



# Updating the Energy Supply Strategy for North Rhine-Westphalia

## *English Summary*



## Introduction

### North Rhine-Westphalia commits to climate-friendly energy system

The recent catastrophic floods in parts of Germany and, indeed, the many other severe weather events around the world have once again brought home to us the devastating impact of man-made climate change. Global warming and the excessive use of resources, especially fossil fuels such as gas, coal and oil, are posing an increasing threat to our natural basis of life, with devastating effects on the planet's climate. Along with the digital revolution, the fight against the causes of climate change and the adjustment to its inevitable consequences represent the biggest challenges we are facing this century. Whilst this calls for decisive and bold action at the regional and international levels, it will also drive innovation which, in turn, is going to help modernise our society.



With the necessary actions to save the climate we are going to comprehensively transform large parts of our society and economy. Being an energy and industry heavyweight, we are well aware of what this transformation means. We are ready to seriously contribute to making it happen. Whether we succeed will particularly depend on the climate-friendly transition of our energy supply.

For North Rhine-Westphalia, the phase-out of coal-fired electricity production is a historic step and a huge challenge. Aware of our responsibilities, we are happy to embrace this in the spirit of climate protection. At the same time, this goes beyond unilaterally imposing stricter climate targets. What we need to do is develop a tangible roadmap for putting energy supply on a secure and affordable footing. With this in mind, the State Government put forward, in 2019, the Energy Supply Strategy for NRW, with the aim to remain an innovative centre of business and industry whilst providing crucial support to the national and international climate effort. To this end, we have identified the essential fields of action and linked them to specific measures. By strongly pushing ahead with the Energy Supply Strategy, we have already made great strides.

Since we came up with the strategy in 2019, the energy and climate policies and regulations in the EU and its member states have progressed. Stricter climate targets in the wake of the Constitutional Court ruling in Germany pose a particularly big challenge, given that we must now speed up the climate-friendly transformation of energy supply structures.

Hence, the changing framework compels us to update the Energy Supply Strategy for NRW. This calls for greater ambition when it comes to both the policy objectives and the specific measures.

The focus is on expanding renewable sources and infrastructure, protecting security of supply, keeping electricity prices affordable, helping business to stay competitive, boosting the hydrogen sector and making a success of what we call 'heating transition'. The update we are now proposing has been developed in a dialogue with eminent representatives from the energy sector, trade unions, industry, science and research as well as a number of sectional groups and peak bodies. After all, energy transition is a joint venture for all elements and levels of society. Let me thank all those involved very much!

North Rhine-Westphalia is a strong and innovative state with an outstanding industry and research landscape. These strengths are the building blocks for the modernisation of our state. We will manage to transform our energy supply system only by focussing on the opportunities this contains and by highlighting concrete solutions and measures. It is the only way to revamp our energy supply structures, and do it responsibly.

A handwritten signature in blue ink, appearing to read 'Andreas Pinkwart', with a large, stylized flourish above the name.

Prof. Dr Andreas Pinkwart

Minister for Economic Affairs, Innovation, Digitalization and Energy  
of the State of North Rhine-Westphalia

## Summary

### Why updating the NRW Energy Supply Strategy

By adopting the NRW Energy Supply Strategy in 2019 along with the measures and objectives described in the strategy's 17 'fields of action', the State Government presented a roadmap for the transformation of the energy system in North Rhine-Westphalia. This roadmap is still valid and will generally continue to apply. At the same time, a number of key energy and climate policy aspects have changed since publication of the NRW Energy Supply Strategy.

Especially the tightening of climate protection targets at EU, Federal and state level has made it necessary to increase the transformation tempo in the energy sector. For example, with the amendment of the Federal Climate Protection Act ("KSG") in June 2021, the reduction target for greenhouse gas emissions for the year 2030 was increased from at least 55 percent to at least 65 percent compared to 1990. In addition, a new reduction target of 88 per cent for the year 2040 was introduced and the goal of net-zero greenhouse gas neutrality by 2045 was enshrined in law. Furthermore, the amendment to the Federal Climate Protection Act reduced the permissible annual emission volume for the energy sector for the year 2030 by 67 million tonnes to 108 million tonnes of CO<sub>2</sub> equivalents (CO<sub>2</sub> eq.). The biggest contribution to the effort to achieve Germany's more ambitious climate protection goals by 2030 must therefore now come from the energy sector.

This means that the transformation of the energy system towards climate neutrality must now take place much faster than previously planned. This extra urgency calls for a clear roadmap for the creation of proper framework conditions to transform the energy system much quicker. With the energy policy's 'triple objective' as a guideline, it is important to identify tangible measures to ensure the energy sector's contribution to achieving the climate targets without losing sight of security of supply and affordability. This is where the update of the NRW Energy Supply Strategy comes in.

In addition to stricter climate targets, more key energy policy decisions have been made at EU and Federal level since the publication of the NRW Energy Supply Strategy in 2019. This has provided fundamental guidance for the transformation of the energy system, to be taken into consideration during the process to update the NRW Energy Supply Strategy.

With the Coal Phase-out Act adopted by the German Bundestag on 3 July 2020, the energy policy recommendations made by the Commission for Growth, Structural Change and Employment ("WSB-Kommission") which had been established by the Federal Government in 2018 were put on the statute books. Lignite and hard coal capacities in Germany were to be shut down by 2038 at the latest. Along with the Coal Phase-out Act, amendments were made to the Combined Heat and Power Act ("KWKG") as well. The amended Renewable Energy Sources Act ("EEG 2021") then came into force in January 2021, adjusting the targets and regulatory framework for the expansion of renewable energy sources in Germany. Prior to this, the German government had presented its national hydrogen strategy in June 2020. In the course of implementing this strategy, a number of changes to Federal legislation were adopted as early as 2021 and, among other things, a voluntary 'transitional regulation' for hydrogen grids was introduced.

On 20 December 2019, the Fuel Emissions Trading Act ("BEHG") came into force, introducing a national CO<sub>2</sub> price for the heating and transport sectors, which were not subject to regulation under the EU Emissions Trading Scheme. From 2021 onwards, distributors of fuels (such as petrol, diesel, heating oil, liquefied petroleum gas and natural gas) are obliged to purchase emission allowances under the national fuel emissions trading system.

The Coronavirus pandemic also had an impact on the framework for the energy sector. For example, in view of the Covid-related contact restrictions, digital participation options for a large number of energy-related licensing and authorization procedures were introduced through the Planning Security Act (“PlanSiG”) to make sure that processes were not obstructed. Furthermore, as part of the national economic stimulus package to deal with the consequences of Coronavirus, the Renewable Energy Surcharge for 2021 was frozen at 6.5 ct/kWh by using revenues from national fuel emissions trading and extra budgetary funds. This kept the surcharge from rising significantly, due to the pandemic-induced temporary drop in prices on the wholesale electricity market.

Moreover, the amendment of the Building Energy Act (“GEG”) in August 2020 implemented the EU Buildings Directive and amalgamated Germany’s Energy Efficiency Act (“EnEG”), Energy Efficiency Regulation (“EnEV”) and Renewable Heating Act (“EEWärmeG”).

On 4 July 2021, the European Commission submitted ‘Fit for 55’, a package of comprehensive measures and regulatory proposals on how to achieve the stricter European climate targets that call for a reduction in greenhouse gas emissions by 55 percent until 2030. The measures include concrete proposals for new climate, energy, transport and taxation policies. Although the Fit for 55 proposals will now have to be addressed in trilateral negotiations amongst the Commission, the European Parliament and the member states – such that clear framework conditions are some way off. The implications for the energy industry are likely to be substantial. On the one hand, this applies to relevant regulation, such as the Renewable Energies Directive, the Energy Efficiency Directive or the Energy Taxation Directive. On the other hand, the forthcoming adjustments to the EU Emissions Trading Scheme will also be critical to the energy sector and, indeed, large parts of industry, given their significant influence on European electricity markets.

### **State of play with regard to the NRW Energy Supply Strategy**

Next to the changed framework conditions, the update must focus on what has already been achieved and implemented. Since the publication of the NRW Energy Supply Strategy, the State Government has been consistently working on its implementation. Here are ten examples that show North Rhine-Westphalia’s dedication to shaping and pushing forward the energy transition.

#### NRW is a frontrunner in the coal phase-out

In the wake of national legislation, North Rhine-Westphalia has embarked on the process to implement the phase-out. Whereas in eastern Germany, the definite closedown of lignite-fired power plants will not begin until 2028, the first unit in the lignite coal region between Aachen and Cologne was already shut down at the end of 2020. By 2029, North Rhine-Westphalia will account for over 70 per cent of the nationwide lignite coal reductions, putting the state at the leading edge of the phase-out programme. NRW is also in the lead when it comes to the reduction of hard coal fired electricity generation. Almost 50 percent of the 8.4 gigawatts (GW) awarded in the initial three capacity tenders originate from North Rhine-Westphalia. So, North Rhine-Westphalia is already taking responsibility for climate protection and is significantly contributing to a marked reduction of energy sector emissions.

#### North Rhine-Westphalia is leading the expansion of renewable energy sources

When it comes to renewable energy, North Rhine-Westphalia is one of the interstate champions in Germany. Despite its location and population density, North Rhine-Westphalia was Number One in the expansion of onshore wind energy capacities with a net construction of around 280 megawatts (MW) in 2020 (gross increase: 314 MW).

This means that the installed capacity of wind turbines in North Rhine-Westphalia was around 6 GW at the end of 2020. In the first half of 2021, according to figures from the mentoring and consultancy

association, Fachagentur Windenergie an Land e.V., North Rhine-Westphalia continues to be in the top group with a net addition of 143 MW, in 3rd place behind typical wind regions such as Lower Saxony (199 MW) and Brandenburg (159 MW).

In the area of photovoltaics (PV), North Rhine-Westphalia was in third place in the interstate comparison in 2020, with an increase of around 580 MW, only just behind the sun-rich state of Baden-Württemberg. With this, North Rhine-Westphalia clearly exceeded the PV growth of the previous year for the fifth time in a row. Towards the end of 2020, the installed PV capacity in North Rhine-Westphalia was already at just under 6 GW.

An important factor that paves the way for expanding renewable energy sources is that information on potentials and available land is now easy to get. Besides expanding the publicly available solar resource map ("Solarkataster"), the NRW Government has, among other things, commissioned a fundamental review of the 2012 wind energy potential study from the NRW Nature, Environment and Consumer Protection Agency ("LANUV"). The central aim of the review is to estimate the overall potential for wind energy use in North Rhine-Westphalia up to 2030 on the basis of current data and framework conditions. Based on the results of the study, the potential for wind energy in North Rhine-Westphalia in 2030 can be estimated at between 14 GW and 15 GW.

#### Go-ahead given for hydrogen ramp-up in NRW

With the publication in November 2020 of the Hydrogen Roadmap for North Rhine-Westphalia, the State Government proposed a strategic outlook for how North Rhine-Westphalia will push forward with hydrogen technologies. Based on a comprehensive stakeholder process and accompanied by a scientific study, the roadmap shows the importance that hydrogen (and its derivatives) can have for a modern, sustainable and a greenhouse gas-neutral economy and society. The Hydrogen Roadmap for North Rhine-Westphalia is also setting concrete targets for the years 2025 and 2030. For example, electrolysis capacities for industrial hydrogen production of more than 100 MW as well as 120 km of new hydrogen pipelines with connections to supra-regional pipelines in North Rhine-Westphalia are envisaged by 2025.

#### North Rhine-Westphalia pushes ahead with grid expansion

In line with the goals of the NRW Energy Supply Strategy, the State Government has lobbied for an acceleration of grid expansion in national legislation through the participation in consultations and via motions presented in the Bundesrat. Examples where this has worked include sped up appeal processes for grid connections of offshore wind farms and new approval and authorization laws for hydrogen infrastructure. These measures will make for better the overall conditions for projects in North Rhine-Westphalia. After all, with the progressive expansion of offshore wind energy, more and more electricity generated at sea will have to be transported directly to North Rhine-Westphalia.

In June 2021, the 'Study on the further development of the electricity distribution grids in North Rhine-Westphalia due to progressive sector coupling and new consumers' commissioned by the State Government was published. The study contained guidance for grid operators in North Rhine-Westphalia, along with recommendations on how to reduce the need for investment in the grid infrastructures, while also allowing a boost for electric transport. The State Government has also launched a project called Integrated Grid Planning for NRW.

#### Paving the way for the heating sector transition in NRW

By providing energy-efficient electricity and heat, combined heat and power (CHP) helps make the energy supply system more flexible and contributes to the retention of North Rhine-Westphalia's position as a centre of industry, making it more climate-friendly in the process. On behalf of the

Ministry for Economic Affairs, Innovation, Digitalization and Energy, the LANUV agency has commissioned a CHP potential study for NRW. With the corresponding LANUV report a ready-to-update register of current and future CHP and other (CO<sub>2</sub>-free) heat potential was created. Along with the LANUV study on the potential for use of industrial waste heat, which was already published in autumn 2019, the CHP study identifies options how grid-based heat supply and CHP technology could contribute to achieving climate goals.

#### Energy-efficient buildings and urban energy solutions

As part of a project called '100 Climate Neighbourhoods', North Rhine-Westphalia is promoting the construction and refurbishment of a hundred housing estates featuring a variety of energy and architectural solutions in both newbuilds and existing buildings. The aim of the project is to consistently reduce heating-related CO<sub>2</sub> emissions – and energy costs - in housing estates. All technologies that are suitable for CO<sub>2</sub> reduction can be used for this purpose. By the end of July 2021, all 100 planned housing estates had been declared eligible. More than half of the neighbourhoods have already been completed whilst the others are under construction or in the planning stage.

With the cooperation agreement between the State Government and the NRW consumer advice bureau for the period 2021-2025, local energy counselling services for private households were put on a long-term footing. This means that locally employed energy counsellors in municipalities will be made permanent cadre and transferred to an institutional funding regime. Professional groups representing architects, engineers, the skilled trades or municipal enterprises also play an important role in providing energy advice.

#### Climate-friendly transport in NRW picking up speed

Electromobility has been stepped up in North Rhine-Westphalia. Since the beginning of 2021, one in four newly registered passenger cars in North Rhine-Westphalia have been electric, of which about half are all-electric vehicles. North Rhine-Westphalia was the first German state to set up a wide-ranging support programme for private and fleet charging infrastructure. Charging points at small and medium-sized enterprises have also qualified for funding.

The self-imposed goal of installing 20,000 charging points in North Rhine-Westphalia by 2022 has already been exceeded by far. As of the end of September 2021, some 65,000 private and around 10,000 public charging points were funded. Overachieving was due in no small measure to financial support under the programme, 'progres.nrw - low-emission mobility'.

#### Energy Research Offensive: Innovation made in NRW

A powerful energy research sector is the basis for the innovation that North Rhine-Westphalia needs to transition more quickly to a climate-neutral energy system. That was the baseline understanding of the State Government's EnergyResearchOffensive.NRW action programme. The idea was to bring innovations and technologies to market readiness much faster. State Government funding for forward-looking projects and other activities has strengthened application-oriented energy research even further.

#### Realigning the funding programme 'progres.nrw - climate protection technology'

In August 2021, the State Government presented the revised progres.nrw funding programme. The programme module is now called 'progres.nrw – climate protection technology'. The overhaul of the funding guidelines goes hand in hand with a thorough revision of the programme content. Whilst implementing measures from the NRW Energy Supply Strategy, the programme will be more closely aligned with the state's energy and climate protection goals. The aim of the new version of the



programme guideline is to make North Rhine-Westphalia a pioneer in the rollout of new technologies for the transformation towards a climate-neutral energy system.

### NRW.Energy4Climate – Fit for the future

The State Government has realigned and future-proofed the operational side of its energy and climate policy. The new state-funded entity, NRW.Energy4Climate is tasked to support the climate protection and energy transition goals whilst at the same time strengthening North Rhine-Westphalia as an industrial and technology hub. Previous initiatives will be grouped together and reinforced under the umbrella of the state's energy and climate protection institution.

### **Updating the fields of action of the NRW Energy Supply Strategy**

The NRW Energy Supply Strategy of 2019 and the measures and demands contained therein in a total of 17 fields of action continue to apply and largely remain valid. Against the background of more ambitious climate protection goals and the need for better implementation, this update takes the NRW Energy Supply Strategy, its key areas and fields of action to the next level.

The 17 fields of action of the NRW Energy Supply Strategy are updated along eight thematic subsets. In this way, it is possible to identify and describe overlaps and cross-references, and formulate an integrated approach.

### Security of supply as a guarantor of climate protection

Society depends on the supply of energy. Currently, over 42 gigawatts of conventional electricity generation capacities from hard coal, lignite and nuclear energy contribute significantly to security of supply in Germany. In the wake of the phase-out of coal and nuclear energy, more than 19 GW of controllable power plant capacity will be taken off the grid in Germany in the period between July 2020 and the end of 2022 alone. The Ending coal-based Electricity Generation Act ("KVBG") stipulates that Germany must ditch coal-fired power generation, ideally by 2035 but certainly no later than 2038. To put supply on a secure footing despite this, Germany will need to significantly expand gas-fired power generation by – according to predictions - 15 GW until 2030.

The increase in climate protection targets and current price rises for coal and natural gas as well as for allowances of the EU emissions trading system will foreseeably lead to further early reductions in conventional power plant capacities in the electricity market. In particular, electricity generation from coal-fired power plants will probably have to be reduced at a considerably greater rate by 2030 in order to achieve the more ambitious climate targets. So, it will be important to adjust the regulatory framework to maintain security of supply – and also to rapidly restructure the energy supply system with a view to the 2030 targets.

The State Government is not overly confident that the electricity market in its present form can guarantee security of supply in the face of increased pressure to transform. The current investment incentives to build the required extra gas-fired capacities by 2030 are predictably not sufficient and should be supplemented by a mechanism to reward the availability of secure power production capacities (capacity market), which could also encourage flexibility. This should also include a regionally differentiated incentive to provide controllable capacity at the right place.

The State Government therefore calls on the Federal Government, among other things, to review the electricity market design and make timely adjustments to ensure security of supply does not degrade, and to create incentives for investment in controllable power generation capacities. The State Government is also using its influence to have better coordination amongst EU nations with regard to the balancing effect in the internal electricity market, in view of the gradual reduction of

secure domestic power-generating capacities. NRW also lobbies for a better and more robust monitoring procedure at the European level.

Bearing in mind the current (autumn of 2021) gas market shortages, the State Government calls on the Federal Government to take a range of steps to ensure gas security of supply in Germany.

#### Further delivering renewable energy expansion and pushing for market integration

Against the backdrop of stricter climate targets imposed this summer by national and NRW legislation, and in anticipation of the Federal Government putting in place much-needed massively improved framework conditions, NRW is increasing the ambition when it comes to photovoltaics and wind farms: The State Government is aiming for at least a threefold, possibly a fourfold, increase in PV capacity from around 6 GW in 2020 to 18 to 24 GW in 2030, and plans to double the installed capacity of wind energy from 6 GW in 2020 to 12 GW in 2030. Whether this will work particularly depends on the Federal Government's success in realising the planned national measures.

The State Government is going to push the expansion of renewable energy, by – amongst other things - adapting the regulatory framework. A planned Amendment of the State Development Plan is a key element here. In addition to setting the course for ground-mounted PV, NRW is going to develop unused acreage for wind energy, particularly on land hit by coniferous deforestation. Red tape and other obstacles will be removed and the State Government will push the expansion of roof-mounted PV on newbuilds. Extra impetus to the expansion of photovoltaics in North Rhine-Westphalia is going to come also from an intensified PV offensive and three new funding modules within the framework of the new state funding programme, 'progres.nrw - climate protection technology'. A distinct focus of the PV offensive will be on rooftop and ground-mounted photovoltaics (including the areas of floating PV and agrivoltaics) as well as on electricity models for tenants.

North Rhine-Westphalia is lobbying for the Federal Government to soon adjust the PV and wind energy targets and pathways along with the resulting annual tender volumes under the Renewable Energy Sources Act ("EEG 2021"), to cater for the new climate policy objectives. In addition, the framework for self-consumption and electricity models for tenants should be improved, and procedures digitalised and streamlined. Offshore wind energy should be established as a central pillar of the climate-neutral energy system and appropriate targets for the provision of land for onshore wind energy should be set.

Options should also be looked at for prioritising the expansion of renewable energy sources over other protected resources or interests. It could be helpful to include this in the Renewable Energy Act.

With regard to improved market integration, the framework conditions for 'green' Power Purchase Agreements must be improved and existing obstacles removed, e.g. by including PPAs in the electricity price compensation scheme for industrial companies. Green electricity marketing should be taken a step further.

#### Speeding up grid expansion – Integrated planning of energy infrastructures in line with demand

In the light of stricter climate targets, energy infrastructures must now be developed and improved at a much faster rate. The State Government will therefore continue to work to identify and realise the potentials for speeding up relevant processes. North Rhine-Westphalia calls on the Federal Government to do their bid, for example by extending digital participation under the Planning Security Act ("PlanSiG") into the relevant other statutes. At the same time, the Federal Government

should soon amend the Federal Electricity Transmission Infrastructure Planning Act (“BBPIG”) which regulates the acceleration of high voltage grid expansion.

North Rhine-Westphalia is paying close attention to the evolution of off-shore wind energy targets. More transmission lines are needed, and this makes it necessary to expand the grid. Current grid plans envisage, for example, a multitude of transmission connection lines to transport off-shore power directly to North Rhine-Westphalia.

To assess the changing demands on the grid infrastructure in North Rhine-Westphalia, the State Government commissioned the ‘NRW Distribution Grid Study’, which was published in June 2021. By far the most important influencing factor has proven to be smart or controlled charging which, depending on the design, can more than halve the need for grid expansion. The State Government is joining NRW.Energy4Climate in the effort to have the findings of the study implemented in North Rhine-Westphalia. The State Government will also push for national legislation to benefit flexible consumption.

Besides electricity grids, the development of a hydrogen infrastructure is also necessary in the spirit of decarbonisation and the desired ramp-up of a hydrogen economy. The State Government continues to lobby at EU level for the creation of an appropriate regulatory framework for hydrogen grids. The idea is to tap the potential of the German gas network and pave the way for joint planning and regulation of gas and hydrogen infrastructure under European law.

Sector coupling is making it increasingly important to take an integrated approach to the various infrastructures (electricity, gas, heating and cooling). It might even be necessary to include planning in this ‘holistic’ exercise. In order to identify early on major cross-sectoral infrastructure projects in North Rhine-Westphalia, and with a view to incorporating the findings into national strategies, the State Government has commissioned a study on integrated grid planning in North Rhine-Westphalia. Modelling will be completed, and the study’s findings published, during the first half of 2022, if things go as planned.

#### Further developing the energy price structure – Strengthening sector coupling and competitiveness – Ensuring affordability

The current energy price system of taxes, levies and surcharges, and the high burden on electricity run counter to both the objective of a competitive and affordable energy supply and the faster electrification of the energy system. In particular, the surcharge-funded promotion of renewable energies via the electricity price as a significant cost driver inhibits innovation, creates misdirected incentives and impedes the development of new innovative business models in the area of sector coupling. The aim of an energy price reform must therefore be to reduce the state-induced burdens on the electricity price and to align the electricity price system more in accordance with emissions of CO<sub>2</sub> and the stricter climate targets in Germany and the EU.

The State Government works to have the EEG surcharge cut to zero as from 2023. This will make electricity cheaper for end users, improve the competitiveness of electricity-based applications over other fossil energy sources and significantly help promote sector coupling and affordable energy supply. At the same time, renewable energies must continue to be adequately funded. The NRW Government is committed to reducing the electricity tax to the European minimum from 2025. Using electricity tax as an eco-incentive no longer makes sense in an energy supply system based increasingly on renewable energy.

The State Government is keen to have the emissions trading systems strengthened. From 2027 onwards, the national fuel emissions trading system should allow free pricing on the market without setting a fixed upper limit. In the long-term, the emissions trading systems should be integrated at the EU level.

The rising prices for energy and emission certificates lead to a considerable burden on the economy, especially on industry, which is facing international competition. A complete reduction of the EEG surcharge would be a first step towards relieving the burden on non-privileged electricity consumers. The State Government is therefore committed to maintaining the framework conditions for ensuring competitiveness and avoiding carbon leakage in view of the recent sharp rise in energy prices.

Political action is needed to protect industry from carbon leakage and to support it in the effort to convert to climate-neutral processes. Ultimately, it will be crucial to retain our competitiveness as a centre of industry. With regard to the promotion of climate-neutral processes, whilst we must pay attention to capital expenditures (CAPEX), it is important not to lose sight of operating expenses (OPEX). One way to achieve this would be Carbon Contracts for Difference (CCfD). The Federal Government's planned CCfD pilot programme will not be sufficient to create the necessary investor confidence. An expansion in terms of content (beyond hydrogen and the sectors under consideration) as well as a significant increase in funding for the CCfD programme is therefore urgently needed.

#### Pushing the heating transition with an evolved and integrated approach

The heating sector is the key to successful energy transition. Next to industrial heating, there is the very important building sector, which means especially space heating and the supply of hot water. Today's investment decisions and measures must make the building sector climate-neutral by 2045. Piped heat supply, which accounts for about a quarter of the heat supply in North Rhine-Westphalia, especially in urban areas, also plays a major role in this. What we need is a more rapid increase in the share of renewable energies in the heating sector as well as faster modernisation and expansion of local and district heating networks. In addition, the integration of efficient CHP plants continues to be of great importance, especially with regard to a secure supply of electricity and heat.

In order to determine the contribution that district heating and CHP will have to make to help satisfy demand for heat in North Rhine-Westphalia in a supply-secure and climate-neutral manner, the State Government asked LANUV to conduct a study on the potential of CHP. The central finding of the study, which was published in September 2021, is that in order to achieve climate neutrality in the heating sector, district heating in North Rhine-Westphalia would have to be expanded in line with demand in order to get the potentially available climate-friendly heat to consumers.

The success of the heat transition policy will be decided in the building and supply sector. In addition to the conversion to renewable energy, efficiency must be increased significantly, in existing buildings in particular, and also in newbuilds. In order to achieve the climate protection goals refurbishments of the building stock has to happen much faster in the short to medium term. Urban neighbourhoods also offer many opportunities for the use of innovative technologies, sector coupling and the implementation of smart solutions.

Against this backdrop, the State Government is committed to improving the regulatory and funding framework for buildings, neighbourhood solutions, heating networks and heating plans. In order to accelerate current planning, it is particularly necessary for the Federal funding for efficient heating networks to become effective as soon as possible, and for the guidelines for Federal funding for energy-efficient buildings to be amended accordingly.

With a view to continued support for the implementation of the heat transition at council level, the State Government is also looking at introducing a municipal heating planning for North Rhine-Westphalia that would involve local councils. Heat planning can help local authorities develop their heat supply and the proper infrastructure strategically, regionally and in the long term on the path towards climate neutrality. The State Government is also looking at options for the implementation of integrated and cross-sectoral energy planning for local government whilst letting councils give their input. Such a holistic approach offers further potential for efficiency and is therefore what we need when it comes to pressing on with concrete measures for climate neutrality at the municipal level and also across sectors.

The State Government is also going to promote innovative strategies for renewable heat generation and continue the existing support for heating and cooling networks. Furthermore, the government will push ahead with the geothermal survey of the state's territory. Building on the successes and experiences of the '100 Climate Neighbourhoods' project, the State Government is going to launch the follow-up project 'KlimaQuartier.NRW', to commence in early 2022.

#### Securing supply for the 'mobility transition'

In the wake of stricter climate targets, the annual emissions volume for the transport sector permitted for the year 2030 was also reduced. This has a direct impact also on the energy sector, as it means that the demand for electricity and hydrogen for the transport sector as well as the need to expand infrastructure (charging points etc.) will increase significantly more than previously planned.

In particular, it means that the transport sector has to be decarbonised, whatever the ultimate choice of technology. According to current estimates, this is most likely to be achieved by expanding the number of battery-electric passenger cars in Germany to at least 14 million vehicles by 2030. The expansion of the charging infrastructure is a central prerequisite for a successful market ramp-up of what in Germany is referred to as 'electromobility'. Therefore, the state government will develop an action plan to determine the need for the various types of charging infrastructure in North Rhine-Westphalia.

In addition to the necessary decarbonisation of individual transport, it is expected that by 2030 around 30 percent of Germany's road freight transport will have to be electricity-based in order to achieve the adjusted climate targets in the transport sector. And, North Rhine-Westphalia is focussing on hydrogen fuel cell lorries in long-distance road freight transport. The same applies to buses, waste collectors and inland waterway barges. Here it is important to develop the logistics chains for hydrogen supply, either via HGV, rail transport or pipelines. There is also a new funding programme to provide incentives for climate-friendly energy solutions for inland navigation. The funding programme was launched in June 2021 and will run until the end of 2023. Approximately 20 million euros have been earmarked, with the Federal Government's contribution totalling some 11 million euros. Moreover, the State Government has launched a short-term funding programme for zero-emission commercial vehicles, benefitting especially small and medium-sized enterprises and local government areas. Funding is available for commercial vehicles and buses with battery-electric or fuel-cell powertrains.

The State Government is also working to ensure that the Federal Governments soon submits proposals for the actual implementation of the stricter emission requirements for the transport sector imposed under the amended Federal Climate Protection Act ("KSG").

The State Government believes it is the national level's duty to adequately fund local public transport, including rail services. In addition to the positive effects for climate protection, this can -

according to the NRW Distribution Grid Study - also significantly reduce the need for expanding the low and medium voltage grids in the run-up to an accelerated effort to get more electric vehicles on the road.

In addition, the revision of the Energy Taxation Directive in the course of the EU Commission's 'Fitfor55' package should be designed in such a way that clean technologies are promoted and outdated tax exemptions and reduced tax rates, which currently promote the use of fossil fuels, are abolished.

### Quick march towards hydrogen

With the publication of the Hydrogen Roadmap, the State Government has presented a roadmap on how North Rhine-Westphalia will speed up the move towards hydrogen technologies. Hydrogen can be used to achieve the more ambitious climate targets and at the same time transform North Rhine-Westphalia as an industry and business hub. It is therefore the government's stated aim to support the development of a hydrogen economy in North Rhine-Westphalia and, in particular, to achieve the targets of the Hydrogen Roadmap NRW. For example, the first large-scale plants should come on stream by 2025, 120 kilometres of a pipeline network should be installed and 400 fuel-cell lorries are envisaged to be put on the road. Numerous innovative companies and research institutions are already working on solutions for a future hydrogen economy. The State Government is pressing ahead with this transformation and works to bring hydrogen technologies to the market much faster.

About one third of the national demand for hydrogen in 2050 will come from North Rhine-Westphalia. One of the drivers of this development is an increasing demand for hydrogen from local industry. On the one hand, it is necessary to substitute grey hydrogen with green hydrogen. On the other, the conversion of industrial processes (e.g. steel production) is creating additional demand for hydrogen, so that about 40 percent of the hydrogen needed in North Rhine-Westphalia will be used in the industry sector.

According to the accompanying study for the Hydrogen Roadmap NRW, only just under 20 per cent of North Rhine-Westphalia's hydrogen demands for 2050 will probably be produced in NRW itself. The results show that it makes perfect sense for North Rhine-Westphalia to use pipelined hydrogen produced in Germany as well as hydrogen imports that come in via pipeline from the Netherlands and the North German ports. The State Government will therefore continue to promote and expand cross-border cooperation with European and international partners. Across the board, the development of an international market for tradable raw materials will become very important in order to meet domestic demand for hydrogen and what we call power-to-liquid.

Its geographical location enables North Rhine-Westphalia to serve as conduit for delivery. Planners and designers of a hydrogen infrastructure in NRW should take this central role into account and think beyond the state's boundaries. Whilst doing so, it is important to make future-proof use of the existing energy set-up. North Rhine-Westphalia's outstanding energy infrastructure (electricity and natural gas grids, gas storage facilities etc.), should continue to be the mainstay of the supply of energy, going forward.

The State Government will continue to support application-oriented research into forward-looking hydrogen technologies and further advances, and, with that in mind, will promote and mentor innovative projects. Innovations and technologies should be developed quickly and used under real-world conditions to trigger investments in the upcoming hydrogen economy.

### Greater flexibility through digitalisation across sectors

If we want to put the transformation on a sustainable footing, digitalisation and the energy transition must go hand in hand. Whilst computer centres and digital consumers depend on strong and stable supply of renewable electricity, the energy transition must go fully digital for best possible coordination and control of the individual elements of the increasingly complex energy system.

Energy transition means that millions of decentralised and volatile power generation facilities, wind turbines and PV units in particular, as well as millions of consumers like electric vehicles and heat pumps, will be integrated into the energy system. With the energy system thus becoming more complex, this can only work by involving every player and stakeholder (decentralised generators, consumers, utility companies, grid operators etc.), and by bringing power generation and consumption into balance, using smart technology.

Digitalising the energy system requires the integration of sensors and actuators (IT components) into existing and newly built or expanded energy grids. This is necessary to better equalise supply and demand, going forward.

The more ambitious climate targets force us to be quicker about putting the potential for flexibility with regard to the energy supply system to full use. This is because a faster reduction in conventional electricity generation goes hand in hand with a rapid decline in controllable power plant capacity. Crucially, the accelerated expansion of renewable energy sources needs to happen along with an increase in flexibility, given that the quantity of renewable electricity feed into the grid is largely based on availability of wind, sun etc. rather than consumer demand.

The State Government is joining with NRW.Energy4Climate to focus more on digitalisation and flexibility. From January 2022, all activities related to energy and climate protection will be grouped under the umbrella of this new state institution. To support NRW.Energy4Climate in the start-up phase, the service contract, 'Integrated and Future-Proof Energy Supply' has been awarded. The main areas of the contract include 'Smart Grids and Distribution Networks of the Future', 'Flexibility and Storage' and 'Digital Business Models & Innovations'.

The State Government will also continue to support innovative projects for the digitalisation of the energy system. The 'progres.nrw – innovation' funding scheme assists the research and business communities companies and research institutions with the creation of forward-looking energy solutions. Furthermore, state government funding for fixed battery storage systems combined with a photovoltaic system will continue to be implemented under 'progres.nrw - climate protection technology'.

The State Government is also committed to improving the regulatory framework for energy storage. For example, energy storage as the fourth pillar in the energy supply system, alongside generation, transport and consumption, should be implemented nationwide via the German Energy Act ("EnWG"), in accordance with the EU's Internal Electricity Market Directive. Moreover, the State Government calls for further development of the framework for expanding the smart meter infrastructure and for the creation of an innovative framework for the use of digital solutions in the energy market.

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