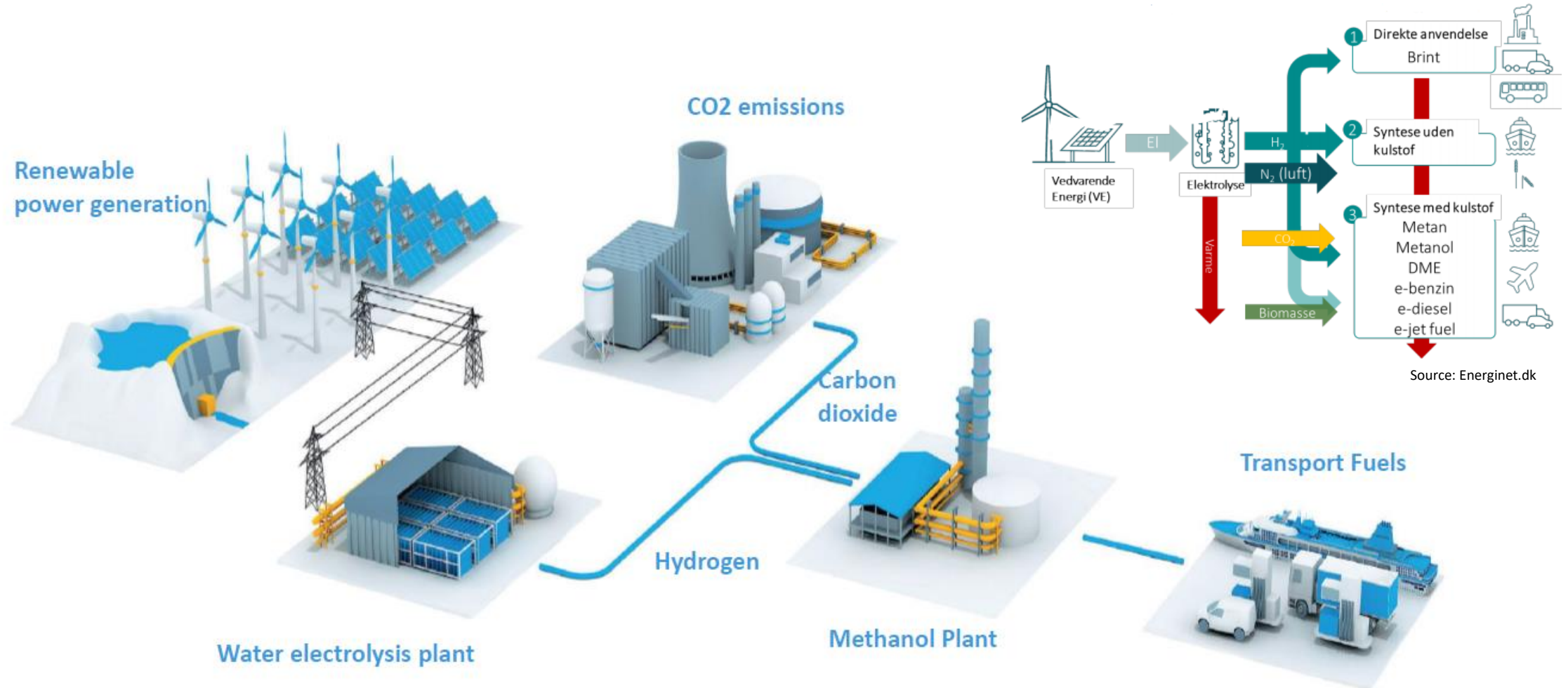


The potential for integration of Power2Met into biogas

Derya Topcu, Business Dev. Manager, Biogas / E.ON Danmark A/S

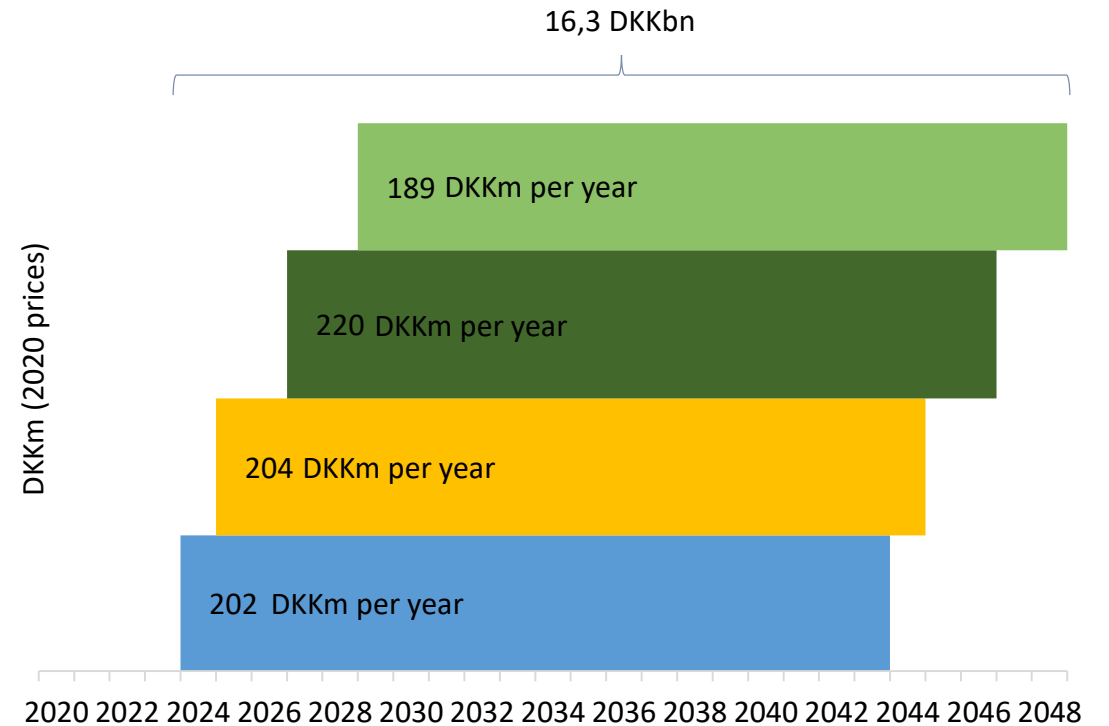
2020-10-06

eMethanol - The Value Chain

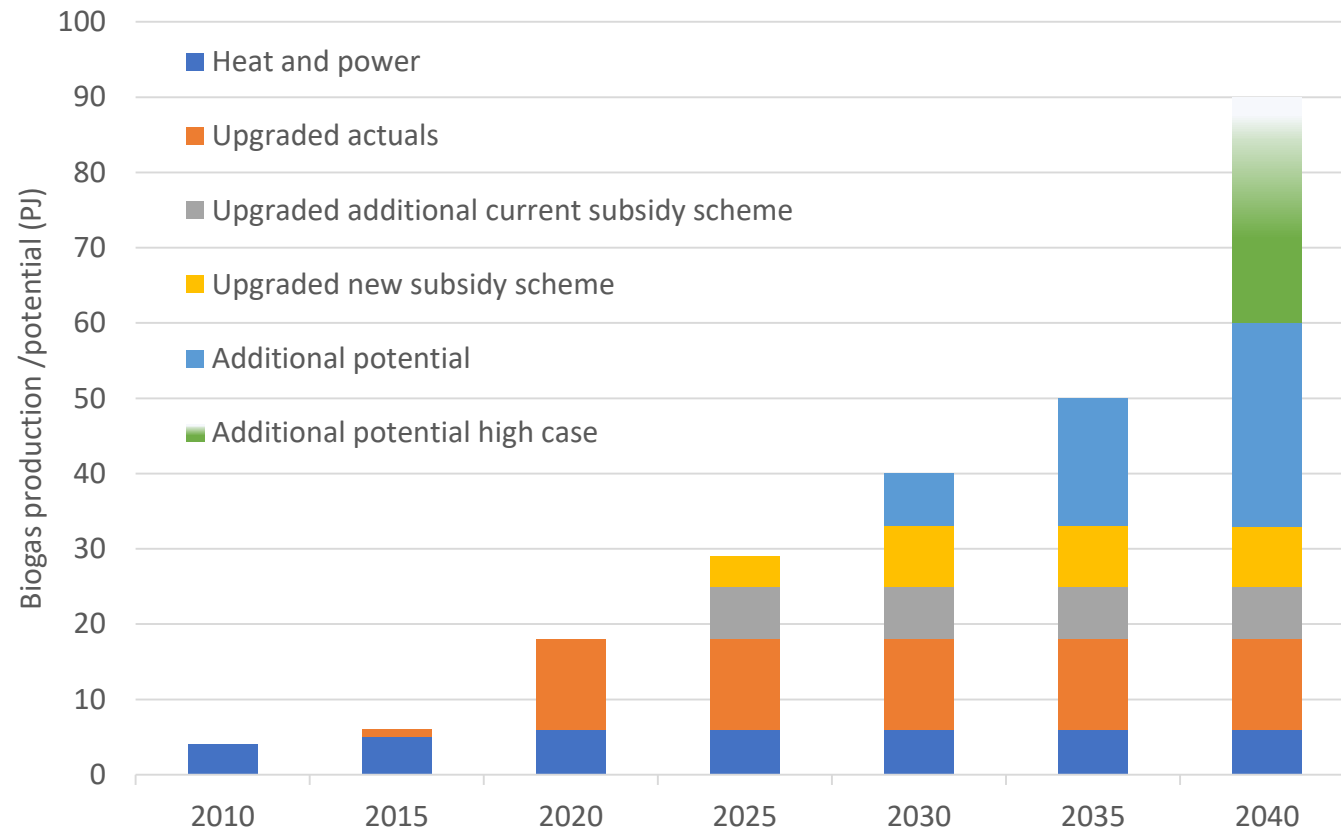


New subsidy scheme to promote CCUS

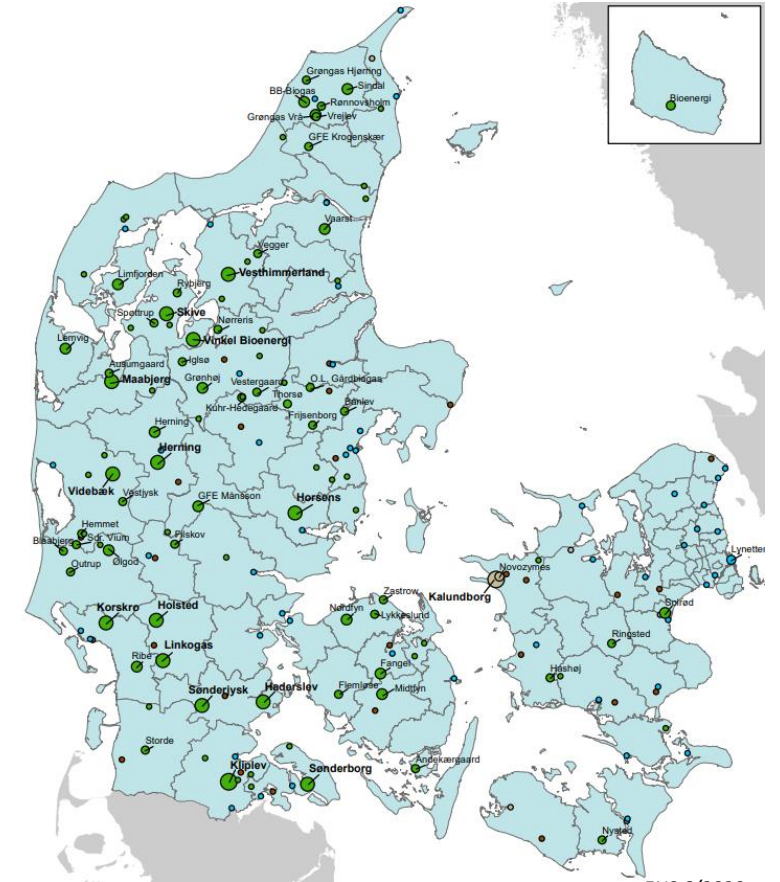
- In the June 2020 political agreement, 16,3 DKKbn has been allocated to carbon capture, utilization and storage (CCUS)
- The subsidy will be market based and technology neutral and awarded for a period of 20 years



Significant development in biogas production in DK – potential even higher



Own calculations and SEGES/SDU



ENS 6/2020

E.ON Denmark – Present Biogas portfolio



GreenLab Skive Biogas

- E.ON Danmark 50%
- Greenlab Skive Biogas amba 50%
- 190 GWh biomethane to the grid
- 400.000 tons biomass
- In operation: December 2019



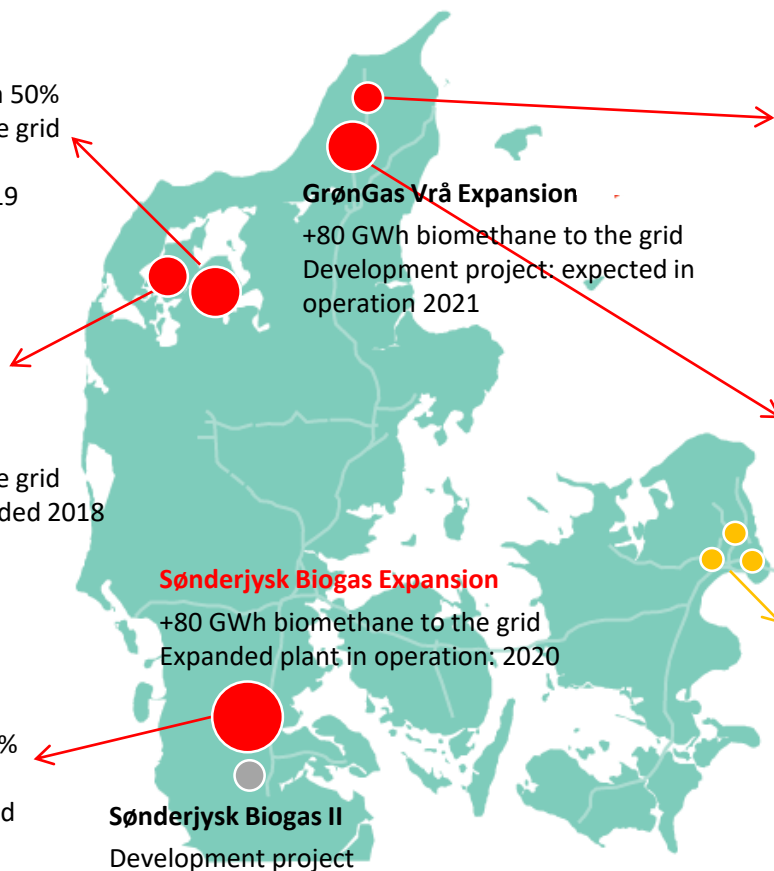
Limfjordens Bioenergi

- E.ON Danmark 50%
- Bigadan 50%
- 195.000 tons biomass
- 100 GWh biomethane to the grid
- Acquired: June 2013, expanded 2018



Sønderjysk Biogas

- E.ON Danmark 50%
- Sønderjysk Biogas Invest 50%
- 650.000 tons biomass
- 220 GWh biomethane to grid
- In operation: July 2016



Grøn Gas Hjørring

- E.ON Danmark 50%
- JPL Holding 50 %
- 60.000 tons biomass
- 30 GWh biogas for power & heat production
- Acquired: June 2013



Grøn Gas Vrå

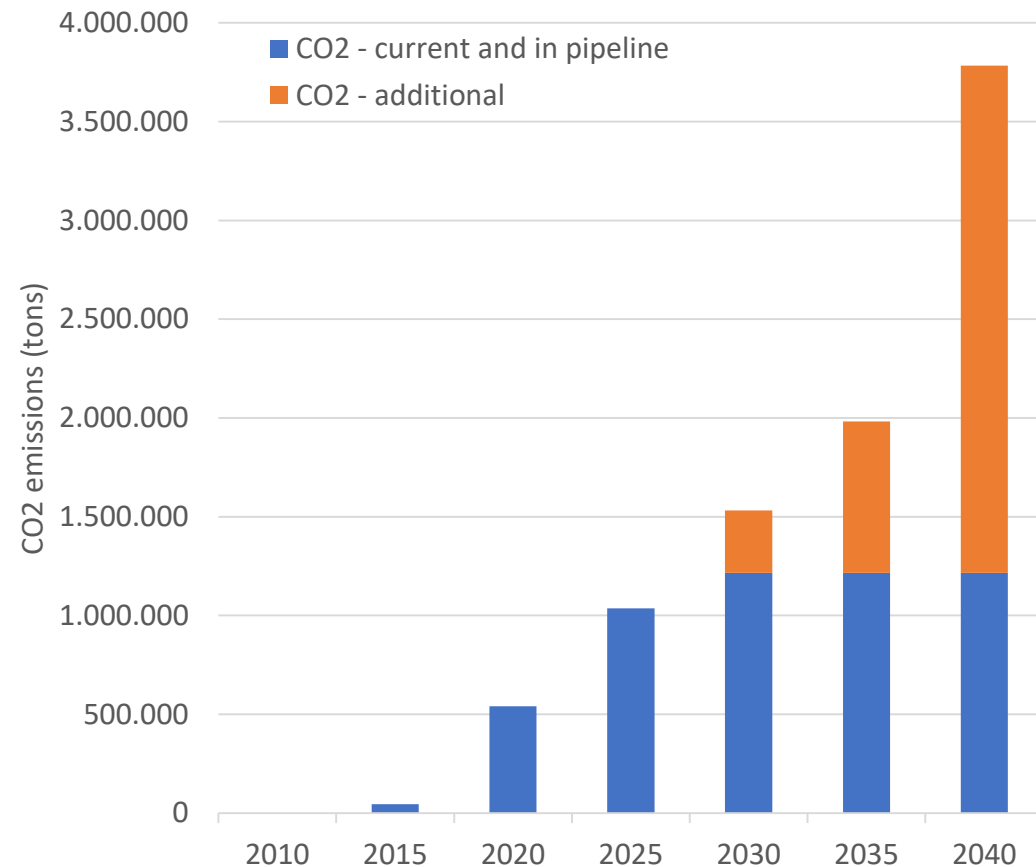
- E.ON Danmark 50%
- JPL Holding 50 %
- 300.000 tons biomass
- 120 GWh biomethane to the grid
- In operation: April 2016



Biogas Filling Stations (3)

- In 50/50 partnership with OK

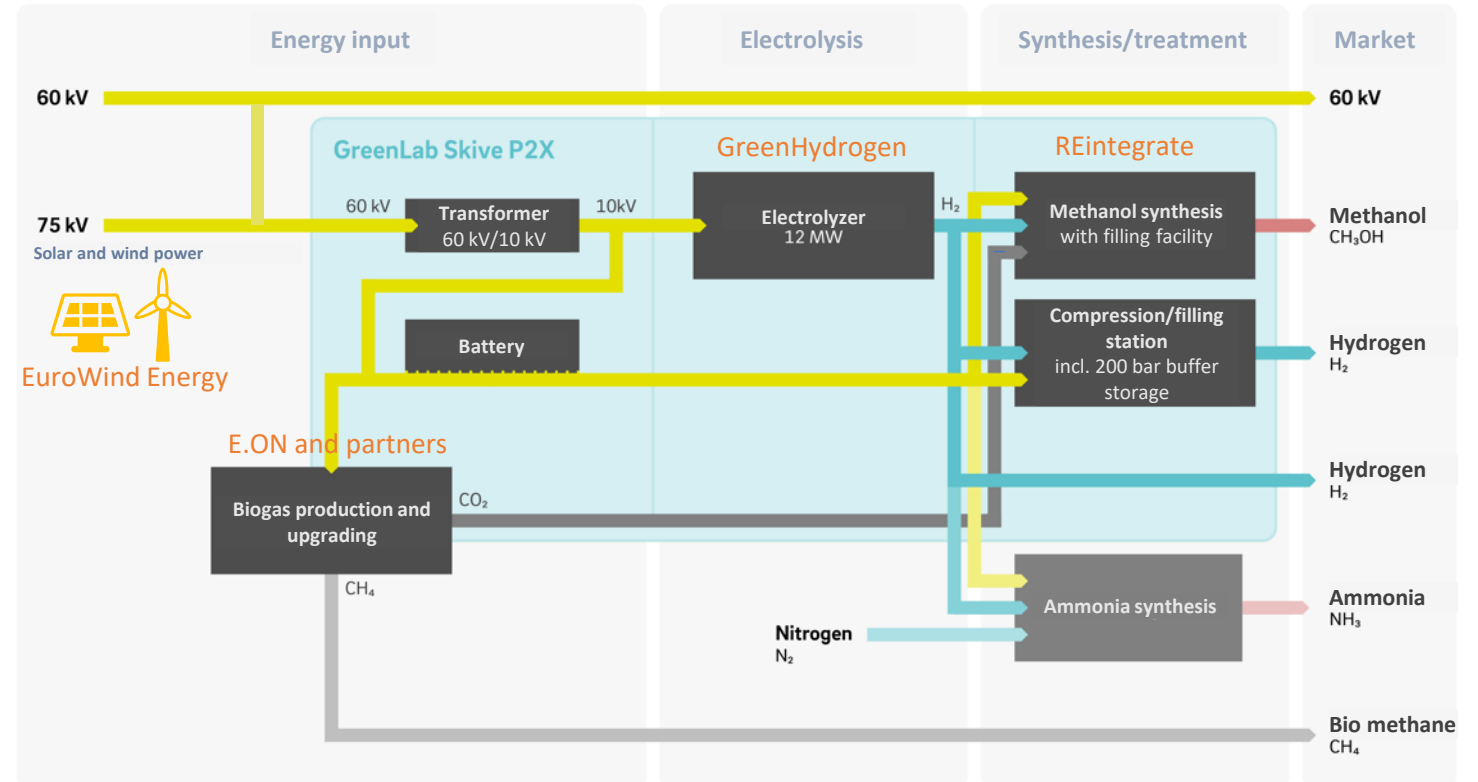
Significant amounts of CO₂ are emitted when upgrading biogas to bio-methane



- A standard sized biogas plant of 200 GWh (0,7 PJ) emits approx. 30.000 tons CO₂ per year
- A 10 MW methanol synthesis plant requires approx. 12.000 tons CO₂ per year
- Before suitable for methanol synthesis additional purification of the CO₂ is needed

Next project: GreenLab Skive PtX

- Project developed by 11 partners from the energy sector
- 12 MW electrolyzer
- GreenLab Skive Biogas will supply CO₂ to the methanol production
- Project has been granted 80 DKKm in public funding from Danish Energy Agency
- Direct grid connection to Wind & Solar power **and**
- Still some regulatory issues (free zones) to be solved, before a feasible BC can be achieved for the investors **and**
- Future investment cost for the units **must** come down through economy of scale and industrialization



Current PtX projects in DK at commercial scale

1. GreenLab Skive PtX*

- Project developed by 11 partners from the energy sector, including E.ON
- 12 MW electrolyzer
- Announced December 2019
- Has been granted 80 DKKm in public funding from Danish Energy Agency
- Final investment decision expected 2H2020/1H2021

2. HySynergy/Fredericia**

- PtX project developed by several partners, including Everfuel, from the energy sector and in connection with the existing Shell refinery in Fredericia
- 20 MW electrolyzer
- Announced November 2019
- Has been granted 6 EURm in public funding from Danish Energy Agency

3. Avedøre/Copenhagen***

- PtX project by Ørsted, Maersk, DSV, DFDS, SAS, Copenhagen Airports
- Announced 26 May 2020*
- Brings together supply side and demand side in a partnership
- Investment decision stage 1 (10 MW) expected 2021/2022

