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Climate in the Post- Pandemic Resilience Era.

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Editorial board.

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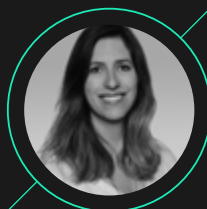
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Editorial.

As we started the year 2020, the COVID-19 pandemic hit globally, compelling countries and companies to take unprecedented measures to prevent its spread, and then to rescue and recover economies. Prior to the crisis, climate change action was gaining momentum, appearing more on decision makers' agendas (the Green Deal accounts for 25% of the multiannual financial framework budget in Europe), yet was not stopping the alarming rise of global carbon emissions which reached historical levels in 2019. The pandemic showed the extreme effect of human activities on carbon emissions and how a change in human behavior could affect these emissions. We estimated a drop of 58% in European daily carbon emissions during the lockdown¹.

Mentalities have now changed drastically. The pandemic quickly turned the world upside down in ways no one thought imaginable. What better time to rethink our world? We believe that a successful recovery must be sustainable because transitioning to a low carbon future is a requirement to ensure medium and long term global resilience. The post crisis environment will accelerate the transition toward a better world where countries and companies act towards low carbon economies. Consulting firms will be part of the equation as transformation facilitators and Sia Partners will be at the forefront.

Sia Partners did not wait for the impact crisis to transform its structure and activities towards purpose-driven activities and position itself to drastically disrupt the market by reorienting global offerings to bring positive social, ethical, and environmental impacts for Customers and Third Part Partners. In 2019, Sia Partners was generating 15% of revenues directly or indirectly from the positive impact driven consulting activities related to climate change.

Investing in green development, promoting a respectful agriculture, ensuring biodiversity preservation, leveraging technologies to reduce our impact on the environment, adopting favorable public policies, and reducing our exposure and vulnerability to climate change are complementary levers to move towards a low carbon society. In this first edition, we explore why and how climate is and will be an integral part of the post pandemic economy through six major focus themes.

Jean Trzcinski and Charlotte De Lorgeril

¹ Sia Partners, "Daily European CO2 emissions to drop by 58% under current measures", April 2020

Adapting Public Policies.

COVID-19 impact on public policies: more than 30 countries with upward policies this year

Governments worldwide response to the COVID-19 crisis demonstrated their ability to intervene quickly and with drastic measures when facing a major urgency with immediate consequences. In only a few months - the state of public health emergency of international concern was declared at the end of January - many States managed to adapt their organization in order to slow down the spread of the virus and save lives. Several parallels can be drawn between the global health emergency and the climate and environmental emergency. The health crisis emphasized the dependence of human health and well-being on ecosystems: among other root causes, environmental factors like habitat and biodiversity destruction may have played a part in the spread of the virus, by bringing animal host populations and humans closer together. Both phenomena are also systemic and represent major risks to human welfare and viability. Facing those emergencies, international cooperation, state intervention and a profound change of social and economic models backed by public support are needed.

For decades, experts have been pointing fingers at the need to take environment and sustainability into account in every aspect of public life. Despite the emergency stressed by the IPCC, efforts have not been sufficient to contain global warming under critical thresholds. As governments are curbing the epidemic thanks to a sudden mobilization of unprecedented magnitude, they might also face a unique opportunity to address the climate challenge.

Recovery from the crisis could open a new chapter in the fight against climate change

The COVID-19 health, economic and financial crisis could enable states and governments to become acutely aware of the need to act for a more sustainable society and economy, launching climate oriented recovery plans and stimulating the emerging dynamic of climate policies.

The health crisis and the unprecedented measures taken to contain it, such as the confinement of about three billion people, have led to a situation that is also unprecedented: near-total shutdown of the transport sector, polluting industries in slow motion, declining household consumption, oil consumption in free fall, etc. During this period, greenhouse gas emission levels have fallen (leading climate experts flagged

a 5.5 to 5.7% fall in levels of carbon dioxide globally², and Sia Partners estimated a 58% drop of European daily carbon dioxide emissions¹ at the most intense confinement period), air quality has improved, particularly in cities, and nature has regained its rights, illustrating the impact of our lifestyles on the environment. The health crisis has also changed the relationship between governments and the scientific community, which has played a major role in the policy-making process to stop the pandemic. This is perhaps an opportunity for the IPCC and climate experts to be heard by governments.

Some international organizations and governments seem to be acting in this direction by pledging not to revive the economy on the pre-crisis model and by proposing more ambitious climate policies. For example:

Secretary-general of the UN Antonio Guterres calls for international cooperation to build a resilient world after the crisis, by directing investments toward sustainable sectors and projects contributing to the decarbonization of the economy and climate's protection³.

The "Green Deal" could be at the heart of the European Union's "Next Generation EU" recovery plan announced by the European Commission on May 27th⁴. The European Union is indeed committed since the end of 2019 in the development of a "Green Deal", a structural transformation program for European economy to achieve climate neutrality by 2050 (see our focus in next article). The implementation of this plan and the depth of its impact nevertheless depends on the member States' priorities after the crisis.

Among the countries calling for a green recovery, France and Germany communicated a joint proposal for sustainable recovery measures for the European Union, including a carbon price floor in the emissions trading system and environmentally friendly recovery roadmaps for each sector⁵. Chile updated its national climate action plan with more ambitious targets published during the health crisis⁶ and Japan⁷ and Rwanda⁸ called for the epidemic not to overshadow the fight against climate change. In May, the latter was in fact the first African country to submit a tougher climate target to the UN, committing to cut emissions by at least 16% over the decade compared with its current trajectory.

¹ Sia Partners, "Daily European CO2 emissions to drop by 58% under current measures", April 2020

² UN, Weather Agency, "Fall in COVID-linked carbon emissions won't halt climate change", April 22th 2020

³ UN, Department of Global Communications, "Climate Change and COVID-19: UN urges nations to 'recover better'", April 22th 2020

⁴ European Commission, "Europe's moment: Repair and prepare for the next generation", 27 May 2020

⁵ French Government, "France and Germany united for the sustainable recovery of the European Union", 18 May 2020

⁶ Reuters, "Chile charts path to greener, fairer future after coronavirus", 13 April 2020

⁷ Climate Home News, "Japan to launch 'green recovery' platform and ministerial meeting", 01 June 2020

⁸ Climate Home News, "Rwanda submits tougher emission-cutting plan to the UN", 21 May 2020

For now, climate is not the top priority topic in most recovery plans

There is a risk the climate emergency becomes a secondary issue for governments that are seeking to prioritize the quick revival of their economies, like after the financial crisis of 2007–2008. The implementation of new climate and environmental policies is therefore likely to be postponed, such as the major international climate events: COP26 will take place in November 2021 instead of the initial date of November 2020⁹. The climate measures taken before the COVID-19 crisis are also under threat. In order not to hinder economic recovery, some governments are rolling back their environmental commitments. For example:

China, which may serve as a role model being one of the first countries to implement its recovery plan, declined to set specific economic growth targets for this year¹⁰. However, among the more than 22,000 projects of its plan, none seems to focus on renewable energies. Heavy industry seems to be a priority: new coal plants were approved for construction in March, and they alone could compromise the objectives of the Paris Agreement. The government also backtracked on key anti-pollution measures, like the limitation by some cities of the number of license plates assigned¹¹.

In the United States, the CARES Act has been signed at the end of March : this historical economic recovery plan mainly aims to support households but also large corporations affected by the crisis (airlines, oil and gas companies, manufacturers, ...)¹². President Trump also issued an executive order to reduce regulations that “inhibit economic recovery”. As a result, the US Environmental Protection Agency suspended its application of environmental laws: companies will not be subject to any penalties for polluting the air or

water if these violations were caused by the COVID-19 pandemic¹³. The Trump Administration trimmed the emission standards for cars as well : the reduction in greenhouse gases, which was to be 5% per year, would be limited to 1.5%¹⁴.

Poland¹⁵ and Hungary, having more carbon-intensive economies than the global average, called for the abandonment or the postponement of the European Green Deal. Czech Republic, which initially aligned with this position, seems finally ready to accept the terms of the Green Deal even if it has doubts about its ability to meet the objectives of the pact¹⁶.

Brazil and Indonesia have relaxed regulations controlling the wood industry, taking steps backwards in the fight against deforestation¹⁷.

The South Korean government is backing a \$2 billion bailout of the country’s biggest coal plant manufacturer, despite promises to end coal financing¹⁸. Similarly, Mexico¹⁹ and Saudi Arabia²⁰ placed support to conventional energy industries at the core of their recovery plans.

The COVID-19 crisis demonstrated governments’ responsiveness and accountability in emergency situations. By slowing down or putting on hold most industries, the pandemic and the measures taken to contain it have created an unprecedented opportunity for administrations to change their social and economic models, and adopt stronger climate policies. However, most countries seem to be focusing their recovery plans on returning as quickly as possible to “business as usual”. Some countries are even backtracking on climate commitments made in the past. It remains that the health crisis raised public awareness of environmental issues, resulting in the proliferation of non-governmental and civil society initiatives willing to bring change.



⁹ UK Government, “New dates agreed for COP26 United Nations Climate Change Conference”, 28 May 2020

¹⁰ The Guardian, “China abandons GDP target for first time in decades amid ‘great uncertainty’ of virus”, 22 May 2020

¹¹ L’Echo, “La relance chinoise se fera en dépit de l’environnement”, 6 May 2020

¹² CNN politics, “What’s in the \$2 trillion coronavirus stimulus bill”, 26 March 2020

¹³ US EPA, “EPA Announces Enforcement Discretion Policy for COVID-19 Pandemic”, 26 March 2020

¹⁴ Reuters, “Trump finalizes rollback of Obama-era vehicle fuel efficiency standards”, 31 March 2020

¹⁵ Reuters, “Poland says virus fallout makes it tough to hit EU climate goal”, 25 March 2020

¹⁶ Euractiv, “In political U-turn, Czechs back EU’s green recovery plan”, 25 May 2020

¹⁷ Vox, “The Covid-19 pandemic is threatening vital rainforests” 22 June 2019

¹⁸ Climate Home News, “South Korean government backs \$2 billion bailout to coal company, despite green finance pledge”, 06 May 2020

¹⁹ Climate Scorecard, “Economic Recovery Plans in Mexico Have Mixed Signals for Climate Change Efforts”

²⁰ Climate Scorecard, “Recommendations for Improving the Climate Aspects of Saudi Coronavirus Economic Recovery Policies and Programs”

Focus on climate issues place in governments responses to the COVID-19 crisis

Canada

\$107 billion economic response plan not accounting for issues related to climate

France – Germany

Joint proposal for sustainable recovery measures for the EU, calling, among other things, for common standards and environmentally friendly recovery roadmaps for each sector

United States

- CARES Act grants benefiting fossil fuel firms
- Easing of regulations that 'inhibit economic recovery'; suspension of the penalty on polluting companies, roll-back of auto pollution rules, weakening of controls on mercury, etc.

Spain

Draft law for a "green tax" on plastic-containing products, that would allow a €724M benefit for public finances

Mexico



Support for PEMEX and the construction of a new refinery at the core of the energy plan and economic recovery

Brasil

- No specific measure for climate change
- Relaxation of the regulations controlling logging

Chile

Second South American country to update its climate action plan under the Paris Agreement, setting more ambitious goals (notably cutting emissions from deforestation by 25% by the end of the decade and setting a 2030 cap on emissions)

-  Post-crisis measures or objectives accounting for climate change
-  Post-crisis measures or objectives overlooking climate issues

Poland - Hungary

Call for the abandonment or the postponement of the European Green Deal.

China

- No focus on renewable energies among the 22,000 projects of the recovery plan
- Projects for the construction of hundreds of new coal plants

European Union

Ambition to place the Green Deal structural transformation program for European economy to achieve climate neutrality by 2050 at the heart of the "Next Generation EU" recovery plan : the deal signed in July 2020 commits member states to allocate 30% of funds to climate projects and apply to all spending a "do not harm principle"

Japan

Proposal to host an online platform and political event to boost international cooperation on climate change through the response to the crisis

Saudi Arabia

No investment in the development of clean technologies, most of the stimulus funds for energy being allocated to conventional energy systems

South Korea

\$2 billion bailout of the country's biggest coal plant manufacturer, despite the government's promise to end coal financing

India

Discussions with various industries (auto, airlines, construction) to include key climate and global warming measures in the recovery plan

Indonesia

Abandonment of the legal requirement for wood exporters to obtain licenses verifying the legal and sustainable sources of wood

Rwanda

First African country to submit a tougher climate target to the UN in May (-16% emissions over the decade compared with current trajectory)

Australia

New plan to tackle climate change proposed in May, although strongly influenced by fossil fuel lobbyists

The Green Deal, at least 25% of the European economic recovery plan budget but a disrupted agenda: sacrificed or emphasized?

Environmental policies and citizen awareness led to the emergence of the Green Deal

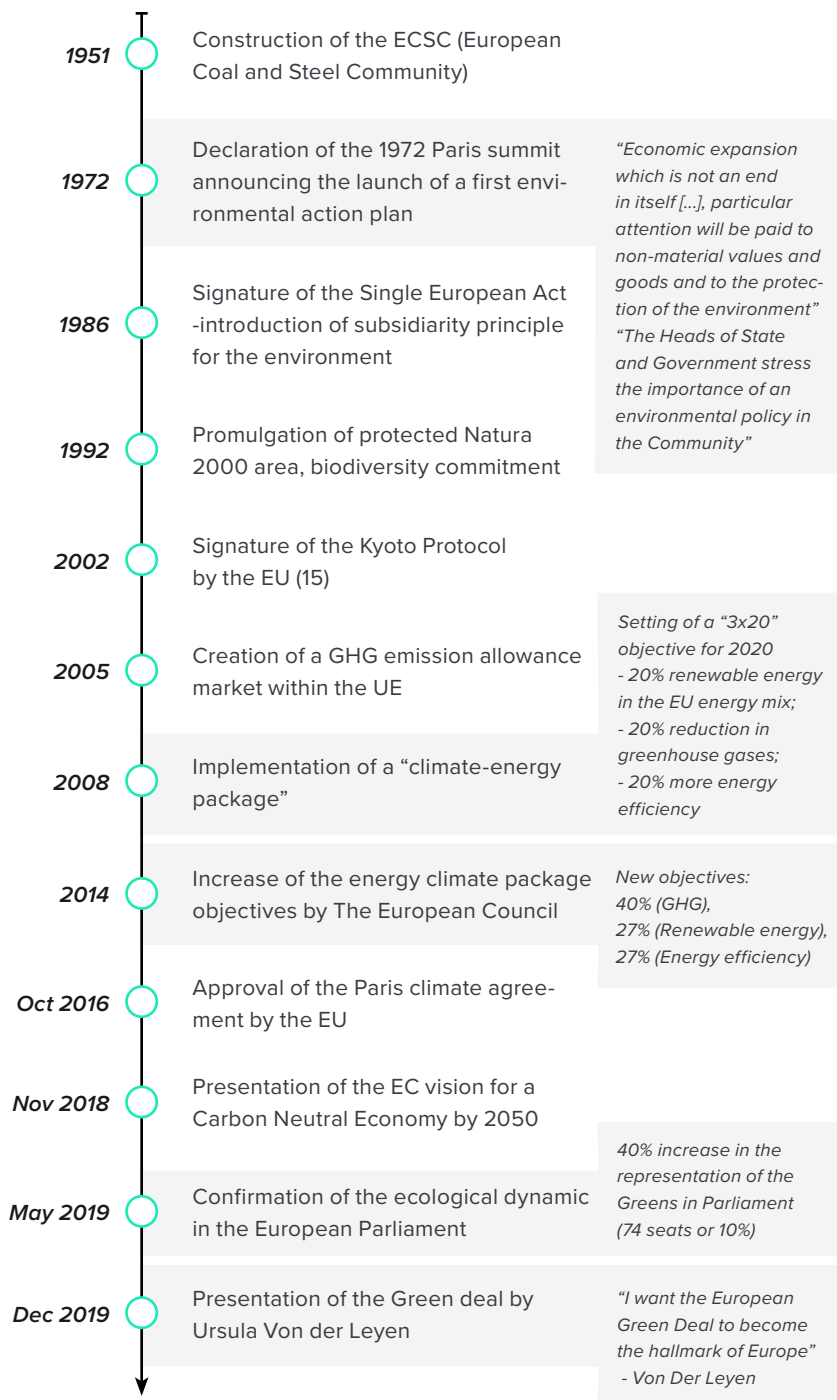
The Green Deal, revealed on December 11, 2019 by Ursula Von Der Leyen, embodies the political strategy for climate change that she presented during her inauguration speech as the new president of the European commission in July 2019.

The Green Deal is a real differentiator between the European strategy and other national and regional policies which do not integrate as much green ambition. Within the European Union, this new green pact marks an acceleration of the climatic and environmental trajectory followed by citizens and governments for the past 20 years.

In the mid-20th century, the foundations of Europe were laid on the goal to massively support the European coal and steel industry (CECA). Today the CECA is recognized to be among the top CO₂ emission sectors. Seventy years later, global warming is considered as one of the biggest challenges of the 21st century. The majority of EU member states agree to bring the continent to carbon neutrality within 30 years. This overwhelming majority nonetheless remains tainted by the opposition of the "Visegrad group." The Czech Republic, Hungary, Estonia and the leading Poland, are strongly dependent on fossil fuel sources (Coal) and refused to include the 2050 carbon neutrality objective during the European summit on June 21, 2019.

Despite this dissonance, the consideration of climate imperatives by the citizens of the European Union has never been stronger: 94% of Europeans deem environmental protection "important" and half of them "very important". Climate change is also considered as a "very serious problem" by 77% of Europeans²¹.

European milestones leading to the Green Deal



In this overall favorable context, the Green Deal intends to allow a deep and systemic transformation to meet European climate challenges.

The Green Deal agenda aims to lead an ambitious transformation of Europe

The purpose of the Green Deal is to transform the entire European Union

by instilling environmental and biodiversity protection in legislation and regulations. It should also allow Europe to reclaim some economic sovereignty in sectors where it is too reliant on other countries.

The Green Deal offers a global transformation of the European Union through three main pillars.

²¹ European Commission, EU Barometer, Attitudes of European citizens towards the Environment, 2020

<p>Environmental and climate commitment « Build a strong and unprecedented climate and environmental ambition »</p> <ul style="list-style-type: none"> ○ Climate ambition ○ Pollution ○ Biodiversity 	<p>Green transformation of economic sectors « Allow Europe to have a growth strategy that respects the climate commitments made »</p> <ul style="list-style-type: none"> ○ Mobility ○ Industry ○ Energy ○ Agriculture ○ Construction 	<p>European posture and functioning within the EU « Position Europe as a united leader on the international scene on environmental and climate issues »</p> <ul style="list-style-type: none"> ○ Mainstreaming sustainability in all EU policies ○ Climate diplomacy (Europe as a global leader) ○ Working together (Europe Climate Pact)
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Each pillar includes a broad action plan to mobilize all European political levers towards a unified strategy²².

Theme	Ambition	Green deal action plan and strategy (not comprehensive)	Current status/ Publication of official measures	Communicated content
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Environment and climate commitment

Climate ambition	Make the European Union the first climate-neutral continent by 2050	First European Climate Law	Announced/ 09/2020	Increase the carbon emissions objectives to -50% or -55% by 2030 with the aim to reach climate neutrality in 2050
Pollution	Prevent the “production” of pollution, and implement measures to clean up the pollution generated by human activity	Pollution control plan	Announced/ 2021	Statement of purpose only for now
Biodiversity	Preserve and restore ecosystems to mitigate climate change. Create a global standard for biodiversity	2030 Biodiversity Strategy	Pre-project / COP October 15, 2020	<ul style="list-style-type: none"> - Establish protected areas for at least 30% of lands and Sea across UE - Reduce the use and risk of pesticides by 50% by 2030 - Plant 3 billion trees by 2030 - Unlock 20 billions €/year for Biodiversity

Green transformation of economic sectors

Mobility	Reduce emissions from the transport sector and promote more sustainable means of transport	Strategy for sustainable and intelligent mobility	Announced / end 2020 - 2021	Reduce emissions in the sector by 90% to achieve climate neutrality
Industry	Meet the double challenge of the ecological and digital transition while remaining competitive and more sovereign	1) Industrial strategy: For a green, digital and globally competitive Europe 2) Action plan on Circular Economy	1) Published 2) Published	1) Develop technologies to build a «zero carbon» steel. 2) Gradually replace single-use products by durable and reusable products
Energy	Decarbonize the energy sector and finalize a fully integrated, interconnected and digital European energy market	1) Strategy for smart sector integration 2020 2) Strategy on offshore wind	1) Announced / 2020 2) Announced / 2020	1) Interconnect energy systems and better integrate renewable energy into the network - Decarbonize the gas sector and promote new gases (especially H2) 2) Fully leverage the potential of offshore wind energy in Europe
Agriculture	Build a sustainable agricultural system and green the common agricultural policy	Farm to Fork Action Plan (F2F)	Published	<ul style="list-style-type: none"> - Reach 25% of agricultural land cultivated organically in 2030 - Strengthen the legislation concerning Protected Geographical Indications (PGI) to include an organic criterion - Cut food waste per capita by half
Construction	Build and renovate buildings to be energy efficient	Renovation Wave initiative	Announced / late 2020	Double or triple the annual renovation rate of the building stock (priority given to public institutions and precarious areas)

European posture and functioning within the EU

Mainstreaming sustainability in all EU policies	Include in all legislative texts and European initiatives the ambitions of the green deal and mobilize a consistent and inclusive green European budget	Just Transition Mechanism / including a new Just Transition Fund	Announced / late 2020	<ul style="list-style-type: none"> - Mobilize at least €100 billion through public loan and private funds - Implement the €7.5 billion Just Transition Fund
Climate diplomacy (Europe as a global leader)	Take the role of leader on the world diplomatic scene on climate issues	Global actions with Europe state members and at international level		Promote EU energy standards and technologies globally
Working together (Europe Climate Pact)	Involve citizens and communities in the action taken in favor of the climate and the environment.	New European Climate Pact	Public consultation finalized on 05/27/2020	

²² European Commission, Official communication, The European Green Deal, 2019

The Green Deal is under the responsibility of Frans Timmerman, Vice President of the EC. Each commissioner must also oversee a part of the green deal according to their field of activity (Industrial strategy for Thierry Breton, Commissioner for the internal market; Biodiversity and "Farm to Fork" strategies for Virginijus Sinkevičius, Commissioner for the Environment, Oceans and Fisheries, etc.). The Commission applied the principle of "Mainstreaming sustainability in all EU policies" of the Green Deal by involving a majority of Commissioners on the subject.

The real revolution does not lie in the Green Deal actions themselves, but in the fact that for the first time, environmental and climatic ambitions drive European policies in such a systemic way. Another strong marker of the Green Deal is the unprecedented proportion of European funds that have been earmarked for green targets. This new ambition must now adapt to respond to the health and economic situation created by the Covid-19 crisis.

Which consequences to expect from the health and economic crisis on the European Green Deal?

As the sanitary crisis resulted on a short term²³, several political decision makers are worried about a "gray" economic recovery. The French Climate Council, for example, recalled in a special report that during the 2008 financial crisis, global CO₂ emissions fell "by 1.4% in 2009 before increasing by 5.9% in 2010." In this context, the Green Deal carries many hopes for decision makers. The Club of Rome considered on March 24 that it «should be Europe's new Marshall plan». On March 24, more than 1,100 personalities from business, politics and science around the world, co-signed an open letter of the Club of Rome asking for a "green recovery" in Europe²⁴. This was echoed by an open letter signed by 17 European energy ministers including France on April 10, warning against «temptations of short-term solutions in response to the present crisis that risk locking the EU in a fossil fuel economy for decades to come» and asking for the Green Deal to be «the roadmap to make the right choices in responding to the economic crisis.»

Focus on the 2020 agenda²⁵

In terms of planification, the health crisis will understandably impact the implementation of the European Commission's work program for 2020. However, the Green Deal seems to suffer from postponements rather less than other European workstreams. We observe three main impacts of COVID-19 on the Green Deal agenda below:

Continuation.

The announcements that were expected on pillars one and three aim at setting the European climate ambition and positioning Europe at the forefront of climate action. These are largely maintained. For example, the 2030 climate strategy, which acts as the first roadmap towards climate neutrality by 2050, remains a priority. It could even be communicated by the end of 2020 even if the COP 26 deadline is postponed from November 2020 to the end of 2021.

Slowdown.

Political decisions requiring to assimilate lessons from the economic and health crisis are delayed up to a few weeks. This is the case of sectoral policies targeting the agriculture, finance or transport sectors. "From farm to fork" and "biodiversity 2030" strategies, originally expected in March, were released on May 20. The consultation concerning the "renewed sustainable finance strategy", whose term was scheduled for April 8, has been extended until July 15.

Enhancement.

Conversely, policies aiming to amplify the green economic recovery are reinforced, without being accelerated. This is the case for policies targeting the construction, energy and industrial sectors. For example, the "renovation wave" initiative, which aims to accelerate the pace of buildings renovation (with the objective to go from 1% of buildings renovated every year to at least 2%), must still be adopted in September 2020 with expected impacts on the economic recovery in the building sector and on the fight against fuel poverty.



²³ Sia Partners, *Daily European CO₂ emissions to drop by 58% under current measures, 2020*

²⁴ The Club of Rome, *Open Letter, Open Letter to Global Leaders – A Healthy Planet for Healthy People, 2020*

²⁵ European Parliament, *Press Officer, EU COVID-19 recovery plan must be green and ambitious, 2020*

Focus on funds mobilized²⁶

Financially, since the first announcements on the Green Deal in December 2019, climate action is forecasted to represent 30% of the Multiannual Financial Framework (MFF) estimated at 1.074 trillion euros. These 30% of the MFF allocated to the Green Deal mainly consist in a greening of the European Union traditional policies. For example, 40% of the budget for the Common Agricultural Policy (which represents around one third of the MFF) is expected to contribute to climate action.

The COVID-19 crisis created the need for new funding in the amount of 1.1 trillion euros. The 1.1 trillion euros include:

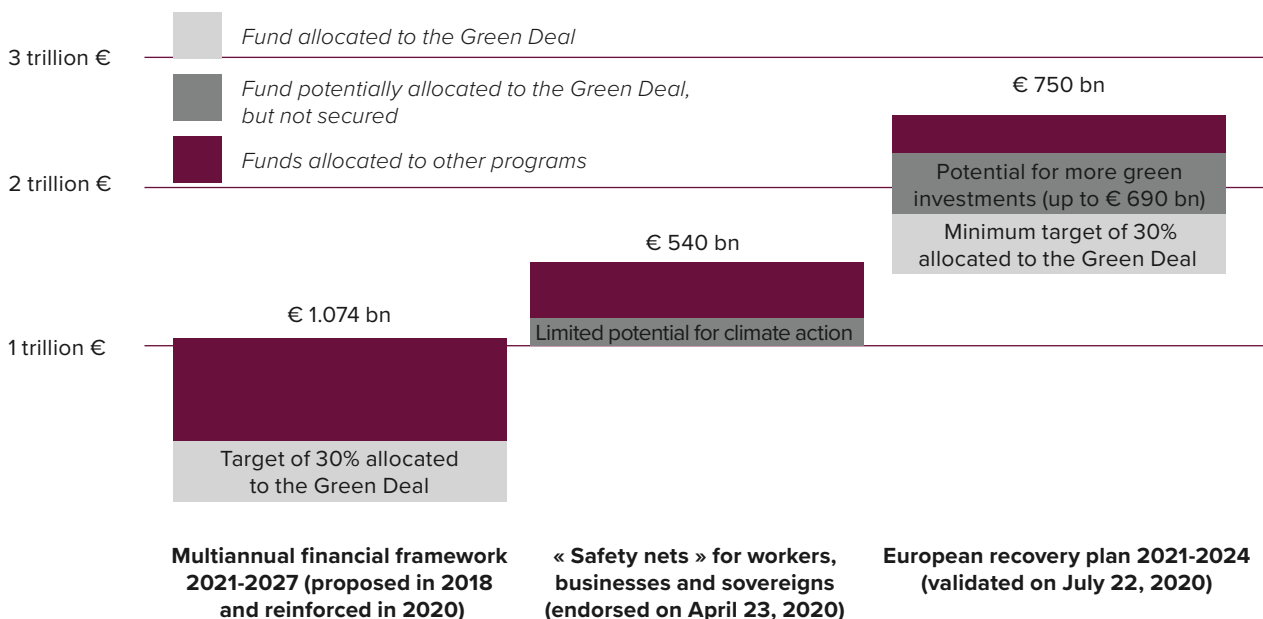
A 540 billion euros plan released on April 10 to deal with the direct consequences of health decisions made by member states of the EU. These expenses seem to respond in a limited way to ecological imperatives. The priority is to finance healthcare costs linked to Covid-19 (240 billion euros in loans), support to innovative SMEs in jeopardy (200 billion euros in loans, including 25 billion euros guaranteed by the member states) and short-time working measures (100 billion euros granted by the European Commission). These measures are distinct from the debt repurchase program of the European Central Bank, announced on March 18, which amounts to 750 billion euros (Pandemic Emergency Purchase Programme).

The 750 billion euros recovery plan which will be invested between 2021 and 2024 (390 billion euros distributed in form of grants and 360 billion euros in form of loans). Presented first on May 27 by the European Commission and validated by the European governments on July 21, this plan offers more perspective for "green" investments. In the final deal, 30% of the plan is targeted to be spent to meet climate goals (vs. a target of 25% proposed by the European Commission in May). Among the 750 billion:

17.5 billion euros are directly associated with environmental policies in Europe (10 billion for the just transition mechanism and 7,5 billion to ease the transition to sustainable agriculture). It is to be noticed that the initial proposal of the European Commission amounted 32,5 billions euros for these investments.

672.5 billion euros are planned to support the economic recovery and resilience in Europe on the issues considered as priorities by the European Commission, in particular those of the Green Deal (667 billion in grants and loans from the EU to the state members and 5.5 billion in investment guarantees). Although guarantees to private and public investors were strongly reduced in the final deal, from €30bn to €5.5bn, the recovery and resilience plan has been significantly increased, from €590bn to €672.5bn.

The remaining 60 billion euros will be allocated to expenses less directly linked to the Green Deal (cohesion policy, corporate solvency, research, health, diplomacy and humanitarian aid).



²⁶ European Commission, Official communication, The EU budget powering the recovery plan for Europe, 2020

At first glance, the conditions seem to be met to ensure the success of the Green Deal. We note, on the one hand, that the recovery plan of 750 billion euros has a high potential for financing the transition to a low-carbon economy (minimum target of 30% and maximum potential of 690 billion euros of “green” stimulus), and on the other hand that projects to be financed are well identified. However, several questions arise:

To what extent will this potential be realized? The challenges of resilience and strategic autonomy in health, aerospace and defense in Europe have gained importance recently and are likely to reduce the share of the Green Deal in the recovery plan. As such, the announcement concerning a 30% share of the total budget of the European Commission to be spent for climate action is a political commitment which makes the identification of a minimum threshold possible.

What activities can benefit from the Green Deal? To identify “green” activities, the European Commission started in 2019 a classification work on sustainable activities, called taxonomy. However, European taxonomy has not yet decided the issue of nuclear energy, for example. In other words, investors do not yet know if this energy production mode can receive support as part of the recovery plan. This should be known by the end of the year 2020.

How is the money paid back? The European Commission aims to repay the 750 billion euros funds to the financial markets - not before 2028 and not after 2058. The budget proposal includes new “own resources” of the European Commission likely to boost the climate action in Europe:

- A levy on plastic wastes has already been committed by European leaders ;
- A new EU emission trading system should be adopted half of 2021 (with a public consultation in the third quarter of 2020) ;
- A proposal on a carbon border adjustment mechanism should be made public in the first half of 2021



« The Green Deal is as necessary as before the crisis. Global warming has not gone away. »

Ursula Von Der Leyen

« If the crisis of Covid taught us one thing [...] that we have to recalibrate our relationship with nature », “ We must be more resistant, make sure that the way we live, produce, consume is sustainable. »

Frans Timmermans

The “Green Deal” is an indicator of the place of ecology in the economic recovery

Despite favorable signs of a green recovery, the directions to be taken are still under discussion whether in Brussels, Strasbourg or in the capitals of the European Union. While listing the political and socioeconomic factors likely to have a strong influence on the Green Deal, we observe accelerators and hurdles to a green economic recovery within the EU. These parameters have to be taken into account in the current phase of strategy planning but also during implementation.

	Selection of accelerators (Non exhaustive)	Selection of hurdles (Non exhaustive)
Politics	<ul style="list-style-type: none"> ● Large preservation of the Green Deal agenda set in December 2019 ● Leading role of Germany and France proposing an unprecedented 500 billion euros recovery plan 	<ul style="list-style-type: none"> ● Reluctance of Northern European countries towards the principle of a common European debt ● Reluctance of Eastern European countries asking for a greater consideration on their transition from coal to gas
Economics	<ul style="list-style-type: none"> ● Increased savings within European households during the health crisis leading to greater potential for mobilizable income ● Need for European industries to find new fields for development and investment 	<ul style="list-style-type: none"> ● Temporary fall in the prices of raw materials, in particular oil, which does not encourage the energy transition ● Need to mobilize capital to save businesses suffering from the economic crisis, whatever their carbon impact (in particular in the transport and hospitality sectors)
Society	<ul style="list-style-type: none"> ● High expectations by Europeans for a strong political action promoting ecological transition 	<ul style="list-style-type: none"> ● Potential increase in sensitivity to buying power issues, due to rising unemployment level, limiting the use of carbon taxes
Technology	<ul style="list-style-type: none"> ● Growing the maturity level of technologies allowing energy transition 	<ul style="list-style-type: none"> ● Risk of subsidizing non-European technologies, in the renewable energy or green mobility sectors

The ambition displayed by the European Union and the recovery plan illustrate the weight that ecology has gained in the political agenda of most European countries.

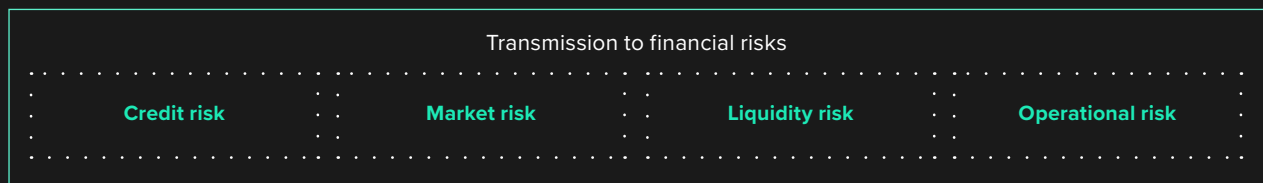
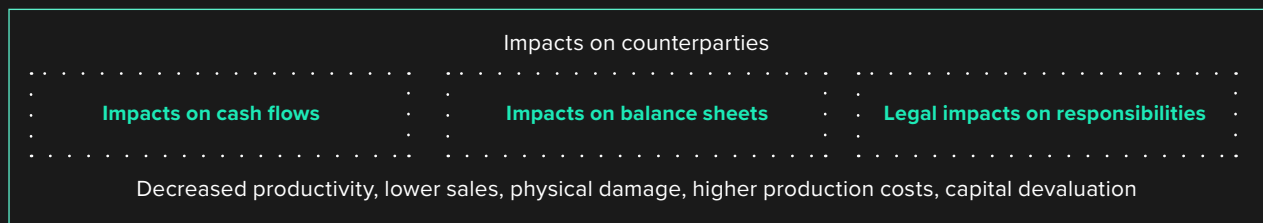
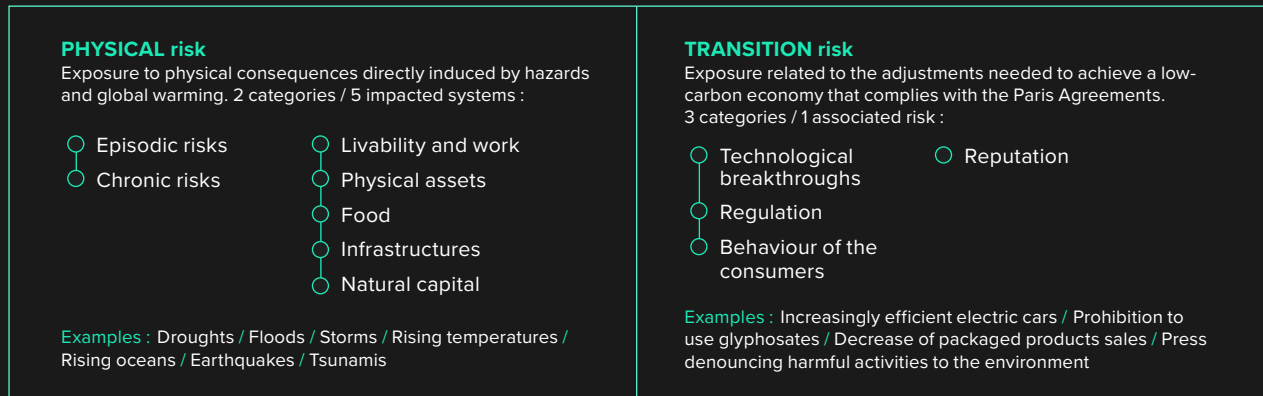


Green Financing.

Climate risk, a new facet of banking risks

The climate and ecological crisis is at the heart of scientific and political debates, aiming at containing global warming. In the financial sphere, this translates not only into the development of environmentally friendly products to redirect financial flows, but also into an efficient management of climate risks, which are growing. Ensuring future financial stability and protecting the banking system from climate risks is only possible through changes in financial institutions' risk models and decision-making processes.

Climate risks are getting transmitted to traditional financial risks...



...hence the need for changes in banks' risk models and policies...

First tools developed aiming at integrating climate risk



Focus on Climate Stress Testing: Forerunners use cases

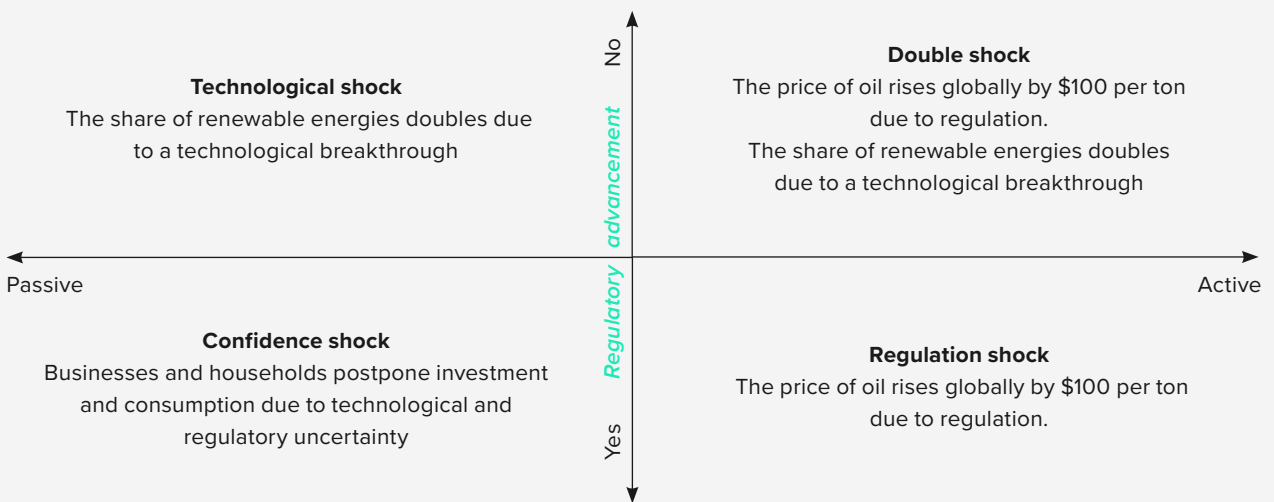
In addition to climate risk integration into their policies and models, financial institutions will have to ensure their stability against these risks, through climate stress testing exercises. These exercises are an integral component of action plans of the French and European regulatory authorities (ACPR and EBA) for 2021. Climate stress test scenarios, which are new and complex in their design, are currently under construction. However, some European countries seem to be more advanced, such as the Netherlands and the UK.

The Netherlands are the European forerunners

The Nederlandsche Bank performed its first climate stress tests in 2019. It was based on four scenarios and a single approach.

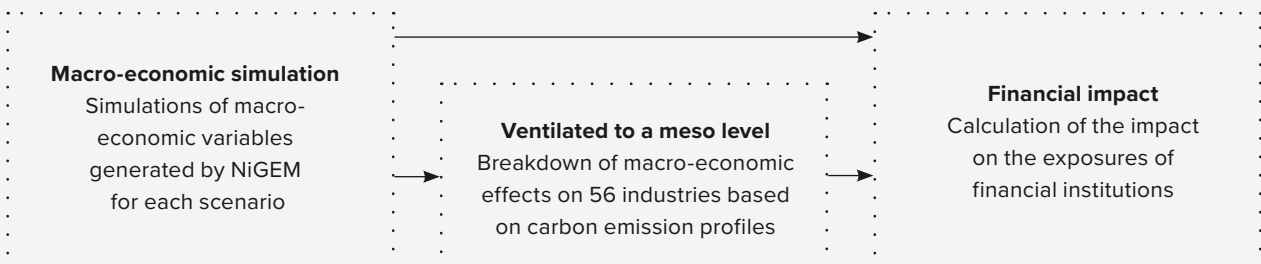
Focus – Climate stress tests in the Netherlands

Four Scenarios:



One Approach:

Scenario (shock)
 The shocks are severe but plausible, based on different reports and expert views. Scenarios materialize on a 5-year horizon.

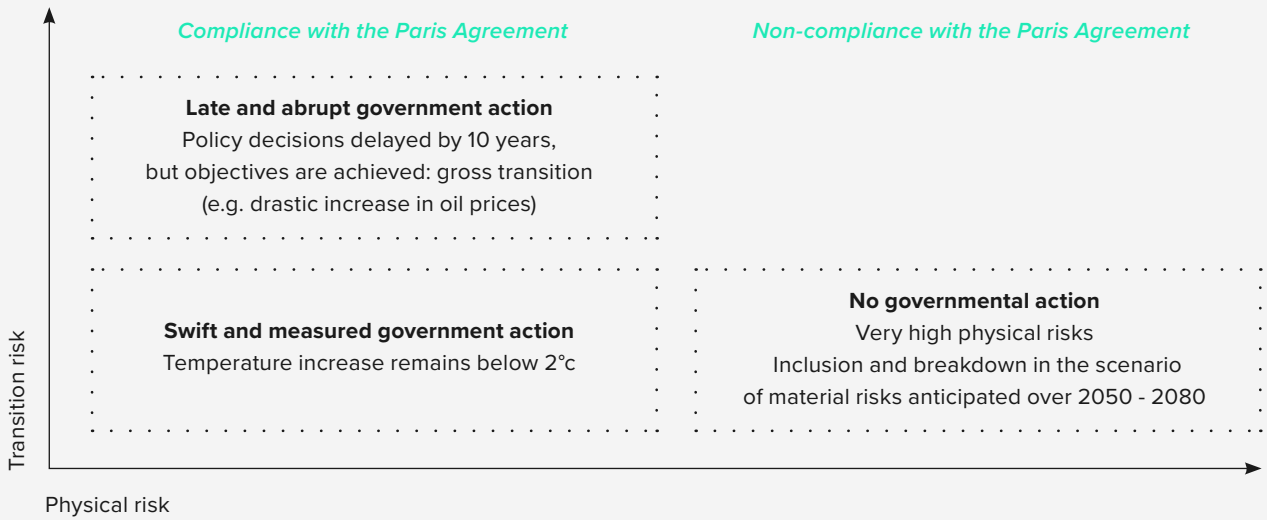


The UK is preparing its climate risk tests

As in France and other European countries, the Bank of England is planning to perform a climate stress test exercise in 2021 to assess the resilience of its banks and insurance companies. In a consultation paper published in December 2019, the Bank of England sets out the methodology and contemplated scenarios.

Focus – Climate stress tests in preparation in the UK

Three Scenarios:



Two Approaches:

Core principles
 Over 30 years (need for a long period in line with the frequency of climate and regulatory changes)
 Methodological facilitator:
 - Balance sheet fixed at the date of the stress test and projected as is (size and composition) over 30 years.
 - Frequency of reporting to the Bank of England: 5 years (i.e. 7 reports)

Approach One
 Own evaluation of the bank according to the scenario

Approach Two
 Use of variables provided by the Bank of England

Bottoms-up methodology applied :
 Measurement of risk and change in asset values
 Anticipation of the response (action plan, modification of the business model)

Climate risks (physical and transition risks) are the new facet of financial risk. Through their impacts on enterprises' cash flows, balance sheet and responsibility, they transmit uncertainty to banks' traditional risks (i.e. credit, market, liquidity and operational risks). As seen above, regulators and national banks are pushing the banks to ensure their stability against climate risk by building climate stress testing scenar-

ios, targeting 2021 to perform its first tests. However, banks, being major actors to meet Paris Agreements, should not wait for new regulations to embrace the integration of climate risk in their search for stability and efficiency. Financial institutions are expected to ensure stability testing ex-post their portfolios through the development of internal testing methodologies, but

also to develop their own tools to integrate climate risks into their policies, products and risk models in order to manage ex-ante climate uncertainty. Banks have the expertise and means to evolve responsibly and leverage technological progress.

Anticipating a Warmer World.

Oil majors' diversification: the surge in green and low carbon activities, with 3.5 times more investments in 2020, compared to a decrease in overall investments

The oil industry has faced in 2020 what could probably become the biggest crisis of its entire history. The failed negotiations between Saudi Arabia and Russia to cut production at the beginning of March, combined with the drop in demand following the worldwide lockdown in response to the COVID-19 crisis, made the oil price collapse by

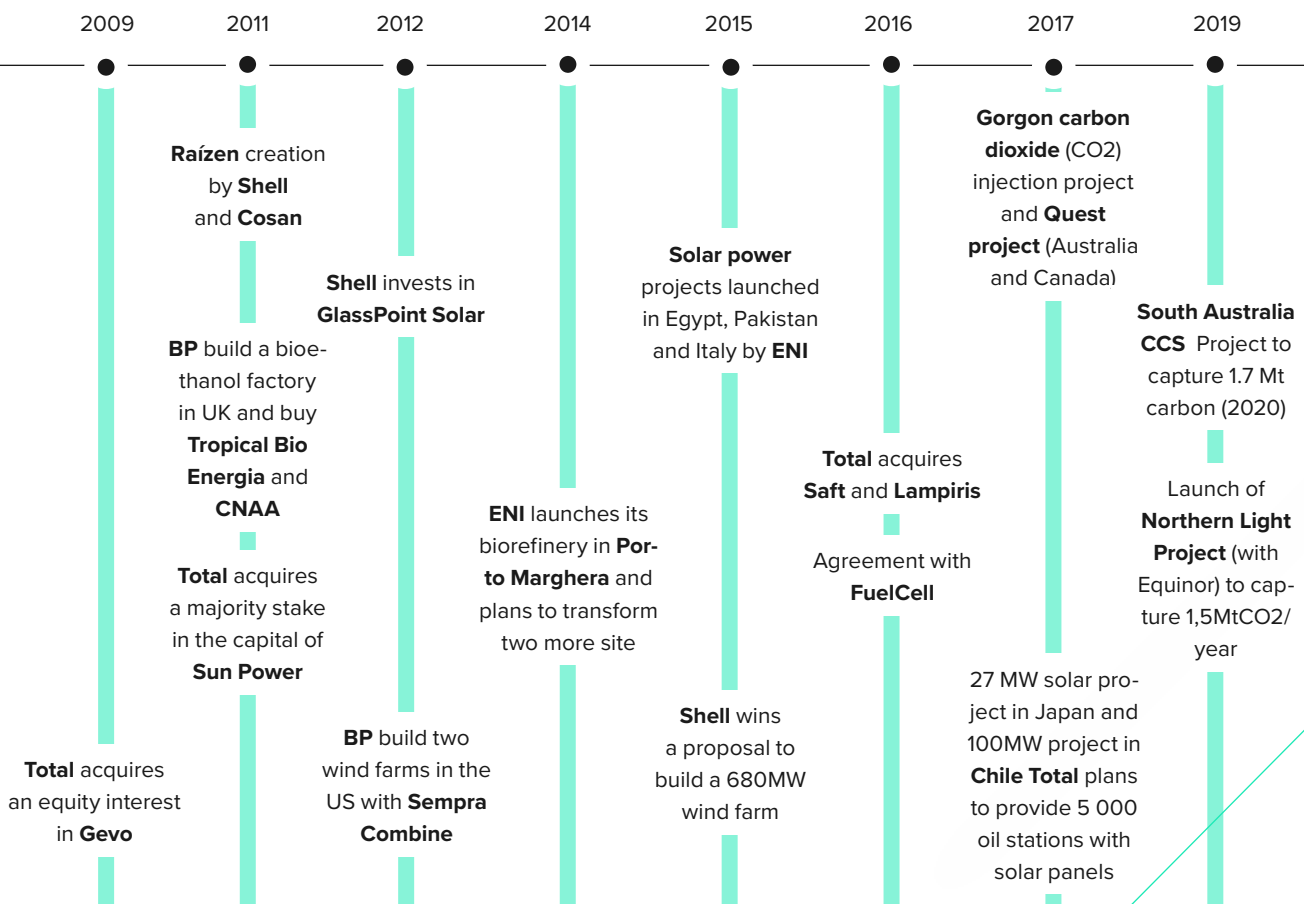
65% in two months. In response, majors cut their upstream investments by 23%. Downstream activities better resisted the crisis with a drop of only 5%²⁷. Alternative investments such as green power and low carbon activities were rather preserved as they belong to majors' long-term strategy. In a future where business models have to be more resilient to unexpected events, will the COVID-19 crisis be an accelerator to majors' diversification?

Diversification, the key to reach resilience?

Diversification is an effective way to re-

duce the risk exposure towards the oil price, as the associated business models are less risky and revenues fairly constant thanks to subsidies. It also allows majors to shift from being purely an oil and gas player to becoming a global energy company, by tackling new businesses. Additionally, diversification is a powerful tool to improve major's brand image, in a world where shareholders and citizens are putting a growing pressure on large companies to address the energy transition. If diversification can lead to a multitude of activities, majors mainly focus on four sectors: solar power, wind power, biofuels and carbon capture.

Majors diversification milestones



²⁷ Sia Partners, Covid-19 crisis will slash 2020 oil majors' investments by 18%

On one hand, green power is a path for majors to set a foot on power production. Through joint ventures or acquisitions majors are developing solar and wind power capacity, benefiting from rather predictable revenues. It reduces their dependence to oil price fluctuations; and perhaps more importantly in a world where climate change is raising more and more concerns, it improves their brand image²⁸. European majors, such as Total or BP, want to position themselves as global energy players. Their target is “to play an essential role in the move to a cleaner, lower-carbon world”²⁹ and “support the energy transition, with the objective to preserve the planet”³⁰. Indeed, majors’ green power capacities are expected to be multiplied by six by 2025.

On the other hand, biofuels and carbon capture limit the environmental impact of majors’ core business and reduce their greenhouse gases footprint. It enlarges the scope of their core business with biofuels and avoid financial penalties due to possible tougher regulations in the future by offsetting carbon emissions. American majors, like ExxonMobil and Chevron, focus on securing their position on the oil market and their core businesses. Regar-

ding the energy transition, their target is to limit the environmental impact of their activities with massive carbon capture projects to offset their emissions. They want to “manage the risks related to climate change”³¹ and “to navigate the energy transition focuses on lowering [their] carbon intensity”³². Their ambition is straightforward: majors’ carbon capture and storage capacities are expected to be multiplied by no less than 13 in five years.

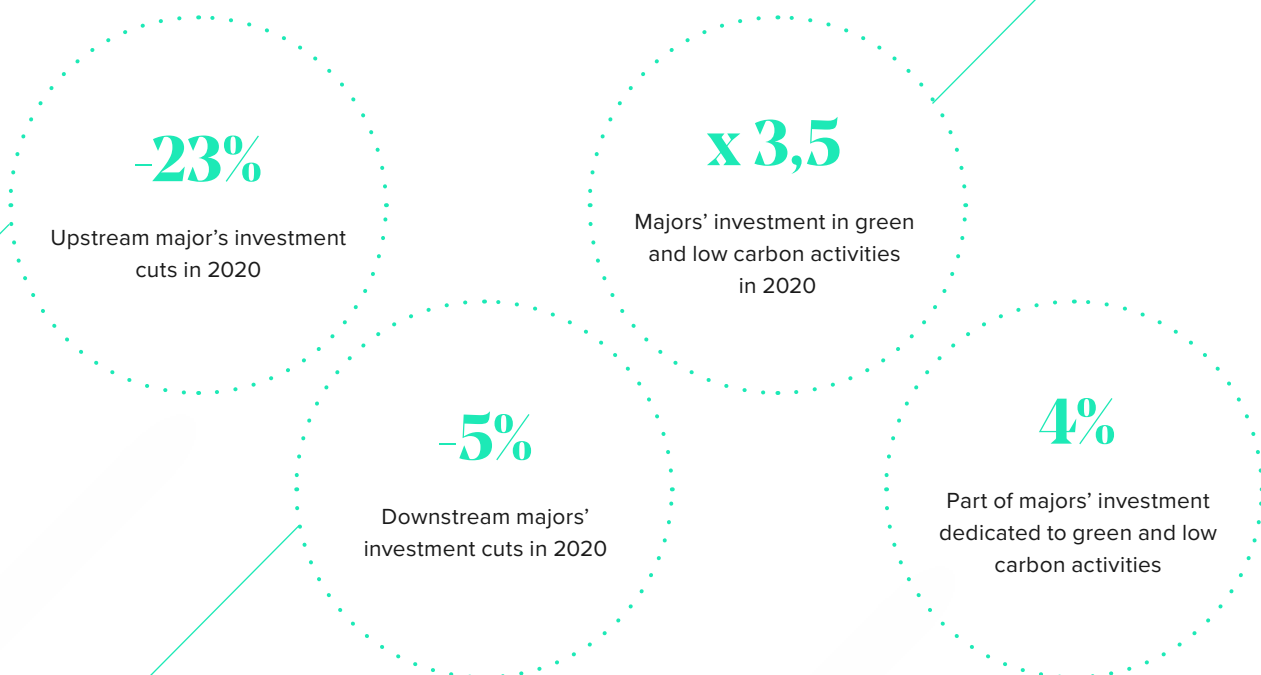
Are investments significant enough to make a difference?

Majors’ financial power reached around \$100 billion in 2019. However, capital expenditures in renewables and low carbon activities are still limited to 4%³³ in 2020. As a consequence, even if green power and low carbon activities are significantly growing at oil majors’ level, it remains insufficient to create a strong resilience against an oil crisis. Similarly, their impact on the power market is low compared to their financial capacity. Targeting to install around 40GW⁷ of solar and wind capacities by 2025 is indeed a challenge but it only represents 4% of the total growth expectations³⁴. To date, oil majors remain oil majors, with a large majority of their

activities targeting the oil business. To become global energy players and participate significantly on the energy transition, their investments on green market have to be more significant. As the health crisis highlighted, majors are still mainly dependent on oil markets and their diversified activities remain insufficient to increase their resilience.

Incentives, such as regulations, taxes, and subsidies can always be imagined to encourage large companies, oil majors ahead, to reduce their environmental impact and limit their emissions. However, in the context of growing national debts and pressures on budget, the trigger to further diversification will be linked with public policies more than ever. The coming government objectives and policies regarding climate change will have an important impact on the oil and gas majors’ long-term strategies and their investments in alternative energies. If what the post-COVID society looks like remains unpredictable, policies regarding climate change will have to cope with the market reality, where a possible long-term low oil price could severely damage the competitiveness of renewable energy.

Oil majors green power capacities: a multiplication by 6 forecasted by 2025



²⁸ Investors plan to push Total to do more on climate change, April 15th, Reuters

²⁹ Royal Dutch Shell, Annual report, 2019

³⁰ ENI, Annual report, 2019

³¹ ExxonMobil, Annual report, 2019

³² Chevron, Annual report, 2019

³³ 22GW of solar and 18GW of wind capacities (see Infographic)

³⁴ Renewables 2019, IEA Analysis

Majors' diversification and perspectives

Sector	Total Capacity (2019)	The essentials to 2025	Global target for 2025 *
Solar power	3 GW x7	<p>With rather predictable revenues, Solar power is one of the main option of diversification for oil majors. With big projects and ambitious targets, Total (25GW of renewables by 2025) and BP (10GW solar project with Lightsource) are leading the way. ENI appears as a challenger with an objective to develop 5GW of renewable power by 2025. Solar power appears to be the sector where majors are the most confident to invest in.</p> <p>Main actors : Total / BP / Eni</p>	22 GW
Wind power	3 GW x6	<p>Similar to solar power, wind power represents another strong opportunity of diversification for majors thanks to generous subsidy policies. Total (1300MW), BP (926MW) and Shell (290MW) are leading the movement. This sector is also going to growth significantly during next years.</p> <p>Main actors : Total / BP / Shell</p>	18 GW
Biofuels	16 Mbbbl +40%	<p>Biofuels present the advantage to remain close to majors' core business and to allow a transition to green activities. Today, there is a large variety of biofuel and each major involved in the sector has chosen to focus on one : bioethanol is mostly developed by Shell (12,2Mbbbl) and BP (through BP Bunge Bioenergia), Exxon-mobil invests on biofuel made by algae and Total focus on HVO. To date, Majors remain rather conservative regarding their 2025 targets as technologies are still immature.</p> <p>Main actors : Shell / BP / Total / ExxonMobil</p>	22 Mbbbl
Carbon Capture and Storage (CCS)	8 MtCO₂ x13	<p>If Carbon Capture Storage is still a prospective activity, majors have set ambition targets for the next few years in order to offset the impact of their core business on greenhouse gases. Exxon-mobil (250m\$) and Chevron (1,2b\$) are particularly involved via research programs and innovative projects with an objective to become leaders in the domain.</p> <p>Main actors : Shell / ExxonMobil / Chevron</p>	114 MtCO₂
Other (electric vehicles, electricity storage)		<p>Other diversification options are generating interests: the development of charging stations and networks for electric vehicles or researches on electricity storage to develop high performance batteries for electric mobility or domestic storage of renewable power. These investment are fitting with majors' strategy to become energy companies by being involved in most of the link of the value chain.</p> <p>Main actors : Total / BP / Shell</p>	

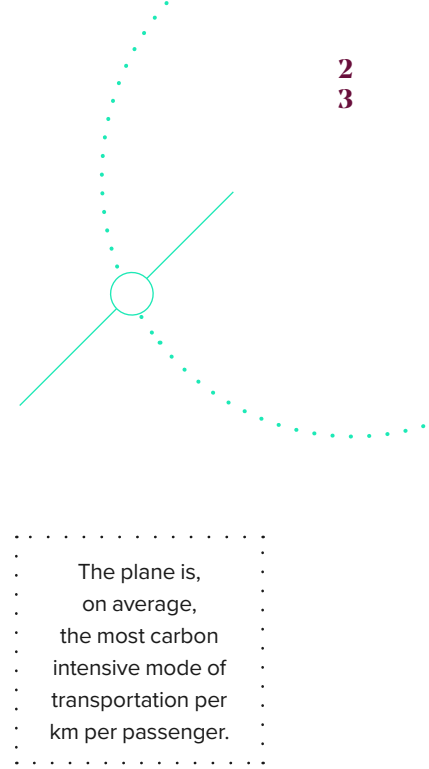
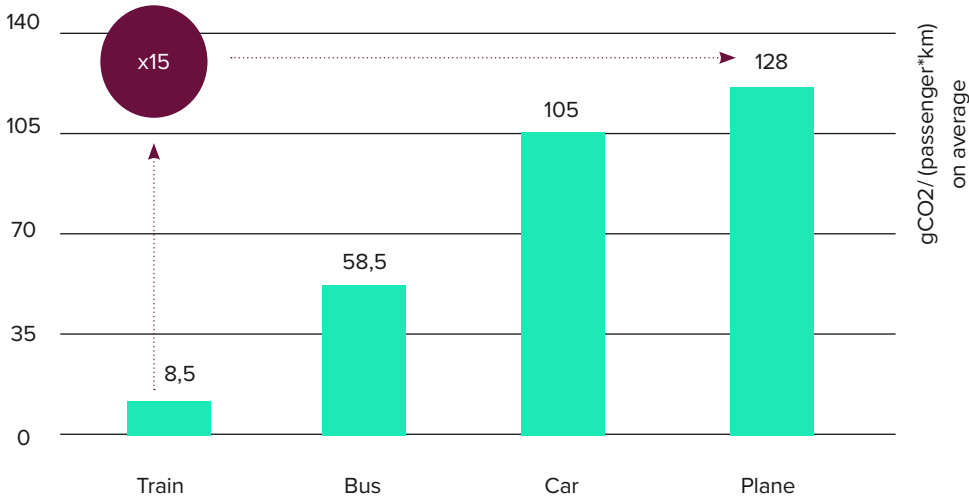
* Communicated by the majors in their reference reports

Source : Sia Partners analysis regarding annual reports and official articles from Shell, Exxon, BP, Total, Chevron, ENI and InfluenceMap study



Integrating 50% of biofuels in kerosene to cut 40% of flights carbon footprint

The aviation sector needs to reduce its carbon footprint...



The plane is, on average, the most carbon intensive mode of transportation per km per passenger.

... and integrating biofuels into kerosene is an efficient solution

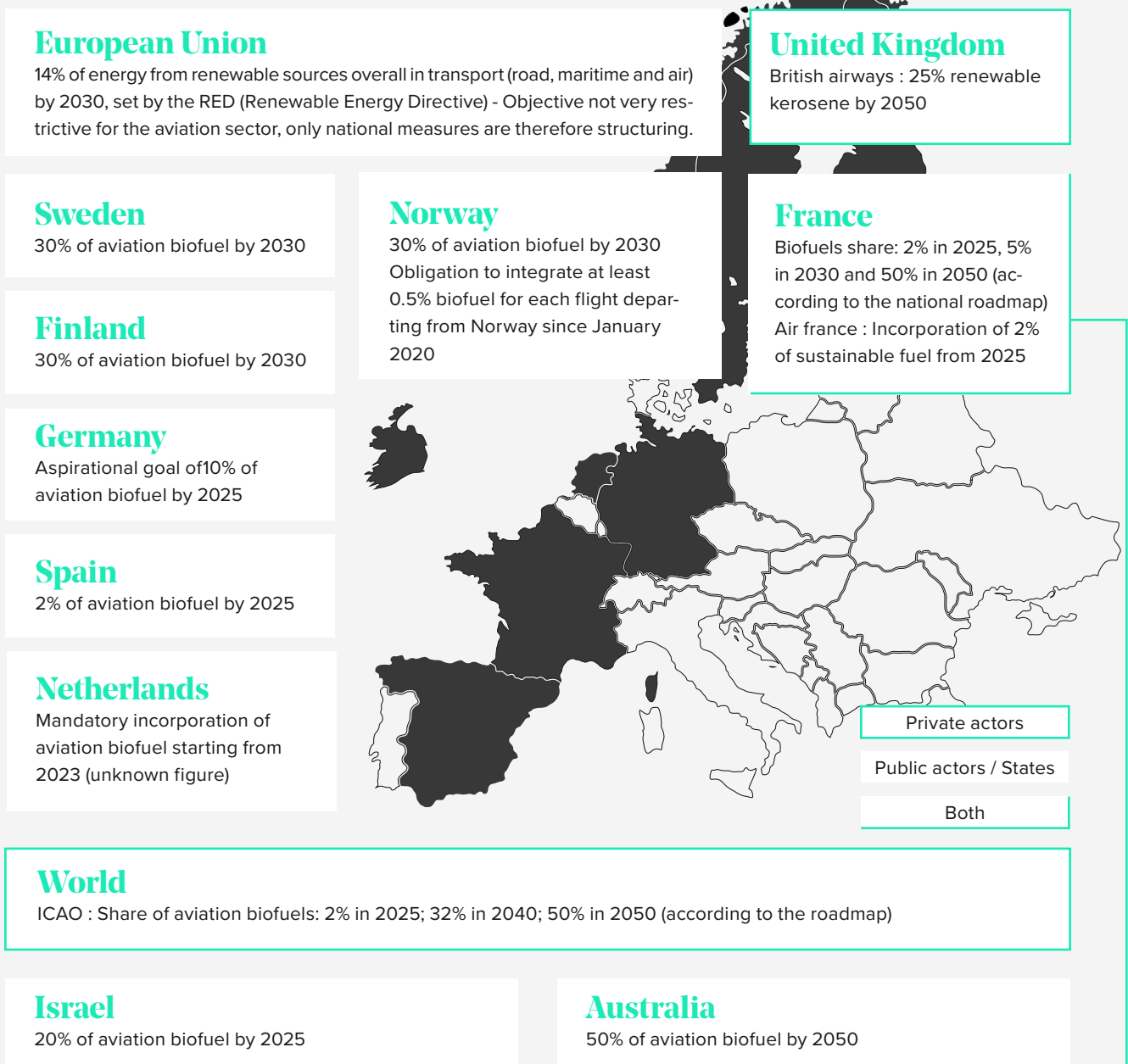
Biofuels are substitutes to fossil kerosene, generated from alternative sources. Their use, on the whole lifecycle, allows to **reduce the carbon footprint of flights.** If the 1st generation impacts the environment negatively (deforestation, competition for arable land), the 2nd ad 3rd generations are more promising in this area. The limit to their massive use is the **available inputs** (a mix between processes would be needed to overcome this difficulty). More research should allow to **improve processes maturity** and **decrease production costs** which are still much higher than for fossil kerosene.

	1 st generation: Dedicated energy crops	2 nd generation: Residues from human activity	3 rd generation: Algae, microalgae
Types of inputs	- Oilseeds (rapeseed, sunflower) - Beet, sugar cane - Cereals (wheat, corn)	- Wood and forest residues - Agricultural residues - Organic waste and cooking oils	- Cultivation of algae in laboratories
Reservoir size	● ● ●	● ● ○	● ○ ○*
Environment preservation	● ○ ○	● ● ○	● ● ●
Technological maturity	● ● ●	● ● ○	● ○ ○
Associated processes	2 (including 1 certified)	5 (including 4 certified)	3 (including 1 certified)
Economic attractiveness	● ● ○	● ● ●	● ○ ○

* Unlimited deposit in the ocean but very difficult to harvest / In the laboratory, cultivation is very complicated because of the fragility of algae to bacteria and the high demand for water and phosphorus

Public and private actors have set aviation biofuels integration targets

Main biofuels integration targets set by public and private actors for the aviation sector



Sources: Sia Partners analysis from the airlines websites, data from the National Ministries of Ecology, ATAG and ICAO

Case Study: Biofuels to reach medium-term objectives

Main 2G biofuel processes allowing big CO2 emissions savings

FT – SPK - Municipal Organic Waste : **-83%** CO2 HEFA – Used Oils : **-78%** CO2

Use Case on French domestic flights

By combining biofuels types to reach 50% of biofuel under reasonable input sources use and limited costs*, Sia Partners estimates the following impacts:

- **40%** cut of CO2 emissions, or **745 kT** of CO2 avoided
- A use of **60%** of the used oil and **6%** of the municipal organic waste gross reservoirs
- **125** million euros of additional costs for airlines in total, or **€5** per ticket

* Sia Partners scenario: 50% fossil kerosene + 27% biofuel 1 (HEFA + used oils) + 23% biofuel 2 (FT-SPK + municipal organic waste)
Scenario described in Sia Partners Climate Analysis Study: "Biofuels: a medium-term solution for a low-carbon aviation", July 2020

Leveraging Technologies.

Cloud computing, a new keystone for the Green Technology market and its forecasted 27% CAGR³⁵

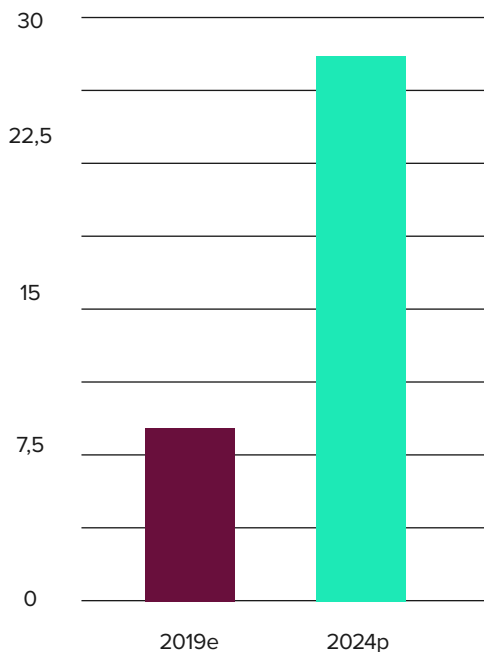
Innovative technologies can create a significant positive impact on climate

Green technology is a crucial to tackling climate change. The race for sustainability creates many opportunities in this market whose double-digit growth will drive the businesses in the coming years³⁷. The concerns of both producers and customers on the environmental dimension of growth drive the change in technology usage and innovation. IT strategy is a tool. It is also an objective of sustainable development and can contribute to the latter through its three main pillars: environmental, social and economic.

Double digit CAGR
21,1%
2019-2024

Source : marketsandmarkets

Green technology and sustainability market, worldwide (USD billion)



« Green IT refers to environmentally sound IT. It is the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems (...) efficiently and effectively with minimal or no impact on the environment. Green IT also strives to achieve economic viability and improved system performance and use, while abiding by our social and ethical responsibilities. »³⁶

San Murugesan

³⁵ MarketsandMarkets, Green Technology and Sustainability Market by Technology

³⁶ Murugesan, S. (2008). Harnessing Green IT- Principles and Practices. IT Professional, 10(1), 24–33. doi-10.1109 mitp.2008.10

³⁷ MarketsandMarkets, Green Technology and Sustainability Market by Technology

We mainly identify six segments of technology that likely create a sustainable impact³⁸: Internet of Things (IoT), Artificial Intelligence (AI) and Analytics, Digital Twin, Cloud Computing, Security and Blockchain. Despite their initial energy need to grow to a critical size, these technologies aim to have a positive net impact in the end. They can decrease the greenhouse gases emission thanks to energy consumption optimization, contribute to more sustainable product design, and fasten process optimization. This is all thanks to digital supply-chain, procurement, and digital factory to manage operations and more broadly affect every value chain of a business³⁹.

These technologies provide high hopes for a more sustainable growth. However, like with all innovations, it will be critical in the coming years to keep the technologies that are best in class from an environmental-efficiency perspective. To do that, the solution is to compare them to existing alternatives and measure the potential rebound effect to contain them.

According to Allied Market Research⁴⁰, eight segments will highly benefit from these technologies by 2026:

- Green Building
- Carbon Footprint Management
- Weather Monitoring and Forecasting
- Air and Water Pollution Monitoring
- Forest Monitoring
- Crop Monitoring
- Soil Condition/Moisture Monitoring
- Water Purification

Firms can operate several levers to reduce the carbon footprint of technology by leveraging IT to improve the sustainability of core businesses. Behind the use of resources or the pollution driven by digital transformation, datacenters are often in the spotlight, while studies often rank them as third source of negative externalities after users and network facilities⁴¹. How-

ever, since cloud computing tends to be a growing trend, we need to identify best practices that help minimize the negative impact of datacenters and maximize its potential to make the most of this technology.

Focus on cloud computing to lighten the carbon footprint of data and pave the way for green IT

The worldwide cloud services market is expected to grow by 14.5% in 2020 to a total of \$266.4 billion, up from \$227.8 billion in 2019⁴². According to

some forecasts, the market size could grow by almost 25% by 2022.

Data centers are core to our technological needs but their environmental impact might be their disadvantage. For datacenters to receive the ultimate benefits and to become a driver of true green growth, they need to follow sustainable expansion best practices. Cloud infrastructure aims to approach two critical elements of green IT - energy efficiency and resource efficiency. If optimized at its best, cloud computing can be the bedrock of green IT revolution.

Moving 86 millions of US workers to the cloud cut IT energy consumption by up to 87%

Source : Lawrence Berkeley National Laboratory



³⁸ *ibid*

³⁹ ByteAnt, *Sustainability Technology: The Best Examples of Implementation*

⁴⁰ Allied Market Research, *Green Technology and Sustainability Market Statistics: 2026*

⁴¹ *IT for Business, Stratégie GreenIT : Bien peser le choix du matériel*

⁴² Gartner, 2019

These key features of cloud computing are essential in making the cloud sustainable⁴³:

- Virtualization is the core characteristic of the cloud. Cloud computing streamlines the infrastructure needed by reducing the amount of equipment that run workloads. This is because it runs multiple OSs on a single device.
- Optimizing a cloud ecosystem goes hand-in-hand with the virtualization. Increasing the virtualization ratios means a lower need for physical infrastructure that helps decrease the need for electricity, fuel, and other resources.
- An inherent characteristic of a cloud computing business model is Pay-per-use. This model encourages cloud users to thoroughly analyze their real need to have a judicious use of the solution.
- Cloud providers engage in the energy transition and want to reduce their greenhouse gas emissions⁴⁴. To do so, many providers cover a high ratio of their energy needs with renewables and/or invest in infrastructure projects. Cloud providers leverage hydro, wind or solar energy to reduce their carbon footprint as they consume more and more energy as their businesses grow.
- Cloud computing fosters digital transformation and it is the keystone for other technologies to grow. An optimal use of Cloud computing can pave the way for the promising green technologies as well as all their uses.

In the era of data and mobility, cloud computing is now a “do or die” for many companies. As more and more companies and customers demand energy efficiency, this can be a first big step in going green. As a versatile technology, cloud computing makes it easier to engage collaborators and reduces the negative impact for users. It also eases the mitigation of infrastructures’ use of resources and pollution. Which in turn broadens the opportunity to reduce the environmental impacts of business activities.



Google powers 100% of its cloud infrastructure with renewable energy

Industry 4.0 as a lever to reduce the sectors carbon footprint, today accounting for 25% of global emissions

Industry 4.0 builds increased communication between objects and machines. This allows manufacturers to satisfy the needs and expectations of their customers in a faster and increasingly digital context. More specifically, Industry 4.0 contributes to finding new ways of dealing with major global challenges such as climate change, the reduction of carbon emissions and optimizing energy-use in manufactured processes.

Industry 4.0 can be a game changer for climate action

The sustainable energy transition and Industry 4.0 share important characteris-

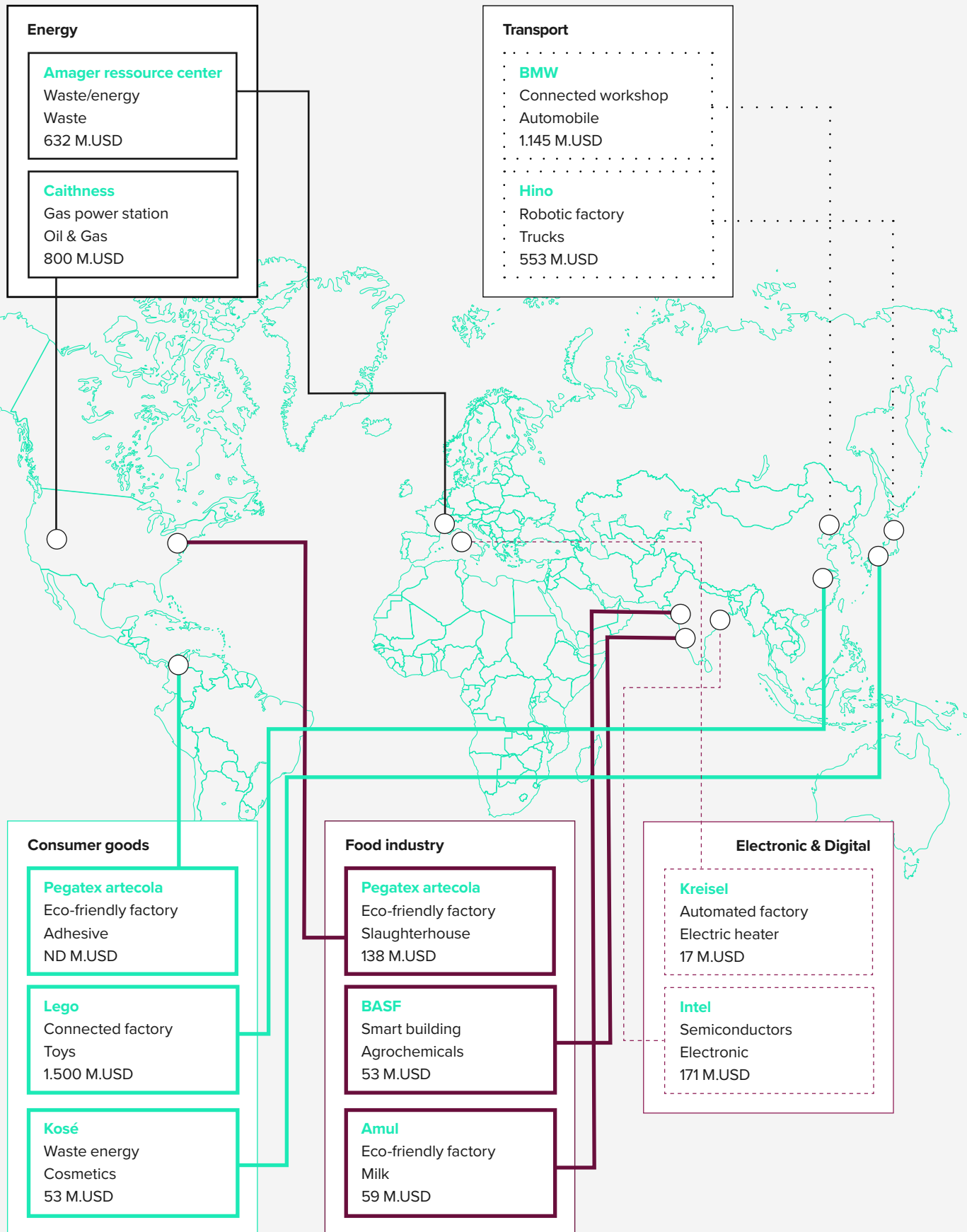
tics. They both are highly influenced by technological innovations, dependent on the development of new suitable infrastructures and regulations, and can act as enablers for new business models. One important characteristic of Industry 4.0 is the digitization of manufacturing processes. This transformation can offer opportunities for energy saving. For example, the application of new software tools that offer energy optimization functionality, or adaptations in the business processes.

Several Industry 4.0 worldwide megaprojects facilitate the energy and ecological transition. From waste management, eco-friendly factories to smart building, global megaprojects are strongly associated with energy efficiencies that could contribute to climate change mitigation and more sustainable energy use in the industrial sector.

⁴³ My Great Learning, *How Cloud Computing Can Help Fight Climate Change by Reducing Carbon Emissions* / R. Buyya and S. Singh Gill, “Sustainable Cloud Computing: Foundations and Future Directions.” *Business Technology & Digital Transformation Strategies*, Cutter Consortium, Vol. 21, no. 6, Pages 1-9, 2018

⁴⁴ *The New York Times*, *The Cloud Factories: Power, Pollution and the Internet*

Main Industry 4.0 mega projects in 2017



Industry 4.0 can reduce manufacturing's environmental footprint

In our increasingly globalized world, economies have increased their specialization. As a consequence, trade in merchandise represented 44% of global GDP in 2017, against 34% in 1980⁴⁵. In the meantime, volume transported have also increased considerably. They multiplied by 6.5, increasing more quickly than GDP growth.

The increase in merchandise exchanges, of course, impacts the climate. According to Banque de France⁴⁶, 25% of global CO2 emissions in 2015 were caused by world trading. These emissions are mainly caused in the stage of production of these goods. Energy production accounts for 32% of the CO2 emissions related to world trading. Transportation also emits large amounts of CO2. International shipping, represented 2.3% of global CO2 emissions in 2015⁴⁷.

Industry 4.0 allows the ability to efficiently and effectively collect, analyze and interpret data from production to distribution. Leading to solutions that reduce the environmental footprint of manufacturing. Analyzing data from processes creates equipment optimization opportunities which, in addition with lean methodologies, reduce energy and raw materials consumption and production costs. Examples in France showed up to 20% of energy costs reduction in Industry 4.0 projects and a study from 2012 estimated that energy consumption in the French industry could be reduced by 9% by 2030⁴⁸.

Automating processes allows factories in developed countries to relocate closer to final markets at acceptable costs, thus reducing transportation and time to market. This reduces the sector's carbon footprint and fulfills customer needs.

In addition to reducing the manufacturing sector's emissions, Industry 4.0 increases the sector's resilience. With simplified global supply chains producing closer to customers and with more flexible and automated production tool the industry is less impacted by crises. Production in turn becomes less dependent on the supply chain capacity and industrial capacities can be redirected to answer basic commodities demand. Which can provide a competitive advantage in times of crises, as witnessed during the COVID-19 crisis.

Technology allows significant savings within the factories

To remain competitive against countries where manpower is cheap, relocated factories must minimize consumptions at all levels from production time to raw materials. Industry 4.0 has many solutions to offer to get there.

For instance, additive manufacturing is a good way to build single piece complex components. It is also a lever to drastically reduce scraps, and that easily generated savings. For example, take the LEAP fuel injectors built by General Electric. From 20 different pieces, GE scaled it down to only one piece leading to a savings of 25% in weight. And each pound matters in a flight. Not only does GE saves money building it, its customers also do so operating it.

Industrial asset supervision can also help in energy savings. It is now possible to set an auto standby for the robots or to level their consumption according to energy prices. Think about heating management of a plant. Implementing a Building Management System (BMS) or a Building Automation System (BAS) helps save considerable amounts of energy. If managed at high precision with IoT, energy consumptions can be analyzed to detect machine weakening, as water flow monitoring for leak detections occurs. Coupled with predictive maintenance, can reduce production breaks.

In the end, the defect and reject rates will be reduced, increasing quality overall thanks to a highly qualified and workforce using the right tools.

The recent health crisis highlighted how much western countries depend on China when it comes to manufacturing. Today, the need to reshore factories is no longer questioned and is an opportunity to take into account the impacts of consumerism. Industry 4.0 comes with environmental benefits, but also social and mostly economical benefits. As more and more governmental stimulus packages should praise greener products, production holds a large amount of their overall footprint.

Industrial sectors with the biggest potential decrease of energy consumption by 2030



⁴⁵ Merchandise Trade (% of GDP), Databank, worldbank.org

⁴⁶ Les émissions de CO2 dans le commerce international, Le Bulletin de la Banque de France n°228

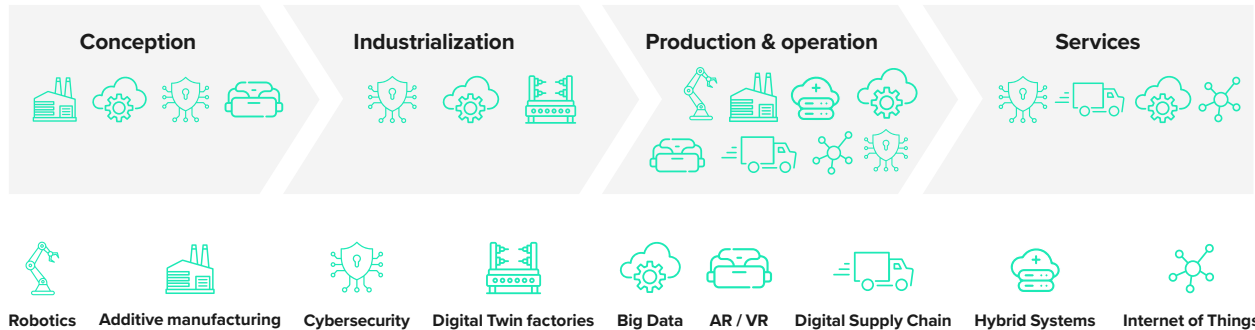
⁴⁷ ICCT, Greenhouse gas emissions from global shipping, 2013–2015

⁴⁸ L'évaluation macroéconomique des visions énergétiques 2030-2050 de l'ADEME, 2012

Focus on Industry 4.0 environmental use cases

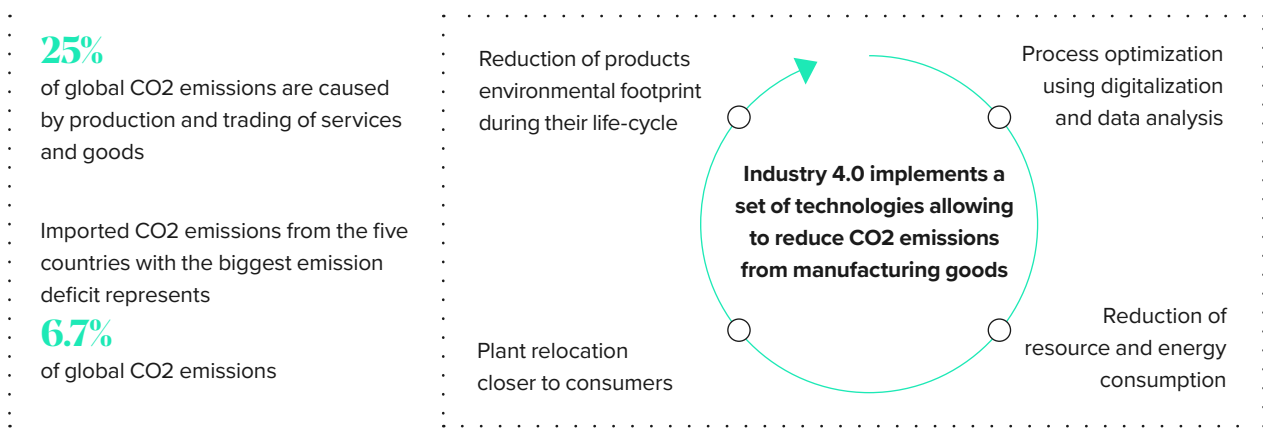
Industry 4.0 : A revolution across the entire industrial value chain ...

Industry 4.0 impacts the entire value chain and all levels of the supply chain thanks to the introduction of numerous innovative technologies allowing increased agility, optimized flexibility of production means and digital collaboration between players.



Industry 4.0 reflects the integration of new technologies to the entire supply chain to optimize manufacturing processes, quickly adapt to customer expectations and promote product customization. As opposed to mass manufacturing in low-cost countries, Industry 4.0 has to be implemented close to the markets, due to its high technicality and fast answer to new needs.

... to reduce the environmental impact of the industry



Use cases for a low carbon Industry 4.0



Biodiversity.

Promising emerging frameworks for a necessary, immediate action in favor of biodiversity

The COVID-19 crisis highlighted well-known risks of zoonosis⁴⁹ outbreaks directly associated with a loss of biodiversity. The pandemic may act as a stimulus for this burning environmental topic that has always been in the shadow of climate change. Pressure is indeed rising and, despite the lack of standards, promising frameworks emerge that will help companies take action for biodiversity.

Biological Diversity must be protected and pressure is growing

Earth is a system that provides vital services such as ozone protection or climate regulation. If not for crossing key planetary boundaries, living conditions would remain normal and predictable, within what scientists have determined a "Safe Operating Space."⁵⁰ Genetic diversity is one of those key planetary boundaries that has already been breached and must be restored. Although the COP8 of Biological Diversity called for a commitment from the private sector as early as 2006, international institutions have yet to describe how this commitment would materialize. COP15 could be a turning point. Considering the natural role of biological diversity in regulating pathogen proliferation, the COVID-19 crisis is one of the most telling and dramatic examples of why biodiversity must be protected. Besides, host of the Convention, China is determined to shepherd an ambitious deal on biodiversity that would help them reshape the COVID-19 narrative and turn a domestically-sensitive environmental issue into a landmark achievement by a new Chinese global leader.

Numerous companies are already willing to take action. Yet, there is no single unified, methodological framework to help companies understand, quantify, and ultimately reduce their impacts. So, how can companies move forward?

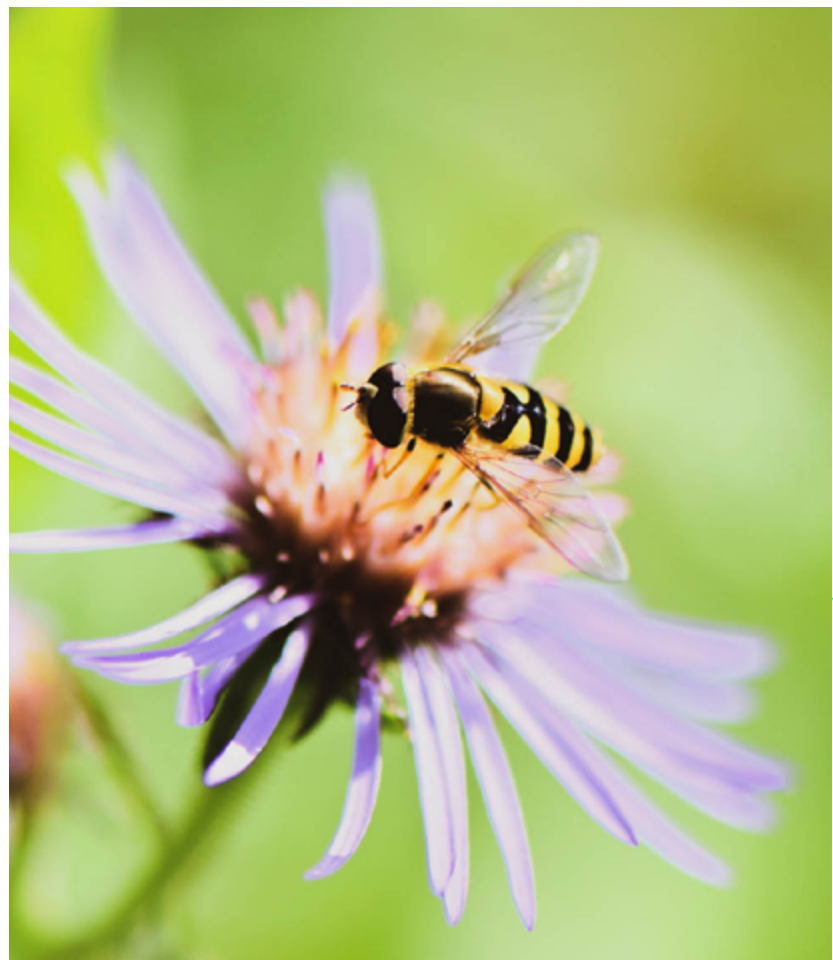
Boiling down biodiversity to a single unit of measurement is, by essence, very complex

Jungles, tundras, savannas, deserts, mangroves, and seabeds are the very nature of biological diversity and habitats makes it almost impossible to boil it down to a single unit of measurement which would be equivalent anywhere on the planet.

Companies cannot rely on the emergence of a single parameter that is analogous to a ton of CO₂, that would entirely

structure objectives and regulations. Even though concepts like the Mean Species Abundance (see infographic F) provide a measure of how local biodiversity deviates from its pristine state, there can be no geographical equivalence across the world. Irremediable loss in one place cannot be fully compensated by improved protection ecosystem services are vital everywhere.

Consequently, the measurements of biodiversity can be impractical and time-consuming and require deep expertise. For companies to set a relevant biodiversity agenda they will need to develop methodologies and tools that require only reasonable amounts of in-house expertise and hard-to-access field data.



⁴⁹ A disease which can be transmitted to humans from animals

⁵⁰ Safe Operating Space, Johan Rockström, 2009

Promising methodological frameworks are there

LIFE Key

Location : Brazil and Paraguay
Main stakeholders : Instituto Life / **Petrobras** and **Itaipu** partnerships / 10 South-American sponsors / 12 international supporters
Applicability : Business Applications : **1 2 3 4 5 6 7 8**
 Organisational focus : **All level** except Corporate
Maturity : Operational (5 local companies LIFE Certified)
Metrics : Biodiversity impact Index, Mean Species Abundance.

Global Biodiversity Score

Location : France
Main stakeholders : CDC Biodiversité / 38 companies via the **B4B+ Club**
Applicability : Business Applications : **1 2 3 4 5 6 7 8**
 Organisational focus : **Corporate and Sector**
Maturity : Operational
Metrics : Mean Species Abundance.

Biological Diversity Protocol

Location : South Africa
Main stakeholders : Originates from the **Biodiversity Disclosure Project** / Managed by **National Biodiversity and Business Network of South Africa** / Hosted by **Endangered Wildlife Trust**
Applicability : Business Applications : **1 2 3 4 5 6 7 8**
 Organisational focus : **Site/Project, Corporate and Supply Chain**
Maturity : Ongoing development

Agrobiodiversity Index

Location : Global NGO, headquartered in Rome
Main stakeholders : Biodiversity International (part of CGIAR) / Funded by the European commission and the Italian ministry of foreign affairs
Applicability : Business Applications : **1 2 3 4 5 6 7 8**
 Organisational focus : **All level**
Maturity : Ongoing development
Sectorial restriction : Agriculture

Business Applications

- **BA 1:** Assessment of current biodiversity performance
- **BA 2:** Assessment of future biodiversity performance
- **BA 3:** Tracking progress to targets
- **BA 4:** Comparing options
- **BA 5:** Assessment / rating of biodiversity performance by third parties, using external data
- **BA 6:** Certification by third parties
- **BA 7:** Screening and assessment of biodiversity risks and opportunities
- **BA 8:** Biodiversity accounting for internal reporting and/or external disclosure

Organizational focus: Country/Region / Portfolio/Sector / Corporate / Supply Chain / Project/Site / Product/Service

The EU has assessed several measurement approaches from all over the world. Based on that assessment, we have summarized five criteria we think are crucial to turn a framework into a standard for business, and selected four of them (see figure) that we deem promising:

- The framework must be accessible to a general audience. Beyond only experts, it must be simple enough for a large public to understand the main concepts and results.
- Legitimacy is key and gained by secured scientific robustness involving the scientific community, and by an on-going review process
- For investors to take biodiversity in consideration, the framework should apply to as many business needs and scales (product, project, corporate, portfolio and country).
- Companies should start with easily accessible data (e.g. prepared external data sets, company business information). If relevant, ecological surveys and detailed field measurements should not be an absolute prerequisite.
- Maturity, a network of users should be active to facilitate continuous improvements and to enable them to learn from one another's experiences.

Companies must not wait for a globally unified framework and can already take steps. Regional options emerge and will facilitate action, encouraging a bigger consideration for biodiversity globally. The 2019 FAO's report on food supply being threaten by biodiversity loss, the EU 2020-2030 Biodiversity Strategy announcement, and the coming French and Chinese international summits all demonstrate a long-awaited scaling-up. Sia Partners is, now more than ever, engaged in helping its clients tackle the challenges biodiversity will introduce in the foreseeable future.

Sources: Sia Partners analysis from Business@Biodiversity data

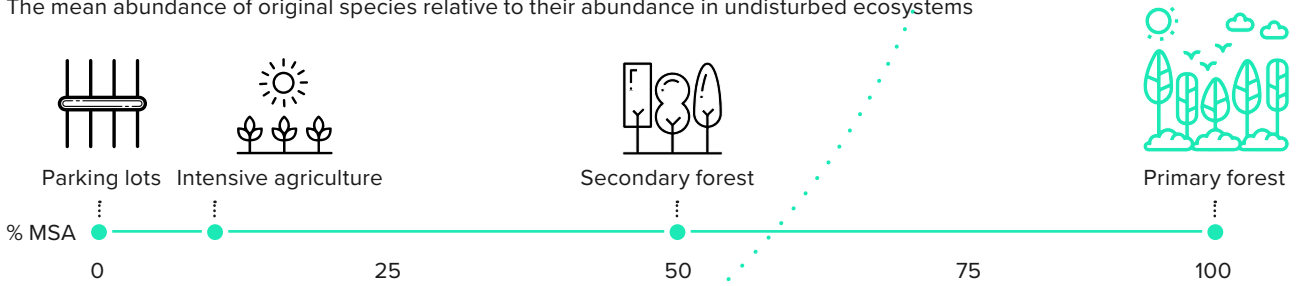
⁵¹ Business@Biodiversity Platform, Arcadis, 2019

⁵² Methodological framework that use metrics (such as MSA) as inputs to solve business issues like impact quantification or reporting.

⁵³ Food and Agriculture Organisation

Focus on Mean Species Abundance (MSA)

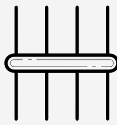
The mean abundance of original species relative to their abundance in undisturbed ecosystems



A surface dimension to deal with heterogeneity : %MSA.km²

At a local scale, the metric MSA.km² allows farmers and other land users to average their biodiversity footprint over a site. Each land-use has an associated MSA (see scale above) and a dedicated surface. Therefore, given a square kilometer of pristine land:

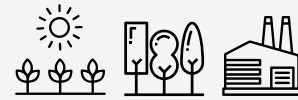
A 0,9km² parking:
Covers 90% of the site with a 0% MSA land-use. The rest remains untouched.



A 1 km² intensive agriculture field:
Covers all the site with a 10% MSA activity.



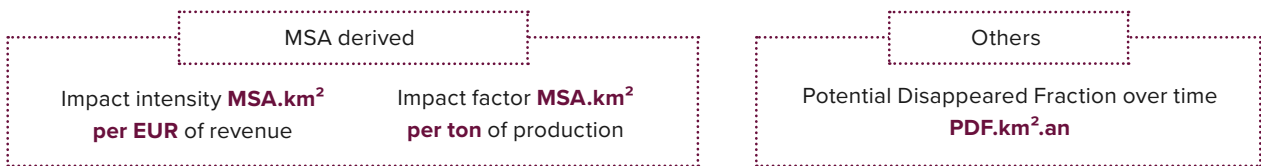
An agricultural exploitation with:
50% of intensive field
10% of secondary forest
40% of food-processing factory



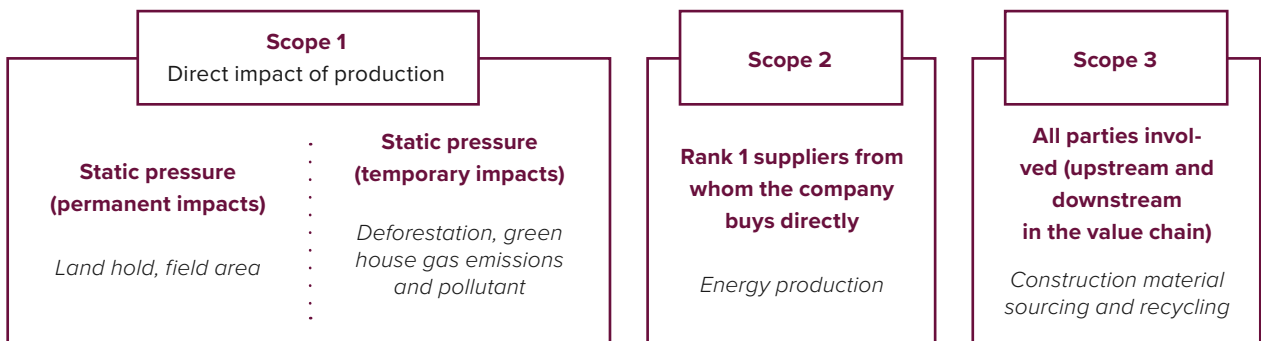
The footprint is a 90% MSA.km² loss for these three land uses

Business perspectives

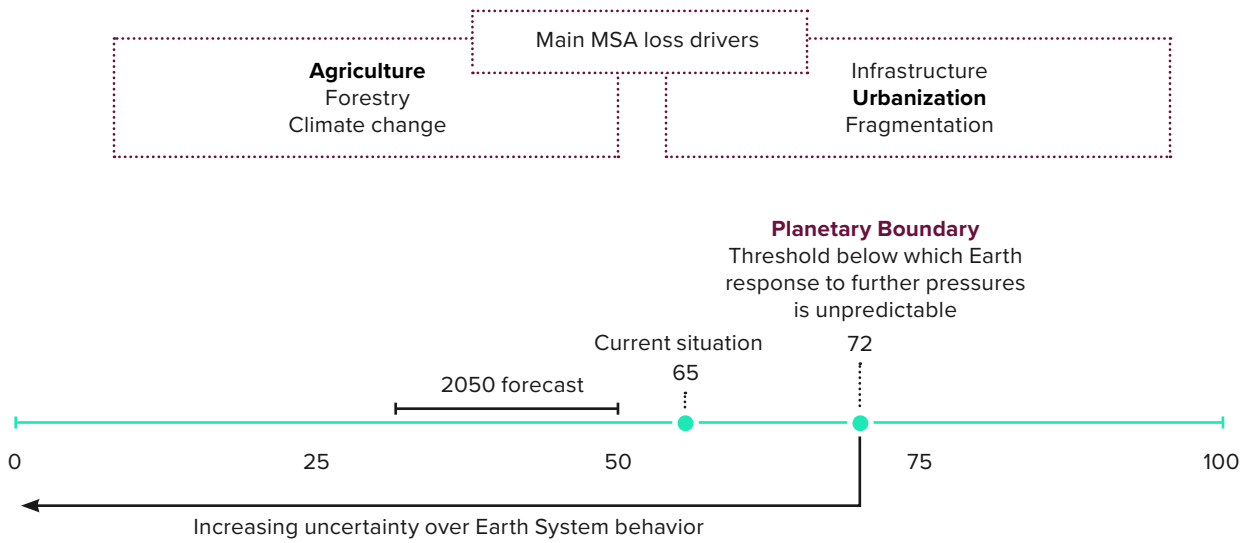
Biodiversity impact metrics for business application ...



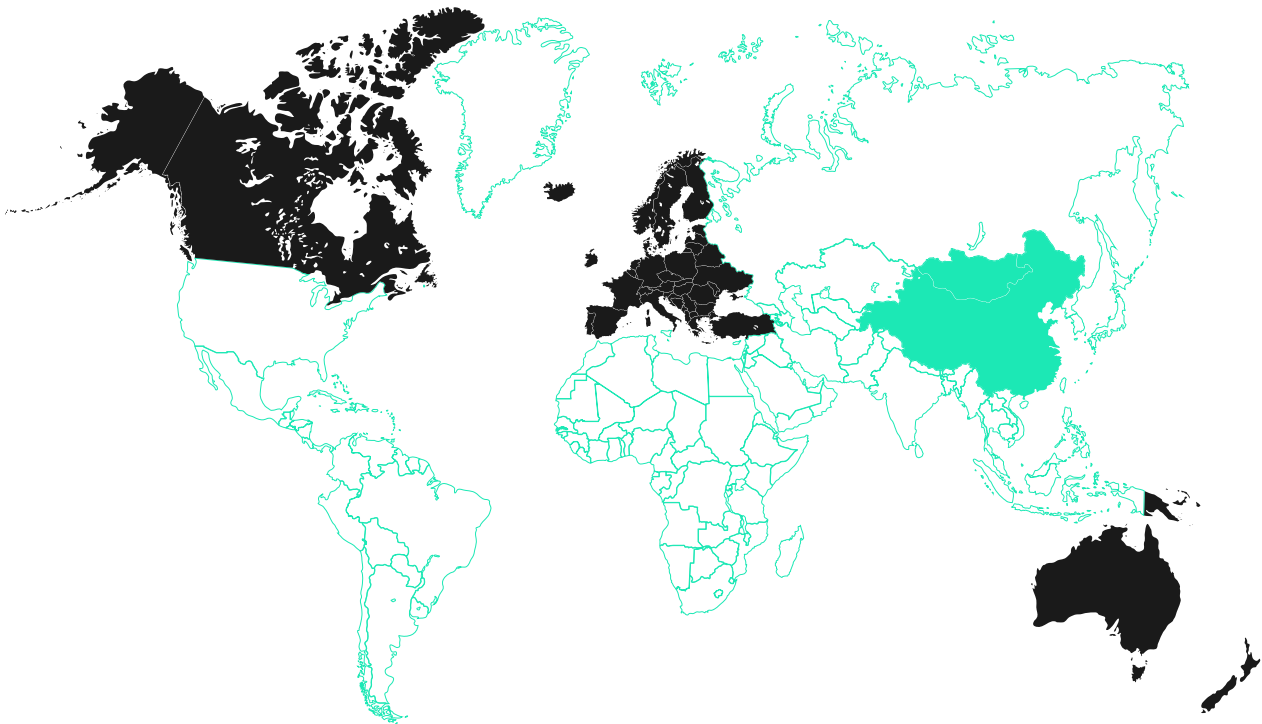
... to be applied over different pressure scopes.



Quantifying the MSA loss at a planetary scale



The big picture



If **America, Europe and Oceania** were converted into **parking lots**, that would correspond to the global MSA loss to date. If the loss rate stays constant, an additional equivalent of **China and Mongolia** will be lost in 30 years

Sources: GLOBIO, Lucas & Wilting, CDC Biodiversité



Agriculture.

Local Food Sourcing and Consumption, a resilient model in an increasingly globalized world?

The COVID-19 crisis reinforced an outlying consumption trend in numerous countries, local food consumption. Lockdown measures and border closures have indeed placed farmers all over the world in a difficult position to sell their products. Local consumption during this crisis was perceived as an act of solidarity and support to local economies. Additionally, long-time supporters also perceive it as an eco-friendly gesture. The demand for local consumption may last beyond COVID-19. This increasing demand questions the interdependency of our food systems, which is an outcome of the acceleration in world agricultural trade.

The agricultural market is going global but unbalanced

From 2000 to 2016, world agricultural trade more than tripled in value. On average, trade in agricultural products has grown at an annual rate of more than 6 percent, rising from \$570 billion in 2000 to \$1.6 trillion in 2016 and represented 8% of international trade in 2017⁵⁴. Economic and population growth have been the main driver of this development. Only to be accelerated by the progress in transport, information and communication technologies, and improvements in market access.

The international market for agricultural products is not homogeneous⁵⁵:

Most developed countries present significant international food trade with the largest imported and exported volumes. In these countries, the globalization of food systems begins to be questioned with a demand for local and organic food, especially in Europe.

Developing countries where trade growth is the most dynamic. Rising per capita income and declining poverty boosted food consumption and imports, while the rise of agricultural productivity is pushing exports up.

Least developed countries where agricultural trade is much lower and the food system is still based on local and/or regional production. Exports are almost zero or focused on specific food products and higher volumes of imports often make countries dependent and exposed to price volatility. If trade has long been with developed countries, South-South agricultural trade has also grown considerably these last years. In 2015 half of developing country exports was destined for other developing countries.

The circulation of agricultural and food products is both a manifestation and a major vector of the globalization of food systems. It reinforces the interdependence between importing and exporting countries and, beyond sharing the products thus conveyed, contributes to the dissemination of standards, values, innovations but also risks. Indeed, international trade profoundly changes people's eating habits and can expose the most fragile countries.

The COVID-19 crisis has exacerbated the issue of domestic food supply

The 2008 financial crisis led to a surge in the prices of agricultural products worldwide and a fall in international



trade. The international wheat market price almost doubled between February 2007 and February 2008⁵⁶, leading some of the world's poorest regions into a state of crisis and causing political instability and riots in several countries.

Today, with food trade less dependent on GDP than before 2008, markets may be more resilient. As price increases endanger food safety, states have implemented growing protectionism since 2008, including changes in domestic support policies. However, the extent of the current crisis and its long-term economic consequences remain difficult to assess. The closure of many borders has made it more difficult not only to trade in foodstuffs but also to employ foreign workers. (The European single market, which allows for the free movement of workers, was strongly impacted by the current crisis). COVID-19 could also jeopardize trade because of health concerns, by increasing standards and controls and by distrustful consumers who are leery of foreign products.

The main importing and exporting countries have mobilized through the WTO (World Trade Organization) and are reporting on the state of the world agricultural trade. Global agricultural markets remain well balanced and grain stocks were forecasted to reach the third highest level of the season⁵⁷. However, countries are reassessing their own food security in response to COVID-19 and some are imposing restrictions for export to conserve stocks. According to the WTO, this decision could endanger the market and communities. *“Lessons from previous crises have taught us that export restrictions increase food insecurity for the most vulnerable populations. The world's poor, including agricultural workers, would bear the brunt of increased export restrictions.”* WTO Agricultural Committee

Cradle of the pandemic, China exports 20% of the world's cereals but remains dependent on food imports⁵⁸. Countries no longer depend on a local market, but on what is happening globally

in the market. Agricultural products and food trade can be used as diplomatic tools by the major powers. In particular, the crisis could see investments by rich countries in foreign lands accelerating: this phenomenon is called land grabbing, the buying or leasing of foreign lands to increase domestic supply.

The application of export restrictions and similar restrictive measures to trade in agricultural and agri-food products creates an unpredictable trading environment affecting food availability and leading to price spikes, increased price volatility and important food shortages.

Local food is an asset to ensure food safety but cannot feed the entire world population

The COVID-19 crisis could be an accelerator for the use of local food, reorienting national productions to guarantee food security and increase resistance to shocks. On the consumer side, a possible hygienic vision could lead to prefer a local product to a foreign one. Consumers may indeed reject products coming from globalization since the pandemic crisis has taken place because of expansion of world trade. Local production and consumption could also accelerate as a new food trend, limiting impact on the environment and consumers health by proposing healthier and more sustainable products requiring less transport and processing. In developed countries, the demand for local food could boost production, which had been supplanted by more competitive imports. In the least developed countries, the development of agricultural economies could thus differ from the growth models previously followed by developed countries in order to preserve and improve the agricultural systems in a new perspective where local takes more importance next to global.

Using local production is a way to increase the resilience of agricultural economies in times of crisis. However, local products cannot feed the whole world population, as production de-

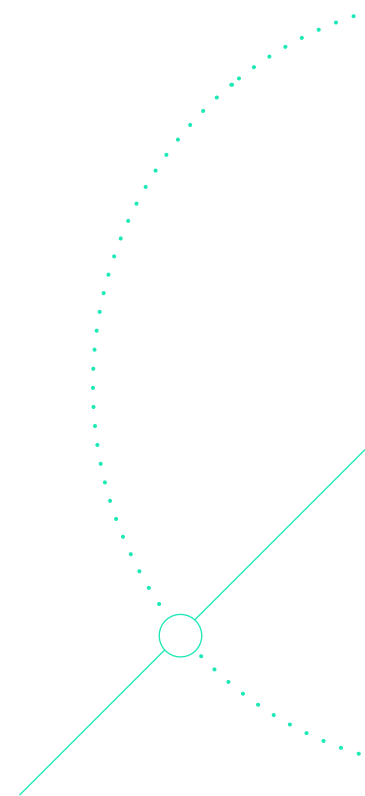
pends on climate, land availability and other factors such as access to water, seeds, and to a lesser extent energy. The international market also constitutes food security in the event of a localized crisis episode (drought in a region of the globe for example). More broadly and beyond agricultural products, the seed trade is now also global. Global farming systems are interdependent.

More than ever, the importance of food and agricultural supply is strategic, especially since the pandemic crisis could only be a taste of the climate crisis anticipated by the scientific community. What we witness today is not yet a total revolution of the system, as international trade is expected to continue. These international exchanges remain essential, but this crisis could have revealed loopholes and stimulated recourse to local (or national) agriculture to improve the resilience of the food systems of the States.

⁵⁶ FAO, 2018. *La situation des marchés des produits agricoles 2018. Commerce agricole, changement climatique et sécurité alimentaire*. Rome.

⁵⁷ WTO, *Analyse Agriculture*

⁵⁸ Agri Mutuel, « Quel sera l'impact du coronavirus sur le commerce des produits agricoles ? », 2020



The international food market: A dynamic but unbalanced market between the world regions

The international market for agricultural products is dynamic and represents a significant part of world trade:

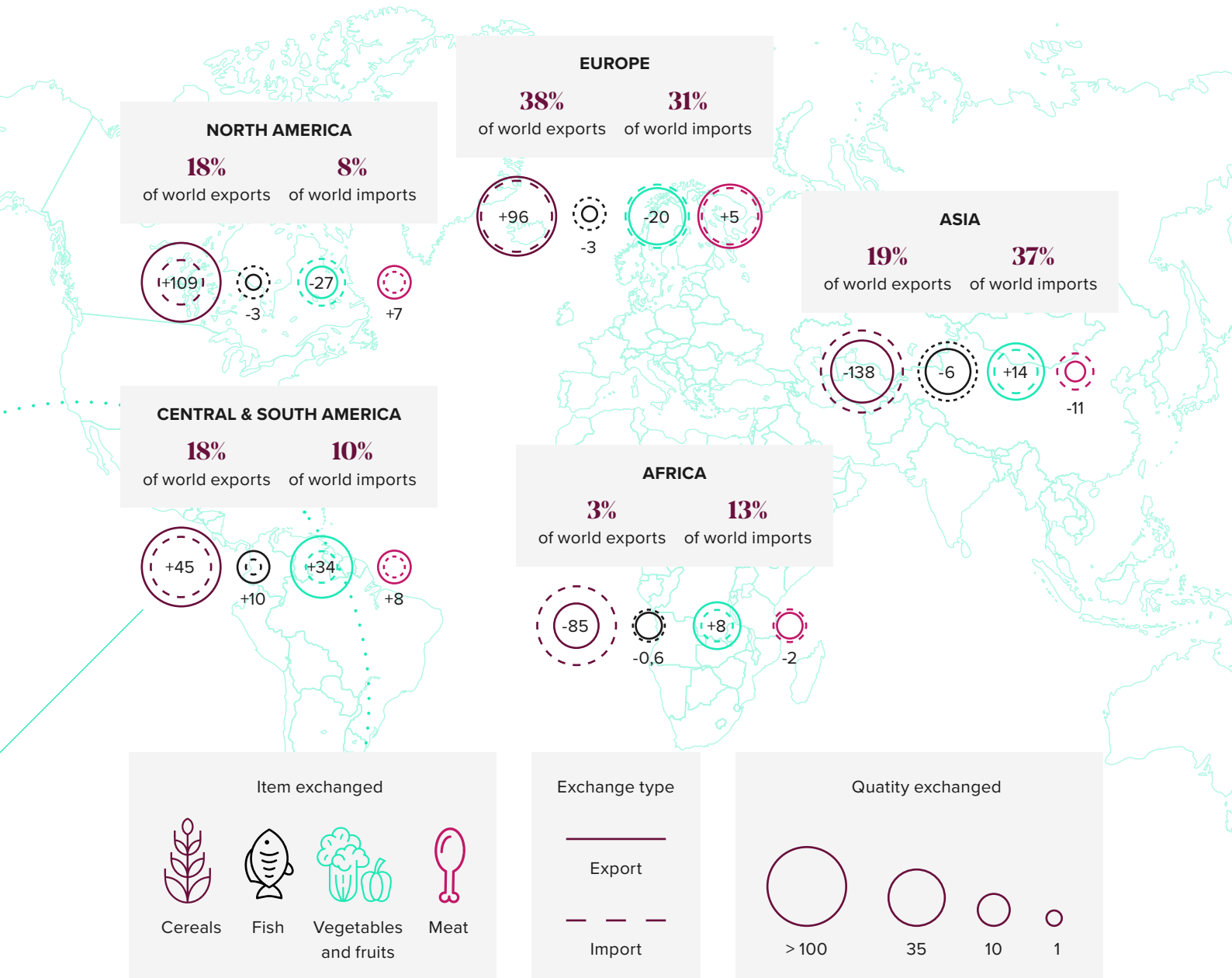
+ 4%

of volume of food exchanged
per year since 2014

10%

of international exports were food exports in 2016
(growing for several years)

Still, volume exchanged are unbalanced between areas:



The unhomogenous distribution of world trade highlights dependence of certain areas on others to insure food supply that meet consumer expectations (price, diversity).

Climate Analysis Center

CONSULTING
FOR GOOD

Consulting for Good describes Sia Partners' ambition to be a purpose-driven company with CSR at its core. Beyond our own policies, practices, and culture, our comprehensive approach integrates CSR into innovative offerings for our clients worldwide, working across our four Labs for Good.

Climate Analysis

Social Responsibility

Responsible AI

Ethics & Compliance

The urgent need to limit the scale of climate change is widely acknowledged.

Sia Partners has been committed to accelerating carbon reduction and the energy transition for 15 years. 12% of our revenue is generated by offerings related to climate change; we help clients in the public and private sectors navigate the on-going global transition to a low carbon economy. Profound mitigation and adaptation are necessary to build a sustainable, resilient world of tomorrow.

● Anticipating a Warmer World

Climate action must conjointly ensure **mitigation and adaptation**. All sectors can reduce their direct impact on the environment through **internal transformations and sustainable management**, ensuring mitigation. Industries also need to prepare for the transformations induced by climate change by adapting in order to **deal with new ranges of risks and become more resilient**.

● Leveraging Technologies

Now more than ever, **new technologies unlock opportunities for climate** as they allow to better master and **optimize infrastructures** and to **leverage all available data**. Our **energy, transportation and AI expertise** allows us to deliver significant results to our clients.

● Green Financing

Green Finance represents all **investments of the energy transition** and is one of its major pillars. At the crossroads between energy, industry and banking, we cover a broad range of issues, from decrypting regulations, defining strategic roadmaps to implementing operational transformations.

● Adapting Public Policies

Administrations and public organizations play a major role in the energy transition. From **local regulations to international collaborations**, governments and administrations **frameworks and low carbon promotion** are critical for the successful transition to a low-carbon model as they define tomorrow's world and scope of action for climate.

● Biodiversity

Biodiversity is becoming a key environmental topic: climate change causes **severe loss in habitats and biological diversity**, generating risks of **disruption of value chains** and for **global health**. As communities care more and the international agenda turns towards biodiversity, both public and private actors hold the keys to act in favor of biodiversity.

● Agriculture

Agriculture & Agri-food Businesses are at the forefront of climate stakes. From the farm to consumers' plates, technology, new behaviors and new activities are revolutionizing the industry towards a **sustainable, innovative and efficient agriculture**.



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