



# A Dutch-German Hydrogen Valley – The Netherlands and North Rhine-Westphalia as a Pioneer Region for the European Hydrogen Economy

## Challenges and Solutions of Hydrogen Infrastructure

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Thursday, 26th October 2023



## Agenda

1. Hydrogen Core Network - Plans and status
2. The Electrical System - An Integrated Component
3. Challenges and Solutions
4. Conclusion



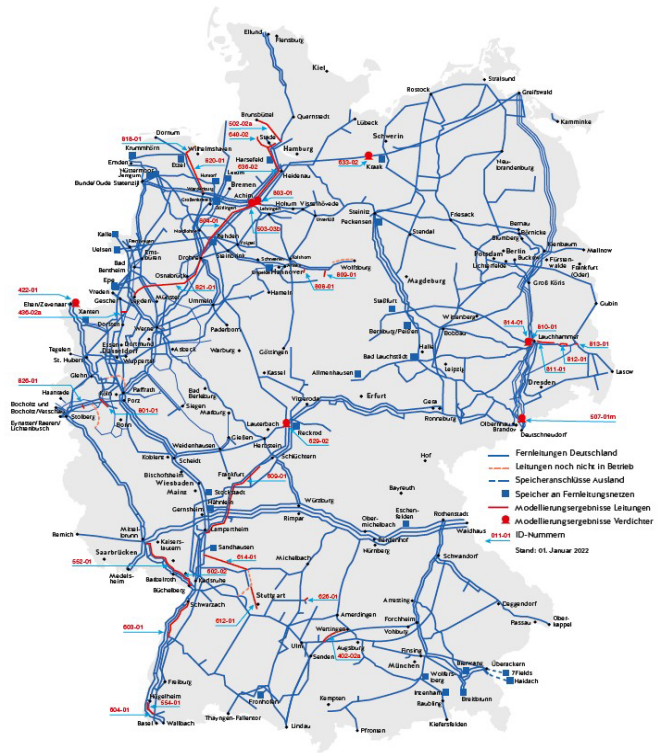
# 1. Hydrogen Core Network - Plans and status



# 1. Hydrogen Core Network

## Transformation of gas network and development of hydrogen network - parallel and simultaneously

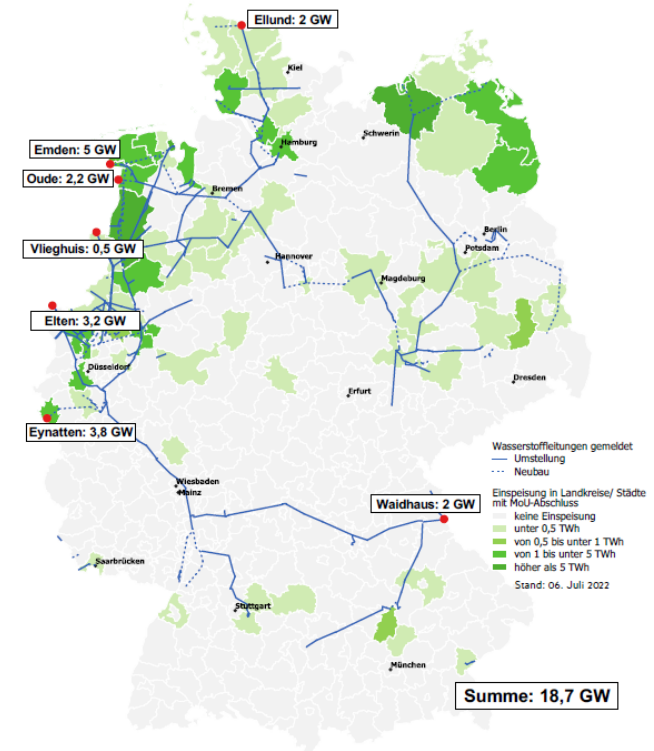
Abbildung 27: Ausbaumaßnahmen der Basisvariante bis Ende 2027/2032, inkl. der LNG-Anbindungsleitungen



Quelle: Fernleitungsnetzbetreiber, schematische Darstellung



Abbildung 52: Ergebnis Wasserstoffquellenverteilung für das Jahr 2032



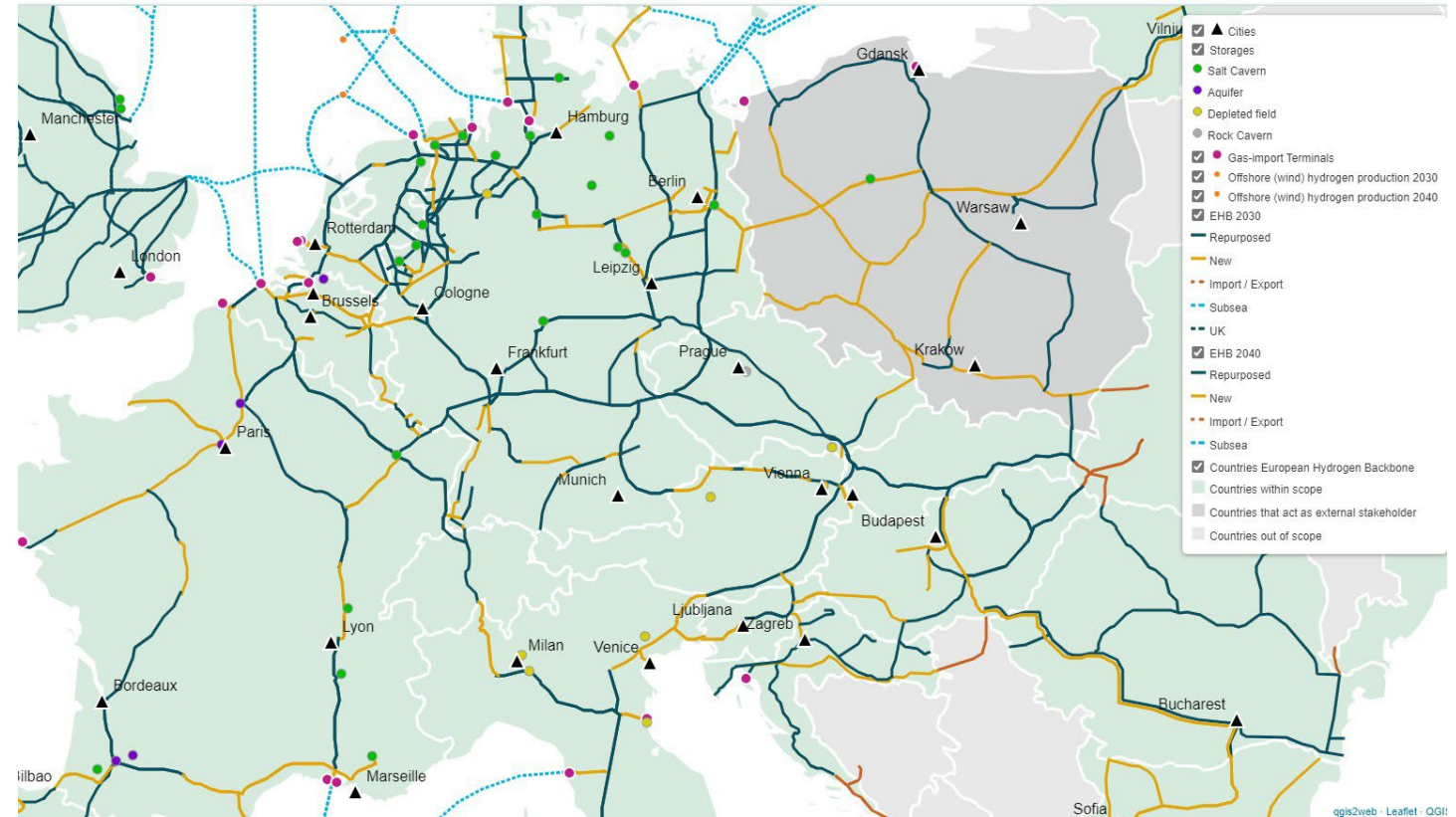
Quelle: Fernleitungsnetzbetreiber und andere potenzielle H2-Netzbetreiber, schematische Darstellung



# 1. Hydrogen Core Network

- Part of the Hydrogen Core Network
- For North Rhine-Westphalia, the connections to the Netherlands and Belgium are of particular importance
- Close exchange with both countries
- Signing of a Lol between Belgium and NRW in Spring 2023 as an expression and commitment of a close cooperation
- With the Netherlands in the framework of the project of the Delta Rhine Corridor also a close cooperation planned

European Hydrogen Backbone Maps



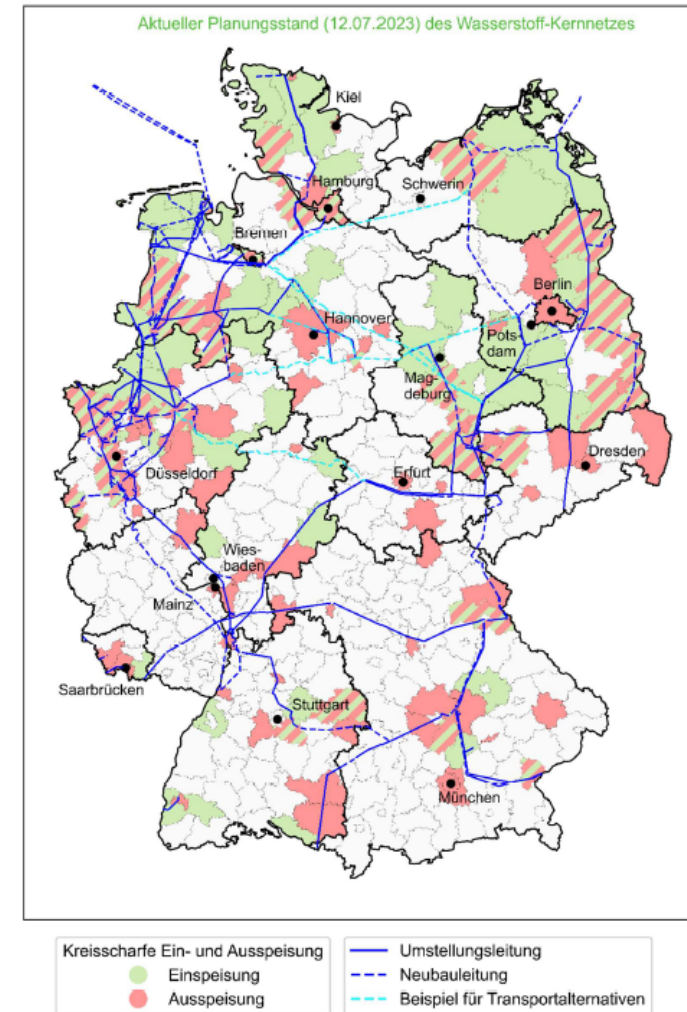
# 1. Hydrogen Core Network

## Current planning status with NRW reference

- The hydrogen core network is modeled on a uniform nationwide calculation model and serves the **supraregional transport of hydrogen**
- EnWG amendment with section 28r EnWG for the development of the hydrogen core network currently in the legislative process
- The law is scheduled **to take effect this fall**
- The TSO have three week to file the joint motion to the Bundesnetzagentur (BNetzA) for the hydrogen core network
- The BNetzA then has to confirm this application. According to current knowledge, this will take place quickly (first quarter 2024)

Quelle: FNB, Planungsstand – Wasserstoff-Kernnetz, 12.07.2023

Abbildung 4: Aktueller Planungsstand des Wasserstoff-Kernetzes



Hinweis: Der hier dargestellte Planungsstand (12. Juli 2023) entspricht noch nicht dem finalen Entwurf des Wasserstoff-Kernetzes. Die dargestellten Trassenvarianten werden in den Folgeschritten bis zur Antragstellung unter Berücksichtigung der eingehenden Meldungen im Rahmen der „Gelegenheit zur Stellungnahme“ potenzieller Wasserstoffnetzbetreiber bewertet und optimiert.

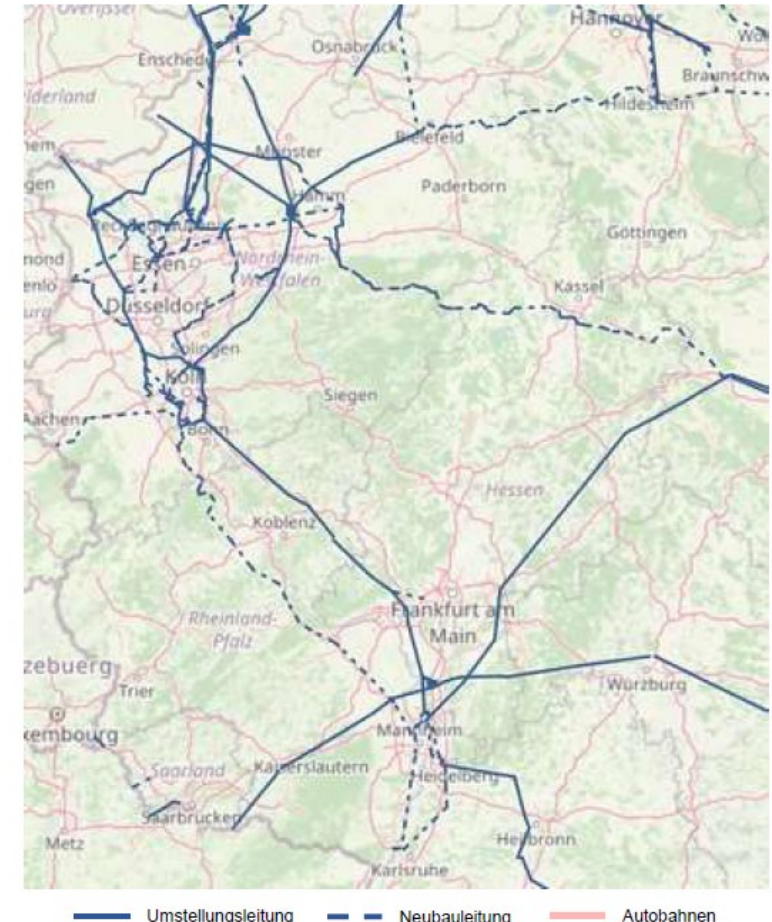


# 1. Hydrogen Core Network

## Current planning status with NRW reference

- Current Status round about 10.000 kilometers
  - this is far above initial expectations and is **very ambitious**
- The L-H gas conversion is an opportunity for the further development of the gas network for a climate neutrality network and the development of a hydrogen network
- Mainly Conversion of gas pipelines to hydrogen up to the year 2032
- The supply focus of the hydrogen core network is in NRW.
- According to the current draft plan, power plant sites in the Rhineland and northern Ruhr area and in particular will be connected.

Abbildung 7: Aktueller Planungsstand des Wasserstoff-Kernetzes in der Region Mitte West



Hinweis: Der hier dargestellte Planungsstand (12. Juli 2023) entspricht noch nicht dem finalen Entwurf des Wasserstoff-Kernetzes. Die dargestellten Trassenvarianten werden in den Folgeschritten bis zur Antragstellung unter Berücksichtigung der eingehenden Meldungen im Rahmen der „Gelegenheit zur Stellungnahme“ potenzieller Wasserstoffnetzbetreiber bewertet und optimiert.

Quelle: Fernleitungsnetzbetreiber, Umsetzung mit NEPLAN®



# 1. Hydrogen Core Network

## Further planning - What's next?

- highly dynamic process: in October 2023, conversion work began on the first hydrogen pipeline between Lower Saxony and North Rhine-Westphalia; further TSO applications will follow in early 2024
- After the hydrogen core network comes into force, network development planning is to be restructured.
- Gas and hydrogen planning are to be combined, and requirements are to be reassessed every two years in a network development process.
- The period under consideration is to be extended beyond 2032 so that the climate-neutral network (“Klimaneutralitätsnetz”) is achieved in 2045.
- At the same time, according to the draft of the German government, the network development processes for the electricity, gas and hydrogen sectors are to be synchronized in terms of time. The aim is thus to achieve **integrated network planning**.
  - NRW is a pioneer with the study "Integrated Network Planning NRW" from this year and has shown great synergy effects and potentials for integrated network planning.





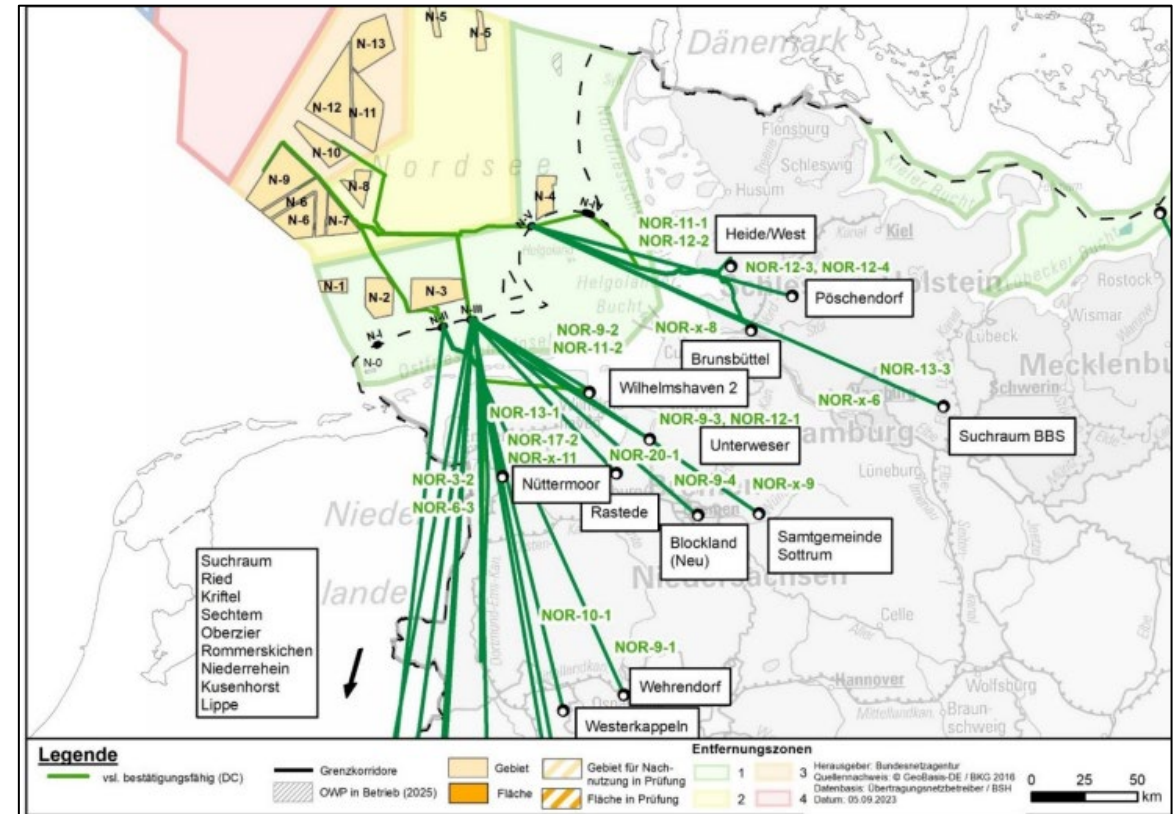
## 2. The Electrical System - An Integrated Component



## 2. The Electrical System

### An Integrated Component

- NRW becomes offshore state with 9 direct grid connections with 18 GW of offshore power
- 10 GW by the so-called “Windader West”
- Grid connection points for these offshore lines in NRW:
  - 1<sup>st</sup> to Münsterland/Ibbenbüren replacing hard coal firing power plant/coal mine
  - northern and western Ruhr area to supply large energy intensive companies
  - in the “Rheinischem Revier” (Rhenish mining area) to substitute big lignite firing power plants

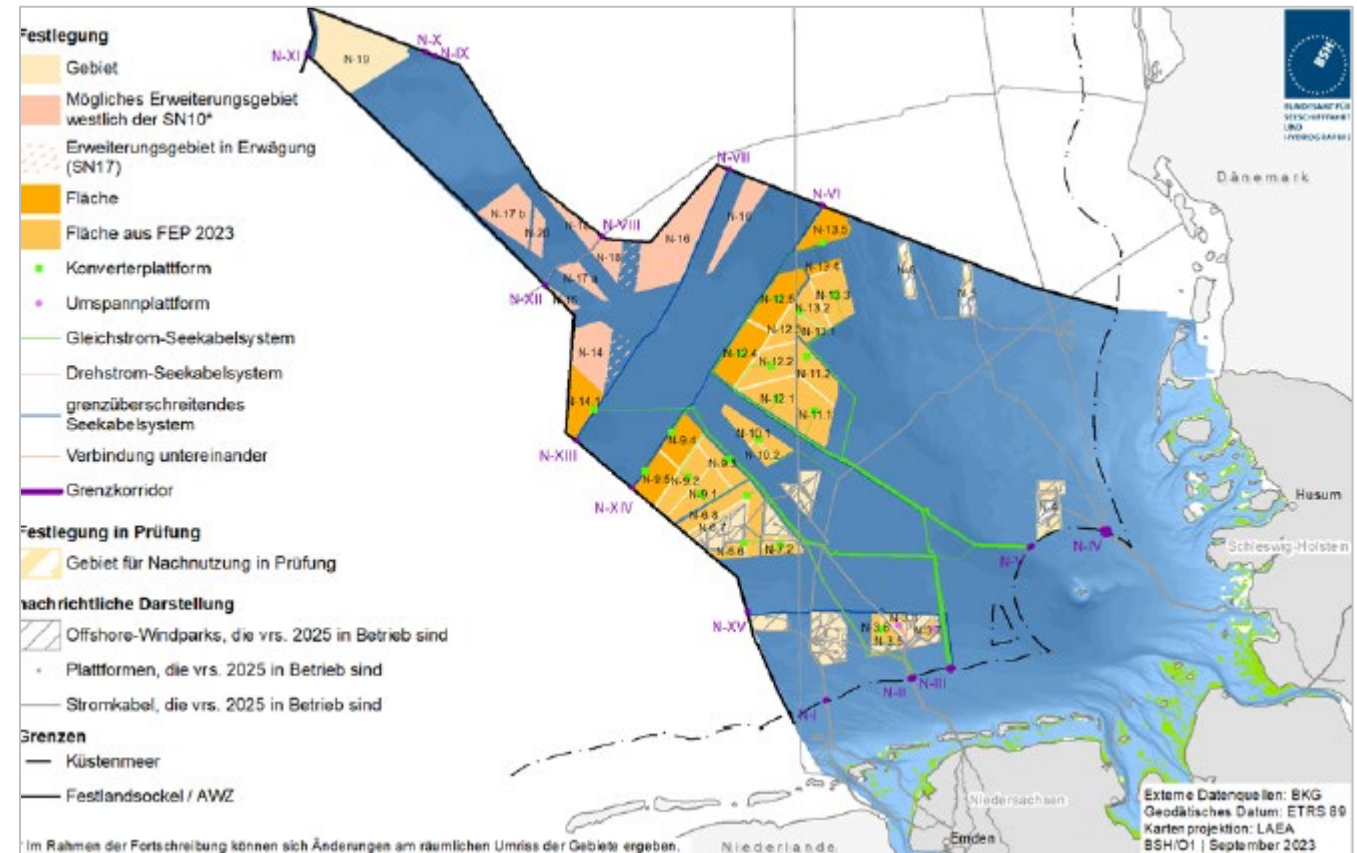




## 2. The Electrical System

### An Integrated Component

- Large areas designated for offshore wind power in the North Sea
- large amounts of renewable electricity thus also bring the potential for electrolyzers to NRW
- The electric and hydrogen-capable systems must be thought together in the future
- At present, the German government is proposing a synchronized network planning in a new draft for the modification of the energy economy act.





## 3. Challenges and Solutions



## 2. Challenges and Solutions

### Permits for energy infrastructure under German law – What does it mean?

- Application principle
- 16 private Transmission system operators (TSO) for gas
- Energy plan approval authorities are predominantly the responsibility of the federal states, such as North Rhine-Westphalia
- Approval of energy infrastructure – power, gas and hydrogen – regularly in a two-step process
  - Regional planning procedure (*Raumordnungsverfahren*, 6 authorities in North Rhine-Westphalia) - 6 months – if new corridor needed
  - Planning approval procedure by the respective locally competent authority (*Planfeststellungsverfahren*, 5 authorities in North Rhine-Westphalia)



## 2. Challenges and Solutions

### Challenges: Initial and general conditions

- Each project category is associated with changes that are perceived as critical and represent not only legal but also communication challenges
  - With a population of 18 million people, North Rhine-Westphalia is a densely populated industrial region
  - Balancing the interests of the population, nature conservation and species protection, and industrial interests
- Permitting challenges specific and across projects
- Decisive environmental legislation at European and federal level that must be observed.
- Permits for projects can be sued
- Difficulties also lie at the actual level: shortage of skilled labor and construction times



## 2. Challenges and Solutions

### Solutions

- **Clear necessity** of hydrogen infrastructure: core grid gives security for planning, permitting and regulation
  - this means that there is no need for a new documentation of the necessity of a project in an administrative procedure
- **Easy Conversion** of gas pipelines to hydrogen: notification procedure § 43f of the Energy Industry Act
  - this means that there is no need for a new approval procedure, so that there is an acceleration in the process
- **New construction** of hydrogen pipelines requires approval process
  - the state of North Rhine-Westphalia has created new positions in the permitting authorities. These also have great expertise in the approval procedures for gas pipelines from years of experience
- **Digitalization of administrative procedures**
  - The state government of North Rhine-Westphalia is committed to further digitalization, building on the experience of recent years during the pandemic



## 3. Conclusion





### 3. Conclusion

- As an energy and industrial state, NRW has a substantial and generally disproportionate share of the challenges in all sectors
- Due to regional conditions, especially L-H gas conversion, NRW is a "frontrunner" in the development of an H2 infrastructure.
- Planning and approval procedures often have the character of a bottleneck - but groundbreaking framework conditions have been created for LNG and H2 infrastructure
- The hydrogen core network is an important step on the way to the green transformation of the economy
- high dynamics and rapid developments are very welcome
- Parallel transformation of gas and electricity infrastructure + development of H2 infrastructure: synchronization requirements and systemic view (integrated network planning)



## Thank you!

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