world energy we.

48

THENEWORDER

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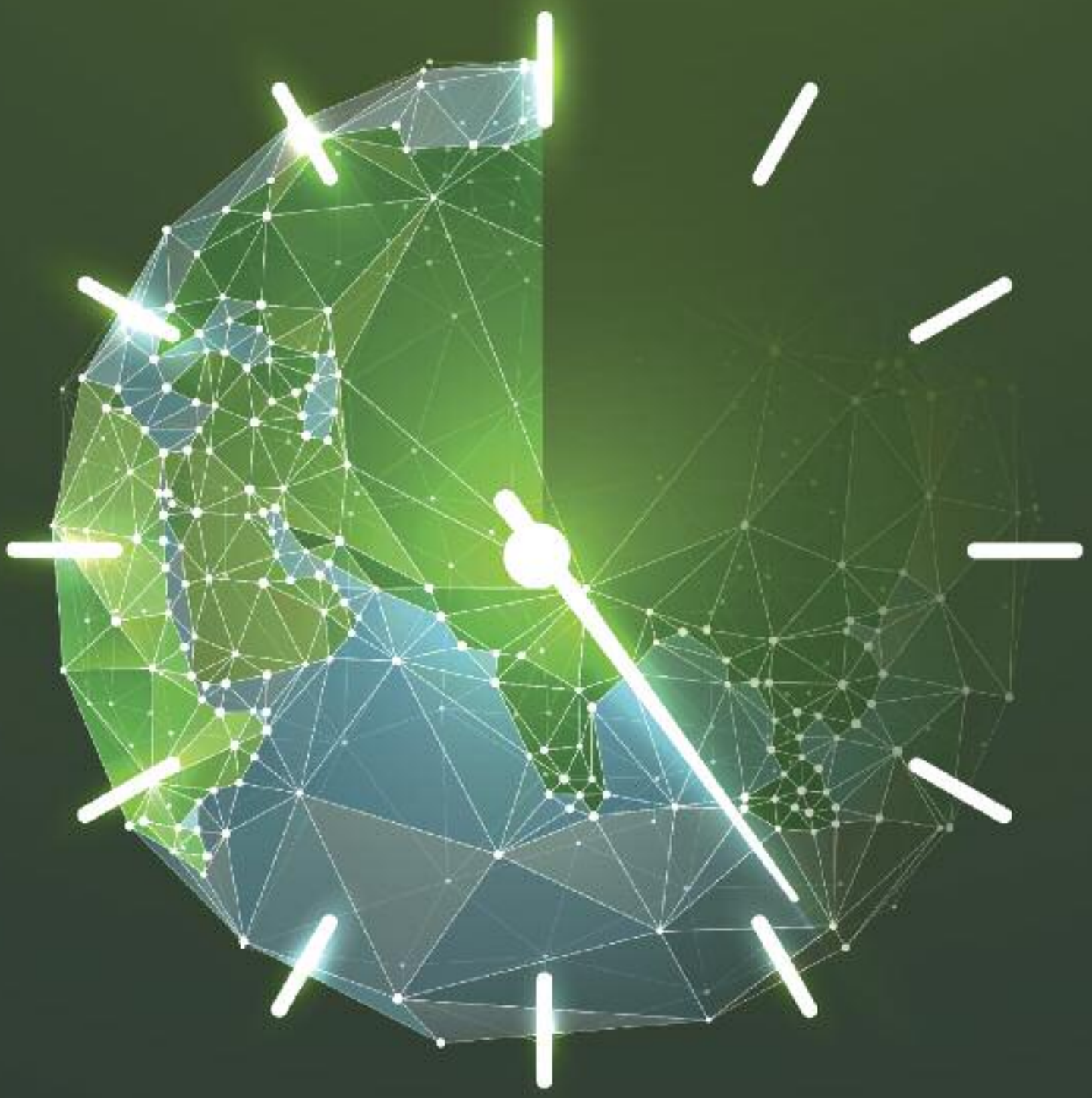
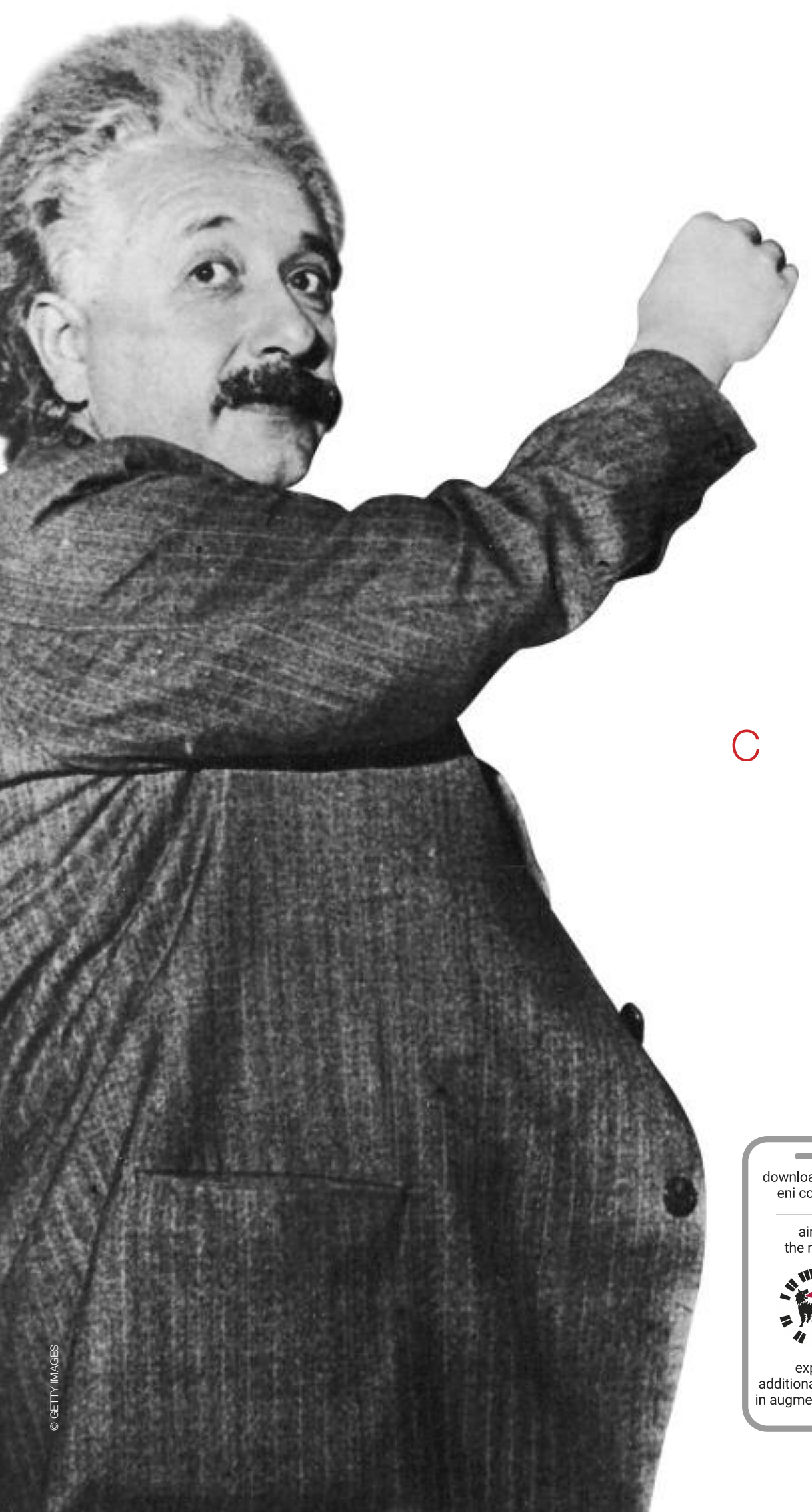
MAY 2021 • N. 48



THE NEW ORDER



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CONTENTS

download the app
eni corporate

aim at
the marker

explore
additional contents
in augmented reality

THERE'S NO GOING BACK

TOMORROW IS AN AMBITION

by **Mario Sechi**

ANTROPOS MOONBASE, 2070.

- Do you remember the first time we met? We were at a party, people were dancing. Was that before Wuhan?

- No, after, the virus had already arrived in Venice. It was everywhere. But we didn't know that yet.

- I remember we said goodbye in a hurry, you got into a speedboat and said, "See you." And I didn't see you for a whole year. Then you reappeared in Piazza San Marco at the end of April; it was sunny, I was celebrating the "liberation" with my friends, the end of the lockdown.

- And I asked you to kiss me.

- What an extraordinary year 2021 was . . . we got married, fifty years ago. And you went back to America; you were wearing your white uniform, it looked great on you.

- At that time, the virus was still around, but the first vaccines arrived. They gave me the Pfizer vaccine in Virginia during my biosecurity course at the Norfolk base. Do you remember your vaccine?

- Oh, how could I ever forget! AstraZeneca.

- Have you spoken to Francesca?

- Yes, she told me that she is testing the launch of the solar sails for the mission on Proxima B.

- What a character she is! When she was small, she stared, enraptured by the filaments of an ancient incandescent light bulb. She was fascinated by the light.

- And now she's on a space base on Titan, surfing the methane lakes.

- How time flies. Come on, turn off the lamps, put a suit on, let's go out and enjoy the view: Earth is about to come up.

BEFORE AND AFTER THE VIRUS. This is our time that one day will be another time, forged by a new generation of men and women: our children. We are at the turn of the page, at the change of script in our story. Before and after. In the meantime, we dedicate this issue of *World Energy* to the theme of the new world order that is taking shape before us. We are facing facts that are bending the space of our existence; we are in the midst of a great wave that accompanies three scientific revolutions of our time.

The first revolution is that triggered in the early twentieth century by an employee at the patent office in Bern, Albert Einstein, the first stage of the missile of knowledge, the rocket of physics, the theory of relativity, the plunge into the vast mystery of black holes, a journey that has continued to the present day, with the first photo of the mystery of cosmic power taken by the Event Horizon telescope on April 10, 2019, in a time that is near and yet so far, when we didn't yet know the pandemic.

The second revolution is that of information technology: Alan Turing's machine, the creation of the computer, the web of global communication, the Internet. Everything becomes available, the subject and object of research. This season of abundant online information, however, proves lacking in the essential features of knowledge: quality and depth. The sea of the web is full of riches, but the fishing is poor at the surface. This explosion

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in computing does not always go hand-in-hand with intelligence.

The third revolution combines the knowledge of mathematics with that of genetics, the power of the algorithm and gene sequencing, the software web and the DNA helix. We are in an area where man can harbor the illusion that he is God the Creator. The "miracle" of the Covid-19 vaccine produced in less than a year is part of this revolution.

Alongside this army of chromosome explorers, there are those who fly high among the stars: the new astronauts. The United States has returned to space with its spacecraft; the Moon is once again an interesting place; a new space race has begun; a drone took off a few days ago on Mars; we see for the first time black holes and their event horizon; a dimension of the universe that opens the doors to other worlds.

These three revolutions met in a flash in 2020. It is no coincidence that the science race has been accelerated in the year of the pandemic, we are in a "crisis," a term deriving from the Greek word indicating a door, the way out (and in), a "choice," a "decision." Where there is a crisis, there is the opportunity to leap forward or backward. That is what we are doing. We are back on the frontier.

The facts, the events of our period, are connected; they are part of a sequence of time, space and energy. Rereading *Relativity* and

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thinking about what happens is an exercise in humility towards events. Albert Einstein taught us that the clock does not tick the same way for everyone. Time depends on coordinates, on the state of motion or rest. Fast. Slow. And, given that we are in the field of the irrational human being, onto the scene thus comes Machiavellian Fortune and the great forces of history.

The time is historical; we are in that interval of the calendar that Henry Kissinger described at the start of the coronavirus epidemic as the "new post-coronavirus order." We see it taking shape on the horizon more and more clearly: a tough confrontation between China and the United States for global supremacy; the eternal making and breaking of East and West; the return (in new form and substance) of a policy of blocs (US vs China); the repositioning of the earthenware vase of Europe among the iron vases; the return to the scene of the Atlantic Alliance; the role of China and Russia in search of an alternative order to orders founded on agreements—Yalta and Bretton Woods—which functioned in another world and not this one. The old post-1945 order is gone: a reform of international relations is good and right; a profound overhaul of the monetary regulation system is urgent with the rise of virtual currencies (created with enormous energy consumption, who would have thought).

The space is that dictated by geography: earth, sea, sky . . . and cosmos. Four dimensions, our existence, our connections. We fly high, but with our feet on the ground. The Suez Canal crisis—a container ship that ends up sideways—has shown how fragile the energy and commodity distribution system is; network security is a priority in a world that has suddenly discovered with the pandemic that relocating manufacturing and chemicals can be dangerous. If biocides become a strategic weapon and production is outside your borders, then you are more vulnerable. If the rare-earth elements used to produce microchips are not under your control, then the car factories are in danger of coming to a halt and the ham and cheese toasty maker you ordered on Amazon never arrives. Life is made up of simple and complicated things, everything moves thanks to the creation and transmission of energy.

The energy transition is not new, but coronavirus has squeezed the accelerator. And the myths are destined to fall, to meet reality. Hydrogen will have a future when there is a market—and for now there isn't one. Oil will continue to move goods and people; planes will have gallons of kerosene in their tanks; the gas that heats homes in advanced economies—available, transportable, safe—will be the best agent in our change of scenery. Carbon neutrality cannot be achieved by ignoring reality. Radical reforms are usually paid for by the poorest and today more than ever we have a duty to seek a just agreement.

There are good reasons to think that in metropolises, electric vehicles will spread exponentially; "smart" mobility is a path already traced on the maps of our satellite screens. But the certainties of the "before" on how our lives will be organized have been disrupted by the "after." Living in a metropolis during a pandemic turned out to be a nightmare; lots of the wealthy left the cities to move to the countryside and the demand for housing in suburban, green areas has grown. Metropolises will continue to attract billions of people, but there are questions that cannot be avoided.

Who will live in the cities of tomorrow? There are those who see the metropolis as the place for new, increasingly proletarianized, "uberized" classes, an economy in which legions of low-income people work to satisfy the consumption of a wealthy class, a closed system: born poor, you stay poor; born rich, you

become richer. At the top of the pyramid of the feudal system 2.0 is an elite that owns everything, in a bubble of privilege, that makes money even when the world is suffering misfortune: exactly what happened with the Silicon Valley giants during the pandemic. One day everything will be forgotten, but not the uneasiness of Fritz Lang's *Metropolis*; that remains. From pharaohs to the masters of steam, from railroad barons to smartphone emperors.

Reading science fiction helps to discover the remote corners of the future, the unexpected. In the pages of *Severance*, a novel by Ling Ma, you will find a fragment: "After the End came the Beginning. And in the Beginning, there were eight of us, then nine—that was me—a number that would only decrease. We found one another after fleeing New York for the safe pastures of the countryside. We'd seen it done in the movies, though no one could say which one exactly." Fiction. Science fiction predicts the future for entertainment but, from Jules Verne onwards, these fictional foresights have worked as prophecies that have become reality. From paper to screen, from movie theater to launch room, from the laboratory on the island of Dr. Moreau to the unspeakable out-of-control experiment. Life is hypothesis, thesis, demonstration. The pandemic has given us a taste of what happens when the biological cycle is deviated and enters the unknown: the spread of disease; the spasmodic search for a way out of the emergency; repeated error; the contagiousness of paranoia; the epidemic of conspiracy, isolation in the multitude; segregation without the space to live; the arrival of the cavalry of science; the need for politics and the common good.

All it takes is this lateral thinking, a slight slip, a step into the politics of catastrophe, to bring into question all the hypotheses of social engineering. The great change brought about by the virus does not only concern structure, but above all superstructure, it is no longer a problem of hardware, but of software, it is not a matter of economic recovery, but of psychological change. The rebound of the economy in the coming months will be big, in some ways spectacular, and the past will suddenly seem to have been erased. Then, just as quickly, the (very visible) signs of something else will emerge: the idea that everything that there was before was not so indispensable, so wonderful, so sure. You can't go back, yesterday is over, today is an instant, tomorrow an ambition.

In this issue of *WE*, we will learn how the new order is a game of breaking down and recomposing the elements of geopolitics. The key is that it is a work in progress, therefore deviation from the flight plan is certain; the story does not proceed in a straight line. Decades of destruction of the humanistic culture and domination of technology have taught managers that we must seek "efficiency"; it seems to me that first we must rediscover another notion: "harmony."

A New Beginning

ERIKA MANDRAFFINO

T WAS 2008 and the magazine you are leafing through was called Oil. I was there. I was also there when, years later, Oil became WE—World Energy—*in line with Eni's philosophy on the evolving world of energy. Today we are changing again. In our content: the in-depth analysis that distinguishes* WE *introduces the reader to the issues our sector, and others, face every day, starting with the energy transition and decarbonization. And in our format: more agile and lean, but above all more sustainable because we use 40 percent less paper. We have chosen elegant, modern, recognizable graphics: the photos and infographics remain true to themselves, but are even more striking. A new beginning that fosters a long publishing tradition and promotes the central importance of carbon neutrality, the strategic goal that Eni wants to achieve by 2050. I hereby announce the opening of a new era of* WE *as the new Director of Eni Communications and the new Editorial Director. Together with Mario Sechi, Managing Director, we decided to relaunch the magazine because the world in which we live requires a change of pace, even in publishing. The situation post-Covid-19 directs us toward greater sustainability, even of the printed word, without foregoing the intrinsic value that it represents for a company that has provided the narrative linking energy and civilization since 1955, when Enrico Mattei appointed the poet Attilio Bertolucci as director of the employees' magazine* Gatto Selvatico. *It is in continuity that we find the strength to face the future. This new pace also means digitization.* WE *will have a new website: WorldEnergyNext.com. This new site will be a frontier of innovation: multimedia, interactive, full of news, interviews, photos and graphics. It will be online in 2021, the year we all hope will be the turning point and a new start. We will face this new year with three new women experts on our Editorial Committee: Marta Dassù, Nathalie Tocci and Francesca Zarri. From here to 2050 is the blink of an eye in the history of the universe. Our company has less than 30 years to complete the most delicate part of the energy transition in a world threatened by global warming. Eni is determined to play a key role in sustainability and innovation and confirms its commitment to promoting social and economic development in all its activities. In the most difficult year in the history of our industry, we have demonstrated strength and flexibility. "Today, we are taking another step forward in our transformation, and we are committed to achieving full decarbonization of all our products and processes by 2050," said our CEO, Claudio Descalzi, announcing Eni's strategic plan for 2021-2024. WE is riding the wave of this transformation. Let's start right here with this magazine.*

VISUAL

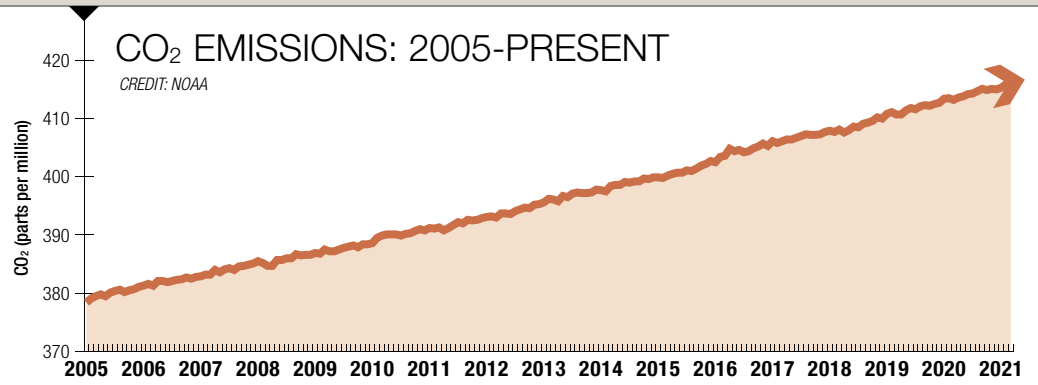
THE CLIMATE IS CHANGING

NASA surveys offer us a snapshot of the state of health of the planet. The graphs on these first two pages compare CO_2 levels in the atmosphere with the rise in global temperature, ice melt and rise in sea level, which could reach 2.5 meters by 2100. To limit global warming to below 1.5 °C and avert the most frightening scenarios, the roadmap traced by the Paris Climate Change Conference envisages a drastic reduction in CO_2 emissions. This reduction is feasible but extremely demanding. It requires an articulated strategy, which includes all possible technological solutions: from energy efficiency to renewables, from carbon capture to nuclear power, from electrification to hydrogen.

CARBON DIOXIDE

+416

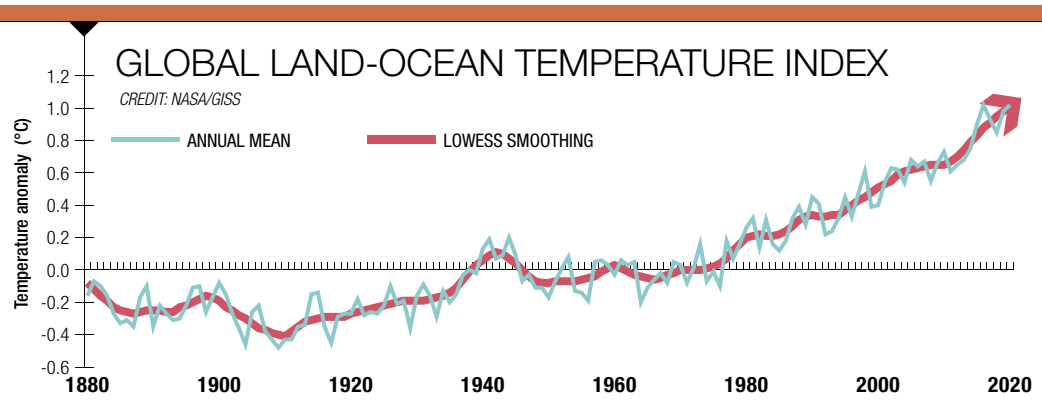
PARTS PER MILLION



GLOBAL TEMPERATURE

+2.1°

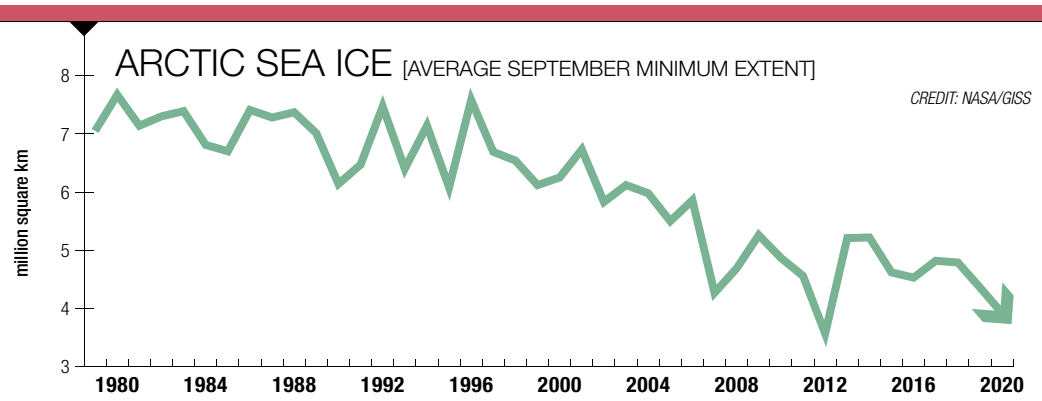
°F, SINCE 1880



ARCTIC SEA ICE

-13.1%

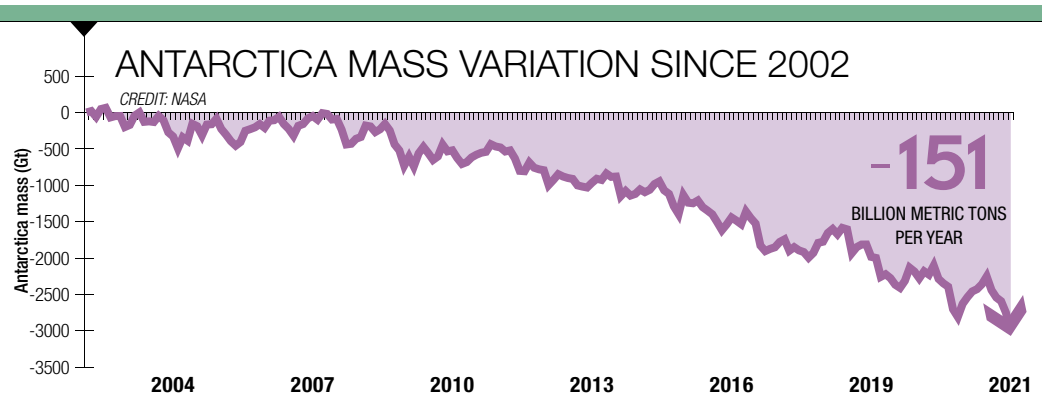
PER DECADE



ICE SHEETS

-429

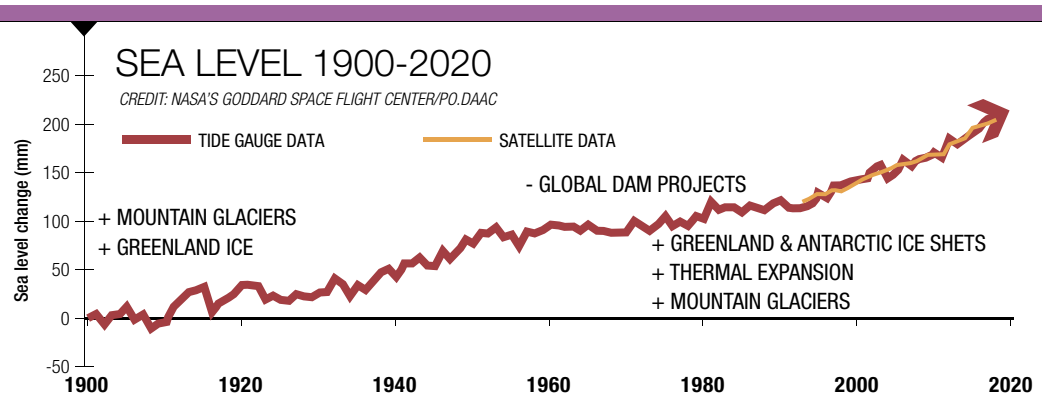
BILLION METRIC TONS PER YEAR

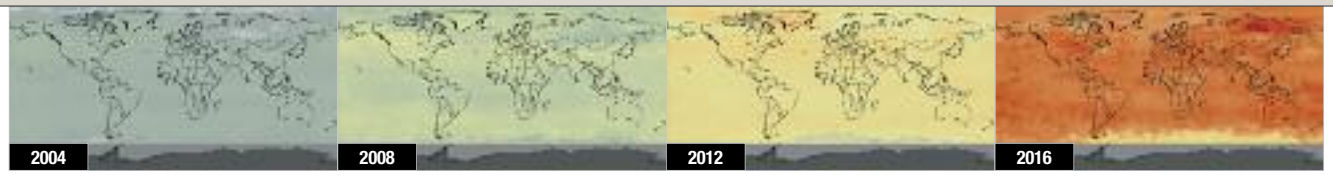


SEA LEVEL RISE

+3.3

MILLIMETERS PER YEAR





Carbon dioxide (CO_2) is an important heat-trapping (greenhouse) gas, which is released through human activities such as deforestation and burning fossil fuels, as well as natural processes such as respiration and volcanic eruptions. The above graph shows CO_2 levels measured at Mauna Loa Observatory, Hawaii, in recent years, with average seasonal cycle removed. Over the past 171 years, human activities have raised atmospheric concentrations of CO_2 by 48% above pre-industrial levels found in 1850. This is more than what had happened naturally over a 20,000-year period (from the Last Glacial Maximum to 1850, from 185 ppm to 280 ppm).

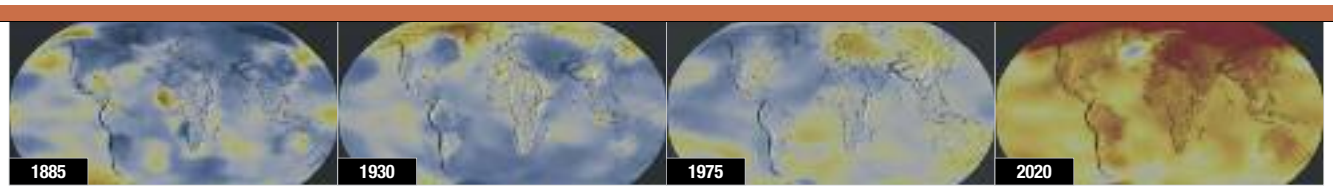
TIME SERIES: 2004-2016

SOURCE: NASA

365 375 385 395 405 415 425

CO_2 in the mid-tropospheric (ppm)

Global distribution and variation of the concentration of mid-tropospheric carbon dioxide in parts per million (ppm). The overall color of the map shifts toward the red with advancing time due to the annual increase of CO_2.



This graph illustrates the change in global surface temperature relative to 1951-1980 average temperatures. Nineteen of the warmest years have occurred since 2000, with the exception of 1998.
The year 2020 tied with 2016 for the warmest year on record since record-keeping began in 1880 (source: NASA/GISS).

This research is broadly consistent with similar constructions prepared by the Climatic Research Unit and the National Oceanic and Atmospheric Administration.

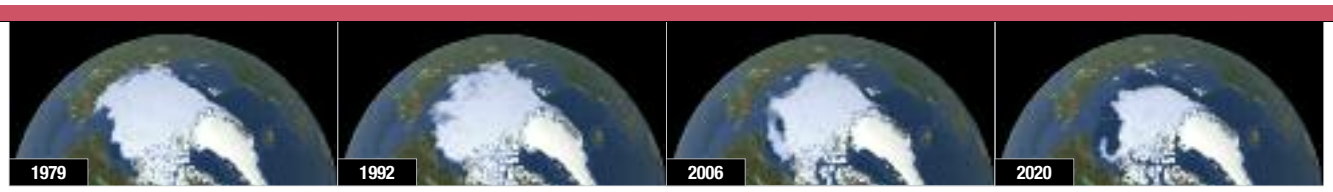
TIME SERIES: 1885-2020

CREDIT: NASA SCIENTIFIC VISUALIZATION STUDIO

-4 -3 -2 -1 0 1 2 3 4

Temperature difference (Fahrenheit)

The time series shows the five-year average variation of global surface temperatures. Dark blue indicates areas cooler than average.
Dark red indicates areas warmer than average.



Arctic sea ice reaches its minimum each September. September Arctic sea ice is now declining at a rate of 13.1 percent per decade, relative to the 1981 to 2010 average. The graph above shows the average monthly Arctic sea ice extent each September since 1979, derived from satellite observations. The 2012 extent is the lowest in the satellite record.

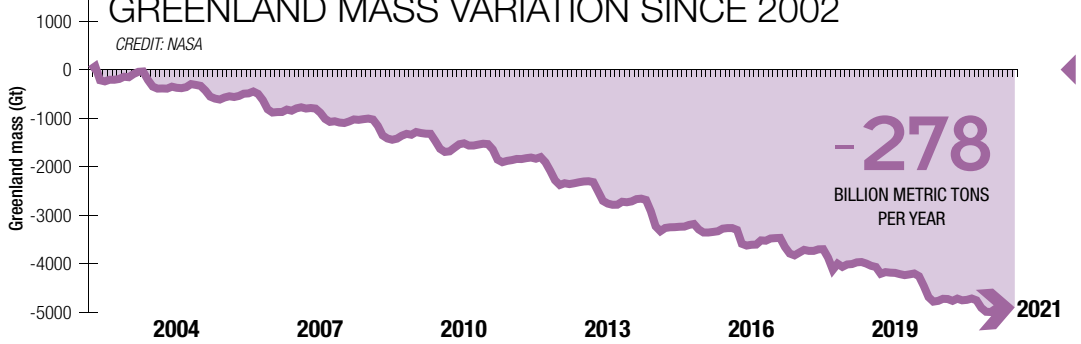
TIME SERIES: 1979-2020

CREDIT: NASA SCIENTIFIC VISUALIZATION STUDIO

The time series shows the annual Arctic sea ice minimum since 1979, based on satellite observations.
The 2012 sea ice extent is the lowest in the satellite record.

GREENLAND MASS VARIATION SINCE 2002

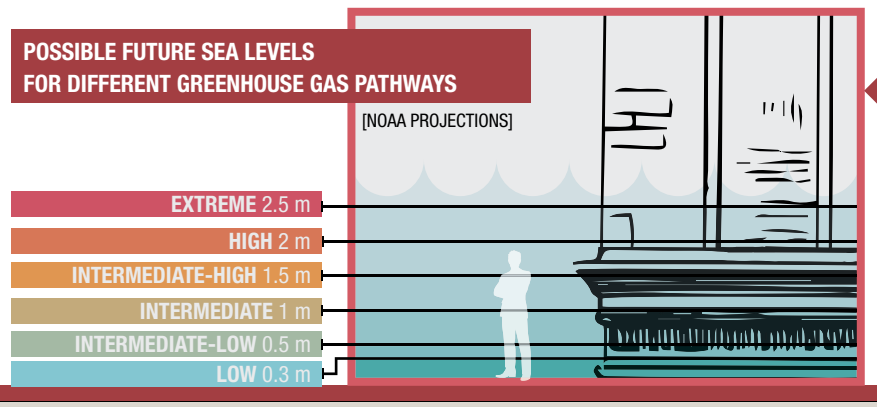
CREDIT: NASA

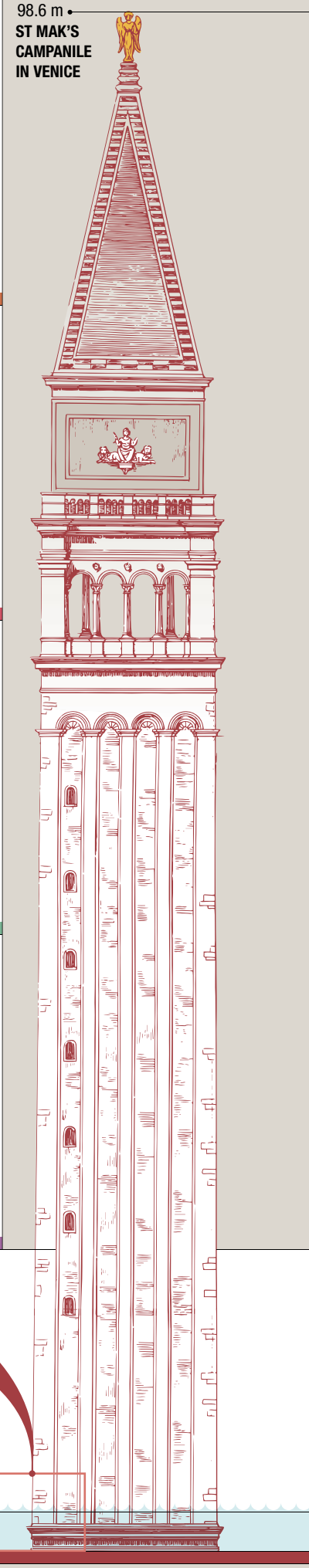


The land ice sheets in both Antarctica (-150.0 billion metric tons per year) and Greenland (- 278.0 billion metric tons per year) have been losing mass since 2002.

COASTAL CITIES AT RISK

Global sea level is very likely to rise at least 0.3 meters above 2000 levels by 2100 even on a low-emissions pathway.
On future pathways with the highest greenhouse gas emissions, sea level rise could be as high as 2.5 meters above 2000 levels by 2100.

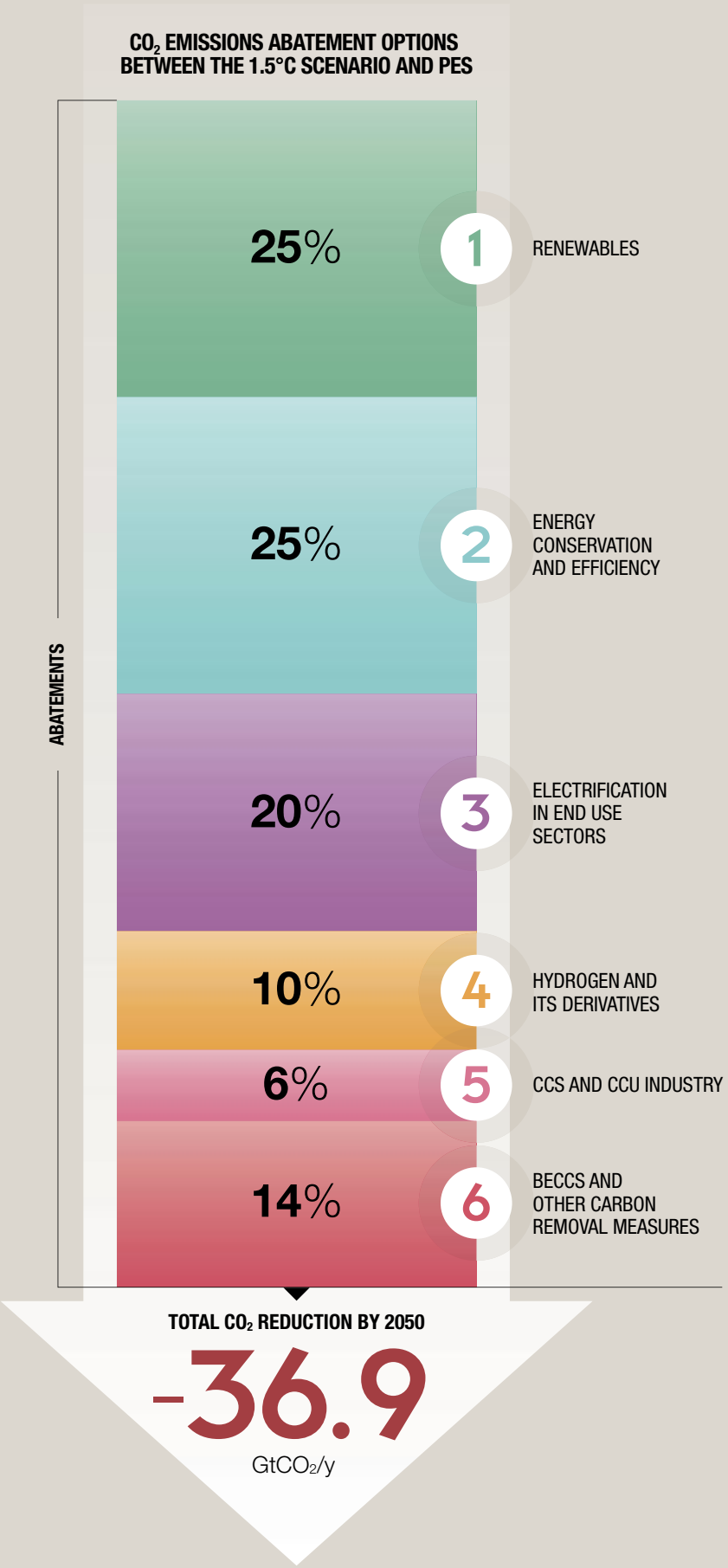




THE ENERGY TRANSITION

SIX COMPONENTS OF THE ENERGY TRANSITION STRATEGY

Renewable energy plays a key role in the decarbonization effort. Over 90% of the solutions in 2050 involve renewable energy through direct supply, electrification, energy efficiency, green hydrogen and Bioenergy with Carbon Capture Storage (BECCS). Fossil-based Carbon Capture and Storage (CCS) has a limited role to play, and the contribution of nuclear remains at the same levels as today.

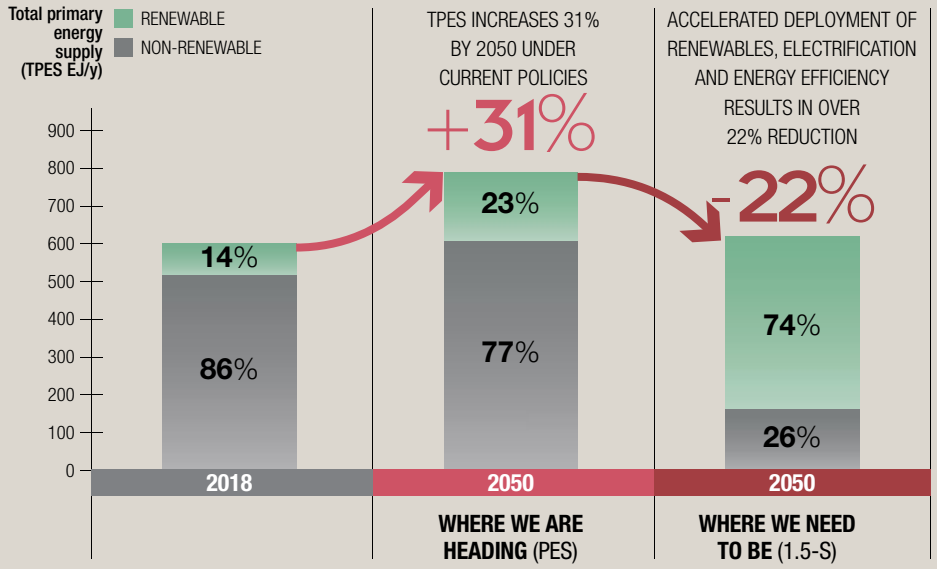


SOURCE: IRENA, WORLD ENERGY TRANSITIONS OUTLOOK, 1.5°C PATHWAY

LEGEND **1.5-S** = 15°C SCENARIO **PES** = PLANNED ENERGY SCENARIO

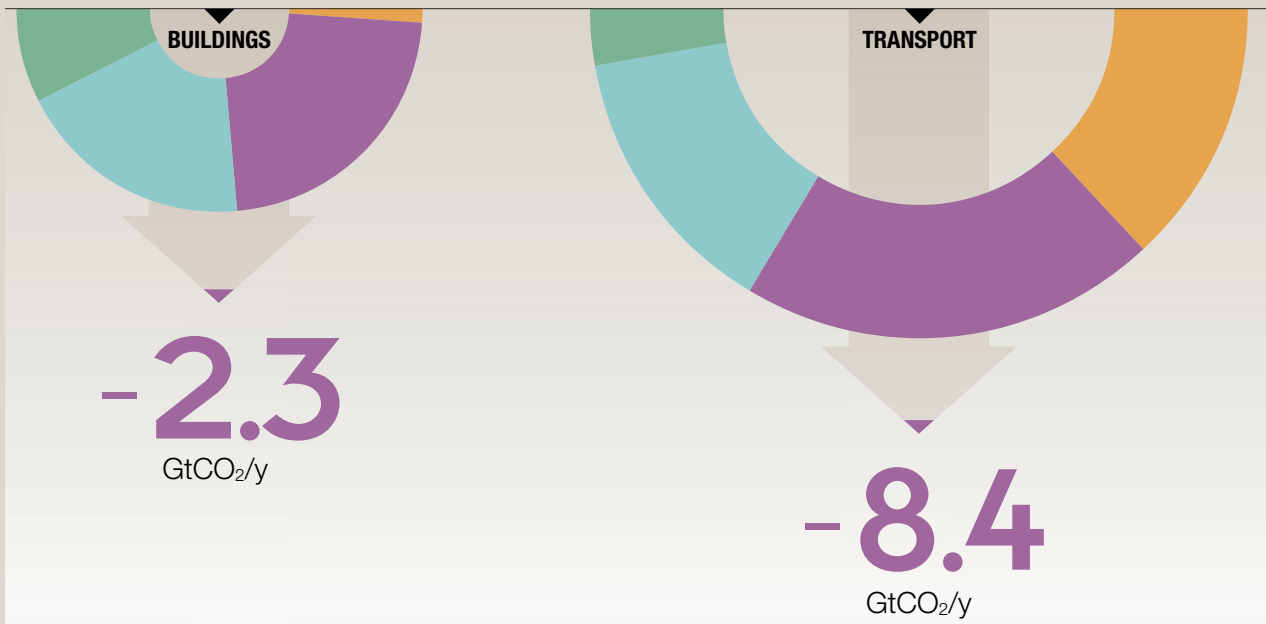
THE GLOBAL ENERGY SUPPLY MUST BECOME MORE EFFICIENT AND MORE RENEWABLE

The share of renewable energy in primary supply must grow from 14% in 2018 to 74% in 2050 in the 1.5°C scenario. This requires an eight-fold increase in annual growth rate, from 0.25 percentage points (pp) in recent years to 2 pp.



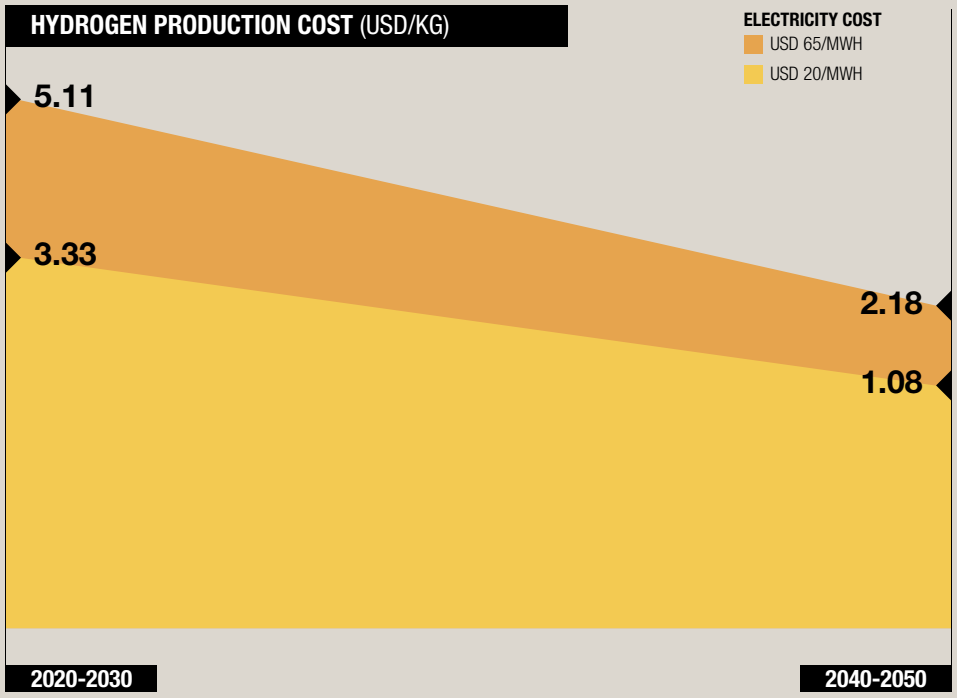
ELECTRIFICATION AND GREEN HYDROGEN OFFER A SOLUTION FOR END-USE SECTORS

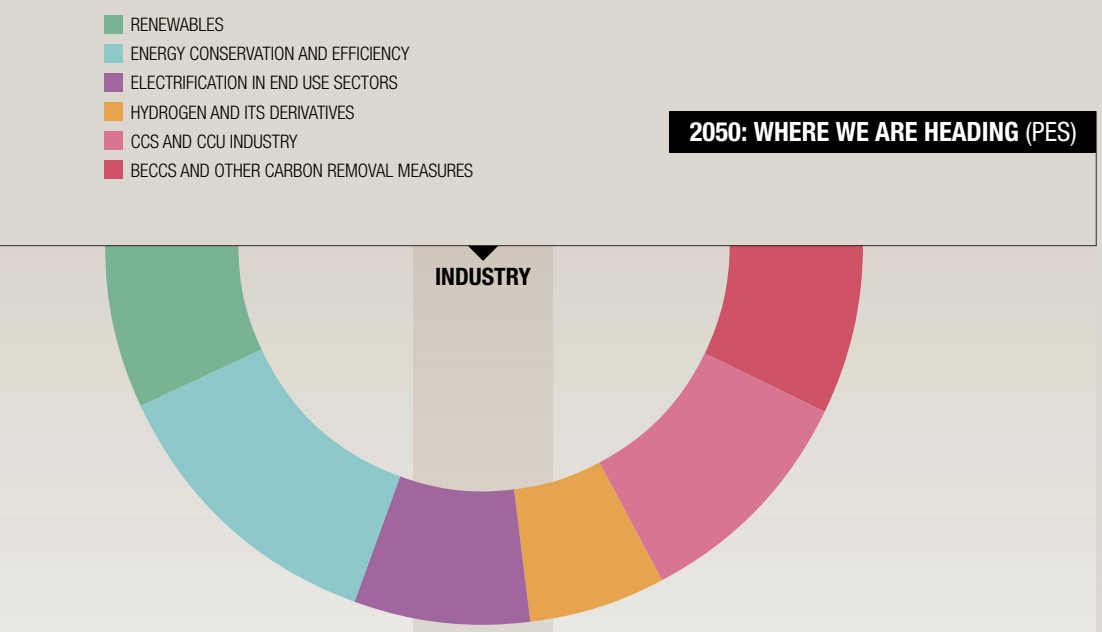
CO_2 emissions abatement options between the 1.5°C scenario and PES in industry, transport and buildings sectors.

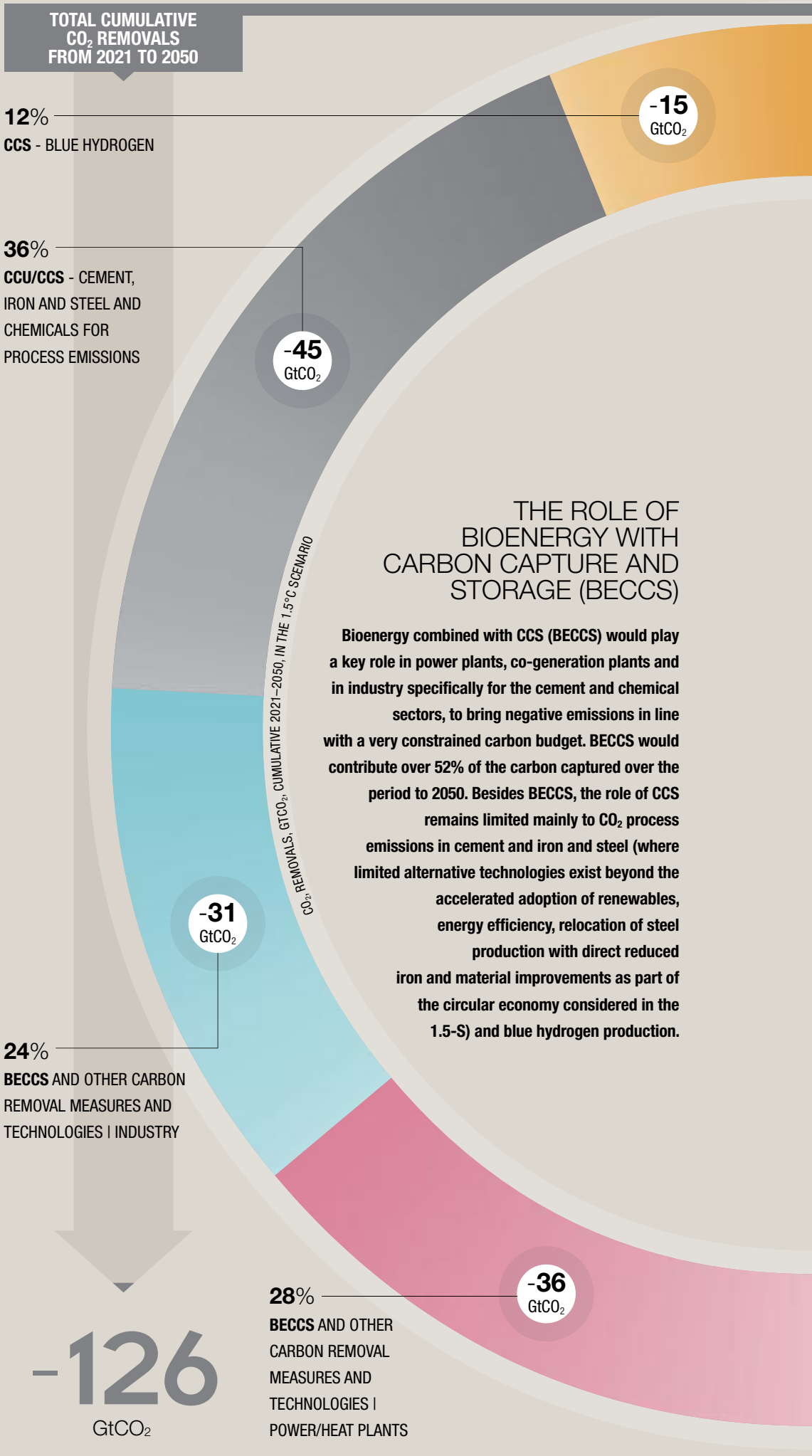


THE COST OF GREEN HYDROGEN WILL CONTINUE TO FALL

Green hydrogen will be producible at costs competitive with blue hydrogen by 2030, using low-cost renewable electricity, i.e., around USD 20/megawatt hour (MWh). If rapid scale-up occurs in the next decade, the cost of green hydrogen will continue to fall below USD 1.5/kilogramme (kg).







THE ROLE OF BIOENERGY WITH CARBON CAPTURE AND STORAGE (BECCS)

Bioenergy combined with CCS (BECCS) would play a key role in power plants, co-generation plants and in industry specifically for the cement and chemical sectors, to bring negative emissions in line with a very constrained carbon budget. BECCS would contribute over 52% of the carbon captured over the period to 2050. Besides BECCS, the role of CCS remains limited mainly to CO_2 process emissions in cement and iron and steel (where limited alternative technologies exist beyond the accelerated adoption of renewables, energy efficiency, relocation of steel production with direct reduced iron and material improvements as part of the circular economy considered in the 1.5-S) and blue hydrogen production.

A CLIMATE CLUB

THE EUROPEAN UNION, THE UNITED STATES AND CHINA, RESPONSIBLE FOR HALF OF GLOBAL GREENHOUSE GAS EMISSIONS, HAVE A HISTORIC DUTY TO TAKE THE LEAD—TOGETHER—IN THE FIGHT AGAINST CLIMATE CHANGE

by **Simone Tagliapietra** and **Guntram B. Wolff**

© ANDERSJILDEN/UNSPLASH

Icebergs colliding in Vatnajökull, Iceland.

CLIMATE CHANGE is one of the most pressing issues of our time. The science is clear: human activities have already caused approximately 1 degree C of global warming above pre-industrial levels, and this is likely to reach 1.5 degree C between 2030 and 2050 if it continues to increase at the current rate. In the Paris Agreement, governments have committed to limiting temperature increase to well below 2 degrees C above pre-industrial levels and pursuing efforts to limit it to 1.5 degree C. Keeping global warming below this safer limit will require global greenhouse gas (GHG) emissions to quickly decline by at least 45 percent from 2010 levels by 2030 and reach net-zero by 2050, with negative emissions thereafter. In short, the world has to substantially accelerate climate change mitigation actions to exclude a possibly catastrophic climate scenario.

In a recent paper published in *Nature*, we propose forming a climate club to incentivize countries to decarbonize quickly. It aims to solve a fundamental problem of climate policy, that of free-riding on others' emissions abatements. Indeed, emissions abatement costs are largely national but the benefits from climate stability are global. The United States under President Trump, for example, dropped out of the Paris agreement, citing "unfairness" as the reason. Dealing with this classical free-riding problem needs to be at the core of a new climate strategy. In our view, a climate club would be an ideal model to solve free riding and decrease global emissions rapidly.

A CLIMATE CLUB BASED ON CARBON BORDER ADJUSTMENT

In our idea of a climate club, members commit to stronger domestic climate measures and agree on the coordinated introduction of carbon border adjustment measures, i.e., measures that levy a tax on the greenhouse gas content of imports comparable to carbon charges on domestically produced goods. For trade between club members, no carbon border adjustment would be applied since all participating economies would commit to similarly strong measures to cut emissions. This would provide an incentive to remain committed to the agreement. Externally, the members would impose comparable carbon border adjustment mechanisms. Such a shared mechanism would prevent industrial relocations to countries with laxer environmental policy—the so-called carbon leakage—and preserve the competitiveness of club members. It would also create an incentive for other countries to join the club, thus making it a catalyst for tougher climate action worldwide.

TECHNOLOGICAL AND POLITICAL CONDITIONS NOW FAVOR A CLIMATE CLUB

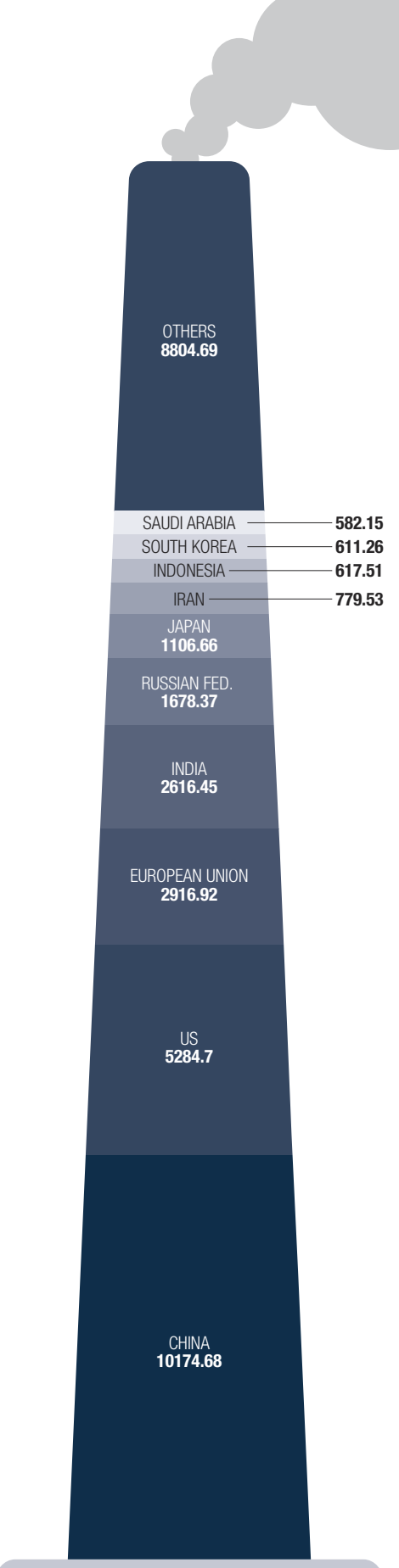
There could be a historical opportunity in 2021 to form a

climate club and reverse the world's failure to tackle climate change. Both technological reasons as well as political developments in the US, the EU and China make a climate club, at least for these three economies, a realistic possibility.

On the technology side, there have been stunning clean technology cost reductions. Solar and wind are already the cheapest ways of adding new electricity generation in most countries, and they could become the biggest source of electricity generation by 2025. Over the last decade, the cost of electricity from wind declined by 70 percent, while utility-scale solar photovoltaic costs declined by 90 percent. Similar cost reductions are being seen for electric vehicles, which are now expected to reach up-front price parity—without subsidies—with internal combustion vehicles by the mid-2020s. This development is also being made possible by battery technology advancements and cost reductions. Meanwhile, global momentum is building behind green hydrogen, which promises decarbonization of those parts of the energy system that electricity cannot reach.

On the political side there have been major developments too. The European Commission is already planning the introduction of carbon border adjustment measures as a central pillar of the European Green Deal. Until now, the fear of European policymakers was that the United States under President Trump would have considered such a move as the start of a trade war, and the United States would have had enough levers to retaliate against Europe, making the initiative unviable. With President Biden, there is now an opportunity for a very different conversation. In fact, Joe Biden's Plan for Climate Change and Environmental Justice pledges the introduction of carbon border adjustment measures on carbon-intensive goods imported from countries that are failing to meet their climate and environmental obligations. At the United Nations General Assembly in September 2020, Chinese President Xi Jinping committed to make China carbon-neutral by 2060. This historic pledge has been accompanied by Xi's call for a "green revolution" and for leading economies to "provide more global public goods, take up their due responsibilities and live up to people's expectations." These political developments mark the first time that the three blocs—representing half of global greenhouse gas emissions—seem to share a common climate ambition.

We believe that a carbon club would have major geopolitical benefits for the EU, US and China. Joe Biden has a clear view on a relationship with China: The United States needs to confront China on technology, intellectual property and human rights violations at the same time seeking to cooperate with Beijing on areas of common interest, including climate change. A climate club would thus fit into the new US President's wider China strategy. Europe meanwhile is eager to collaborate with both the United States and China on a new climate agenda. Soon after Biden's election, the European Union outlined its willingness to engage with the US on climate, including on the joint introduction of carbon border adjustment measures. Europe would also be happy to have China on board, as it would be in its geopolitical interest to avoid a hardening of the US-China standoff, from which Europe would only lose.



THOSE RESPONSIBLE FOR GHG EMISSIONS AROUND THE WORLD

Greenhouse gas emissions in China, the United States and the European Union make up more than half of global emissions. The graph data, relating to 2019, are expressed in $MtCO_2$.

PROMOTING JOINT CLIMATE CHANGE MITIGATION ACTIONS

The scope of the climate club should not be limited to the joint introduction of carbon border adjustment measures as we argue in our piece in *Nature*. It could encompass a wide range of actions that its members can jointly undertake to unlock some of the key bottlenecks the world will face in the pathway to climate neutrality.

A first example is the joint development of those clean technologies that are required to decarbonize our economies, but that are still at an early stage of development, such as green hydrogen or solid-state batteries. By exploiting international synergies and economies of scale, their development could indeed be significantly accelerated.

A second example is the joint development of carbon removal initiatives. Removing carbon from the atmosphere will be necessary to reach net zero by mid-century and subsequently to achieve net negative emissions. This can be done with both nature-based and technology-based solutions. Nature-based solutions notably include afforestation and reforestation. Technology-based solutions include carbon capture and storage and geoengineering solutions like direct air capture. Notwithstanding their key importance for climate action, these solutions currently remain insufficiently addressed due to a lack of incentive to individual action. This makes international cooperation essential in the field. The climate club might spark a new global effort on afforestation and reforestation as well as on research and innovation in technology-based solutions.

A third example is the joint promotion of measures to contain the permafrost's thaw. As a result of rising global temperature, the Arctic permafrost is not thawing gradually, as scientists once predicted, but rather at an unprecedented speed. This is a major problem for climate change, because the permafrost is a massive reservoir of greenhouse gases. As these soils soften and slump, they indeed release ancient organic materials—and masses of greenhouse gases—that have been frozen underground for millennia. The permafrost globally holds up to 1,600 gigatons of carbon dioxide: nearly twice what is currently in the atmosphere. This situation led scientists to sound an alarm bell and point to the urgent need to avoid reaching a tipping point that would ignite a vicious cycle in which global warming would release gases from the permafrost, and make the heating much worse. The climate club should act to avoid this dangerous climate tipping point, jointly funding measures

Photovoltaic panels for heating water installed on a roof. In many states, photovoltaics and wind power are now the cheapest energy sources.

to urgently contain the permafrost thaw, actions such as restoring grassland by both reducing forests and increasing large animal herds grazing. This is a global common good, and as such it requires international cooperation.

To conclude, both technological and political conditions are now ideal to establish a new climate club in which members commit to stronger domestic climate measures and agree on the coordinated introduction of carbon border adjustment measures. This would remove a major stumbling block to global decarbonization: the classical free-riding problem.

The world finally has a chance to reverse its failure in tackling climate change. Being responsible for half of global greenhouse-gas emissions, the European Union, the United States and China have a historical duty to lead. Doing so with a climate club offers the highest guarantee of success.

we

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THE ENERGY TRANSITION HAS ACCENTUATED A COMPETITIVE PLAYING FIELD IN WHICH CHINA HAS A CLEAR ADVANTAGE ON THE TECHNOLOGY FRONT, THE US IS INVESTING HEAVILY AND THE EU CLAIMS LEADERSHIP BUT WITHOUT A CLEAR VISION OF THE GEOPOLITICAL IMPLICATIONS OF THE CHANGE TAKING PLACE

by **Marta Dassù**

THE GEOPOLITICS of fossil fuels is a traditional topic of analysis. For a good part of the 20th century, the power of states depended on their access to oil and gas, and this is set to continue given that oil and especially gas will maintain a prominent position in the global energy mix for a few more decades. However, the geopolitics of fossil fuels will be combined with the more recent geopolitics of renewable energies as a result of the transition that aims to reduce the environmental impact of energy systems but that will also affect international equilibrium.

In his latest book *The New Map*, Daniel Yergin describes the transformations that have taken place in recent years in the international energy market, and above all the long-term consequences of the US shale revolution. Between 2008 and 2020, United States' oil production tripled, making America the largest producer in the world, ahead of Russia and Saudi Arabia. Although the United States still imports considerable quantities of oil from the Middle East, there is no doubt that it has strengthened its energy autonomy, although the "energy domination" theorized by Donald Trump remains an illusion. At the same time, the traditional producers of the Gulf have been weakened with the transition from a phase dominated by the perception of oil scarcity to a phase marked, instead, by abundant supply and falling prices. The US production of natural gas has also put Russia in difficulty, complicating its relations with Europe and driving it to make new energy agreements with China. In all this, OPEC's bargaining power has been downsized, while the decisive choices for oil markets are now largely dictated by the United States, Saudi Arabia and Russia. At a deeper level, however, the international energy market is going through a phase of structural change. Over the past fifty years, the weight of low-carbon energy sources in the global energy mix has doubled and, whilst today it still represents just over 15 percent of the total, the trend is growing, especially in advanced economies. By 2050, for example, the US Energy Information Administration estimates that the weight of renewables in the US energy mix will double, from 21 to 45 percent. The pandemic-induced recession has accelerated the trends in progress. In 2020, whilst global oil demand fell by 8.8 percent and coal demand by 5 percent, the renewable energy sector expanded with the record addition of 200 gigawatt hours.

In the post Covid-19 scenario, the United States and Europe are geared to pursuing this transition path; their stated goal is to achieve climate neutrality—net zero carbon emissions—by 2050. The Biden administration, which has brought America back into the framework of the Paris Agreement, has created a USD 2 trillion investment plan in clean energy for the next

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four years. On the part of the EU—a continent that aspires to leadership in the energy transition after launching the Green Deal—investments in the sector represent a large portion of the funds allocated under Next Generation EU. According to Bloomberg forecasts, the expansion of renewables will mark the next three decades. Of the USD 1.5 trillion that will be invested in the energy sector, about 80 percent will be absorbed by clean energy and electric batteries.

In essence, there are now three conditions, previously absent, that require us to take the energy transition seriously: capital, consumer preferences and technologies, which will continue to evolve. The International Energy Agency predicts that by 2050, part of the renewable energy will be produced by technologies as yet unknown.

The transition will have important geopolitical repercussions, starting with an evolution in relations between the West and China, which controls many of the raw materials essential for the development of "cleantech." The rise of renewable energies will also tend to affect the internal structure of "rentier states," the regimes that are supported by energy revenues, with effects on relations between the European Union, on the one hand, and Russia and the Middle East on the other. These same transatlantic relations will be invested in the energy agenda, with the US and the EU committed to reconciling the objectives of sustainability with the interests of their own industrial competitiveness.

THE UNITED STATES AND CLIMATE AS NATIONAL SECURITY

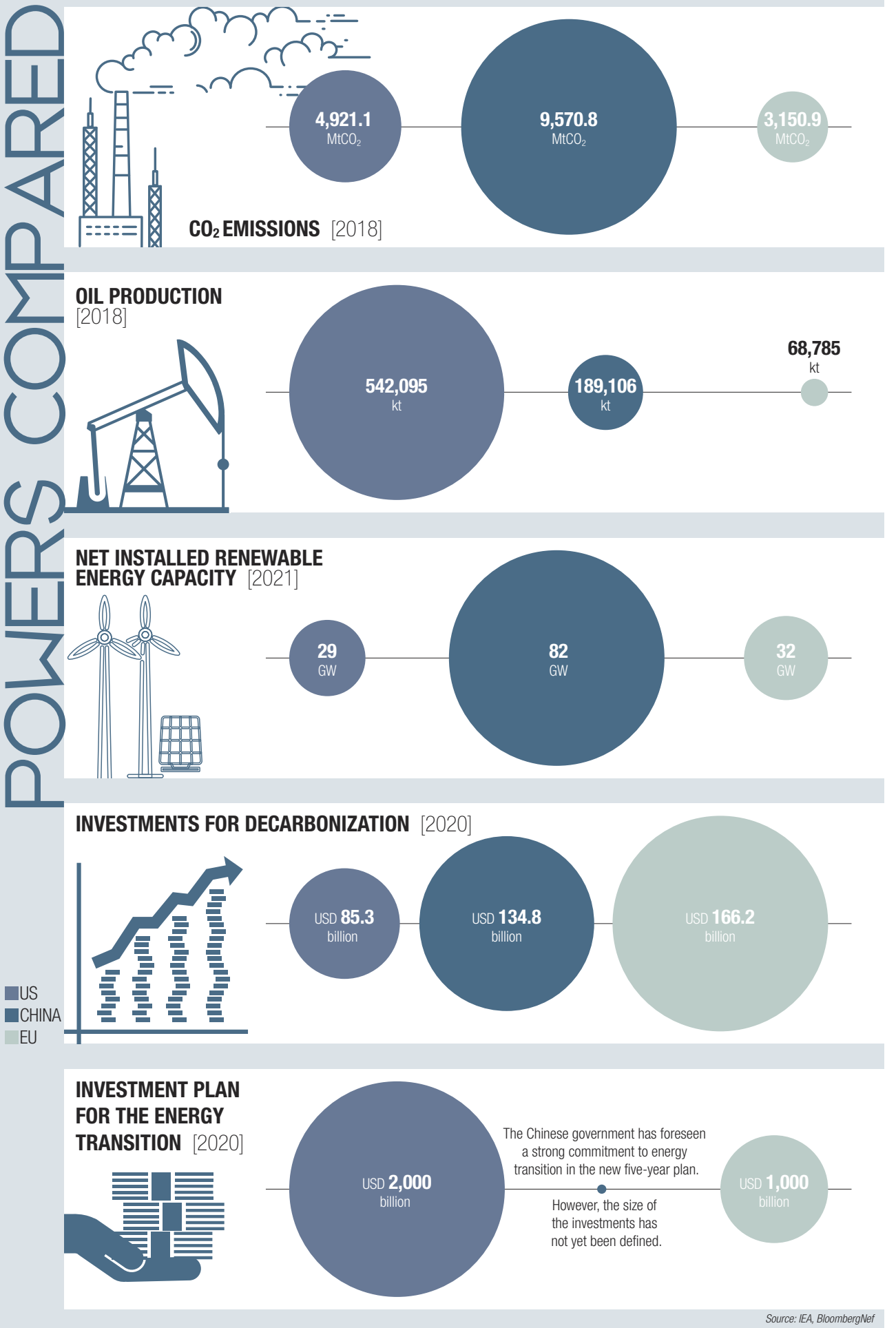
The new US administration considers climate change a problem of national security, and Joe Biden called it "the next pandemic," echoing Bill Gates' predictions. It is therefore no coincidence that John Kerry, Biden's Special Envoy for Climate, also sits on the National Security Council and chose the Munich Security Conference last February for his first international appearance. In the vision of the United States, climate change, with its connected extreme meteorological phenomena, is a source of risk and cost for the population and at the same time a cause of international systemic instability, accelerated competition for scarce natural resources, increased migratory movements and local and regional conflicts.

But it is not only the strategic aspect that explains the US's new security paradigm with respect to climate change; there is also a connection with the emphasis on technological competitiveness in the American industrial system. Indeed, key technologies for the energy transition are considered an essential factor for the competitiveness of the US in the 21st century, in the same way fossil energy was an essential factor in the 20th century. Over the past decade, the United States has invested around three trillion dollars in renewable energy, tripling its installed wind capacity and dramatically increasing the share of solar energy. In early April, Joe Biden announced an ambitious plan for the offshore wind industry on the Atlantic coast.

The clean energy economy focuses on technology and regulation efficiency while that of fossil energy is essentially based on the availability of assets in the form of natural resources. It is true that advanced technologies have been applied to the wealth of fossil resources—the shale revolution is a prime example—but the two economic models are very different. The future of the energy transition will depend on a grand coalition between government and business (including Wall Street for green finance); this has been seen before, with the development of the nuclear industry, which was supported by government military efforts.

The challenge, of course, is to ensure that the new energy mix is sustainable economically and socially. In the short term, President Biden will be able to take advantage of the strong recovery of the US economy after the pandemic, but in the medium term the balance of the energy transition in terms of jobs will have to be positive if the new American administration does not want to pay a political price.

Decarbonization as a domestic priority will also influence foreign policy considerations. While it is true that oil and natural gas will remain significant sources in the energy transition, it is still reasonable to expect a decrease in the



Source: IEA, BloombergNef

weight of oil and gas, as a tool and as a goal, in the US's strategic considerations. The relative disengagement from the Middle East, already underway, will be one of the possible implications. With the reduction in weight of fossil fuels, the United States could lose significant international leverage as a swing producer. On the other hand, environmental considerations and clauses will influence their trade agenda—and part of the American approach to reforming the WTO—and bilateral relations with large "Indo-Pacific" economies. Overall, old and new energy geopolitics will tend to combine, or rather overlap.

RARE EARTH ELEMENTS AND COMPETITION WITH CHINA

Washington's emphasis on climate change has an ambiguous bearing on the number one problem in US foreign policy past and present: competition with China. On the one hand, the international strategy of the United States—which, according to Jake Sullivan, National Security Advisor, must work for the American working middle class—aims at a tough policy of containment of China. On the other hand, the response to climate change has a global dimension and therefore requires sitting at the same table with China (and the table has been organized by the US with the Leaders Summit on Climate in April). In short, it is a question of evaluating to what extent the new "hi-tech cold war" with China will allow sectoral agreements on energy. After all, the real cold war, with the USSR last century, did not prevent specific agreements on arms control.

With China, the essential issue concerns the competition for technological supremacy; the United States cannot leave the supremacy in green technologies to China. China is now the main contributor to greenhouse gas emissions and is highly dependent on coal, which still powers 58 percent of its electricity production. At the same time, China produces around 70 percent of photovoltaic panels globally, half of electric vehicles and one third of wind energy. In 2020 alone, it increased its wind capacity by nearly 100 Gigawatt hours. This is a 60 percent growth on the previous year, a claim used by China to legitimize its commitment (considered not very credible by the majority of observers) to achieve carbon neutrality by 2060.

The US's push for greater energy sustainability, at least in the short term, will also have to refer to China for another aspect: the new global trend of developing low-carbon technology has vastly increased competition for access to the raw materials required to support it. There is a broad mix of metals and minerals needed for the energy transition—including cobalt, copper, lithium and rare-earth elements—and China plays a major role in nearly all supply chains. Thanks in part to the policy of penetration in Sub-Saharan Africa, China controls almost 85 percent of the world reserves of refined cobalt, essential for the production of lithium-ion batteries, and in addition controls

40 percent of the deposits of rare-earth elements. As noted by the *Financial Times*, building an electric vehicle without involving China has become nearly impossible.

The energy transition has accentuated a competitive playing field in which China has a comparative advantage, the United States is investing heavily and Europe is claiming leadership but without a clear vision of the geopolitical implications of the change taking place.

THE FOREIGN POLICY OF THE EUROPEAN GREEN DEAL

The EU sees itself as a leader in environmental sustainability and wants to build effective multilateral agreements on this leadership. Europe produces 10 percent of global carbon emissions; to render the Green Deal globally effective, without damaging its industrial competitiveness, Europe must find agreements with other major economies.

Despite still being heavily dependent on fossil fuels, which represent just over 70 percent of the continental energy mix, Europe is now aiming for a profound transformation of its economic system based on the paradigm of ecological transition: a 55 percent reduction in net carbon emissions by 2030 and climate neutrality by 2050. This is also why financing the energy transition constitutes a substantial part of the funds allocated under Next Generation EU.

The transformation of the European energy system has geopolitical repercussions that are, for the moment, largely neglected. As we know, Europe is heavily dependent on the outside world for its energy supply; in 2019 alone, it imported energy products worth more than EUR 320 billion. The European energy transition will therefore have an effect on both the main current suppliers (from Algeria to Russia) and on the oil market (Europe accounts for around 20 percent of global imports). This means that the Green Deal cannot be viewed just as an economic reform; the foreign policy dimensions must also be addressed.

The geopolitical implications of the European Green Deal, according to a recent study by the European Council on Foreign Relations, are schematically as follows. First, negative repercussions for some of the main fossil fuel producing countries in the Mediterranean: Europe will have to somehow prepare to manage the consequences by contributing to the development of renewable energies. Second, a gradual reduction in dependence on Russia, which will move toward energy deals with China. Third, growing imports of materials critical to the development of clean technologies—the metals and rare-earth elements mentioned above. To avoid excessive dependence on China, Europe will have to diversify its supply chains. Fourth, the attempt to create a strong convergence on climate policy with the United States, which allows for agreements on climate and trade while cushioning the potential distorting effects of carbon pricing mechanisms. Fifth, the aspiration to define global standards for the energy transition, in particular on the hydrogen issue and on "green bonds," the financing for the energy transition.

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China produces around 70 percent of photovoltaic panels globally, half of electric vehicles and one third of wind energy.

It is now possible and necessary to build a transatlantic alliance on energy. But it won't be that simple. The "old" geopolitics continue to create tensions. Natural gas will remain an essential source in the energy transition, and this means that highly controversial nodes, such as the Nord Stream II gas pipeline between Germany and Russia, will continue to divide the two sides of the Atlantic and the Europeans in the middle.

On the new climate agenda, Joe Biden is certainly much closer to Europe than Donald Trump and also than previous democratic administrations. However, there are problems to be solved. Last December, the European Commission proposed to the US a series of joint climate initiatives, which include carbon taxation mechanisms. As is well known, Europe has long proposed a "Carbon Border Adjustment Mechanism," a system of tariffs on the carbon content of imported goods. The reason is quite clear: in the absence of such a mechanism, businesses would tend to transfer their production to countries with less strict environmental regulations (according to the phenomenon we call "carbon leakage"). In other words, it is a mechanism to defend the competitiveness of European industrial business, already criticized by the United States in the past for its potentially protectionist effects. In principle, the Biden administration also favors tighter environmental regulation, and it could be willing to discuss the EU's proposals. But this requires significant compromises on Europe's part, for example, lowering certain standards (automotive emissions). And it does not alter the skepticism already expressed by John Kerry on the possible introduction of a "border tax," seen as a mechanism of last resort. There is no doubt that an agreement between Europe and the United States, however difficult and insufficient, is in any case an indispensable condition for encouraging other large economies to move along similar lines.

In conclusion, the energy transition will inevitably produce losers and winners even on an international level. Only by being aware of this will Europe be able to manage the geopolitical repercussions.

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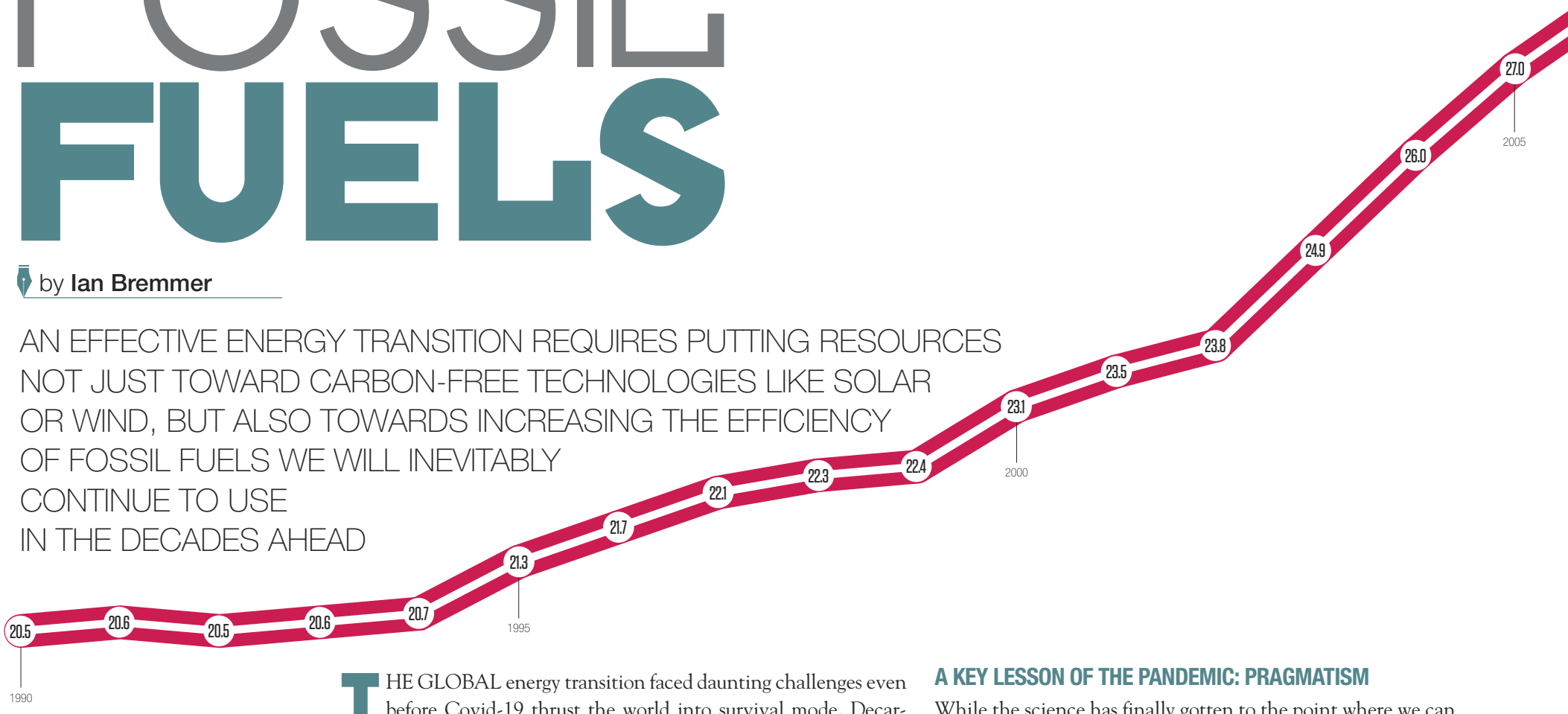
DECARBONIZING FOSSIL FUELS

by **Ian Bremmer**

AN EFFECTIVE ENERGY TRANSITION REQUIRES PUTTING RESOURCES NOT JUST TOWARD CARBON-FREE TECHNOLOGIES LIKE SOLAR OR WIND, BUT ALSO TOWARDS INCREASING THE EFFICIENCY OF FOSSIL FUELS WE WILL INEVITABLY CONTINUE TO USE IN THE DECADES AHEAD



THE GLOBAL energy transition faced daunting challenges even before Covid-19 thrust the world into survival mode. Decarbonizing the world requires trillions in long-term investment from governments, companies and consumers alike… trillions that become even more painful in the context of our current global economic downturn. Factor in that fossil fuels also continue to generate significant amounts of taxes for governments—revenues that help balance budgets and fund public programs like welfare and unemployment benefits, which are absolutely critical these days—and governments now have even more reason to push decarbonization efforts further down the priority list. Meanwhile, the world continues to burn.

A KEY LESSON OF THE PANDEMIC: PRAGMATISM

While the science has finally gotten to the point where we can begin planning for our green energy future, our political and socioeconomic systems are not there yet. This is particularly true of the world's democracies, where voters are consistently animated more by short-term concerns that affect their personal lives than longer-term worries that impact the entire world. If we are being honest about it—and it's high time we are—ambitious climate goals like the ones established in the Paris Agreement require serious disruption to the personal lives of voters, more than it is realistic for us to expect politicians looking to get reelected can successfully enact, let alone build

ENERGY-RELATED CO_2 EMISSIONS, DOUBLE RECORD

In 2020, we recorded the largest annual decline in energy-related CO_2 emissions since the Second World War, as a result of Covid-19 On the other hand, emissions are set to increase in 2021 to the second highest levels in history after the record set 10 years ago following the financial crisis. The reasons for this increase include, again, the Covid-19 pandemic, as governments around the world are pouring funds into economy stimulus packages towards the recovery from the post-pandemic recession.

Source: IEA

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An oil tanker off the coast of San Pedro, Los Angeles, California. In recent years, the oil & gas sector has suffered the greatest decline in investment.

long-term public policy around. One of the key lessons we need to take away from our current pandemic is that we must be pragmatic about what governments can and cannot do in the face of global emergencies, and anticipate those limitations as much as possible as we work around them. To that end, the world needs to start putting many more resources not just toward carbon-free technologies like solar or wind, but also towards increasing the efficiency of fossil fuels we will inevitably continue to use in the decades ahead.

That is not the direction the investment enthusiasm of recent years had been pointing. Prior to the pandemic, environment, social and corporate governance (ESG) investment strategies had been increasingly framed in the line of "divestment" from fossil fuels rather than a "strategic usage" of them. Some investors turned away completely from oil and gas companies so they could send a message about their values; others just did not see the diminishing profit margins as worth the effort and risk. Recent years had seen the rise of investors looking to simply divest of their fossil-fuel holdings; between 2014 and 2018, the number of institutional investors who had vowed to divest from fossil fuels had skyrocketed from $52 billion to $6 trillion in terms of assets under management. While their intentions are admirable, in practice they complicate the transition picture tremendously; rather than starving oil and gas companies of funds, we need them invested and innovating at the highest level possible to continue shrinking the carbon footprint of fossil fuels while the energy transition remains underway.

It's a tall task, and Covid-19 only made matters worse, as energy investment through Q3 of 2020 had been projected to fall by an unprecedented 18 percent year-over-year. To be sure, the fall in energy investment cannot and should not be attributed solely to Covid-19, or even just to environmentally conscious investors. Oil and gas companies have been taking significant write-downs in recent years, a signal they themselves expect less profitable futures ahead, which makes sense in the context of a world actively trying to decarbonize. Fewer guaranteed returns, wild swings in oil and gas prices, and general uncertainty over both supply and demand given the looming energy transition all dimmed economic prospects for these companies compared to returns of recent decades. And while all these structural challenges continue to persist, the reality is that there are still billions of profits to be made in the interim for oil and gas companies, even more over the long run if their investments are channeled strategically and proactively towards cleaner energy solutions. Whether they like it or not, oil and gas companies are a critical component of solving the climate change puzzle, and investors need to support them in that pursuit.

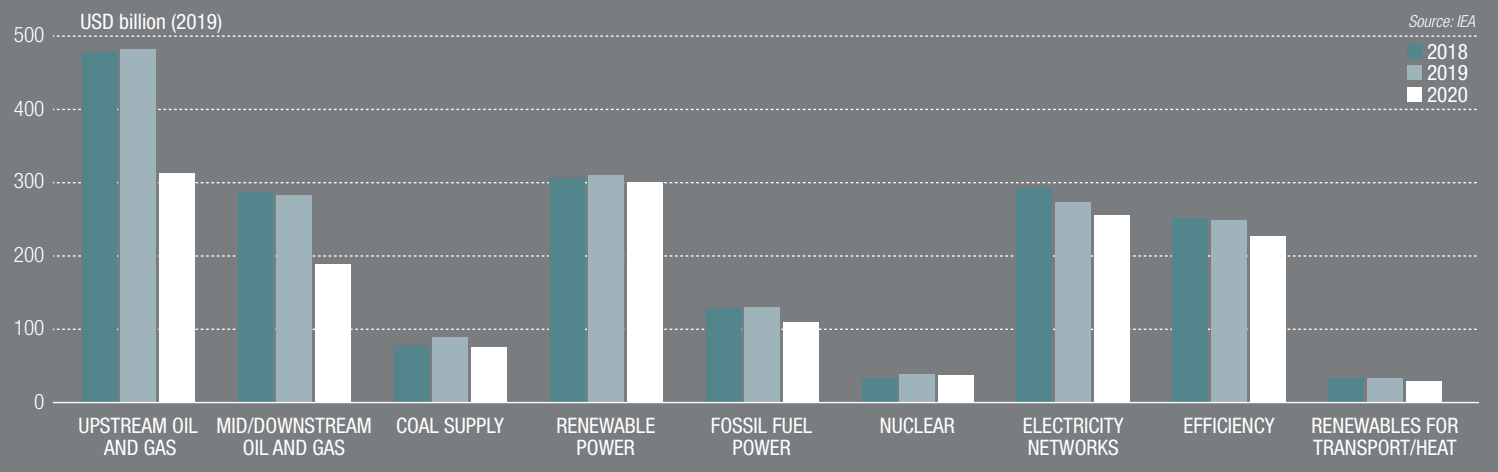
THE URGENCY OF THE BATTLE MITIGATED BY HEALTH AND ECONOMIC CRISES

Covid-19 of course complicates those efforts in multiple ways. The sustained challenges posed on both the economic and health fronts by Covid-19 will necessarily push back the immediate urgency of the climate change battle for governments, companies and consumers alike in the world's advanced industrial democracies. Even more concerning is what happens to lower and middle-income countries, the ones who are already bearing a disproportionate amount of the hardship brought by the pandemic. These are the countries that have less healthcare capacity to deal with the ongoing health crisis, and the least amount of money to procure the vaccines that are their tickets out of it. These are also the countries that have less resources to stand their economies back up via stimulus once the worst of the crisis is past. For many of these countries, the further additional costs required of "green" stimulus is a non-starter, even as emissions levels have vaulted back above pre-pandemic levels in recent months. When all is said and done, there will be some cash-strapped countries facing serious debt crises as a result of the global economic tumult, and not necessarily through any fault of their own. For countries like these, using cheap fossil fuels won't be a choice, but a necessity.

To help fight climate change today—and to maximize the long-term impact of those efforts—ESG investments need to also be investing in the difficult to decarbonize sectors of oil and gas to make them more efficient while they still remain rel-

ENERGY INVESTMENT BY SECTOR FROM 2018 TO 2020

Investment is down across all energy sectors in 2020. In particular, the worst affected sector was the upstream oil & gas sector, which recorded a decline of 35%.



atively cheap options for consumers, and while entire industries like shipping and aviation struggle with the logistics of transitioning to renewable fuel sources. Failure to do so will mean investors will fail to capture millions in potential profits—they will also fail to make the energy transition as efficient as possibly. To be sure, leapfrogging to renewable resources makes intuitive sense over the long term, but it severely constrains the short and medium term, which is where most of the damage to the environment will still be done. We need to begin moving away from this conception of our energy transition being "either-or." Acknowledging that doesn't just make financial sense, but practical sense too given the current realities of our politics and economics.

In recent years, traditional oil and gas companies have been making progress on ESG through their own investments, though how successful they will ultimately be will likely be determined by how much others invest and support these initiatives. Yet more actors must play active roles as well—any successful global energy transition needs a comprehensive multilateral policy framework. Just as critically, more government policy is needed on domestic fronts as well to align the short-, medium- and long-term social interests with market ones, all within the context of the looming climate change threat. After four years of a Donald Trump administration that largely ignored climate change concerns (to put it charitably), the US finally has the political leadership in place under President Joe Biden to give the issue the kind of attention and resources it deserves. Having the globe's largest economy rowing in the same direction as everyone else when it comes to climate change gives the world a much better chance of success in mitigating global warming's worst effects. And while there will be plenty of detractors arguing that short-term economic concerns shouldn't be sacrificed for the sake of long-term environmental ones, this is a false choice—if the energy transition already underway hits the rocks, that will impact not just energy-related companies and consumers, but also banks given the trillions they have already invested in those companies, which in turn will hit the rest of the economy. In a world as interconnected as ours, problems in one area of our economy frequently spill into others; that requires more government involvement than what we've been accustomed to seeing.

AN ORDERLY AND SLOWER TRANSITION

All of which leads us to the following conclusion: More decarbonization efforts (and dollars) must be spent on existing fossil fuels, already difficult under normal circumstances and the direction ESG enthusiasm was pointing, but now critical as the world begins the recovery process from the pandemic. Any green energy transition will have to be orderly, and slower than the one science dictates and the technology currently enables given the very real social and economic costs that the pandemic has extracted. Covid-19 has complicated our global energy transition; now is the time to strategically invest to make our green energy journey as practical as possible going forward to make it a success, and to ensure we end up at the sustainable energy future the world demands of us.

IAN BREMMER
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The New WORLD

by **Francesco Gattei**

THE POST-COVID-19 WORLD CANNOT BE EXCLUSIVELY ELECTRIC AND DIGITAL. ONLY BY ACKNOWLEDGING THIS WILL IT BE POSSIBLE TO IDENTIFY THE MOST EFFECTIVE ROUTE TO REDUCE EMISSIONS TOWARDS THE GOAL OF CARBON NEUTRALITY

WE STARTED 2020 like every other year: New Year's Eve dinner, holidays abroad in search of sun and visits to museums or matches at the stadium. It all lasted less than 70 days. After the "short century," we also experienced "the shortest year." As early as March 9, 2020, many certainties in our lives were no longer: as never seen in times of peace, schools were closed, curfews imposed and movement outside the home restricted. The suspension of the football championship in Italy was the most tangible proof that the matter was terribly serious.

14 months later, we continue to live this dystopian screenplay of birthdays via the web and online shopping and film premieres from the sofa. Not even an episode of Black Mirror ever went this far. We have lived this suspended life, albeit with different nuances, almost everywhere in the world. The globalized world quickly discovered the dimension of staycations, restricted travel and take-away food. We found barriers at city borders like in the Middle Ages, closed theaters and online schools.

DIGITIZATION AND ELECTRIFICATION OF CONSUMPTION

From an economic point of view, two major trajectories emerged in 2020: the triumph of the digitization of trade (digital commerce has grown by 60 percent in the past year) and communications and the electrification of consumption. In fact, in a situation in which energy consumption fell by five percent (with reductions of 8.5 percent and 6.7 percent for oil and coal), electricity demand declined only marginally (down two percent).

The world of immobility and immateriality also favored a trend that is unprecedented in size: the drop in CO_2 emissions into the atmosphere, which fell by six percent according to the IEA. Over the past 30 years, the only reduction in emissions was seen in 2009, but then by around just 1.5 percent. In reality, March 2020 was not a month like any other; it was a portal to a new reality, like in the classic sci-fi movies. We entered it and took a leap into a parallel dimension, where we successfully tested the enormous potential of the technologies we began to create and distribute just over ten years ago. If Covid-19 had occurred in the early 2000s without 5G, online commerce and mobile phones, its disastrous economic and social impact would have been even more dramatic. We would have spent a lot of time in lines in front of supermarkets, lessons would have been held over the phone and smart working would have been impossible.

In 2020, quite the opposite as we have been projected into what appears to be a possible future. In fact, around this almost dream-like dimension of our existence, the prospects of a "new normal" or rather the "new world" of post-Covid-19 have been taking shape.

A good key to interpretation is given by stock market trends, which have seen certain sectors either rewarded or penalized to an extraordinary extent: on the one hand, capital has been focused on information technology, electric cars, renewable sources and, of course, online entertainment. The new world beyond the portal is focused on electricity and big data but the losers are car manufacturers, airlines, oil majors, restaurants and hotels. The old world of molecules, physical exchange and travel appeared behind us, but things changed quickly in the time of the pandemic. On November 9, we went back through the portal as the announcement of the success of Pfizer vaccine guided us into what could be another future scenario, one in which the old and the new world coexist. Indeed we have discovered that part of that old world (too quickly set aside) is terribly dear to us, and it will be essential for our rebirth.

THE FOUR PILLARS AND THE COMMODITY SUPER CYCLE

In a society that will be engaged in a gigantic Marshall plan to recover the effects of a four-percent loss in global GDP in 2020 and to reabsorb the debt that totals 355 percent of GDP (it was 320 percent in 2019), we will have to get back to building, traveling abroad and moving and consuming locally. This is why some merchant banks, such as Goldman Sachs and JPMorgan, foresee the start of a new commodity super cycle. Copper, oil, steel (and consequently also coal), corn and soy are the focus of potential demand pressure and consequently, a hike in prices.

Bits and electrons are not enough to grow GDP; we need commodities, transformations and molecules to ensure humanity an adequate level of development and economic sustainability. Our civilization, according to the greatest energy expert of today, Vaclav Smil, is based on four pillars: steel and cement for construction, ammonia for our food chain and plastic or its derivatives for products, clothing and materials. They all have two basic characteristics: they require fossil fuels and their molecules of composition, carbon and hydrogen, as feedstock and more fossil fuels for the transformation processes. It is impossible to reach the temperatures required in these transformations (1500 °C for cement or 800 °C for steel hardening) with electric motors. These four elements are also the basis of all the new renewable sources (such as cement and steel for wind turbines), of the mining processes necessary to extract the superconducting minerals that are essential for electric motors and, of course, for the construction of new emission-free cars. For a year we have minimized the use of these pillars. But we were confined to our homes, paying a very high price. We have absorbed wealth and been forced to use debt to minimize the effects of lockdowns on income generation.

The commodity super cycle is the economic vaccine we have identified to recover from the pandemic. But this dynamic is interwoven with one of the few positive consequences of the Covid-19 season: the decline in carbon emissions. It's hard to believe that 2020 performance (a six percent drop in emissions) can be repeated. Indeed, it is foreseeable that in 2022 we will return to breaking new records for greenhouse gases in the atmosphere. During the pandemic, we found further evidence of the very strong correlation between economic growth (down four percent), world trade (down five percent), energy consumption (down five percent) and CO_2 emissions (down six percent). This is not surprising if we take into account the fact that the world energy structure demonstrates substantial stability in terms of carbon intensity per unit of primary energy consumed: for every ton of energy produced (in oil equivalent), we emit 2.3 tons of carbon. This was essentially the case in 1990 (2.4) and almost nothing changed in 2020 despite the lower contribution of hydrocarbons in the annual mix.

THE CLIMATE CHALLENGE IS WON WITH REALISM

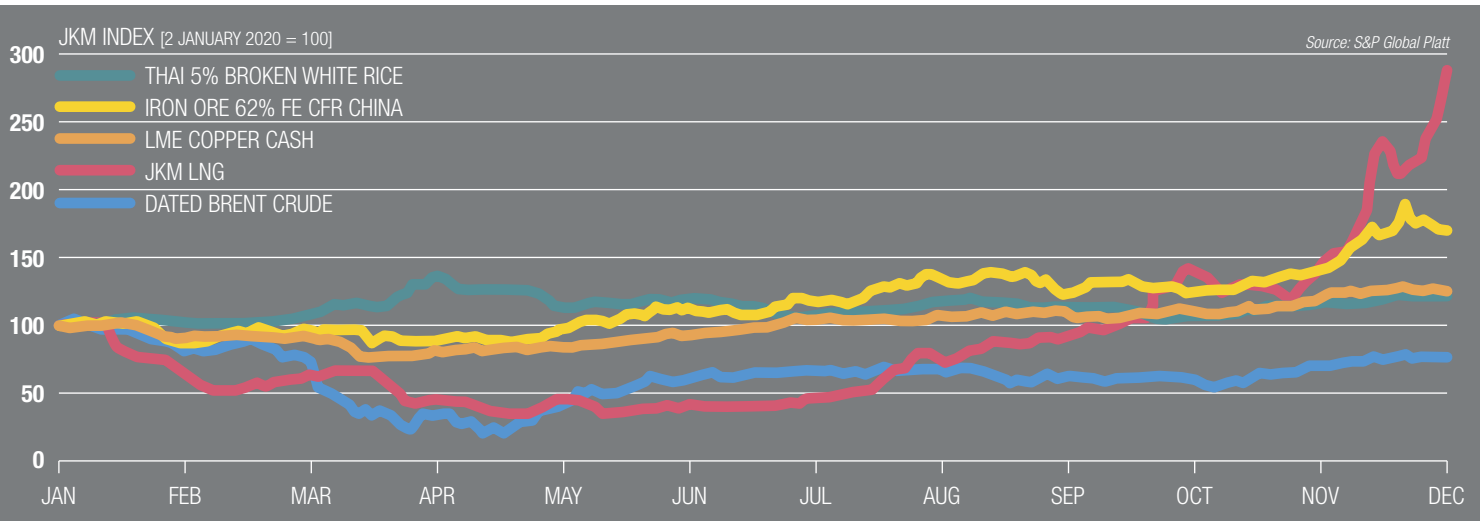
The climate change challenge now requires the progressive elimination of emissions over the next thirty years, with an annual trend in line with what we achieved in 2020. But last year, the fall in emissions was achieved through a costly process unsustainable for society, one that maximized the role of intangible assets, which are powered by electricity and digital exchanges but which are not sufficient to ensure adequate growth in world income.

2021 will be a new start not only for the economy but also for the energy transition plan and the fight against climate change. It is the year of COP26, the first climate conference to evaluate progress in relation to the pledges made in the COP21 in Paris in 2015 and at which participating nations must commit to a further acceleration in their targets; it is the first year since the United States rejoined the agreement after self-exclusion under the Trump administration; and finally it will be a time to record the importance and weight that the various Recovery Plans will give to the transition process.

In reality, it will be an opportunity to cross another portal into a world that fully recognizes the essential nature of the four pillars of our economy and the inevitability of their transformations, understands feedstock and energy flows based on the molecular structure of hydrocarbons and admits the impossibility of envisioning an exclusively electric and digital future. Only

THE COMMODITIES SUPERCYCLE

From LNG in Asia to Brent Crude, from iron to rice, the price of raw materials has risen to new highs. The commodities rally is due to the injection of liquidity to the markets through the post-pandemic stimulus packages, currently worth more than USD 13 trillion, and to the greater weakness of the US dollar. The surge in prices in 2020 in fact coincides with the collapse of the US currency.



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The defense of forests, which capture carbon naturally, remains, at least in the short to medium term, the most immediate and virtuous option for reducing emissions.
In the photo, the rainforest in Costa Rica.

by acknowledging this will it be possible to identify the most effective route to reduce emissions towards the goal of carbon neutrality and to recognize the essential contribution of all those technologies that ensure a rapid reduction in carbon intensity: from those that add a biological component to our fuels (biofuel or biogas), to systems for capturing and/or using carbon for the benefit of large industrial plants. And finally, it will be an opportunity to recognize the role of the most immediate and virtuous option, at least in the short-medium term: forest protection or reforestation, which naturally capture carbon while also ensuring the growth of future absorption capacity. Perhaps the 2021 screenplay of our sci-fi movie will finally include a greater dose of realism. That truly would be a great leap of imagination!

we

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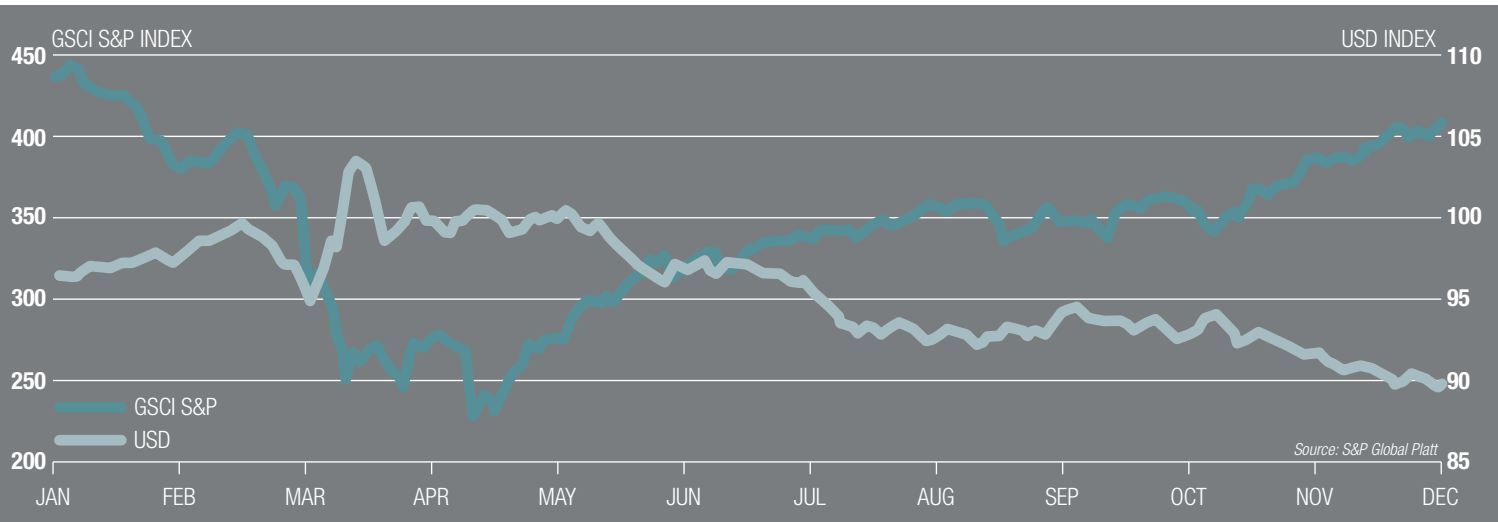


THE ROAD TO PARIS

FIVE AND A HALF YEARS AFTER THE SIGNING OF THE PARIS CLIMATE AGREEMENT, NATIONAL POLICIES STILL REMAIN LARGELY INADEQUATE, WITH COMMITMENTS THAT WOULD CAUSE TEMPERATURES TO RISE BY 2.9 DEGREES BY 2100

by **Luca Franza**
and **Lorenzo Colantoni**

"ACCORD DE PARIS c'est fait!" was the phrase blazoned across the Eiffel Tower and the Arc de Triomphe in December 2015 to celebrate the diplomatic success of the Paris Agreement after a decade of failed negotiations. This global enthusiasm left little room to address immediately the thorny question of implementing the Agreement and defining the tools that would determine its success. More than five years later, in the midst of a seemingly never-ending pandemic, and after COPs of mixed success, addressing the issue of implementing the Paris Agreement is now central to determining the future of the global fight against climate change.

MANY OBSTACLES AND LITTLE TIME

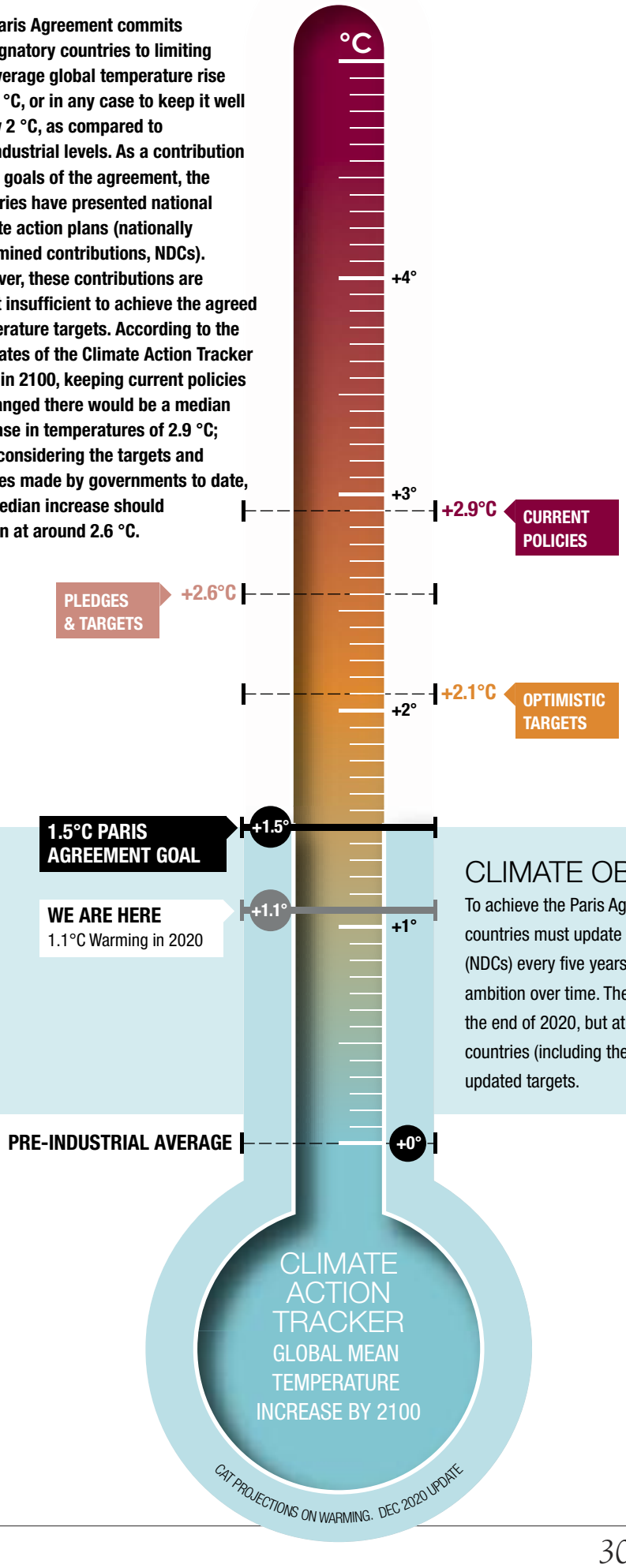
Whilst the collapse in the cost of renewables has in fact offered decarbonization technologies that are economically and socially sustainable on a global scale, there are still many obstacles and little time left to tackle them. Politically, with the recent addition of Iraq, 191 of the 197 signatories have ratified the Agreement, and of the remaining six, only Turkey and Iran make a substantial contribution to global emissions. There have also been several events over the past year that offer a positive outlook on national decarbonization commitments—in particular the growing European focus on the Green Deal, the Chinese goal of complete decarbonization by 2060, the re-entry of the United States to the Paris Agreement and the ambitious climate policies proposed by the Biden administration. However, national policies still remain largely inadequate, with pledges that, according to analysis by the Carbon Action Tracker, would currently lead to temperatures rising by 2.9 degrees Celsius by 2100—almost double the ideal target of the Paris Agreement of 1.5 degrees. Nearly every country has yet to propose policies compatible with this target, with key countries such as China, Russia and the United States that far exceed even the dangerous limit of 2 degrees.

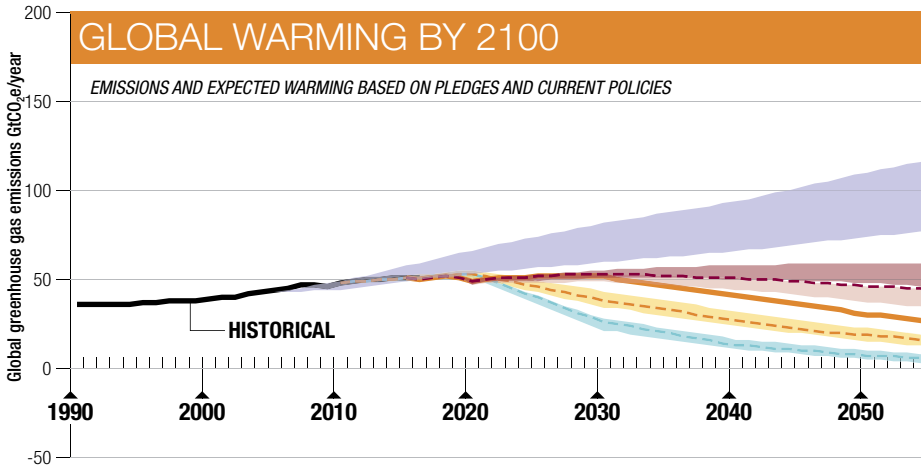
TECHNOLOGY AND DEVELOPMENT: THE UNRESOLVED ISSUES

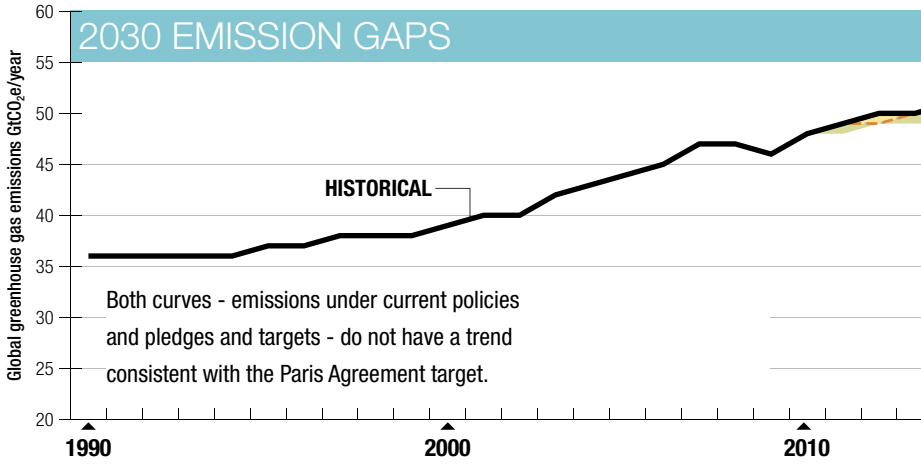
There are also several unresolved matters, from technological issues (how to ensure an energy mix dominated by intermittent but also stable renewables) to development (how to support the boom in Africa's electrification through renewables). In relation to this and other challenges, the COP26 in October 2021 will be central; a crucial event that already suffers from a one-year delay due to the pandemic. There will be four central themes: the first will be the definition of detailed rules for certain key aspects of the Paris Agreement, especially with regard to the transparency and reliability of national commitments (already in themselves determined exclusively at the national level), the definition of "carbon markets" (a key tool but still practically non-existent on a global level) and agreement on

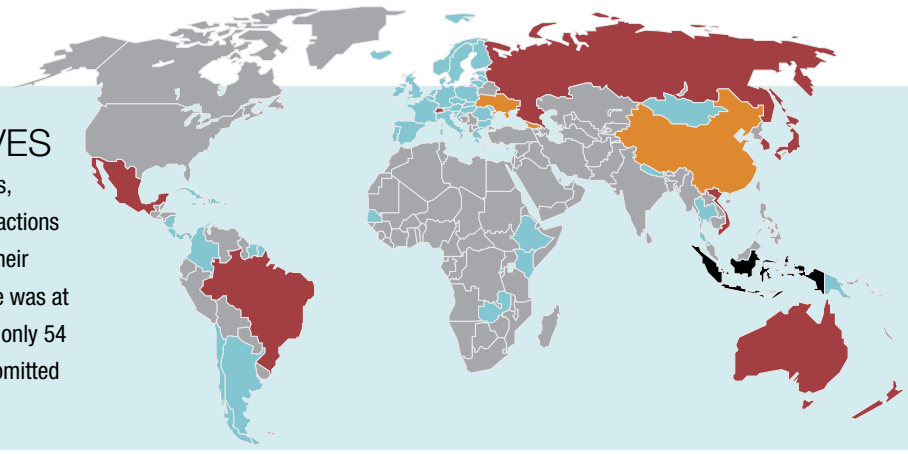
CLIMATE ACTION

The Paris Agreement commits the signatory countries to limiting the average global temperature rise to 1.5 °C, or in any case to keep it well below 2 °C, as compared to pre-industrial levels. As a contribution to the goals of the agreement, the countries have presented national climate action plans (nationally determined contributions, NDCs). However, these contributions are as yet insufficient to achieve the agreed temperature targets. According to the estimates of the Climate Action Tracker (CAT) in 2100, keeping current policies unchanged there would be a median increase in temperatures of 2.9 °C; even considering the targets and pledges made by governments to date, the median increase should remain at around 2.6 °C.





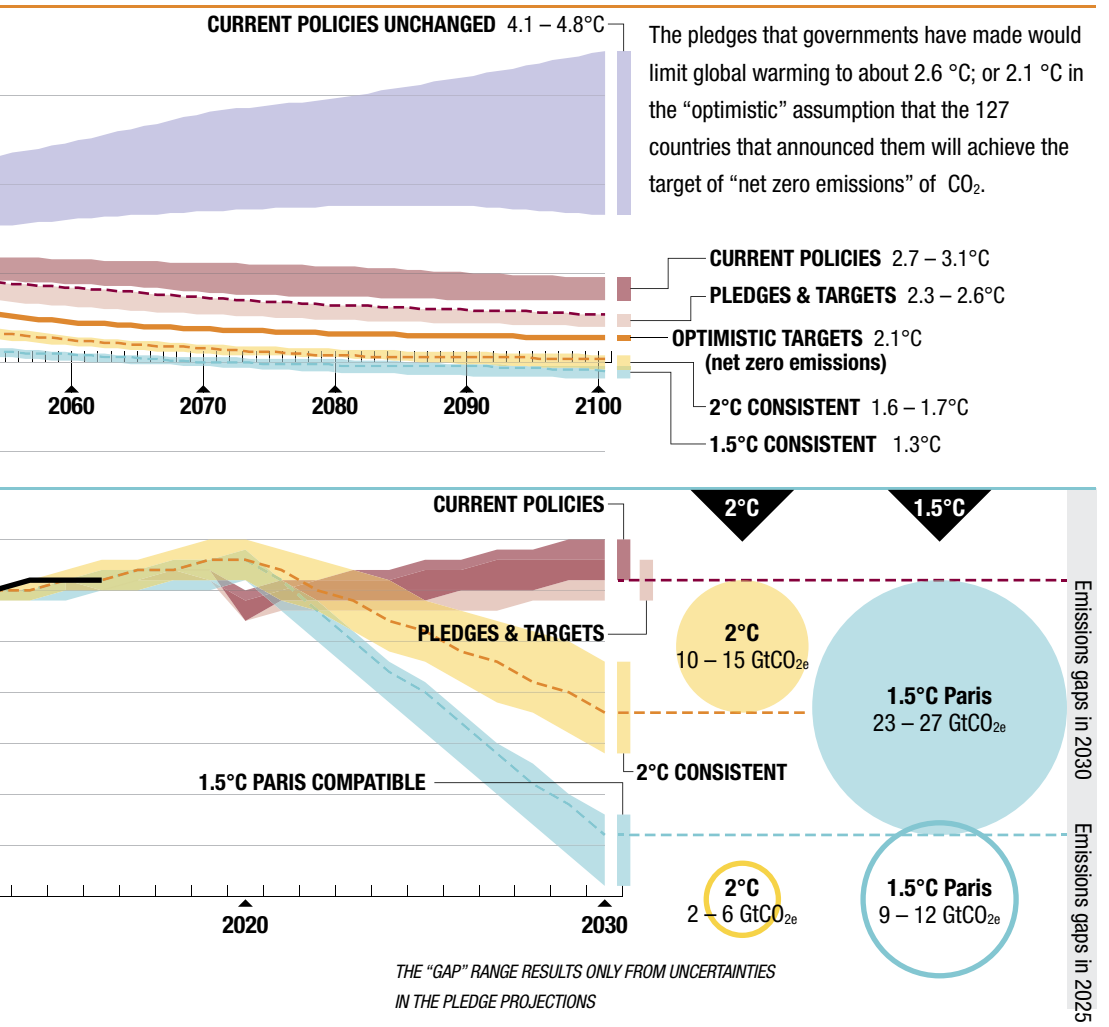




CLIMATE OBJECTIVES

To achieve the Paris Agreement goals, countries must update their climate actions (NDCs) every five years, increasing their ambition over time. The first deadline was at the end of 2020, but at the moment, only 54 countries (including the EU) have submitted updated targets.

the time horizon of the "Nationally Determined Contributions," NDCs, after 2025 (which must be shared). The focus must be on adaptation—largely neglected in favor of mitigation—and on a fund to cover climate damage, especially for the least developed countries. We must then organize climate finance capable of supporting the transition of these countries, often held back by limited investments and by high risk premiums for green investments, buffering in addition the brutal impact of the pandemic. Finally, it is fundamental that we define long-term objectives and strategies that are consistent with the target of 1.5 or 2 degrees by 2100, before the time window to implement them effectively closes.



STATUS OF THE 2020 NDC UPDATE PROCESS

49 countries have submitted new NDC targets (48 countries plus the EU27):

- 39 countries have submitted stronger NDC targets (38 countries plus the EU27)
- 10 countries did not increase ambition

4 countries have proposed new NDC targets:

- 3 countries have submitted stronger NDC targets
- 1 country did not increase ambition

110 countries have not updated targets

The Paris Agreement, however, is of a hybrid nature, tending to focus on non-legally binding aspects. Considering also the limited effectiveness of international agreements on the environment (not only the Kyoto Protocol but also, for example, CITES, a treaty to protect endangered plants and animals), national policies will actually be decisive, both in terms of absolute reduction of emissions and in the definition of environmentally, economically and socially sustainable models of decarbonization. Therefore, we examine below the policies of the four main global emitters (China, the United States, the European Union and India, in descending order of CO_2 emissions).

CHINA

In the context of the COP, China has traditionally led the G77, the group of emerging countries that puts pressure on industrialized countries to shoulder their responsibilities for historic emissions and make more funds available for climate finance. However, its impetuous economic growth has rendered this position unsustainable, and in fact China has gradually taken on greater responsibility for the climate. The pinnacle was reached with Xi Jinping's December 2020 statement pledging to reach a peak in emissions by 2030 and carbon neutrality by 2060. Beyond the narrative, China has also contributed concretely to the decarbonization process, investing heavily in low-carbon energy sources (second only to the EU in terms of absolute values for the period 2010-2019). The investments have also been motivated by the geo-economic goal of achieving leadership in various sectors, such as photovoltaic panels in the 2000s and, more recently, electric vehicles and batteries. However, there is a disconnect between the declarations and strategic investments on the one hand and continued support for carbon-intensive sectors on the other.

China essentially invests in everything and requires increasing quantities of every energy source, from the most to the least polluting. Theoretically, China would have to shut down all of its coal-fired power plants by 2040 to meet the target of limiting global warming to 1.5 degrees. Despite the proclamations, the country is instead building new ones, moreover with accelerated approval of new projects in 2020. Choices in China have a huge impact: China currently consumes half of the coal used globally and is responsible for nearly 30 percent of the world's CO_2 emissions. China also finances a quarter of coal-fired power plants under construction overseas, and the ambitious Belt and Road program is decidedly carbon-intensive. In the context of future negotiations, it will be important to monitor China's positioning on issues such as the carbon price and taxonomies for green finance. There will be international pressure to create a timeline for the decommissioning of coal-fired power plants, especially on countries with climate neutrality goals, but while these pressures are expected to have an effect on other Asian nations such as Japan and Korea, China does not seem willing to yield.

UNITED STATES

With the election of Joe Biden, the United States has regained a leadership position in climate change negotiations that had been lost in the Trump years. This will lead to their playing an increasingly important role in the months leading up to COP26. The United States will seek both to push other states to raise their ambition through climate diplomacy, and to promote reforms of global economic and financial governance to incorporate principles useful in the fight against climate change. More attention is expected on divisive issues such as insufficient

green finance effort (including private investment), climate adaptation funds and the mechanism to address the losses and damage from global warming in developing countries. It will also be interesting to see how the plans to create a solid transatlantic climate partnership will materialize, given the American opposition to increasing carbon prices and possible US-EU geo-economic competition in certain supply chains, such as hydrogen and batteries.

Meanwhile, the new president readmitted the United States to the Paris Agreement with one of his first executive orders and the United States will organize a climate summit on April 22. The United States is expected to announce a new voluntary national contribution by COP26. However, reaching a credible target will require careful internal consultation of all stakeholders, which could take time. In the election campaign, Joe Biden promised climate neutrality by 2050, the complete decarbonization of electricity generation by 2035 and the efficiency improvement of four million buildings. To finance these plans, the proposal presented during the election campaign called for an increase in the corporate tax from 21 percent to 28 percent.

In the first months of Mr. Biden's government, the priority was to manage the pandemic. The USD 1.9 trillion stimulus package approved in February focuses on helping families and businesses hit by the crisis, but it is not enough to stimulate green economic growth in the long term. This goal is instead pursued by the USD 3 trillion infrastructure plan that is about to be presented by President Biden's team. This plan foresees various expense items, including the upgrading of the electricity network and charging stations for electric vehicles. However, there is risk of a dilution of efforts. The plan is complicated by the debate on how to finance it, as US public debt is increasing and President Biden has pledged not to raise taxes for those earning less than USD 400,000 a year.

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Hydrogen fueling positions at a gas station in Fountain Valley, California. Hydrogen could play an important role in fighting climate change, but it has been slow to gain ground due to its high costs.

Workers install solar panels in Mumbai, India. India aims to install 175 GW of renewable capacity by 2022 and 450 GW by 2030.

EUROPEAN UNION

In the years following the signing of the Paris Agreement, the European Union confirmed its climate leadership, but engagement has increased considerably with the new Commission led by Ursula von der Leyen, which, through the Green Deal, has included under the umbrella of decarbonization not only energy policies, but also industrial and agricultural policies (with the Farm to Fork Strategy). The promotion of a systemic approach to decarbonization was one of the first and most important achievements of the new Commission, which a year and a half after its inauguration has already outlined numerous proposals to this effect—from the vast strategy for energy system integration to the strategy for the circular economy and the strategy for industry promoted at the beginning of 2020 (and already under review due to the pandemic). The Commission has also raised the ambition of European targets, agreeing in December 2020 on a 55 percent reduction in emissions, compared to the previous 40 percent; this increase is fundamental to achieving the new Commission's central climate policy goal of full decarbonization by 2050, a notable change from predecessor Jean-Claude Juncker, who largely neglected the EU's long-term goals. In this regard, the pandemic has been both a challenge and an opportunity for the current Commission, which has managed to channel a substantial part of the recovery funds under the umbrella of the Green Deal; 30 percent of the Next Generation EU funds (NGEU, which total EUR 1.8 trillion) must be dedicated to climate action, and the national plans must respect the principle of "do no significant harm" to the environment (DNSH). The mobilization of these funds has also reduced the traditional opposition of the countries of Central and Eastern Europe—Poland in particular—towards climate policies; however, it will not be easy for the Commission to effectively monitor use of these funds in a manner consistent with achieving climate objectives.

The European Union also faces a complex situation in terms of global climate diplomacy. The US return to the scene is critical to the success of the Paris Agreement, but it obliges the Union to share the leadership that it failed to consolidate unequivocally during the absence of the Trump administration. Faced with increasingly fragile transatlantic relations, a lack of coordination on key issues such as the imposition of a carbon tax—an issue that both the Commission and several member states, such as France, are already urging strongly—risks transforming this potential cooperation into a risky competition or even a small carbon trade war. Also, the positive climate cooperation thus far with China may have suffered a setback following the sanctions launched by the EU in March 2020 and promptly responded to by a Chinese counterattack. This conflict could easily sink the China-EU Investment Agreement (key to regulating the climate impact of trade) and, in general, will cool relations between the two at a key moment for the future of the Paris Agreement. Finally, the EU will have to try to become the leader of a broader alliance in the climate field, engaging above all Sub-Saharan Africa. This objective is central to exploit the opportunities of the energy transition and to consolidate the EU's soft power, but competition with regional powers, and especially with China, remains extremely high.

INDIA

The Indian approach to implementing the Paris Agreement suffers from an ambivalence similar to that of China. India presented ambitious voluntary national contribution targets, goals that would reduce the carbon intensity of GDP by 33-35 percent and reach 40 percent of electricity generation from non-fossil sources by 2030. The policies in place, and in particular the targets to install 175 GW of renewable capacity by 2022 and 450 GW by 2030, should allow India to achieve its targets. The most promising developments in India involve solar power, including off-grid solutions in agriculture, such as solar powered water pumps. Narendra Modi's government has already made enormous progress in terms of access to energy, showing that India has an extraordinary ability to implement ambitious plans in a short time, including in the energy sector. As in China, however, this promising picture contrasts with the Indian government's support for coal. Not only is there no decommissioning plan, but the government is planning additional coal capacity and has encouraged private investment to stimulate coal production in national mines, demonstrating its prioritization of security of supply and energy independence. In view of COP26, it will be interesting to monitor India's positioning on issues such as emission credits, fossil subsidies and the decommissioning of coal-fired power plants; India's position on decommissioning could be similar to that of China. In general, it will be important to monitor how India intends to spend its stimulus package, which is equivalent to 10 percent of GDP. According to preliminary indications, the country could use this opportunity to develop national supply chains in electric mobility and in the production of renewable energy, thus becoming an impressive player in the growing global competition in this area.

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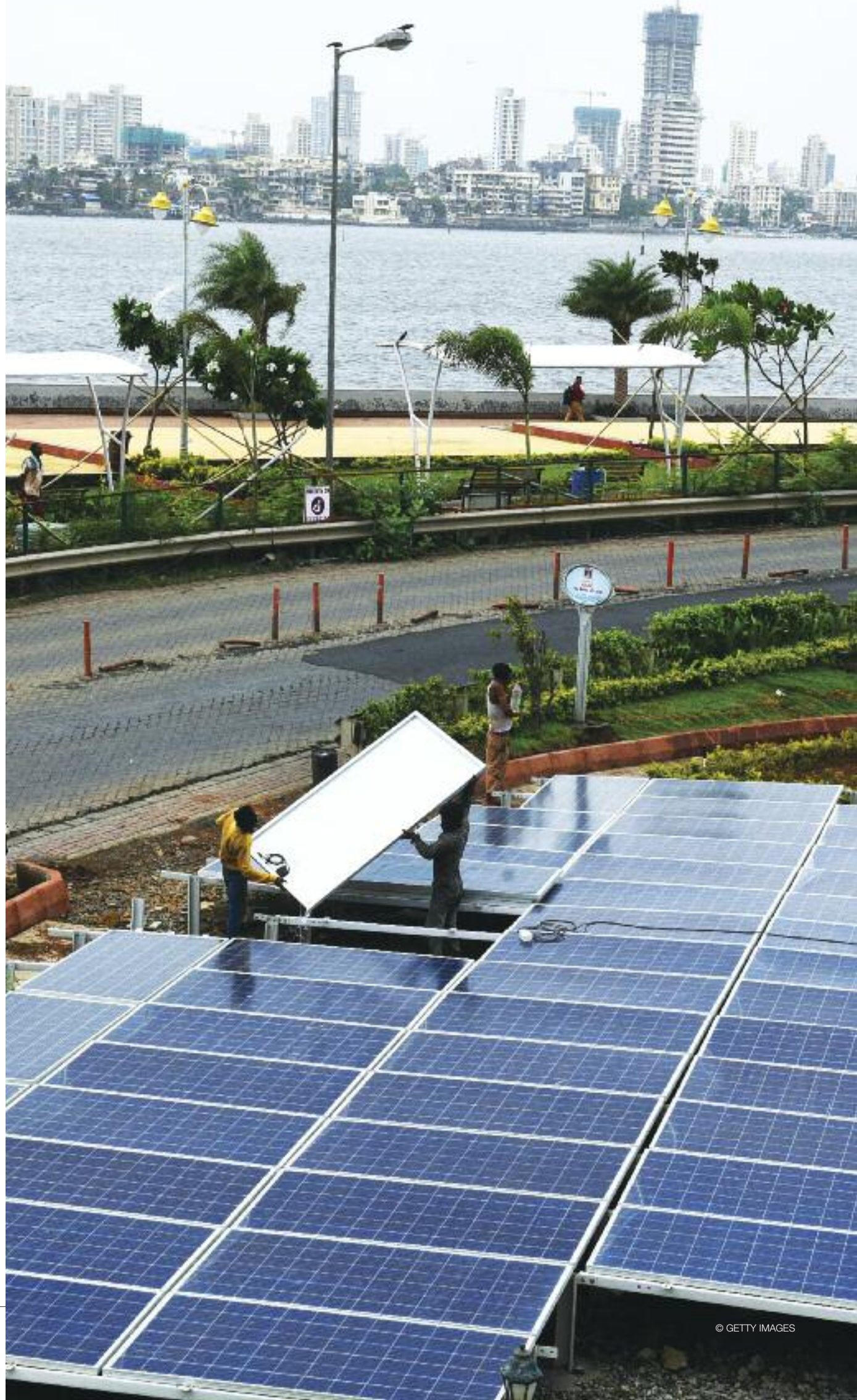


NO MORE EXCUSES

by **Marina Andrijevic**

THE COST OF GLOBAL DECARBONIZATION IS WELL WITHIN THE BUDGETS ALLOCATED BY GOVERNMENTS TO RECOVER FROM THE PANDEMIC. OUR ABILITY TO PREVENT CLIMATE CHANGE WILL DEPEND ON HOW THE STIMULI ARE USED

SCIENTISTS, pundits and policy makers draw many parallels between climate change and the Covid-19 pandemic. Among them, an overwhelmingly large pool of voices demands that the economic recovery in the aftermath of the pandemic be green. The rationale for the coupled view of these two crises is compelling. To avert future pandemics, we need better stewardship of the planet. The much-needed creation of job opportunities and boosting innovation can be done through investments in clean energy technologies and climate-friendly recovery. But it boils down to one proposition: the nature of the recovery from the pandemic could be a dealbreaker for our ability to prevent dangerous climate change.

When governments started coming up with bold pledges for dealing with the economic effects of the pandemic, my colleagues and I unpacked one aspect of the recovery planning. We found ourselves awestruck by the outcome of what was essentially a comparison between two numbers. We put side-by-side the fiscal stimulus packages in response to Covid-19 and the yearly investments into low-carbon energy necessary to keep global warming in line with the goals of the Paris Agreement. In a paper titled "Covid-19 recovery funds dwarf clean energy investment needs" published in *Science* last October, we show that decarbonizing global economies is well within the budget of what governments are putting forward for the recovery.

ENERGY DECARBONIZATION IS CRUCIAL

To keep their economies and livelihoods afloat, governments have to prioritize supporting the healthcare systems, managing schools, and ensuring employment opportunities. Yet, spurring the economic activity to meaningfully recover will require investments beyond the most acute needs. Our analysis focuses on decarbonizing the energy sector, which is currently responsible for about two-thirds of economy-wide greenhouse gas emissions. The energy sector is therefore the dealbreaker for meeting the goals of the Paris Agreement. Keeping the global mean temperature increase below 1.5 or 2 °C hinges on steep reductions in the use of fossil fuels and a rapid shift to renewable low-carbon sources, such as solar and wind

power, as well as improvements in energy efficiency.

In our analysis we make a concrete case for how the Covid-19 recovery funds injected into the backbone of every economy can be aligned with ambitious efforts to reduce emissions. Governments can play the key role to mobilize private investment by channeling stimulus into dedicated public financing mechanisms. Liquidity measures for development banks can help them to proactively support low-carbon investments, particularly in developing countries, and through that reduce perceived risks faced by private investors. They can support policies, incentives, rebates and guarantees and tilt the playing field in favor of economic activity powered on clean energy.

AN UNPRECEDENTED ECONOMIC STIMULUS

When the paper was published, governments had committed more than USD 12 trillion to support the struggling economies. Since then, fiscal measures surpassed USD 14 and will likely increase further, not least because of the expected large fiscal package from the new US administration. The current global stimulus adds up to 16 percent to the world's GDP in 2019 (2019 was the reference year in our paper) and is multiple times larger than what was put forward in the aftermath of the global financial crisis in 2008-09.

We contrasted this unprecedented sum of money with the investments needed to decarbonize the global energy sector in a Paris Agreement-compatible pathway to a 1.5°C world. Our model estimate is that total energy sector investments amount to around USD 1.4 trillion globally between 2020 and 2024, or about 10 percent of the stimulus packages. But this is the aggregate global energy sector investment. Compared with a pre-Covid business-as-usual scenario, the additional investments into a green transformation to align with the Paris Agreement are about 300 billion per year. This is equivalent to a mere two percent of the total pledged stimulus to date, or 10 percent cumulatively over the next five years.

Putting the world on a pathway to meet the Paris goals requires not just additional investments, but also massive divestments from fossil fuels. In the context of the recovery, avoiding the

lock-in into polluting energy sources is just as important as ramping up investments into renewables. Together with the 300 billion dollars annual increase into low-carbon energy, investments into fossil fuels need to be reduced by 280 billion dollars per year for a Paris compliant pathway. The 20 billion annual difference between these two estimates—which is essentially the net shift in total energy system investments from current policy projections towards achieving the 1.5°C goal of the Paris Agreement—makes up less than 0.2 percent of current global stimulus. That is just 1 percent in total over the next five years.

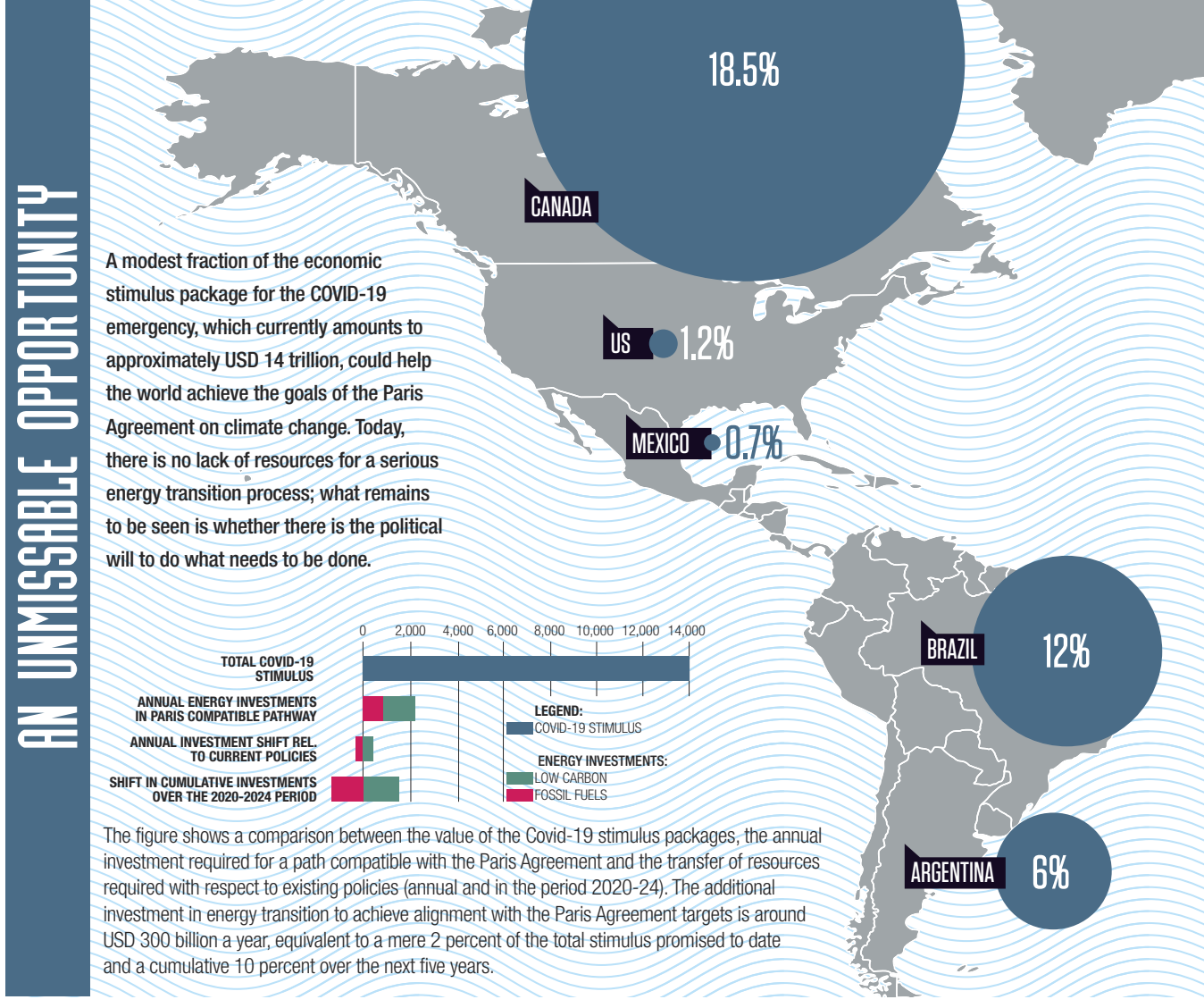
AN IMPORTANT STEP TOWARDS ACHIEVING THE GOAL

This would not mean that energy systems will be fully decarbonized within five years, but that with these annual investments, the global economy would have made an important and positive step towards limiting climate change. A recent study published in *Nature* issues another stark warning of stranded assets if the economies bounce back on fossil fuels, particularly coal, whose prices have been decreasing with falling emissions. The low prices of fossil fuels are an opportunity to remove subsidies and enact measures that would support expansion of renewable energies.

To be clear: climate change does not end with cleaning up energy systems. And not all low-carbon energy investments are expected to be made by governments. However, the comparison we make is an indication of the difference in orders of magnitude. It also illustrates what is possible when a crisis is taken seriously.

Fast forward six months since our analysis was published, many parts of the world are still in lockdowns and often on the brink of human and infrastructural limits to deal with the pandemic. There are also risks that governments will unconditionally support fossil fuel industries. But the world has changed in two important ways since then. The first is the development of effective vaccines, which offer a ray of hope that the pandemic might be coming to an end. The second is that Americans elected Joe Biden as president. He started the term by signing executive orders to get a grip on the raging pandemic and to begin damage control after Trump. Markets are responding positively to the prospects of normality from the inoculation underway in many countries.

Meanwhile, the crisis that has been there before and will outlive the pandemic is only getting more pronounced. Year 2020 tied with 2016 as the warmest year on record. Extreme weather events battered different parts of the world with typhoons, floods, hurricanes, wildfires and most recently polar temperatures in much of Europe and North America. The drop in emissions caused by the disruptions from the pandemic was likely temporary and will not have an impact in the long term unless the economic recovery is powered by clean fuels.



The figure shows a comparison between the value of the Covid-19 stimulus packages, the annual investment required for a path compatible with the Paris Agreement and the transfer of resources required with respect to existing policies (annual and in the period 2020-24). The additional investment in energy transition to achieve alignment with the Paris Agreement targets is around USD 300 billion a year, equivalent to a mere 2 percent of the total stimulus promised to date and a cumulative 10 percent over the next five years.

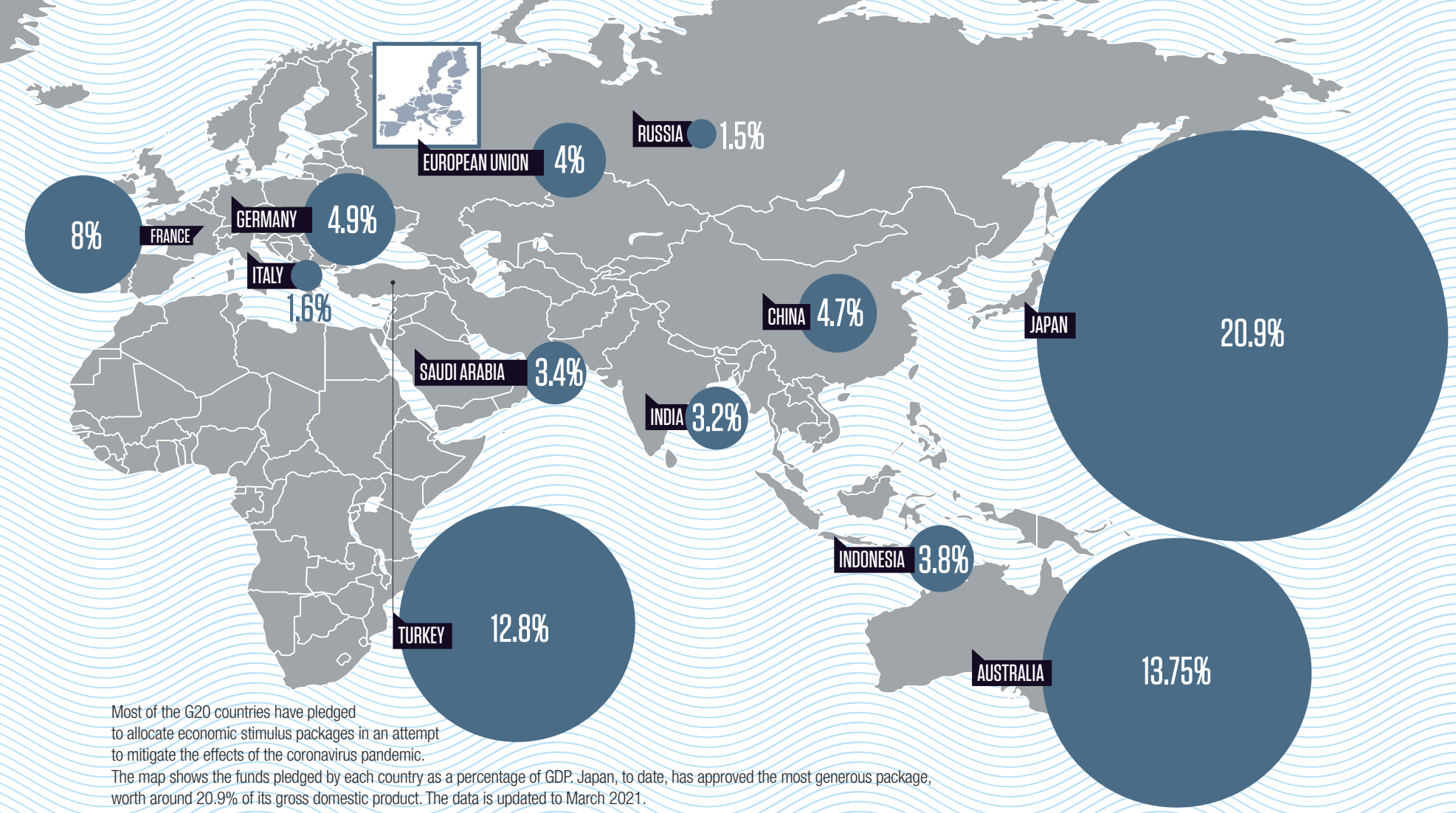
ALL EYES ON THE USA AND CHINA

President Biden resuscitated the global climate policy arena by re-joining the Paris Agreement and by setting up a powerful delegation of both climate veterans and freshly minted experts to join the global leadership in the fight against climate change. These developments are reasons for cautious optimism, and the world will be closely watching the White House climate summit on April 22, 2021 with the hope that the US will announce a net-zero target by 2050.

All eyes are on the US in the context of the green recovery too. While the US stimulus package was the largest in the world from a single country during Trump's term, it was devoid of provisions for a green recovery. Signaling a change of course, President Biden promised generous fiscal support for green investments during his campaign and is now bracing for a congressional scramble to pass a more than two trillion dollars plan targeted at infrastructure, transport and the power sector that will also "address the climate crisis head-on."

Some of the largest economies such as China, the EU, South Korea, Japan have already announced their long-term targets to reach carbon neutrality. Together with a large number of smaller countries and with the expectation that the US will soon join the club, about 60 percent of the world's emissions will be covered with net zero targets.

Even the climate wonks were somewhat taken by surprise by



Most of the G20 countries have pledged to allocate economic stimulus packages in an attempt to mitigate the effects of the coronavirus pandemic. The map shows the funds pledged by each country as a percentage of GDP. Japan, to date, has approved the most generous package, worth around 20.9% of its gross domestic product. The data is updated to March 2021.

Source: Statista

China's commitment to reach carbon neutrality by 2060. But the most recent CO_2 monitoring indicated that China's emissions bounced back to levels higher than in the pre-pandemic era. While long-term ambitions are welcome, this a stark reminder that governments' near-term actions are critical. Lack of ambitious action and further lock-in to fossil fuels will render the Paris Agreement goals unattainable. The recent UNFCCC synthesis report is a stark reminder of the inadequacy of the 2030 targets currently on the table.

Sound diplomatic relations between the US and China can be partly credited for the success of the Paris Agreement. Ahead of the COP26, the peer pressure between the world's two biggest emitters will be instrumental in putting the Paris goals into practice. They should now work together on consolidating the pandemic recovery plans with climate action to double down on reducing emissions in the near-term.

INTERNATIONAL COOPERATION IS ESSENTIAL

Cooperation must also be extended beyond the largest emitters. In our paper we indicated large regional disparities between countries, both in their capacity to address the Covid-19 crisis and in investment needs for clean energy systems—especially when considered as relative shares of economies. The US and the EU have pledged the most funds for their post-pandemic recovery but have proportionally the lowest low-carbon energy investments needed for switching onto a Paris-compatible track. Meanwhile, emerging economies such as India have committed less funding for pandemic recovery but require proportionally more investments to decarbonize their energy system while providing their populations with reliable, clean and affordable energy.

Just as the pandemic cannot be curtailed without an equitable global distribution of the anti-Covid jabs, climate change cannot be stopped without international cooperation either. New and old mechanisms of cooperation need to be mobilized to support developing economies in shifting to low carbon energies, not least because many countries will have even more people to lift out of poverty in the aftermath of Covid. Our paper ultimately makes a point that money is not a problem. Myopic thinking, however, might be.

We

MARINA ANDRIJEVIC
A research analyst within the science team of Climate Analytics, Andrijevic supports the economic core of the team with research and application of quantitative economic methods to climate change issues.

ISRAEL BEGINS LIFE AFTER COVID-19

PHOTOGALLERY

A FEW MONTHS AFTER THE START OF A VACCINATION CAMPAIGN THAT REACHED 60 PERCENT OF THE POPULATION IN RECORD TIME, ISRAEL IS TAKING ITS FIRST STEPS INTO A “POST-PANDEMIC” FUTURE. THE VIRUS HAS NOT YET BEEN COMPLETELY ERADICATED, BUT CASES HAVE FALLEN DRAMATICALLY AND THE GOVERNMENT HAS LAUNCHED THE GREEN PASS, A TOOL THAT ALLOWS RESTAURANTS, MUSEUMS, THEATERS AND GYMS TO OPEN THEIR DOORS TO PEOPLE WHO HAVE BEEN VACCINATED. THE PASS LASTS FOR SIX MONTHS AND CERTIFIES IMMUNIZATION AGAINST COVID-19, EITHER BY VACCINATION OR BY PRIOR INFECTION. WHILE ON THE ONE HAND, THE PASS HAS BEEN THE KEY TO ACCESS “NORMALITY” FOR A LARGE PROPORTION OF THE ISRAELI POPULATION, ON THE OTHER HAND, IT HAS RAISED A SERIES OF ETHICAL AND LEGAL QUESTIONS ABOUT INEQUITY IN THE DISTRIBUTION OF VACCINES AND THE LEGITIMACY OF EXCLUSION FROM SOCIAL LIFE OF THOSE WHO HAVE NOT WANTED OR BEEN ABLE TO HAVE THE VACCINATION. DAN BALILTY'S REPORT DOCUMENTS THE RETURN TO LIFE OF THE GREEN PASS PEOPLE.

Dan Balilty is a photographer, cinematographer and music producer. He began his professional photography career in 1999 working as a photojournalist for a local news agency in Jerusalem. Since then, he has worked as a staff photographer for Yedioth Ahronoth, The Independent and The Associated Press. Today, he splits his time between New York and Tel Aviv and is a regular contributor to the New York Times. His work has largely concentrated on daily and political life in Israel and the West Bank.

AT A CONCERT

People attend a concert by the band Mercedes Bend at a club in Tel Aviv on March 26, 2021. Israel's vaccination program has been remarkably swift and successful, immunizing 60 percent of the population in just four months. Israelis are now experiencing the start of a “new normal.”

THE GREEN PASS

Music fans display their Green Pass before entering a concert in Tel Aviv on March 26, 2021. The Green Pass is a six-month pass, issued exclusively to those who are fully vaccinated or have recovered from Covid-19. The paper or digital pass allows holders to access freely any kind of indoor or outdoor event.

AT THE STADIUM

Fans during a soccer match between Israel and Denmark in Tel Aviv on March 25, 2021. Israeli fans were able to return to the stands as early as mid-March, but only if they had been vaccinated.

STREET PARTY

A street party at a market in Tel Aviv on March 12, 2021. The Green Pass, which for many Israelis represents the entrance ticket to a "post-pandemic" society, leaves several ethical questions open.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AT THE OPERA Members of the audience at the Opera House in Tel Aviv on March 19, 2021. The “new normal” that Israelis are experiencing thanks to the high immunization rate achieved in the country, “excludes” from social life children under 16 (about two million people) who are not yet eligible to receive the vaccine.

AT THE RESTAURANT
A family gathering at a restaurant in Jerusalem on March 21, 2021. You must have a Green Pass to book a table.

EASTER PRAYERS
Worshippers at the Western Wall in Jerusalem during the Priestly Blessing of Passover on March 29, 2021. It is the first time since the beginning of the pandemic that thousands of people have returned to gather in prayer in this place considered sacred by the Jews.

AT THE BEACH

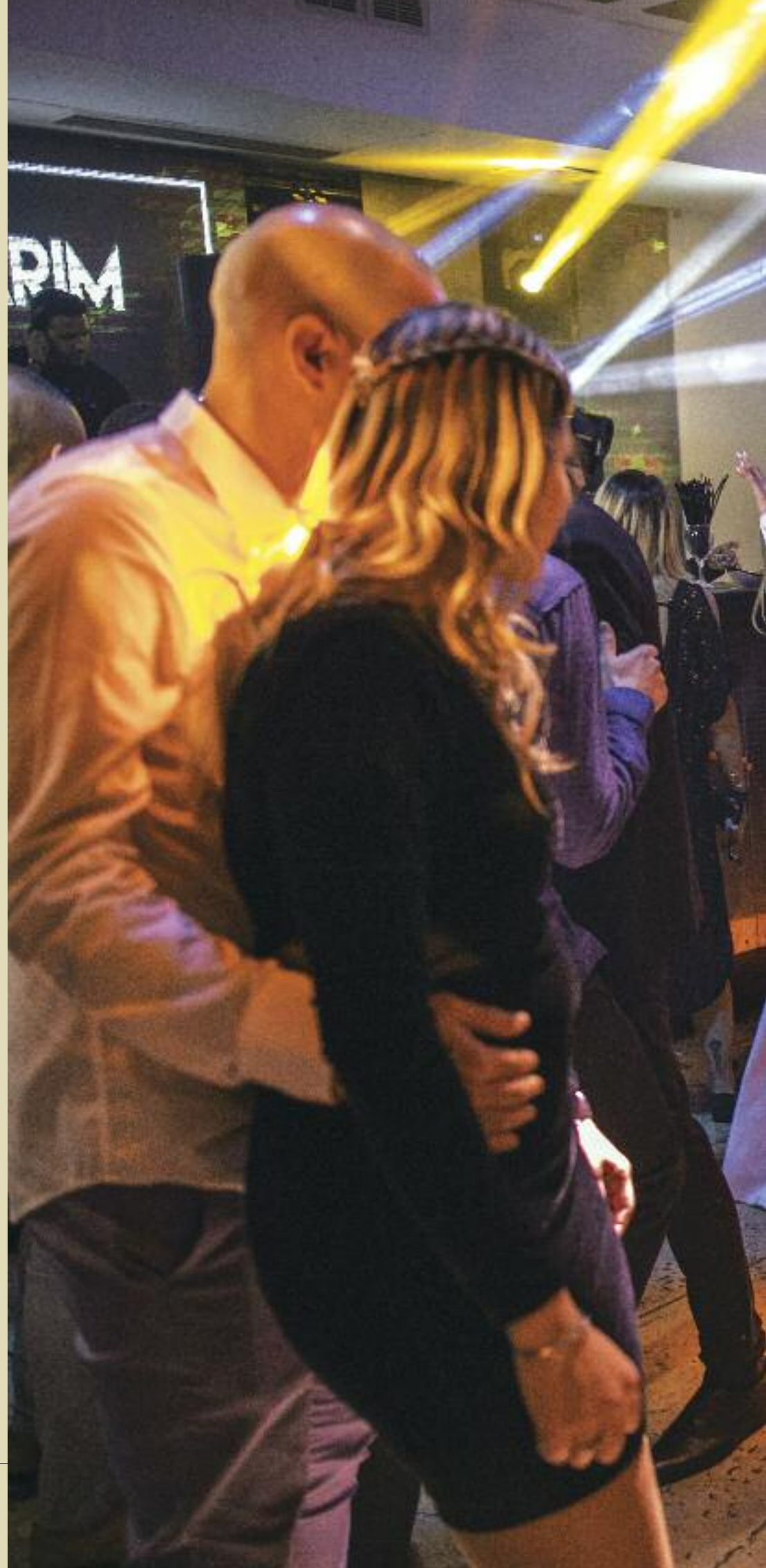
Beachgoers in Tel Aviv on March 23, 2021. Tourism in Israel is also expected to restart soon. According to the government's roadmap, in May entry to the country will still be limited to small organized groups, while from July it will be open to anyone who has been vaccinated, subject to a negative swab test.

AT THE BAR

People drink and socialize at a bar in a Tel Aviv on April 1, 2021. The managers of public places are required to check that their customers have a pass.

AT A WEDDING

A wedding in the southern city of Kiryat Gat, Israel, on March 24, 2021. Marriage in Israel is recognized by the state only if it is celebrated by the relevant religious institutions; Israeli citizens classified as “non-religious” are therefore forced to marry abroad, often in Cyprus, and then ask for the marriage to be recognized at home. During the pandemic, thousands of couples were unable to marry due to travel restrictions.



TIME to ACT

by **Nicola Graziani**

POPE FRANCIS POINTS THE WAY – NOT EASY BUT NOT IMPOSSIBLE – TOWARDS THE RADICAL RETHINKING OF THE DEVELOPMENT MODEL STARTING FROM ENVIRONMENTAL ISSUES. HUMAN BEINGS MUST BE THE KEEPERS OF THE COMMON HOME

THERE IS AN ERROR to be carefully avoided when considering Pope Francis's teaching on the environment and climate change, and that is that he total rejects the idea of progress. As if the world were a terrifying forge imagined by J.R.R. Tolkien, where a magician molds monstrous creatures at an industrial pace, without knowing that soon Nature, with an unstoppable march of ancient trees, will take back its rightful place by destroying the destroyers. Pope Francis does not negate the modern world: he asks for its re-foundation, with human beings placed at the center of creation. And, therefore, its guardians and defenders.

Not a human master, but a noble creature that owes its survival to other creatures. Without these creatures, the human person has neither purpose nor chance of survival. Hence the apocalyptic tones that he often uses in his interviews and in his books. But even the Apocalypse, for the Catholic Church, is not destruction: it is revelation, opening our eyes to the reality of things. No one has yet said at what time will be the end of the world and certainly it has not been foretold by Pope Francis, who, on the contrary, emphasizes the great capacity of humanity for self-regeneration. It will be the same this time, too, as long as it is what we want.

Giovanni di Paolo, The Creation of the World and the Expulsion from Paradise, 1445. Metropolitan Museum of Art, New York.

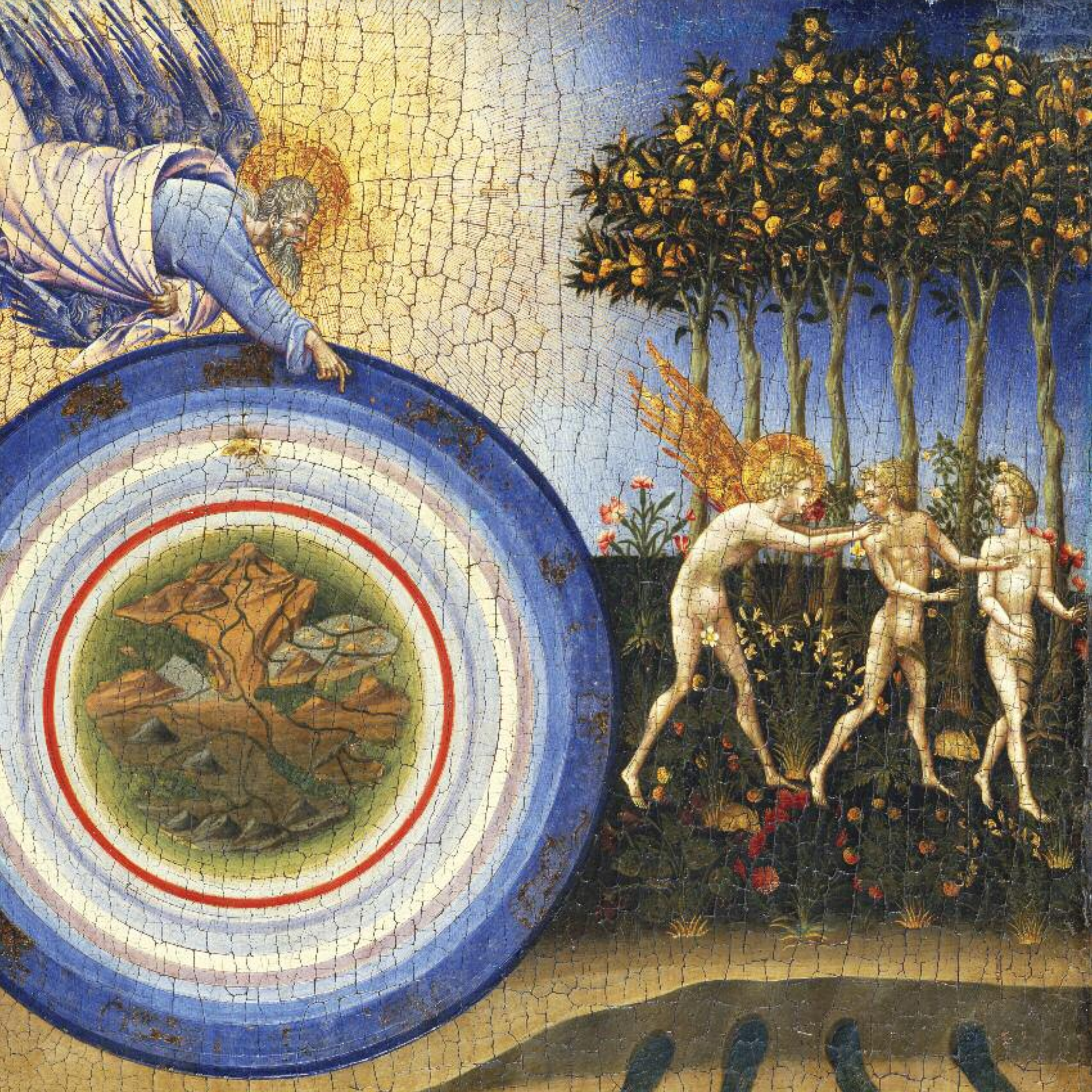
OVERCOMING THE "THROW-AWAY CULTURE"

In other words, what the Holy Father points to is the way - not easy but not impossible - towards the radical rethinking of the development model starting from environmental issues. The greatest of opportunities in a time that witnesses, in part because of the coronavirus pandemic, the rethinking of many beliefs and certainties no longer taken for granted as they still were two years ago. In this situation, between the Papacy and the contemporary world there is much more than an affinity of views: there is a possible if not probable unity of purpose. Let it be clear though: this is the time to act.

However, the regeneration must start with the acceptance of a fact: the worst enemy of the environment is what Pope Francis calls the "throw-away culture". That is to say, the idea that we can exploit for our own economic advantage the wealth of raw materials and even human beings themselves, then throw away the waste - be it material or human - without awarding it any dignity or possibility of recovery. This leads to dwindling material resources, trampling on the dignity of men and women, the Earth becoming an increasingly fragile paradise and, this time truly, a paradise lost.

Not by chance, again last February when he received the diplomatic corps accredited to the Holy See, Pope Francis blamed this "disposable" culture asking for "international collaboration for the care of our common home."

The first testing ground will be the next United Nations Climate Change Conference (COP26), scheduled for November



Laudato si'

I urgently appeal, then, for a new dialogue about how we are shaping the future of our planet. We need a conversation that includes everyone, since the environmental challenge we are undergoing, and its human roots, concern and affect us all.

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in Glasgow. The Pope's hope is for an "effective agreement in addressing the consequences of climate change".

MAN AS KEEPER OF THE EARTH

In the vision of Pope Francis, man is and must be the guardian of the Earth. Technology and the many abilities acquired give "those with the knowledge, and especially the economic resources to use them, an impressive dominance over the whole of humanity and the entire world," he writes in Laudato Si', the encyclical issued in 2015 and that even now represents the heart of his pontificate. "Yet by itself the market cannot guarantee integral human development and social inclusion," he adds. This happens because the logic of exchange, which is in itself positive in solving problems as well as creating wealth, is superimposed by the logic of maximizing profit which discards who and what is not consistent with it. This results in the exploitation of children, the abandonment of the elderly, slavery, the trade in endangered animal skins and "blood diamonds". Equally, climate change is a global problem, simultaneously cause and effect, of this logic. Today "it represents one of the principal challenges facing humanity," writes the Pope in the encyclical. Many of those who "possess more resources and economic or political power seem mostly to be concerned with masking the problems or concealing their symptoms."

Thus, a series of emergencies arises, none of which can be postponed and each, even taken individually, capable of upsetting the economic and social equilibrium. First of all, "access to safe drinkable water is a basic and universal human right, since it is essential to human survival and, as such, is a condition for the exercise of other human rights." Denying this access means denying "the right to a life consistent with their inalienable dignity". Equally, biodiversity is extremely delicate and extremely necessary: "Each year sees the disappearance of thousands of plant and animal species which we will never know, which our children will never see, because they have been lost forever." They too, like human beings and raw materials, are not so much exploitable resources as riches in themselves.

THE NEED FOR AN "INTEGRAL ECOLOGY"

Therefore, the ecological dimension cannot be separated from the social or political dimension. We need a veritable "integral ecology" that extends to new areas of civil coexistence. In fact, "if everything is related, then the health of a society's institutions has consequences for the environment and the quality of human life." There is no injury to solidarity and civil coexistence that does not have repercussions that impact the environment: "We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental." Furthermore, this integral ecology "is inseparable from the notion of the common good".

The common good, in the language of the Church, is the aim

Technology, which, linked to business interests, is presented as the only way of solving these problems, in fact proves incapable of seeing the mysterious network of relations between things and so sometimes solves one problem only to create others.

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and purpose of politics. In his numerous speeches on the common good, the Pope has never neglected to conclude his reasoning (as most recently in the Encyclical Fratelli Tutti, published in October 2020) with a personal reflection on good politics. This starts with the assumption by men and women of responsibility in relation to that which surrounds them, for towards the enhancement of the human beings through the exercise of their central role in the environment.

The Pope's invitation is "an honest and open debate so that particular interests or ideologies will not prejudice the common good." Unfortunately, "recent World Summits on the environment have not lived up to expectations because, due to lack of political will, they were unable to reach truly meaningful and effective global agreements on the environment." The request is for global governance, given that "environmental protection cannot be assured solely on the basis of financial calculations of costs and benefits" and that "the environment is one of those goods that cannot be adequately safeguarded or promoted by market forces". It goes without saying that multilateralism is a privileged formula in international relations, as is the strengthening of processes such as the Paris Agreement or institutions such as the World Health Organization.

It is within the community of nations, upheld by an internal democratic principle, that the solution of environmental and social problems must be entrusted to transparent political processes based on dialog. The international political class and that of individual states must thus be capable of renouncing the efficiency logic, the "mindset of short-term gain and results" which is instead dominant today. If they are able to do so, "they will attest to their God-given dignity and leave behind a testimony of selfless responsibility".

THE PRIMARY FUNCTION OF SCHOOL, FAMILY AND MEDIA

From this point of view, the anthropological and educational sphere is essential. Pope Francis underlines the primary function of school, family and media. To achieve a different lifestyle, it is important to know how to "bring healthy pressure to bear on those who wield political, economic and social power." This is what happens when the choices of consumers, aware of their own weight, "prove successful in changing the way businesses operate, forcing them to consider their environmental footprint and their patterns of production." Environmental and non-environmental education, in short, to teach daily gestures and habits, from reducing water consumption, to separate waste collection and even "turning off unnecessary lights."

Everything is tied together, in the vision of Pope Francis. At the root of everything, however, is the idea and the belief that the human being is the center of Nature, its most perfect representation. There is no opposition between one and the other, between humanity and that which surrounds it. This makes the difference between ecology according to Pope Francis and ecol-

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These situations have caused sister earth, along with all the abandoned of our world, to cry out, pleading that we take another course. Never have we so hurt and mistreated our common home as we have in the last two hundred years. Yet we are called to be instruments of God our Father, so that our planet might be what he desired when he created it and correspond with his plan for peace, beauty and fullness.

ogism as manifested in Western societies, especially in the second half of the last century.

Traditional ecologism is based on a concept of incurable hostility between man and woman on the one hand and Nature on the other, as if to trace a conflict that began with the struggle of the humans for their survival. A zero-sum game in which there is no chance of survival other than winning. Hence the substantial incapacity of the ecologist movements of understanding the goodness of social and economic progress that could go hand in hand with the defense of the environment. This lack of vision has led, in the end, to the almost total disappearance of the environmental defense movements from the stage of advanced democracies, with the consequent affirmation of a hyper-liberal conception of the market, insensitive to legitimate green issues.

The Church, having arrived at the problem with some delay, today stands as the critical conscience of a humanity that has forgotten its duties towards an Earth often exhausted by the excessive exploitation of its natural resources. In this context, the poetic words with which Francis opens his apostolic exhortation "Querida Amazonia" read like a call to the Church itself, first and foremost, to keep reminding us how delicate creation is.

CATHOLICISM AND THE ECOLOGICAL CHALLENGE

Ecology is indeed the third great challenge that Catholicism has had to face in this most recent part of its centuries-long history. Seventy years ago, there was the confrontation with real socialism and the anti-human (as well as anti-market) ideology of Marxism-Leninism. Having overcome this challenge, there was the battle of ethical values against cultural relativism, perhaps with poorer results. Now Pope Francis, who loves to talk about inculturation in the modern world, makes human and integral ecology the symbol of his pontificate. Unlike the approach used by its predecessors, however, he does not choose a head-to-head battle. Rather, he chooses slow but constant penetration, and perhaps also the waiting and patience with which Matteo Ricci stood in front of the entrance to the Forbidden City.

The result cannot be taken for granted; the possibility of defeat is ever present. Perhaps the scope of the anthropological operation is also even broader than in the past, precisely because of the proclaimed unity of the many themes implied and summarized by the term "environment".

NICOLA GRAZIANI
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THE RACE FOR GREEN SUPREMACY

by **Lorenzo Castellani**

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LEADING THE GREEN TRANSITION IS KEY TO DRIVING ECONOMIC GROWTH IN A CHANGING WORLD. THE NEXT CHAPTER IN THE CHALLENGE BETWEEN GLOBAL POWERS WILL BE ONE OF "CLIMATE WARS"

"WE WANT TO LEAVE a good planet, not just a good currency," began Mario Draghi in his speech in Parliament at the inauguration of the government. The words had already been preceded by the facts. The new government has created a Ministry of Ecological Transition, which is entrusted to Roberto Cingolani, a scientist with excellent management skills (demonstrated at the Italian Institute of Technology) and a solid business culture (experience in the top management at Leonardo) and Enrico Giovannini, an important expert in sustainable development with significant institutional experience, has been cho-

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sen to lead the Ministry of Infrastructure and Transport.
As always when analyzing Mr. Draghi's choices, we must view the government's actions in the international and European framework, including in relation to green economy policies. Too often in the public debate, the green transition is perceived exclusively in relationship to electric mobility, components and construction materials. While the green transition is concerned with all of the above, as they are fundamental to making increasingly crowded cities livable and to improving energy efficiency for the benefit of consumers, there is a deeper path that runs between capitalism, state and industry.

CLIMATE ACTION AND GEOPOLITICAL SUPREMACY

Just as digital technology has supported economic growth over the past decade, for the coming decades action on climate change is set to become a key global issue both politically and economically. Driving green development and controlling the required technologies will be essential to promoting economic growth in a changing world. Therefore, after the trade and technology wars of recent years, it is expected that the next chapter in the tensions between the US and China will be what we could call "climate wars." It's not just about saving the planet and making it more livable; in the great game of power, green strategies offer a road to global supremacy. At the end of the Second World War, the two great global powers began a technology, arms and space race, creating a complex of military and industry that provided a dramatic boost to economic development in the second half of the twentieth century. Today, after the great slowdown of the pandemic and the stabilization of digital capitalism, a path is being sought to deploy new economic, industrial and technological strategies. There is much more than electric cars and scooters at stake and, underlying it all, there is a philosophy different from alternate number plate systems or restricted travel. Bank of America has estimated that investments in the energy transition could increase to USD 4 trillion per year, investments that would revolutionize production and technologies. This turning point will also require the restructuring of employment, obliging countries to reshape their welfare and education systems. What will be left by the wayside in terms of employment by the old manufacturing will have to be offset by the new sectors.
In this process, every region of the globe has strengths and weaknesses, and the former can be used or exploited to exert pressure or gain advantages in the race for green superiority. China's wind and solar capacities will increase threefold and fourfold respectively by 2030, compared to two and threefold in the United States. The same goes for electric batteries, which will quadruple in China by 2025 and triple in the United States. It's not just about offense but also about defense. Tensions could escalate due to China's dominance in solar energy value chains and rare-earth metal production, and as a result of protectionist policies

The race for green supremacy could facilitate the rebirth of Europe, already a leader in climate policy with 70 percent of mutual fund assets, the world's most advanced green regulation and a significant advantage in terms of decarbonization.
In the photo, the European Parliament in Strasbourg.

focused on the internal market, such as the "Made in America" policy of recent years or in a more focused way, to the European drive to build internal supply chains for the production of electric batteries.

TOWARDS A EUROPEAN RENAISSANCE

While US-China relations have been the geopolitical and economic frontier for the past decade, Europe appears to have fallen behind. However, the green wave could mark a turning point, as Europe is already a leader in climate policy, with 70 percent of mutual fund assets, the most advanced green regulation and a significant lead in decarbonization. Consequently, climate wars could facilitate a European renaissance. Already 80 percent of the world's largest clean-tech companies are European and one third of expenditure in the national recovery and resilience plan has to be invested in the field of green transition. Green business, circular economy, renewable energy, building efficiency and renovation will be the sectors in which public and private companies, but also savers, will have to invest in the coming years.
Furthermore, whilst China is the most advanced country in terms of electricity, solar and batteries, the United States and Europe are investing in hydrogen, the new green gold. Both France and Germany have thrown themselves into research on the production of green hydrogen, clean and versatile energy. Paris has already set aside EUR 7 billion, while Berlin has put EUR 9 billion on the table. In addition, the Italian government has already included EUR 2 billion for the development of hydrogen in the Recovery Fund package. The European Commission has estimated an eventual joint financial commitment of EUR 120-130 billion.

AN OPPORTUNITY FOR ITALY

Italy also has a place at the table in Brussels, in particular through its state energy subsidiaries. This is also a fundamental opportunity to exploit Italy's natural geographical position in the center of the Mediterranean and connected with a vast network of gas pipelines to the rest of the world. Italy can become the hub of Europe and the tap from which energy flows north, thereby acquiring a new geopolitical role. Achieving this requires synergies between public and private sectors rather than subsidies. We will need infrastructure, technology and networks on which national industry champions can work.
In this scenario, the public policies developed by the government will be fundamental, as they will affect the economic life of Italy well beyond the end of the current legislature. We are in one of the rare moments in history in which reforms will have to survive the political cycle, affecting institutions in the long run. A good dose of pragmatism will be needed, as already demonstrated by Minister Roberto Cingolani, who pointed out, "It is obvious that green hydrogen is the decidedly preferable source of energy, but we must have the ability to think of a mix of energy carriers, which varies greatly over the years."
This flexibility and realism must also be demonstrated by administrative and financial entities and not just energy carriers. In the green revolution, just as the US created a complex of military and industry in the 1950s, there will be increasing osmosis between public and private and profit will be increasingly integrated with the guarantee of a superior quality of life. New combinations and collaborations will make the best use of European funds and relaunch the economy through the opening of new markets. In the "climate war" era, there are no longer a few, large, monolithic actors, but instead aggregate systems of capital, research, business and the state that will forge a new cycle of economic and human development.

LORENZO CASTELLANI
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EUROPEAN GREEN DEAL

QUO VADIS?

by **Marc-Antoine Eyl-Mazzega**

MORE THAN A YEAR after the first lockdowns across Europe and almost two years after the May 2019 European elections, the EU has experienced a war-type shock to its economy and the health of its citizens, albeit without physical destruction. The EU has overall proved resilient despite the pandemic crisis and Brexit trade deal negotiations. It has been fostering critically important energy and climate policies at the same time its institutions and the concept of European solidarity have been subject to unprecedented tensions. A recovery and resilience fund is being set up, yet the EU's economic cohesion has been further weakened by the crisis. Fostering cohesion and efforts for strategic autonomy in the energy sector and rapidly increasing public and private investment will be crucial if that transformation is to succeed.

TWO YEARS THAT CHANGED EUROPE AND CAN NOW CHANGE THE WORLD

Ahead of European elections two years ago, who would have bet that Germany, Poland and the Czech Republic would adopt the EU carbon neutrality objective by 2050, that an agreement on enhancing the 40 percent reduction of carbon emissions by 2030 objective to net a 55 percent reduction would be within reach, and that the European Commission (EC) would be mobilizing over 300 billion euros in grants borrowed on its own in financial markets, grants to be spent by member states (MS) in 2021-2023? The Green Deal has survived the pandemic and historical, unprecedented changes in policy ambition, speed,

FOR ENERGY TRANSFORMATION TO BE SUCCESSFUL, IT IS CRUCIAL TO PROMOTE COHESION AND EFFORTS TOWARDS STRATEGIC AUTONOMY IN THE ENERGY SECTOR AND TO RAPIDLY INCREASE PUBLIC AND PRIVATE INVESTMENT

scale, mobilization and support are on the table: not only is this a new program of sustainable growth aimed at fighting environmental, climate and sanitary degradations, it has also become an investment roadmap of the European recovery strategy, alongside the digital transformation. And who could have foreseen that European oil and gas majors would join utilities and other players in dramatically ramping up investments into low carbon technologies? These tectonic changes were brought by social pressure, growing awareness of the interplays between the climate and biodiversity crises, technological progress, the greening of finance and political elites starting to live up to these challenges. In a sign of changing times and with thanks to tough EU regulation, electric vehicles took a 10 percent market share in 2020, a robust growth in sales despite a gloomy automotive market. Last but not least, the global climate governance picture appeared to be in a stalemate when the world went into lockdown. The COP26 had to be postponed and only a small minority of countries had met the obligation to submit a revised climate pledge for 2030. Emissions suddenly declined, yet the first signs of the Chinese recovery were accompanied by a surge of coal demand, prompting concerns that the economic recovery would bring back emissions on a soaring path. The WTO was ineffective and US-China tensions were the highest in decades, and these factors marginalized climate issues. In 2021, global climate governance comes into a new light: China, Japan, South Korea, the UK and the EU have notably adopted a carbon/climate neutrality objective by 2050/60. Canada and Australia are also expected to raise their mid-term ambition, alongside the US, which will present a new National Determined Contribution (NDC) at the climate summit of 22 April 2021. These developments call for a reality check: Is the European Green Deal going to succeed? What are the conditions for that success and the key obstacles? And how should the EU position itself in relation to global climate governance and the US-China rivalry?

THE EU'S EVENTUAL SUCCESS RESTS ON ITS ABILITY TO FOSTER INTERNAL COHESION

Member States have very different energy and electricity mixes, natural resource endowments and economic structures. There is no single pathway to reach climate neutrality and every MS should choose its own journey, provided that it delivers and does not hamper the efforts of others. Of course, policies need to be closely coordinated to ensure cost-effectiveness. The large sequencing scheme should also be unified. First, decarbonizing the electricity sector will need to be pushed from 25 percent of end uses currently to well over 50 percent. The transport sector is the next milestone and substantial progress can be achieved in the road and rail segment over the 2020 decade, and e-fuels should be used in aviation even though it will inevitably be costlier than present fuel. Industry, agriculture and the residential sectors should make their contribution and efforts cannot wait, but it will be very long and difficult transition. Energy efficiency is now rightly identified as the central pillar of the transformation

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Green algae bioreactors, Arcos de la Frontera, Cadiz, Spain. Through the process of photosynthesis, the algae, cultivated intensively inside the bioreactors, biofix CO_2 molecules.

(renovation wave of over 300 million buildings), but practical and financial hurdles are still to be addressed and high consumption reductions are uncertain in the absence of deep behavioral changes. As of now, industry and agriculture decarbonization are the two other weak spots of the journey towards carbon neutrality.

MS should be able to decide which technologies will be needed. A different magnitude of effort depending on national circumstances should also be recognized, with some countries having to move quickly while others need more time as they have much higher emissions to abate, bigger challenges in terms of social acceptance and structural change, or a lower potential for affordable low-carbon energy production (hydro, offshore wind). The ultimate objective is to reach net zero, giving the possibility to reach neutrality later by individual MS, provided that this is compensated by offsets from others. What matters is that the European Commission helps by providing the rules for burden sharing, the sequencing of transition, the level of coordination and scale, and the optimization of overall system costs. This requires:

- Laying out financial and regulatory support for the right technologies and sectors where there is real need, given the chosen pathway and external competition;
- Triggering the right level of investments in low-carbon technologies with public subsidies and conducive regulation;
- Ensuring that finance can be mobilized for investments and that there is an optimal redistribution of costs and benefits among the states, regions, sectors and citizens.

There are manifold problems that may arise. Several MS want to drop nuclear benefits from a level playing field and insist that while being low carbon, nuclear waste contradicts the “do not harm” principle. Instead, they want to impose their renewables-based solutions on the rest of Europe. Other MS argue that they will need natural gas longer in order to reduce system costs while others want to reject gas and coal, going for the all-electric option. Controversies related to the taxonomy and its delegated acts reflect these issues and Europe should not contradict the rest of the world on either nuclear or gas. The taxonomy should also help industries in transition improve their operations, no matter if this is not fully green from the start. Of course, there will be challenges in aligning criteria and conditions among policies and instruments as well as with the climate and environmental urgency. But the point is the transition should not destroy jobs, industries and balances among MS, that is, social, economic and political cohesion. Otherwise, it will fail altogether.

Hydrogen will have to be a targeted complement to electrification, not a substitute. Its roll out requires public funding, but that should be carefully tailored to real and efficient needs. Priority should be given to existing carbon intensive production/uses such as aviation fuels, segments in industry and eventually, ammonia for the petrochemical sector or maritime segment. Its competitive large scale production will require all fuels as renewable electricity and water could actually be scarce and as efficiency losses and logistics mean higher costs. Overall, as stakeholders discuss the right balance between electrons and molecules, one should not underestimate the pace of change in electricity demand patterns with the electrification of transport and digitalization of the economies. Seeking to decarbonize without nuclear, or in pushing out gas from power generation too quickly as the penetration of renewables accelerates, or in planning for hundreds of terawatt hours of hydrogen imports looks questionable, if not irresponsible.

INDUSTRIAL DIMENSION OF THE ENERGY TRANSITION

In an evaluation in 2020, the IFRI (French Institute of International Relations) compares the data on energy transition in the industrial sectors of the European Union, China, United States and Japan.

Source: IFRI

TOTAL EMISSIONS 2018

THOUSAND TONS OF CO2eq

Source: OECD, JRC, Eurostat

6,676,650

1,238,342

3,758,426

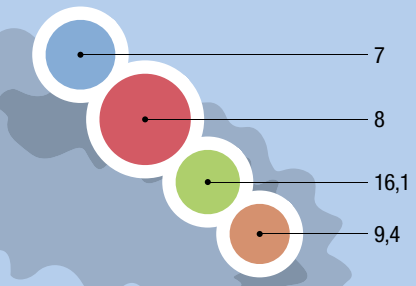
9,957,000

GHG EMISSIONS

GHG EMISSIONS PER CAPITA

2018 (TONS)

Source: OECD, JRC, Eurostat

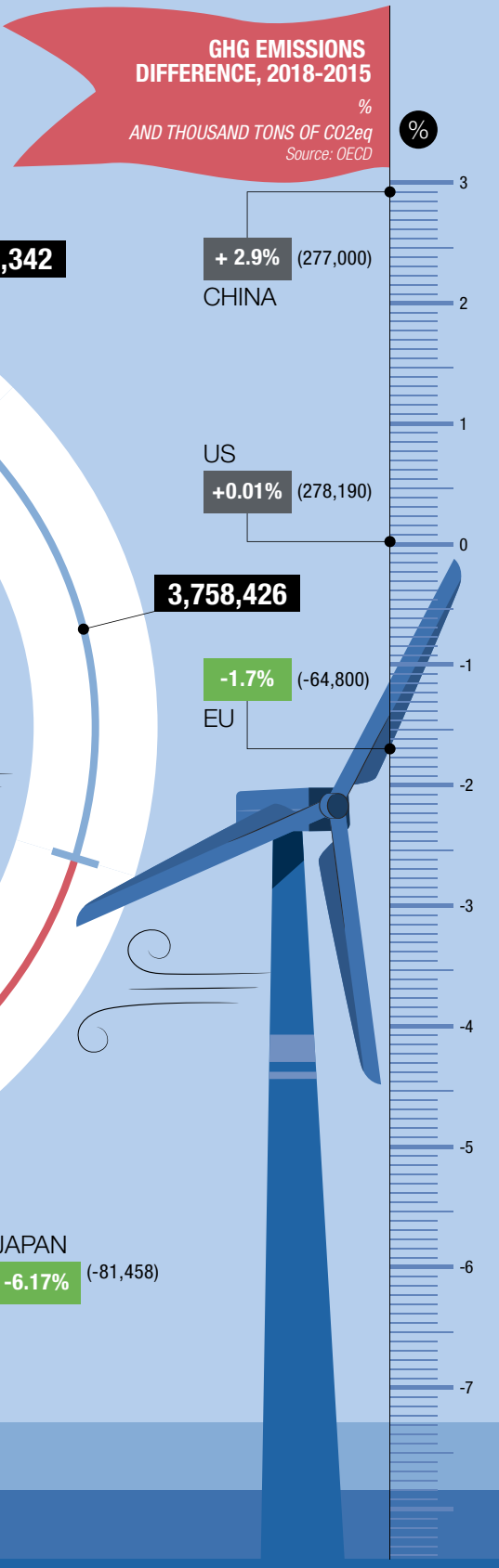


GHG EMISSIONS DIFFERENCE, 2018-2015

%

AND THOUSAND TONS OF CO2eq

Source: OECD



CHINA
+ 2.9% (277,000)

US
+0.01% (278,190)

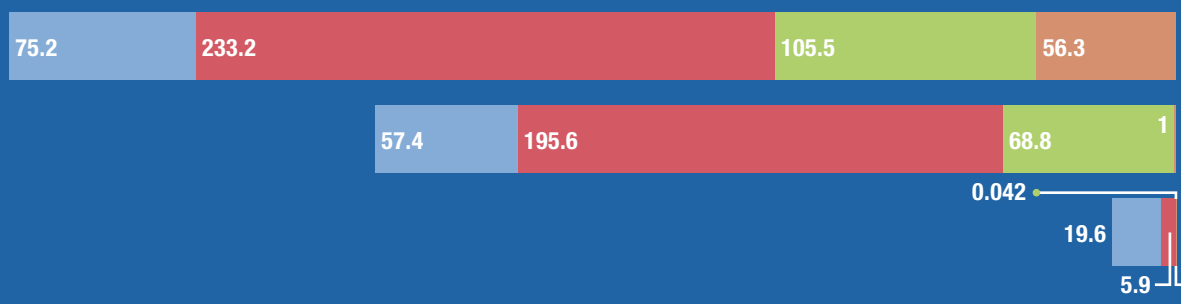
EU
-1.7% (-64,800)

JAPAN
-6.17% (-81,458)

INSTALLED RENEWABLES CAPACITY ADDITIONS

2013-2020 (GW)

EU
CHINA
US
JAPAN



SOLAR CAPACITY

Source: IEA, SolarPowerEurope, other industry associations

ONSHORE WIND CAPACITY

Source: (Industry associations, IFRI estimate, NDRC

OFFSHORE WIND CAPACITY

Source: Industry associations

Following the crises, structural challenges to the acceleration of the transition appear. Several MS face soaring public debt levels with less budgetary playing field, especially if interest rates rise. Millions of Europeans are poorer and facing social difficulties. Recovery funds may not be used to accelerate the transition, but rather to fill budget gaps, and robust new cross border value chains may not emerge. There is way too little information available about the plans of MS, and too many are late in attaining goals. Moreover, while governments are keen to take grants, they are not so eager to take loans. Recovery fund allocation will be conditional on at least 37 percent of money being allocated to sustainable projects and digital investments. The EC will also have to be the effective gatekeeper for ensuring that recovery funds are properly used while MS are responsible for laying out credible investment and reform plans. The risk is too slow, insufficient and uneven spending, and that would fail to give the technological boost needed and turn out as a missed opportunity for industrial renaissance and upward economic convergence. An independent energy and climate advisory body assessing European and policies from MS would be an efficient tool, notably with a more systematic approach to the CO_2 abatement costs of the different options.

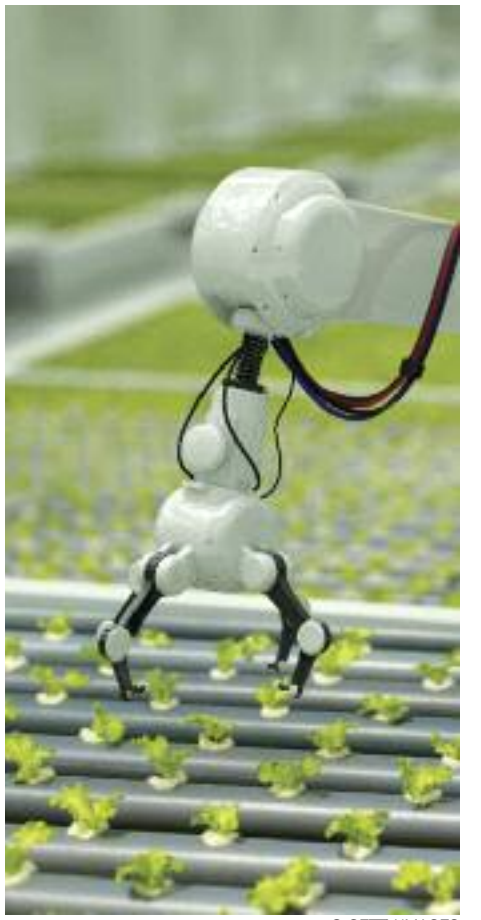
Cohesion is also paramount among regions, territories and cities—they are the blind spot of the Green Deal. They will have a crucial role to play yet lack funding and resources although the Just Transition fund is a new much needed approach to avoid entire regions falling further behind. Education and training will be essential and requires constant dialogue and adjustment at all levels to prepare the right skills for tomorrow. Lastly, the Green deal will have to deliver on the job front: more lasting, qualified, attractive jobs need to be created everywhere, not just in a few regions.

INDUSTRIALIZATION AND STRATEGIC AUTONOMY IN ENERGY AND DIGITAL SYSTEMS ARE CRITICAL

The crises have highlighted the role of value chain resilience and the importance of having European companies mastering critical components of value chains for current and future technologies that will determine Europe's economic and political sovereignty. Industrial policies for low carbon solutions and technologies are central to this endeavor. The EU has rightly been developing the Important Projects of Common European Interest (IPCEI) instrument and mobilizing for battery cells with the European Battery Alliance, as well as increasingly on recycling and mining, and now for electrolyzers. Horizon Europe or the Modernization Fund, for example, have been strengthened and the stability pact could be reformed. The need for combining the digital transformation with the energy transition is rightly identified, with initiatives on data centers, quantic calculators, space and artificial intelligence. Advanced economies will transform their worlds with artificial intelligence, data, smart systems and robotization.

More attention needs to be paid now to scaling up hydrogen, digital buildings, high efficiency individual and centralized cooling systems, small modular nuclear reactors, new highly efficient solar cells, all major equipment of electricity grids batteries, European mining, refining and battery recycling ventures and offshore wind systems. Major innovation and scale up efforts are needed in the field of electricity storage, recycling, semiconductors and solid state battery cells. Decisively, the EU needs to concentrate on a market design that triggers investments at the scale needed: a doubling for the power sector alone, a tripling for energy efficiency, not to mention industry! That requires walking a smart line: regulation can deliver quickly but the implied shadow carbon price varies, while a super high carbon price risks derailing the economy.

The decarbonization of existing industries will be costly and challenging to deliver. Europe needs robust steel, cement and petrochemical industries and outsourcing emissions would be fully inconsistent with Europe's climate ambitions. Support must come from clear and predictable targets, ecodesign regulation, financial support and smart and coordinated taxation. The carbon border adjustment mechanism may protect these industries from unfair competition (provided that free carbon allocation is progressively cancelled, which is a challenge for exporters), help replenish the EC budget and contribute to international climate finance. Should it not work out, a plan B is needed, one based on stricter ecodesign standards on emission-intensive products, consumption taxes coupled with environmental and social certificates and more direct grants or preferential loans to companies exposed to international competition that are making decarbonization investments. Overall, EU's competitiveness must be built around carbon and environmental footprints and strict standards.



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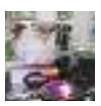
Robotic arm used to harvest hydroponic lettuce in a greenhouse. Hydroponic agriculture is more sustainable than land farming, as it saves 90% of water and cuts down on the consumption of fertilizers and herbicides.



Semiconductor factory, Nantong, Southeast Jiangsu Province. China aims to reduce imports of these small components, essential for technological development, to achieve self-sufficiency.

NAVIGATING THE STORM OF THE US-CHINA RIVALRY

The multiple crises have also fostered the systemic nature of the US-China rivalry. With China and the US committing to deep decarbonization and mobilizing recovery funds for that purpose, the technological race and competition for standards, markets and innovation will strengthen. EU cohesion and strategic action will be essential if the EU is to have a say and preserve its interests, which need to be clearly defined: ensuring that EU's acceleration effort does not open new vulnerabilities; protecting European companies and jobs from unfair actions and practices and helping them deliver the investment and technologies needed in Europe and abroad; and scaling up global decarbonization and biodiversity protection efforts to preserve the planet. Competition from China will toughen, especially with regards to low carbon mobility technologies and solutions, nuclear, offshore wind, smart and sustainable cities and everything related to internet of things and artificial intelligence. China is also expected to seek greater advantage and leverage from its strong, if not dominant, position in many critical metals and rare earths, and the 14th Five-Year Plan confirms China's focus on self-reliance. Competition from the US will be particularly tough in the field of industrial data, electricity storage, clean mobility, nuclear notably coupled with hydrogen, and CCS, especially in the context of the infrastructure package and large federal support for strategic industries.

The EU should be active, using trade, diplomacy and development aid, in order to promote a result-oriented global energy and climate governance agenda. That would include:

- Higher NDC commitments by leading economies, notably China, the US, South Korea, Japan, and Australia;
- A major initiative on plastic sobriety, recycling alongside efforts to reduce the carbon footprint of existing hydrogen and ammonia uses, which could be dealt with by the G20;
- Fostering efforts by the G20 for energy efficient appliances and standards worldwide and for finally phasing out fossil fuel subsidies, more than ten years after the Pittsburgh summit;
- Harmonizing green finance, notably extra financial disclosures, taxonomies, green bonds standards measures to fight greenwashing;
- Proceeding with a swift implementation of the carbon border adjustment mechanism for the steel, cement, electricity, fertilizers and aluminum industries, while ensuring full WTO compliance and strong coordination with trade partners;
- Stopping planning for new coal fired power plant projects, immediately ending coal power plants finance, closing ageing coal plants in China, the US, Japan, Korea and Australia and accelerating the German coal phase out;
- Ramping up funding for adaptation in emerging economies exposed to climate change;
- Creating a UN observatory of climate related changes, risks and threats with an alert mechanism and a response force;

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- Seeking the right balance between industrialization and protection from unfair practices and the need to seek open and transparent markets and trade;
- Engaging Sub-Saharan African nations into an engaged sustainable energy access partnership, with more conditionality, yet more tailored support measures and resources to scale up investments into grids, smart and hybrid systems, and resilient infrastructures;
- Leading a global efforts towards helping the suffocating mega cities to becoming more sustainable and resilient.

MARC-ANTOINE EYL-MAZZEGA
Expert in energy policy, he is Director of the Center for Energy & Climate, IFRI.

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THE EU'S GOAL

by **Brahim Maarad**

THE EUROPEAN GREEN DEAL AIMS TO ACHIEVE CLIMATE NEUTRALITY IN EUROPE BY 2050. THIS USED TO BE A CHALLENGE. NOW, WITH COVID-19, IT IS AN ABSOLUTE NECESSITY

"OUR GOAL IS TO RECONCILE the economy with our planet, to reconcile the way we produce and the way we consume with our planet and to make it work for our people." With these words on December 11, 2019 the President of the European Commission, Ursula von der Leyen, presented the Green Deal. It is the vision for a climate-neutral continent by 2050 and it is also a roadmap, with fifty actions, to reach this ambitious goal. The Commission had only been in office a few days and the Green Deal was not only its first act but also the guiding standard of its mandate. "It is on the one hand about cutting emissions, but on the other hand it is about creating jobs and boosting innovation," explained President von der Leyen. "We do not have all the answers yet. Today is the start of a journey. But this is Europe's 'man on the moon' moment." Three months later, the world was hit by the Covid-19 pandemic, turning the agenda upside-down, accelerating the path toward an eco-sustainable Europe. It was no longer a choice, but a necessity. A pressing challenge had been transformed into a unique opportunity.

A NEW STRATEGY FOR A JUST AND PROSPEROUS SOCIETY

The European Green Deal is the new growth strategy that aims to transform the EU into a just and prosperous society with a modern, resource-efficient and competitive economy that by 2050 will no longer generate net greenhouse gas emissions and in which economic growth will be dissociated from the use of resources. It seeks to protect, conserve and improve the EU's natural capital and protect the health and well-being of citizens from environmental risks and related consequences. At the same time, the transition must be just and inclusive. In practice, it will mobilize EUR one trillion in investments over ten years. To support the transition of countries most dependent on carbon-intensive economies, "from the coal miners of Asturias to the peat harvesters of the Irish Midlands," a Just Transition Mechanism has been set up that will mobilize EUR 150 billion. "People are at the heart of the European Green Deal. The transformation that awaits us is unprecedented and will only succeed if it is fair and benefits everyone. We will support the people and regions required to make the greatest efforts so that no one is left behind," explained von der Leyen to the European Parliament. "The Green Deal requires a huge investment, which we will transform into investment opportunities. The plan presented today is intended to mobilize at least EUR 1,000 billion and will the road ahead, creating a wave of green investments."


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According to the Commission's estimates, additional investments in the order of EUR 260 billion per year will be required to achieve the 2030 climate and energy targets, an amount equivalent to 1.5 percent of Europe's 2018 GDP. One quarter of the European budget will be linked to climate goals, and the European Investment Bank has set out to double its climate target from 25 percent to 50 percent by 2025 to become the European Climate Bank. In response to the crisis triggered by the Covid-19 pandemic, the EU has approved a Recovery and Resilience Plan (for a total of EUR 672 billion) which requires the beneficiary states to allocate at least 37 percent of the funds to the climate transition and this investment will be funded by issuing European bonds that will promote sustainable finance. The EU is set to become the first green bond issuer in the world.

The Green Deal action plan aims to boost the efficient use of resources to move to a clean, circular economy, restore biodiversity and cut pollution. To do this, all sectors of the EU economy will have to invest in environmentally friendly technologies, support the innovation industry, introduce cleaner, cheaper and healthier forms of private and public transport, decarbonize the energy sector, ensure greater energy efficiency of buildings and collaborate with international partners to improve global environmental standards.

In March 2020, the Commission proposed the first European climate law with which it intended to transform the objective set in the Green Deal into law and ensure that the European economy and society become climate-neutral by 2050. This means that all EU countries are legally obliged to achieve net-zero greenhouse gas emissions, mainly by reducing emissions, investing in green technologies and protecting the natural environment. The new EU goal for 2030 is to reduce greenhouse gas emissions by at least 55 percent compared to 1990 levels.

Also in March, the Commission presented a new strategy to help Europe's industry lead the twin transitions toward climate neutrality and digital leadership. It includes comprehensive measures to modernize and decarbonize energy-intensive industries, to support sustainable and smart mobility industries, to promote energy efficiency and to ensure a sufficient and constant supply of low-carbon energy at competitive prices. It also foresees a Clean Hydrogen Alliance, to accelerate industry decarbonization and maintain industrial leadership, followed by alliances on low-carbon industries and on industrial clouds and platforms and raw materials.

The European Commission has also adopted a new Circular Economy Action Plan, which focuses on design and production that support the circular economy, with the aim of ensuring that the resources used are kept for as long as possible in the EU economy. The measures proposed include implementing a sus-

GOALS

CLIMATE The EU will be climate-neutral by 2050. To achieve this goal, action is required by all economic sectors.

POWER Decarbonize the energy sector.
TODAY: the production and use of energy account for over 75% of EU greenhouse gas emissions.

BUILDINGS Renovate buildings, promote energy efficiency.
TODAY: buildings are responsible for 40% of our energy consumption.

MOBILITY Introduce cleaner, cheaper and healthier forms of private and public transport.
TODAY: transport is responsible for 25% of our emissions.

FUNDING

EUR 1000 BILLION Sustainable investments that will be mobilized over the next ten years to achieve the objectives of the Green Deal.

EUR 100 BILLION Investments that will be used in the period 2021-2027 to support workers and citizens in the regions most affected by the transition.

EUR 260 BILLION The additional investments that will be needed every year to reach the 2030 climate and energy targets.

EUR 672 BILLION The basis of the EU Recovery Plan in response to the Covid-19 crisis; the beneficiary states are required to allocate at least 37% of the funds to the green transition.

Source: European Commission

tainable product policy in the EU, restricting single-use products, countering premature obsolescence and banning the destruction of unsold durable goods. In July, a new global strategy was adopted to bring nature back into our lives and a "Farm to Fork" strategy, from producer to consumer, for a fair, healthy and environmentally-friendly food system.
The new biodiversity strategy promotes concrete measures to put European biodiversity back on the path of recovery by 2030, for example by transforming at least 30 percent of Europe's land surface and seas into effectively managed protected areas and returning at least 10 percent of Europe's agricultural area with characteristic under high-diversity landscape features. It foresees the unlocking of funding of EUR 20 billion per year.
The "Farm to Fork" strategy sets concrete objectives for transforming the EU food system, which include reducing by 50 percent the use and risk of pesticides, by at least 20 percent the use of fertilizers, by 50 percent the sales of antimicrobials used for farmed animals and aquaculture and finally reaching 25 percent of agricultural land under organic farming.

A NEW ENERGY PLAN WITH A VIEW TO CLIMATE NEUTRALITY

In July, the Commission set out its plans for the energy system of the future and clean hydrogen. It is evident that to become climate-neutral by 2050, Europe needs to transform its energy system, which accounts for 75 percent of the its greenhouse gas emissions. The two strategies will pave the way toward a more efficient and interconnected energy sector, one driven by the twin goals of a cleaner planet and a stronger economy.
The EU Strategy on Energy System Integration is upheld by three main pillars: first, a more circular energy system, with energy efficiency at its core; second, a greater direct electrification of end-use sectors; and finally (in sectors where electrification is difficult) the promotion of clean fuels, including renewable hydrogen and sustainable biofuels and biogas.
In an integrated energy system, according to the EU, hydrogen can support the decarbonization of industry, transport, power generation and buildings across Europe. The EU hydrogen strategy addresses how to transform this potential through investments, regulation, market creation, research and innovation. This gradual transition will require a phased approach: from 2020 to 2024, support for the installation of at least 6 gigawatts of renewable hydrogen electrolyzers in the EU and the production of up to one million tons of renewable hydrogen; from 2025 to 2030, hydrogen needs to become an intrinsic part of the integrated energy system, with at least 40 gigawatts of renewable hydrogen electrolyzers and the production of up to ten million tons of renewable hydrogen in the EU; from 2030 to 2050, renewable hydrogen-based technologies should reach maturity and be deployed at large-scale across all hard-to-decarbonize sectors.
To help deliver on this strategy, the Commission has launched the European Clean Hydrogen Alliance, which brings together industry leaders, civil society, national and regional ministers and the European Investment Bank. The Alliance will build up a portfolio of investments for scaled-up production and will support demand for clean hydrogen in the EU.
The Green Deal is not limited to direct emissions, but also concerns "indirect" ones, for example those related to construction. In October, the Commission published its Renovation Wave Strategy to improve the energy performance of buildings. The Commission aims to at least double renovation rates in the next ten years to reduce energy and resource consumption in buildings. This will improve the quality of life for people living in and using them, reduce greenhouse gas emissions, foster digitization, and improve the reuse and recycling of materials. By 2030, 35 million buildings could be renovated and up to 160,000 additional green jobs created in the construction sector. Buildings are responsible for about 40 percent of the EU's energy consumption and 36 percent of greenhouse gas emissions from energy, but only one percent undergo energy efficient renovation every year. Given that nearly 34 million Europeans cannot afford to heat their homes adequately, public policies to promote energy efficient renovation are also a response to energy poverty, support the health and wellbeing of vulnerable people and help reduce energy bills.


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In November, the Commission presented the EU Methane Strategy. Methane is the second biggest contributor to climate change, after carbon dioxide. The strategy sets out measures to cut methane emissions in Europe and internationally and contains legislative and non-legislative actions in the energy, agriculture and waste sectors, which together account for around 95 percent of the methane emissions associated with human activity worldwide. The Commission will work with the EU's international partners and with industry to achieve emission reductions along the supply chain.
To help achieve the European goal of climate neutrality by 2050, the Commission presented—also in November—the EU strategy on Offshore Renewable Energy. It proposes to increase Europe's offshore wind capacity from the currently installed 12 GW to at least 60 GW by 2030, and to 300 GW by 2050. The Commission aims to supplement this capacity by 2050 with 40 GW of ocean energy and other emerging technologies, such as floating offshore wind and solar PV. This ambitious growth will

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be able to count on the vast potential offered by the European Union's seas and on the global leadership of EU companies in the sector. It will create new opportunities for industry, generate green jobs across the continent and strengthen the EU's global leadership in offshore energy technologies, while also ensuring the protection of the environment, biodiversity and fisheries. The Commission estimates that investments of almost EUR 800 billion will be needed between now and 2050 to achieve the proposed objectives.

MORE SUSTAINABLE BATTERIES TOWARD ZERO POLLUTION

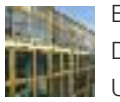
Batteries that are more sustainable throughout their life cycle are also key to achieving the objectives of the Green Deal and its zero-pollution ambition. In addition to promoting competitive sustainability, they are necessary for green transport, clean energy and achieving climate neutrality by 2050. The Commission presented a proposal that addresses the social, economic and environmental issues related to all types of batteries.

Batteries placed on the EU market should become sustainable, high-performing and safe along their entire life cycle, and produced with the lowest possible environmental impact, using materials obtained in full respect of human rights and social and ecological standards. They must be long-lasting and safe and, at the end of their life, should be repurposed, remanufactured or recycled, feeding valuable materials back into the economy. From July 1, 2024, only batteries and rechargeable industrial and electric vehicles batteries for which a carbon footprint declaration has been established can be placed on the market. To improve significantly the collection and recycling of portable batteries, the current collection rate of 45 percent is expected to rise to 65 percent in 2025 and 70 percent in 2030, so that the materials of batteries we use at home are not lost for the economy. Other batteries—industrial, automotive or electric vehicle batteries—must be collected at a rate of 100 percent. All collected batteries have to be recycled and high levels of recovery obtained, in particular of valuable materials such as cobalt, lithium, nickel and lead.

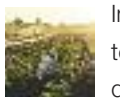
The Green Deal cannot be imposed from above. This is why last December the European Commission launched the European Climate Pact. This initiative invites people, communities and organizations to participate in climate action and build a greener Europe. The Climate Pact offers a space where people can connect and share knowledge, develop and implement climate solutions, thus becoming part of a growing European movement.

we

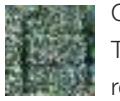
BRAHIM MAARAD
AGI reporter. Brussels Correspondent.



Beddington Zero Energy Development (BedZED) is the UK's largest carbon neutral eco-community. BedZED experiments an innovative approach to energy saving and environmental sustainability.



In July, the EU adopted the "Farm to Fork" strategy, which aims to devote 25 percent of agricultural land to organic farming, halve the use of pesticides and reduce the use of fertilizers by at least 20 percent.



Collection of plastic for recycling. The European Commission has recently adopted a new Circular Economy Action Plan.

CLIMATE AND ENERGY IN THE POST BREXIT ERA

by **Antony Froggatt**

AFTER LEAVING THE EUROPEAN UNION, THE UK WANTS TO SHOW THAT IT CAN BE A WORLD LEADER ON THE URGENT ISSUE OF CLIMATE CHANGE. BUT THERE IS STILL A SIGNIFICANT GAP BETWEEN THE COUNTRY'S AMBITIONS AND ITS ACTIONS

ON JUNE 23, 2016, the UK population voted by a slim margin to leave the EU, which led to a final separation 1653 days later on 31 December 2020. Brexit has had, and will continue to have, a profound effect on many aspects of UK society, including the export of goods to the EU (especially food and agricultural products), the movement of people, the setting of many standards and legislation. However, the full impact of Brexit has been masked by the COVID-19 crisis, and its economic significance to the UK and the EU will only become clearer in the coming months.

COP26 AND POSITIONING "GLOBAL BRITAIN"

As the UK prepared to leave the EU, the government put forward a new narrative centered on a "Global Britain" which was about "reinvesting in our relationships, championing the rules-based international order and demonstrating that the UK is open, outward-looking and confident on the world stage." Outside of the EU the UK would, as claimed by the Foreign Secretary, Dominic Raab, be able to "trade more liberally" and be a "champion of the basic freedoms enshrined in the UN Charter." The UK Government's new approach and self-confidence is evident in the recently released Integrated Review. The Review puts forward 2021 as the key year to set the "tone for the UK's international engagement in the decade ahead." 2021 sees the UK assuming Presidency of the G7, co-hosting the Global Partnership for Education in July and culminating in the 26th UN Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP) in Glasgow in November which the UK is co-hosting with Italy. The latter responsibility holds particular strategic importance, as the Review notes "tackling

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The changing of the guard at Buckingham Palace, London. The elite regiment, entrusted with the safety of the Royal Family, was established over half a century ago by Henry VII.

In the foreground, the Millennium Bridge and, in the background, Saint Paul's Cathedral, London. The bridge, completed in 1999, leads to the City, one of the biggest economic and financial districts in the world.

Trafalgar Square, London. The nerve center of the city center, the square is the stage for political and cultural events.

climate change and biodiversity loss will be the UK's international priority through COP26 and beyond," and the Economist remarks how "Britain has been handed the opportunity to prove, post-Brexit, that it can be a world leader on a pressing issue." COP26 is being viewed as the successor to COP21, where the Paris Agreement was signed. It holds crucial importance as it is expected, at the very least, to lead to an increase in the ambition of the national carbon reduction pledges so that collectively they are more likely to meet the goals of the Paris Agreement and increase global finance available to the most vulnerable countries for adaptation and mitigation activities.

THE ABSENCE OF CLIMATE AND ENERGY IN PRE-BREXIT DISCUSSIONS

Ahead of the referendum to leave the EU, public rhetoric was primarily concerned with immigration, national sovereignty, the ability to set national laws and the economy. There was very little discussion about the impact on the environment and how Brexit might affect the UK's ability to address climate change. The impact on the energy sector was also not a significant element of the pre-referendum discussion, except in Northern Ireland, which has a single energy market operating with the Republic of Ireland.

Importantly, the UK's current energy sector and climate policies are intricately linked to those of the EU, because of shared market rules and common standards and joint research and development. In fact, a variety of EU institutions have provided policy support and regulatory oversight functions in addition to representing the UK internationally across a range of organizations and treaties. The UK and EU also have connected energy infrastructures, particularly gas pipes and electricity cables which is significant given that the UK is increasingly dependent on energy imports. Overall, 35 percent of net energy is imported, with the UK receiving around 7 percent of its power and 12 percent of its gas from the EU. These levels are far higher than at the turn of the century when the UK was a net exporter. Lastly, the UK has been a member of the EU Internal Energy Market (IEM), which has facilitated efficient energy trade and interconnection.

THE IMPACT OF BREXIT ON ENERGY: IEM, TRADING & INTERCONNECTION

The UK has, as a result of Brexit, left the IEM and will need to make many changes to remain connected. Electricity and gas will continue to flow through the pipes and wires that connect the UK's energy network to those in continental Europe and the Republic of Ireland. Interconnectors are not only an important part of the UK's security of supply strategy, but also as part of its market-based approach, enabling reduced storage or backup systems and aiding price stability. Moreover, their value to the system is increasing as decarbonization occurs, with greater use of variable renewables such as solar and wind that allow power to flow from areas of high production to those of high demand, ensuring system efficiency.

With the UK being outside of the IEM, the operating regime that enables energy to flow has changed. In particular, the EU-GB electricity interconnectors are no longer market coupled. This means the new regime will be less efficient than before and will likely lead to marginally higher prices for UK consumers. Gas is imported both via the fixed gas pipes connecting the UK to the Republic of Ireland, Norway, Belgium and the Netherlands, but also via Liquified Natural Gas (LNG) imports from Qatar, the United States, Russia, Trinidad and Tobago and Algeria. Since 2008, the UK has significantly increased its use of LNG, diversifying its supply options and reducing dependency on being at the "end of the pipeline" from Russia.

Leaving the EU itself is unlikely to have a short-term impact on the UK's energy sources. Rather it will change the operating regimes of the interconnectors with its neighbors. But the UK and the EU are committed to short term emissions reductions and becoming Net Zero by 2050, which will require a transformation in the way energy is produced, stored and used. Therefore, decarbonization may increase the impact of Brexit on the UK's energy sector—depending on what it finally looks like—and the process itself will have a significant impact on the UK's engagement with the rest of the world.

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THE IMPACT OF BREXIT ON CLIMATE CHANGE

Outside of the EU, the UK will have to shift its domestic and international approach to climate change in a number of ways—not least by creating several new UK institutions. Firstly, during the Brexit negotiations it became clear that the UK would leave the European Emissions Trading System (EU ETS) and in December 2020, days before the Brexit transition period was due to end, the UK announced that it would introduce a UK-wide emissions trading system.

Although the UK ETS began formal operation on 1 January 2021, the price wasn't set immediately. Rather, the legislation states that "the UK ETS authority must publish the carbon price for the 2021 scheme year on or before 30 November 2021." In the December 2020 Energy White Paper, the government stated that the UK ETS will be "the world's first net-zero emissions trading scheme" and that they will consult in due course on how to align the cap with an appropriate net-zero trajectory." This ambition requires an expansion of the scheme to cover all sections of the economy. If undertaken this will provide lessons to other countries as they implement or expand their ETS.

However, the UK system is not, at least for now, linked to the EU ETS. Many had hoped the UK would link its system to the EU ETS in the same way Switzerland has, and the UK is open in principle to linking to others either in the EU or internation-

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Street artist performs in Covent Garden, a district famous for its lively nightlife and theaters.

The British Museum, with its collection of around 8 million pieces, bears witness to the history of humanity from its origins to the present day.

Thirdly, in December 2020 the UK published its Nationally Determined Contribution (NDC) under the UNFCCC, where it has pledged to reduce greenhouse gas emissions by at least 68 percent compared to 1990 levels by 2030. This is the first time the UK has proposed its own NDC as it was previously included within the European Union submission. The UK Government claims that the 2030 target is the most ambitious of any developed country and that the UK was one of the first to put into legislation a domestic target of Net Zero Emissions by 2050. The UK is widely regarded as good on climate policy—the 2008 Climate Change Act was the first of its kind in its efforts to bind future governments to climate change targets and reflects the UK's long-standing commitment to climate action. However, it is generally agreed that there remains a significant gap between the UK's ambition and action, with real challenges in some sectors like housing and transport, where necessary change is still being avoided. Putting in place adequate policies and measures in these sectors would increase credibility and influence internationally.

Finally, in November 2020, the UK launched a 10-point plan for a Green Industrial Revolution, which it hopes will turn the UK into "the world's number one centre for green technology and finance." The plan includes action on off-shore wind, where the UK can genuinely claim a global leadership position, but in other areas, such as electric vehicles and green hydrogen, many other countries have more advanced manufacturing and deployment levels. The UK will therefore need to rapidly accelerate its plans if it is to have a global leadership role, at a time when the UK civil service has been pre-occupied with the costly and complex processes of getting Brexit done and managing the COVID-19 pandemic.

As the UK seeks to increase its global influence following Brexit, many of the historical methods, such as trade in raw materials or military power, are less important. Rather, developing new systems and technologies and creating soft power approaches that can support climate change mitigation and adaption are clear areas of global importance. This has been recognized by the current government, both in terms of its hosting of COP26 and plans for low carbon technologies. However, addressing climate change is not a short-term action, but requires constant attention and prioritization. Many will be looking beyond COP26 to judge whether climate change is shaping UK policy, in particular its energy and industrial strategies, or if it was just a temporary lever of influence in a post-Brexit narrative.

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ANTONY FROGGATT
He is an energy policy consultant and Senior Research Fellow at Chatham House, one of the most highly accredited think tanks in the world.

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Secondly, discussions are underway over the introduction of Carbon Border Adjustment Mechanisms (CBAM). This is a levy or tax on goods being placed upon imports, if the country of production has lower climate change commitments and/or carbon prices and is seen as an important step in creating a global level playing field.

The European Commission has put forward new legislative proposals on the CBAM, which is likely to be introduced sector by sector in the EU, starting with those such as cement and steel that have a significant carbon footprint. The UK stated in October 2020 that it "recognises the importance of addressing carbon leakage. A range of approaches could potentially help to address this, of which carbon border adjustments are one. HMG is undertaking further analysis on the issue of carbon leakage across relevant departments." In February 2021 it was reported that the UK Government was considering using its presidency of the G7 to "try and forge an alliance on carbon border taxes." The development of a global CBAM would be significant, helping to financially recognize efforts to decarbonize the production of goods, and therefore increase mitigation ambition. The UK could play a significant role in this, as it develops new agreements with its trading partners.

ally, such as those in North America, South Korea or Japan. This may provide an added incentive for the creation of regional or linked carbon markets.

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ABOUT FACE

by **Moisés Naím**

UNDER THE NEW PRESIDENT, THE US HAS CHANGED ITS COURSE AND LOOKS TO LEAD STRONG AND DECISIVE INTERNATIONAL ACTION TO FIGHT CLIMATE CHANGE

DONALD J. TRUMP wanted to make the United States an "energy superpower." His vision was to lead the country not just towards energy self-sufficiency but also towards "global energy dominance." This required the vigorous promotion of oil, natural gas and coal. Trump's energy secretary, Rick Perry, said "An energy dominant America will export to markets around the world, increasing our global leadership and influence." The implementation of this vision led to the opening of federal lands and waters to oil and gas drilling, including pristine areas like the Arctic National Wildlife refuge. President Trump never hid his conviction that carbon dioxide emissions were not a primary contributor to climate change.

President Joseph Biden has a very different view. His main goal is that America (and, hopefully, the rest of world) will actively decarbonize. Rather than investing in energy generated by burning hydrocarbons, Biden wants his nation to invest in energy produced by renewable sources like sun and wind. Moreover, the protection of the environment is a fundamental goal of the new president's energy policy. The strong contrast between his plan and President Trump's energy policies has led Senator Sheldon Whitehouse (D- R.I.) to stop his nine years of weekly speeches in the senate about the need for action on climate change. His last speech on this topic, number 297, was given the same day President Biden unveiled his plan. Whitehouse said "The conditions are at last in place for a real solution. A new dawn is breaking, and there's no need for my little candle against the darkness."

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FROM PLANS TO ACTION

During his initial weeks in office President Biden signed a number of Executive Actions to reverse his predecessor's carbon-intensive and environmentally-risky energy policies. As he had promised in his electoral campaign, one of his first decisions as president was to rejoin the Paris Climate Accord. Biden also announced that he would convene a meeting on this topic "to persuade the leaders of the major greenhouse gas-emitting nations of the world to join the United States in making more ambitious national pledges, above and beyond the commitments they have already made." At home, Biden took quick action and halted operations of the Keystone XL pipeline, imposed new limits on existing and future oil and gas production and prescribed that all federal agencies should include climate-friendly operating procedures.

THE MAIN THRUST OF BIDEN'S DOMESTIC ENERGY POLICY

Biden's national energy plan has three main goals:

1. Achieving a net zero emission standard by 2050 and a Carbon Pollution-Free Electricity Sector by 2035. To achieve this goal, the plan calls for aggressively investing in the development of innovative and cleaner energy technologies. It seeks to make the US auto industry less polluting and will launch an ambitious program to modernize the nation's federal infrastructure, from buildings to transit networks and water systems. Biden also intends to create a National Council on Workforce Development which, operating from the White House, will promote the large-scale creation of clean-energy jobs. It also establishes a National Climate Task Force, made up of twenty-one senior officials of federal departments and agencies who will meet regularly to ensure maximum co-ordination in the efforts to combat climate change.
2. Advancing Sustainable Agriculture and Conservation. The administration will deploy a new cadre of "conservation workers" tasked with addressing climate change concerns on the ground, such as sustainable forest management and protection of water supplies and ecosystems
3. Securing Environmental Justice and Fostering Equitable Economic Opportunities. Every aspect of Biden's plan will be

undergirded by a comprehensive environmental justice plan involving special attention to disadvantaged communities, which would receive up to 40 percent of the benefits of the massive spending in clean energy and energy efficiency. The plan would enable federal agencies and the private sector to make investments in the rural, suburban, and urban communities that need them most.

Each of these main thrusts includes multiple objectives and targets requiring expenditures of up to $2 trillion, as well as the hoped-for creation of some 10 million new jobs.

SOMETHING OLD, SOMETHING NEW, SOMETHING BORROWED

Unsurprisingly, President Biden's energy plan follows the strategic directions set by President Obama's, which had called for short-term relief of Americans facing high energy costs, the creation of 5 million jobs and investments in clean energy of up to $150 billion during two presidential terms. The target was an 80 percent reduction in greenhouse emissions by 2050.

What is new in Biden's plan is its giant dimension. It aims to double Obama's proposed number of new, environment-related jobs that will be created, and his investment plan is six times larger than Obama's. The official goal is to get to zero net-emissions by 2050. It also puts stronger emphasis on the redress of environmental damages due to past negligence, a goal that reflects the influence of the more progressive sector of the Democratic Party.

Perhaps the most prominent non-politician supporting the Biden plan is Bill Gates, who has characterized it as "super hard and very broad, but doable." Some of Gates' suggestions have been adopted by the administration, such as the strong emphasis on energy innovation, the creation of the National Climate Task Force and the adoption of measures aimed at ensuring that some of the costs of cleaning up past pollution are paid by the responsible parties. The plan also includes strong incentives for companies to generate non-polluting, carbon-free energy alternatives.

HOW FEASIBLE IS IT?

Running strongly against the long, historical trend of fossil fuels as the primary source of energy, the plan will inevitably receive technical and political opposition from these industries and the administration's rivals. In fact, the pushback has already started. When unusually low temperatures in Texas, Oregon and other states led to major collapses of electricity services, adversaries of Biden's plan were quick to blame the breakdown on renewable energy installations such as wind and solar. The fact is that both natural gas pipelines and wind turbines were affected by these events, although the freezing of gas lines accounted for most of the paralysis.

The debate on the transition to green energy proposed by Biden has intensified as a result of the briskness with which he has moved on this front. To defuse antagonism to the plan, Biden has reached out to oil, coal and gas workers: "They helped build this country. We're never going to forget the men

MICHAEL REGAN
Administrator of the Environmental Protection Agency (EPA). He is the first Black man to serve in the role. He's appreciated by environmentalists for his work as secretary of North Carolina's Department of Environmental Quality.

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and women who dug the coal and built the nation. We're going to do right by them, make sure they have opportunities to keep building the nation in their own communities and getting paid well for it."

The fact that the administration has a majority in both chambers of Congress surely facilitates the passing of the legal and fiscal elements of the plan. but this majority is fragile, and it cannot be taken for granted that the plan will enjoy an easy sail through Congress. Its immense cost, estimated at USD 2 trillion, will make lawmakers balk. Critics will point to the risks of upending such an important sector of the economy at such a dizzying speed. Gradualism rather than shock-therapy will be the mantra of those opposed to the Biden energy plan. In his favor, the president can count on his experience as a legislator and the ample and deep personal and bipartisan relationships he has developed over the years in Congress. His 36 years working there surely provide him a robust understanding of how the legislative process works, who are the main actors and which are the risks and challenges. Also, how to navigate those risky political shoals.

Yet, even if everything else goes well, the success of Biden's energy plan could still experience major delays and other problems due to the faulty, untested technology required to reach its ambitious goals. The International Energy Agency maintains that to reach net-zero emissions by 2050, as envisioned by the Biden plan, half the reduced emissions would have to come from technologies not yet commercially available. This reality has led most utility companies to target the year 2050 for zero net emission of greenhouse gases in the electricity sector, rather than 2035, as proposed in Biden's plan.

PERSONNEL IS POLICY

Even if it succeeds in garnering the political support it needs to be adopted, like all large-scale plans the Biden's plan depends on the efficiency of its execution. There is an old saying in Washington: "personnel is policy." It captures the fact that the people the president appoints to carry out his plan are as important, if not more important, than policy pronouncements. So far, despite the inevitable criticisms resulting from the toxic, highly polarized political environment that now pervades the nation, Biden's appointments in the most critical jobs in the energy and environment arena have been relatively well received. Biden appointed John Kerry as his international climate envoy, Gina McCarthy as the domestic climate czar, Jennifer Granholm as Energy Secretary and Michael Regan as head of the Environment Protection Agency. These are all widely respected and knowledgeable individuals who have spent much of their professional lives working at the highest levels of government.

A CALL TO ARMS

Joseph Biden's energy plan and former President Trump's plan are very similar in their radical nature and audacious scope, both aiming to create profound permanent change in the way Americans get and use energy. But there is where their similarity ends: While Trump's plan was to massively expand the production of fossil fuels, Biden's plan is designed to maximize and speed-up decarbonization. While Biden's plan is essentially based on science, Trump's plan was largely based on electoral, populist objectives.

Due to its very large scope Biden's plan presents inevitable risks and uncertainties. Although it has been suggested that the plan should be approached in a gradual manner, so as to minimize opposition and pitfalls, the reality is that time to take action on climate change has essentially run out and gradualism can no longer be afforded, in spite of the risks involved in swift action.

On the positive side, Biden's plan will probably provide a galvanizing force for strong and decisive international action to combat climate change, helping to eliminate hesitancies and doubts. In sounding the bugle, President Biden's call is to prompt mobilization, a call to arms.

we

MOISÉS NAÍM
He is a distinguished Fellow at the Carnegie Endowment for International Peace in Washington, D.C. and a founding member of WE's editorial board. His most recent book is *The End of Power*.

THE PLAN

TARGETS

- Net-zero emissions by 2050.
- Carbon-free electricity by 2035.
- Promote sustainable agriculture and conservation.
- Environmental justice and equitable economic opportunities.
- 10 million new jobs related to clean energy.

EXPENDITURE

USD 2 trillion.

USA EMISSIONS

- 6,577 million metric tons of carbon dioxide equivalents.
- 1.8% reduction compared to 2018.
- decline of 13% compared to 2005.

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JOE BIDEN'S GREEN TRANSITION

by **Samuel L. Oswald**

JOHN PODESTA, FOUNDER OF THE CENTER FOR AMERICAN PROGRESS AND A LEADING PLAYER IN US POLITICS FOR THE PAST 25 YEARS, TALKS ABOUT THE CHALLENGES FACING THE NEW RESIDENT OF THE WHITE HOUSE

THE BIDEN ADMINISTRATION is tackling a number of key challenges at once, among them the climate crisis, the nation's relationship with Europe, and national and global economic inequality. In this wide-ranging interview with *World Energy*, John Podesta, who played a key role in the Clinton and Obama administrations, talks from experience about how the new president can tackle these challenges holistically.

President Biden issued several major Executive Orders on January 27. How do you assess these moves? And what do you think lies ahead?

From his first days in office, Biden is making good on his campaign promises. The ambition of his climate program grew during his political campaign. He linked the crises facing America: the Covid-19 crisis, the resulting economic crisis, the racial justice crisis and the climate crisis; and he suggested that we need to tackle all of them together to create a more just and equitable economy. We could do that by making huge investments in transforming the energy systems in the US, which would serve to not only mitigate the threat of climate change but also spur investment in clean energy areas through the lens of infrastructure.

From day one, Biden kept his pledge to rejoin the Paris Accords, rolled back the attack on environmental protection and withdrew the permit for the keystone pipeline, the latter a hallmark of the Trump Administration. One week later, Biden came forward with a range of Executive Orders which paved the way for a "whole-of-government-approach" to make climate the center of his economic, security and diplomatic policies. The team he has brought together will play an important role, but the next step is to attract investments. For this, Biden will need help from Congress.

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JOHN PODESTA

John Podesta has been a major player on the US political scene for the past 25 years. From 1998 to 2001, he served as Chief of Staff to President Bill Clinton, and from 2014 to 2015 he served as Counselor to President Barack Obama. In 2016, he was Chairman of Hillary Clinton's presidential campaign. He founded the Center for American Progress, an influential progressive think tank based in Washington. Mr. Podesta teaches Law at Georgetown University.

Do you believe that there will be some regulatory action before new legislation and/or investments are put forward?

You can characterize Biden's strategy as the three big proposals he made during the campaign: a 100 percent clean power sector by 2035, which is quite audacious, a net-zero economy by 2050 and a focus on environmental justice, through which 40 percent of the planned investment will be allocated to distressed communities. President Biden has considerable regulatory authority, but it will take some congressional action in the form of additional support for clean power. The Administration will get right to work on reducing the broad spectrum of emissions. Expect further action in achieving 100 percent electrification of cars and light-duty trucks. The Administration will regulate methane emissions—particularly from oil and gas production—which has been a major source of the increased emissions during the last two years of the Trump Administration. The Department of Energy has considerable authority to increase efficiency standards, both for consumer goods and in the industrial sector.

Special Envoy John Kerry said that jobs that will be lost in legacy businesses can be found again and upskilled. What's your view on this process? And what's your view on the timing and geographical location of this process? We've seen a polarized America, is there a way to make the energy transition into a phenomenon that can heal instead of polarizing?

The country owes it to the people who are caught in the transition to ensure that investment takes place. There is a significant opportunity to create a system of innovative job creation and business development. As you and your colleagues know, clean energy jobs have been generated already. The question is: How can we accelerate that process? We have already gotten these big announcements, for example, from General Motors, Ford, and Volkswagen, etc., about the investments that they are making in changing their future from one built around internal combustion engines to one built around electrification and zero-emission vehicles. We just have to be wise in terms of creating the supply chains and investment posture that ensures fair distribution in the prosperity that will be produced. This will be a controversial industrial policy, but Biden is committed to understanding the pain that globalization has visited on certain communities and he is committed to creating opportunity in rural America, which has felt lost and left behind. We need to direct investments toward places that need them. We are going to be mindful of the fact that these jobs need to be decent and pay a wage that can support American families. There is an opportunity to do so with offshore wind in the Northeast, as well as on the Pacific Coast, over which governors are competing. Another example is green finance. Look at where the financial community wants to put its money: where

> Biden is committed to understanding the pain that globalization has visited on certain communities and he is committed to creating opportunity in rural America, which has felt lost and left behind. We need to direct investments toward places that need them. We are going to be mindful of the fact that these jobs need to be decent and pay a wage that can support American families.

innovation is moving. More and more investors and stakeholders have strict Environment, Social, Governance (ESG) mandates, which are opening up a completely new set of investment opportunities and job creation.

The climate seems to be one of the fundamental positives in the reweaving of the transatlantic fabric. You have already mentioned methane emissions; but if we were sitting in Brussels, we would have already quoted carbon border adjustment mechanisms. How do you think this balance between positives and conversations that are more complicated will play out in the coming months? In addition, how can countries come together with a shared understanding of a price for carbon that reflects its value?

I think the natural global partner for the US is the EU and Europe. Both from the perspective of getting the economies moving in the same patterns towards the net-zero goal and a value structure that I think is highly constructive to create those essential patterns of change that become virtuous and move across the world. The EU is furthest along; they have put out the idea of a carbon border adjustment scheme, which is something the world is going to need to embrace. Biden has put it front and center. The challenge is that systems in the EU and US are built along somewhat different structures. The US revolves around investment standards, while in the EU there is the Emissions Trading System (ETS). Therefore, how one looks at those different systems and makes them coherent, in terms of border adjustment, needs a good deal of discussion. As long as everybody is working towards the same end goal, it should be achievable.

We also need a shared view on the social cost of carbon at an international level. Secretary Yellen in November spoke about a carbon tax worth 40 dollars per ton while the EU Commission is aiming at a value of carbon of 100 euros per ton, so [roughly] three times as much. So cross border adjustment trade mechanisms need to come together with a shared understanding of what the value of carbon is. Moreover, it will be important to account for standards and regulatory reductions against pricing schemes considering that they impute a cost to carbon in them through the social cost of carbon and other regulatory means. That is technically challenging, but we need to get going on that project. Canada is aiming at a 170 Canadian dollar fee per ton by 2030.

However, I think of carbon pricing schemes in the US as a complementary policy, as opposed to the backbone of the regime. The prices people are talking about in the US will not get the job done. They can affect certain sectors like the power sector, but you are not going to decarbonize transportation with the kind of prices that are discussed in the United States. Therefore, you need the push the technology, regulation, and accountable commitments of major private sector actors to get that job done. Pricing plays a role, but with all due respect, for

my economist friends who say it might look good on paper, the political reality is very different in terms of what you can get done. You have to think about each sector and drive decarbonization with a specific strategy by sector, whether that is power, transit, shipping, or air travel—even a common global pricing system is not going to get us to net zero. What we do need is an act of intervention. We need much more support for research and development and most importantly, industrial policy. The WTO will play an important role as well but will require reform. We now have a skilled former finance minister and diplomat in charge of the WTO, Ngozi Okonjo-Iweala. I have worked with her, including on the development of the Sustainable Development Goals, and she is terrific. She will not only have to get the WTO functional again but address this very crucial problem of how the global trading system accommodates different systems of emission reductions.

Do you think the Biden administration will change US policy on other areas of the world, Africa in particular, but also the Mediterranean and the Middle East? Will Biden and Europe bilaterally have both a reactive and a dedicated policy to these areas?

A photovoltaic plant in Alamosa, Colorado.
President Biden aims to decarbonize the energy sector by 2035 and to achieve net-zero emissions for the entire US economy by 2050.

Absolutely. Secretary Kerry will choreograph the larger picture, while Treasury Yellen, Samantha Power, incoming head of USAID, the new leadership at the US International Development Finance Corporation and Millennium Challenge Corporation all support building climate resilience, which is not just about hardening infrastructure. It is about building community resilience in the face of a very changing and dynamic set of problems that result from the interruption of food systems, water systems, extreme weather, etc. The Biden Administration will focus on cooperating with Europe, Africa, and international financial institutions in Asia. First, we have to get the South Koreans and the Japanese to stop financing overseas coal and then simultaneously have a feasible and cost-competitive proposition to replace that. In this way, we will have a development pathway that is based on sustainability and clean energy. We need to have a sustainable development strategy in those regions. Whether that is in the form of debt relief or other mechanisms, the priority is to make good on the commitments that were made, beginning in Copenhagen and Paris, to finance the transition for the people who ironically contribute the least, but get hit the worst. If we do not, the level of chaos in the world, disruption to the global economy, and disruption to the orderly patterns of migration is going to be so profound that the last decade is going to seem easy by comparison. There will be many people moving internally and across borders, which is why it is such a profound security issue, as well.

Let me ask you a question that links what is happening here in the US with Africa, where there is a clear need for baseload power. Can we have a baseload power in Africa without gas? If so, do you believe that natural gas can be a major component that leads us to a new energy economy, including hydrogen? If it is confined to a transition to net-zero?

Well, that is an important question. There are places in Africa that are gas-rich, that will not give up on the opportunity to utilize gas if it means increased economic activity. What we in the US and the rest of the developed world need to do is to provide places like Africa, Southeast Asia, and the Middle East with the possibility to incorporate more renewables into their energy mix. There is no question that the answer is not to deprive the energy-poor of power; the answer is to help create a system that is going to build out clean and sustainable energy. From my experience in and talking with Indian colleagues, the first question should not be how you provide baseload power, but what the real needs are at the ground level that will power economic activity. This is the source of the problem and from where we need to work our way towards our climate goals. The Government of India is struggling with that, but they are moving forward with a huge build-out of renewables, specifically solar. The constraints they are facing are mainly transmission and an aging state-based grid system. Our job will be to find these bottlenecks and fix them.

Africa is a little different, but applying the broader approach of the Sustainable Development Goals (SDGs), which means spurring economic activity and loosening bottlenecks, will in the distal perspective get us to where we need to be.

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Interview produced for WE and “Eni on the Hill”, Eni’s internal podcast from Washington, DC by:
SAMUEL L. OSWALD
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THE IMPORTANCE OF ENERGY RESILIENCE

by **Rita Lofano**

RECENT BLACKOUTS IN TEXAS AND CALIFORNIA SPARKED A LARGER DEBATE ABOUT AMERICA'S ENERGY READINESS DURING THE GREEN TRANSITION. THE US MUST SHIFT ITS MINDSET TOWARD VIEWING ELECTRICITY AS A NATIONAL SECURITY ISSUE

THE KEY WORD is "resilience." It is "a word that should be on every policymaker's mind when discussing energy," warns Ken Medlock in an interview with World Energy. Mr. Medlock, professor at Rice University, where he is Senior Director of the Baker Institute's Center for Energy Studies, highlights the lessons learned from devastating blackouts in Texas (in February 2021, as a result of extreme cold) and in California (in August and September of 2020, as a result of record high temperatures). "Different causes, but similar lessons. Resilience is critical," Medlock continues, "and steps need to be taken to ensure energy systems are resilient and hence reliable. Rarely does this ever mean narrowing the set of load serving options;

rather, concerted effort should be taken to ensure there are resources available to step in when other resources are not available. And this must be done with one eye on reducing the environmental impact of energy infrastructures."

LAST SUMMER'S BLACKOUTS AND THE POLITICAL CONFRONTATION

In California, considered a "model" in the green transition, the electricity failure during last summer's crisis reached 500 megawatts (less than 1 percent of demand). In Texas, the leading energy producing state in the United States (with 41 percent oil and 25 percent gas), the electricity blackout reached 45,000 megawatts, of which 30,000 were generated by coal, gas and nuclear and 16,000 from renewables (ERCOT data, Electricity Reliability Council of Texas). This paradox sparked a political confrontation. The Republicans, headed by Governor Greg Abbott, pointed the finger at the intermittent nature of renewable sources and in particular wind power, which was strongly subsidized but proved to be fragile, with the turbine blades freezing in the cold. For the Democrats, the Texas freeze instead demonstrated how fossil fuels failed to withstand the shock and that the Lone Star State has suffered from excessive deregulation and a lack of interconnection with the other electricity grids in the US.

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"Of course if ERCOT had been more significantly connected to neighboring regions in recent decades, it is likely that more generation capacity would have been constructed in Texas, where land is cheap and resources are abundant," but "the fact," says Medlock, is that there were "multiple fragilities … everything failed at epic proportions. There are some relatively simple regulatory interventions that could avoid such calamity in the future, so hopefully the discussions will steer in that direction and away from any political grandstanding."

The Texan energy mix depends above all on natural gas. The February polar vortex also "froze" fossil fuels: production was down by up to four million barrels of oil per day (almost 40 percent of US supply), about six million barrels per day in refining capacity in the Gulf of Mexico (almost 30 percent of the total) and up to 20 billion cubic feet per day of gas (20 percent of the total), numbers almost never before recorded in the history of energy in the US. But it is as if it went unnoticed. "What attracted people's attention, what made headlines in the world media, were the huge electricity blackouts. And it's easy to see why: the personal tragedies caused by the lack of electricity were distressing. Electricity is the true lifeblood of modern civilization. Unlike crude oil, the impact of the shortage of supply is immediate," observes Mark Finley, former CIA analyst and now Fellow at the Baker Institute of Rice University and author, with Medlock, of the report "Time to Update America's Energy Security Programs," as part of the "Recommendations for the New Administration" of Joe Biden, who pushes for a transition from fossil fuels to clean technologies as a weapon to combat climate change.

"For energy security, electricity is the new oil," says Finley, in an interview with World Energy. "Here in the United States, if you ask people what energy security means, everyone thinks about oil. But the consumption of electricity in the US is higher than that of oil. If we want to move towards a future with lower CO_2 emissions, everyone agrees that the role of electricity is destined to grow. Yet still no one considers electricity to be a matter of national security. People believe that because it is produced at home, it is risk-free. As we have seen with the extreme cold in Texas and with the blackouts in California, this is not the case at all, not to mention the risk of network cyber attacks. The issue of energy security must be seriously rethought and understood. With the reduction of dependence on fossil fuels, new dependencies will be created, but unlike what that done with oil, no serious thought has yet been given to how to manage and mitigate the risks associated with the transition to cleaner energy. For fifty years, the United States has focused energy security on oil, creating policies, protocols, treaties, reserves, but nothing similar has yet been done for other forms of energy." A striking case is that of rare-earth elements, which are "increasingly strategic, not just for the technology sector but also for energy transition and for military applications," notes Finley, underlining how China has used its competitive advantage in this market as both an economic and geopolitical weapon.

AMERICA'S GAP WITH CHINA: NOT JUST HAVING THE RESOURCES BUT "KNOWING HOW TO EXPLOIT THEM."

Will the United States be able to close this gap? "Like all natural resources, the availability of rare-earth elements is distributed in different parts of the world but it is one thing to possess them underground and another thing to be able to extract them. I would say that what matters more is the political system 'above ground,' that is the type of regime of those who possess them, the interest and incentives to develop them, the technology, the market. Where the US has shown it has a competitive advantage is the capacity to innovate and grow," Finley points out, citing the American shale revolution that discredited the "Peak Oil" theory and made the United States the leading producer of oil and gas.

Dallas skyline, Texas. In February, Texas, the energy heart of the United States, suffered a heavy blackout due to the big freeze that paralyzed energy production and electricity grids.

Traffic in the streets of Los Angeles, California. Last August, the most populous state in the US imposed a series of planned blackouts to cope with a record heat wave that pushed the power grid to its limits.

San Francisco, California. Electricity is the very lifeblood of modern civilization, but still few people consider electricity a matter of national security.

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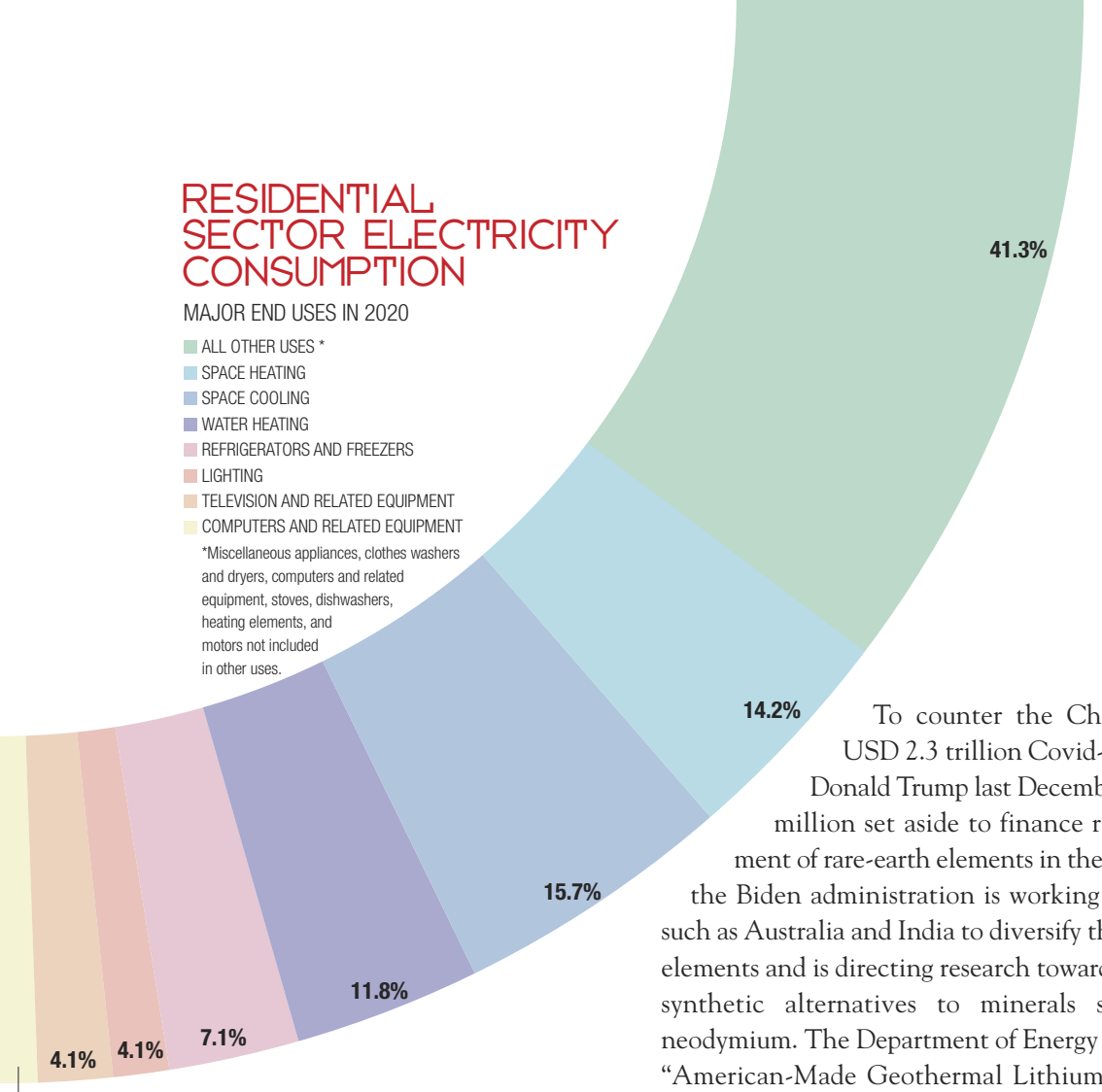
RESIDENTIAL SECTOR ELECTRICITY CONSUMPTION

MAJOR END USES IN 2020



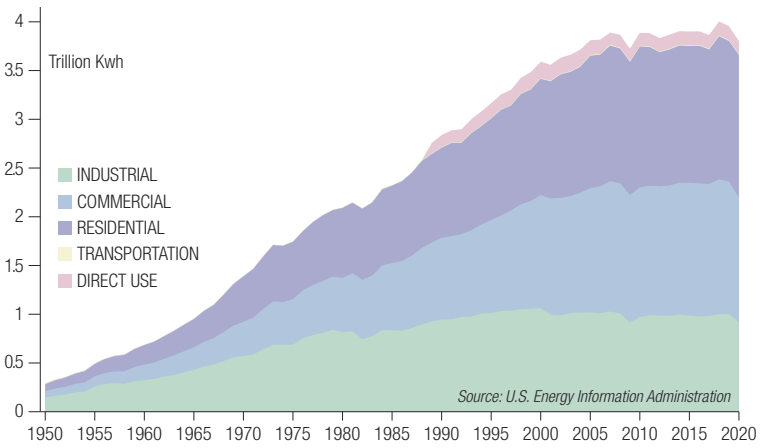
*Miscellaneous appliances, clothes washers and dryers, computers and related equipment, stoves, dishwashers, heating elements, and motors not included in other uses.

Heating and cooling/air conditioning account for the largest annual uses of electricity in the US residential sector. This is why, in the event of extreme cold or hot temperatures, consumption soars, which, in the event of unsustainable energy supply, can lead to planned blackouts, as happened in California and in Texas last year.

Source: U.S. Energy Information Administration

US ELECTRICITY, SALES AND DIRECT USE

United States electricity consumption in 2020 was about 3.8 trillion kilowatt hours (kWh), 13 times greater than electricity use in 1950.



To counter the Chinese monopoly, the USD 2.3 trillion Covid-19 aid plan, signed by Donald Trump last December, included USD 800 million set aside to finance research and development of rare-earth elements in the United States. Today, the Biden administration is working with allied countries such as Australia and India to diversify the supply of rare-earth elements and is directing research towards the development of synthetic alternatives to minerals such as cobalt and neodymium. The Department of Energy has even launched an "American-Made Geothermal Lithium Extraction Prize" of USD 4 million for whoever develops technologies that can reduce the environmental impact of extracting lithium from geothermal brines.

The fight against climate change is central to the presidential agenda. Within hours of being sworn in, Biden signed 15 executive orders, including one marking the US's return to the Paris Agreement. He appointed John Kerry as Special Envoy for Climate with a seat on the National Security Council. The Climate Advisor is the former leader of the Environmental Protection Agency (EPA) Gina McCarthy, who stands for the energy transition of the United States in the same way that Anthony Fauci stands for the fight against the pandemic.

A large chunk of President Biden's USD 2 trillion mega-plan for infrastructure is assigned to climate. It proposes financing part of the energy transition by raising corporate taxes from 21 to 28 percent (which Trump had drastically cut from 35 percent) and eliminating tax breaks for fossil fuels. It includes incentives for clean energy (USD 174 billion for electric cars alone and USD 100 billion for the modernization of electricity grids), funds for the construction of energy-efficient and weather-resistant homes, as well as the obligation for utilities to produce a quota of electricity from carbon-free sources. All these measures must pass the scrutiny of Congress. Minority leader in the Senate, Republican Mitch McConnell, has already described the infrastructure plan as a "Trojan horse" that conceals climate measures opposed by conservatives.

"President Biden has for now made some moves using his executive powers, blocking construction of the Keystone XL pipeline and enacting a moratorium on new federal oil and gas licenses. But what can be achieved with executive orders is limited," Finley points out. "What Biden did was overturn Trump's executive orders. Executive orders are political expedients. In the American system, if a lasting impact is to be achieved, you have to follow the legislative process. And there is little appetite, even among Democratic representatives of energy states (such as the influential Joe Manchin of West Virginia, who chairs the Senate 'Energy and Natural Resources' Committee) for punitive measures against oil & gas." For Medlock, there is still room for "real progress" in the fight against climate change, "even with the typical blustering that characterizes debates in DC nowadays." Some measures to expand carbon capture technologies, fund scientific innovation and exploit all the colors of the hydrogen rainbow for decarbonization are likely to draw "support from both sides of the aisle" in Congress, facilitated, curiously, by the fact that the regions of the country with the greatest potential in green resources are located in Republican controlled districts: an "alignment" favorable to advancing Joe Biden's agenda. How will the story end? We are only at the beginning of this story, and politics are unpredictable, as in a striking remark by Mark Twain: "The radical invents the views. When he has worn them out, the conservative adopt."

We

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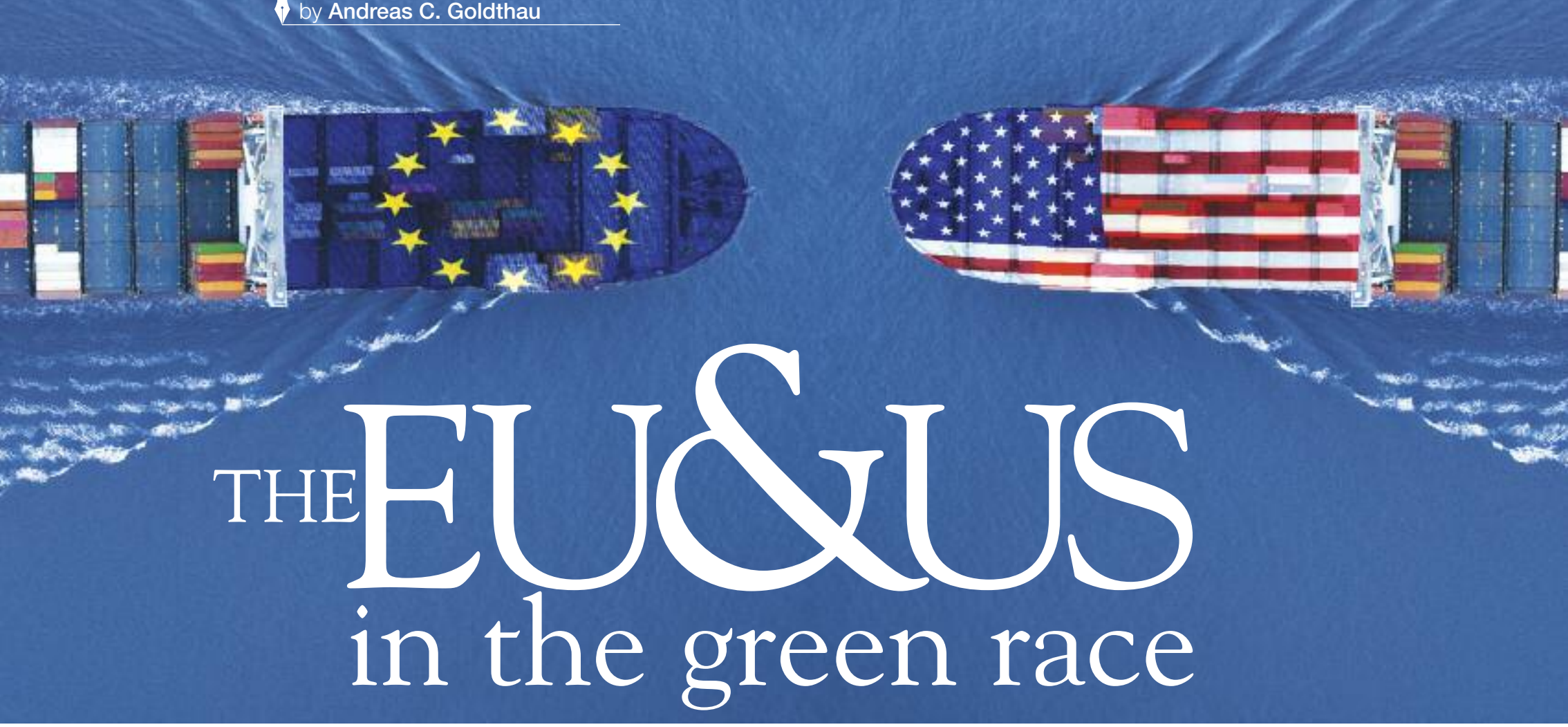
UNITED *yet* RIVALS

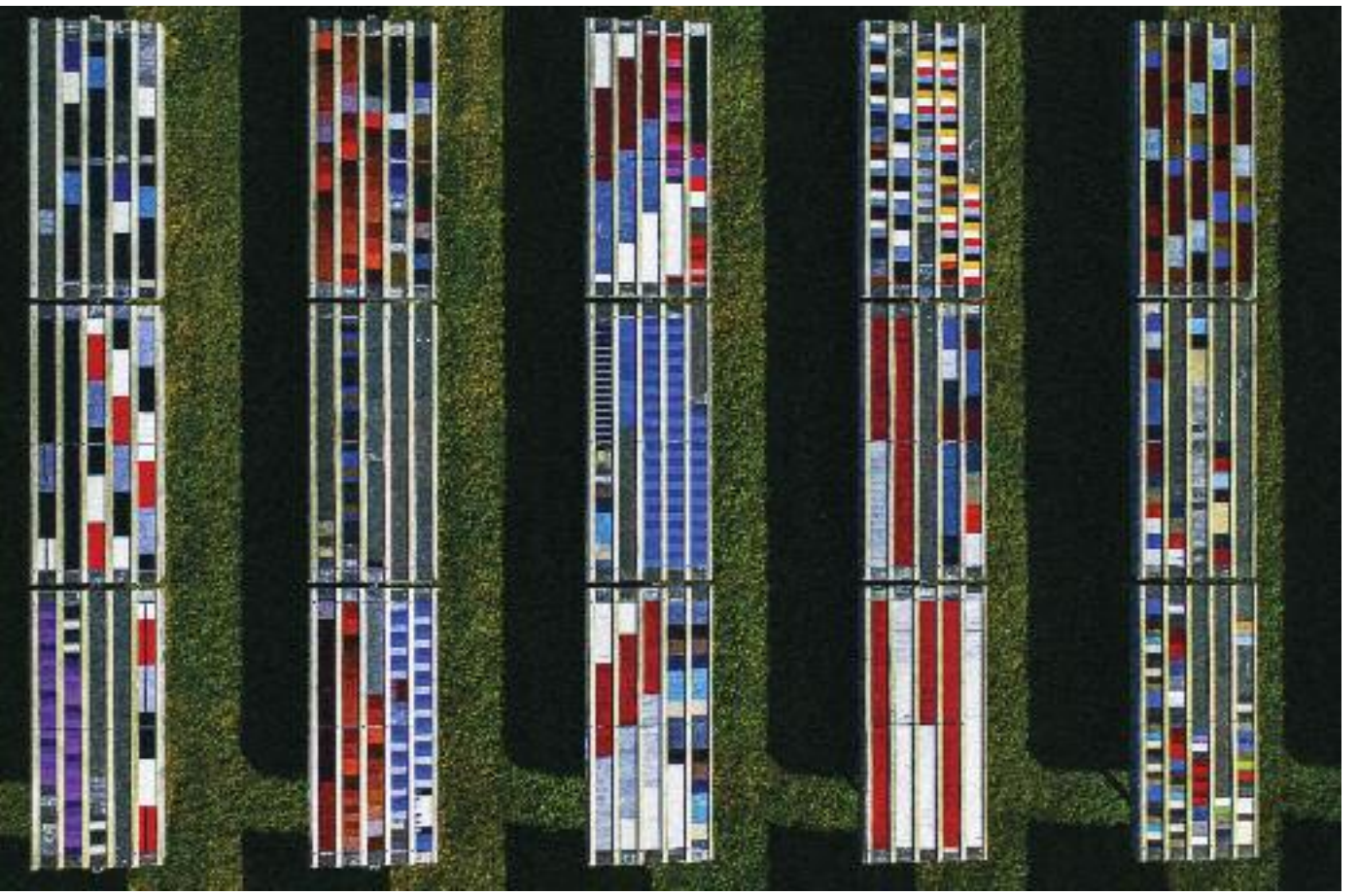
by **Andreas C. Goldthau**



THE EU&US in the green race

PRESIDENT BIDEN HAS RESTARTED COOPERATION BETWEEN THE TWO POWERS IN THE FIGHT AGAINST CLIMATE CHANGE. HOWEVER, THIS HAS TRIGGERED COMPETITION FOR MARKET SHARE, TECHNOLOGICAL LEADERSHIP AND INVESTMENTS IN LOW-CARBON TECHNOLOGIES AND SOLUTIONS

AS PART OF HIS DAY-ONE MEASURES, President Biden signed an executive order for the US to re-join the Paris Agreement. And he was soon to convene a Leaders Summit on Climate, bringing together major economies in an effort to fight dangerous climate change. John Kerry, a high-level presidential envoy, will champion international climate action, making it a signature policy of the Biden government. The forceful message: the US is back and committed to the global fight against global warming and determined to take the lead in multilateral climate action. After four years of a climate change-denying and isolationist Trump administration, this was met with much relief throughout the global community and welcomed in most European capitals.



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The European Union, a traditional climate leader, has high hopes for the new US administration. President Biden has set the US target for climate neutrality by 2050 or earlier; by 2030, emissions are to be cut to 50 percent of 2005 levels. The EU, in turn, is committed to reducing greenhouse gas emissions by at least 55 percent by 2030 compared to 1990 levels, and to net-zero by 2050. Sharing similarly ambitious goals and aligned domestic climate agendas will offer opportunities for jointly fostering global climate action.

COP26 IS AN OPPORTUNITY TO RENEW RELATIONS

The upcoming COP26, the annual climate negotiations get-together under the umbrella of the United Nations Framework Convention on Climate Change to be held in Glasgow, may offer a good opportunity for renewed transatlantic efforts. At COP26 the global community is to commit to updated national climate action plans and to ratchet up international ambition in decarbonization. Together, the EU and the US stand a good chance of forging a global deal, which commits international leaders to long-term decarbonization pathways at the same time it bolsters ambitious efforts from developing nations with sufficient climate finance.

Yet, sharing common goals does not necessarily mean agreeing on how to get there. In fact, the EU's approach to decarbonization markedly differs from the one pursued by the US. A cornerstone of the EU Green Deal, the European decarbonization masterplan, is the ETS, the bloc's carbon trading system. The ETS puts a price on emissions, thus incentivizing companies to reduce the carbon intensity of production. Through a combination of clear price signals and targeted policy efforts from agriculture to mobility, the EU hopes to fully decarbonize every economic sector by 2050. The US, by contrast, works through a combination of green financial stimulus, regulation, and state support for advancing technological progress in renewables, energy storage and clean appliances. The country's deep financial sector is also seen as instrumental in pricing in climate risk, thus steering money from brown to green investment through market forces. As such, this is neither surprising nor problematic—the difference in policy approaches mirrors the distinct organization of state-market relations on both sides of the Atlantic.

DIFFERENT POLICY APPROACHES, POSSIBLE TENSIONS ON THE HORIZON

The trouble is that it could result in tension. A reason lies in the fact that pricing carbon means additional costs for domestic industry and European companies may face competitive pressure from goods and services imported from countries or regions with less stringent climate targets. Domestic consumers may prefer the cheaper, more carbon intensive foreign product over the domestic one. And production might move to non-EU locations to avoid additional charges and costs. Climate ambition, the fear is, might deindustrialize Europe in addition to fostering carbon leakage.

The EU's answer to this problem lies in leveling the playing field between domestic and foreign products through a carbon border adjustment (CBAM). Goods with higher carbon content than their European equivalent will see a levy at the border, thus reducing both the incentive for EU companies to manufacture elsewhere and for European consumers to prefer an imported over the domestic product. A CBAM is likely to complement the European Green Deal and hedge the EU's decarbonization agenda against climate laggards whose export industry enjoys lower costs and hence a competitive edge.

This is precisely where things may get thorny going forward. While linking trade and climate policies makes sense from the perspective of the EU, others may regard it as discriminatory. China has already signaled that it regards Europe's plans as troubling and hinted at action at WTO level should the EU indeed levy (bon) tariffs on Chinese imports. The US has also signaled clear reservations. John Kerry, the US climate envoy, called CBAM a last resort measure during his visit in March 2021 and expressed concern that the EU might take fast action. A reason for the skepticism of the Biden administration lies in the fact that the US does not operate a nation-wide carbon market, which would allow both sides to mutually recognize equiva-

Solar panels seen from above, Florida, United States.

Climate leadership is essential to the development of strategic low-carbon industries capable of supporting income and welfare and creating jobs.

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An autonomous electric vehicle at a charging station, Babcock Ranch, Florida. The electrification of transportation is one of the measures included in Joe Biden's plan to reduce greenhouse gas emissions in the United States.

lency in incremental climate costs to their domestic economies and businesses. Short of a carefully designed CBAM flanked by targeted diplomatic efforts on part of the EU, a unilateral carbon levy might stir up transatlantic trade disputes of the kind Europe had hoped to leave behind with the Trump administration leaving the White House.

There is another element to transatlantic climate action. For both the EU and the US, ambitious climate policies are about more than stopping global warming: they amount to massive green industrialization programs. On both sides of the Atlantic, the shared belief is that climate leadership is indispensable for developing strategic industries in the low carbon domain, industries capable of sustaining taxable income, social security systems and the overall economy going forward. And on both sides there is a strong political imperative for making green industrialization policies work. "Building Back Better," a key slogan of Biden's campaign, in essence is about a key promise: to generate opportunity, jobs and welfare whilst transitioning the economy towards a low carbon model. The promise is specifically to improve the life of those blue-collar workers that team Biden wants to lure back from the Trump camp, and it is hoped that government spending on green energy, sustainable infrastructure and climate technology will accomplish that improvement. Similarly, the EU Green Deal not only represents Europe's "man on the moon" project but is also designed to make a heavily industrialized continent future-proof for the post-carbon age. It is also meant to offer a promising future for those that stand to lose from the transition, thus putting a lid on rampant populist trends in many parts of Europe.

A SHARED FIGHT, BUT FOR JOE BIDEN IT WILL ALWAYS BE "AMERICA FIRST"

In short, the green race is one that must not be lost. This makes Europe and the US competitors, for market share, technology leadership, and investment in climate technologies and low carbon solutions. The sitting US administration is climate friendly. But it will keep on putting America first, as did its predecessor. The battle for economic leadership in a low carbon world will be fierce, and it will be fought in areas as different as global industry standards, rules for sustainable investment and designs for carbon tariffs at the border. For the climate this is not the worst news, as long as the emerging transatlantic and global competition continues to advance technology and lower costs for low carbon solutions. For the EU, however, it means that transatlantic energy and climate relations need to strike the right balance between cooperating wherever possible with the fight against dangerous climate change while at the same time carefully defending European interests.

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