Green LNG
Liquefied Bio Natural Gas in Hirtshals
Small Scale LBNG production in Hirtshals, Denmark
Go LNG – BSR Cluster Meeting, 15th November 2017, Klaipeda.

HMN Naturgas A/S
HMN Group

HMN Naturgas I/S
owned by 57 Municipalities
Revenue: 3,805 mill. DKK
Net profit: 266 mill. DKK
365 employees

Key figures 2016

Distribution
+ 250,000 connected customers
Distributed volume; 1,498 mill. m3

Sales
+ 220,000 customers
Volume; 1,121 mill. m3
Net profit; 166 mill. DKK

Green LNG A/S
(During formation)

HMN Naturgas I/S
33%
Sold to Eniig & SEAS-NVE per 1/12/2017?

For sale

Go LNG BSR Cluster Meeting nov-17
The Project

Capacity: 160 ton/day
Storage capacity: 750 – 2.500 tons
Area needs: 15.000 m2
Power capacity: 4 MW

Produced capacity:
~ 56.000 ton = 70,0 mill. m3* (per year)

Price estimate: 50,0 mio. Euro

Construction time: 24 – 30 months

First delivery: Q1 - 2020

* 1 ton LNG = ~ 1.250 M3n (danish grid quality)
The Project

- EIA application
  - Expected approved Q1 2018

- CEF application for Grants
  - In process
  - Expected approved November 2017

- Tender update pr. end October 2017
  - Engineers still calculating

- EPC Contract signing Q1 2018
  - Depending on Grants
Green LNG A/S, established 1st June 2017

Project Partners

Fjord Line
Secure basic consumption

Skangas
Knowledge in LNG Markets & handling & transport & bunkering

HMN Naturgas
Knowledge in Energy Markets & hedging & gas- & biogas-supply
Balancing & Integration

• A liquefier can
  • Secure gas consumption in the gas grid in (summer) nights and weekends
    • And hereby reduce cost to back-compression in the gas grid
  • Reduce power consumption (to zero), in night times without wind power
    • And hereby be a part of the power regulation regime
    • And/or optimize power costs according to LNG production
  • Increase power consumption at Power overflow
    • And also here be a part of the power regulation regime
    • And/or optimize power costs according to LNG production

• In all cases it will depend on a calculation which takes into account the storage capacity and supply of customers.
In 2017 will biogas production in Northern Jutland exceed consumption in summertime.

In 2020 is biogas production expected to exceed consumption.

Balancing services to save “Back-Compressions costs”
Danish Power System

Power Production in DK, 1<sup>st</sup> and 8<sup>th</sup> November 2017

Wind- and Solar-Power are increasing, but difficult to control

Screaming for Power balancing services
Biogas and Carbon reduction

Calculation of carbon reductions can be done in 2 ways;

• The REDcert way;
  • In the process alone
  • Typical carbon reduction based on manure, straw and waste
    • GHG-savings at 85 – 90 %* ~ 8 – 12 g CO2 eq per MJ

• Including derive effects, as reduction of methane emissions at fields
  • GHG-savings up to 160 %

• LBG certificate
  • GHG-savings at 83 – 88 %* ~ 8,1 – 12,2 g CO2 eq per MJ
    • @ liquefier efficiency at 98 %, can be improved by windpower

*Reference; 83,8 g CO2 eq per MJ
Biogas Markets and customers

• Land based customers
  • Trucks at EU’s Blue Corridor
  • Off-Grid customers who wants greener image
  • And/or driven by environmental/economical attraction (higher value for customers customer)

• See based customers
  • Ferry in national services (local demands)
  • Local Ships like Tug Boats and supply Ships for Oilfields or Windfarms
  • Long terms; Ship Fleets in international services who wants to reduce the total emission.

• LNG Terminals near Hirtshals, who want to provide customers with a green alternative

• Price for LBG ? As LNG + biogas fee
  • Driven by demand and the value of the exact GHG-savings on the specific biomass.
Thanks for your attention

Henrik Rousing, Business developer
Tlf. + 45 20 90 58 35 - hro@naturgas.dk
Linkedin.com/in/henrikrousing

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