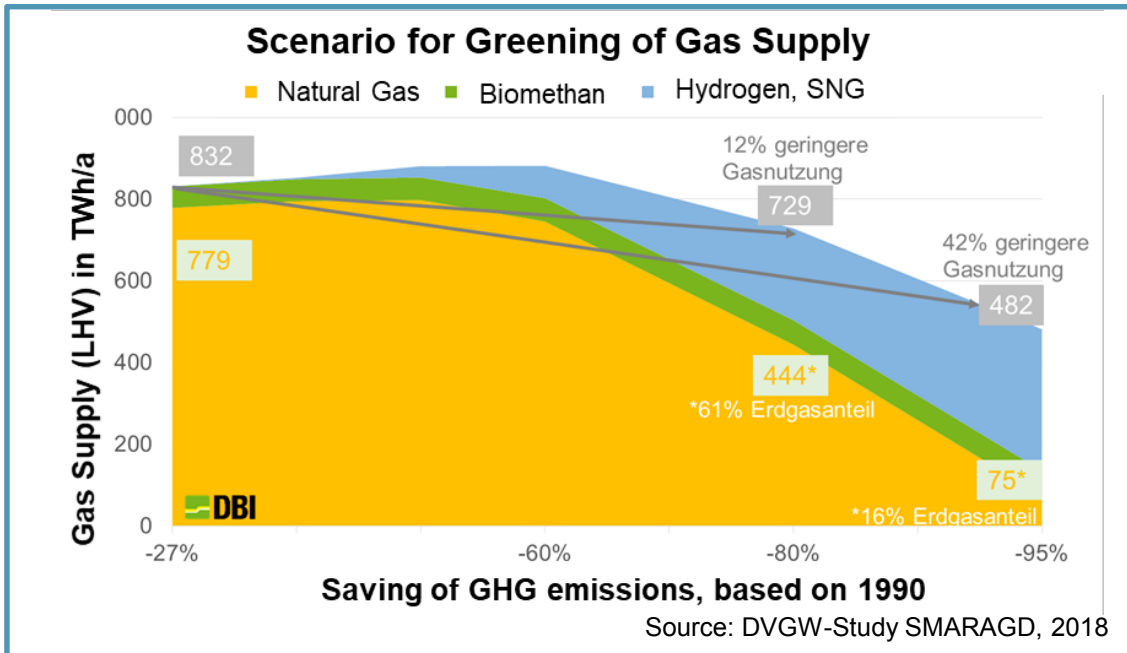


# TRANSFORMATION PATHWAYS OF GAS SUPPLY IN GERMANY – SUPPLY STRATEGIES AND EXPECTED COSTS



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	Power Sector	Heat Sektor	Transportation
Fuel Switch	Coal → Gas 70-110 Mio.t CO <sub>2</sub> pro anno	Oil → Gas 18,4 Mio. t CO <sub>2</sub> (building) 12 Mio. t CO <sub>2</sub> (industry) pro anno	Diesel → Gas 25% CO <sub>2</sub> - saving
Content Switch	„Greening“ of baseload	Saving of GHG-emissions by more than 80 % in 2050 direct GHG emissions	Bio-LNG in 50% of heavy transport emission-free until 2030
Modal Switch	Hydrogen based energy storage	642 Mio. t until 2050	strategy e-fuels → hydrogen

Source: DVGW Energy Impuls

## Gas technology will be a bridge and future technology in energy transition and GHG reduction

- **60%** GHG reduction by Natural Gas (779 TWh/a  $\cong$  85%)
- **80%** GHG reduction by introduction of renewable gases until 2040 (444 TWh/a  $\cong$  40% Natural Gas)
- **95%** GHG reduction by consequent climate neutral technology implementation (75 TWh/a  $\cong$  16% Natural Gas)

## Combined transformation strategies to reduce GHG emissions using existing infrastructure

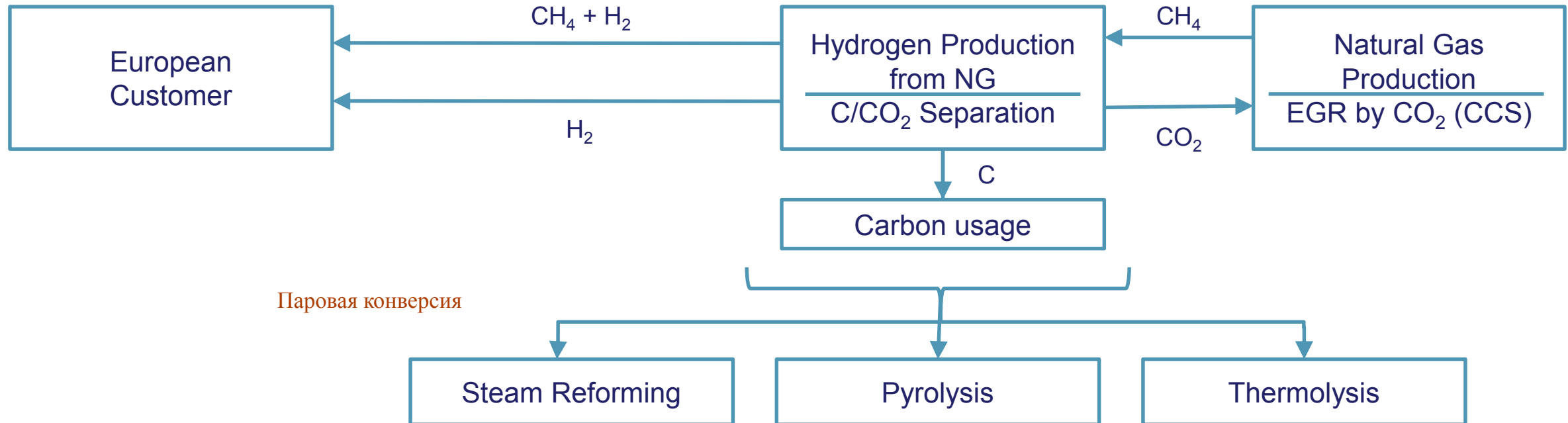
- **Fuel Switch** → substitution of energy carriers by natural gas
- **Content Switch** → increasing content of renewable, climate neutral gas (blue hydrogen, green hydrogen, biomethane)
- **Modal Switch** → coupling of sectors, new technologies

## Limited potential for green gas technologies in Germany

- Biomethane from fermentation of biomass
- Power-to-Gas from Wind and PV power
- Expected inner German green gas supply by 50%

## Import of climate neutral gases expected

- **Mid Term:** Blue Hydrogen *Улавливание и хранение углерода*  
(from Natural Gas, CCU, CCS)
- **Long Term:** Biomethane, green Hydrogen  
*Климатическая установка*



**Expected costs for transforming German gas grid until 2050 → about 23 % of total maintenance costs**

## Vision & Ziele

- Vision:** Integration der Sektorkopplung unter Nutzung verschiedener H<sub>2</sub>-Verwertungspfade für den Aufbau eines Energiesystems der Zukunft in Mitteldeutschland
- Ziele:** Versorgung einer großskaligen Elektrolyse mit erneuerbarem Strom aus Windenergie zur Produktion von grünem H<sub>2</sub>. Dieses wird im Rahmen einer Forschungskaverne am Standort Bad Lauchstädt unter Tage eingespeichert und zur klimaneutralen Versorgung des mitteldeutschen Chemiedreieckes mit Wasserstoff genutzt.

## Konsortium

VNG Gasspeicher GmbH
ONTRAS Gastransport GmbH
Terrawatt mbH
DBI-GTI gGmbH Freiberg
Uniper Energy Storage GmbH

## CO<sub>2</sub>-Einsparung

Der sehr hohe H<sub>2</sub>-Bedarf der Region kann zu einem großen Teil kurzfristig durch grünen Wasserstoff substituiert werden:

	Subst. H <sub>2</sub> -Menge [p.a.]	CO <sub>2</sub> -Einsparung [p.a.]
2025	1,3 Mrd. m <sup>3</sup>	1,3 Mio. Tonnen
2050	ca. 9 Mrd. m <sup>3</sup>	ca. 9 Mio. Tonnen

## Technisches Konzept

