



## North Rhine-Westphalia's industry in transition – great achievements, great challenges ahead

Energy Transition Platform | November 2016

By Dr. Daniel Vallentin, Wuppertal Institute

### Key facts and figures on North Rhine-Westphalia's industry

The state of North Rhine-Westphalia (NRW) is vital to the success of Germany's energy transition, as it is the **traditional center of Germany's manufacturing and energy-intensive industries**, such as metal production, basic chemicals, non-ferrous metals and paper. NRW's long history and high concentration of energy-intensive industry operations is mainly due to the proximity of black coal and lignite deposits in the Ruhr area or the Rhine mining region. **Large coal-fired power generating units located adjacent to the coal mines ensure relatively cheap and stable electricity supply to industrial plants** and have contributed to a strong infrastructure for industry and manufacturing.

#### Socio-economic role

Today, NRW's manufacturing and energy-intensive industry still contributes an important share to the state's economic gross value production. However, **NRW's manufacturing sector and energy-intensive industries have experienced a significant decline in recent years**. In 1991, the state had around 3 million people employed in manufacturing. By 2013, the figure had dropped to around 2 million people. Over the same period, the number of people employed in the services sector rose from 1.8 million to around 6.8 million.

**This decline is closely linked to changes in NRW's coal-mining industry.** Due to the high costs of mining underground black coal deposits at great depths in the Ruhr area, black coal extraction has been in decline for decades, with numerous mines being shut down. Today, only one coal-mine is still operating in the Ruhr area and it will be shut down by 2018. In contrast, the state government has decided that the opencast lignite mines in the Rhine region will stay open until at least 2030. However, the possibility of abandoning coal-mining for electricity generation is currently gaining public support at a national level.

The **Energy Transition Platform** is an initiative designed to support state and regional governments in developing and implementing innovative clean energy policies.

The Climate Group, alongside the initiative's lead government, North Rhine-Westphalia, and Stiftung Mercator launched the Energy Transition Platform in early 2016 with the aim to connect highly industrialized, carbon intensive states and regions.

The partner regions come together to learn from their global peers, build strong partnerships and to jointly overcome barriers to the adoption of clean energy models.



## Energy demand

These developments have led to major structural changes in the traditionally industrial parts of North Rhine-Westphalia and the transformation process is still ongoing. The remaining **energy-intensive industries have had to modernize their processes and products to stay competitive**. As a result of structural change and efficiency improvements, total energy demand of the manufacturing sector and energy-intensive industries was reduced by about 15% between 1990 and 2013. **Manufacturing and industry represents about 35-40% of NRW's total final energy demand**. Since the 1990s, the fuel mix of the sector's energy supply indicates significant shifts, with a considerable reduction of black coal (-43%) and natural gas (-20%). At the same time, its electricity demand has remained widely stable. Renewable energy has experienced strong relative growth, though still represents a small share of total industrial final energy demand.<sup>1</sup>

Considering the final energy demand of individual industry branches, production of basic chemicals (208 PJ) and iron/steel (191 PJ) were by far the largest industrial consumers of final energy by 2013. Together, they represented about 52% of industrial final energy demand in NRW.

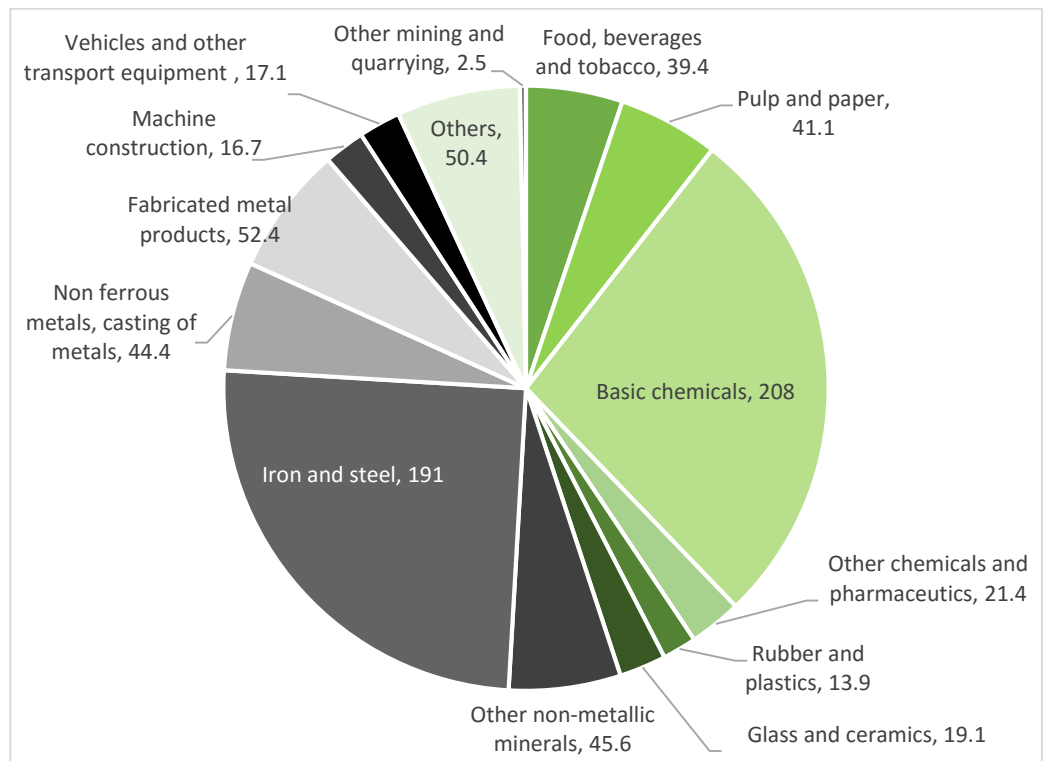


Figure 1: Final energy demand (PJ) in NRW by industry branches, 2013

<sup>1</sup> These and following figures related to final energy demand are based on own calculations with data from IT.NRW: Energie- und CO<sub>2</sub>-Bilanz NRW. Düsseldorf, several years.

## Greenhouse gas emissions and climate impacts

NRW's manufacturing and industry sector also plays an important role with regards to the state's greenhouse gas (GHG) emissions. In 2011, manufacturing and industry plants discharged about 141 million metric tons of CO<sub>2</sub>, making them a major contributor to Germany's total CO<sub>2</sub> emissions. **Steel and iron production alone represented about 45% of NRW's industrial CO<sub>2</sub> emissions**, mainly due to the high energy and carbon intensity of blast furnace production processes. The chemical industry is the second largest industrial producer of CO<sub>2</sub>, representing 27% of NRW's industrial CO<sub>2</sub> emissions, mainly due to its high demand for electricity and steam.<sup>2</sup>

However, NRW's manufacturing and industry sector has made **considerable efforts to reduce energy demand and GHG emissions in the last two decades and has managed to bring down CO<sub>2</sub> emissions by 27% from 1990 to 2011**. Especially in the chemical industry, efficiency improvements and process optimization have led to a substantial reduction in CO<sub>2</sub> emissions while increasing production at the same time. Consequently, **the chemical industry has managed to decouple its production growth and climate impact**. This development was mainly triggered by global competition and the pressing need to reduce costs for input resources and energy.

In order **to comply with climate policy targets at the European and state level, a lot remains to be done for NRW's industry**. The European Commission's Low Carbon Economy Roadmap requires the industry sector to reduce GHG emissions by more than 80% compared to 1990.<sup>3</sup> NRW's state government has adopted a Climate Protection Act, setting legally binding climate targets which mean that by 2025, GHG emissions need to be at least 25% lower than 1990 levels and at least 80% lower by 2050. At a first glance, NRW's 2020 target seems to be less ambitious than the 40% one set by the German federal government for the same period. However, 25% is seen as realistic and challenging enough given the state's economic structure.

Due to the emissions reductions already achieved in the last two decades, the main mitigation challenge for NRW's manufacturing and industry sector occurs in the period from 2020 until 2050. **As most efficiency potentials have already been reaped, so-called 'low carbon' or 'breakthrough' technologies would be necessary to achieve further substantial CO<sub>2</sub> mitigation** in NRW's energy-intensive industries. These low carbon technologies include, for example, the use of hydrogen from renewable energy for direct iron reduction processes in the steel/iron industry or ammonia production in the chemical industry. Such mitigation strategies would require substantial changes in the current infrastructure and technology setting of NRW's industry and come with significant investments costs.

<sup>2</sup> Based on own calculations with data from LANUV (2011): CO<sub>2</sub>-Emissionen der Industriebranchen in NRW in 2011. Düsseldorf.

<sup>3</sup> European Commission (2011): A roadmap for moving to a competitive low carbon economy in 2050. Brussels.

## Ecological re-industrialization – North Rhine-Westphalia’s policy approach

---

Despite – or even because of – the above mentioned challenges, and the economic importance of the manufacturing and industry sector, NRW’s state government has decided to adopt a proactive approach to climate and innovation policy. **The state government wants to make industry part of the solutions** needed for complying with ambitious energy and climate policy targets. It pursues the **vision of an “ecological re-industrialization”** of the state, which will help to unlock future markets and business fields arising from the green transformation of the energy and industry sector. For example, the expansion of wind power and the large-scale renovation of building stock will require products and services from key NRW industry branches, such as chemicals, iron/steel and mechanical engineering.

In order to **strengthen the profile and portfolio of NRW’s industry in future “green markets”**, **the state government has published an environmental business strategy** (Umweltwirtschaftsstrategie). It has defined three main targets for all activities relating to the strategy: improving competitiveness, identifying strategic topics and markets, and developing the brand “Environmental Business in North Rhine-Westphalia”. The strategy will receive funding of about €800 million for activities related to **business development, innovation and research activities**. Funding for these activities is designated through so-called ‘lead market’ competitions and open calls for project proposals. Recently, the government initiated a lead market competition which focuses on environmental business activities, particularly energy conversion, energy distribution and storage, as well as resource and material efficiency. Out of 93 project proposals, 27 innovative projects were selected with an overall budget volume of about €25.5 million.

Besides the aforementioned environmental business strategy, the state government makes use of numerous other instruments to foster the green modernization of NRW’s industry sector. One key element of its policy approach is to **intensify the exchange and dialogue between key players from energy-intensive industries**. NRW’s government has initiated a comprehensive participatory process for developing its climate protection plan – a roadmap with technical strategies and policy measures for achieving the state’s climate policy targets. While the participatory process encompasses all economic sectors, discussions with the manufacturing and industry sector turned out to be particularly challenging due to high competitive pressure and technical complexity in some industry branches. Therefore, the state government initiated a follow-up process for energy-intensive industries with **specific stakeholder workshops for all energy-intensive industry branches**. As most mitigation challenges in the industry sector are expected from 2020 onwards, the workshops focused on the research and development of key low carbon technologies in order to support their timely market introduction. For example, in the workshop for the aluminum industry, strategies to optimize aluminum recycling and enable more flexible operation of the aluminum electrolysis process have been discussed.

Furthermore, the state government has adopted **technology-specific programs for reducing the energy and carbon intensity of industrial operations**. A key program at the interface of the energy conversion sector and energy-intensive industries is the so-called **impulse program for combined heat and power (CHP)**. The program is based on the government’s target to expand CHP to 25% of overall power generation in NRW by 2020 (the current share of CHP is



about 13%). It encompasses a wide range of different instruments, such as funding for studies on the potential for CHP in NRW, research and development activities related to innovative CHP technologies and concepts, as well as low-interest loan schemes for installing CHP plants at different scales.

## Conclusions

---

This paper shows that existing long-term climate policies present an enormous challenge for NRW's manufacturing and industry sector, as well as for policymakers and decision-makers in both the public and private sectors. On the one hand, the 2050 mitigation targets call for significant changes in energy-intensive production processes and infrastructures. On the other hand, competitive disadvantages for NRW's industrial companies at the international level should be avoided in order to prevent carbon leakage effects resulting from the relocation of industrial production to countries or regions with less ambitious climate and environmental policy frameworks. Therefore, it is appropriate to understand climate policy as a vehicle for developing future "green markets" and innovation. It is vital that instruments of such policy programs are developed in close dialogue with practitioners from the different industry branches to make sure that they are effective and efficient in supporting industrial companies in this transformation process. However, preparing energy-intensive industries for a low carbon world in 2050 cannot be managed by the state level alone and requires support of the federal government. Therefore, both policy-making levels should join forces for a collaborative policy program for an "ecological re-industrialization" in industrial regions such as North Rhine-Westphalia.

## Contact

---

To find out more, please contact **Anne-Sophie Dörnbrack**, States & Regions Policy Manager (Energy Transition) | [StatesAndRegions@theclimategroup.org](mailto:StatesAndRegions@theclimategroup.org) | +44 (0)20 7960 2977

**Website:** [TheClimateGroup.org/EnergyTransitionPlatform](https://TheClimateGroup.org/EnergyTransitionPlatform)

Funded by:

STIFTUNG  
MERCATOR

Supported by lead government:

Ministerium für Klimaschutz, Umwelt,  
Landwirtschaft, Natur- und Verbraucherschutz  
des Landes Nordrhein-Westfalen

