

Bio natural gas into the Danish natural gas grid

Biomethane Regions – Copenhagen, 24th November 2011



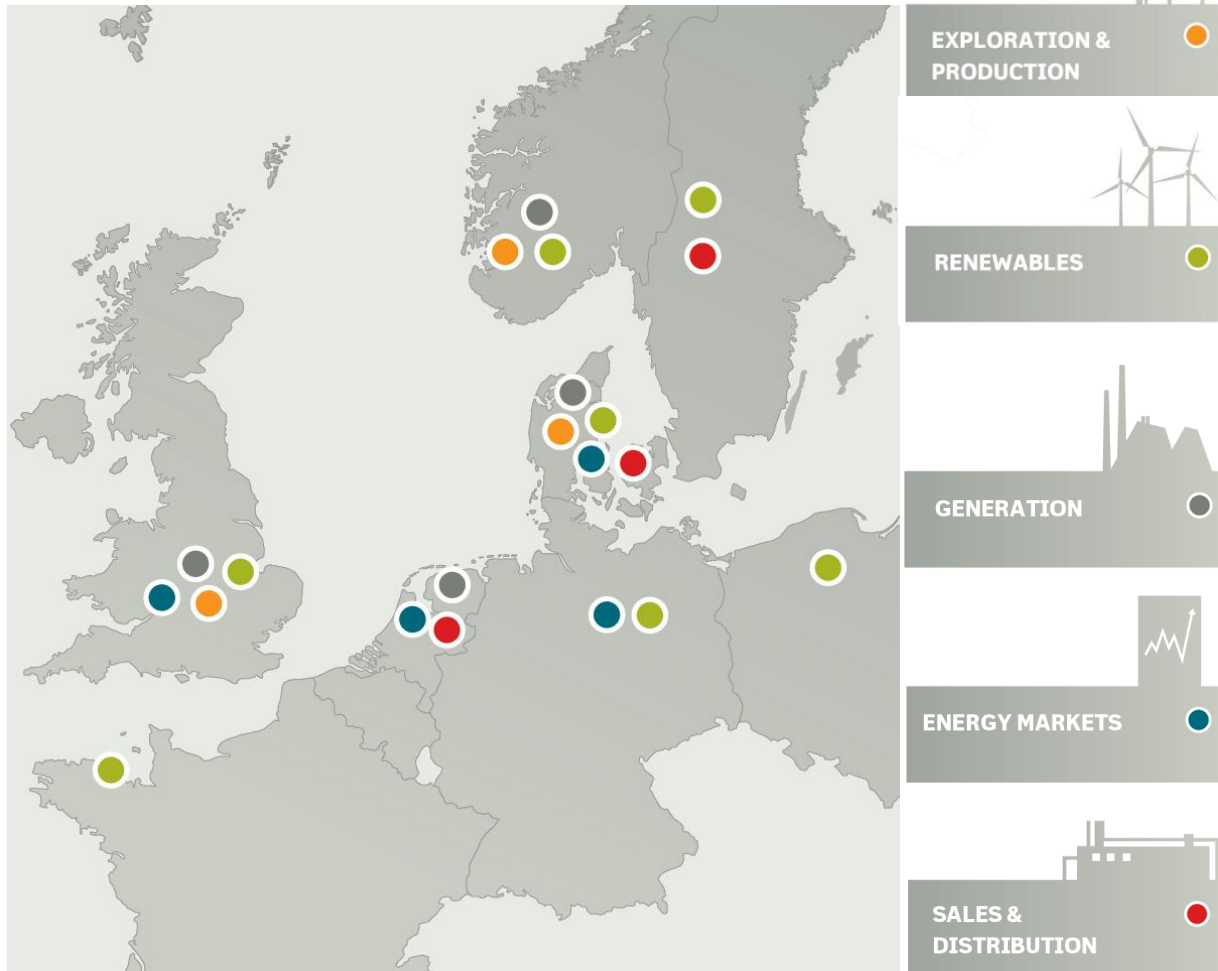
Asger Myken – asgmy@dongenergy.dk

DONG
energy

Agenda

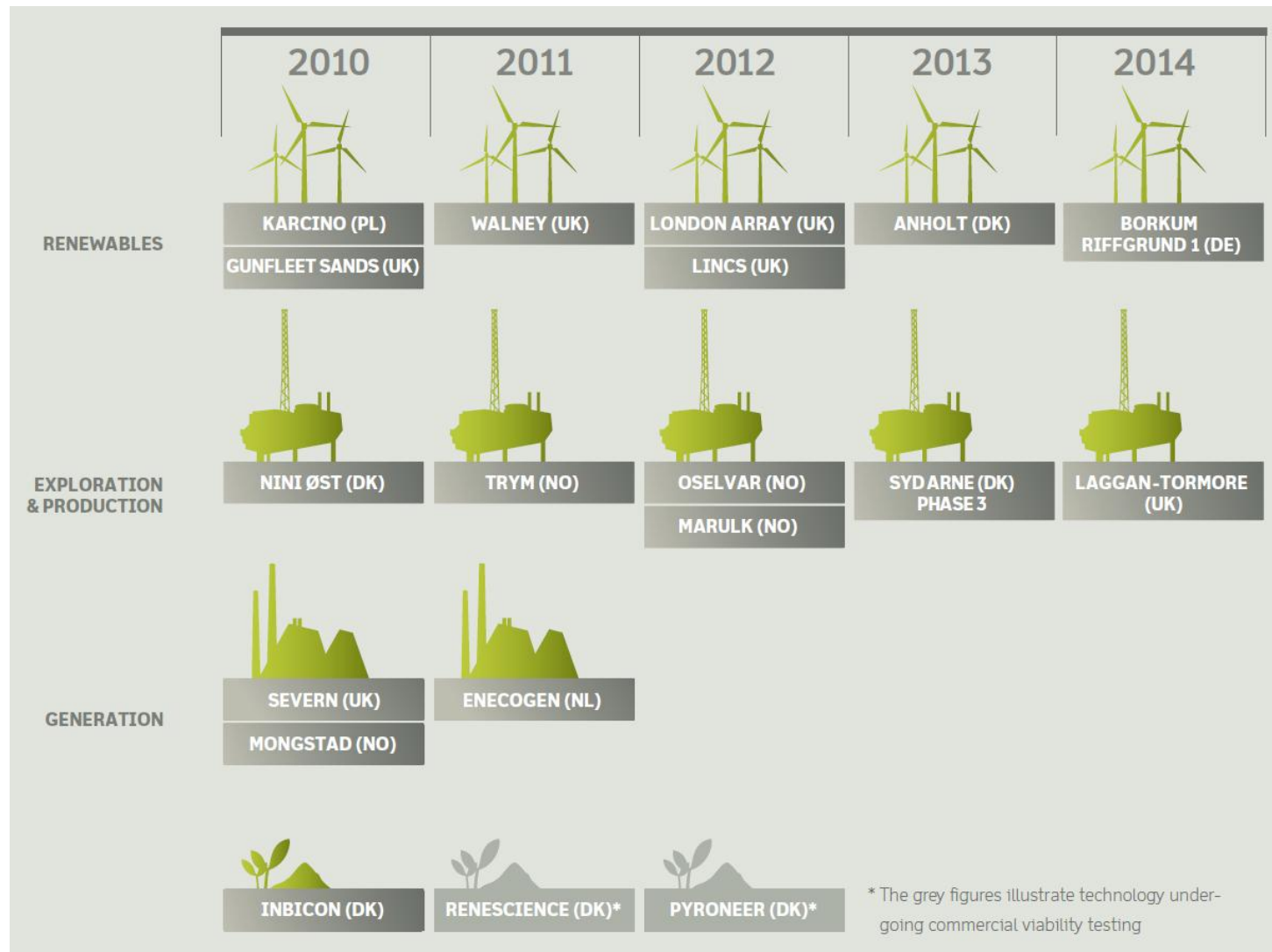
- Short introduction to DONG Energy
- Denmarks first biomethane plant
- Other biogas activities in DONG Energy

DONG Energy is one of the leading energy groups in Northern Europe



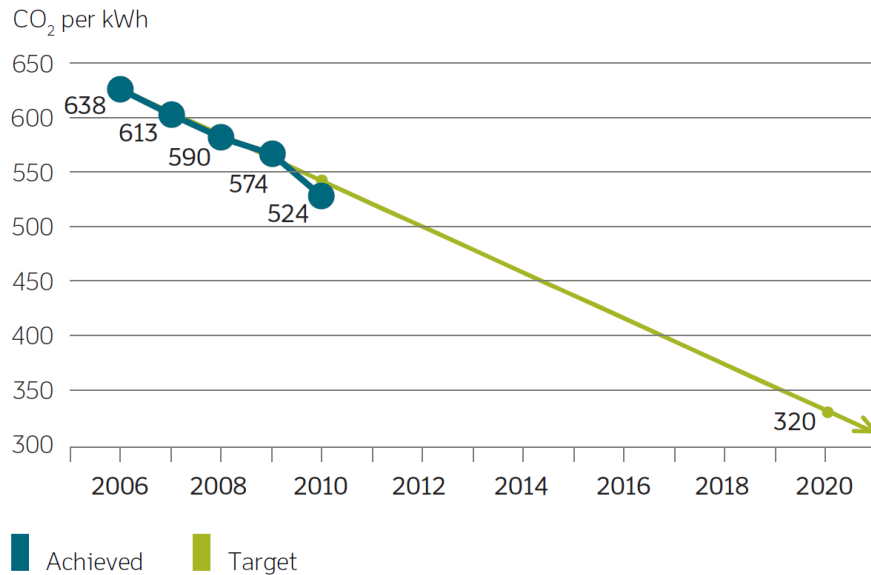
- We are headquartered in Denmark
- Our business is based on procuring, producing, distributing and trading in energy and related products in Northern Europe

New assets in operation 2010-2014

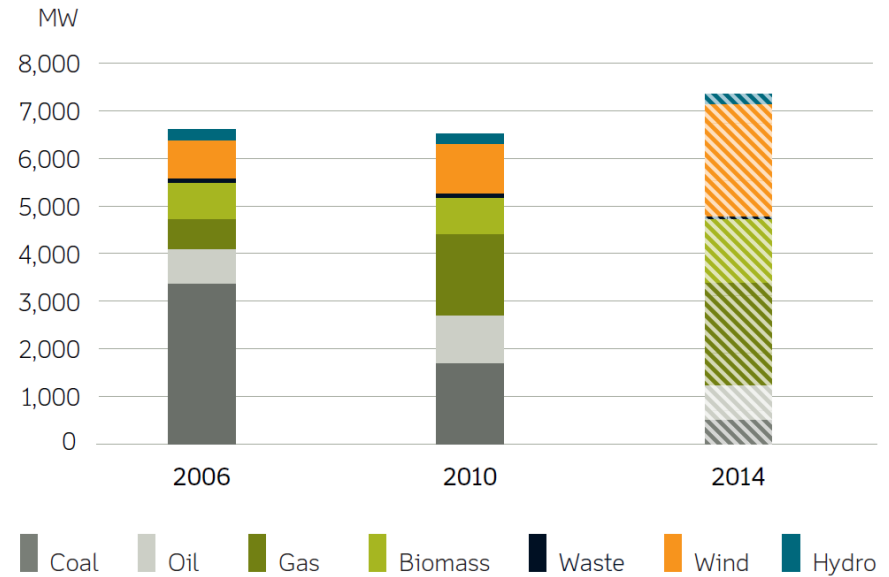


Moving towards a greener future

CO₂ REDUCTION TARGET



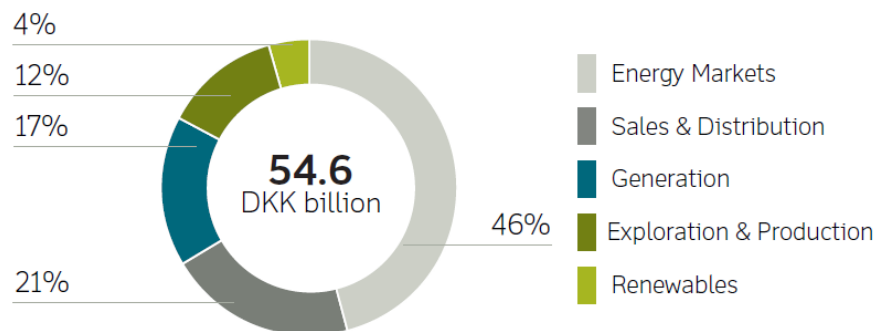
THERMAL AND RENEWABLE ENERGY CAPACITY



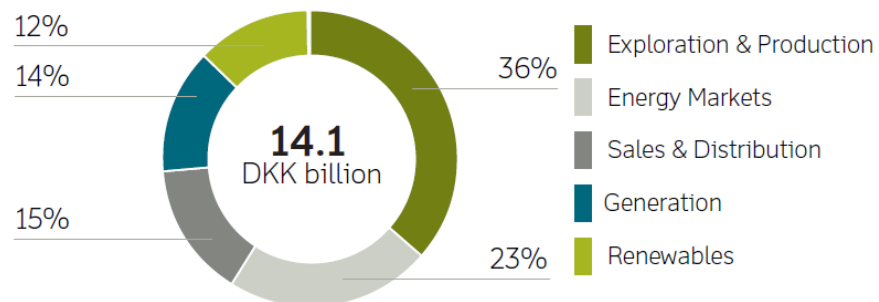
Note: Hatched column denotes estimate

Revenue and EBITDA by business unit

REVENUE 2010

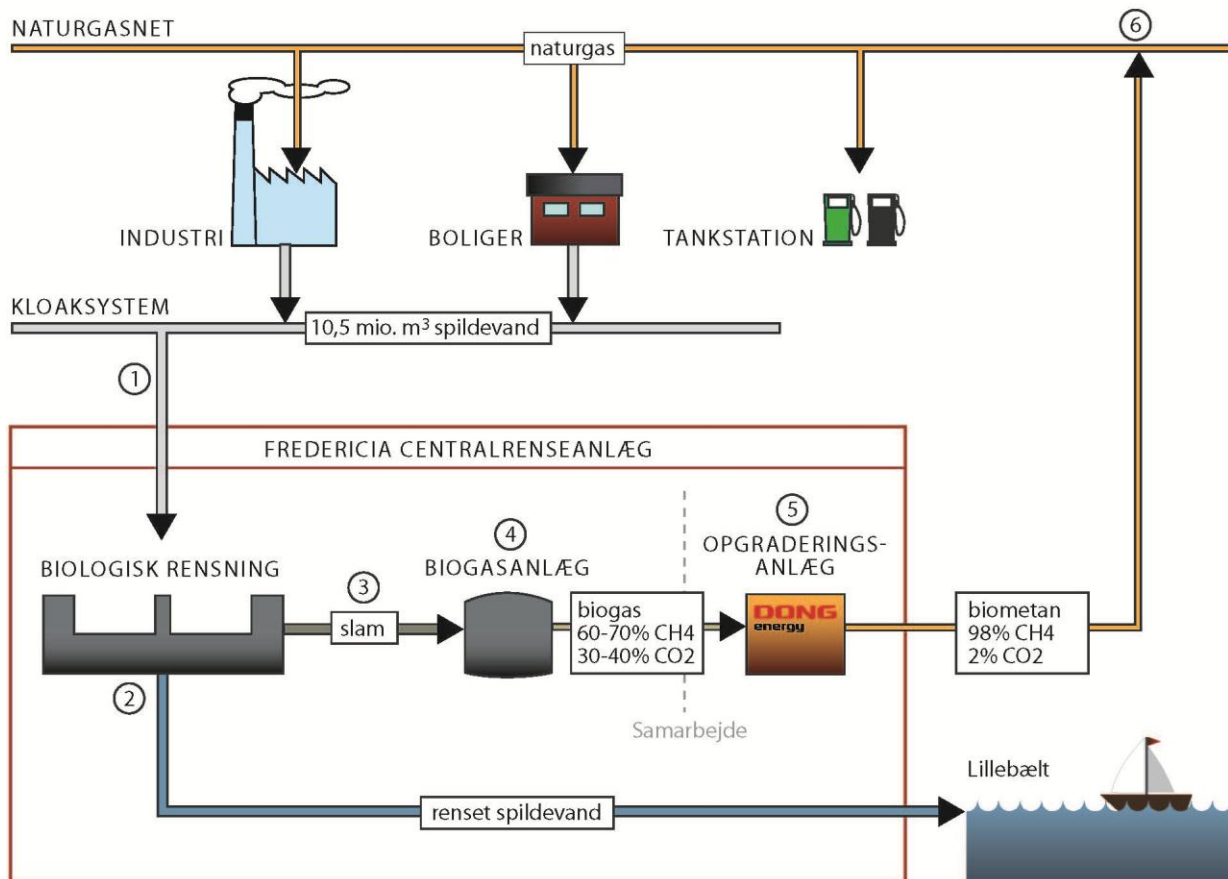


EBITDA 2010

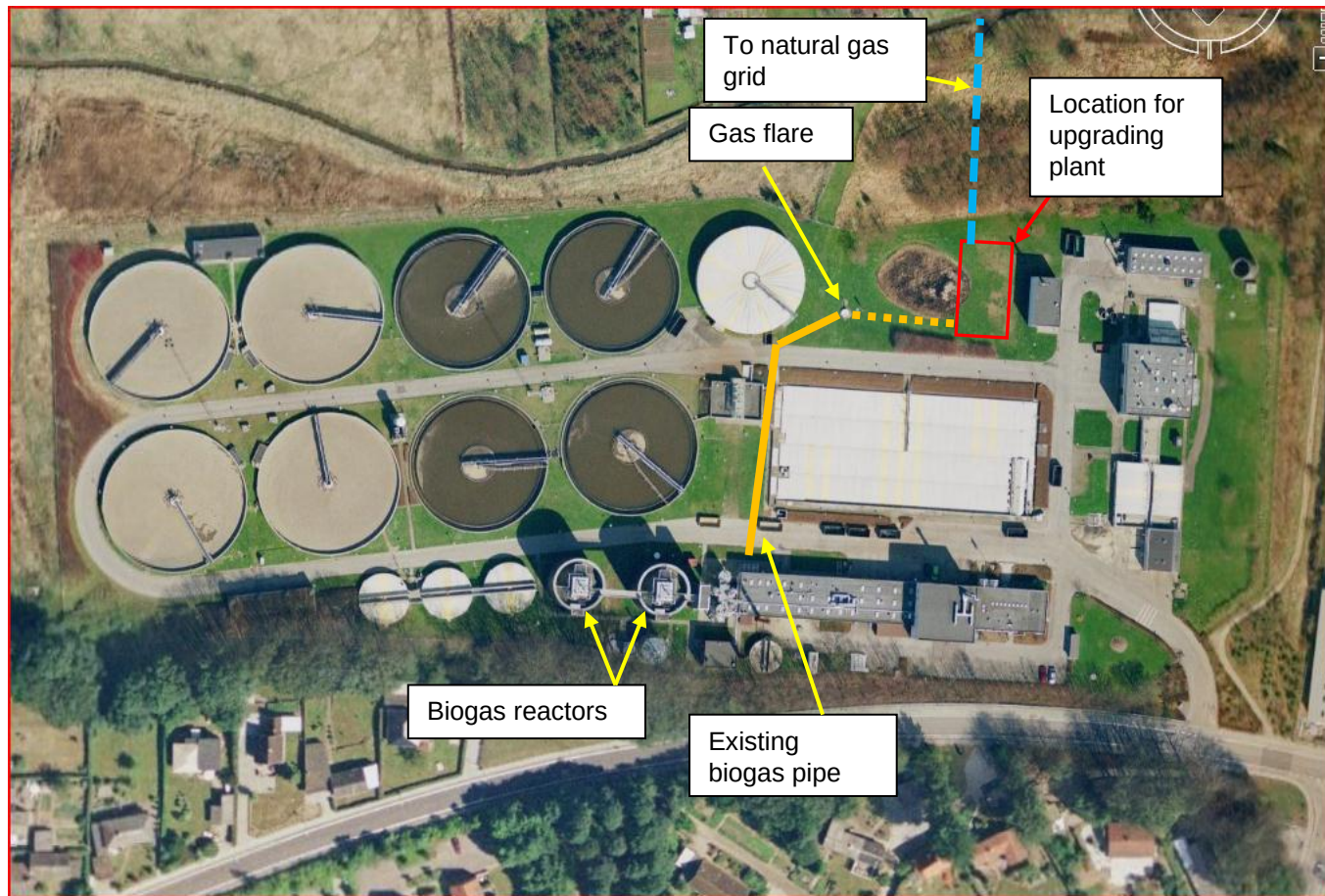


DONG Energy now distributes biogas through the natural gas grid for the first time in Denmark

- In operation from 15th September 2011
- Expected production: 8-10 GWh/year
- Based on biogas from wastewater treatment plant



Fredericia Waste Water Treatment Plant



Upgrading technology

- Water scrubber
- Additional cleaning of waste gas
- Supplier: Greenlane AB
- Capacity: 300 Nm³/h biogas



Water scrubber process

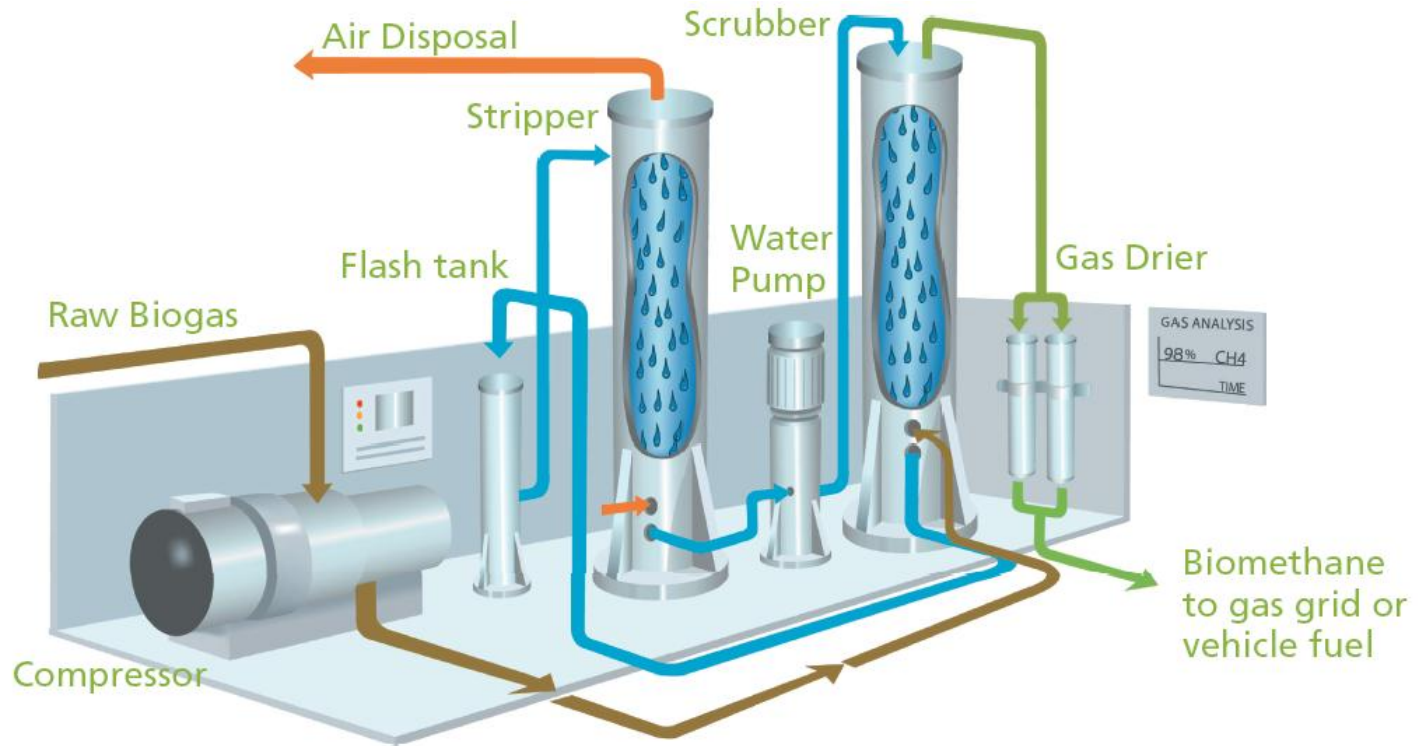
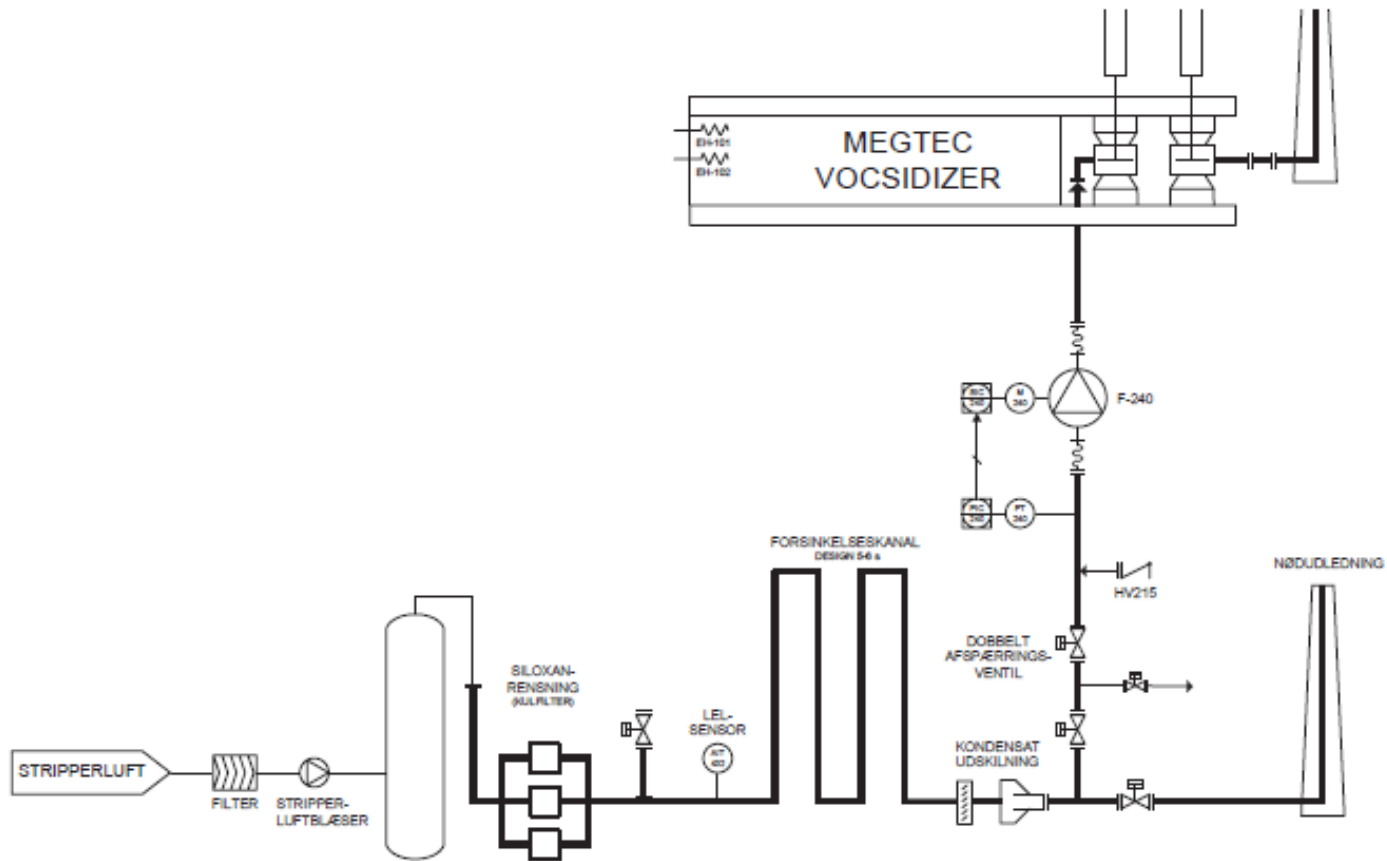


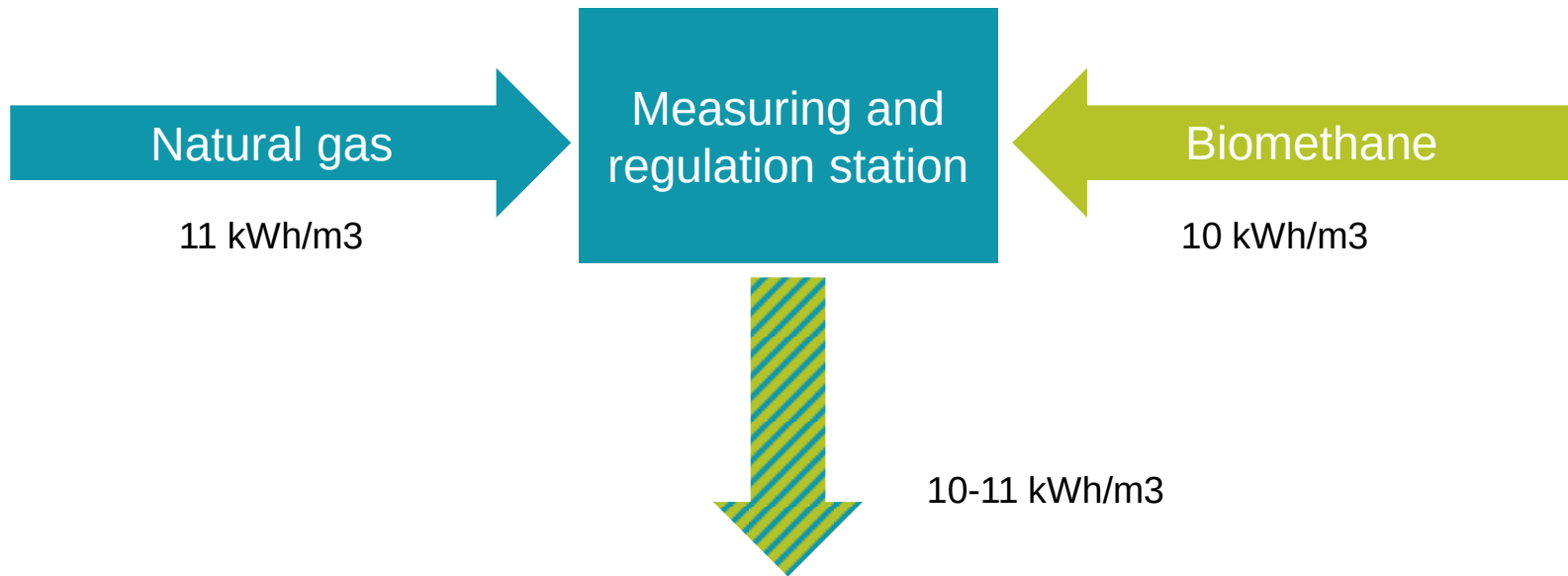
Illustration authorised by Greenlane AB

Effluent gas cleaning



Propane addition is avoided

- Disadvantages by propane addition:
 - High costs (upgrading costs increases approximately 25%)
 - Compromising the sustainability of the biomethane product
 - Reduces the grid capacity for delivery of biomethane
- An average calorific value is applied to customers on a monthly basis



Potential added value from DONG Energy to biogas producers



- Inbicon:
 - C5 melasse
 - Based on straw
- REnescience
 - Liquid fraction
 - Based on municipal waste

Raw
materials

Biogas plant



Biogas

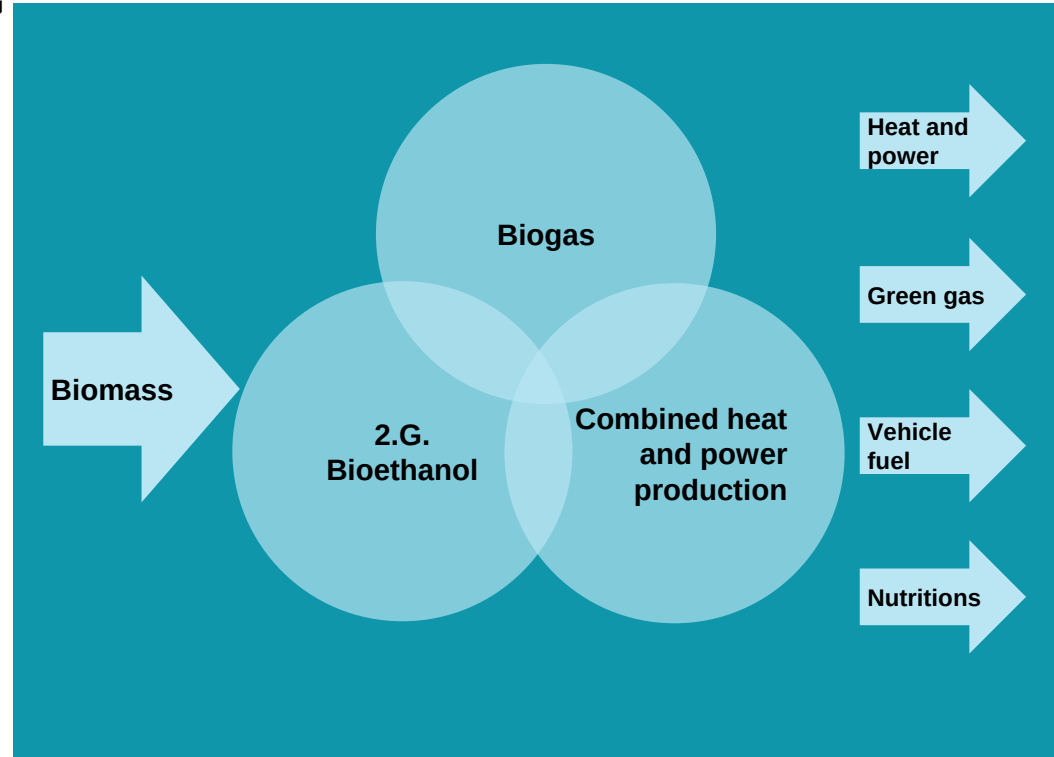


- Upgrading
- Distribution and sales
- Financial products (e.g. fixed price for biogas)



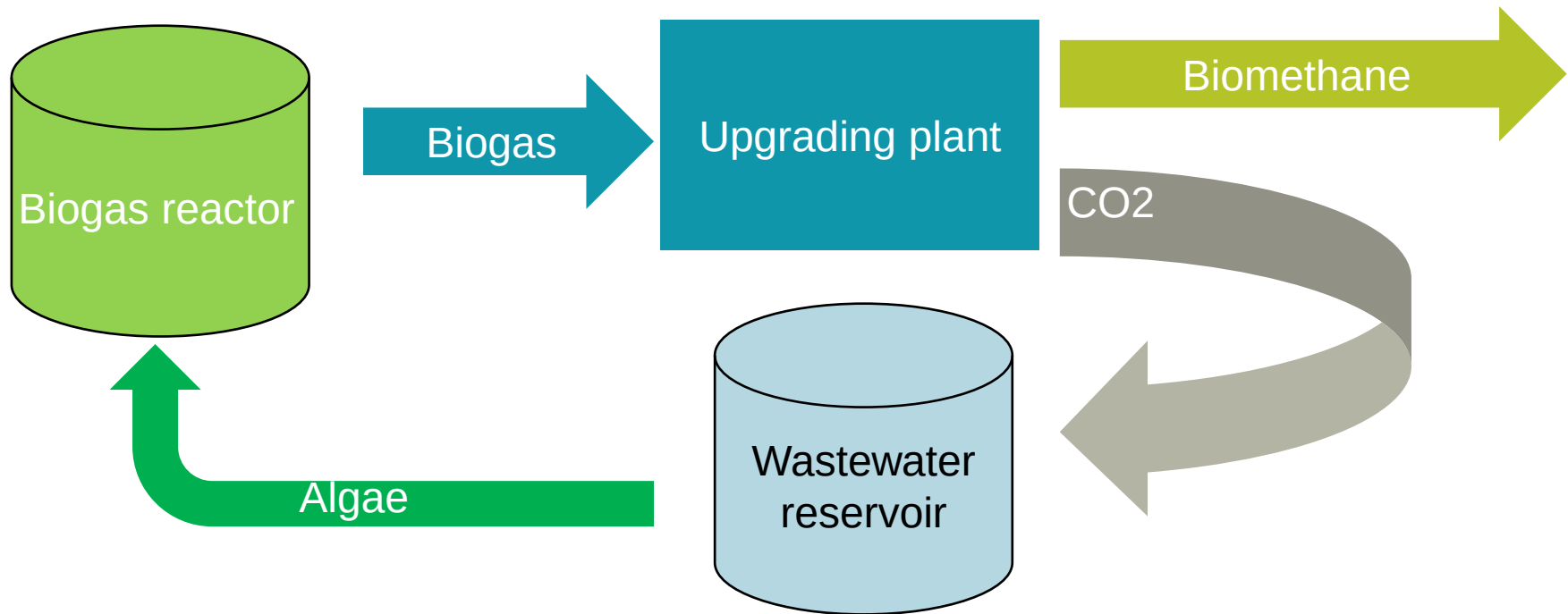
Maabjerg Energy Concept

- Consortium of Vestforsyning, Struer Forsyning, Nomi og DONG Energy (including subsidiaries Renescience og Inbicon).
- Expected Annual production:
 - 50-70 million litres of bioethanol
 - 44 million m3 biogas
 - District heating of 20,000 houses
 - Power consumption of several thousands houses
- Treatment of:
 - 300.000 - 400.000 tonnes straw
 - 500.000 tonnes of biomass (primarily manure)
- Final decision on establishment dependent on further analysis



Algae production and CO2 reduction from upgrading plant in Fredericia

- Potential RTD project with Fredericia Spildevand as project manager
- CO2 from the upgrading process will be used to stimulate algae production
- Improved CO2 reduction effect of the biomethane



Biogas as a vehicle fuel

- DONG Energy holds 50% of the shares of Fordonsgas Sverige AB, the leading Swedish supplier of biomethane to vehicles
- Participates in demonstration project for heavy duty gas vehicles
 - Supported by the Danish Transport Authority
 - Participants include Ecological Council, Volvo, Scania, The Danish Biogas Association
 - 4 trucks to be demonstrated: 2 CNG and 2 dual fuel
- Participates in application to the Danish Transport Authority
 - Project manager: Municipality of Fredericia
 - Biogas as fuel for buses and other vehicles in Fredericia

