Establishing a European Green Gas Market

- Steps toward a low carbon economy

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Facts about Energinet.dk

- Independent Public Enterprise
  - Owned by the Danish State
- Non-profit self sustainable company
- Owns and operates the backbone of the energy infrastructure
  - 400 kilovolt High voltage electricity grid
  - 80 bar high pressure gas lines
  - Nord Pool Spot
  - Nord Pool Gas
- Conveys a number of energy related public functions
  - Subsidies for green energy production
  - Funds energy research
- Member of The European Network of Transmission System Operators for Gas/ Electricity (ENTSOG/ ENTSOE)

Working towards a CO2 neutral energy system

- Fossil free energy system 2050
- 50% wind 2020
- Smart grids as an intelligent power system
- Potential for gas in the transport sector
- LNG as a low carbon option for ships
- Interlinking wind and gas systems
- Renewable gasses as a supplement to natural gas

Agenda

- What is Renewable Gas?
- Energinet.dk's vision for RE-gasses
- Market integration of RE-gasses
- Virtual upgrade ?

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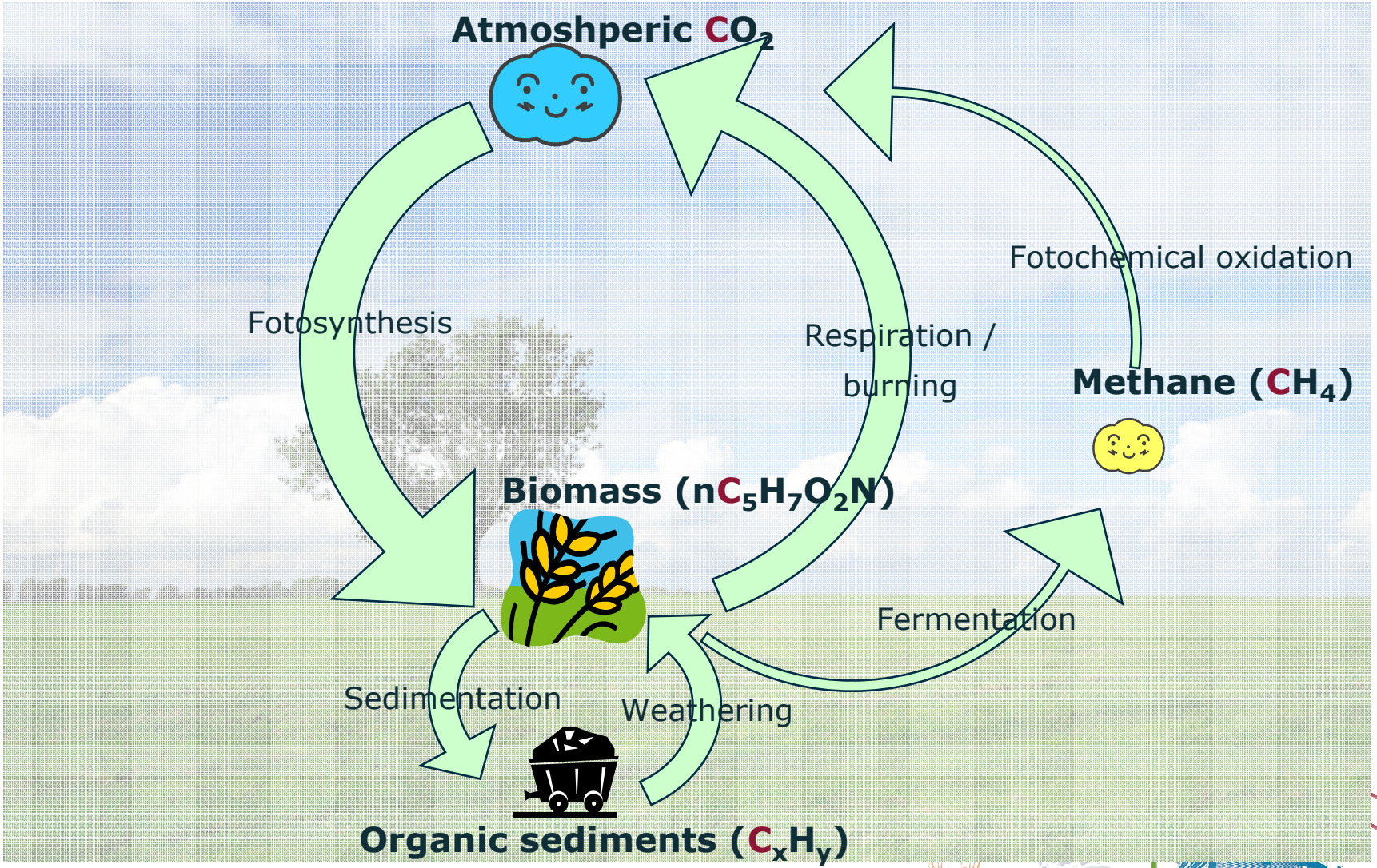
The natural carbon cycle



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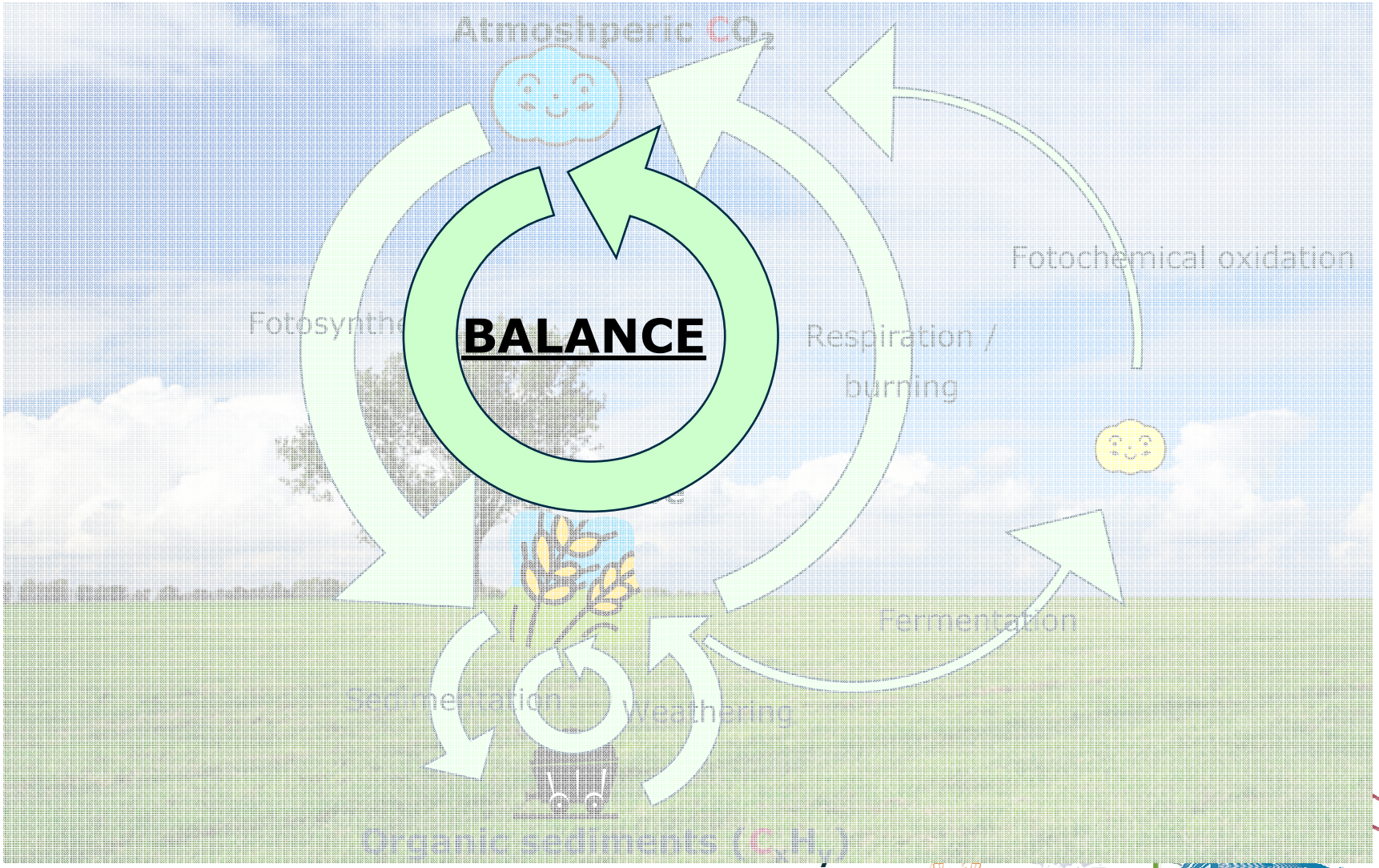
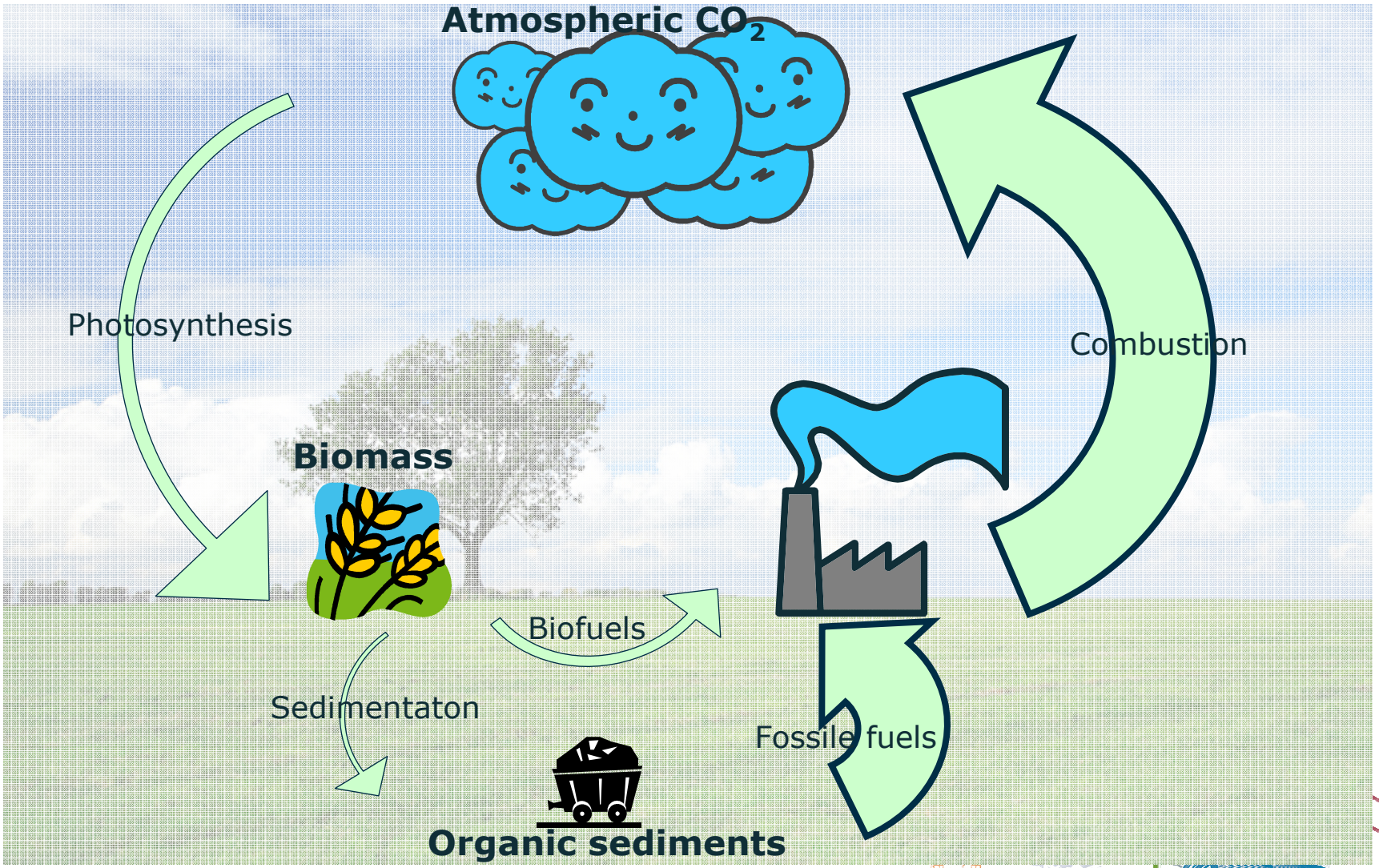


The carbon cycle in the present day energy system



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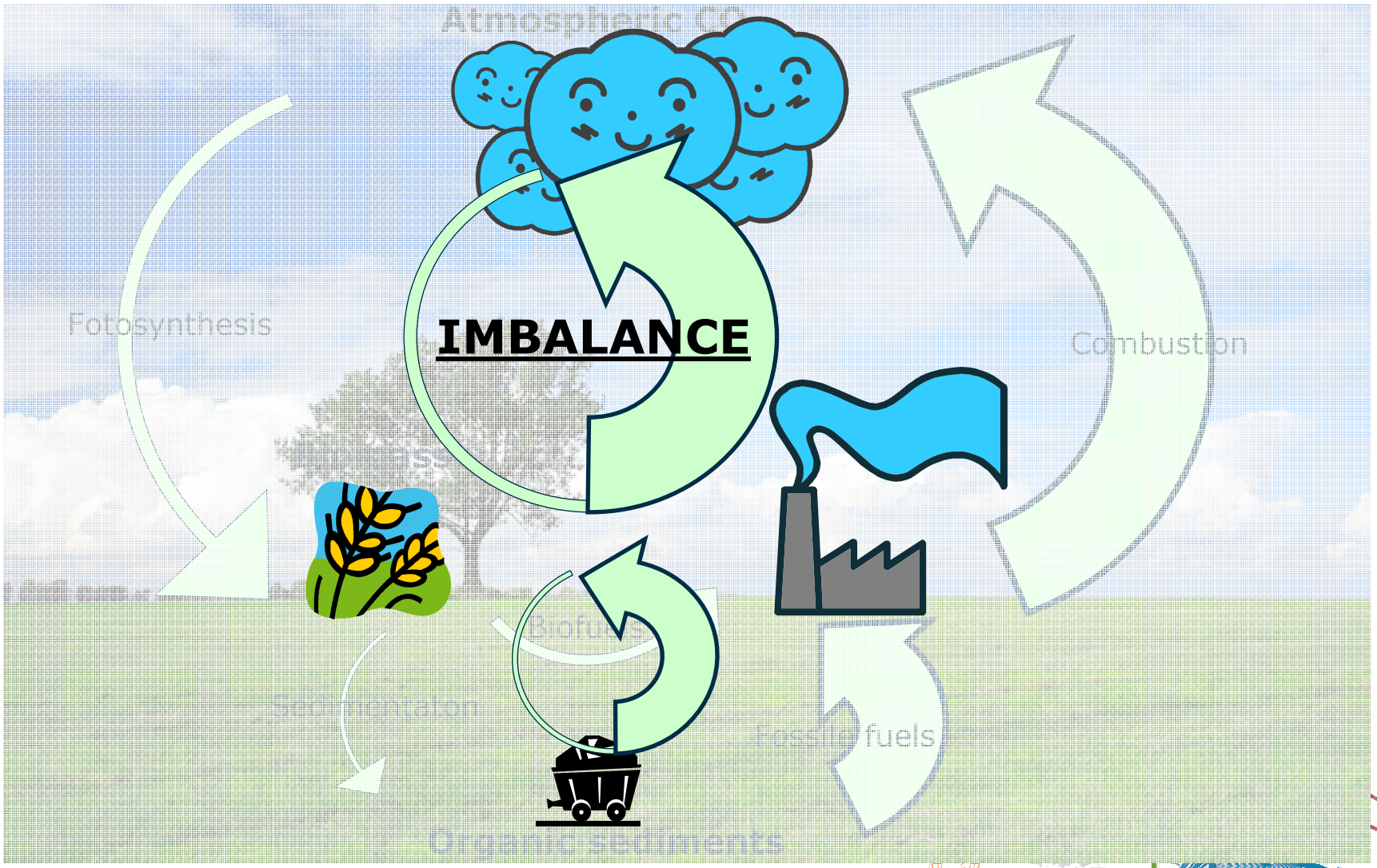
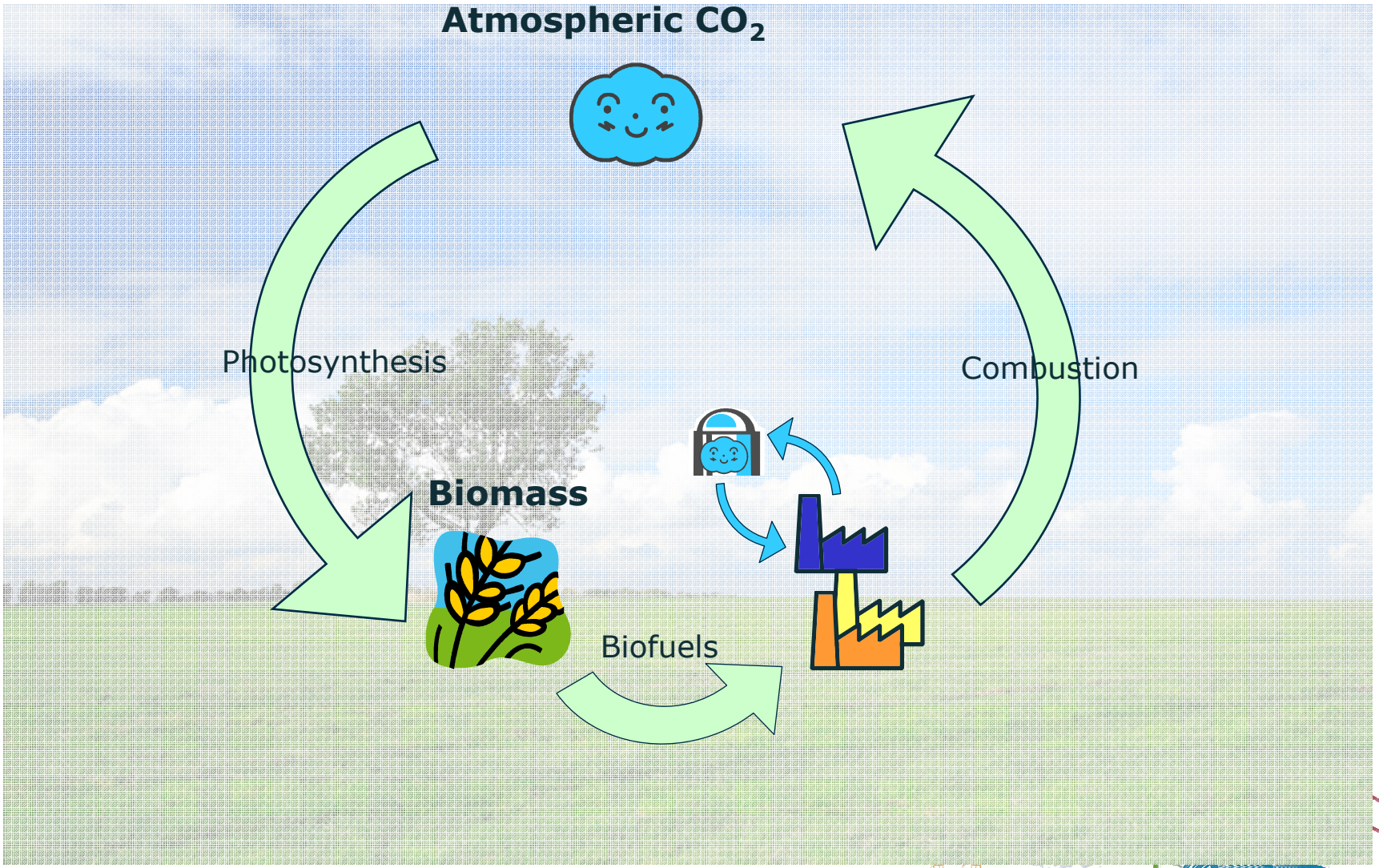
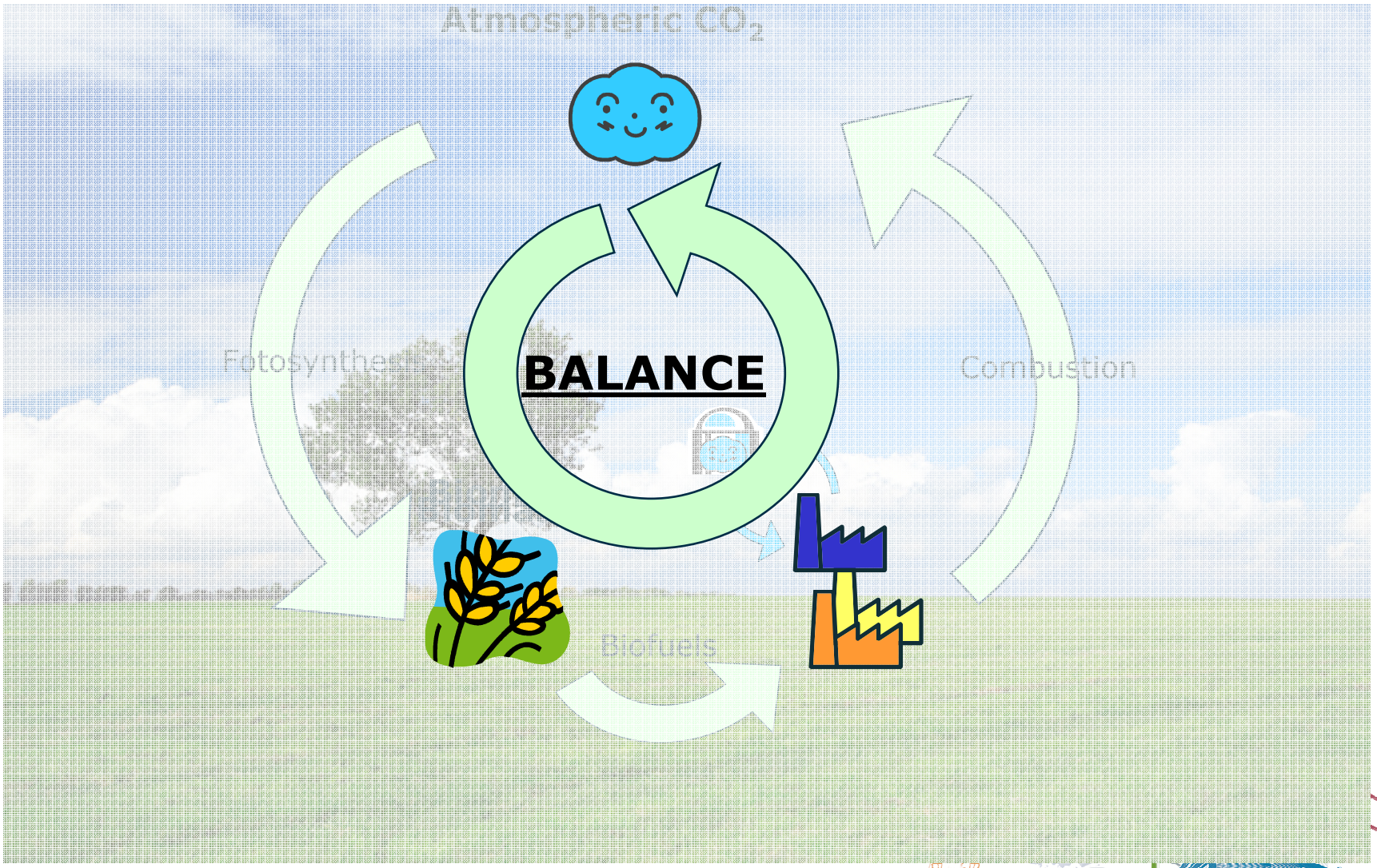


Definition on Green Gasses

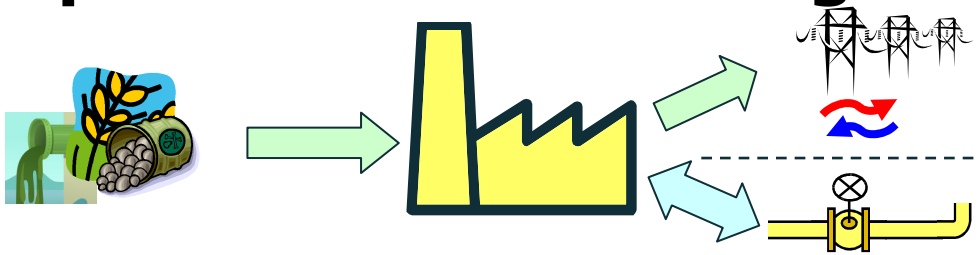


Green gas carbon cycle



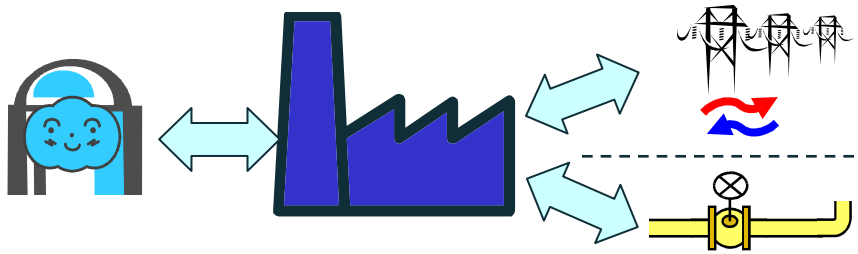
Green gas production technologies

Biogas



Thermal gasification

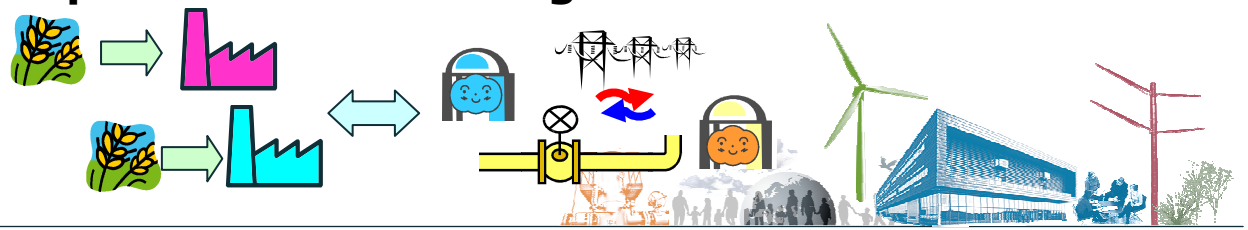
Catalytic gasification (SOEC/SOFC)



+ other many other new production technologies

- Elektrofilic bacteria

- Hydrogenisation of biomass



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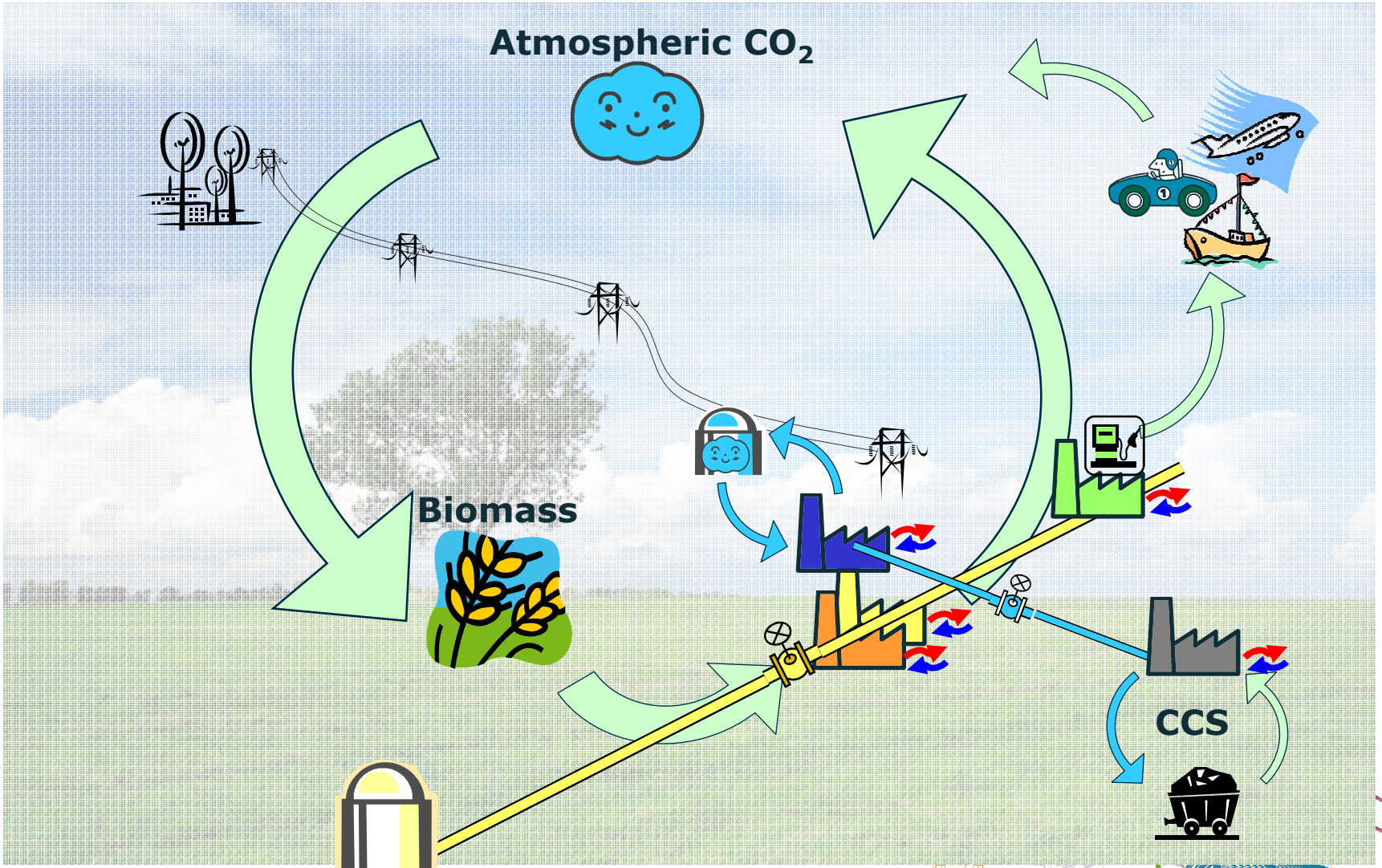
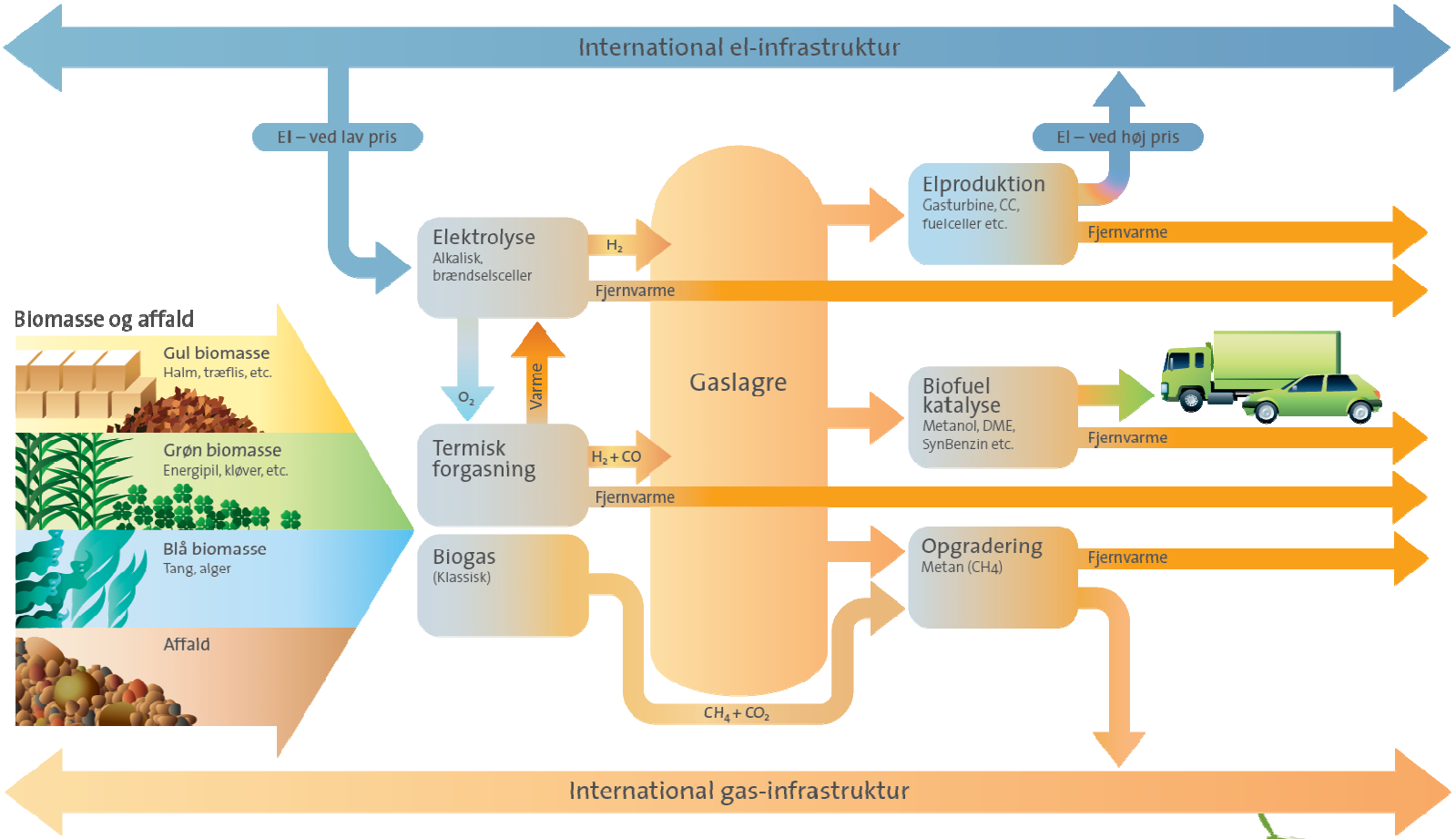
Green gasses in the energy system

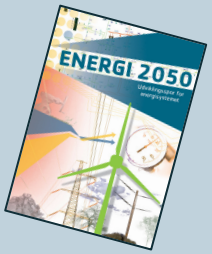


The energy system of the future
- the gas system as a stable foundation



Indhold

Four scenarios to 2050 –> focus on wind-scenario



Fossil-free

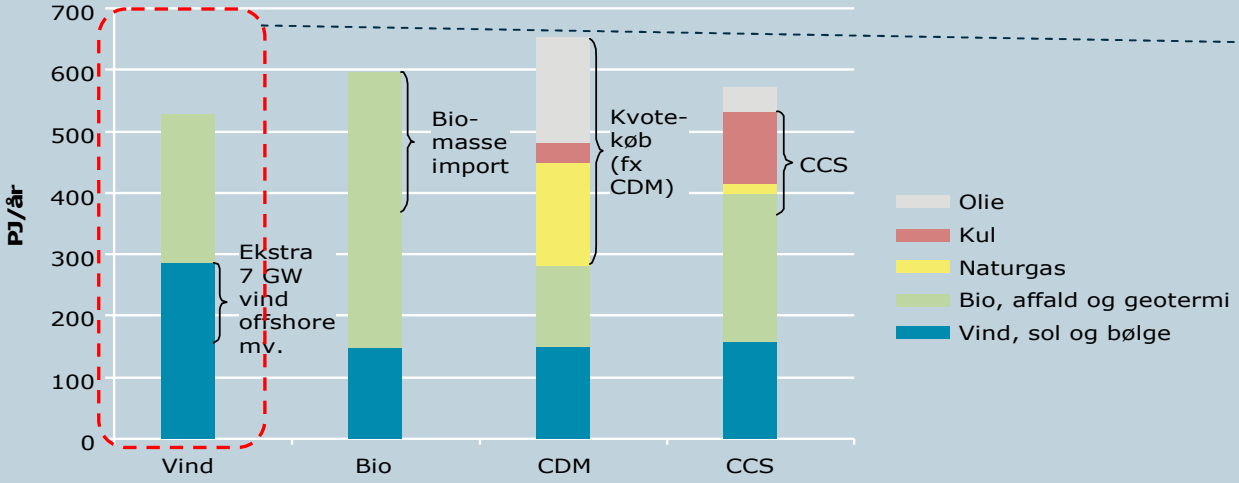
CO2 neutral

Wind-scenario
Limited biomass (200 PJ)

Bio-scenario
Unlimited biomass

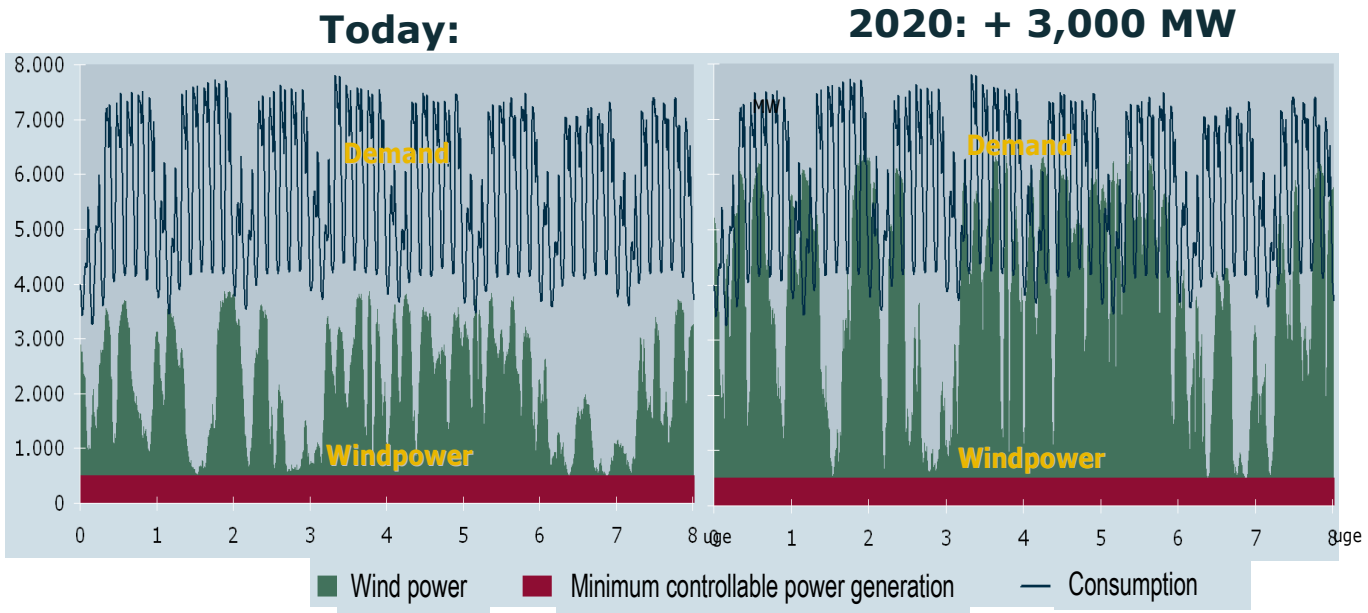
CDM-spor
50% CO2 reductions in DK

CCS-scenario
100 % CO2 reductions in DK



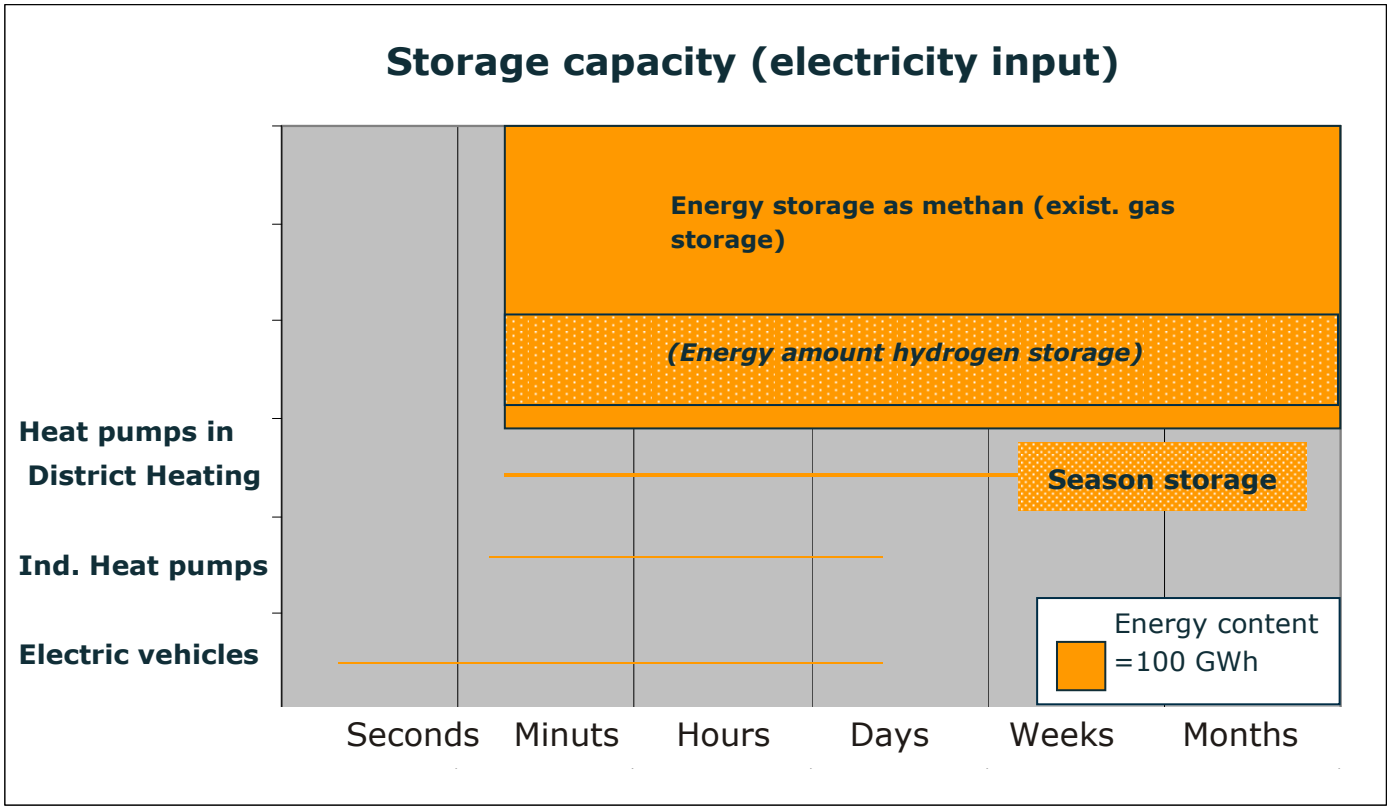
Windpower a huge ressource in the Nordic region

Integration of additional 3,000 MW wind power– a for vision 2025



2050
17 GW vind ?

Power balancing and stability in power system



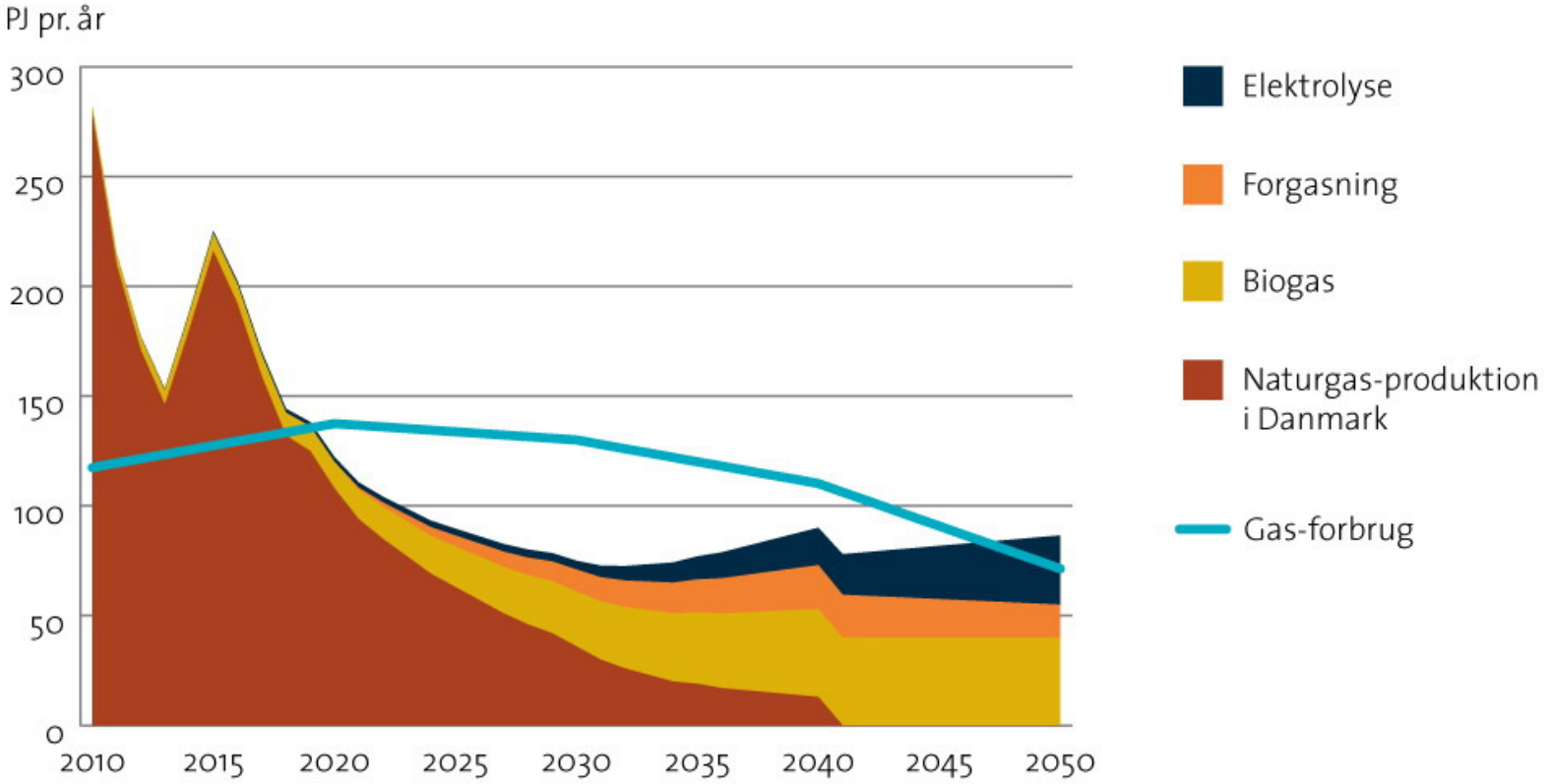
Investment prices (2050) in energy storage

0,5 DKK/kWh (methan)

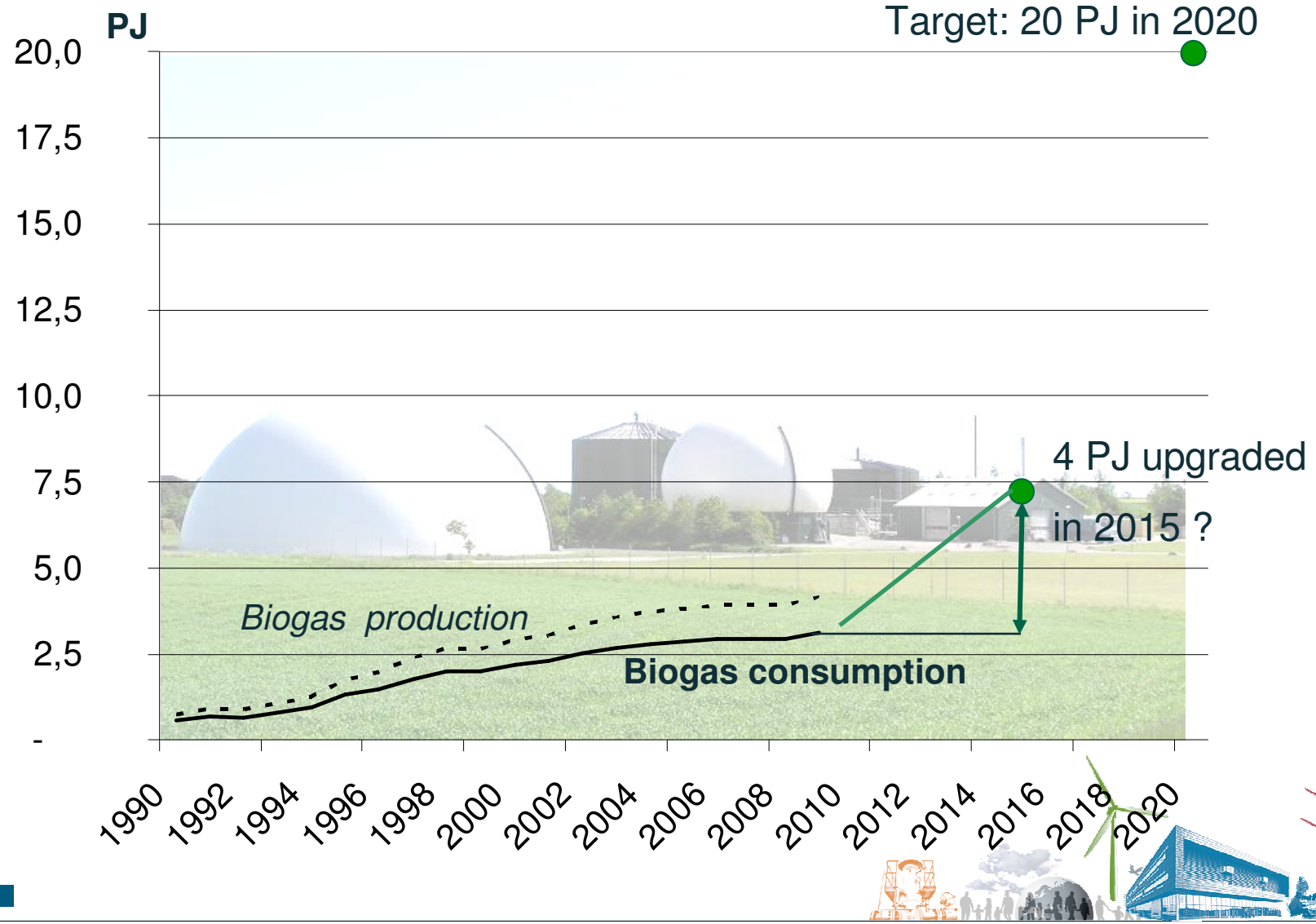
3-7 DKK/kWh (heat)

Electric batteries (VRB):
200-600 DKK/kWh (el)

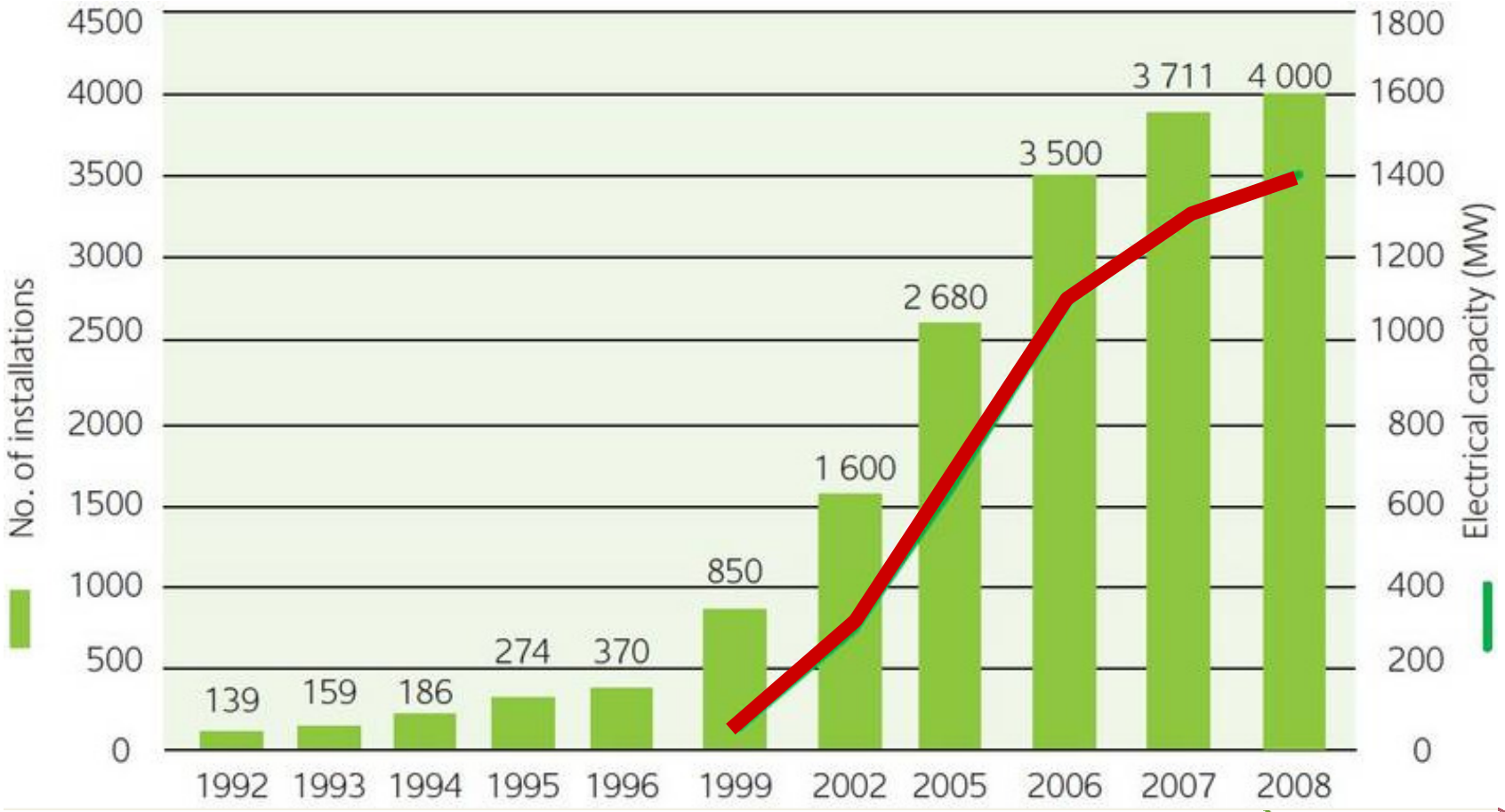
2025 – natural gas, 2050 Green gas



Danish Biogas Production target



The Germans did it



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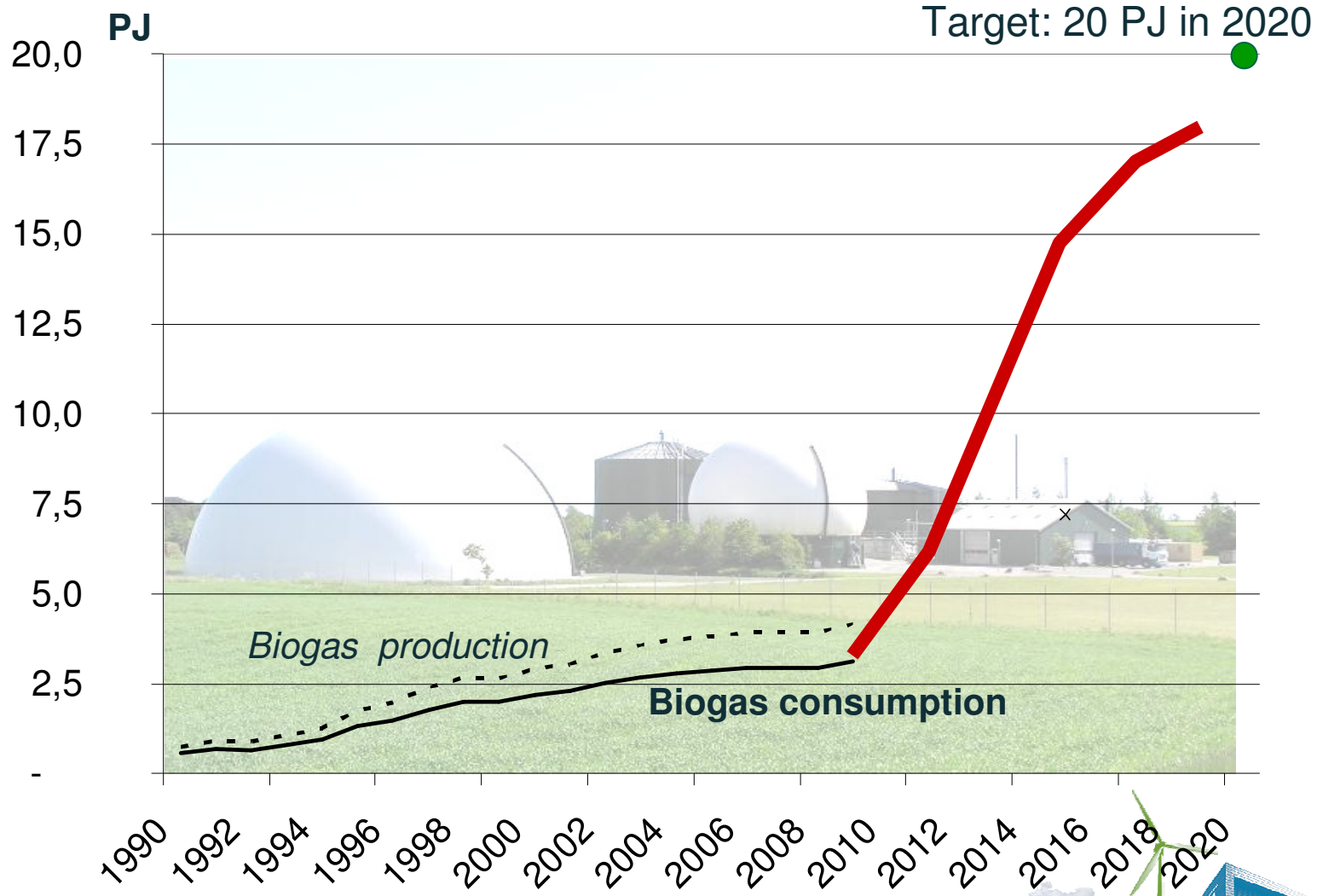

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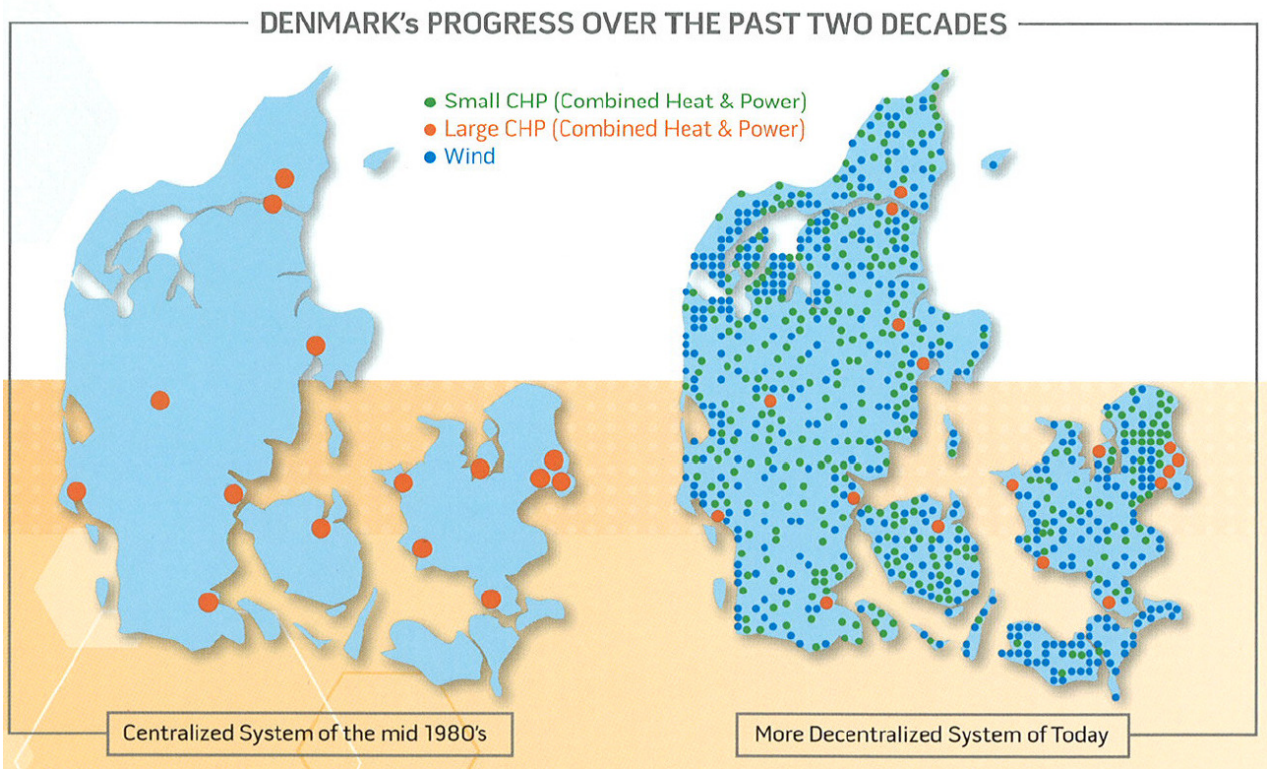
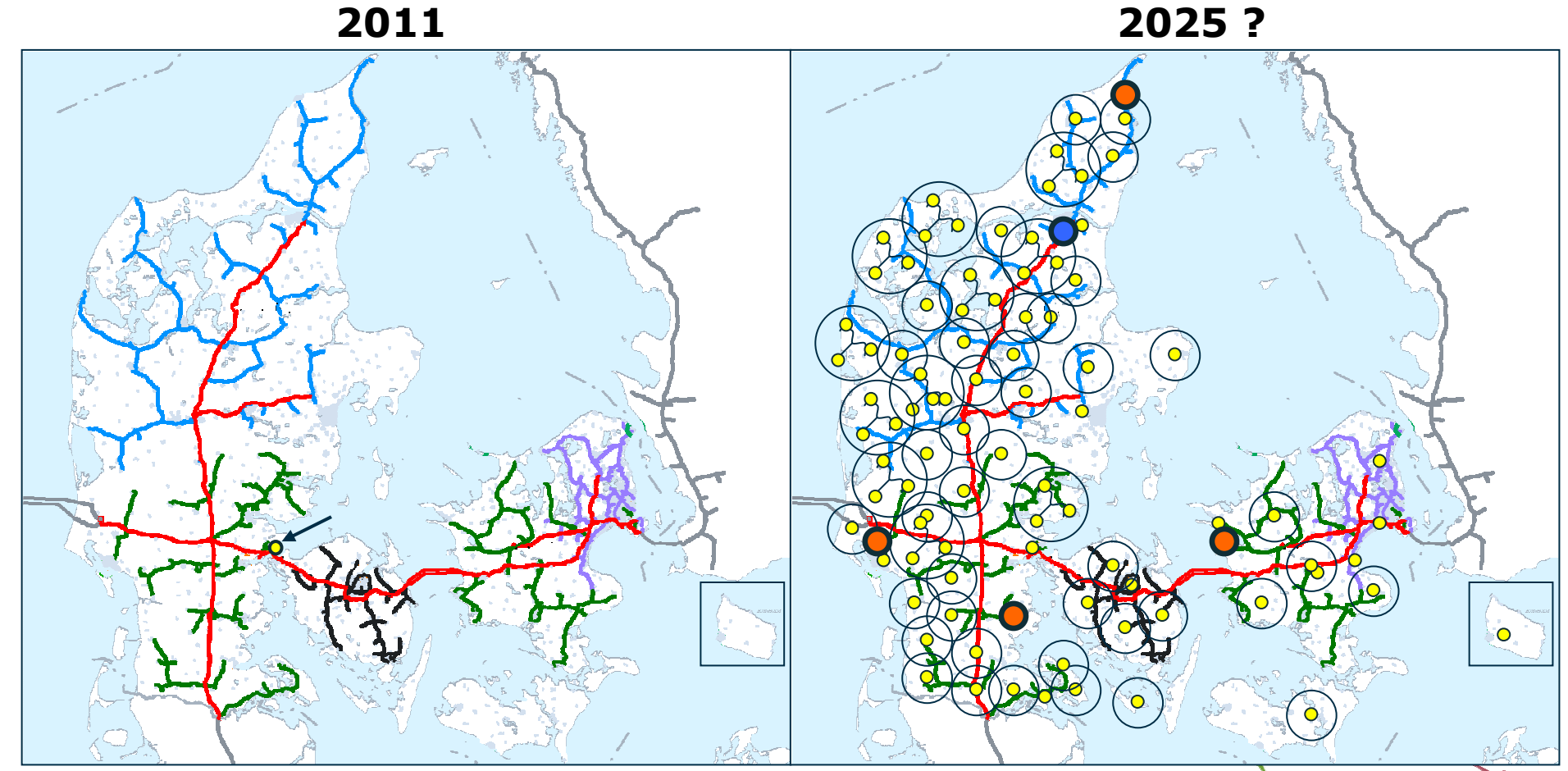
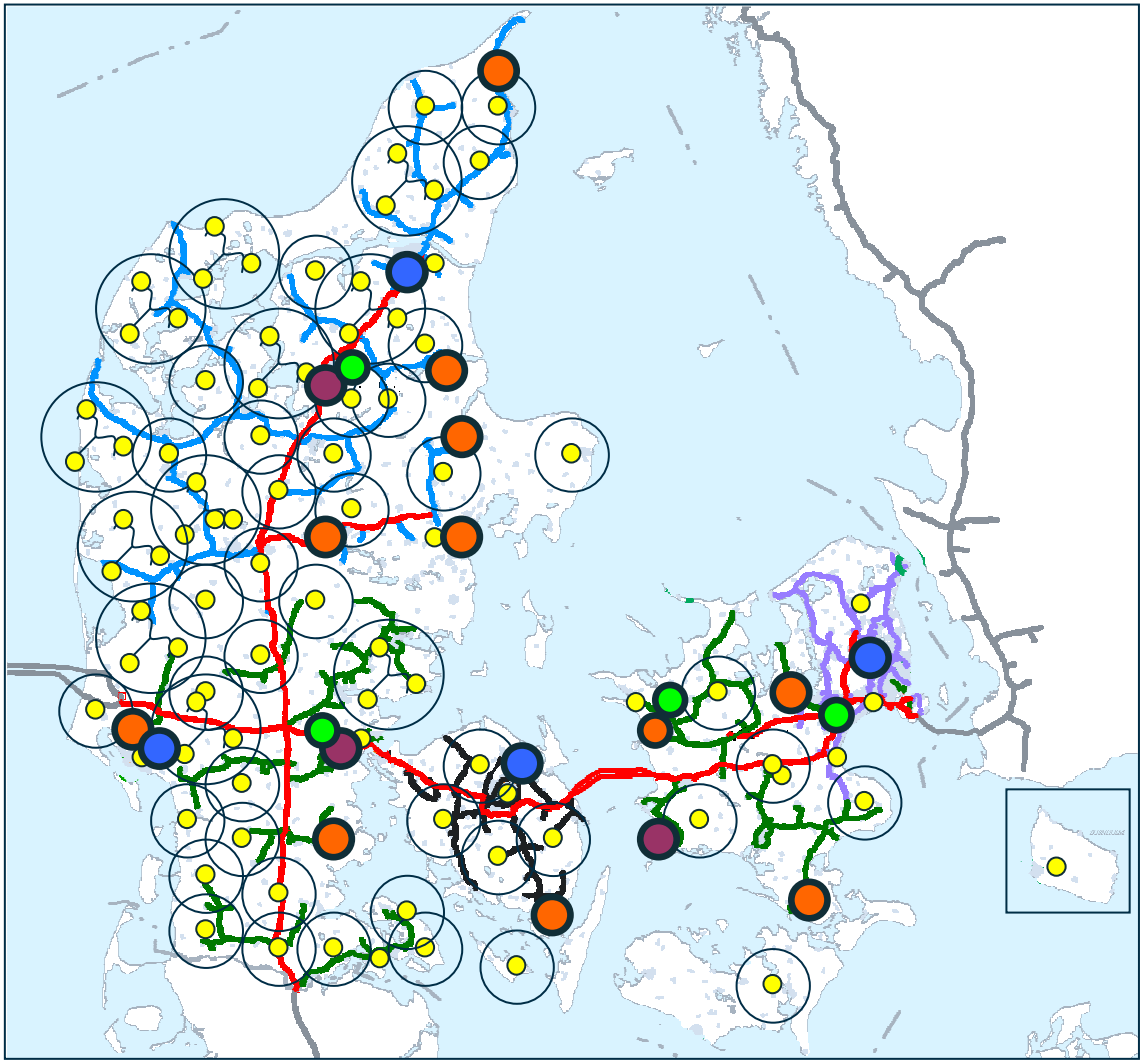
The development of the electrical grid 1980 - now



Development in the gas sector 2011 - ....

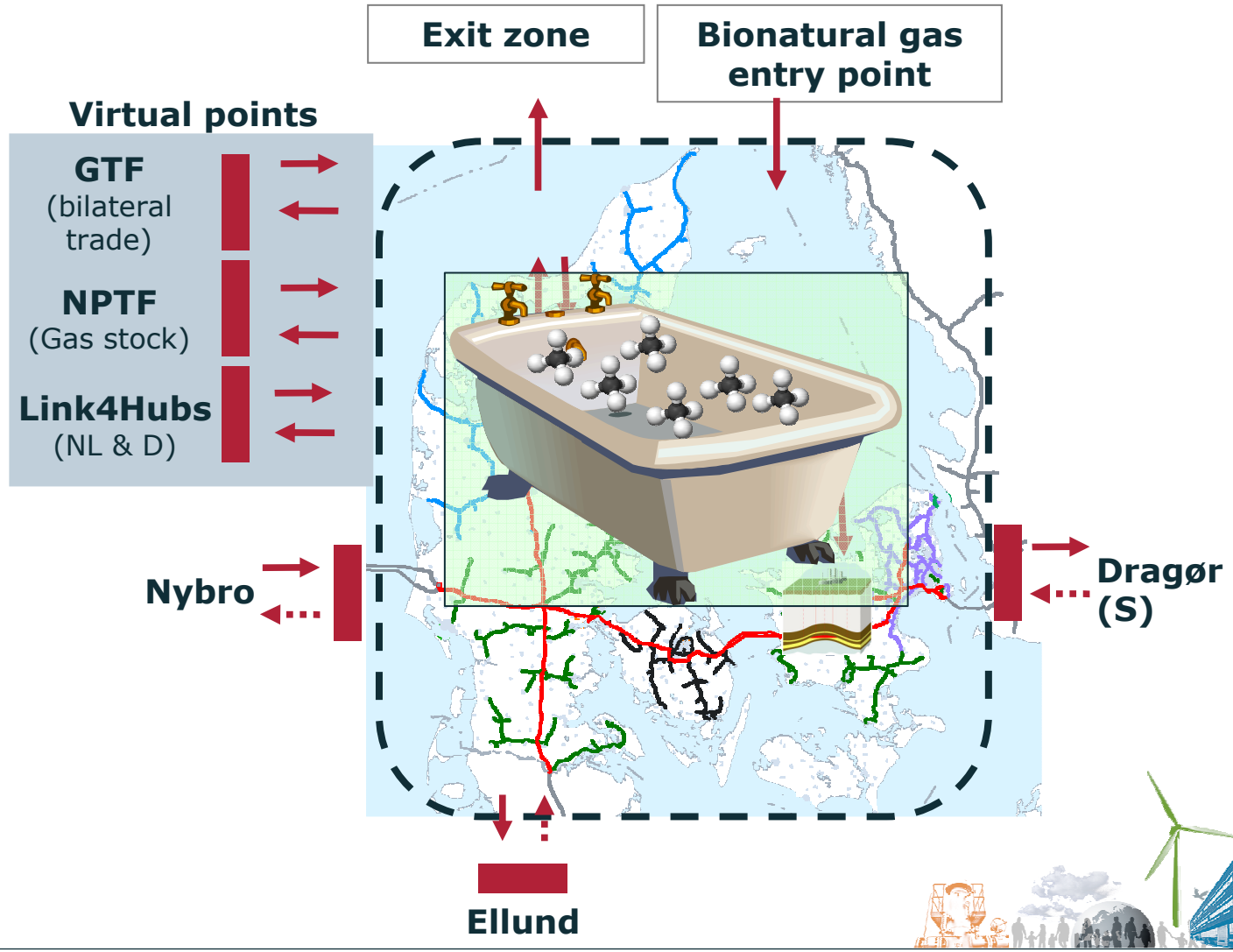


2050 ?

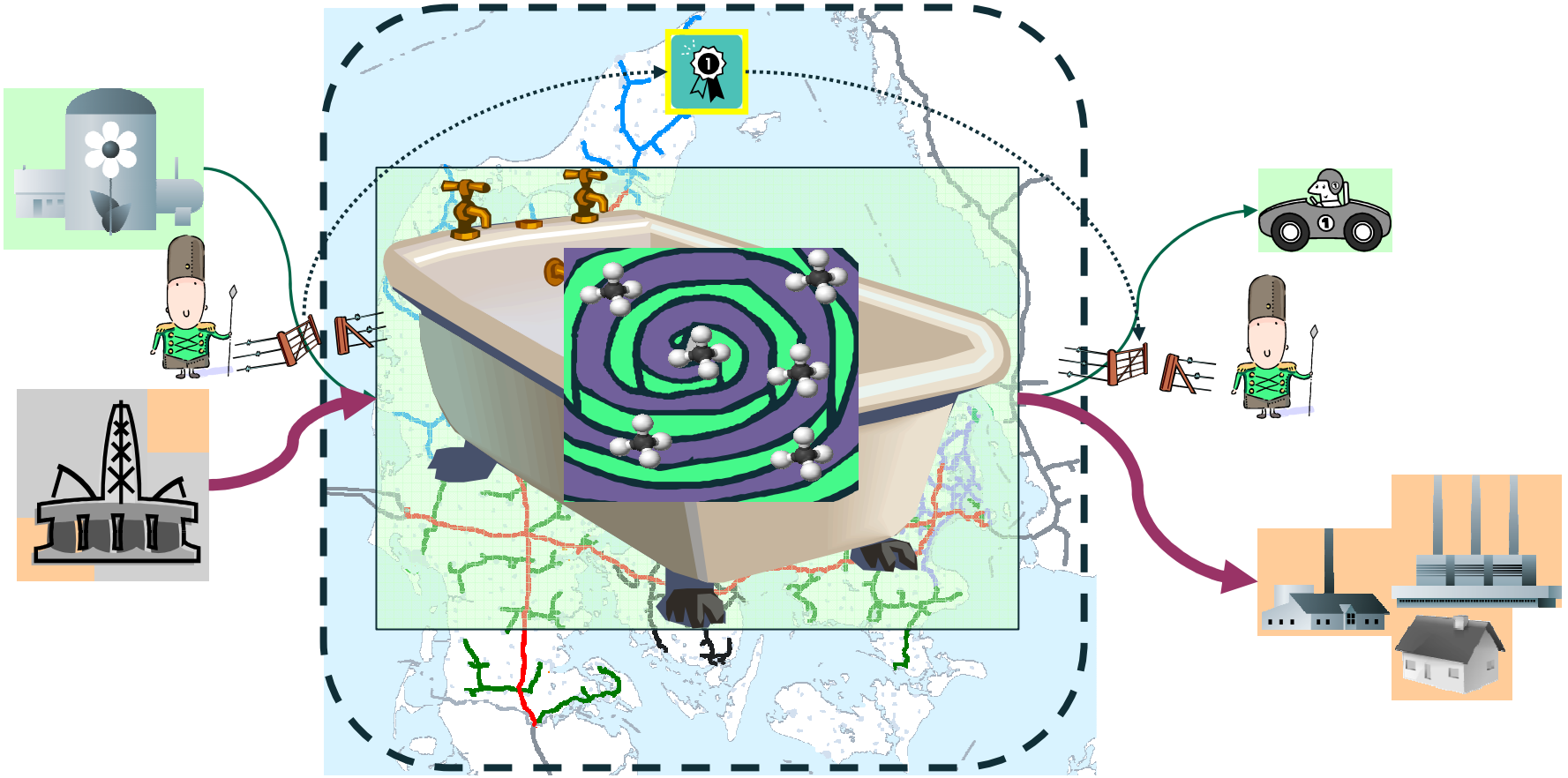


- Decentral production
- Different RE-gasses
- Several subnets
- Full biomass utilization
- CO2 as a resource
- A ”internet” or three

The Danish gas market

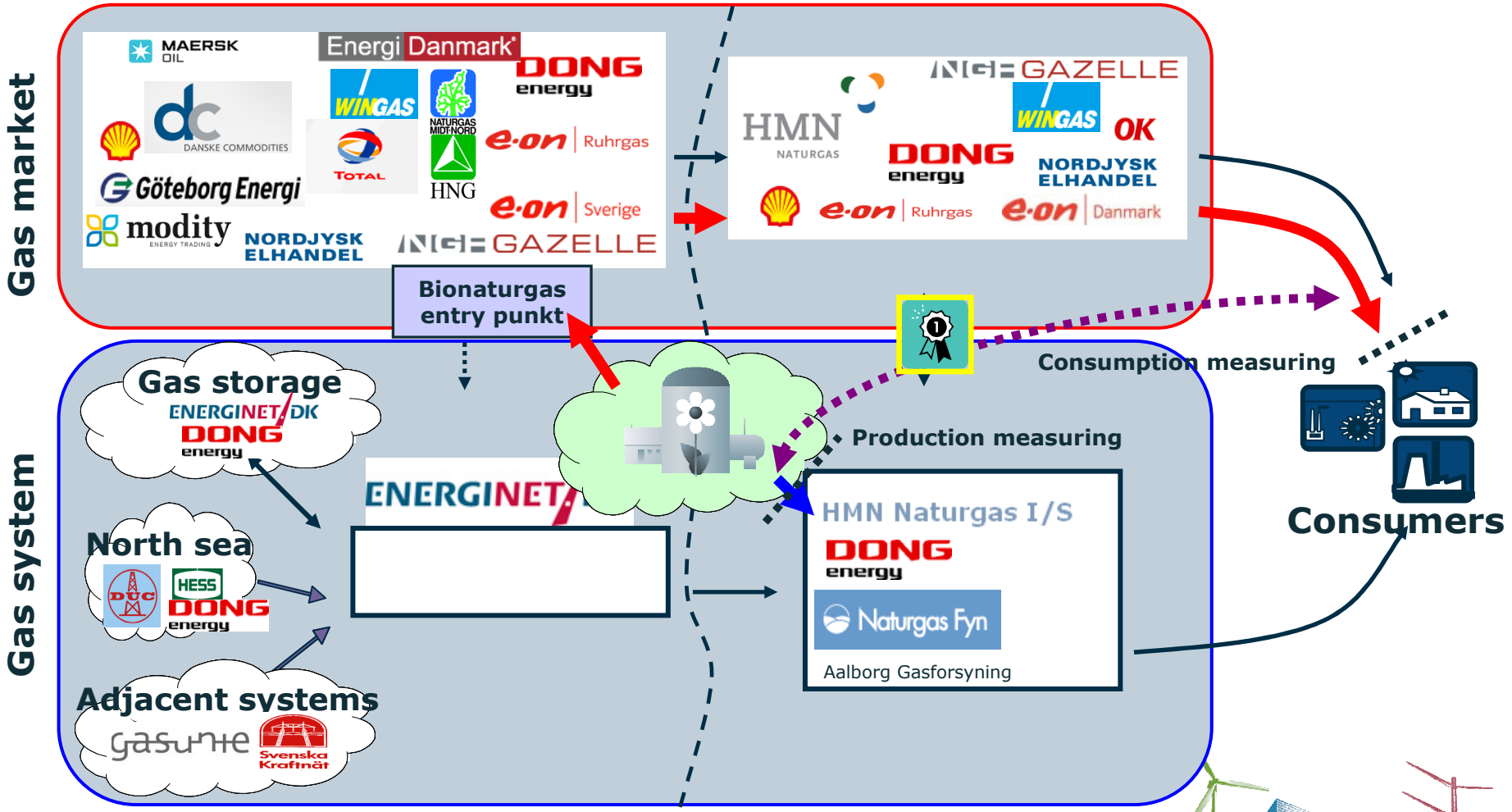


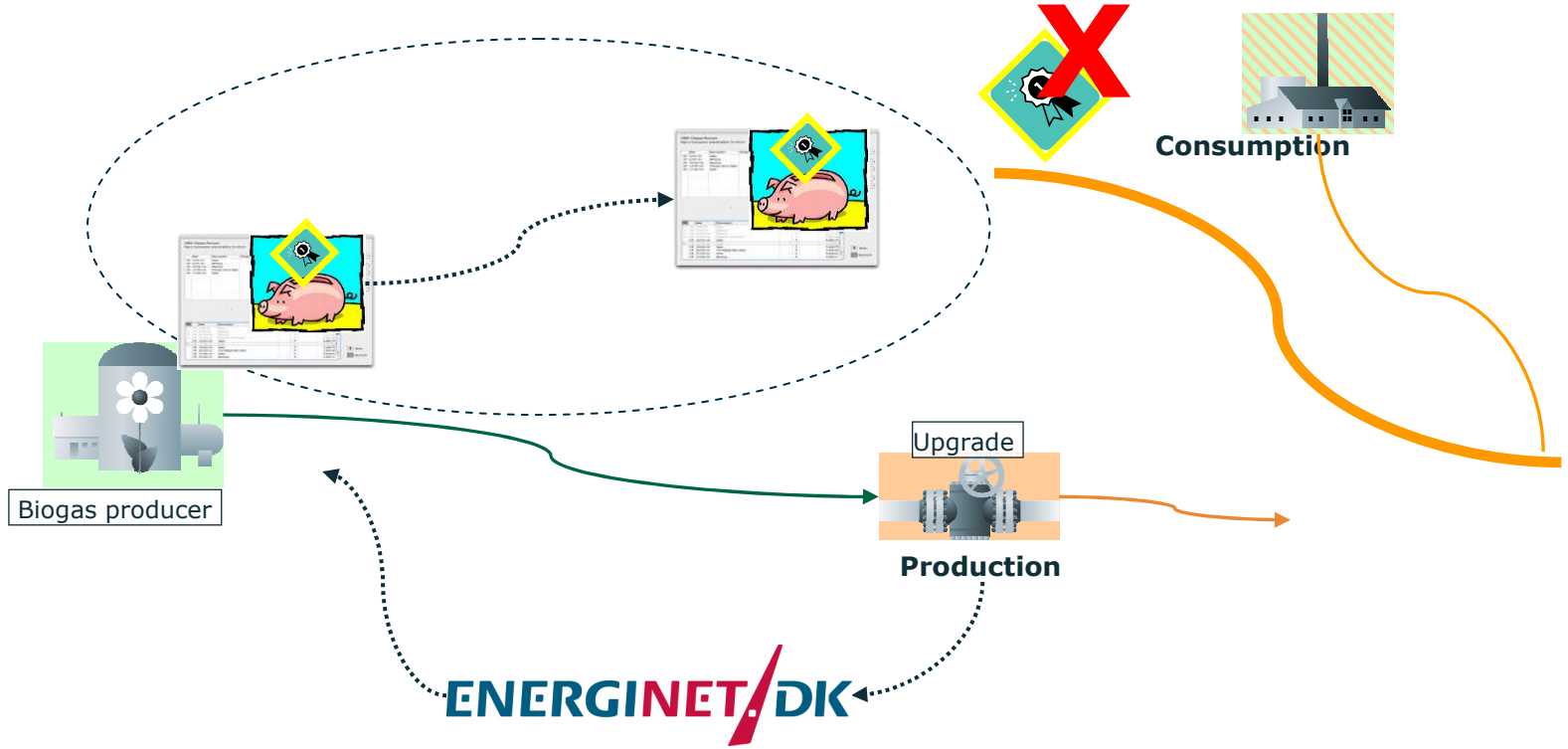
Potential barriers for biogas certificates



- Communication. Have to explain that gas trade is virtual
- Virtual trade in the ETS Directive -> redemption of CO2 qoutes
- Virtual trade in the RE Directive -> Biogas in transport and 20/20/20 target compliance

Biogas in the Danish Gas market model




Consumption
Upgrade
Biogas producer
Production
ENERGINET.DK

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OFFENDING COMMAND: ~

STACK:
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