

HYBRID NETWORK INFRASTRUCTURE

BERLIN, JANUARY 30TH 2018

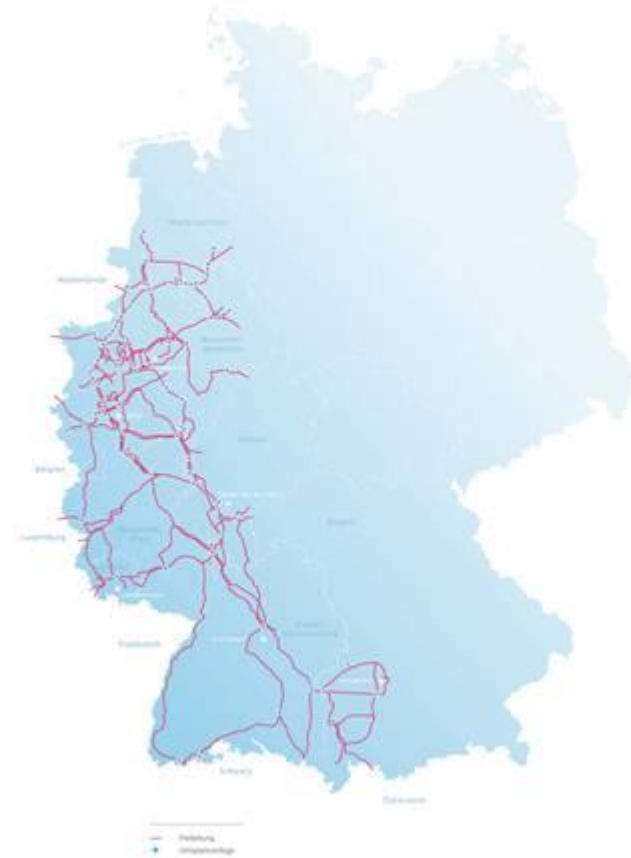
DR. ERIK RIEDEL, AMPRION, HEAD OF SCENARIO DEVELOPMENT

AMPRION AND OGE AS PARTNERS FOR INTELLIGENT SECTOR COUPLING

Gas transportation grid of OGE



Electricity transportation grid of Amprion

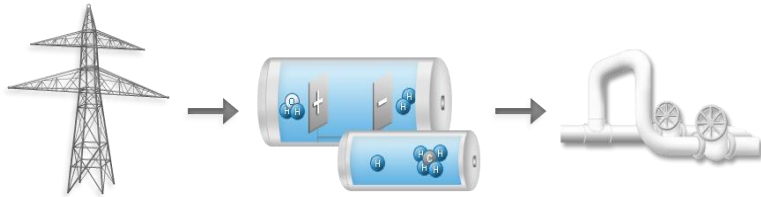


- Due to the high overlap of both transportation systems Amprion and OGE are perfect partners to interlink both grids

RATIONALE OF SECTOR COUPLING ON SYSTEM LEVEL

Politics / Economics:

- High cost efficiency will be the focus of the next phase of energy transition
- Ensuring of the target-triangle: Economic efficiency, security of supply and sustainability
- Sector coupling on system level can contribute to this



Alternative transportation routes by Power-to-Gas:

- Use of the existing infrastructure for the physical or energetic use H₂ / SNG in addition to the planned electricity grid expansion from 2030 onwards
- Re-Electrification only in case of a so called “Dunkelflaute” (“dark-doldrums” without feed-in of renewables); case of low efficiency

Electricity-System:

- The feed-in of Renewable Energy Sources (RES) in Northern Germany has to be partly transported into the south
- The transformation of RES into another energy carrier for direct use is recognized as an alternative

Gas-System:

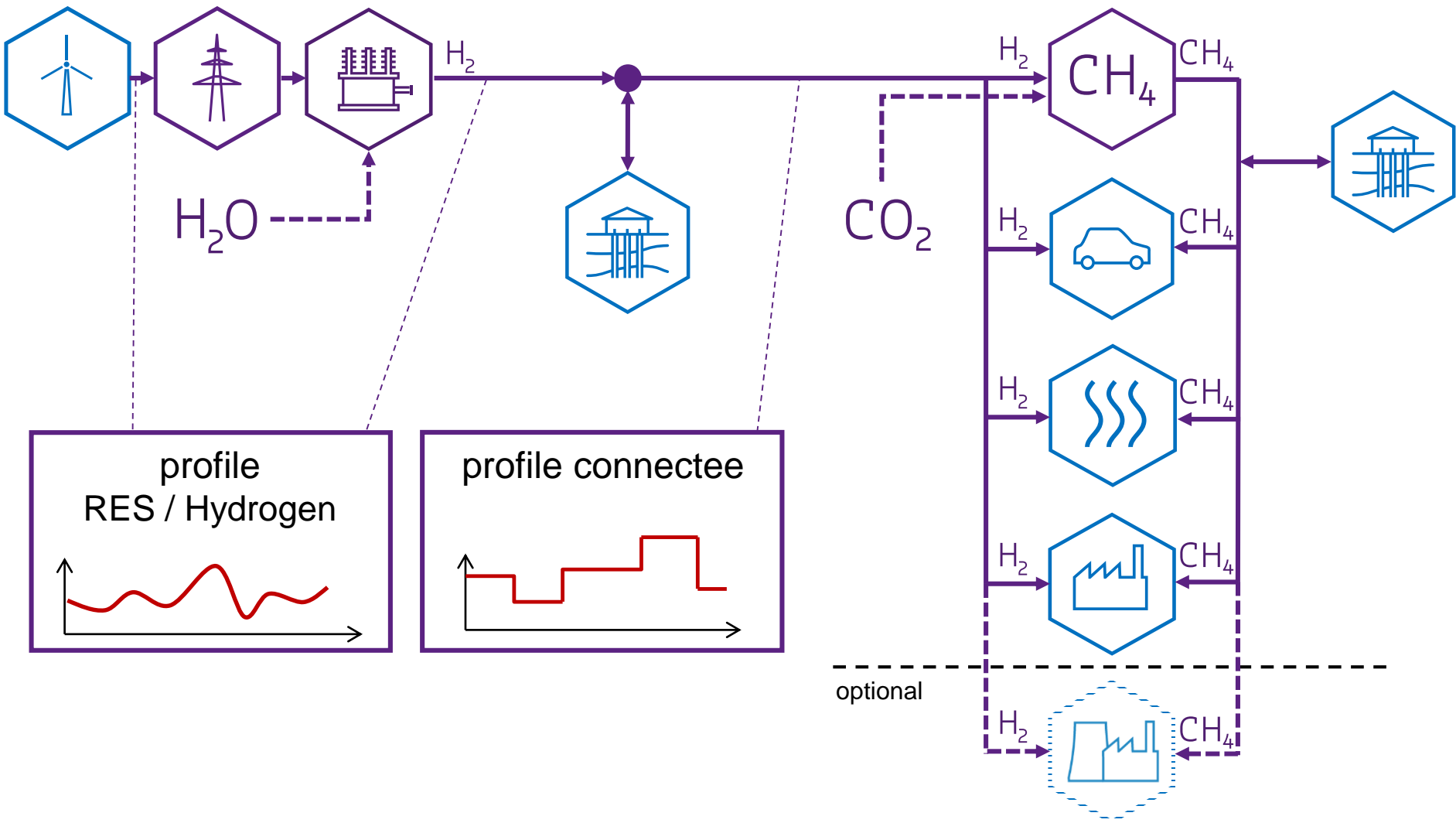
- Long-term: Change of transportation-routes (e.g. caused by L-/H-Gas change) and reduction of gas-demand caused by decarbonisation targets in the long run
- Use of the existing gas-infrastructure for H₂ and SNG

Public acceptance:

- Public resistance against infrastructure-projects of the energy sector (line-measures)
- Alternative measures with only local effects on nature will be preferred (point-measures)

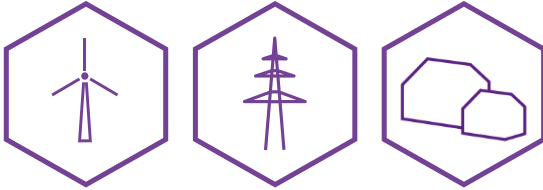
- No public acceptance for an additional high number of new DC-power lines
- We foresee an optimum between electricity grid expansion and Power-to-Gas
- Power to gas is no alternative for the measures of the “grid development plan”

CONCEPT OF INTELLIGENT SECTOR COUPLING



APPROACH TO INTEGRATE RES INTO THE ENERGY SYSTEM

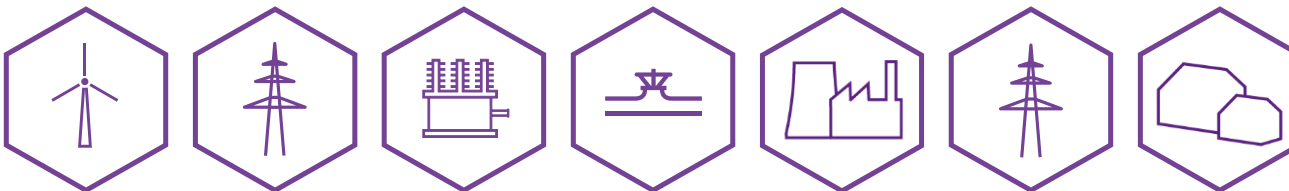
1. Integrate RES into the electricity system: preferably transported and used as electricity



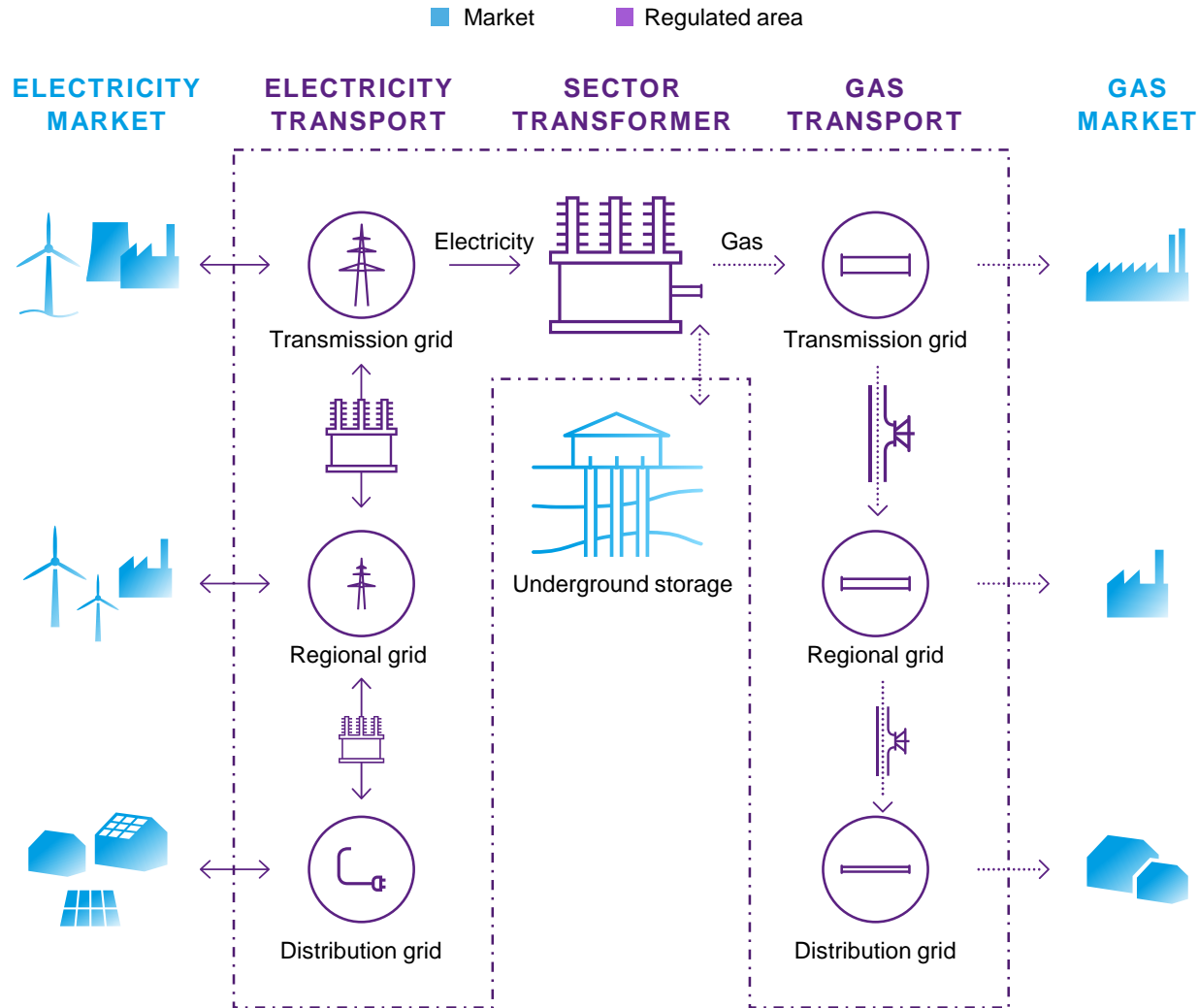
2. If RES cannot be integrated into the electricity transportation system: Transformation of RES with Power-to-Gas and transportation using the gas system



3. Only if needed (e.g. dark doldrums):
Re-Conversion of the gas to electricity using gas power plants



SECTOR COUPLING ON SYSTEM LEVEL



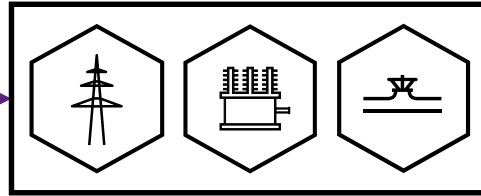
SECTOR COUPLING ON SYSTEM LEVEL – LONG TERM VISION

Energy flow

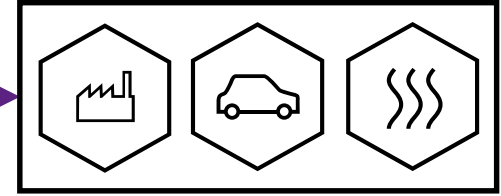
Electricity producer



Electricity



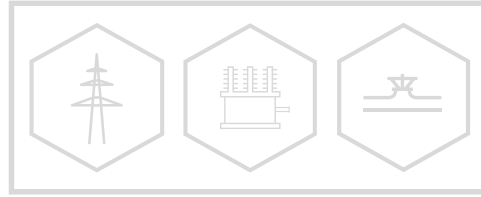
Gas



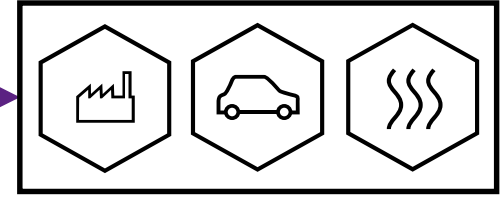
Ownership of commodities



Trader



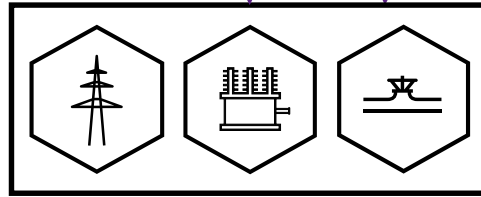
Trader



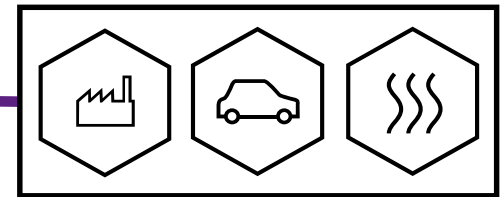
Cash flow



Auction revenue



Grid user



BASIC INFORMATION: DEMONSTRATION PLANT



Electric power
50 – 100 MW



Total investment
€100 – €150 million



Commissioning
2023

Advantages of our approach:

- Non-discriminatory access for H₂-connectees
- Capacity of the Power-to-Gas-plant in future scalable
- No new allocation mechanism
- We are ready to start immediately

THANK YOU FOR YOUR ATTENTION