



Green LNG

Liquefied Bio Natural Gas in Hirtshals

Value Chain in Small Scale LNG and Business ideas' for the Industry

Go LNG – BSR, International Conference, 26th – 27th April 2017, Vilnius.

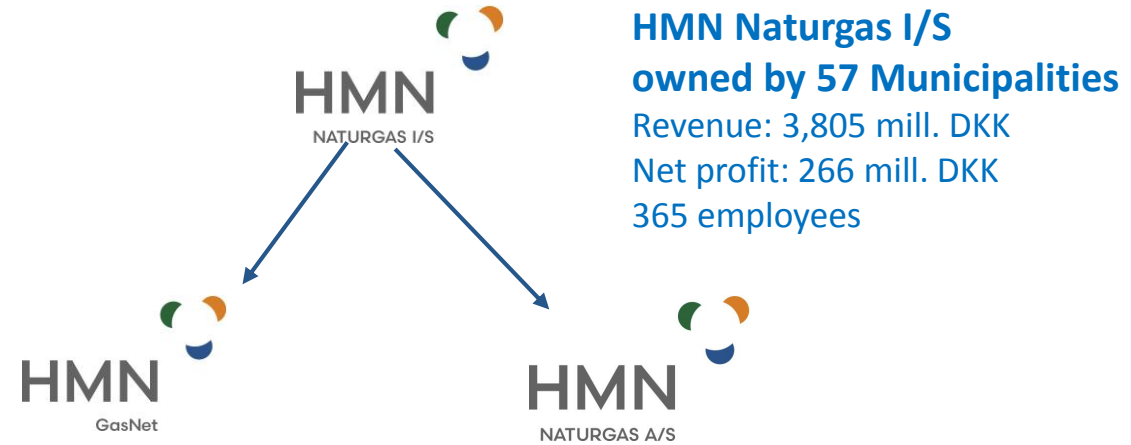
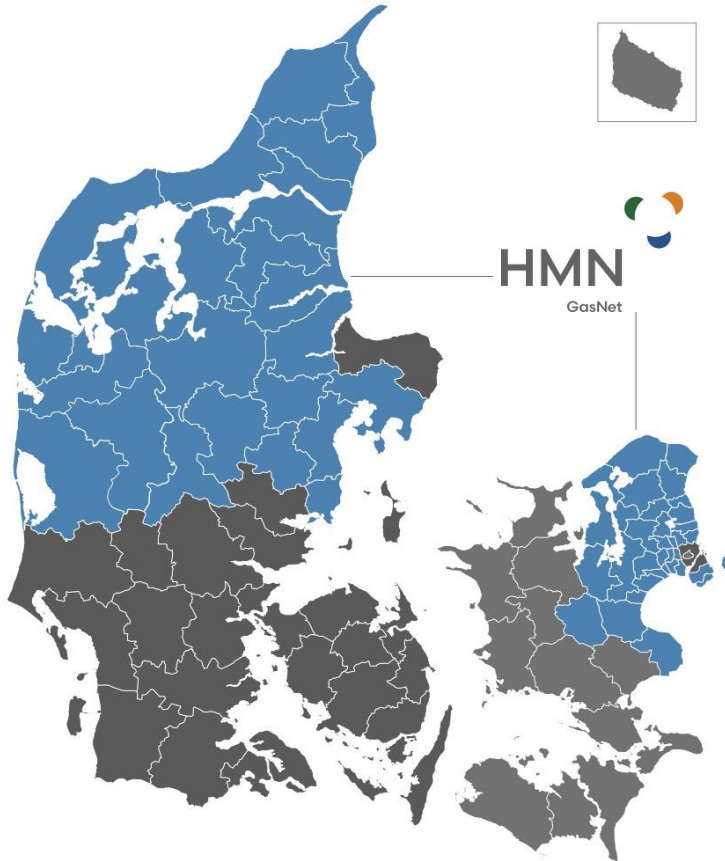
HMN Naturgas A/S

Agenda

1. Presentation of HMN and Partners
2. Business Idea
3. Balancing and integration
4. Carbon reductions
5. The Project



HMN Group



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

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

Key figures 2016

Liquefaction plant – Business case Light (Disclaiming of all the mentioned statement)

Liquefaction close to consumption

Gas price: TTF + 1 euro/mwh

CAPEX: 10 Euro/Mwh

OPEX: 5 Euro/Mwh

Pros and cons

Security of supply !

Use of Biogas (a business case in it's own)

Balancing of the gas and power grid and integration (a business case in it's own)

LNG price TTF indexed !

High fixed cost

Liquefaction - imported

Gas price: TTF + 2 to 5 Euro/Mwh

CAPEX: 5 Euro/Mwh

OPEX: 10 Euro/Mwh

Pros and cons

Transportation in the weekends ?

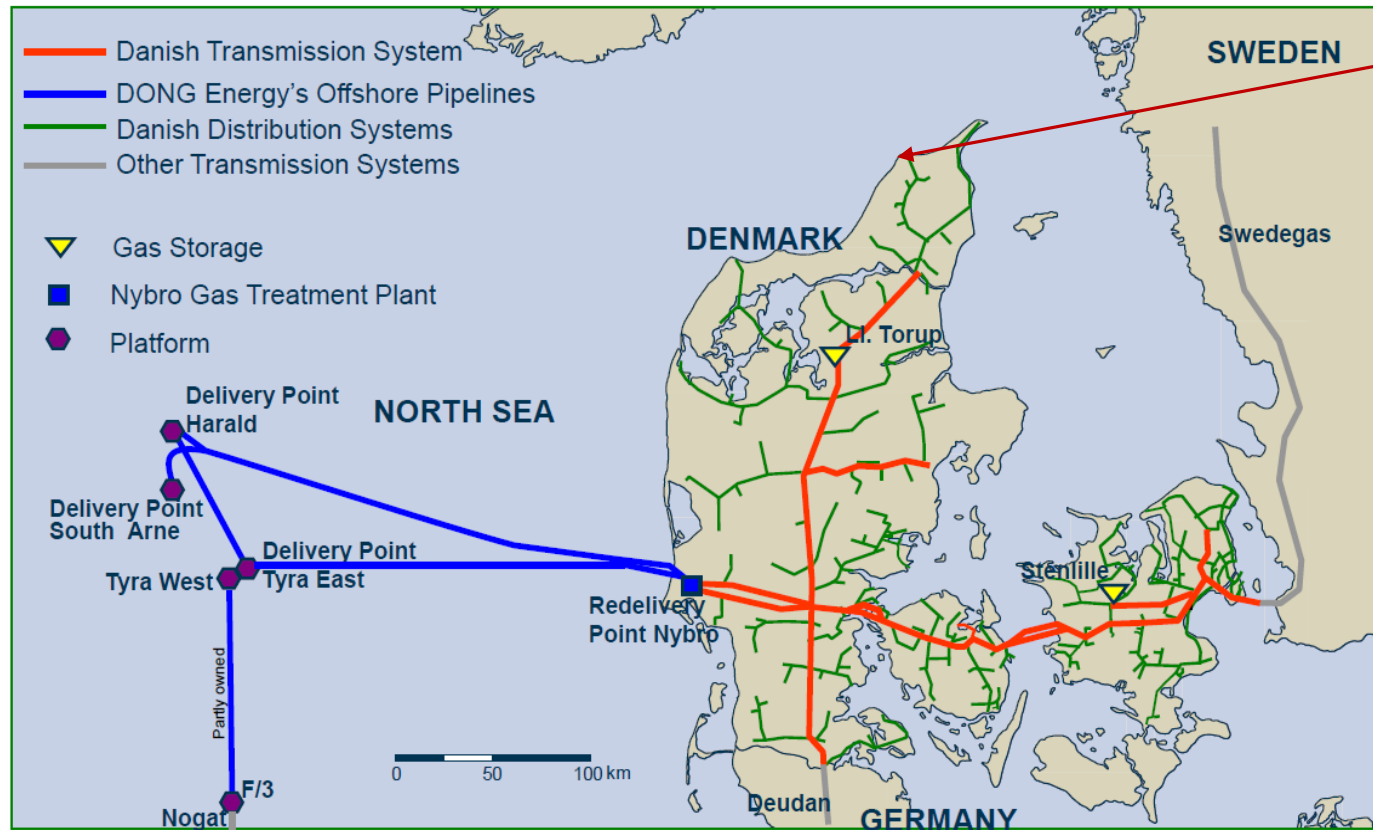
Will the LNG price rise or fall?

Take or Pay ?

LNG price TTF indexed or Oil indexed?

Low fixed cost

Danish Gas System



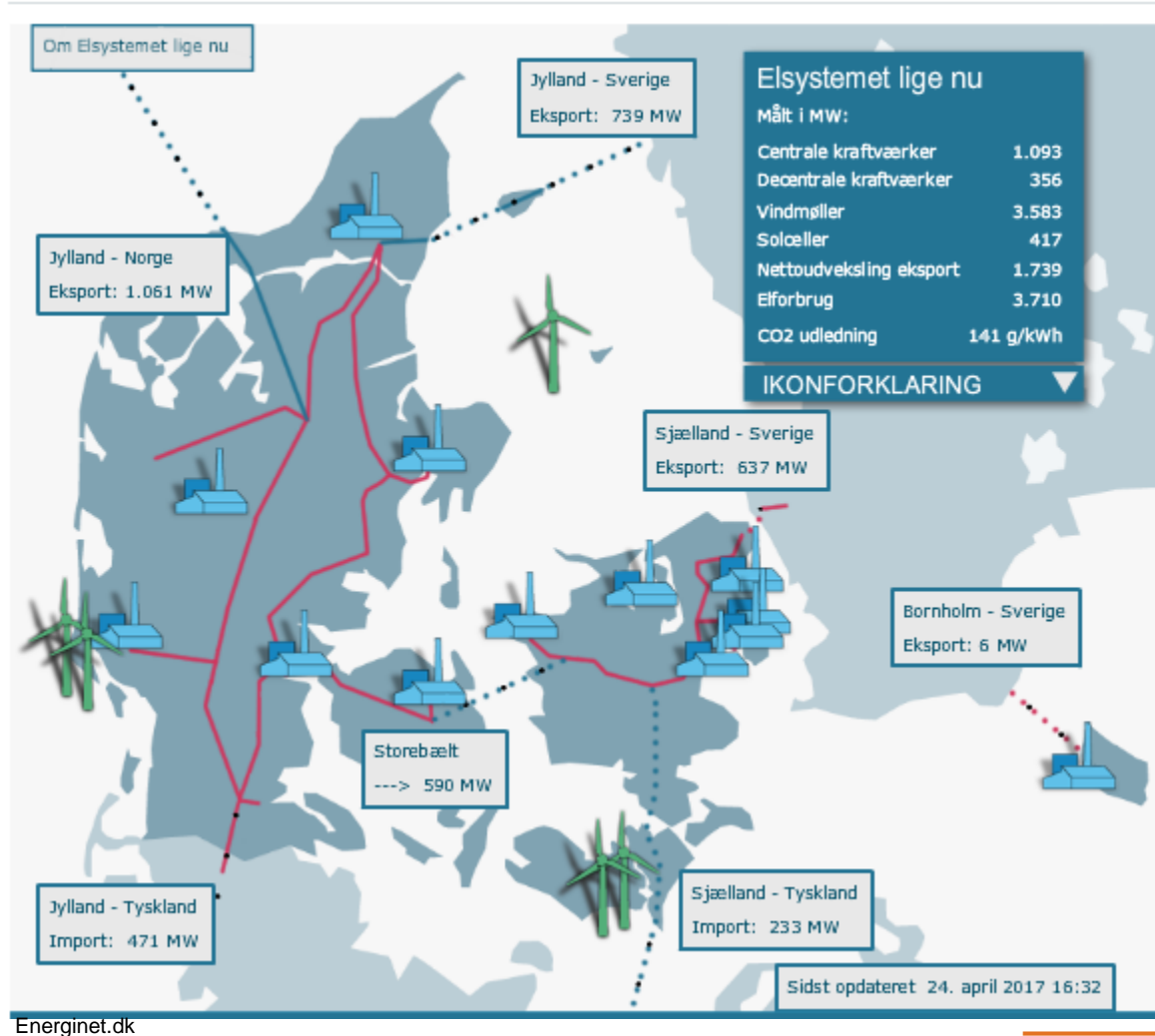
Hirtshals

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



Consumption in DK = 3.710 MW
Windpower + Solar = 4.000 MW
(snapshot 20.04.2017, 16:32)

Windpower and Solar are increasing
Screaming for balancing services

Balancing & Intergration

- A liqiefier 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 whit out windpower
 - And hereby be a part of the power regulation regime
 - And/or optimize powercosts according to LNG production
- In both cases it will depend on a calculations which takes into account the storage capacity and supply of customers.

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 derivate effects, as reduction of methane emmissions at fields
 - GHG-savings up to 160 %
- LBG certificate
 - GHG-savings at 83 – 88 % ~ 8,1 – 12,2 g CO₂ eq per MJ
 - @ liquiefier efficiency at 98 %, can be improved by windpower

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)
- Sea 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.

Green LNG A/S

(during formation)

Project Partners

Fjord Line

Secure basic consumption



Skangas

Knowledge in
LNG Markets
& handling
& transport
& bunkering

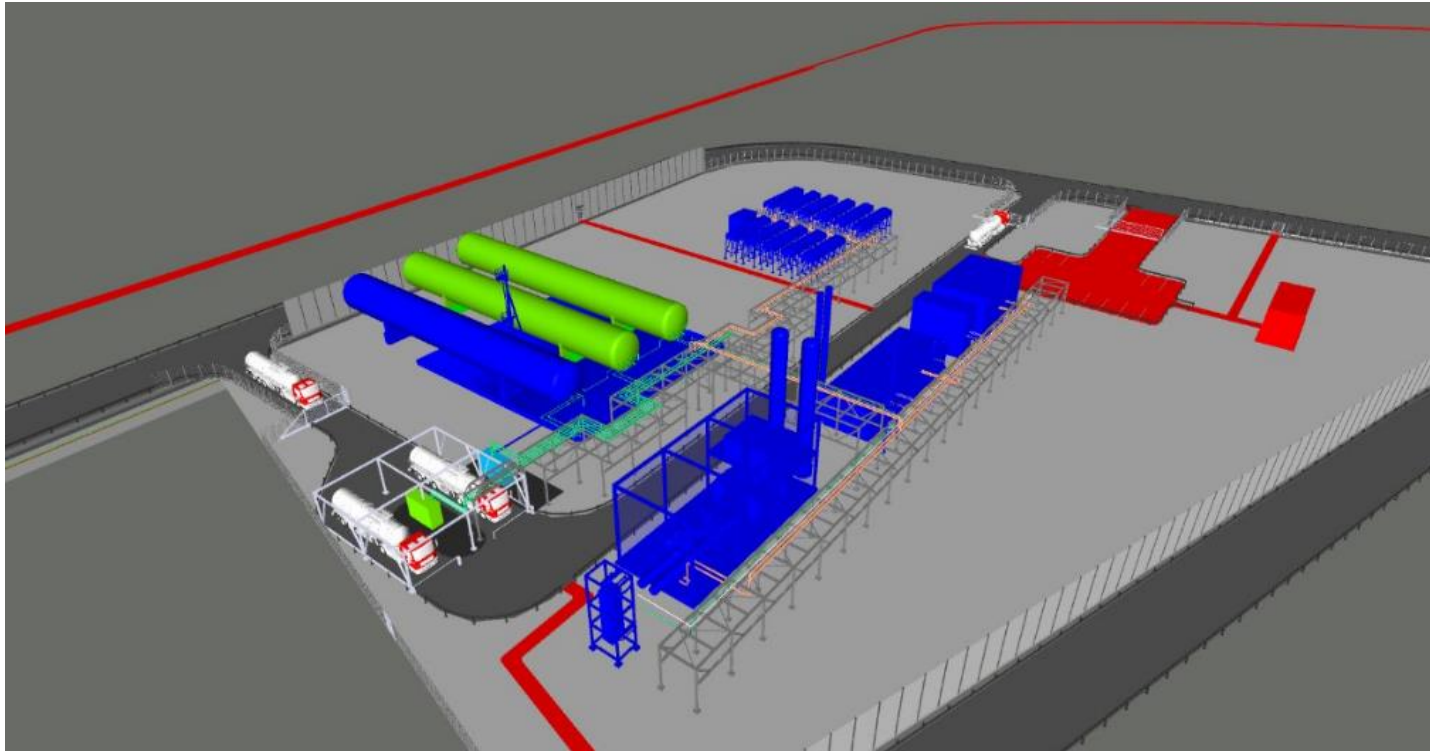


HMN Naturgas

Knowledge in
Energy Markets
& hedging
& gas- & biogas-supply



The Project



- EIA application
 - Expected approved January 2018
- CEF application for Grants
 - In process
 - By July 2017
 - Approved by end of 2017
- Contract signing by end of 2017
 - Depending on Grants

Thanks for your attention

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