

# Biogas as Energy Source in Greenland



Case: Sisimiut

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# Waste or Resource?



- Bio-Waste or 'waste' is often considered to be 'unuseful'.
- 'Waste' from one production may be relevant as a 'resource' in another production or in several aligned productions.

# 3 types of bio-mass

1. *Solid (organic waste)*
2. *Fluid (Bio-oil, ethanol...)*
3. *Gas (Bio-gas)*

1 -> Waste burning plant in 6 cities (district heating)

2 -> Bio-oil (Royal Greenland A/S in Ilulissat)

3 -> Bio-gas (?)

# The theoretical potential

Is defined by the dynamic interrelation between:

- The stage of discovered bio-gas resources
- The stage of discovered tools for producing bio-gas
- The societies awareness and need of the first two.

Together they defines the overall 'Potential' for bio-gas in a concrete place.

All of them are dynamic... A change in one will increase or decrease the overall potential for bio-gas.

It is therefore relevant to investigate (one by one and together):

1. The resource potential
2. The technological potential
3. The economical potential

# The resource potential;

Case – Royal Greenland A/S

'Green accounting' of the process/material flow in the factory.

- Amount of waste
- Type of waste (Shrimps and Crabs)
- Total bio-gas production

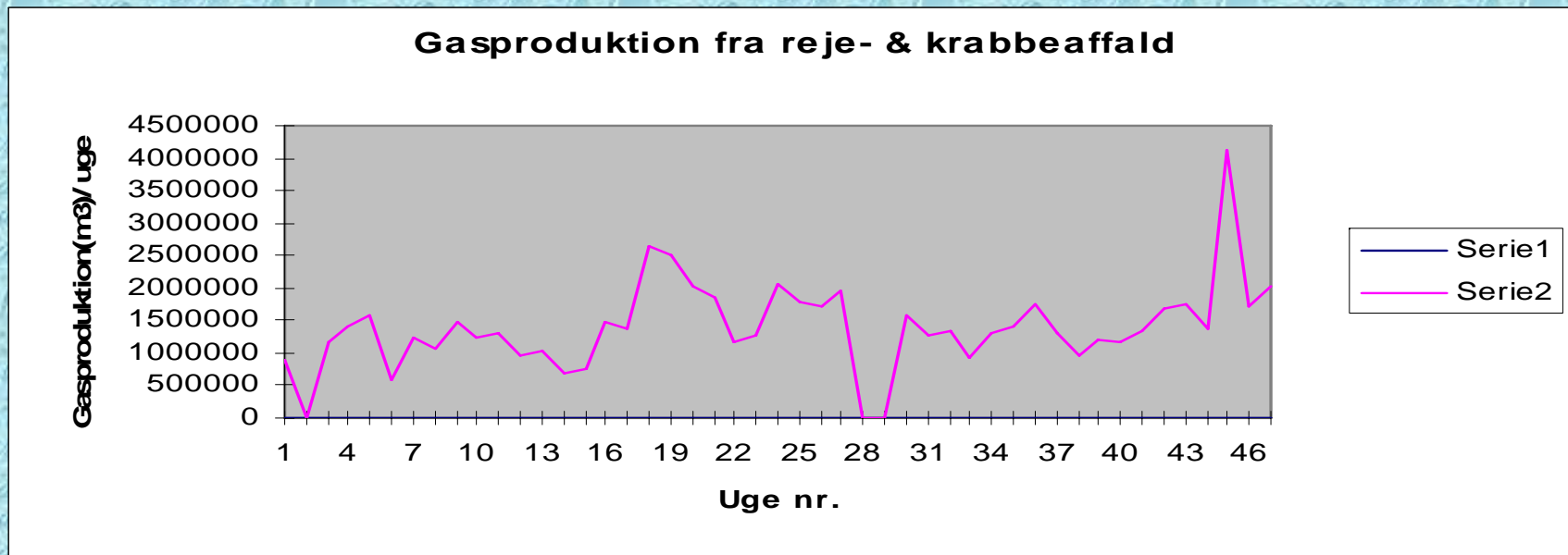
Result: Huge potential amount of bio-gas production:

Total amount of waste is 16.743.419 kg/year.

Without to long periods without new waste

Total amount of bio-gas is 232.703 Nm<sup>3</sup>/year.

# Production of bio-gas

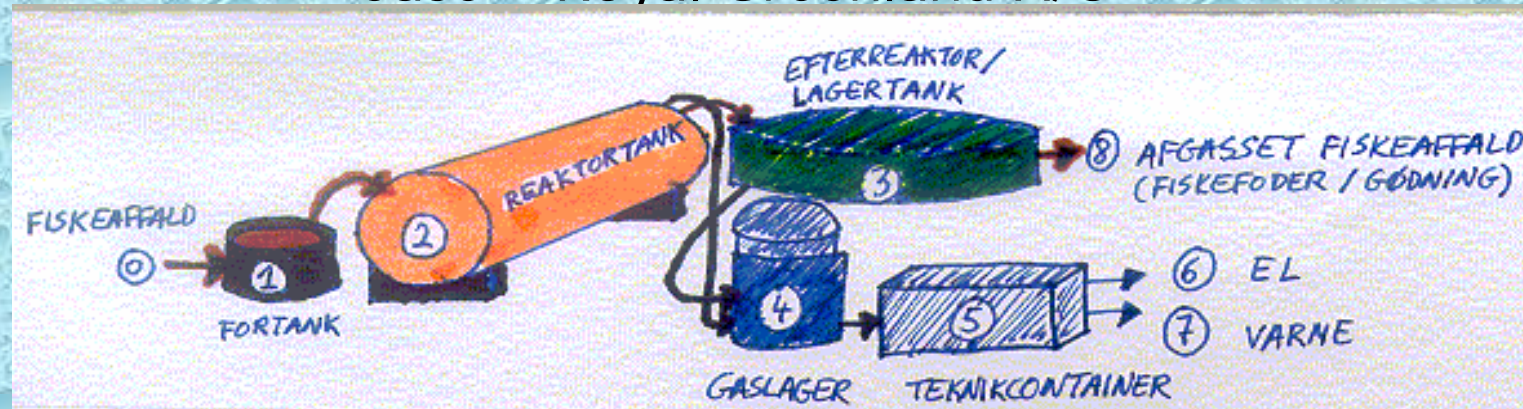


Bio-gas production from Shrimps and Crabs

Important: Not likely more than 2 weeks without input of new waste material.

# The technological potential

Case – Royal Greenland A/S



## The technological potential consist of;

- 3 biochemical processes. Methane bacteria produces 55-65% Methane (bio-gas).
- Survey of the relevant alternative technologies.
- Best practice with Arctic modifications.
- The Methane can be used as heat or heat+electricity

## Result:

Relevant technology is available & reduces the consumption of 139.615 L oil/year = 76% of the oil consumption in Royal Greenland A/S Sisimiut = 4% of the oil consumption in Sisimiut.

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# **The economical potential**

Case – Royal Greenland A/S

**Technical life time 20 years.**

**With production of heat only**

- Paid back after 12,5 years.

**With production of power and heat**

- Paid back after 5 years.

# Constraints

- Technology is not proven in the arctic
- Practically illegal to produce power (- > economically, technically and environmental barrier)

# Conclusion

## **Very large potentials for Bio-gas in Sisimiut**

1. Huge resource potential
2. Relevant technology potential
3. Relevant economically potential

The overall potential may be larger with the increase of oil prices, more centralized production in RG A/S and improved technology.

# Perspectives

- Shows that Bio-mass and bio-gas is a realistic RE in Greenland/Arctic.
- Bio-gas could be a part of the efforts in the energy plan.
- Bio-gas might be considered in other cities in Greenland and The Arctic.
- Royal Greenland A/S will gain a green accounting, better tools to follow the production, more areas to earn money and an extra example that shows to the world that they have a green profile.
- The potential will increase due to increase in oil prices and centralization process in the fishing industry.