



SWISS POWER GREEN GAS
15.9 2022 - SBS Kliplev

Lars Byberg

- Bachelor of Agronomy, at *The Royal Veterinary and Agricultural University (KVL)*
- Cand.Scient Environmental Chemistry, at *University of Copenhagen (KU)*
- Executive MBA, MMT at *Technical University of Denmark (DTU)*
 - *Thesis: Implementation of an environmental & economical sustainable Biogas Model*
- Quality Manager Nordic AG in DuPont (1997)
- CEO of Bioenergi Vest A/S & Biomass Manager RSKS (2009)
 - “Development of the decentralized Ringkøbing-Skjern Biogas Model”
- Founder of AgroFora (2011) - *Bioenergy systems architect*
 - *Vision "Convert sunlight captured by plant tissue to bio-methan with less energy and maximized output"*
 - *Japan: Shonai, Kami, Nagashima, Sustainergy, Region North Jyland, GreenLab, ADP, F.M California, HMN, DONG, Siemens, TREFOR, Akzo Nobel, Energinet.dk Gas Storage, DuPont, E.ON, etc.*
 - *Founder of Power-to-biomethane (2017)*
- Co-Founder of Gas Vitae (2017) – *Biogas and green certificate trading*
- CEO of Sustainable Bio Solutions (2019)
 - Development, implementation and execution of SBS Kliplev
One of the largest biogas plants in the world



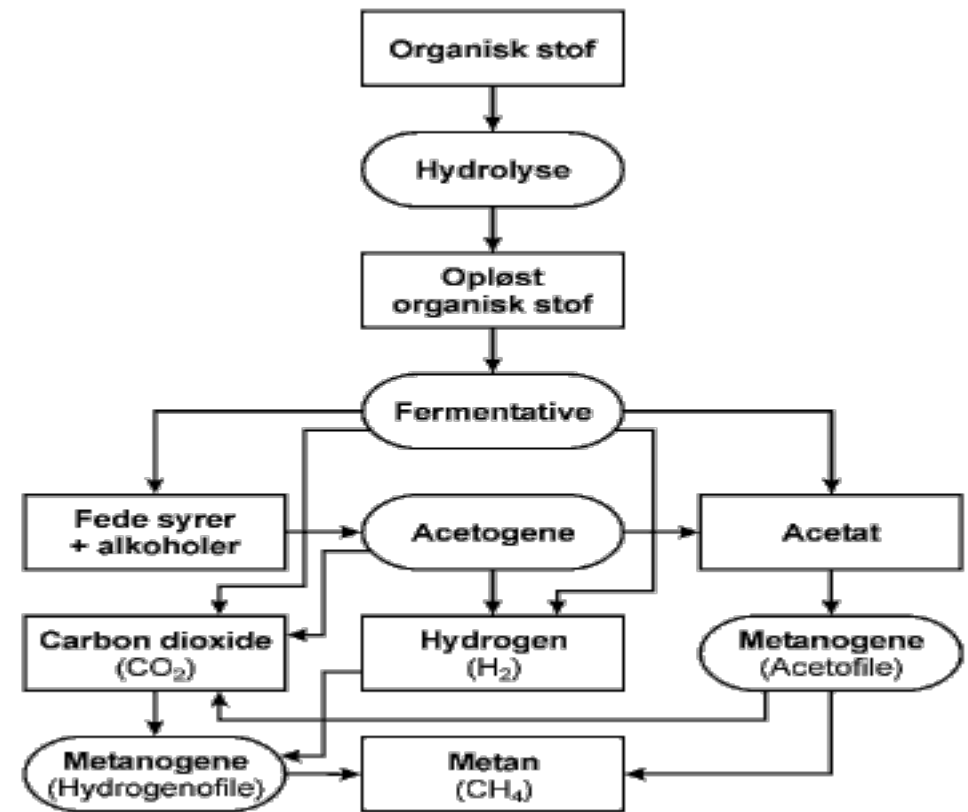
Biogas = 65 % CH₄ og 35 % CO₂

- Microorganisms CH₄
- - O₂ (anaerobe)
- Temp 52 Celcius

Biogas is CO₂ neutral (*not fossil*)

+1 million biogas plants in China and India:

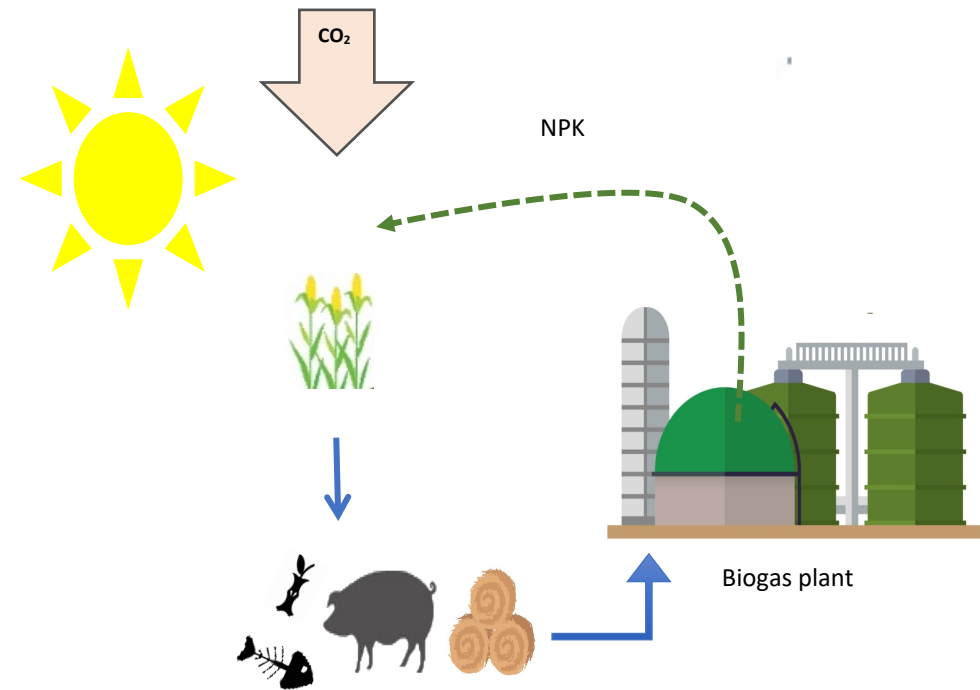
- 1. Recirculating of nutrients*
- 2. Energy production*



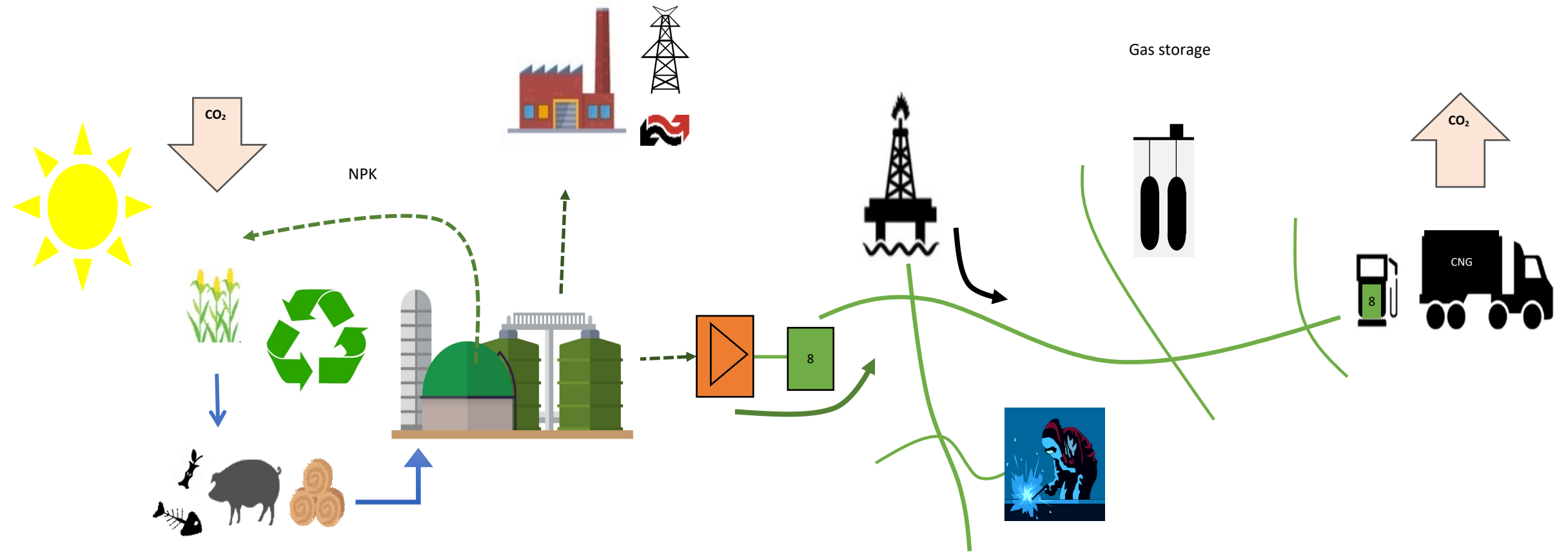
Kilde: "Stimuleret in situ reduktiv deklorering. Vidensopsamling og screening af lokaliteter

"Version 1.0 Februar 2005, © Miljøstyrelsen.

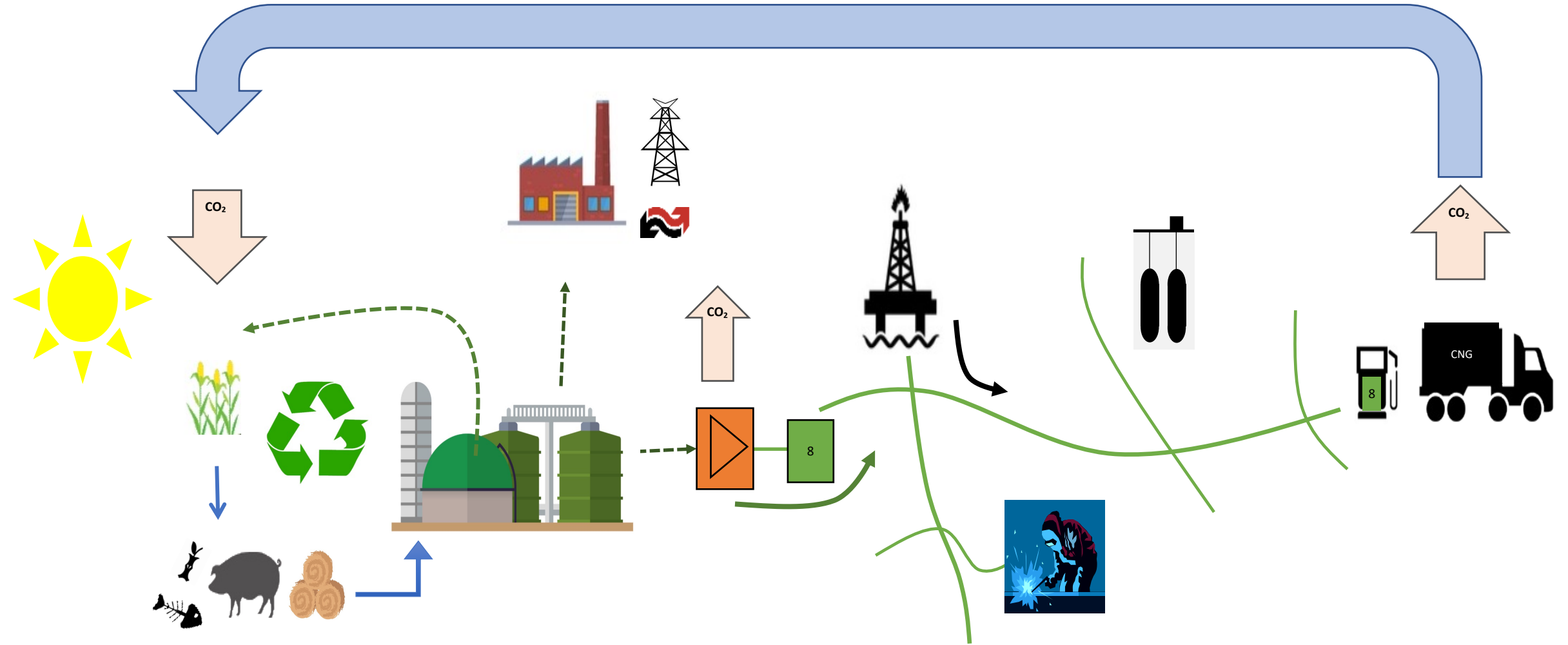
Biogas



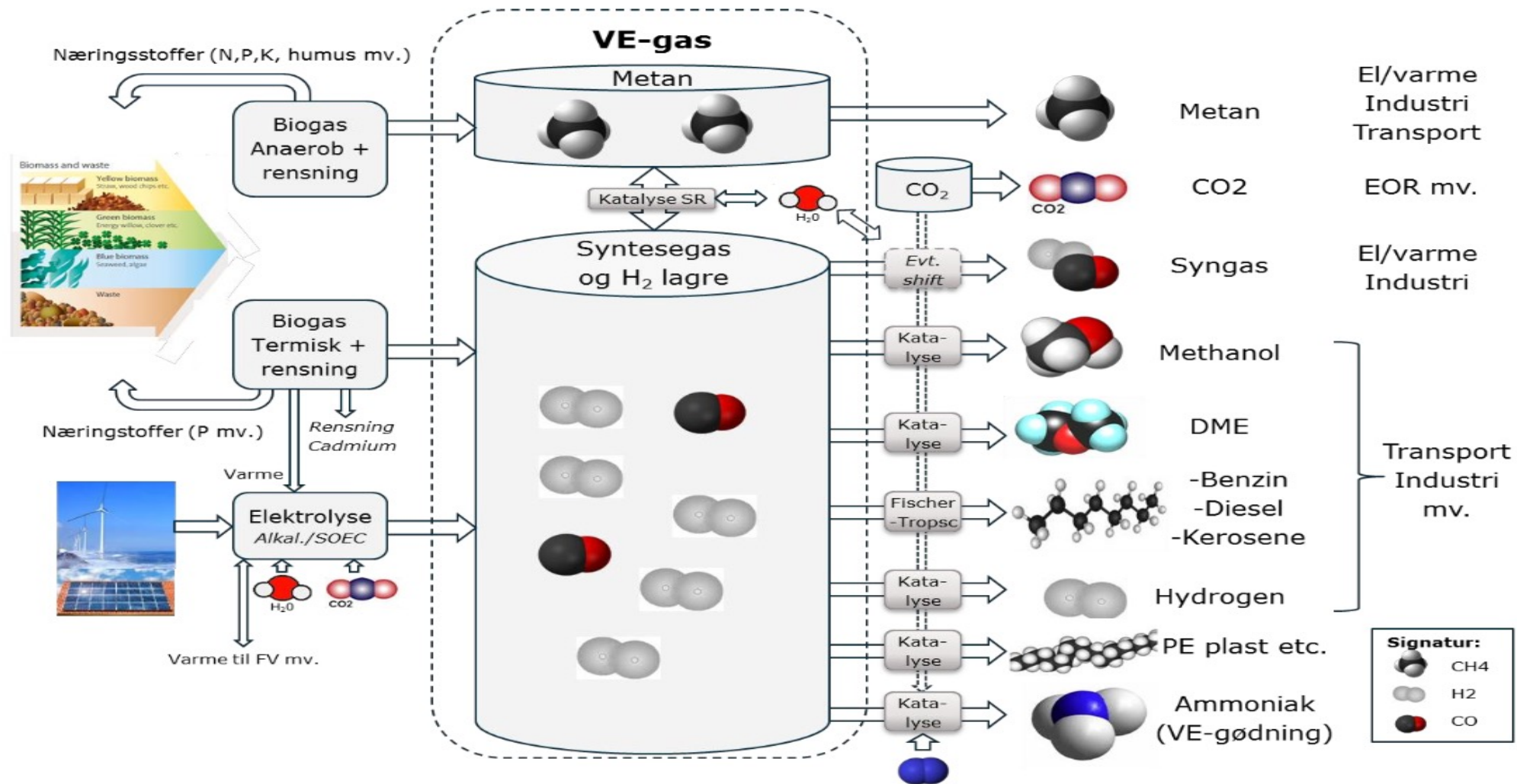
Biogas – in the gas grid



CO₂ neutral

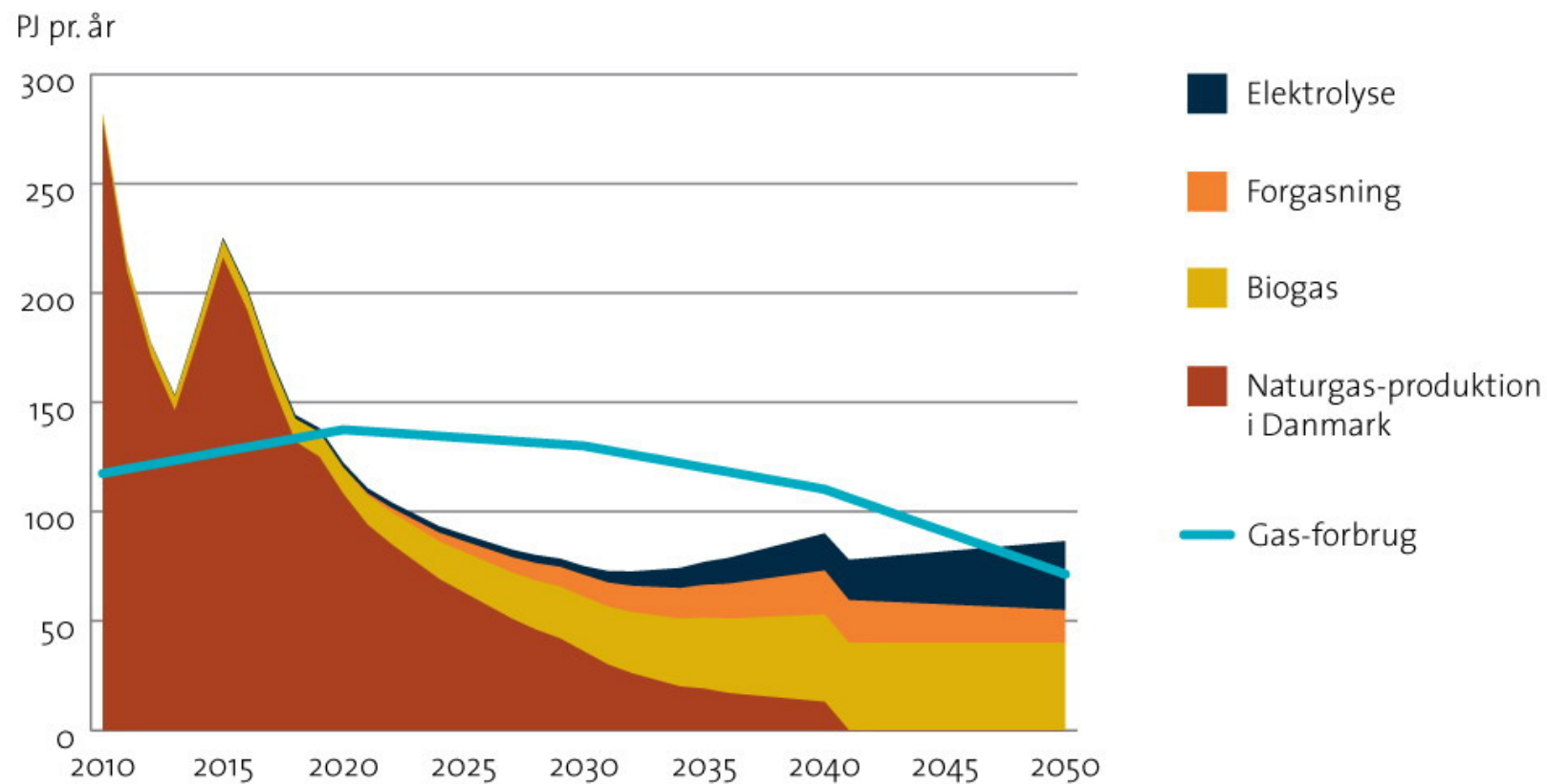


Energikoncept 2030 (Energinet.dk)

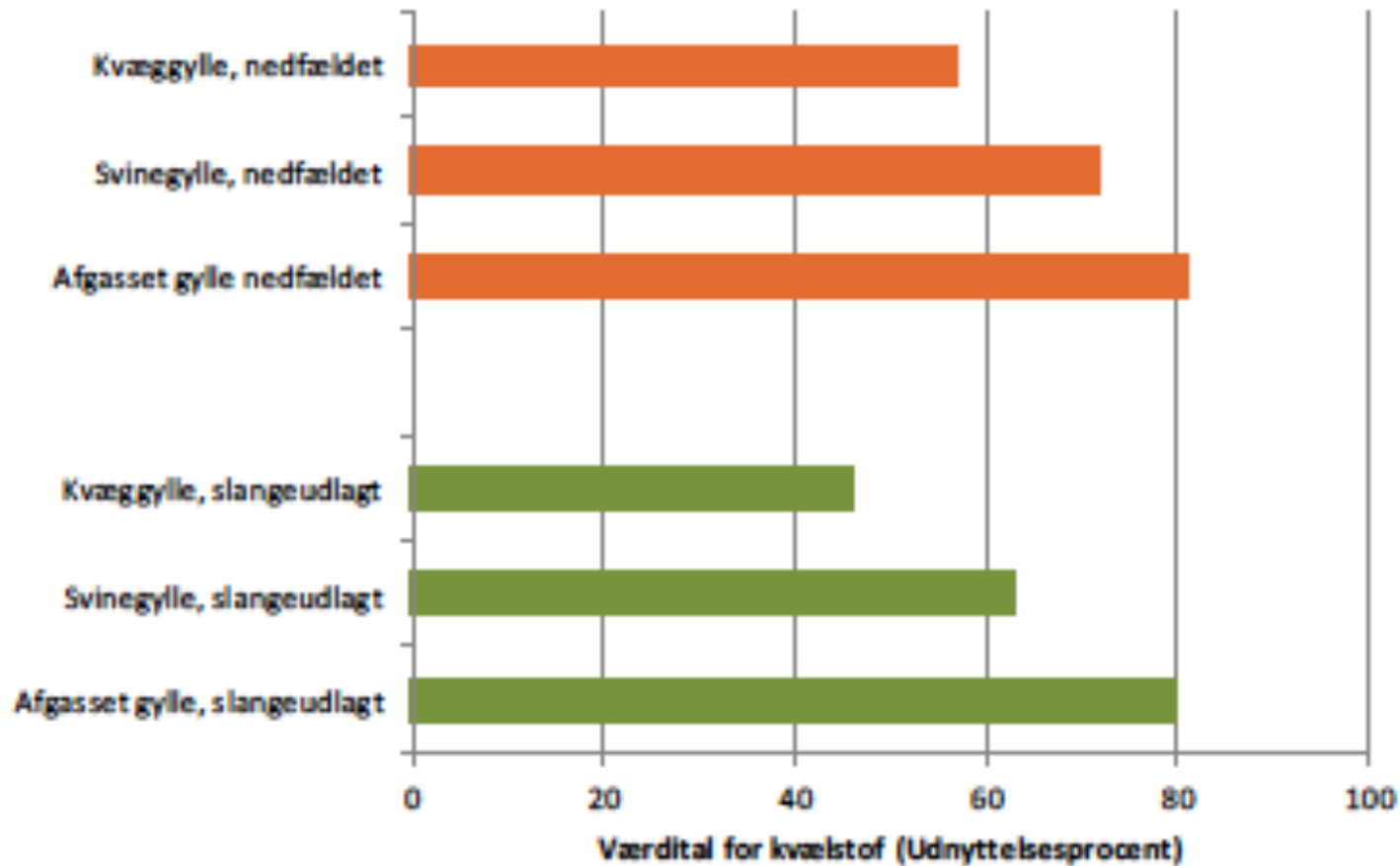


Figur 8.2 Eksempel på muligheden for at bruge gassystemet til en fleksibel integration mellem biomasse, VE-el og en række brændstoffer og produkter, hvor naturgas i dag er meget central.

2025 naturgas, 2050 VE-gas

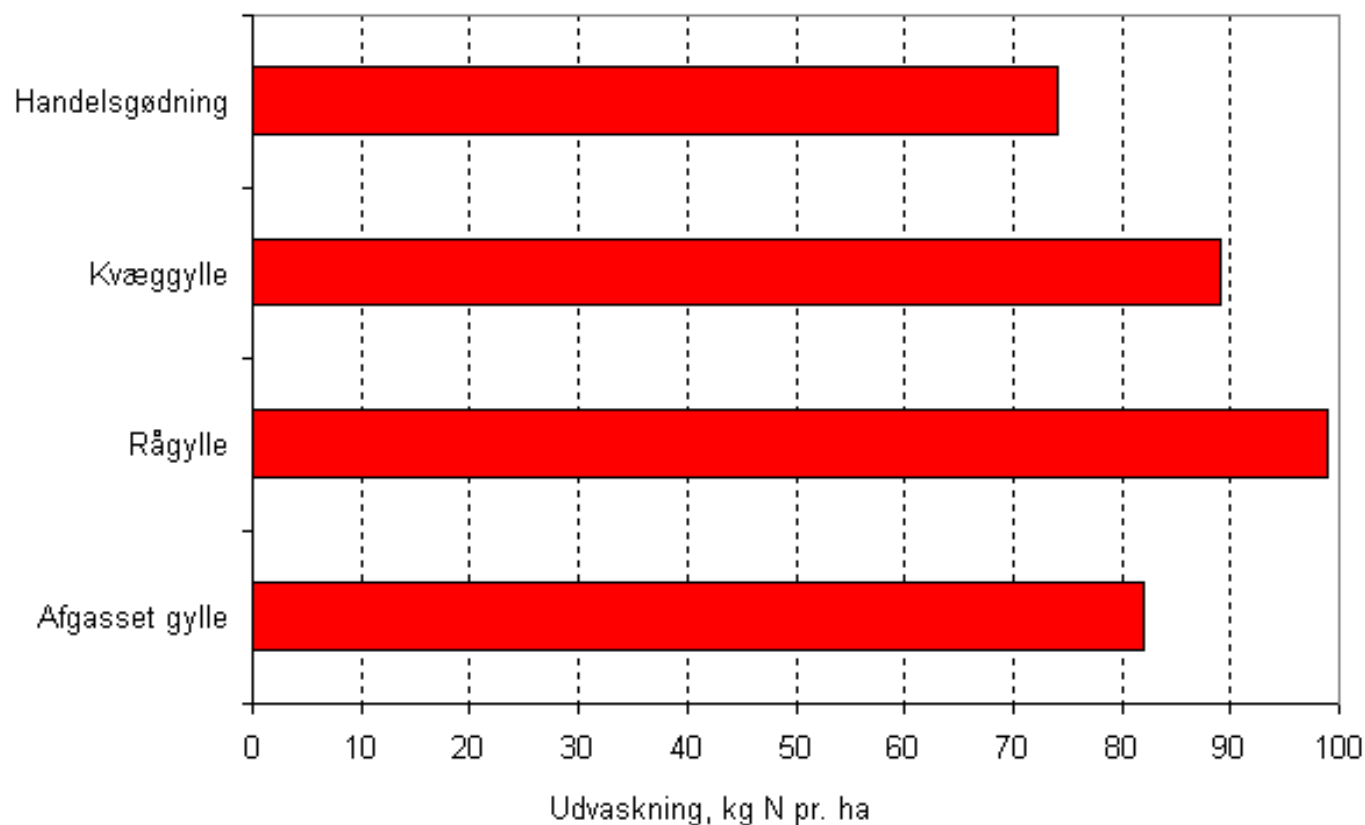


NPK utilisation



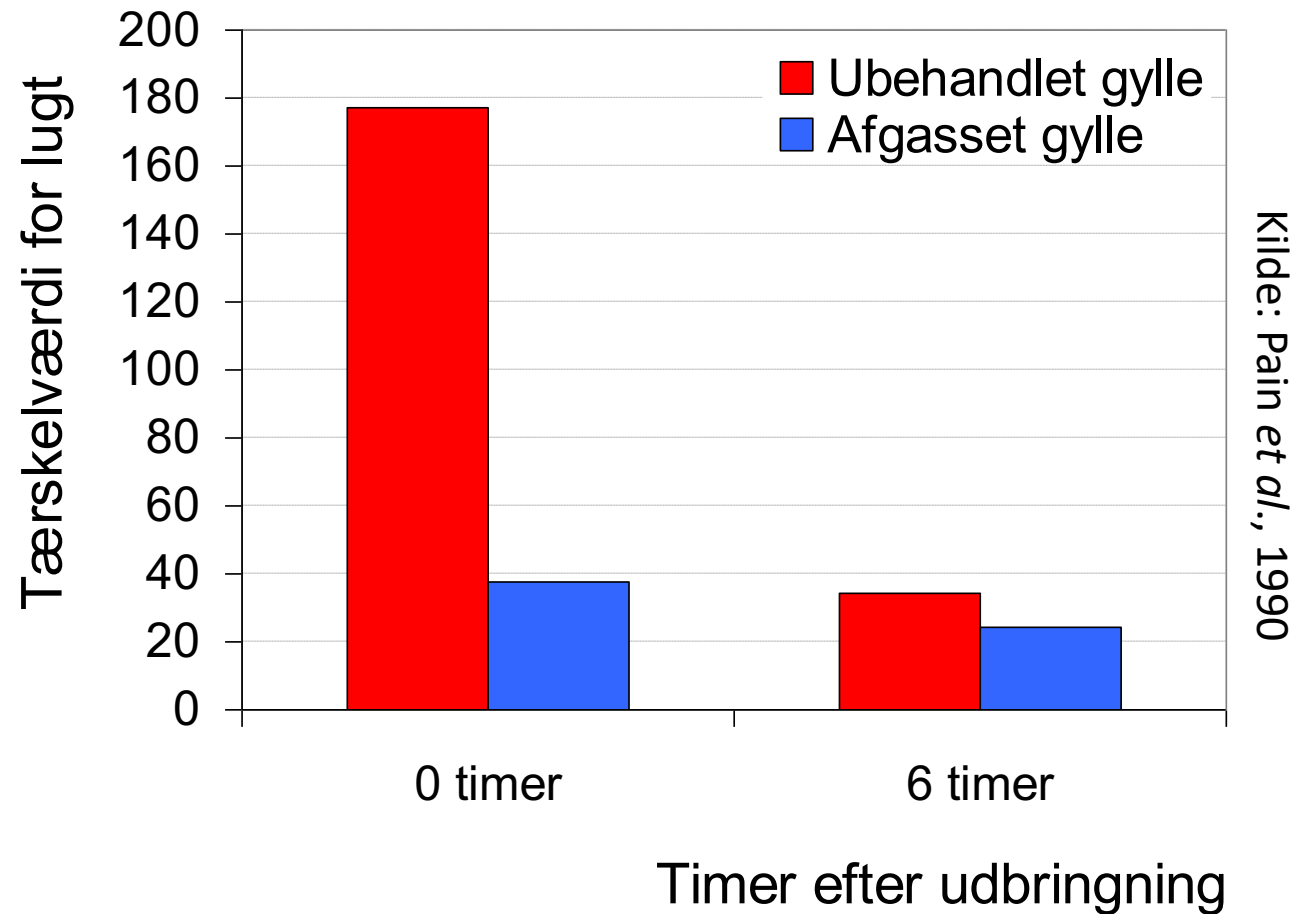
Figur 1: Udnyttelsesprocent af kvælstof i husdyrgødning til vinterhvede. Gengivet efter (DLBR 2008).

Reduced leaching of NPK

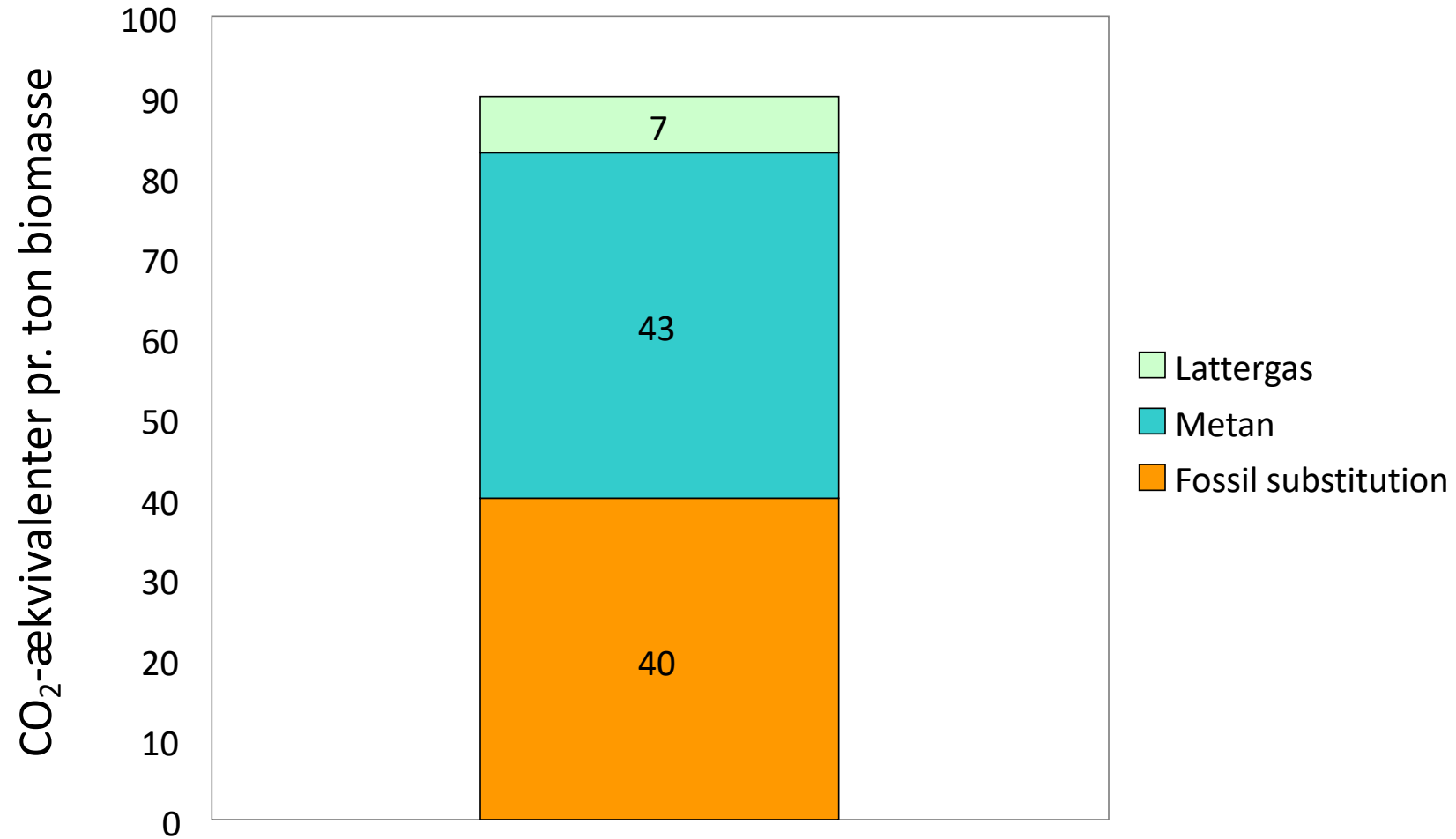


Grøn viden Markbrug nr. 266 ♦ November 2002

Smell from digestate



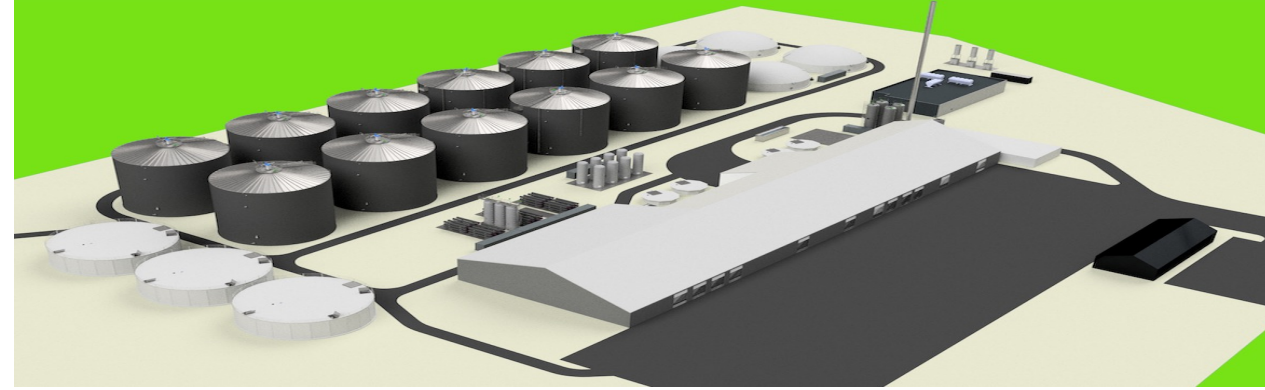
CO₂-reduction by de-gasification of manure



SBS Kliplev



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- 12 x 9.500 m³ digesters
- An Organic line and two conventionally line
- Digestion capacity is 980.000 tons biomass per year
- Production is 41 mio. Nm³ methan per year
- Gas upgraded and injected in the gas grid

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One of the largest biogas plants in the world - Probably

- Build and operated by Danish **Bigadan**, der har bygget mere end 40 biogasanlæg verden over, og som har mere end 30 års erfaring inden for design, byggeri og drift
- SBS Kliplev is owned by **Arjun Infrastructure Partners**

SBS Kliplev



SBS Kliplev sommer 2021



Rejsegilde: Bygherrer gav den biogas



Der var mange, der lagde vejen forbi, da der var rejsegilde på biogasanlægget i Kliplev. Privatfoto

22 jun. 2021 kl. 12:00



Kliplev: Normalt holder man rejsegilde, når tagspærene er lagt, men ligesom coronarestriktioner har sat deres præg alt andet, har de selvfølgelig også sat deres præg på opførelsen af det nye biogasanlæg i Kliplev.

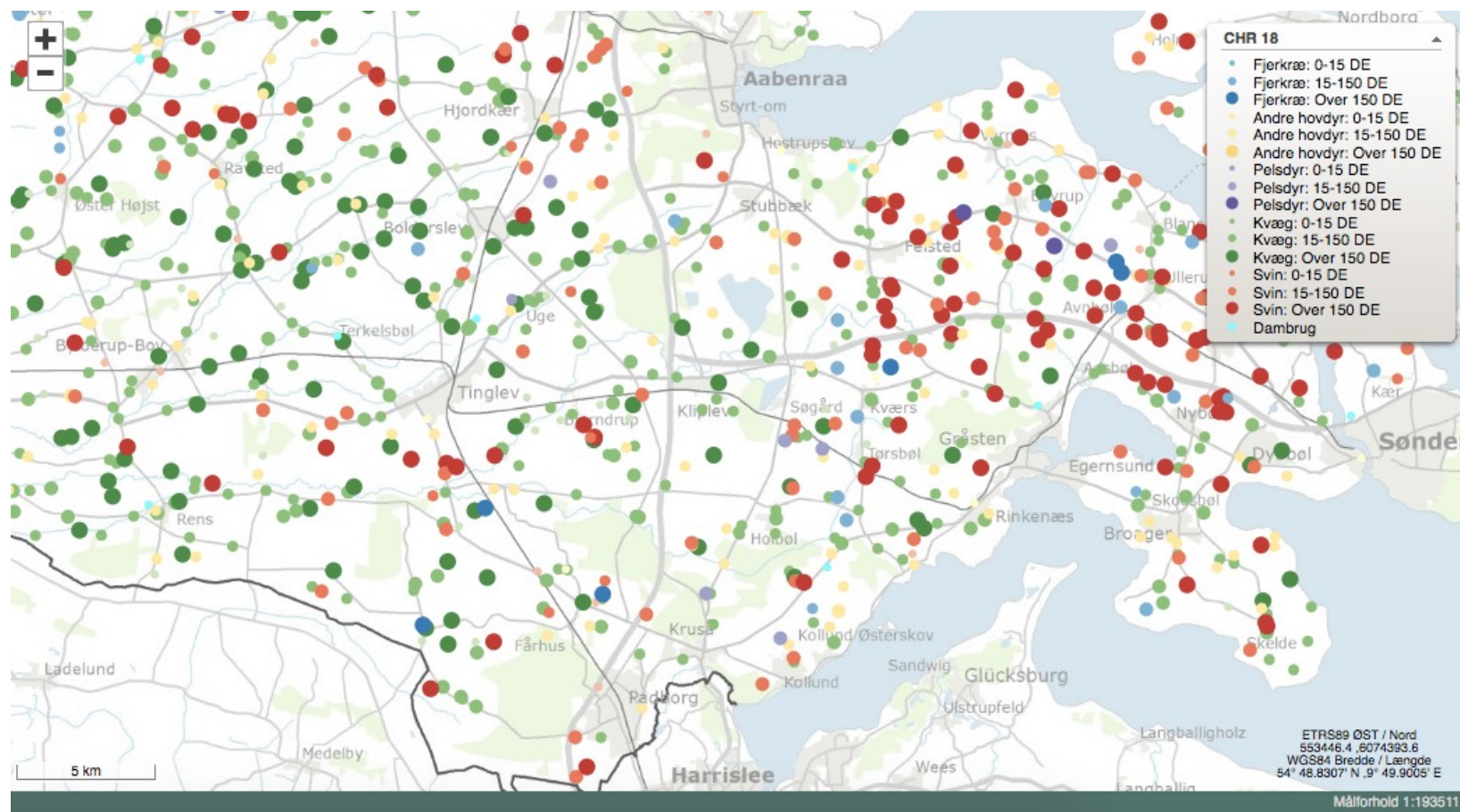




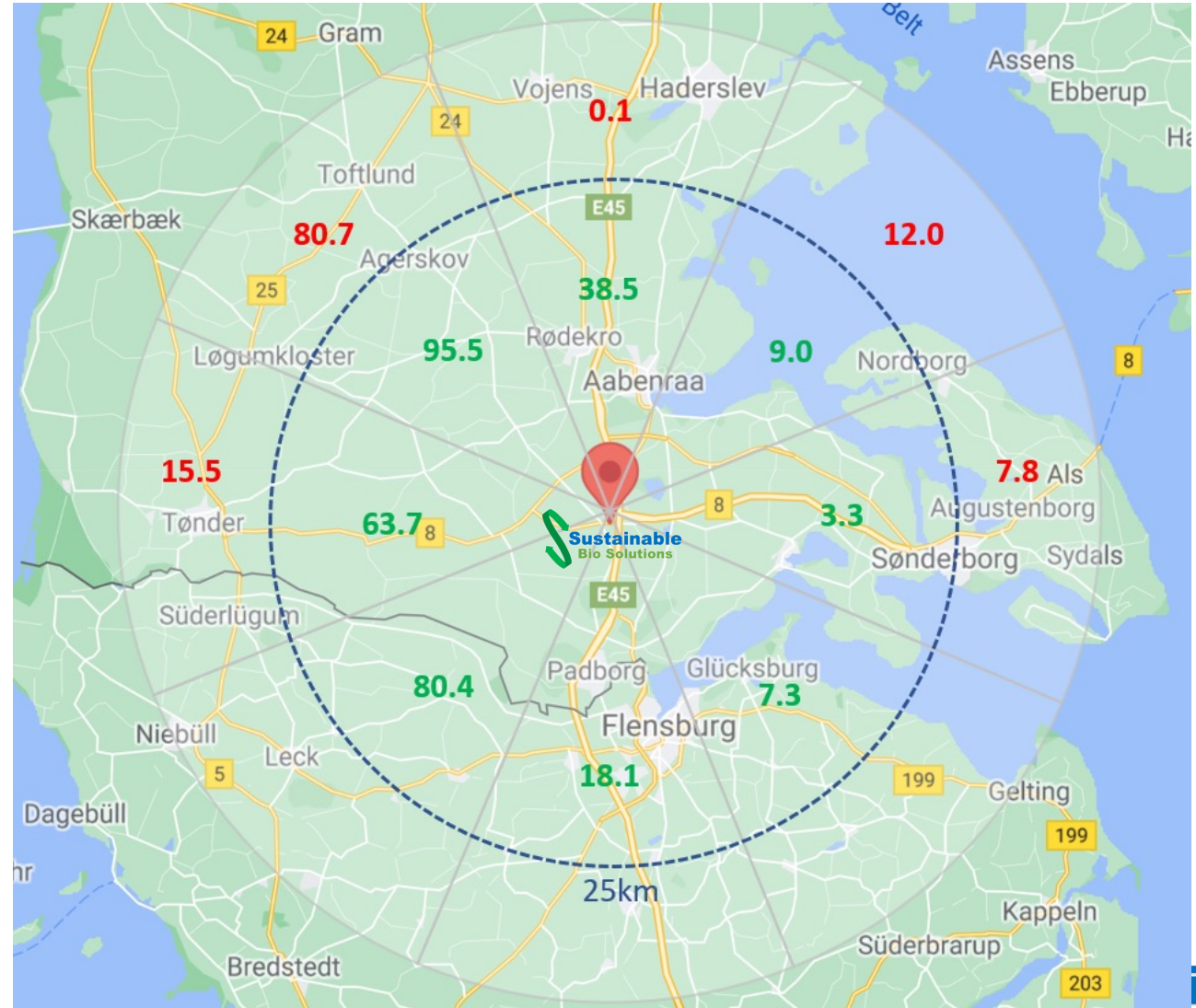




Husdyrfordelingen



Transport of manure - zonal distribution



Smell

Limits

- Open land: 10 LE/m³
- City zone : 5 LE/m³



Storage

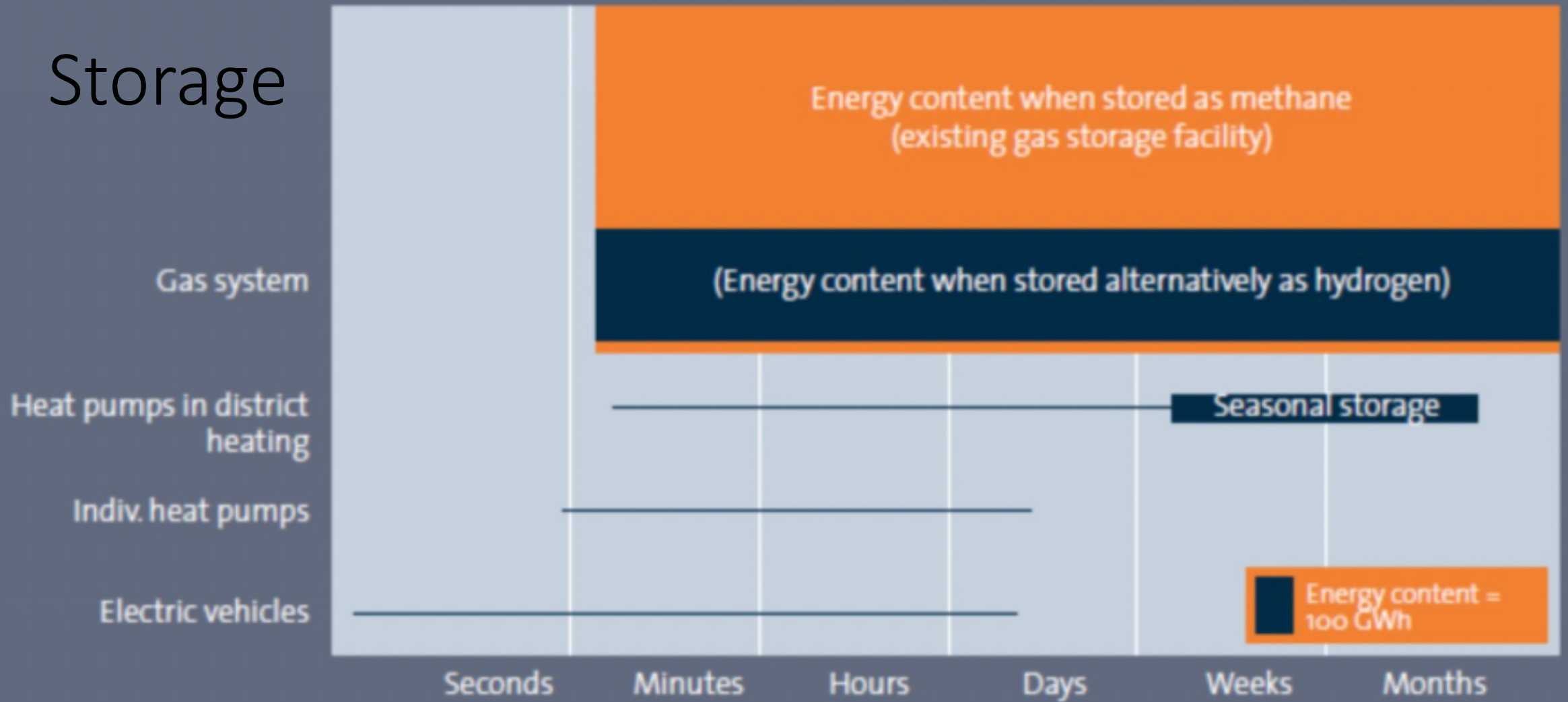
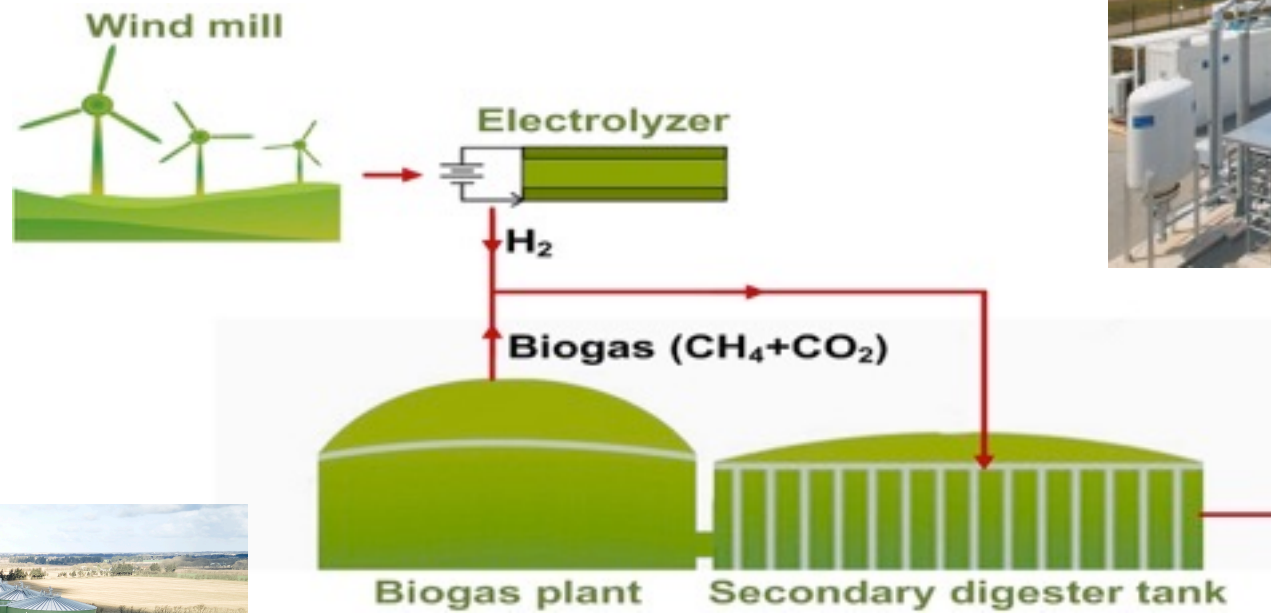


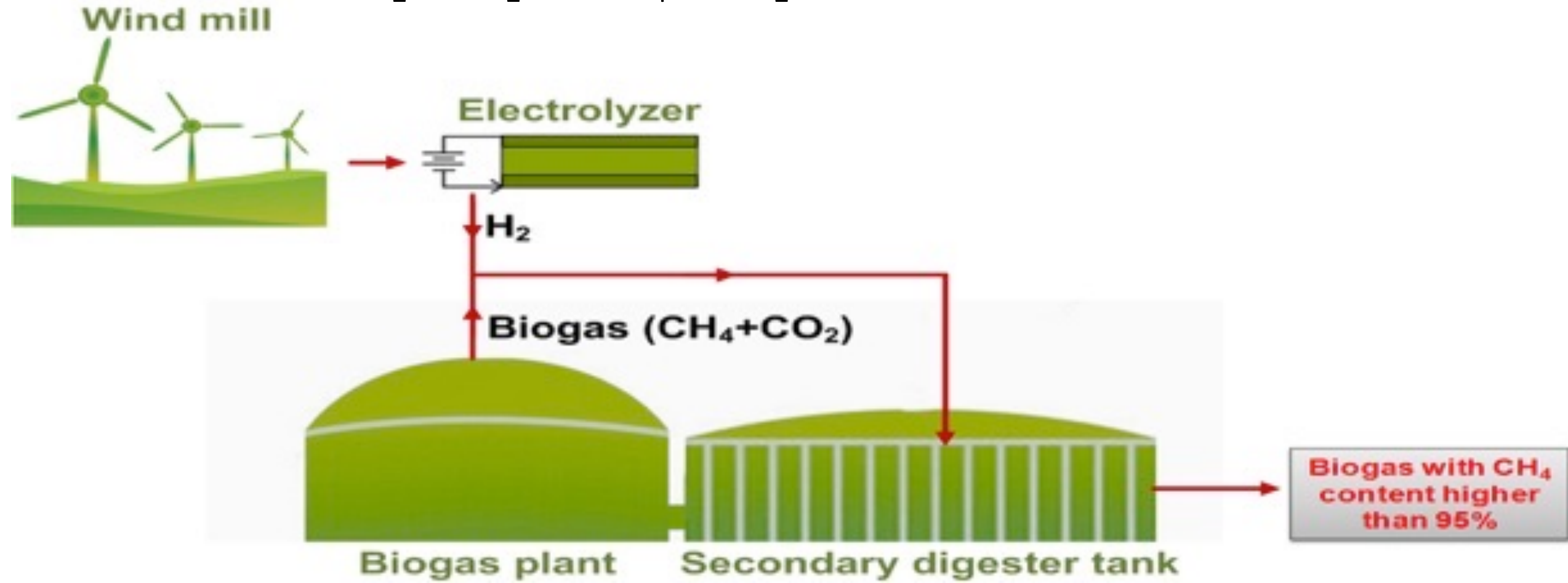
Figure 1-8: Energy content (electricity input) of different storage types in the energy system. The orange areas show the size of the potential energy storage. For gas, the small black box indicates the content if the gas is stored as hydrogen rather than methane.

Power-to-BioMethane



Power-to-Biomethane

- Microorganism's is living on converting – result 95% CH₄



Power-to-Biomethane

1. Increased the CH₄ energy production by up to 30%
a) Same biomass input b) Same biogas plant
2. Convert renewable electricity to storable renewable gas (*a battery*)
3. Reducing energy consumption for upgrading biogas (*stripping CO₂*)
4. Capture valuable Carbon
Carbon will be a limited resource in a fossil free society

Thank you - Full gas

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