

GERMANY'S HYDROGEN MODEL REGION

**THE RIGHT
PLACE.
THE RIGHT
TIME.**



INTRODUCTION: THE RIGHT PLACE, THE RIGHT TIME.

The Ruhr Metropolis has both the capacity and the ambition to become the first model region for the ramping-up of the hydrogen market in Germany and Europe. To drive this project forward, the companies BP Europa SE, OGE GmbH, RWE AG, thyssenkrupp AG, Thyssengas GmbH and Vonovia SE have joined forces with Hydrogen Metropole Ruhr (HyMR for short), an initiative of the Ruhr Regional Association (Regionalverband Ruhr; RVR) and Business Metropole Ruhr GmbH (BMR).

In this policy paper, we describe why a model region also benefits the whole of Germany and what steps are necessary to get it off the ground quickly.

The Ruhr Metropolis has set out to become the greenest industrial region in the world. Hydrogen is a key driver of this transformation.

The right place, the right time: The Ruhr Metropolis is poised to start its successful hydrogen transformation.

About Hydrogen Metropole Ruhr

Hydrogen Metropole Ruhr (HyMR) is an initiative of the Ruhr Regional Association (Regionalverband Ruhr; RVR) and Business Metropole Ruhr GmbH (BMR). The initiative coordinates hydrogen activities within the Ruhr region. It was created in the beginning of 2022. Its tasks include:

- Reinforcement and visualization of the hydrogen economy along the entire value chain
- Linking up local and regional stakeholders
- Promoting the development of a hydrogen model region in the Ruhr Metropolis

Recent achievements of the HyMR include the successful coordination of the application as 'HyPerformer' region, involving 15 million euros of subsidies from both the German federal government and the state government of North Rhine-Westphalia for hydrogen mobility projects. Another success is the creation of a H2 climate protection network ('H2-Klimaschutznetzwerk') with funding from the federal government.

WHY DO WE NEED A MODEL REGION?

The importance of model regions for the acceleration of hydrogen technology is confirmed not only by network operators and energy companies, but also most recently by a study conducted by the Jülich Research Center (Forschungszentrum Jülich)¹. The study concluded that, in view of the acute time pressure and the complex infrastructural and economic requirements, a regional approach which can serve as a model offers many advantages.

- As a model region, there are established networks between the energy industry, infrastructure operators, other industrial stakeholders, research institutions and municipalities, which facilitate communication.
- Grid operators and energy suppliers need reliability and financial security, just like their customers.
- Various hydrogen use cases may be developed in networks, especially applications in the industrial and mobility sectors.
- The implementation of hydrogen ecosystems that combine supply security and economic efficiency should start on a smaller scale.
- In model regions, integrated concepts can be tested more quickly. Eventually, the results and lessons learned may be extended to the whole of Germany.

1 'Transformation des Energiesystems in Modellregionen mithilfe von grünem Wasserstoff', short study on behalf of the Federal Ministry of Economic Affairs and Energy, Projektträger Jülich, 2021.



WHY THE RUHR REGION?

The Ruhr Metropolis is the industrial region in Germany with the most experience of structural transformation. Here, the economy and society are in a constant state of change - not least since the end of coal mining. The aim to become the greenest industrial region in the world underlines the region's commitment to transformation. This also applies to the topic of hydrogen.

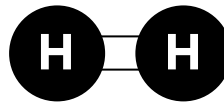
As early as 2020, a study by IW Consult, a subsidiary of the German Economic Institute in Cologne, showed that the Ruhr region - compared to eight other metropolitan areas of Germany - has the best conditions to become a hydrogen model region.¹

Key advantages of the Ruhr Metropolis are the special mix of modern industry, its unique poly-centricity, and the high degree of networking between municipalities, business and science. This results in the following arguments for the Ruhr Metropolis becoming a hydrogen model region:

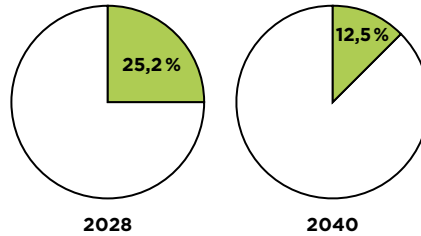
² 'Wasserstoffranking 2020: Wo steht das Ruhrgebiet im Metropolenvergleich?', study on behalf of Regionalverband Ruhr, IW Consult, 2020.

■ **Hydrogen demand:**

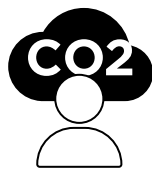
According to estimates by transmission system operators, around a quarter (25.2 percent) of Germany's total hydrogen demand will come from the Ruhr Metropolis by 2028. By 2040, the region will still account for 12.5 percent of the country's total demand, then of course at a significantly higher level in terms of volume.³



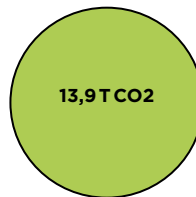
Hydrogen demand



- **CO2 savings potential:** In 2020, energy-related per capita emissions in the Ruhr Metropolis totalled 13.9 metric tons of CO2 equivalents⁴ compared to a national average of 7.3 metric tons.⁵ Most of this is attributable to heavy industry; steel production alone is responsible for over 25 percent of total greenhouse gas emissions in the Ruhr region. The use of H2 offers enormous savings potential with supraregional significance.⁶



Per capita emissions



Ruhr region (2020)



Germany (2020)

³ Calculation based on the project reports of Netzentwicklungsplan Gas 2022-2032 by FNB Gas e.V. Data source: https://fnb-gas.de/wp-content/uploads/2023/03/2023_03_31_NEP-2022_Anlage-2_Projektmeldungen-WEB-1.xlsx. Retrieved 30 May 2023.

⁴ 'Energie- und Treibhausgas-Bilanz für die Metropole Ruhr 2012-2020', Regionalverband Ruhr, 2022.

⁵ Treibhausgasemissionen, Energieatlas NRW, Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein-Westfalen (LANUV). Online source: https://www.energieatlas.nrw.de/energiestatistik/Pages/Content.aspx?topic=8&subtopic=2#Chart8_2_6Anchor. Retrieved 30 May 2023.

⁶ 'CO2-Kompass Metropole Ruhr: Wasserstoff als Lösung auf dem Weg zur Klimaneutralität, study on behalf of Regionalverband Ruhr, IW Consult, 2021.

- **Infrastructure:** Due to its mining history, the region has the densest network of gas infrastructure in Europe.

Much of this infrastructure is double-stranded and can be converted to hydrogen in the short term without jeopardizing the natural gas supply. With the GetH2Nukleus project and the H2ercules initiative, major projects have already been launched to rapidly expand this infrastructure.

- **Geographical location:** The Ruhr Metropolis is suitable for the import of hydrogen due to its numerous nodes of pipelines, roads, railways and waterways and thus a perfect starting point for the rapid rollout of the technology beyond the region. In addition to the 'port triangle' of Duisburg, Rotterdam and Antwerp, there are also various medium-sized inland ports such as Wesel, Dortmund and Hamm. Former coal-fired power plant sites with their own port connections may also play a significant role as part of a decentralized port infrastructure.
- **Energy and industrial know-how:** From research to application, the region has an exceptionally dense knowledge ecosystem around hydrogen. This includes the TrHy project in Duisburg, one of four national hydrogen centers, as well as institutions such as KWS Energy Knowledge eG and the Gas- und Wärme-Institut in Essen, the Max Planck Institut für Kohlenforschung in Mülheim an der Ruhr, several Fraunhofer institutes, universities and technical colleges, and the start-up hub H2UB.
- **Model region beyond the Ruhr region:** The discussion around hydrogen cannot be limited to the Ruhr Metropolis, but must also extend beyond the region's borders. For example, extending hydrogen infrastructure to cement plants in the Münsterland, the small and medium-sized businesses in South Westphalia or the chemical industry in the Rhineland are natural next steps and therefore are being taken into consideration in the concept for the Ruhr Metropolis.

Studies on the potential of the hydrogen economy in the Ruhr Metropolis can be found here:






HOW CAN THE METROPOLIS RUHR BECOME A MODEL REGION?

The recipe for turning the Ruhr Metropolis into hydrogen model region consists of two main ingredients: the commitment of the stakeholders in the region on the one hand and the right support and regulation from politics on the other. The region's stakeholders have already demonstrated their strong commitment to hydrogen with numerous initiatives, just a few of which will be mentioned here:

- With a Memorandum of Understanding signed in June 2023, HyMR and the companies BP Europa, Open Grid Europe, RWE, thyssenkrupp, Thyssengas and Vonovia declared that they would cooperate to turn the Ruhr Metropolis into a hydrogen model region.
- As part of the amendment to the Energiewirtschaftsgesetz (Energy Industry Act), OGE and Thyssengas, among others, are modeling the Wasserstoffkernnetz (hydrogen core network) in Germany. This core network is intended to connect centralised hydrogen nodes and cover all regions of Germany. Individual pipeline projects such as GetH2 and H2ercules will be integrated into the core network.

- 
- In Gelsenkirchen, the Klimahafen (climate port) functions as a living lab for the green transformation of an entire industrial park with numerous small and medium-sized enterprises. A part of the initiative is a study-supported pilot project in which process heat from energy-intensive companies is converted to hydrogen-rich gas. The climate port will be connected to the hydrogen pipeline network that is currently under construction..

These and other examples show that the Ruhr Metropolis is committed to a hydrogen-fuelled future. It has not only set itself the goal of becoming a hydrogen model region - it's already in the process of achieving it.

However, political support is needed for the next steps toward becoming a model region and establishing a national hydrogen economy. In the following, we outline which political decisions and changes of direction are necessary for success.



OUR RECOMMENDATIONS FOR ACTION FOR BUILDING A HYDROGEN MODEL REGION:

In the region:

1. Promote the model region via conceptually coordinated sub-projects,
because there are already good approaches to this on the ground. One example among many is the construction of the first hydrogen-powered reduction plant at thyssenkrupp Steel in Duisburg, which was funded by the state.

2. Scientific monitoring and evaluation of the progress of the model region,
because this will enable us to learn the best possible way to implement the national rollout of the hydrogen economy.

3. Promotion of Hydrogen Metropole Ruhr as the coordination office responsible for setting up the model region,

because a central and coordinating institution with regional expertise is crucial to success.

4. Development of a roadmap by the federal government, the state of North Rhine-Westphalia and the HyMR,

because realistic and efficient time planning requires joint action.

In Germany and the EU:

5. Short-term development of a model for risk management for network expansion by the federal government,

to enable network operators to pre-finance investments in the hydrogen network. In this regard, the federal government can take inspiration from a proposal made by the Deutsche Energieagentur (German Energy Agency; dena) in 2022.

6. Short-term provision of guarantees/collateral by the federal and state governments to hedge the risk of hydrogen supply contracts,

to account for the different time horizons of suppliers and customers and thus enable the accelerated transition to hydrogen.

7. Involve relevant stakeholders in the evaluation process of the Wasserstoff-Beschleunigungsgesetz (Hydrogen Acceleration Act),

to monitor the effectiveness of the measures and adjust them in a timely manner, if necessary.





8. Provide funding for capital expenditure (CAPEX) and operating expenditure (OPEX),

because this can support companies in climate-friendly business development and reduce investment risks.

9. Rapid introduction of effective Carbon Contracts for Difference (CCfD) to support companies' transition to climate-friendly production processes,

because this can provide investment incentives, reduce the risk of cost overruns and reduce competitive disadvantages.

10. Dispense with the requirement to separate the ownership of gas and hydrogen networks as proposed by the European Commission by 2031 (vertical unbundling),

because we need the infrastructure, the know-how and rapid investment of the gas operators to quickly develop a hydrogen network.

11. Dispense with the prohibition on the exchange of commercially sensitive information between gas and hydrogen subsidiaries of a corporate group (horizontal unbundling),

as this will make it impossible to draw on existing technical expertise that has been built up over decades and will lead to the unnecessary development of duplicate structures in the expansion of the hydrogen network.



12.


Orientation towards CO2 savings through hydrogen during ramping-up of the market,

because hydrogen from other sources is needed for a transitional period in addition to the still scarce green hydrogen.

13.

Classification of electrolyzers in the Bundes-Immissionsschutzgesetz (Federal Immission Control Act) as energy plants,

because this reorganization of the legal framework will speed up approval procedures, especially for the construction of small plants.



YOUR COOPERATION PARTNERS FOR THE HYDROGEN MODEL REGION



BP Europa SE



Open Grid Europe GmbH



RWE AG



Thyssengas GmbH



thyssenkrupp AG



Vonovia SE



Hydrogen Metropole Ruhr is an initiative of:



Contact us.



Imprint

Regionalverband Ruhr (Ruhr Regional Association)

Die Regionaldirektorin
Karola Geiß-Netthöfel
Kronprinzenstraße 35
D-45128 Essen

Telephone: +49 (0)201.2069-0

Fax: +49 (0)201.2069-500

info@rvr.ruhr

www.rvr.ruhr

Status: June 2023

