# Power to Methane

## An Integral Part of Biomethane Industry

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# 25 Countries – 36 National Organisations
# 55 Companies – Representing >7,000 Stakeholders

www.european-biogas.eu

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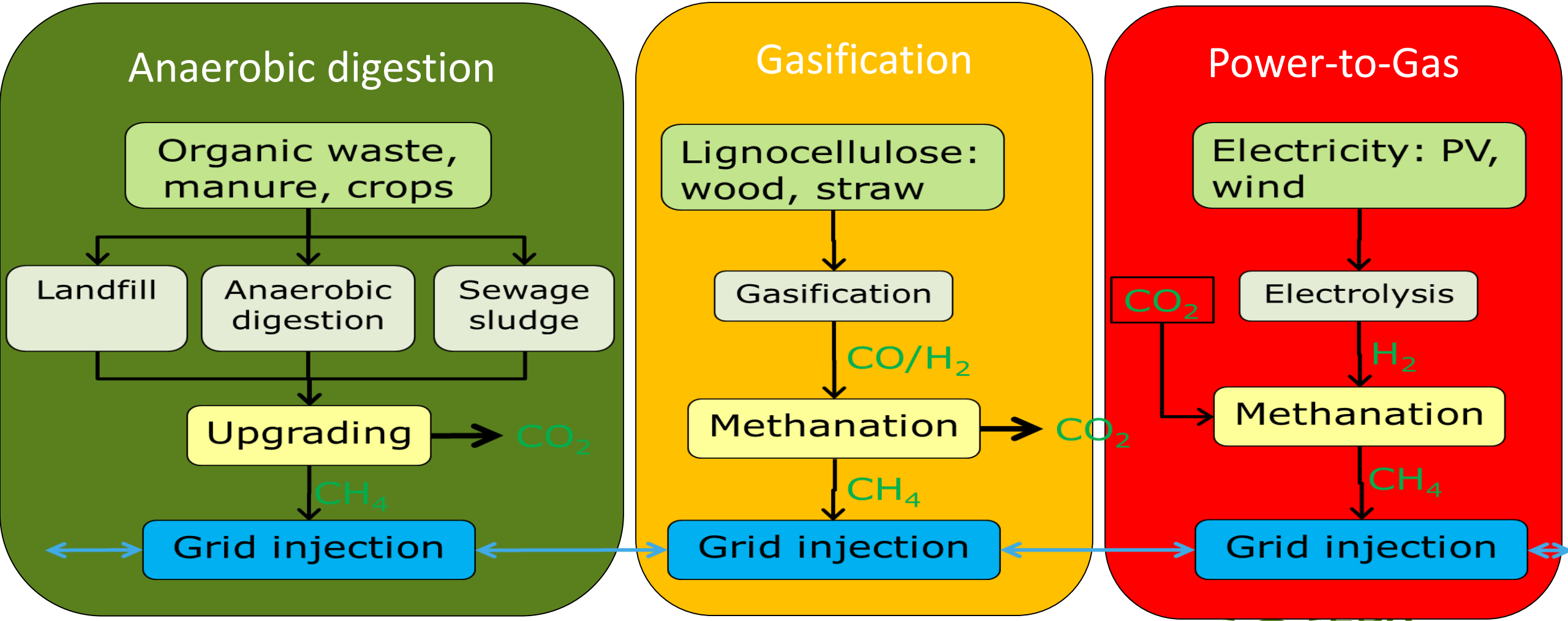
# European Biomethane Industry

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# Why Biomethane (and not $H_2$)?

- ***Existing infrastructure***, feed-in without any restrictions at any time: Pipelines, network, facilities, storage in caverns/aquifers, gas turbines, appliances compatibility, …
- 3,5 times ***higher storage capacity***: Hydrogen needs much more space (or pressure…) for the same amount of energy
- ***Existing and affordable consumer applications*** – $CH_4$ is already an universal energy carrier - **CNG** cars and busses, CNG/**LNG** trucks, ships, industry
- Methane is also a ***raw material***!
- ***Flexibility***: depending on the market situation and the infrastructure, energy can be transferred between different energy carriers.

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# Biomethane Statistics & P2M Capacity

**18 bcm** Biogas in CHP applications (methane equivalent)

**1.7 bcm** Annual biomethane production

**80 bcm** Hydrogen could be methanised with 20 bcm $CO_2$

**382 TWh** Electricity could be “methanised” only by our industries

**With the existing production capacity!**

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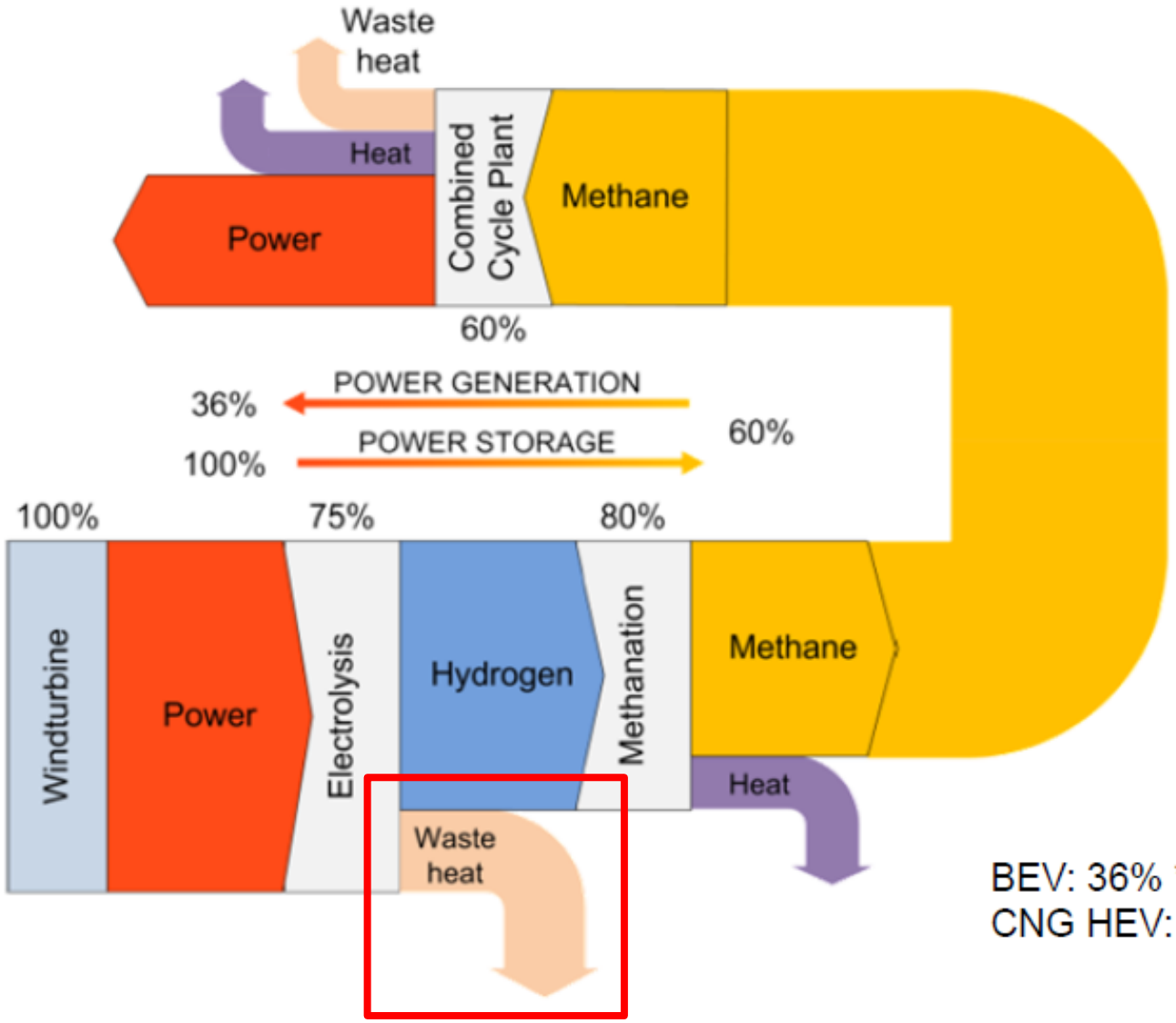
# Efficiency Power-to-Gas: Even low-level heat losses




60-65% SNG

35-40% Power

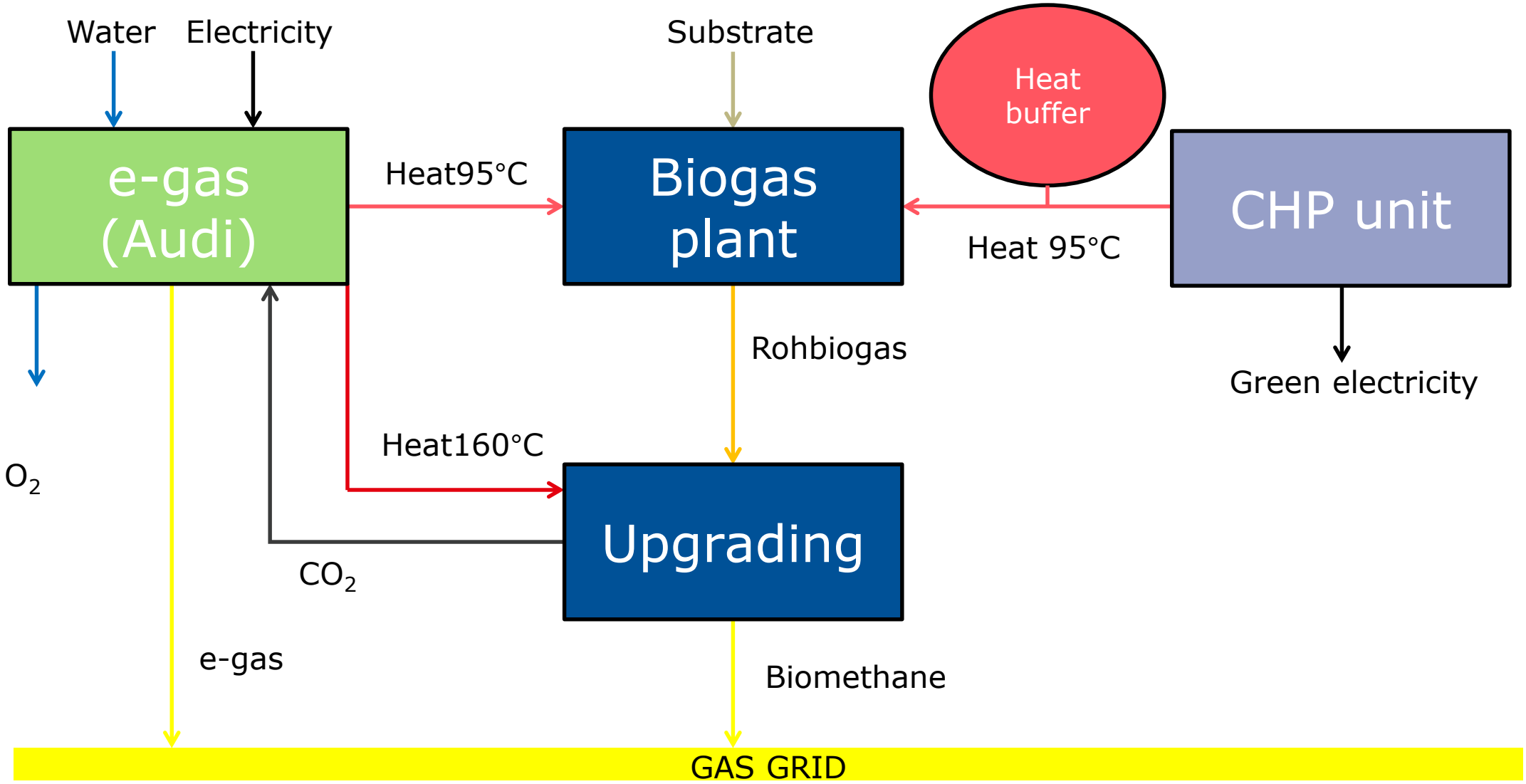
50-60% Combined heat power

Vs.0% due to power cut off/ power curtailment

BEV: 36% * 0.65 = 23.4% Efficiency W2W
CNG HEV: 60% * 0.25 = 15% Efficiency W2W

Source: Sterner, M.; et. al.: Renewable (power to ) methane, Fraunhofer IWES, Germany

# Power-to-methane in Werlte: A process scheme

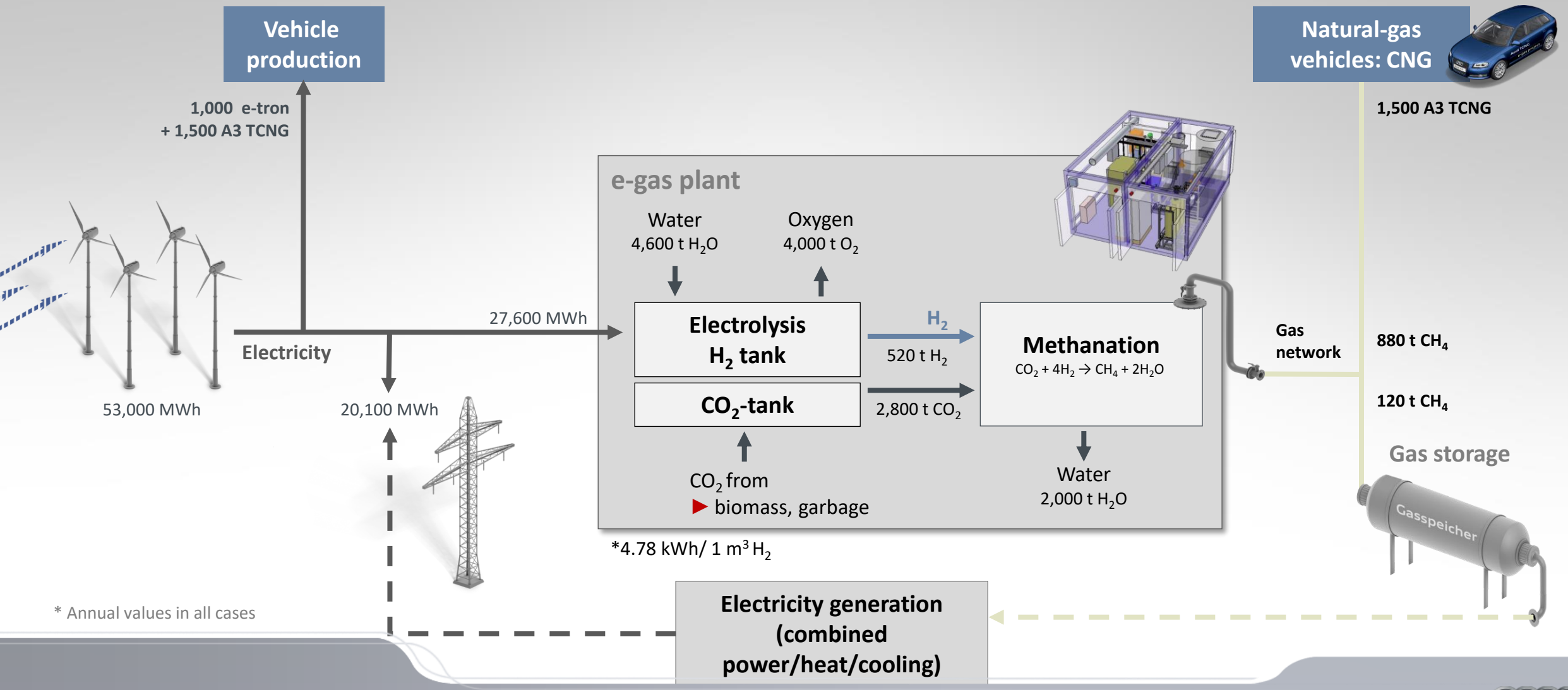



*Quelle: EWE*

Gefördert durch:
Bundesministerium für Wirtschaft und Energie
aufgrund eines Beschlusses des Deutschen Bundestages

# Coupled electricity-methane networks – a flexible system

## Audi pilot project with 6 MW PtG plant in Northern Germany




* Annual values in all cases

# Power-to-Gas: Audi e-gas plant in Werlte (Northern Germany)

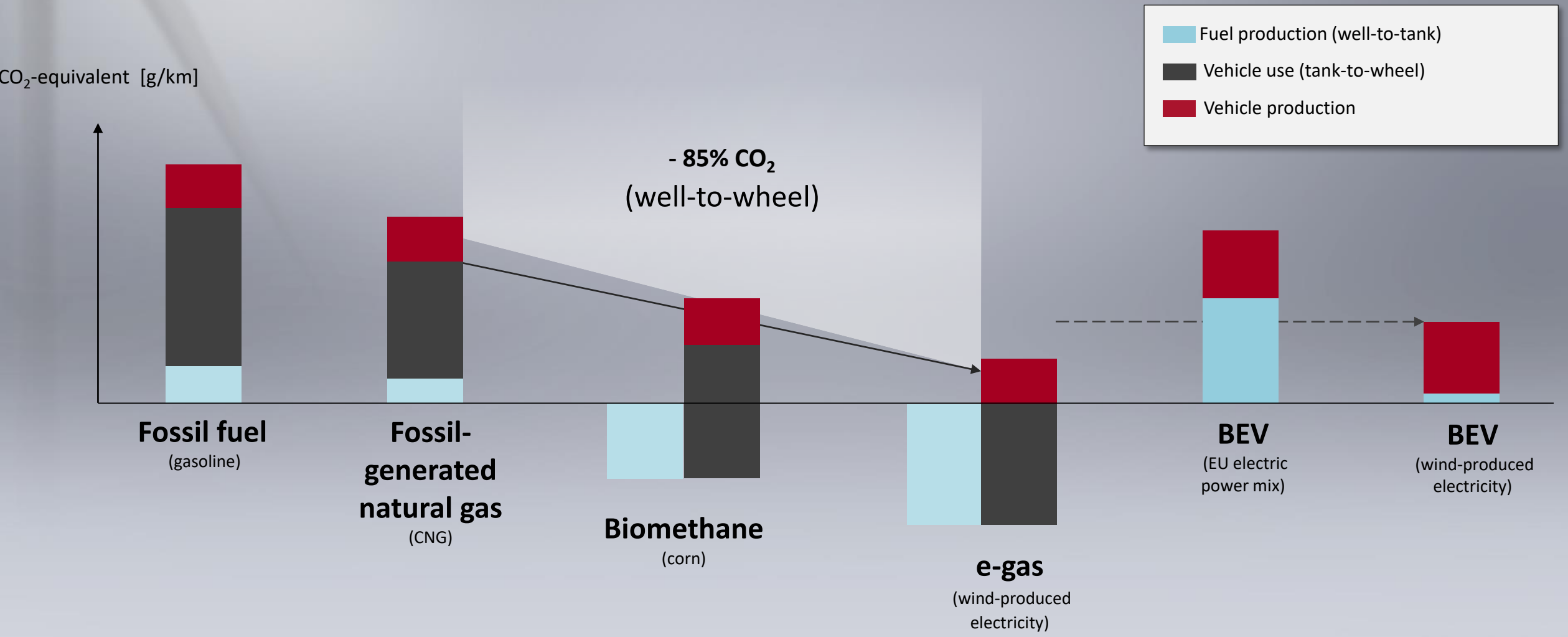
Quelle: EWE Netz

# Technical Data Audi e-gas plant (Werlte)

| | |
|---|---|
| **Energy content e-gas (average)** | 13,85 kWh/kg |
| **Electricity input (prognosis)** | 26 – 29 GWh/a |
| **Power input electrolyzers** | 3 x 2 MW |
| **Efficiency „power to gas“ (with using heat)** | **54 % ➔ 70 %** |
| **Max. $H_2$ output** | 1300 $Nm^3/h$ |
| **Max. $H_2$ storage time** | 60 min |
| **Max. e-gas output** | 325 $Nm^3/h$ |
| **Operation time (prognosis)** | 4.000 h/a |
| **e-gas output (prognosis)** | 1000 t/a |

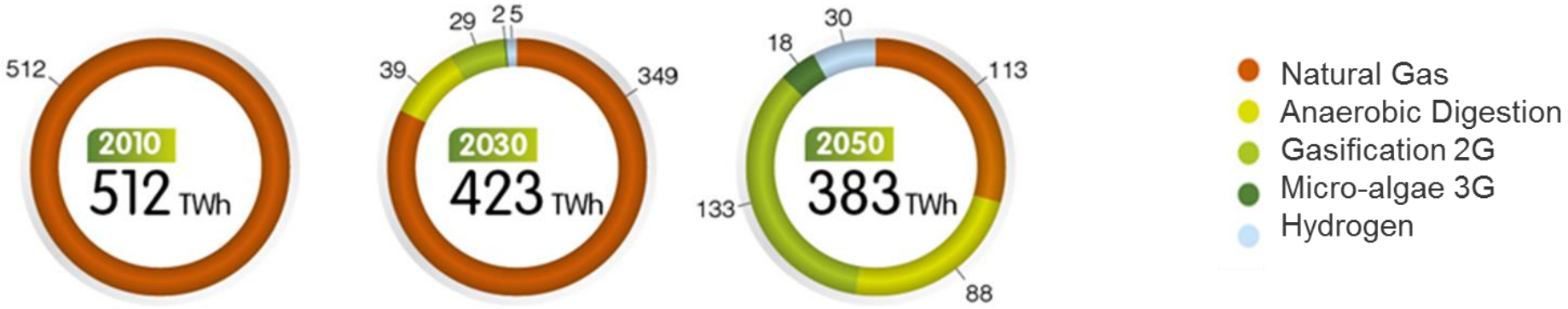
# Greenhouse gas footprint: PtG as good as BEV running on green power

(Mileage: 200,000 km)

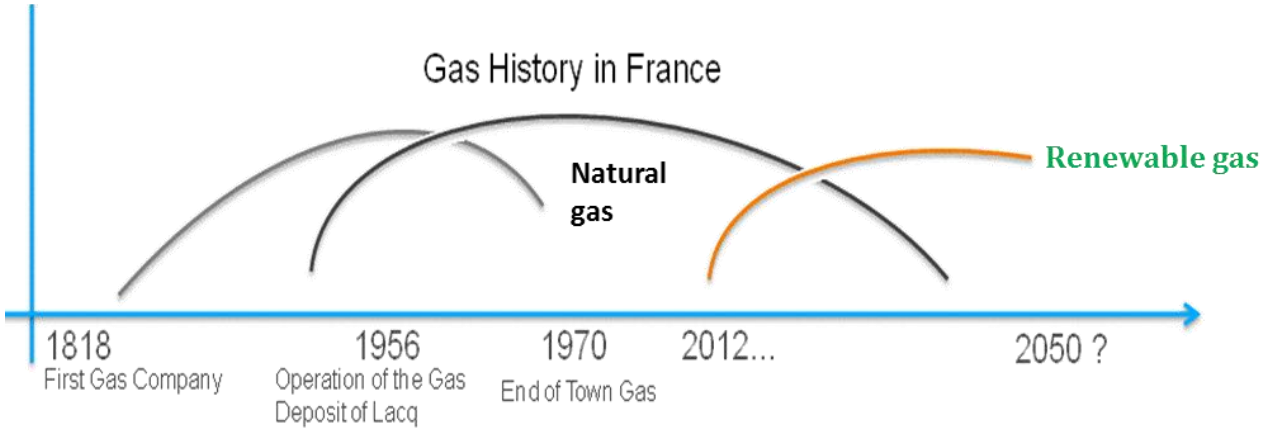



Audi
Vorsprung durch Technik

# Gas Future: 2nd Transition in Progress




France – scenario from ADEME of gas energy in the grid
Source: GRDF 2016




Source: ENGIE 2017

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# Conclusions

- **Biomethane industry is a strong and mature partner for green electricity,** with considerable production capacities today, and sound potential for the future
- **Power-to-Methane technology** has no limits in conventional gas industry and its **implementation is cheaper and quicker**
- **Power-to-Methane technology** and biomethane production are much synergetic, easily integrated, and with tremendous potential in **utilization of existing $CO_2$ streams**

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