INSTITUT
MONTAIGNE

POLICY BRIEF

Eric Chaney – January 20, 2020

How Europe Can Lead the World to Reduce its Carbon Footprint

European countries are among those most likely to reach the objectives of the Paris Climate Agreement. The members of the European Union reiterated with almost unanimous agreement their objective of being carbon neutral by 2050. Their actions, with a 23% decrease in territorial emissions since 1990, are moving in this direction. However, at this stage, the 2050 objective still seems out of reach.

Faced with the climate emergency, public opinion has expressed concern and demanded that governments do more as soon as possible, without always completely grasping the scope of the actions to be taken or their resulting costs. In order to reach their objectives, European countries must continue to raise citizens' awareness of the changes that are necessary in their everyday lives, to involve businesses and regional and local governments, and to accelerate policies for change in key areas such as energy, transportation, and production and consumption patterns. This is the objective of the European Green Deal, which was proposed by the Commission on December 11, 2019 and which lays out a multifaceted strategy and an agenda.

However, an essential dimension is lacking in EU actions, and without it, there is a risk that the 2050 objective will never come to fruition.

In order to modify behavior and consumption, one of the most effective and least expensive strategies is to impose a uniform carbon price that is high and increases over time, in order to raise the price of goods and services so that they reflect the future damage caused by their carbon content. Carbon pricing is a policy that is gaining ground around the world.

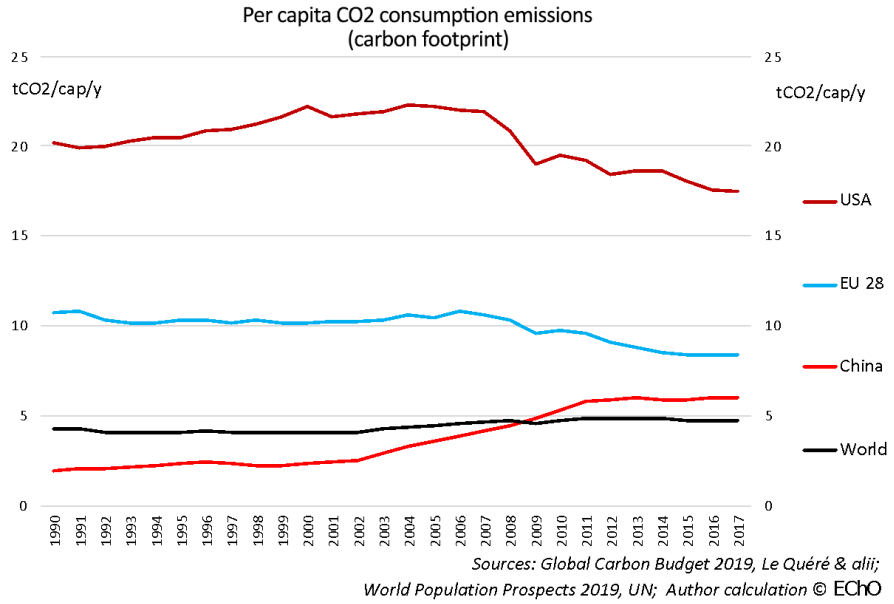
As the European Union contributes only less than 12% of worldwide emissions, its action will only marginally change the worldwide climate. This static vision of things can discourage even the best political intentions. Yet we believe that it is erroneous. If the 28 EU governments agreed on a high carbon pricing trajectory, they would need to apply it both to local products and to imports, thus creating a significant "carbon dividend." In this way, the European Union would have a powerful argument to convince its trading partners to follow the same path, thus creating a "climate club," to borrow an idea from Nobel Prize-winning economist William Nordhaus. Today, only the European Union is capable of putting this into action, for it is politically mature and of adequate size to succeed.

This brief will examine how the European Union could change the world's carbon use by adopting a policy of carbon reduction based on price, without harming its economy, through complete and

decentralized redistribution of the carbon dividend, which would make the environmental transition not only effective but also equitable.[1]

It is accepted beyond any reasonable doubt that the increase of greenhouse gases (GHGs) in the atmosphere and, regarding CO_2, in the oceans, is the main cause of the climate and environmental change happening today. These changes will accelerate in future decades due to the already-existing concentrations, and could have serious consequences in the coming decades and extremely serious ones for future generations if we do not quickly stabilize the quantity of GHGs in the atmosphere (mainly CO_2, which has a long cycle). From this point of view, it is encouraging that per capita CO_2 emissions have been declining in the US and the EU for ten years, and have stabilized in China. But although the reversal of the trend is good news, we are still very far from the mark if we want to limit the increase in the global average temperature to less than 2°C. In this brief, we are mainly looking at reducing CO_2 emissions (the proposals for CO_2 can also apply to other GHGs such as methane).

Graph 1:
Per capita CO2 emissions are declining in industrialized countries, not worldwide



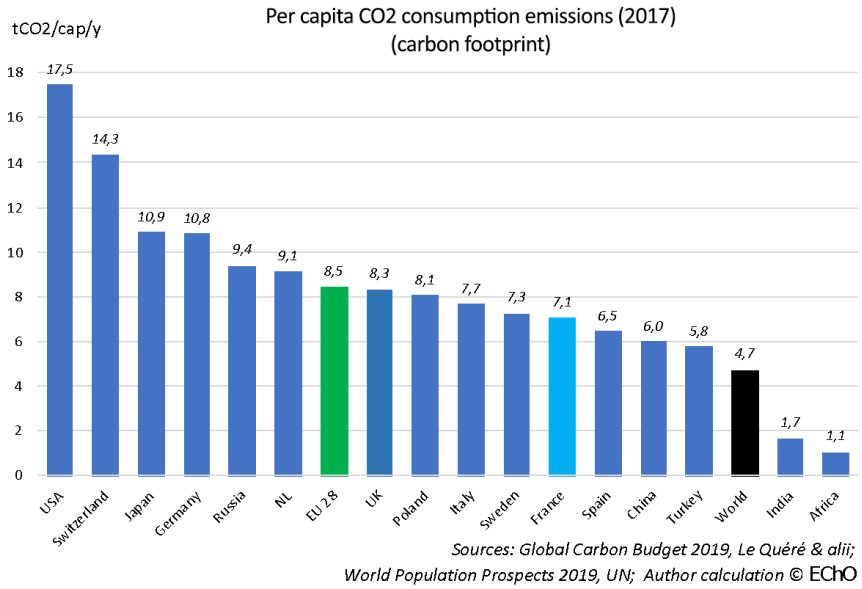
Sources: Global Carbon Budget 2019, Le Quéré & alii;
World Population Prospects 2019, UN; Author calculation © EChO

For a region like the European Union, which contributed 11.9% of worldwide CO_2 emissions in 2017 from a consumption standpoint,[2] which is more relevant than the territorial emissions standpoint due to its consideration of the carbon content of net imports, it is urgent to bring emissions down to zero as quickly as possible, and to think of ways to reduced stored GHGs (so-called negative emissions). In any plausible scenario, the GHG emissions of Asia and especially of Africa will only increase in the future, due to both economic development and demography. Moreover, a vast majority of EU member states (28 including the UK) have reaffirmed their objective of carbon neutrality by 2050, without, however, indicating concrete methods for reaching it, including financial transfers, which may partly explain the resistance of Poland, which is the only country that has not yet adopted it.

[1] I would like to acknowledge the edits, advice, and contributions made by Anne Le More and Paul-Adrien Hyppolite to this brief.
[2] Source Global Carbon Project 2019, Le Quéré et al. The item of data that is most frequently cited from this source is that the EU-28 produced 9.4% of the CO2 emitted worldwide in 2018. These are territorial emissions. The consumption standpoint adds to the territorial production of CO2 that necessary for the production of imports net of CO2 production necessary to exports (the second part is to avoid double counting). This concept is more relevant than territorial CO2 emissions alone, because it takes into account carbon "leaks" that are due to the structure of production and demand. It should be noted that China has a lower carbon footprint from this standpoint, for obvious reasons.

Graph 2

The average European emits 50% less CO2 than the average American and 42% more than the average Chinese



1. Enough beating around the bush: without high carbon pricing, we won't make it

In order to reduce emissions on a large scale – a 50% decrease in relation to 1990 levels as of 2030 would realistically put the European Union on the path to its 2050 objectives[3] – the price signal is the most powerful tool available to us, because it changes behavior in a way that is both coordinated and decentralized: a uniform carbon price included in goods and services consumed in the European Union, as long as it is high enough to be compatible with the goal of reduction, makes it unnecessary to regulate certain industries or to promote or punish certain kinds of behavior. Producers and consumers adapt on their own, by making decisions regarding supply as well as demand, more precisely and effectively than any centralized or regulated approach, including policies of subsidizing alternative energy sources. The immense advantage of the price signal is that it coordinates a very large number of economic decisions that are made individually by companies and consumers, without any other intervention by the authorities except that of enforcing the uniform carbon price.

It also makes it visible to everyone that fighting climate change has a cost, something that is only hidden by wishful thinking about using public money (funded ultimately by taxpayers), or household saving through bank assets (a form of forced savings allocation, or even of expropriation) or company accounts (with the cost ultimately passed on to consumers through higher prices). Appalled by this wishful thinking, whose only effect is to delay difficult decisions, Christian Gollier, professor at the Toulouse School of Economics and President of the European Association of Environmental Economists, made a statement that is both concise and politically hard to swallow: "the concept of a happy energy transition is a utopia."[4]

The case is so convincing that the most important American economists – including 27 Nobel Prize winners and 15 former chairs of the President's Council of Economic Advisers – who usually disagree about almost everything, signed a statement[5] in January 2019 supporting carbon pricing that increases over time through a tax with border adjustment for the United States that is entirely and uniformly redistributed to citizens. Bringing together Nobel Prize winners who are as politically opposed as Angus Deaton on the left and Edward Prescott on the right, this call has had legislative effects: a bipartisan bill

[3] The current objective is to reduce 1990s levels by 40%.
[4] Christian Gollier, "Le Climat à la Fin du Mois" ["The Climate at the End of the Month"], p. 139 ff. Paris: PUF, 2019.
[5] Economists' statement on carbon dividends organized by the Climate Leadership Council.

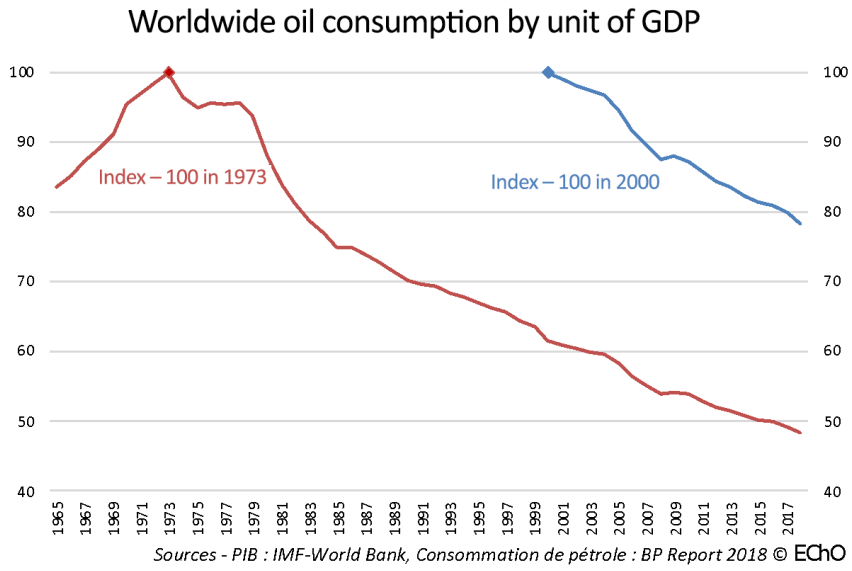
in Congress[6] sponsored by Democrat Ted Deuch and Republican Francis Rooney proposing a carbon tax of \$15/t CO_2 in 2019 that would increase by \$10 per year until the objectives of reducing emissions are attained. More recently, Republican Senator Mitt Romney stated: "I'm looking for innovative solutions that can be adopted worldwide. Well, a carbon tax would encourage them, potentially."[7]

Real-life experiments: the effects of the oil crisis and a drop in oil prices

The oil crises of 1973, 1979, and 2008 and the drop in oil prices in 1986 offer us a direct observation of the impact of the price of oil (and thus of carbon) on CO_2 emissions. Naturally, oil was – and, to a large extent, still remains – a major source in the energy mix. The first observation is that the quintupling of the price of crude oil between 1972 and 1979 very rapidly reversed the curve of worldwide oil consumption by unit of GDP: it peaked in 1973, dropped precipitously after 1978 (-30% in 1993) and has not stopped declining since then. **The price signal works!**

Graph 3

Worldwide growth is continuously using less oil



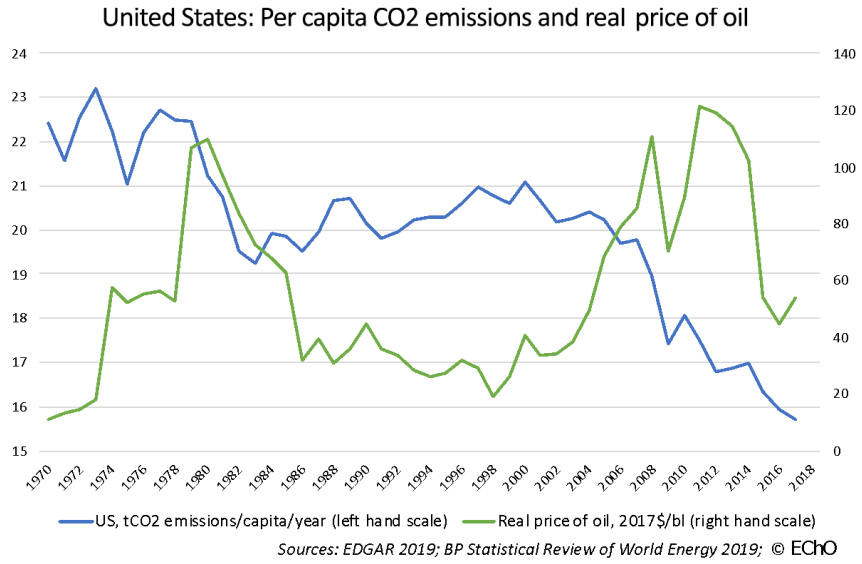
The second observation is that although per capita CO_2 emissions in the United States were constantly increasing, the oil crises made them drop by 13% between 1970 and 1983. Conversely, the drop in oil prices in 1986 increased oil consumption and, with it, CO_2 emissions.

[6] Energy Innovation and Carbon Dividend Act H.R. 763 (House) et S.3791 (Senate). The announced objective is to reduce GHGs by 40% in 12 years.

[7] Talks at GS with Senator Mitt Romney – Goldman Sachs Briefings, October 21, 2019.

Graph 4

The inverse relationship between the real price of oil and CO2 emissions



Since then, gradually increasing oil prices, reaching a peak in 2012, have contributed to reduced reliance on oil in the American economy, in a large part by substituting gas for oil, and thus to the country's reduced carbon footprint: per capita emissions dropped by 15% from 2000 to 2011. From 1970 to 2018, the correlation between the price of oil and emissions is -0.44. **The price signal really works!**

Using carbon pricing to reduce emissions is making great strides

Although the failure to increase the carbon tax on fuel in France following the yellow vest movement has considerably reined in French policies, the international trend is moving in the other direction, as public awareness of climate change makes it more politically relevant to observe the commitments made during the Paris summit. According to the World Bank,[8] 46 countries and 30 regional governments have already adopted regulations on carbon pricing, covering approximately 20% of GHGs, and approximately one hundred countries have presented projects to the United Nations that use carbon pricing as a tool to fight climate change. Nine EU countries, including France, have recently reaffirmed their belief that "carbon pricing is essential to send a clear long-term signal to economic agents."[9]

While many countries have implemented carbon pricing policies that increase over time, they have done so at different levels and for different sectors, often excluding transportation. For example, Sweden, which introduced a carbon tax back in 1991, increased it to €109/t CO_2 [10] in 2018 with an emissions coverage rate of 40%, compared with €62 in Finland,[11] €45 in France, €28 in Iceland, €21 in the UK, €15 in Spain, €7.30 in South Africa, and €5 in Chile.

[8] The World Bank - Carbon pricing Dashboard

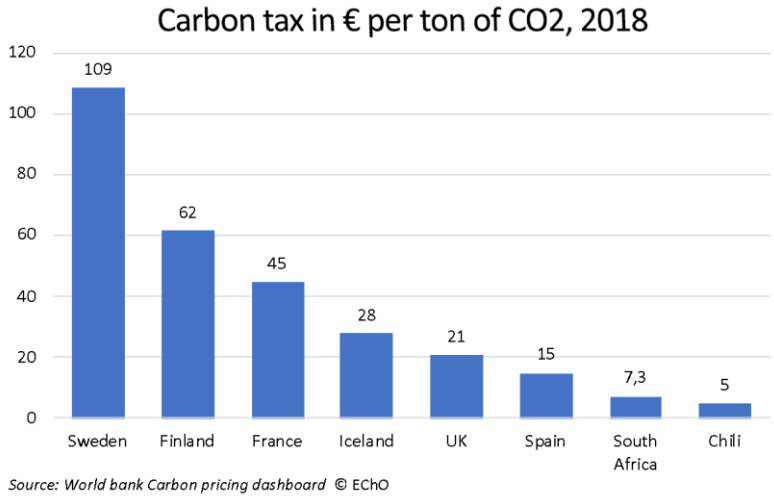
[9] Statement to Strengthen and Extend Carbon Pricing in Europe, signed by the ministers of the environment in Denmark, France, Finland, Ireland, Italy, the Netherlands, Portugal, Sweden, and the UK in December 2018.

[10] SKR 1173/tCO2, source: World Bank, op. cit.

[11] €62/tCO2 for fuel, €53 for other fossil resources, source: World Bank, op. cit.

Graph 5

In Europe, the carbon tax varies by a factor of seven

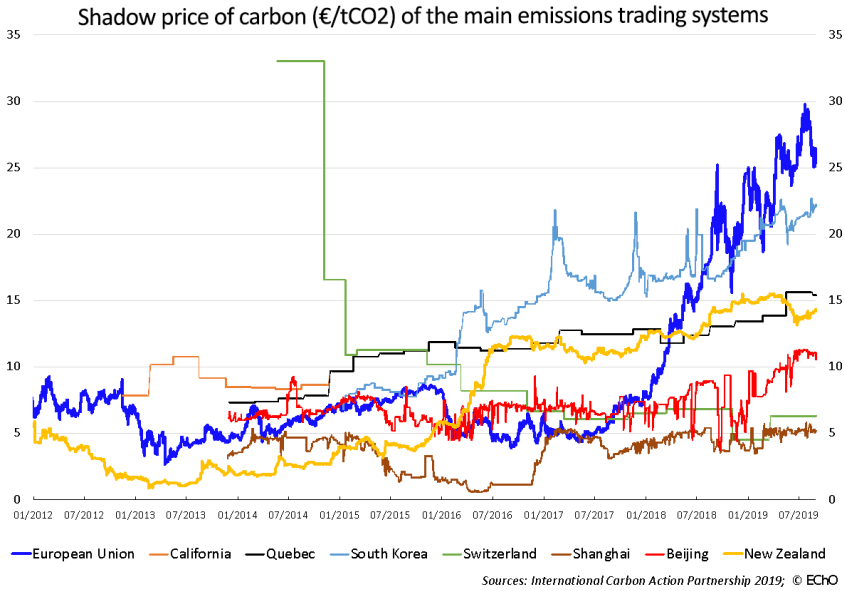


Source: World bank Carbon pricing dashboard © EChO

Many other countries or regions have implemented "cap and trade" systems for CO_2 emissions, following the European ETS,[12] which also consists in acting through pricing, with prices that vary from €26.3 in the EU to €22.3 in South Korea, €15.4 in California and Canada, and €10.5 in Beijing. Although, under certain conditions, both are equivalent for reaching the reduction objective, they nevertheless differ in an important way: carbon pricing does not allow for precisely predicting the effective reduction of emissions, and is thus plagued by some uncertainty. Emissions markets do not have this flaw, because they establish the authorized CO_2 quotas in advance, at a cost of some uncertainty about the shadow price of carbon, whose significant volatility introduces uncertainty regarding the return on companies' investments in carbon-reducing measures.

Graph 6

Carbon trading systems are multiplying



Sources: International Carbon Action Partnership 2019; © EChO

Note: The California and Ontario systems merged in 2015

[12] European Union Emissions Trading System, hereafter referred to as ETS in this brief.

… But this produces a real hodgepodge of good intentions

Even if carbon pricing policies are becoming widespread, it is quite striking how very heterogeneous they are, even within the European Union. If we also consider that for their own projects a growing number of companies are using a carbon pricing trajectory that they establish internally, **the result is a real hodgepodge of good intentions, with a high risk of undesirable trade-offs, both for countries and for private economic actors, consumers, businesses, and investors**. A chance to bring national policies into line with each other was missed at COP 21 in 2015. Negotiators had given up on introducing an international carbon price due to opposition from large developing countries such as India, South Africa, and Brazil. These countries thought that they should not have to pay for the consequences of CO_2 accumulated in the atmosphere by the industrial development of the West, then of the USSR, and, more recently, of China, while part of their population still lives in extreme poverty and some of them have abundant coal resources. Considering that reaching an agreement among all participants was the absolute priority, the negotiators did not try to address these arguments, which still remain just as relevant.

Without international coordination, how can the European Union bring its good intentions – becoming carbon neutral by 2050 – into line with its actions? **We believe that without a strong price signal to be observed by the entire Union, or at least the great majority of it, failure is very likely.** A high carbon price that increases over time may not be enough for reaching the objectives, but **without the powerful incentive that it offers, any grab bag of regulations and capital expenditures, however sumptuous they may be, will fail**.

A high carbon price on the domestic market must be accompanied by a border adjustment (taxing imports and exempting exports from tax), which will extend the price signal to all goods and services consumed in the Union, including those that are imported, in order to take "carbon leaks" into account and to create a level playing field between the Union and its trading partners. It should be emphasized that the goal of the border adjustment is not to find a new source of tax revenue for EU countries, but to ensure that carbon pricing is the same for all goods and services consumed within the Union. For this reason, it is more appropriate to call the revenue from this source a "carbon dividend" instead of a "carbon tax," in keeping with the concept put forth by William Nordhaus.

How can we implement a carbon pricing policy in the European Union?

First of all, we should point out the proposal put forth by Jacques Delpla and Christian Gollier: creating a central carbon bank,[13] to which countries with the same objective of carbon neutrality in 2050 would delegate the responsibility for reducing emissions by establishing a uniform carbon price on all producers and importers through a bidding system regarding quantities, at a price established by the institution. It remains to be seen whether this radical and effective proposal, which eliminates existing systems, has a potential political future.

The method that we propose is to combine the centralized signal – a uniform carbon price – with the decentralization of the methods implemented to enforce it.

2. Unify EU members around a uniform carbon price on the domestic market

Compared to other developed countries, among which we must henceforth include China, the European Union is currently advanced in its use of carbon pricing, with both a cap and trade system (ETS) and in some countries a carbon tax. The cap and trade system, launched in 2005, has been subjected to sustained criticism, but at least it exists and has evolved toward stronger control of emissions and has begun to expand the range of its application. Indeed, the Commission's Green New Deal anticipates "a possible extension of emissions trading quotas to new sectors."[14] The resulting market price per ton of CO_2 was

[13] See "Pour une Banque Centrale du Carbone" ["For a Central Carbon Bank"], Jacques Delpla and Christian Gollier, Analysis N°1, Asterion, October 1, 2019.

[14] Communication of the Commission of the European Parliament, COM(2019) 640 – December 11, 2019

ridiculously low until spring 2018, but since then has been markedly rising, reaching €30/t CO_2 last July. Futures contracts fluctuate around €26.

At the same time, as discussed above, carbon taxes vary from €15/tCO_2 in Spain to €109/tCO_2 in Sweden, with France at €45.

The first step would thus be to agree on a uniform carbon price trajectory in the entire Union, on the basis of impact studies linked to IPCC reports,[15] which would allow us to estimate the current cost of damage caused by the emission of a ton of additional CO_2, which is a sound foundation for the concept of the social cost of carbon.[16]

This raises three difficulties, regarding governance, stability, and management of the existing state of affairs, i.e., the emissions market.

2.1. Who should decide the carbon price trajectory and how should it be done?
The original shortcoming of the experience of the cap and trade system, that is, free allocations that were generously given to certain industries due to their economic influence, have shown that it was hard to avoid short-term political pressure when long-term action needed to be taken. The proposal of a carbon price trajectory should therefore be entrusted to a **politically independent agency,** which would also be independent of the European Commission, and made up of internationally renowned scientists and economists from countries or institutions located in the EU or elsewhere.

Politicians ultimately agreed to entrust the summary of scientific knowledge on climate change to independent scientists, which led to the establishment of the IPCC. European leaders and members of parliament, who are aware of the stakes and are close observers of trends in public opinion, should arrive at the same conclusion for the carbon price trajectory.

> **→ We propose creating a *European Union Carbon Agency* (EUCA), to which EU countries would entrust the mission of determining the carbon price trajectory that is most consistent with the objective of carbon neutrality by 2050. Its recommendations would be submitted to the European Council and Parliament.**

Our hypothesis is that these institutions would deem the political risk of rejecting the EUCA's proposals too high, considering the rapidly increasing concern and demands of public opinion concerning climate change, which could be called "the Greta Thunberg effect." If it were not possible to engage all the countries of the European Union, nothing would prevent determined countries from committing to a shared carbon strategy based on a uniform carbon price, although this would raise thorny problems of "carbon leaks."

2.2. Can the carbon price trajectory be established once and for all?
Scientific knowledge evolves, and this is true of both climate modelling and analyzing the interaction between the climate and environmental-economic systems. The same holds for the state of low-carbon or no-carbon energy-producing technologies. Therefore, the carbon price trajectory can only be dependent on the current state of our knowledge.

For example, the report by the commission headed by Alain Quinet in 2009[17] proposed anchoring the carbon price trajectory to a target of €100/t CO_2 in 2030 and using a discount rate of 4%, which led by backcasting to a price of €4 in 2010. The update produced in 2019[18] by the same commission, based in

[15] Intergovernmental Panel on Climate Change
[16] Making a connection between climatological research and economic impact has been an ongoing and colossal effort since 1970, with William Nordhaus as one of its pioneers. In his speech in Stockholm when he received the Nobel Prize in economics in 2018, Nordhaus spoke of the "amazing discovery of the shadow price and social cost of carbon."
[17] "La Valeur Tutélaire du Carbone" ["The Tutelary Value of Carbon"], report of the Commission headed by Alain Quinet, La Documentation Française, N°16-2009.
[18] "La Valeur de l'Action pour le Climat" ["The Value of Climate Action"], report of the Commission headed by Alain Quinet, France Stratégie, February 2019.

particular on IPCC reports, proposed to raise the 2030 target to €250/t CO_2, which would be consistent with a price of €115 in 2010 and €160 in 2019, using the same discount rate.

Although economic actors, in both the business and political worlds, would prefer to have a trajectory established permanently in order to be able to anticipate future costs, it would be a serious mistake to establish a carbon price trajectory that would depend on the state of knowledge at a given time. Even if it is more likely that the future estimates of the EUCA would raise the carbon price,[19] it is not out of the question that the inverse scenario could take place, in case, for example, of rapid progress toward the objectives due to technological innovations that cannot be anticipated today.

→ In order to introduce stability into the carbon price trajectory without making it overly rigid, we propose that it be regularly revised, with a minimum of three years between revisions.

2.3. Adapting the European emissions market

As mentioned above, the ETS has the advantage of being an existing system, of having begun to adapt to more ambitious objectives, and of having recently moved toward prices that are closer to representing the long-term costs of emissions – in particular, the range in the Stiglitz-Stern report,[20] $40 to $80/t CO_2 in 2020, or the value identified by Christian Gollier,[21] €50 in 2019. Its principal disadvantages remain a price that is still too low, significant price volatility – a result of the rigidity of the allocated quantities – and the low coverage rate of the system. It should be mentioned that the last characteristic is not really a problem if a carbon tax is adopted, since it will, by definition, apply to all the carbon content of goods and services exchanged in the Union. The issue would then be to connect the two systems in such a way as to avoid double taxation.

The participating countries have already agreed to strengthen the system, which has entered its third phase (through 2020) and will soon enter its fourth (2021-2030). The system's coverage has expanded, allowances are sold at auction, and allowances have been created for innovative renewable technologies and CO_2 capture technologies, which their developers can sell on the market. Phase 4 will continue to reduce the number of allowances and will strengthen the stabilization mechanism (with the possibility of intervening in the market in case of excessive allowance-selling, during a recession, for example).

The German plan presented on September 20, 2019[22] extends the national trading system to sectors that the ETS does not cover, such as construction and transportation. Although it has been criticized for the low carbon price that it plans to apply, it nevertheless contains interesting ideas for a possible reform of the ETS. In this way, the German market will begin by applying a de facto carbon tax (ranging from €10/t CO_2 in 2021 to €35 in 2025), and, after 2025, will have a CO_2 allowance that is known in advance, at a market price that will have a minimum and a maximum. The interest of this formula is to limit price volatility, and to work with the existing ETS market.

However, the establishment of a uniform carbon price for all goods and services will require the reform of the ETS, both to raise the market price while reducing its volatility and to eliminate free allowances, which will no longer be justified if there is a carbon tax at the EU's borders.

→ Proposal for reforming the ETS:
We propose to raise the ETS price and to reduce its volatility by renegotiating allowances downward and introducing a price corridor, as in the German model.

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[19] Columbia and Harvard researchers propose a carbon price trajectory starting at a high level (from $150 to $200/t CO2) and decreasing over time. Inspired by research on risk-taking in finance, they observe that the uncertainty about the impact of GHG emissions will decrease over time: we will know more about this topic in 2030 than we do today. Nevertheless, we may ask ourselves if the advantage of a trajectory that is known in advance and increases over time – i.e., encouraging producers and consumers to adapt now instead of tomorrow – has been taken into account correctly in their model of general equilibrium. See "Declining CO_2 Price Paths", Kent D. Daniel, Robert B. Litterman, and Gernot Wagner, PNAS October 2019.

[20] Report of the High-Level Commission on Carbon Prices, headed by Nicholas Stern and Joseph Stiglitz.

[21] Christian Gollier, op. cit.

[22] See "Germany Introduces Carbon Price for Building and Transport Sector Emissions from 2021", ICAP News, September 23, 2019

The price trajectory proposed by the EUCA would provide a ceiling for the restructured ETS, with a minimum level that could be, for example, 80% of the ceiling.

By doing this, we would agree to make an exception to the principle of the uniform price of carbon in the Union, but it would be limited to 20% of the optimal price for limited sectors that have already contributed to lowering emissions in the past. This would be the price to pay for maintaining a system that was difficult to negotiate and which, once again, offers the advantage of already being in existence.

Proposals have been made to fund an authority tasked with intervening in purchases and sales on the emissions market in order to bring the price close to the ceiling. But in this case, we do not see the advantage in preserving a market infrastructure when deciding in advance not to respect its equilibrium. The Delpla-Gollier proposal of a central carbon bank is more radical and consistent from this viewpoint: it involves the explicit dismantling of the ETS.

3. What products should be affected and how can this be handled in practical terms?

In order for the carbon price to actually have an effect on behavior, it must apply to all goods and services according to their carbon content. **In a closed world, the easiest solution is to tax at the source, i.e., fossil resources themselves, whatever their use, as well as industrial activities that produce CO_2 in addition to using fossil energy (cement, steel, chemistry, etc.)**. Once the tax is collected by the national authorities, economic actors (producers and purchasers) will decide on its effects in the pricing system, without interference from the authorities, which guarantees the most effective allocation of resources.

As the European Union is not closed, taxation must also apply to imports. For the purpose of this analysis, let us suppose for now that the European Union is the only area to apply carbon pricing. For imported fossil resources, the formula is simple: they are taxed at the same level as on the domestic market. For other imported goods and services, taxation should apply according to their carbon content. Conversely, goods and services produced in the European Union and exported from the Union should be exempt from the carbon tax (or benefit from tax relief similar to what is practiced in a cap and trade system).

In reality, as has already been emphasized here, a growing number of countries or regions have adopted carbon pricing policies. The preceding regulations should thus be modified according to the carbon price that is already included in imported products. If a partner's price policy is similar to that of the European Union (subject to verification), no border adjustment would be necessary on either side. Intermediate cases are trickier. It could be agreed to apply import taxes in keeping with the carbon pricing required on both sides, that of the EU and the partner country, and to make an exemption for exports. In this way, double counting would be avoided and there would be a level playing field.

Determining the carbon content of imported goods can become tricky – even more so for services – and can lead to bilateral disputes. Just as the European Commission has the expertise and leadership role in international trade negotiations, it would be consistent for it to be responsible for determining the carbon content of imported goods and services and for negotiations regarding this with third-party countries, working closely with the EUCA. This task would naturally fall to the Trade and Climate Action Directorates.

We should point out once again that it is not simply a question of guaranteeing a level playing field between EU producers and those who export to the EU, **but above all to ensure that the prices of all goods and services consumed in the European Union reflect their carbon content**.

Finally, taxation must not infringe upon the products covered by the ETS or its local equivalents, in order to avoid double counting.

→ Our set of proposals:
- allow member states to choose their method of applying uniform carbon pricing through a combination of the ETS, a strengthened national version of the ETS, and a carbon tax, with the shared feature being the carbon price trajectory that is recommended by the EUCA and total coverage of goods and services consumed;
- tax fossil resources (coal, oil, natural gas) that are extracted in or imported into the European Union and industrial activities producing their own CO_2 by applying the carbon pricing recommended by the EUCA;
- exempt sectors covered by the ETS or its national equivalents from the tax;
- introduce an adjustment at EU borders with a tax on the carbon content of imported goods and services, with equivalent tax relief for exports;
- empower the European Commission to determine the carbon content of goods and services traded;
- trade partners who apply the same carbon pricing would be the only ones exempted from the border adjustment.

4. How should we allocate the dividends of carbon pricing?

Whether it is an issue of fiscal resources from a carbon tax collected by the national authorities (or regional authorities) or revenue from auctions of CO_2 emissions allowances, national governments (or regional ones) will receive a veritable windfall, taken essentially from the surplus of consumers and, to a lesser extent, from the profits of businesses.[23]

The yellow vest movement in France and the thinking underlying the position of the American economists[24] as well as much European research – especially a study by the Council for Economic Analysis titled "A Just Tax, Not Just a Tax"[25] – all lean towards **redistribution of all the money raised by carbon pricing policies**, which the American economists cited above call "**carbon dividends.**" The precise methods of distribution are open to discussion. The American Nobel Prize winners, probably based on their own experience of reaching a consensus despite very different ideological orientations, propose uniform redistribution to all citizens, so as to forestall any political quarrels. They point out that uniform redistribution is by its nature a progressive negative tax, as it favors low-income households. French experts, challenged by the yellow vest movement, propose a more finely-tuned distribution that takes income distribution and the energy requirements of each household into account.[26]

The issue of the redistributive effects of any carbon pricing system is clearly of great importance, not only from the viewpoint of the acceptance of policies to fight climate change, but also from a fundamental viewpoint of fairness. Economist Lutz Sager shows that the impact of the border adjustment that would accompany a carbon tax has a redistributive effect in the shape of an "upside-down U" curve: the households at either extreme of income distribution would be more affected than intermediate incomes.[27]

The position shared by the French Council for Economic Analysis and the German Council of Economic Experts, who support uniform carbon pricing in Europe, is to return the carbon dividend to the private sector and leave the choice of method to the national authorities. This position seems to us to be the

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[23] The distinction is more formal than real, insofar as shareholders are to a large extent European consumers with retirement savings in pension funds or UL life insurance policies.
[24] Climate Leadership Council, op. cit.
[25] "Pour le Climat: une Taxe Juste, pas Juste une Taxe" ["For the Climate, a Just Tax, Not Just a Tax"], Dominique Bureau, Fanny Henriet, and Katheline Schubert. Les Notes du Conseil d'Analyse Economique, n° 50, March 2019.
[26] Dominique Bureau, Fanny Henriet, and Katheline Schubert, op. cit.
See also "Faisons Encore Mieux que les Prix Nobel: Rendons la Taxe Carbone à la Fois Ecologique et Sociale…" ["Let's Do Even Better than the Nobel Prize Winners: Let's Make the Carbon Tax Both Environmental and Social"], Patrick Criqui, Telos, February 7, 2019.
[27] "The Global Consumer Incidence of Carbon Pricing: Evidence from Trade", Lutz Sager, London School of Economics, working paper, June 2019.

wisest and also the most consistent with the principle of subsidiarity that underlies the distribution of responsibilities within the European Union.

→ We propose to distribute the carbon dividend as follows:
- redistribute the main part of the carbon dividend to households, on a national basis, with the revenue from the border tax being divided in proportion to the carbon content of imports in each country;
- allow each country, or even each local government in the case of specific policies, decide on the method of distribution;
- keep a portion of the carbon dividend to be redistributed among countries, taking into consideration their specific situations in terms of per capita revenue and also their portion of domestic fossil resources in the national energy mix.

5. Promote a "carbon club" beyond the European Union due to the size of its market

As William Nordhaus has forcefully reiterated, the specificity and the difficulty of fighting GHG emissions is that they constitute a 'public bad', symmetric of the public goods theorized by Paul Samuelson in 1954 (national defense is a good example of a public good in Samuelson's definition) that is worldwide. Reducing emissions increases the well-being of each individual on the planet, both living and future inhabitants, but policies can only be national. Even if we observe a snowball effect, which public opinion has something to do with, as Carattini and his co-authors point out,[28] there remains major difficulty, as shown by the US's withdrawal from the Paris agreement, or the resistance of some European countries to adopting shared carbon neutrality objectives.[29]

Although it does not exert irresistible influence on the world stage, the European Union has an incomparable advantage to convince certain trading partners of the benefits of a determined carbon policy: the size of its domestic market, which is today the biggest in the world as an integrated market. Although it will be slightly smaller with the departure of the United Kingdom, it will remain a respectable size.

As is clear from the set of proposals in the previous section of this brief, the European Union could propose abolishing the adjustment at the border for any trading partner who would adopt a national policy based on the same carbon pricing system as the European Union,[30] with a range open to negotiation and also taking into account the volatility of exchange rates.

In more direct terms, the border tax would be the stick, and tax exemption would be the carrot, offering special access to the domestic market, assuming that all EU partners do not adopt the same carbon price. **This idea is none other than the "climate club" concept developed by Nordhaus himself**. The future Nobel Prize winner had shown in an article from 2015[31] that without sanctions against countries who do not participate in reducing their carbon footprint, there can be no stable coalition of countries committed to fighting climate change. He showed that on the contrary, even modest penalties imposed on hold-outs in the form of import taxes could encourage the creation of a large, stable coalition that would lead to robust emissions reduction.

Provided that it can come to an agreement on a carbon price trajectory that is realistic for accomplishing its objective of carbon neutrality, the European Union finds itself in the

[28] How tangible environmental commitments spur cooperative behaviour in local and global dilemmas, Stefano Carattini, Simon A. Levin, Alessandro Tavoni, CEPR VOX, October 23, 2019
[29] On this issue, the approach that we are proposing, based on the carbon footprint of consumption – and not production – of GHGs, should be of interest to a country that has so far been skeptical, Poland, because its consumption footprint is markedly lower than its production footprint.
[30] If, as has been reported, an EU partner "threatened" to collect the tax at the EU border itself, we would see this positively, for this partner would thus be committing to a carbon pricing strategy similar to that of the EU. It would, of course, be necessary to verify the facts on the ground.
[31] "Climate Clubs: Overcoming Free-riding in International Climate Policy," William Nordhaus, American Economic Review, 015, 105(4): 1339–1370.

extraordinary position of being able to bring with it a group of countries that is significant enough to reduce worldwide emissions of GHGs to a much larger extent than its own efforts alone would produce.

For instance, consider China or the United States post-Trump: these two countries are both greatly affected by climate change and are also major emitters of GHGs. For both of them, especially China, the European Union is an essential export market. In both countries, public opinion is increasingly concerned with climate change.

Leaving aside unpredictable political elements, the most dangerous of which is nationalism, **the stars are almost perfectly aligned for the European Union to be the key player in the fight against climate change**, despite the relative modesty of its own contribution to GHG emissions.

→ Our proposal for promoting a Climate Club:
- along with[32] an internal negotiation on a carbon pricing trajectory, the European Union should propose to its trading partners to form a "climate club" by adopting a similar price trajectory, while remaining free to implement it as they see fit;
- countries in the club would be mutually exempt from any carbon tax or more generally any GHG tax at their bilateral borders;
- countries who are not members of the club would see a similar carbon (or GHG) tax applied to their exports to any club countries.

[32] The advantage of a parallel negotiation is to create a virtuous cycle: the possibility of an international climate club would encourage adopting a carbon pricing trajectory that would be shared by all EU countries, or even by all members of the European Economic Area. Reciprocally, opening discussions with EU partners before reaching a European agreement would assure these partners that they are considered.

A scenario illustrating carbon pricing and its effect on emissions

Is it possible to quantify at the same time what the carbon pricing trajectory should be, its effect on the basic pace of emissions, and its economic impact? Many research teams worldwide have tackled this objective, following William Nordhaus and the set of DICE[33] models that he has developed since 1992. The task is of daunting complexity and we will not attempt to take up the challenge in this brief. However, we can attempt to give some sense of the order of magnitude, at least concerning the European Union.

First of all, what would happen if we did nothing more than what has already been determined, both at the level of the EU and of its member states? We can establish a rough idea of this by econometrically estimating the connection between the growth rate of consumption emissions and the growth rate of real GDP. Over the 2000-2016 period, the estimate indicates a trend toward reducing emissions by 2.7% annually, which can be attributed to various factors, such as measures already taken, technological innovations, including decreased prices for intermittent renewable energy sources, or the substitution for natural gas for other fossil resources. It also indicates an elasticity value of economic growth slightly greater than 1 (1.2, which is not significantly different from 1). In concrete terms, with all else being equal, an economic growth rate of 1.5% would be associated with a reduction in emissions of 0.8% (- 2.7% + 1.2*1.5%) per year.

The first piece of good news is thus that there is already a downward trend in the European Union. The second is that in 2018, CO_2 levels had already significantly decreased compared to 1990 levels, which were the basis of the Paris agreement. The objective that the European Union has set is to reduce GHG emissions by 20%. Limited to CO_2, consumption emissions were 15% lower in 2017 than in 1990, according to the most recent data provided by the *Global Carbon Budget*.[34] With the hypothesis of a trend growth rate of 1.6% in the EU gradually slowing to 1.3% around 2035, past trends would lead to a continuation of the lowering of CO_2 emissions, but one that is inadequate for reaching the objectives: in 2030, emissions would be at 75% of the 1990 level (a reduction of 25%), while the objective is a reduction of 40%.

For a rough simulation of the impact of a higher carbon price, whose point of departure we estimate in 2019 at €15/tCO_2, [35]we hypothesize a shared carbon price of €20/t CO_2, i.e., an increase of 30%, established in 2022, and covering all domestic production and consumption in the European Union. The price trajectory is then described by a growth rate that declines over time by 1pp per year. We adopt a conservative hypothesis regarding the price elasticity of carbon demand (-0.2 distributed over three years), while estimates often cited in the literature vary from -0.2 to -0.5.

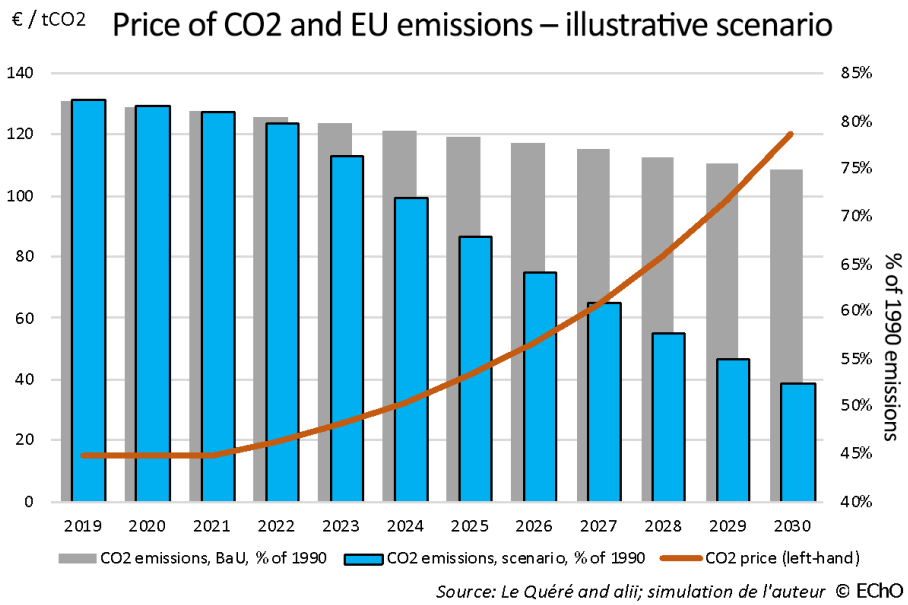
Under these conditions, the price per ton of CO_2 would climb to €120 in 2030, and emissions would decrease by 37% compared to 2016, and by 30% compared to the trend scenario. Emissions in 2030 would be 48% lower than in 1990, which is a better result than the current objective (a 40% reduction), and which would make the objective of carbon neutrality by 2050 more realistic.

The carbon dividend to be distributed across the European Union would grow quickly, from approximately 80 billion euros in 2022 to 315 billion (in constant euros) in 2030.

[33] Dynamic Integrated Climate-Economy. See "An Optimal Transition Path for Controlling Greenhouse Gases," William D. Nordhaus, Science, 20 Nov 1992: Vol. 258, Issue 5086, pp. 1315-1319.
[34] Le Quéré et al, op. cit.
[35] The price of carbon on the ETS is on the order of €26/tCO2, but this covers only 25% of emissions, according to State and Trends of Carbon Pricing 2019, p. 28, World Bank Group, which suggests a CO2 price of €7/tCO2 for all emissions. By including the carbon taxes that are already applied (see graph 4), we reach an average value on the order of €15/t CO2.

Graph 7

A scenario illustrating carbon pricing and its effect on EU emissions



Source: Le Quéré and alii; simulation de l'auteur © EChO

Note: The initial (2020) price per ton of CO_2 is valued at €15 for all goods consumed in the EU. This is a weighted average of carbon prices observed in EU countries, the price being zero for products that are not taxed (see note 34). The first increase following a hypothetical agreement among EU countries would occur in 2022. It is 30%. The increase rate would drop afterwards, allowing the price per ton of CO_2 to reach €120 in 2030, with calculations in constant euros. The underlying hypothesis of this model is that carbon price elasticity is -0.2 over three years.

We should point out that it is possible to conduct online simulations of carbon price trajectories by adjusting different parameters, including carbon price, using MIT's EN-ROADS model. Unfortunately, its field of application is global, without any possibility of breaking data down by region.