

► Impacts of a green hydrogen value chain on the labor market in Germany

Input-Output Workshop 2024

Osnabrueck

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AGENDA

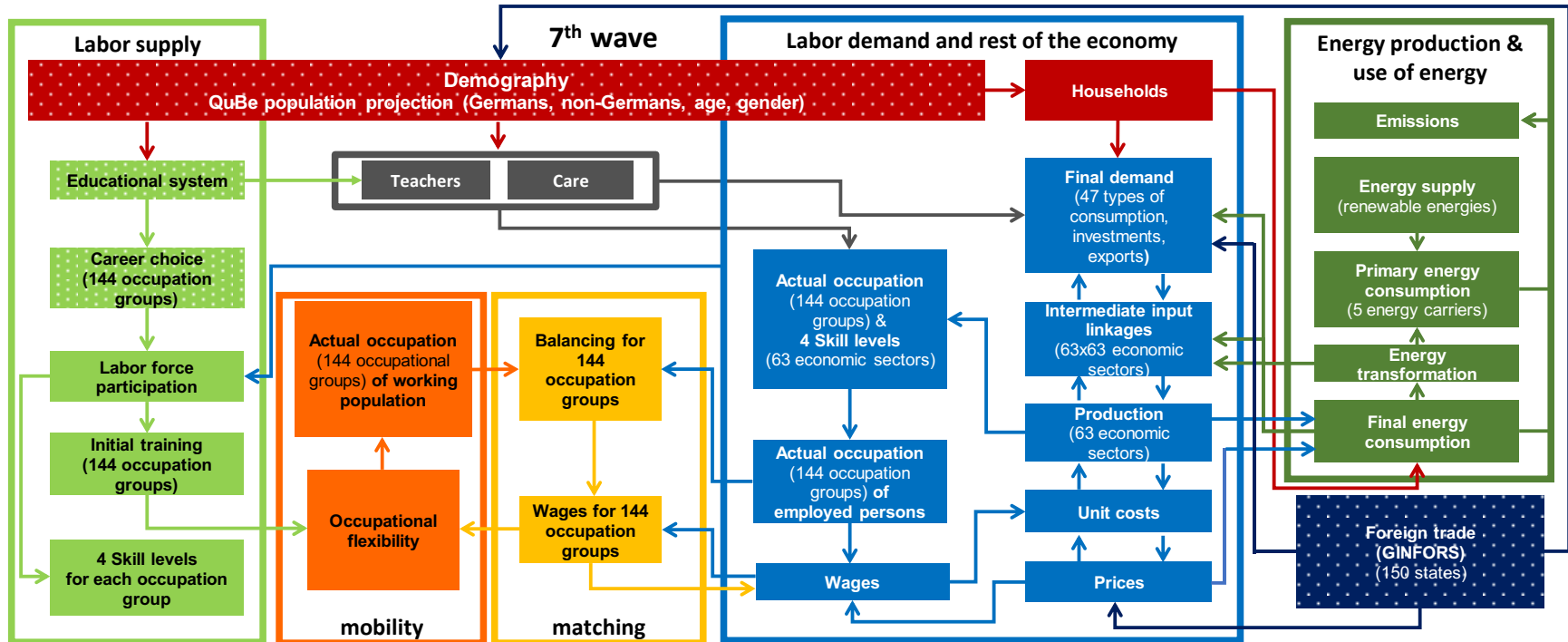
- Qualifications and Occupations (QuBe) – Project
- QuBe – Project: Model System
- Baseline Scenario
- Hydrogen Scenario – Assumptions
- Scenario Technique
- Hydrogen Scenario – Results
- Conclusion & Outlook

QUALIFICATIONS AND OCCUPATIONS (QUBE) - PROJECT

- **Goal:**
 - Long-term overview of the expected development of workforce demand and supply broken down by qualifications and occupations (**baseline projection**)
 - Continuous monitoring
 - Information for politics, practice and science
- **Method:**
 - Demographic and economic modelling:
 - **QINFORGE** – QuBe Inter-Industry Forecasting Germany
 - Scenario technique: Deviations from the previous development path are intentionally modeled to demonstrate the effects of alternative developments
- **Level of disaggregation:**
 - **Workforce supply:** 144 occupational groups, 4 qualification levels
 - **Workforce demand:** 144 occupational groups, 4 requirement levels



QUBE – PROJECT: MODEL SYSTEM



indicate independent models. All other components are integrated into the QINFORGE model.

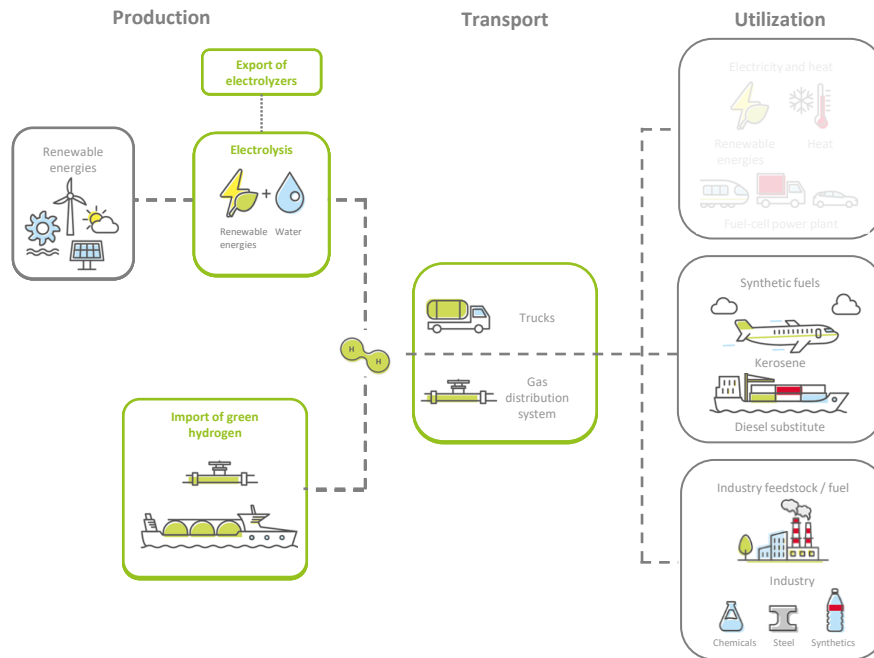
BASELINE SCENARIO

- Modelling based on the 7th wave of the QuBe - project → state of data: autumn 2022
- **QuBe baseline projection** is used as reference scenario
- **Assumptions in the QuBe baseline projection:**
 - Increase in price level
 - Increase in German defense spending
 - Further expansion of renewable energies
- Based on this, an **Alternative Scenario** with additional assumptions is created, hereafter:
Hydrogen Scenario

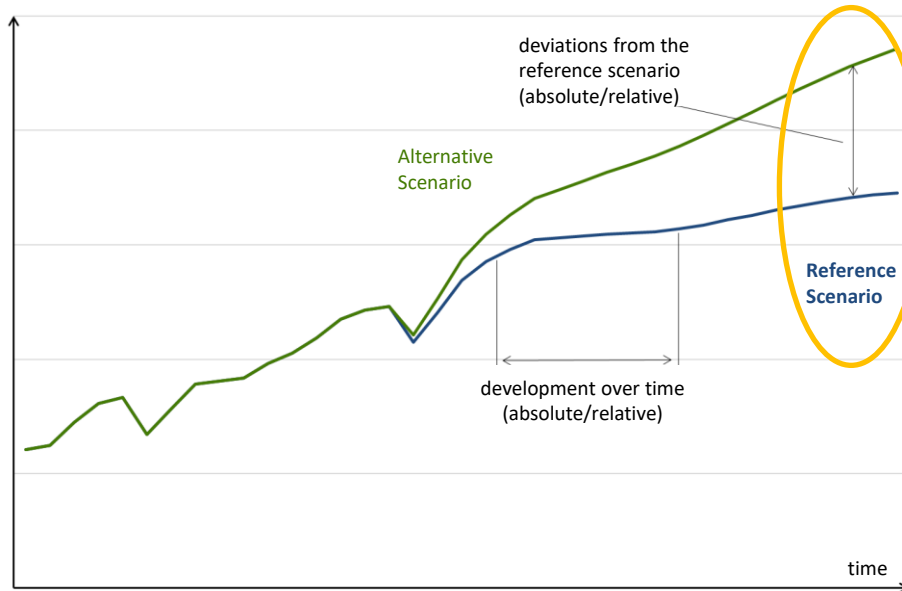
HYDROGEN SCENARIO - ASSUMPTIONS

Assumptions are derived from qualitative knowledge based on expert interviews and literature research.

1. Green hydrogen: produced via water electrolysis powered by **renewable energies**
2. Hydrogen demand: covered by domestic production and import
3. Hydrogen infrastructure (ports, pipelines and storage)
4. Export of hydrogen technologies
5. Utilization of hydrogen and (imported) hydrogen downstream products (ammonia, e-kerosene)

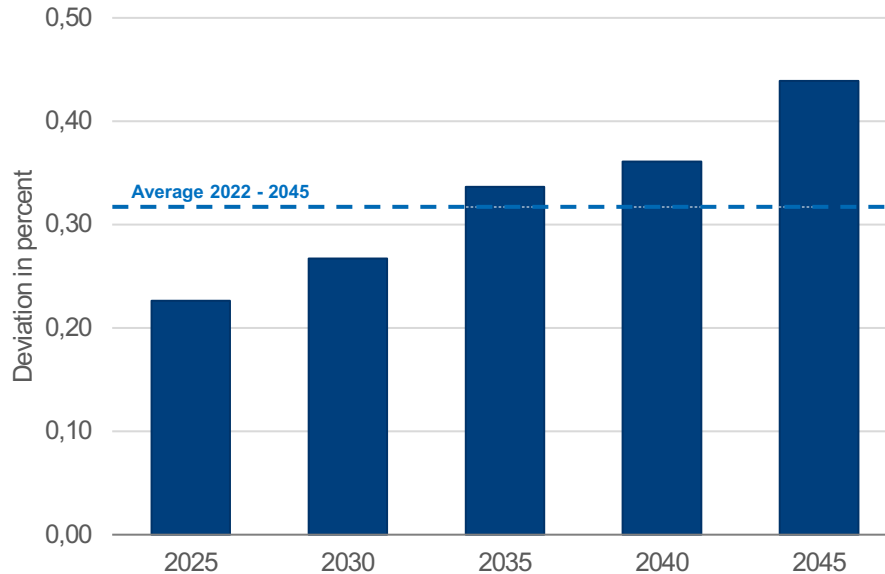


SCENARIO TECHNIQUE



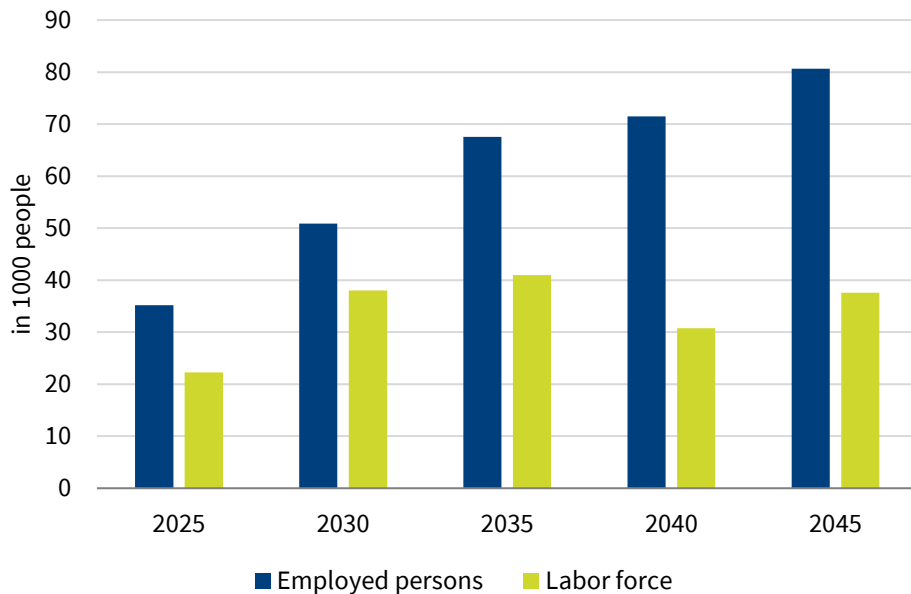
- Comparison between the **Reference Scenario** and the **Alternative Scenario** reveals the consequences resulting from the differing assumptions
- Evaluation can be done based on two perspectives:
 1. Development over time within a scenario
 2. Deviation between the scenarios at a certain point in time

HYDROGEN SCENARIO – RESULTS: REAL GDP



- The development of a **hydrogen economy** has a **positive impact on real GDP**.
- Between 2023 and 2045, real GDP is expected to **average 0.32% higher annually** than in the QuBe baseline scenario.
- Additional **equipment and construction investments**, as well as increased **private consumption spending**, will contribute to the higher GDP.
- Higher **import expenses weaken the positive effect**.

HYDROGEN SCENARIO – RESULTS: EMPLOYMENT

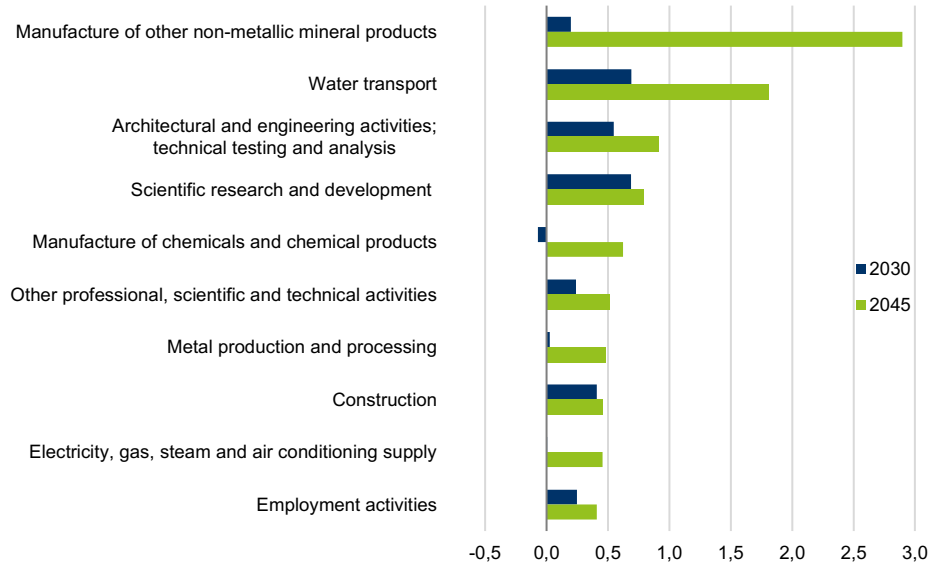


- The ramp-up of a hydrogen value chain requires **additional workers**
- **More people are participating on the labor market** due to the positive economical development
- There are **less unemployed people** compared to the baseline projection
- The strongest **positive effect** comes from **expanding renewable energies**

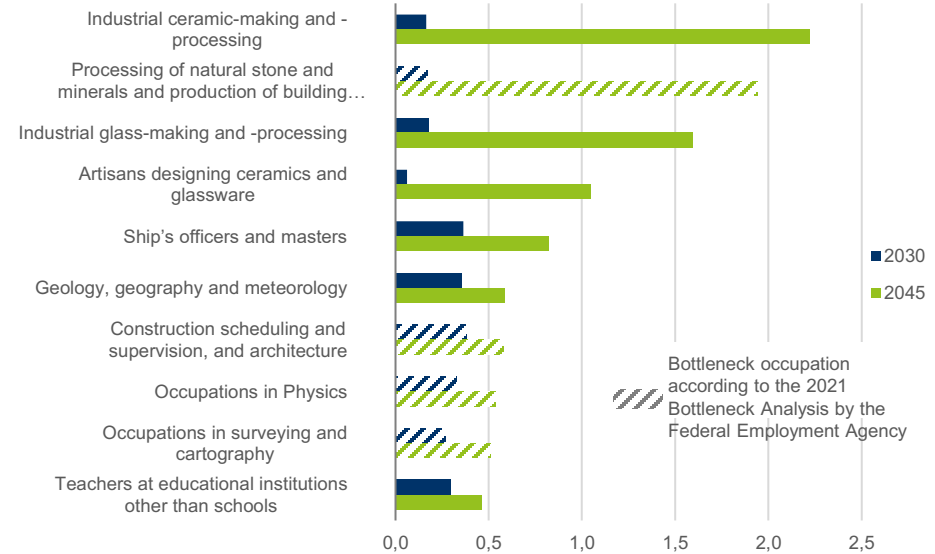
HYDROGEN SCENARIO – RESULTS: SECTORS AND OCCUPATIONS

Economic Sectors and Occupation Groups with the greatest impact on the number of employed individuals

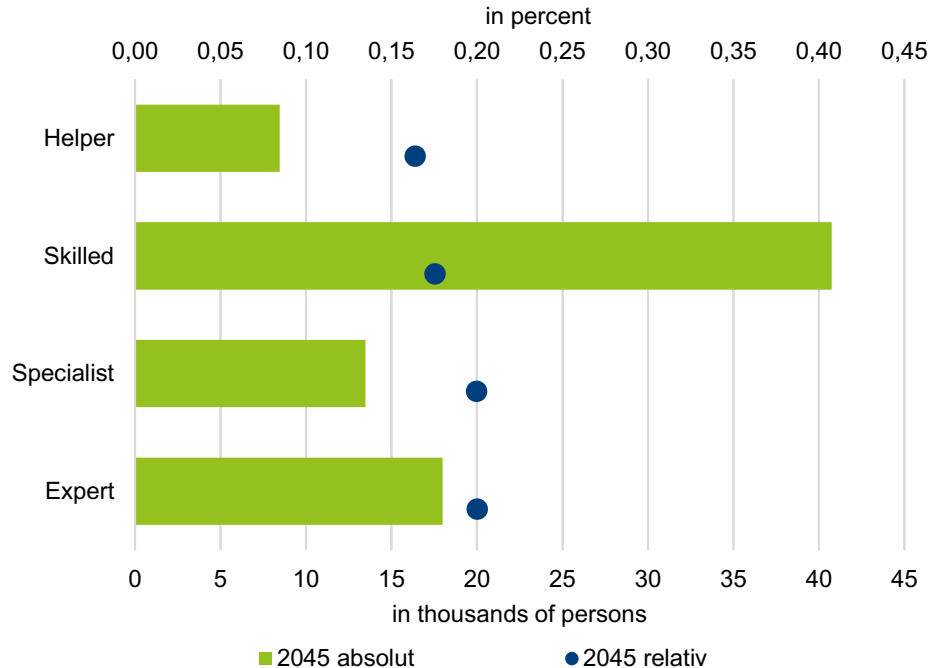
Economic Sectors in percent



Occupation Groups in percent



HYDROGEN SCENARIO – RESULTS: QUALIFICATION LEVEL



- The demand for additional **skilled workers** is highest in **absolute numbers**.
- Skilled workers also make up the largest share of all activities in the German labor market.
- **Relative** to other occupations, the demand for **specialists and experts** is expected to grow the most in the **long term**.

CONCLUSION & OUTLOOK

- Results indicate that establishing a green hydrogen value chain yields **positive effects** for the **economy** and the **labor market**
- Most employment effects are due to the **expansion of renewable energy production** and the development of a **hydrogen infrastructure**
- Also, **induced effects** become visible
 - Investment activities **foster employment** and **improve earning opportunities**
 - Positive implications for **private consumption**
- Currently, the work on a **scenario update** is in progress
 - Assumptions are revisited and recent developments were considered
 - Disaggregation of the IO-Table to account for the **Aggregation Bias**



Thank you for your attention!



Literature

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