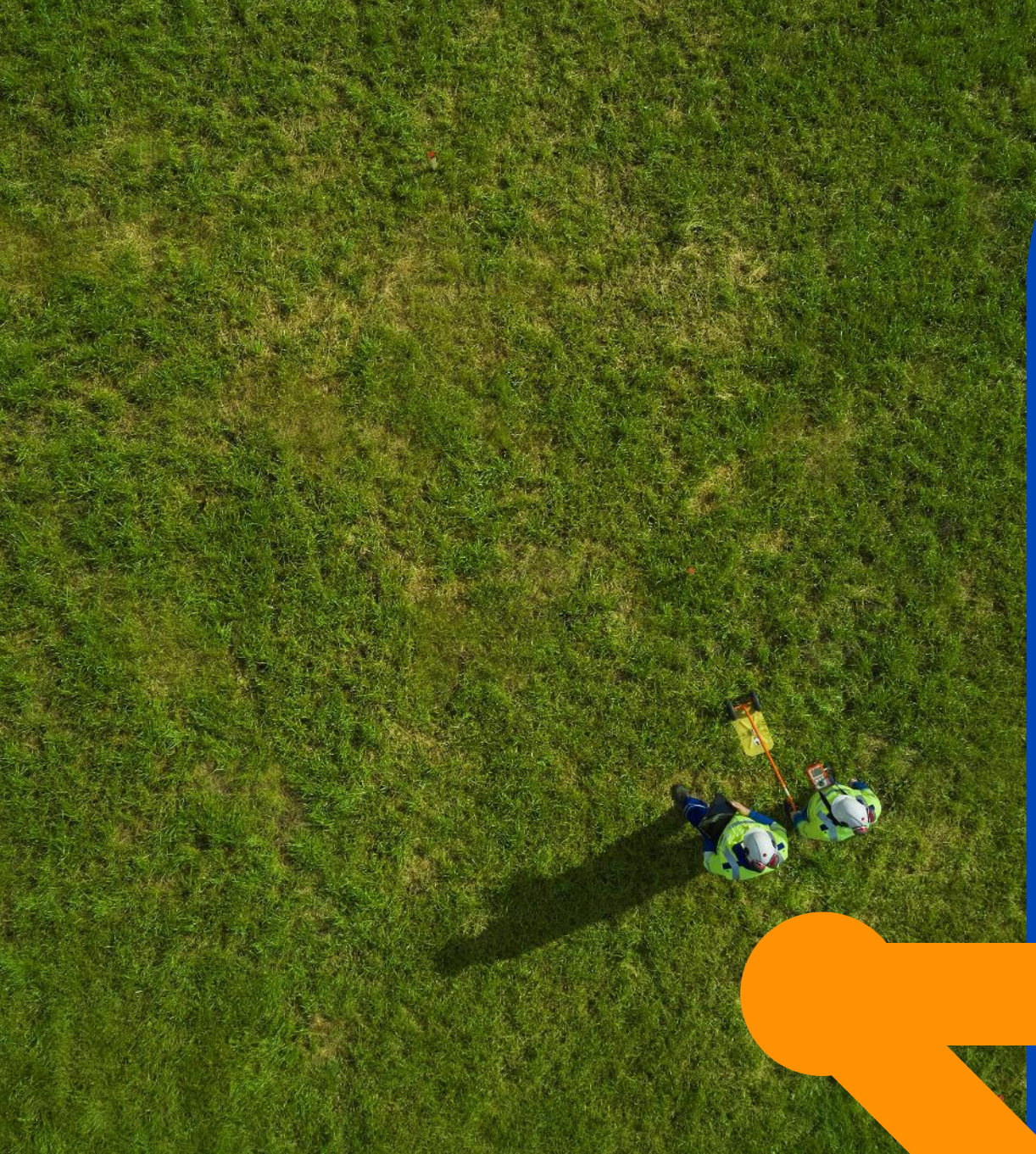

Thyssengas

Coexistence of hydrogen and biomethane

The Vision of a TSO in a metropolitan area

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Thyssengas GmbH

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A brief look at Thyssengas

Founding year:
1921

Locations:
8

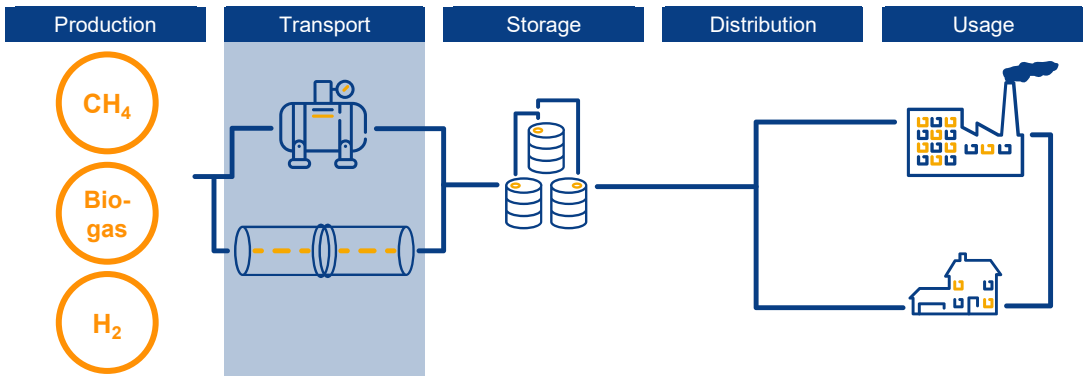
Employees:
~550

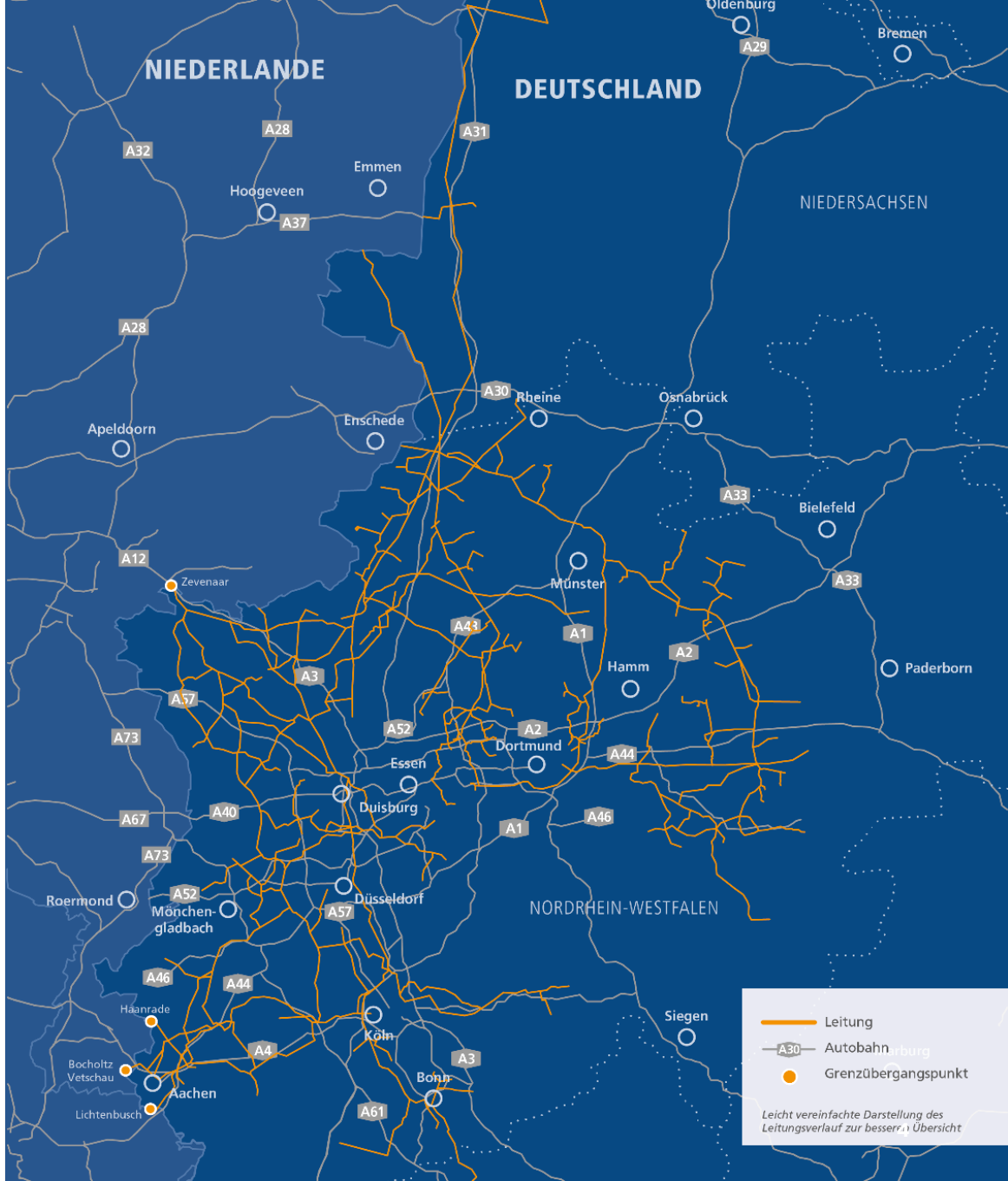
Transmission network:
~4.400 km

Exit points (2024):
1.078

Pipeline kilometers in the H2 core network:
~1.100

A brief look at Thyssengas





Development of complementary green gas markets with high uncertainties

Active market development...

...enabled shaping the hydrogen core grid

We plan to implement 35 new construction and conversion projects with a total of around 1,100 kilometres of pipeline as part of the H2 core network. Our aim is to connect industry and small and medium-sized companies in North Rhine-Westphalia and Lower Saxony.

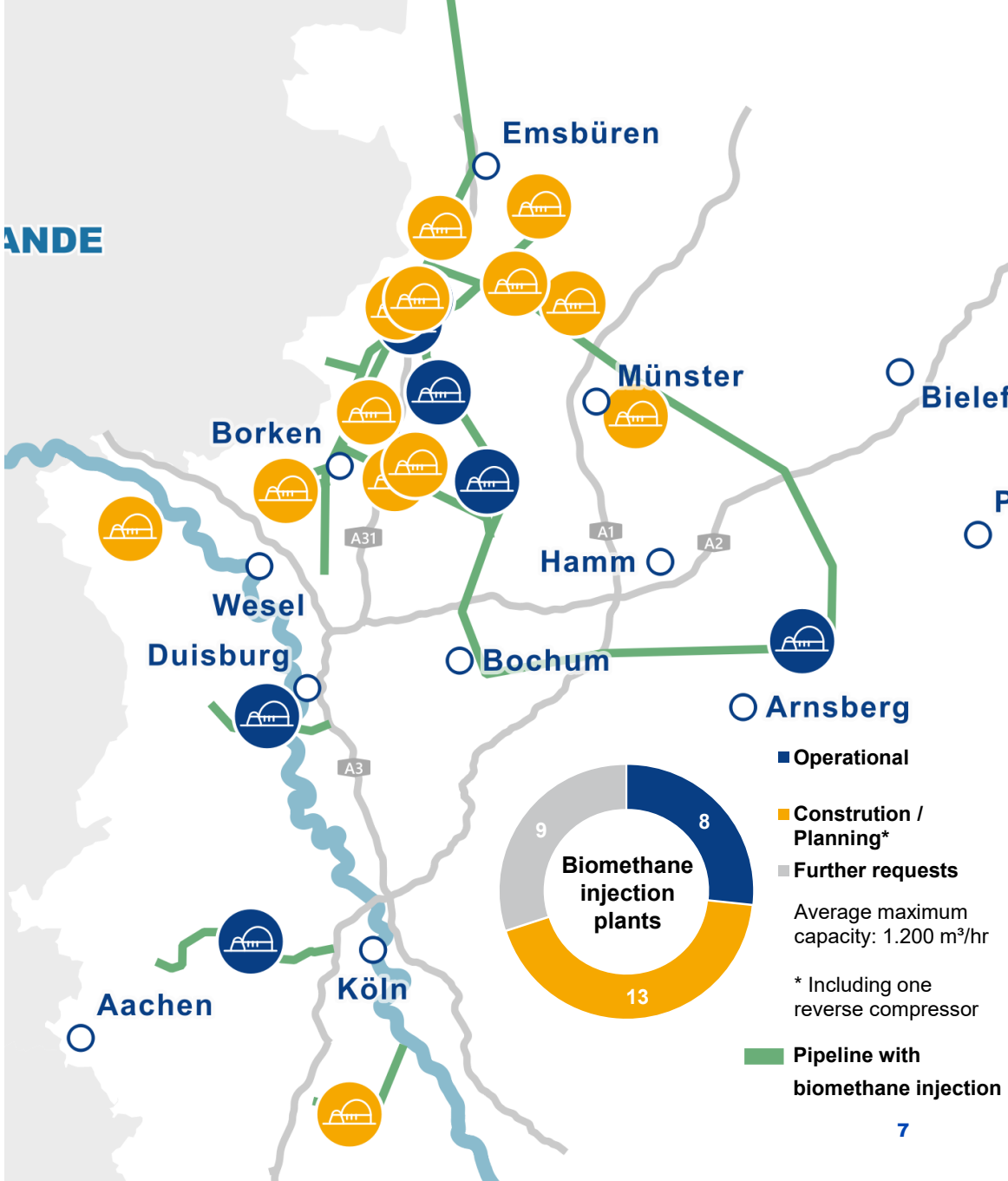
- Approval by the Federal Network Agency in October 2024
- Market development since 2021, political parameters and market survey in 2024 enabled iteration of the core network
- Continued high uncertainty and limited commitment from consumers and producers due to price dynamics
- Current problem: matching the market needs regarding the launch of the pipelines

Unleashing biomethane...

...by using experiences from the hydrogen market

Biomethane market entry in 2014 with the commissioning of our first biomethane injection plant. Slow growth until 2022 was followed by a sharp increase in new injection plants to date. Due to the normalisation of market prices, the maximum feed-in capacities per plant continue to rise (average 1.200 m³/hr).

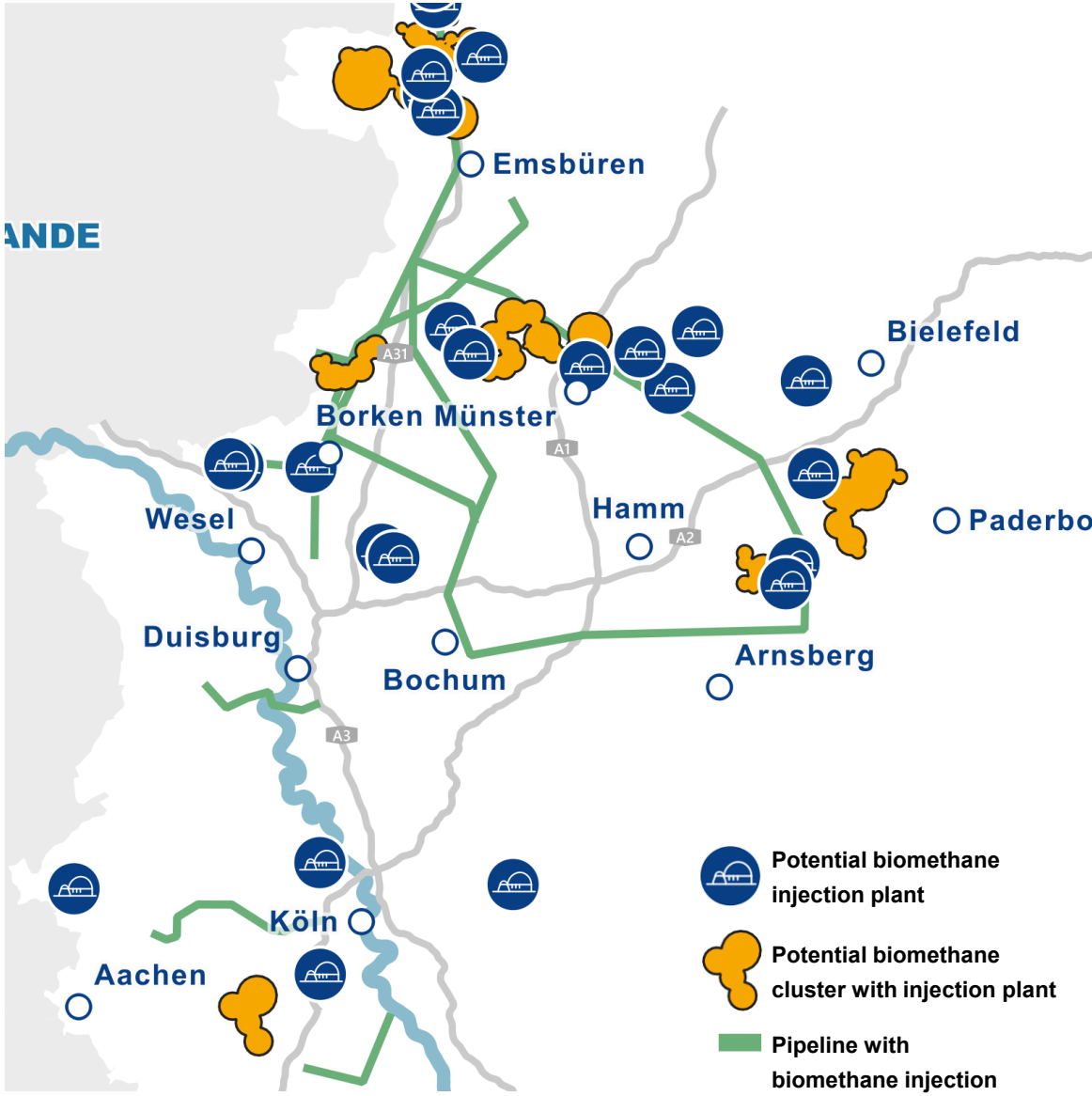
- Active market development for Biomethane since 2024 by using experiences from the hydrogen market
- The aim is to stimulate the market and position biomethane as a complementary commodity
- The biomethane market also remains highly uncertain due to lack of commitments, primarily on the consumer side
- We use scenarios to define target networks in cooperation with consumers and producers to gradually establish planning reliability at regional level



Definition of target networks to gradually establish planning reliability at regional level

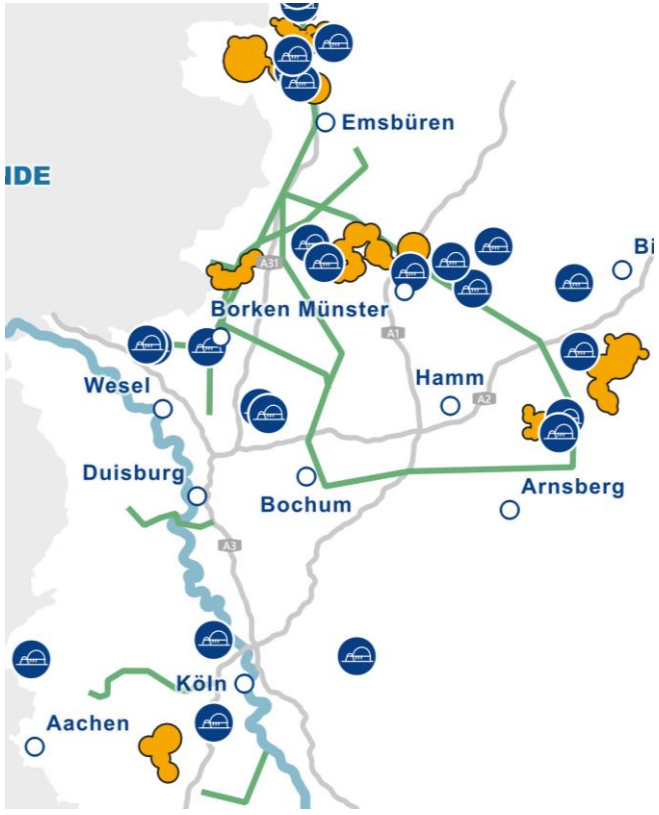
The drivers for market growth within the Thyssengas network are currently expiring tariffs for biogas plants (power generation) and various new sales market potentials due to legislative changes.

- Scenarios are a supplement to current real grid connection requests to improve target network development for 2045
- The **scenario shown** on the right reflects an additional potential to already shown new injection plants for a selling price of biomethane (production incl. injection) at **9 ct/kWh**
- The potential identified in the scenarios does not represent the total potential of biomethane in the Thyssengas network area, as it is derived purely from existing biogas plants that are phasing out of the tariff system

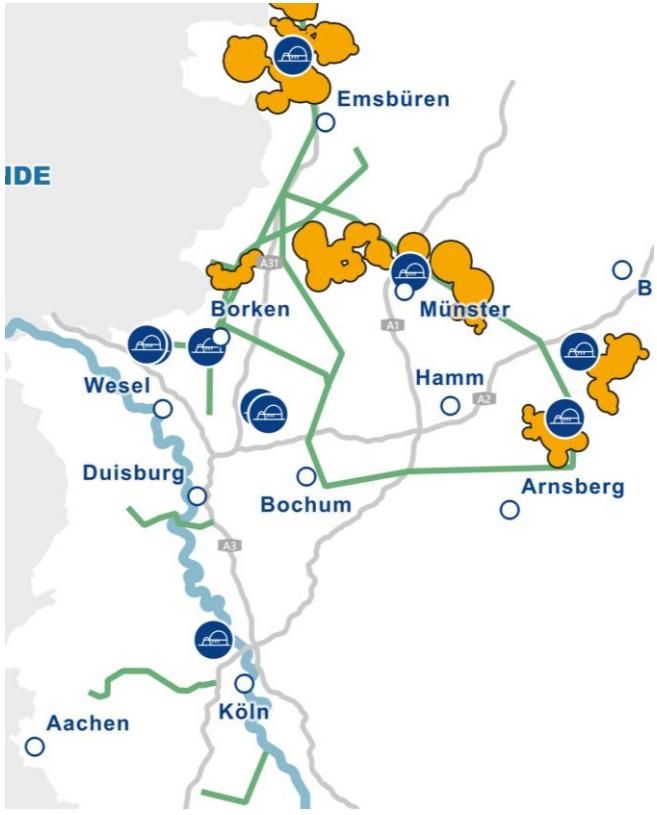


Definition of target networks is based on scenarios and discussions with consumers and producers in our network area

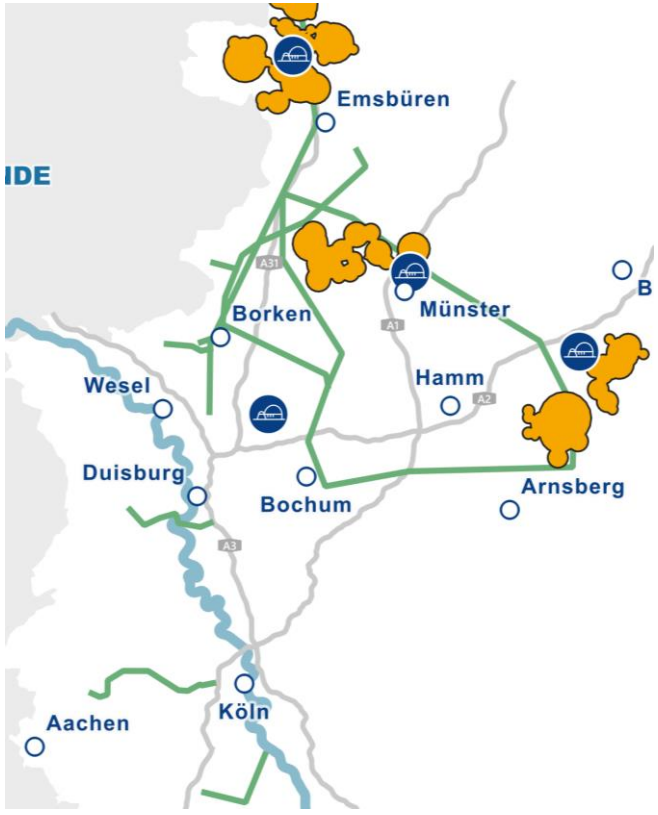
Biomethane Price: 9 ct/kWh



Biomethane Price: 8 ct/kWh



Biomethane Price: 7 ct/kWh

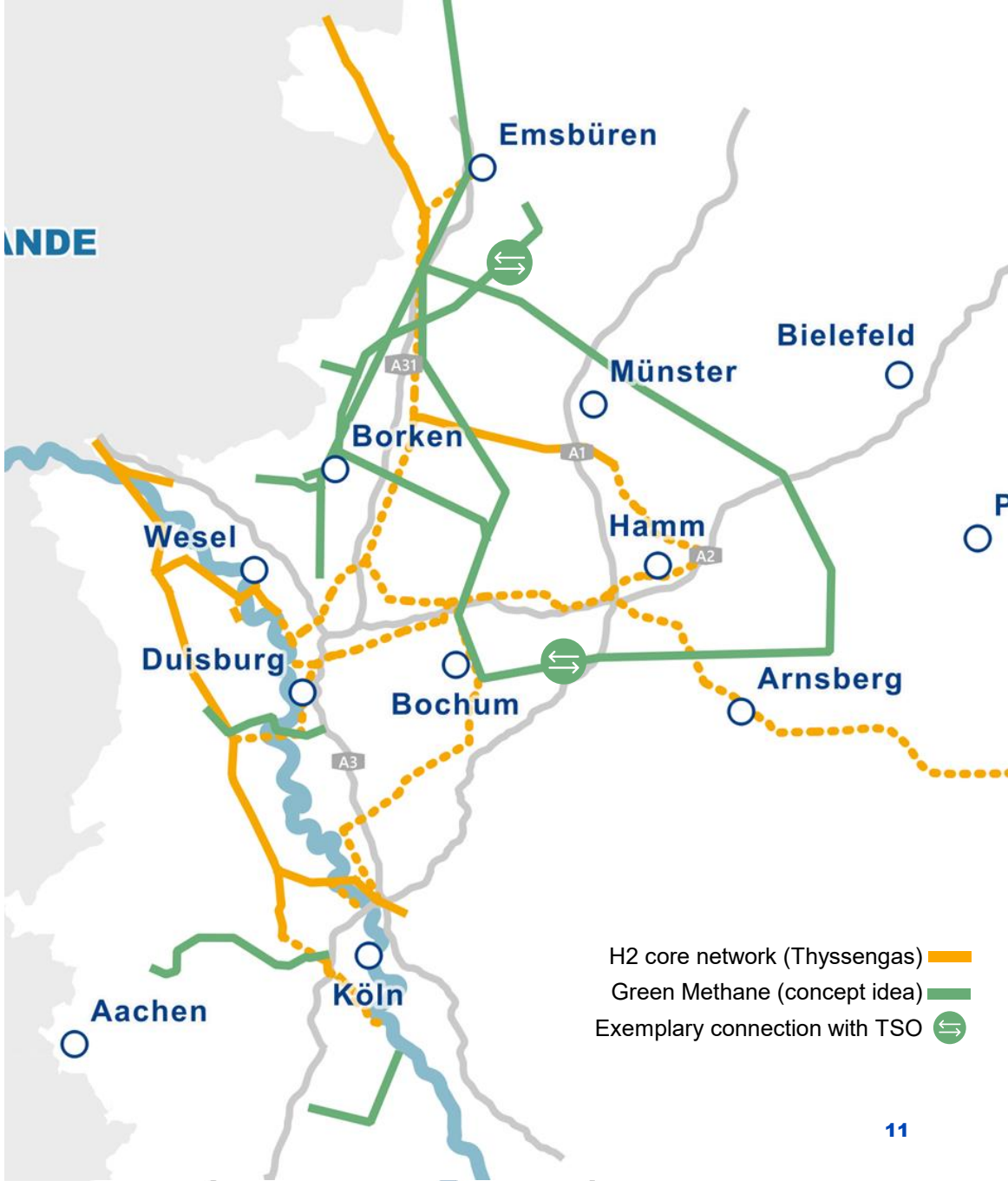


Combining hydrogen and biomethane potential to meet specific local needs

Coexistence of biomethane and hydrogen requires adjustment of the existing network

Depending on market developments for natural gas, hydrogen and biomethane, there is a possibility, that the Thyssengas network area is not only a sink for hydrogen but also for biomethane.

- The goal is for hydrogen and green methane to coexist and complement each other rather than to compete
- Import volumes / injection of biomethane into the Thyssengas network by other TSO may be necessary to meet demand
- Market needs determine whether demand is met via closed network areas or European interconnected networks
- Utilising existing assets and optimising injection costs to stabilise network fees while transforming the network



Our understanding of the coexistence of hydrogen and biomethane

The parallel use of biomethane and hydrogen offers an **economic added value** within European transmission networks and at regional level by **linking specific production potentials** of EU member states.

In order to meet biomethane demand through **market-driven**, **cost-efficient commodities** beyond 2045 and 2050, it is necessary to focus on an efficiency-driven transmission system network that spans regions and EU countries. This contributes to ensuring **biomethane transit** within and outside Europe and takes into account the **resilience** concept of the REPowerEU plan and Internal Gas Market Directive / Regulation.

Target networks and their optimisation are an offer to the market so that hydrogen and biomethane **complement each other** in terms of security of supply and market penetration **rather than competing**.

For a reduced and economically viable biomethane transmission network the connection conditions for biomethane injection plants must be adapted. Transmission system operators must be able to **maintain the attractiveness of network fees** for a market with a reduced number of customers by **increasing efficiency** in terms of investments and operating costs.

Hurdles on the way to the vision

High level of uncertainty among consumers regarding biomethane in Germany

Reduced awareness of biomethane potential by German politics

Consumers mostly have limited knowledge of current developments in the European biomethane market and the targets set by the European Union

Biomethane is mostly regarded by consumers as a regional option from regional producers and not as a cross-border traded commodity

As a result, consumers often do not consider biomethane as an option for reducing emissions, as it has not been part of the government's approach to date

Raising awareness among market participants of the potential of biomethane

As Thyssengas has done with hydrogen, we are trying to understand what knowledge about biomethane is missing among consumers in our network area and to provide this information (e.g. market prices, EU/DE production potential, emissions)

The purpose is to enable consumers to decide which commodity (hydrogen, biomethane, natural gas with CCS, etc.) **is economically viable for their application and to commit to it. Commitment is the key to efficient and affordable infrastructure**

Elements to be developed in Germany to support Biomethane

Consistent vision and commitment (German TSO) for the integration of biomethane

Encouraging the expansion of the integration and equal treatment of biomethane compared to natural gas and hydrogen in the legally prescribed network development plans (every two years)

Encourage discussion on the system development strategy (Germany) taking into account transmission infrastructure for European biomethane transit and regional biomethane demand

Expanding the discussion from hydrogen to green gases

Encouraging the further development of the 'National Hydrogen Strategy' towards a comprehensive 'Green Gases Strategy'

Use of the three elements mentioned to encourage to set national targets for the use of biomethane, e.g. via the NECP (no targets defined to date)

Thank you for listening!

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