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NORSK INSTITUTT FOR
BIOØKONOMI

Anaerobic digestion and biogas upgrading

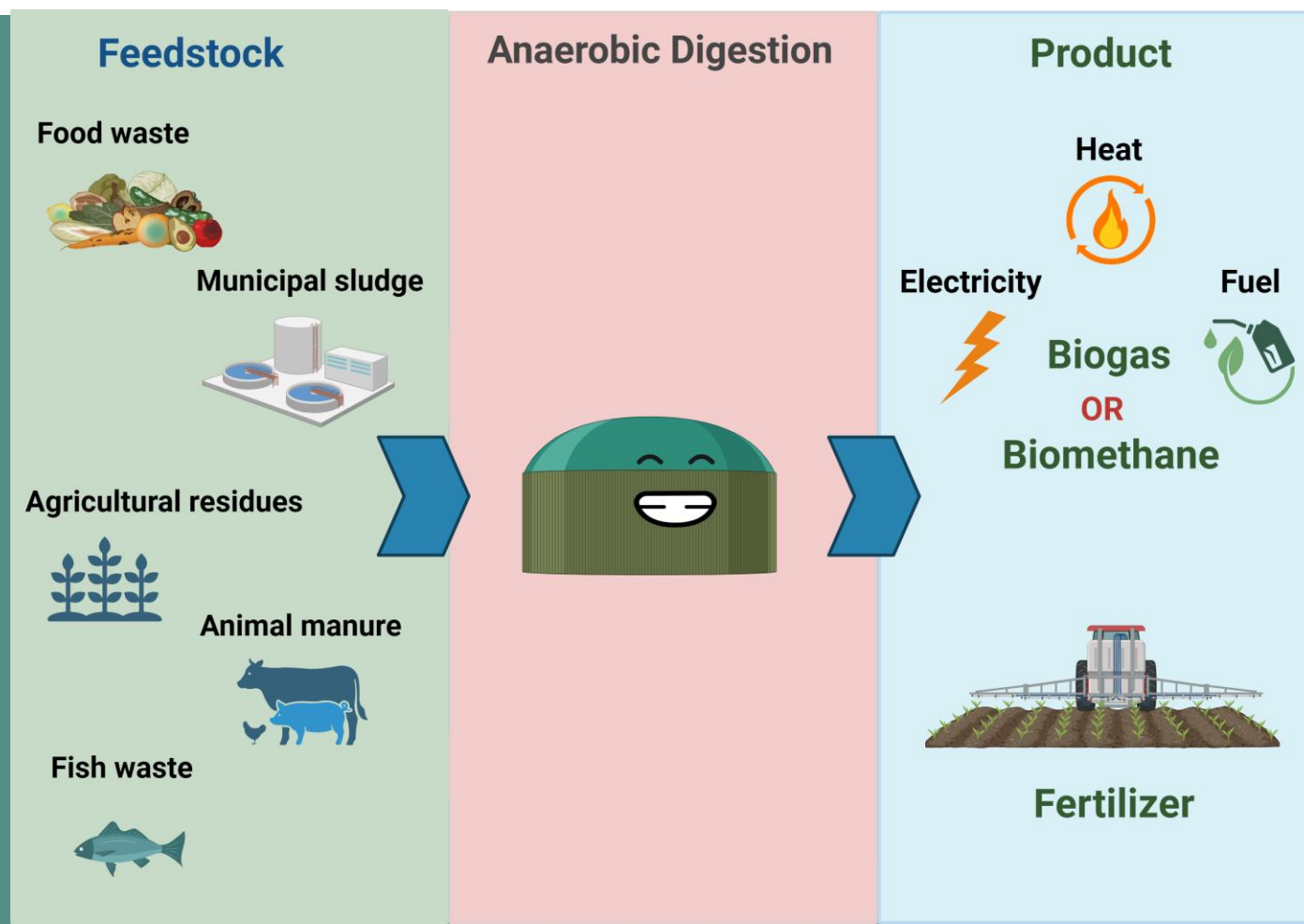
Status and perspective



Norwegian Centre for
Environment-friendly
Energy Research

**BIO4
FUELS**

WP3.4 Anaerobic digestion and gas upgrading



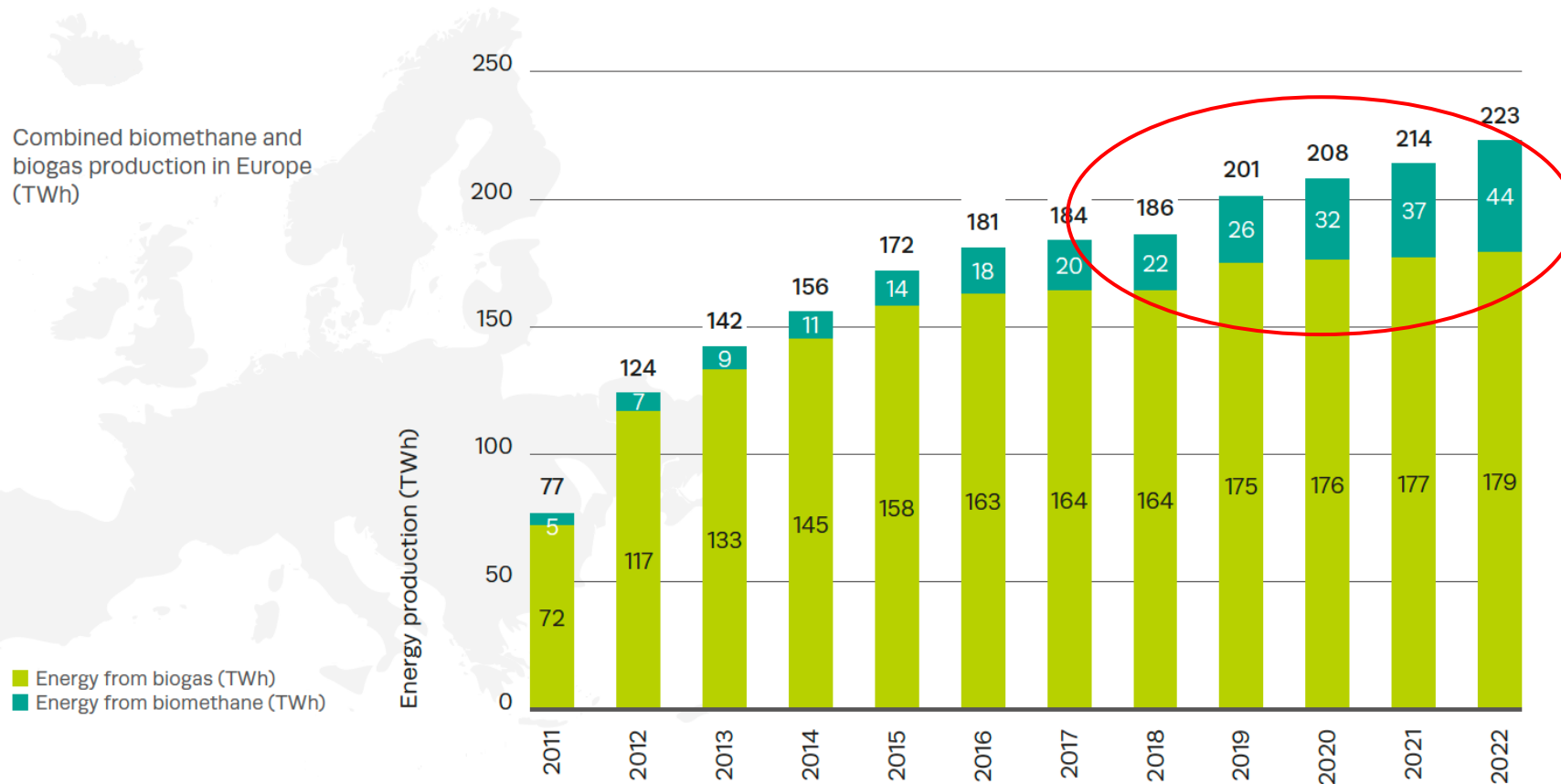
Bio4Fuels Day

Lu Feng, NIBIO

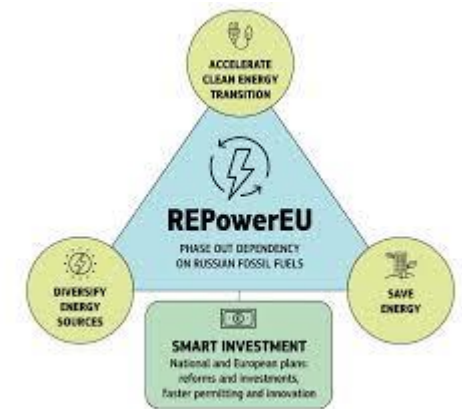
Helsinki, Finland

12.06.2024

Development of EU's biogas sector



EU plans to produce 35 bcm biomethane sector by 2030.



Combined biomethane and biogas production in Europe (TWh). Source: EBA

Highlights- the driving factors

Investment Surge

- EU biogas investments grew 30% annually since 2017, reaching €2.5 billion by 2023

Policy Boost

- Supportive policies increased biogas capacity by 40% to 18,000 MW by 2022.

Tech Innovations

- Advanced tech boosted biogas yield efficiency by 25% in five years.

Market Expansion

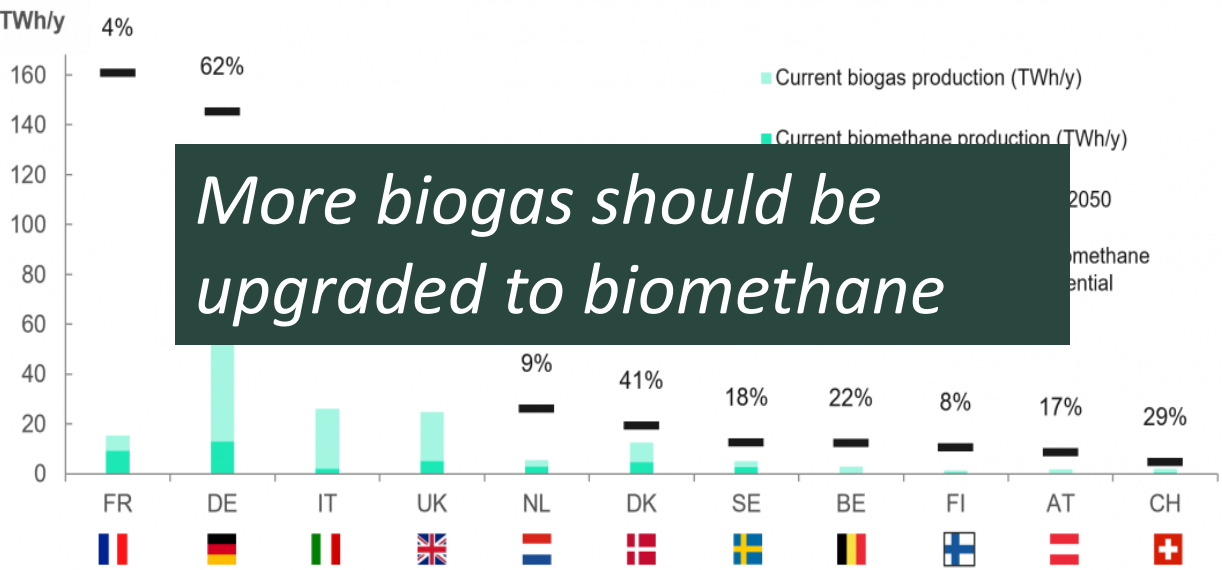
- Biomethane production quadrupled to 8 billion m³ annually, meeting 10% of EU gas demand

Circular Economy

- Biogas processed 100 million tonnes of waste yearly, cutting emissions by 20 million tonnes

Anaerobic digestion to biogas/biomethane

Biogas and biomethane production compared to Anaerobic Digestion potential in 2050

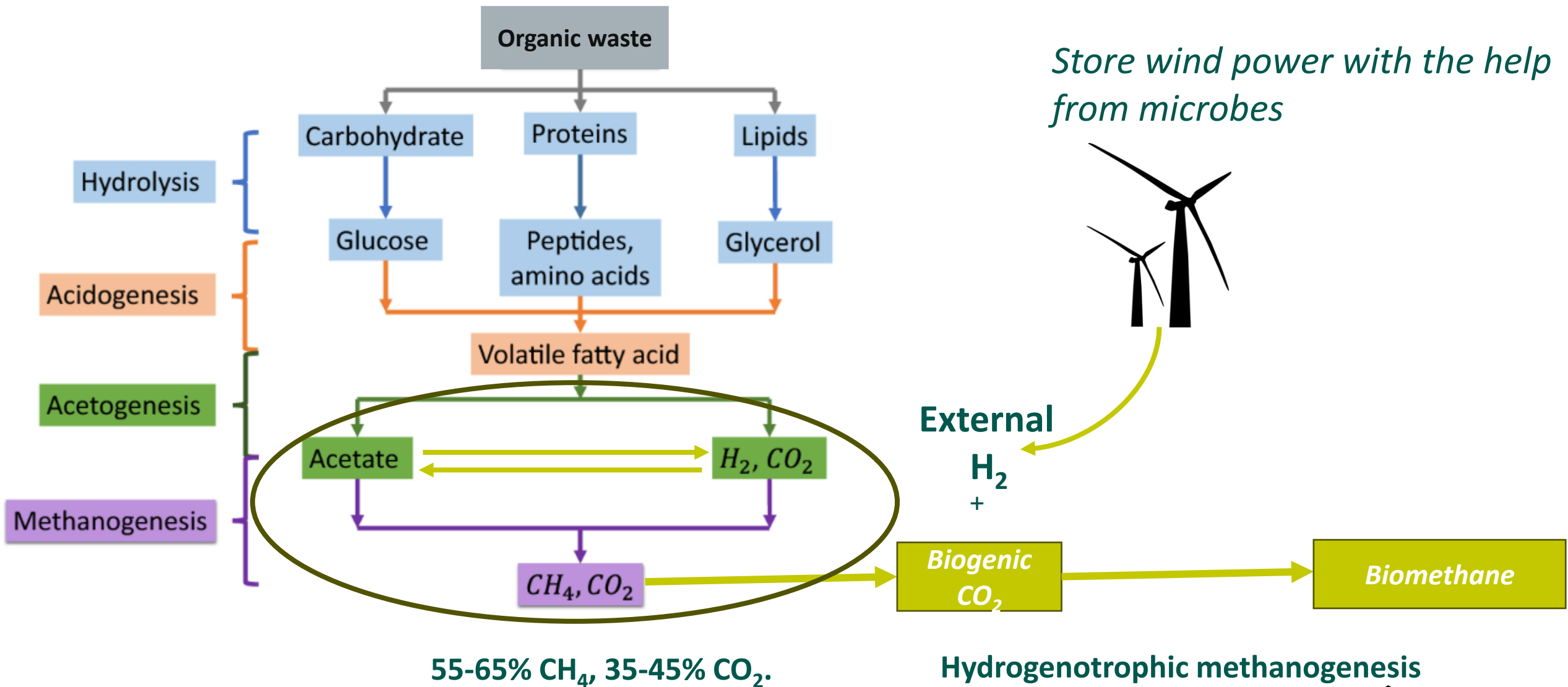


More biogas should be upgraded to biomethane

- Biogas to biomethane - major source of future growth.***
- Greener gas grid.*
 - Large Emission Reduction*
 - Utilize Organic Waste*
 - Energy Independence*

Figure source: Sia Partners
7th European Biomethane Benchmark

Biological upgrading to biomethane- Principle



Biological upgrading

Pros

- **Low Operating Costs**
- **Low Energy Consumption**
- **Reduced Emission**
- **Environmentally Friendly**
- **Renewable Energy Source**
- **Durability to impurities**

Cons

- **Process Complexity**
(Pure culture/mix culture)
- **Longer start up period**
- **Ex-situ -extra cost**
- **In-situ - affect the main proecss**

Large-scale application



COMMERCIAL SCALE STORE&GO PROJECT IN SOLOTHURN, SWITZERLAND

opened in January 2019. Use pure culture?



NATURE ENERGY'S POWER TO X PUT INTO OPERATION – NOV 2022.

METHANE PRODUCTION 12000 M³/D

Conclusion and perspective

Biogas upgrading **boosts production and supports sustainability** by efficiently utilizing CO₂ and renewable H₂.

Biofilm processes, for instance TBR, show promise for biogas upgrading, while the key is to maintain **long-term stability, high treatment capacity, and ease of start-up.**

While pilot projects and commercial applications are ongoing, **more research is still needed.**



Thanks for your attention

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