LNG as clean fuel for coastal communities

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Samsø - The island of gathering

- 3700 inhabitants, 7x33 kms
- Independent municipality
- Agriculture, grain, pigs and milk
- Vegetables – intensive cultures
  - potatoes, onions, cabbage
- Tourism, green energy, gastronomy
  - Circular agriculture
Connections and cooperation

- Liquid Natural Gas ferry 2015
- Liquid Bio Methane 2020?
- New harbour in 2014
- Prestudy ongoing
SAMSØ is the center of our life!
SAMSØ is the center of Denmark!
SAMSØ is the center of Europe
SAMSØ is the center of the World!
Biogas and ferries

- Biogas is impossible without the ferry as customer
- Public debate
- Municipal decision in 2013: We make our own shipping company!
- New ferry since 2015, good business case!
- Now we need the biogas 😊
600 pax
160 cars
1 hour trip
Dual fuel engines

27 million euro
7,000 euro per islander
Samsø farmers and society deliver the waste inputs for the anaerobic digestion, which produce the ferry fuel.

The farmers get organic fertilizer in return.
90,000 tonnes of organic wastes (industry sewage, household waste, agricultural wastes, slurry, straw, grass) turned into biogas and fertilizer suitable for conventional and organic farming.

Emission saved 13,000 tonnes of CO₂. Princess Isabella becomes fossil free and Samsø reaches a better balance.

Investment around 8 million EUR. Double line biogas plant produce 4.5 million m³ of biogas.

Investment 2 million EUR. 4.5 million m³ of biogas is cooled down to 2500 tonnes of Bio-LNG.

13 permanent jobs can be created by the business case and potentially many associated businesses can benefit from this bio-refinery.
Biogas Liquefaction

- Workshop held at Samsø in 2017
- Challenge of scale and economy
  - Technically possible
    - Wärtsilä, Kosan Crisplant, StirLNG/Pentair, Air Liquide, Cryopur, Næreregeri/Cryobox, Biofrigas
  - Island delimitations
- Liquefaction of biogas report

Figure 5. The major steps from biogas towards LBM. For further explanation, see text.
Cryopur

CRYO PUR SYSTEM

1. PRETREATMENT
   -75°C

2. CO₂ CAPTURE
   -120°C

3. LIQUEFACTION
   -120°C / -160°C

Biogas

CH₄, CO₂, H₂O, N₂, O₂, H₂S, VOC, Siloxanes

-90°C

-120°C
Status for Samsø business case

• Environmental permissions OK
  – Samsø Municipality is the gas costumer
  – The biogas plant should be private

The business case in an island context consist of many ‘non-monetary’ values such as innovation, branding, pride, tourism and sense of coherence.

The strict business case may not be profitable on short terms but the long term business for the Island is clear.
Next steps at Samsø

- LBG is not competitive without subsidies in DK
  - Present subsidies does not support LBG
- Change in national subsidy from 2020
  - Not favouring LBG
- New calculations for Green & Local LNG:
  - **IF** we can achieve present subsidy-level
  - Ferry Tickets will increase by 3-5%
    - or we need more municipal support - Investment in local jobs and green image
- We need a ‘Lex Samsoe’
Next steps for LBG

- LBG is part of the green future
  - LBG cannot be the complete answer
- LBG business cases can develop in coastal communities, eg. in Scandinavia and the Baltic Sea Region
  - The Samsø Field to Ferry business concept is one case driven by pride and determination by local politicians
Model of change

- Can we get the Permissions?
- Do we like it?
- Is it possible technically?
- Can we make a living from it?
Wrapping up – From Field to Ferry

- A field, livestock, farmer and societal waste
- A biogas plant
- A liquefaction unit
- A ferry

Liquid Biogas for Ferry – The Samsø Case
Thank you for your attention
Questions, comments, discussion
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