

Renewable Gas from biogenic and not biogenic sources in EU

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EBA

European Biogas Association

European Biogas Association: >7000 stakeholders



EU Biomethane Industry



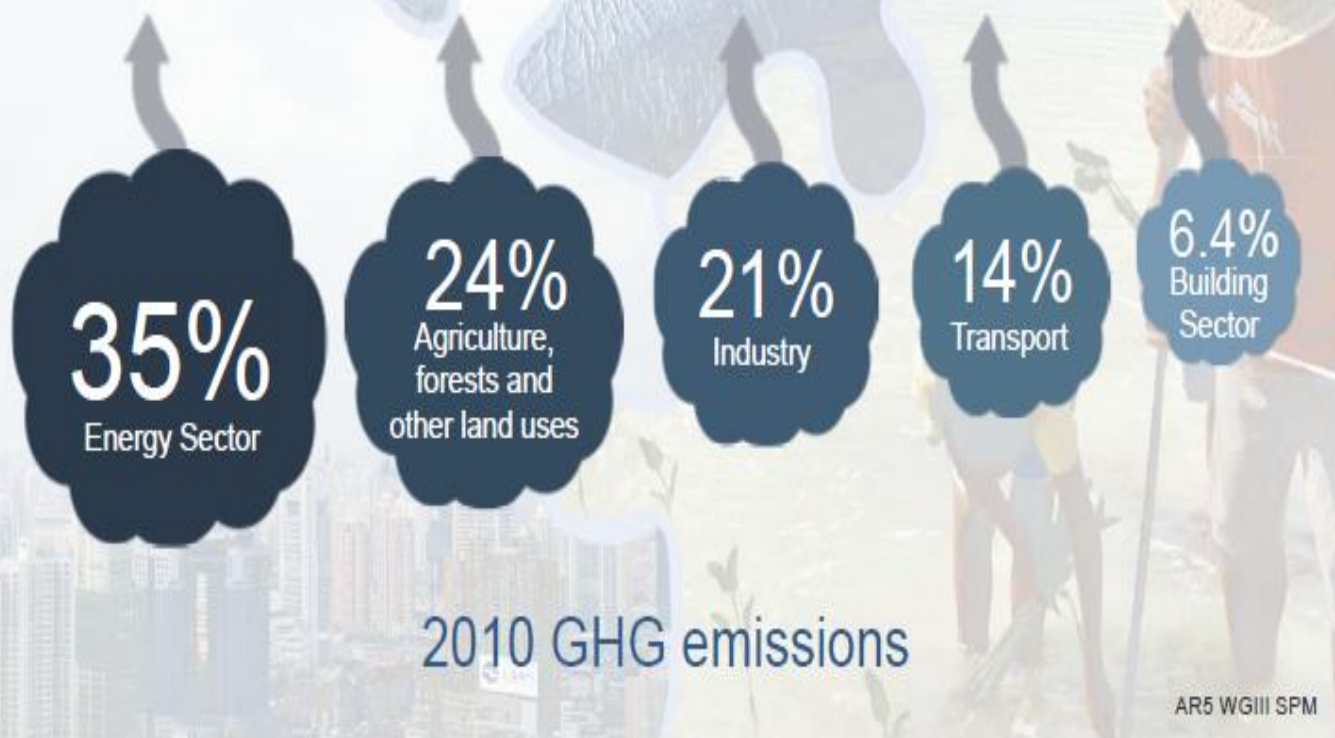
Overview of the European Biomethane Industry



2G Biomethane from Biogas? BiogasDoneRight!

HUMAN INFLUENCE: Sources of Emissions

Energy production remains the primary driver of GHG emissions



IPCC AR5 Synthesis Report

ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP



Biogas Done Right?

- ✓ Farm profitability improved? Yes!
- ✓ Farm resilience improved? Yes!
- ✓ Food production maintained or enhanced? Yes!
- ✓ New stable jobs created? Yes!
- ✓ Farm less dependent on external fertilizers? Yes!
- ✓ Renewable energy exported to the rest of society? Yes!
- ✓ Practical approaches to biogas validated? Yes!
- ✓ Soil fertility improved? Yes!
- ✓ Potential for net greenhouse gas reduction? Yes!
- ✓ Innovation continuing? Yes!
- ✓ **BIOGAS DONE RIGHT? YES!!**

Source: IPCC Mitigation Report 2014



European Biomethane Industry

Anaerobic digestion

Organic waste,
manure, crops

Landfill

Anaerobic
digestion

Sewage
sludge

Upgrading

CO₂

CH₄

Grid injection

Gasification

Lignocellulose:
wood, straw

Gasification

CO/H₂

Methanation

CO₂

CH₄

Grid injection

Power-to-Gas

Electricity: PV,
wind

Electrolysis

H₂

CO₂

Methanation

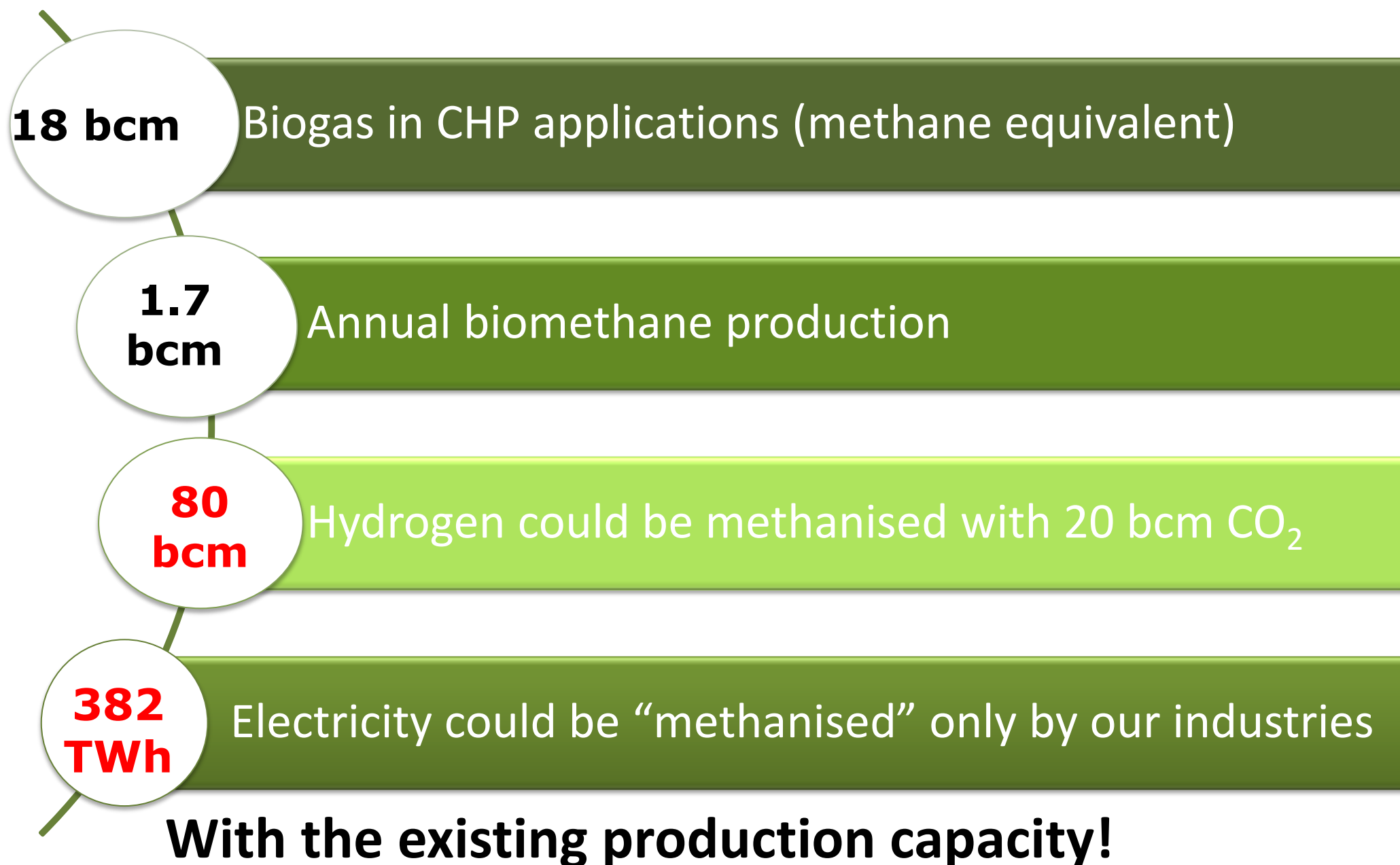
CH₄

Grid injection

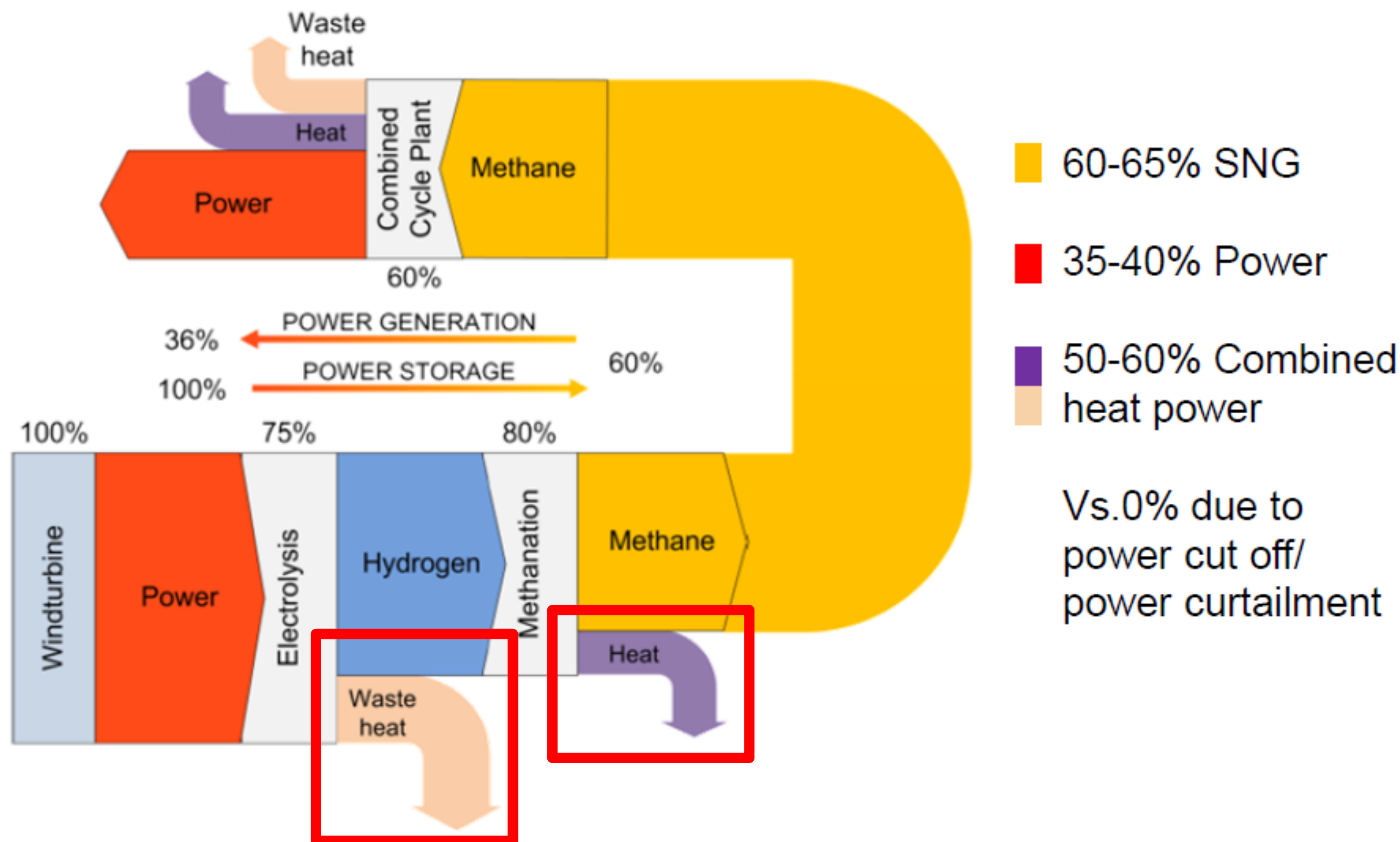
Why Biomethane (and not H₂)?

- **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** – CH₄ 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.

Biomethane Statistics & P2M Capacity



Synergy with Biomethane Production



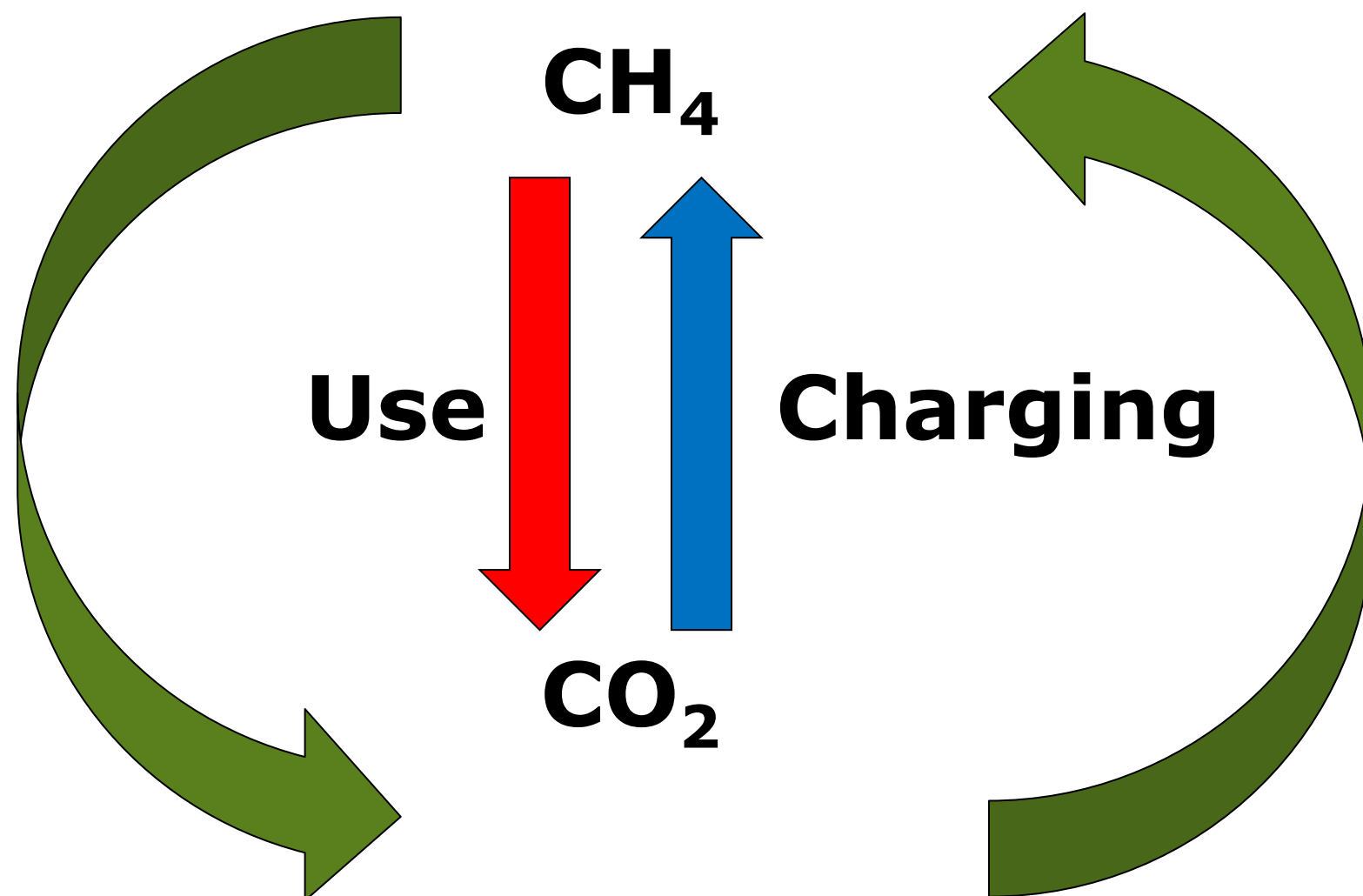
Source: Sterner, M.; et. al.: Renewable (power to) methane, Fraunhofer IWES, Germany

Synergy in Process Integration

- ***Methanation produces heat***, which can be perfectly integrated into the upstream gas production facilities, thus ***heat is fully utilised***
- ***Biological P2M process*** can be integrated even more, and to replace the raw biogas upgrading process (Viessmann)
- ***Gasification*** offers large scale process integration
- ***Carbon efficiency dramatically increases in both processes***: P2M process integration significantly improves the CO₂ footprint of biomethane, thus ***enabling greening more natural gas***

Shall We Exploit Lithium or Carbon???

Carbon "BATTERY"



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 CO₂ streams**

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