



**MINISTRY OF FOREIGN AFFAIRS
OF DENMARK**

BIOGAS GROWTH AND FOOD WASTE PRE-TREATMENT IN DENMARK

**CHRIS VOELL, HEAD – WASTE, RECYCLING & BIOGAS ADVISORY
DANISH TRADE COUNCIL OF NORTH AMERICA**

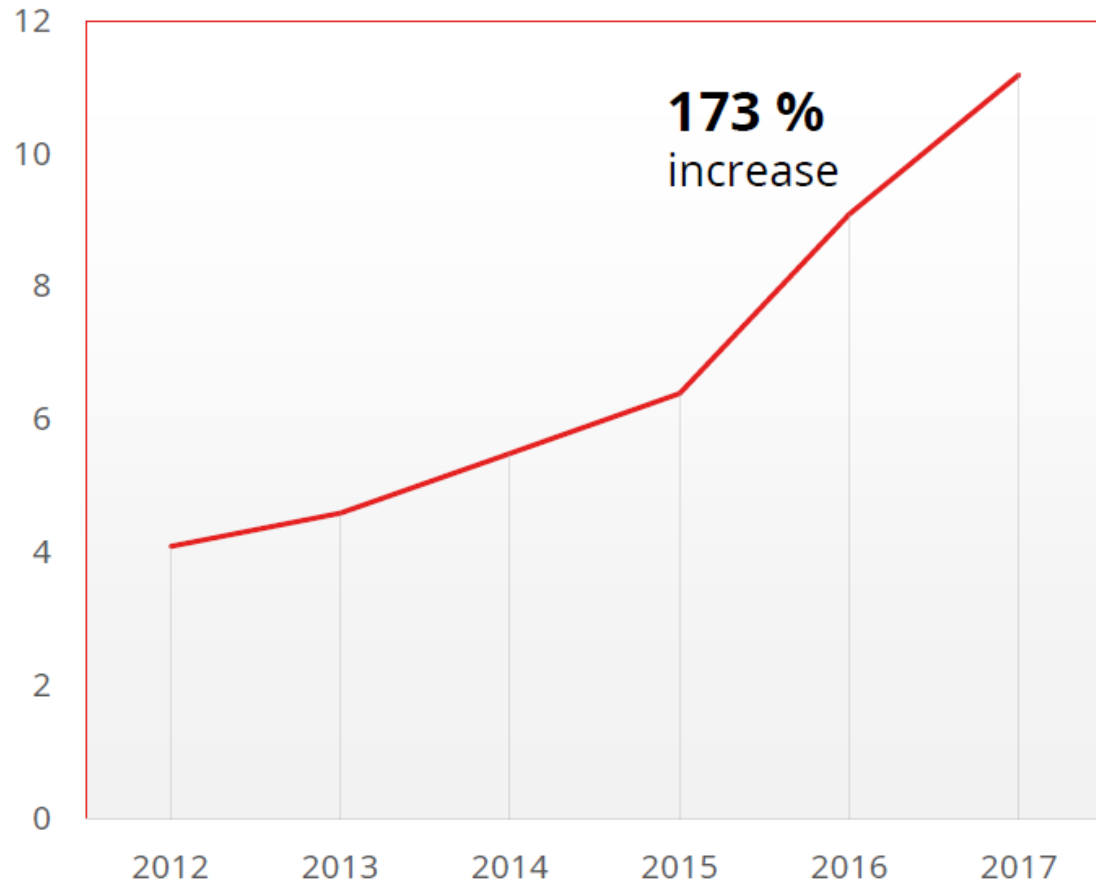
**LARS RAVN NIELSEN, CEO
GEMIDAN ECOGI**

GMI Biogas Subcommittee Meeting, Madison, WI – October 28, 2019

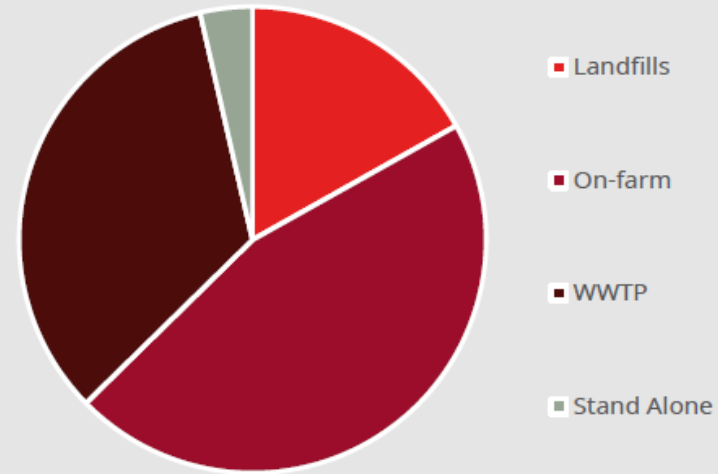


THE STATE OF BIOGAS PRODUCTION IN DENMARK

Production in PJ



AGRICULTURAL BIOGAS PLANTS DOMINATE PRODUCTION



12 % of manure in biogas production

11 % biogas in the grid in 2018

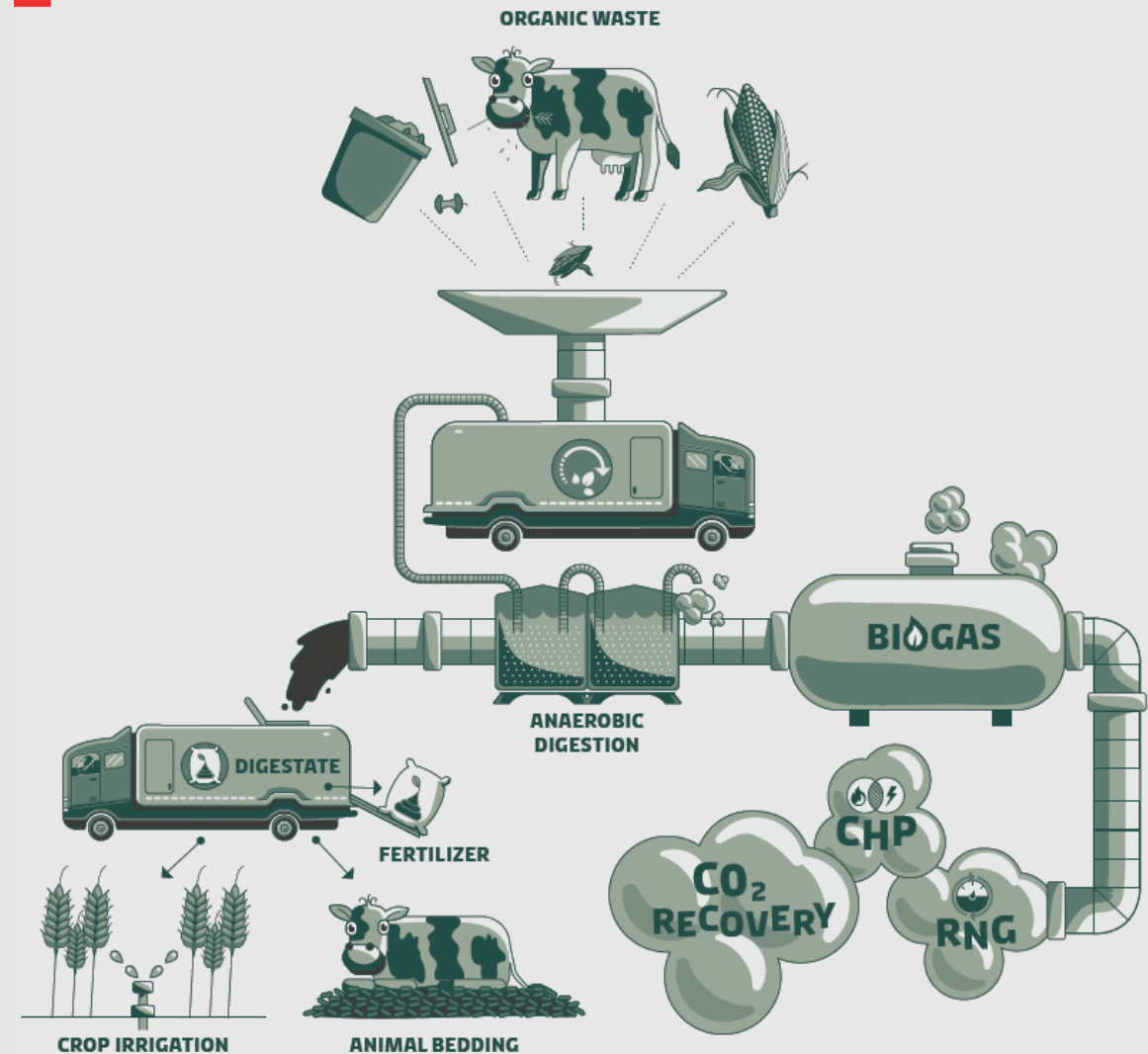
Record summer:
18 % biogas in the grid in July

Estimated green gas in the grid in 2030: **100 %**

DANISH BIOGAS MODEL

Danish Biogas Innovations

- Large-scale, centralized co-digestion AD plants
- Feedstocks / Co-Digestion
 - Livestock manure, deep bedding, food waste, ag residuals
 - 'Bio-pulp' from food waste capture
- Products
 - Organic fertilizer, RNG/biomethane, animal bedding, food-grade CO₂
- Farmer cooperative model
- Framework conditions for renewable natural gas
- Transformative utility companies – fossil to renewable



LARGE-SCALE, CENTRALIZED CO-DIGESTION

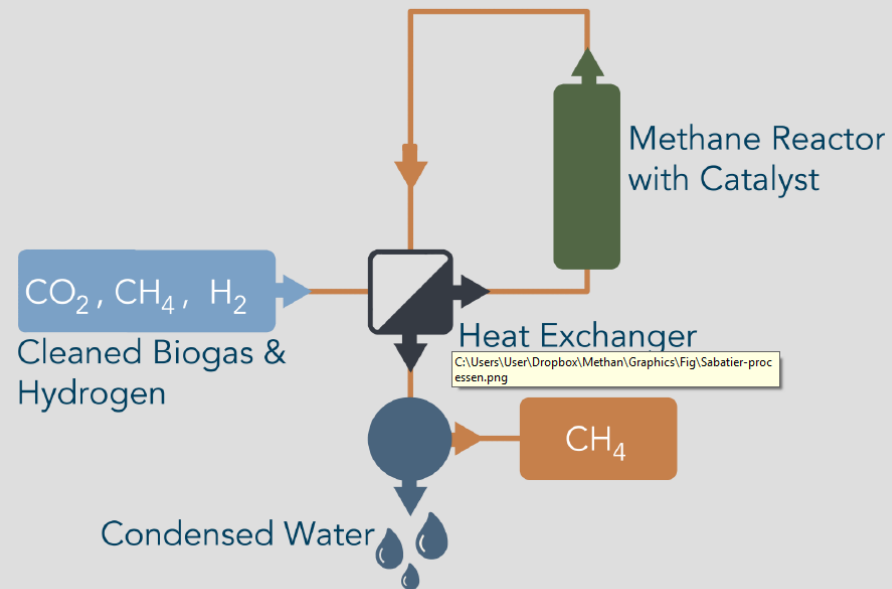


BIOGAS CLEANING AND UPGRADE

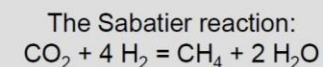
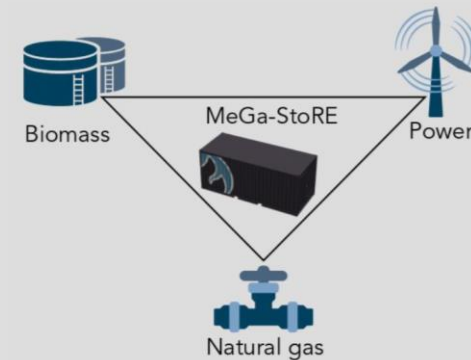


POWER TO GAS – BIOGAS AND WIND

The Methane Process



MeGa-StoRE Methane Gas for Storage of Renewable Energy

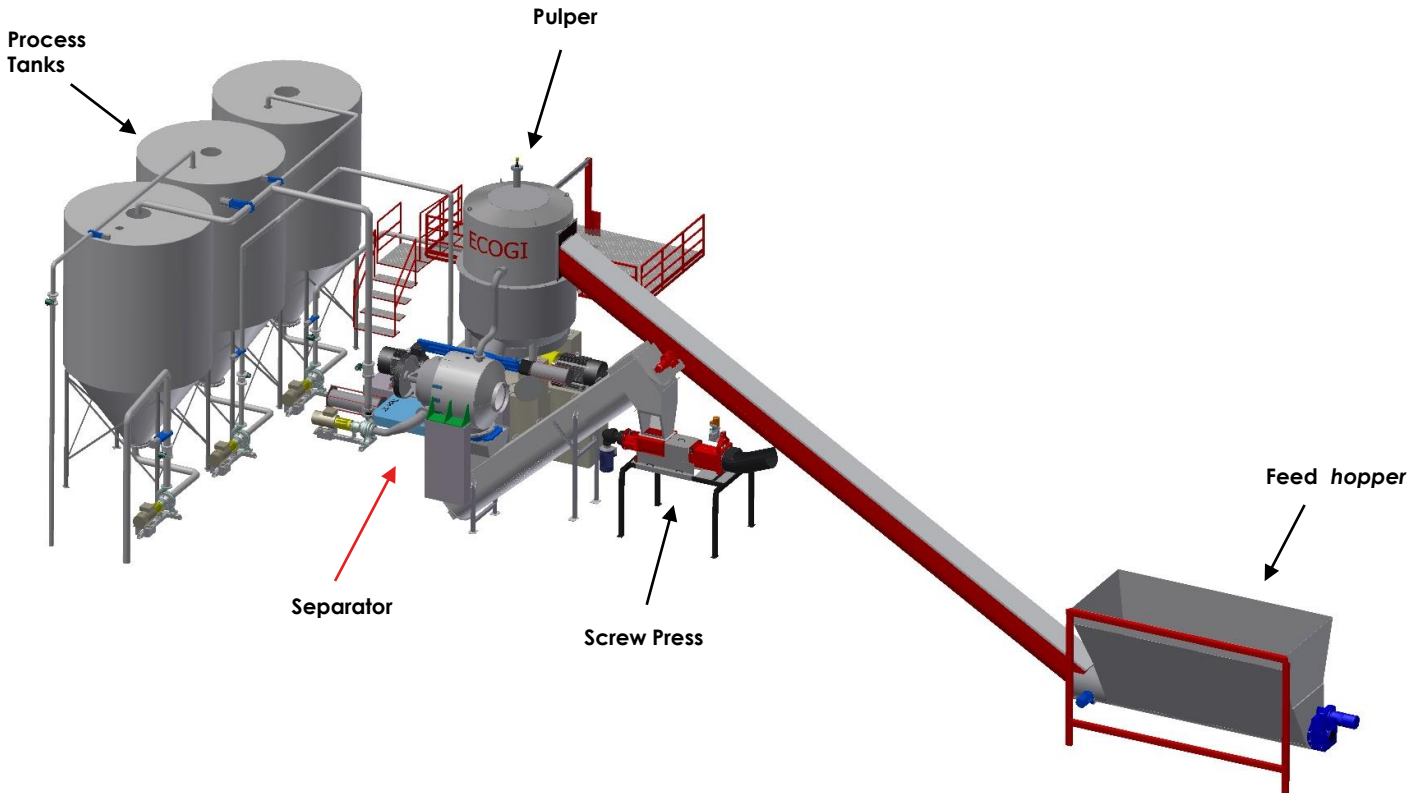


GEMIDAN ECOGI A/S

- Mission is to pre-treat and properly manage food waste from residential, commercial, institutional and industrial streams.
- Built on quality design and flexibility to handle multiple and ever-changing feedstocks (plastic, paper, metal, glass packaging).
- Efficiency and ease of operation are critical elements.
- 'Bio-pulp' quality is essential.
- Main business areas:
 - Design and sales of Ecogi facilities
 - Supply, set up and commissioning of plants
 - Operation and maintenance agreements
 - Spare parts sales



STANDARD ECOGI FACILITY



BIOPULP CHARACTERISTICS

- Only 'bio-pulp' to have international Environmental Technology Verification (ETV) Certificate verifying product purity
 - Purity of Biopulp >99,9% (dry basis)
- Can adjust TS from 10 - 20% depending upon end use and transport options
- Extremely small particle size allows for accelerated biogas production
 - 95%+ recovery based on expected methane yield
- Low values of heavy metals and other foreign elements
- Plastic content well below Danish and EU regulatory limits



ECOGI PLANT IN NÆSTVED, ZEALAND



ECOGI PLANT IN FREDERIKSHAVN, JUTLAND





Biogas Go Global (BGG) is a new public-private partnership that is set out to accelerate the U.S. biogas production by utilizing knowledge and experience from the Danish biogas model.

BGG aims to break down barriers for biogas production, support the right framework conditions, business models and technologies in the U.S.

The initiative gathers industry experts, regulators and academia into one partnership to ensure that knowledge is transferred across the different sectors simultaneously. Cross-sector knowledge-exchange is often transferred to each sector separately, so BGG ease the workflow for all parties involved and increase the transparency within the industry.

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QUESTIONS?



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