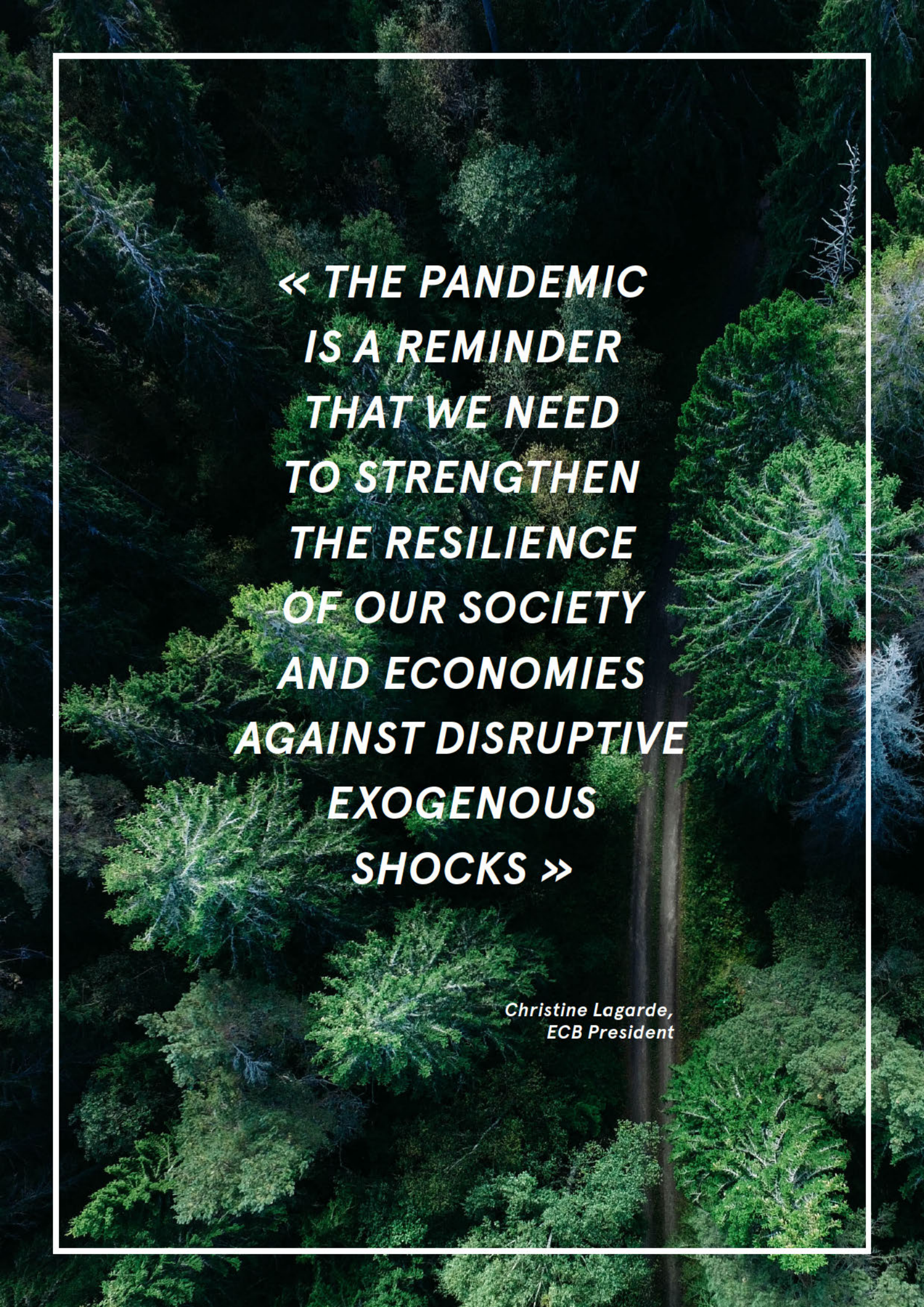


CARBON IMPACT QUARTERLY



LA FRANÇAISE
INVESTING TOGETHER

An aerial photograph of a dense forest, likely a coniferous forest, with a narrow path or clearing visible on the right side. The trees are lush green, and the overall scene is captured from a high angle, looking down into the canopy.

**« THE PANDEMIC
IS A REMINDER
THAT WE NEED
TO STRENGTHEN
THE RESILIENCE
OF OUR SOCIETY
AND ECONOMIES
AGAINST DISRUPTIVE
EXOGENOUS
SHOCKS »**

*Christine Lagarde,
ECB President*

LOW CARBON ECONOMY : POST COVID GREEN STIMULUS AND SUSTAINABLE RECOVERY

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INTRODUCTION

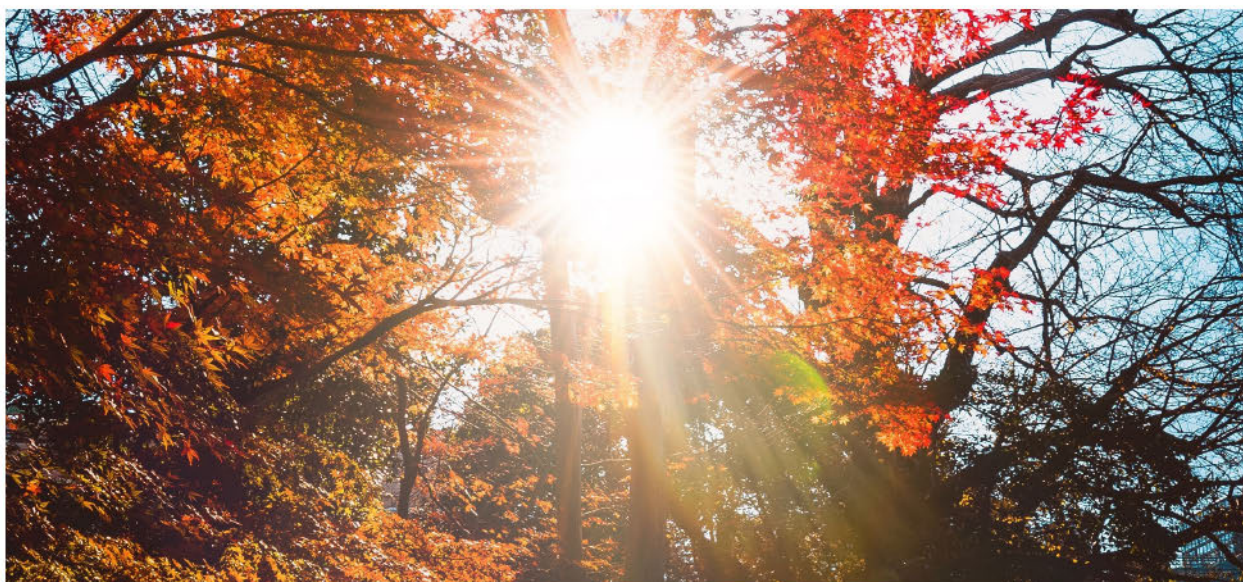
It is largely known that each economic crisis represents a deep breath for the planet, but this comes at the expense of companies' financial health, employment, wages, social well-being, global growth, and the list can go on. However, who says crisis calls a cycle which loops with a recovery: when the deep breath in which greenhouse gas have dropped is offset by the new emissions related with the kickstart of the economy. For instance, CO2 emissions decreased by 1.4% the year after the 2008 financial crisis but they increased by 5.1% in 2010 when the economy activity started to recover.

But awareness has evolved since the last global crisis, particularly since 2015 after the COP21 meeting leading to the Paris agreement. This was a huge step towards a new paradigm, in which the possibility of having a more ecological way of producing became a real target and in which quantifiable goals were set down. Today's society is fighting against the Covid-19 pandemic and its negative economic implications.

The Covid-19 crisis has been very brutal, unprecedented, and striking in its worldwide spread. While most of the world's population was in lockdown in their homes, we followed the terrifying news of this pandemic spreading fast, impacting the lives of millions of families, and putting pressure on many countries health's infrastructure capacity. Yet we also noticed the unexpectedly fast, positive impacts on the environment: clean air and clear skies thanks to airborne particulate matter levels dropping in big cities.

Indeed, during lockdown, coal consumption has dropped massively as electricity demand fell and according to the IEA, we have seen the largest worldwide decline in coal consumption since World War II. Overall, 2.6 billion metric tons of CO2 will not be emitted as we expect global energy demand to drop by -6% in 2020 which is seven times worse than what we saw following the 2008 crisis.

Today, policymakers may see this pandemic as an opportunity to integrate the environment into the economic recovery and finally set down new rules in order to kickstart the economy, while integrating and considering the impact it may have on the planet. We will focus on the stage of this progress and whether we can combine economic recovery with the investments necessary to limit global temperatures from rising.



1 – WHAT WOULD A SUSTAINABLE RECOVERY LOOK LIKE?

No one yet knows the full extent of the COVID induced crisis and its impact on our economy and society. The current consensus however is that, without significant intervention and international cooperation, our GDP growth outlook is not going back to positive territory by the end of the year nor by the end of 2021. But further away from the cold economical aspects of this crisis, the health and social hazard is as threatening. The health care helplessness, the rise of unemployment and further increase in inequalities is at the heart of the concern. The environment is today the only area which has benefited from this pandemic.

One could think that climate change emergency might be put to the background with the pressing issues to address. That is exactly what should not happen. We have had the tremendous opportunity to curb CO2 emissions and if we managed to crystallize this into a structural drop, we would still have a chance to reach our Paris Agreement objectives.

A – Fiscal stimulus mechanisms available

The International Energy Agency, which monitors and forecasts energy demand and related emissions to support international discussions around climate mitigation (like the UN Conference of Parties on Climate Change –COP-), has published an exceptional report in the midst of the COVID-19 crisis, to address the idea of a green recovery linked to the economic one, when governments around the world are thinking about their stimulus packages.

The report named “Sustainable Recovery” finds that the spending need of the plan envisaged would be of **roughly \$1Tn per year over the next 3 years**. As stated in the report, *“this represents about 0.7% of global GDP today, and includes both public spending and private finance that would be mobilized by public policies. The public spending required would be equivalent to less than 10% of fiscal expenditure in recovery plans announced to date; after the 2008-09 financial crisis, green measures accounted for around 16% of total stimulus measures”*.

Governments, depending on their political wing or current economical state, could choose different levers to implement a recovery plan:

- ◆ Traditional targeted government spending
- ◆ Financial incentives such as subsidies, grants and loans
- ◆ Tax incentives whether through a tax relief or burden
- ◆ Recovery through the labor market: job creation, hiring incentives, reconversion programs
- ◆ “Green Strings attached”: conditions entangled with government support
- ◆ Not a fiscal stimulus measure, but a potential global game changer: Carbon pricing mechanism

The means are manifold and so diverse that there is no unique route to THE ultimate solution, but the green stimulus should be readily implementable to boost consumption, preserve and create new jobs while contributing to greenhouse gas emissions reductions.

B – Possible recovery

a – Measures by sector

The immediate response to the crisis has been through Central Banks intervention. They have lowered interest rates and ensured liquidity and access to the capital market for companies (through quantitative easing programs such as the e1,350bn PEPP – Pandemic Emergency Purchase Program– from the ECB).

From a company standpoint, in economies where central banks have the above monetary power, this helps decreasing cost of capital and improves the economics of new, capital-intensive, projects such as large-scale renewable energy development or large-scale sustainable infrastructures. But it mainly favors companies of such a size that they can access capital markets.

For the smaller companies, banks are expected to help pass down the stimuli. Indeed, part of the ECB’s easing mechanism is to facilitate liquidity access for the financial sector as well as alleviate the capital requirements burden.

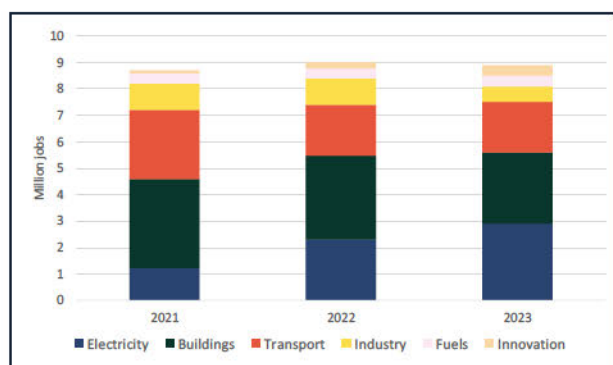
But governments’ interventions need to be more sector specific and access all layers of the economy. Here is a snapshot of the most carbon intensive sectors and what developments would currently be available to them with existing technologies, as indicated in the IEA Sustainable Recovery report.

	ENERGY	TRANSPORTATION	INDUSTRY
CONTRIBUTION TO EMISSIONS AND EMPLOYMENT	<p>The Energy sector is responsible for 40%* of global emissions.</p> <p>It is also the employer of 40m people worldwide.</p>	<p>The Transportation sector is responsible for 21%* of global emissions.</p> <p>It is also the employer of more than 30m people worldwide.</p>	<p>The Industrial sector is responsible for 24%* of global emissions.</p> <p>It is also the employer of 23% of the global workforce with almost 800mn jobs.</p>
	<i>*as of 2014 in the ETP 2017</i>		
COVID IMPACT	<p>The IEA estimates that investments in the Energy sector in 2020 will record its largest drop with a reduction of \$400bn versus 2019 which represents a 20% drop year on year.</p> <p>Within energy, the oil & gas sector's related investments are scheduled to decline by -30% when this is more resilient in the power sector (around -10%). However, this slowdown in capital spending will also affect renewable energies that are expected to drop in line with the power sector.</p>	<p>While we had short lived impacts on passenger car sales, we are seeing longer term impacts on Airline companies.</p> <p>So far, almost every national European and US airline company has received a support package of some sort to outlive the lockdown downturn.</p>	<p>Industries, depending on their application, are more or less hit by the COVID disruption, however, with order book likely to slow down and the already booked loss over Q1/Q2, they will have to reduce their investments in 2020 (at least).</p>
RECOVERY MEASURES	<p>Accelerate new capacity in Wind, Solar and storage.</p> <p>At the regional level: promote small scale solar projects and subsidize communities to deploy locally.</p> <p>This more regional approach can be accompanied with a workers' training program. Converting workers of our browner energy sources to the greener ones would be a way to preserve employment in the sector, support current and future consumption by addressing the skillset ramp up that needs to be achieved if this industry is to transform swiftly.</p>	<p>Governments should include green "strings" to their recovery packages (cf Air France). This would support the investment spent in new technologies and infrastructures without adding an extra burden to currently struggling business models.</p> <p>The most obvious way to expand and accelerate EV adoption (battery electric or hydrogen electric vehicles), would be to support cost competitiveness.</p> <p>While subsidies are necessary at the consumer level, investments in charging infrastructures are paramount. Several developments can be envisaged combining both Battery and hydrogen technology and related infrastructure. Hydrogen is particularly relevant for the decarbonation of heavy vehicles like buses or trucks.</p> <p>Cities can further develop what has been trending for the past decades, the automation of green urban mobility through public transport and easier walking or cycling access.</p>	<p>The main themes in the industrial sector are energy efficiency, electrification and waste and material recycling. In this sector where the electrification of the heating process could be a huge levy to decrease related emissions, decline in R&D is dramatic when there's no proven available technologies yet: here we think of cement, paper or iron/steel production where carbon based feedstock needs to be replaced by lower intensity ones (like blue or green hydrogen).</p> <p>The recycling market needs to be encouraged by policies on collection, which is still very low in most developed countries. Plastic recycling rate is on average 41% in Europe in 2017. Targeting this segment by encouraging collection, could help industrial's innovation in terms of materials second life.</p>

b – Green recovery and employment

The energy sector is a major employer across the globe with more than 40 million people in 2019 according to the IEA: 43% of those working in the electricity generation and grids and 50% in the production and distribution of fossil fuels.

FIGURE 1: Job creation by industry in the sustainable recovery plan



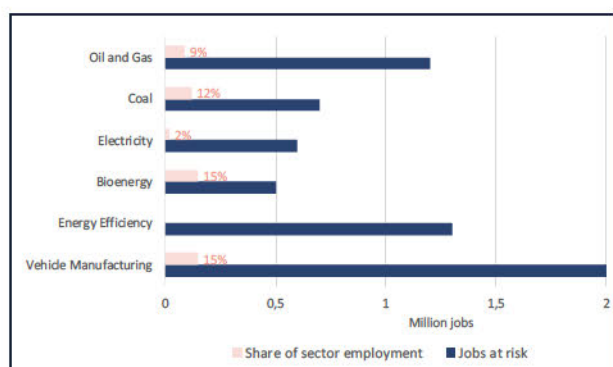
Source: La Francaise AM, IEA Sustainable Recovery

Due to the drop in energy demand induced by the COVID crisis, by 20% in full lockdown countries, it is estimated that 6 million jobs have been lost or are at risk and the energy sector makes up 2/3rd of it (the remaining third coming from the auto manufacturing sector).

While power generation is protected by its defensive nature, sustained low oil prices will have a bigger impact on the Oil & Gas sector, with 1.2m job losses expected.

The coal industry had started downsizing long before COVID with the relative cost advantage of natural gas and renewable energies. The job losses in this industry are estimated around 0.7m out of an industry that employs 6.5m worldwide.

FIGURE 2: Energy related and auto industry manufacturing jobs at risk



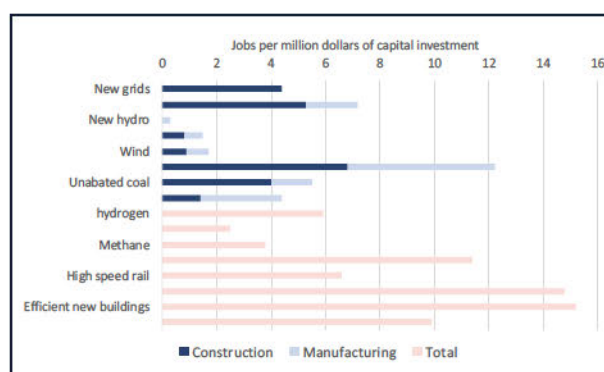
Source: La Francaise AM, IEA Sustainable Recovery

To protect employment and to ensure workers' skills conversion can accompany the transition, the IEA recovery plan fully embeds the employment aspect in its sustainable recovery.

The sustainable recovery plan encourages the creation of 27 million jobs: 35% are in energy efficiency, 25% in the electricity sector, 10% of jobs relate to cars and the remaining across fuels, renewables in end-uses, recycling and innovation.

The IEA proposition relies on employment multipliers for each technology and will vary depending on the region as they will depend on wages levels, material costs and overall cost of the project. They have estimated the job creation linked to the recovery package proposal through the number of jobs created for each million dollars of investment or spending. As you can see below, energy efficiency, grids and solar PV create more jobs than Coal or Gas power per million dollars of investments.

FIGURE 3: Construction and manufacturing jobs created per million dollars of capital investment and spending by measure



Source: La Francaise AM, IEA Sustainable Recovery

Specifically, on power generation, BNEF puts it a different way but highlights the same finding through the number of jobs necessary for each 1MW capacity in the US:

- ◆ 0.4 and 0.5 worker for 1MW of Gas and Coal capacity
- ◆ 1.2 and 3.8 workers for 1MW of Wind and Solar capacity

2 – WHAT COUNTRIES HAVE IMPLEMENTED SO FAR?

A – EU

a – Next Generation EU

The Eurogroup agreed in July 2020 to the “Next Generation EU” plan which has a budget of 750bn EUR to help the member states finance the economic recovery post the COVID pandemic. The member states have decided to split the plan into €390Bn of non-refundable grants and the rest as loans. It will supplement the Union’s budget for the period 2021–2027, which will bring the total financial capacity to 1.85bn EUR. The notion of green and digital transition is central through the plan alongside economic resilience, showing the emphasis on interlinking recovery package with climate change objectives.

The Next Generation EU plan is based on three pillars:

The main bulk, is **to support to member states in investment and reform**, of which 30% include references to the green transition:

- ◆ New “recovery and resilience facility”, with 672.5bn EUR. This includes relations to the green and digital transitions to the same extent as the resilience of economies. This is where grants and loans will be allocated in accordance with their compatibility with the current EU agenda, including the Green Deal.
- ◆ 10bn EUR will be allocated to the “Just transition fund” to accelerate the transition towards climate neutrality.
- ◆ 67.5bn EUR for:
 - The EAFRD (European Agricultural Fund for Rural Development) budget to help farmers and rural areas make the changes necessary for the implementation of the Green Deal.
 - “React EU” by 2022 to be allocated based on the relative youth employment to the relative prosperity of the country.
 - **Boosting the European economy by attracting private investment**
 - This will be done through a new solvency

support instrument aiming to mobilize 300bn for affected companies that have a role to play in a cleaner, digital, and resilient future, showing alignment with the objectives of the recovery and resilience facility.

- An increase in the capacity of InvestEU to reach 15.3bn EUR and the creation of a new strategic investment facility integrated into it to support the resilience of strategic sectors: those linked to the green and digital transition.
- **Learn from the crisis and respond to the EU’s strategic challenges**
- Creation of a new program dedicated to health security and a top up of the existing for Horizon Europe to fund research and development for health, resilience, green and digital transition.
- Additional funding for infrastructures, external action and other objectives

b – Green Deal⁽¹⁾

The Next Generation EU includes a clear necessity to be aligned with the Green Deal as climate neutrality is one of the four priorities of the EU strategic agenda for 2019–2024.

In December 2019, the European Commission presented the European Green Deal, an overarching framework and program of actions to transform the European economy so they can become climate neutral by 2050. The key aspect of this is the “Climate Law”, which embeds a legal commitment from the EU to achieve its neutrality objective.

To reach this objective, at least 25% of the EU budget will be allocated to the Green Deal measures (which is in line with more than 30% of Next Generation EU being aligned with green objectives). This target implies a large set of different measures that the European Commission summarizes as:

(1) https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

- ◆ investing in environmentally friendly technologies
- ◆ supporting industry to innovate
- ◆ rolling out cleaner, cheaper, and healthier forms of private and public transport
- ◆ decarbonizing the energy sector
- ◆ ensuring buildings are more energy efficient
- ◆ working with international partners to improve global environmental standards

c – Single country example: France

Within Europe, Member states will have different pathways to the green recovery and some countries have started implementing it.

The current legislative framework of France with regards to the Paris agreement and the objective of limiting global warming to less than 2°C by the end of the century started with the Energy Transition Law passed in 2015. The objectives were to cut GHG emissions by 40% between 1990 and 2030 and by 75% by 2050. This is also the law (Article 173) that requires French listed companies to disclose their climate related risks and French investors to measure and communicate the carbon footprint of their portfolios as much as their strategy to align investments with the Paris agreement objectives.

Since then, the Energy and Climate law has been passed and outlines the framework on climate and energy matters to meet the objective of climate neutrality for 2050.

France has been quite vocal in the necessity to integrate green objectives to the Eurogroup recovery plan. This came to reality with the 100bn euros rescue package launched on September 3rd (33% of the total country's annual budget) which includes 30bn euros of stimulus labeled as ecological. This is so far the biggest package approved in the EU and aims to be implemented by 2022, including 40% of its funding from the EU.

The stimulus comes in a much-needed context as the pandemic shock hit France in a sizeable manner and GDP is expected to contract by more than 9% in 2020⁽²⁾. The 30bn portion will focus on measures like tax rebates in order to boost industrial output and provide employment and education services for the young generation. It goes beyond reducing emissions as it also encompasses animal wellbeing and earthquake proofing in offshore territories.

We have summarized the breakdown of the budget spent by energy transition related project types as laid out in the rescue plan.⁽³⁾

(2) Bloomberg consensus

(3) https://www.gouvernement.fr/sites/default/files/cfiles/mesures_france_reliance.pdf

FINANCING COSTS	SECTOR
TOTAL €11.1bn €1.2bn €4.7bn €0.55bn €0.18bn €1.9bn €2.6bn	Transport: <ul style="list-style-type: none"> • Support urban cycling and public transports • Improve the global rail network's quality • Improve transport infrastructure across the territory • Electrification of the government's fleet • Incentives to citizens for EV purchase bn • Support to the Auto and aeronautics industries
TOTAL €6.7bn €2bn €4bn €0.5bn €0.2bn	Buildings and Renovation: <ul style="list-style-type: none"> • Energy efficiency of private buildings • Public buildings renovation • Energy efficiency and improvements of social housing • Ecological transition and renovation of SMEs
TOTAL €3.4bn	PIA: <ul style="list-style-type: none"> • Public grant program to support energy transition innovation
TOTAL €2.5bn	BPI France financing: <ul style="list-style-type: none"> • Loans to SMEs to encourage the energy transition
TOTAL €2bn	Hydrogen: <ul style="list-style-type: none"> • Support, develop and accelerate green hydrogen technologies
TOTAL €1.5bn €0.5bn €0.3bn €0.35bn €0.05bn €0.3bn	Biodiversity: <ul style="list-style-type: none"> • Climate change adaptation and resilience • Urban organization and recycling of brownfields • Urban density support • Earthquakes risks mitigation in the West Indies • Secure access and infrastructures of drinking water
TOTAL €1.2bn	Decarbonizing Industry: <ul style="list-style-type: none"> • Energy efficiency, electrification and heating processes
TOTAL €1.2bn €0.4bn €0.25bn €0.1bn €0.25bn €0.2bn	Agriculture: <ul style="list-style-type: none"> • Agro-ecological transition towards a sustainable model • Animal wellbeing • Vegetal based proteins security • Upgrade of equipment and infrastructures • Forest preservation and climate change risks mitigations
TOTAL €0.5bn €0.226bn €0.274bn	Circular economy: <ul style="list-style-type: none"> • Reducing plastic consumption (single use specifically) and support recycled plastic development • Accelerate waste reutilization • Waste management industry support
TOTAL €0.5bn	Nuclear: <ul style="list-style-type: none"> • Nuclear waste management, dismantling and innovation in the power sector
TOTAL €0.1bn	Electricity grids: <ul style="list-style-type: none"> • Climate change adaptation and resilience of electricity networks

Example of a company specific package with 'green strings attached': the government had announced at the end of April to release 7bn EUR for Air France, nailed to the ground by the Covid-19 crisis, but under certain environmental conditions. The first consisted of reducing its CO2 emissions on domestic flights by 50% by 2024. The second, to limit «drastically» flights for which a rail alternative of less than 2 hours 30 minutes exists, if they do not serve the Roissy-CDG hub.

B – The United States

The US were not sheltered from the COVID-19 pandemic, which resulted in an economic contraction of almost 5% from January to March 2020, alongside a surge in unemployment to almost 15% in April. The health crisis that threatened the liquidity position of US companies, led 70 large firms to file for Chapter 11 bankruptcy and to a -32% GDP contraction quarter on quarter for Q2 2020.

The rescue packages deployed in March and April amount to almost \$2trn⁽⁴⁾ for immediate fiscal impulse, \$561bn in deferrals and \$560bn in other liquidity and guarantee measures for \$560bn. None of this specifically targets green activities but the whole industry benefits from it. In the case of the US, we will not focus on what has currently been done but what could happen shall Joe Biden be elected.

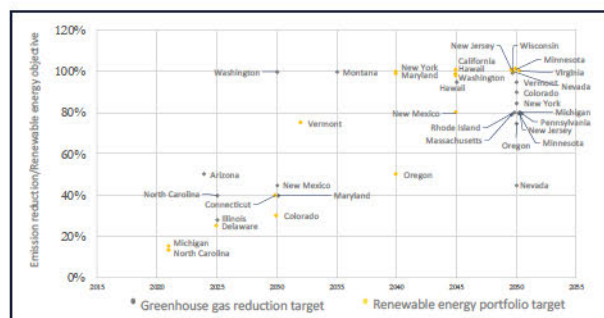
Indeed, the political prioritization of climate change issues has been flipped during the past presidential mandates. Under Obama's presidency, the US made several steps forward in the fight against climate change, through federal laws such as the Clean Air Act but mainly through the ratification of the Paris Accord in the COP21 in 2015. However, when Donald Trump came to the White House, he reversed all the efforts that had been made to tackle global warming. Trump's energy independence executive order reversed Obama era rules and encouraged increased production of coal, while pulling out of the wider commitments to reduce GHG emissions taken with the Paris agreement. However, the relative cheapness of natural gas and renewable power over coal and the local states climate change mitigation measures have countered his plans.

State measures to fight climate change through local policies have been diverging from the federal one since Trump came into administration. Some of the policies include incentives to increase the use of renewable energy, "Carbon Capture, Utilization & Storage" (CCUS) and improving standards to achieve a higher efficient energy use. More than half of the country – 30 states, Washington, and three territories – have adopted a renewable portfolio standard (RPS), according to

the National Conference of State Legislatures, and seven states and one territory have set renewable energy goals. In June 2017, under the initiative of California, New York and Washington, the United States Climate Alliance was created. Today the coalition has 26 members corresponding to 24 US states and 2 US territories: Puerto Rico and American Samoa. Among the member states there are three republican-governed states: Massachusetts, Vermont and Maryland. The member states committed to respect the Paris agreement and have as objective to reduce their GHG emissions by at least 26% compared to 2005 by 2025. This bipartisan coalition represents more than 60% of the US GDP, 55% of the US population and roughly 45% of US CO2 emissions⁽⁵⁾.

The following graph shows the states that have established a specific quantified objective with a fixed deadline. Those that are in grey have a specific goal to reduce the levels of GHG emissions with 1990, 2000 or 2005 as a reference year. Most of these goals have 2050 as a deadline. The states in yellow are those that have established a goal to have a specific percentage of renewable energy portfolio for retail energy production.

FIGURE 4: State level objectives



Source: La Francaise AM

Environmental impact of Joe Biden's Election

The health crisis has been the propitious scenario that increased voting intentions in favor of the democrat candidate. According to the surveys occurring over this summer, Biden would have a good chance of coming into power and roll back several policies established during the Trump mandate, mainly with regards to fiscal and environmental policies. According

(4) <https://www.bruegel.org/publications/datasets/covid-national-dataset/#usa>

(5) U.S. Energy Information Administration (2019): Energy-Related Carbon Dioxide Emissions by State, 2005–2016. February 2019. Online available: <https://www.eia.gov/environment/emissions/state/analysis/pdf/stateanalysis.pdf>

to Bloomberg's general average poll index, Joe Biden has 49.7% of voting intentions as of the 15th of September.

Many Americans disapprove Trump's management of the COVID crisis, the drop of the economic activity as a consequence of the lockdown only exacerbates the feeling of disapproval and hence makes more plausible to have Joe Biden as the 46th president of the US. He embraces the Green New Deal as a framework to meeting the climate challenges the world faces. The deal is a proposed package of US legislation that aims to address climate change and economic inequality.

After his first \$1.7 trillion proposal during the primaries, Joe Biden then decided to accept ideas from several young environmentalists, which resulted in a more aggressive and extensive plan **that aims to reduce the CO2 emissions from the electric industry and achieve 100% of clean electricity by 2035**. Biden also ensured that he **would rejoin the Paris Agreement and that he would spend \$2 trillion over four years**, instead of \$1.7 trillion over ten years, to stimulate the creation and development of renewable energy sources and more energy efficient energy-efficient cars and buildings⁽⁶⁾.

He also considers that his climate action has the potential to create at least 1 million new jobs linked only to the creation of electric vehicles and charging stations, another million could come from the construction sector, particularly from building greener infrastructure. This plan represents a push to help the economy recover from the crisis brought on by the COVID-19. Some other specific actions that Biden has added to his campaign is to reduce the impact of the airlines emissions by setting up measures to incentivize the creation of new, sustainable fuels for aircraft, as well as other changes to aircraft technology and standards, and air traffic management⁽⁷⁾. The democrat candidate has also promised to accelerate the development and deployment of carbon capture sequestration technology. He will double down on federal investments and enhance tax incentives for CCUS. Biden plans to stimulate the purchase of electric vehicles through credit tax mechanisms designed to target middle class consumers¹². Finally, he also seeks to enact a national strategy to develop a

low-carbon manufacturing sector in every state, accelerating cutting-edge technologies and ensuring businesses and workers have access to new technologies and skills, with a major focus on helping small and large manufacturers upgrade their capabilities to have both competitive and low-carbon futures¹².

Biden not only contemplates the environmental issues but he framed his climate plan with an employment focus too. He has voiced his willingness to focus on an unprecedented amount of resources into transitioning the United States away from fossil fuels as a component of the economic recovery. However his plan does not establish a ban on fracking nor a ban on exports and imports of fossil fuels as it could cause a defeat for the democrats given the potential economic impact. They still can try to set up such a policy once in power, but again this ambitious bill is not likely to be approved by the Congress, at least, in its current state.

Shall Trump be re-elected, climate action is expected to be minimal compared to the scenario above. However, he would be re-elected in a very different environment than in 2016. First, his willingness and efforts to support the coal industry have failed in the past four years. Plants have shut down and major utility players publicly stated that it no longer made sense investing in coal capacity given the relative cheapness of renewable energy and natural gas. Secondly, the current election is happening in a middle of a wildfire crisis which has, yet again, hit California (and neighbour states), increasing public scrutiny on the necessary mitigation of physical risks induced by climate change.

C - China

Even before the COVID-19 pandemic, China wanted to promote the transition from fossil fuels to renewables energies as they were facing the threat of social unrest linked to the amount of pollution in high density urban areas like Beijing or Shanghai.

Increasingly drastic pollution management measures have reduced air pollution and even improved the situation dramatically over the past five years. To reduce air pollution due

(6) https://www.washingtonpost.com/climate-environment/how-joe-bidens-surprisingly-ambitious-climate-plan-came-together/2020/07/31/b73e78d0-cd11-11ea-91f1-28aca4d833a0_story.html

(7) <https://joebiden.com/climate/>

to this uncontrolled use of coal, China has invested heavily in renewable energies. As of 2015, investment in renewable energy in China alone accounted for 17% of global investment, or \$102.9bn. In 2017, a five-year plan called for investing \$361 billion in renewable electricity by 2020. The country has also introduced an anti-pollution tax. From now on, companies and institutions must pay for their polluting emissions into the air, water, and soil. During COP21, China pledged to reduce its carbon intensity by 45% by 2020. An objective already achieved 3 years in advance, with -46% compared to 2005 rate.

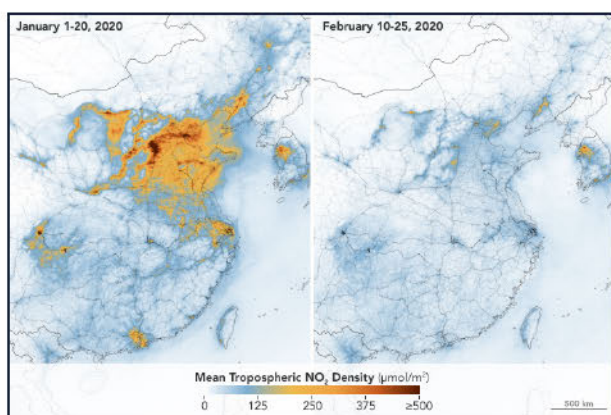
COVID-19 pandemic originated in China in December 2019. The pandemic which started regional quickly took a global scale. China had not experienced a recession for 40 years. In Q1 2020, the country's GDP plunged by 6.8% due to the coronavirus outbreak while China's growth was already hampered by the trade war with the US. The coronavirus outbreak had a short-lived benefit for China though. Indeed, the concern of air pollution, which should be treated as a major public health issue (1 million deaths per year in China), returned to the public debate following the publication of an image from NASA. It was during the lockdown in China that NASA was able to observe a significant drop in pollution, partly linked to the economic slowdown caused by the epidemic. The drop in Nitrogen dioxide concentration was first noticed near Wuhan, the epicenter of the epidemic, but has gradually spread to other parts of China, according to the scientists from NASA who examined images from their satellites and those of European Space Agency.

To support its economy and get back to economic growth, the state has announced a stimulus plan of nearly \$586bn. As part of this stimulus, China announced that it will respond to the economic crisis with green policies. First, the Chinese Ministry of Finance will allocate nearly 407bn RMB (\$57bn) to ecological and environmental protection in 2020, up from 390bn RMB. As such, the country has just presented a major ecological protection plan for the next fifteen years. From this total package, 25bn RMB will be allocated to air pollution prevention and control, 31.7bn RMB to water and 4bn RMB to soil protection. The objective is to extend its forest cover to 26% and to control 75% of recoverable sandy land. The area of natural forests will be maintained at 200m EUR hectares and 60% of wetlands will be under protection. In addition, more than a third of the country's natural coastline will be untouchable.

On the transportation side, the Chinese government will push and subsidize charging stations for electric vehicles to increase the charging coverage in China and allow this technology to be deployed massively. China plans to expand the country's charging network by 50% this year. According to Xinhua news agency, the nation intends to establish an additional 600k charging points, of which 200k will be public chargers within 48k charging stations. Tax incentives will be introduced for diesel vehicle replacement (\$1.46bn⁽⁸⁾). New energy vehicles will be taxed less as an incentive. For long distance transportation, there will be incentives for development with a focus on intercity high-speed rail.

After this report was written, President Xi Jinping announced (late September) that China aims to be carbon neutral by 2060, tightening its GHG reduction objective and implying higher spending on green technologies in the next five year plan (to be released in March 2021). While we are waiting for more details on the quantum and distribution of the green stimulus, this will be of significant impact as China is the world's biggest emitter. One estimate published after the announcement amounts to \$5.5trn required by 2050 to fund this neutrality objective.

FIGURE 5: Airborne Nitrogen Dioxide Plummets Over China



Source: NASA

(8) https://www.carbonbrief.org/coronavirus-tracking-how-the-worlds-green-recovery-plans-aim-to-cut-emissions?utm_source=Web&utm_medium=contentbox&utm_campaign=Covid-box

3 – HOW BIG IS THE GAP?

A – How much do the current measures compare with the consensus on required investments?

a – Conclusions IEA sustainable recovery plan

To summarize the IEA recovery plan's measures, it would require an annual \$1trillion (0.7% of today's global GDP) spent over the next three years and would have, under those assumptions, a real GDP impact of +3.5% in 2023 versus the "no measures" scenario, this represents an annual extra 1.1% of growth and inflation would globally exceed 1% by 2023.

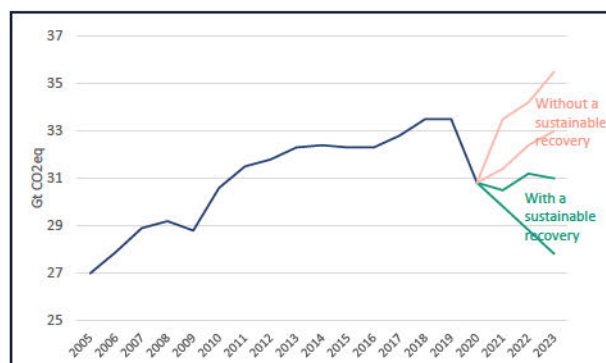
The aggregate households and firms spending by 2023 would reach +3.9% led by the support measures to specific industries and to employment. The IEA forecasts the creation of 9.5million new jobs in energy related manufacturing, construction, and maintenance. Which compares with 6million jobs being put at risk through the COVID crisis (energy supply, efficiency, and vehicles).

The public spending required would only represent 10% of current stimulus packages announced which is below the proportion targeted at green recovery post the 2008-2009 crisis, which was standing at 16%.

The human impact is sizeable as it would also allow 420million people to access clean cooking solutions and would allow 270million people to gain access to electricity.

While electric infrastructures (generation/distribution) would be reinforced and therefore more resilient to the physical risks of climate change, the plan would also crystallize the drop in CO2 emissions. Global GHG emissions would be reduced by 3.5Gt by 2025 vs the "no measures" scenario (graph 3.10). The 2020 emissions reduction induced by the COVID related slowdown would therefore be structurally locked-in; when without green measures we run the risk of going back to pre-COVID emission levels.

FIGURE 6: Total CO2 emissions trajectories 2020-2023

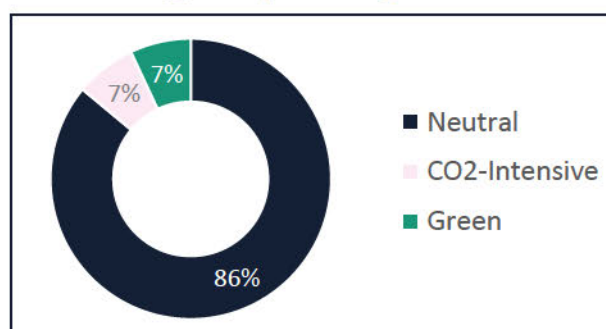


Source: La Francaise AM, HSBC, IEA Sustainable Recovery

b – Current measures announced

The current \$800+Bn share of the global over \$12tn recovery package, that targets specifically post-carbon economic priorities, is clearly shy of what would be required. This commitment is also to consider over the next 3 to 5 years depending on the geography. Thanks to the European Commission, it is not that far off and with China's commitment we could see a massive uptick in that number (China is not included in our total green package as not disclosed yet).

FIGURE 7: Total Stimulus to date, including EU package



Source: La Francaise AM, BNEF

The unfortunate drawback is that as much money is going to benefit CO2 intensive companies as it will for green ones. So far, \$863bn in stimulus for carbon intensive technologies without green conditions have been announced. Transport is taking the biggest share of this, with 49% of

the sum, including 14% for the aviation sector which has been particularly hit by the crisis. With regards to fossil fuel direct help, the Oil and Gas sector only receives 5% of the share and 1% for the coal industry.

There is a need for other countries to join the movement. We are expecting more packages to come from European countries, but the real game changer would be from major economies like the US, Brazil, India and China (through their new objective).

If Joe Biden's green deal were to go through senate, this could add an annual \$500bn support to green energies and technologies. If we assume an annual \$200bn spent for the already approved packages, the total sum of \$700bn would not be that far off the 1tr a year recommended by the IEA.

This is where political pressure/international engagement should encourage the Asian giants to fill the gap, through the existing frameworks in place (Belt and Road Initiative or domestic infrastructure development programs). The 2021, Carbon Border Adjustment Tax (see next section), would also be encouraging trade partners to install or reinforce their carbon pricing system (which can go through subsidies/fiscal stimulus).

B – How could global carbon pricing systems help

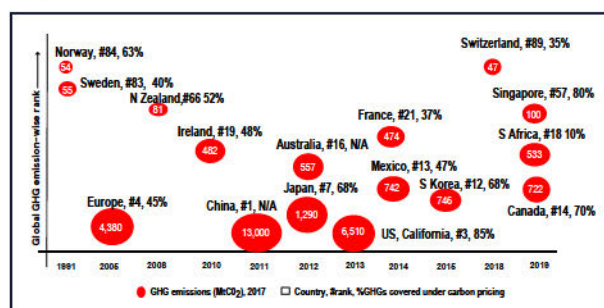
The World Energy Outlook 2019 includes assumptions on a global CO₂ price that would lead to a 'Sustainable scenario'. This estimates how it will affect demand for energy by altering the relative costs of using different fuels "In the Sustainable Development Scenario, a higher and broader CO₂ price is assumed, rising to \$140/t in 2040 in advanced economies and to \$125/t in selected developing economies such as Brazil, China, Russia and South Africa".

The European ETS allowance carbon price has been ranging around \$27-\$29/t over the past two years. Other carbon markets differ in levels but still exhibit a huge gap with the IEA target.

This is where a carbon pricing mechanism should today be envisaged alongside fiscal stimulus to a targeted green recovery. This would allow to close the gap and avoid the indirect effect of public spending or tax breaks that would support carbon intensive activities.

The current 28 carbon pricing schemes that exist in the world are inequal in price and emission coverage. According to the World Bank, only a fifth of the world's global emissions are subject to a carbon price as of 2020.

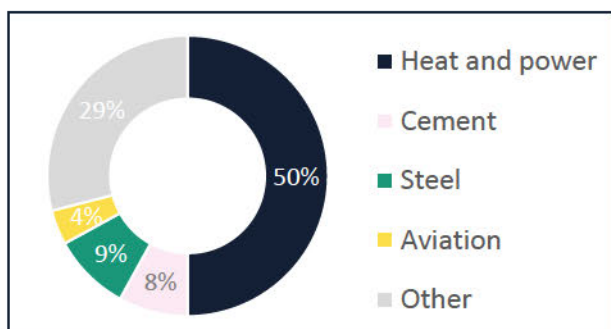
FIGURE 8: Overview of key carbon pricing schemes, by emitter



Source: PRIMAP, HSBC

Local (country specific) or regional schemes (EU Emissions Trading System, EU ETS) are currently administered independently with no global adjustments. The likelihood of getting to a global emissions trading system is not yet on the table. Therefore, the EU is exploring a solution to avoid carbon leakage. Indeed, a proposal is envisaged for the summer of 2021 of a Carbon Border Adjustment Tax, as part of the wider European Green Deal agenda. A carbon Border mechanism would tax imports from high intensity sectors, to ensure European producers are not placed at a disadvantage and do not change jurisdiction where the costs of carbon compliance are lower. So far, carbon leakage has been addressed with free allocation and indirect cost compensation, while carbon price has been relatively low.

The sectors that would be targeted are Steel, Cement, Aluminum, and power. They represent 45% of the EU's emissions and 2/3rd of verified EU ETS emissions, split as follows.

FIGURE 9: EU ETS emissions

Source: La Francaise AM, BNEF

A carbon border mechanism would depend on the carbon intensity of the imported goods and EU industrial activity is already more carbon efficient than in other areas. However, depending on the sector, different situations are currently at play: the current balance of trade imports vs exports and availability of technologies to decarbonize are not at the same stage depending on the sector.

There are different formats to put the mechanism in place, the most likely being to extend the scope of the current EU ETS program where importers would buy Emission allowances to compensate the embedded emissions from outside jurisdictions. This has the advantage of reducing trade discrimination as domestic and international producers would bear the same price and this does not require unanimity from member states which has been the issue in the failed attempts of 2009 and 2016.

Locally this would allow to finance partly the energy transition investments required under the green deal and/or go towards the recovery plan participation. Outside of EU borders this would have a level playing field effect, accelerating ex-EU producer's reduction in carbon emissions.

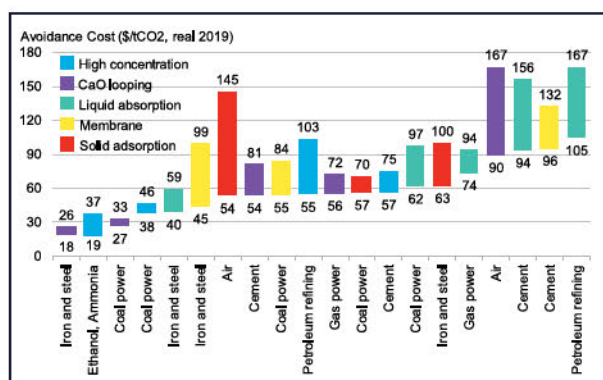
C – The big unknown: CCUS

Carbon, capture, utilization, and storage (CCUS) include a wide set of technologies which, for some, have been used for decades but have not been widely adopted due to their utilization costs. However, CCUS is vital for reducing emissions across the energy system in both the IEA's 2°C Scenario (2DS) and Beyond 2°C Scenario (B2DS). Indeed, the

growth of these technologies would enable to sequester part of the induced emissions that we do not manage to reduce.

As of the Energy Technology Perspective 2017 from the IEA, under the Reference Technology Scenario (RTS) (current policies), the role of CCUS remains the same through to 2060, resulting in only 1.3 GtCO₂ captured and stored per year by 2060. However, if CCUS is deployed more widely, like the assumption in the 2DS, it could result in 6.8 GtCO₂ captured in 2060. CCUS then features more heavily with increased climate ambitions as it can reduce hard-to-mitigate emissions from industrial processes, lower the emissions from remaining fossil fuel use and potentially result in net-negative emissions when combined with bioenergy.

As of 2020, 300MtCO₂ are used each year through different applications, the main ones being feedstock for chemical processes and enhanced oil recovery (EOR). EOR is the process of extracting crude oil from a field where no other method can be used, this has the advantage of extracting 30%-60% of the reservoir versus 20%-40% through primary and secondary means. Carbon dioxide can be injected through the gas injection technique as it reduces oil viscosity. More than 80% of the current demand is met by low cost capture from high concentration sources like bioethanol fermentation, natural gas fermentation and hydrogen production.

FIGURE 10: Costs of avoiding a portion of CO₂ emissions

Source: BloombergNEF

The growth in demand has come from EOR and storage and following BNEF assumption that the market still grows with a ~10%

CACGR, global capacity should double by 2030, estimated at 1GtCO₂ per year by 2040.

However current costs of air capture and other absorption methodologies are currently prohibitive unless it can directly contribute to revenue generation. The current US 45Q tax incentive is an illustration of direct support that the Oil & Gas industry has benefitted from to develop CCUS projects. An accelerated use however requires policy intervention. Existing or foreseen penalties on CO₂ emissions are forcing companies to explore CCUS options. The current carbon pricing mechanisms in place like the EU ETS are aligned with this idea but the excess allowance in the market results in a carbon price much lower than what is required. The development of a carbon border tax would directly encourage the global level-playing field in terms of carbon cost but we would also expect to see more direct incentive to targeted industries that would close the loop (cement, iron and steel) and by distinguishing the policy applications of capture, transport and storage. The deployment of those technologies is therefore interlinked with a Carbon pricing mechanism, investment in

storage capacity and policy support in the different parts of the value chain.

The biggest projects currently ongoing are capturing more than 1Mt of CO₂ per annum:

- ◆ NRG's Parish coal plant started its Petra Nova project in 2017. The system captures 33% of the generation's emissions. The CO₂ is then delivered to an EOR project which growth in demand has supported the capacity enlargement to supply 1,4mt of CO₂/yr. With tax credits and EOR demand, the cost of CO₂ disposal for Petra Nova is now at \$24 per ton according to BNEF.
- ◆ Shell's Quest CCS project captures 1.2mt CO₂/yr from hydrogen production and inject it 2km underground. Total costs of disposal are much higher at \$41 per ton.
- ◆ Norway has made the headlines recently as it has ordered a large CCS project of 1.5mt CO₂/yr capacity (costing \$675m). This should find demand from the Oil & Gas sector which can now offset investments against the offshore oil & gas carbon tax of e50 per ton (which is paid on top of the EU ETS allowance).

CONCLUSION

The health crisis we currently face will resolve at some point whether it takes a couple of months or another year. The economic one however will last longer. As of today, it is difficult to appreciate the length of the recession as it not only depends on the vaccine outlook but also on the reliability of the underlying assumptions that consumers' behaviours will go right back to pre-COVID levels. This uncertainty about the depth and breadth of the economic impact explains why such unprecedented recovery packages have been announced so far and why we expect more to come. Without them, the global state of the world would be in a disastrous economic condition which would have natural negative impacts on our societies and our environment. But with them we are indebting further our economies and digging further into a negative interest rate system. Therefore, governments should make the most of it and incentivize a sustainable recovery.

About the current green stimulus, we think it should be a sector specific, readily implementable, factor in employment preservation while working towards the global objective of carbon emissions reduction to reduce climate change transition and adaptation risks. As the IEA sustainable recovery plan highlights, this would require \$1trillion per year over the next three years. While the European Commission has recently set the scene, allowing the green stimulus package to increase over \$800bn, we are still short of what is required. The only way to close this gap is to see some positive actions from the US through the elections, as well as from the Chinese carbon neutral plan. In the meantime, the European commission can force, if it cannot convince, other international players to rethink their carbon pricing mechanism through the carbon border adjustment tax that naturally goes with their renewed Climate Objective. The European Central Bank is also sending signals that it will support the growth of the green market and can provide additional support through its financing.

We introduced this paper with the paradigm set by the ratification of the Paris agreement in 2015. The COVID-19 crisis has now set a new one. Solidarity has emerged from this collective exposure to the pandemic. Our governments should foster this mindset and scale it up to cross borders. The only way climate change can be addressed or mitigated is through a worldwide, long term oriented, collaborative action which recognizes that prosperity should encompass the preservation of our environment for the generations to come while focusing on the social vulnerabilities we are facing in the short term.

Imprint

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