

# How to make the European Green Deal work

A large question mark made of green foliage stands on a small island in the middle of a blue ocean. The island is surrounded by water and has a few palm trees. The background is a clear blue sky.

Ursula von der Leyen has proposed a European Green Deal to make Europe climate neutral by 2050. Grégory Claeys, Simone Tagliapietra and Georg Zachmann consider how this initiative could be made to work

**E**uropean Commission president-designate Ursula von der Leyen has made climate change a top priority, promising to propose a European Green Deal that would make Europe climate neutral by 2050. The European Green Deal should be conceived as a reallocation mechanism, fostering investment shifts and labour substitution in key economic sectors, while supporting the most vulnerable segments of society throughout the decarbonisation process. The deal's four pillars would be carbon pricing, sustainable investment, industrial policy and a just transition.

First: a meaningful carbon price should be established for all sectors, by strengthening the EU emissions trading system (ETS) and by pushing EU countries to increase the price for emissions not covered by the ETS. To ensure a robust mechanism against carbon leakage, a carbon border tax should be prepared.

However, such a measure will be extremely politically challenging, and the EU's future climate policy should not rely on its successful implementation. Other instruments should therefore be put in place first, including subsidies for low-carbon exports and stricter environmental standards importers would have to comply with to access the EU market.

Second: the carbon price should be complemented by a sustainable investment strategy that pushes companies to switch technologies and promotes behavioural change among citizens, offsetting any rising costs they face because of higher carbon prices. Green investment should be promoted by shifting current EU funds towards this purpose while enabling EU countries to support green investment, and by incentivising private investment through regulatory measures and through support for European promotional banks.

Third: European industry should be strengthened through support for disruptive green innovation; by creating the conditions for innovative, green, European companies to flourish (for example through new product

standards and via carbon-based contracts for difference to ensure competition between companies for the most efficient technologies); and through measures to export the European Green Deal on the back of a reform of EU neighbourhood and development policy.

Fourth: the adverse social consequences of climate policies should be taken into account and minimised in each European climate policy proposal. Unavoidable impacts should be addressed by targeted compensation measures. The scope of the European Globalisation Adjustment Fund can be broadened and the mechanism adjusted to aid the transition in coal-mining regions.

*A single carbon price for all sectors and countries is economically efficient but implies substantial distributional effects*

## The contours of the European Green Deal

The European Union has stated repeatedly its aim to be at the forefront of global action against climate change. The EU has adopted policies to reduce its greenhouse gas emissions and support energy from clean sources, while being active in international climate negotiations.

However, the EU has not managed to reduce its greenhouse gas emissions convincingly, and has not done enough to tackle emissions in some sectors. In transport, greenhouse gas emissions are rising, while in electricity systems coal continues to play a persistent role. Energy efficiency improvements in buildings have been unsatisfactory and the decarbonisation of industry has proved difficult.

Meanwhile, climate policy has become one of the most divisive EU topics. The FridaysForFuture movement has mobilised mainly young people to demand stronger climate policies. In contrast, there has been a backlash against fossil-fuel price increases perceived as unfair, as seen with the *gilets jaunes* movement in France and beyond.

In this context, European Commission president-designate Ursula von der Leyen has promised to broaden and strengthen EU climate policy (von der Leyen, 2019). She intends to propose a European Climate Law that would require the EU to become climate neutral by 2050 – likely making Europe the first continent to do so.

To reach this ambitious goal, a comprehensive policy framework is required, encompassing the climate, energy, environmental, industrial, economic and social aspects of this unprecedented process. This is what the European Green Deal is all about.

Von der Leyen has put forward a broad concept of the European Green Deal, sketching out about 20 different proposals. They include an increase in the EU's 2030 emissions reduction target from 40 to 55 percent, the

introduction of a carbon border tax, the drafting of a Sustainable Europe Investment Plan, the partial transformation of the European Investment Bank (EIB) into a climate bank, the extension of the EU emissions trading system (ETS) and the development of a new industrial policy for Europe (von der Leyen, 2019).

These proposals are preliminary and, at the time of writing, are still in the form of general policy guidelines. Von der Leyen has said she will come up with a detailed policy plan within the first 100 days of her mandate. So, while we have some general contours, the European Green Deal remains to be structured.

This *Policy Contribution* seeks to contribute to the design of the European Green Deal by outlining a realisable plan focused on what can be considered its four foundational pillars: carbon pricing, sustainable investment, industrial policy and a just transition.

### **How to price greenhouse gas emissions well**

Putting a price on all emissions is essential because it incentivises all relevant parties to reduce their greenhouse gas footprints. Without such a price, other climate policy measures – such as subsidies or standards – cannot effectively reduce emissions<sup>1</sup>. The new Commission is therefore right to strive for a sensible price on all greenhouse gas emissions. A major reform of emission pricing in Europe will have to address three questions of principle:

#### **A single price or differentiation between sectors/countries?**

A key question when pricing greenhouse gas emissions is whether each unit of emissions (typically expressed as the greenhouse gas equivalent of one tonne of carbon dioxide) should have the same price, or whether prices in different sectors and/or different countries should be allowed to vary.

Currently, Europe has a hybrid system. Greenhouse gas emissions from large industrial emitters (including power generators) that fall under the EU ETS have a single price throughout Europe, while other emissions, such as from heating or road transport, are not explicitly priced.

Textbook economics would suggest putting the same price on all emissions. This would incentivise economic actors to reduce all emissions that can be mitigated at a cost below this emission price and would avoid inefficient circumvention (such as consumers preferring to use natural gas that is not covered by the current emission pricing system, instead of electricity which is). Consequently, harmonising emission prices across sectors reduces the total cost of emissions reduction<sup>2</sup>.

But while a single carbon price for all sectors and countries is economically efficient, it implies substantial distributional effects. Two examples:

1. To decarbonise transport – which is essential to achieve a carbon-neutral continent – much higher carbon prices would be needed than the carbon price required to decarbonise most electricity production. Electricity prices will be determined by the most expensive unit that is needed to meet the demand – which will still often be a fossil-fuelled power plant (even though the bulk of electricity is produced carbon-free) – and might thus drastically increase without much impact on power-sector emissions. This will have massive distributional consequences as all electricity consumers will have to pay these higher prices.
2. A single carbon price will affect more poorer EU countries, which typically have higher emissions per unit of GDP. Therefore, in sectors with emissions that are not very sensitive to expected carbon prices<sup>3</sup>, keeping carbon prices lower might reduce undesirable distributive effects little impact on emissions.

For efficiency reasons, the European Commission should strive to converge towards a single carbon price over time. Heating and transport emissions should be priced to provide economic actors with incentives to change their consumption behaviour and/or invest in cleaner technologies. And emissions in sectors with high levels of trade across EU country borders (eg. electricity and industry) should have the same price in each country to avoid distorting the single market<sup>4</sup>.

But giving EU countries some flexibility to set prices for emissions that are price insensitive but have significant distributional consequences might have limited cost in terms of efficiency but high political value. The right tool would be a significant and rising European minimum tax rate on emissions, which those countries that want to cut emissions faster<sup>5</sup> can exceed if they want.

*Carbon leakage has not represented a substantial issue for EU industry under the emissions trading system*

## Tax or trading permits?

There are two main instruments for putting a price on emissions. Either the government fixes a price – a tax – or the government issues a fixed volume of emission allowances and leaves the market to determine a price for these allowances. Economists have a slight preference for taxation because there is less risk of getting the price wrong than of getting the volume wrong.

But in practice, policymakers try to guide both the price and the volume by adjusting either if the system does not provide the expected results. Consequently, mixed systems (where some emissions are covered by carbon trading and others by taxes) and/or hybrid systems (where prices in trading systems are managed) are the norm rather than the exception.

The EU has a mixed system with half of the emissions falling under the EU ETS, and the other half being only partially covered by national taxes<sup>6</sup>. The EU ETS is also a hybrid system because the system is regularly adjusted to deliver 'sensible' prices<sup>7</sup>.

The European Green Deal can retain the current mixed and hybrid system. But it should include proposals to push EU countries to put the right prices on emissions in some of the areas not covered by EU ETS: transport, heating and maybe agriculture. The right approach would be to revise the 2003 Energy Taxation Directive (2003/96/EC), which sets minimum tax rates for fuels.

A European agreement on minimum carbon prices in the non-ETS sectors would allow national governments to establish national carbon-pricing rules within their national fiscal systems, while reducing concerns about intra-EU carbon leakage. It will still be difficult to define a minimum tax rate that is equally acceptable to the poorest

and richest countries. But as the fiscal revenues accrue at the national level, these revenues in principle allow each country to target compensation at the most affected national consumers.

The EU ETS can also be strengthened by providing investors with some clearer guidance on future prices. Our suggestion would be to give the European Investment Bank a mandate to sell guarantees that protect investors against low carbon prices in the future. This would create a liability for future governments in case of carbon prices that are too low<sup>8</sup>.

### What to do with the revenues

Emissions pricing in the EU can bring substantial revenues. Putting a price of €40/tonne<sup>9</sup> on all EU emissions (around 4.5 billion tonnes annually) would lead to €180 billion in revenues – significantly more than the current revenues from the EU ETS (around €25 billion<sup>10</sup>).

The first issue is how much of this money would accrue at the European level and how much at national level. This is a largely political question. While it might be more efficient to have more revenues available in the centre to enable compromises in difficult issues, EU countries in the past only allowed the European Commission to set up two relatively small centralised funds.

The second question is what to use these revenues for. They can be used for the general budget, returned to consumers to mitigate distributional effects, used to support the development of low-carbon alternatives, public investment in low-carbon infrastructure, or given to companies to compensate them for competitive disadvantage arising from stronger climate policies. Getting this balance right will be crucial for the political viability of any emissions pricing system<sup>11</sup>.

Currently, most ETS revenue is given to national governments, which are bound by a relatively weakly monitored commitment to spend half of the money for climate and energy purposes. For the years 2021-30 two special European funds have been set up to centrally support innovation (Innovation fund: €20 billion) and lower-income EU countries (modernisation fund: 2 percent of issued allowances).

We would advise against using additional emissions pricing revenues in the general budgets of EU countries, and would suggest instead to use additional funds to support the development of the low-carbon economy through public funding of research, development and innovation, support for private investment in low-carbon alternatives, and compensation for the most-affected households that must increase their carbon-related spending (heating, electricity).

### Dealing with leakage

If Europe puts in place a stringent climate policy while other parts of the world do not, there is a risk that emissions-intensive companies might leave the EU with its high emission prices, and relocate to places with significantly lower or no emission prices. This is called carbon leakage. This issue is set to become more relevant with the EU pursuing a more ambitious climate policy, but we do not know the exact order of magnitude of the issue (PMR, 2015).

Studies show that carbon leakage has not represented a substantial issue for EU industry under the ETS (Branger *et al* 2017; Ferguson and Sanctuary, 2019; Zachmann *et al* 2011). It is also important to consider that the carbon price represents one element among many others in an industrial strategy. Other considerations include energy prices, logistics, territorial legacy and innovation ecosystems.

Currently, carbon leakage is dealt with by giving emission allowances for free to companies in specific sectors. The allocation mechanism for free allowances is based on production benchmarks to ensure that companies have

an incentive to reduce emissions but not to reduce production in the EU. But the mechanism has led to massive windfall profits for companies (they received allowances for free but included the cost of emissions in the price of their products). It is not desirable to continue with this method to deal with carbon leakage.

Part of the European Green Deal, according to von der Leyen, would be an alternative system: a carbon border tax (CBT). This has two aims: i) preventing carbon leakage by ensuring that all goods consumed in the EU, whether imported or produced domestically, are treated the same; ii) pushing other countries across the world to also decarbonise. This would be achieved by putting a tax or tariff on the emissions embedded in imported products. In addition, EU exporters might reclaim the cost of the emissions embedded in their products to ensure that European companies are not at a competitive disadvantage when selling abroad.

In reality, calculating the emissions content of imports is feasible<sup>12</sup> but difficult, as all emissions along the entire value chain would need to be considered. Even more challenging would be the risk of potential retaliation from trade partners. Von der Leyen already made clear that a CBT should be compatible with the rules of the World Trade Organization (WTO), to ensure that countries cannot retaliate based on WTO rules.

But even if the CBT is safe-guarded against formal objections, trade partners might still perceive a CBT as overreach and threaten/implement retaliatory measures (such as, for example, when the EU tried to introduce a unilateral carbon price on intercontinental flights)<sup>13</sup>.

The ongoing fierce debate between proponents and opponents of such a tax<sup>14</sup> show that achieving a meaningful border tax will require the expenditure of a great deal of political capital in Brussels and the national capitals. There is a risk that discussing a complex solution to a potential problem will distract attention from more urgent issues and result in a weak compromise.

Any CBT proposal will be extremely politically challenging, and the EU's future climate policy should not rely on its successful implementation. This is particularly because the scale of the carbon leakage problem remains unknown.

Therefore, the EU should follow a trial-and-error approach, with the first priority being to do what is necessary to ensure an appropriate price on all greenhouse gas emissions in Europe. As far as the leakage risk is concerned, the EU should help domestic producers of steel, cement and chemicals (eg. the products most affected by higher carbon prices) to become cleaner – as it did in the past with renewable energy subsidies for the electricity sector.

*The overarching objective of the Green Deal should not be to boost growth but to facilitate the reallocation of capital in and across sectors in order to decarbonise*

Companies that produce internationally traded goods with significantly lower emissions than the average could be granted subsidies linked to the reduced emissions. The value of these subsidies per tonne of mitigated emissions might be significantly higher than the carbon price as long as the new technologies are not mature. This could help to build the competitive advantage of European industry for the global low-carbon economy.

In addition, carbon rebates for exports (ie. companies can reclaim the carbon price embedded in export products) can be applied, combined with a support scheme for low-carbon production of otherwise emissions-intensive products.

As far as the second aim of pushing other countries across the world towards decarbonisation is concerned, the EU should make better use of environmental standards. Requiring compliance with strict environmental regulations a condition of access to the EU market of 500 million people should be a strong incentive to all other countries to adapt and change their production processes.

In parallel, the European Commission should work on a WTO-compatible and acceptable CBT, but should hold off from implementing it<sup>15</sup>. The Commission should closely monitor the evolution of carbon leakage risks in Europe, and ultimately implement a CBT if the risks start to materialise.

## **Mobilising investment for the transition**

### **How large is the 'green investment gap'?**

Most estimates of the yearly average additional investment (public and private) necessary to achieve the EU's current 2030 climate and energy targets are in the range of €175 billion to €290 billion<sup>16</sup>. The European Commission's most recent estimate (European Commission, 2019a) of this 'green investment gap', taking into account the currently agreed target<sup>17</sup>, is €260 billion per year. According to this estimate, the investment needs per

sector would be: €125 billion for the residential sector, €71 billion for the service sector, €21 billion for the transport sector, €21 billion for power generation, €13 billion for the power grid, €4 billion for the industry sector, and €2 billion for boilers.

Whatever the exact aggregate number for the 'green investment gap', it is important to note that the models used in these estimations tend to underestimate investment that will be needed for the low-carbon transition<sup>18</sup>. In addition, the success of technologies in the long run is highly uncertain.

As a result, it might be preferable to over-invest in green R&D in the short-term to insure against potentially catastrophic events in the future. Also, scenarios involving less behavioural change on the part of citizens are generally the most expensive in terms of investment.

This means that if Europeans want to preserve their current way of life as much as possible they need to invest even more today. All in all, despite the high uncertainty surrounding these estimates, the desirable number for additional investment is probably nearer to the €250-300 billion per year range<sup>19</sup>. In this context, the Sustainable Europe Investment Plan mentioned by Ursula von der Leyen in her political guidelines and in her first speech (16 July 2019) to the European Parliament only envisages a €100 billion per year target.

What would be the macro consequences of the Green Deal? Despite the potentially significant size of the plan (and despite being a good selling point for the European Green Deal), the possibility of obtaining a so-called double dividend – both a positive environmental effect and a positive macroeconomic effect – seems to be overstated.

Even if the potential crowding-out effect of the investment pillar of the European Green Deal appears to be very low, especially in today's low interest rate environment, the aggregate macroeconomic effect of the transition, and

of the investment plan to support it, is overall expected to be relatively modest<sup>20</sup> (around +0.1 percent of annual GDP growth according the literature review conducted by Gueret *et al* 2019)<sup>21</sup>.

Besides, the overarching objective of the Green Deal should not be to boost growth<sup>22</sup> but to facilitate the necessary reallocation of capital in and across sectors in order to decarbonise, and to mitigate the resulting reallocation in employment.

*A 'green golden rule' could make the European fiscal framework much more flexible by exempting from the fiscal rules public investment that mitigates or adapts to climate change*

Having said that, even if the overall impact on growth is expected to be small over the whole period, a potential co-benefit from a macro perspective of having a 10-year investment plan ready would be to have a list of concrete off-the-shelf investment projects that can be rolled out more quickly if they are needed from a countercyclical perspective (which might come in handy quickly given the slowdown currently experienced by the European economy). This would boost the total macroeconomic effect of the plan, given that multipliers have been higher during recessions.

In terms of timing, political economy considerations dictate clear sequencing: green investments need to be made as soon as possible, before carbon prices rise to a high level, so households and companies can switch smoothly to green alternatives when this happens. The green investment push thus needs to start now. The temptation to procrastinate and to leave the burden of reaching the 2030 targets to the 2024-2029 Commission should be avoided.

The EU has very limited resources to conduct its own investments. Its main role in plugging the green investment gap will thus be to design an investment plan that will: 1) mobilise public funds through the EU budget and member states' national budgets and through the European Investment Bank in order to take advantage of the historically low interest rates from which European governments and institutions currently benefit, and 2) incentivise the private sector to invest in the transition.

### How can the Commission boost public investment for the transition?

Public investment will be needed because of the public-good nature of some the investments. This will be particularly the case for deployment of a sustainable transportation system, which will involve, first, helping owners of old polluting vehicles to replace them by more environmental-friendly vehicles, and, more importantly, developing alternatives to car ownership.

This implies renovating the railway network or building bicycle facilities. Another important role for the public sector will be to renovate public buildings and social housing to make them energy efficient. Finally, public authorities will also have to invest in R&D in new technologies, especially carbon capture and storage.

More generally, direct public investment is also important for increasing the long-term credibility of other climate-mitigation instruments and to reduce the potential regulatory risk perceived by private investors. From an incentive perspective, it is important also that governments should bear some of the losses in case of failure resulting from a change in environmental regulation to convince investors the regulation is definitive.

The role of the Commission will be twofold: greening the EU's own investments, and encouraging EU countries green their public investments.

### Greening the EU's own investments

At the European level, the main tool to invest directly will remain the EU budget. The European Commission (2018c) has already proposed to increase the share of EU spending that contributes to the EU's climate objectives from 20 percent in the 2014-20 Multiannual Financial Framework (MFF) to at least 25 percent in the next MFF (ie. from about €30 billion to about €45 billion per year over 7 years). This is a good first step, but there are two important caveats.

First, given the total size of the EU budget (around 1 percent of GDP), it will always remain a marginal source of green investment compared to the overall needs. But even if the overall effect is small, the share of cohesion policy funding in public investment per EU country is very variable (from zero in Luxembourg to 84 percent in Portugal<sup>23</sup>), which means that a shift towards green investment in the EU budget could still play a catalyst role in some countries in which cohesion funds play a significant role.

Second, increasing the target goes in the right direction, but for the EU budget to be significant in filling the green investment gap, it is also crucial to review how EU expenditures are accounted for as contributing to the fight against climate change. The current methodology tends to overestimate substantially the contribution of the EU budget, in particular of agricultural funds (European Court of Auditors, 2016).

Each expenditure item is given a climate coefficient of 0 percent, 40 percent or 100 percent depending on its contribution to climate change mitigation or adaptation. This method has the advantage of being simple and pragmatic, but can be highly misleading: for instance, expenditure that leads to an increase in emissions does not have a negative coefficient for negative impact. A more demanding but much more accurate methodology that would try to estimate carbon content of each action would help make the EU budget genuinely greener.

### Encouraging and enabling green public investment by EU countries

Despite the EU budget's significant role in some countries, most public investment is still carried out at the national level in the EU. As a result, the strategic goals and the funds allocated to them are in the hands of national governments and not under the control of the EU.

If the European Commission wants to foster investment to accelerate the transition, it must find a way to encourage public investment in member states and then use indirect measures to steer it so it contributes to the climate objective. For this, the Commission has two main tools at its disposal.

The first is the country-specific recommendations made under the European Semester, which have recently highlighted the need for investment in some particular sectors at the local level to fulfil common objectives, including the fight against climate change (European Commission, 2019b).

Even though EU countries have often not followed through on the country-specific recommendations in recent years (Efstathiou and Wolff, 2018), this represents at least a welcome first attempt to coordinate investment across member states around some European priorities.

The second, and probably more influential, tool for the EU to steer investment is the European fiscal framework. In general, fiscal rules should be reformed to deter countries from slashing public investment when they consolidate their public finances, and to ensure that they are able to take advantage of favourable interest rates to invest in public goods.

One way to do that would be to include some form of golden rule in the European fiscal framework to allow the financing of investments through the issuing of debt. At the very least, as proposed by Claeys *et al* (2016), public investment could be accounted for in the same way that corporate investment is accounted for: its costs could be distributed over the whole service life of the investment, rather than smoothed over four years, as is the case now.

If an agreement cannot be found to reform thoroughly the fiscal rules to make them more investment-friendly in general, a reform focused on authorising deficit-financed green investment during the transition should be pursued as part of the European Green Deal. One way to put in place a form of 'green golden rule' would be to revise the investment clause of the European fiscal framework to make it much more flexible in order to exempt from the fiscal rules public investment that mitigates or adapts to climate change.

In fact, the current clause already allows for deviation from the structural balance medium-term objective to finance investments *"with positive, direct and verifiable long-term effects on growth and on the sustainability of public finances."* Given the potentially high risk in the long run of climate change for public finances, it would not be a stretch to apply the clause to green investment.

However, other refinements would be necessary to transform the clause from a temporary exemption that can only be used in bad times<sup>24</sup> to a more permanent exemption for green investment from the rules, even in good times.

To avoid any abuse of such a green investment clause by EU countries that might be tempted to apply the exemption to their current expenditures, two safeguards could be introduced.

First, the maximum amount of green investment exempted could be related to the level of the green investment gap in each country, which would be determined each year as part of the European Semester.

*Private investment will drive electrification and improved energy efficiency, and will also represent most of the investment in the transport sector*

Second, clear accounting rules would be needed to separate investment in the low-carbon transition from other expenditures. This could be facilitated by the introduction of an ambitious taxonomy for sustainable finance<sup>25</sup> and clear rules concerning the issuance of green bonds. Well-defined green investments financed through the issuance of green bonds could thus be clearly separated from the rest of the budget and exempted from the rules.

### How can the Commission encourage private investment in the transition?

Corporations and households will be responsible for the vast majority of investment needed for the transition<sup>26</sup>, as the sectoral distribution of investment needs also suggests.

Private investment will drive the electrification and improved energy efficiency of the privately-owned segment of the residential sector, and of the service and industry sectors. Private investment will also represent most of the investment in the transport sector given that replacement of private vehicles will be covered by households.

In the energy sector, investment in renewable power generation or electricity storage will mainly be financed by the private sector. The Commission thus needs to find a way to mobilise significant resources from the private sector and redirect financing from brown towards green activities to fill the green investment gap.

The role of the Commission will be twofold: to create a conducive regulatory framework, and to improve the financing conditions for green investment.

### Creating a conducive regulatory framework

The most important tool to push companies and households away from brown activities will be a high carbon price. Another important step will be to put in place as soon as possible an ambitious investment taxonomy that will make brown activities unattractive to investors.

But these tools will not be enough to encourage the efficient deployment of immature low-carbon technologies, which are confronted with several market failures. Private deployment of low-carbon technologies will help to bring down the cost of these technologies (as was the case for photovoltaic, wind, batteries and electric vehicles) and will therefore enable large-scale take-up in the EU and beyond.

Hence, public support instruments beyond carbon pricing will be crucial for an efficient decarbonisation pathway. Particularly important will be public support for private R&D investment, pilot projects and first deployment. Much of the monetary incentives will have to come from the member states. But the Commission must enable and encourage such incentives by allowing EU countries (especially in terms of state aid rules) to experiment with support programmes.

### Improving the financing conditions for green private investment

Many green technologies are more capital intensive than brown technologies. Consequently, financing conditions play an important role in the technology choices of economic actors.

In other words, there are many sectors in which, depending on the interest rate and on their access to finance, households and companies can choose either green (for example an electric vehicle with a high capital cost but lower fuel costs) or brown (for example a conventional car with a lower upfront cost but higher fuel costs)<sup>27</sup>.

Direct support for private investment is thus complementary to the price and regulatory incentives needed to solve market failures. In particular, it is crucial to provide assistance to valuable projects that face financing constraints because their social desirability arises from positive externalities that are not internalised by private investors or manifests itself beyond the maturity of traditional financial instruments – scenarios that are particularly the case for green investment.

The best instrument for this would be to use more actively public development banks – the EIB and national public finance institutions – to finance the transition.

On that front, the Commission's main tool to crowd-in private investment will remain InvestEU, the upgraded version of the Juncker Plan, which at time of writing is planned to continue to be part of the EU Multiannual Financial Framework for 2021-2027.

The Juncker Plan was originally intended as a short-term demand stimulus to substantially leverage the Commission's limited resources through private investment. The European Fund for Strategic Investments (EFSI) – the formal name of the main instrument of the Juncker Plan – received a €16 billion guarantee from the EU budget and €5 billion of the EIB's own resources to enable the EIB Group to invest in riskier projects that have difficulty finding other sources of financing, and to reduce the potential crowding-out effect, without risking its AAA rating.

This was supposed to generate at least €315 billion of additional investment before mid-2018 by crowding-in private investors. EFSI was extended in 2017 until 2020 and the guarantee increased to €33.5 billion (€26 billion from the EU guarantee and €7.5 billion from the EIB) with the goal of mobilising €500 billion in additional investment by 2020.

For 2021-2027, the proposed size of the InvestEU guarantee is €38 billion, which is expected to mobilise €650 billion in investment, with 30 percent of this overall budget contributing to climate objectives.

It is difficult to assess if the Juncker Plan has achieved its goal and contributed significantly to an increase in investment in Europe, but the European Court of Auditors (2019) and Claeys and Leandro (2016) were sceptical about the additionality of investments decided under the plan.

According to the European Court of Auditors (2019), at least one third of the projects were not additional, ie. they could have been executed without EFSI, either by the EIB without EU budget support, or via alternative private financing sources.

Another issue with the plan is the slow disbursement of the funds. According to the EIB's own model (EIB, 2018), the peak impact of the plan will be in 2020-2021, six years after its design and 12 years after the beginning of the crisis. The Juncker Plan could not function as a stimulus tool.

However, despite its flaws as a stimulus plan, the Juncker Plan was a smart attempt to leverage the very limited EU resources using private capital markets. Moreover, improvements were made when the plan was renewed in 2017, and others improvements are envisaged as part of the InvestEU proposal. The new approach is to put less emphasis on volume and more emphasis on investing in the EU's top priorities, in particular fighting climate change.

*For InvestEU to become the main financial vehicle of the European Green Deal, its guidelines need to be much stricter in terms of sustainability*

However, to ensure InvestEU succeeds, additional changes to the programme and its governance should be made. In particular, the additionality criteria in the choice of projects that can benefit from the EU guarantee should be improved. To ensure that these projects are additional, they need to be different to the usual EIB projects, otherwise the green investment gap will not be reduced. The EIB's internal rating currently plays an important role in determining whether projects can be submitted to the independent committee in charge of granting the EFSI label.

However, the ratings themselves are provided by the EIB team, creating a risk that the EIB has an incentive to under-rate projects to make them eligible for the EU guarantee and to reduce its own risks. As a safeguard against this, the rating could be delegated to an independent team.

Other changes could also be considered to ensure that financed projects are different from traditional EIB projects, such as the systematic use of subordinated instruments or of instruments with longer maturities. Furthermore, to be truly additional, InvestEU should focus on projects that really lack financing options.

In addition, for InvestEU to become the main financial vehicle of the European Green Deal, the guidelines need to be much stricter in terms of sustainability. For instance, almost three quarters of the projects supported by EFSI in the transport sector in the first three years of the programme were high-carbon projects, and EFSI still supports fossil-fuel projects in the energy sector (Roggenbuck and Sol, 2019). The selection of projects thus needs to be much stricter and in line with climate goals.

A more radical approach could be for the Commission to push for the reform of the European Investment Bank in order to adapt its mission and transform it into the EU's climate bank. In her political guidelines, von der Leyen said she wanted to increase the share of total EIB financing dedicated to climate investment from 25 percent to 50

percent by 2025. To do this, the Commission must convince the EIB board of governors – the finance ministers of EU countries – to change how the EIB functions and the projects it invests in<sup>28</sup>.

If the Commission wants the EIB to contribute to filling the green investment gap, it must avoid duplication of investment already committed under national budgets or EU Structural Funds, or that could be financed by the private sector. Instead, to best use limited EU funds, the EIB should be refocused on financing investments that are strategic, in particular in the energy transition.

In addition, the EIB – even without the EU budget guarantee for EFSI – should be able to do more to finance the transition. Its volume of new lending disbursed has gone down every year since 2015, and its total outstanding amount of loans has fallen as well.

The EIB has clearly some margin of manoeuvre to act more forcefully: its capital ratio has gone up in recent years, its leverage has been going down since 2012, and according to its statutes (article 16.5), it can lend as much as two and a half times its level of subscribed capital, plus reserves and profits, which means its portfolio of loans could reach around €600 billion, compared to about €450 billion today.

The EIB currently benefits from very favourable rates for its borrowing from capital markets<sup>29</sup> and it would be a shame not to use this opportunity to finance worthwhile projects that can contribute to the fight against climate change.

If EU countries are (unduly) afraid for the EIB's rating, the Commission should propose a new capital increase, similar to that which was done at the beginning of 2013 to increase the EIB's firepower to fulfil its enhanced mission as the EU's climate bank.

An additional important part of transforming the EIB into the EU's climate bank is scaling-up its technical assistance activities, which are important for supporting local governments across Europe in developing (ie. procuring) and structuring clean energy projects.

### **An industrial policy for the European Green Deal**

To be politically and socially accepted and supported, the European Green Deal must make decarbonisation into an opportunity to revitalise European industry, and thus to ensure long-term economic growth and jobs. That is, while heading towards climate neutrality by 2050, the European economy has to remain highly competitive at global level, in the context of increasing competition from China and other big players.

While EU countries implement their own industrial policies, it is important to also have a broader EU-level industrial policy, in order to prevent market distortions and to allow synergies and economies of scale.

An EU industrial policy for the European Green Deal should be structured according to a three concentric circles strategy.

#### **Circle 1: foster disruptive innovation**

Innovation is the driving force for decarbonisation, and will be at the core of the decarbonisation of industry. To achieve climate neutrality while leading global decarbonisation from an industrial standpoint, Europe must become a global innovation powerhouse for clean energy, clean mobility and smart buildings technologies. To do so, Europe must invest more in R&D, and must invest better.

- Investing more: Europe's R&D spending in relation to GDP remains lower than in other major economies. In 2015, Europe's private and public sectors combined spent 2.04 percent of GDP on R&D, compared to 2.07

percent in China, 2.79 percent in the US, 3.29 percent in Japan and 4.2 percent in South Korea (Eurostat, 2019). Europe will thus not meet the target it set itself in 2010 to spend 3 percent of GDP on R&D by 2020. The EU business enterprise sector in particular needs to invest more. Its share of total R&D expenditure is much lower in Europe (64 percent) than in the US (72 percent), or China, Japan and South Korea (almost 80 percent) (Eurostat, 2019).

- Investing better: Europe is a global innovation leader in sectors such as automotive and biopharma, but is less present in the fast-growing technological, electronics and digital sectors that will increasingly underpin clean energy, clean mobility and smart buildings solutions. To turn decarbonisation into an industrial opportunity, the EU must push the business enterprise sector to scale-up its R&D investment also in these disruptive sectors.

In the framework of the European Green Deal, two existing EU initiatives could be enhanced and used to stimulate more R&D investment by the business enterprise sector in clean disruptive technologies.

The first tool is the European Innovation Council (EIC), currently in pilot phase. This is inspired by the US Defense Advanced Research Projects Agency (DARPA), an agency of the US Department of Defense that has significantly contributed towards many technologies, including the internet and GPS.

DARPA has a rather limited budget of about \$3 billion per year and focuses on the identification and recruitment of, and provision of support to, top innovators. Likewise, the EIC is designed to financially support – through a combination of grants and equity – innovators who are developing high-risk, disruptive innovations with the potential to create new markets.

The EIC could become the core innovation tool of the European Green Deal, with a strong mandate in the areas of clean energy, clean mobility and smart buildings. To enable this, and to make the EIC truly comparable to DARPA, the EIC will have to be endowed with at least €15 billion from 2021 to 2027 under Horizon Europe<sup>30</sup>.

The second tool is the Innovation Fund (IF). Established under the EU ETS for the period 2021-2030, the IF supports the demonstration of low-carbon technologies and processes in energy-intensive industries, carbon capture and utilisation and storage of carbon dioxide (CCU and CCS), innovative renewable energy and energy storage technologies.

The IF has been endowed with at least 450 million carbon allowances, amounting at current carbon price levels to about €11 billion. A sensible way to further scale-up the IF would be to rapidly reduce the number of allowances allocated for free under the ETS, and to use the resulting revenues for the IF.

In general terms, it must be emphasised that fostering disruptive innovation will require a significant dose of risk-taking and an acceptance that there will be failures. New support models that provide numerous and still sizeable grants in a relatively non-bureaucratic way are crucial to enable disruptive ideas to emerge.

Accepting that a significant proportion of these ideas will fail is better than putting money on safe but non-disruptive bets<sup>31</sup>. As Rodrik (2014) put it *"failure is part and parcel of a successful industrial policy effort"*<sup>32</sup>.

### Circle 2: create the conditions for innovative European companies to flourish in a receptive market

Public funding for disruptive technological innovation does not by itself guarantee industrial development. The success of DARPA strongly relates to the overall US economic ecosystem, which strongly favours innovation, and to its ability to turn disruptive innovations into marketable products. DARPA's limited budget shows that creating the

conditions for making innovative products marketable can be more important than public funding for innovation itself.

The EU has three main tools to create the conditions for innovative, green, European companies to flourish in a receptive market.

The first, more general, tool is the completion of the EU internal market. Fragmentation in environmental standards, energy taxation and support measures for clean technologies prevent innovative European cleantech companies from scaling up in the way that their US and Chinese competitors do on their domestic markets.

It is vital to develop a solid regulatory framework, focused on ensuring competition and access to a truly single market, with common environmental standards. To do this, national industrial policies need to be coordinated – otherwise they create distortions that lead to further fragmentation of the EU single market. As Altomonte and Veugelers (2019) put it: *“failing to coordinate would hamper the full exploitation of the size of the EU market and the related economies of scale.”*

The second, more specific, tool is public procurement. In the EU, this is estimated to amount to about 16 percent of GDP (European Commission, 2018). Given its scale, public procurement represents a unique tool to foster innovation.

For example, requiring clean mobility solutions in public procurement tenders could provide a solid boost to the demand for electric cars and buses, helping transform the European automotive industry. To become the global leader in electric cars, China did not focus on public funding for innovation, but rather on creating demand for them through supportive government policy, including public procurement programmes (Fredriksson *et al* 2018).

The third tool is carbon-based contracts for difference, which could be a technology-neutral support mechanism for the deployment of low-carbon technologies. As in the renewables sector with auctioned feed-in premiums, industrial producers of carbon-intensive products would obtain a public subsidy for each unit sold.

For example, a steel producer that only needs 0.5 tonnes of CO<sub>2</sub> to produce one tonne of steel (compare to a benchmark of 1.5 tonnes of CO<sub>2</sub>/tonne of steel), and that managed to secure a carbon price of €50 per tonne through the system of carbon-based contracts for difference, would receive €25 for each tonne of its low carbon steel when the EU ETS price is at €25. These contracts for difference can be auctioned to ensure competition between companies for the most efficient technologies.

*Fragmentation in environmental standards, energy taxation and support measures for clean technologies continue to prevent innovative European cleantech companies from scaling up*

These three complementary tools can foster the emergence of the necessary ecosystem that will enable innovative green European companies to grow in a receptive market.

### Circle 3: export the European Green Deal

The EU produces less than 10 percent of global greenhouse-gas emissions. This implies that to have an impact on global temperature levels, the EU needs to push the European Green Deal beyond its borders. To do so, a two-step strategy is needed.

The first step would be the rapid establishment of the Neighbourhood, Development and International Cooperation Instrument (NDICI), which has been proposed by the European Commission as part of the EU's 2021-2027 budget discussions (ongoing at time of writing). NDICI would bring together EU funding for its external policies in a single instrument.

The Commission has proposed a budget of €89.2 billion for the NDICI for 2021-2027, while the European Parliament has called for a budget of €93 billion. A quarter of the NDICI budget would be earmarked for climate action – about €3 billion/year over the period.

NDICI should be put in place quickly because the sooner it is in place, the sooner the EU can increase its visibility and leverage in developing countries, while pooling existing resources would favour internal efficiency and – most importantly – impact in the field (Tagliapietra, 2017a). Meanwhile, the climate component of NDICI should be scaled-up, to reach, say, a minimum of €5 billion/year.

A higher amount would give NDICI more leverage to stimulate recipient countries to implement the energy-market reforms that are necessary to attract international (and thus also European) private investors.

The second step would be to further consolidate and streamline EU development finance and climate activities outside Europe, which are today divided between the European Commission, the EIB, the European Bank for Reconstruction and Development (EBRD) and EU countries.

Streamlining could be done by creating a single entity such as a European Climate and Sustainable Development Bank, as proposed by Council of the European Union (2019), which strongly made the case for fixing the current system of European multilateral finance, which is characterised by overlaps, gaps and inefficiencies.

*It will be important to use the revenues from climate policies to compensate the citizens most affected by the rise in carbon prices*

Council of the European Union (2019) outlined three options for creating a European Climate and Sustainable Development Bank: i) building on the EBRD and the external financing activities of the EIB; ii) creating a new, well-capitalised, institution with mixed ownership (including the European Commission, EIB, EBRD, EU countries and others); iii) creating it as an EIB subsidiary. Together with NDICI, a European Climate and Sustainable Development Bank could become a key tool to export the European Green Deal.

Such an approach would represent a triple win for the EU. First, it would help meet the EU's climate finance obligations and thus help to achieve the 'conditional' emission-reduction commitments assumed by most developing countries under the Paris Agreement.

Second, it would enable EU industry to enter into new, rapidly growing, markets. And third, it would help economic development in the EU's partner countries, providing an invaluable foreign policy dividend for the EU.

### **How to make the transition inclusive and just**

Climate policies including emissions standards for cars, renewables support financed through levies on households' electricity consumption and carbon pricing for heating fuels disproportionately affect poor households, and might thus lead to an increase in inequality (Zachmann *et al* 2018).

The impact will be particularly significant for the lowest deciles of the income scale, for those in rural and suburban areas (who will be affected by the rise in fuel prices) and for regions that are particularly dependent on the production of fossil fuels, such as coal, and will thus be affected by the disappearance of some industries and jobs. This means that some segments of the population and some regions particularly affected by the transition will require special assistance.

However, while climate policies can have adverse distributional consequences, inaction cannot be the answer. Not acting would make everybody worse off, ultimately with a greater negative affect on low-income households compared to high-income households. There is hence no trade-off between climate and equity.

From a political perspective, what makes the situation more difficult is that the gains from climate policies will mostly be invisible if these policies succeed and disaster is avoided, while the costs of climate policies are immediate and tangible, especially for the most vulnerable population groups.

To avoid a dangerous backlash against climate policies (such as the reaction that was at the root of the *gilets jaunes* movement, which led the French government to abandon an expected carbon tax increase), the question is therefore how climate policies and compensation schemes should be designed to counterbalance these adverse distributional effects.

### Designing less-regressive climate policies

The first solution is to prioritise less-regressive policies and focus on less-regressive sectors first. Climate policies for different products/services have different distributional impacts. In order to reduce the regressive effects, climate policymakers might prioritise the least-regressive elements.

For example, putting high prices on carbon in transport, and in particular on aviation, will have less dramatic distributional consequences than a similar price for heating or electricity.

Policymakers should also focus on less-regressive policy tools. Different instruments can be used to decarbonise a sector and some policy instruments are more regressive than others. Policy choices should therefore be concerned not only by effectiveness and efficiency considerations, but should also take distributional aspects into account.

In the discussion on taxes versus technology standards, distributional concerns provide an additional argument for the former.

Most importantly, policy design should seek to minimise regressive effects. For example, giving free allowances to companies whose face-value is priced in for consumers is an unnecessarily regressive instrument.

### Correcting regressive climate policies through compensation

Policies dealing with the social consequences of the transition and ensuring that no one is left behind will take two complementary forms.

*Countries strongly reliant on coal use employment as an argument to delay the necessary transformation, though coal jobs in Europe no longer represent a sizable issue*

First it will be important to use the revenues from climate policies (and in particular the increased revenues resulting from a more comprehensive carbon pricing system) to compensate the citizens most affected by the rise in carbon prices.

To do this, money raised from taxing emissions could be returned to citizens in the form of a so-called dividend<sup>33</sup>. This could take the form of lump sum transfers like in Switzerland, where two thirds of the revenues from carbon levies go back to the population through this means<sup>34</sup>.

Money can also be targeted at the lower deciles of the income distribution. This is the case, for example, in British Columbia in Canada, where revenues from the carbon tax have been used to reduce taxes for the lowest paid, plus provide an additional transfer conditional on low income levels.

In the light of the fiasco of the increase in the French carbon tax in 2017-18, which resulted (in combination with a large increase in oil prices) in the emergence of the *gilets jaunes* movement, Bureau *et al* (2019) made a detailed proposal for France that could be used as a blueprint in many EU countries.

They proposed to redistribute fully the French carbon tax revenues, through transfers based on income and geographical criteria, targeting the most affected locations such as rural and small urban areas with limited access to public transport. Using this combination of criteria would minimise the number of people negatively affected by the rise in carbon prices – in the French case such a system of transfers would compensate fully the six lowest deciles of the income distribution.

From a political perspective, it appears that well-designed compensation mechanisms are crucial if the population is to accept climate policies. This is what the Swiss, Canadian and French (in a negative way) examples suggest.

What should the European Commission do on that front? Given that most of the revenues from the ETS and from national carbon taxes go directly to member states, the EU cannot directly put in place such a compensation scheme.

However, as part of the European Green Deal, the Commission should at least raise awareness about this issue among EU countries, encourage them to share best practices and even make recommendations in the context of the European Semester for such schemes that could be put in place at national level.

Second, given that the reallocation of capital resulting from the fight against climate change will also result in a reallocation of employment, it is crucial to put in place policies to facilitate the transition towards new jobs for those whose jobs are at risk. Even if overall the net effect on employment is neutral or even slightly positive, the transition will make some jobs disappear, while creating new ones<sup>35</sup>.

The transitional issue related to climate change is not very different to the challenges from globalisation or technological change, so the solution could be the same: if a change in the demand for skills is rapid, there is a role for authorities to play to ensure that the workforce (and in particular displaced workers with low skills) can be retrained successfully and quickly.

It is thus crucial to invest heavily in human capital: adult education, re-training, and policies to improve the labour mobility of older workers, to avoid a high level of unemployment in some particularly affected regions.

At the EU level, Claeys and Sapir (2018) and Tagliapietra (2017) proposed broadening the scope of the European Globalisation Adjustment Fund so it can also finance active labour market policies to help workers who have lost their jobs as a result of the implementation of EU climate policies.

## Managing the transition in coal and energy-intensive regions

Over the last few years it has become evident that supporting coal and energy-intensive regions is of vital importance to ensure the social viability and political feasibility of the transition to climate neutrality. Countries strongly reliant on coal keep using employment as an argument to delay the necessary transformation. But this argument is hollow, because coal jobs in Europe no longer represent a sizable issue, either at national or regional level.

Production of coal in the EU has been decreasing since 1990. Alves Dias *et al* (2018) estimated that by 2030 the closure of coal mines and coal-fired power plants across the EU could lead to a loss of 160,000 jobs (or 0.06 percent of the current EU workforce). It should also be noted that 109,000 of these jobs are already considered at high risk, because of a lack of competitiveness.

While coal jobs are objectively not substantial from EU or national perspectives, their loss could have a substantial impact from a regional perspective. By 2030 several regions are expected to be particularly hard hit by the transition: one region in Poland could lose up to 41,000 jobs, and a further three (in the Czech Republic, Romania and Bulgaria) could each lose more than 10,000 jobs (Alves Dias *et al* 2018).

Given the limited and regional nature of this challenge, the EU could well provide a solution for the coal jobs that will be lost in the transition. Offering such a solution would be beneficial in terms of: i) refocusing the coal transition debate on the only area it should belong to – energy policy; ii) providing an incentive to coal-reliant countries to implement or accelerate coal phase-out plans.

The EU should propose to member countries a speedy coal phase-out and should concurrently put in place a scheme, such as the Just Transition Fund proposed by von der Leyen (2019), to support workers who would face

losing their jobs. This would reflect what it is already being done in the United States<sup>36</sup>, and what was done in Europe during the coal-mining transformation of the 1950s<sup>37</sup>.

In 2017, the European Parliament proposed the creation of a Just Transition Fund, which would use 2 percent of the revenues from the auctioning of emission allowances to support regions with a high share of workers in carbon-dependent sectors and where per capita GDP is well below the EU average.

This proposal was rapidly dismissed, however, notably because of opposition from the European Commission. In 2018, the European Parliament put forward a new proposal to establish a Just Transition Fund, this time in the context of the MFF negotiations, and with a proposed endowment of €4.8 billion for 2021-2027.

*The EU does not need to establish a new Just Transition Fund to support coal-mining regions; it only needs to make a better use of the existing European Globalisation Adjustment Fund*

But the EU does not need to establish a new Just Transition Fund to support the transition in coal-mining regions. It only needs to make a better use of the existing European Globalisation Adjustment Fund (EGF), which was established in 2006 and has a maximum annual budget of €150 million for 2014-2020 – a budget that has so far not been fully employed, with on average €40 million disbursed from the EGF each year.

The EGF supports workers who lose their jobs because of major structural changes in world trade patterns arising from globalisation. It can be triggered when more than 500 workers are made redundant by a single company, or if a large number of workers are laid off in a particular sector in one or more neighbouring regions. The EGF provides up to 60 percent of the funding for projects, lasting up to two years, to help workers who have been made redundant find new employment or set up their own businesses. EU countries apply for finance from the EGF and national or regional authorities oversee the deployment of project funds.

The EGF has been transformed over time. In 2009, its scope was broadened to cover also people losing their jobs as a result of the global financial and economic crisis. In 2014, the categories of workers eligible for support were broadened to include young people not in employment, education or training (NEETs).

In short, the EGF has been adapted to new economic and social challenges emerging in Europe. The EGF should now be extended to people losing their jobs in coal-mining regions as a result of the decarbonisation process<sup>38</sup>.

This can be done quickly by amending the regulation governing the EGF, as was done in 2009 in response to the negative impact on employment of the global financial and economic crisis. The amendment could increase the use of the currently under-utilised EGF (Claeys and Sapir, 2018). The amendment should:

- Broaden the scope of the EGF, to include support for EU coal-mining regions that commit to a timely coal phase-out;
- Modify the redundancies requirements, to allow the EGF to be used not only once workers lose their jobs, but also before this happens. This would allow the planning of an orderly transition, limiting the socio-economic effects of the coal phase-out in these regions;
- Extend the implementation period from 24 to 36 months, to allow for proper implementation in complex cases, such as the closure of coal mines.

Under the 2021-2027 EU budget, the focus of the EGF on coal-mining regions could be further strengthened, transforming it into a European Globalisation and Climate Adjustment Fund (EGCF).

In order to ensure coal mining is phased out across the EU by the end of the 2021-2027 EU budget cycle, the EGCF would need to be endowed with adequate financial resources, with additional resources taken from the European Social Fund. The 'coal-item' in the EGCF budget for 2021-2027 should be €150 million per year, a total of €1 billion over the period (Tagliapietra, 2017).

By mobilising about 0.1 percent of its total budget, the EU could thus provide a significant incentive to coal-reliant EU countries to complete the coal phase-out, generating substantial benefits in terms of climate, environment and human health. Doing so on the basis of the existing EGF could speed up the overall process by avoiding the bureaucratic hurdles related to a new institutional set-up.

## Concluding remarks

The recipe for the success of the European Green Deal is as simple as it is breath-taking: to intelligently promote deep decarbonisation by accompanying the economic and industrial transformation this necessarily implies, and by ensuring the social inclusiveness of the overall process.

Should the strategy succeed, the European Green Deal might become a blueprint for other countries and a tangible example that pursuing climate neutrality is technically feasible and economically and politically viable.

To be clear, this will not be an easy ride. As in any revolution, there will be winners and losers. What a European Green Deal should do is provide a clear sense of direction to citizens and companies, and put in place mechanisms to ensure that the most vulnerable segments of society are supported and not left behind.

But to be politically sustainable, policymakers must be honest about the nature of the European Green Deal.

The European Green Deal does not need to redefine EU economics. All it needs to do is to shift our economy from fossil fuels to zero-carbon in a way that's socially and politically viable.

The European Green Deal should thus not be promoted as a powerful economic bazooka, but rather as an efficient reallocation mechanism, fostering investment shifts and labour substitution in key economic sectors, while helping the most vulnerable segments of society throughout the process.

In practice this means promoting a shift from fossil fuels to renewables, turning combustion-engine car jobs into electric car jobs, compensating low-income households for higher fuel prices and re-training coal miners to get new jobs.

This is how President designate von der Leyen should present the European Green Deal to make it socio-economically successful and politically sustainable. ■

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### Endnotes

- 1. Without a carbon price, falling fossil-fuel prices might make it attractive to use fossil fuels in unregulated sectors, while greater efficiency of devices might encourage increased usage (rebound effect).*
- 2. This is becoming more important as electrification is seen as a main avenue for decarbonisation. When fossil fuels in heating, cooling, mobility and other energy services compete with electricity, they should not be subject to (too) different carbon prices.*
- 3. That is, when the level of the carbon price is very far from the marginal abatement cost in this sector.*
- 4. This should also include the harmonisation/cancellation of existing national compensation schemes for indirect emission costs in the EU ETS.*
- 5. For example, those EU countries that have above-average 'effort sharing' targets for 2030.*
- 6. There is a complex national patchwork of explicit or implicit taxation of fossil fuel use in transport and heating (Kettner-Marx and Kletsen-Slamanig, 2018).*
- 7. A surplus of emission allowances has built up in the ETS since 2009, as a consequence of the economic crisis and high imports of international credits. This led to low carbon prices. This problem was addressed by introducing in January 2019 a market stability reserve: a system under which 900 million allowances are transferring into a reserve rather than*

auctioned. As a consequence of this intervention, the price of emission allowances quickly increased from below €10 in early 2018 to about €25 per tonne of CO<sub>2</sub> at the time of writing.

8. For more details on such guarantees, see Zachmann (2013).

9. There is no European Commission modelling on what carbon price would be needed to achieve 50-55 percent decarbonisation by 2030. Existing modelling for policies that imply a 45 percent emissions cut by 2030 compared to 1990 indicate a carbon price of at least €28. But targeting to go from 4300 million tons of CO<sub>2</sub> equivalent of greenhouse gases (mt) in 2020 to 2600 mt (a 55 percent reduction compared to 1990) instead of 3100 mt (minus 45 percent compared to 1990) implies an almost 50 percent increase in mitigation (from 1200 mt to 1700 mt), which arguably comes at strongly increasing marginal cost. See [https://ec.europa.eu/energy/sites/ener/files/technical\\_note\\_on\\_the\\_euco3232\\_final\\_14062019.pdf](https://ec.europa.eu/energy/sites/ener/files/technical_note_on_the_euco3232_final_14062019.pdf)

10. The EU ETS covers less than half of all emissions. Only about 60 percent of the allowances are auctioned, and the price at time of writing is around €25.

11. By definition, carbon tax revenues would go into the general budget. But implicit linkage to expenditure is a common practice when introducing new taxes. For revenues from the ETS, the EU and member states would be relatively free to dedicate it to specific purposes.

12. The EU could use standardised norms such as ISO 14067 that have been created to measure the carbon footprint of products (for details, see <https://www.iso.org/obp/ui#iso:std:iso:14067:ed-1:v1:en>).

13. In 2012 the EU tried to make intercontinental flights leaving from or arriving in the EU buy emission allowances for the whole emissions of each flight. It was seen as a relatively simple case. Nevertheless, WTO compliance of the scheme was challenged and fierce opposition from the US and China (which threatened to retaliate by no longer buying Airbuses) killed the project politically.

14. See, for example, Horn and Sapir (2019) and Wolff (2019).

15. Our proposals would actually give time to the European Commission to prepare a ready-made solution for a CBT if it is needed in the future.

16. See for instance European Commission (2018a).

17. However, this estimate corresponds to a -40 percent emission reduction target, not to the more ambitious -55 percent proposed by Ursula von der Leyen. As abatement costs are typically non-linear, the green investment gap to reach that target could even be larger.

18. For instance, the PRIMES model used by the European Commission “does not include investment in roads, railways, ports and airports infrastructure and in systems facilitating sharing of vehicles etc., as these are out of the scope of the model. Investment or hidden costs related to behavioural or organisation structural changes or in sectors outside energy are not part of the calculation of investment expenditures either. Generally, the model does not include the full investment expenditure of industrial plants and buildings, but only the parts that relate to energy and efficiency and to a certain extent to the additional investment expenditure to change process technology in the industry” (European Commission, 2018b, p330).

19. This number increases further if the international climate finance promises of developed countries from the 2015 Paris Agreement are added (\$100 billion per year).

20. This is probably the case because the models used assume a low multiplier on average over the next decade.

21. This does not take into account, however, that averting climate change soon enough would lead to the avoidance of (hardly quantifiable) costs related to health care, climate-related damage, the loss of value of stranded assets, migration, and to compensation for distributional effects.

22. Actually, boosting growth significantly could make the climate targets harder to achieve, unless a full decoupling of economic growth and greenhouse gas emissions is achieved thanks to technological progress.

23. <https://cohesiondata.ec.europa.eu/Other/-of-cohesion-policy-funding-in-public-investment-p/7bw6-2dw3>

24. Today, the investment clause is subject to the following conditions: that the member state’s GDP growth is forecast to be negative or to remain well below its potential (resulting in negative output gap greater than 1.5 percent of potential GDP) and that the member state remains in the preventive arm and that an appropriate safety margin with respect to

the 3 percent of GDP deficit reference value is preserved (European Commission, 2019c). As a result of these restrictive conditions, only two countries, Italy and Finland, have so far applied to the use the investment clause.

25. Such a taxonomy is at time of writing under discussion; see [https://ec.europa.eu/info/business-economy-euro/banking-and-finance/green-finance\\_en](https://ec.europa.eu/info/business-economy-euro/banking-and-finance/green-finance_en)

26. Overall, it is useful to remember as an order of magnitude that public investment represents around 3 percent of EU GDP, while private investment represents 17 percent of EU GDP in 2019 (AMECO).

27. The current low interest rates are thus good news for low-carbon technologies but there is no guarantee that interest rates will remain as low as now throughout the whole transition.

28. The EIB has proposed to its member to stop lending to fossil fuel projects by 2020, but this crucial move is currently blocked by some countries which still want gas projects to be financed by the EIB. If this might help to reach the 2030 target, it is however important not to forget the final objective of reaching carbon neutrality by 2050, which has some implications for the investments made before 2030. This 'path dependence' should rule out substituting carbon with gas, which might be good enough for reducing 2030 emissions, but is incompatible with the 2050 neutrality.

29. The EIB issued on 18 September 2019 bonds with a 15-year maturity worth €3 billion at 0.05 percent.

30. Horizon Europe is the EU's research and innovation framework programme for the period 2021-2027. The European Commission proposed to endow it with a budget of €100 billion, while the European Parliament has proposed €120 billion. Of the eventual budget, 35 percent is due to be earmarked for climate-related research.

31. The European Research Council is a good example of the value of risk-taking, as so far it has funded seven Nobel Prize laureates.

32. Rodrik also recalls an anecdote about Thomas Watson, the founder of IBM, who supposedly advised cautious managers that: "if you want to succeed, raise your error rate."

33. It is true that tax revenues are generally fungible in the overall budget, but some mechanisms should be put in place to ensure transparency of the level of revenues generated by the carbon tax, so that governments can show that they use the revenues to compensate those most affected by the tax.

34. Another interesting policy put in place in Switzerland is the mechanism by which the carbon price increases automatically if emission targets are not met, but price rises are postponed if they targets are exceeded. This provides citizens with an incentive to control their emissions, as noted by Bureau et al (2019).

35. Sectors in which jobs could be lost include power generation using fossil fuels (including coal mines, fossil-fuel power plants and refineries), energy-intensive manufacturing, transport, the equipment sector for fossil-fuel technologies and retail sales of fossil fuels (eg. gas stations). In principle these job losses will be compensated for by new jobs in sectors including renewable energy installation, maintenance and operation, and construction (because of the need to renovate the building stock). The renewable energy sector should create more domestic jobs than the fossil-fuel energy sector (see Zachmann et al 2018).

36. The concept of a 'just transition' was developed by North American unions in the 1990s, with a focus on support for workers who lost their jobs as a result of environmental protection policies. Examples of US federal just transition initiatives include President Obama's Partnerships for Opportunity and Workforce and Economic Revitalisation and President Trump's Assistance to Coal Communities programme.

37. Europe's 1950s transition mechanism for coal-mining regions was the European Coal and Steel Community (ECSC) Fund for the Retraining and Resettlement of Workers. With the 1957 Treaty of Rome, this fund was transformed into the European Social Fund, which in its early stages was used to support workers who lost their jobs in sectors that were modernising, such as coal mining.

38. In 2017, a first coal-related project was financed by the EGF, to support the Spanish coal-mining region of Castilla y León. Spain applied for a €1 million to help redundant coal miners and young NEETs in the region find new jobs, following the dismissal of 339 coal workers in five coal mines. In order to be eligible, Spain had to establish a link between the redundancies and major structural changes in world trade patterns resulting from globalisation. Spain successfully argued that the European coal industry is increasingly suffering from competition from cheaper coal from non-European countries.

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*The authors are grateful to Jean Pisani-Ferry, Dirk Schoenmaker, Reinhilde Veugelers and Guntram Wolff for their input and encouragement. This article was originally published on [Bruegel](#)*