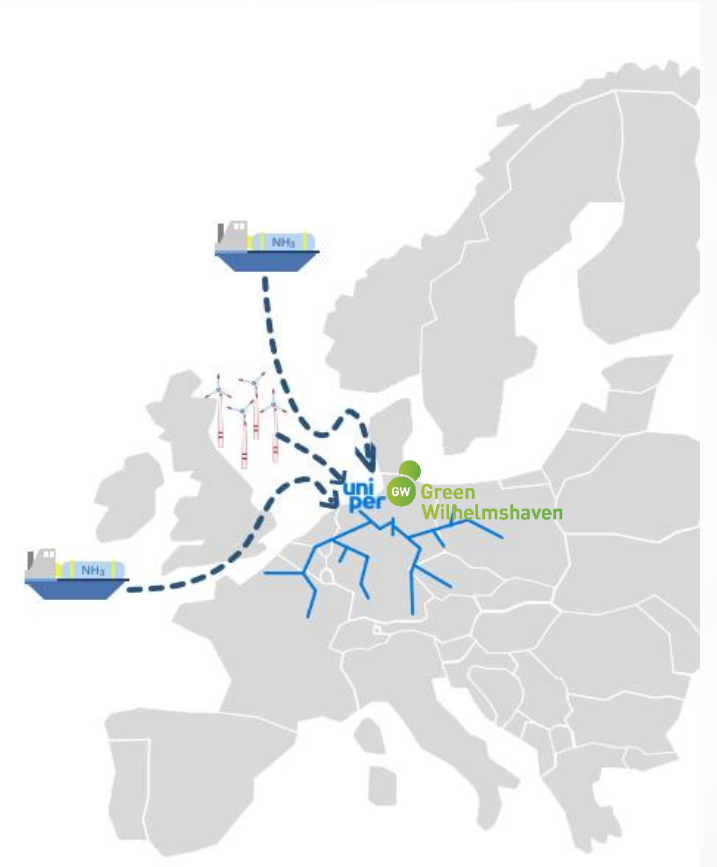




# “Uniper Green Wilhelmshaven”: A Major Hydrogen Source for the German Steel Industry

Achim Schillak – Senior Manager Business Development Hydrogen | Uniper SE | April 5, 2023



# Uniper Green Wilhelmshaven in a nutshell

- Creating a **leading German hub** for the supply with **green hydrogen**
- Combination of complementing projects:
  - **Large-scale electrolysis** for domestic hydrogen production
  - **Import terminal** for **ammonia** with cracking facilities
  - **Cavern storage facilities** for buffering of supplies
- First volumes planned for **2027**, continuous ramp-up of capacities
- Connection to **hydrogen backbone**, initial pipeline routes to customers in Lower-Saxony, Bremen, Hamburg, and North Rhine-Westphalia
- **Attractive source of green hydrogen for the German steel industry**



# Why Wilhelmshaven?

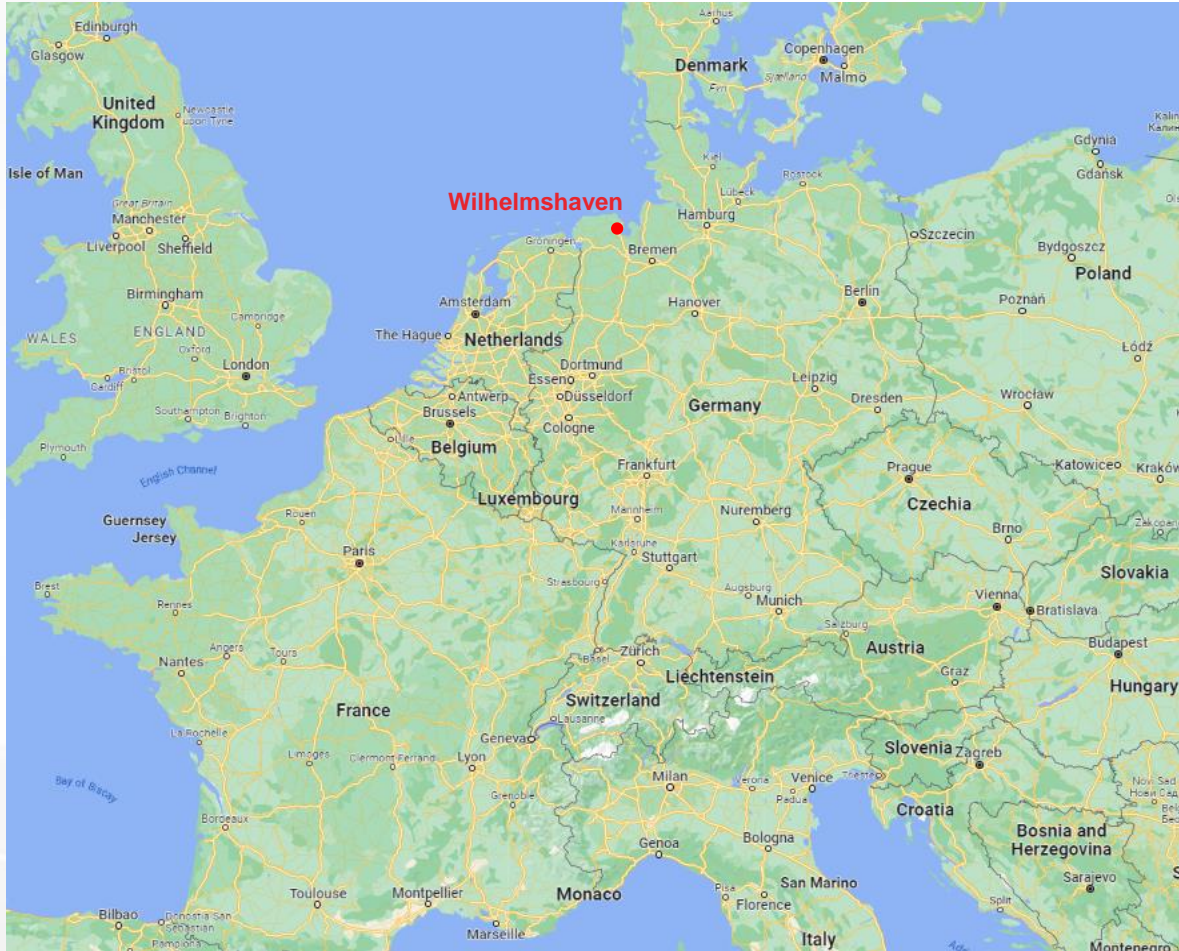


Image source: Google Maps

- **North Sea** coast:
  - Only German **deep-water** harbour
  - Landing point of 4+GW **offshore wind power**
- Existing Uniper **sites** (LNG, powerplant)
- Proximity to **cavern storages**
- Access to **H2 backbone**



# Green Wilhelmshaven: two complementing sources for green hydrogen

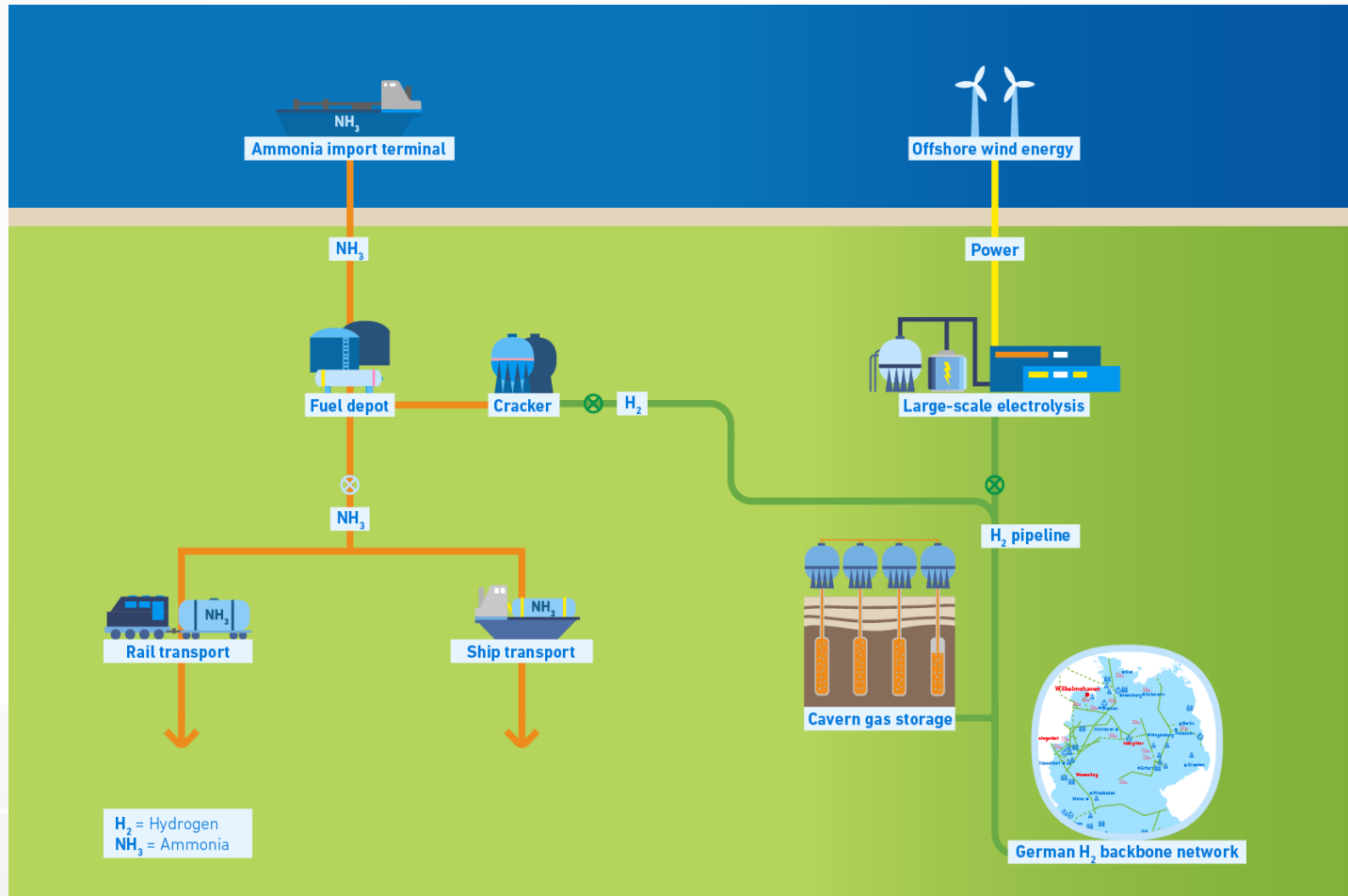


Image source: [www.greenwilhelmshaven.de](http://www.greenwilhelmshaven.de)

- Two individual yet highly integrated projects
- Access to green energy:
  - **Green ammonia** from world-wide sources
  - **Offshore wind power**
- **Combined output capacity ~400ktpa of green hydrogen**
- First hydrogen deliveries in **2027**





# Ammonia import terminal and cracking facilities

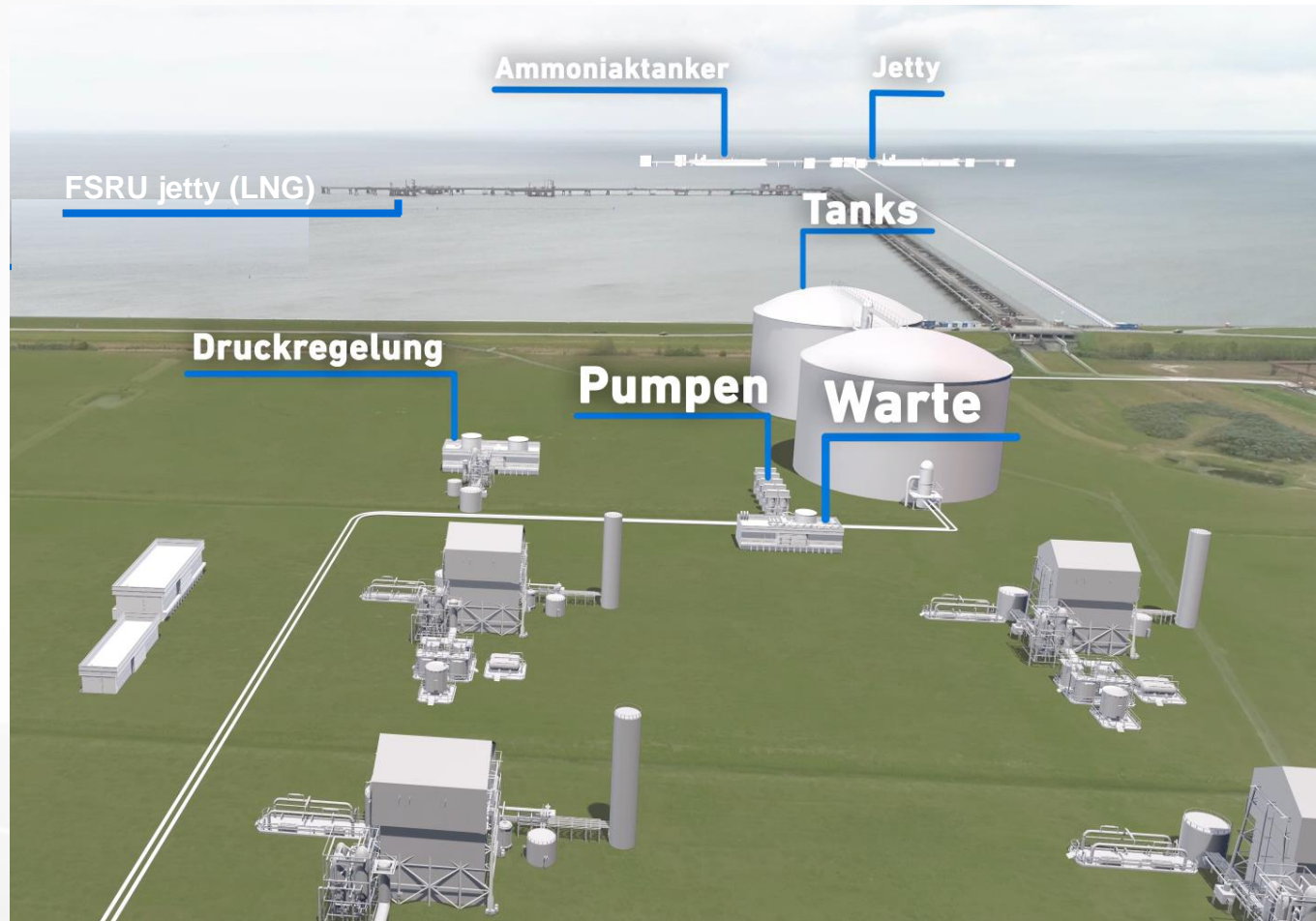


Image source: [www.greenwilhelmshaven.de](http://www.greenwilhelmshaven.de)

- Neighbouring Uniper's Wilhelmshaven LNG terminal
- Commissioning of **NH3 import terminal** in **2028**
- Commissioning of **crackers** in **2030**
- Ultimate **NH3 import** capacity of **~2.5mtpa**
- Ultimate **H2 output** capacity of **~300ktpa / ~10 TWh/a**



# Large-scale electrolysis

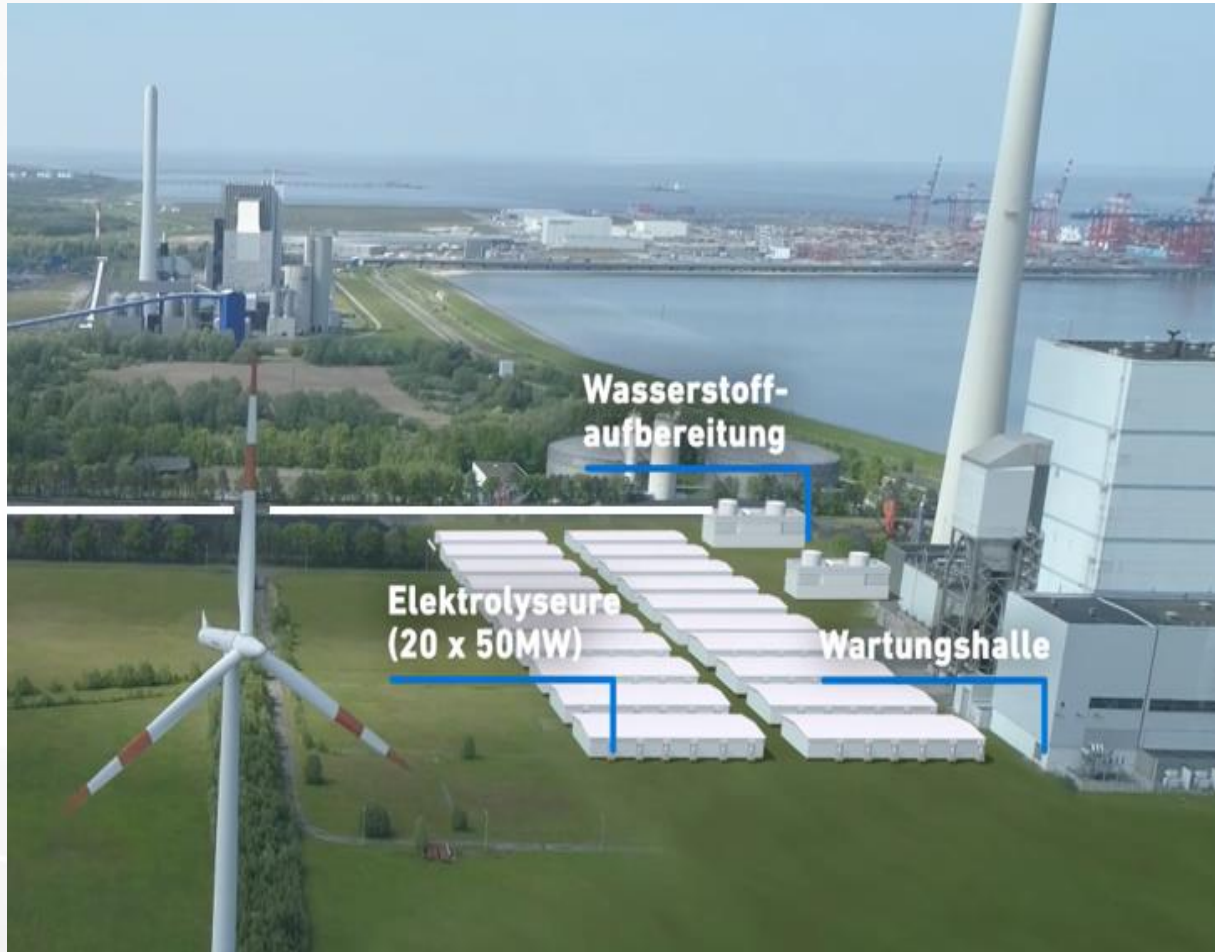


Image source: [www.greenwilhelmshaven.de](http://www.greenwilhelmshaven.de)

- Using site and infrastructure of Uniper's former coal-fired powerplant Wilhelmshaven
- Commissioning in **2027**
- Initial electrolyzer capacity of  $100\text{MW}_{\text{el}}$  (**H2 output** capacity of  $\sim\mathbf{10\text{ktpa}}$  /  $\sim\mathbf{0.35\text{ TWh/a}}$ )
- Continuous expansion to  $1\text{GW}_{\text{el}}$  electrolyzer capacity until 2030 (ultimate **H2 output** capacity of  $\sim\mathbf{100\text{ktpa}}$  /  $\sim\mathbf{3.5\text{ TWh/a}}$ )



# Storage capacities crucial to secure continuous hydrogen supply according to customer's demand

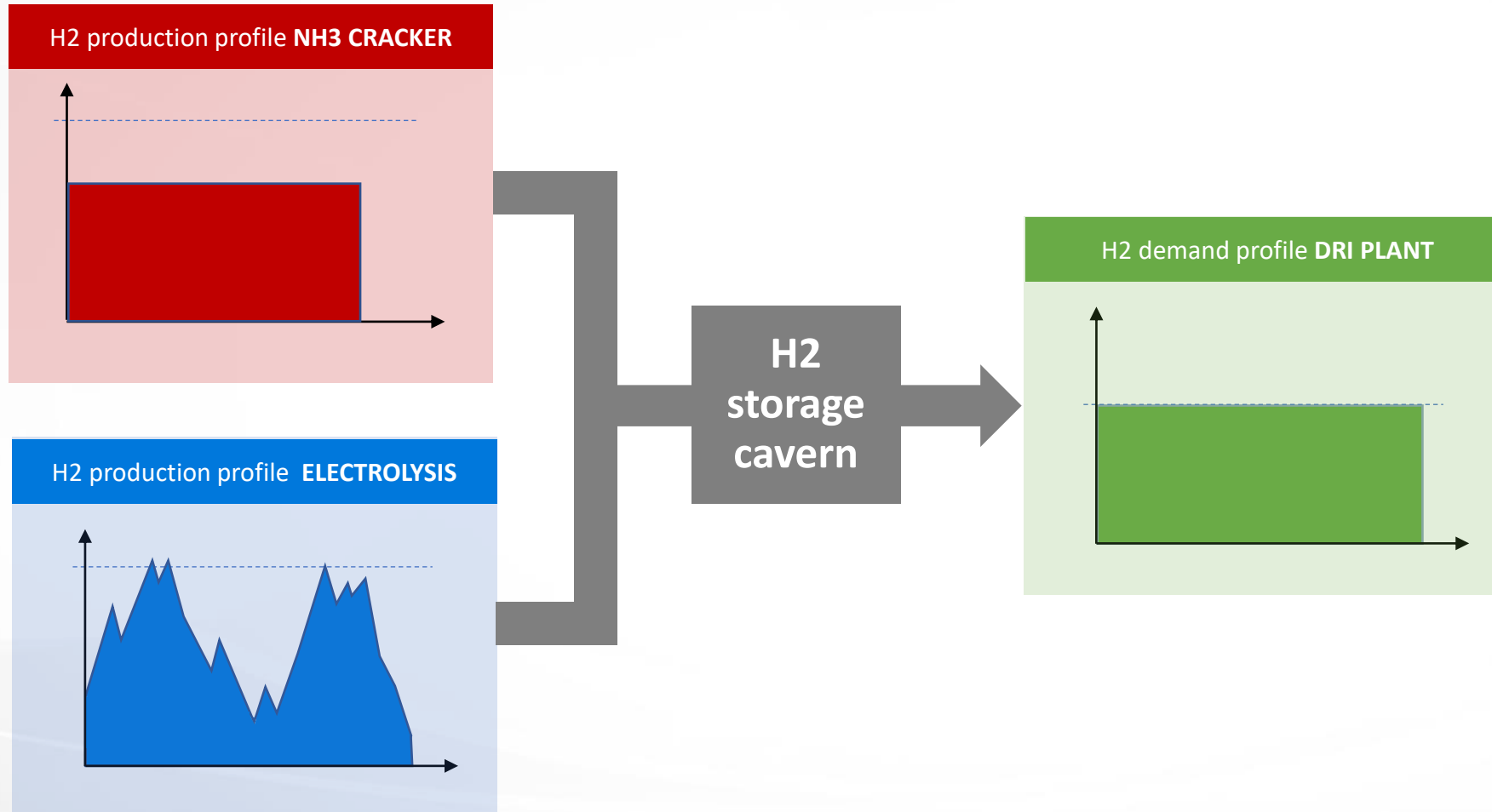


Image source: ENERGY-HUB Port of Wilhelmshaven



# Pipeline connection from Wilhelmshaven to hydrogen offtakers

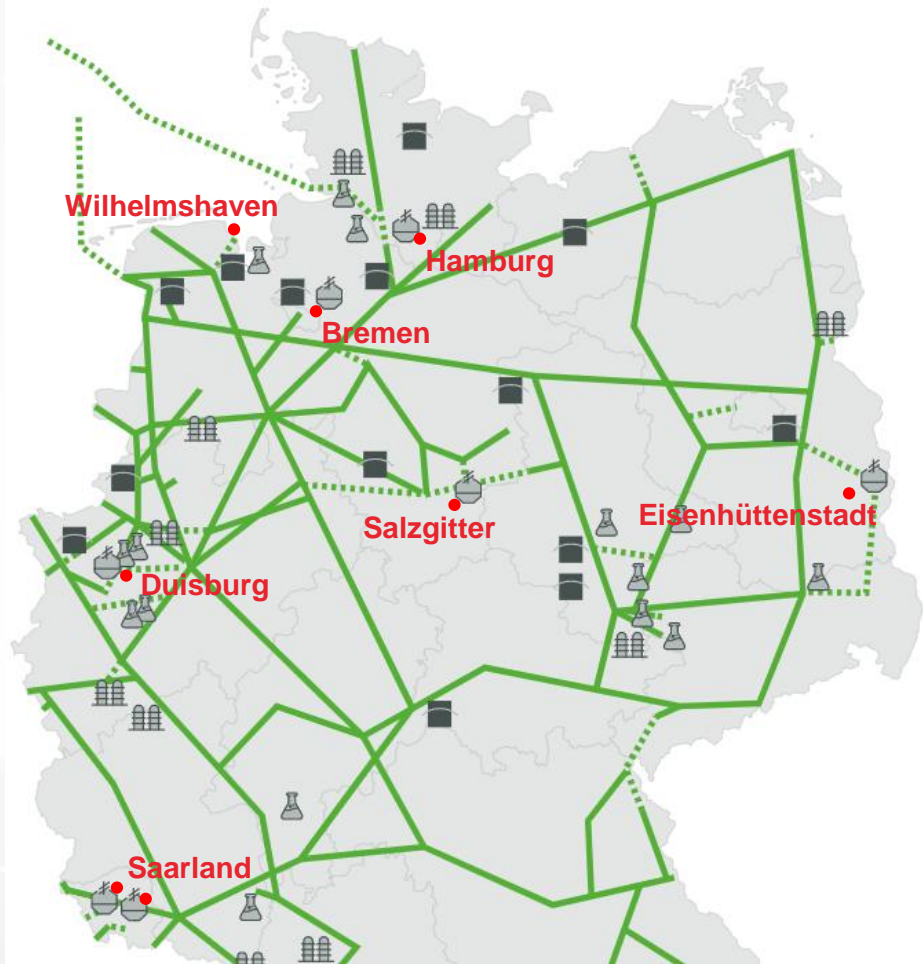


Image source: FNB, <https://fnb-gas.de/>: German Hydrogen Backbone 2050

- Connection of Wilhelmshaven to German **hydrogen backbone** approximately in **2026/27**
- Access to first offtakers in **Bremen** and **Hamburg**
- Access to customers in **Lower-Saxony** and **North-Rhine Westphalia** approximately in **2028/29**





# Advantages of Green Wilhelmshaven as green hydrogen source for German steel industry

- **Availability**

First deliveries in 2027

- **Scalability**

Continuous capacity upgrade in line with demand build-up

- **Reliability**

Own hydrogen storage capacities guarantee supply to customers according to their specific demand profiles

- **Security of supply**

Combination of own domestic H<sub>2</sub> production and NH<sub>3</sub> import from various international sources

- **Pricing alternatives**

Combination of NH<sub>3</sub> import and electrolysis offer various pricing models



# Uniper Green Wilhelmshaven: a major hydrogen source for the German steel industry



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