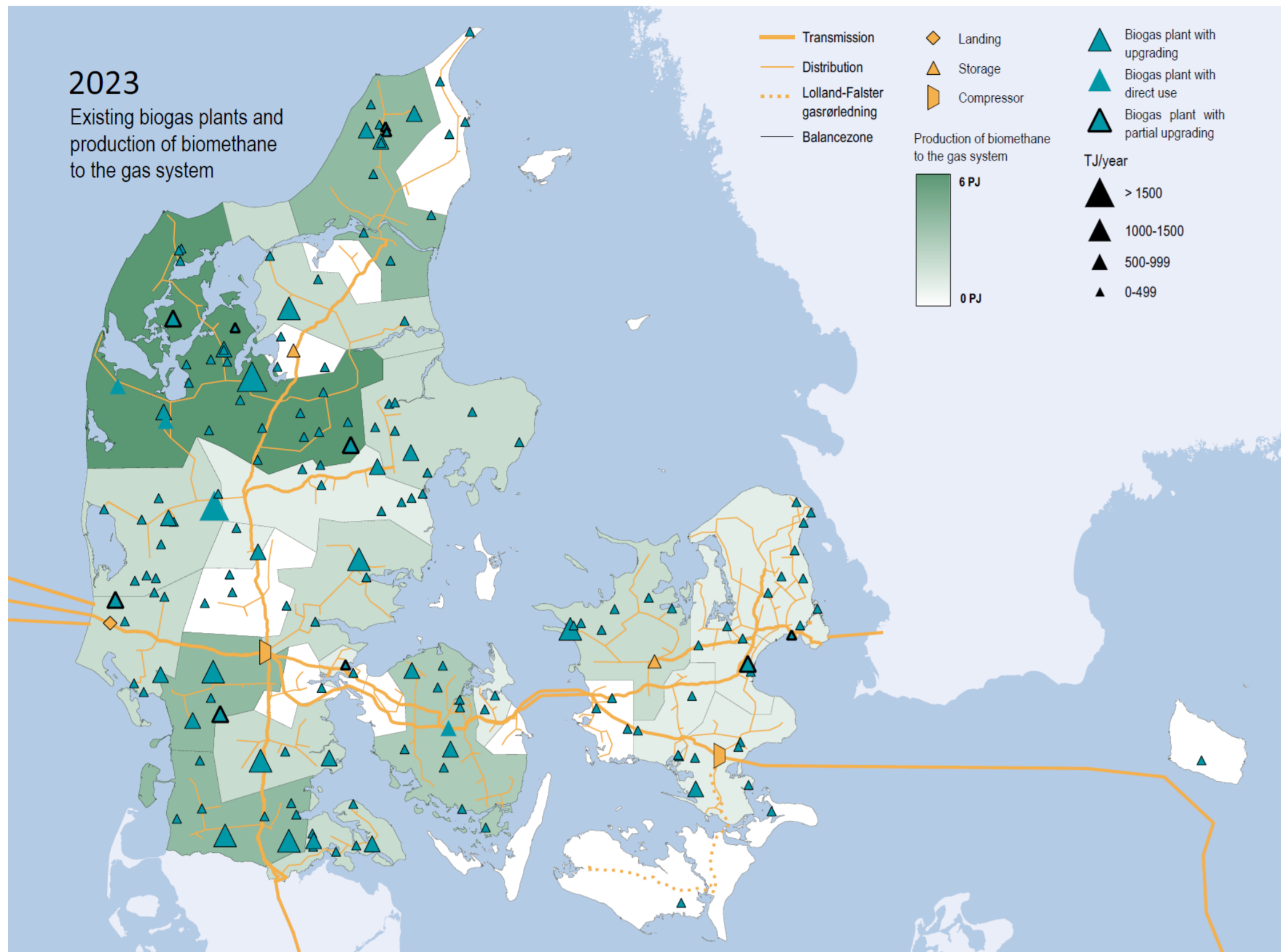


# Biogas in Denmark: Achievements, Innovations, and Future Prospects

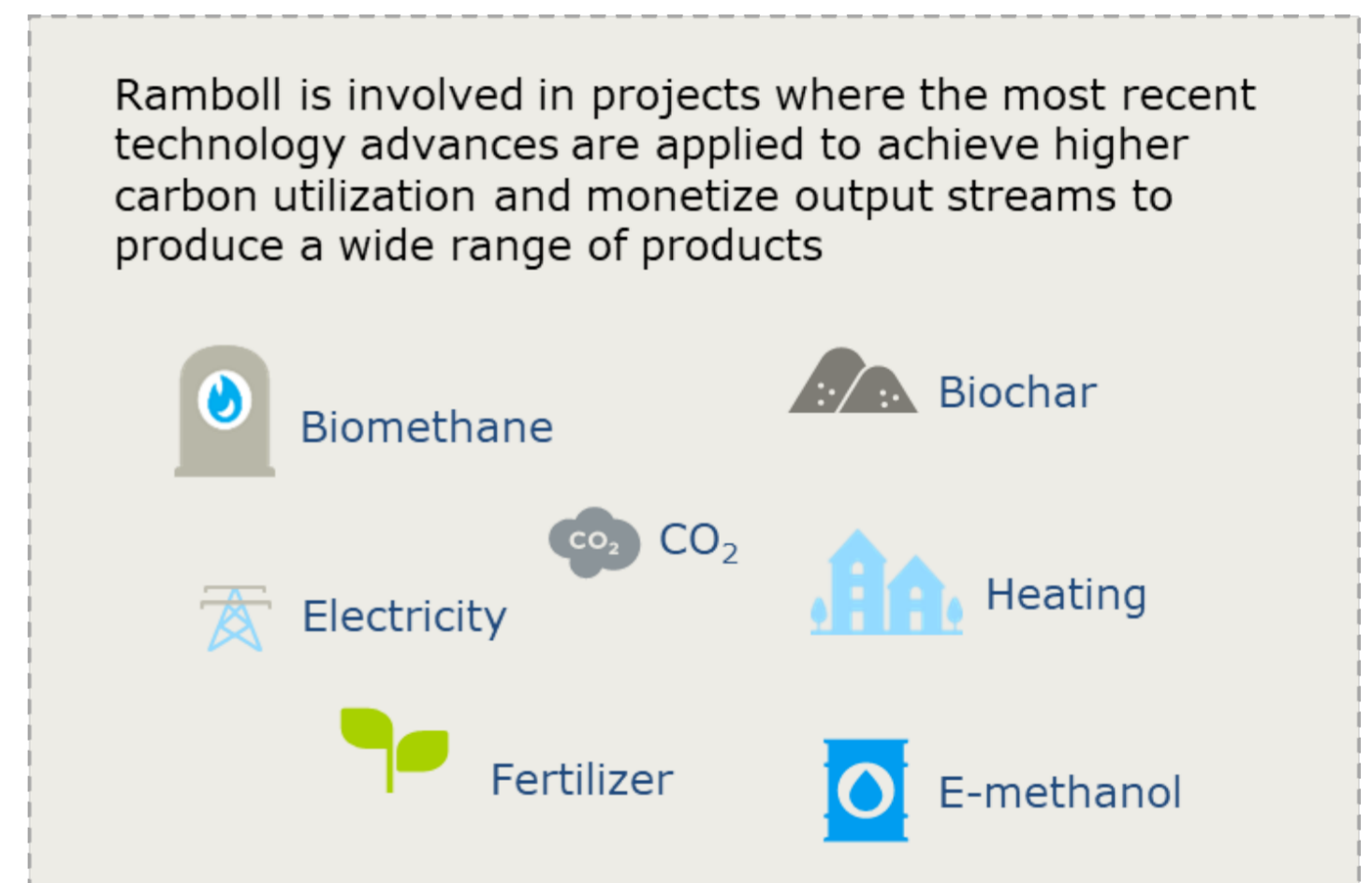
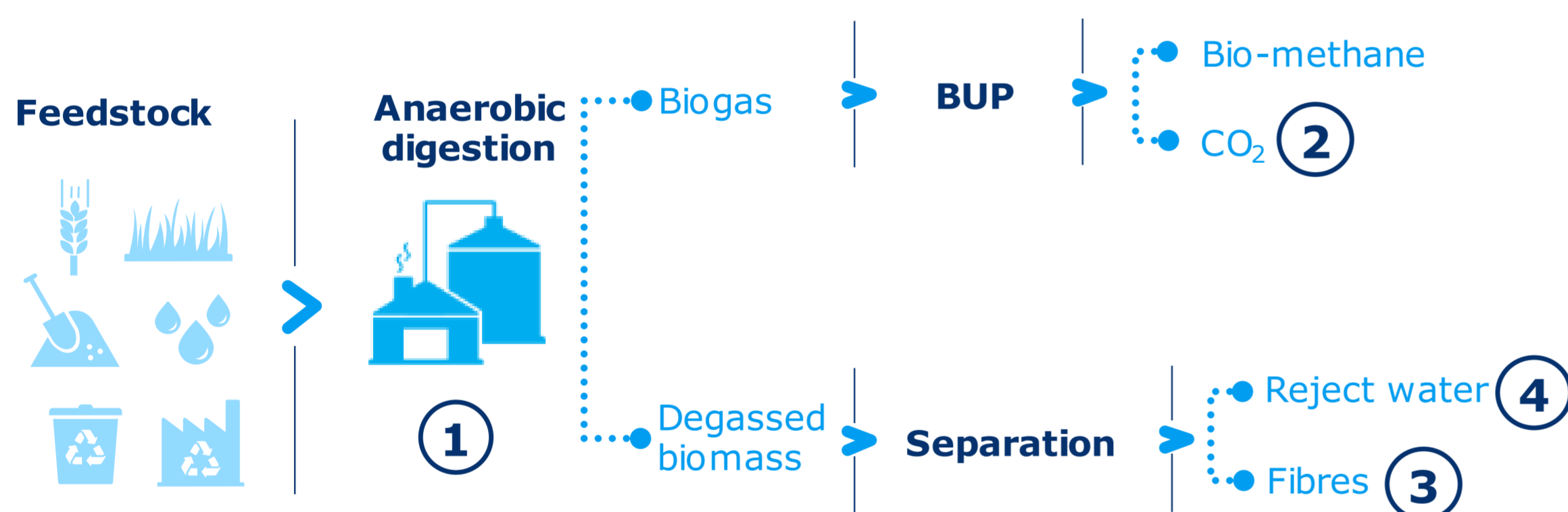
Author: Maria Puig-Arnabat (mpat@ramboll.com / +45 21128120)

## Current status of biogas plants in Denmark



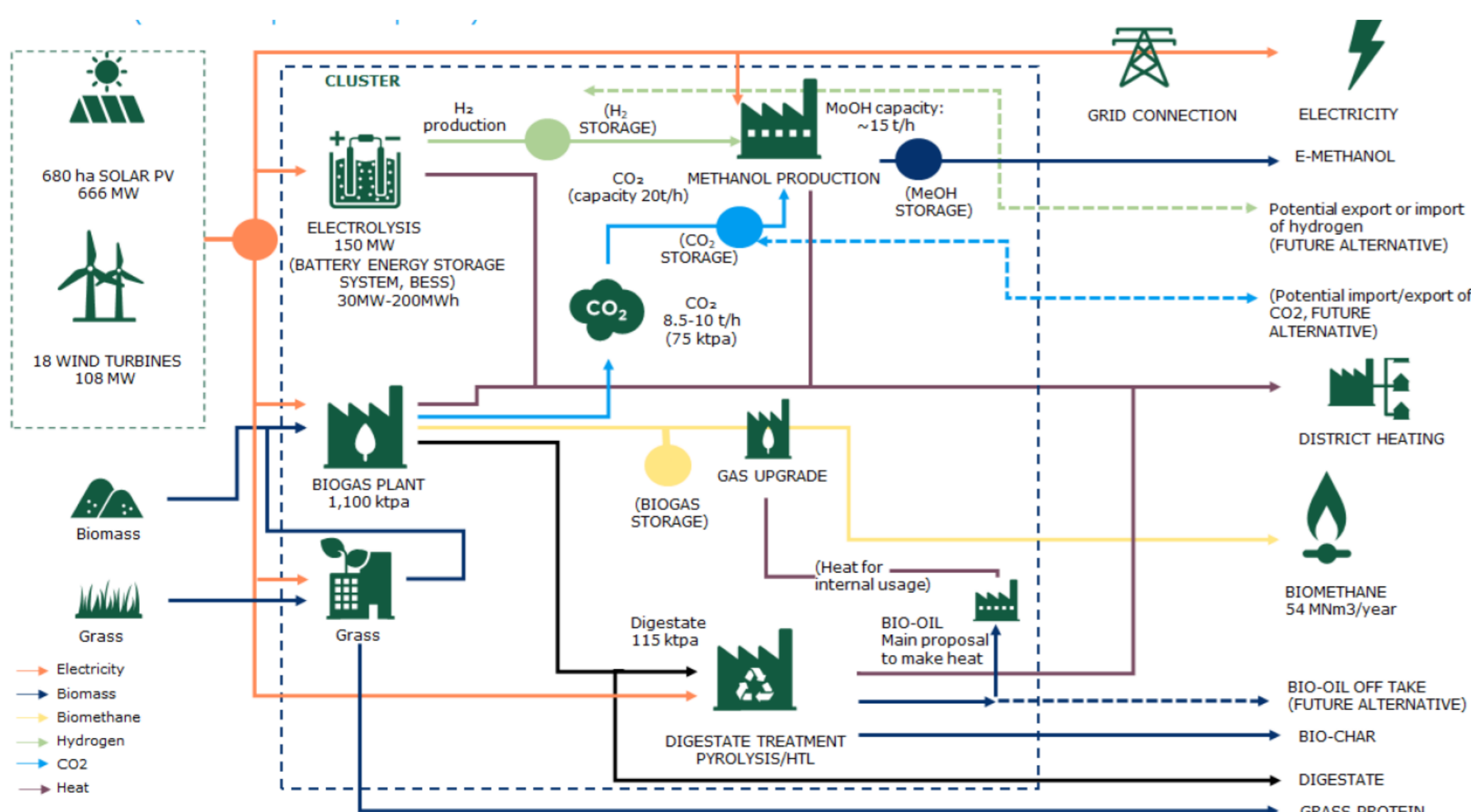
- Current **share of biomethane in the natural gas grid is 37.4%** (August 2023)
- Governmental ambition to have **100% green gas by 2030**
- Denmark has approx. **190 biogas plants** (agricultural plants, WWT plants, industrial plants and landfill plants)
- Danish biogas plants are **predominantly large-scale industrial** operations. This contrasts with countries such as Italy, Germany, and France, which also have strong and developed biogas markets but with much smaller plants.
- **Livestock manure makes up for 75% of the raw feedstock** for agricultural plants and that represents one third of the total manure produced.
- Valid from 2025 the **maximum input share of energy crops is set to 4%** and the use of corn is prohibited. The long-term goal is to reduce use of energy crops even further, but regulation beyond 2026 remains to be decided.
- New regulation on **methane leaks, cap at 1%**
- **Simple digestate management system.** Raw digestate is returned to the farmers that use it as a fertilizer in their fields.

## Danish biogas market is exploring innovative ways for value creation from AD output streams



- 1 Exploring different options to increase the biogas yield e.g. a) increasing fibrous feedstock/dry matter e.g. **straw**, thus unlocking feedstocks that are currently not yet used for high value applications; b) use of ultrasound or thermal pre-treatments to accelerate the disruption of especially fibrous biomass to achieve higher conversion
- 2 Value creation from the **biogenic CO<sub>2</sub>** stream by selling it to end users or using hydrogen from electrolysis to produce **e-methane or e-methanol**.
- 3 Value creation from the **digestate fibres** stream e.g. a) using them as growing media for plants b) **bio-oil** production via **pyrolysis** or **hydrothermal liquefaction**; c) **biochar** production via pyrolysis for soil amendment and carbon sequestration.
- 4 Value creation from the **reject water stream** e.g. using the remaining C on the liquid fraction of the digestate to produce additional biomethane.

## Creation of energy clusters where AD is the core technology – Viborg Go Green



Fully circular bio-economic cluster, a land-based energy island, that will supply electricity, fuel, heat and biomethane to Viborg Municipality

### Ramboll's involvement:

- Conceptual design, Site Layout, Mass & energy balance and Design support
- Local plan
- Environmental Impact Assessment
- Environmental Approval