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### **1. Our last, best chance on climate**

*Amar Bhattacharya and Nicholas Stern, Brookings OP-ED, 8 September 2021*

The 2018 Intergovernmental Panel on Climate Change (IPCC) special report Global Warming of 1.5°C highlighted the grave risks of global warming beyond 1.5 degrees Celsius, the already evident impact of climate change, and the limited time to arrest it. Projections show that more rapid and severe climate change will inflict greater harm on the environment, lives, and livelihoods. For example, warming of 2 degrees Celsius instead of 1.5 degrees Celsius would essentially wipe out all coral reefs on the planet, instead of 70 to 90 percent, and expose 37 percent of the population, instead of 14 percent, to extreme heat at least once every five years. Warming that exceeds 2 degrees Celsius significantly increases the risk of larger, likely irreversible environmental changes. The IPCC's 2021 report documents the rapid acceleration of climate change, dramatically narrowing the window for limiting global warming from 2 degrees Celsius to 1.5 degrees Celsius and underscoring the imperative to reach net zero emissions by 2050.

There is a growing realization that the risks and economic costs of climate change have been underestimated. If unchecked, climate change could displace hundreds of millions of people, mostly in the developing world, increasing the potential for conflict. Likewise, carbon-intensive economies depend on jobs that may be eliminated in the future to reduce pollution and avert catastrophic climate change. Jobs and incomes will be lost, driving many into poverty, and the longer decarbonization is delayed, the more disorderly future shocks will be.

Thanks to technological advances, the cost of renewable energy is declining, making it increasingly competitive with fossil fuels. Moreover, there is mounting evidence that decarbonization does not hamper growth, development, and jobs but instead offers a path

to more inclusive, resilient, and sustainable growth; indeed it can “unlock the inclusive growth story of the 21st century.”

Increased spending on sustainable infrastructure has strong multiplier effects. In the short term, it can help the world economy recover from the effects of the COVID-19 pandemic by creating jobs and investment opportunities. In the medium term, it can spur innovation, create new sources of growth, and reduce poverty and inequality while delivering cleaner air and water. Over the long term, stabilizing climate change is the only path to a viable future.

To enable the shift away from carbon, governments must work with stakeholders to encourage clean energy and transportation systems, smart development, sustainable land use, wise water management, and a circular industrial economy. Major investment is needed to replace aging and polluting infrastructure, address infrastructure deficits and structural change in emerging market and developing economies, and protect and restore natural capital. In a report prepared for the Group of Seven (G-7), we asserted that the world must increase annual investment by 2 percent of pre-pandemic gross domestic product for this decade and beyond.

An even greater boost is needed for emerging market and developing economies (other than China) given their recent sharp declines in investment and need for financing to support growth, development goals, and structural change, including rapid urbanization. The coming two decades will be a crucial period of transition for emerging market and developing economies, requiring greater investment in all forms of capital—physical, human, natural, and social.

In developed and developing economies, investment offers significant potential to accelerate the transition to net zero through lower- and zero-carbon solutions, from sustainable aviation fuels to electric vehicles. The 2020 “Paris Effect” report finds that by 2030, low-carbon solutions could be competitive in sectors accounting for 70 percent of emissions, up from 25 percent today and none five years ago.

Greater support by governments and stronger international cooperation can help accelerate the pace of innovation, further drive down costs, and ensure the widespread availability of low-carbon technologies, including in developing economies. Developed and developing economies need greater investment and fiscal stimulus now to counter the effects of the pandemic while responsibly managing debt and deficits over the medium term. Fiscal policy, on both the revenue and expenditure sides, can promote the transition to low-carbon, inclusive growth, including through green budgeting.

### **1.1 Policies to Accelerate Change**

Policymakers must set expectations and provide a clear sense of direction on how to achieve the net zero emissions target. To that end, the International Monetary Fund (IMF), the World Bank, and a growing number of academic, public, and private sector voices have called for elimination of fossil fuel subsidies and putting a price on carbon. A credible carbon price would send a critical signal to direct investment and innovation toward clean

technologies and encourage energy efficiency. The IMF managing director said that “without it we simply cannot reach the goals of the Paris Agreement” and that “this price signal needs to get predictably stronger—by 2030, we need an average global price of \$75 per ton of CO<sub>2</sub>, way up from today’s \$3 per ton,” to be effective.

Along with carbon pricing, the transition to climate-resilient growth will require many different and mutually supportive policies given major market failures, the availability of other powerful and effective policy instruments, and political economy impediments. As outlined in a recent paper, governments and the private sector must:

- Reinforce carbon pricing with sector-specific policies—regulations, energy efficiency standards, feebates—and phase out coal.
- Boost public investment in sustainable and resilient infrastructure, including nature-based solutions—restoration of degraded lands and conservation of existing ecosystems—while mitigating the impact on the poor.
- Promote sustainable use of natural resources with policy measures such as payments for ecosystem services, regulations, reform of agricultural and water subsidies, and incentives for a circular economy to decouple economic growth from use of material resources.
- Deploy industrial and other policies to spur climate-friendly innovation, including in digitalization, new materials, life sciences, and production processes, with a focus on the coordination of policy areas and on long-term policies and policy planning.
- Provide information and promote public discussion on social norms and behaviour to reduce energy demand and carbon intensity of consumption and business activity; educate the public about climate change risks and on early warning systems and evacuation plans in case of natural disasters.
- Align finance with climate objectives—manage financial stability risks posed by climate change; align social and private returns with green investment; mobilize resources for investment, including a major boost to international climate finance; and make monetary and supervisory policies consistent with net-zero-emissions objectives.
- Develop insurance instruments and social safety nets to mitigate the immediate impact of climate shocks.
- Foster a just transition with investment in and support for the shift to a low-carbon economy for affected workers, businesses, and regions—rapid change will involve dislocation in both production and consumption.
- Integrate sustainability considerations into public financial management and corporate governance; use better models and look beyond gross domestic product when deciding policy priorities and measuring well-being and sustainability.

By acting together on climate change, countries will benefit from stronger demand expansion and investment recovery, economies of scale, and lower costs for new technologies. The returns to collaboration and innovation are uniquely powerful at present given the high unemployment following the pandemic; the need for global access to COVID-19 vaccines; and the mounting threat of climate change, biodiversity loss, and environmental degradation. Failure to act on any of these threatens human health, economic prosperity, and the very future of the planet.

## 1.2 Mobilising Climate Finance

Progress on global climate action will require commensurate ambition on climate finance. There are abundant pools of long-term savings, and interest rates are exceptionally low worldwide, but many emerging markets and most developing economies find it difficult to access long-term financing on the necessary scale, and the cost of capital is a major impediment to sustainable investment.

Developed economies' commitment to provide \$100 billion in climate finance by 2020 is not just symbolic but foundational to climate action. Credible progress on the \$100 billion commitment is a make-or-break issue for the success of the coming conference and for climate action in the developing world.

Rich countries need to build on the G-7's commitment by boosting climate finance in 2021-22 and doubling it to \$60 billion by 2025. There is an urgent need to improve the quality of climate finance, by boosting grants from their present low level, immediately doubling finance for adaptation, and ensuring that at least half of concessional climate finance supports adaptation and resilience objectives.

Because of their mandates, instruments, and financial structure, multilateral development banks are the most effective source of support for climate action in developing economies and for the mobilization and leveraging of climate finance. These institutions must use all their powers and instruments at this moment of crisis, agreeing to triple financing by 2025 from 2018 levels. This will require an accelerated replenishment this year of IDA (the World Bank's fund for assistance to the poorest countries), more effective use of development banks' balance sheets, enhanced private sector finance mobilization, accelerated alignment with the Paris Agreement, and proactive capital increases.

Establishing the Resilience and Sustainability Trust within the IMF could also help bolster efforts, and proposals from the United Nations Economic Commission for Africa and the Bezos Earth Fund offer other ways to leverage concessional climate finance. The use of country platforms, which the Group of Twenty (G-20) has promoted but has yet to effectively apply, is another option to increase coordination.

Efforts to align the financial system with climate risk and opportunities are underway through the COP26 private finance agenda and in conjunction with initiatives such as the Financial Stability Board's Task Force on Climate-Related Financial Disclosures, the Network for Greening the Financial System, the Coalition of Finance Ministers for Climate Action, the

European Union sustainable finance expert group, and, most recently, the Group of Twenty working group on sustainable finance.

### 1.3 From Pledges to Action

U.S. Special Presidential Envoy for Climate John Kerry has described the coming conference, scheduled to begin in Glasgow on October 31, as the “last, best opportunity to get real” on the threat of climate change. The U.K. COP26 presidency, under the leadership of Alok Sharma, has set out priorities for the Glasgow conference: commitment to the net-zero-emissions target, stepping up action on adaptation and resilience, delivering on the \$100 billion climate finance commitment, bolstering and transforming private finance, and increasing collaboration on all these objectives.

There has been encouraging progress already. At its June Carbis Bay meeting, the G-7 committed to net zero emissions by 2050, halving collective emissions over 2010-30, increasing and improving climate finance by 2025, and conservation or protection of at least 30 percent of the land and oceans by 2030. And, for the first time, the G-20 has signalled the need for action on carbon pricing. In the private sector, a growing number of businesses across all sectors have committed to net zero targets, and major financial institutions have set deadlines to take portfolios to net zero.

This decade will be decisive. What happens at national and international levels will determine whether the post-COVID recovery is strong and inclusive and whether we will embark on a new path of sustainable growth. If we get it right, we can usher in a new era of sustainable development with expanded opportunities for people across the world. Get it wrong and we will not only have a lost decade for development, but the people of the planet will be in great danger in the coming decades. We need to choose now, and we must choose wisely.

## 2. Construction companies should avoid knocking down buildings

*From an article by Roger Harrabin, BBC energy & environment analyst, 24 September 2021*

Britain’s top engineers are urging the government to stop buildings being demolished. Making bricks and steel creates vast amounts of CO<sub>2</sub>, with cement alone causing 8% of global emissions. They say the construction industry should where possible re-use buildings, employ more recycled material, and use machinery powered by clean fuels.

They are concerned about "embodied emissions", which is the CO<sub>2</sub> emitted when buildings and materials are made. They believe that unlike carbon from aircraft, vehicles and gas boilers, embodied emissions are not in people's minds. They suspect few people realise there's a carbon impact from, for instance, building a home extension.

A report, steered by the Royal Academy of Engineering, said a new way of thinking is needed before planning new homes, factories, roads and bridges.

Prof Rebecca Lunn from Strathclyde University, one of the report's authors, said: "Our biggest failure is that we build buildings, then we knock them down and throw them away. We must stop doing this." Fellow author, Mike Cook, adjunct professor at Imperial College, challenged the government's £27bn road-building programme because of the embodied emissions created to obtain the concrete and tarmac, as well as the use of very polluting machines to construct the highways.

Prof Cook told BBC News: "We have to radically revise the way we look at things. "The most important thing is to maximise the use of existing road infrastructure by using smart motorways to maximise every inch of tarmac."

The Chartered Institution of Building Services Engineers' Dr Julie Godefroy urged the government to set targets for the construction industry to move swiftly towards zero carbon, including embodied emissions. She observed: "We have to avoid demolition and new-build. Often most of the material in an existing building is underground - so we should seek to use existing foundations."

The Royal Institution of Chartered Surveyors (RICS) estimates that 35% of the lifecycle carbon from a typical office development is emitted before the building is even opened. The figure for residential premises is 51%.

### **3. The Scandinavian Way to Zero Carbon Construction**

*Extracted from an article by Matthew Keegan, BBC Future, 23rd June 2021*

Quiet, clean and green are not words you would typically use to describe a construction site. But the site at Olav Vs gate, one of the busiest streets in the heart of Norway's capital city, Oslo, was special. In a first of its kind in the world, all the machinery used on site – excavators, diggers and loaders – were electric. Work began on the site in September 2019, converting what was once a hectic turning zone for the city's taxis into a new pedestrianised area. Locals may have initially raised eyebrows at what appeared to be just another inconvenient construction site, but soon it was clear there something very different about it. In fact, this was a pilot project for the first zero-emission urban construction site in the world.

Using electric equipment in place of traditional diesel engines meant that everyone in the vicinity noticed a reduction in ambient noise and pollution. "We observed shops keeping their doors open towards the street, even when construction work was going on just outside on the pavement," says Philip Mortensen, a senior adviser at the City of Oslo's Climate Agency. "The workers also reported much better communication on site due to lower noise levels, and that as a consequence the working environment felt safer."

Decarbonising the construction industry is something in which Oslo wants to lead the world. And it's with good reason. At present, the construction sector alone is responsible for more than 10% of global greenhouse gas emissions. The impact of construction is even more

evident when looking at CO2 emissions from energy use – with the sector contributing 38% of the world's emissions.

In Oslo, the picture is a little different, with construction responsible for 7% of the city's total emissions, though it still contributes significantly to local air and noise pollution. But with the Olav Vs gate zero-emission pilot site, the city is eager to keep improving. In total, by using electric construction machines, the Olav Vs gate pilot project was able to save 35,000 litres of diesel and the equivalent of 92,500 kg of CO2, compared to the use of regular machinery. That's the equivalent of taking 20 cars off the road for a year. They were not able to make the project 100% emission free as they had some challenges, particularly with a propane burner that could not be rebuilt or replaced with an emission-free alternative. But the city insists it was still very happy with the result, saving 99% emissions compared to if the project had been done using regular diesel.

The city now wants all municipal construction sites to be zero emission by 2025 and all construction work, public or private, to be zero emission by 2030. Six more of Norway's biggest cities have also recently committed to the same goals as Oslo. Norway has the rare benefit of an electricity grid with 98% renewable energy, most from hydropower, which makes the country an ideal testing ground for zero-emission sites. To move things forward, the City of Oslo has been using its purchasing power as a strategic tool. Since 2019, public tenders for construction work, for example roads, schools, nursery homes, water and sewage pipes, have been awarded to those building with zero-emission machinery and trucks.

If Oslo has taken the lead, it's been quickly followed by Copenhagen and Helsinki, which have also had zero-emission construction sites. Yet, overall, the construction industry is infamous for being resistant to change, and has historically been driven by lowering costs rather than greenhouse gas emissions.

An electric machine can be twice as much as a diesel machine. If you retrofit it, then it might be two or three times more expensive. However, you are not having to pay for diesel and the electricity required instead works out much cheaper. Electric machines offer other advantages, like being able to work later into the night or earlier in the morning as they generate less noise, which in turn can help to make money back.

In addition to equipment costs, another hurdle is ensuring a steady supply of power to operate the electric machines. One alternative is to have some kind of battery container that you charge somewhere else and then you keep switching and bringing them in so that you can continuously power your machines.

One such battery system that's recently been trialled in Hong Kong is called the [Ampd Enertainer](#). It's an advanced, compact battery system that can replace the diesel generators that currently power the world's construction. For the founders of Ampd Energy, which makes the Enertainer, the goal is to provide the infrastructure for the backbone of the electrification of the construction industry. Currently, the Enertainer is being used by 18 of the largest construction and property developers in Hong Kong. Typically, it powers cranes, hoists, welders and any other construction equipment which uses electricity. The makers of the Enertainer say it can reduce carbon emissions by 85% – for each deployment of a



battery system to a construction site, it saves the equivalent of 200-400 cars' emissions. It can also generate 1/30th of the noise pollution of a diesel generator.

Another innovation looking to increase efficiency and reduce waste is modular construction. The process is where a building, or parts of it, are constructed off-site, which brings its own advantages. In Denmark and the Nordic countries, given they are located in the northern part of Europe with limited daylight in the winter months, builders don't have much time out in the field. Instead, many of the buildings are using a lot of prefabricated elements.

"When it comes to modular construction, safety, productivity and environmental impact, all of those things tie together," says Jochen Teizer, associate professor in the department of civil and architectural engineering at Aarhus University. "If I do offsite fabrication and then ship it, I improve all of those things; reduce the waste in the assembly process but also increase the safety for the workers. That's another advantage."

But while innovations like electrification, digitisation and modular construction are all helping the industry to decarbonise and reduce waste, they don't always work together at the same time. "The construction industry has a lot of stakeholders involved in the projects. I think that's one of the challenges we have," says Teizer. "From architects, subcontractors to contractors, a lot of inefficiencies happen with communication, where people design a project one way, but then it gets executed in a different way. I think it will take a generation to see change. It ties back to educating our next generation of engineering workforce out there. So we need the right tools."

Although slow, progress is being made. Building on the success of its first zero-emission urban construction site, the City of Oslo expects around 10 to 20 new projects launching this year will use heavy-duty zero emission equipment such as diggers, wheel loaders, trucks and drill rigs on site. In addition, Oslo's target that all construction sites be zero-emission by 2025 has sent a strong signal, and many construction companies are making plans for this transition. Construction equipment manufacturers are beginning to produce more electric machinery. In fact, a [database of electric machinery](#) is available with a link to public information about those machines to make it easier for cities who are looking for such machinery, and to convince them to start doing this.

Meanwhile, the Cities Climate Leadership Group (C40) has launched a [Clean Construction Declaration](#) – which includes, amongst other commitments, a pledge to reduce emissions from construction sites. The declaration calls for procuring and, when possible, using only zero-emission construction machinery from 2025 onwards. Currently, around 40 cities around the world have signed up to the declaration, among them Oslo, Budapest, and even big cities outside Europe such as Los Angeles and Mexico City.

## **4. Climate crisis: do we need millions of machines sucking CO<sub>2</sub> from the air?**

*Damian Carrington, Guardian Environment editor, @dpcarrington, Fri 24 Sep 2021*

Does the world need millions of machines sucking carbon dioxide directly out of the air to beat the climate crisis? There is a fast-growing number of companies that believe the



answer is yes and that are deploying their first devices into the real world. From turning CO<sub>2</sub> into rock in Iceland, to capturing the breath of office workers, to “putting oil back underground”, their aim is to scale up rapidly and some have already sold their CO<sub>2</sub> removal services to buyers including Bill Gates, Swiss Re, Shopify and Audi. Prices, however, are sky high – \$600 (£440) per tonne and more.

Direct air capture (Dac), as the technology is known, is challenging in more ways than just financially. Despite its potent climate heating properties, CO<sub>2</sub> makes up just 0.04% of air and so trapping a tonne of the gas means processing a volume of air equivalent to 800 Olympic swimming pools.

“It is not super intuitive,” says Jan Wurzbacher at Climeworks, which just opened the world’s biggest Dac plant in Iceland and recently hosted a conference for the Dac industry. “But that doesn’t mean it is hard. There is no physical reason it can’t be done for \$100/tonne in the next 10-20 years.” Climeworks’ units use fans to pass air over a solid material that absorbs CO<sub>2</sub>. When the material is saturated, it is heated to 100C (212F) and releases a stream of pure CO<sub>2</sub>. Its Orca plant in Iceland uses renewable geothermal energy. The CO<sub>2</sub> is then taken by a partner company, Carbfix, and put underground with water, where it solidifies into rock in two years. About 4,000 tonnes a year will be captured and the company is also working on projects in Oman and Norway.

Canadian firm Carbon Engineering takes a similar approach to CO<sub>2</sub> capture but is looking to bury the CO<sub>2</sub> in depleted oil and gas reservoirs in the US and the North Sea off Scotland, effectively reversing the flow in existing pipes. The company aims to bury 1m tonnes a year in the US in 2025, at about \$300/tonne. The company also wants to use its technology to provide CO<sub>2</sub> as a feedstock for producing low-CO<sub>2</sub> jet fuel.

Charm Industrial takes agricultural and forestry waste that would otherwise rot – emitting CO<sub>2</sub> – and heats it to create “bio-oil” that is then pumped back into empty oil reservoirs. The first injection took place in Oklahoma in January and the equivalent of 1,400 tonnes of CO<sub>2</sub> has been buried this year, at a cost of \$600/tonne.

CarbonCapture Inc, a US firm, is using “molecular sieves” called zeolites to capture the CO<sub>2</sub>. Handily, zeolites are already produced in huge volumes for use in laundry detergents, oil refineries and sewage plants. In the Netherlands, Carbyon hopes using thin-film technology will make its machines faster at separating the CO<sub>2</sub> from the air.

Energy use is a big concern if Dac is to be deployed at massive scale and Mission Zero Technologies uses electrochemical processes to release the captured CO<sub>2</sub>, which it says means 3-5 times less power is needed than for heat-based processes. Another firm, Heirloom, does away with fans and allows heat-treated rocks to passively absorb CO<sub>2</sub> over a couple of weeks, before more heating liberates the gas.

There are also other business models. Soletair Power’s approach is to turn buildings into CO<sub>2</sub>-capturing machines. The company’s current office unit can capture a kilogram of CO<sub>2</sub> every 8 hours.

A lack of commercial CO<sub>2</sub> supply recently hit the UK, and AirCapture, based in California, is developing onsite machines that suck CO<sub>2</sub> from the air to produce streams for businesses such as drinks companies. Most CO<sub>2</sub> today is produced from fossil fuels and has to be trucked to sites.

But can these systems really play a significant part in beating the climate crisis?

The biggest and most urgent task in beating the climate emergency is to slash the burning of fossil fuels to as close to zero as possible. The problem is that some sectors are very hard to decarbonise, such as farming, aviation and certain industrial processes, and these emissions have to be mopped up to stop global heating. It is also likely, given that CO<sub>2</sub> emissions are actually still rising, that the world will overshoot the carbon budget for the internationally agreed 1.5C target. This also means CO<sub>2</sub> is going to have to be pulled from the air. The Intergovernmental Panel on Climate Change concluded in 2018 that billions of tonnes of CO<sub>2</sub> a year may need to be captured and buried after 2050.

“Unless affordable and environmentally and socially acceptable CO<sub>2</sub> removal becomes feasible and available at scale well before 2050, 1.5C-consistent pathways will be difficult to realise, especially in overshoot scenarios,” the IPCC said.

Dac, however, is not the only option. Growing crops, burning them to produce power, and burying the emissions also removes CO<sub>2</sub>, but scientists worry about the huge land and water requirements. Growing trees – the original CO<sub>2</sub> removal machines – is also an option, but also requires a lot of land, takes time and the forests then have to be protected for decades or the CO<sub>2</sub> goes up in smoke.

Will the financials add up? For all these companies, scaling up to crush the cost of their technologies is critical. The other critical factor for large-scale Dac is the creation of a market for CO<sub>2</sub> disposal. Jet fuel and clean office air might raise some funds in the near term, but not enough to get to removing billions of tonnes of CO<sub>2</sub> a year.

“If there’s no price on CO<sub>2</sub>, it’s going to be extremely difficult to establish these technologies,” says Prof Reto Knutti, a climate scientist at ETH Zurich. “So I think that governments have to say, yes, there is a price for CO<sub>2</sub>, and then the private sector can come up with fancy innovative solutions.” Negotiations over rules for an international CO<sub>2</sub> market will be one of the main issues at the Cop26 summit in November, and the backers of Dac will be hoping for success.

Early adopters of Dac, like Microsoft, are already pushing funding into the sector, and both Elon Musk and the UK government have launched technology competitions worth \$100m and £100m respectively. There are also some early offset customers, such as insurance giant Swiss Re, which has signed a 10-year deal with Climeworks, and Shopify, both attracted by the certainty of removal.

Prof Michael Mann, a climate scientist at Penn State University and author of *The New Climate War*, says: “Of all of the geoengineering schemes, Dac seems the safest and most efficacious. It could, along with natural reforestation, be an important component of

broader efforts to draw down carbon from the atmosphere, a strategy that arguably belongs in any comprehensive climate abatement program. But since we're only talking about capturing 10%, at most, of current carbon emissions, this obviously cannot be a primary strategy for cutting emissions."

"Dac would be an amazing weapon in the fight against climate change," says Robert Rohde, a climate scientist at Berkeley Earth. "However, it remains very small-scale and high cost. Current global capacity for Dac is about 12,000 tonnes of CO<sub>2</sub> per year. Each year, human activities release 40bn tonnes. So, right now, Dac is like trying to bail out the Titanic using an eyedropper. The industry needs to find a way to rapidly grow many thousands of times larger, and cut costs by about 80%, if they are going to have a real hope of making a tangible impact in the fight against global warming, It will be great if they can make it work, but I am not optimistic, and most of the world's attention should be focused on reducing emissions because we don't have time to wait."

## **5. Global windfarm installations expected to surge after Covid drop, says report**

*From an article by Jillian Ambrose, Guardian website, 9 Sep 2021*

Windfarm installations are expected to double to record global levels this year, after a short-lived Covid-19 slowdown, according to the Global Wind Energy Council (GWEC). The group's annual report found that the world's offshore windfarm capacity grew by 6.1GW last year, down slightly from a record 6.24GW in 2019, but would rebound to more than 12GW in 2021 powered by an offshore wind boom in China.

China led the world in new installations for the third year in a row with more than 3GW of offshore wind grid connected in 2020, and remains on track to surpass the UK as the world's biggest offshore wind market by the end of the decade. The world's second largest economy connected more than 3GW of offshore wind to its electricity grid last year, almost half the global total, while installations in smaller Asian countries such as Taiwan and Vietnam stalled due to Covid-19 delays.

GWEC has forecast a fresh record year for offshore wind growth in 2021 as China's wind industry rushes to install 7.5GW before the expiry of government subsidies at the end of this year. The future of the industry's growth is also expected to be powered by a record year for offshore wind financing, according to the report, after the \$8bn investment in the world's biggest offshore windfarm off the UK's Yorkshire coast.

The Dogger Bank offshore windfarm, to be built by SSE and Norwegian energy giant Equinor, will use the biggest turbines in the world to generate enough renewable electricity to power 4.5m UK homes.

GWEC expects the offshore wind industry to deliver 235GW of new capacity over the next decade under current government policies, more than seven times the existing global

offshore wind total, but warned that the pace of growth will need to accelerate to meet global climate targets.

The report has called for “a step-change in political action” in order to streamline planning and permitting regimes and reduce red tape.

Under analysis undertaken by the International Energy Agency and the International Renewable Energy Agency the world may need up to 2,000 GW of offshore wind by 2050 to have a chance of keeping global temperature from rising above 1.5C of pre-industrial levels, which is crucial to avert catastrophic levels of global heating.

## **6. Reducing cows’ methane emissions**

*From an article by Emma Bryce, Guardian International Edition, 30 Sep 2021 entitled “Kombucha, seaweed, vaccines: the race to reduce cows’ methane emissions”*

In 2017, Canadian cattle farmers in Alberta started slipping a special ingredient into their animals’ feed. The cows remained oblivious – their forage tasted no different – but by munching on, they had been enlisted into the fight against the climate crisis. The feed, called Bovaer, contained 3-NOP, an organic compound that inhibits cows’ methane production. Farmers ultimately fed the enriched fodder to 15,000 animals and collectively cut their methane emissions by 30% on average and up to 80%. In September, the ingredient was approved for use in Brazil, the world’s second-largest producer of beef.

It works by inhibiting the enzyme activity of methanogens, the microbes that break down food in a cow’s rumen and generate methane as a metabolic by-product. Adding tiny amounts to a cow’s daily diet can reduce methane production by between 30% and 90% depending on the feed type, research shows, with no impact on the animals’ appetites or the flavour of dairy or meat.

Researchers are also exploring a methane-busting compound from an unlikely source: the feathery fronds of *Asparagopsis* seaweeds. Many of these widely occurring seaweed species contain the compound bromoform, which similarly blocks methanogens’ enzymatic reactions when incorporated into feed. Ermias Kebreab, a researcher on the environmental impact of livestock at the University of California, Davis, has found that sprinkling 85g (3oz) of seaweed a day into a cow’s feed cuts methane production by more than 80%. The amount is low enough that cows can’t detect it and the meat carried no aftertaste.

*Asparagopsis* farms are now springing up off the shorelines of Australia, Hawaii, and North America, as various startups see its potential including Blue Ocean Barns, a US company that has partnered with a commercial dairy farm to trial its *Asparagopsis*-infused feed. Most of these farms are small-scale enterprises and there are still obstacles to scaling up production, including, according to 2020 research paper, the need for much more scientific research on seaweed’s potential risks and benefits. These include the potential toxicity to cows of some of the substances in seaweed and the environmental implications of growing seaweed at such a large scale.

These innovations all feed into a race by meat and dairy businesses to reduce their climate impact to appease concerned consumers and investors. Just 20 livestock companies produce more emissions than Germany, Britain or France, according to a report by environmental campaigners.

“You’re seeing much more industry involvement,” said Harry Clark, director of the New Zealand Agricultural Greenhouse Gas Research Centre. New Zealand-based dairy producer Fonterra, for example, is developing a methanogen-targeting feed additive called Kowbucha – a reference to the fermented drink kombucha – to reduce its emissions, which contribute about 20% to New Zealand’s overall footprint. Clark helms a multimillion-dollar government- and industry-funded methane research division which investigates solutions to bring down New Zealand’s livestock methane emissions.

One program involves researchers working to identify livestock that are naturally low-methane emitters for future breeding. Others are developing an anti-methane vaccine that produces methanogen-targeting antibodies. This has shown success in laboratory conditions, but in a cow’s gut – churning with gastric juices and food – the antibodies struggle to latch on to the right microbes. Despite this, research continues. “We’re now going through a massive process of elimination to try to find better antibodies,” Clark said. “We’ve nearly doubled this [research] program in size because we feel it has such potential.”

## **7. UN warning over nations' climate plans**

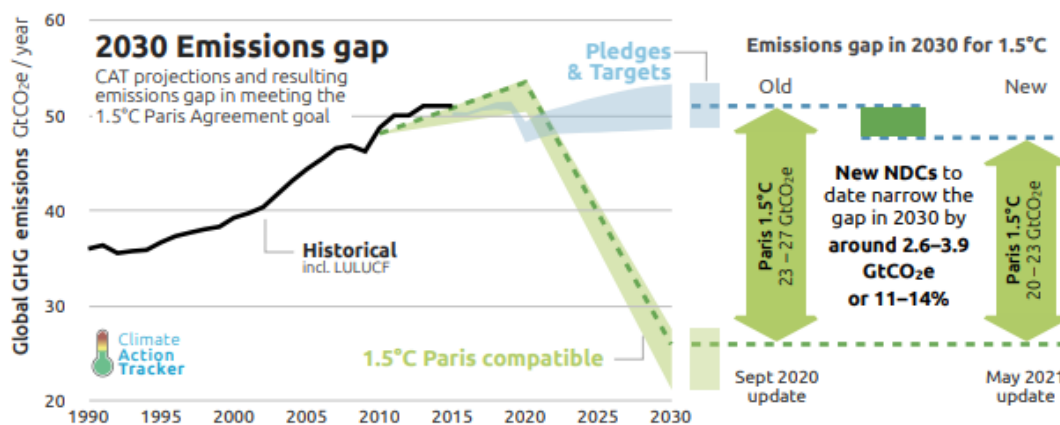
*From an article by David Shukman, BBC Science editor, 17 September 2021*

Despite all the promises to take action, the world is still on course to heat up to dangerous levels. That's the latest blunt assessment of the United Nations. Its experts have studied the climate plans of more than 100 countries and concluded that we're heading in the wrong direction.

Scientists recently confirmed that to avoid the worst impacts of hotter conditions, global carbon emissions needed to be cut by 45% by 2030. But this new analysis shows that those emissions are set to rise by 16% during this period. That could eventually lead to a temperature rise of 2.7C above pre-industrial times - far above the limits set by the international community.

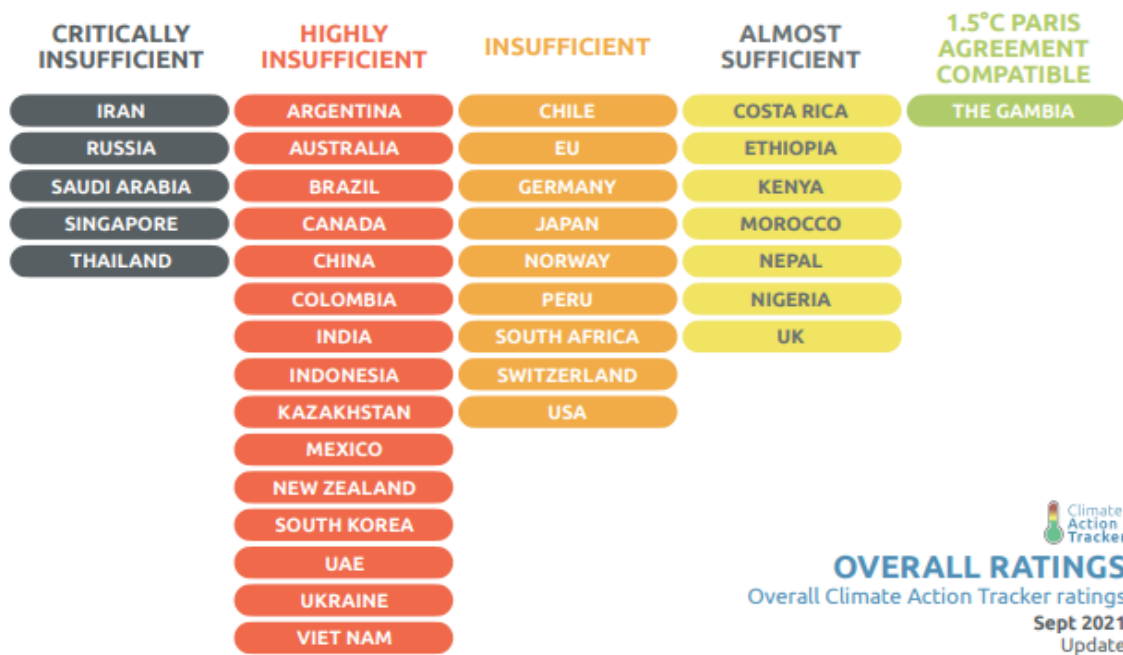
## 8. Climate Action Tracker Global Update September 2021: Summary

- ▶ **Code red:** The new IPCC report on climate science has reinforced the absolute urgency of closing the 2030 emissions gap if there is to be any chance of limiting warming to 1.5°C. While people are suffering from ever more severe and frequent impacts of climate change around the globe, and the IPCC has yet again clearly demonstrated the feasibility and urgency of climate change mitigation, action to reduce greenhouse gas emissions continues to lag behind what is needed – in practically all countries and sectors. International climate finance to support action in developing countries is falling short. Even countries with strong targets are mostly not on track to meet them, while more have failed to bring forward stronger commitments for 2030.
- ▶ **Gap narrowed only slowly:** NDC updates submitted so far in 2020–2021 have narrowed the gap to what is needed for 1.5°C only by up to around 4 GtCO<sub>2</sub>e, or up to 15%. Of particular concern are governments - **Australia, Brazil, Indonesia Mexico, New Zealand, Russia, Singapore, Switzerland and Viet Nam** - that have failed to lift ambition at all – they have submitted the same or even less ambitious 2030 targets than they had put forward in 2015. These countries need to rethink their choice. There are still over 70 countries that have yet to submit an updated target.



- ▶ **The new comprehensive CAT rating system reveals a few lone frontrunners, but most government targets and actions remain highly or critically insufficient.** For domestic action, only one developed country has a domestic target that is rated under the CAT's new rating system as "1.5°C compatible" (**UK**), and some are close (**EU, Germany, Norway**). Domestic targets are, however, only one dimension of the actions needed for Paris compatibility. None of these governments have put forward sufficient international climate finance - which is absolutely essential for ambitious action in those developing countries needing support to reduce emissions - nor do they have sufficient policies in place. As a consequence, the EU, Germany and Norway are rated as "Insufficient" in the new overall CAT rating, whilst the UK is slightly better rated as "Almost sufficient". Only one country – a developing country – **The Gambia scored an overall 1.5 degree compatibility** in the new CAT rating system launched with this update.
- ▶ **More targets and actions are needed:** almost all developed countries need to further strengthen their targets to reduce emissions as fast as possible, to implement national policies to meet them, and to support more developing countries to make the transition. Developing countries also need to update their targets and policies, but also show a pathway for how they could also reduce their emissions as fast as possible if they were supported financially - and to clearly indicate the support they need.





- ▶ **Positive developments need to urgently be scaled up:** some countries have significantly updated their targets and implemented new policies (**USA, EU, Germany**). Such positive movements need to urgently be followed by all other countries. Governments need to take advantage of the drop in renewable energy and storage costs and ramp up their installation. They must cancel their coal construction plans, and drop plans and funding for gas pipelines and new terminals.
- ▶ **The most important target date is 2030**, by which time global emissions must be cut by 50%, and governments are nowhere near this. We estimate that with current actions global emissions will be at roughly today's level in 2030, we would be emitting twice as much as required for the 1.5°C limit.
- ▶ **The wave of national mid-century net zero targets give reasons for hope, but will fail without sufficient 2030 reductions.** There needs to be alignment between 2030 targets and net zero goals for the latter to be believable. Our assessment shows that most net zero targets are formulated vaguely and do not yet conform with good practice. Robust short-term targets and pathways towards achieving them are required to fully realise their ambition. If fully implemented, the net zero targets on the table, in combination with the 2030 goals on the table so far, could reduce global temperature increase to around 2.0°C in the CAT optimistic case, based on our briefing from May 2021.

Ross Rutherford

Engineers for Social Responsibility Newsletter Editor

1 October 2021