THEMATIC RESEARCH

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Green & Sustainable

Strong political momentum for carbon markets

- **The last six months saw significant political developments on the front of the fight against climate change:** return of the United States to the Paris Agreement following the election of Joe Biden, announcement by China of a climate neutrality ambition by 2060 underpinned by heightened intermediary climate change mitigation measures, increase by the EU of its greenhouse gas reduction target by 2030 (-55% vs. -40% previously from 1990 levels).

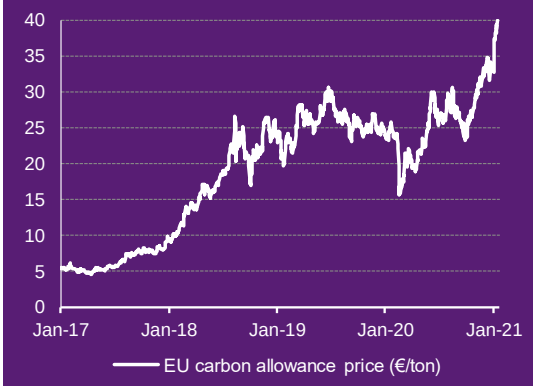
- Sign of a reinforced consensus around the urgency of climate action within the international community, **these developments have already been followed (case of China) or should be followed (case of the EU) by initiatives in the field of carbon markets, these schemes remaining for the moment confined to the regional scale in the United States.**

- **In early February 2021, China introduced a national carbon emissions trading market for the electricity sector.** As this market is based on rather generous emission benchmarks rather than on authorized emission caps, it is unlikely in the short term that it will substantially penalize the domestic electricity sector and that it favors stopping the use of coal for power generation. However, **its implementation underlines the central government's desire to use a now proven mechanism to implement its carbon neutrality ambition... before tightening the rules for allocating allowances and extending the scheme to other, carbon intensive sectors (refining and industry).**

- **On the EU side, the recent upward revision of the intermediate decarbonization target by 2030 should lead to significant changes in the operating rules of the community market, the ETS (European Trading Scheme),** which at the beginning of the year entered phase 4 (2021-2030). For the latter, a scarcity of available emission allowances and an extension of the scheme to other carbon-intensive sectors (road transport) are to be expected from forthcoming legislative proposals from the European Commission (EC). We believe they are inevitable in order to allow the EU to take a step forward in its decarbonization journey, this by promoting, via relevant carbon price signals, the transformation of sectors such as transport and industry which are still very dependent on fossil fuels. **These elements are the basis of the anticipation - now consensual - of a markedly upward trajectory in carbon allowance prices in Europe until 2030 (from € 40/t today - see graph opposite – to possibly €60-€90/t in 10 years from now).**

- From this perspective, the current consensus is around the **EC pushing for ETS reform not only to support (much higher) allowance prices, but also, in a correlated manner, to gradually dry up the volume of allowances auctioned throughout phase 4. In doing so, the EC will create conditions for the undertaking of decarbonization investments to become inescapable for the abovementioned hard-to-abate sectors (industry and mobility).**

Trend in EU carbon price since 2017 (€/t)



Source: Bloomberg

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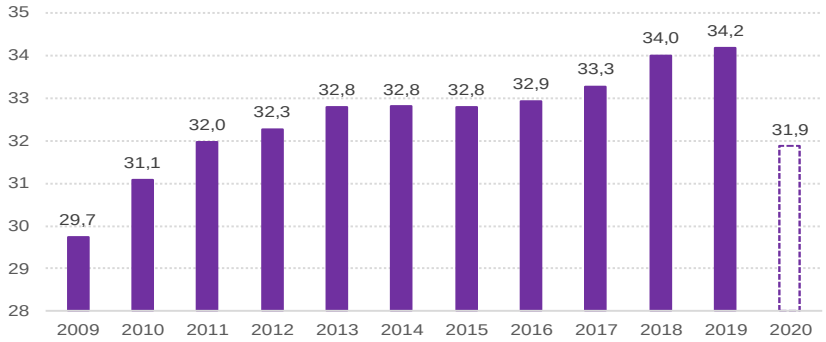
1. Heightened climate change ambitions all across the OECD+

1.1. Mounting climate change challenges…

Despite the decline observed in 2020 in an unprecedented context of a global health crisis, the levels of worldwide CO_2 emissions still represent a considerable challenge in the fight against climate change. Indeed, CO_2 emissions dropping by some 6% in 2020 according to preliminary estimates cannot overshadow the upward trend observed since 2009 (see chart below). This trend must itself be analysed in light of the trajectory of carbon emissions necessary to achieve the objectives set by the Paris Agreement of December 2015. Let's recall **this agreement sets the objectives of "holding the increase in the global average temperature to well below 2° Celsius above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5° Celsius above pre-industrial levels". Such targets entail reaching carbon emissions neutrality around 2050 followed by negative emissions thereafter**.

Trend in worldwide carbon emissions (2009-2020 -$GtCO_2$)



Sources : BP, Nature.com

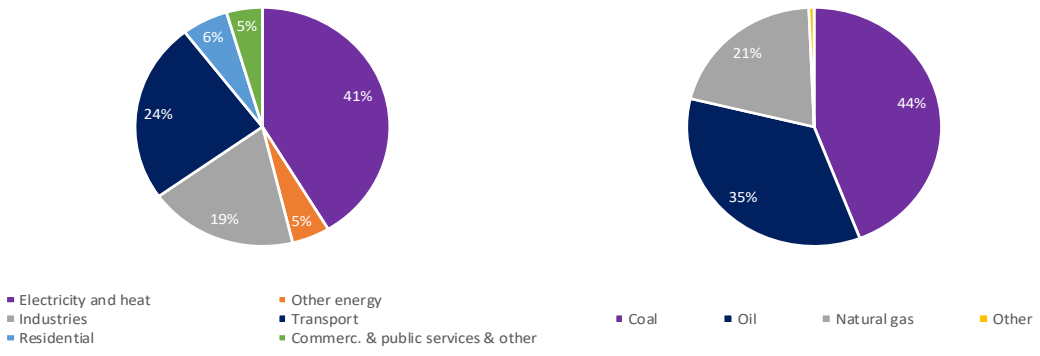
In the short term, the normalization of the sanitary and economic environment are likely to bring carbon emissions back to their pre-2020 level. This is due to the global economy's continuing dependence on fossil fuels, which in 2019 still represented 80% of the satisfaction of final energy needs. In their current configuration, the energy and economic systems in place continue to carry structurally high levels of carbon emissions.

Achieving climate neutrality by 2050 therefore implies the transformation of existing systems through:

i/ **The (more or less spontaneous) replacement of part of the assets in place** by equivalent low-carbon solutions (typical case of **the electricity generation sector which represented 41% of global CO_2 emissions in 2017** - see graph below) alongside

ii/ **The transformation of other carbon-intensive sectors** that provide essential goods and services to the global economy (mobility and industry together making up for 43% of worldwide CO_2 emissions in 2017 – see graph below) **to reduce their climate impact**.

Figure: Breakdown of worldwide CO_2 emissions in 2017 by sector and primary energy source (total: 32.8 Gt)



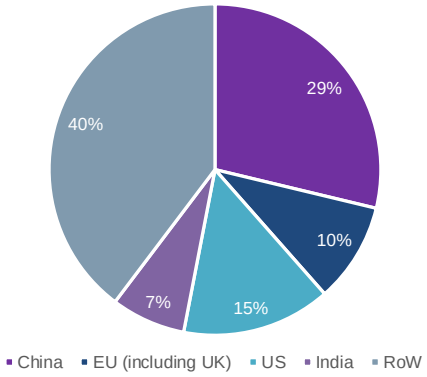
Source : IEA (2019)

As we highlighted in the recently-published report discussing the role of gas to reach climate neutrality by 2050 (see **Is green in the pipe ? Sensing natural gas' potential contribution to climate change mitigation**), the various energy transition policies/initiatives from governments and corporates underway all across the globe precisely aim to achieve both goals.

1.2. … alongside increased consensus on the need for urgent climate action within the international community

The past 6 months saw significant political developments on the front of climate change mitigation strategies in the US, China and the EU. Coming from countries / jurisdictions together making up for nearly 55% of global carbon emissions (see chart below), these developments suggest mounting political consensus on the relevance of targets set under the Paris agreement as well on the need for urgent climate action.

Breakdown of worldwide CO_2 emissions by country/jurisdiction in 2019 (% - total: 34.2 $GtCO_2$)



Source: BP

1.2.1. US: the fight against climate change, Joe Biden's priority

In the US, immediately after taking office as 46th president, Biden recommitted his country to the Paris climate agreement. While holding a very strong symbolic dimension, this announcement is the first action deriving from Joe Biden's presidential program in the energy and climate fields, structured around the fight against climate change and the underlying goal to make the US achieve climate neutrality by 2050.

In broad terms, Joe Biden's energy and infrastructure program in this field revolved around the concept of "climate and environmental justice" through the greening and modernization of existing assets, whether for mobility, buildings, electricity networks and water. As part of this, the climate and environmental justice proposal will make a federal investment of $2tn over the next four years, the ultimate goal of such spending being to leverage additional private sector and State and local investments to total to more than $5tn. As explained in the program, the bulk of the spending will be made using the US government procurement system which represents around $500bn per annum to undertake the investments that are expected to escalate the use of clean energy in the mobility, electricity and building sectors. The Federal State will therefore seek first and foremost to drive change through the renovation of its own equipment (vehicles and buildings), while working with States and municipalities for the systematic deployment of new green technologies (production of carbon-free electricity, electric vehicles, buildings meeting the most recent thermal insulation standards, etc.) in the aforementioned sectors. The latter case is well illustrated in the mobility sector where the new Federal administration will work with (the) nation's governors and mayors to support the deployment of more than 500,000 new public charging outlets by the end of 2030.

1.2.2. China: now aiming for climate neutrality by 2060 and revising upward its NDCs

The second half of 2020 was marked by a **series of major climate announcements by China's government.** In September 2020, **Chinese President Xi Jinping told the UN General Assembly that China would aim for carbon neutrality by 2060. A few weeks later (December), China's government followed up on this new climate ambition by ratcheting up its 2030 commitment in its revised Nationally Determined Contributions (NDCs[1]) under the Paris Agreement**.

[1] NDCs are non-binding national plans highlighting climate actions, including climate related targets, policies and measures governments aim to implement in response to climate change and as a contribution to achieve the global targets set out in the Paris Agreement. NDCs are established independently by the parties (countries or regional groups of countries) in question. However, they are set within a binding iterative "catalytic" framework designed to ratchet up climate

The **new targets** unveiled on that occasion are as follows:

i/ **Cut CO_2 intensity of GDP by more than 65% from 2025 levels** – compared to the earlier target of 60%-65%;

ii/ **Reach a non-fossil fuel (renewable and nuclear energy) share of 25% in primary energy** – compared to the earlier target of 20%;

iii/ **Increase forest stock by 6 bcm from 2005** – compared to the earlier target of 4.5 bcm and

iv/ **Raise combined wind and solar power capacity to 1,200 GW** – up from the installed capacity of 415 GW at the end of 2019.

1.2.3. EU: lifting its carbon emissions reductions by 2030

At the forefront of climate change mitigation initiatives since the signature of the Kyoto Protocol in 1997, **the EU recently raised its intermediate decarbonization targets so as to maximize chances of reaching climate neutrality by 2050**. This objective is at the heart of the European Green Deal announced in December 2019 by the freshly installed new European Commission headed by Ursula von der Leyen and in line with the EU's commitment to global climate action under the Paris Agreement[2].

Last December, after months of intense negotiations among Member States, **the European Council reached an agreement for a more ambitious decarbonization of the European Union by 2030. By then, the objective is to reduce net greenhouse gas emissions not by 40% (compared with their 1990 level) but by 55%.** The setting of these more ambitious decarbonization objectives for the European Union was first officially mooted in December 2019 by the newly installed European Commission when it presented its Green Deal. At the time, it met with opposition from several Member States, which spurred intense negotiations at European Council level before an agreement was eventually reached.

2. Increased use of carbon markets to progress towards climate neutrality

It is against such backdrop of mounting decarbonization ambition that **carbon cap-and-trade markets are increasingly perceived as key enablers of energy transition policies.** While they should remain limited to regional initiatives in the US, these markets, despite very different stages of development, are called upon to play a central role in the decarbonization of the economy in China and in the EU.

2.1. Basics of carbon cap-and-trade markets

In broad terms, **a carbon cap-and-trade system is a common term for a government-led regulatory program designed to limit, or cap, the total level of CO_2 emissions, as a result of industrial activity.**

Such program can work in a number of ways. The most common functioning is through **a central authority (usually a governmental body) which allocates or sells a limited number of carbon allowances that allow a discharge of a specific quantity of CO_2 emissions in the atmosphere over a set time period.** Carbon emitters are required to hold permits in amount equal to their emissions. Emitters that want to increase their emissions must buy allowances from others willing to sell them. Companies/installations reducing their emissions are entitled to sell any excess allowances.

In practice, **these markets can be organized in very different ways from one jurisdiction to another depending on whether**:

i/ **The cap-and-trade system covers one or more sectors or all sectors of the economy**;

ii/ **Carbon allowances are allocated free of charge or must be fully purchased through explicit auction mechanisms**. The former caser can correspond to a benchmark system where, for the sectors / installations concerned, CO_2 emissions only become "payable" above a certain threshold (see below for China).

Recent experience shows that **these patterns evolve over time. Carbon cap-and-trade programs enjoy a very evolutionary nature, with sector coverage being generally expanded alongside free allocations of allowances being gradually stopped and replaced by increasingly restrictive explicit auctions.** Given its carbon footprint, which is both significant (see above) and easy to measure at the facilities' level, the electricity generation sector is generally the first covered by carbon cap-and-trade markets. Under such

action over time. Once states have set their initial NDCs, these are expected to be updated on a 5-year cycle. Biennial progress reports are to be published that track progress toward the objectives set out in states' NDCs.

[2] While officially set by the European Commission, this objective is not yet officially declared by all Member States. It is nonetheless worth mentioning that several Member States including Denmark, France, Germany and Hungary have already enshrined in law their country's pledge to reach carbon neutrality by 2050. The Spanish Parliament is currently processing a Climate Change and Energy Transition Bill, which aims to achieve climate neutrality by 2050.

evolving scheme, "carbon constraint" gradually spreads to all economic activities, ultimately promoting investment in technologies that reduce/eliminate the carbon footprint of the sectors / installations concerned.

All in all, **what initially works as a tax "internalizing" the cost of an environmental externality for the company/facility concerned ultimately becomes an incentive to invest in low-carbon technologies/processes**.

2.1.1. Pros and cons of carbon cap-and-trade markets

On paper, cap-and-trade systems for carbon emissions are often presented as the most economically relevant solution to the climate externalities of the various sectors covered by the scheme. Indeed, whilst it sets a limit in the volume of carbon that the latter can emit, this system also leaves the economic actors concerned the choice between purchasing allowances corresponding to their actual emissions and making investments aimed at reducing or even eliminating these emissions.

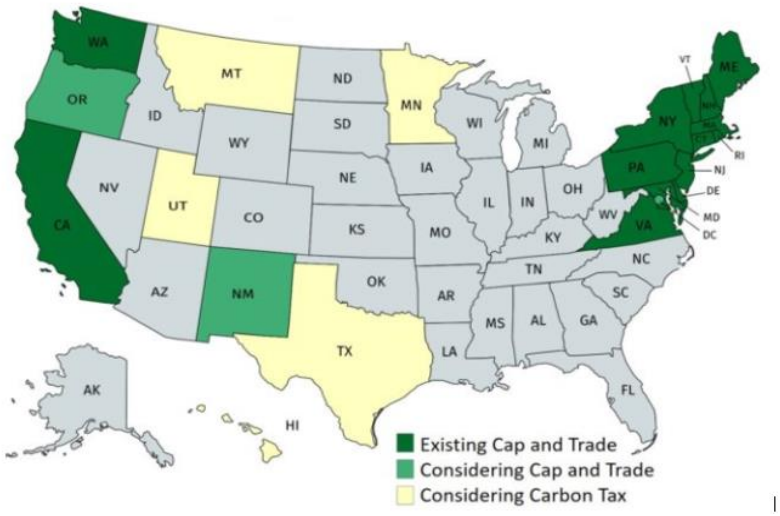
Critics of these programs point to the various problems that they have confronted, such as weak emissions caps, volatility in emissions allowance prices, overly generous allocations of emissions allowances to strategically important entities, **all issues resulting in limited carbon emissions reductions**. **However, a detailed analysis of these problems reveals that their origin is above all of political/regulatory nature.** As these markets have the ultimate economic effect of causing carbon-intensive sectors to internalize their climate externality, climate authorities are often reluctant to set from the start very restrictive emission caps for the sectors concerned, for fear of a negative impact, taking the form of incremental cost being ultimately passed to the end customer in an insufficiently competitive market or lower cost competitiveness on the world markets of the "domestic" sectors/facilities covered by the scheme.

In other words, **the effectiveness of a carbon cap-and-trade market in the decarbonization of the economy ultimately relies on the political will underpinning the implementation of this mechanism.**

2.2. US carbon markets: a set of State/regional initiatives unlikely at this stage to reach nation-wide level

On the side of the United States, the country's federal structure as well as the absence of a strong consensus around climate change mitigation at national level (at least until Joe Biden's election) accounts for **initiatives in the field of carbon cap-and-trade markets having remained thus far at States' level, usually as part of regional or even transnational initiatives**.

US: State carbon pricing initiatives



Source: Priceoncarbon.org

The map above shows the various **initiatives taken by States in the field of carbon taxation and cap-and-trade systems**. The latter have so far only been implemented in **15 states, taking two main forms:**

i/ **A pioneer State in this field, California set up the first carbon market in 2013 that has evolved over time to cover the main carbon emitting sectors (power generators, refineries and other large emitters) as well as various greenhouse gases**[3]. Alongside the development of its own trading system,

[3] The resulting cap-and-trade program now applies to almost 85% of California's greenhouse gas emissions.

California entered a partnership with Canadian provinces British Columbia, Nova Scotia, and Quebec through the Western Climate Initiative (WCI);

ii/ **The Regional Greenhouse Gas Initiative (RGGI) is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia to cap and reduce carbon emissions from the power sector**. RGGI compliance obligations apply to fossil-fueled power plants 25MW and larger within the ten-state region. As of 2021, Pennsylvania is pending RGGI membership with an anticipated start in early 2022.

Pennsylvania recently joining RGGI suggests greater consideration of climate issues at State level. However, as the above map illustrates, on this issue, the gap between the coastal states and the rest of the country is striking. Characteristically, yet ambitious for the electricity sector (ambition of carbon neutrality targeted by 2035), the program drawn up by Joe Biden in the energy and climate fields for the recent presidential elections does not provide for the establishment of a federal emissions carbon market. It is therefore probable that **the realization of Joe Biden's program in the areas of climate change and energy supply will rely on a combination of actions at the Federal level (investment program in public equipment aimed at decarbonizing mobility and supply electricity for Federal sites) and actions at State level (investments in local energy infrastructure, possible extension to other States and toughening of existing carbon cap-and-trade systems).**

2.3. China's carbon market: a lenient, benchmark-based scheme covering power producers, for the time being

In the wake of its announcements on the climate front in autumn 2020 (see above), China completed its recent pilot initiatives in the field of carbon cap-and-trade[4], with the launch, effective since February 1, 2021, of a national program. For the moment, **this scheme only concerns the power generation sector, which however represented 40% of national emissions, more than twice the size of the EU ETS, until then the world's largest carbon market.**

In practice, this market concerns 2,225 installations across China with annual emissions of at least 26,000 tCO_2 or 10,000 tons of standard coal equivalent energy consumption. It operates on the basis of a benchmark of 877 $kgCO_2$/MWh for standard coal plants over 300 MW and 979 $kgCO_2$/MWh for standard coal plants below 300 MW. For less common plants that burn coal gangue and coal water slurry, the benchmark is 1,146 $kgCO_2$/MWh, while for gas-fired plants it is 392 $kgCO_2$/MWh. Under the scheme, China's power operators will have to buy emissions permits if their plant exceeds these carbon intensity benchmarks.

The entry into force of this carbon cap-and-trade marks a new stage in China's climate policy. In fact, the limitation of this market to the power generation sector alone should only be temporary, with the future inclusion of carbon-intensive industrial sectors (refining, steel production, chemicals). **However, it is unlikely that in its current form, the market will severely penalize utilities and, above all, guide investments in new generation capacities outside of coal.** China, which depended on this fossil fuel for 65% of its electricity production in 2019, does not intend to phase out from coal in a foreseeable future, on the model of the policy currently pursued in Germany. Characteristically, approvals for new coal projects in China increased in 2020 with plans for 40.8 GW of new coal plants - equivalent to the entire coal generation fleet of South Africa - being proposed in the sole H1. In this perspective, the definition of emissions benchmarks would serve mainly to orient investments in the electricity sector towards the most efficient coal capacities from a thermal point of view. For instance, new, "ultra-supercritical" coal-fired plants achieve a net thermal efficiency of around 48% with induced CO_2 emissions of 700 $kgCO_2$/MWh, to compare with old coal-fired plants displaying much lower efficiency rates (circa 38%) and accordingly much higher carbon intensities (circa 900 $kgCO_2$/MWh).

Observers nonetheless point to the scheme offering a working basis to go much further in decarbonizing the Chinese economy, starting with the electricity sector before extending to the aforementioned CO_2-intensive industrial activities.

2.4. EU ETS: more stringent rules expected under phase 4 to reflect revised emissions reductions targets

EU raising its decarbonization ambitions by 2030 came a few days before the entry into force of phase 4 (2021-2030) of the EU ETS.

Set up in 2005, the EU ETS was until the start of this month the world's first international emissions trading system. Since inception, its primary vocation has been to enable the EU to reduce its greenhouse gas emissions (-40% reduction targeted by 2030 from 1990 levels until December 2020, now -55% from the same base levels) and, in so doing, help Europe progress towards carbon neutrality by 2050.

[4] China had since 2011 developed pilot emission trading platforms in nine cities and provinces.

2.4.1. A long maturation process since 2005 (phases 1, 2 and 3)

As the table below illustrates, since inception in 2005, **the EU ETS has undergone various transformations** aimed at enlarging the scope of emissions covered and favoring the emergence of carbon price signals incentivizing the use of the least CO_2-intensive technologies and processes, this through:

i/ **The gradual enlargement of the EU ETS' scope,** resulting in 45% of EU's carbon emissions now being covered by the scheme, but more importantly

ii/ **The introduction in 2013 of an EU-wide emissions cap which reduces linearly** (1.74% p.a. until 2021, 2.1% p.a. thereafter) and **the concomitant introduction of explicit auctions at national level for the allocation of carbon allowances.**

That being said, a clear **distinction has to be drawn for the time being between the power generation sector, on the one hand, which must cover all of its emissions by purchasing allowances put up for auction** and, on the other hand, **industrial sectors exposed to a risk of relocation in the event of an excessive increase in the carbon constraint** ("carbon leakage"). These sectors (steel, cement, glass, chemicals, pulp and paper, etc.) still continue to receive free allowances covering the major part of their CO_2 emissions. However, it should be noted (see below) that this system of free allocation of quotas is doomed to gradual extinction throughout phase 4 (2021-2030).

Main changes introduced in the EU ETS since its entry into force in 2005

Timeframe	2005 **Phase 1** 2007	2008 **Phase 2** 2012	2013 **Phase 3** 2020
Perimeter	**CO2 emissions from power generation and energy-intensive industries** (refining, steel manuf., cement, etc…)	**Inclusion of aviation** in 2012 (for internal flights)	Inclusion of **new sectors** (aluminium and part of the chemical industry) and **new gases** (nitrous oxide and perfluorocarbons)
Members	**EU member states prior to 2004**	**Iceland, Norway and Liechstenstein** (EEA) joined in 2008	**All EU Member States + EEA**
Allocation	**Allowances majoritarily given for free**, as set in the National Allocation Plans		Introduction of an **EU-wide emissions cap which reduces linearly** year by year **End of allowances free of charge for the power sector** in 2013 / gradual phase out of allowances free of charge for industrial sectors

Sources: I4CE, Natixis

While gradually amending the ETS to make it suitable for serving the EU's decarbonization targets, **EU decisionmakers also had to cope with the impact of the market oversupply which developed as a result of the 2009 economic crisis** (allocation of allowances in 2009 based on an incorrect GDP growth scenario, EU's economy contracting by 5% that year).

A series of measures were announced at the end of 2017 with the aim of bringing down excess allowances from over 1,700 tCO_2 at year end-2017 to less than 0.8 t tCO_2 by year-end 2030, namely:

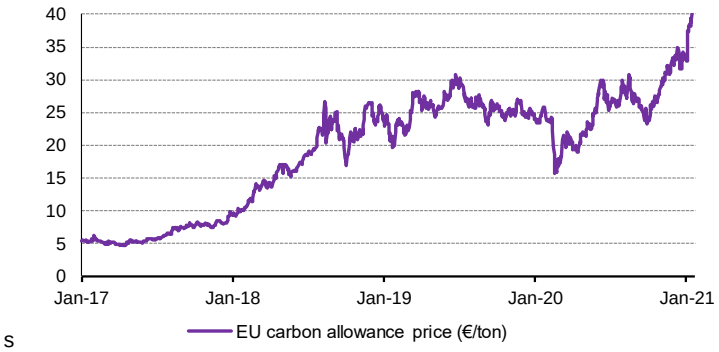
i/ **The linear EUA reduction factor will be 2.2 % from 2021** (vs. 1.74% previously), as proposed by the European Commission (EC);

ii/ **Each year from 2019 to 2023, 24% of the cumulative surplus of allowances will go to the Market Stability Reserve (MSR);** from 2023 the allowances held in the reserve above the total number of allowances auctioned during the previous year should be cancelled;

iii/ **Conditional lowering of the auction share by 3% of the total quantity if needed, to avoid application of the cross-sectoral correction factor** (this is between the 5 % proposed by Parliament and 2 % proposed by Council).

These measures were instrumental in **partially rebalancing the market but more importantly in restoring ETS' perceived ability to play a meaningful role in the EU economy's decarbonization**. These elements account for the spectacular rise in carbon prices throughout 2018, from €7/t in January to €25/t in September, and then for EU carbon allowances trading on average at €26/t over the past two years (see chart below). Such trend is all the more remarkable considering the various sources of uncertainty market players have had to face over the past two years (timing and implications of the Brexit on the EU ETS, impact on the sanitary and economic crisis on the supply-demand balance, etc.).

EU ETS: trend in carbon allowance price (€/t) since 2017



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Source: Bloomberg

2.4.2. What to expect for ETS phase 4

The abovementioned measures announced at the end of 2017 to rebalance the EU ETS were part of a general market design aiming to achieve a 40% cut in greenhouse gas emissions by 2030 from 1990 levels. **Rules governing ETS phase 4 which entered into force last January 1 therefore need to align with the -55% cut in greenhouse gas emissions now targeted by 2030.**

It is against such backdrop that the **EC launched last fall a public consultation with a view to adapting the ETS to EU's new decarbonization objective for 2030**. The EC is scheduled to present legislative proposals in the summer. Some changes will likely be enacted sooner than others, experts say, in order to give European industry as much time as possible to adjust to the new emissions limits before 2030 arrives.

The considered changes go in three main directions:

i/ **Inclusion of new sectors in the ETS**. The EC wants to add emissions from intra-EU shipping, while also considering inclusions of sectors such as buildings, road transport, as well as potentially all fossil fuel-burning activities. Alternatively, the consultation says these sectors could be covered by a new ETS, possibly linked to the existing scheme.

ii/ **Fewer free allowances**. The EC considers accelerating the **reduction of the volumes of free allowances to sectors subject to the carbon leakage risk**. Furthermore, free allowances could be "replaced" by the EU's plan to impose carbon cost on imported goods in some of the sectors subject to the carbon leakage risk (through the considered carbon border adjustment mechanism- CBAM[5]), or only given to companies that invest in emissions cuts.

iii/ **Supply cuts**. Such cuts could be implemented through various channels, namely **faster cap cuts** than the -2.2% p.a. agreed on in 2017[6] **and/or more aggressive use of the MSR** (see above) that is currently used to gradually reduce the volume of excess allowances by removing from the market a fixed portion of total permits put up for auction (currently 24% p.a. up until 2023). Another option considered by the EC is the mandatory cancellation of allowances pertaining to polluting power plants upon closure.

2.4.3. Carbon prices should continue their upward trajectory

Although partly accounted for by specific atmospheric conditions encountered in Europe[7], the **recent rise in EUA prices to record levels** (**€40/t** - see above) **reflects the growing anticipation by market participants that the amendments to ETS phase 4 are likely to result in scarcer allowances at substantially higher prices up until 2030.**

Last December, as part of a webinar organized by Vivid Economics at the request of the European Commission, in the context of a review of the EU ETS ahead of planned legislation expected in June 2021, **a group of analysts provided price forecasts by 2030 ranging from €56/t to €89/t** (see table below). Whether these price estimates will be met is likely to be affected by a series of exogeneous factors (magnitude of EU economy's recovery once the pandemic is over, pace of renewable capacity additions,

[5] Put forward as early as December 2019 by EC president Ursula von der Leyen, the proposed introduction of this CBAM continues to a raise a series of key questions and its concrete implementation remains unclear at this point. The CBAM taking the form of a carbon tax on import would raise an issue of compatibility with existing WTO rules although we understand that such mechanism could be covered by exceptions from the latter. A majority of market observers consider that the CBAM is likely to be implemented through the joint introduction on a carbon tax on imports AND domestic production, which would practically imply customs duty on imports as well as the extension of the ETS. Under such scheme, sectors currently benefiting from the carbon leakage rule would cease to receive carbon allowances free of charge.

[6] To implement such cap cuts, the EC considers an amendment of the linear reduction factor to meet the higher 2030 target of at least 55% or a one-off reduction of the cap.

[7] Recent cold snap triggering the use of thermal power plan and incremental demand for carbon allowances.

substantial breakthroughs affecting low-carbon technologies/processes, etc.). **However, the consensus around a significant long-term increase in EUA prices reflects clear policy aims by the EU to tighten supply of allowances over time and use the ETS to get 27-member block on track to achieve climate neutrality by 2050 , including the possibility to expand the system to new sectors.**

Survey of EUAs price forecast by 2030 (December 2020)

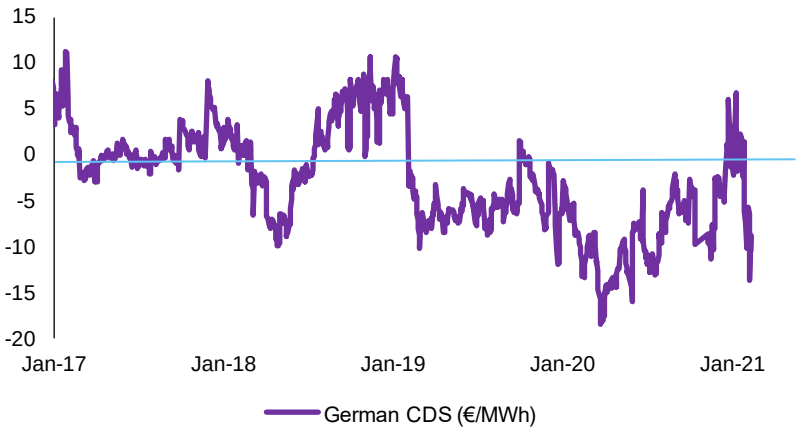
Research entity	2030 EUA price forecast (€/t)
ICIS	56
BNEF	79
Energy aspects	65
Refinitiv	89
EUA price at 31/12/2020	

Sources: SP Global, Bloomberg

These expectations seem to us to be well grounded, insofar as the consensus is growing within the EU around the urgency of climate action and that only strong action on the quantities of allowances authorized and their price will allow the ETS to take a new step in the decarbonization of the European economy.

On its way to achieve carbon neutrality by 2050, the EU is slightly ahead of the intermediary targets it has set for itself. **By 2018, EU greenhouse gas emissions had been reduced by 23% from 1990 levels. Alongside general factors including continued modernization of the EU economy, accelerated growth of renewable energies displacing thermal power generation in wholesale electricity markets, the EU ETS certainly played its part in this achievement albeit to an extent difficult to gauge and all in all probably limited.** In the power generation sector, the rise in CO_2 prices in 2018 contributed in Germany to plunging gross margins for coal-based generation after taking into account the cost of acquiring emission allowances (clean dark spreads - CDS) in deep negative territory (-€10/MWh or below – see graph below). This movement has led some utilities to close some of their coal-fired power plants and to consider reconversion to allow these assets to continue to play a role in the ongoing energy transition[8].

Trend in German Clean Dark Spreads since January 2021 (€/MWh)



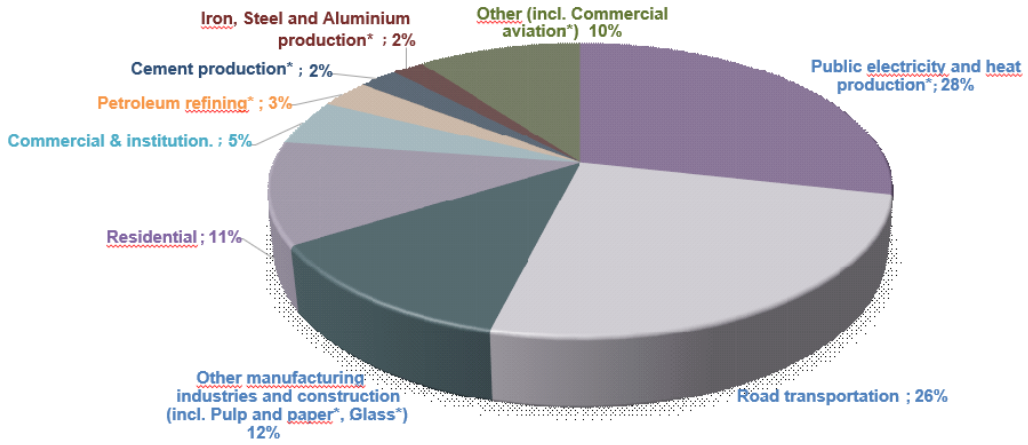
Source: Bloomberg

From this angle, there is a consensus around the fact that reaching the new target of 55% reduction in greenhouse gases by 2030 will involve efforts, but also greater technological leaps than those observed over the period 1990-2020. Despite their modernization over the past three decades, certain sectors (industry and mobility) continue to heavily rely on fossil fuels used as a feedstock (case of chemicals and steel manufacturing) and/or as an energy vector (case of the mobility sector) and as such are considered "hard to abate". Together these sectors still make up for nearly 50% of EU's CO_2 emissions (of which around

[8] The example of the coal-fired power station operated by Vattenfall in Moorburg near Hamburg is emblematic. Last month, the Swedish electrician announced that they had signed a letter of intent with Mitsubishi Heavy Industries, Shell and Warme Hamburg to launch a 100 MW green electrolysis project at the site. In addition to the development of an electrolyser powered by solar and wind energy, the project aims to create a green energy hub with the development of a logistics chain, which could include hydrogen storage infrastructure, but also the transformation of part of the existing gas networks to transport the hydrogen thus produced to commercial and industrial sites.

25% for road transport, now nearly at par with the power generation sector – see chart below). From the perspective of the considered amendments to the EU ETS, these data are telling. They show that the achievement of significant progress in the decarbonization of the EU economy will continue to rely on the exit from fossil fuels in power generation in favor of now proven technologies (nuclear and renewable energies) in the next 5-10 years, but even more on the transformation of the abovementioned hard-to-abate sectors.

Breakdown of EU's 2017 CO2 emissions by sector (%)



* *Sectors followed by an asterisk are presently covered by the ETS*

Source: European Environment Agency

To achieve this, the development of carbon price signals will be crucial to

i/ Allow these sectors to gradually internalize the cost of their climate externality and then

ii/ Incentivize the switch to low-carbon technologies/processes. In this respect, carbon prices are called upon to bridge the cost competitiveness gap between emerging low-carbon technologies/processes and those based on fossil fuels.

Still very carbon-intensive (worldwide median level of Scope 1 and 2 emissions of 9kgCO_2/kgH_2), the hydrogen production sector offers a good illustration of how CO_2 prices can help emerging, low-carbon processes achieve cost parity with established, carbon intensive ones. According to BNEF and the Hydrogen Council, carbon price levels of the order of $50- $70/ton would allow methane reforming units equipped with CCS (carbon capture and storage) processes to achieve economic viability (see **Low-carbon hydrogen: sensing the path to large-scale deployment**).

With this in mind, its is clear that **the inclusion of land transport in ETS' scope would help bridge the current cost gap between ICE (internal combustion engine) vehicles on the one hand, and the various types of electric vehicles (battery electric vehicles - BEVs - and fuel cell electric vehicles - FCEVs[9]), on the other hand**, in particular in the heavy-duty segment (buses, trucks, etc.) (see **Decarbonizing the light mobility segment: Li-Ion Vs. Hydrogen Vehicles**).

From this perspective, the current consensus is around the **EC pushing for ETS reform not only to support (much higher) allowance prices, but also, in a correlated manner, to gradually dry up the volume of allowances auctioned throughout phase 4. In doing so, the EC will create conditions for the undertaking of decarbonization investments to become inescapable for the abovementioned hard-to-abate sectors.**

[9] FCEVs are generally referred to as hydrogen vehicles, for the fuel cell is hydrogen fueled.

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