



Germany's current climate action status

Core messages

1. The Federal Government faces an enormous challenge in the field of climate policy: if we are to meet the climate targets set by the new Climate Change Act, we must nearly triple the present rate at which we are reducing our emissions. Whilst emissions declined by an annual average of 15 million tonnes during the last decade, they now need to drop by between 36 and 41 million tonnes each year up to 2030.
2. The climate action taken in all sectors so far is inadequate. The buildings sector will have missed its sectoral target for the second time in succession in 2021, and we can already predict that the climate targets for 2022 and 2023 will be missed in numerous other sectors. Projections shows that, without additional fast-acting climate measures, we will fall well short of the 2030 targets across the board.
3. The current status is particularly sobering in the energy sector. Carbon emissions actually rose in 2021, the rollout of onshore and offshore wind energy is at its lowest level seen in the last ten years, the completion of the electricity grids is being delayed by even more years, and the demand for electricity in 2030 has been systematically underestimated. Against this background, a dramatic expansion of renewable energy and the elimination of obstacles and barriers are top priorities.
4. The situation we find ourselves in marks the launch of work on an Immediate Climate Action Programme in which the new Federal Government will initiate all the necessary legislation and policies so that the respective procedures can be completed by the end of 2022. Even under this ambitious timetable, much of the progress will still take several years to bear fruit.
5. The Federal Ministry for Economic Affairs and Climate Action (BMWK) has already started the work in its own field of responsibility. The central components are: expanding renewable energy, increasing energy efficiency, and reorienting industrial policy to the goal of climate neutrality. Further to this, the EU now needs to press ahead rapidly and with great ambition on the negotiations on the Fit for 55 package.
6. The forthcoming correction in the course to reach a 1.5C path is also a task for Germany's international climate, energy and economic policy. This will form one of our key priorities in the forthcoming G7 presidency.
7. Good climate policy will modernise our country and will safeguard Germany's industrial future. The world's leading economic regions have committed to climate neutrality by the middle of the century, and the global race to produce the best technologies is now beginning. Germany needs to be a frontrunner so that it can safeguard its prosperity and lead the way.

Chapter 1 – Current climate policy situation in Germany

Introduction

Time is getting short for an effective mitigation of the climate crisis. The rise in the average global temperature is, if possible, to be kept down to 1.5C in order to avoid serious repercussions for life on Earth – this is what has been agreed in the Paris climate accord. It can only be achieved if emissions of greenhouse gases are curbed as quickly as possible around the world. The aim is global carbon neutrality by the middle of this century. Climate change poses a threat to the fundamentals underpinning our lives and economic activity in Germany: increasing extreme weather events and climatic changes not only endanger lives, health and biodiversity – they also cause substantial economic damage.

For this reason, we want to make Germany greenhouse gas-neutral in less than 25 years – in 2045 at the latest. More and more countries are facing up to this task. The entire European Union and all G7 partners – i.e. some of Germany's main trading partners – want to reach this target by 2050; China has 2060 in its sights. An ambitious and rapid restructuring of our economy towards greenhouse gas neutrality is not just a contribution to climate change mitigation: it will also help maintain our global competitiveness in many economic sectors. The global race for the best strategy for this has begun.

The situation we find ourselves in could hardly be more challenging: given the inadequate emission trends seen in the past, and the likelihood that we will fall short of our targets in the next few years, there is an urgent need for action all of the sectors. The new Federal Government will respond to this. This status report forms the platform for specific action. The Federal Government is now starting its work on the Immediate Climate Action Programme, which will be concluded in several stages with all the necessary acts, ordinances and measures by the end of 2022.

Current emission data

Greenhouse gas emissions in Germany dropped by 41.3 per cent to approximately 729 million tonnes of CO₂ equivalents between 1990 and 2020. However, the clear fall in 2020 – greenhouse gas emissions declined by 8.9 per cent or approximately 71 million tonnes of CO₂ equivalents in year-on-year terms – was only partially due to climate policies and lasting structural change. The expert council on climate issues assumes that more than half of the reduction in emissions seen in 2020 was due to special factors such as favourable weather conditions and effects of the measures to tackle the COVID-19 pandemic.

Also, we can already predict that greenhouse gas emissions will have risen again in 2021 in many sectors. On the basis of a current estimate of primary energy consumption in 2021 by the Working Group on Energy Balances, last year probably saw a rise in energy-related carbon emissions of just over 4 per cent or approximately 25 million tonnes. On top of this, the economic recovery following 2020 entails a rise in process-related emissions in the industrial sector, so that the emissions in 2021 were probably more than 30 million tonnes higher than those of 2020. The rise is predominantly due to the energy sector (more coal-fired electricity generation) and to a lesser extent due to the buildings sector (cooler weather). This means, despite all the uncertainties, that we can predict that that the attainment of the 2020 climate target (greenhouse gases down 40 per cent from 1990) was fleeting in nature, and that the -40 per cent target was missed again in 2021.

According to a current estimate by the Agora Energiewende thinktank, the building sector is likely to miss its sectoral target for the second time in 2021, and it may be the case that the transport sector will fall short of its annual target for the first time in 2021.

Development of emissions in 2022 and 2023: outlook

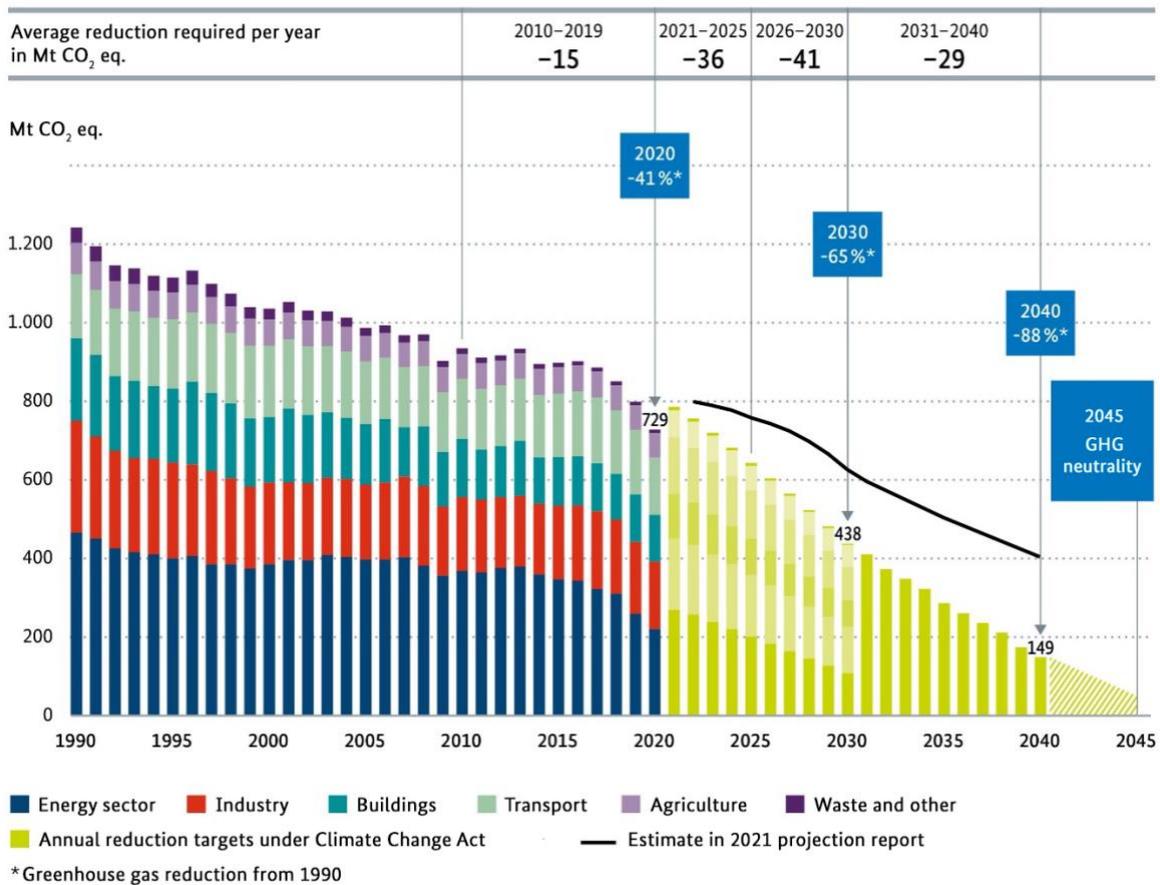
On the basis of the current trends in emissions and the problems the various sectors have had so far with reaching their targets, we can assume that, even if we make an immediate and rigorous change in our climate policy, greenhouse gas emissions will likely remain above the annual targets set by the Climate Change Act in 2022 and 2023. A large part of 2022 will be taken up with the drafting and passing of legislation underpinning the measures in the Immediate Action Programme, so that many of the new rules will not come fully into effect until 2023. Furthermore, a number of key areas such as the designation of additional sites for wind energy or the planning of heat supply by municipalities will need time for planning and implementation. In other cases, such as the ramp-up of electric mobility, serial retrofitting or the market penetration of heat pumps, some time will be needed before the market shares can increase substantially. Finally, the climate-friendly restructuring of industrial facilities will take time. For these reasons, we cannot realistically expect there to be an obvious impact on emission trends in the various sectors already in 2023. But this is what makes it so important to start work straight away on the Immediate Climate Action Programme and to make progress across the board so that we do not lose more valuable time. That is the only way to get back on track from 2024 so that we can meet the ambitious climate targets for 2030.

The speed of climate action must nearly triple.

The rate of emissions reductions must more than double in the coming years and then nearly triple in the run-up to 2030 if we are to attain the goals set out in the Climate Change Act. The average annual reduction in emissions over the last decade stood at 15 million tonnes, but it will have to rise to more than 40 million tonnes a year in the second half of this decade. This is required by the Climate Change Act, which was revised in June 2021 following the path-breaking ruling on climate action by the Federal Constitutional Court in March 2021. The Act prescribes that greenhouse gas emissions must fall by 65 per cent from 1990 by 2030; also, annual climate targets apply to the various sectors from 2021.

Attaining the goals of the new Climate Change Act is an enormous challenge, and all the sectors will have to make a demanding contribution towards this. The measures implemented so far will, according to current scientific estimates in the Federal Government's 2021 projection report, only cut emissions by around 50 per cent by 2030. So we are at risk of missing the 2030 target by 15 percentage points, or 195 million tonnes of CO₂ equivalents. That would correspond to nearly half of the total emissions of 438 million tonnes of CO₂ equivalents envisaged for 2030.

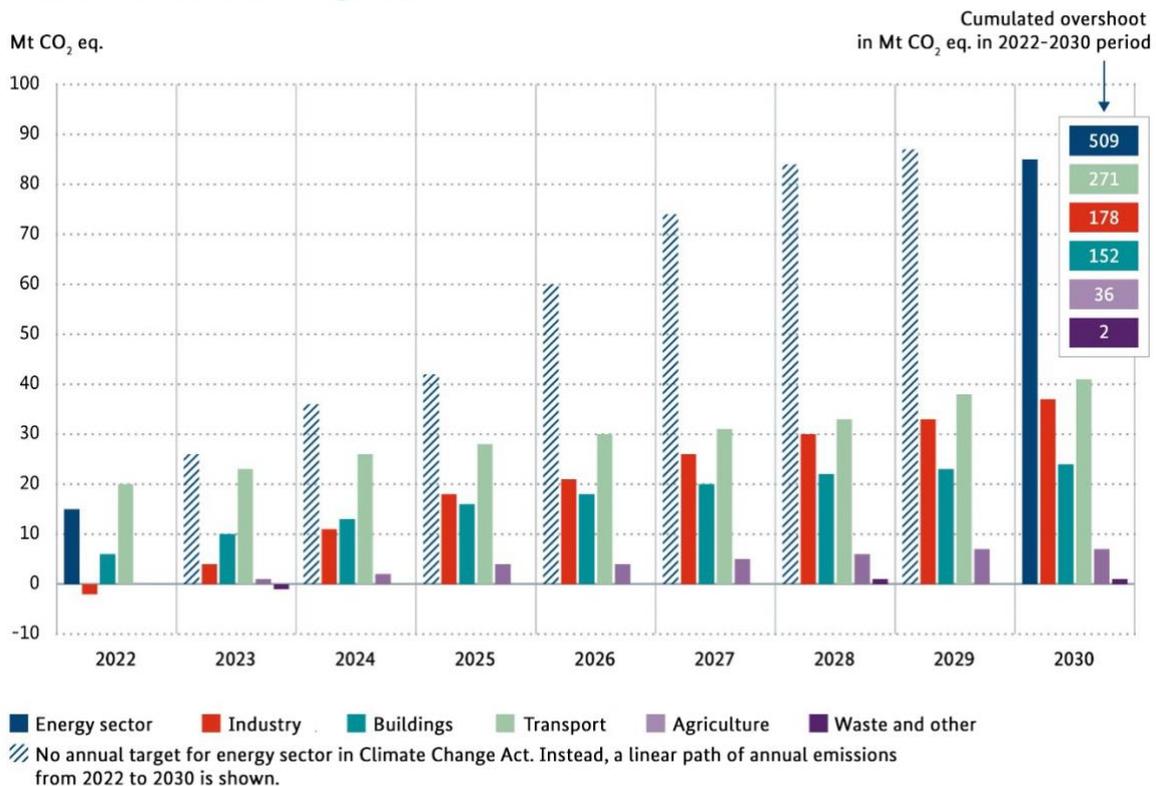
Development of greenhouse gas emissions in Germany



Source: Federal Environment Agency, Climate Change Act

The Climate Change Act stipulates annual declines in the yearly emission volumes for the various sectors up to 2030. The projected emissions will not fall quickly enough if the current climate policies remain unchanged, meaning that according to current calculations the gap between the targeted and the actual emissions will keep growing up to 2030. Also, if we keep falling short of the targets, the annual deficits will cumulate. This means that, between 2021 and 2030, the stipulated emission ceilings would be exceeded by a cumulative amount of more than a gigatonne (1,000 million tonnes) of CO₂ equivalents - i.e. by more than the current emissions of an entire year. The following graph shows the urgent need for action across the board.

Forecast sectoral overshoot of annual climate targets in line with Climate Change Act



Source: 2021 Climate Action Projection Report, Climate Change Act

Furthermore, under European climate legislation, Germany must comply with binding annual emissions targets for emissions outside EU emissions trading. This means that, if targets are missed, particularly in the sectors of transport, buildings and agriculture, there will be consequences under European law. Countries which miss their EU reduction targets in these sectors will have to purchase surplus emission rights from other countries. This would result in substantial burdens on the federal budget – money that would then be lacking for the generation of added value and the modernisation of the economy in Germany. We intend to do our utmost to avoid this.

Chapter 2 – Current situation in the EU and internationally

Current situation in the EU

German climate policy is closely linked to EU climate policy. Many EU climate policies have an impact within Germany. The EU has – particularly thanks to EU emissions trading and EU-wide standards – increasingly emerged as a pace-setter for climate policy in Germany and elsewhere. In the other direction, successful climate action in Germany is a prerequisite for the whole of Europe to be able to transition to greenhouse gas neutrality. In the European Climate Law, the European Union has set itself the goal of greenhouse gas neutrality by 2050 and has raised the 2030 target to a 55 per cent reduction in greenhouse gas emissions from the 1990 figure. Both targets have been

made binding under international law by the European Union in the context of the Paris Agreement.

However, Europe still has much to do before 2030: by 2019, the EU had managed to cut its emissions by 24 per cent from 1990, and the 2020 figure was 34 per cent as a result of the pandemic. The European Environment Agency assumes that the current measures can bring about a reduction of 41 per cent by 2030, meaning that the European climate gap stands at roughly 15 percentage points, similar to Germany's own gap. The European Commission has presented the Fit for 55 package in order to bring the EU on track to meet its 2030 and 2050 targets. It aims to adapt the EU's climate policy toolbox to the new level of ambition. The proposals of the European Commission embrace a broad range of instruments including carbon pricing, standards, targets for the Member States, and compensatory measures. Also, the rules governing funding of renewable energy and improvements in energy efficiency, also in buildings, are being revised.

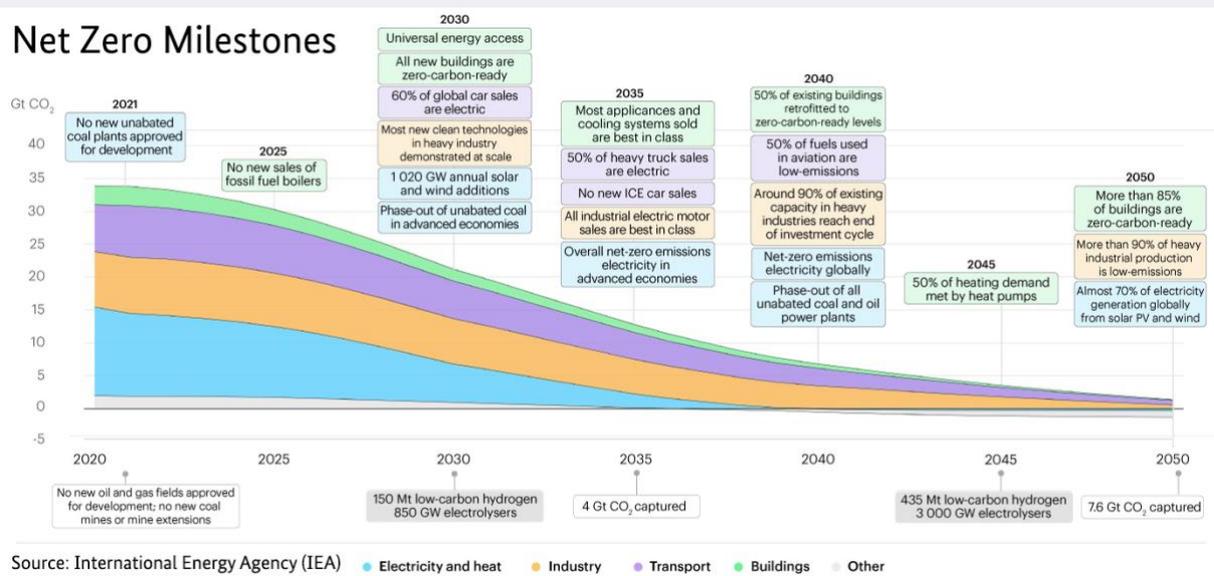
The Fit for 55 dossiers must now be adopted rapidly and with a high level of ambition so that they will swiftly have an impact and so that the EU's climate target for 2030 remains attainable. A key role here will be played by the French presidency of the Council of the European Union in the first half of 2022. Rapid agreement on the key dossiers in the package is therefore not only essential for European climate policy, but is also an important building block in Germany's efforts to attain its national climate targets. It is crucial that Germany, as the largest Member State, plays a proactive and constructive role in the forthcoming negotiations.

Current international situation

The rules to implement the Paris Climate Agreement were successfully put in place at the climate conference in Glasgow in November 2021. The final resolution from Glasgow includes the decision to restrict warming to 1.5C if possible and confirms that this will not least require a 45 per cent reduction in global carbon emissions from the 2010 level by 2030. However, the current 'nationally determined contributions' (NDCs) of all countries would actually result in a rise in emissions up to 2030. Scientific analyses (the Climate Action Tracker) suggest that the commitments made so far would only make it possible to restrict the global rise in temperatures to around 2.4C. For this reason, the parties to the agreement are called on to adapt their 2030 targets in time for the next climate conference in Egypt in November 2022 and to present long-term strategies leading to net-zero emissions by the middle of the century.

In 2020, the EU submitted a joint climate action contribution on the basis of the -55 per cent climate target for 2030, and it is now implementing this, particularly in the form of measures based on the Fit for 55 package. The EU's Member States will now have to work together in 2022 to clarify whether the current 2030 climate target represents the greatest possible level of ambition, or whether it should be raised further.

It also became clear in Glasgow that, overall, the industrialised countries have not so far been able to keep the promise of providing US\$100 billion a year in support for the developing countries up to 2020. The previous Federal Government had therefore promised to raise the substantial German contribution even further. This, and the path towards new financial targets for the period after 2025, will therefore be core issues for the COP 27 UN Climate Conference in Egypt, as will a possible adjustment of the 2030 climate targets. Further priorities will be the adaptation to and resilience against climate changes that can no longer be prevented.



The coalition agreement provides that the new Federal Government should also orient its international climate, energy and economic policy to the 1.5C path. The International Energy Agency (IEA) first presented such a global 1.5C path in May 2021. Its 'Net Zero by 2050' report covers all energy-related carbon emissions from energy, industry, buildings and transport and describes the milestones for a global path to carbon neutrality in 2050. According to this approach, the annual volume of newly installed renewable energy capacity will have to be quadrupled to more than 1,000 GW and the progress on energy efficiency greatly enhanced if the 1.5C ceiling is to be achieved. At the same time, coal-fired power plants in industrialised countries and the rest of the world will need to be switched off by 2040. In the residential sector, says the IEA, no more boilers using fossil fuels should be sold around the world from 2025. No new internal combustion vehicles should come onto the streets from 2035. Despite all the uncertainties in such longer-term scenarios, this IEA scenario shows that not only the Federal Government's national and European, but also its international climate action policy will have to become much more ambitious in the coming years. This will require a joint strategy of all the relevant government ministries.

Chapter 3 – National need for action

Principles of our climate policy

Our climate action policy will only be successful if – in addition to an effective reduction in greenhouse gas emissions – we also focus on economic prosperity and social justice as key policy principles. In view of the massive challenges and the urgency, we can no longer afford to play off climate action, economic policy and social acceptability against one another. We will in future be taking a rigorously joined-up approach to these central aspects of societal policy. In line with this fundamental principle of our climate policy, for example, climate-related demands on individuals must be designed in a socially acceptable way in order to ensure public acceptance of the transition process. This is reflected in an increase in climate housing benefit and the minimum wage, as well as in funding for industry and the safeguarding of competitiveness. All of these elements are core components of a forward-looking climate policy. Private-sector investment in climate-neutral buildings, energy and industrial facilities, infrastructure and mobility systems will form the centrepiece of a climate-neutral economy. In view of low interest rates and a high availability of

capital seeking investment opportunities, there is a useful window for capital-intensive changes. Our climate policy aims to mobilise this private capital.

In view of the very different challenges faced by the various sectors, we are opting for a broad range of instruments drawing on regulation, carbon pricing, funding programmes, fiscal incentives and a variety of support for the stakeholders involved. By setting the right policy framework and incentives, we will avoid misplaced investments and will create long-term certainty for planning by all the stakeholders. In addition to the departure from the use of fossil fuels, we will make progress on cutting energy consumption as a key horizontal task.

We will revisit the **Climate Change Act**. Climate action will be a **cross-cutting task** for the Federal Government. The lead ministries will assess the climate impact of their draft legislation and its compatibility with the national climate targets, and will furnish their bills with a corresponding explanatory memorandum (climate check). On the way to climate neutrality, all sectors must make their contribution to achieving the climate targets. We will verify compliance with the climate targets using cross-sectoral accounts covering multiple years. The existing annual monitoring will form the basis for this.

In view of the position we are currently in, it is already obvious that we cannot simply continue the existing climate policies. The planned 2022 Immediate Climate Action Programme will launch the necessary measures in all sectors so that Germany can get on track as quickly as possible to meet the targets set out in the Climate Change Act.

Overarching measures

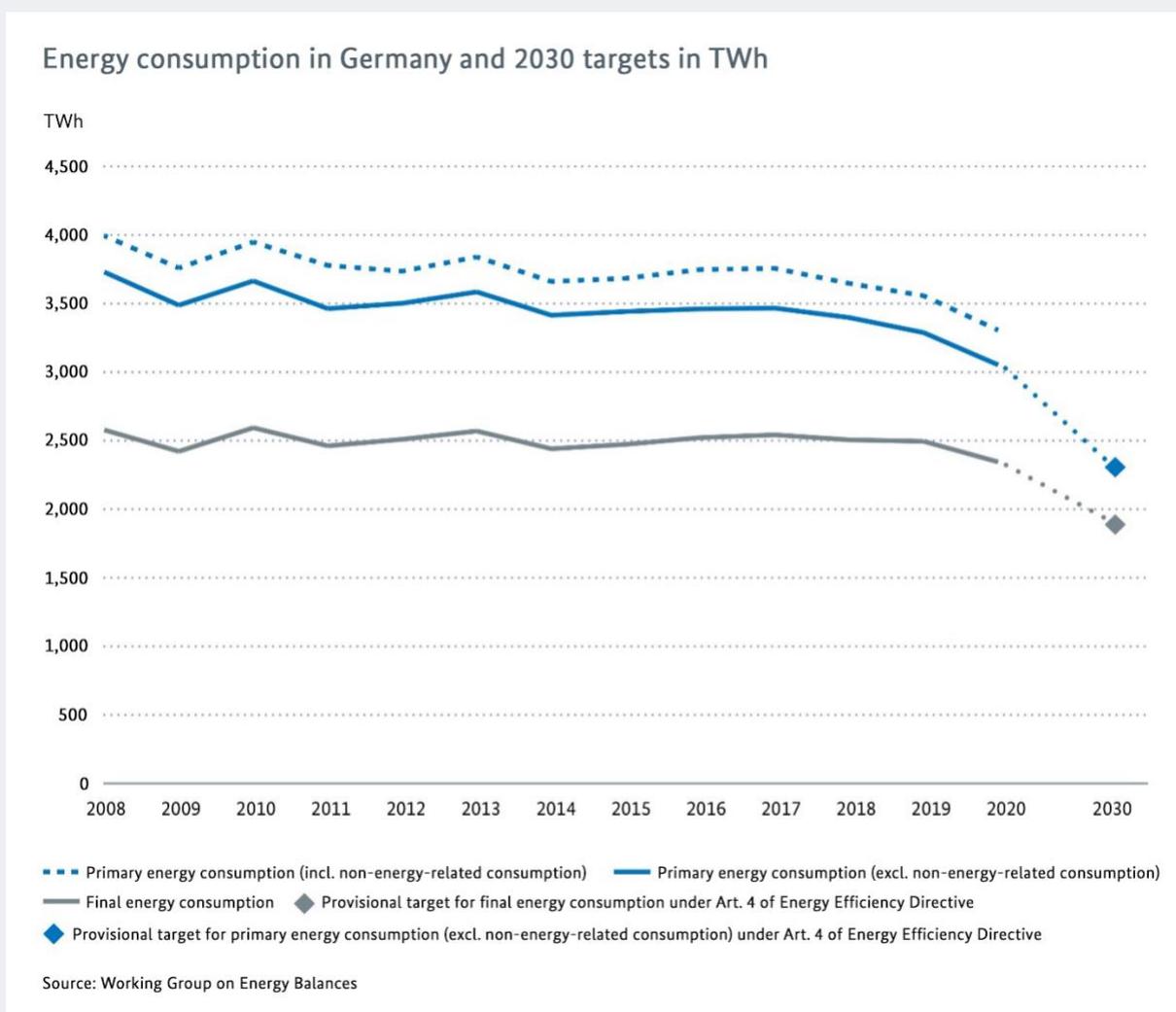
Despite – or because of – the tense budgetary situation at federal level, resulting not least from the pandemic, it is necessary to **bring government incentives and public spending into line with the attainment of the climate targets** so that our climate policy can be efficient and cost-effective. This includes pro-innovation tax rules and the avoidance of subsidies which harm the environment or the climate. We have therefore stated in the coalition agreement that we will remove subsidies and spending that damage the climate, and thus gain additional budgetary scope. To this end, the levies, taxes and fees in place in the energy system are to be thoroughly reformed. Also, it is crucial to remove bureaucracy which impedes the transformation, and to speed up planning and approval procedures for climate action projects.

In a first step, the **EEG surcharge** (which helps to fund renewable electricity) is to be fully financed from the federal budget starting in 2023. This will reduce the cost of electricity for households. Furthermore, as of 1 June 2022 we will introduce a staggered model of energy classes for buildings which regulates the passing on of the carbon price under the Fuel Emission Allowance Trading Act. Should this timetable prove impossible, the increased costs from the carbon price will be shared equally between landlords and tenants from 1 June 2022. It will continue to be necessary to ensure reliable financing for all the measures deployed by the Federal Government to assist individuals, science and research, and companies and municipalities during the transition. To this end, the Federal Government is planning to develop the Energy and Climate Fund into a Climate and Transformation Fund, and to bolster its funding in the 2022 budget. This will be used to finance additional climate action measures and measures to transform the German economy. The possibility for the relevant municipality and its neighbours to share in the value added by ground-

mounted photovoltaic and onshore wind installations is to be extended to existing installations in order to support the local transition.

If climate action and the energy transition are to be successful, we will need to combine two things: the massive expansion of renewable energy and the **reduction of our energy consumption**. Today, more than 80 per cent of our energy needs are still covered by fossil fuels. We must reduce this consumption quickly, substantially and sustainably whilst maintaining security of supply and keeping energy affordable. Despite a host of measures and funding programmes, Germany has not really made rapid progress on this in recent years. For example, macroeconomic final energy consumption fell by a mere 2 per cent or so from 2018 to 2019, whilst primary energy consumption dropped by around 11 per cent. But if we are to meet our climate targets, we will need a much sharper drop in final energy consumption, of 20 to 25 per cent. This challenge must be tackled vigorously in all sectors.

We will need to act quickly and resolutely if we are to meet ambitious energy efficiency targets by 2030. For this reason, in parallel to the ongoing negotiations on the revision of the EU Energy Efficiency Directive, we will establish a **statutory basis for national energy efficiency policy** this year. We also want the public sector to finally and fully live up to its function as a **role model** and to introduce modern energy management as a standard feature of all major public facilities as quickly as possible. Equally, we will need to give low-income households more help with cutting energy consumption and energy costs.



We will continue to need **biomass** across the economy, as a source both of energy and of material. In fact, industrial demand for biomass will grow. However, the use of biomass for energy is currently competing with the use of biomass as a material and with the strengthening of natural sinks as anchored in the Climate Change Act. The agreement made in the 2030 Climate Action Programme to restrict the use of biomass as an energy source to the sustainably available potential (1,000 to 1,200 PJ/year) will be fleshed out in a **sustainable biomass strategy**. This includes a monitoring process and efficiency-based steering mechanism for biomass flows which ensure that both the need for biomass and the targets in the Climate Change Act for natural sinks are met. Also, we will review the incentive effects of funding instruments and, if necessary, undertake adjustments, and target research funding to progress the development of bioenergy technologies.

The public sector, including the federal administration, must thus serve as a role model in line with the Climate Change Act. It is to be organised on a climate-neutral basis (including compensation) by 2030 at the latest, and to achieve material climate neutrality by 2045. In advance of the programme of measures to be presented in 2023, we will rapidly launch effective pilot projects in all relevant fields of action (facilities, mobility, procurement, canteens and events) with a view to a **climate-neutral federal administration**. We will build up a system to calculate environmental and climate costs in order to establish a well-founded scientific basis for the CO₂ shadow price which the federal administration has had to apply to all procurement since the beginning of 2022.

Energy

The energy sector will have to deliver on the lion's share of the national climate targets in the years up to 2030. There is a great need for action here. For example, the **energy sector** is responsible for the largest share of emissions in Germany – roughly 30 per cent. Its greenhouse gas emissions amounted to 220 million tonnes of CO₂ equivalents in 2020, and the 2021 figure will be even higher. In order to attain the statutory sectoral target of 108 million tonnes of CO₂ equivalents in 2030, emissions from the energy sector will have to be more than halved from today's level. According to the projection report, the gap between emissions and the 2030 climate target is 85 million tonnes of CO₂ equivalents; the cumulated figure for the period between 2022 and 2030 is 509 million more tonnes of harmful emissions than planned.

The responsibility of the energy sector, and of the electricity sector in particular, for the transformation extends far beyond its own sectoral boundaries: in view of the need to electrify large parts of other sectors (in particular industry, buildings and transport) and the future rise in demand for green hydrogen in the context of sector coupling, the energy sector will also play a key role in decarbonisation. At the same time, this offers a commercial opportunity for Germany and for small and medium-sized firms in particular, since an energy supply which is based on renewables guarantees much higher domestic and distributed value creation than the existing energy system, which is largely based on the import of fossil oil, fossil gas and hard coal.

The main task for the coming years will therefore be to bring about the complete decarbonisation of the energy sector through intensive efforts in the field of energy efficiency in all the sectors of demand, through the restructuring of all the infrastructure with a view to gradual phase-out of all fossil fuels, and through the massively accelerated expansion of the generation of renewable electricity and heat. At the same time, it will be necessary to ensure sustainability, system stability, security of supply and affordability, and thus public acceptance for the energy transition.

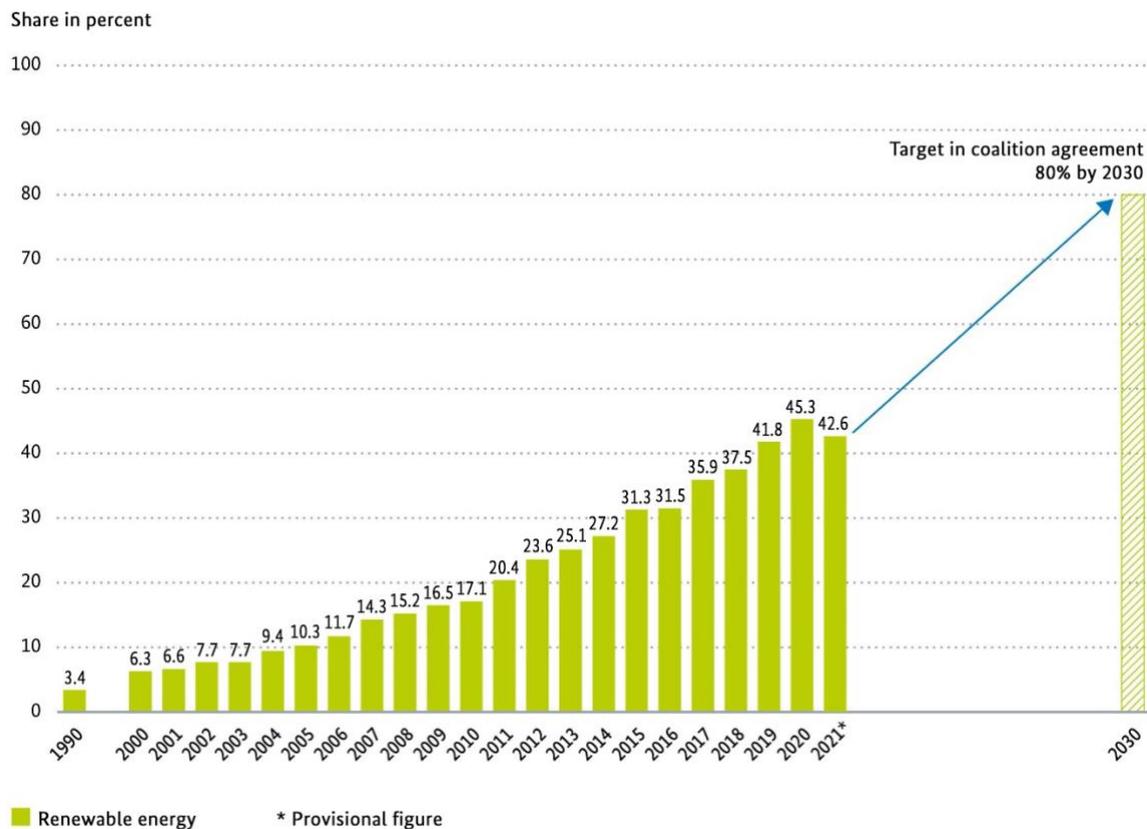
It is also clear that that electrification on its own will not achieve the goal of greenhouse gas neutrality. We will continue to need to use gaseous fuels ('molecules') to meet our energy needs in the long term. This includes both the necessary ramp-up of a hydrogen industry and the import of green energy. This is because Germany will not be able to meet all of its energy needs from the domestic production of renewable energy, even in the long term, and will thus remain dependent on imports of energy and reliable business relations with other countries and stakeholders.

Renewable energy in the electricity sector

The key to attaining the climate targets in a sustainable manner is a **massive expansion of renewable energy** in order to replace the coal-fired and nuclear power capacity being taken off the grid and ultimately also to replace fossil gas, as well as to cover the future rise in electricity demand. This is a Herculean task for Germany. For example, in 2021 the share of gross electricity consumption covered by renewables was just over 42 per cent, up from a 2010 figure of only 17 per cent. The goal now, however, is to increase this share to 80 per cent by 2030, i.e. within the space of less than a decade. The pressure to act on this is significantly increased by the future rise in electricity demand for sector coupling from approximately 560 TWh (in 2021) to between 680 and 750 TWh in 2030 – a fact that so far has inadmissibly been ignored in the Renewable Energy Sources Act. What this means is that electricity generation from renewables will have to rise from its present level of just under 240 TWh to between 544 and 600 TWh in 2030, or by between 120 and 150 per cent.

The problem is that we find ourselves in a really bad place as we start out along the road to meet the new targets: the trend is currently pointing in the wrong direction. In 2021, the contribution made by renewable energy to covering electricity consumption actually dropped for the first time since 2000, both in absolute and in relative terms – and a major cause of this was the lack of

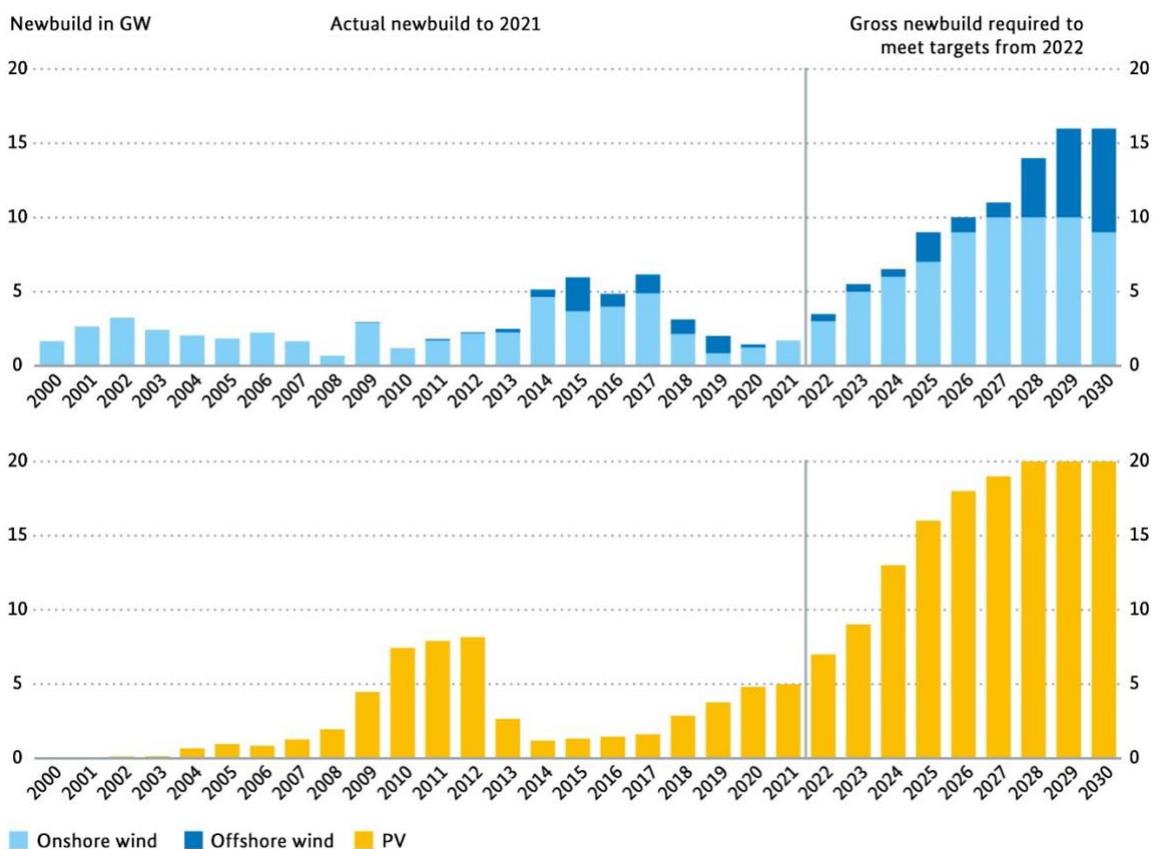
Share of gross electricity consumption covered by renewable energy



Source: Working Group on Energy Balances – Statistics

newbuild of renewable energy (combined with rising electricity consumption and a below-average amount of wind). For example, the last three years saw on average just one gigawatt of onshore wind capacity added, the lowest amount for more than ten years. In the case of offshore wind, the rollout has ground to a complete halt: not a single new offshore wind turbine was connected to the grid in 2021. Again, this is the lowest level since the offshore era began in 2012. Solar energy is the only field in which there has been a steady amount of newbuild of around four to five gigawatts a year, but this in no way compensates for the lack of new wind capacity.

Expansion of wind and PV



Source: Working Group on Energy Balances – Statistics

Against this background, the new Federal Government is making it its joint mission to dramatically speed up the expansion of renewable energy and to eliminate all obstacles and barriers. In this context, bringing about a big acceleration in the newbuild of onshore wind energy is one of the greatest challenges posed by the energy transition. Working from the expansion targets set out in the coalition agreement, more than 100 GW of onshore wind capacity will need to be in place by 2030. If we include the dismantling of older turbines in the next few years, this means that the currently installed capacity needs to be more than doubled. In the case of photovoltaics, our aim is to boost the installed capacity to 200 GW by 2030. That is more than three times the capacity in place today. When it comes to offshore wind, we will increase the expansion targets for 2030 from 20 to 30 GW, in order to attain 40 GW by 2035 and at least 70 GW by 2045.

The **shortage of available sites** is a major problem: the planning undertaken so far by the Länder falls far short of delivering on the new 80 per cent target for 2030 with installed capacity of more than 100 GW. Up to the end of 2020, only around 0.8 per cent of the total area of Germany was dedicated to onshore wind, and only 0.5 per cent is actually available for use, since for example minimum distance requirements in many of the Länder and problems with approvals significantly reduce the potential. In order to make progress here, we will pass legislation anchoring the goal of dedicating two per cent of the area of Germany to onshore wind energy. A central role in the expansion of renewable energy is played by **enhanced cooperation with Länder and municipalities**. We will therefore talk with the Länder in the coming weeks about how we can

organise the joint goal of an accelerated expansion of renewables and the provision of the land required for this.

The availability and auctioning of sites is also central to the expansion of **offshore wind energy**. At present, offshore wind energy frequently finds itself competing hard with other forms of use when the scarce sites in the North Sea and the Baltic are distributed. We will therefore grant priority to wind-powered installations in the Exclusive Economic Zone. Also, we will encourage more shared use and cross-border projects.

All suitable roof space must be used for the **expansion of solar energy**: to this end, it will be mandatory to generate solar power on new commercial buildings, and it will be the norm to do so on new residential buildings. Obstacles which currently restrict the expansion of solar power will be removed, red tape will be pruned, and the volumes up for auction will be increased. In this way, we will speed up connections to the grid and certifications. If we are to achieve the installed capacity of 200 GW of solar energy in 2030, we will need to increase the annual amount of newbuild to 20 GW.

We will vastly speed up the **planning and approval procedures, which currently take far too long**, particularly for onshore wind energy, e.g. by giving temporary priority to renewable energy when the various interests are weighed up against each other, until the goal of climate neutrality has been reached. Further to this, a clarification of the law is required, stating that renewable energy is in the overriding public interest and serves public security. Accelerated and simplified procedures will also require improvements in the human and technical resources of agencies and courts, as well as the digitisation and modernisation of the planning and approval procedures. In the case of onshore wind energy, as agreed in the coalition agreement, we will reduce the distances to radio navigation equipment and weather radar, and implement measures to improve compatibility with military interests. In this way, we will be able to free up new sites for wind energy very quickly. Compatibility of **climate action and species protection** can be improved e.g. by a statutory standardisation of the way the impact of wind energy projects on protected species is assessed, and by legally secured exemptions in combination with a national species protection programme. This will make it possible to protect populations, and to progress both species protection and climate action.

Conventional energy

The conventional forms of energy – nuclear power, coal and fossil gas – are becoming steadily less prominent on the electricity market. The first step is the phase-out of the use of the highly risky technology of nuclear power: the last three nuclear power plants will be switched off at the end of 2022. So far, the plans in place compensate for only part of this: whilst the planning and preparations covered the energy security aspects of the **nuclear phase-out**, they omitted the aspect of carbon emissions. The lack of expansion of renewable energy, also in 2022 and 2023, could therefore mean a short-term rise in carbon emissions from Germany's electricity mix. Overall, this will not affect the emissions in Europe's electricity sector, since these are limited by EU emissions trading. The failure to plan for the nuclear phase-out in terms of climate policy does, however, worsen Germany's national carbon footprint and is one factor behind the forecast failure to meet the national sectoral goal for the energy sector in 2022.

Following the nuclear phase-out, the next step will be the **coal phase-out**. The aim is to put an end to coal-fired power generation, ideally **by 2030**. To achieve this, we will bring forward to 2022 the

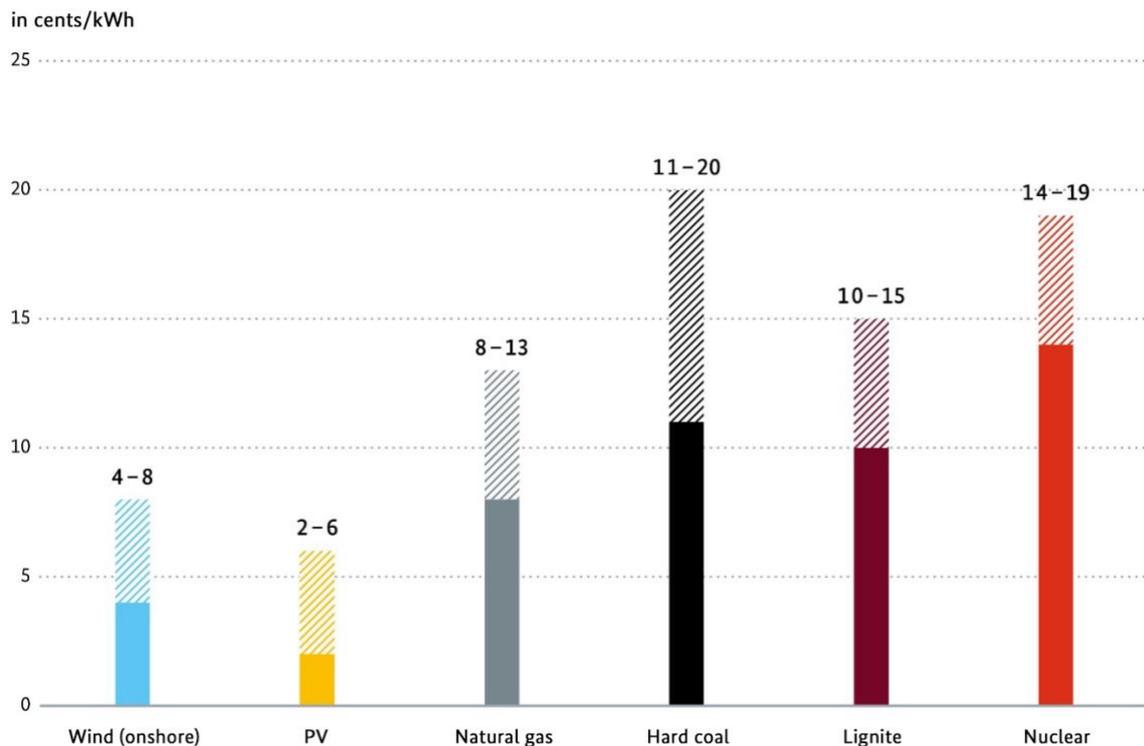
review of the date of the coal phase-out, which the Coal Phase-out Act originally prescribed for 2026, and will take the necessary steps for a more rapid phase-out of coal. Also, we are aiming at an ambitious design of emissions trading at European level, so that its incentives, in conjunction with the accelerated expansion of renewables-based electricity generation and the construction of H₂-ready gas-fired power stations, can ensure that the phase-out of coal can be completed by 2030. To this end, we will if necessary also introduce a national minimum price in EU emissions trading – although the current carbon price in emissions trading is already well above than the floor of €60/tonne envisaged in the coalition agreement. Further to this, the bringing forward of the coal phase-out will require adjustments to or the bringing forward of the support for structural change in the affected regions in order to alleviate the social and structural impact and to ensure public acceptance.

The third step will be the **phase-out of the use of fossil gas**. Here, the use of fossil gas to generate power will be gradually cut back and partly replaced by green hydrogen. According to the 1.5C path set out by the International Energy Agency, the industrialised countries need to attain the goal of climate neutrality by 2035. We have set ourselves an ambitious goal here. It will require the rapid market ramp-up of the production and transport of green hydrogen, since gas-fired power stations which use green hydrogen will then have to provide enough of the secure capacity needed to maintain security of supply. Also, it is necessary to ensure that the gradual phase-out of the use of natural gas meets with broad public acceptance and is underpinned by legally secure regulation.

Security of supply and electricity market design

The role of renewable energy is changing fundamentally. In view of the development of prices for fossil energy and carbon emissions worldwide, and of the increasing dependencies, it has become clear that a low-cost electricity supply for residential and industrial customers can only be ensured if domestic renewable energy is massively expanded. New wind and solar installations deliver electricity at a cost between four and five cents per kilowatt-hour. This is roughly half of the present level of electricity prices on the exchanges. Their electricity generation can be forecast reliably over the course of the year and is not vulnerable to political crises; they thus serve **public security** and contributed to a more independent electricity supply. This security of supply from renewable energy is indispensable for the population and the economy.

What does electricity generation from new large power plants cost in the EU?



Sources: Fraunhofer ISE, Federal Environment Agency, German Institute for Economic Research; status: 2021

Also, as the shares of wind and solar energy increase, there is an ever greater need for reliable mechanisms to safeguard the balance of electricity generation and demand in every hour of the year. Here, it is important to make use of flexible demand, to continue to press ahead with the integration of the electricity market in the EU and the creation of storage facilities, and to intensify the expansion of the power grid. Further to this, we need a rapid newbuild of secure capacity in the shape of **modern gas-fired power stations**. These will make an essential contribution to ensuring security of supply during the phase-out of coal. Wherever possible, they must use renewable fuels from the outset, or be designed to be fully convertible to renewable gases in the future (**'H₂-ready'**). This is because gas-fired power stations and gas pipelines will need to use non-fossil fuels if they are to continue to operate after the climate neutrality year of 2045. We will be seeking solutions in a dialogue with the companies so that this can be anchored in a legally secure way in the new operating permits.

In order to set the incentives needed for the restructuring of the energy supply, we will have to orient the **electricity market design** accordingly. To this end, we will be setting up a 'Climate-neutral electricity system' platform this year to draw up specific proposals for a new electricity market design. This includes the question of how the shift to hydrogen-fuelled power stations can be organised, what reforms are needed regarding levies, taxes and fees in the energy sector, how eco-power generated on a distributed basis can be used to a greater extent in the region where the power is generated, and how the policy framework for citizens' energy can be improved.

Finally, this development towards an entirely climate-neutral electricity system will require permanent and enhanced **monitoring of security of supply**. The coal phase-out has already

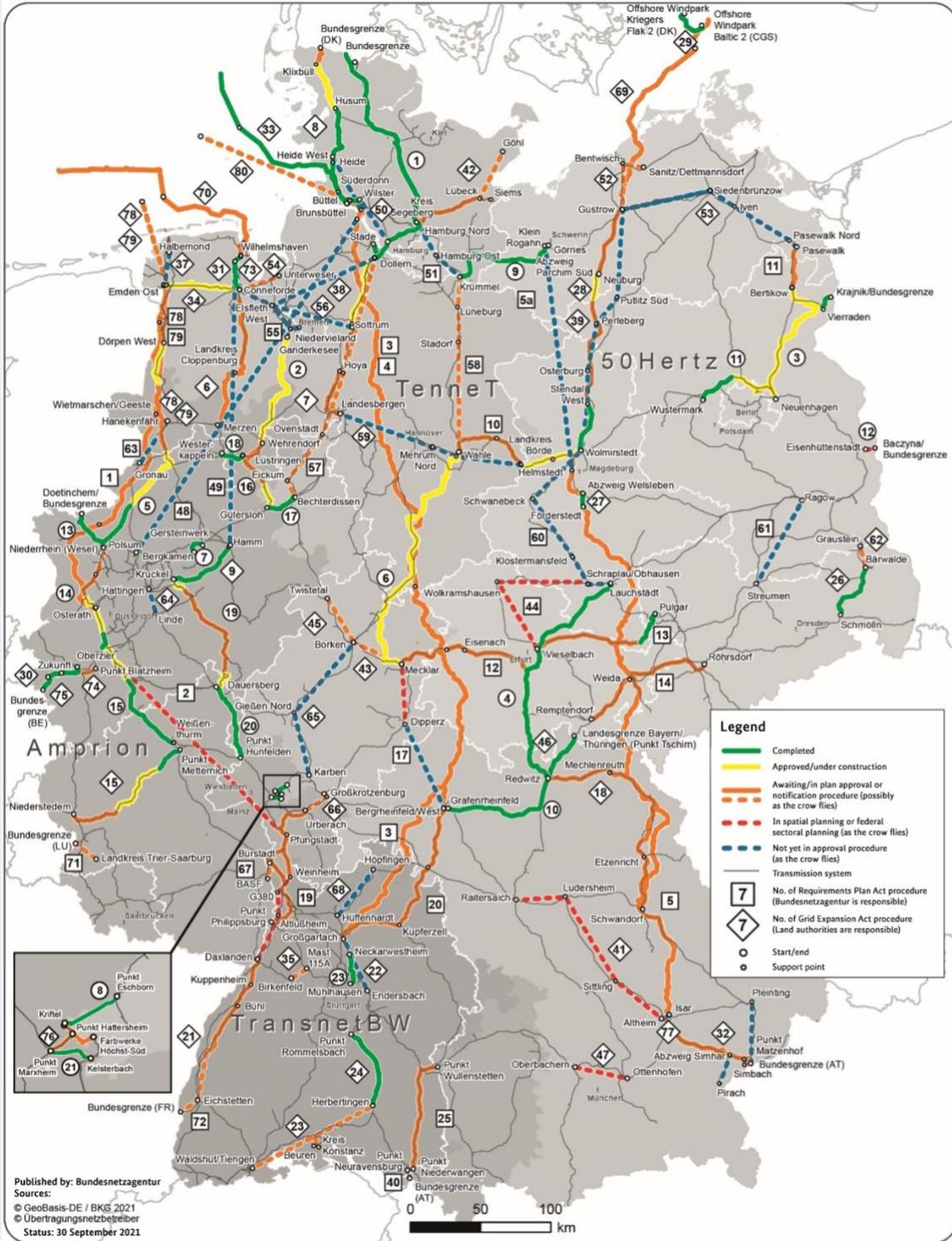
resulted in the introduction of integrated monitoring by the Bundesnetzagentur (Federal Network Agency) of how appropriate the generation capacities are and of the security of the system. This will enable us to precisely observe whether challenges arise in the longer term from the interactions of the market and the grid which for example necessitate additional measures regarding the grid.

Transmission and distribution grids

In addition to the dramatic acceleration in the expansion of renewable energy, the transformation of the energy system through to greenhouse gas neutrality in 2045 will require corresponding **expansion and restructuring** of the grids and (energy) infrastructure, as well as their **modernisation and digitisation**. This is necessary for the provision of the additional volumes of electricity required for the decarbonisation of the industrial, transport and heat sector and in order to ensure security of supply and system stability. It will include the needs-based and secure provision of necessary system services (in addition to balancing capacity, in particular reactive power and voltage stability, inertial reserve and the restoration of the grid and supply). Also, the offshore connection lines will have to be planned, approved and realised in order to bring the electricity from the Exclusive Economic Zone onto land. At present, the speed of expansion and restructuring is lagging far behind what is needed for the transformation.

The necessary **expansion at transmission and distribution system level** has become bogged down. Citing figures for the third quarter of 2021, the Bundesnetzagentur says that, of the priority expansion projects under the Federal Requirements Plan Act and the Power Grid Expansion Act – which have a total length of roughly 12,241 km, only 1,848 km are in operation, and 675 km under construction. A total of 9,718 km are still awaiting or undergoing planning procedures.

Status of projects under the Federal Requirements Plan Act and the Power Grid Expansion Act following Q3 2021



As things stand, **substantial delays** can be expected in the expansion of transmission systems, which will play a crucial role in the future electricity system. A number of priority projects to expand high-voltage DC grids will, according to reports from the project managers and the approval authorities in the context of the internal auditing of grid expansion by the BMWK, likely be delayed by several years, e.g. SuedLink (to 2028 rather than 2026), SuedOstLink (to 2027 rather than 2025), Ultranet (to 2027 rather than 2024) and A-Nord (to 2027 rather than 2025). Here, as is also the case with other grid expansion projects, it is important to subject all the steps up to commissioning to an intensive and detailed review and to counteract any delays. We will expand the internal auditing of the grid expansion in a targeted manner, engage in a permanent dialogue with all the stakeholders involved in the expansion of the grid to share best practices, and push for swift decisions.

Total routes coming on stream of all DC projects under the Requirements Plan Act (as planned)		Project manager	Length (km)	Completion as per agreement in May 2019	Completion as per monitoring by Bundesnetzagentur Q2/2021	Current survey (internal BMWK audit Q3/2021 plus follow-up questions)	Possible (delayed) completion as assessed by TSOs
Status: Q3/2021							
No. 1	Emden Ost – Osterath ("A-Nord")	Amprion	300	2025	2025	2027	
No. 2	Osterath – Philippsburg ("Ultranet")	Amprion, Transnet BW	342	2024	2024	2026	2027
No. 3	Brunsbüttel – Großgartach ("SuedLink")	TenneT, Transnet BW	689	2026	2026	2028	
No. 4	Wilster – Bergheinfeld West ("SuedLink")	TenneT, Transnet BW	538	2026	2026	2028	
No. 5	Wolmirstedt – Isar ("SuedOstLink")	TenneT, 50Hertz	538	2025	2025	2027	
No. 5a	Klein Rogahn-Isar ("SuedOstLink-Verstärkung")	TenneT, 50Hertz	758	n/a	2030	2030	
No. 48	Heide West – Polsum ("Korridor B")	Amprion	408	n/a	2031	2030	2031
No. 49	Wilhelmshaven/Landkreis Friesland – Hamm ("Korridor B")	Amprion	266	n/a	2031	2030	2031

As in the case of the expansion of renewables, the **protracted procedures** – partly for legal reasons – are a major cause of the slow expansion of the grid. If we are to be able to comply with the ambitious climate targets, these processes and corresponding review programmes will have to be accelerated as much as possible. This will include changes to the law wherever these can speed matters up. As we do this, we will also subject the implementation of Federal Sectoral Planning to critical scrutiny, and will reduce it wherever possible. Before the end of 2022, we will include in the Federal Requirements Plan further powerlines in the transmission system which are needed to attain the new climate targets.

There is also a need to act in the area of grid development planning. If we are to complete the transformation of the energy system, we will have to plan the central infrastructure from the point of view of the overarching long-term goal, i.e. greenhouse gas neutrality in 2045. This also applies to the ambitious expansion of offshore wind energy and the connection of the installations. In the case of the distribution system, the grid expansion planning needs to be developed into integrated and forward-looking grid planning. The aim is to have an forward-looking and efficient response to demand which takes account of the development of the other sectors and of measures to steer consumption. We also need to stop planning grids for electricity, natural gas, hydrogen and heat separately from one another. Rather, we need a common framework for the various types of infrastructure (system development strategy).

We need to make greater use of the advantages and opportunities of digitalisation for the energy transition, and the **distribution systems must also be modernised and digitised**. This affects various aspects, such as the visibility of and possibilities to control the electricity grids, e.g. by means of smart grid operating tools, and also via the digitisation of the processes of the distribution system operators. We will significantly accelerate the rollout of **smart metering systems**, while ensuring data protection and cybersecurity. The challenge here is to provide information which serves the grid, particularly from distributed generators like PV installations

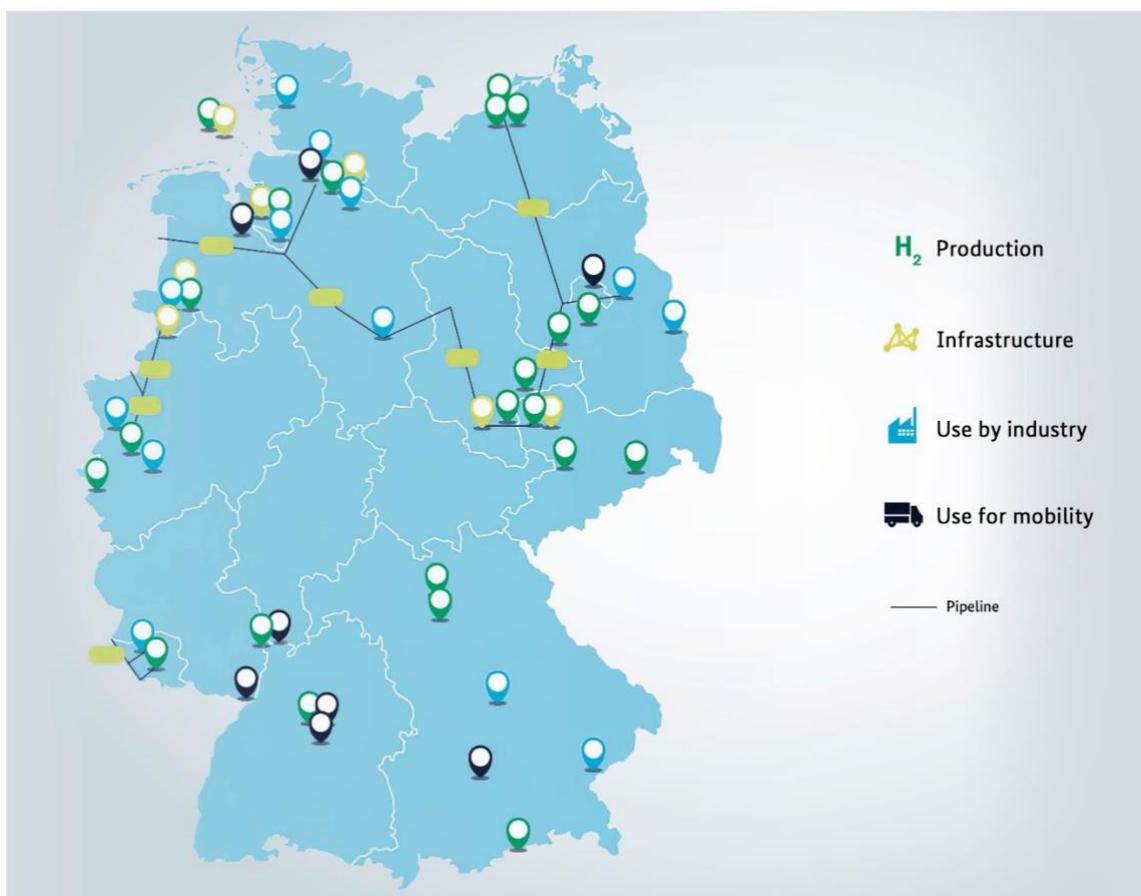
and flexible consumers (e.g. charging devices for electric vehicles and heat pumps) and to enable these installations to be controlled by smart metering systems. This will require further developments both in the legal framework and in the standards.

Green hydrogen

The establishment of an efficient green hydrogen economy plays a key role in the attainment of the climate targets and will position Germany as a lead market for climate technologies.

In order to bring about the market ramp-up of green hydrogen, the expansion target for electrolyzers is being doubled to 10 GW by 2030. We will be providing funding for investments in hydrogen technologies, particularly via the rapid implementation of the hydrogen projects in the context of the Important Projects of Common European Interest, the establishment of further funding programmes, and carbon contracts for difference.

Hydrogen IPCEI



Source: Federal Ministry for Economic Affairs and Climate Action

We will back this with appropriate legislation to maximise the production of, trade in, transport and use of green hydrogen. To this end, we are also working at European level, e.g. to establish certification systems. A central role will be played by the import of green hydrogen. The existing measures, e.g. H2Global, will be developed further. Also, we are calling for the development of an internal European hydrogen market and are building up import partnerships. The creation of a

hydrogen grid infrastructure is a central precondition for a reliable and efficient supply of hydrogen, since it networks the clients (particularly in the centres of industrial consumption) with the best places to generate green hydrogen (e.g. windy sites in northern Germany) and can include hydrogen storage facilities as flexibility and back-up components. It is also important to have good networking with our European neighbours, since in view of the limited availability of sites for renewable energy, we will have to import the bulk of the hydrogen. We will be proposing appropriate measures for this, not least to expand the hydrogen transport networks. The intention is for green hydrogen to be used primarily in those sectors of the economy which are not able to make their processes and procedures climate-neutral via direct electrification.

Energy research and innovation

A far-reaching transformation of the energy system towards greenhouse gas neutrality represents a major modernisation task for an industrialised economy. In the coming years, we will need to significantly accelerate the rate of innovation in the energy transition and become more efficient at tapping technological potential, for instance for energy storage. This will only be possible through efficient and market-oriented energy research that places a strong focus on transfer into practical applications, overcomes previous fragmentation and thinks all the facets together.

Industrial sector

In 2020, the **industrial sector** was responsible for around 24 per cent of total emissions, or 172 million tonnes of CO₂ equivalents. Between 2010 and 2019, greenhouse gas emissions decreased by less than 3 per cent – during a period of economic growth with increasing gross value added. This rate of reduction needs to be significantly increased to meet the Climate Change Act target for industry, which requires a rate of around 35 per cent between 2019 and 2030. According to the projection report, the current gap between actual emissions and the 2030 climate target is 37 million tonnes of CO₂ equivalents; the cumulated figure for the period between 2022 and 2030 is 178 million tonnes of CO₂ equivalents.

Emission savings of the past have largely been due to improvements in energy and material efficiency. What we need now are greater leaps in emissions reduction, for example by replacing fossil fuels with renewable energy sources and switching from conventional to innovative, climate-neutral production processes across the industrial spectrum. The expected economic recovery will probably lead to an unfavourable emissions trend, as it has not yet been possible to completely decouple the development of greenhouse gas emissions from economic growth. The goal for the coming years must therefore be to achieve economic growth and simultaneously decrease emissions.

In the coming years, energy-intensive industry in particular will face major challenges. A fundamental transformation of industrial production processes is necessary for Germany to become a climate-neutral centre of industry. This transformation must be based on decarbonisation, electrification, added flexibility, energy and resource efficiency, and a circular economy. In addition to the availability of electricity from renewable energies, it requires the use of hydrogen (or its derivatives), especially where direct electrification is not possible, the use of sustainable biomass as a material, and innovative technologies for the efficient use of raw materials (e.g. lightweight construction). In addition, technical negative emissions will be necessary. This requires a strategy for dealing with the 5% or so of residual emissions that cannot be avoided.

Steel, chemicals and cement are the industries with the most climate-damaging emissions within the industrial sector. At the same time, they produce essential basic materials for German industry. It is therefore of central importance to quickly embark on the path towards climate neutrality via innovative climate-neutral technologies of the future, which are to be installed as far as possible in every upcoming new investment.

Steel production sites in Germany



Source: German Steel Federation (Wirtschaftsvereinigung Stahl)

Central measures in the area of climate-neutral industry have so far been emissions trading, the Fuel Emission Allowance Trading Act and funding programmes (such as the Federal Promotion of Energy and Resource efficiency in Industry, the Decarbonisation in Industry Funding Programme, the Promotion of Hydrogen Use in Industry and the Lightweight Construction Technology Transfer Programme). **The measures and funding instruments to date are far from sufficient to achieve the emissions targets of the industrial sector in accordance with the Climate Change Act.**

To achieve these targets, we need to use reinvestment windows that are coming up in this decade to restructure an industrial sector that produces little greenhouse gas and, going forward, is greenhouse gas-neutral. The basic prerequisite for this is a reliable framework that offers a sufficient degree of planning and investment security. This includes an ambitious reform of European emissions trading, the rapid expansion of renewable energies, hydrogen capacities and

electricity grids in Germany and in Europe, the acceleration of approval processes for the necessary connections to these grids, the preservation of international competitiveness and adequate protection against carbon leakage.

At the beginning of the legislative period, we will create the legal and financial conditions for the provision of **carbon contracts for difference** as a central instrument to support the transformation of industry (initially as a pilot programme). Another central project for 2022 is the introduction of new incentives for the use of climate-friendly technologies, in particular through so-called 'super depreciation'. We will also strengthen **energy and resource efficiency**, for example by tapping waste heat potential, closing materials cycles and linking concessions granted to industrial companies in the field of energy taxation to the implementation of economic energy efficiency measures, as well as further developing European product standards.

Our goal is to create **green lead markets** that enable companies to profitably develop and sell 'green premiums', e.g. through public procurement. We will set up a holistic **interdisciplinary lightweight construction strategy** for all sectors, materials and production processes and expand the Lightweight Construction Technology Transfer Programme. Further measures will follow in the course of the legislative period to make German industry both competitive and climate-neutral.

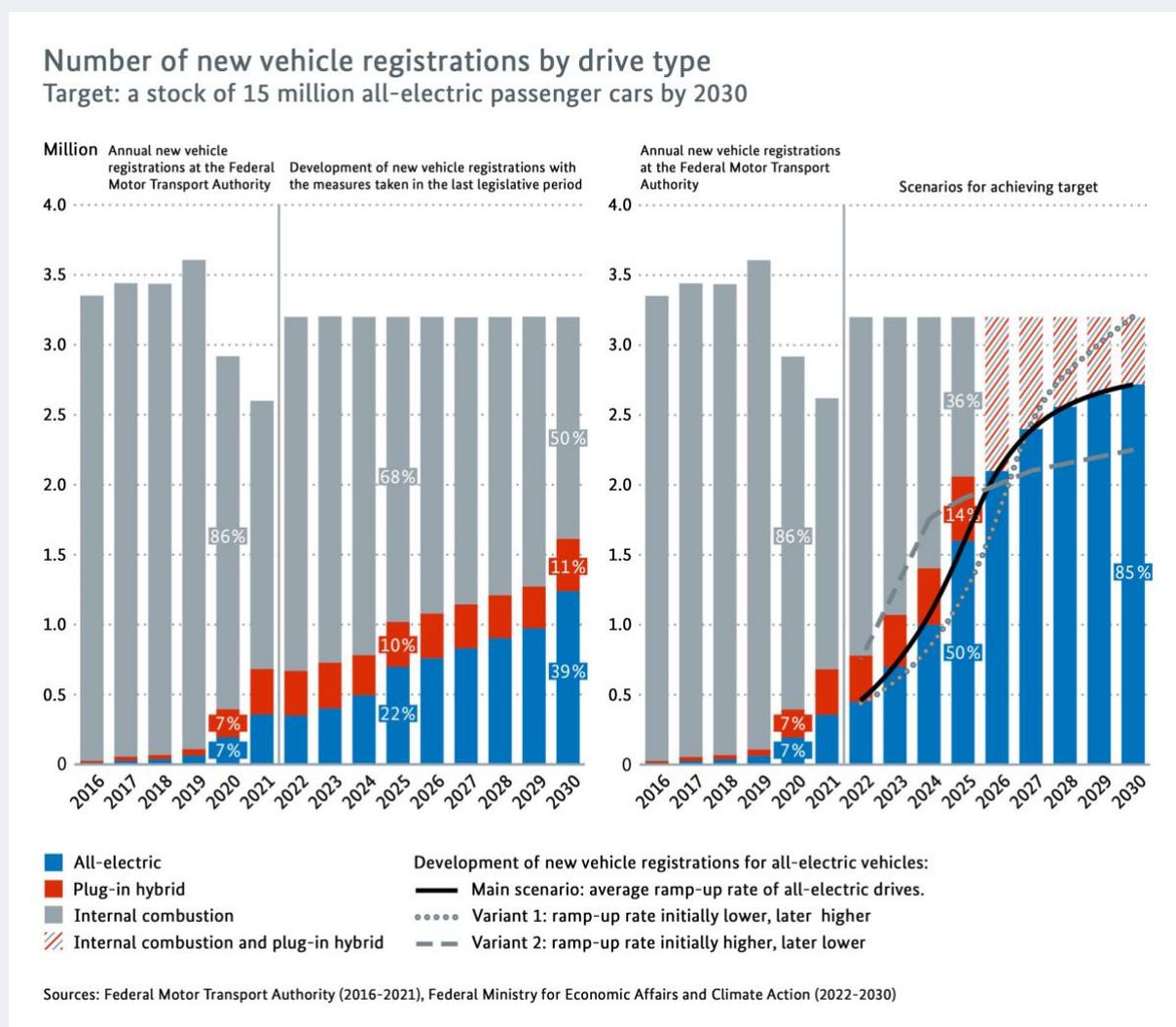
Internationally, we will underpin the increase in ambition in the industrial sector in order to maintain its competitiveness and avoid carbon leakage, for example by founding an international, open and cooperative climate club. Its main long-term goals are to achieve a globally uniform (minimum) carbon price and to agree on international transformation standards, e.g. in the field of the hydrogen economy. We will use Germany's G7 presidency in 2022 to help achieve this.

Transport

Due to the pandemic, the **transport sector** emitted about 146 million tonnes of CO₂ equivalents of greenhouse gases in 2020, or 20 per cent of Germany's emissions. However, in the ten years prior, i.e. between 2010 and 2019, emissions from transport had increased by just over 7 per cent to 164 million tonnes. Not only does this trend need to be broken by 2030, but in order to meet the 2030 sectoral target, emissions will need to be brought down to an ambitious 85 million tonnes, which is about 50 per cent of 2019 levels. According to the projection report, the current gap between actual emissions and the 2030 climate target is 41 million tonnes of CO₂ equivalents; the cumulated figure for the period between 2022 and 2030 is 271 million tonnes of CO₂ equivalents.

In the transport sector, no structural changes have been made in recent decades that are sufficient as to reduce greenhouse gas emissions on a sustainable basis. For example, after decades of continuous growth, passenger car transport has remained at a high level despite the measures taken to date, while rail accounts for only 8 per cent, and cycling and walking for just 6 per cent. In

freight transport, too, the share accruing to heavy goods vehicles (HGVs) has increased massively in recent decades, while the share of rail has so far been less than 20 per cent.



The number of models of electric passenger cars available for purchase and the associated sales figures give cause for hope. Thanks to subsidies provided in the form of the environmental bonus and the innovation premium, there has been considerable momentum on this market since mid-2020. For example, fully electric passenger cars already accounted for 13.6 per cent of new car registrations in 2021, while plug-in hybrids accounted for 12.4 per cent. In December 2021, the share of fully electric passenger cars was as high as 21.3 per cent, and that of plug-in hybrids 14.4 per cent. Nevertheless, the share of electric vehicles in the car fleet and thus of electric mileage in total car mileage is still very low. In heavy goods vehicles, the electrification of drive systems is currently still lagging well behind that of passenger car traffic.

A key precondition for meeting the 2030 sectoral target set out in the Climate Change Act is a massive increase in the share of electric driving, which will require a corresponding stock of electric vehicles, and thus also a respective share of new vehicle registrations. By meeting the target set out in the coalition agreement for at least 15 million passenger cars to be fully electric by 2030, the share of electric mileage in passenger car traffic can be increased to over 40 per cent which, according to the projection report, would close about half of the gap between actual emissions and the 2030 climate target.

If the distribution of drive options in new passenger car registrations shown in the graph is achieved, the target for 15 million passenger cars to be fully electric by 2030 would be met. However, the measures needed to reach this goal do not yet exist. In order for all-electric drive systems to find acceptance among car buyers, the charging infrastructure must be expanded more quickly in particular. The coalition agreement sets a target of having one million public charging points with non-discriminatory access installed in Germany by 2030, with a focus on developing the fast-charging infrastructure. This requires the speed of infrastructure expansion to be accelerated, with a new annual installation rate of around 100,000 public charging points needed as early as 2025. A further increase in electric mileage and further reduction in greenhouse gas emissions in passenger car traffic will be achieved through the use of plug-in hybrids whose range and use have been optimised for electric driving. Germany will start only to register vehicles that are carbon-neutral presumably well before 2035 in accordance with the proposed amendment to the EU regulation on passenger car emissions performance. We are committed to ensuring that only vehicles which are certified as being able to be refuelled with e-fuels can still be newly registered thereafter.

When it comes to HGV traffic, a share of over 30 per cent electric mileage can be achieved by 2030 (cf. NPM WG 1¹). A key lever for reaching this target – the introduction of carbon-based differentiation and a CO₂ surcharge on the HGV toll in 2023 – was agreed in the coalition agreement. As in the case of passenger cars, expanding the charging infrastructure in advance of demand is a key precondition for ensuring that the share of new annual HGV registrations with electric drives is as high as it needs to be. As we move to electrify car and HGV traffic, it is of key importance to ensure that sustainably manufactured batteries are available in Europe and that we have access to the raw materials required to produce them.

Based on the measures adopted to date, the projection report forecasts that the share of rail traffic will rise, going on to account for about 10 per cent of passenger transport and about 22 per cent of freight transport by 2030. By doubling the volume of rail passenger transport as agreed in the coalition agreement, and by increasing the share of rail in freight transport to 25 per cent, the gap between actual emissions and the 2030 climate target can be further closed. Increasing the capacity and attractiveness of public transport and raising the share of journeys undertaken by bicycle or on foot likewise makes an important contribution to reducing greenhouse gases and, in particular, also helps to significantly increase the quality of life in cities.

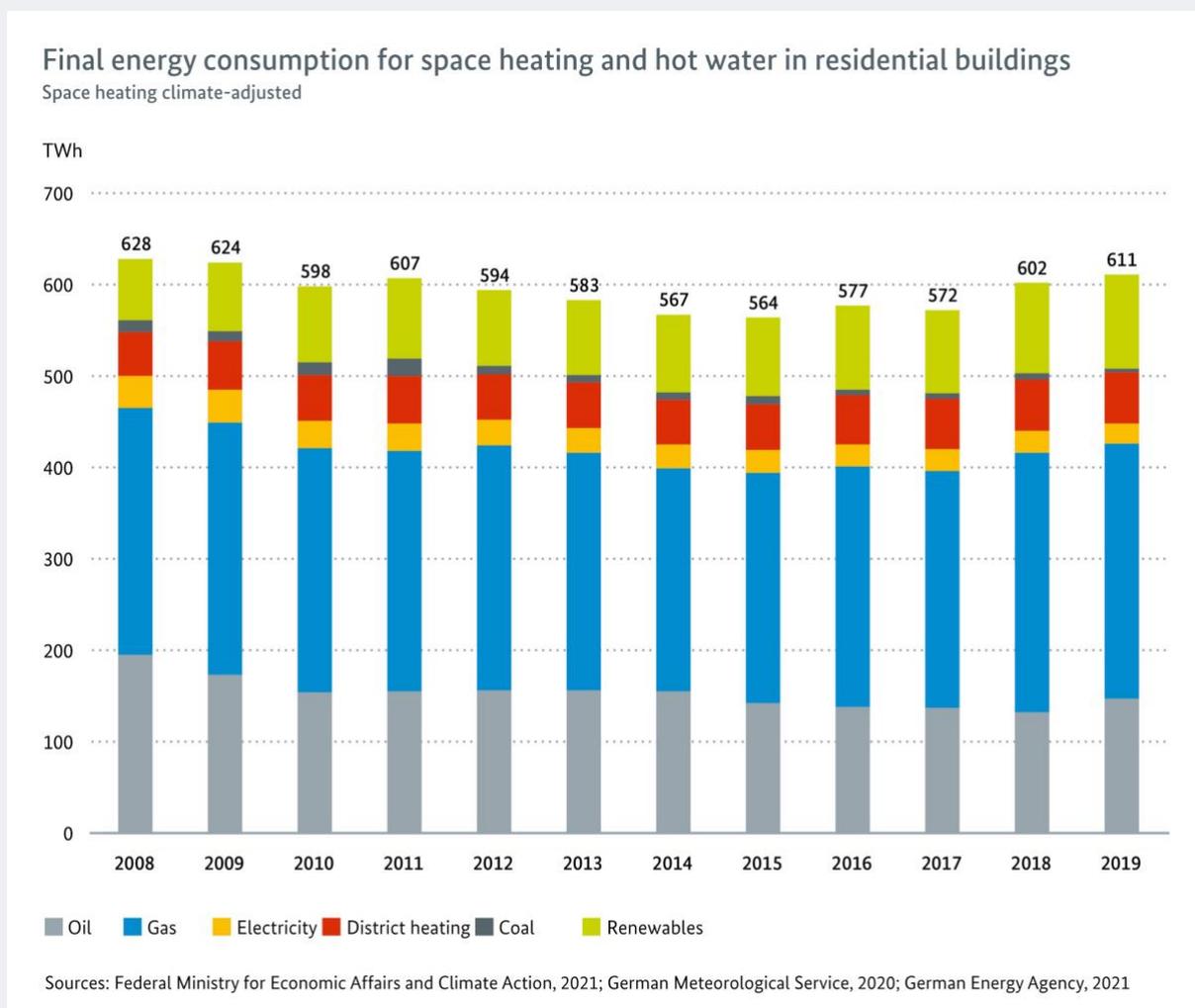
Electricity-based fuels (PtL) are particularly useful for mitigating climate change in aviation and shipping. The German Government supports ambitious PtL quotas in these two sectors in order to stimulate a market ramp-up. This is particularly relevant in the negotiations under the EU Fit for 55 package. To meet the set targets, production capacities for green hydrogen and green synthetic kerosene need to be significantly increased.

Buildings

In 2020, the **buildings sector** emitted 119 million tonnes of CO₂ equivalents. Over the 2010 to 2019 reference period, emissions (not climate-adjusted) were brought down by about 18 per cent. This was not, however, enough, the buildings sector failing to meet its climate target in both 2020 and 2021. In order to meet the 2030 target (a maximum of 67 million tonnes of CO₂ equivalents), the reduction rate needs to be significantly increased – to around 44 per cent. As regards the amount of final energy consumed, an upward trend has emerged in recent years. For example, by

¹ https://www.plattform-zukunft-mobilitaet.de/wp-content/uploads/2020/12/NPM_AG1_Werkstattbericht_Nfz.pdf

2019, climate-adjusted final energy consumption by residential buildings had increased by about 2 per cent compared with 2010. According to the projection report, the current gap between actual emissions and the 2030 climate target is 24 million tonnes of CO₂ equivalents; the cumulated figure for the period between 2022 and 2030 is 152 million tonnes of CO₂ equivalents.



The need for action in the buildings sector is considerably high, and the sector faces **major challenges**. Over recent years, final energy demand in residential buildings has actually been rising instead of falling. In addition, the share of renewables and heat pumps in heating systems is rising only very slowly. The main reasons why energy consumption is only falling slowly are **stagnation in the refurbishment rate** combined with an increasing level of specific **heat demand**. In addition, **rebound effects** after refurbishment are also slowing progress. The particular challenge here is that, unlike automobiles or power plants for example, the existing building stock cannot be replaced, but must be refurbished to make it more energy-efficient despite **existing restrictions**.

In the buildings sector, there has been a failure in recent years to adapt the legal standards for refurbishment and new construction to technical progress. The consequence of this, especially in new construction, has been that **high levels of subsidies** have been paid which have had only little effect on reducing carbon emissions. In this respect, there is an urgent need for action to bring funding policy in line with standards in a way that serves the goals that have been set.

In the coalition agreement, the Federal Government sets itself a clear goal: by 2030, **50 per cent of the heat supply** is to be produced on a **climate-neutral basis**. This requires a host of measures including **comprehensive municipal heat planning, decarbonisation and expansion of heat networks**, energy-efficient refurbishment of buildings to reduce energy consumption, and the expansion of decentralised renewable heating systems. Together with the Federal Ministry for Housing, Urban Development and Building (BMWSB), we will work towards achieving the EU Renovation Wave target of doubling the refurbishment rate in the EU by 2030. Public buildings must set an example in terms of the speed and depth of refurbishment. Together with the Federal Ministry for Housing, Urban Development and Building, we will further develop the existing measures and instruments so that they have an impact on climate change mitigation as quickly as possible and help pave the way towards climate neutrality.

The **Buildings Energy Act** will be amended in order to tailor the rules for new construction and the refurbishment of existing buildings towards achieving the goal of climate neutrality by 2045 and reducing the energy demand significantly. The coalition agreement stipulates that from 1 January 2025, every newly installed heating system must be powered by at least 65 per cent renewable energy. This will bring substantial progress in terms of reducing greenhouse gas emissions, expanding renewable energy – especially the use of heat pumps and their market ramp-up – and increasing energy efficiency. According to current expert opinions, 4.1 to 6 million heat pumps can be installed by 2030. It is now important to put this requirement quickly into law so that the various stakeholders can adjust to the new rules and do not have to wait to see what the policy framework will be. The number of new connections to heating networks is to be increased in the 2020s in particular, and at the same time the decarbonisation of the heating networks is to be advanced.

From 1 January 2025, all new buildings are to be built to the KfW 40 energy efficiency standard. As early as 1 January 2024, any parts to be replaced in major extensions, conversions and extensions of existing buildings are to meet the KfW 70 energy efficiency standard. These requirements set forth in the coalition agreement, as well as any adjustments that may become necessary along the way, are to be implemented before the end of 2022 as part of the Immediate Climate Action Programme. As a next step, the Buildings Energy Act will be substantially revised during this legislative term and the requirements stipulated in the European Energy Performance of Buildings Directive, the Renewable Energy Directive and the Energy Efficiency Directive will be implemented with a view to achieving the goal of a climate-neutral building stock by 2045.

The **Federal Funding for Efficient Buildings (BEG)** will provide assistance to facilitate the implementation of the new requirements contained in the Buildings Energy Act and to offer incentives for the market to move in this direction. This applies in particular to the renewable energy provisions for newly installed heating systems. In existing buildings, which play an important role in successful climate change mitigation, replacing the heating system and refurbishing the building envelope to improve energy efficiency are measures that should ideally be considered as part of an overall concept to reach the goal of climate-neutral buildings. In addition, the broad funding support provided by the BEG instrument based on a sound financial footing will give a further boost to increasing energy efficiency and decarbonising the heat supply in the buildings sector, especially in existing buildings. The instrument will achieve this by providing better incentives in terms of energy-efficient refurbishment and optimal alignment with the Renovation Roadmap, the quality of implementation (energy-saving effects), the strengthening of neighbourhood approaches, sector coupling opportunities, sustainability aspects and the energy (grey energy) required for the production and use of building materials, etc. Together with the

Federal Ministry for Housing, Urban Development and Building, we will lay the foundation to be able to take a closer look at the use of grey energy and life cycle costs. As one of the measures towards doing this, we are introducing a digital building resource passport. We will link the funding support for buildings with the planning of heat supply by municipalities.

In particular, the challenge consists in putting the funding programmes on a permanent footing in accordance with the above-mentioned needs. For people in personal and financial situations in which there are obstacles despite adequate funding provided (e.g. investments by people in old age), we will **develop** tailor-made **support options** to raise the number of refurbishments. Furthermore, **refurbishment roadmaps in the field of energy advice services** are to be made available free-of-charge to parts of the real-estate market to increase their use in a broad and systematic manner.

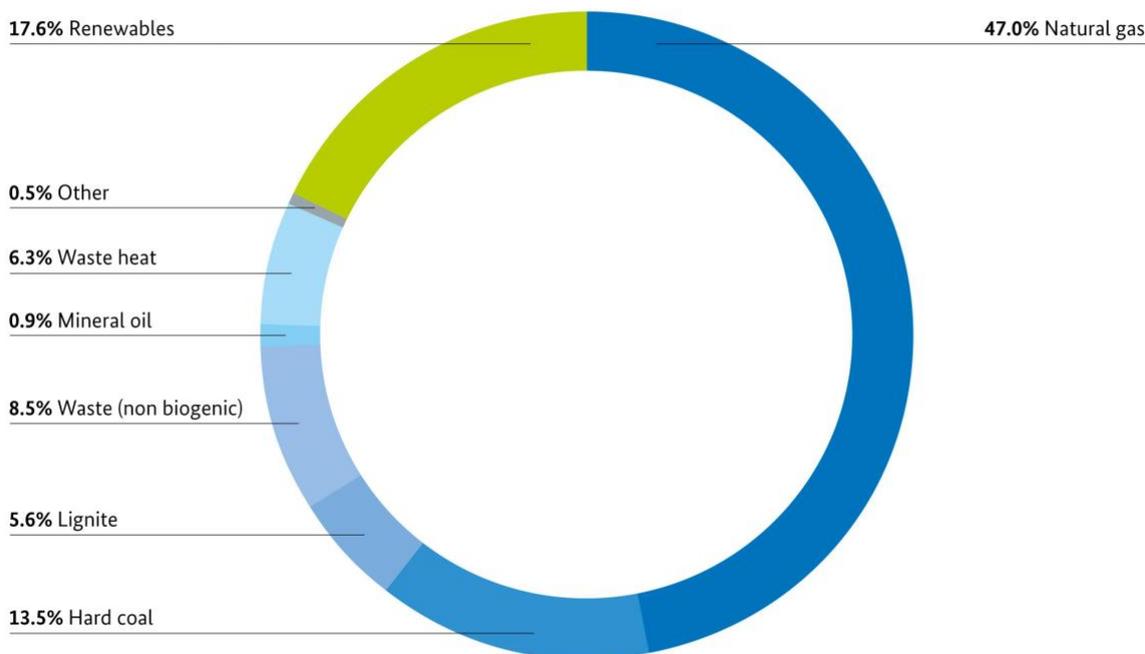
In future, in addition to support for energy-efficient building refurbishments from the federal budget, a much higher amount of **private capital** is to be channelled into this area, for example into integrated energy-efficient refurbishments and climate-neutral energy systems. These investments are to be made into neighbourhoods, individual buildings and groups of buildings by homeowners and landlords, housing companies or third parties (energy contracting providers, agencies commissioned with the regeneration of neighbourhoods, or similar). In order to considerably increase the number of energy-efficient refurbishments of existing buildings in the coming legislature, the Federal Ministry for Economic Affairs and Climate Action is also focusing on establishing new **business models** in the buildings sector. Serial refurbishment is an essential new **business model** that can make energy-efficient refurbishment faster, cheaper and more effective.

Heat planning and heating networks

Municipal heat planning, an instrument for strategic planning and investment decisions about heat supply, is still not being used to the necessary degree in Germany, and tends to be used on a voluntary basis and without standardised methods. As we implement our mission to **roll out municipal heat planning across Germany**, as set out in the Coalition Agreement, we will be working with the Länder to create a **statutory guidance framework** (Act on municipal heat planning) that will give local stakeholders greater certainty for their plans and investments – especially given the long investment cycles for infrastructure, heat generation and buildings. On 1 January 2022, a **Centre of Excellence for the Municipal Heat Transition**, which offers information and advice to municipalities, was opened in Halle/Saale. We will build it up as Germany's central point of contact for municipalities seeking information on the municipal heat transition.

The expansion and decarbonisation of heat networks is a decisive factor for increasing the share of renewables in the heat sector. At present, the dominant source of heat fed into the heat networks continues to be fossil fuels. We will be funding the expansion and decarbonisation of heat networks with an instrument called **Federal assistance for efficient heat networks (BEW)**, which we will put in practice as soon as it has been approved under the new Guidelines of the European Commission on State aid for climate, environmental protection and energy. As we harness the window of opportunity presented by the phase-out of coal for incentivising investments to transform and expand the heat networks and make them climate-neutral, we will need to be able to offer better and more long-term funding. For this reason, we will substantially increase the financing for the BEW from the future Climate and Transformation Fund (CTF).

Net heat generation per energy source in heat networks in 2020



References: Destatis, German Association of Energy and Water Industries (BDEW); Last updated: 12/2021

Electricity-based **large-scale heat pumps** working with ambient heat and low-temperature waste heat are a key technology for transforming the heat networks. **Heat storage facilities** can provide for better flexibility around heat generation and heat consumption and help to integrate the sector with the electricity market – particularly in situations where there is excess power from renewables.

Deep geothermal energy can deliver high-temperature heat to be used in buildings, but can only be harnessed if there are heating networks in place. Funding from the BEW is to make this technology, which is associated with high investment costs and risks, economically viable. If we are to make our heat supply climate-neutral by 2045, we must do considerably more to use the existing potential for geothermal energy. This potential is as large as an annual 10 TWh up to 2030, and we want to use it to the greatest possible extent. More specifically, this means a tenfold increase in the amount of heat fed into the networks from this source.

We will adjust the toolbox of measures identified in the **Dialogue on climate-neutral heat by 2045** as necessary, hold discussions with stakeholders, and quickly implement the identified instruments so as to be able to generate up to half of the heat consumed as of 2030 from climate-neutral sources. We will then continue this dialogue, harnessing it as a central forum for consulting experts from the sector and other stakeholders in the heat transition, and for jointly creating a basis for broad-based acceptance of the heat transition.

Making greater use of the potential of **industrial waste heat** can also make a significant contribution to the success of the heat transition. In future, consistent improvements in the funding framework, e.g. through the **Federal funding for energy and resource efficiency in business**

(EEW), will provide incentives for the necessary investments. At the same time, **non-monetary barriers** that have so far prevented a greater use of waste heat must be further **reduced**.

Agriculture

In 2020, the **agricultural sector** accounted for 62.4 million tonnes of CO₂ equivalents, which is almost nine per cent of Germany's total emissions. Between 2010 and 2019, the amount of greenhouse gas emissions had fallen by slight margin (approx. 1.6%). The reduction rate must be increased to almost 8% between 2019 and 2030. According to the projection report, the current gap between actual emissions and the 2030 climate target is seven million tonnes of CO₂ equivalents; the cumulated figure for the period between 2022 and 2030 is 36 million tonnes of CO₂ equivalents.

Agriculture has a special role to play in the climate crisis: on the one hand, the sector is largely dependent on the climate and directly affected by the consequences of global warming. On the other hand, it is responsible for significant amounts of greenhouse gas emissions. At the same time, the type of agricultural land use (especially the exact crop rotation) determines whether the humus balance is positive or negative.

Greenhouse gas emissions from the sector have fallen in recent years – mostly due to dry weather, lower numbers of livestock being kept, and a slight decline in meat consumption. But it has to be seen whether this trend will continue in the future. In any case, it is already clear that emissions are not falling quickly enough. The climate targets set out in the Climate Change Act will only be met if the necessary transformation towards a sustainable use of agriculture, livestock and the climate takes place. This particularly means reducing numbers of livestock and improving animal welfare.

Agricultural land itself also causes greenhouse gas emissions, particularly if it is farmed and fertilised intensively. Emissions caused by nitrogen fertilisation must therefore be reduced by ensuring a more efficient use of fertiliser. Increasing the share of organic farming to 30% of the total land used for farming by 2030 can also make a contribution to climate action. This is because organic farming causes lower emissions per square metre, due to the absence of chemical/synthetic phytosanitary products and fertilisers, lower nitrous oxide emissions, and often a higher proportion of humus. Also, organic farming delivers important synergies with other environmental and conservational objectives. A reduction in the consumption of animal products would also help efforts to increase the share of organic farming, given that more land would be available for food production.

Land use and forests

In 2020, the **land use, land use change and forestry (LULUCF)** sector posted negative emissions of -11.3 million tonnes of CO₂ equivalents. This made it the only sector in Germany to act as a carbon sink overall. By 2030, this function is to be considerably increased, to reach -25 million tonnes of CO₂ equivalents.

The LULUCF sector has an impact on the climate crisis both through its greenhouse gas emissions and its ability to bind CO₂. Its negative emissions overall, a balance largely owed to forestry, is crucial to our ability to achieve the target of climate neutrality by 2045. In terms of climate action, but also of biodiversity, it is essential that natural ecosystems and their functions as carbon storage

entities and sinks are better protected, restored, and made more resilient in the face of a changing climate. For the first time, section 3a of the new Climate Change Act sets out binding targets for the LULUCF sector.

The largest carbon sinks are the forests, which currently bind some additional 60 million tonnes of CO₂ equivalents per year, but are already losing part of this capacity to act as a sink, because they are managed mainly with wood use in mind, which means that they cannot sufficiently adapt to climate change. The largest source of greenhouse gases from the sector is dehydrated bogs, which are mostly used for agricultural purposes and emit more than 50 million tonnes of CO₂ equivalents.

The measures set out for the LULUCF sector in the current 2030 Climate Action Programme already address the most important ecosystems for climate action within the agricultural sector: bogs, forests, land. These measures must be consistently pursued and supplemented. We will use natural climate action to protect and restore our ecosystems and counteract the risks the LULUCF sector is facing due to the climate crisis. This requires solid financing for the rehabilitation of ecosystems such as bogs, forests, water meadows, and grassland, and for supporting types of use that are compatible with climate action and the protection of biodiversity.

Waste and recycling industry

In 2020, the **waste and recycling industry** generated almost nine million tonnes of CO₂ equivalents in greenhouse gas emissions. In the past, greenhouse gas emissions from this industry had already been reduced significantly, by more than 35% between 2010 and 2019. This trend must be actively pursued in the coming decade as well. According to the projection report, the current gap between actual emissions and the 2030 climate target is one million tonnes of CO₂ equivalents; the cumulated figure for the period between 2022 and 2030 is two million tonnes of CO₂ equivalents.

The Federal Government will therefore support the circular economy as an effective contributor to climate action and resource conservation. For this purpose, we will be adjusting the current legal framework, define clear targets, and review the legal provisions governing the waste industry. We will bring together existing commodity policies into a National Recycling Strategy and use this as a basis as we advocate uniform standards within the EU.

Chapter 4 – Need for action in the EU and internationally

Need for action in the EU

We need to give our climate and energy policy a stronger European perspective. Our ambitious targets are only realistic if we work together with and in Europe. If we are to achieve the EU climate target for 2030 and avoid structural disruption, it will be necessary to step up climate effort action across the EU as swiftly as possible.

This is why bringing the negotiations on the Fit for 55 package to a swift conclusion has utmost priority in EU climate policy, so that the relevant climate action instruments can take effect as soon as possible. The French Council Presidency in the first half of 2022 has a hugely important role in this regard, so that, ideally, the Member States will have agreed on a general approach on all the major dossiers of the Fit for 55 package by summer. The Federal Government has already backed the proposals made by the Commission on the Fit for 55 package. On this basis, it will play a positive and constructive role in the negotiations that follow. It will be necessary to further specify our position on the Fit for 55 dossier for the further negotiation process. We must not only look to our German interests but also be more proactive as we seek solutions that will help Europe as a whole to make progress on climate neutrality, renewables and energy efficiency. The questions received from other Member States so far show that there is a need for further clarification, in particular with regard to the efforts to strengthen and expand the existing EU emissions trading system, the introduction of a separate EU emissions trading system for buildings/heat and transport and the associated Social Climate Fund, the Carbon Border Adjustment Mechanism (CBAM), and the CO₂ limit values for cars and light commercial vehicles. These are dossiers on which Germany could play a key role. An equally important component of the Fit for 55 package are the European Commission's proposals on developing European energy policy (Renewable Energy Directive, Efficiency Directive, Energy Performance of Buildings Directive). It is essentially important to the Federal Ministry for Economic Affairs and Climate Action that the Fit for 55 package should help Europe achieve its climate targets, strengthen its competitiveness and capacity to innovate, and safeguard its manufacturing sector and jobs.

On this basis, the new Federal Government will enter into contact with important EU partners, especially in southern, central and eastern Europe, to build trust and explore the potential for compromise. The European Climate Initiative will also be used to further strengthen European cooperation on climate action.

Need for action internationally

Only if all countries, especially the G20, which are the world's largest economies emitting the highest levels of emissions, commit fully to steering towards greenhouse gas neutrality will we be able to remain on the 1.5C path and avoid catastrophic impacts from the climate crisis. This is why climate action is at the very top of the agenda of our G7 Presidency, the motto of which will be 'Transforming now for 1.5C', and which we will use to work with our international partners to reduce greenhouse gas emissions, increase carbon pricing, invest in sustainable climate and energy concepts, and speed up the energy transition. Within the G7, we will also discuss how we can make our societies and economies – both within the G7 itself and beyond – more resilient and adaptable. In this spirit, we will be using our Presidency to make the G7 a pioneer in the discussions on how to

develop a cooperative global climate club open to all countries and to forge international partnerships beyond the G7, especially with the G20 partners.

In our dialogue with China and in our cooperation with large emerging economies such as India, Indonesia, South Africa and Brazil, in particular, a core issue on the agenda will be our support for global decarbonisation and ambitious national climate action. A central feature here will be a global phase-out of coal-fired power plants by 2040 and their replacement with renewables, as outlined on the 1.5C pathway developed by the International Energy Agency.

The outcomes of the COP in Glasgow have put in place the requirements we need to be able to fully concentrate on implementation now. We must do better on climate financing in the context of the Paris Agreement, not only so that we can deliver on old promises and reach the US\$100 billion target. This is also about providing global financial support so that all the main sectors – energy, industry, buildings, transport, land use – can substantially cut their emissions. For this purpose and also to allow developing countries to put in place adaptation strategies and measures, we must significantly improve public financing for climate action and bring global financial flows and investments in infrastructure in line with the 1.5C pathway.

Since its inception 13 years ago, the International Climate Initiative has developed into a funding instrument of international repute, whose annual budget of currently approximately €600 million makes it the second pillar of Germany's climate action financing beside the work of the Federal Ministry for Economic Cooperation and Development. The Federal Ministry for Economic Affairs and Climate Action will be taking targeted action to further expand this pillar during this legislative term, and will do so in close cooperation with the Federal Foreign Office and the Federal Minister for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection, both of which will become involved in the International Climate Initiative. The International Climate Initiative will ensure that we will continue to make it a strong priority for us to support developing nations and emerging economies as they implement ambitious climate action. This in turn will require ambitious long-term strategies and interim targets for 2030, which we will be supporting through the International Climate Initiative. As we do so, we will strongly draw on the expertise that we have developed in Germany and especially in the Federal Ministry for Economic Affairs and Climate Action – particularly in the fields of climate action, energy, and industry.

We will expand our existing energy partnerships with strategic partners outside the EU and will initiate new partnerships of this kind. In this context, Germany's supply with climate-neutral forms of energy, such as green hydrogen, will become increasingly important. Funding instruments to this effect, such as the funding guideline for international hydrogen projects, H2Global, and a PtX Growth Fund, are to be put on a permanent basis or newly established. H2Global will be lifted to the European level.

Chapter 5 – Next steps to be taken

This initial climate action status shows that there is an enormous need for action. Climate neutrality will not be achieved by a transition in the electricity and heat sectors alone. All sectors – transport, building and housing, electricity generation, industry and agriculture – will have to do their bit for the investment and modernisation drive. This is a path that offers tremendous potential for the German economy. As Germany takes up a pioneering role in the field of climate action, local companies and engineers have a chance to develop technologies, installations and processes that will later be needed by other countries as well as they decarbonise. This means that German companies have a chance to increase their international competitive potential. Parallel to this, massive investments in climate-neutral forward-looking investments will boost economic growth in Germany and the European Union. This gives us the unique opportunity to turn climate action into an economic success model. This is an opportunity that we need to grasp by acting now.

This initial climate action status marks the start of our work to draw up the Immediate Climate Action Programme as announced in the coalition agreement. The objective of the Immediate Climate Action Programme is to put all sectors on the right course to meeting the targets and to ensure that all the necessary measures are taken for Germany to be able to reach its climate targets. The work on the necessary legislation, regulation, and other measures for this is to be concluded by the end of 2022. To make this happen, the Federal Government will press ahead with the drawing up and the implementation of the Programme.

A first package containing the most pressing legislation and projects is to be adopted by Cabinet in the spring. By then, the objective is to also conclude the process of interministerial coordination on the overall programme so that the Länder, associations, and the expert council on climate issues can be involved.

Any work that is not concluded by the end of spring must have progressed to the point where it is adopted by Cabinet in summer 2022 at the latest – this is the only way in which the measures agreed can be implemented and take effect in the second half of 2022. Despite this ambitious schedule, we are inviting all the associations affected and also the Länder and municipalities to put forward their own proposals and initiatives for the Immediate Climate Action Programme. We have a great deal of work before us – but it is worth every effort!

The instant measures that will soon be presented by the Federal Ministry for Economic Affairs and Climate Action include the following:

- **Amendment of the Renewable Energy Sources Act (EEG):** We will amend the EEG to **set the course for an electricity supply that will be based on 80% renewables by 2030.** To achieve this, we will increase the quantities up for auction. Technology-specific quantities will be increased, starting from what will already be a highly ambitious level. The level of gross electricity consumption we are using in our calculations lies at the centre of the corridor set out in the Coalition Agreement (680-750 TWh), i.e. 715 TWh. We will enshrine a new principle in law, namely that the expansion of renewables is in the overriding public interest and in the interest of public security.
- **Solar energy:** We will unleash the power of solar energy by introducing a **solar acceleration package.** The solar acceleration package will contain a broad range of individual measures designed to deliver significant progress on solar energy. Among other

things, this means putting in place improvements around landlord-to-tenant electricity supply, raising the thresholds applying in auctions, and opening areas and sites for ground-mounted installations whilst observing the relevant environmental criteria. We are also taking legislative action to ensure that all suitable roofspace will be used for solar energy in future. Solar energy will be mandatory for new commercial buildings, and will become the norm for new private buildings.

- **Wind energy:** We will **harness the potential of land that can be made available for onshore wind power at short notice** and **introduce an Onshore Wind Power Act to speed up the expansion process**. We will also be reducing the mandatory distances to rotating beacons and weather radar and implement measures to make the expansion of onshore wind power better compatible with military interests. This can free up a lot of sites for wind power. For instance, in areas where radio navigation systems and rotating beacons are in place, it is possible to install 4 to 5 GW of capacity. Another 3 to 4 GW can be installed in areas where there are military interests. We will use the Onshore Wind Power Act to reserve two per cent of Germany's land territory for wind energy, reconcile the expansion of wind power with conservation interests, and pave the way for swifter planning and approval procedures.
- **Bringing down the price of electricity:** We will lay the basis for having more electricity from renewables at competitive prices. In particular, electricity is to become cheaper than fossil fuels. For this purpose, we will render heat pumps and eMobility more attractive and make progress on sector coupling. For this reason, we will be **financing the renewable energy surcharge (EEG surcharge) from the federal budget as from 2023, which will ease the financial burden on electricity consumers**. As we abolish the EEG surcharge, we are moving the provisions resulting from the special equalisation scheme (Combined Heat and Power Act, offshore grid surcharge) into a separate statute so as to give the industrial sector a reliable and predictable legal basis with regard to the relevant surcharges.
- **Carbon contracts with the industrial sector:** We will lay the legal and financial basis for 'carbon contracts for difference', which will be a key instrument to support the transformation within the industrial sector. As the industrial sector ushers in climate-neutral manufacturing methods, it needs a reliable funding and investment framework. This instrument will render climate-neutral manufacturing methods economically viable at an earlier point in time and ensure that companies can better plan ahead financially.
- **Heat strategy:** In the heat sector, we are also striving for a very high share of renewables and will be generating 50% of the heat used in Germany in climate-neutral ways by 2030. As we regard energy efficiency as a second pillar to work with, we will develop a new strategy for climate neutrality in buildings that will bring together both instruments in an optimised manner. We will make decisive progress on climate action in the buildings sector and work towards a full rollout of municipal heat planning and towards decarbonising and expanding the heat networks. For this purpose, we will see to it that the Federal assistance for efficient heat networks (BEW) takes effect as soon as it has been approved under the state-aid rules, and will top up its financing.
- **Standards and funding for buildings:** Together with the Federal Ministry for Housing, Urban Development and Building, we will **swiftly review the Buildings Energy Act** to create a reliable basis for investors to plan on. This will set us on the pathway towards climate neutrality in 2045 where new buildings and the modernisation of buildings are concerned, and help reduce energy consumption in this area. In this way, we are implementing the Coalition Agreement where it says that every new heating system installed as of 2025 must be based on at least 65 per cent renewable energy. This will prevent misdirected investments that are not compatible with our climate targets. Parallel

to this, the federal funding scheme for efficient buildings will be swiftly adjusted; it will act in support of the new provisions of the Buildings Energy Act and set the right incentives for greater efficiency to prepare the market for these steps until 2025.

- **Hydrogen strategy:** We are adjusting our measures to ramp up the use of hydrogen technology so as to double the production of green hydrogen compared to the plans currently in force. To this end, we will be revising the National Hydrogen Strategy by the end of this year, and will introduce additional funding programmes.

This is merely a first sample of the projects we are planning. At present, we are working to see which other measures can be introduced at short notice. Furthermore, action taken by other ministries and sectors will also be fed into the Immediate Action Programme that will be drawn up over the coming months in close cooperation within the Federal Government.