H2.B HYDROGEN CENTER BAVARIA

Progress Report

on the Hydrogen Ramp-Up in Bavaria

Initiated by

Bavarian Ministry of Economic Affairs, Regional Development and Energy

June 2026

About the H2.B

The Hydrogen Center Bavaria (H2.B) is the networking and coordination platform for hydrogen in Bavaria, initiated and financed by the Free State of Bavaria. Since its establishment in September 2019, the center has become a nationally and internationally recognized platform for hydrogen topics in Bavaria. It brings together the wide-ranging expertise and hydrogen activities of the Free State of Bavaria under a cross-sector umbrella at the interface of business, science, government, and the public. The H2.B also coordinates the Hydrogen Alliance Bavaria, a network of more than 420 stakeholders from business, science, and industry associations.

The overarching objective of H2.B is to strengthen the hydrogen economy in Bavaria and accelerate the rollout of hydrogen use across a broad range of applications. Among other things, the many activities of H2.B promote stronger networking among Bavarian hydrogen stakeholders within Hydrogen Alliance Bavaria and with other Bavarian, national, and international stakeholders. In 2020, H2.B and its partners in Hydrogen Alliance Bavaria prepared a position paper on Bavaria's hydrogen economy as the first step toward the Bavarian Hydrogen Strategy. In 2022, H2.B published Hydrogen Roadmap Bavaria, which presents perspectives and specific areas in which action is needed and outlines key milestones for the hydrogen ramp-up. The Progress Report on the Hydrogen Ramp-Up in Bavaria describes current political and economic developments and the status of ongoing initiatives and projects in Bavaria, and identifies measures for achieving the goals of Hydrogen Strategy 2.0.

Definitions

- **Renewable hydrogen**, a renewable fuel of non-biological origin (RFNBO), is defined under EU law as hydrogen produced through electrolysis using water and electricity from renewable energy sources and meeting specified requirements concerning additionality and the temporal and geographic correlation of hydrogen production. Renewable hydrogen is also commonly referred to as green hydrogen.

- **Biogenic hydrogen** is produced from biomass sources and is not considered an RFNBO under the Renewable Energy Directive (RED). It may, however, count toward European renewable energy targets if it meets the relevant sustainability criteria.

- **Low-carbon hydrogen** is produced from sources that are not exclusively renewable. It must generate at least 70 percent fewer greenhouse gas emissions over its entire life cycle than fossil natural gas, for example through carbon capture and utilization (CCU) or carbon capture and storage (CCS). A corresponding Delegated Act entered into force at the end of 2025. There are various methods of producing low-carbon hydrogen; so-called blue hydrogen is expected to be the most scalable option. Blue hydrogen is produced from natural gas by steam reforming, with some of the resulting carbon dioxide (CO_2) captured and stored.

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Executive Summary

Bavaria is well-positioned to play a leading role in the hydrogen sector. Key factors include its strong industrial base, a high-performance and innovative research and development landscape, numerous dedicated regional initiatives, and, with the H2.B and the Bavarian Hydrogen Alliance, a nationally and internationally established platform for the Bavarian hydrogen ecosystem.

This progress report shows that, since the roadmap was published in 2022, the ramp-up of hydrogen has been proceeding more slowly than originally anticipated due to a complex and dynamic market and regulatory environment. The main reasons for this include, in particular, high costs, uncertainties regarding the economic and legal framework, significant regulatory hurdles, delays in infrastructure development, and – as a result – limited demand to date. At the same time, however, important foundations have been laid, and key steps have been successfully taken to set the course for the next implementation phases.

In recent years, significant political and regulatory frameworks have been established at the European, German, and Bavarian levels. Bavaria has supported these developments through its own funding measures totaling 255 million euros – particularly in the expansion of electrolysis capacity and hydrogen refueling stations. This has laid the groundwork for the market's continued growth. The Bavarian State Ministry of Economic Affairs, Regional Development and Energy has approved 24 funding grants for electrolysis projects with a total capacity of 143 MW_{el}, as well as 29 grants for hydrogen refueling stations. The Free State also supports a wide range of research and development projects across the entire hydrogen value chain. Of central strategic importance is the approved hydrogen core network in Germany, which comprises approximately 1,050 kilometers of pipeline infrastructure in Bavaria. With the planned commissioning of the first sections over the next two years, essential prerequisites for a cross-regional supply will be established. In addition, progress is being made in the development of distribution networks, the establishment of regional ecosystems, storage projects, and pilot and demonstration projects in industry, mobility, and heating.

At the same time, it is evident that many projects depend on more reliable framework conditions adapted to current circumstances, as well as additional economic stimulus. In dis-cussions with Bavarian stakeholders along the hydrogen value chain as part of a stakeholder dialogue, the importance of hydrogen for decarbonization was emphasized – particularly in application areas where direct electrification reaches its limits. At the same time, it is clear that a successful ramp-up requires the coordinated development of production, infrastructure, imports, storage, and demand. Four key areas of action are central to this: a holistic, integrated approach to the energy transition; the expansion of transport, distribution, import, and storage infrastructure; the improvement of economic viability and investment security; and the strengthening of resilience through diversification, regional value creation, and technological neutrality.

The report thus identifies a clear need for action in the coming years. These include reliable and appropriate political and regulatory frameworks; the accelerated expansion of the core network, distribution networks, and storage facilities; the establishment of sustainable import structures; and greater market activation on the demand side. In addition, there is a need for continued support for research and innovation, the strengthening of regional hydrogen hubs, the development of skilled workers, and closer integration of hydrogen, electricity, and carbon dioxide (CO_2) infrastructure. Bavaria has the opportunity not only to secure its technological leadership but also to further expand it in the course of the European hydrogen ramp-up. To achieve this, it will be essential to gradually translate the foundations already laid into robust market and infrastructure development.

Dr. Fabian Pfaffenberger
Managing Director Hydrogen Center Bavaria (H2.B)

Bavaria has set out on this journey.: Numerous projects already demonstrate the commitment with which municipalities, companies, research institutions, and initiatives are working on hydrogen production, infrastructure, and applications. Turning these efforts into a sustainable ramp-up now requires reliable framework conditions, high-performing infrastructure, economic incentives, and stronger links among production, storage, transport, and demand.

Abbreviations

AFIR	Alternative Fuels Infrastructure Regulation
BayFELI	Bavarian Funding Program for the Development of Electrolyzer Infrastructure
BayFOR	Bavarian Research Alliance
BayH2T	Bavarian Funding Program for the Development of Hydrogen Refueling Station Infrastructure
BIK	Federal Funding for Industry and Climate Action
BMWE	Federal Ministry for Economic Affairs and Energy
CBAM	Carbon Border Adjustment Mechanism
CCfDs	Carbon Contracts for Difference
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilization
CCUS	Carbon Capture, Utilization and Storage
CEF	Connect Europe Facility
CISAF	Clean Industrial Deal State Aid Framework
CO_2	Carbon dioxide
EEG	Renewable Energy Sources Act
EnWG	Energy Industry Act
EU-ETS	EU Emissions Trading System
FAU	Friedrich-Alexander-Universität Erlangen-Nürnberg
GHG quota	Greenhouse gas reduction quota
GTP	Gas Distribution Network Transformation Plan
GW	Gigawatt
GW_{el}	Gigawatt of electrical capacity
H_2	Hydrogen
H2.B	Hydrogen Center Bavaria
H2N	Bavarian Funding Program for the Purchase of Hydrogen-Powered Commercial Vehicles
IEA	International Energy Agency
INTERREG	European Territorial Cooperation
IPCEI	Important Projects of Common European Interest
ITZ	Innovation and Technology Center
ITZ-H2	Hydrogen Innovation and Technology Center
KsNI	Climate-Friendly Commercial Vehicles and Associated Refueling and Charging Infrastructure
LCF DA	Low-Carbon Fuels Delegated Act
LMU	Ludwig-Maximilians-Universität München
LNe	Long-Term Negative Emissions Strategy
LOHC	Liquid Organic Hydrogen Carrier
Mtpa	Million metric tons per year
MW_{el}	Megawatt of electrical capacity
NEP	Network Development Plan
NIP	National Innovation Program for Hydrogen and Fuel Cell Technology
NZIA	Net-Zero Industry Act
PCI	Project of Common Interest
PMI	Project of Mutual Interest
RE	Renewable energy
RED	Renewable Energy Directive
RFNBO	Renewable Fuels of Non-Biological Origin
R&D	Research and development
SAFs	Sustainable Aviation Fuels
SME	Small and medium-sized enterprises
StMWi	Bavarian Ministry of Economic Affairs, Regional Development and Energy
TEN-E	Trans-European Networks for Energy
TEN-T	Trans-European Transport Network
TTZ	Technology Transfer Center
TUM	Technical University of Munich
TWh	Terawatt-hours
WTAZ	Hydrogen Technology Application Center

1 Introduction

1. Introduction

In May 2020, the Bavarian State Government adopted its Hydrogen Strategy to establish an appropriate framework for developing and specifically shaping the hydrogen ramp-up in the Free State. The Hydrogen Roadmap Bavaria, published by the Hydrogen Center Bavaria (H2.B) in 2022, builds on this initiative. It was developed to give hydrogen stakeholders in Bavaria an additional point of reference in a dynamic economic and technological field and to identify areas for action and milestones on the path toward a global hydrogen economy.

Since the Bavarian Hydrogen Strategy and the Hydrogen Roadmap Bavaria were published, the global geopolitical, political, and economic framework has changed substantially. The energy crisis, shifting security and trade dependencies, higher costs along key value chains, and new European and national regulatory and funding frameworks have significantly altered the starting position. These developments have a direct impact on energy and economic policy in Bavaria and influence both the availability of climate-neutral energy carriers and investment decisions by companies, infrastructure operators, and public-sector stakeholders.

Against this backdrop, the current situation, previous assumptions, and the milestones and timelines for the hydrogen ramp-up must be reassessed. Technological, infrastructure-related, economic, and regulatory developments need to be evaluated realistically and existing strategies adjusted accordingly. The objective must remain to strengthen the role of hydrogen as a central component of a resilient, climate-neutral, and competitive energy and industrial landscape in a targeted manner.

In mid-2024, the Free State of Bavaria published the Bavarian Hydrogen Strategy 2.0 as part of the Bavarian Energy Plan 2040. Through coordinated implementation strategies, the plan addresses security of supply, renewable energy, hydrogen, heat supply, and storage systems.

This progress report reflects the updated Bavarian Hydrogen Strategy and the latest political and economic developments since the Hydrogen Roadmap Bavaria was published in 2022. It also takes stock of initiatives and projects in Bavaria. In addition to reviewing the areas of action identified in the Hydrogen Roadmap Bavaria, the report examines the measures currently required to achieve the goals established in the Bavarian Hydrogen Strategy 2.0.

H2.B prepared the progress report using findings from a multistage consultation process involving various stakeholders. Key obstacles and areas of action were discussed in depth at meetings of the working groups of the Hydrogen Alliance Bavaria. Partners in the Hydrogen Alliance Bavaria and representatives of hydrogen regions in Bavaria were also able to contribute additional perspectives through a feedback portal. The aim was to reflect as fully as possible the diverse perspectives on the hydrogen ramp-up that inevitably arise from the heterogeneous hydrogen stakeholder landscape in Bavaria.

Download Bavarian Hydrogen Strategy 2.0

2 Current Situation

2. Current Situation

2.1 Bavaria as a Hydrogen Hub

The Free State of Bavaria is recognized as a major economic and innovative region in Europe and worldwide. Bavaria plays a leading role in hydrogen technologies, as demonstrated by the large number of companies within the hydrogen-sector based in the state and its dense, high-performing research landscape. Measured by the number of patent applications, the Munich metropolitan region is one of the world's ten leading hydrogen innovation clusters. The Nuremberg metropolitan region also has a closely integrated innovation landscape comprising research institutions and numerous internationally successful companies and has been designated an EU Regional Innovation Valley.

Numerous Bavarian companies, from start-ups to major international corporations, are among the global leaders in hydrogen technologies. They hold leading positions particularly in hydrogen production, fuel cell technology, the manufacture of valves and connectors, hydrogen logistics, and the development of hydrogen-based chemical products and chemical hydrogen storage technologies.

Close collaboration between business and science is a key factor behind this innovative momentum. Intensive cooperation among companies, universities, and research institutions makes a major contribution to advancing hydrogen technologies while strengthening Bavaria's competitiveness as a business location. The H2 Real Lab Burghausen, a central innovation project in the Chemical Triangle in the south of Bavaria, is one example of this close collaboration. The nonprofit organization, established in 2021, brings together companies, scientific institutions, and municipalities in the region with the aim of advancing industrial transformation through hydrogen technologies. The real lab is a large-scale research and demonstration project that addresses several research priorities. The Bavarian innovativeness is also reflected in the number of start-ups founded in the state, which ranks first in Germany. Bavaria is home to several hydrogen start-ups as well, often as spin-offs from Bavarian universities.

The Free State has a broad, internationally recognized network of scientific institutions. These include eleven public universities, among them LMU Munich (LMU), the Technical University of Munich (TUM), and Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU); three private universities; numerous universities of applied sciences; and private research institutes. These institutions not only form the foundation of scientific work on hydrogen but also make a substantial contribution to educating the next generation of researchers. Five Bavarian universities offer specialized bachelor's and master's degree programs in hydrogen-related fields.

Scientific excellence is also supported by renowned research organizations such as the Max Planck Society and the Fraunhofer Society and their institutes, as well as institutions of the Helmholtz Association and the Leibniz Association. These internationally recognized institutions make important contributions to research and attract skilled professionals from a wide range of disciplines.

Overview: Hydrogen Research in Bavaria
Short profiles of the research and development activities of universities, research institutes, and clusters in Bavaria

In addition, there are numerous private-sector research and development centers and six planned or active hydrogen technology transfer centers (TTZs) at Bavarian universities of applied sciences and technical universities. These centers serve as research-based innovation drivers for the regional economy.

At the regional level, the hydrogen landscape in Bavaria is characterized by diversity, specialization, and close interaction among research, business, and government. The regions complement one another through their respective capabilities and jointly contribute to establishing Bavaria as a hydrogen leader. In the 14 Bavarian HyLand hydrogen model regions funded by the Federal Ministry of Transport, regionally integrated concepts for introducing hydrogen technologies are supported, and the development of electrolyzers, hydrogen refueling stations, and a regional customer base focused on the transport sector is systematically advanced.

Fig. 1: Hydrogen Research and Education in Bavaria
no claim of completeness; as of June 2026

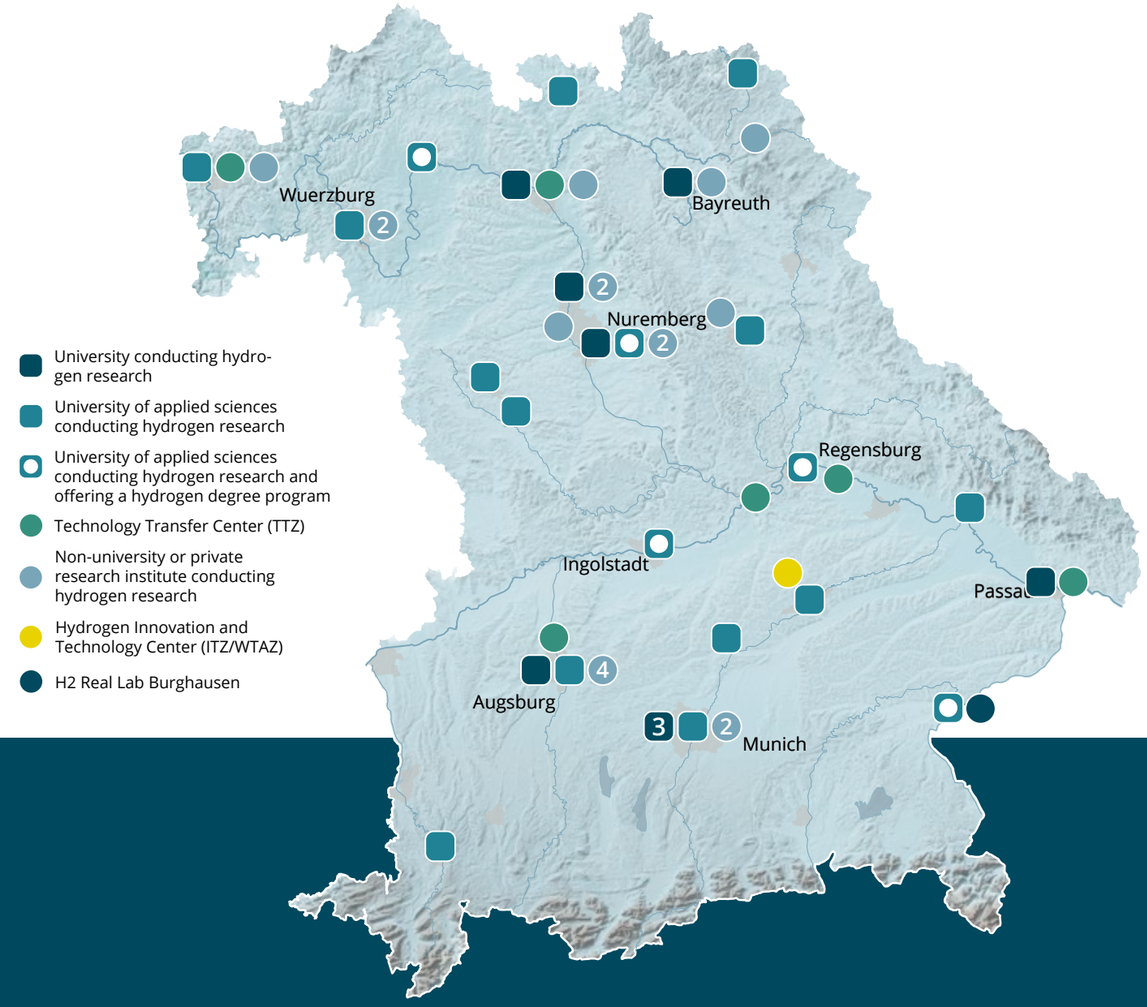


Fig. 2: Hydrogen Regions and Clusters in Bavaria
no claim of completeness; local projects are not listed; as of May 2026

Regional hydrogen and innovation networks

- A hy+ Nuremberg Metropolitan Region
- B H2NOPF
- C HY2.ZERO
- D HY10
- E H2 Region Landshut
- F Hydrogen Technology Region Augsburg

Cross-border INTERREG hydrogen projects

- G HyBaBo (completed in 2026)
- H HYDROMUN
- I BioH2Region
- J HyEfRe
- K Danube Indeet
- L H2MA (completed in 2025)
- M H2-Initiative (completed in 2025)
- N AMETHyST (completed in 2025)

Hydrogen industry clusters

- O Bavarian Lower Main Hydrogen Pipeline (WBU)
- P Hydrogen Alliance Danube Region Kelheim-Regensburg
- Q HyPipe Bavaria – H2 Cluster Ingolstadt
- R HyPipe Bavaria – H2 Cluster Burghausen

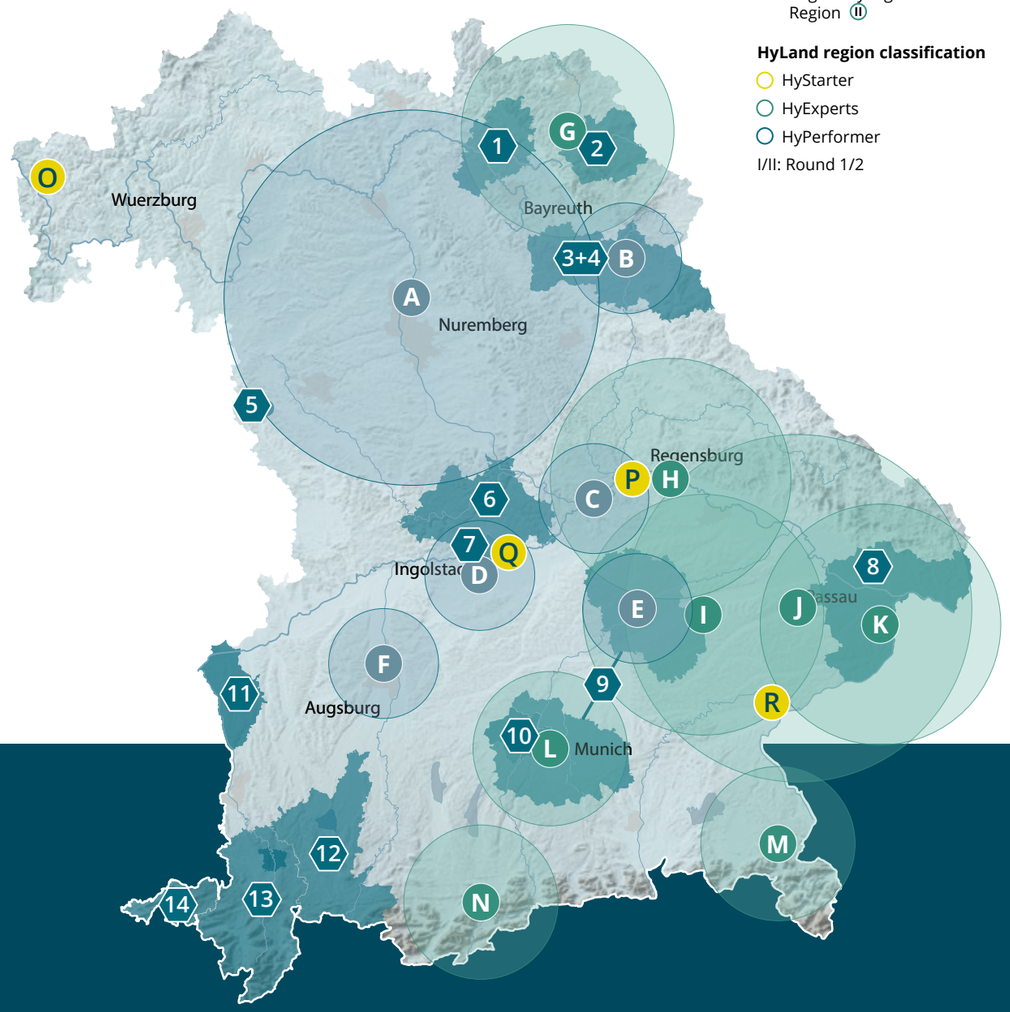
Former HyLand regions

- 1 District of Kulmbach (II)
- 2 Hydrogen Model Region Fichtelgebirge (I)
- 3 Hydrogen Region District of Neustadt an der Waldnaab (I)
- 4 District of Neustadt an der Waldnaab (II)
- 5 InterFranken Special Purpose Association (II)
- 6 District of Eichstätt (II)
- 7 IN2H2 – Hydrogen Concept Ingolstadt (I)
- 8 District of Passau (II)
- 9 HyBayern – Hydrogen Model Region Landshut–Munich–Ebersberg (I)
- 10 State Capital Munich (II)
- 11 H2PURE – Hydrogen Planning for the Ulm/Neu-Ulm Region (I)
- 12 Hydrogen Region Ostallgäu (I)
- 13 HyAllgäu (I)
- 14 Region HyAllgäu – Lake Constance Region (II)

HyLand region classification

- HyStarter
- HyExperts
- HyPerformer

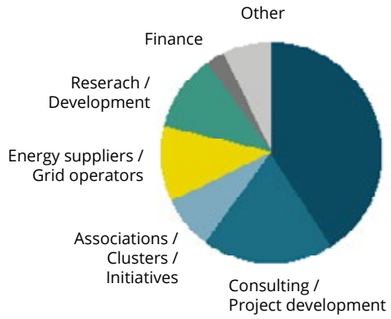
I/II: Round 1/2

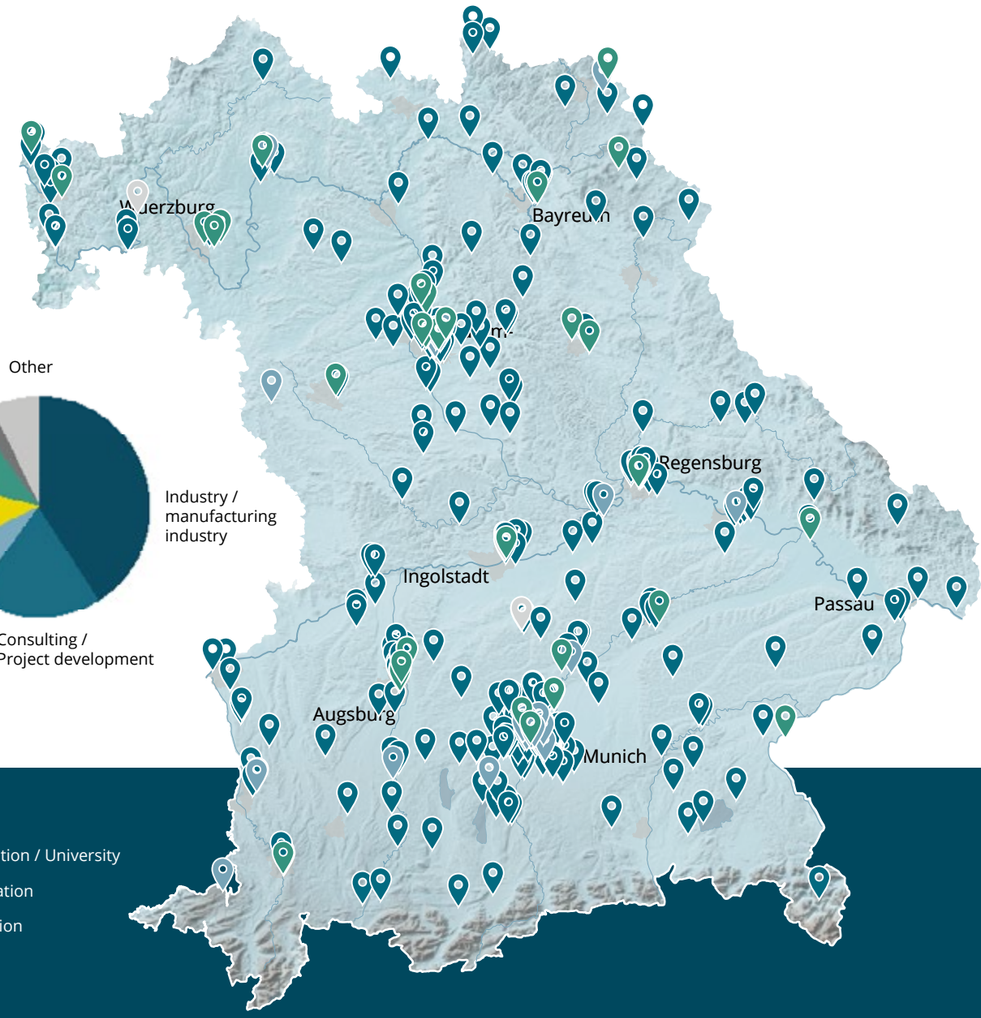


In addition, numerous other regions and regional alliances are advancing the hydrogen economy through political engagement, networking and information activities as well as joint projects. Four European Territorial Cooperation (INTERREG) projects are currently pursuing different forms of cross-border cooperation in the hydrogen sector.

Since being initiated by the Free State of Bavaria in 2019, the H2.B has served as a coordinating and networking platform under a cross-sector umbrella at the interface of business, science, government, and the public. The Hydrogen Alliance Bavaria, established at the same time and coordinated by H2.B, is an essential anchor for providing information, guidance, and networking to Bavarian hydrogen stakeholders. From 18 founding partners, Hydrogen Alliance Bavaria has grown to more than 420 stakeholders from business, science, and the cluster landscape. It brings together stakeholders across the entire hydrogen value chain.

Fig. 3: Overview of the Hydrogen Alliance Bavaria
only one location is shown for each organization; as of May 2026





2.2 Developments in Energy Policy

Since the Hydrogen Roadmap Bavaria was published, numerous measures have been taken at the EU, federal, and Bavarian levels to promote the energy transition and the hydrogen economy. The following section presents a selection of the most relevant strategies, legislative initiatives, and instruments for the hydrogen ramp-up since 2022.

2.2.1 European Union

In May 2022, in response to Russia's war of aggression against Ukraine, the European Commission published the REPowerEU Plan. Through the EU Hydrogen Accelerator, the plan raises the level of ambition for hydrogen. In addition to the 5.6 million metric tons of hydrogen per year envisaged in the Fit for 55 package, a further 15 million metric tons of renewable hydrogen are intended to provide long-term alternatives to gas imports from Russia by 2030. Ten million metric tons are to be produced within the EU and ten million metric tons supplied through imports. The plan also establishes new targets for energy savings, diversification of energy sources, and the accelerated expansion of renewable energy. Key provisions for the hydrogen economy include the conversion of industrial processes and the development of hydrogen infrastructure by 2030.

The Green Deal Industrial Plan followed in February 2023. Among other objectives, it is intended to strengthen the competitiveness of Europe's hydrogen economy through simplified legal frameworks, improved access to financing, skills development, and international cooperation, while accelerating the transition to climate neutrality. It includes the Net-Zero Industry Act (NZIA), which establishes targets for a climate-neutral economy and classifies many hydrogen technologies and their upstream components as strategically relevant. This is intended to improve their competitiveness and market access. In addition, non-price criteria such as sustainability and resilience in public procurement are intended to support demand for European technologies.

Two delegated acts under the Renewable Energy Directive (RED) II define renewable hydrogen as an RFNBO and establish a method for calculating the life-cycle greenhouse gas emissions of RFNBOs[1].The revised directive, RED III, adopted in October 2023, sets sectoral greenhouse gas emission targets and minimum shares for advanced biofuels and RFNBOs through 2030 (see Section 2.2.2 for national imple-mentation). The Low-Carbon Fuels Delegated Act (LCF DA), which defines low-carbon hydrogen, was published in the Official Journal of the European Union on November 21, 2025.

The European Carbon Border Adjustment Mechanism (CBAM) was introduced to prevent the relocation of CO_2 emissions to non-EU countries. In December 2025 measures were adopted to make CBAM more effective and to reduce administrative burdens. After a two-year transitional period, CBAM has applied in its definitive form since the beginning of 2026. Its gradual introduction is coordinated with the phaseout of free allowances under the EU Emissions Trading System (EU ETS)[2]. Instead of starting in 2027 as originally planned, EU ETS 2 is scheduled to launch in 2028 as a separate emissions trading system that will also include the buildings and transport sectors.

The EU regulation on the use of renewable and low-carbon fuels in maritime transport, FuelEU Maritime, and the EU regulation ensuring a level playing field for sustainable air transport, ReFuelEU Aviation, establish fuel requirements for maritime and air transport.. The regulations entered into force in 2025 and 2024 and define progressively lower greenhouse gas emission thresholds for maritime transport and progressively higher blending quotas for sustainable aviation fuels through 2050. In road transport, stricter CO_2 emission standards were established under the Fit for 55 package for new passenger cars and light commercial vehicles; since June 2025, these standards have provided additional flexibility for automakers for the years 2025 through 2027. Since June 2024, stricter emissions targets through 2040 have applied to new heavier commercial vehicles entering the market from 2030 onward. These targets cover not only heavy-duty vehicles but also medium-duty trucks, urban and intercity buses, and trailers.

The Alternative Fuels Infrastructure Regulation (AFIR) has been in force since April 2024. It is intended to ensure minimum infrastructure for refueling with alternative fuels, as well as infrastructure interoperability and user-friendliness. By 2030, urban nodes and the Trans-European Transport Network (TEN-T) are to have a number of hydrogen refueling stations that is initially sufficient to support the ramp-up. An initial review of AFIR is scheduled by the end of 2026 and is expected to assess the targets and exemptions.

The EU Hydrogen and Gas Decarbonisation Package adopted in May 2024 establishes the legal framework required for European hydrogen infrastructure. Among other provisions, the accompanying Gas Directive sets planning requirements for the development of hydrogen distribution networks. The directive is to be transposed into national law by the 2026 parliamentary summer recess (see also Section 2.2.2).

The Clean Industrial Deal presented in March 2025 is intended, among other things, to advance the use of renewable and low-carbon hydrogen in the EU through financial support and the creation of domestic lead markets.

In December 2025, the European Commission presented its proposal to modernize EU energy infrastructure through the European Grids Package and the Energy Highways initiative.

These include two hydrogen corridors, among them the SouthH_2 Corridor, which is particularly important for Bavaria. The package contains proposals for integrating low-cost clean energy and accelerating electrification in all member states, although the current version focuses primarily on electricity infrastructure. The Clean Energy Investment Strategy of March 2026 is intended to identify ways to close the investment gap for energy infrastructure. In particular, mobilizing private capital and de-risking investments are intended to stimulate investment in energy infrastructure. The Strategic Infrastructure Investment Fund could provide an equity platform that gives hydrogen networks access to capital. The final design of the Multiannual Financial Framework for 2028 through 2034 will also determine key levers for further financial support of the hydrogen ramp-up in the EU.

The Industrial Accelerator Act was presented in early March 2026 and bundles industrial policy measures intended to increase competitiveness and productivity within the EU. Proposed measures include Made in EU requirements as a condition for public procurement, subsidies in certain energy-intensive industries, and conditions for foreign direct investment in strategic technologies.

Against the backdrop of the latest energy crisis resulting from escalation in the Middle East and the closure of the Strait of Hormuz, the European Commission presented the AccelerateEU Plan in April to speed the development of a resilient energy union.

The non-legislative framework provides for legislative initiatives intended to dampen short-term price spikes for imported fossil fuels and strengthen Europe's energy independence over the long term. Under the plan, a targeted review of the

[1] A study commissioned by the European Commission on the ramp-up of hydrogen production is underway and is intended to provide the basis for the review of the RFNBO Delegated Act. Final results are expected in mid-2028. An earlier adjustment announced for the second quarter of 2026, particularly to the electricity sourcing criteria, could have a positive effect on the implementation of hydrogen production projects in Bavaria and Germany.

[2] The European Commission will present a draft reform of EU ETS 1 in July 2026.

Regulatory Milestones

2022 2023

May 2022
REPowerEU Plan
EU

December 2022
Launch of H2Global
EU

January 2023
EEG 2023 takes effect
FEDERAL LEVEL

February 2023
Green Deal Industrial Plan
EU

March 2023
Launch of the European Hydrogen Bank
EU

June 2023
EU ETS Reform (ETS 2)
EU

July 2023
RFNBO Delegated Act
EU

July 2023
Updated National Hydrogen Strategy
FEDERAL LEVEL

RFNBO criteria was announced for the second quarter of 2026, two years earlier than planned. The review is justified by the slow market ramp-up of RFNBOs and the urgent need for energy independence.

The EU also has long-term complementary funding programs that address objectives at different levels, ranging from research and innovation under Horizon Europe, to strengthening the domestic market through the ETS Innovation Fund and InvestEU, to cross-border networking and cooperation through Important Projects of Common European Interest (IPCEI) and the Connecting Europe Facility (CEF).

In December 2025, the European Commission published its seventh list of Projects of Common Interest. Since the revised Trans-European Networks for Energy (TEN-E) Regulation entered into force in 2022, the list has also included Projects of Mutual Interest and is referred to as the Second Union List of PCIs and PMIs[3]. The list includes numerous hydrogen projects. These projects are eligible to apply for EU funding from the CEF and benefit from accelerated permitting and regulatory procedures.

Funding from the Innovation Fund was used to implement the first pillar of the European Hydrogen Bank to stimulate the European hydrogen production market. Support is provided as a fixed premium in euros per kilogram of renewable hydrogen, or RFNBO, or low-carbon hydrogen. The first auction began in November 2023, followed by two further auctions in 2024 and 2025. Through a second pillar of the European Hydrogen Bank, the European Commission also intends to support international hydrogen production and imports of hydrogen and hydrogen derivatives into Europe. The design of this pillar is still being developed.

As a supporting measure, the Hydrogen Mechanism was launched on the EU Energy and Raw Materials Platform in July 2025. The mechanism collects supply and demand data for renewable and low-carbon hydrogen and shares the data with market participants. This is intended to create greater transparency and facilitate exchanges between the supply and demand sides. The first call to match supply and demand on the basis of the collected data began in November 2025. The results were announced at the end of March 2026, with more than 200 matches achieved in total.

Since December 2022, H2Global has supported the international ramp-up of the hydrogen economy beyond the European Union. The instrument is based on a double-auction mechanism that offsets the price difference between supply and demand. The first tender was launched in December 2022 and funded by Germany. A second H2Global auction, funded by Germany and the Netherlands, was announced in February 2025.

The EU state aid framework that entered into force in June 2025, the Clean Industrial Deal State Aid Framework (CISAF), expands the funding options available to EU member states for clean energy, key technologies, and industrial decarbonization. The German federal scheme for net-zero technologies based on CISAF was approved by the European Commission in February 2026 and extends the state aid framework under CISAF for the federal government, states, and municipalities.

A revised European Union Hydrogen Strategy is expected in 2026 and will likely take a more pragmatic approach with a stronger focus on the demand side. Particular attention is expected to be paid to the economic policy importance of hydrogen and related technologies and their role in resilience in the context of geopolitical risks.

[3] PCIs are important cross-border infrastructure projects that connect the energy systems of EU countries. PMIs are projects supported by the EU in cooperation with countries outside the EU.

2.2.2 Federal Level

At the federal level, numerous hydrogen-related milestones have also been reached since April 2022. In July 2023, the National Hydrogen Strategy was updated with the aim of accelerating the market introduction of hydrogen and increasing domestic electrolyzer capacity to 10 GW. Through lead markets for climate-friendly basic materials introduced in May 2024, the federal government at that time sought to promote demand for sustainably produced materials, including through the use of renewable hydrogen, and thereby support industry's transition to climate neutrality. Other national strategy documents address the hydrogen ramp-up, including the new Industrial Strategy of November 2023, the Climate Foreign Policy Strategy of December 2023, the National Ports Strategy of March 2024, the Hydrogen Import Strategy of July 2024, and the 2024 System Development Strategy of November 2024.

A number of legislative initiatives and amendments affect the ramp-up of the hydrogen economy. Numerous changes were adopted in July 2022 under the Immediate Energy Measures Package, known as the Easter Package. It establishes the use of renewable energy as a protected interest of overriding public importance and as serving public safety, and provides for measures to expand renewable energy along with complementary hydrogen measures. Several amendments to the Energy Industry Act contain important provisions for hydrogen. An amendment adopted in April 2024, for example, provides for integrated network development planning for the natural gas network and the future hydrogen transmission network, as well as rules for financing the hydrogen core network. This created the basis for the core network, which the Federal Network Agency approved with modifications in October 2024.

A further amendment to the Energy Industry Act, currently in the legislative process, is intended to transpose the EU Hydrogen and Gas Decarbonization Package and establish a legal framework for transforming existing gas networks, particularly gas distribution networks, and for developing the hydrogen market. During consultations with the federal states and industry associations, Bavaria has advocated pragmatic rules, including on responsibilities, and viable financing and risk-mitigation mechanisms. The European requirements must be transposed into national law by August 2026.

Relevant amendments have also been made under the Renewable Energy Sources Act (EEG). EEG 2023, for example, established the basis for tenders to support innovative concepts involving hydrogen-based electricity storage and facilities that generate electricity from green hydrogen. Because the current EEG expires this year, instruments for the continued expansion of renewable energy from 2027 onward are currently being redesigned. The present draft amendment focuses more strongly on market integration and limits on profits and also provides for a refinancing contribution through contracts for difference. In addition, network operators are to be permitted to charge connection customers a construction cost contribution that, through regional differentiation, creates incentives for efficient use of scarce network capacity and for locations that support the grid.

2023

- October 2023 — **CBAM Regulation** — EU
- October 2023 — **FuelEU Maritime Regulation** — EU
- November 2023 — **RED III Directive** — EU
- November 2023 — **ReFuelEU Aviation Regulation** — EU

2024

- April 2024 — **AFIR Regulation** — EU
- April 2024 — **Energy Industry Act reform for the hydrogen core network** — FEDERAL LEVEL
- June 2024 — **Net-Zero Industry Act** — EU
- July 2024 — **Bavarian Hydrogen Strategy 2.0** — BAVARIA

The Act to Accelerate the Availability of Hydrogen, Amend Other Legal Framework Conditions for the Hydrogen Ramp-Up, and Amend Other Provisions of Energy Law, known as the Hydrogen Acceleration Act, was adopted at the end of February 2026. The act is intended to reduce complexity, simplify procedures, and accelerate approvals. Projects within the scope of the act are also designated as being of overriding public interest.

The Second Act on the Further Development of the Greenhouse Gas Reduction Quota implements provisions of RED III. For hydrogen mobility, the mandatory RFNBO subquota for meeting the greenhouse gas reduction quota is particularly relevant. In the future, an increasing share of the greenhouse gas reductions required of petroleum companies is to be met by purchasing certificates for placing hydrogen and synthetic fuels on the market. This creates binding requirements for the use of renewable energy in transport for the first time and is intended to increase demand for renewable hydrogen, particularly through the RFNBO subquota. Certificate prices are therefore expected to rise, and improved economic conditions may also lead to lower hydrogen prices at refueling stations over time.

However, key incentives continue to be absent or delayed, including those expected from tenders for hydrogen-ready power plants under the Power Plant Strategy, the Carbon Management Action Plan, the Hydrogen Storage Strategy, the Long-Term Negative Emissions Strategy, the Hydrogen in Transport Master Plan, and measures based on those strategies.

At the federal level, the National Innovation Program for Hydrogen and Fuel Cell Technology provides a central funding framework. In its second phase, from 2016 to 2026, it focuses not only on research and development but also, in particular, on activating the hydrogen market in the transport sector. Until the November 2023 ruling of the Federal Constitutional Court on the Climate and Transformation Fund, several other programs supported the purchase of hydrogen-powered commercial and special-purpose vehicles or industrial decarbonization. The suspension of some of these funding programs, particularly the program for climate-friendly commercial vehicles and associated refueling and charging infrastructure in 2024 because of insufficient budget funds, together with political debate over priority hydrogen applications, caused a sharp increase in market uncertainty and a decline in investment incentives. This is countered by a funding call launched in January 2026 under NIP II which supports hydrogen refueling stations for road transport in conjunction with commercial vehicles using hydrogen-based drive systems. Refueling stations and corresponding vehicles are funded as a package to meet AFIR targets for refueling infrastructure and ensure a baseline level of utilization at the stations. In the medium term, synergies may arise with the Bavarian Funding Program for the Purchase of Hydrogen-Powered Commercial Vehicles. The Eighth Energy Research Program takes a long-term approach to energy research and includes a hydrogen mission.

Carbon Contracts for Difference create a mechanism under which contracts between the government and energy-intensive industrial companies offset the additional cost of climate-friendly production processes compared with fossil-based processes. Contracts are awarded through a competitive bidding process; an initial bidding round has already taken place. A second bidding process with revised criteria to improve accessibility, especially for midsize companies, began in early May 2026.

Another important funding instrument is the Federal Funding Program for Industry and Climate Action, which supports industrial decarbonization and the application and implementation of CCU and CCS.

The Whitepaper on Hydrogen Storage was published in April 2025. The Federal Ministry for Economic Affairs and Energy considers the geological conditions for meeting storage needs to be highly favorable, particularly with respect to salt caverns. However, the potential of porous reservoirs, which occur primarily in southern Germany, receives less attention. The white paper assumes that demand for hydrogen storage in Germany will increase sharply. The main drivers are expected to be the use of hydrogen in industry and in power plants for reconversion to electricity. To strengthen Germany's security of supply, the Federal Government plans to tender new dispatchable capacity under its Power Plant Strategy. In the 2026 tenders, hydrogen-ready gas-fired power plants are expected to account for nine GW of derated capacity and must meet the long-duration criterion, meaning they must be able to provide power for at least ten hours. A further two GW of derated capacity to be tendered in 2027 is planned on a technology-neutral basis. Most of this capacity is to be built in Germany's grid related south. The power plants are to be fully decarbonized by 2045.

In September 2025, an energy transition monitoring report commissioned by the Federal Ministry for Economic Affairs and Energy focusing on the electricity sector was published. A related ministry paper sets out areas for action and available policy options from the perspective of the Federal Ministry. According to the paper, targets and subsidies for renewable energy expansion should be reviewed. The further hydrogen ramp-up should be promoted more pragmatically, and overly complex requirements should be reduced. The Conference of Energy Ministers in December 2025 also addressed the hydrogen ramp-up and called on the Federal Government to take comprehensive measures to strengthen, make more flexible, and accelerate market development. From the Bavarian perspective, the resolutions' call to take porous reservoirs and the use of hydrogen in mobility into account is particularly relevant.

Additional measures to support the hydrogen ramp-up are currently under development or review. Examples include a planned biofuel step-up mechanism that would introduce a minimum share of CO_2-neutral fuels under the Building Modernization Act and consideration of a green gas quota that could require gas suppliers to include increasing shares of renewable or low-carbon gases such as hydrogen in their product portfolios. The actual effects and resulting impacts on private and commercial customers will depend on the design of any such quota.

2024

July 2024
Federal Hydrogen Import Strategy
FEDERAL LEVEL

August 2024
EU Hydrogen and Gas Decarbonisation Package
EU

October 2024
Approval of the hydrogen core network
FEDERAL LEVEL

2025

February 2025
Clean Industrial Deal
EU

June 2025
Clean Industrial Deal State Aid Framework (CISAF)
EU

July 2025
Launch of the Hydrogen Mechanism
EU

November 2025
Low-Carbon Fuels Delegated Act
EU

2.2.3 Bavaria

Bavaria provides a stable and supportive environment for hydrogen. The Free State of Bavaria is committed to the energy transition and actively helps shape it. Bavaria also promotes the development of international hydrogen cooperation. Numerous delegation visits and international events have taken place for this purpose in recent years.

With the Bavarian Hydrogen Strategy adopted in 2020, the Bavarian State Government established a framework for ramping up the hydrogen sector in Bavaria. Its continuation, Bavarian Hydrogen Strategy 2.0 of July 2024, is a central component of the Bavarian Energy Plan 2040, which identifies pathways for achieving climate targets. The strategy is intended to further advance the development of the entire hydrogen value chain in Bavaria and the expansion of the corresponding infrastructure, with a focus on imports. It defines three areas for action as guidelines for coordinating the continued development of the Bavarian hydrogen economy: the foundations and framework conditions for the hydrogen ramp-up; hydrogen availability in terms of supply and procurement; and economic transformation in terms of customers and demand.

To implement these goals, Bavaria has launched specific funding programs to stimulate demand for hydrogen and hydrogen technologies and expand infrastructure. These include the Bavarian Funding Program for the Development of Hydrogen Refueling Station Infrastructure (BayH2T), the Bavarian Funding Program for the Development of Electrolyzer Infrastructure (BayFELI) and the Bavarian Funding Program for the Purchase of Hydrogen-Powered Commercial Vehicles (H2N) – see the next section. A total of 255 million euros has been made available for these three programs in state budgets since 2020. Other technology-neutral funding programs that include hydrogen technologies support research and development, such as the Bavarian Energy Research Program and the Bavarian Technology Funding Program Plus; the transformation of the energy system and market development, such as the Bavarian Funding Program for Energy Concepts and Municipal Energy Use Plans; or the funding of low-emission buses for local public transportation.

In July 2025, the CCU/CCS Action Plan for Carbon Management in Bavaria was published. The plan considers synergies and interfaces with hydrogen and includes 20 measures intended to establish the basis for carbon management in Bavaria.

The Bavarian State Government also advocates at the EU level for easing the rules that define RFNBOs so that the energy carrier becomes less expensive. Among other measures, hydrogen from biogenic sources should be treated as equivalent to renewable hydrogen. Bavaria, with more than 2,700 biogas plants and substantial woody and waste-based biomass resources, has particular potential for producing biogenic hydrogen.

2026

April 2026
Hydrogen Acceleration Act
FEDERAL LEVEL

April 2026
AccelerateEU Plan
EU

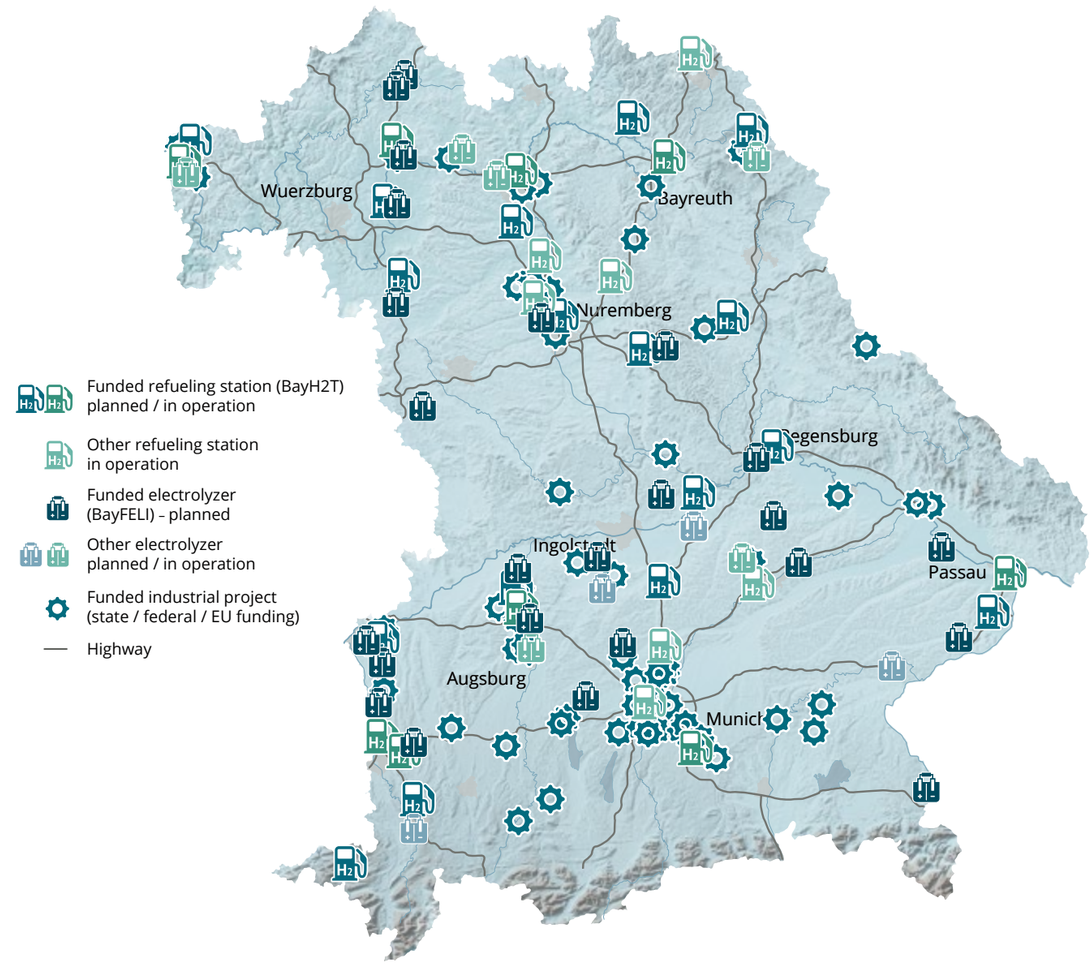
June 2026
Second Act on the Further Development of the GHG Reduction Quota
FEDERAL LEVEL

2.3 Monitoring: Hydrogen Ramp-Up in Bavaria

In the Hydrogen Roadmap Bavaria (2022), H2.B identified key milestones for a possible pathway by which the Free State of Bavaria could develop a hydrogen economy. These milestones were based on the state of knowledge in 2021 and the political, technical, and economic conditions and forecasts prevailing at the time. As described in the preceding sections, these conditions have changed substantially since publication and have, in some cases, adversely affected the hydrogen economy's ramp-up.

Although many projects have continued to strengthen Bavaria as a hydrogen location, the actual pace of the ramp-up has fallen short of the expectations set out in Hydrogen Roadmap Bavaria (2022). The energy supply risks and price crises resulting from Russia's war of aggression against Ukraine created a wide range of uncertainties, particularly for energy-intensive industries, and constrained investment capacity within the hydrogen economy. Implementation of several ambitious milestones set out in Hydrogen Roadmap Bavaria was therefore delayed. This slower pace of development is not limited to Bavaria, especially because the main framework conditions for the hydrogen economy are established at the EU and federal levels. A special report by the European Court of Auditors in July 2024 already assessed the EU targets for hydrogen production and imports by 2030 as overly ambitious, and most large projects worldwide are still in early planning phases.

Fug. 4: Hydrogen Projects in Bavaria
no claim of completeness; as of June 2026



The Global Hydrogen Review of the International Energy Agency tracks worldwide developments in the hydrogen sector each year. The latest report, published in September 2025, records progress in projects to produce renewable and low-carbon hydrogen but also points to project delays and the withdrawal of individual project consortia. Compared with the previous year's report, the total volume of announced renewable and low-carbon hydrogen production projects through 2030 fell from 49 to 37 million metric tons per year. The IEA cites high costs, uncertain demand, regulatory uncertainty, and slow infrastructure development as reasons. Projects that have reached a final investment decision or are under construction account for only 11 percent, or 4.2 million metric tons per year, of the new low-emission hydrogen production announced worldwide through 2030.

Despite the slower pace of the global hydrogen ramp-up, Bavaria has made substantial progress, as described below.

2.3.1 Production

By mid-2025, two funding rounds under the Bavarian Funding Program for the Development of Electrolyzer Infrastructure, BayFELI, had approved a total of 24 electrolyzer projects with a combined capacity of 143 MW_{el}. The largest active electrolyzers in Bavaria are currently located in Wunsiedel, with 8.75 MW_{el}, and Pfeffenhausen, with 5 MW_{el}, and were funded through federal programs. Other electrolyzer projects are also planned, including a proposed 125 MW_{el} large-scale electrolyzer in Neustadt an der Donau. The milestone established by H2.B in the Hydrogen Roadmap Bavaria of at least 300 MW_{el} of installed electrolyzer capacity in Bavaria by 2025 has not yet been reached. This uncertain early phase of the hydrogen ramp-up has shown that, because of unclear and stringent regulation and high costs, projects that receive support from funding programs are the ones predominantly planned and implemented. The funding programs of the Free State of Bavaria are making a substantial contribution to expanding domestic electrolyzer capacity.

Several stakeholders in the Free State are also working on demonstration projects to produce hydrogen from biogenic residues. Another project in Burghausen is producing hydrogen as part of a federal flagship project. Bavaria does not yet have industrial-scale projects for producing hydrogen from biomass, as specified as a milestone in Hydrogen Roadmap Bavaria. One reason is that regulatory incentives for the use of biogenic hydrogen have not yet been sufficient. The Second Act on the Further Development of the Greenhouse Gas Reduction Quota is intended to address this issue. In the future, biogenic hydrogen from advanced feedstocks may be counted multiple times toward the greenhouse gas reduction quota in the transport sector. The quota requirements under RED III will also be increased. However, the mechanism currently has only a limited effect because fuel suppliers generally rely on less expensive and more readily available alternatives such as biomethane. Incentives for using biogenic hydrogen in industry may not arise until CO_2 prices are higher. In addition, biogenic hydrogen production competes technologically with other uses of biomass.

There are currently no known projects in Bavaria for the industrial production of blue or turquoise hydrogen. In addition to the limited maturity of some individual technologies, a key reason has been the long-standing absence of regulation for low-carbon hydrogen[4], which is now in place. Beyond producing hydrogen directly, it may also be beneficial to use hydrogen sources in which the gas is generated as a process by-product. At the Gendorf Chemical Park in Bavaria, for example, hydrogen is produced as a by-product of chlor-alkali electrolysis. It is used on site primarily as a substitute for natural gas and also in other chemical processes. The H2 Real Lab Burghausen is also working on the use of by-product hydrogen.

Natural deposits of molecular hydrogen, often referred to as white hydrogen, have recently attracted growing worldwide attention because of their potential as a usable primary energy source. The formation and extraction of white hydrogen are subjects of current scientific research, including in northern Bavaria. As part of a pilot project, a Bavarian start-up intends to investigate potential sites associated with the development of geothermal waters and assess whether recoverable hydrogen deposits may be present.

[4] Low-Carbon Fuels Delegated Act (LCF DA), see Section 2.2.1.

2.3.2 Transport, Storage, and Distribution

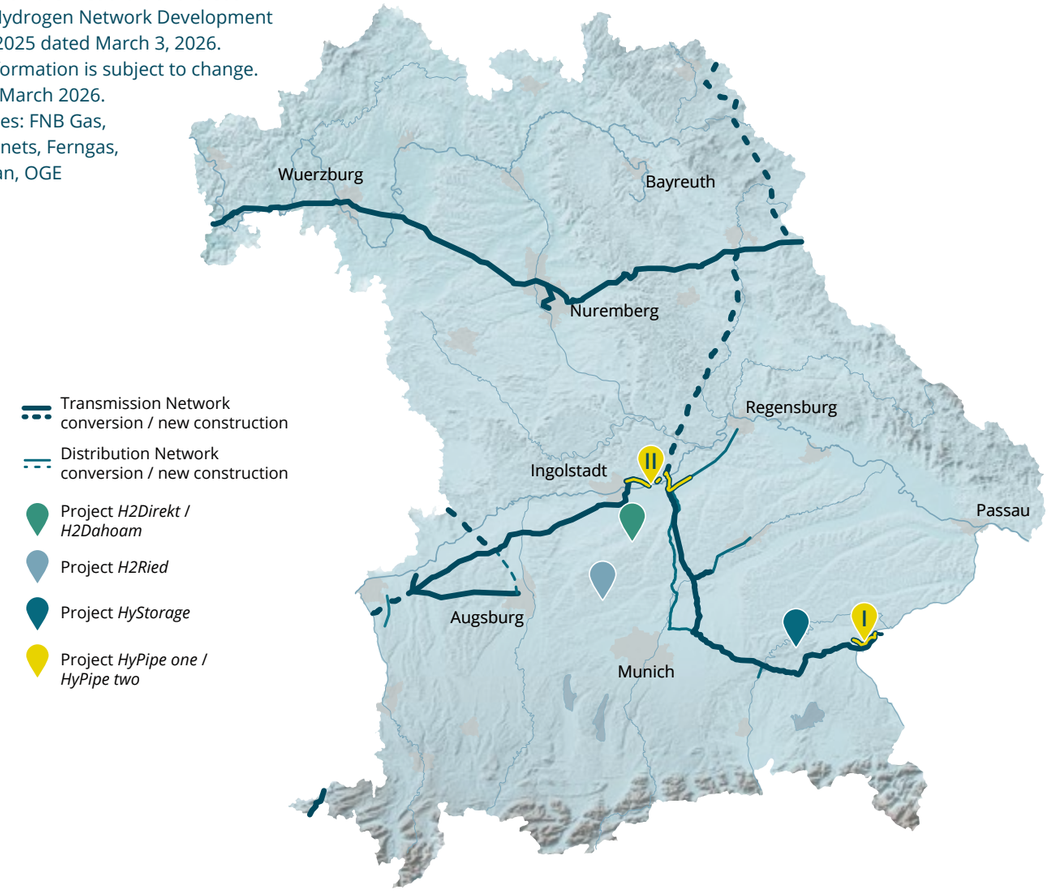
Progress has been made in hydrogen transport and distribution. In February and March 2024, gas transmission system operators and electricity transmission system operators conducted a joint nationwide market survey of hydrogen production, injection, storage, and use. The survey identified substantial potential.

In October 2024, the Federal Network Agency approved construction of the nationwide hydrogen core network, which will consist of approximately 60 converted natural gas pipelines. By 2032, a pipeline network more than 9,000 kilometers long is to be developed in stages, with annual injection and withdrawal capacities of approximately 101 GW and 87 GW, respectively. In July 2025, the Federal Network Agency established a uniform nationwide ramp-up tariff for the hydrogen core network to increase planning certainty during market development.

As the long-distance gas transmission and hydrogen transport networks are expanded and transformed, gas transmission system operators and hydrogen transport network operators must prepare a nationwide Gas and Hydrogen Network Development Plan every two years on the basis of a previously defined scenario framework. The first draft of the Gas and Hydrogen Network Development Plan 2025-2037/2045 was published for consultation in early March 2026.

The planned hydrogen core network in Bavaria is 1,050 kilometers long. On March 19, 2026, the hydrogen core network operators launched a coordinated process for reserving the first capacities in the core network. In Bavaria, this concerns the two user clusters in Burghausen and Ingolstadt and the initial HyPipe one and HyPipe two sections. The HyPipe one section between Gendorf, Burghausen, and Lengthal, appro-

Fig. 5: Hydrogen Core Network through 2037 and Infrastructure Pilot Projects in Bavaria
based on the first draft of the Gas and Hydrogen Network Development Plan 2025 dated March 3, 2026. All information is subject to change. As of March 2026. Sources: FNB Gas, bayernets, Ferngas, NaTran, OGE



ved in September 2025, is currently under construction and is scheduled to be ready for transport by 2027. The section is also part of the PCI project HyPipe Bavaria – The Hydrogen Hub, which is integrated into the international SouthH_2 Corridor project.

The SouthH_2 Corridor aims to build a hydrogen pipeline connecting Algeria, Tunisia, Italy, Austria, and Germany and thereby import hydrogen from North Africa into Europe. The H2 Import Consortium Bavaria, comprising six companies from the energy and chemical industries, has also been formed for this purpose.

The hydrogen core network is intended to become part of a European hydrogen pipeline network. The European Hydrogen Backbone initiative, which comprises 33 energy infrastructure operators in Europe, consolidates planning for hydrogen infrastructure projects to accelerate the implementation of a pan-European hydrogen network. Various European hydrogen networks have received PCI or PMI status and are therefore eligible for funding under the CEF. The South Central Corridor from Algeria and Tunisia to Germany, the SouthH_2 Corridor, and the Southwest Hydrogen Corridor from Portugal to Germany are also the only hydrogen corridors classified as Energy Highways, which represent Europe's most urgent energy infrastructure needs.

The import corridors could connect Germany and Bavaria with various countries and diversify hydrogen imports. Bavaria has a key position as a connecting region among several European hydrogen corridors. Connections to major seaports seeking to establish themselves as hydrogen import hubs would enable hydrogen to be sourced from overseas and transported onward, for example to Bavarian inland ports. The Danube Region Hydrogen Alliance for Kelheim and Regensburg is examining hydrogen transport on the Danube. Import options involving hydrogen derivatives such as ammonia are also being studied. Bavarian ports are also engaged in a strategic process to prepare their sites for the energy transition. In particular, a hydrogen ecosystem is to be developed for the local logistics sector.

To support the development of international transport corridors and emphasize the interest of Bavaria in their implementation, numerous delegation visits have taken place in addition to information and networking events. These include visits to Tunisia concerning the SouthH_2 Corridor, France and Spain concerning the H2med project, the Netherlands and Belgium concerning hydrogen import hubs, and Egypt and Morocco.

In addition to implementing international and national transport networks, the development of regional and cross-regional hydrogen distribution networks is an important foundation for the ramp-up of the hydrogen economy. The Gas Distribution Network Transformation Plan is a central planning instrument for transforming gas distribution networks and is prepared by distribution system operators under the H2vorOrt initiative. In 2025, the fourth reporting year, planning processes were refined (partly in light of the EU internal gas market directive) and for the first time the German network territory was divided into 40 planning regions in cooperation with gas transmission system operators. This is intended to improve coordination with technical requirements, network conditions, and customer needs. One result of the plan is that most participating network operators intend to convert initial network sections fully to hydrogen by 2035, given that sufficient quantities of hydrogen are available.

Overall, a large share of today's network infrastructure is expected to remain in operation, although partial or complete decommissioning and changes in network use are foreseeable. Several projects for the cross-regional distribution of hydrogen are already underway in Bavaria. Under the name Kernnetzplus, planning for hydrogen connections at the transport and distribution levels in southern Bavaria is being advanced. A federal concept for a possible distribution network financing framework is not yet available. Other initiatives connecting Bavarian regions to hydrogen supply infrastructure include the Bavarian Lower Main Hydrogen Pipeline and H2Nordlech in the Augsburg area.

At the regional level, the municipal utilities in Haßfurt have many years of experience injecting hydrogen into the natural gas network. Since 2016, hydrogen has been produced locally from surplus renewable electricity. In the H2Direkt pilot project in Hohenwart, an existing natural gas network was converted to 100 percent hydrogen. The project has operated successfully since October 2023 and is continued under the new name H2Dahoam, with local hydrogen production and storage added in the future. In the H2Ried project, an electrolyzer is being built locally in the Dachau and Freising counties to produce green hydrogen primarily from locally generated solar power. This regional hydrogen is then to be injected into the existing natural gas network so that consumers receive a blend of up to 20 percent hydrogen and 80 percent natural gas. Beginning at the end of 2026, the H2Gersthofen project is intended to heat approximately 250 rental and owner-occupied apartments in four multifamily buildings with hydrogen.

In addition to pipeline-based supply, transporting hydrogen by trailer plays a prominent role, especially during the transition period before a comprehensive pipeline network is established. Trailers may also remain an economically sensible supplement for short distances. One example is the Port of Schweinfurt, where a hydrogen refueling station is currently being built. The station is to be expanded with an electrolyzer and a filling station for hydrogen trailers. Because both facilities were funded by the Bavarian Ministry of Economic Affairs, Regional Development and Energy, this example shows how the two Bavarian programs BayFELI and BayH2T support the development of decentralized hydrogen ecosystems.

Hydrogen storage infrastructure is essential to a stable and secure long-term energy supply because energy availability will fluctuate even more strongly in the future and alternatives to natural gas reserves will be needed. The Bavarian Alpine region in particular contains extensive porous rock formations with substantial potential for hydrogen storage.

In a scientific study, TUM estimated the static hydrogen storage capacity of oil and gas reservoirs and active natural gas storage facilities in the Bavarian Molasse Basin in the Alpine foothills. Depending on the assumed working gas share, the capacity ranges from 12.6 to 25.2 TWh. The hydrogen storage potential of active natural gas storage facilities in the region, at 5 to 10 TWh, represents a significant share of Germany's total hydrogen storage potential. HyStorage is an important project for developing hydrogen storage infrastructure. At the Bierwang site, it is investigating the integrity of porous reservoirs for hydrogen storage. The initial test phases have already been completed successfully.

Abb. 6: Overview Map of Import Corridors and PCI/PMI Projects
no claim of completeness; as of May 2026.
Sources: EU PCI-PMI Transparency Platform, h2inframap.eu

2.3.3 Mobile and Stationary Applications

The market for hydrogen vehicles nationwide is developing more slowly than expected. According to Federal Motor Transport Authority data, the total number of registered hydrogen buses and hydrogen trucks in Germany in January 2026 was 253 and 194, respectively. In addition, 1,583 hydrogen-powered passenger cars were registered. Low vehicle demand can be explained in part by the temporary suspension of federal funding programs for commercial vehicles and by generally slower market development (see Section 2.2.2).

Slow market development is also affecting the general availability of hydrogen vehicles. In recent months, several major manufacturers have postponed market launches and discontinued development activities. These decisions were generally attributed to the slow market ramp-up and delayed infrastructure expansion.

Funding from the Free State and Federal Government under the HyPowerDrive hydrogen IPCEI project for research and development of fuel cell technology for the passenger car segment is intended to create positive momentum. Several German manufacturers also continue to plan series production of hydrogen vehicles in various segments.

Through the BayH2T funding program, the Bavarian Ministry of Economic Affairs, Regional Development and Energy supports the use of hydrogen in mobility. During the program's term from 2020 to 2024, a total of 29 grants for hydrogen refueling stations were approved. The first nine funded stations are already in operation, and additional stations will be commissioned successively. A total of 16 public hydrogen refueling stations are currently operating in Bavaria.

Bavaria also has numerous forward-looking mobile and stationary application projects supported by state, federal, and EU funding programs. These include the Hydrogen Technology Application Center in Pfeffenhausen, which is part of the federally initiated Hydrogen Innovation and Technology Center. The facility is planned to include testing, inspection, and certification capabilities for tanks, refueling, and drive systems for hydrogen mobility, as well as a hydrogen liquefier. Supported by a research consortium, the center is intended to assist regional industry with the transition to new drive technologies. The corresponding federal grant was issued in February 2026 and is supplemented by funding of the Free State. The Bayernflotte project supports the development of heavy-duty fuel cell trucks in Bavaria and their testing under real-world conditions. A hydrogen train is currently being tested between Augsburg and Füssen and Peißenberg. Three hydrogen trains are scheduled to begin operating on the Mühldorf-Burghausen route at the end of 2026.

Several pilot and demonstration projects involving stationary hydrogen applications are currently being implemented in Bavaria. In spring 2025, for example, a pilot project began with the aim of supplying a major company's customer experience center entirely with green electricity from a photovoltaic system coupled with fuel cells. A demonstration project in Dachau is intended to produce hydrogen-containing synthesis gas through a combination of hydrolysis and gasification of sewage sludge and wood residues and use it to defossilize brick production. Bavaria currently has no industrial-scale projects that use hydrogen to provide process heat. This is mainly due to the lack of local hydrogen infrastructure and supply in some locations, as well as high operating costs, high investment risk, and substantial price uncertainty.

The first call under the new Bavarian Funding Program for the Purchase of Hydrogen-Powered Commercial Vehicles, H2N, is expected to begin in July 2026 after the federal NIP II funding call for hydrogen refueling stations for road transport in conjunction with commercial vehicles using hydrogen-based drive systems closes (see Section 2.2.2). H2N is intended to help activate the market for hydrogen-powered commercial vehicles and to complement the existing Bavarian funding programs for electrolyzer and hydrogen refueling station infrastructure.

2.4 Areas of Action identified through the Stakeholder Dialogue

For Bavaria itself and within the EU, hydrogen remains an essential component for achieving climate targets and ensuring security of supply while maintaining affordability. The continued ramp-up is taking place within this field of tension. Building on the current progress of the hydrogen economy, the H2.B supports relevant stakeholders in implementing the next steps.

As part of a multistage consultation process, various Bavarian stakeholder groups, including partners in the Hydrogen Alliance Bavaria and representatives of hydrogen regions in Bavaria, were surveyed and involved in developing areas of action. From these stakeholders' perspectives, four central areas of action were identified for the successful development of the Bavarian hydrogen economy. The objective was to reflect as fully as possible the diverse perspectives on the hydrogen ramp-up arising from the heterogeneous hydrogen stakeholder landscape in Bavaria. The following points summarize the opinions and assessments of the stakeholders consulted.

2.4.1 Hydrogen as a Driver of the Energy Transition

The stakeholders consulted continue to recognize the important and versatile role of hydrogen in the transition of the electricity and molecular energy systems. This applies particularly to hydrogen as an energy transport and storage medium, as an element of sector coupling, as a feedstock and fuel, and in applications in which system benefits and resilience are decisive or direct electrification is not technically, economically, operationally, or infrastructurally practical or possible.

Integrated Energy Transition

The energy transition must be approached holistically. In addition to expanding renewable energy, producing hydrogen, and broadening energy-saving and efficiency measures, the integrated planning of flexible, secure, and high-performing energy infrastructure is essential. This includes not only the expansion of electricity networks and hydrogen pipelines, but also storage facilities and complementary CO_2 infrastructure.

The expansion of renewable energy, which is essential to the energy transition, is also a key foundation for the hydrogen ramp-up in Bavaria. As the share of renewable energy grows and electricity supply becomes increasingly variable, the need to expand electricity networks and storage options also increases. Hydrogen can serve the system and the grid as a seasonal energy store that provides additional flexibility and security of supply and as a grid-supporting buffer, for example by using electrolysis to draw surplus power from the grid and reconverting hydrogen to electricity to relieve grid congestion.

Even with a complete transition to CO_2-neutral energy sources, unavoidable process-related CO_2 emissions will remain, for example in the cement and lime industries as well as in waste incineration. To achieve climate targets, these unavoidable emissions will have to be captured and stored or used in the future, for example as a feedstock for hydrogen derivatives such as renewable methanol and other hydrocarbons. Broad use of CO_2 capture[5], storage, transport, and utilization is essential to establish a circular CO_2 economy. However, the circular CO_2 economy should not compete with the hydrogen economy now being developed.

[5] Under RED III, CO_2 from industrial point sources may be used to produce synthetic fuels through 2041.

Fig. 7: Process for developing the areas of action

Openness to Technology and Applications
From the stakeholders' perspective, a successful and sustainable hydrogen ramp-up requires a technologically diverse and application-neutral approach that integrates all pathways to climate neutrality and considers different approaches within hydrogen technologies. A diversity of approaches makes it possible to identify and implement optimal technical, economic, and environmental solutions for specific challenges and to strengthen the resilience of the energy system. This applies, for example, to industry and commerce, which both need a secure hydrogen supply and expanded electricity infrastructure. In the transport sector, battery and hydrogen mobility must coexist because vehicle use profiles and the availability of charging and refueling infrastructure differ. The heating market needs alternatives to direct electrification, for example for older buildings that are poorly suited to heat pumps. In decentralized and stationary energy supply, including for critical infrastructure and the construction or defense sectors, systems using hydrogen and hydrogen derivatives provide practical and necessary alternatives to battery applications.

Technological openness should continue to play an important role not only in production and applications but also in the design of funding programs, particularly at the federal and EU levels. According to the stakeholders, concentrating support on hydrogen technologies that are highly relevant to the German market could hinder the development of exportable technologies with greater application potential abroad because of different geographic, economic, and regulatory conditions.

Research and innovation are essential for developing new technologies. They also drive efficiency gains, cost reductions, production scale-up, and reduced dependence on critical raw materials. A strong research and development landscape also reinforces and energizes the domestic market and has positive effects on the training and availability of skilled workers. Continuous research into new materials plays a central role in improving hydrogen technologies. Innovative materials and functional materials can enhance the performance of fuel cells, electrolyzers, and other facilities such as reforming and dehydrogenation or hydrogenation reactors, extend their service lives, and reduce production costs. At the same time, new hydrogen production and storage processes must be advanced toward market readiness to enable broader industrial use.

Another important aspect is creating a market for recycled products and processes. Greater use of recycled materials in hydrogen production and infrastructure supports resource conservation and sustainability. Efficient recycling processes are also needed to recover critical raw materials such as catalyst materials and electrolyzer components and reduce dependence on imports.

Public Awareness
Transparency and honesty are essential to a sustainable energy transition with broad public support. This includes transparent and consistent communication about the availability, economic viability, practical suitability, and system integration of hydrogen and hydrogen technologies, with the aim of strengthening public awareness and reducing information asymmetries among stakeholders. When evaluating technology pathways, operational and macroeconomic benefits, system value, safety considerations, and user behavior should be considered alongside technical efficiency.

Raising public awareness of hydrogen at an early stage is crucial, particularly with respect to industrial transformation, needs-based infrastructure planning, and workforce development. Because investment cycles and conversion processes are long, a needs-based transition to hydrogen solutions requires early planning based on realistic forecasts. Training skilled workers is also a central issue. Broad interest in vocational training and degree programs in the relevant technical and engineering disciplines promotes both the development of a qualified workforce and innovation in hydrogen technologies.

2.4.2 Infrastructure

From the stakeholders' perspective, infrastructure is the backbone for transporting, storing, converting, and distributing hydrogen to users and is decisive for the successful ramp-up of the Bavarian hydrogen economy. A well-developed system of injection points, converters, transshipment terminals, storage facilities, and transport options that is connected internationally and provides appropriate access throughout Bavaria not only enables cost-effective and reliable transport to different demand centers but also creates security of supply, strengthens economic competitiveness, and supports the transition to climate neutrality.

Integrated Planning of Transport and Supply Infrastructure
Stakeholders identified the temporal, geographic, and quantitative divergence between hydrogen supply and demand as a major obstacle to the hydrogen ramp-up. This is compounded by the complexity of new stakeholders and business models emerging during the market's ramp-up phase. The approved hydrogen core network is a fundamental building block for developing and expanding hydrogen infrastructure within Germany and Europe and an important step toward supplying the first major customers with gaseous hydrogen. It is therefore essential to implement hydrogen network development consistently in the coming years and to coordinate further infrastructure expansion with the evolving demand timeline.

In addition to connecting anchor customers with large hydrogen requirements, combining small and medium-sized customers in a hub is a key factor for the successful hydrogen ramp-up in Bavaria. For industrial and commercial customers that have previously been supplied with natural gas through the distribution network, a reliable perspective for conversion to hydrogen is highly important to enable these companies to defossilize. Ensuring supply across the whole of Bavaria beyond the core network also requires comprehensive distribution network planning and consideration of alternative supply options, such as rail and ship transport or the use of hydrogen derivatives, liquid organic hydrogen carriers, and other hydrogen carriers. Hydrogen trailers also play an essential role in the early development of smaller regional ecosystems and in last-mile supply in Bavaria.

In addition to expanding hydrogen infrastructure, a nationwide CO_2 storage and transport infrastructure should be developed to connect sources of unavoidable process-related CO_2 emissions with industrial customers and intermediate storage facilities. Coordinated development of the two systems can create synergies that accelerate the transition to a sustainable economy and make it more cost-effective. Linking hydrogen technologies with CO_2 management strategies not only reduces greenhouse gas emissions but also enables the production of climate-friendly hydrogen derivatives from renewable hydrogen.

Importance of Imports
Bavaria will likely depend to a large extent on hydrogen imports from outside the state, particularly from other countries. Developing diversified supply sources and import routes is therefore another decisive factor in ensuring security of supply and industrial transformation. Effective hydrogen imports require the early development of long-term international hydrogen partnerships with a wide range of producing countries. Stronger corporate involvement is advisable for the successful implementation of specific projects. Developing transport and storage infrastructure is also crucial. This includes expanding German seaports and Bavarian inland ports into import hubs and creating a pan-European hydrogen pipeline network, as envisioned by the European Hydrogen Backbone initiative. Harmonized standards and certification are also required to ensure the sustainability and quality of imported hydrogen and facilitate its integration into national energy systems.

2.4.3 Economic Viability and Bankability

Economic viability and bankability are decisive factors for successful hydrogen projects of the stakeholders and therefore for the rapid ramp-up of the hydrogen economy. To stimulate investment, concepts must be economically profitable and financially viable. This requires transparent business models, reliable market forecasts, and stable long-term policy frameworks that provide investment certainty. Provisions of the adopted Hydrogen Acceleration Act are an important element. At the same time, administrative burdens urgently need to be reduced, and long-term complementary incentive mechanisms are needed on the user side. These mechanisms should not only penalize behavior that damages the climate but also promote the rapid market introduction of climate-friendly technologies. The internalization of external costs through regulatory measures and policy instruments such as CO_2 emissions trading must therefore be accompanied by market activation for climate-friendly hydrogen solutions.

Predictability and Reliability
Clear and reliable framework conditions are important foundations for mobilizing investment and creating viable business models. An appropriate, clear, and coherent regulatory framework for hydrogen technologies, with consistent and stable long-term objectives and requirements and generally applicable standards and norms, not only makes hydrogen easier to use but also creates planning and investment certainty for companies and investors. This is particularly important for decisions, processes, and contracts in which long-term commitments serve to reduce risk.

A forward-looking, consistent, and reliable funding policy creates a stable environment during the ramp-up phase and encourages companies and investors to invest in hydrogen technologies. As a general principle, funding policy should be designed as an adaptive system that responds to current innovation needs and the pace of innovation while allowing adopted laws to take full effect without undermining legally induced price signals. However, funding programs must not be terminated at short notice or funding windows postponed, so that companies and investors have the opportunity to adjust strategically to changing market conditions.

Targeted market mechanisms are also needed to strengthen the competitiveness of renewable and low-carbon hydrogen and climate-friendly technology applications and to enable the development of viable business models. Examples include Carbon Contracts for Difference and hydrogen auctions conducted by H2Global and the European Hydrogen Bank, which provide long-term price stability within the respective instrument and send price signals. Green lead markets, particularly for emissions-intensive industries, are also an important building block for greater planning certainty and reliability.

Accelerating Market Ramp-Up
Comprehensive regulatory adjustments are required to accelerate the hydrogen economy's ramp-up. The legal framework must be revised to reflect hydrogen's new role and practical use in various parts of the energy system. Detailed and overly restrictive requirements inhibit innovation and investment under the prevailing dynamic conditions. The RFNBO criteria in particular should be made more practical and flexible. Requirements that are too narrow can make investment more difficult during the ramp-up phase, delay project development, and unnecessarily limit the availability of renewable hydrogen. Sustainability requirements must remain ambitious but must also be designed to enable rather than prevent investment.

To implement the necessary infrastructure quickly, approval procedures for hydrogen production, storage, and transport should be further simplified and accelerated, as envisaged, for example, by the Hydrogen Acceleration Act. The rules for calculating the eligibility of hydrogen from different sources, such as for credit toward the greenhouse gas reduction quota, must also be made clearer and more practical.

Although achieving climate targets requires a focus on producing and using renewable hydrogen from electrolysis powered by renewable electricity or hydrogen from biogenic residues, additional hydrogen sources must also be developed. These include by-product hydrogen, hydrogen produced from natural gas with subsequent CO_2 capture, and potentially white hydrogen in the future. At the same time, the scaling of renewable hydrogen in particular should continue to be advanced.

Regional Ecosystems
In the innovative, geographically diverse state of Bavaria in particular, regional ecosystems form the foundation for the development of a sustainable and comprehensive hydrogen infrastructure. They bring together local stakeholders from industry, research, and society, raise awareness among technology users, and create decentralized market structures, enabling technologies to be put into practice more quickly and infrastructure to be developed in a targeted manner. Especially in the early phase of the hydrogen ramp-up, hydrogen clusters that encompass the entire value chain locally can drive the hydrogen ramp-up even beyond the planned core network and effectively complement key projects for energy-intensive industries.

Hydrogen hubs not only accelerate market penetration by pooling supply and demand but also promote regional value creation and create new jobs. They also help leverage regional strengths, address specific local needs, and involve the public, ultimately contributing to the success and acceptance of the energy transition.

2.4.4 Resilience

The stakeholder dialogue also highlighted the increasingly important role hydrogen plays in building resilience. Key aspects here include stabilizing energy systems, reducing dependence on individual energy suppliers, and ensuring sustainable economic development.

The reduction, recovery, and recycling of rare and valuable platinum group metals, such as platinum, palladium, ruthenium, or iridium, which are required in electrolysers or fuel cells, can make a significant contribution to reducing dependence on raw material imports and the carbon footprint, as well as increasing the economic efficiency of the facilities. Hydrogen fosters new economic partnerships with countries that have significant renewable energy potential, thereby reducing geopolitical dependencies. Building a robust hydrogen economy requires comprehensive measures – ranging from decentralized production, strengthening the domestic economy, and diversifying supply chains, to targeted support for research and innovation, and international partnerships.

3

Measures for a sustainably successful Hydrogen Ramp-Up

3. Measures for a sustainably successful Hydrogen Ramp-Up

The Bavarian Hydrogen Strategy 2.0 identifies areas of action and goals for the continued hydrogen ramp-up. The four thematic areas in Section 2.4, which are the outcome of the stakeholder dialogue, show where Bavarian stakeholders see a need for action. To achieve the goals established in the strategy, H2.B has developed measures based on the current status of the hydrogen ramp-up and the areas of action identified.

Implementing these measures, which also consider the role of hydrogen in making the local energy system more flexible and secure, is intended to support the development of local hydrogen ecosystems, or hydrogen hubs, establish international hydrogen transport routes to Bavaria, and strengthen the leading technological position of Bavaria in the field of hydrogen.

Raising market awareness through information and guidance

- **Provide early information and raise awareness among relevant market stakeholders**, particularly in key Bavarian sectors requiring transformation, among small and medium-sized enterprises, and at the regional level, concerning applications for hydrogen solutions. Along with energy agencies, H2.B can serve as an initial point of contact and help connect stakeholders with appropriate contacts.
  FEDERAL GOVERNMENT BAVARIA COMPANIES
- Promote realistic expectations and acceptance through **appropriate communication**, for example through information campaigns, guides, and training for companies and the general public. These resources should focus in particular on the availability, economic viability, practical suitability, safety, and system integration of hydrogen and hydrogen technologies.
  FEDERAL GOVERNMENT BAVARIA COMPANIES

Market stimulation through demand incentives and competitiveness

- **Continue and broadly establish green lead markets,** particularly for basic-material and emissions-intensive industries. EU FEDERAL GOVERNMENT
- **Introduce reliable long-term quotas for the use of renewable hydrogen** and, during a transitional period, low-carbon hydrogen. RED III, for example, should be transposed into national law promptly and without going beyond its requirements (gold-plating)[6]. These RFNBO quotas are particularly relevant for industry and for road, maritime, and air transport. To make the requirements effective, appropriate penalty mechanisms must be established. FEDERAL GOVERNMENT
- **Increasing the competitiveness of hydrogen applications,** for example through the introduction of tax incentives, accelerated depreciation, and exemptions from fees for hydrogen applications. In the mobility sector, this can be achieved, for example, by treating batteries, fuel cells, and hydrogen engines equally for tax purposes, in addition to the now long-term exemption from toll surcharges for air pollution and noise pollution. In the heating market, a revision of the requirements under the Building Modernization and Heating Planning Act could provide the necessary impetus. In the energy sector, the maturity-based procedure used by transmission system operators, which replaces the previous first-come, first-served approach to grid connection requests, results in more efficient allocation. Further adjustments would nevertheless be required, for example a reduction in the application fee. FEDERAL GOVERNMENT
- **Take hydrogen applications into account in public procurement**, for example when converting public vehicle fleets. EU FEDERAL GOVERNMENT BAVARIA
- Create incentives to **expand decentralized hydrogen ecosystems** so that supply and demand are more closely linked and can scale, particularly along strategically important hydrogen import corridors, the core network, trans-European transport networks, and major demand clusters. EU FEDERAL GOVERNMENT BAVARIA COMPANIES
- Implement and expand mechanisms that **strengthen expertise and competitiveness in hydrogen technologies within Europe**, for example by maintaining and expanding non-price criteria in tenders and maximum shares for technology imports from markets in which disproportionately high government subsidies distort pricing. EU
- **Strengthen industrial resilience** by supporting the development of intra-European supply chains for key components, such as electrolyzers and storage systems, and the use of diverse hydrogen technologies. EU
- **Continue and accelerate support for medium- and large-scale projects**, such as IPCEIs and regulatory sandboxes, particularly application projects that can serve as key pillars for developing hydrogen transport infrastructure. Expand complementary programs for climate-friendly investment, research, and development projects. Notification and approval procedures urgently need to be accelerated. EU FEDERAL GOVERNMENT

[6] As of the date of this progress report, the German Bundestag has passed the Second Act on the Further Development of the Greenhouse Gas Reduction Quota. This means that the measure outlined here for the transportation sector has essentially been fulfilled.

Long-term plannability and investment security

- **Maintain existing climate and emissions reduction targets** to provide a stable long-term signal that enables industrial transformation processes and the investments they require. EU FEDERAL GOVERNMENT BAVARIA COMPANIES
- **Rapidly implement EU directives**, such as the EU internal gas market directive, and **promptly adopt key legislation** such as the Electricity Supply Security and Capacity Act, including timely tenders for hydrogen-ready power plants. Announced strategic frameworks, including those on hydrogen storage, carbon management, the circular economy, and negative emissions, should also be published, enshrined in law, and implemented consistently. FEDERAL GOVERNMENT
- **Establish reliable framework conditions for using all renewable and low-carbon hydrogen production pathways** while focusing market-activating support and preferential treatment on hydrogen produced from renewable electricity or biogenic residues. Lock-in effects that could impede the energy system's transformation must be avoided. EU FEDERAL GOVERNMENT
- Maintain the schedule for **implementing the hydrogen core network** as a central element of the hydrogen ramp-up, including connections to neighboring countries to create a pan-European hydrogen pipeline network. FEDERAL GOVERNMENT COMPANIES
- Implement a **harmonized guarantees-of-origin registry** so that the use of renewable hydrogen sourced from abroad can be credited. FEDERAL GOVERNMENT

Streamlining and simplifying regulation

- Promptly **extend the transitional periods** and make the requirements for additionality and the temporal and geographic correlation of electricity sourcing for the production of renewable, RFNBO-compliant hydrogen more practical through at least 2035[7]. EU
- **Streamline procedures**, for example in permitting and in application processes for funding instruments, building on initial improvements to Carbon Contracts for Difference. EU FEDERAL GOVERNMENT
- **Improve access to funding instruments for all sectors**, particularly for small and medium-sized enterprises, for example access to the EU Innovation Fund. EU FEDERAL GOVERNMENT
- Establish a **proportionate legal basis for accelerating small-scale projects** that appropriately reflects the new role of hydrogen in decentralized applications within the energy system. FEDERAL GOVERNMENT
- **Simplify regulation,** for example the crediting of hydrogen from different sources, such as RFNBOs and biogenic hydrogen, toward the greenhouse gas reduction quota. EU FEDERAL GOVERNMENT
- **Accelerate and simplify standardization, certification, and technical standards processes**, for example to ensure that renewable and biogenic hydrogen can be credited toward quota compliance and to enable reliable hydrogen-compatibility certificates for components. EU FEDERAL GOVERNMENT
- **Promptly and continuously evaluate the practical effects of EU legal requirements** on viable hydrogen business models within the EU, taking account of the differing starting conditions and circumstances of individual member states, to safeguard their international competitiveness. This should be analogous to the evaluation already planned for instruments such as the European Carbon Border Adjustment Mechanism. EU FEDERAL GOVERNMENT

More entrepreneurial pioneering spirit and cooperation

- Utilize the **corporate energy plans** funded by the Free State of Bavaria to systematically identify, evaluate, and implement specific measures, such as the use of renewable energy, improving energy efficiency, and the transition of industrial processes, for example, through the use of hydrogen. These energy plans can also serve as a solid foundation for subsequent grant applications. COMPANIES
- **Participate in demonstration and pilot projects** and use of **Bavaria's Technology Transfer Centers (TTZs) and the Hydrogen Technology Application Center (WTAZ) f**or research and development to gain an advantage in knowledge transfer, cost and risk assessment, and strategic market positioning. COMPANIES
- **Establish companies or consortia** as complementary alliances among producers, transport providers, and customers to increase planning and investment certainty. COMPANIES
- **Use information, continuing education, and networking offerings**, such as training, professional development, and vocational education for employees. COMPANIES
- **Use internationalization offerings s**uch as trade fair participation, delegation visits, and events for international networking and identifying opportunities for cooperation. Also **examine international funding programs and participate in consortia with scientific partners**, for example under Horizon Europe, to strengthen research and innovation. In addition to H2.B, other stakeholders such as the Bavarian Research Alliance (BayFOR) provide support. COMPANIES

Strengthening the leading technological position of Bavaria and Germany

- **Continue technology-neutral research funding** to strengthen domestic markets and create new export opportunities. FEDERAL GOVERNMENT BAVARIA
- **Provide more targeted support for hydrogen start-ups** to bring innovative hydrogen technologies to market readiness faster, use new materials, and increase efficiency. FEDERAL GOVERNMENT
- **Develop new markets across the value chain of hydrogen**, for example for recycling processes, to reduce the use of critical and costly materials such as rare earths and precious metals. EU FEDERAL GOVERNMENT BAVARIA COMPANIES
- **Expand vocational and continuing education for skilled workers** to ensure that the expertise required for the ramp-up of hydrogen applications is available. FEDERAL GOVERNMENT BAVARIA COMPANIES

Making the energy system more flexible and secure

- **Expand hydrogen infrastructure coherently** across production, imports, transport, storage, and distribution, including hydrogen hubs for onward distribution through various transport modes. This includes expanding import and conversion infrastructure for hydrogen and its derivatives, liquid organic hydrogen carriers, and other hydrogen carriers, for instance at Bavarian ports. It also requires accelerated expansion of the hydrogen distribution network to supply important customers beyond the core network, particularly in a geographically large state such as Bavaria, and greater consideration of complementary modes such as trailer, rail, and ship transport. EU FEDERAL GOVERNMENT COMPANIES
- Further develop the Whitepaper on Hydrogen Storage to **reflect the importance of porous reservoirs** to hydrogen security of supply in southern Germany. FEDERAL GOVERNMENT
- Conduct **rolling demand analyses** to ensure that new hydrogen storage facilities are developed or existing natural gas storage facilities are converted in a timely manner, particularly porous reservoirs in Bavaria. FEDERAL GOVERNMENT BAVARIA
- Develop a **CO_2 transport infrastructure** in parallel and in line with demand, connecting sources of unavoidable CO_2 emissions with production facilities for hydrogen derivatives, among others. FEDERAL GOVERNMENT BAVARIA

[7] In April 2026, the European Commission announced a review and revision of the RFNBO criteria for the second quarter of 2026.

4

Outlook

4. Outlook

4.1 Further Developments and Forecasts

Numerous studies expect global hydrogen demand to increase significantly in the coming years. According to the 2025 Global Hydrogen Review of the IEA, the hydrogen sector continues to grow worldwide despite delays and project cancellations, although less dynamically than expected at the beginning of the decade (see also Section 2.3). Current production of approximately 1 Mtpa is expected to at least quadruple by 2030 but will still remain below political and industrial ambitions. Global installed electrolyzer capacity was almost 3 GW_{el} in 2025, with nearly two-thirds of total capacity located in China (IEA 2025). Depending on the analysis, installed electrolyzer capacity within the EU was estimated at 514 to 800 MW_{el} at the end of 2025 and is projected to reach 29 to 108 GW_{el} by 2030 (European Hydrogen Observatory 2025, Hydrogen Europe 2025, IEA 2025, Rystad Energy 2025).

The IEA most recently recorded a slight slowdown in the growth of hydrogen use. New hydrogen offtake agreements focused on refineries, the chemical industry, and maritime transport. The gradual implementation of sectoral quotas for hydrogen use in transport and industry under RED III is expected to lead to a continuous increase in hydrogen demand within the EU.

This increase in demand for hydrogen and hydrogen derivatives will also emerge in Germany, driven by decarbonization targets in the industrial, transport, and energy sectors. Estimates vary considerably depending on assumptions about future electrification rates, renewable energy and transport infrastructure expansion, the continued development of key technologies, and political framework conditions. Estimates of annual demand in Germany in 2030 range from approximately 40 to 170 TWh, while forecasts for 2045 range from 163 to 606 TWh (EWI & BET, 2025). The National Hydrogen Strategy (2023) assumes demand of 95 to 130 TWh for hydrogen and hydrogen derivatives by 2030 and, by 2045, 360 to 500 TWh for hydrogen plus an additional 200 TWh for derivatives.

Analyses available for Bavaria also anticipate a significant increase in demand for hydrogen and hydrogen derivatives. The Energy System Analysis – Climate-Neutral Bavaria (FfE & consentec, 2024) served as a basis for developing the Bavarian Energy Plan 2040 (see Section 2.2.3) and presents six scenarios. The so-called mix pathway assumes the most balanced and ambitious possible development of the Bavarian energy system and can therefore be regarded as a balanced scenario for estimating hydrogen demand. Under this pathway, Bavaria is expected to consume 31 TWh of hydrogen in 2040, of which 13 TWh would be used by thermal power plants for conversion and 10 TWh by industry. The Hydrogen Roadmap Bavaria (H2.B, 2022) projects hydrogen demand of 17 to 43 TWh in 2040.

4.2 Potential Technological Applications for Hydrogen in Bavaria

At the EU level, RED III, at the federal level, the Federal Climate Change Act, and at the Bavarian level, the Bavarian Climate Protection Act, among other instruments, define pathways for the energy transition (see also Section 2.2). Hydrogen can contribute to achieving targets for increasing the share of renewable energy and reducing greenhouse gas emissions. The sectors have different potential pathways for defossilization through the use of hydrogen. The following application opportunities are particularly relevant to Bavaria.

Together, the transport and building sectors accounted for almost 51 percent of Bavaria's greenhouse gas emissions in 2023, equivalent to 42.7 million metric tons of CO_2 equivalents (StMUV, 2025). Technological solutions for decarbonizing these sectors are already available in principle. In **transport**, hydrogen-powered vehicle technologies, including fuel cells and hydrogen combustion engines, are available for passenger cars and commercial vehicles alongside battery-electric vehicles. In **buildings**, hydrogen-powered heating systems are available as alternatives alongside heat pumps, district heating, and biomass heating systems.

The **industrial sector** accounted for approximately 17.3 percent of annual greenhouse gas emissions in 2023. Particularly in energy-intensive industry, the potential for transformation through hydrogen use must be considered in a differentiated manner.

In the **cement and lime industries**, most greenhouse gas emissions, almost two-thirds, are process-related and result from the calcination of limestone used as a raw material. Process-related emissions from Bavaria's seven cement plants account for almost 75 percent of the state's process emissions, and the lime industry accounts for almost 12 percent. These emissions can be avoided only to a limited extent by using raw materials that have already been calcined. CO_2 capture, utilization, and/or storage (CCUS) is therefore indispensable. One-third of CO_2 emissions are generated by the fuels used in clinker production. In addition to climate-neutral energy carriers such as biogenic fuels, primarily from waste, or synthetic methane, process heat can also be supplied by combusting hydrogen.

The situation differs in the **glass, brick, paper, and metal-processing industries, including foundries, heat treatment plants, and galvanizing facilities**, which require substantial process heat and whose emissions are predominantly energy-related. In these industrial segments, green and low-carbon hydrogen will be an important future decarbonization option. Where affordable hydrogen infrastructure is available, converting existing systems from natural gas to hydrogen can often be simpler and more economical than direct electrification. In high-temperature processes, such as heating very large glass melting tanks, electrification is not technically possible or economically viable today, making hydrogen an important option. Hybrid solutions combining hydrogen and electrification are also expected in some processes. It should be noted that certain continuous manufacturing processes, such as glass production in melting tanks, have long replacement cycles. Gas-fired melting tanks generally have a service life of 12 to 15 years, and conversion to a different production technology also takes several years.

Bavaria does not produce primary steel through the blast furnace route. **Steel production** in Bavaria is based on the electric steel process, in which recycled scrap steel is used in electric arc furnaces. Hydrogen can be used in other thermal processes, for example to preheat combustion air in gas-fired heating furnaces.

Refineries and the **chemical industry** will depend primarily on renewable or biogenic hydrogen as a feedstock in the future to replace hydrogen produced from natural gas and petroleum currently used in ammonia, methanol, and refinery processes. Hydrogen can also play a role in supplying process heat. In addition, demand for synthetic fuels, particularly for maritime and air transport, will sharply increase the use of renewable or biogenic hydrogen. The petrochemical and chemical industry will therefore become one of the main future customers for renewable or biogenic hydrogen.

The **energy sector** accounted for almost 14 percent of the annual greenhouse gas emissions in Bavaria in 2023. Although renewable energy already provided three-quarters of electricity generation and approximately 57 percent of electricity demand in Bavaria in 2024, conventional power plants, especially natural gas plants, continue to make an important contribution to electricity generation, particularly by stabilizing the grid and ensuring security of supply. As coal use is phased out by 2038 and the Power Plant Strategy of the Federal Government moves forward with planned tenders for new dispatchable hydrogen-ready gas-fired power plants, demand for hydrogen will increase sharply. Additional power plant capacity will be particularly important in Germany's grid related south to reduce congestion. Decentralized combined heat and power plants and generator sets may create additional hydrogen demand.

The **agricultural sector** contributes almost 17 percent of greenhouse gas emissions in Bavaria. Hydrogen can contribute both through production from biogenic agricultural residues and through use as a fuel for agricultural vehicles, including e-fuels, LOHCs, and hydrogen combustion engines, and as a fuel in combined heat and power plants that supply heat to barns and greenhouses. Hydrogen can also contribute indirectly to CO_2 reductions through the use of climate-friendly fertilizer produced from green ammonia.

To defossilize or decarbonize the Bavarian sectors described above, the availability of green hydrogen and its derivatives, competitive and affordable prices, and corresponding transport and storage infrastructure are decisive alongside green electricity. These factors are in turn influenced by an appropriate regulatory framework. Only coordinated implementation of the time-limited measures described in Section 3 across the entire value chain will effectively stimulate the hydrogen ramp-up.

The different properties of hydrogen as an energy carrier and its effects on products, processes, and production facilities, some of which have service lives of several decades, may require capital-intensive conversions or new installations. These investments can affect product costs and corporate competitiveness and may therefore present existential challenges. Continued research and development is therefore needed, particularly for industrial applications, to ensure that conversion to hydrogen can be achieved with the lowest possible investment and the highest possible plant availability. Against this backdrop, the transfer of knowledge between research institutions and industry has a central role.

4.3 Summary

The guiding principle for transforming the Bavarian energy system is a balance among the three energy policy objectives of security of supply, affordability, and sustainability. Because hydrogen is an important component of this balance, one of the five sub-strategies within the Bavarian Energy Plan 2040, the Bavarian Hydrogen Strategy 2.0, is dedicated to this key technology. To continue making progress in using the potential of hydrogen for the energy transition in Bavaria, it is particularly clear that regulation must be designed and implemented at the federal and EU levels with greater speed, reliability, and practical suitability. This will enable Bavaria to maintain and further expand its leading role in hydrogen.

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List of Figures

Imprint

Publisher:
Hydrogen Center Bavaria (H2.B) / Zentrum Wasserstoff.Bayern (H2.B)
Fürther Straße 250
90429 Nuremberg, Germany
Phone: +49 (0) 911 5302 99236

info@h2.bayern
www.h2.bayern

Managing Director:
Dr. Fabian Pfaffenberger

Board:
Prof. Dr. Veronika Grimm, Prof. Dr. Peter Wasserscheid

Authors:
Udo Dröge, Elisabeth Gruber Löw, Paula Kopp, Tim Lixfeld,
Dr. Fabian Pfaffenberger, Carolin Reiser

Layout:
zur.gestaltung, Nuremberg

Illustrations:
Hydrogen Center Bavaria (H2.B)

As of:
Juni 2026 – translated in August 2026

Citation:
Hydrogen Center Bavaria (H2.B, 2026): Progress Report on the Hydrogen Ramp-Up in Bavaria.

www.h2.bayern