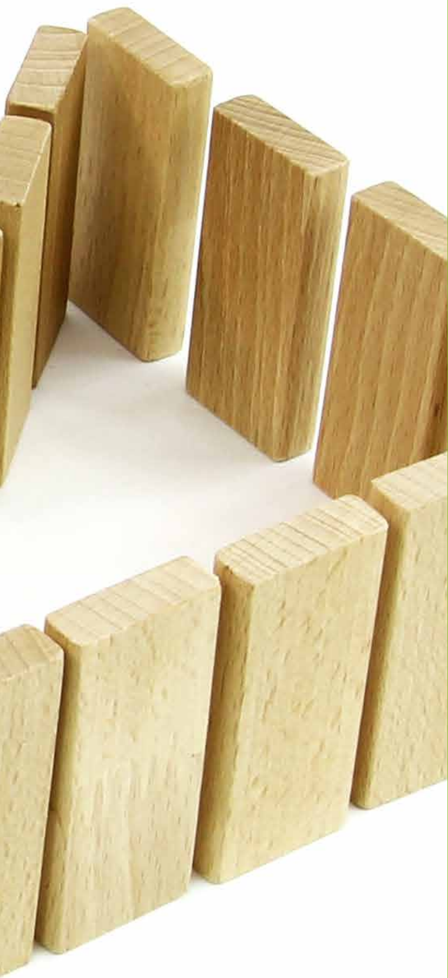
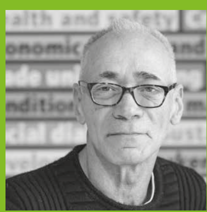


3. The path to 'zero carbon' in a post-Covid-19 world

Author



Béla Galgóczi

Topics

A climate lockdown is not an option."

Béla Galgóczi, ETUI

Introduction

€260
billion needed to achieve 2030 climate targets

Acknowledging the gap between the European Union's climate policy commitments and the targets of the 2015 Paris Agreement, in November 2018 the European Commission set the long-term objective of a 'climate-neutral Europe', to be achieved by 2050. However, while Europe did manage to meet its rather unambitious 2020 GHG reduction target of 20% before the Covid-19 crisis hit, indicators show that the equally unsatisfactory 2030 target (40%) appears to be out of reach. Meeting the enhanced ambition of climate neutrality by 2050 thus poses a huge challenge and will require a radical step up in terms of the Continent's climate policy efforts.

The European Green Deal, announced by the new Commission in December 2019 (European Commission 2019c) as its flagship initiative, seeks to translate this objective into concrete policies. A key pillar in this strategy is the large-scale Sustainable Europe Investment Plan, which aims to mobilise at least EUR 1 trillion in sustainable investments over the next decade to help meet additional funding needs to fulfil the new policy ambitions. At an earlier date, the Commission had estimated that achieving the current 2030 climate and energy targets would require EUR 260 billion of additional annual investment (or about 1.5% of 2018 GDP) in energy systems and infrastructure. These numbers alone offer a sobering assessment of the challenges Europe is confronted with.

Just a few months after these important announcements, the effects of the Covid-19 pandemic manifested themselves, bringing profound and unexpected changes to our daily lives, our work, and to the economy as a whole. Addressing the dramatic consequences of the pandemic became the number one priority for policymakers all over Europe, as well as for the social partners, at both a national and supranational level. For obvious reasons, the very first initiatives sought to contain the spread of the virus, with various lockdowns imposed across Europe. This was also done in order to facilitate upgrading efforts regarding national healthcare systems, which in most countries were visibly challenged by the Covid-19 'tsunami'. Of course, it soon became clear that further and more long-term measures would be needed to mitigate the damage caused by the shutdown of the economy and to protect workers against the worst consequences of the pandemic, which could continue to be felt for several years to come.

Beyond these measures, however, it is time to reflect about the world after Covid-19 from an eco-sustainability perspective. This chapter argues that the environmental dividend of the lockdown was short-lived and a return to 'business as usual' would be a serious mistake. The climate emergency, which was at the top of the policy agenda up until February 2020, has not gone away and it could, in many ways, be further exacerbated by the policy responses addressing the Covid-19 emergency. It should also be clear to all that a 'climate lockdown', as a desperate, last-resort measure to deal, in a not-so-distant future, with the consequences of an ineffective response to the climate emergency, is neither possible nor desirable. This chapter elaborates on this crucial point by advancing a series of policy recommendations for a sustainable recovery.

Two emergencies: climate change and Covid-19

Parallels and differences

It is arguable that, in many ways, the pandemic and the policy responses to it have delivered important lessons for dealing with the broader topic of sustainability.

Habitat destruction and an ever-increasing pressure on natural resources (especially food production) have clearly emerged as a breeding ground for pandemics (Chin et al. 2020). The assault on ecosystems that allowed the novel coronavirus to jump from animals to humans shows that sustainable use of Earth's resources and biodiversity protection have a key role in preventing similar diseases from emerging in the future.

The planet's resources are finite

The two crises bear some interesting similarities and also some crucial differences. Both the pandemic and the climate crisis are intimately connected to the exponential growth of demand suddenly imposed on resources: on the one hand, the resources available to national health systems (see Chapters 1 and 5 in this volume), and on the other, planetary resources. However, while the pandemic was partly managed by expanding the capacities of our national healthcare systems, the climate emergency cannot be addressed simply by throwing more resources at it, because, at a fundamental level, our planet's resources, unlike healthcare capacities, are finite and cannot be extended indefinitely. There is, as the saying goes, no Planet B to bail us out.

The temporal dimension of the causal links between human actions and either crisis is also crucially different. For instance, with the pandemic, the effects of individual and collective choices and behaviours tend to manifest themselves almost in real time: infections and fatalities can grow exponentially in a matter of days or weeks, shocking people and governments into action. This narrow timeframe (and also the potential for counter-measures to reverse dangerous trends in an equally short timeframe) pushes citizens to demand urgent solutions, and governments and regulators to provide immediate answers. Not so with climate change (and the loss of biodiversity), where cause and effect are more distant from each other in both time and space: a quasi-perfect manifestation of the 'boiling frog' syndrome. With climate change, collective and individual risk are also less self-evidently connected than in the case of the pandemic. Nevertheless, the strong and proactive response to the outbreak holds some lessons for addressing the slower-moving, but no less insidious, dangers of climate change.

The lockdown's impact on the environment

In the midst of this crisis, one could have been forgiven for thinking that the climate emergency could be set aside for a while. In fact, the early phases of the economic shutdown created a small window of 'climate optimism', when the air of our cities was breathable, the skies were once again blue, and pictures of Venice's unusually transparent waters seemed to present us with the possibility that a different, more eco-sustainable, future was within grasp.

The lockdown of cities, regions and even entire countries did indeed lead to a sudden drop in greenhouse gas emissions and a consequent unprecedented improvement in air quality, as documented in images by NASA (2020) and the European Space Agency (ESA) (Watts and Kommenda 2020). However, while this has certainly been a welcome, if unintended, consequence, it is clear that it lacks any structural character. Furthermore, there are not only opportunities but also risks that can arise from such radical carbon footprint-shrinking measures, and policy responses need to balance short-term actions with longer-term objectives.

On the positive side, even short-term air quality improvements in lockdown regions and a subsequent drop in global CO_2 emissions are undoubtedly an encouraging phenomenon. For example, the German think tank Agora Energiewende (2020) estimates that, due to the Covid-19 lockdown, German CO_2 emissions in 2020 could shrink by between 50 and 100 million tonnes. This means that Germany could reach an average emissions reduction of 42% in 2020 (when compared to 1990) instead of the earlier expected 37%, and thus meet its climate policy target. But could this lead to an unwarranted degree of optimism, or even to societal complacency?

The benefits will not last forever

This lockdown-induced optimism was in fact short-lived and, with hindsight, clearly misplaced. As economies began to reopen in the late summer months, our roads became progressively busier, factories and businesses started planning ahead, with a view to resuming their old production and distribution processes, and people's changing attitudes towards public transport – now viewed with suspicion as a possible locus of viral contagion – suggest that the days ahead may not necessarily be any greener.

The rebound effects of this 'back to business' reopening could reverse any positive environmental consequences and even make things worse in the longer term, just as we saw at the time of the 2009

50-100
millions tons of CO_2
estimated reduction of German emissions

crisis. While global CO_2 emissions fell by 1.2% in 2009, due to a 0.1% drop of global GDP during the financial crisis, this was followed by a 5% rebound the following year (Peters et al. 2012).

At the same time, empirical evidence indicates that, despite the impact of the coronavirus crisis, a new global peak in atmospheric carbon dioxide levels was actually reached in May 2020. Measurements by the Mauna Loa observatory in the US showed that the concentration of CO_2 in the atmosphere reached 417.2 parts per million (ppm) in this month, 2.4ppm higher than the peak of 414.8ppm in 2019. Without the worldwide lockdowns, it might have risen by 2.8ppm. This means that the effects of the lockdown could only slow down the increase of global CO_2 concentration, but not stop or even mask it (Harvey 2020). And it is now clear that 2020 is also going to be the first or second hottest year on record, as global data of the first seven months of the year indicate (Scientific American 2020).

Policy responses to the pandemic do not offer a template for the climate crisis

The economic shock to people's livelihoods – with businesses, education systems and entire sectors of the economy shutting down, redundancies and restructuring taking place (see Chapters 2 and 6), travel restrictions being imposed, and disruptions to supply chains causing shortages of essential goods and services – demonstrates how damaging rapid responses can be. This is certainly not the way to deal with the climate crisis. The Covid-19 crisis should enter our history books as a stark reminder that it is best to avoid a situation in which, due to a lack of incremental action taken over a longer period, radical, almost-overnight measures become necessary to avoid a catastrophe.

The sudden stop of economic activities also has the negative side effect that it reinforces the 'growth versus environment' and 'jobs versus environment' dichotomies that sensible climate policymakers have been eager to leave behind in recent years. Any 'emergency brake' response almost inevitably triggers a reaction, from both decision-makers and large parts of the public, in which the priority becomes growth and jobs at any price.

Greenhouse gas reductions and their drivers

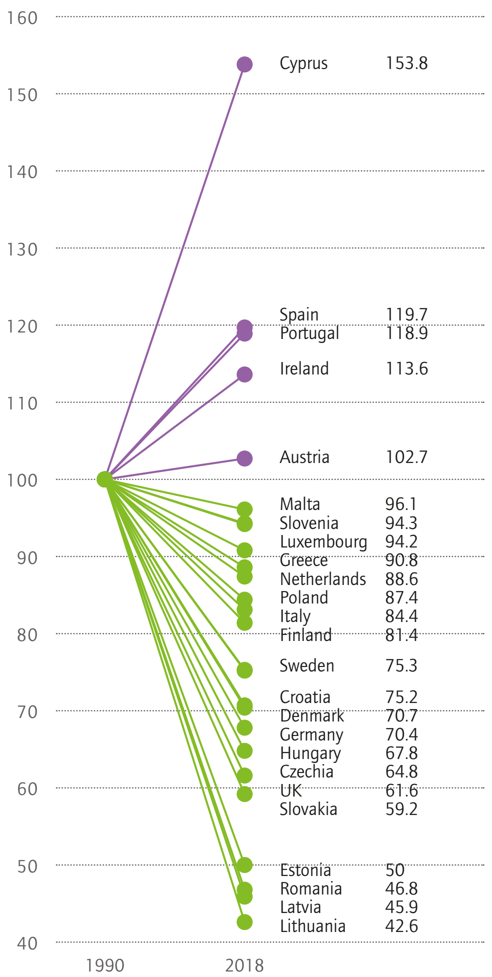
50%
of EU GHG reduction achieved by Germany and the UK

GHG reductions on a territorial basis

The reduction in total GHG emissions since 1990 means that the EU – even without the one-off effect of the Covid-19 crisis – will meet its 2020 target. However, projections reported by Member States show that the EU targets currently envisaged for 2030 and 2050 (despite falling short of the Paris objectives) are out of reach on a business-as-usual basis. Meeting even these non-satisfactory current targets would require significantly more effort, and even stricter targets are expected to be adopted within the European Climate Law proposal in Autumn 2020.

This section looks back over the past few decades and examines Member State performance in the reduction of GHG emissions in both quantitative and qualitative ways.

Figure 3.1 Greenhouse gas emissions in 2018, index (1990=100)



Source: EEA [env_air_gge].

As Figure 3.1 shows, most of the Member States reduced emissions between 1990 and 2018, contributing to the aggregate EU performance.

Most emissions cuts were due to economic restructuring and not to dedicated climate policies

In absolute terms, Germany and the United Kingdom accounted for about 50% of the EU net GHG reduction in this 28-year period. New Member States from central and eastern Europe showed the highest relative reductions, mostly due to the radical change in their economic structure during the transformation crisis of the 1990s; reductions in Romania, Latvia and Lithuania actually exceeded the 50% mark. Germany also 'benefited' greatly from the collapse of East German energy-intensive industries during the 1990s.

The overall net GHG emission reductions achieved by most Member States were, however, partly offset by higher GHG emissions in a few Member States such as Austria, Ireland, Portugal, Spain and Cyprus, which recorded increases of between 2.8% and 53% between 1990 and 2018.

Structural features and drivers of emissions

Figures 3.2a and 3.2b show the structural features and key drivers underpinning GHG emissions: on the one hand, emissions per unit of GDP and emissions per capita in 2017 (Figure 3.2b (right)), and on the other, changes in energy demand and in the carbon intensity of energy generation over the period 1990-2017 (Figure 3.2a (left)).

In a business-as-usual scenario, higher GDP leads to higher GHG emissions, other factors being equal. Richer Member States with higher GDP per capita would thus also be expected to have higher GHG emissions per capita. However, Figure 3.2b (right) shows GHG emissions per capita by Member State and reveals that in reality there is no consistently direct link between GDP and emissions, illustrating that those 'other factors' matter a lot in the reduction of the latter. Such factors might be energy efficiency, energy intensity or the carbon intensity of energy generation, but the structure of the economy plays also an important role. Below we take a look at some of these factors in more detail. For example, emissions per capita are highest in Luxembourg and Estonia (20.0 and 16.0 total CO_2 per person), respectively the richest and one of the lower-income (but fast-growing) Member States. A common feature for both, however, is a relatively low level of decoupling of GDP from emissions: in other words, as their GDP grows, so do their

Figure 3.2a Change in the carbon intensity of energy 1990-2017 (%)

Figure 3.2b GHG emissions per unit of GDP in 2017 (PPS, EU-28 =100)

Source: EEA 2020 https://www.eea.europa.eu/publications/soer-2020/chapter-07_soer2020-climate-change/view, Table 7.3.

emissions. On the other hand, Sweden and Romania are among the countries with the lowest per capita emissions, again an unusual pair (one of the richest and one of the poorest Member States), but both with a strong record of decoupling.

Figure 3.2b (right) also shows GHG emissions per unit of GDP for Member States, depicting how much GHG they emit in the production of a unit of GDP (at purchasing power parities) relative to the EU28 average. There are important differences among countries. In 2017, Estonia, Bulgaria and Poland had the highest GHG intensity of GDP relative to the EU28 average (232%, 204% and 178%, respectively), while Sweden had the lowest, with 52% of the EU average. Trends over time (not shown by the graph for this indicator) suggest a downward convergence in emissions intensity among Member States as a combined effect of structural changes in economies (such as the shift towards less polluting services) and of a reduction in both energy use and in its carbon intensity. As a result, the levels of GHG emissions both per capita and per GDP are also more similar now across Member States than they were in 1990, illustrating a convergence process, with continued decoupling of GHG emissions from economic growth (EEA 2019a). It is worth noting that, by both measures, Sweden tops the list of Member States in the decoupling of GDP from emissions.

Decreasing emissions intensity is mostly driven by decreases in the energy intensity of the economy and by a lower carbon intensity of energy generation. The main trends by Member State between 1990 and 2017 are shown in Figure 3.2a (left). A decrease in the energy intensity of GDP is characteristic for all Member States, although to varying degrees. New Member States from central and eastern Europe (CEE) had the highest relative reductions (between 38% and 69%), while Portugal, Greece and Spain had, relatively, the lowest (between 4% and 14%). Lower energy intensity of economic growth can be explained by improvements in energy efficiency (in its transformation and end use, and also in energy savings) and the strong uptake of renewables, as well as by changes in the structure of the economy. Deindustrialisation in CEE countries and in Eastern Germany during the 1990s was a major driver, while a general trend for most Member States has been the services sector comprising a higher share of GDP, thus leading to lower energy intensity in their economies. An increasing share of the services sector has been a general trend in most MS and contributed to lower energy intensity.

Beside reductions in energy intensity, the lower carbon intensity of energy generation has been a key factor underpinning lower emissions, in spite of a decline in nuclear electricity production in recent years. This positive trend has been due both to the higher contribution from renewable energy sources in the fuel mix and to the switch from more carbon-intensive coal to less carbon-intensive gas. With the exception of Cyprus, all Member States saw decreasing carbon intensity in their energy generation. Bulgaria, the Netherlands and Portugal had the smallest reductions in carbon intensity over the 27 years (between 6% and 8%); Poland achieved a reduction of 11.6%; while Belgium, Czechia, Denmark, Finland, Latvia, Slovakia and Sweden achieved the greatest reductions (between 28.8% and 35.2%).

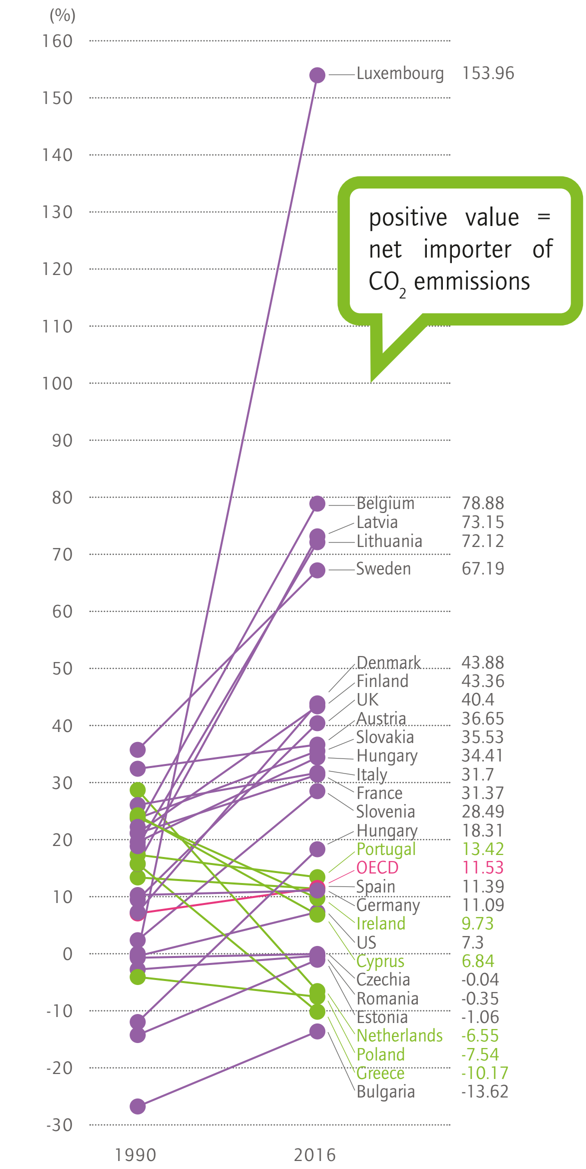
As regards the contribution of individual economic sectors to the reduction of GHG emissions, the picture is very mixed. EU climate mitigation policy is based on a distinction between GHG emissions from large industrial sources, which are governed by the EU Emissions Trading System (ETS) (European Commission, 2019a), and emissions from sectors covered by the Effort Sharing Regulation (European Commission, 2019b). Of the net EU reduction in total GHG emissions between 2005 and 2017, the sectors in the ETS accounted for two thirds, and the sectors not covered under the ETS accounted for one third. The sectors falling under the scope of the Effort Sharing Regulation currently represent about 60% of total greenhouse gas emissions in the EU, and they broadly include transport, waste and agriculture, as well as the heating systems of residential and commercial buildings, and the parts of industry not covered by the ETS. In the last couple of years, transport (in particular, road transport) and agriculture showed an increase of emissions. Section 3 will focus in more detail on the energy sector (which achieved a substantial GHG reduction) while Section 4 will address road transport, where initial reductions turned into a renewed increase of emissions in the last couple of years.

Consumption-based emissions

In addition to the commonly reported production-based ('territorial') emissions, statisticians also calculate 'consumption-based' emissions, by correcting the former to include CO_2 emissions 'embodied in trade'. Emissions embodied in trade are those emissions that occur during the production of traded goods and services. This type of estimate is also known or referred to as a 'carbon footprint'. Eurostat's calculation of the EU27's carbon footprint measures how much CO_2 would have been emitted due to the EU27's demand for products, if all imported products had been produced within the EU27 using an EU27 average production technology.

Figure 3.3 shows the share of emissions embodied in trade for most EU Member States for 1990 and 2016. Positive values mean that a country is a net importer of CO_2 emissions, as its emissions calculated on a consumption basis are higher than those based on production. Emissions embodied in trade actually grew between 1990 and 2016 for most Member States, indicating that their actual carbon footprint has tended to shrink more moderately than what the more widely used production-based calculations show. There are substantial differences, however, by Member State.

Figure 3.3 CO_2 emissions embedded in trade, as % of territorial emissions



Source: Global carbon project https://ourworldindata.org/consumption-based-co2.
Note: values shown, are for 2016

Most EU Member States (and the EU as a whole) are net importers of carbon emissions embodied in trade, and when examining emissions reductions over time, reductions in consumption-based emissions tend to be lower than reductions in production-based emissions.

A smaller reduction in consumption-based emissions

Initially, new CEE Member States tended to be net exporters of CO_2 emissions, meaning that their

A much more radical decoupling of GDP growth from material use, resource use and GHG emissions is needed than what has been achieved so far."

production-based (territorial) emissions were higher than their emissions linked to the goods and services they consumed. However, as these countries became richer with GDP and consumption growth, their net emissions export (as a share of total production-based emissions) showed a diminishing trend, with most of them becoming net importers of emissions by 2016 (see Figure 3.3). From this group, only Bulgaria, Czechia, Estonia and Poland remained net exporters of emissions. Belgium and Luxembourg also stood out for their high share of trade-embodied CO_2 imports, which in 2016 were equal to, respectively, 78% and 153% of their territorial emissions.

Following these changes over time provides an answer to the question of whether countries have mostly achieved emissions reductions by offshoring emission-intensive production to other non-EU countries. If only production-based emissions fell, whilst consumption-based emissions rose, this would suggest that Member States may have indeed 'offshored' emissions elsewhere. In general, this has not been the case: for the EU as a whole, including large, rich countries like France, Germany and the UK, both types of emissions decreased in this period. However, certain Member States like Belgium and Luxembourg did display this pattern.

Figure 3.4 shows the main trends of GHG emissions, domestic material consumption (DMC) and resource productivity (GDP/DMC) for the EU27.

To sum up, as GHG emissions, material use and resource use in the EU have been shrinking since 1990, while GDP has been growing, resulting in an increase in resource productivity, an absolute decoupling of GDP from the former can indeed be acknowledged. However, the extent of this is nowhere near enough to meet the 2030 targets and in particular the 2050 target of a net-zero-carbon economy. If Europe wants to maintain economic growth in the future, a much more radical decoupling of GDP growth from material use, resource use and GHG emissions is needed than what has been achieved so far. If we continue with the current economic model, only a full 'climate lockdown' could deliver a zero-carbon economy. However, the recent Covid-19 lockdown has demonstrated that this is an untenable policy proposition, and alternative and immediate action is therefore needed to address the climate emergency which combines environmental protection with social and economic sustainability.

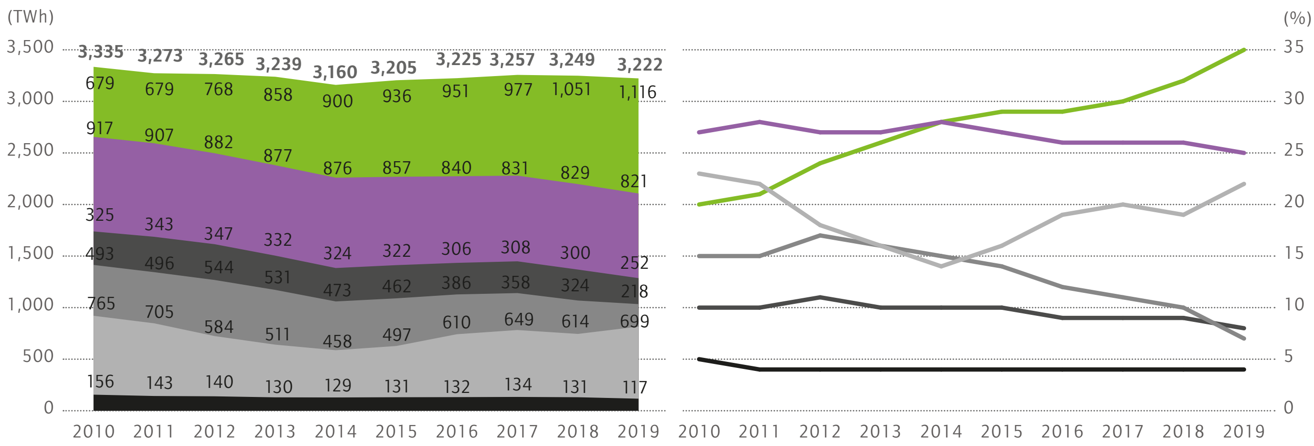
Figure 3.4 EU28 domestic material consumption, gross domestic product, and resource productivity (2000-2017)

Source: EEA 2020.

Energy transformation

A shifting energy mix

Figure 3.5 Electricity generation by fuel type and changes in composition (2010-2018), EU-28 terawatt hours (TWh)



Source: Eurostat; Agora Energiewende and Sandbag (2019).
Note: right hand scale indicates the composition in percent

34.6%
Share of renewables in total EU electricity mix (2019)

As shown in section two, the two major factors in reducing GHG emissions have been a reduction in energy intensity of GDP and a reduction in the carbon intensity of energy generation. This section now shows how this worked with electricity generation at EU level over the last decade. While between 2010 and 2019 GDP grew by 14.8% in the EU28, electricity generation fell by 3.5%. However, it was the decarbonisation of energy generation, principally through changes in the composition of electricity generation, that played the biggest role in the reduction of emissions in the last decade, as shown in Figure 3.6. In 2019, renewables provided 34.6% of total electricity in the EU28, followed by nuclear energy (25.5%), gas (21.6%) and coal (14.5%) (Agora Energiewende and Sandbag 2020).

On the basis of the period 2010-2019, the contribution of coal to electricity generation in the EU is on the retreat, as its share fell from 24.5% in 2010 to 14.5% in 2019. The decrease for hard coal was much more radical (from 14.8% to 6.7%) than for lignite (from 9.7% to 7.8%). Figure 3.6 also reveals that the retreat of coal has not been consistent over the decade: until 2015 coal stubbornly kept its share in electricity generation. From 2016, however, its shrinkage gathered pace, peaking in 2019 (in one year, hard coal fell by one third and lignite by 16%).

2019: a bigger reduction in coal than during the entire previous decade

At the same time, the share of renewable sources of energy generation in electricity grew from 20.3% in 2010 to 34.6% in 2019.

Phasing out coal

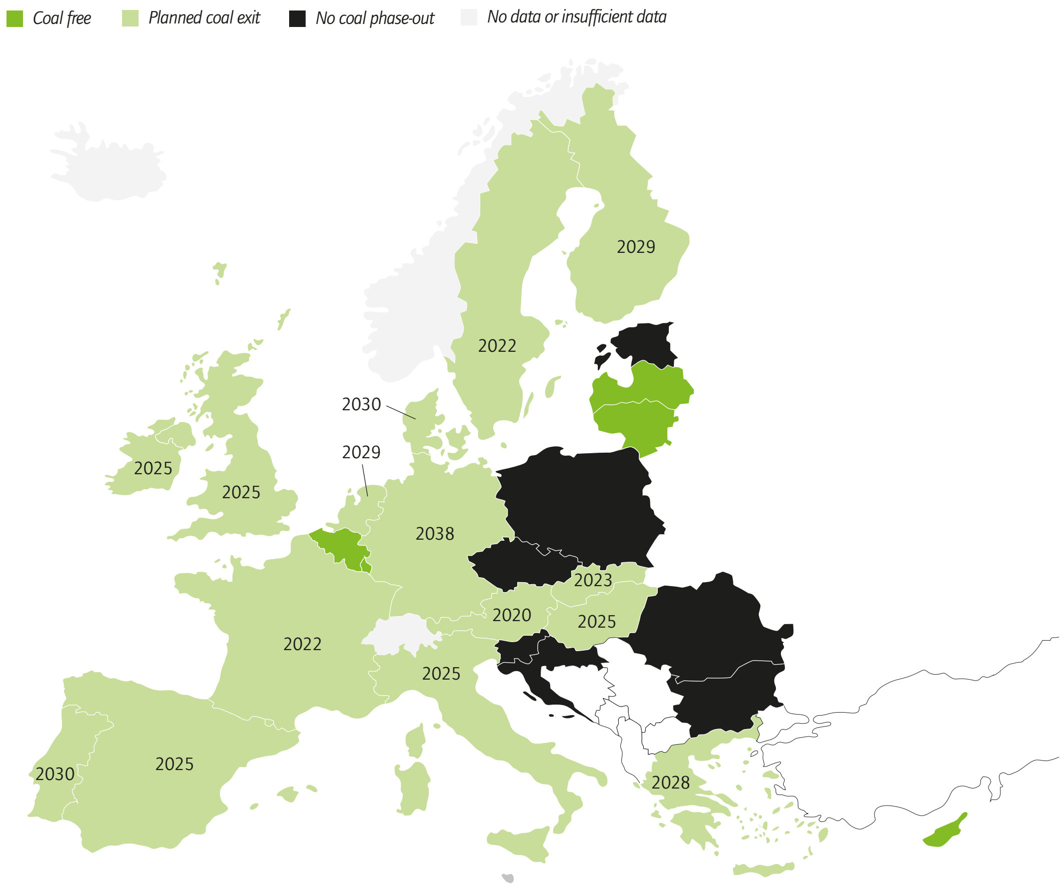
The phase-out of coal in energy generation is gaining momentum throughout Europe

Figure 3.6 shows that the phase-out of coal in energy generation is gaining momentum throughout Europe. The majority of EU Member States have set up a plan with a deadline by which they are to become coal-free. Phasing out coal in energy generation is an explicit policy target for most Member States.

All EU15 Member States other than Germany are planning to phase out coal by 2030 at the latest, with Germany announcing a later deadline of 2038. These 'phase-out countries' have been responsible for almost all of the fall in hard coal generation in the last decade. While western Europe is thus on course to phase out coal, for the new Member States in central and eastern Europe the picture is more mixed. Latvia and Lithuania are currently coal-free, and Hungary and Slovakia are to phase out coal by 2025 and 2030, respectively. However, negotiations about a possible phase-out out have only just started in Czechia, and although Poland took an important first step in September 2020 with an agreement to phase out coal mining by 2049 (Euractiv 2020), a phase-out of coal in energy generation is not currently on the agenda. Meanwhile, Bulgaria, Croatia, Romania and Slovenia have held no negotiations nor made any decision about phasing out coal. Finally, although Estonia does not have coal in its energy mix, the majority of its energy demand is covered by oil shale, a more polluting solid fuel than coal, without any phase-out plan.

2030
target year for coal phase-out in western Europe (excluding Germany)

Figure 3.6 The status of coal phase-outs in the EU (as of June 2020)



Source: Europe Beyond Coal (2020), national sources.
Note: Belgium, Cyprus, Latvia, Lithuania, Luxembourg and Malta are coal free; Estonia does not have a coal plant, but uses shale oil, an even more polluting solid fossil fuel. without a phase-out plan

Trade unions and the coal phase-out

The role of unions in the coal sector in various countries can be regarded as defensive, from defending the status quo of coal-based economies (for instance, in Poland and at plant level in France) to pleading for lengthier transition processes (for instance, in Germany).

The main objective of trade unions in the Polish coal sector is to defend the status of coal in Poland and vehemently oppose any phase-out initiative (Szpor 2019).

In Germany, the IG BCE union (for mining, chemicals and energy) has pursued a balancing act, arguing for an as-late-as-possible coal phase-out strategy that incorporates 'proper framework conditions', including an active industrial policy and job security (Borgnäs 2019). There have been repeated clashes between members of the IG BCE and environmental activists of the Ende Gelände movement who occupied the Hambach Forest and an open-cast mine in Rhineland (Bergfeld 2019). The IG BCE's general secretary, Michael Vassiliades, insisted on the need to put jobs first and environmental issues second.

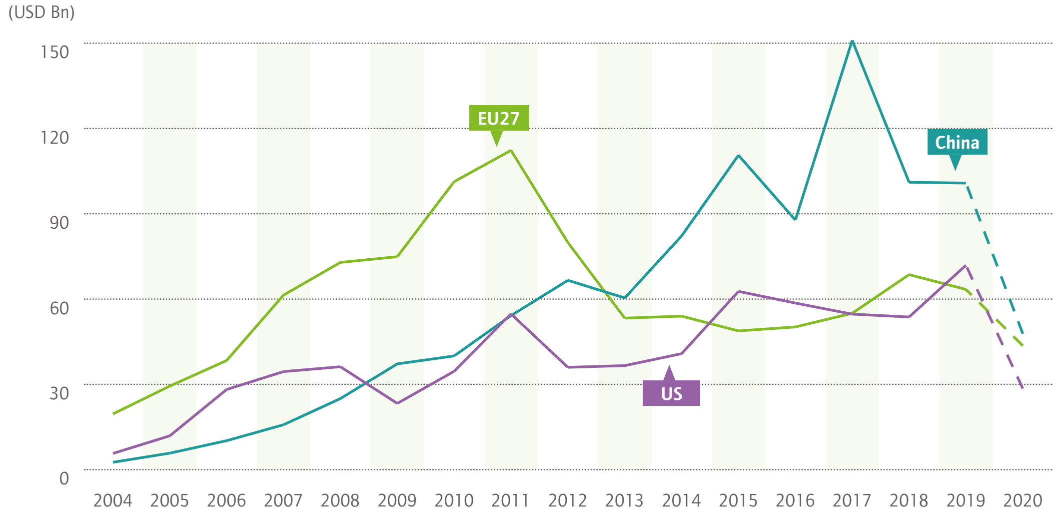
In France, the coal sector is limited to four coal-fired power plants with less than a thousand direct employees between them. After the declaration of the government in 2018 to close them down by 2022, demonstrations were held by the Confédération Générale du Travail (CGT) union and all four plants began a strike action that has continued in repeated waves ever since (Jakubowski 2019). The CGT and Force Ouvrière (FO) unions argue that the government should withdraw the closure project, given the low share the plants have in France's CO_2 emissions and their role in maintaining energy security. Both organisations have also denounced the high social costs of the closure, which could lead to up to 5,000 job losses. The third main union, the Confédération Française Démocratique du Travail (CFDT), has taken a more nuanced approach to the transition, supporting the decarbonisation of the energy sector but denouncing the lack of transparency concerning the future of the plants. It is clear that without strong and transparent commitments to future investments that guarantee both a just transition and sustainable and long-term employment alternatives, unions will continue to view with scepticism any decarbonisation efforts that threaten, in the short or long term, the livelihoods of their members and of the communities they represent.

Clean energy investments

The other important aspect of the energy transformation is to invest in renewable sources of energy generation and to deploy new capacities on a massive scale. This has been a declared objective of the European Commission, from the Energy Union Strategy in 2015, and the Juncker Commission's Investment Plan, to the most recent initiative of

At its peak, in 2011, the EU outperformed China and the US combined. In 2015 and 2017, it was China that achieved more clean energy investments than the EU and the US combined."

Figure 3.7 New investments in renewable energy (USD billion)



Source: BNEF (2020a).

the European Green Deal (see also Laurent 2020). Looking back over Europe's performance in the last decade, however, its record is rather mixed, in particular when put into international comparison with the US and China.

Europe is losing its position as a climate policy world leader, and the changing levels of clean energy investment provide an evident example of this.

Based on Bloomberg New Energy Finance (BNEF 2020a) data, Figure 3.7 shows that in the period between 2004 and 2011, the EU had been the unquestionable leader in this field, with a spectacular increase in investments. At its peak, in 2011, the EU outperformed China and the US combined. Then an equally spectacular collapse led to a low point in 2015, when clean energy investments in Europe were just over 40% of the 2011 investment peak. In 2015 and 2017, it was China that achieved more clean energy investments than the EU and the US combined, and even if the EU afterwards gained back some ground, in 2019 both the US and China invested more in clean energy than Europe. According to the latest data, the first half of 2020 looks promising as, in the face of the Covid-19 crisis, clean energy investments in the EU grew by almost 50% when compared to the first half of 2019, and were just slightly behind China. Nevertheless, the EU has clearly lost some ground in recent years, and will need to be more ambitious in the future.

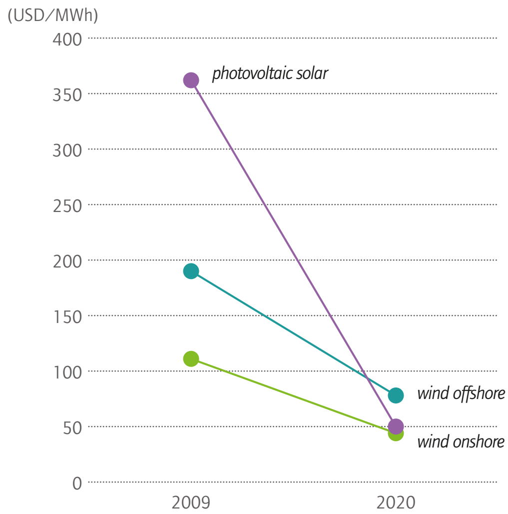
50%
growth in clean energy investments in the EU, despite the Covid-19 crisis (first half of 2020)

86%
in 2020 1kWh of solar energy cheaper than in 2009

Rapidly falling cost of renewables starts to outprice coal

The shift in the energy mix is showing an accelerating trend, thanks in part to economy-of-scale developments, with the unit price of solar and wind energy generation falling rapidly and thus

Figure 3.8 Global electricity benchmark prices for renewables (USD/megawatt hour)

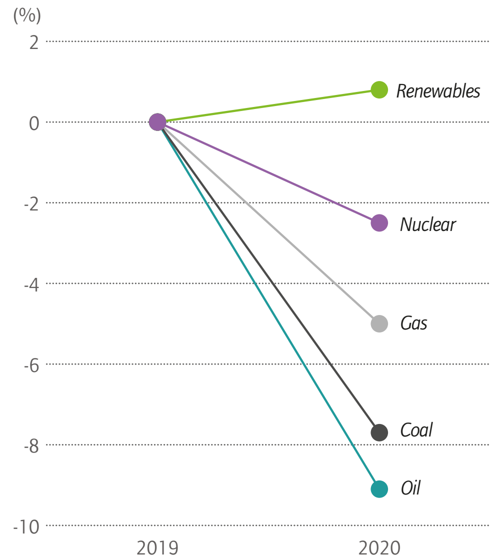


Source: BNEF 2020b, https://about.bnef.com/blog/scale-up-of-solar- and-wind-puts-existing-coal-gas-at-risk/.
Note: 2020 first half.

making fossil fuel-based energy generation less and less competitive. According to BNEF data (2020b), following a 9% drop in the price of onshore wind and a 4% drop for solar generation after the second half of 2019, by early 2020 these had become the cheapest sources of new-build generation for at least two thirds of the global population (living in locations that comprise 71% of GDP and 85% of global energy generation). Figure 3.8 shows that the global electricity benchmark price for one kilowatt hour (kWh) of solar energy in 2020 was 86% lower than in 2009. For onshore and offshore wind, the fall in prices was less spectacular but still around 60% (BNEF 2020b).

In 2020
solar and wind
power
are the cheapest sources of energy

Figure 3.9 Projected change in global primary energy demand in 2020 relative to 2019, by fuel (%)



Source IEA 2020 https://www.iea.org/data-and-statistics/charts/projectedchange- in-primary-energy-demand-by-fuel-in-2020-relative-to-2019.

Energy shifts in the time of a pandemic

Recent global developments show that the era of fossil fuel is in rapid decline. Global projections by the International Energy Agency for 2020 estimate that the Covid-19 crisis is likely to accelerate the already ongoing energy shift away from fossil fuel towards renewables. Figure 3.9 shows the latest energy demand forecast with regard to its composition by source of energy. While global energy demand is likely to fall by 6.1% in 2020, it is only renewables that are expected to grow slightly (by 0.8%), while demand for oil is likely to fall by 9.1%, for coal by 7.7% and even for gas by 5%.

The social side of energy transformation: energy poverty in Europe

When it comes to the social aspects of the energy transformation, energy poverty is an important indicator. As most European countries have no official definition for the term 'energy poverty', this state is often described as the 'inability to keep homes adequately warm'. The EU SILC (Statistics on Income and Living Conditions) survey thus uses energy poverty as an indicator of material deprivation that expresses the share of population that is unable to keep its home adequately warm. Figure 3.10a shows energy poverty for the total population in EU Member States for the years 2005, 2012 and 2019.

The main trend in Europe has been a gradual reduction in energy poverty (Figure 3.10b), as the share of the total population affected slightly declined between 2005 and 2019, with an interim increase in the early 2010 years. New CEE Member States have a difficult legacy to confront, however: over a third of their populations often experienced energy poverty in 2005 (with an almost 70% peak in Bulgaria). For most of these countries, the situation has improved markedly in the past 14 years, as in 2019 Czechia, Estonia, Hungary and Poland all had lower levels than the 7.6% EU average. However, Bulgaria and Lithuania still had alarmingly high values (30.1% and 26.7%, respectively). Southern European countries form the other risk group: Italy, Greece, Portugal and Cyprus were particularly affected by energy poverty, with 2019 values ranging between 14.1% and 21%. Although there is no link between energy poverty and the speed and depth of energy transformation, vulnerable groups need particular attention when national climate and energy plans are being set up.

Figure 3.10a Energy poverty in the EU in % of total population

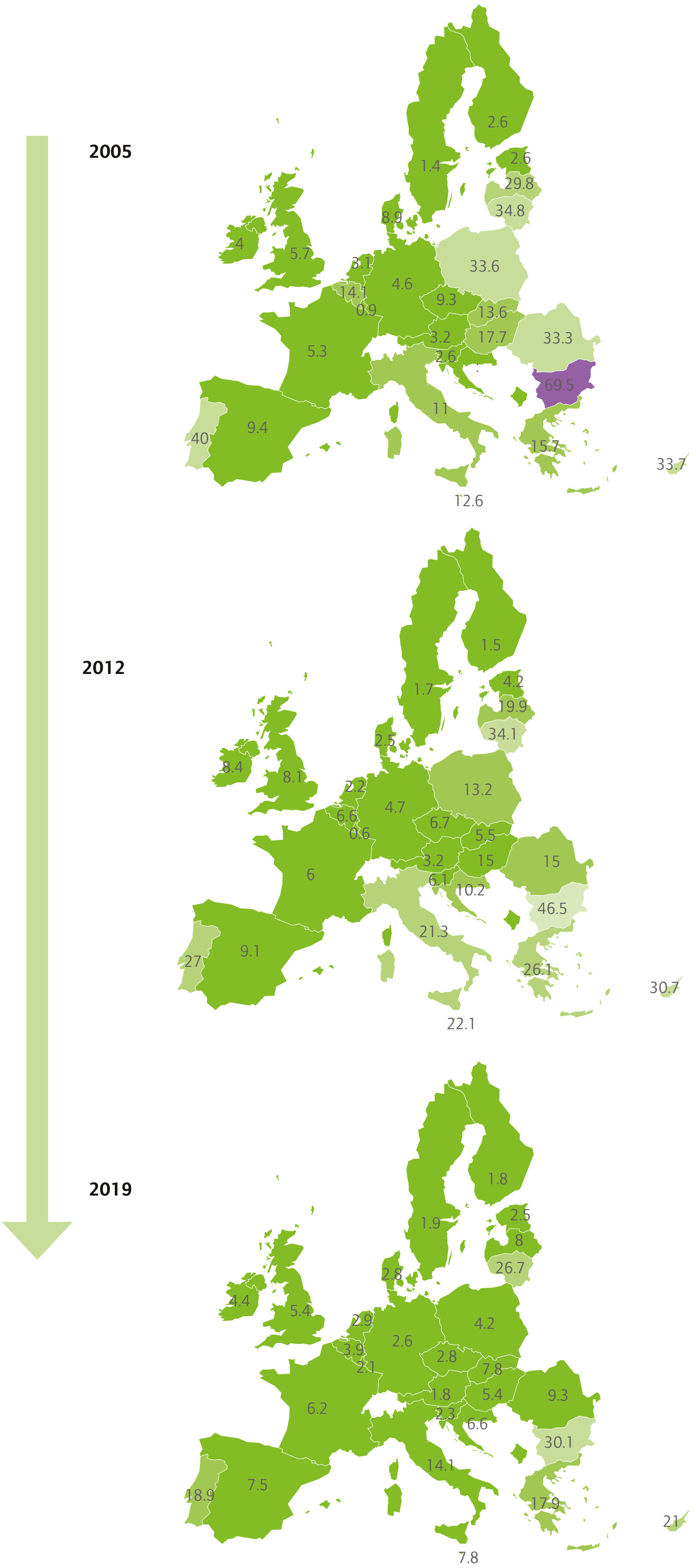
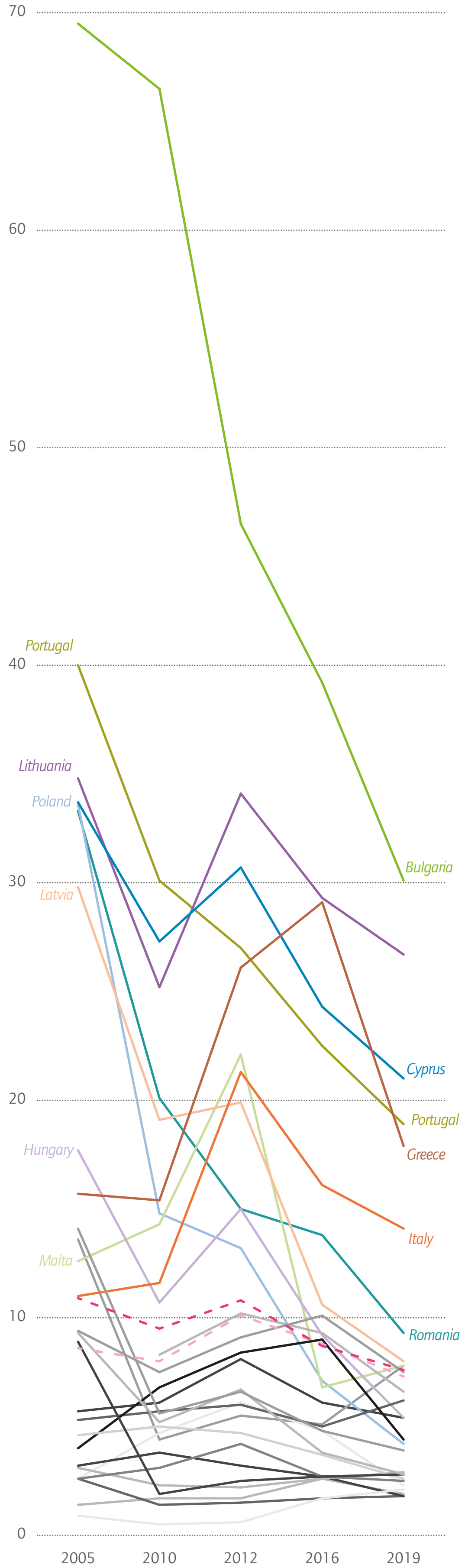


Figure 3.10b Change in energy poverty by Member State (2005-2018)



Source: EU SILC, 2020.
Note: Energy poverty defined as share of respondents claiming inability to keep home adequately warm.
For Italy, Ireland, Luxembourg, the UK, the EU and EA 2019=2018.

The case of the automobile industry: moving towards electromobility

19%
and growing

Share of road transport in EU emissions

Besides the energy sector, road transport is a major source of EU GHG emissions (with roughly 19% of the EU total in 2018) and unlike the energy sector, road transport has been a source of emissions growth in the last few years. According to the European Energy Agency (EEA 2019b), in 2017 transport made up 27% of total EU28 GHG emissions, and specifically road transport was responsible for 19% of EU emissions (for comparison, aviation constituted 3.5% and rail less than 0.2%).

As of May 2020, with 3.7 million quality jobs in automobile manufacturing and a total of 14.6 million jobs in the broader European automotive sector, the industry remains a key employer in Europe (ACEA 2020a). Digitalisation and decarbonisation are likely to reshape the entire business model of this industry, and throw unprecedented challenges in the way of its future, first and foremost by redefining the ways in which labour is sourced and used, and secondly by reorganising its entire value chain.

Total transport made up
27%
of total EU28 GHG emissions

Source: EEA, 2017

Figure 3.11 shows the evolution of average CO_2 emissions from new passenger cars for the EU27, the UK and Norway between 2000 and 2019.

A quantum technological leap needed to meet emissions targets

Following a moderate decrease in car emissions between 2000 and 2007, the reduction became steeper and continued in this trend up until 2014: this amounted to a total reduction of 29% over these 14 years. Since 2015, however emissions have been rising again, with average emissions at 122.4g CO_2/km in 2019. Reaching the EU emissions target of 95g CO_2/km by 2021 would require a colossal effort from the car industry.

Yet despite the many uncertainties and structural pressures, the European automobile industry still managed to squeeze out a record year in 2019. Compared to 2018, new-car registrations increased by 1.2% across the European Union, reaching more than 15.3 million in total and marking the sixth consecutive year of growth (ACEA 2020b).

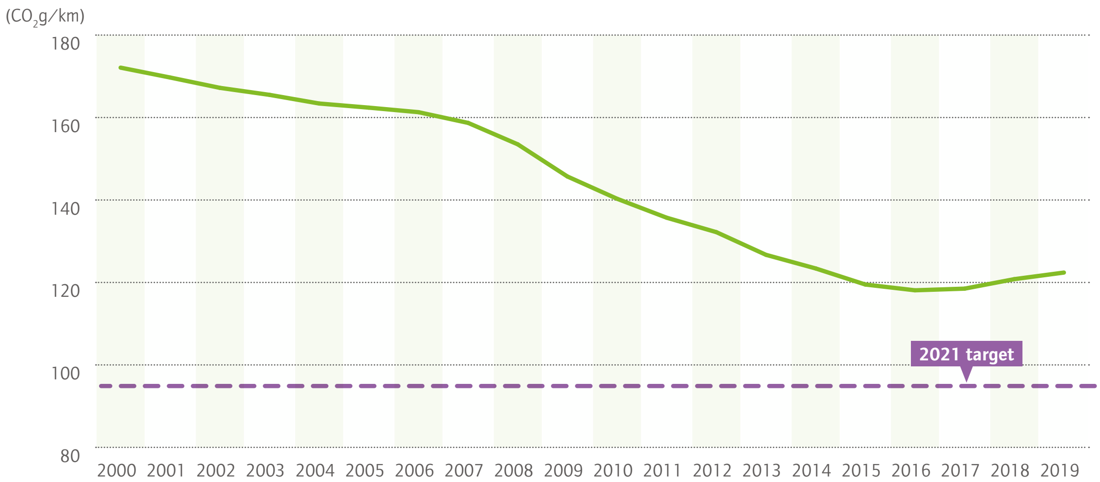
However, 2020 has already shaped up to be a very different year for the industry, not least because of the Covid-19 crisis. New car registrations in June 2020 were far behind those of June 2019, as Figure 3.12 shows.

Most EU countries saw double-digit drops. Italy, Germany and Spain fell by 23%, 32% and 36% respectively, while Portugal recorded the highest decrease of 56%. France was the only Member State that recorded a growth in new car sales due to its recovery plan that also favoured car purchases.

Europe is way behind China on electromobility

The path for the future is towards zero-carbon mobility, where battery (fully) electric vehicles (BEVs) will have a central role, even if Europe is still at the very beginning of this transformation. Figure 3.13 shows the evolution of the stock of electric vehicles since 2015 in global comparison. In 2015 the spread of passenger vehicles with electric propulsion was still in an embryonic phase, as the total number of such vehicles, including BEVs and plug-in hybrids (PHEVs), constituted just 639,000 worldwide (IEA 2020). In that year, 98% of BEVs were

Figure 3.11 Average CO_2 emissions from new passenger cars in the EU27, UK and Norway (CO_2 grams per kilometre)

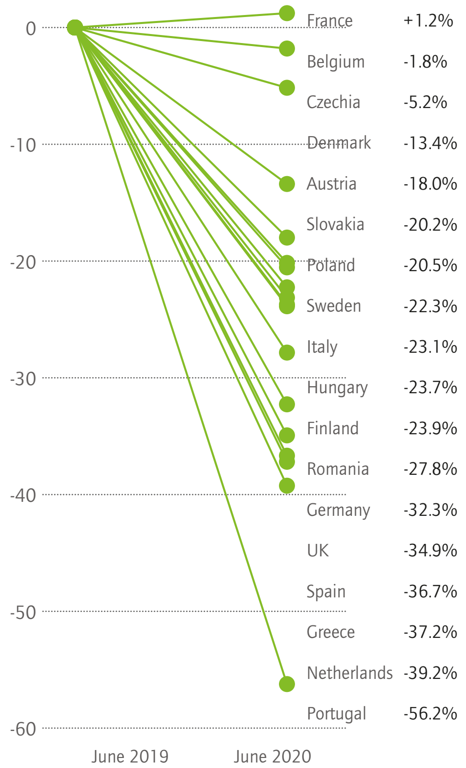


Source: EEA 2020 https://www.eea.europa.eu/data-and-maps/indicators/average-co2-emissions-from-motor-vehicles/assessment-2.

56%

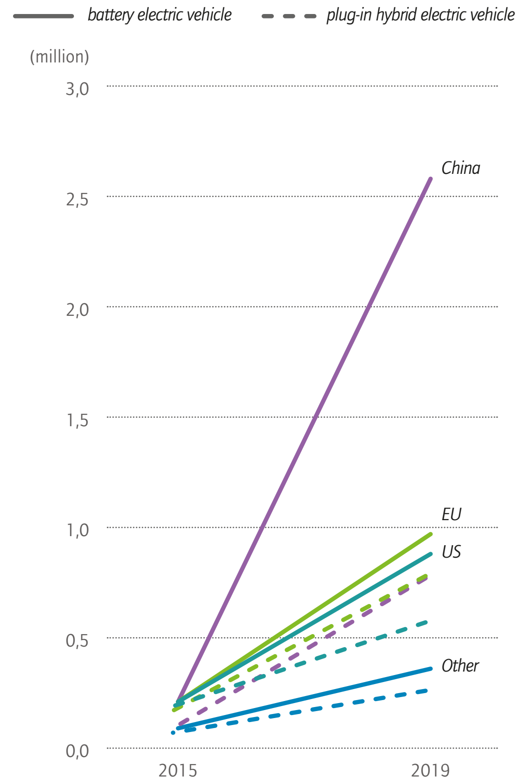
Portugal: highest decrease in the EU in new car registrations in 2020

Figure 3.12 NChange in new car registrations in key European markets, June 2020/June 2019, (%)



Source: ACEA 2020b

Figure 3.13 Global electic car stock, 2019



Source: IEA, 2020 https://www.iea.org/reports/global-ev-outlook-2020.

EU

20%

vs. China

53%

share of global battery electric vehicle stock

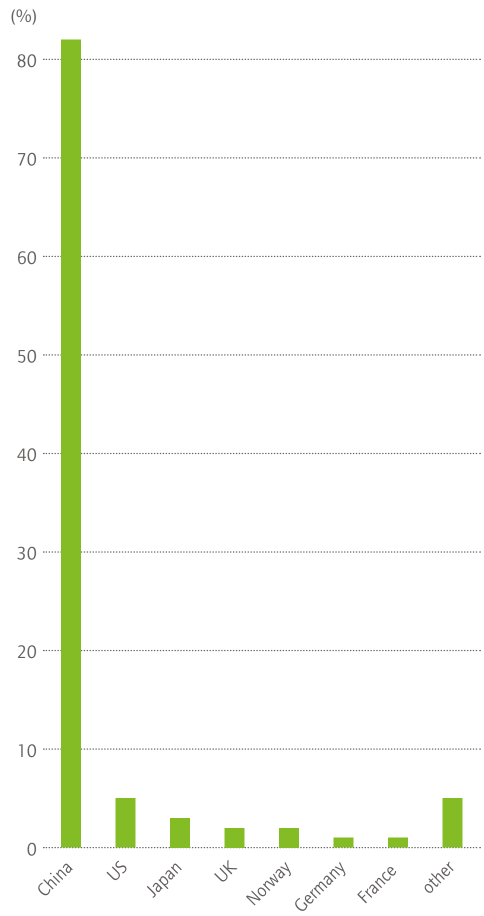
equally shared between the EU, the US and China, and these three regions also made up the overwhelming majority of PHEV global stock. There has since been a spectacular growth in the pure electric BEV category, as between 2015 and 2019 the stock (still a tiny fraction of the total passenger car market) quadrupled in the US, grew almost fivefold in the EU and grew a staggering twelvefold in China. In 2019, China had 53% of all battery electric vehicles in the world, while the EU's share was 20%. Although the EU made some progress in plug-in hybrids and, in 2019, slightly overtook China, this technology ought to be seen as an interim stage towards full electric mobility.

The dominance of China is even more pronounced in publicly accessible electrical vehicle chargers (for both conventional slow chargers and fast chargers). Figure 3.15 shows data for publicly accessible fast chargers (IEA 2020).

The data speaks for itself: China has 82% of global publicly accessible electrical vehicle fast chargers worldwide, followed by the US (5%), Japan (3%), the UK and Norway (2%) and Germany and France (1%).

For Europe, there is a long way to go in both speeding up BEV production and sales and establishing the necessary charging infrastructure. It is a positive sign that the EU Recovery Fund and the Next Generation EU Investment programme include these as priorities.

Figure 3.14 Publicly accessible electric vehicle fast chargers, 2019 (% of the global total of 598,000)



Source: IEA, 2020 https://www.iea.org/reports/global-ev-outlook-2020.

The EU recovery plan

No way back to a pre-Covid-19 'normal'

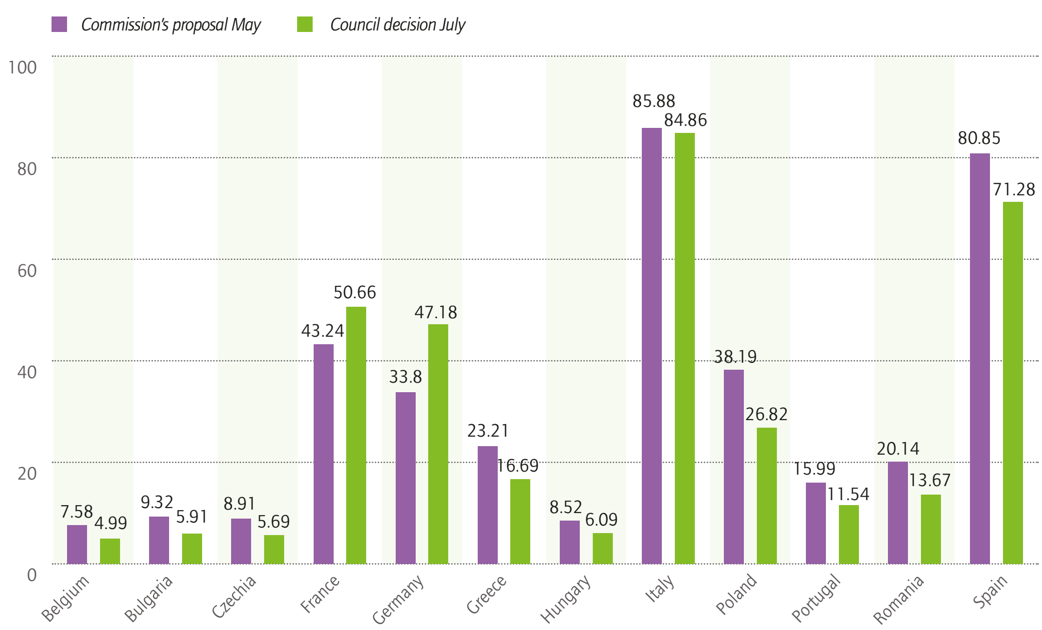
It is clear that after the pandemic there is no way back to the 'old normal', as a structural shift will necessarily have to be part of any cyclical adjustment. From a technological point of view, the digitalisation of the economy gained a further boost, and this will have longer-term effects. From a sustainability point of view, policymakers recognised the urgent need to act and shape recovery measures in line with earlier decarbonisation strategies. It is a welcome development that once the first shockwaves of the health crisis had settled, European policymakers (both at national and at EU level) quickly recognised that the blueprint of EU recovery should be the European Green Deal.

The European Recovery Fund proposed by the Commission in May 2020, and approved by the European Council in a modified form at the July Summit (2020), is a historical milestone in two ways. It is the first time that the EU as a whole will borrow from capital markets to finance expenditures throughout the Union. And, secondly, it aims at a longer-term vision of a zero-carbon economy, with the Next Generation EU (NGEU) investment programme building on the objectives and priorities of the European Green Deal (see also Laurent, forthcoming). This includes: stepping up investment in retrofitting/renovation of the building stock, with a target of EUR 350 billion per year via the InvestEU instrument; establishing an EU tendering scheme for renewables and facilitating EUR 25 billion worth of capital investment at the Member State level, along with EUR 10 billion in funding from the European Investment Bank; and scaling up investment in clean hydrogen. For the automotive sector, key objectives are a EUR 40-60 billion investment in zero-emission powertrains and a doubling of investments in charging stations.

The final compromise deal approved by the European Council, includes cuts in total grants from EUR 433 billion originally proposed by the Commission to EUR 384.4 billion, and it also includes modifications in the cross-country allocation method of the largest instrument, the Recovery and Resilience Facility (RRF). While 70% of the RRF is now expected to be allocated during 2021 and 2022, for the 30% that is due in 2023 a new allocation key is applied. Instead of the relative unemployment rate between 2015 and 2019, now the loss in real GDP in 2020 and the cumulative loss in real GDP observed over the period 2020-2021 will be decisive. This means that while the earlier proposal generally favoured lower-income countries (independently of how much they have been affected by the Covid-19 crisis), the approved package now favours large countries with a high GDP loss, as the fall of GDP is measured at absolute level in constant-price euros (see Chapter 1). Figure 3.15 shows the effect of the changes in the allocation of grants to Member States as a percentage of their gross national income (GNI), based on calculations by Bruegel (Darvas 2020).

While Italy and Spain will further on receive the highest amount of grants, it is Germany and France who will benefit most from the amendments. At the other end of the spectrum, Poland and some CEE new Member States now receive significantly lower allocations than what the original Commission proposal contained. Poland, Romania and Croatia will receive roughly 32% less in the form of grants; for Greece the reduction is 28%, and for Bulgaria 38%.

Figure 3.15 Comparison of cross-country grant allocations from the recovery instruments (EUR billion at 2018 prices)



Source: Bruegel 2020 and European Commission.

The ETUC expressed its support for the upward revision of the 2030 greenhouse gas emission reduction target, from 40% to 55% (compared to 1990 levels)."

Trade unions and the green transformation

A strategic dilemma

Stevis and Felli (2015) differentiate between labour unions in terms of political strategy, terming different organisational styles as either 'business' or 'social' unionism. 'Business unionism' limits itself to getting a fair share out of a growing economy while leaving broader questions of political economy and equity to firms and states. 'Social unionism', on the other hand, believes that unions ought to have a say in the organisation of the (political) economy, both because it shapes the material reality of workers' lives and because these unions see themselves as collective representation organs for engaged citizens.

In their traditional roles, many trade unions have aimed to manage the effects of economic changes driven by the profit-seeking motives of capital. Often, they have gone as far as questioning the legitimacy of such changes, and at least one strategy to shield workers from their more negative consequences has been that of resisting or opposing change altogether.

However, changes linked to decarbonisation presents a novel challenge for these traditional strategies. After years of debate, decarbonisation is now best characterised as a shared objective in the interest of humanity. At the same time, meeting this objective poses significant challenges to the world of work, as the workplace-level effects of this transition – such as employment reduction, job transitions, higher flexibility and work pressure – are similar to those which unions normally fight against when defending their members' interests. A further complication is that, in most cases, changing dynamics in the world of work are under the simultaneous influence of all other major megatrends: decarbonisation, certainly, but also technological change and globalisation.

There is a visible tension between the main responsibility of unions in managing the consequences of change and their role as agents of change. By raising their climate policy ambition, and with it also the pressures and demands on work organisation, they are invariably and consequentially rendering their interest representation role more difficult. This conflict often manifests itself as a growing tension between plant-level action and union action at a higher level. Unions at national or supranational level have been promoting the concept of just transition in the context of climate change for a while now. But unions on the ground – at local, regional, sectoral or company level – are confronted with its implementation in real-life work relationship practices. National union centres and their umbrella organisations are, by and large, organisations set up to represent workers before government and intergovernmental organisations on matters relating to broad economic, industrial and social policy, and environmental issues, whereas the dealings of industry- or sector-wide union structures with employers typically pertain to wages, working conditions, collective bargaining, and union coordination. The former category of union organisation thus typically engages more with broader societal issues, while the latter is more narrowly focused on how the membership is affected by the immediate consequences of the transformation. In an ideal system of internal industrial democracy, these two levels would be able to reconcile their different roles in ways that would strengthen union action across the board. In reality, however, it is often the case that such a reconciliation of interests is rendered more challenging by the reluctance of governments and employers to provide adequately funded and sufficiently targeted policies that offer a fair mutualisation of the risks pertaining to the transition to a green economy. It is thus often the case that the inadequacies of the broader policy framework end up being internalised within the union movement, generating intra-systemic tensions.

Trade unions on the European Green Deal

The tension between trade union strategies described above has also been recognisable in various trade unions' positions on the European Green Deal (EGD) and on the climate policy objectives attached to it. As summarised in the ETUI Green New Deal newsletter (ETUI 2020), while the ETUC and the European Federation of Public Service Unions (EPSU) openly declared their support for an ambitious EU climate policy, IndustriALL and IG Metall were more cautious and expressed some reservations.

Ahead of the announcement of the EGD, the ETUC pointed to the urgent need for ambitious climate policies that should be inclusive and supportive of the most vulnerable regions, sectors and workers. The position paper rightly emphasised that a concrete just transition strategy which aligns with the EU's climate policy aspirations is necessary.

In a statement on the industrial strategy document of the Commission, the ETUC stressed the importance of a just transition concept that offers prospects to those regions, sectors and workers that will be most affected, and that guarantees that no one is left behind. The confederation also called for a carbon border adjustment mechanism to protect European jobs and industry from unfair competition or carbon leakage.

It must be enshrined in a much broader investment strategy that channels billions of euro into all regions that struggle with structural challenges."

Luc Triangle,
General Secretary of IndustriAll

Ahead of the Climate Law and the EU Climate Pact, the ETUC expressed its support for the upward revision of the 2030 greenhouse gas emission reduction target, from 40% to 55% (compared to 1990 levels), as well as for the longer-term objective of reaching net-zero GHG emissions by 2050. However, it again stressed that trade union support for a binding climate law is conditional on a well-funded just transition mechanism. In order to have sufficient funding to fight climate change, the ETUC urged the EU Council to increase the EU budget to 1.3% of GNI and to pursue further progress on a fairer taxation system.

EPSU also expressed its support for the 2030 and 2050 targets but it emphasised that the European Green Deal should steer away from market-based solutions. The federation formulated several key demands, including a significant increase in public investment, the promotion of public ownership of utilities, an ambitious just transition strategy, and universal and affordable access to basic services and common goods.

For its part, IndustiAll stressed that in order to secure the support of workers in industry, the EGD should be made 'social'. Europe's industry union warned that increasing the carbon price within the ETS might not be the silver bullet that will trigger transformative change, partly because this would neglect the specificities of the different industrial sectors regarding technological readiness and the cost of low-carbon options. Regional disparities represent another risk for the success of the EGD.

On the Just Transition Mechanism, IndustriAll General Secretary Luc Triangle stressed that for it to be successful, it 'must be enshrined in a much broader investment strategy that channels billions of euro into all regions that struggle with structural challenges'. He added that the planned amount available from the EU budget is much too small 'to trigger the transformative changes that those regions need to become climate-neutral without becoming economic deserts at the same time'.

According to IndustiAll, the new EU industrial strategy must be implemented for workers and with workers. Triangle warned that 'decarbonising sectors such as energy-intensive or automotive industries will not happen with a target-driven and a market-driven approach. The EU and its Member States must create the conditions for the targets to become reachable.'

Meanwhile, Europe's biggest industrial union, the German IG Metall, expressed its support for the objective of climate neutrality set out in the EGD, but stressed that the targets must be concrete and achievable. The union also made the point that it would not support a disruptive transformation carried out on the backs of workers, stating that the automobile industry was key for the economy. The union agreed with the raising of the CO_2 price, but stressed that the idea can only work if people are offered practicable and socially acceptable alternatives.

Conclusions

"Job losses and longer-term labour market effects of the Covid-19 crisis, in particular increases in inequality and the high exposure of vulnerable groups, have made it clearer than ever how important a 'just transition' approach is in climate policy."

This chapter has provided an overview of the performance of the EU and its Member States regarding their progress towards meeting key climate policy targets over the last few decades. It has presented a double focus, on both the climate emergency crisis and the unfolding Covid-19 crisis – the two being intimately entwined, but also offering opportunities for mutual learning. While the 2020 targets have been reached at EU level, the 2030 targets remain out of reach (despite being unsatisfactory in their ambition and non-compliant with the Paris Agreement), not to speak of the ambitious and now official net-zero emissions target for 2050. The analysis has shown the different aspects and drivers of GHG emissions reductions at Member State level. GDP per capita matters, as richer countries can only keep emissions low if they are efficient in energy and resource use and decarbonise their energy generation and use (which offsets the trade-embodied emissions which are commonly on the rise due to growing consumption). For 'catching-up economies', the challenge is how to increase their wealth without generating higher emissions and resource use. Structural shifts in the economy, in particular the shift from industry to services, have historically helped in this respect, but this approach has its limits, and the preservation of core industry competences for Europe has emerged as a key strategic priority during the pandemic. The data reported in the previous sections also showed that while the EU has been rather successful over the years in reducing territorial (production-based) emissions, the reduction in consumption-based emissions has tended to lag behind (effectively causing the 'farming out' of emissions beyond the EU).

Decoupling economic growth from emissions and resource use remains the most important policy objective, but also policy challenge, for 21st century Europe. In spite of the temporary reduction of GHG emissions due to the Covid-19 crisis this year, reaching zero carbon by 2050 will require a radical step up in decarbonisation efforts, with a paradigm change in both production and consumption patterns. An insight into two key sectors, energy and automobiles, shows how difficult this transformation process is and what challenges lie ahead. The energy sector has an encouraging record of GHG reductions and its decarbonisation has sped up in the past couple of years. Besides more stringent policy targets, the fall in the cost of deploying renewable energy due to technological progress and economies of scale has also contributed to a faster retreat of fossil fuels, in particular coal. Road transport and the automobile industry are, however, in a more challenging situation. Emissions from road transport started to grow again in the past couple of years and the 2021 emissions target for new vehicles seems to be out of reach. Europe is lagging behind China and to some extent the US in the transformation towards electromobility. Urgent action is needed to reverse this trend, for the sake of the planet but also to make sure that the European automobile industry, and the 14 million European jobs depending on it, remains competitive in the years to come.

These difficulties present us with a number of mutual learning opportunities, stemming from both the Covid-19 crisis and the way the climate crisis is currently being addressed. Five of them will no doubt need to receive further attention in the months and years to come. Firstly, job losses and longer-term labour market effects of the Covid-19 crisis, in particular increases in inequality and the high exposure of vulnerable groups, have made it clearer than ever how important a 'just transition' approach is in climate policy. The EU's ambitious climate policy objectives can only be reached if accompanied by a strong social policy element and supportive labour market policies.

Secondly, policies that are framed as 'just transitions' should be much more comprehensive. The Just Transition Mechanism within the European Green Deal and its support from the EU Recovery Fund initiative are welcome, but fall short of addressing the magnitude of the challenges ahead. Much more emphasis should be placed on human capital investments and on facilitating labour market transitions across the whole economy. Just transition should not be reduced to policies for energy-intensive regions only.

Thirdly, it is fair to observe that both the recent health and the economic crises have led to a recognition of the central role of the state as the actor providing the safety nets and investments necessary to weather a crisis. During the Covid-19 crisis, state intervention and its mobilisation of public resources at levels not seen before suddenly became possible. Dealing with the climate emergency also needs a stronger state that has learnt the necessary lessons about recovery plans and their implementation.

Fourth, launching the European Recovery Fund and mobilising massive investments through the Next Generation EU programme was the right decision for the EU to make. These initiatives need to be made operational while also ensuring that they will mobilise additional resources and investments instead of simply reallocating existing resources.

Fifth, from a governance perspective, the European Semester framework will have a key role to play in the implementation of the EGD objectives, and needs to be equipped accordingly. As the 2020 Semester is to integrate an environmental dimension as well as the UN Sustainable Development Goals, this needs to be reflected in its practical implementation – not only in the upcoming Annual Sustainable Growth Strategy, but also in the Country Reports and the Country-Specific Recommendations.

Finally, a high degree of policy integration will be needed to establish and maintain the consistency between growth, social fairness, environmental sustainability and fiscal responsibility under the new circumstances.

The climate emergency needs to be understood in the same spirit of urgency and with the same sense of purpose that has shaped Europe's response to the pandemic; as noted in the opening paragraphs of this chapter, a climate lockdown is not an option.

Strandh M., Winefield A., Nilsson K. and Hammarström A. (2014) Unemployment and mental health scarring during the life course, European Journal of Public Health, 24 (3), 440-445.

UNHCR (2019) Returns from Greece to Turkey. https://data2.unhcr.org/en/documents/details/67988

Vallas S. and Schor J.B. (2020) What do platforms do? Understanding the Gig Economy, Annual Review of Sociology, 46, 273-294. https://doi.org/10.1146/annurev-soc-121919-054857

All links were checked on 09.10.2020.

Chapter 3

ACEA (2020a) Employment in the European automobile sector, Brussels, European Automobile Manufacturers Association. https://www.acea.be/statistics/article/employment

ACEA (2020b) Passenger car registrations in the EU, Brussels, European Automobile Manufacturers Association. https://www.acea.be/press-releases/article/passenger-car-registrations-1.2-in-2019-21.7-in-december

Agora Energiewende (2020) Auswirkungen der Corona-Krise auf die Klimabilanz Deutschlands. https://www.agora-energiewende.de/fileadmin2/Projekte/2020/_ohne_Projekt/2020-03_Corona_Krise/178_A-EW_Corona-Drop_WEB.pdf

Agora Energiewende and Sandbag (2020) The European power sector in 2019, London, Sandbag. https://www.agora-energiewende.de/en/publications/the-european-power-sector-in-2019/

Bergfeld M. (2019) German unions are waking up to the climate disaster, Jacobin Magazin, 16 August 2019. https://www.jacobinmag.com/2019/08/german-unions-climate-environment-fridays-for-future

BNEF (2020a) Clean energy investment trends 2020, New York, Bloomberg New Energy Finance. https://data.bloomberglp.com/professional/sites/24/BNEF-Clean-Energy-Investment-Trends-1H-2020.pdf

BNEF (2020b) Scale-up of solar and wind puts existing coal, gas at risk, New York, Bloomberg New Energy Finance. https://about.bnef.com/blog/scale-up-of-solar-and-wind-puts-existing-coal-gas-at-risk/

Borgnäs K. (ed.) (2019) Gerechte Energiewende: Sieben Thesen zu Herausforderungen und Chancen aus industriegewerkschaftlicher Sicht, Berlin, Stiftung Arbeit und Umwelt der IG BCE. https://www.arbeit-umwelt.de/thesenpapier-vorgestellt-neuausrichtung-der-energiewendepolitik-notwendig/

Chin A. et al. (2020) Anthropocene in an age of pandemics, Anthropocene, 30 (100247). https://doi.org/10.1016/j.ancene.2020.100247

Darvas, Zs. (2020) Having the cake, but slicing it differently: how is the grand EU recovery fund allocated? https://www.bruegel.org/2020/07/having-the-cake-how-eu-recovery-fund/

EEA (2019a) European environment – state and outlook 2020, Luxembourg, Publications Office of the European Union. https://www.eea.europa.eu/publications/soer-2020

EEA (2019b) Greenhouse gas emissions from transport in Europe, Copenhagen, European Environment Agency. https://www.eea.europa.eu/data-and-maps/indicators/transport-emissions-of-greenhouse-gases/transport-emissions-of-greenhouse-gases-12

Euractiv (2020) Poland agrees to shut coal mines by 2049. https://www.euractiv.com/section/electricity/news/poland-agrees-to-shut-coal-mines-by-2049/

European Commission (2019a) Towards a sustainable Europe by 2030, Reflection Paper, Brussels, European Commission. https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf

European Commission (2019b) Green public procurement. http://ec.europa.eu/environment/gpp/index_en.htm

European Commission (2019c) Communication from the Commission – The European Green Deal, COM(2019) 640 final, 11 December 2019. https://ec.europa.eu/info/files/communication-european-green-deal_en

ETUI (2020) Editorial. Why a Green New Deal Newsletter. https://www.etui.org/news/editorial-why-green-new-deal-newsletter

Harvey F. (2020) Atmospheric CO2 levels rise sharply despite Covid-19 lockdowns, The Guardian, 4 June 2020. https://www.theguardian.com/environment/2020/jun/04/atmospheric-CO2-levels-rise-sharply-despite-Covid-19-lockdowns#maincontent

IEA (2020) Global EV Outlook 2020: entering the decade of electric drive?, Paris, International Energy Agency. https://www.iea.org/reports/global-ev-outlook-2020

Jakubowski A. (2019) Phasing out coal in the French energy sector, in Galgóczi B. (ed.) Towards a just transition: coal, cars and the world of work, Brussels, ETUI, 81-108.

Laurent E. (2020) The European Green Deal: from growth strategy to social-ecological transition?, in Vanhercke B., Spasova S. and Fronteddu B. (eds.) Social policy in the European Union: state of play 2020, Brussels, European Trade Union Institute (ETUI) and European Social Observatory (OSE), 93 – 108.

NASA (2020) Environmental effects of coronavirus quarantines. https://earthobservatory.nasa.gov/images/event/146381/environmental-effects-of-coronavirus-quarantines

Peters G. et al. (2012) Rapid growth in CO2 emissions after the 2008–2009 global financial crisis, Nature Climate Change, 2 (1), 2-4. https://www.nature.com/articles/nclimate1332.epdfScientific American (2020) Will 2020 be the hottest year on record? https://www.scientificamerican.com/article/will-2020-be-the-hottest-year-on-record/#:~:text=In%20its%20first%20seven%20months,records%20go%20back%20141%20years)

Stevis D. and Felli R. (2015) Global labour unions and just transitions to a green economy, International Environmental Agreements: Politics, Law and Economics, 15 (1), 29–43.

Szpor A. (2019) The changing role of coal in the Polish economy – restructuring and (regional) just transition, in Galgóczi B. (ed.) Towards a just transition: coal, cars and the world of work, Brussels, ETUI, 33-35.

Watts J. and Kommenda N. (2020) Coronavirus pandemic leading to huge drop in air pollution, The Guardian, 23 March 2020. https://www.theguardian.com/environment/2020/mar/23/coronavirus-pandemic-leading-to-huge-drop-in-air-pollution

All links were checked on 21.09.2020.