

SOLRØD BIOGAS – TOWARDS A CIRCULAR ECONOMY

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MISSION AND VISION

The Solrød Biogas Plant was taken into operation in 2015. The plant was established and is operated by Solrød Biogas A/S, founded May 28, 2014 with Solrød Municipality as shareholder. Solrød Biogas A/S is driven by the vision of implementing sustainable, CO₂ neutral energy solutions, while solving important climate and environmental challenges in Solrød Municipality.

The idea to build a biogas plant in Solrød emerged from

the need to find a sustainable solution to the community’s odour problem, caused by seaweed fouling the beach. Simultaneously, the Solrød Municipality also wished to take concrete action concerning climate change challenges by producing green energy. The project benefited from the synergic involvement of several actors and interests, as local industries also had challenges finding beneficial outlets for their wastes and by-products, and they became involved as they found great interest in the project plans.



Figure: Solrød Biogas Plant, taken into operation in 2015

BIOGAS IN SOCIETY

A Case Story from IEA BIOENERGY TASK 37 "Energy from Biogas"

INPUT AND OUTPUT

Treatment capacity biomass	200,000 tons/year
Methane production	6 million m ³ /year
Electricity production	23 GWh/year
Heat production (District Heating)	28 GWh/year

Biomass feedstock	(tonnes)	Share of biogas	Contribution to the value of the project
Seaweed*	7,400	0.5%	Nutrients supply and improved sea water quality
Manure	53,200	9.5%	Gas production and process stability
CP Kelco (pectin)	79,400	76.6%	Gas production booster
Chr. Hansen	60,000	13.5%	Nutrients supply and gas production booster
Total	200,000	100.0%	

**Zostera maritima, Pilayella littoralis and Ectocarpus sp.*

The biogas plant has a treatment capacity of 200,000 tons feedstock/year. The biogas produced is used for CHP generation in a large gas engine. The power is sold to the grid and the heat is supplied to the local district heating system which is operated by Vestegnens Kraftvarmeselskab I/S and owned by 12 municipalities as stakeholders. The energy production of the biogas plant and the anticipated savings of CO₂ (equivalent) became part of the Solrød Municipality's Sustainable Energy Action Plan (SEAP), under the Covenant of Mayors.

INVESTMENT AND ECONOMY

Solrød Biogas A/S has a share capital of 16 million DKK, consisting of a cash contribution of 6.08 million DKK and 9.92 million DKK as assets, other than cash.

Investment, DKK	85 million (ex. CHP unit)
EU grant	0.5 million EUR
Annual revenues DKK	30 million

ESTIMATED BENEFITS RELATED TO SOLRØD BIOGAS PLANT

- 60 GWh/year renewable energy production
- 104 local jobs, of which 14 permanent
- 40,100 tons CO_{2e} saved/year (51% of the municipality target for 2025)
- Sustainable waste treatment and lower costs of waste transport
- Production of digestate as biofertiliser for farmers
- Reduced leaching of N to aquatic environment by 62 tonnes/year (70% of requirement for Køge Bay)
- Reduced leaching of P to the aquatic environment by 9 tonnes/year (100% of requirement for Køge Bay)
- Reduced odour nuisance from the beach/seaweed
- Improved sea water quality and higher recreational value of the maritime coastal area



Figure 1-3: Harvesting seaweed along Køge Bay costal line, Figure 4: Tanker for biomass transport

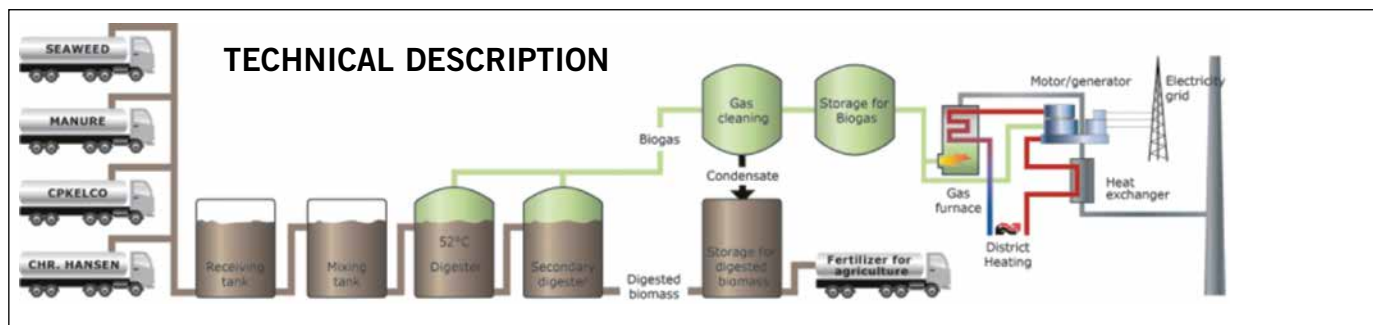


Figure: Simplified biomass and biogas flow diagram of the plant

LESSONS LEARNED

Partnership and organisation

- The project development and implementation was successfully carried out through public-private cooperation, between Solrød Municipality, suppliers, outlets, and research institutions. Partners with various skills and areas of expertise such as the EU-MLEI project, Region Zealand, Growth Forum Zealand and Roskilde University provided from the start essential input to the project development. It was proved advantageous, that development and optimisation of the process of the biogas plant was organised as public-private cooperation in the early phases. Such cooperation contributes to more openness to different interests, better projects, and the chance of being more innovative in an area of specific need – the seaweed issue being a good example. In collaboration with industries and other municipalities several tests have been carried out in order to optimise the removal of seaweed from the beach and the inflow to the biogas plant, i.e. to reduce levels of sand and water, secure effective logistics, avoid high levels of heavy metals etc.
- Regulatory approvals and permits take time and have a built-in hierarchy. Thus, focus on planning for decision making, public hearings, technical pre-hearings, etc., to include stakeholders at an early stage, and avoid unnecessary duplication. Object-oriented planning will ensure state of the art permits, and locational requirements, in line with what is in the best interest of the biogas plant.
- Buy in technical, financial, and legal expertise, especially when preparing the call for tender for construction of the biogas plant and when designing the contracts, to secure reasonable business and financing plans of overall supply and purchase of biomass and biogas.
- Run information campaigns and elaborate materials with specifications on contents of products, expected regulations, etc., and engage local (agricultural) consultants, with a view to playing an active part in “selling” the concept.

The initial phase

- A feasibility study is an advantage, in order to reveal possibilities and issues, making possible to set the most appropriate agenda for the development phase.

Project development phase

- Involvement of politicians and collaborative partners at all stages, to achieve broad ownership of the project by a wide group of people, and to ensure the indispensable political commitment and prioritization of the project.
- Organise the development process in such a way as to directly involve stakeholders, with constant focus on integrated design process and goal-oriented project development. Focus on multilateral benefits of the biogas plant and develop these multifaceted benefits in collaboration with the various stakeholders.
- Produce coherent project documentation. It ensures internal consistency in the development process and creates the optimal relationship between different topics in the planning process.

THE FUTURE

With the stable operation of the biogas plant from autumn 2015, Solrød Municipality works towards transforming fossil fuelled villages into self-producing renewable energy villages, promoting district heating and alternative heating systems, energy efficiency activities, reducing use of fossil fuel in transportation, etc.

In parallel, operation of the Solrød Biogas Plant will give the opportunity to collect valuable, full scale experience about the use of seaweed as AD feedstock in biogas plants. In many other parts of the world, washed up seaweed resulting from excess nutrients run-off from land into the ocean is a major environment and health issue requiring sustainable solutions. Its use as AD feedstock for biogas production requires large scale demonstration and further in-depth studies and testing.

CONTACTS

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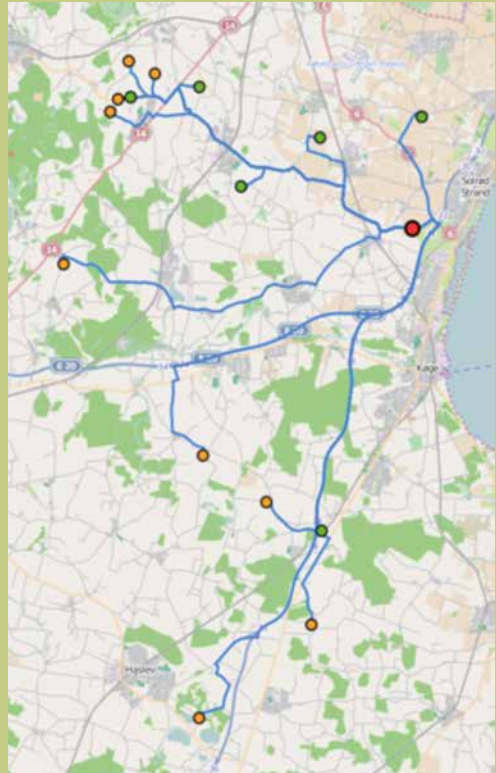
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Location of Solrød Biogas Plant (Blue lines show transport routes from Solrød Biogas to the farmers that are to supply manure and receive back digestate)