








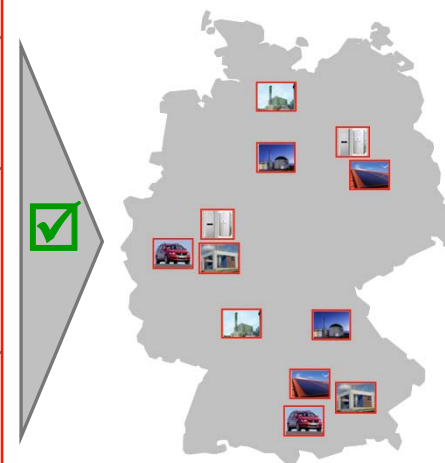
## The Future Role of Natural Gas in a Low Carbon Economy

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 <sub>2</sub>	Efficient end-use technology & Biomethane
	- 60% CO <sub>2</sub> 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 <sub>2</sub> +10% biofuels/RES -7% CO <sub>2</sub> -Reduction via bio	climate protection with Existing CNG-Infrastructure, Vehicles and Biomethane

Climate protection 2020



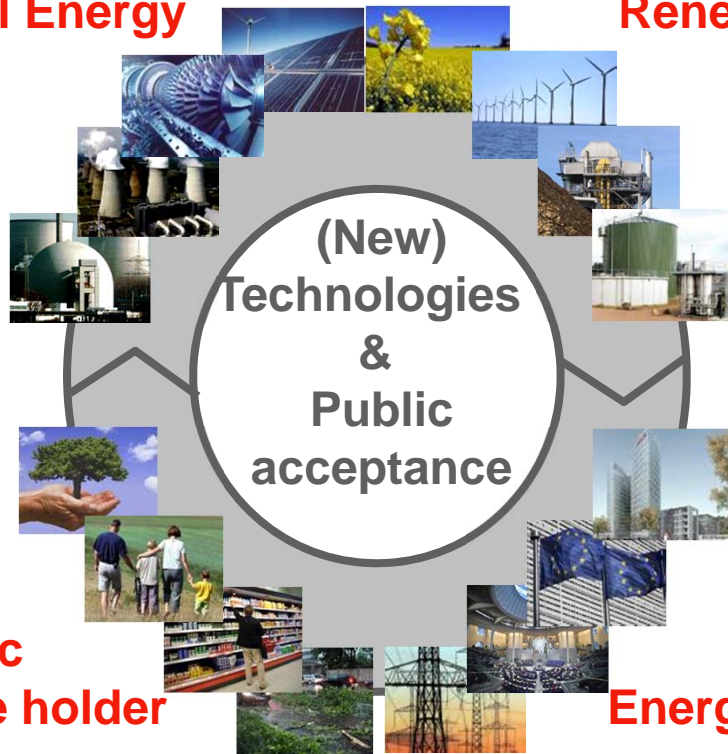
Natural Gas is well positioned in a successful Climate strategy 2020

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

## Aspects in the Transformation of the Energy System

**Fossil Energy**

**Renewable**



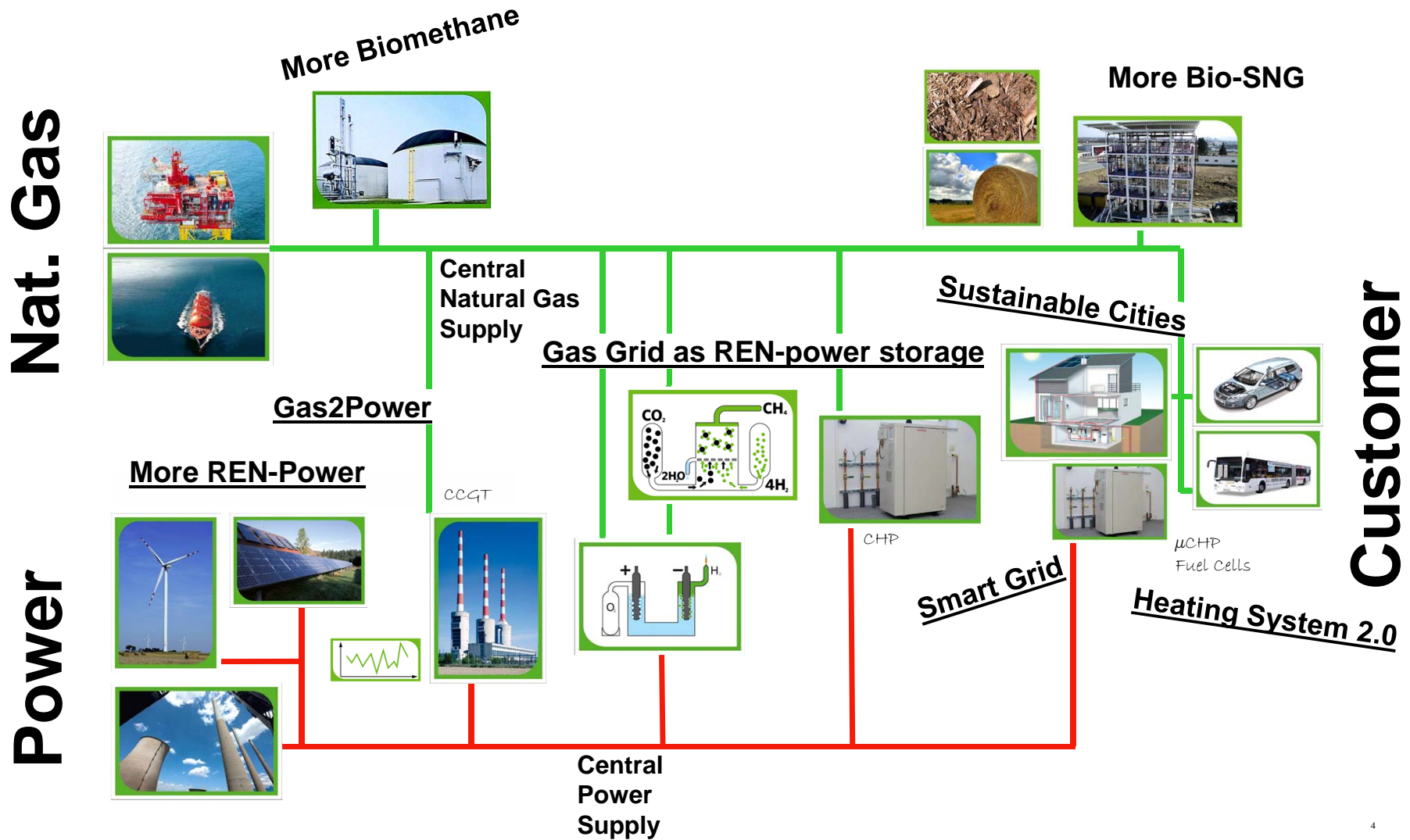
**Public  
Stake holder**

**Energy politics**

## Political Target (Focus)

- ① Reduction of energy consumption from fossil Resources
- ② Reduction of CO<sub>2</sub> -emissions by 80-95% (2°C Target)

# 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



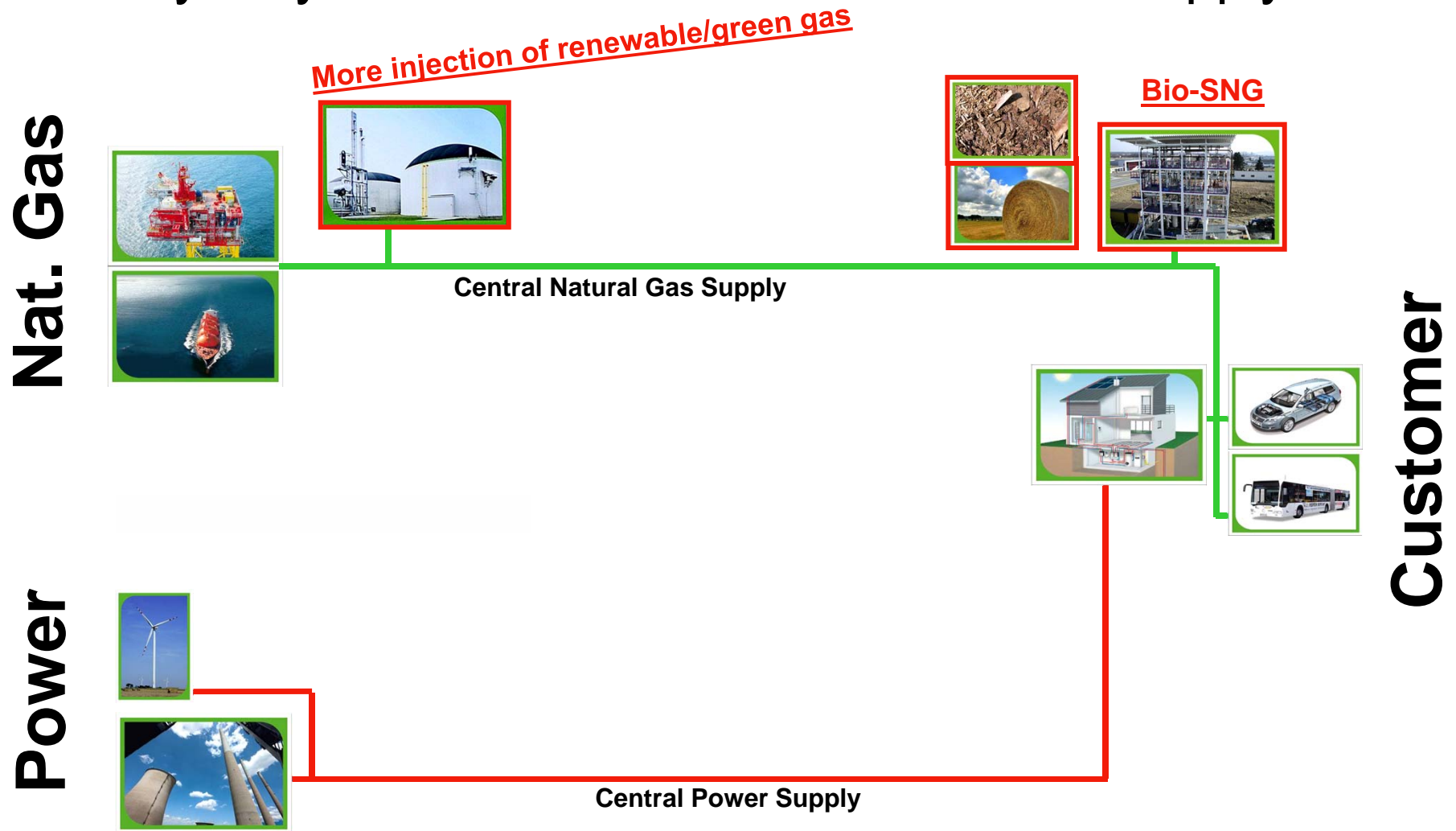
**Customer**

**Power**

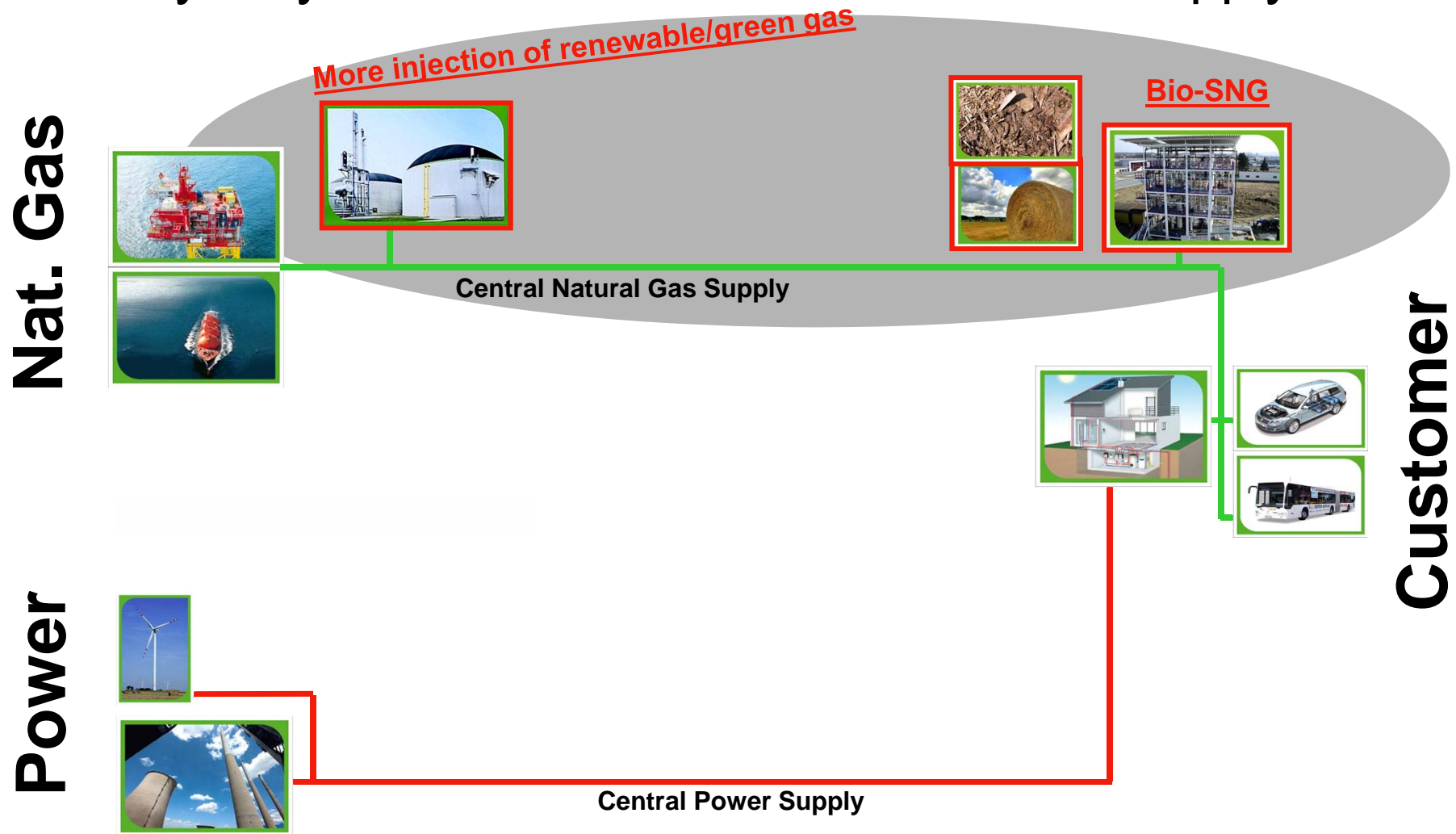


Central Power Supply

# Today's System of Natural Gas and Power Supply

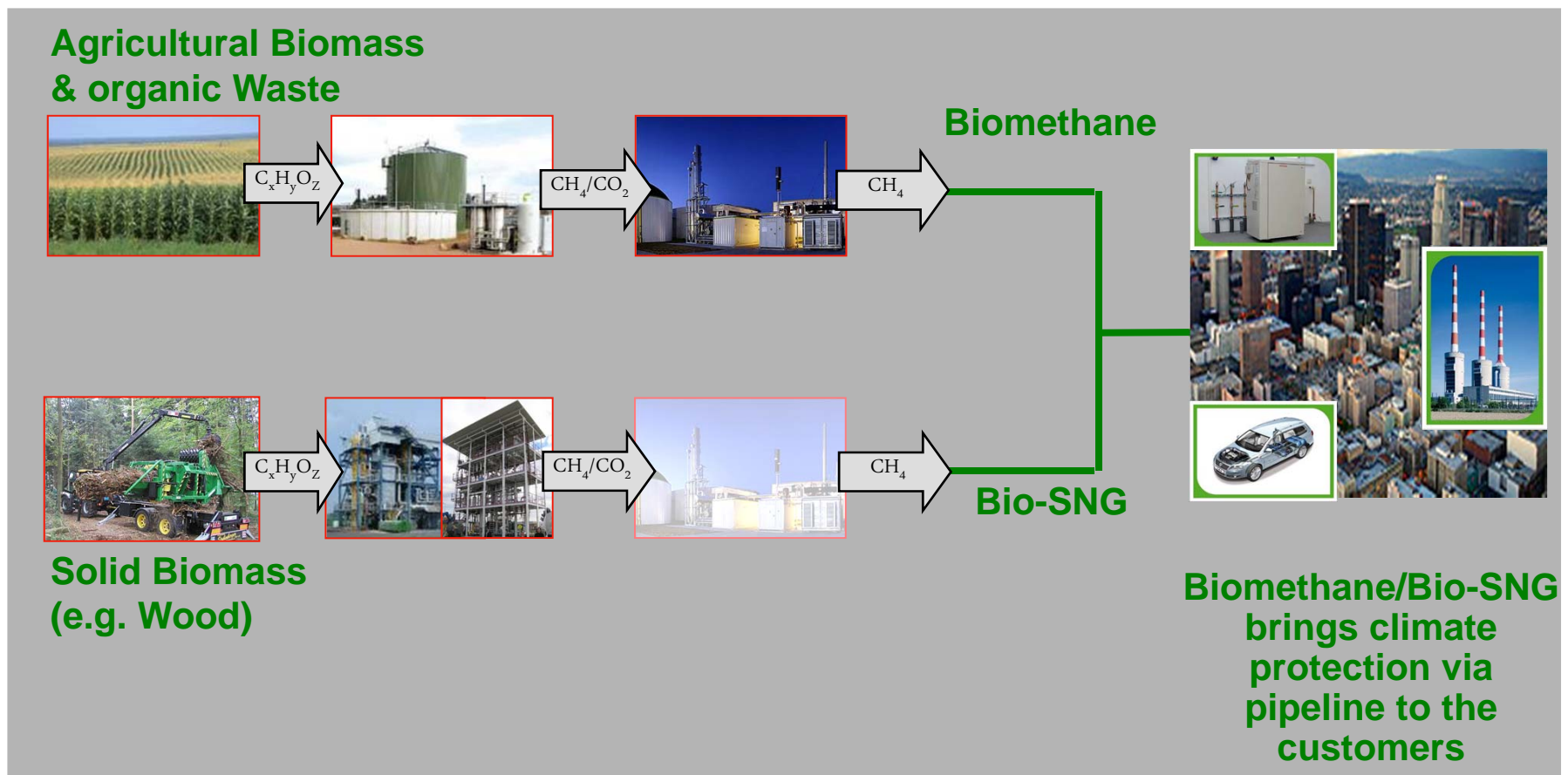


# Today's System of Natural Gas and Power Supply





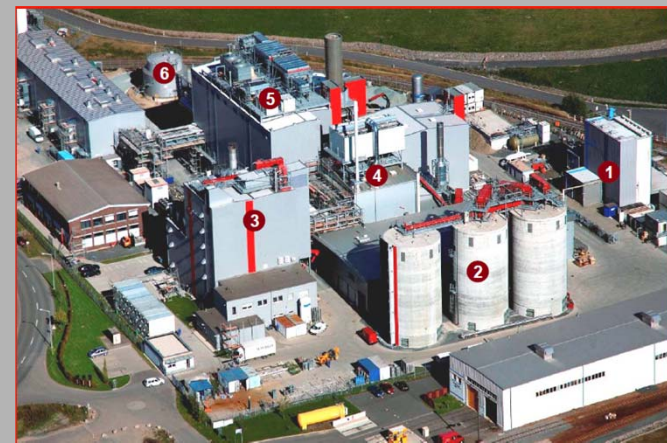
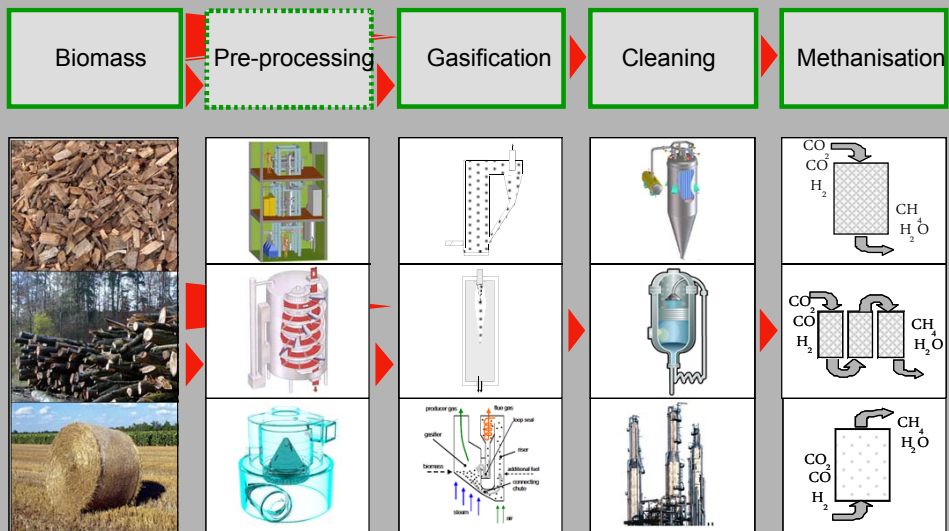
# Natural Gas is the most efficient „carrier“ for Biomass





## 2<sup>nd</sup> Generation Biomethane from solid Biomass

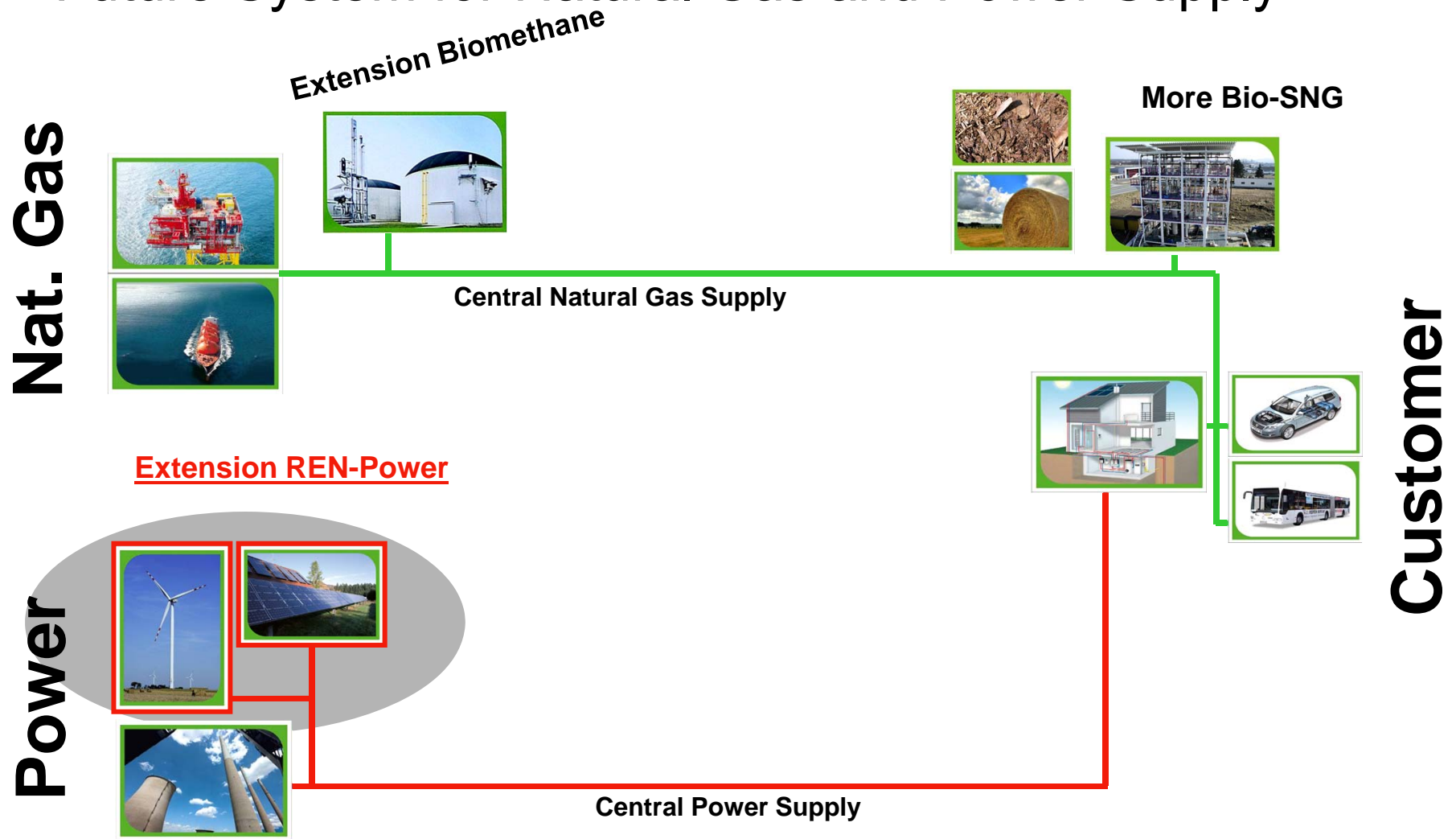
Complex industrial plants



Perspective:

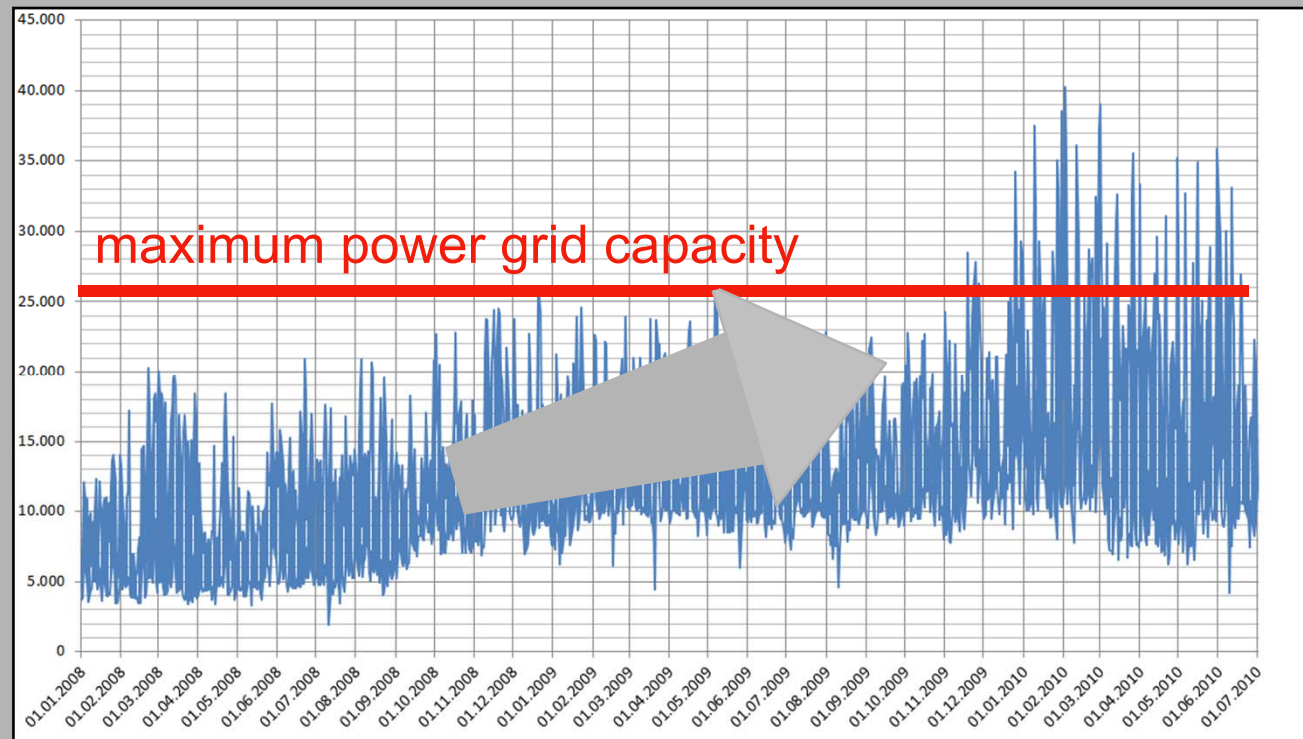
- Enlarged biomass basis
- lower GHG Emissions  
(up to -90% in comparison to Natural Gas)
- Lower specific production costs

# Future System for Natural Gas and Power Supply



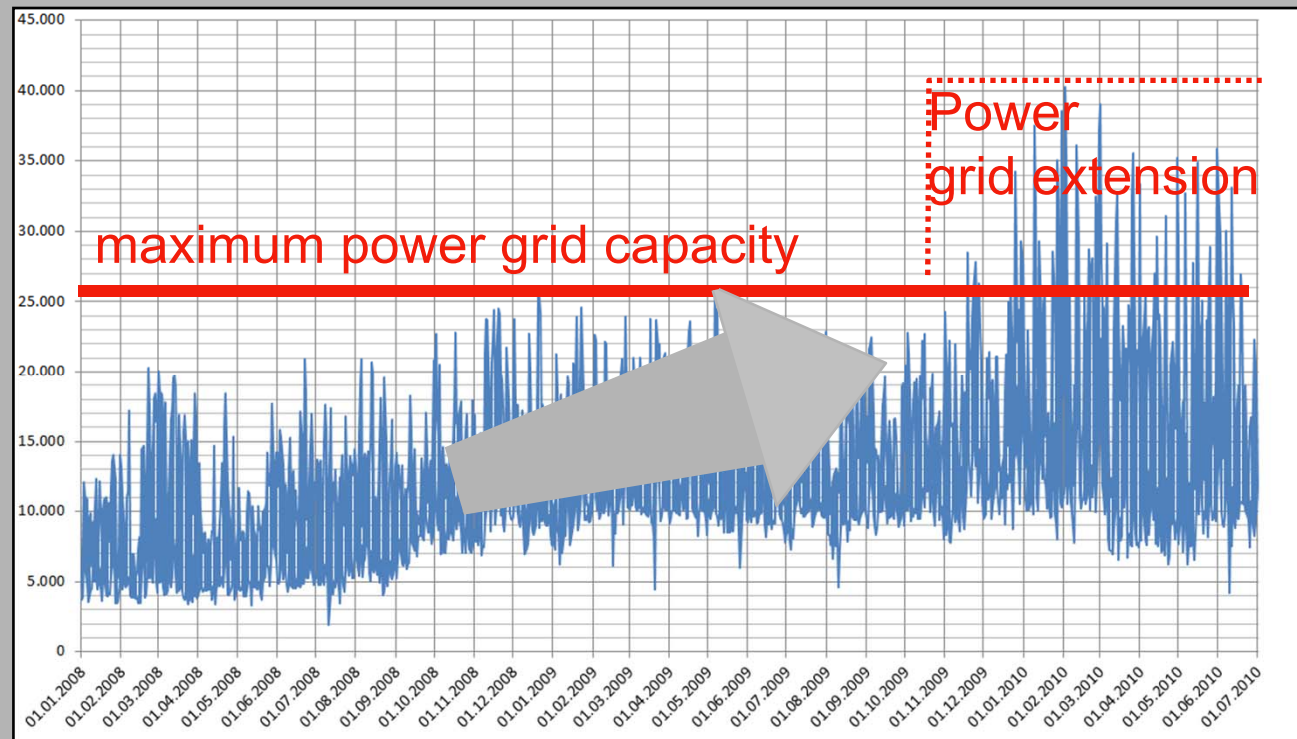
## Wind Power Generation 1 Jan 2008 – 1 Jul 2010

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



## Wind Power Generation 1 Jan 2008 – 1 Jul 2010

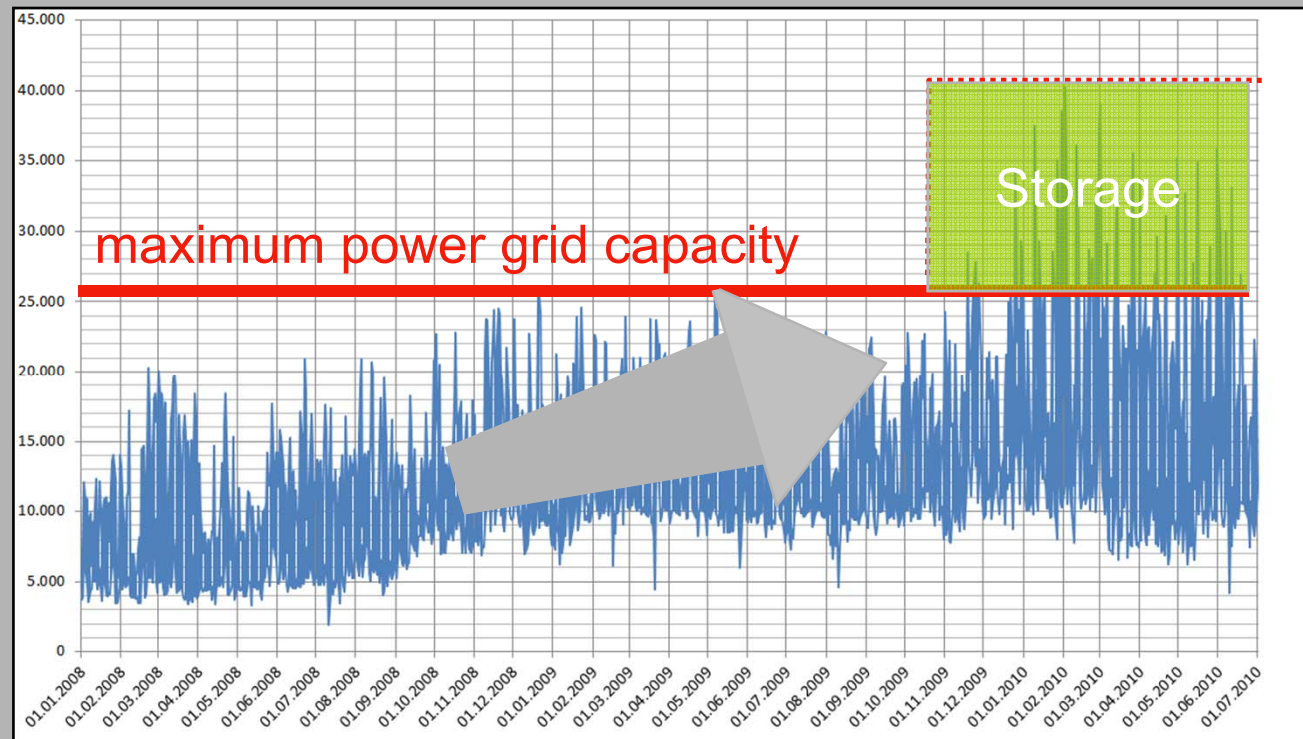
- volatile
- increasing
- more wind power than power network capacity





## Wind Power Generation 1 Jan 2008 – 1 Jul 2010


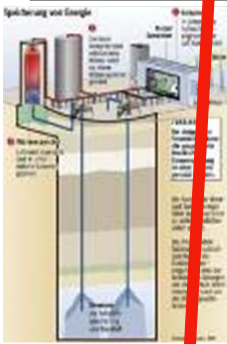



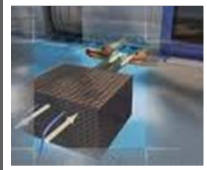
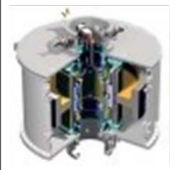

- volatile
- increasing
- more wind power than power network capacity



## Energy Storage

### Long-term storage

### Short-term storage

Proven technology	Room for improvement	New technologies	Known technologies with potential for improvement			
Water reservoirs	CAES	H <sub>2</sub> integration in NG	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



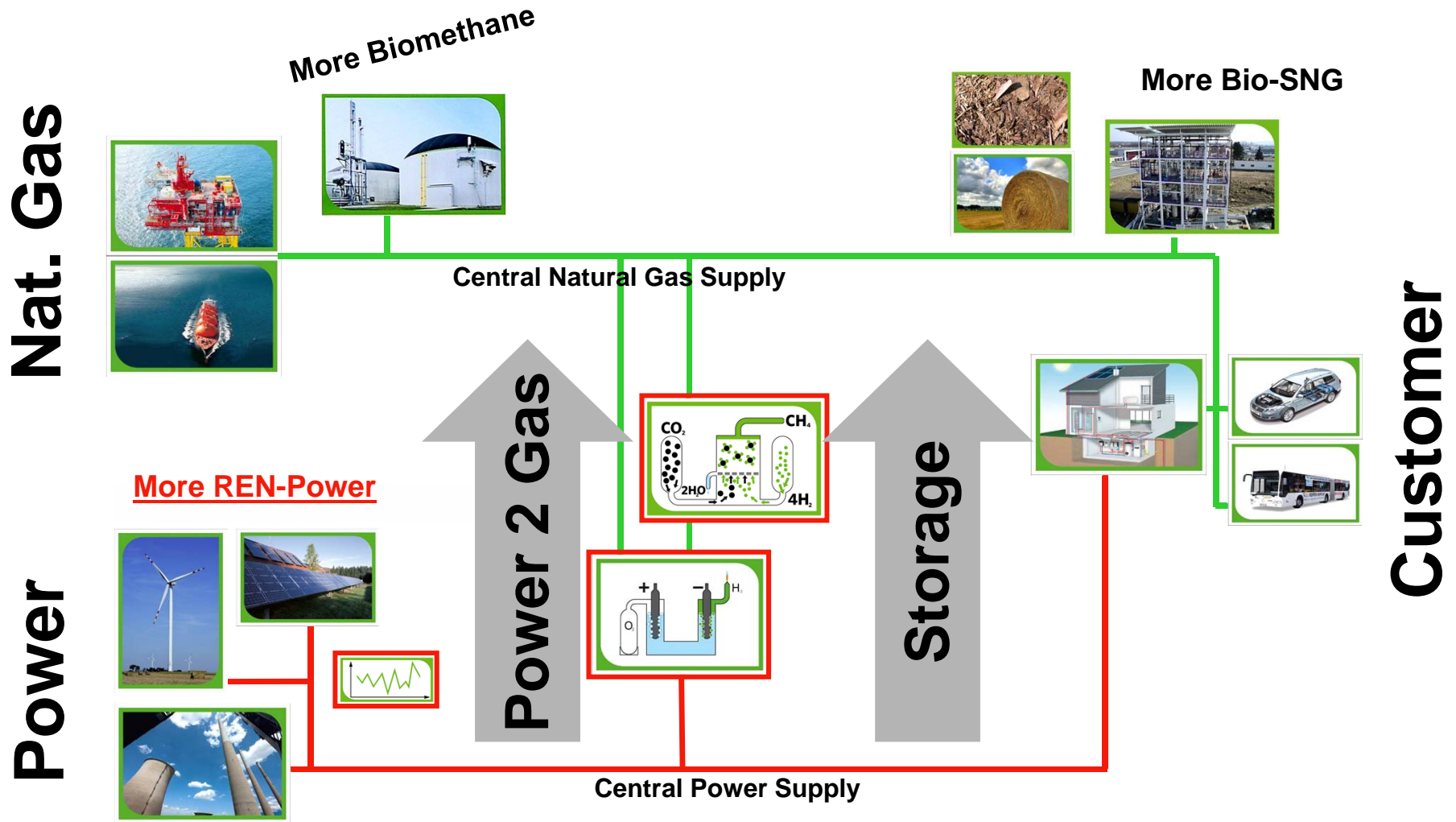
Need for further R&D



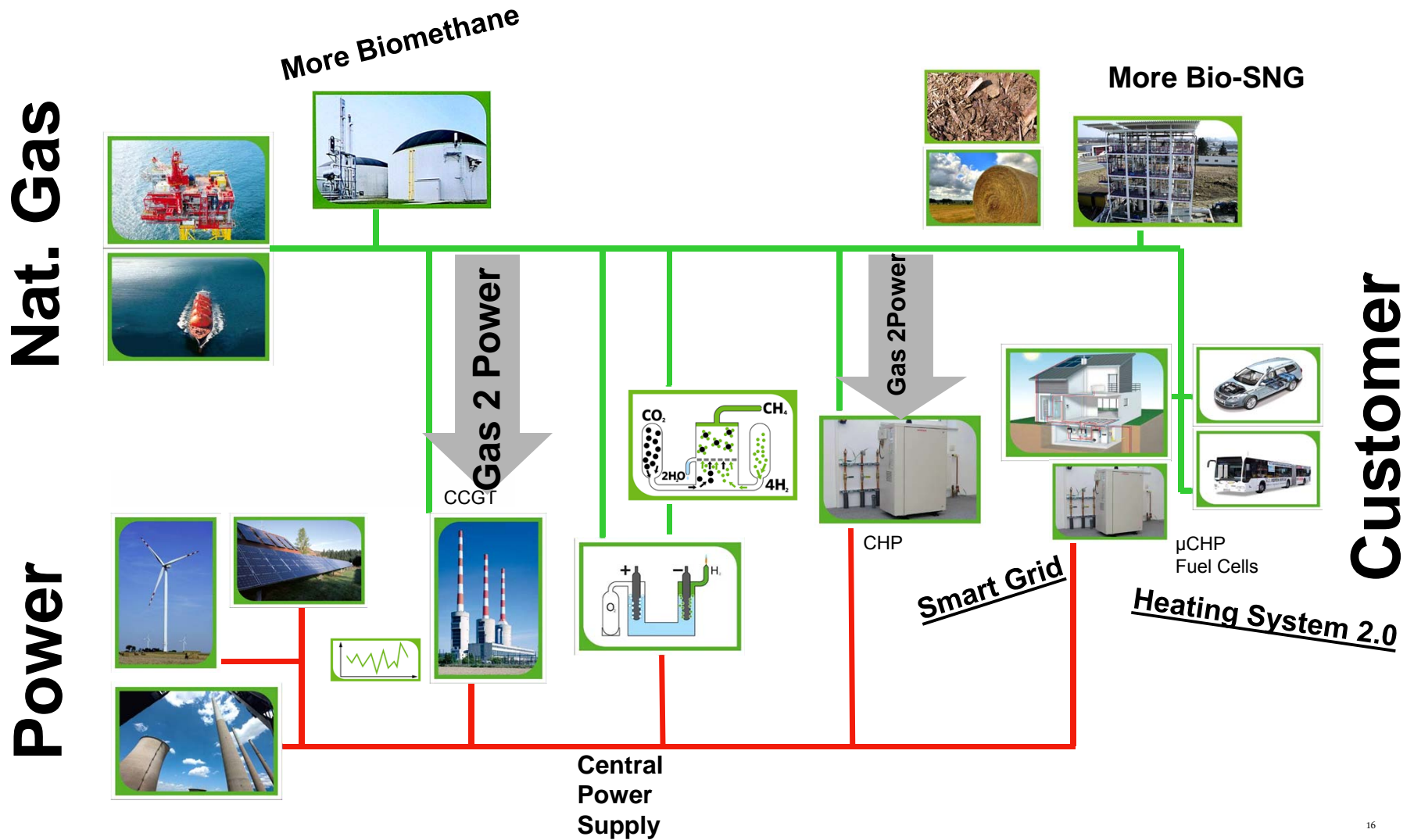
Important for CHP optimization



# Future System for Natural Gas and Power Supply



# Future System for Natural Gas and Power Supply



## 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“**



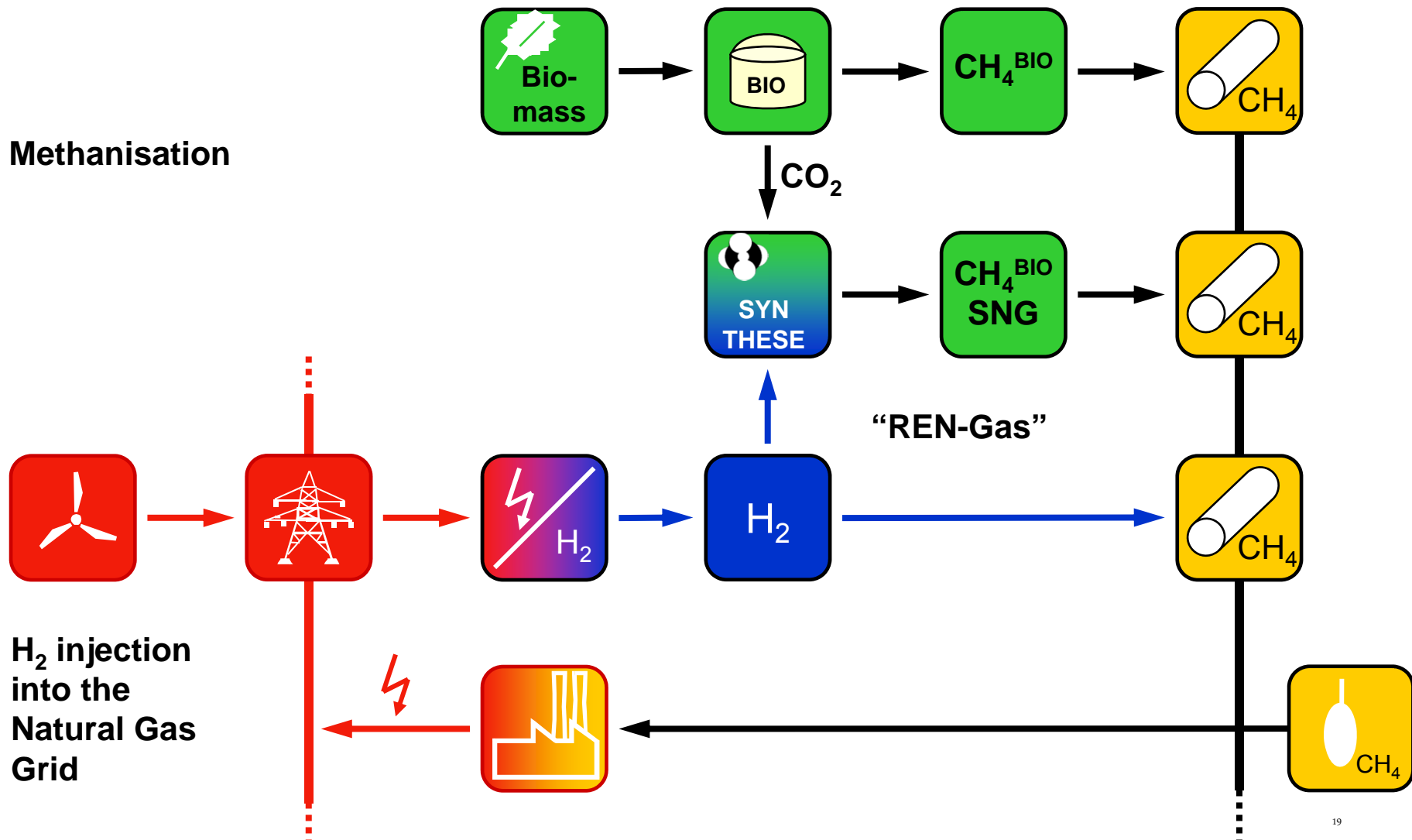
Thank you for your attention



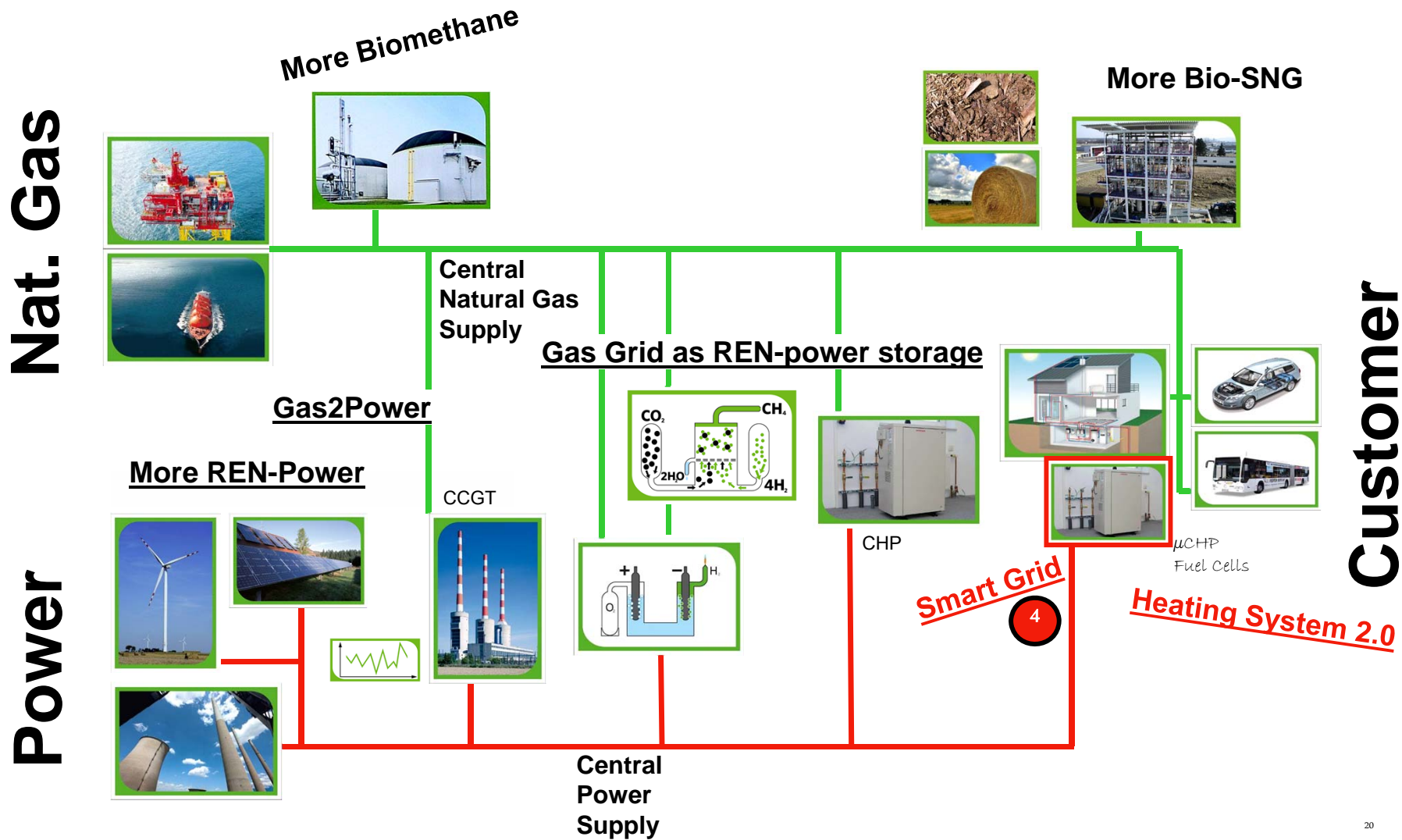
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2 Natural Gas Grid: integrates fluctuating REN-power



# Future System for Natural Gas and Power Supply





## 4 Heat market innovation pathway

