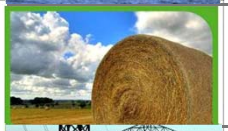
The Future Role of Natural Gas in a Low Carbon Economy

IGU – Gas Event, Sunday 4th December, 2011

Dr. Achim Hilgenstock, E.ON Ruhrgas AG, Germany

Political Targets of Natural Gas & Biomethane for 2020

		Targets	Potential
Biomass & REN		More Energy efficiency - 40% CO_2	Efficient end-use technology & Biomethane
		- 60% CO_2 with bio fuels 6 bcm/a biomethane injection	
Power		Minimum of 30% REN-Power More Energy Efficiency	Flexibility (GT) & Efficiency (CCGT … µCHP)
Heat		Reduction of energy consumption +14% Renewables	Efficient techn. & RES (Solar, geothermal heat & Biomethane)
CHP		+25% CHP-Power	Efficient CHP Technology ((µ)CHP)
Mobility		95 g/km CO_2 +10% biofuels/RES -7% CO_2-Reduction via bio fuels	climate protection with Existing CNG-Infrastructure, Vehicles and Biomethane

Climate protection 2020

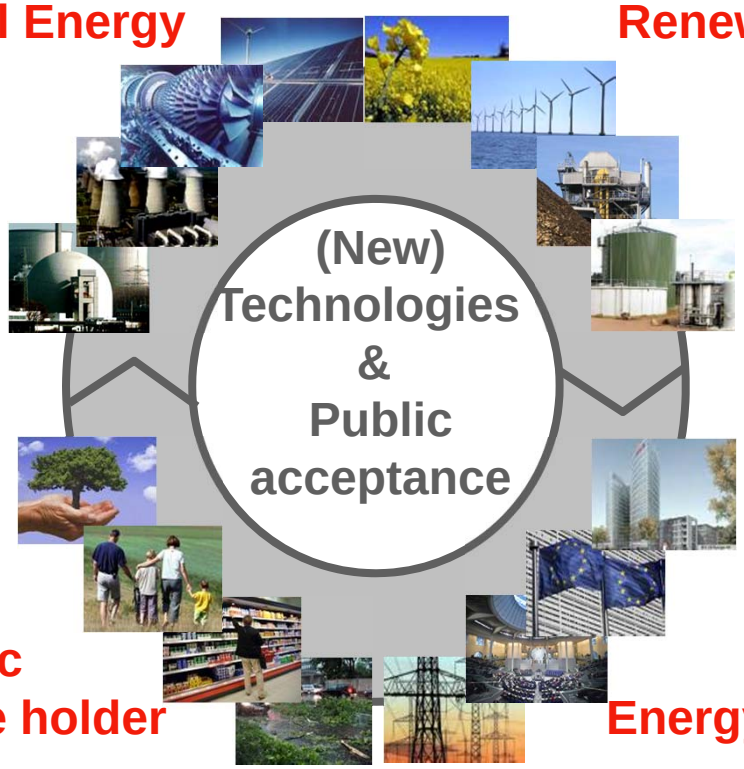
Natural Gas is well positioned in a successful Climate strategy 2020

…but what does that mean for a „Energy System 2050“?

Aspects in the Transformation of the Energy System

Fossil Energy

Renewable



Public Stake holder

Energy politics

Political Target (Focus)

1. Reduction of energy consumption from fossil Resources
2. Reduction of CO_2 -emissions by 80-95% (2°C Target)

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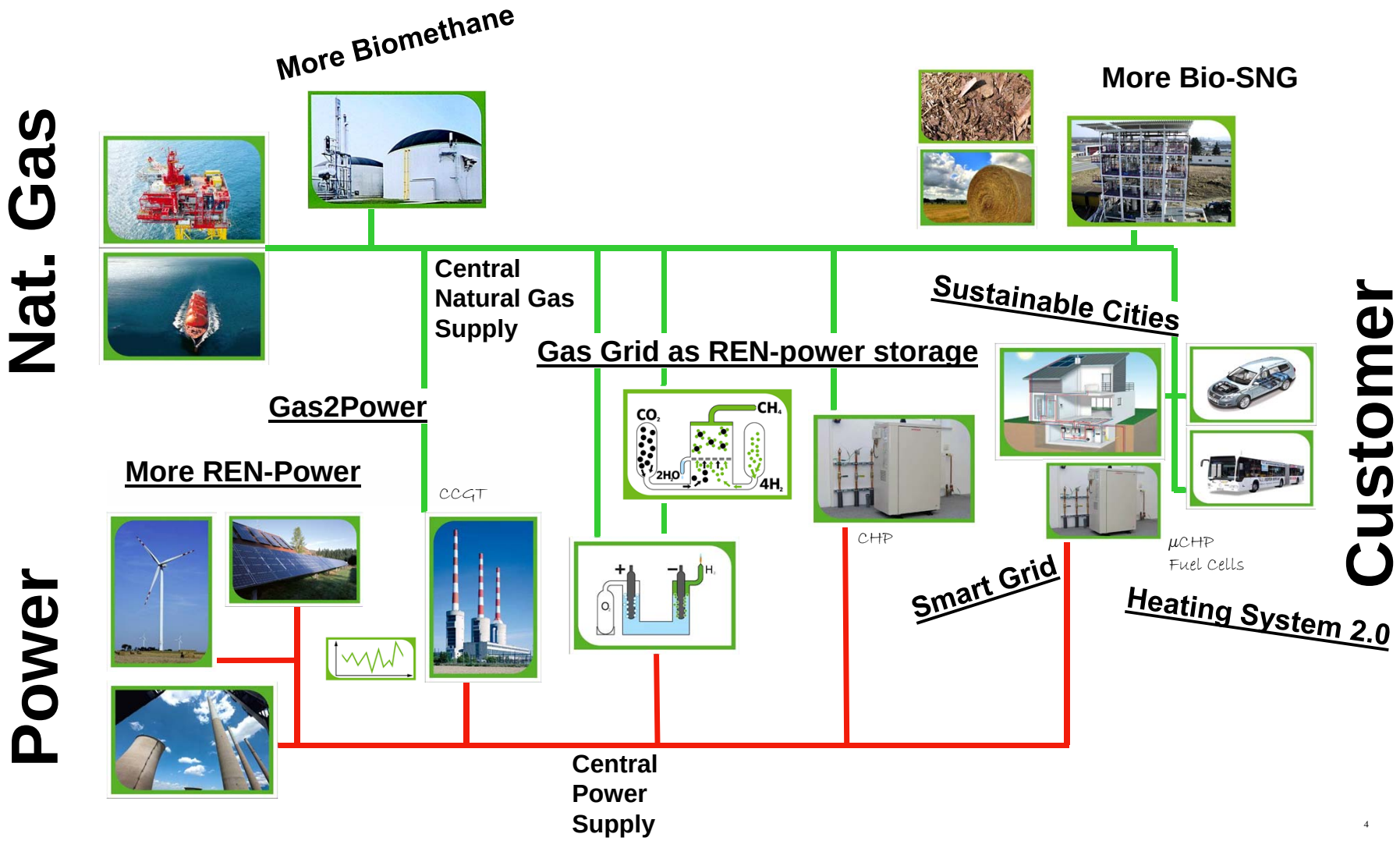
Future System for Natural Gas and Power Supply



Today‘s System of Natural Gas and Power Supply

Nat. Gas

About 500.000 km pipeline system in Germany

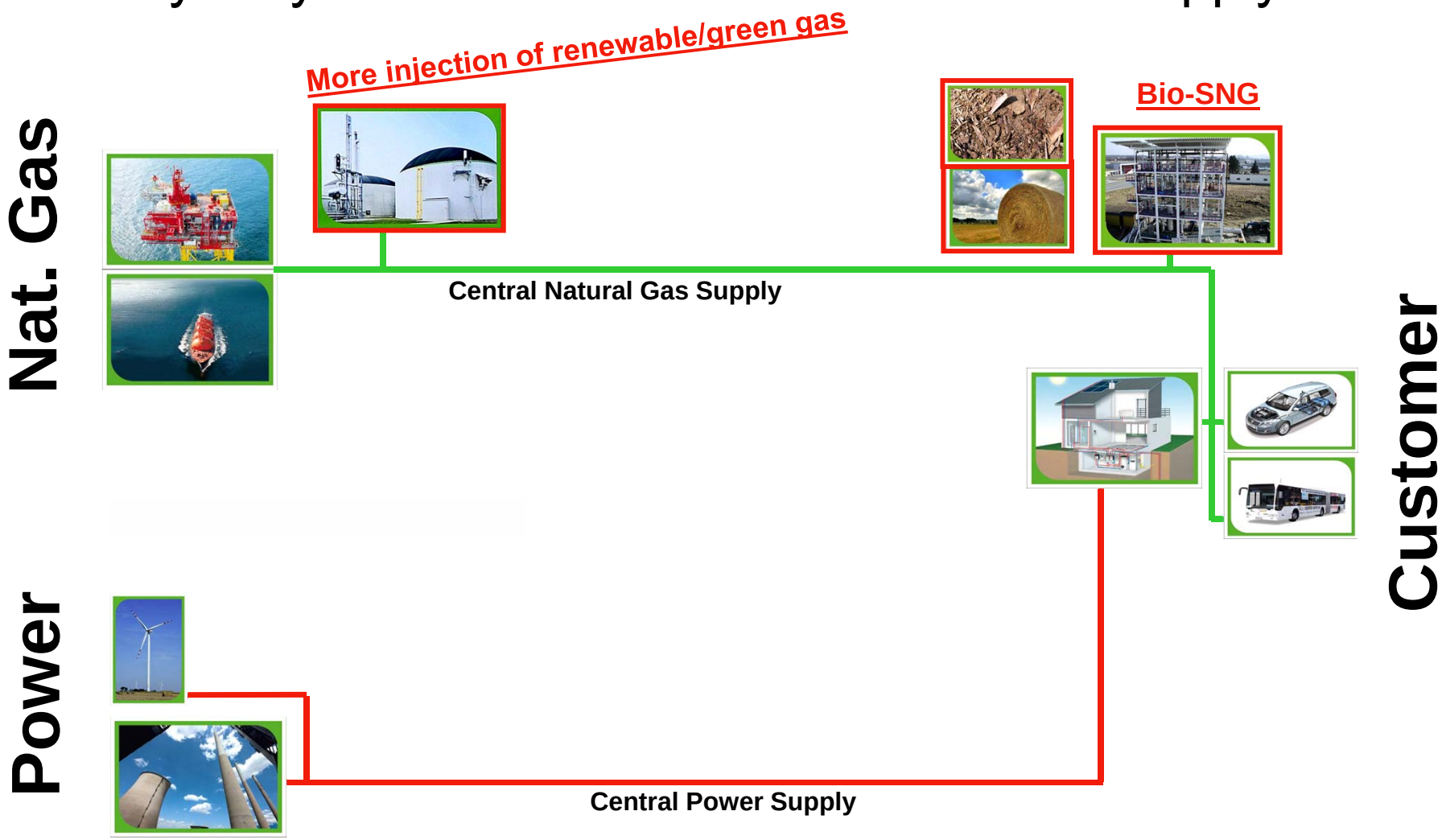
Central Natural Gas Supply

Customer

Power

Central Power Supply

Today‘s System of Natural Gas and Power Supply



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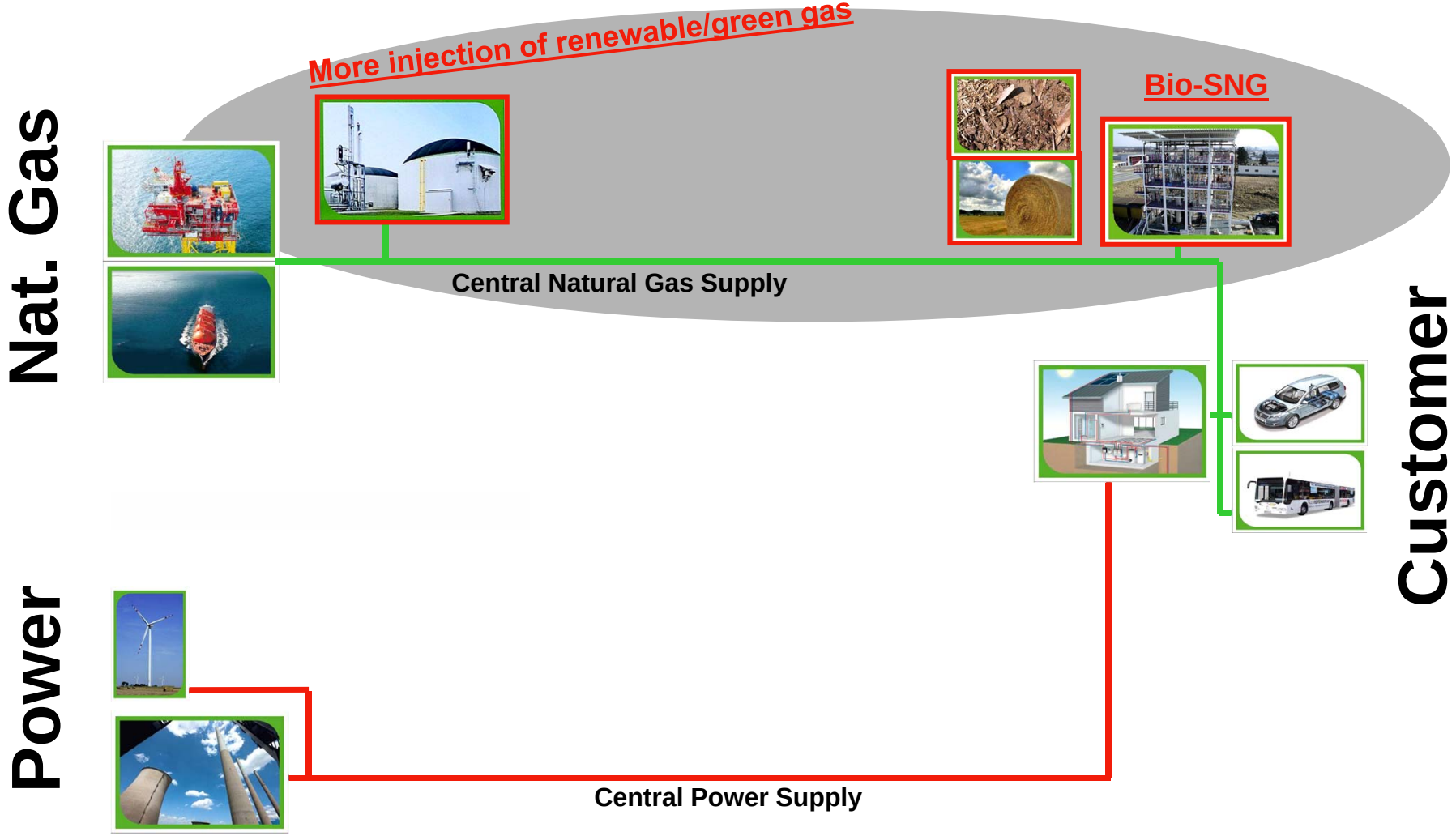
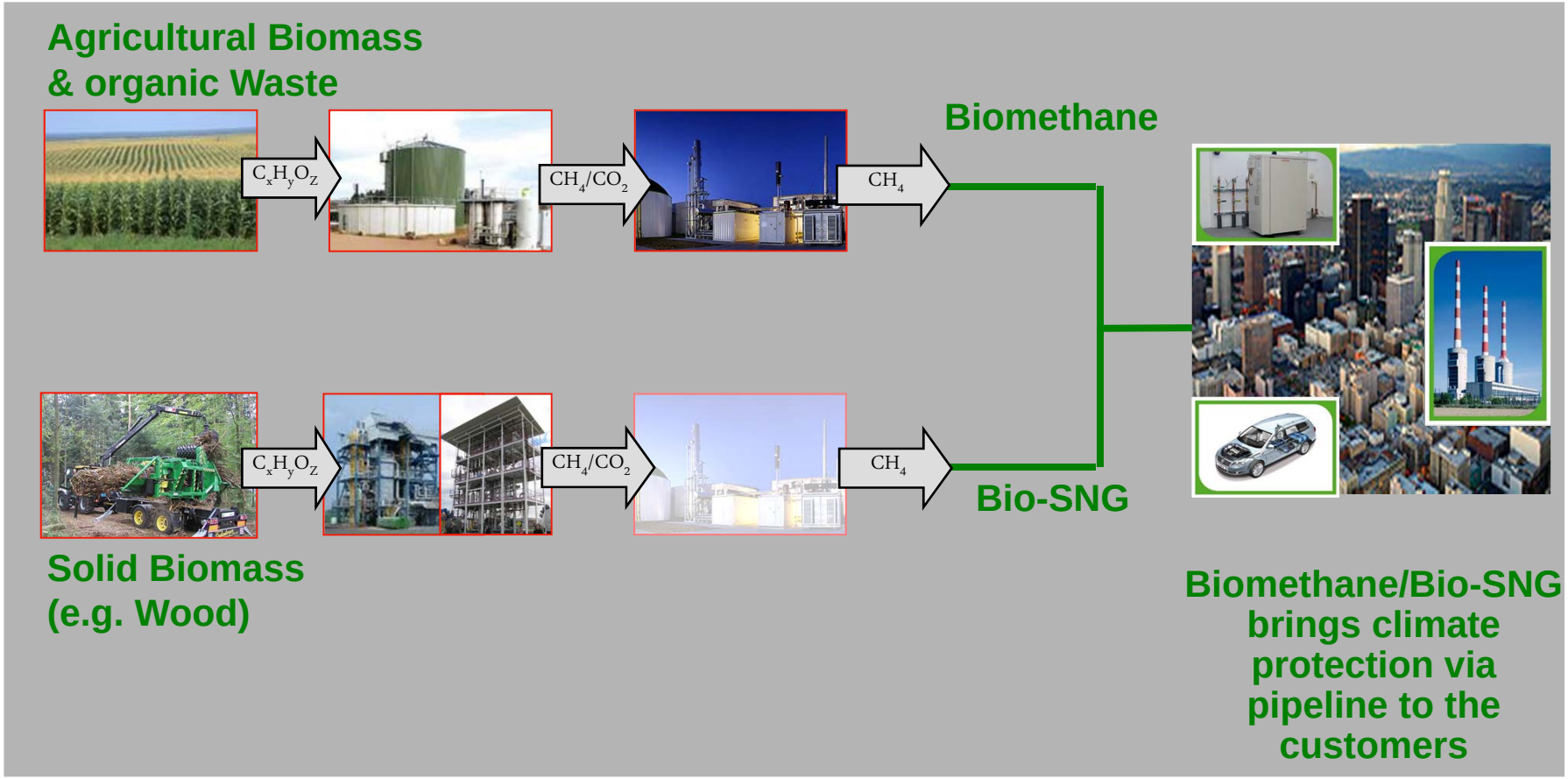
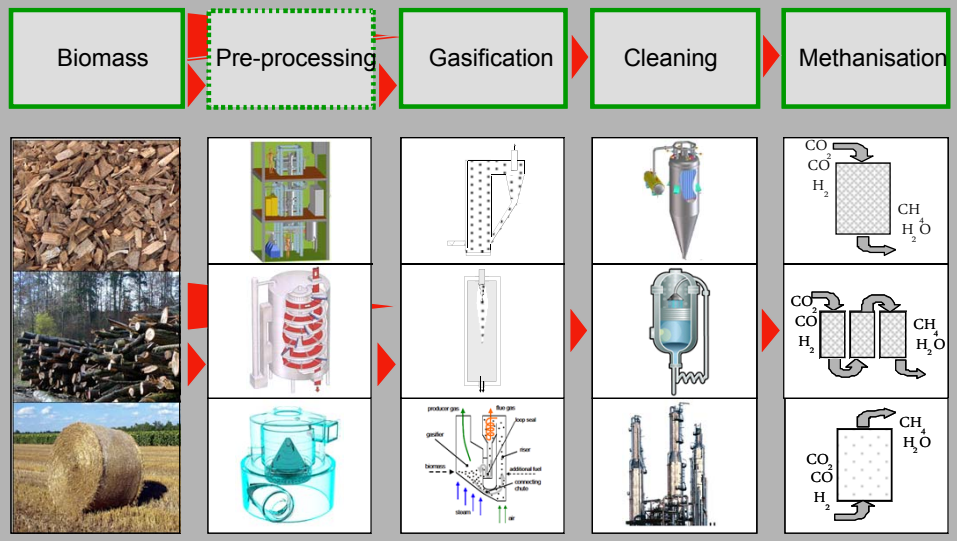


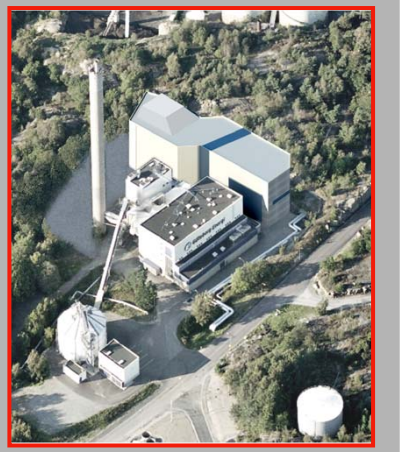
Natural Gas is the most efficient „carrier“ for Biomass



2nd Generation Biomethane from solid Biomass

Complex industrial plants





Perspective:

- Enlarged biomass basis
- lower GHG Emissions
  (up to -90% in comparison to Natural Gas)
- Lower specific production costs

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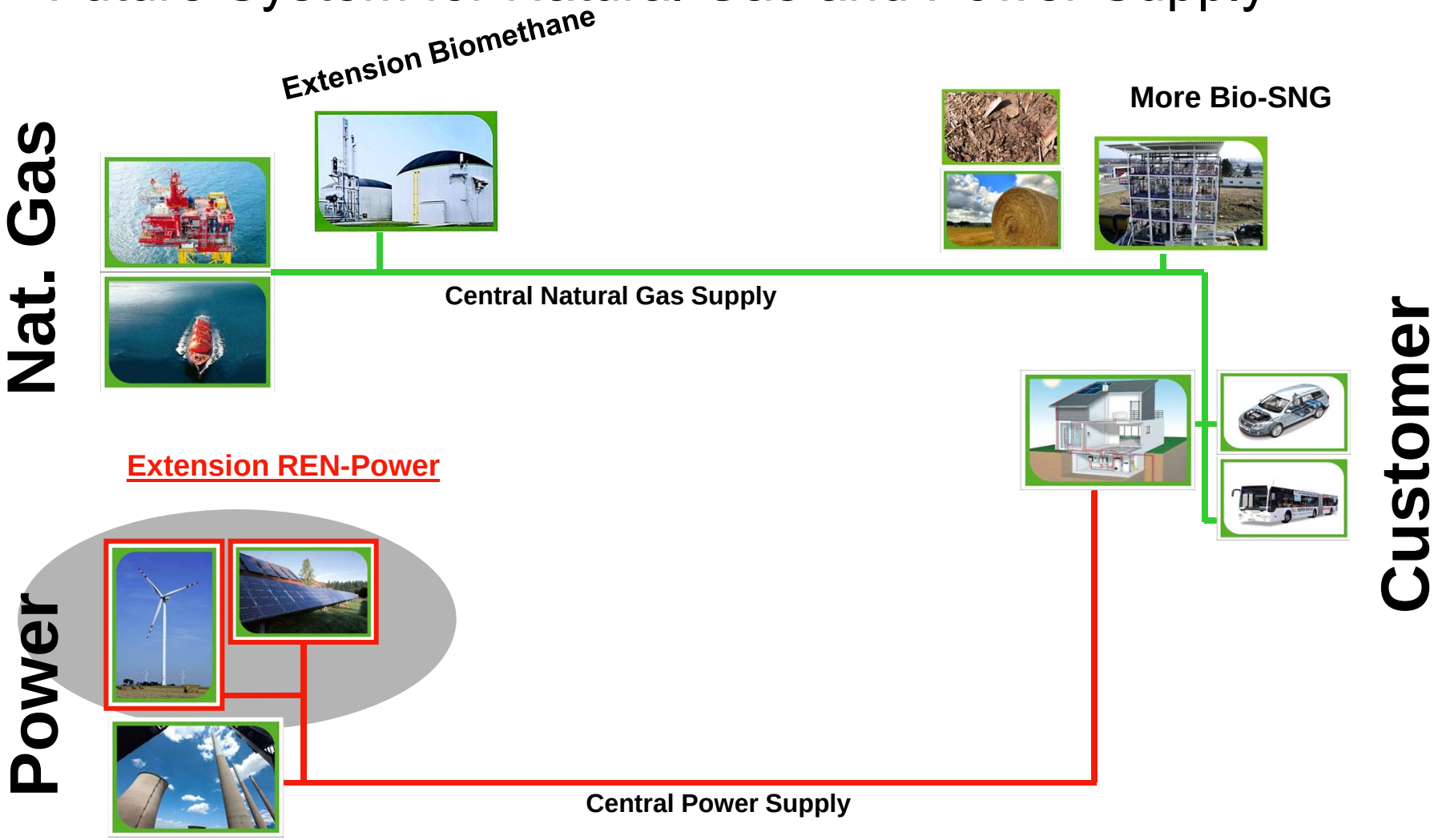
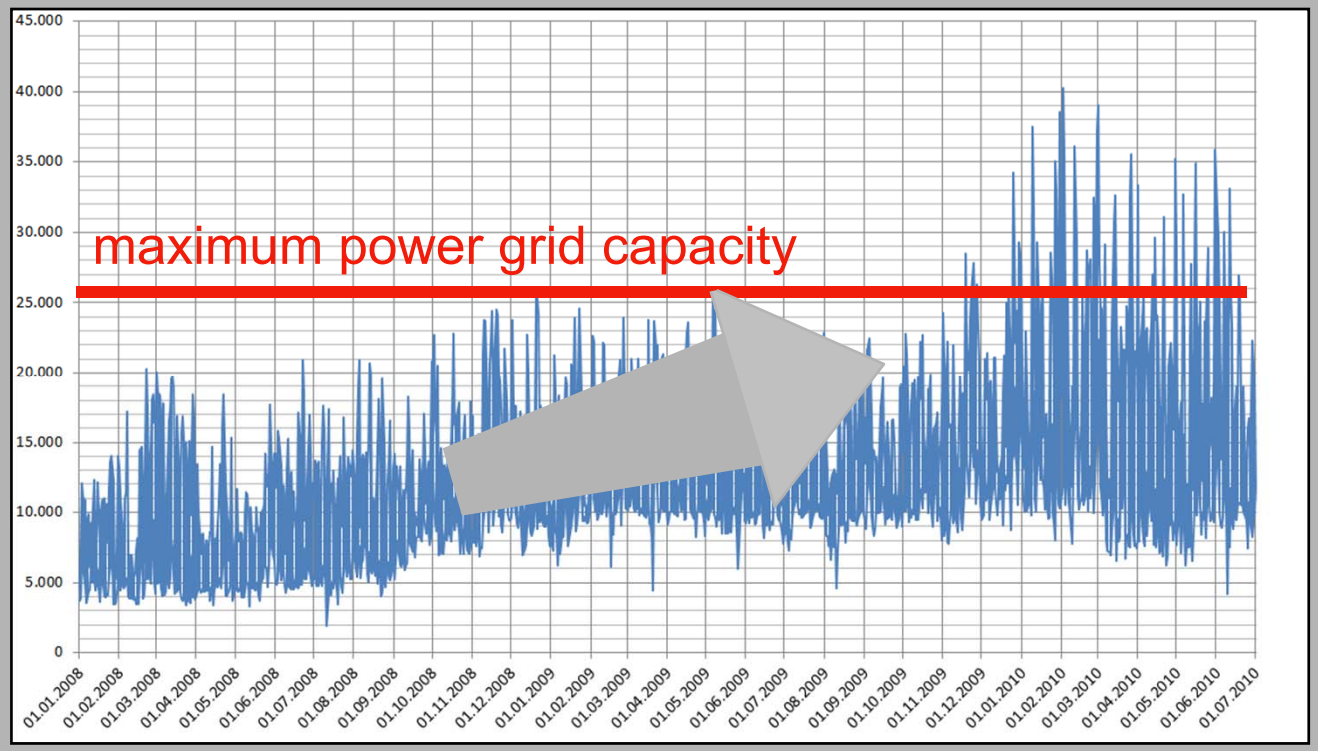


Wind Power Generation 1 Jan 2008 – 1 Jul 2010

- volatile
- increasing
- more wind power than power network capacity



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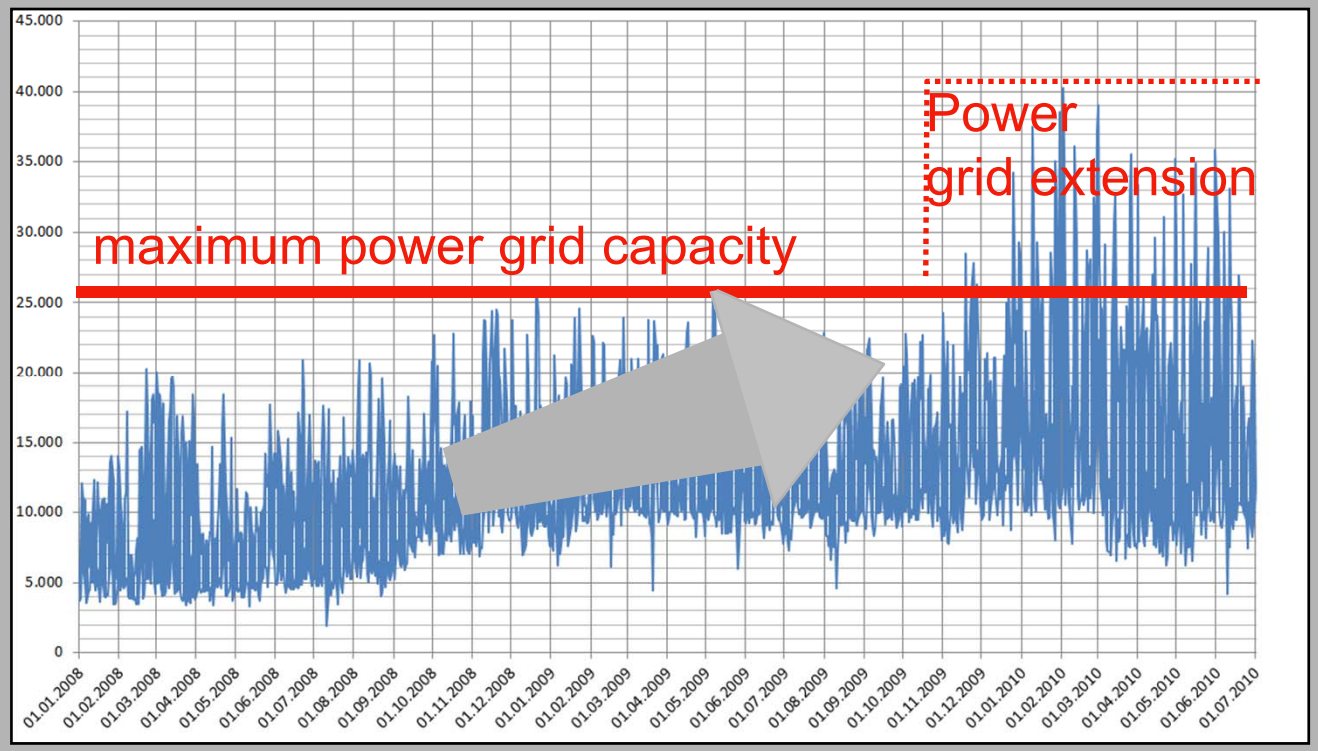

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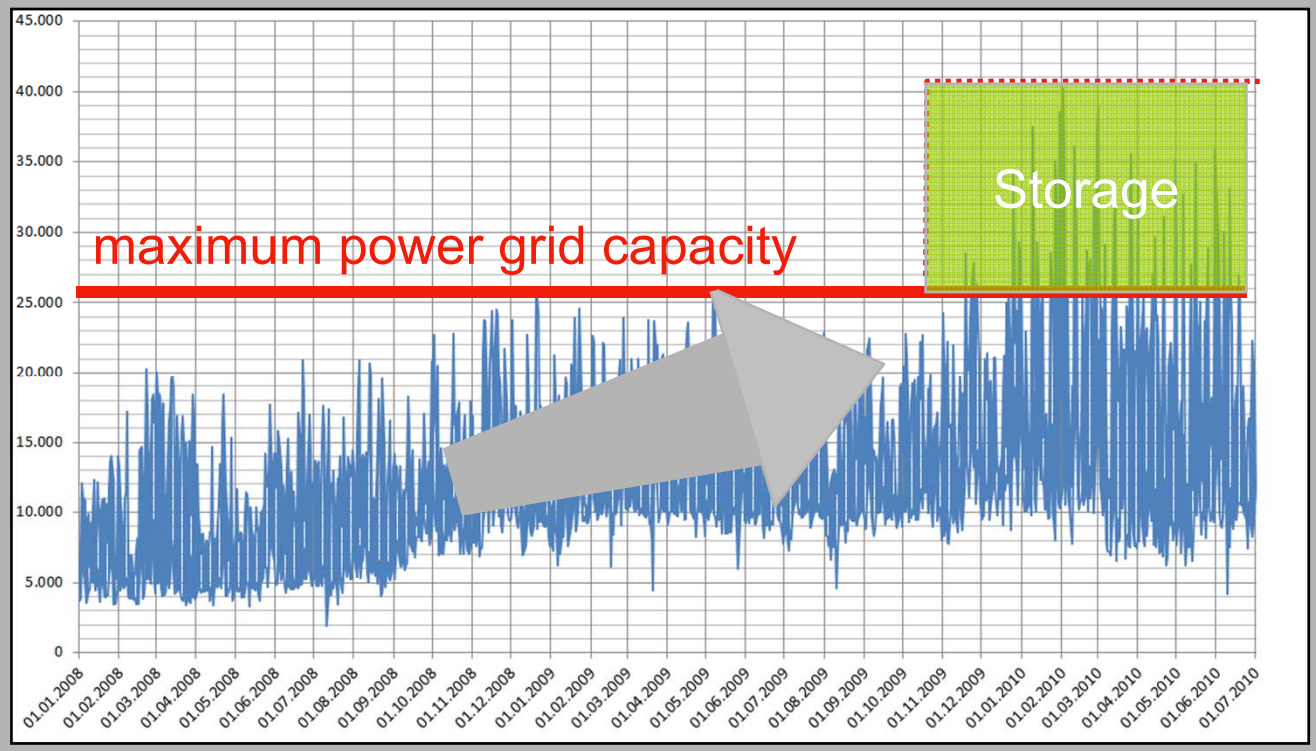

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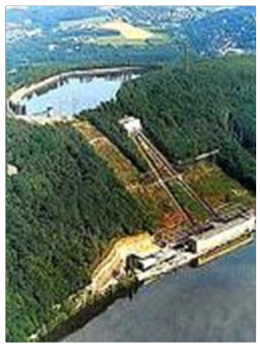
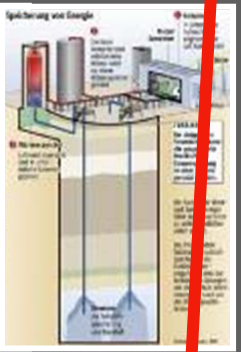
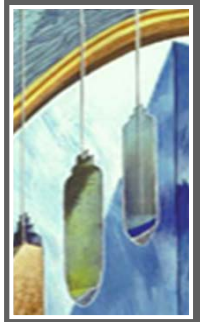
Energy Storage

Long-term storage

Proven technology	Room for improvement	New technologies
Water reservoirs	CAES	H_2 integration in NG



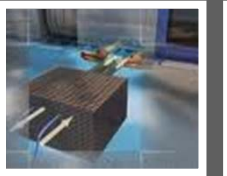


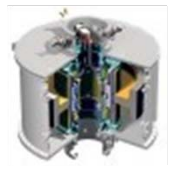


Short-term storage

Known technologies with potential for improvement

Battery	Supercap	Fly wheel	Heat (latent)





Evaluation

In Germany, limited potential

Adiabatic storages

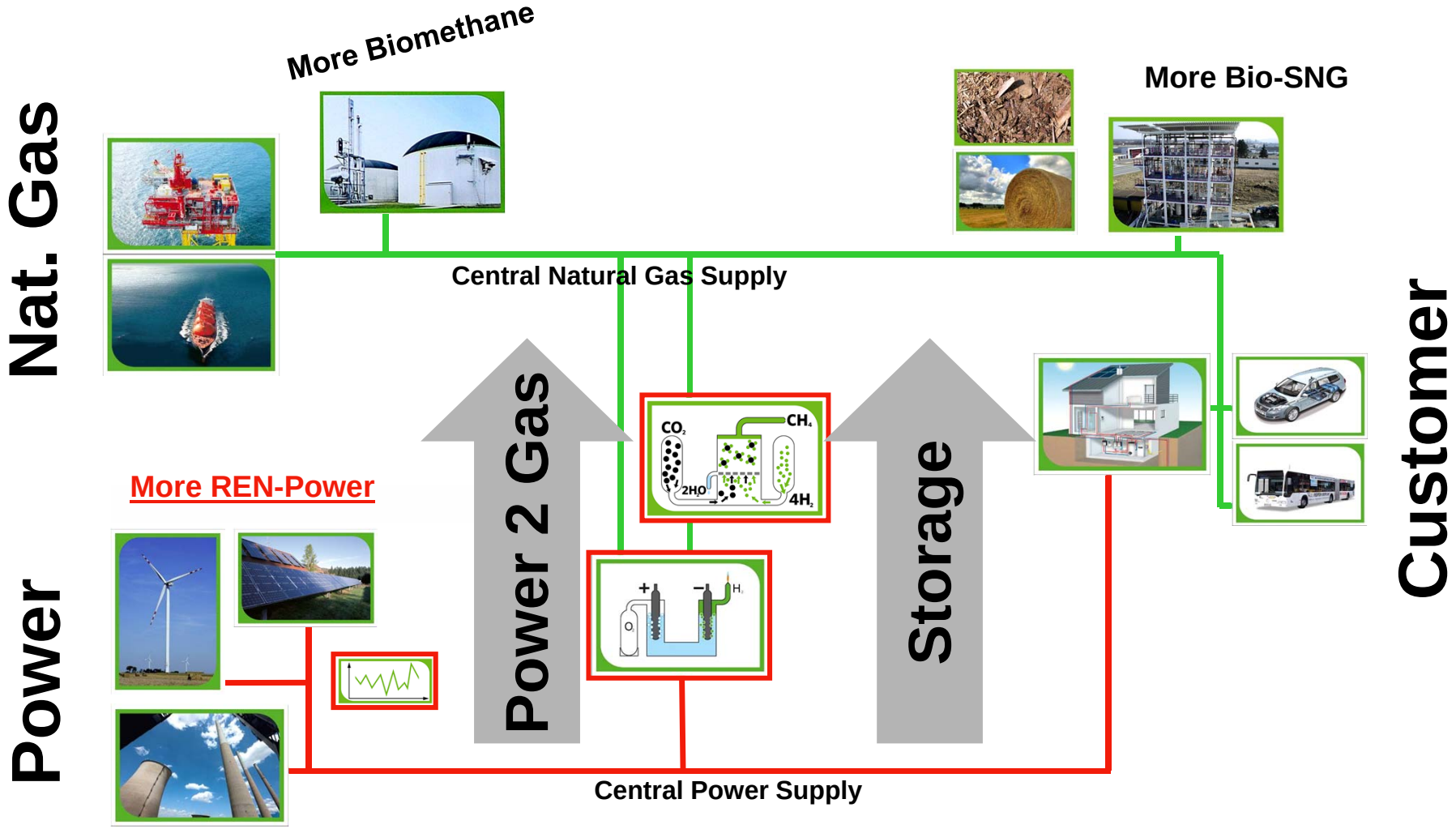
Wide range of options based on existing gas grid; methanisation as an option

Important for e-mobility

Need for further R&D

Important for CHP optimization

Future System for Natural Gas and Power Supply



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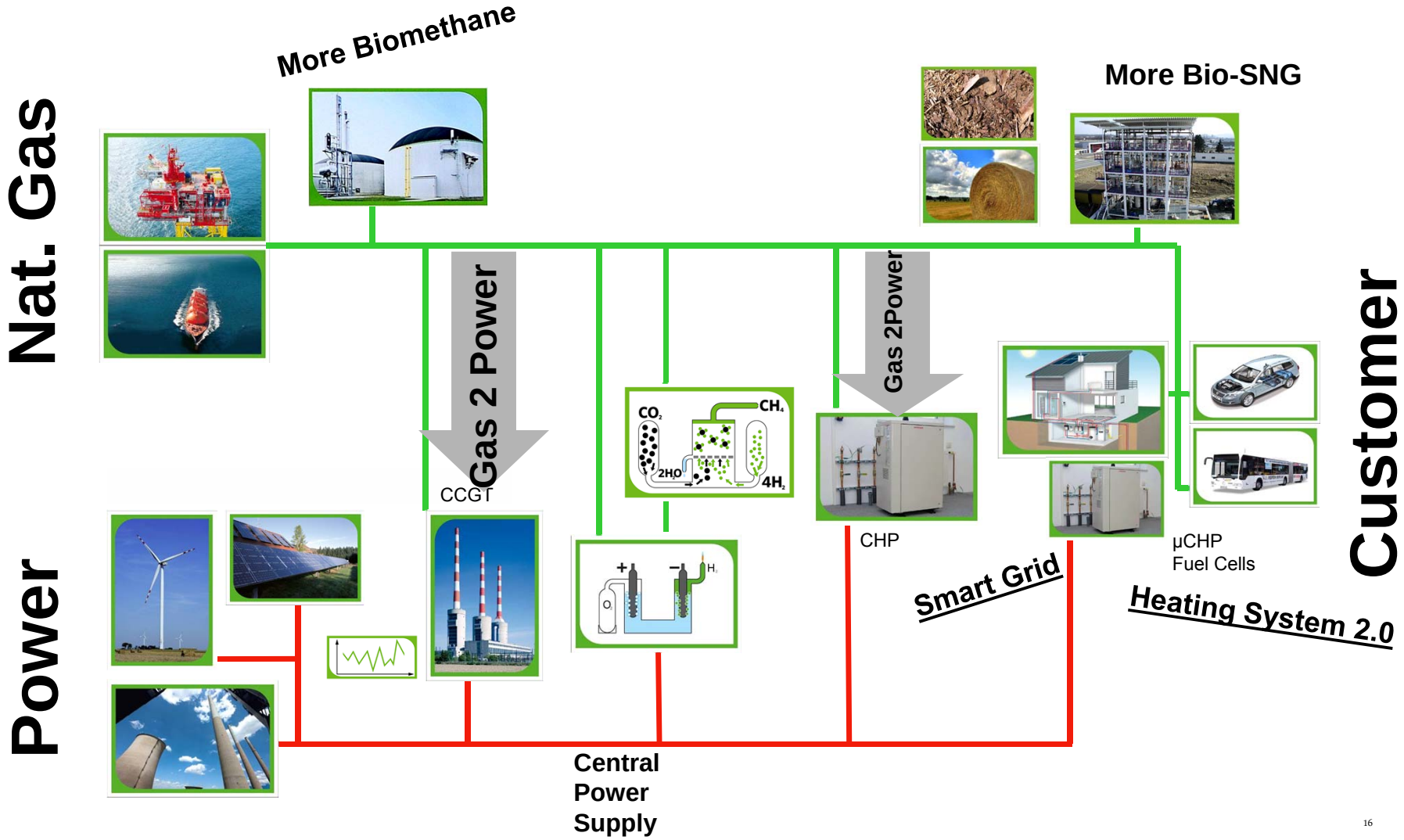

Natural Gas will be an indispensable part of the future Energy System

- **Natural Gas enables climate protection till 2050**
- **Natural Gas includes renewable energy in all areas of the combining Power and Gas Grids**
- **Natural Gas (Grid) provides a solution to storage renewable energy**
- **Natural Gas enables decentralised power generation systems and Help stabilizing power grids**

- **Natural Gas is the „Perfect Solution for Low Carbon World“**

Thank you for your attention

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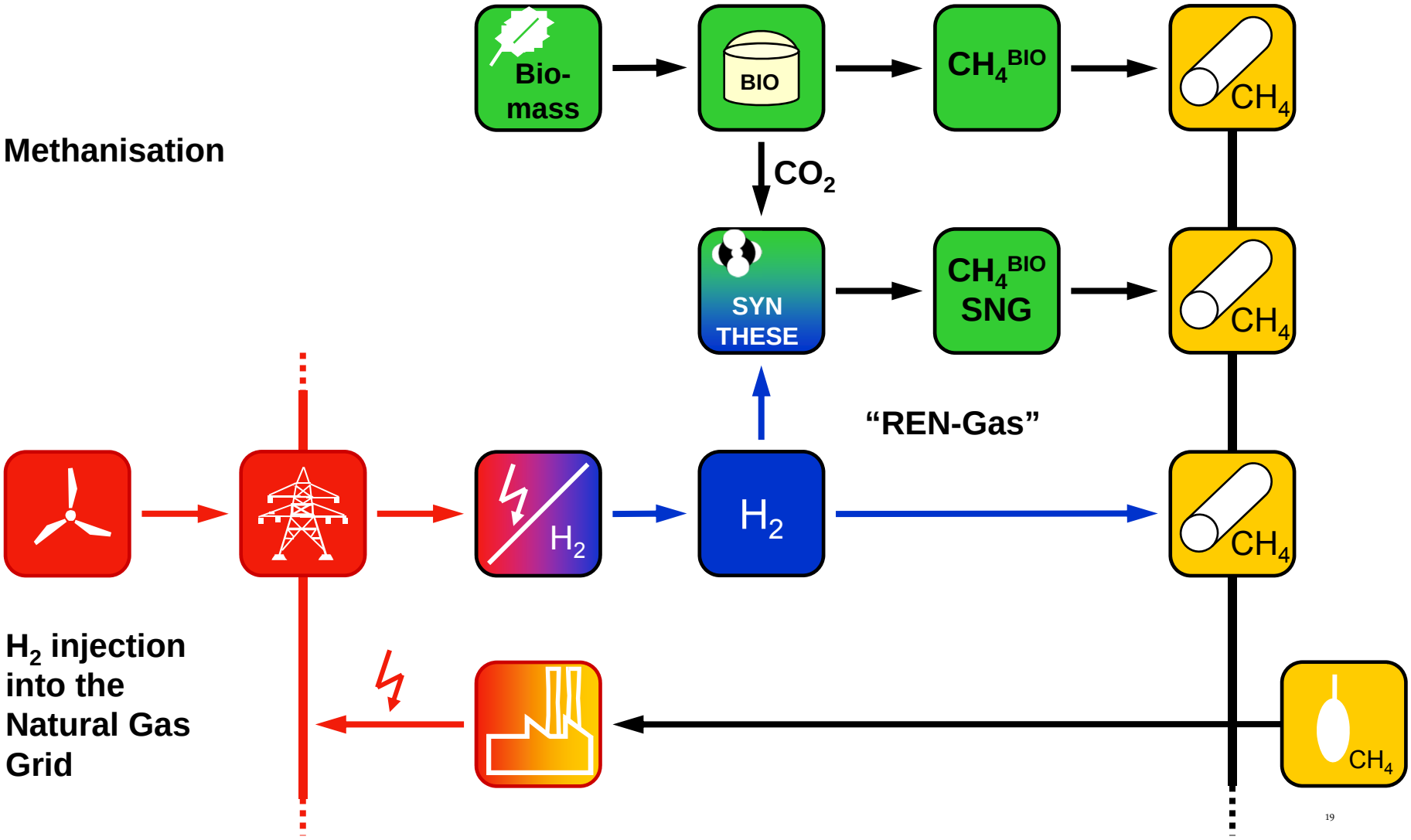
② Natural Gas Grid: integrates fluctuating REN-power



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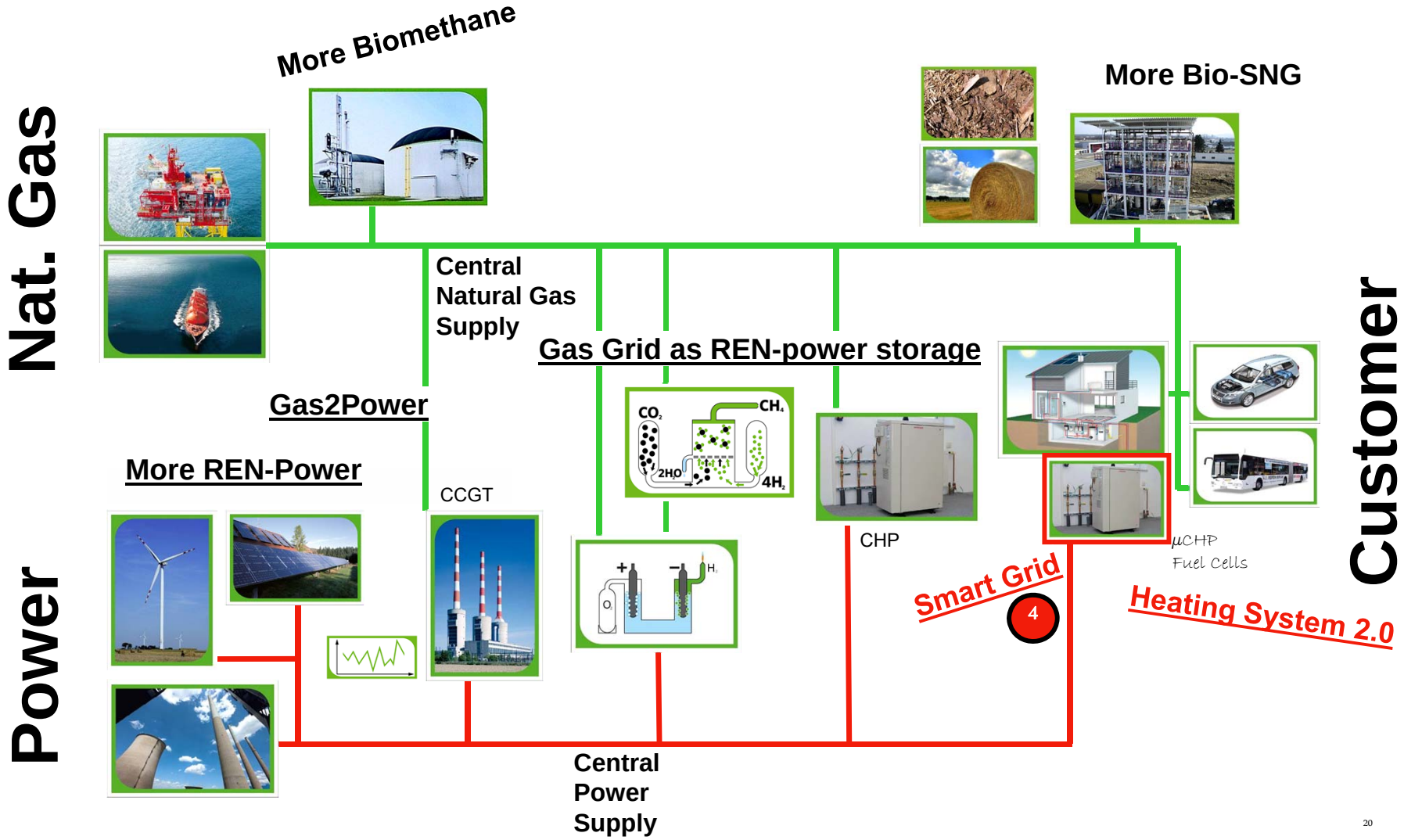
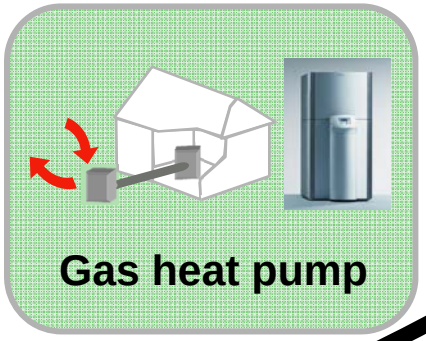
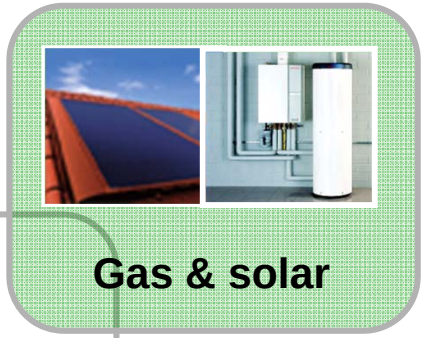


4 Heat market innovation pathway

More efficiency and climate protection





Marketability | Innovation | Future technology