Introductory overview

Two faces of (a) just transition: the coal story and the car story

Béla Galgóczi

1. The climate emergency and the importance of these two sectors

Time is running short for us to have a realistic chance of getting climate change under control and preventing it from becoming irreversible and self-sustaining. Talking about the climate emergency has become widespread and, due also to the successful campaigns of the youth movements 'Fridays for Future' in Europe and the 'Sunrise Movement' in north America, public awareness has been rising fast in the last couple of years. New scientific evidence on the expected effects of climate change, ever more dramatic, appear on a weekly basis. Without higher levels of ambition, an IPCC report (2018) already foresees a 1.5°C warming by the mid-2040s, while scientists find that global sea level rise could reach an average of 65cm by 2100, double that previously forecast (NASA 2018). Scientists also warn that global warming may reach a certain threshold in the very near future, one that triggers a sudden, violent shift in the climate system and catalyses a domino effect of dramatic new climatic changes via feedback mechanisms (Green *et al.* 2019).

In the wake of the Paris agreement, it has become increasingly clear how national commitments are falling short of the necessary targets, the result being a huge emissions gap. National pledges would be likely to deliver a temperature increase of at least 3°C by 2100 and would only bring one-third of the reduction in emissions required by 2030 to be on track towards climate targets (UNEP 2017). In the absence of significantly greater ambition, the carbon budget behind a 2°C scenario will be almost depleted by 2030. At the same time, an IPCC (2018) report ahead of the COP24 Katowice Summit pointed to the dramatic difference between 2°C and 1.5°C warming scenarios, making a strong case for sticking to the more ambitious target.

Climate policy ambition thus needs to be stepped up and radical change is, of course, necessary in order to reach a net-zero carbon economy at global level in the second half of the century. In its Communication, the European Commission (2018a) set the long-term objective of a climate-neutral Europe by 2050. This means that, between 2030 and 2050, cuts in greenhouse gas (GHG) emissions will be required at a level twice as deep as Europe is likely to achieve between 1990 and 2030.

Transition to a net-zero carbon economy is thus a compelling necessity and the clock to get climate change under control is ticking.

Meeting the Commission's ambitious objective will not be possible without the timely phasing-out of unabated coal from energy generation. Coal still accounts for one-third

of all energy used worldwide and 38 per cent of electricity generation and is responsible for 44 per cent of global CO_2 emissions (IEA 2018). Also, the transport sector, and road transport in particular, is one of the remaining sectors in the European economy in which emissions have not decreased in recent decades and where the pressure to change this course is mounting. These two key sectors will have a deciding effect on whether climate change can be held at bay.

This book focuses on the main policy objectives and trends in the transformation in both the energy sector and the automobile industry. It analyses the main drivers of the transformation, the likely employment and regional effects and the role played by actors' strategies, taking both the common elements and the main differences into account. The first part of the book is devoted to the coal transition, while the second part addresses the challenges faced by the automobile industry. 'Just transition' has become the main concept and strategy tool for managing the transformation towards a net zero-carbon economy in a way that is both balanced and fair, but it is also clear that this concept is developing in a too broad and general, and often even over-stretched, manner. In order to discuss it meaningfully, we need to turn to specific case studies. Coal-based energy generation on the one hand and the automobile industry on the other do not only represent two sectors that are responsible for a large part of total GHG emissions, they also illustrate what is really meant by the different contexts of just transition.

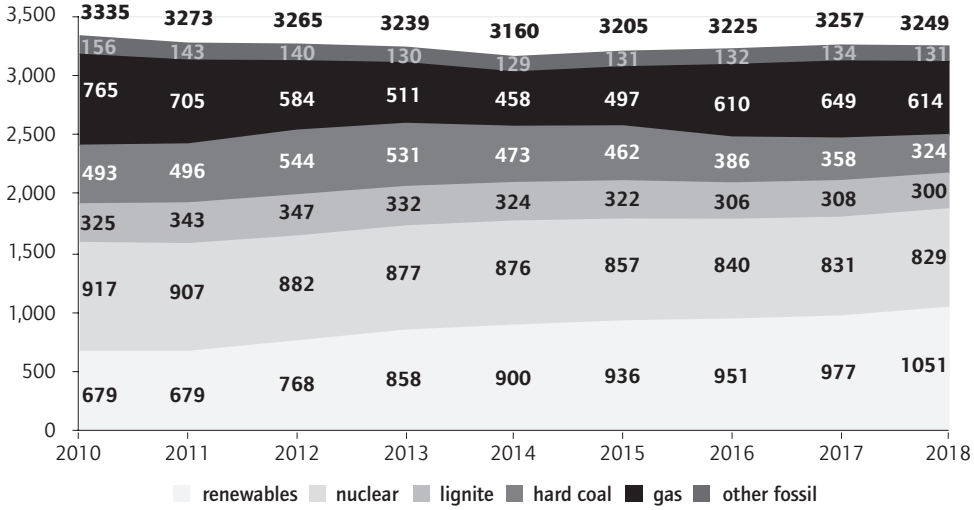
After framing the main challenges in the introductory overview, part 1 of this book deals with the coal transition in key EU member states, with part 2 then discussing the challenges faced by the European automobile industry. Four chapters in the first part cover Poland, Germany, France and Italy, while chapter 5 analyses the importance of regional policy in managing the coal transition. Part 2 delivers an account of the revolutionary change taking place in the automobile industry, proceeding from a European overview (chapter 6) to insights both from France (chapter 7) and from Germany, the latter with its central eastern European supply chains (chapter 8). Chapter 9 then gives the view of IG Metall, a trade union which has a key role in managing change in the automobile industry in an active and forward-looking way.

2. The shrinking role of coal in the European economy

The composition of electricity generation in the EU28 in 2018 shows that renewables provided 32.4 per cent of total electricity, followed by nuclear energy (25.5 per cent), hard coal and lignite (19.2 per cent) and gas (18.9 per cent). Renewables other than hydro made up 21.8 per cent, just above coal and gas (Agora Energiewende and Sandbag 2019).

The EU's share in global coal-based electricity generation was just seven per cent (2017) and, while the world on average still had a 38 per cent share of coal in generating electricity, in Europe it was just above twenty per cent (IEA 2018). In 2016, there were 128 coal mines in twelve EU member states and 41 regions, with a total annual output of 500 million tonnes making up sixty per cent of gross EU coal consumption. The

Figure 1 **Electricity generation by fuel type and changes in composition (2010-2018), EU28 in terawatt hours (TWh)**



Source: Eurostat; Agora Energiewende and Sandbag (2019).

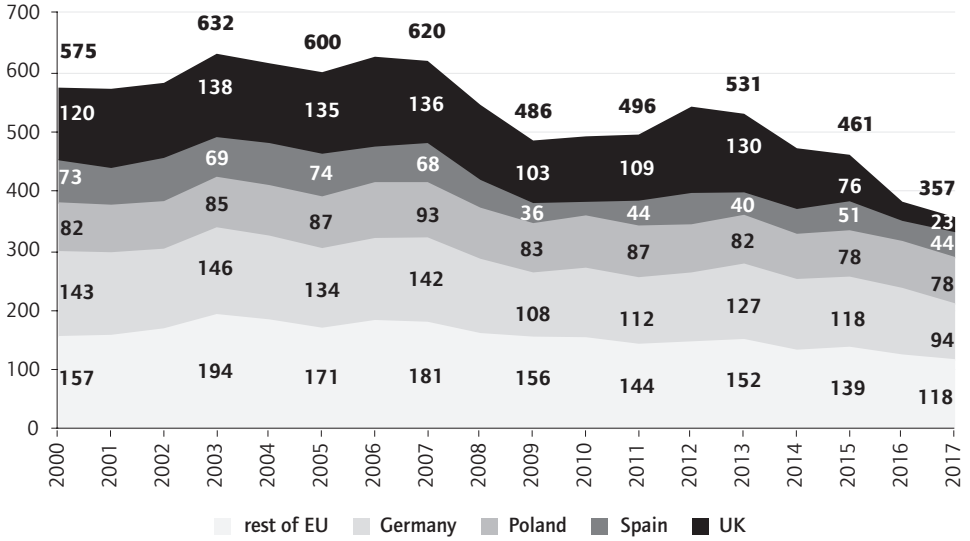
other forty per cent of the gross consumption of solid fuels (almost entirely hard coal) in the EU was covered by imports, making up 4.9 per cent of the EU's total energy imports (Eurostat 2018). There were 207 coal-fired power plants in operation in 21 member states in 103 regions, with a total capacity of 150 gigawatts (GW), making up fifteen per cent of total European power generation capacity. Coal infrastructure was thus present in 108 European regions (Alves Dias *et al.* 2018).

Taking 2010-2018 into account, coal generation is on the retreat in the EU as Figure 1 illustrates. The period between 2010 and 2012 showed a strong increase in coal, but there has since been a clear declining trend.

Total coal use in electricity generation in the EU28 fell by six per cent in 2018 and was 24 per cent below 2010 levels. For hard coal, the respective falls were nine per cent and 34 per cent; while for lignite, the declines in 2018 compared to 2010 were a mere 2.5 per cent and eight per cent (Agora Energiewende and Sandbag 2019).

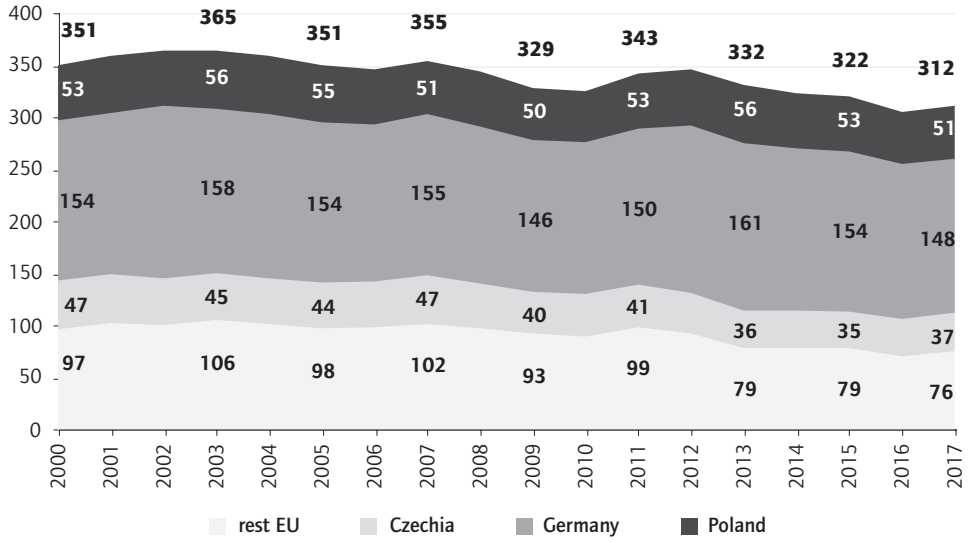
As regards how the role of coal has changed in those member states with the strongest usage traditions, the differences are quite significant. In order to illustrate the different patterns of change, Figure 2 (hard coal) and Figure 3 (lignite) show the role of coal in electricity generation in the EU over a longer perspective, between 2000 and 2017, indicating the trends in the top five coal-dependent member states. It is important to note that the role of coal-based energy generation in the EU still grew until 2007 and that only thereafter did it start to decrease.

Figure 2 **The role of hard coal in electricity generation in the EU (2000-2017), TWh**



Source: Eurostat; Agora Energiewende and Sandbag 2018.

Figure 3 **The role of lignite in electricity generation in the EU (2000-2017), TWh**



Source: Eurostat; Agora Energiewende and Sandbag 2018.

While electricity generation by hard coal fell by 38 per cent between 2000 and 2017 in the EU28, generation by lignite – a greater pollutant – fell by only eleven per cent in this seventeen-year period. The data also clearly show the dominant role of a small number of member states in burning coal. In 2017, Germany, the UK, Poland and Spain made up 67 per cent of EU electricity generation from hard coal. The UK managed a

spectacular reduction in the use of hard coal (by 2017 this was down by eighty per cent compared to 2000), while Spain saw a forty per cent reduction and Germany 35 per cent. In Poland, however, the use of hard coal in energy generation has remained practically the same over the last 17 years.

Turning to the use of lignite in electricity generation, it was Germany, Poland and Czechia that made up 76 per cent of the EU total in 2017. Most worrying is that, for the two dominant users of lignite, Germany and Poland, usage did not change significantly over the last seventeen years (in Germany, it fell from 154 TWh in 2000 to 148 TWh in 2017; for Poland, the change in this period was from 53 to 51 TWh).

The first part of this book shows how the transition process to a coal-free economy is being managed at national level, providing insights also into company and regional level strategies. Chapter 1 discusses how Poland is trying to manage its coal transition by adjusting its energy system to cope with EU policy targets while, at the same time, not giving up coal in the foreseeable future. Chapter 2 gives an account of Germany's long and difficult farewell to coal, based also on the recommendation of the national Coal Commission to the federal government, while setting a positive example of how social and civil dialogue can shape the framework of a difficult restructuring process, albeit one that still falls short in its level of ambition. Chapter 3 discusses the case of France, concerning how it is itself embarking on a just transition away from coal in an ambitious, but conflictual, way. Chapter 4 delivers an account of the Italian energy transformation with particular emphasis on the 'best practice' case of how ENEL, its biggest energy firm, is re-inventing itself to become the first carbon-neutral energy multinational in the world. Furthermore, chapter 5 discusses the importance of regional policy in managing the coal transition.

3. The automobile industry: out of the crisis, but now facing disruption and renewal

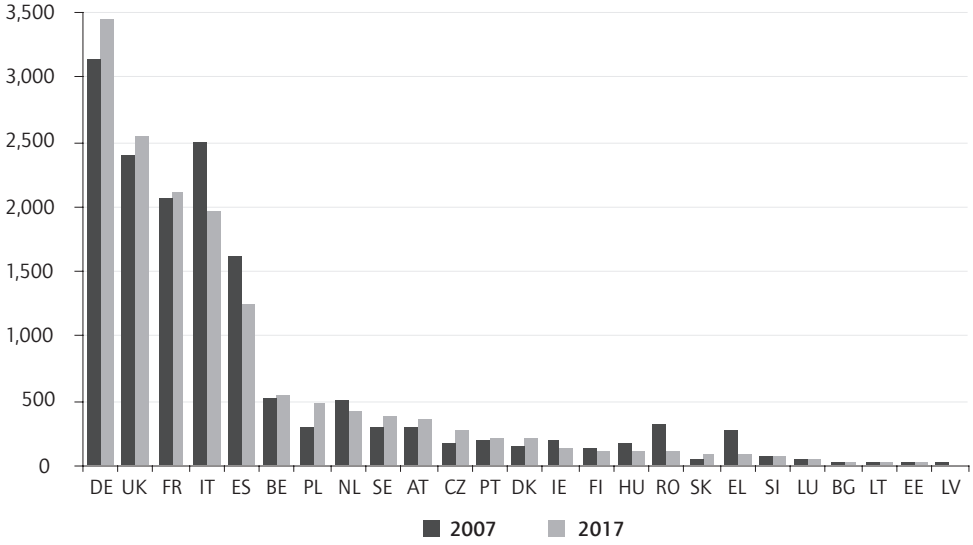
As of 2017, with 3.5 million quality jobs in automobile manufacturing (2.6 million direct and 0.9 million indirect), and with a total of 13.8 million jobs in the broader European automotive sector, the industry is a key employer in Europe (ACEA 2019). With digitalisation and decarbonisation, the industry faces unprecedented challenges in the near future that will re-write its entire business model, redefine work and redraw its value chains. Managing this change requires innovative approaches from the main actors and new forms of relationships between the actors.

Chapter 6 of this publication discusses the challenges of the automobile industry at European level, while also presenting forecasts for the next decade. Chapter 7 describes the situation of the French automobile industry, establishing empirical insights into developments in employment and restructuring. Chapter 8 provides an analysis of the German automobile industry and its value chain in central eastern Europe. Chapter 9 gives an evaluation of the European and German car industry from the point of view of IG Metall, sketching also the main strategy of Europe's biggest trade union in dealing with the challenges.

By 2018, the European automobile industry finally seemed to have surpassed the effects of the crisis of 2008/2009. Mitigating the long-standing issues of overcapacity and pressures on prices and costs, sales and production volumes began to pick up from 2013, while both the trade surplus and employment are growing and profitability among the major assemblers and suppliers is again on the rise.

Despite the ending at macroeconomic level in 2013 of the double-dip recession that followed the 2008 financial crisis, total sales in the European automotive sector nevertheless re-attained their pre-crisis peak only in 2017, although with great differences by individual member state (Figure 4).

Figure 4 **New passenger car registrations in EU member states, 2007 vs. 2017**



Source: see Anne-Gaëlle Lefeuvre, chapter 6 of this publication.

Over the past decade, the European automotive industry has witnessed significant transformations. To take just a few examples, the emergence of central and eastern Europe as a manufacturing powerhouse, large-scale product diversification (alongside a shift towards premium market segments with the soaring rise of SUVs or sport utility vehicles) and the unquestionable market (and, increasingly, technological) dominance of China on a global level – none of these were exactly defining features of the industry before the Great Recession.

In 2018, there was thus no perception of having an economic crisis in the automobile industry that would trigger a transformation process; the order books were full. Even the 'diesel scandal' seemed to have calmed down, as indicated by the results of the main manufacturers that were implicated. Business was going particularly well even in those areas that are set to be affected most severely by the upcoming transformation. Small and medium-sized suppliers manufacturing highly-specialised components in combustion technology are currently benefiting from the worldwide boom in private

transport. In terms of organisational theory, therefore, one cannot speak today about a crisis-induced transformation of the automobile industry. However, downwards risks did appear in the second half of 2018 with regulatory changes appearing on the horizon (new emission measurement standards and partial diesel bans in a number of cities).

Even so, 2018 was also the year in which the main European manufacturers realised that the future of the industry will be radically different and that the forthcoming changes are going to be sweeping. Especially important in this respect is the switch to electrified powertrains, which affects over thirty per cent of the value added in a car, and under which process certain products and activities could be completely eliminated precisely in those fields where the European automobile industry (in particular the German, but also the French) has particularly strong competence.

4. Drivers of change in the two sectors

Decarbonisation in both the automobile and the power sector is driven by climate and environmental regulation at European and national level and by changing consumer preferences.

4.1 Towards the end of coal

Stricter regulation on emissions and changing profitability patterns due to technological progress making renewables cheaper, as well as a turn of investment decisions away from coal, mark the stages of coal's retreat and will lead to the closure of mines and power plants with substantial employment losses in the near future.

At a time when Europe needs radically to step up its climate policy efforts to meet the COP21 objectives, and when coal is responsible for two-thirds of the CO_2 emissions of the power sector, coal-fired power plants are facing growing regulatory pressures to reduce greenhouse gas emissions and air pollution.

With the adoption in 2017 of its 'Best Available Technique' conclusions for Large Combustion Plants, the European Commission (2017) set new standards for these plants in line with the Industrial Emissions Directive (IED). These limits will be the point of reference in the future under which the continuing operation of large thermal power plants in Europe will be permitted, and underpinned by the 'best available techniques reference document' (BREF). BREF sets, among other things, new upper limits for the emission of oxides of nitrogen and sulphur (NO_X and SO_X) by large installations burning carbon-based fuels like coal and lignite. All coal-fired power plants in the EU need to meet these standards by 2021 but, in 2017, 82 per cent of such installations exceeded them (Wynn and Coghe 2017). This includes eighty per cent of German and virtually all Polish coal power plants.

As part of the package of 'clean energy for all Europeans' (European Commission 2016), the Commission's 2018 proposal for a recast of the Electricity Regulation is another crucial regulatory initiative affecting the lifespan of coal-fired power plants. The proposal sets stricter principles for national capacity mechanisms, i.e. the subsidies paid by several EU member states to power plants for making available stand-by power generation capacity to meet demand peaks.

Phasing out coal is also looking increasingly feasible and economically affordable in large parts of the world. Renewable energy sources, such as onshore and offshore wind and solar photovoltaics (PV), are constantly improving in terms of cost competitiveness with coal. The cost of renewables is plunging faster than forecasters anticipated even a few years ago, with technologies such as large wind turbines appearing on the market. Bloomberg New Energy Finance (BNEF) predicts two 'tipping points' at which the cost of renewables will make power generation fuelled by natural gas and coal increasingly unattractive. PV and wind are already cheaper than building new large-scale coal and gas plants. The next tipping point could come by the mid-2020s, when the operation of existing coal and gas plants could become more costly than taking power from wind and solar. Compared to 2017 levels, the cost of an average PV plant is estimated to fall 71 per cent by 2050. Wind energy is also getting cheaper and BNEF expects the cost to drop 58 per cent by 2050 (BNEF 2018).

The governance mechanism of the Energy Union and Climate Action initiative (European Commission 2018b) obliges member states to come up with national energy and climate plans (NECP). Specific plans for 2030 must quantify the planned national contributions towards achieving the EU's 2030 targets on renewable energy and energy efficiency (see the details of the national plans by Poland, Germany, France and Italy in chapters 1, 2, 3 and 4, respectively, of this publication). These plans will deal with the future composition of energy generation and the lifespan of existing coal-fired power plants. Phasing out coal in energy generation is an explicit policy target for most member states. All EU15 member states are planning to phase out coal by 2030 at the latest, with Germany having announced a later phase-out of coal by 2038. These 'phase-out countries' have been responsible for almost all of the fall in hard coal generation in the last decade. Western Europe may therefore be phasing out coal, but most of the new member states in central and eastern Europe – led by Poland – are sticking to it.[1] The exceptions here are Latvia and Lithuania, which are coal-free, and Hungary and Slovakia where coal phase out is planned for 2030 and 2023, respectively. Figure 5 shows the status of coal phase-out plans by member state.

1. Estonia, while not having coal-fired power plants, burns an even more polluting solid fuel, oil shale, and has no phase-out plan.

Figure 5 **The status of coal phase-out in the EU (as of October 2019)**

Source: Europe Beyond Coal (2019) and national sources. Note: Cyprus, Belgium, Latvia, Lithuania, Luxembourg and Malta have no coal-fired plants.

4.2 Re-inventing the automobile (industry)

There are no such policy objectives as phasing out the automobile, although several countries are planning, and having discussions, on the possible end of the combustion engine.

The automotive industry is undergoing three simultaneous transformations (see further details in chapters 6 and 9 of this publication). First, regulatory change aimed at fulfilling climate policy objectives and at improving environmental performance and public health is pushing the industry toward powertrain electrification with the potentially imminent disappearance of the internal combustion engine. Second, a 'mobility revolution', made possible by extensive digitalisation and vehicle electrification, entails the development of services and service provision functions alongside new connectivity and autonomous features. Such change is truly revolutionary since it has the potential for overhauling vehicle usage and ownership, along with the industry's traditional

business model. Third, digitalisation across the automotive value chain promises to stretch further the physical limits of flexible production and this is likely to have a considerable impact in terms of working environments. Intelligent production systems are building the interface between production machines and employees through an integrated communication network also encompassing other devices, employees, products and even other production sites. In addition to the new automation potential which is opening up, this will also facilitate comprehensive control of the production process.

The paradigm change in mobility and transport will also have a disruptive effect on earlier established globalisation patterns in the industry. Emerging automobile producers in China were unable to gain market access in global and European markets in the most recent decades, but in the new future world of electromobility this might become possible. The same is true for start-ups in Silicon Valley. Established incumbent car manufacturers in Europe will need to face these challenges as they will re-write existing business models and globalisation patterns with wide-ranging changes throughout the entire value chain.

The most important driver of the changes in automobile production is climate and environmental regulation. In the context of the commitments of the COP21 Paris Agreement, the transport sector now stands out as the one that has, so far, not contributed to the reduction of greenhouse gases. Cars contribute over sixty per cent of CO_2 emissions in the transport sector and thus constitute a source of very considerable leverage for emission reduction strategies. The pressure on manufacturers to cut emissions is therefore high.

At European level, debates in late 2018 were taking place on the post-2021 scenario of CO_2 emission limits for the average fleet, i.e. the average of all the cars registered by a manufacturer in one year. After the European Commission set the scene in November 2017 with a proposed fifteen per cent reduction by 2025 and thirty per cent by 2030 (compared to current emission standard limits), the Environment Committee of the European Parliament put forward a proposal for a reduction level of 45 per cent on average by 2030. The Council of Environment Ministers then reached a compromise on a 35 per cent reduction in carbon emissions (European Council 2018). In the end, the European institutions agreed on a reduction scenario of fifteen per cent by 2025 and 37.5 per cent by 2030. Several member states are discussing the introduction of further measures to regulate mobility behaviour (including city charges, speed limits and bans on certain categories of cars in low-emission zones).

By 2021, phased in from 2020, the fleet average to be achieved by all new cars is 95 grams of CO_2 per kilometre. For European manufacturers, the average is currently 118.5g/km (2017), set to rise for the first time since 2000 due also to declining registrations of diesel vehicles. Based on the 95g/km target by 2021, EU manufacturers will have to pay a penalty of €95 per registered vehicle and gram of CO_2 by which their fleet exceeds the limit.

Emissions reduction can, ultimately, be regulated via two levers: increasing the efficiency of classic combustion engines and via the market ramp-up for electric cars. The potential offered by new technologies (including downsizing, cylinder deactivation, automatic transmission, mild hybrid technology and lightweight construction) is estimated to have a reduction effect of between ten per cent and 18 per cent. The rest must, therefore, be achieved through registration quotas for electric cars.

5. Employment effects

In the coal-based power sector, a majority of the jobs that still exist will disappear in a decade and the regional effects will be harsh, as revealed by the regional employment developments and forecasts by the Joint Research Centre of the European Commission (Alves Dias *et al.* 2018). For the car industry, the exit from the combustion engine and the electrification of the powertrain, together with the effects of digitalisation and automation, will affect each individual job while employment loss both in the medium- and long-term is also projected. Different competences, skills and work organisation patterns will have a substantial impact on the previously-established comparative advantages of nations and manufacturers. We refer here to employment forecasts along different scenarios based on the ELAB 2 study by the Fraunhofer IAO Institute (Bauer *et al.* 2018) and on the study and forecasts made by Transport and Environment (2017), with details presented in chapters 6 and 9 of this publication.

5.1 Coal

In the early 1960s, coal mining secured the employment of millions of people in Europe (the UK and western Germany each had 600 thousand coal mining jobs, while even Belgium had 175 thousand at its peak). Since then, however, the number of coal mining jobs in Europe has been in rapid and continuous decline.

Based on the most recent Eurostat data, Table 1 shows employment in coal mining (hard coal and lignite) over the last decade. In 2017, the number of coal mining jobs was just below 130,000 in the EU, less than one-half of the 2007 level with a loss of 142,000 jobs during the decade. In 2017, almost two-thirds of European coal mining jobs were in Poland, followed by Czechia and Germany some way behind.

Looking at broader employment in the coal industry, the latest data available are from 2015. In that year, the number of total jobs in coal mining was 185,000.[2] Based on national data, it is estimated that around 52,700 people worked in coal-fired power

2. Employment data are based on the estimates of the JRC 2018 expert report that draws upon national information and on estimates by Euracoal (Alves Dias *et al.* 2018). These data are presented here in order to gain an overview of the entire coal sector (including also power plants). Consequently, the data do not exactly correspond to Eurostat data, which only refer to coal mining, and are also more recent. At the same time, even the 2015 figures from Eurostat are different to the ones presented here (185,000, in comparison to the number of jobs in coal mining as reported by Eurostat of 159,000). The biggest difference between the two sources appears in the case of Romania.

plants across the EU in 2015, putting the number of direct coal industry-related jobs (in coal mines and in power plants) at c. 237,700 in the EU28 (Alves Dias *et al.* 2018). In coal mining, the share of the total held by Poland alone is above fifty per cent. Employment in coal-fired power plants is less than one-third of the level in mining and it is spread more evenly across the EU, although Poland has the highest number here, as well, followed by Germany and Czechia. Even so, almost three-quarters of this total number of 237,700 direct coal-related jobs in 2015 were concentrated in ten EU NUTS-2 regions, four of which are located in Poland, two in Germany and two in Czechia.

Table 1 **Employment in the mining of coal and lignite in the EU27***

	2007	2017
European Union – 27 countries	271,800	129,748
Bulgaria	14,289	10,300
Czechia	24,265	15,145
Germany	42,440	14,465
Poland	135,905	82,036
Romania	20,908	953
Spain	8,515	923
United Kingdom	5,944	1,420

Note: for UK, 2007=2008 and 2017=2016; for Czechia, 2007=2010.
Source: Eurostat 2019 [sbs_na_ind_r2]; *EU27: including UK, but excluding HR.

Several coal mines have been closed in the recent past due to a lack of competitiveness (27 mines in the 2014-2017 period, including mines in Germany, Poland, Czechia and Romania). Spain has closed its last 26 coal mines due to losses and the end of public subsidies, sustaining in 2018 a loss of 2,000 jobs that saw the end of the coal mining era in that country. In 2018, Germany completed its phase-out of the mining of hard coal, although lignite mining still continues.

Experts from the JRC research centre (Alves Dias *et al.* 2018) have forecast cumulative job losses of c. 27,000 in coal mining and the power sector by 2020. In the next decade, the closure of coal mines will be mainly aligned with the decommissioning rates of coal-fired power plants. With a view to the stricter regulations on emissions and state aid, and considering also their age and technological level, 35 per cent of Europe's coal-fired plants will be engaged in a first wave of retirements between 2020 and 2025, with an estimated direct job loss in power plants of up to 15,000. Related job losses in coal mining could reach a further 35,000 in that period. A second decommissioning wave between 2025 and 2030 could result in the loss of another 18,000 jobs in power plants and over 35,000 in coal mining. Altogether, 130-140,000 direct jobs could be lost by 2030, leaving only a few tens of thousands in the entire EU. Energy-intensive industries that rely on coal-based energy inputs might also be affected. For example, coking coal is a critical input in the European iron and steel sector as it constitutes 37 per cent of its raw material needs.

Based on these data, estimates that include indirect jobs dependent on the coal cycle across the EU put the total number of direct and indirect coal-related jobs in the EU

at just over 450,000 in 2015. Given that direct coal mining jobs were, by 2017, already down by 25 per cent compared to 2015, one can assume that the total number of coal-dependent jobs may also have decreased to a similar extent (i.e. to a total figure of c. 330-350 thousand). It can also be expected that many of these jobs will become redundant in the next decade, both in direct and indirect coal activities. In comparison, Eurostat data also reveal that the total number of people employed in the EU27[3] was 215.0 million in 2007, falling to 209.4 million during the crisis (2013), but then, overcoming the losses, growing to 219.8 million by 2017. During the entire period, the number of manufacturing jobs fell from 32.0 million to 28.5 million. Although the total number of coal-dependent jobs makes up only a small fraction (c. 0.15 per cent) of European employment, and much greater job losses occurred during the crisis, the challenge is that these are concentrated on a small number of regions with wide-ranging effects on the local and regional economy. In many of these regions, the livelihood of a large part of the population is dependent on the continuation of a coal-based economy.

The emerging low-carbon economy is expected to compensate for the unavoidable job losses in carbon-intensive activities across the whole economy, but these jobs will not necessarily appear at the same time and in the same place where jobs are being lost.

Tackling these structural mismatches should be one of the aims of properly-designed just transition policies to balance the burdens of the necessary transformation. This is why comprehensive regional development plans and targeted just transition policies tailored to coal-intensive regions will become crucial in facing these challenges, as chapter 5 of this publication demonstrates.

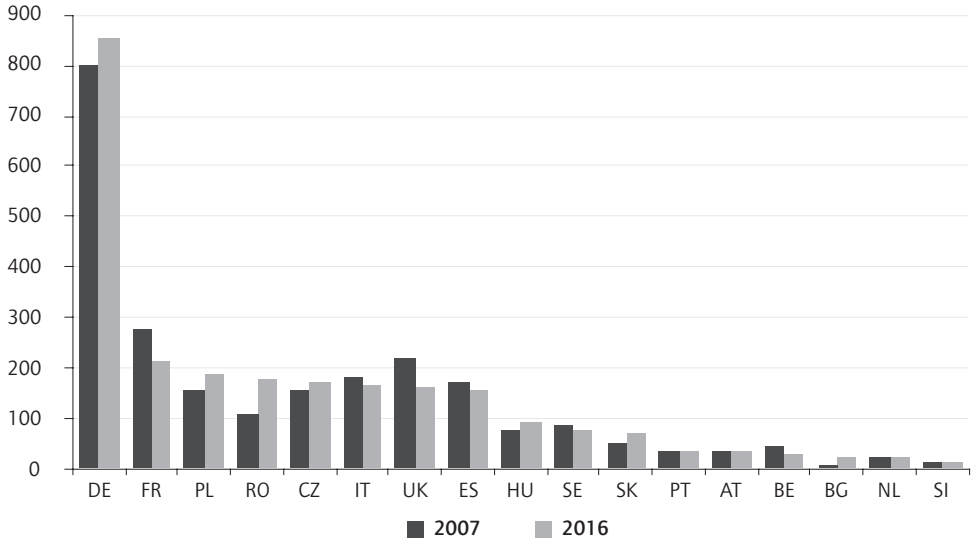
5.2 Automobile

Unlike the coal sector, that has already lost most of its employment in recent decades, employment in the automobile industry is now near its peak level over the last two decades. The ACEA employment data points to the automotive industry being a key employer in Europe (ACEA 2019), while the industry is now facing unprecedented challenges which will require fresh approaches and mindsets from all who are involved in it.

With the increase in production for export, especially in the value-added premium segment, manufacturers in particular have been able to build up employment in Germany despite the impact of relocation initiatives. The case of France is slightly different as a result of its specialisation in the more cost-sensitive mass market segment. Employment gains have been widespread in CEE countries, while France, Italy, the UK and Spain have seen a downwards trend in automobile employment in the last decade, as shown by Figure 6.

3. Including UK but excluding Croatia, for the 15-64 age group.

Figure 6 **Employment in the automotive industry in key EU member states, 2007 vs. 2016**



See: Lefeuvre and Guga, chapter 6 of this publication.

Unlike coal, future employment changes in the automobile sector are much less straightforward and much harder to forecast. The only certainty is that the changes will be massive and that almost all jobs in the industry will be affected to some extent. There are many simultaneous factors at work – climate and environmental regulation (that not only shapes production but also market demand), digitalisation of the production process and the advance of autonomous and connected vehicles – all of which are likely to have a fundamental impact on employment in both quantitative and qualitative ways. Technological change will re-shape international value chains while globalisation patterns may also change, posing uncertainty for the future viability of any geographical location, including long-established manufacturers in Europe.

One thing has crystallised in the last couple of years: the main pathway of the transformation will be the electrification of the powertrain and the parallel phasing-down of the internal combustion engine (ICE). Battery electric vehicles (BEV) consist of fewer components than the traditional combustion engine and require less labour input. This is because the car runs on an electric motor that has a much lower depth of added value while even the production of the battery cell, the most cost-intensive component of electric drivetrains, is highly automated and hence will not require much human labour. In production, the simplification of manufacturing processes is likely to lead to a decline of employment both in OEMs and in suppliers although, as Anne-Gaëlle Lefeuvre and Ştefan Guga state in chapter 6, the extent of this will depend on the pace of the transition from ICE to BEVs. They also point to the possibility that, in the interim phase with the co-existence of BEV and ICE engines on the basis of the hybrid bridging technology combining both, the demand for labour and employment may even rise.

In recent years, studies have published various figures on the question of how many jobs will be lost in the event of a market ramping-up of electric cars (PA Consulting 2018), as referred to in detail in chapter 6. Maximilian Strötzel and Christian Brunkhorst also discuss in chapter 9 the results of the ELAB 2.0 study, commissioned by IG Metall and the Fraunhofer Institute for Labour Economics and Organisation (Bauer *et al.* 2018), with employment forecasts based on the real production figures of the members of the study consortium. These include all German manufacturers and major suppliers. In the most realistic scenario, that assumes 25 per cent battery electric vehicle and fifteen per cent plug-in hybrid vehicles (PHEV), 70,000 jobs will be lost in the production of powertrains by 2030.

In the short-term, however (i.e. until the mid-2020s), the prospect of stricter environmental and climate policy regulation will boost investment in new ICE technology and hybrid powertrains, alongside the continuing shift from diesel to petrol motorisation. These should all have a neutral, or even slightly positive, impact on employment in production.

Chapter 6 also documents that the extent of medium- and longer-term employment decline is also likely to depend on the capacity of the European industry to develop electrochemical operations related to battery development, which could take up between four and seven per cent of automotive employment in the future.

The specific evidence presented by Michel Sonzogni and Sebastian Schulze-Marmeling in Chapter 7 on recent developments in the French automobile industry portrays a conflicting scenario with mounting pressure on employment. Car manufacturers in France are reacting to market and regulatory pressures by stepping up their demands for labour force flexibility, creating greater uncertainty and vulnerability. Figures from the Syndex database on employment in the powertrain industry in France show that, between 2014 and 2016, permanent jobs in the French powertrain sector fell by five per cent while the number of temporary workers grew by 100%, now taking the larger share of jobs in the powertrain sector.

On the other hand, Martin Krzywdzinski in Chapter 8 reports balanced employment patterns in German car manufacturers and suppliers, in contrast with those in the CEE locations of the same German companies. According to a plant-level empirical study conducted by the author, German plants tend to have lower shares of fixed-term contracts, a high share of skilled workers and high R&D propensity. Employment levels are on the increase in CEE locations, but the share of fixed-term contracts are significantly higher than in the case of German plants. According to the survey results, only fifteen per cent of German plants report more than ten per cent of employees being on fixed-term contracts whereas this was the case for 49 per cent of CEE plants. In 21 per cent of the CEE automotive suppliers surveyed, the share of fixed-term contracts even exceeded thirty per cent (compared to less than one per cent of suppliers based in Germany).

6. Two faces of a just transition: the lessons from two carbon-intensive sectors

'Just transition' was an early trade union demand for managing the transformation towards a net-zero carbon economy and this approach has now become a mainstream policy tool referred to by international institutions and treaties. This is a major success, but concerns are growing that the term is getting too broad with the danger of being hollowed-out and over-stretched.

In this context, trade union organisations need to make a pragmatic return to the original interpretations of what just transition means in practice as regards the development of a net-zero carbon economy: i.e. a transformation which achieves change in a balanced and fair way.

From a functional point of view, just transition has two main dimensions: in terms of 'outcomes' (the new employment and social landscape in a decarbonised economy) and of 'process' (how we get there). The 'outcome' should be decent work for all in an inclusive society with the eradication of poverty; the 'process' should be based on a managed transition with meaningful social dialogue at all levels to make sure that burden-sharing is just and that nobody is left behind. The 2015 ILO Guidelines (ILO 2015) broaden the horizon and highlight the need to secure the livelihoods of all those who might be negatively affected (directly or indirectly) by the green transition and also stress the need for societies to be inclusive and provide opportunities for decent work for all.

From the 'process' perspective, just transition has two main pillars (Galgóczi 2018): one that deals with the distributional effects of climate policies (for example, how a higher carbon price or electricity price affects different income groups and what forms of compensation should apply) and one that deals with the management of employment transitions. The latter should not only be directed to employees whose jobs are being lost or fundamentally transformed during the green transition, but also to those whose livelihood depends on those activities. This includes active regional restructuring practices with industrial policy and regional development initiatives.

Beyond theoretical and systematic analysis, the different approaches of just transition strategies can best be shown through empirical evidence and best practice in key sectors. This book is an attempt to demonstrate the main challenges and provide some insight into such practices in two key sectors. Phasing out coal in energy generation and managing the epochal change towards a new mobility paradigm both present huge challenges to the world of work. These two transitions also demonstrate how just transition practices can differ from sector to sector and from country to country. The case studies in this book mostly address the 'process' dimension of just transition, with a focus on dealing with employment change and job transitions.

There is a major difference between the two sectors in both the nature and the magnitude of the challenge, as the two parts of the book clearly demonstrate: coal has no future but the automobile does have one (at least, as we all believe), albeit in quite

a different form than the one we have currently come to know. However, even though coal itself does not have a future, workers in the sector and their families, as well as those depending on the sector in the surrounding region, must have one. Employment in the coal sector makes up just 0.15 per cent of European employment but, with its high concentration, the sector is of vital importance for individual regions. On the other hand, with its more than five per cent share of total European employment, the broader automobile sector is a key employer. Both sectors have higher than average wage levels and outstanding trade union organisation with high collective bargaining coverage.

Given these differences in the challenges facing employment and labour relations in the two sectors, it is no wonder that just transition approaches in the European energy sector are quite different from those that are emerging in the automobile industry. However, country differences are also substantial.

The main focus of just transition policies in the coal sector is to stretch the phase-out as long as possible, with defensive strategies such as income protection and early retirement as the dominant employment policy tools. The cases of Germany and Poland – the two countries that generate nearly one-half of hard coal-based, and nearly two-thirds of lignite-based, electricity in the EU – clearly demonstrate this. At the same time, they also highlight important country-specific differences.

For Poland, Aleksander Szpor in chapter 1 shows how the key domestic stakeholders of energy policy – trade unions and the private sector – are concentrating their efforts on preserving a status quo in which the state protects the coal mining sector and a coal-based energy system against EU climate and energy policy. The lack of a genuine climate policy in Poland is seen as legitimate in the domestic political environment. The result is that, on the domestic political agenda, strategic documents related to the energy and coal sector do not tackle the problem of reducing the number of coal mines or jobs as this would be instantly opposed by the trade unions and could endanger the stability of any government. The main goal of Polish energy strategy until 2040 (for details, see chapter 1) is energy security while ensuring the competitiveness of the economy and energy efficiency alongside the reduction of the energy sector's impact on the environment. According to this, hard coal will still remain the single most important source of electricity production in Poland in 2040.

Given the policy instruments that exist in the protection of the status of coal in the Polish economy, such as the special pension system for miners or the capitalisation of coal mining by state-controlled companies, it is difficult to hold the sector accountable and to push ahead with change.

Given the lack of pressure for more radical change, active transition management is not being seen as necessary. There is no policy framework for managing employment transitions and the 'contingency measures' addressed to miners are rather limited. They embrace traditional monetary instruments like mineworkers' pensions, early retirement and redundancy payments (although the latter two have recently been used only on a limited scale). There are virtually no schemes for re-employment in

alternative workplaces and only a very limited number of projects are addressed to miners' families and local communities.

In Germany, the number one coal burner in Europe, a cautious, gradual and consensual way of phasing out coal has been chosen. Building on sixty years of experience in transforming the Ruhr coal and steel region into a modern energy and knowledge-based economic region (Galgóczi 2014), Germany's coal phase-out applies three main elements of a just transition approach: slow and gradual transition with a high level of social dialogue; active labour transition management; and engagement in industrial and regional development (for this aspect, see also chapter 5 by Stefan Gärtner).

Philipp Litz in chapter 2 analyses both outcome and process. In 2018, the federal government established the Commission on Growth, Structural Change and Employment (often referred to as the 'Coal Commission') to provide recommendations on a gradual reduction of the capacities of existing coal-fired power plants in Germany. The Commission consisted of policy-makers at different levels of governance and all major stakeholders including employers, trade unions, NGOs and experts. The recommendations aim at a gradual and steady reduction in the greenhouse gas emissions of the power sector. The last coal-fired power plant should be phased out by 2038 (with the option of an earlier exit by 2035), marking the longest farewell to coal by an EU15 member state. At the same time, the Coal Commission has followed the concept of a just transition in various dimensions. First, social dialogue has been exemplary; second, with a phase-out stretched over almost two decades, both the regions and energy and industry companies have been given a reasonable amount of time to transform; and, thirdly, the proposal foresees the provision of comprehensive financial support to the stakeholder groups affected. The declared aim is to replace the gradual loss of gross added value and employment with new jobs and gross added value by industrial producers, and to the same level.

The Commission's recommendations stipulated that coal regions should be developed into modern energy regions. At the same time, investment in transport and digital infrastructure, as well as in local research and innovation, should aim to strengthen the regions' locational advantages and innovation potential.

The recommendations also ensure that the phasing-out of coal-fired power generation is as socially acceptable as possible. Extensive labour market policy measures are proposed for those still employed in the coal industry today, including the exclusion of redundancies in the course of the phasing-out of coal-fired power generation. Furthermore, it is recognised that there will be a need for further training measures for employees as well as targeted re-employment in suitable positions, within and outside the sector, for those affected in lignite mining.

All these measures are to be implemented with financing for the coal regions of €40bn over the next twenty years. The forward-looking element of coal transition policies are the regional and industrial policy initiatives to revitalise coal regions after coal phase-out; these make up the main strength of the German case.

The stakes in the automobile industry are much higher and the transformation is also a more complex one as, besides decarbonisation, the digitalisation of both the production and the product and a reconfiguration of the global supply chains of the industry are proceeding simultaneously. There are also several unknown elements in this transformation, such as what engine technology will finally prevail, how radical changes in mobility patterns will be and what role individual vehicle use will have in the future.

Given this complexity of the transformation, it is often not even recognised as a case for just transition, with the main focus of demands at this point being the mobilisation of resources regarding transiting from the combustion engine towards electric vehicles and how this process can be shaped and facilitated. Chapters 6, 7, 8 and 9 of this publication reveal that such a paradigm change inevitably includes massive alterations in employment patterns as no job in the sector will remain unaffected.

At policy level, automobile industry stakeholders have been playing a controversial role over a long period in lobbying for lighter regulation on car emission standards, while some manufacturers also took the step of implementing fraudulent practices. However, after the diesel scandal, they have (since 2017) at least launched radical restructuring and investment programmes towards electrification.

While climate policy ambition was not the strength of automobile industry actors, they are now focused on managing the radical transformation in a balanced way. Co-operative industrial relations and co-determination practices in the main European manufacturers (above all in Germany and France) are great assets to facilitate employment transitions in an advanced-looking and innovative manner. In the German case, as Maximilian Strötzel and Christian Brunkhorst describe in chapter 9, the main task for the trade union IG Metall is to shape location, employment, innovation and investment strategies; conclude agreements to safeguard production locations; and find a development perspective for every plant. At plant level, works councils are focused on securing the core interests of employees with further agreements on collective bargaining, company pension schemes and profit-sharing. In return, they support the restructuring process.

A number of best practice cases are examined by the authors. The General Works Council of Daimler has reached an agreement on *Projekt Zukunft* ('Project Future') under which job security for all Daimler employees is extended from 2020 to 2030, including those in logistics and branch offices. Within the work of the company's innovation committees, the works council is to be advised of future product strategies by plant management and has the right to make proposals in response. Investment commitments of €35bn have been made in German locations over the next seven years dedicated to the areas of e-mobility, mobility services, connectivity and autonomous driving. Meanwhile, Volkswagen is anticipating extensive job cuts as a result of the introduction of new technologies and products. As part of its 'Future Pact', 25,000 jobs will be eliminated although 9,000 will also be created. Back in 2016, the works council had already been able to negotiate a job security plan up to 2025, so the reduction in employment will therefore be achieved in a socially acceptable manner. This includes

part-time work for older employees, which is set to be significantly expanded. At the same time, commitments have been made to locate new e-mobility products at German sites. In this way, each department has been given a development perspective over the next few years. Management's plans to outsource certain products and logistics, or to relocate all new e-components abroad under specific termination plans, could thus be fended off. There have also been strategic agreements in the supplier sector which relate specifically to the transformation process. At Schaeffler, an agreement on the future (*Zukunftsvereinbarung*) has been reached that goes beyond normal employment agreements. Suppliers' products are relatively independent of brand identity in the end product, so they can position themselves more flexibly within the new drive and mobility concepts than end manufacturers. In this way, business models beyond the private ownership of cars are also of great interest here.

In the French automobile sector (see chapter 7), company trade unions are also in the position of negotiating on the issues arising from the company's strategic orientation in the medium-term. Unions may seek to negotiate on the types of job categories threatened by economic or technological change; on the implementation of employee mobility; on the sustainable training and inclusion of young people in the company; on the employment of older workers; etc. This negotiation framework, together with works council consultations on strategic orientation, offers the tools with which to achieve a shared vision of a company's strategy and outlook, and to formulate together alternative proposals and identify secure development paths. These tools deserve to be used broadly by companies within the powertrain sector in France and in Europe more generally. Where they are well utilised, such information/consultation practices provide the opportunity to discuss the opportunities for diversification and the detailed skills, training and employment adaptations that they will require.

The main lesson to be drawn from the cases presented in this book is that just transition is not an abstract concept, but a real practice in real workplaces. It is this 'on the ground' perspective that really matters. While the green transition itself is an imperative, only a just green transition will deliver. Decarbonisation itself is a common objective, but concrete transitions take place in work environments that are, farther on, determined by the capital-labour relationship. The overall objective is in common, but conflicts of interest during the transition are inevitable. This is where the role of trade unions and social dialogue is key. It may well be true that some of the approaches that have worked well in some of the scenarios outlined in this book are geographically, and even culturally, specific to the companies, actors and settings which prompted and encouraged them, and which built on the advantages conferred by these into forms of resolution that could be acceptable to all. Nevertheless, there are others which are surely more generic in tone and, therefore, appropriate in a wide range of contexts. Among them would seem to be these:

— workers' commitment to change is a prerequisite if it is to happen in a way that causes least disruption, but this will not take place without purposeful and practical engagement through dialogue. However, this must not reflect simple routine: dialogue must be both genuine and open if it is to result in honest and supportable outcomes; and, additionally, innovative change will require

innovative relationships and new ways of working with and listening to each other. Furthermore, dialogue must be specific rather than abstract, and directed towards action plans;

— companies therefore need to take responsibility for instigating programmes of workplace education around the science of climate change and providing forums for workers to discuss the issues with experts and to develop considered responses. Trade unions have a role here, too, in ensuring that the issues raised by climate change are on the workplace agenda;

— even if policy must necessarily be global, its implementation must, equally necessarily, be local. Not only workers in plants but regional parliaments and assemblies must be at the forefront of change and active partners in it. Comprehensive regional development plans are essential in delivering the sustainability of regions and the revitalisation of local economies into the future. Especially in the light of the heavy concentration of certain types of industrial and energy production, local authorities must be committed in the search for replacement industries and jobs, and funding, that deliver a similar skillbase and which ensure a minimisation of the knock-on effects. Here, the engagement of expert staff will be key and authorities need to be open to specific secondments where necessary;

— the green transition will have major implications for workers' skills. The transition must be to a future which places at least an equal premium on skills as current technology. Industry R&D must, therefore, look specifically for opportunities to establish technological leadership which will, in turn, create opportunities for upskilling. In this, technical institutes and NGOs will have a key role in advising on future requirements; public sector agencies will have a key role here too as well as in providing backing in the form of genuine retraining programmes. At the same time, it is absolutely clear that greater use of temporary work relationships, and extending the 'gig economy' into the sectors that are at the heart of the green transition, will undermine workers' buy-in and that such forms of employment must be rejected. Cross-border solidarity also demands that eyes are not closed to the rise of precarious forms of labour elsewhere in Europe even while more standard forms of employment are preserved domestically;

— intelligent forms of production and feedback loops developed out of digitalisation and automation raise issues of data privacy and personal rights, including in the workplace. These must be resolved on the basis of the protection of users' personal rights to their data and this must also apply right across the workplace.

Ultimately, a transition that results specifically from public policy, rather than changes in consumer taste, market decline or some or other corporate mis-step, requires public policy to take lead responsibility in providing the conditions to assist workers in the transitional restructuring that results. Europe needs to be ambitious in its proposed outcomes; yet deeply traditional as regards the processes in which it engages to achieve them. We commend the broad framework of dialogue and deep, structured engagement

with workers that we outline here to policy-makers across Europe. Without that, and without the foresight to commit investment finance to particular areas with a view to replacing outdated, even if still highly serviceable, technology, Europe will not be able to make a success of the green transition. And time is continuing to run short.

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