Research Challenges in a Gas Economy Framework

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VAASA GAS EXCHANGE

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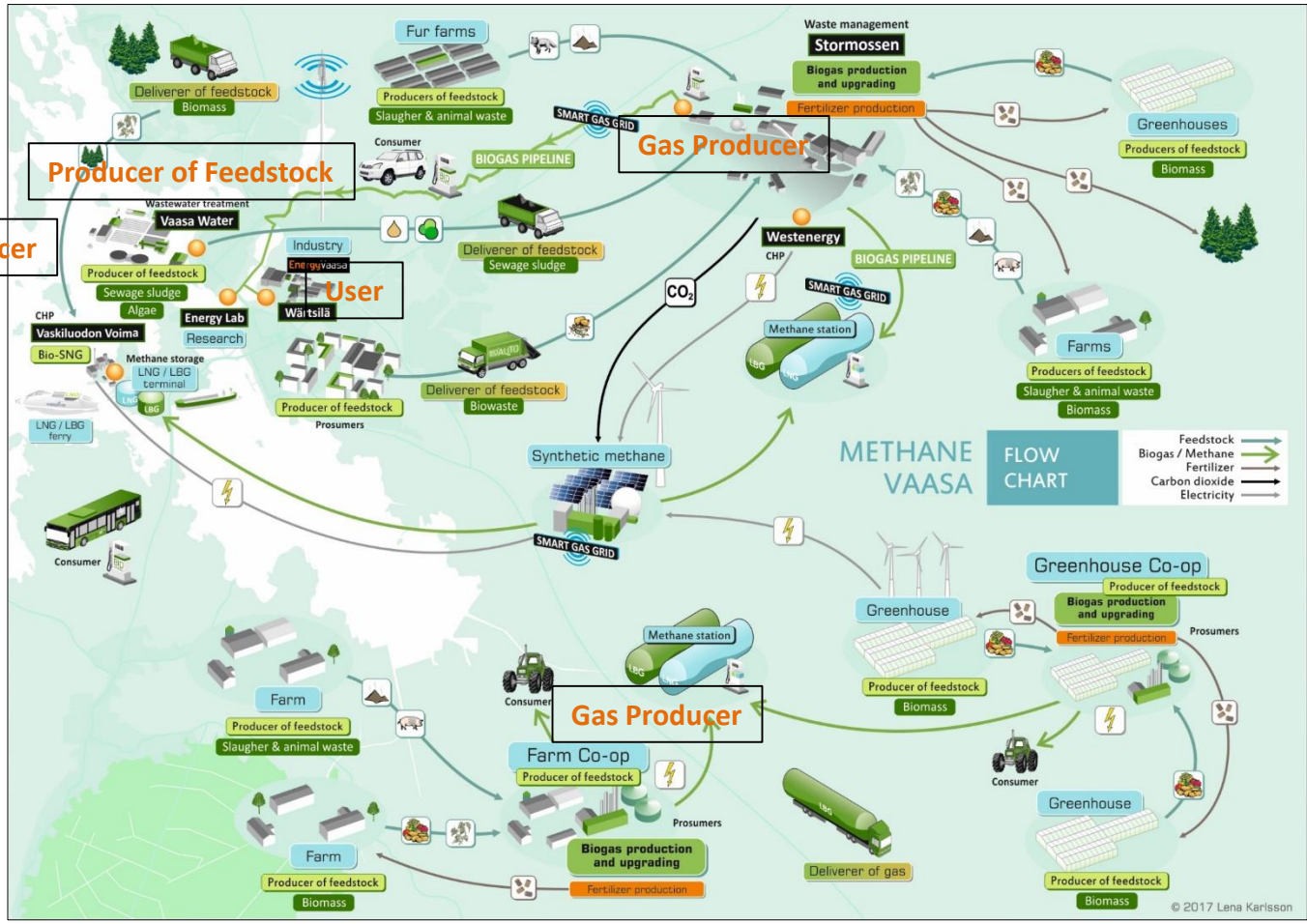
From the Availability to the Delivery

Potential to grow the gas economy in the region

The framework for a Gas Economy in the Region

Availability:

- Landfill Gas Systems
- Biogas Production
- LNG Systems
- Possibility to use wind and energy to produce syngas
- Biomass to Syngas, thermal treatment.



Why Gas?

- Gas Offers a common denominator between the different available options
- Gas can be produced by several kinds of feedstock
- It has several positive aspects regarding transportation
- Gas is indeed a veicle for transporting energy
- In the same way that money transport value

Why Gas? Additional positive aspects.

From the gasification processes we have e discrete number of different compounds and ...:

- They are not too many
- The concentration and gas composition can be adjusted by using different conditions.

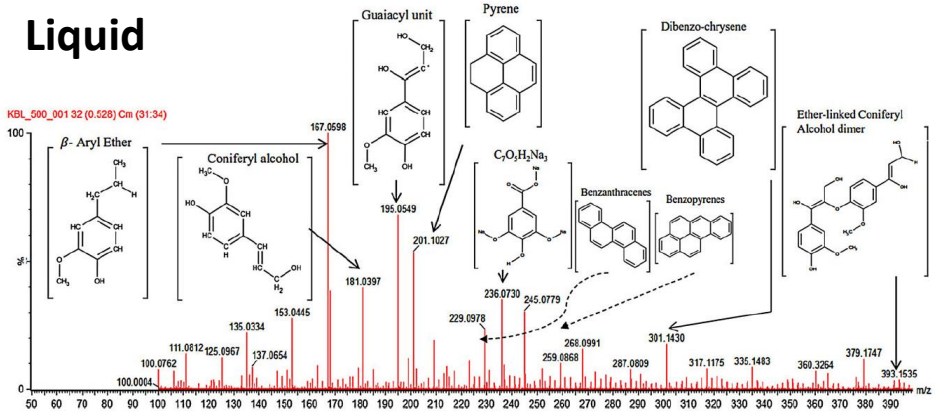
In SCWG, high temperature/high res time:

- More H2, CO2 and CO

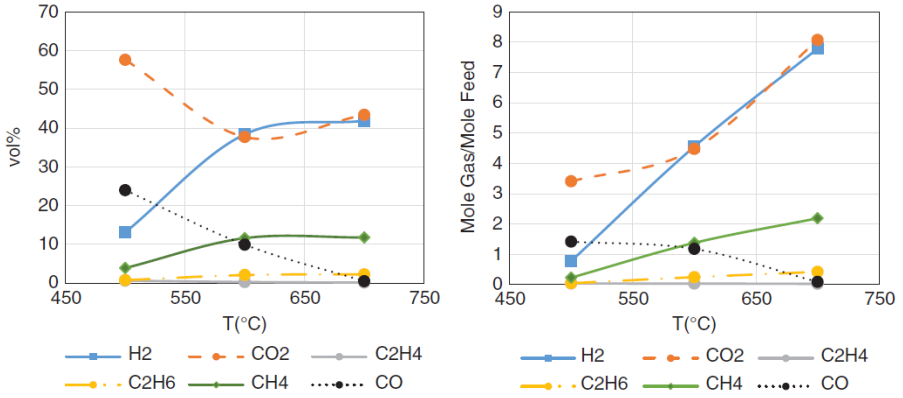
Lower temp/lower res-time

- More methane, ethane, ethene

Liquid



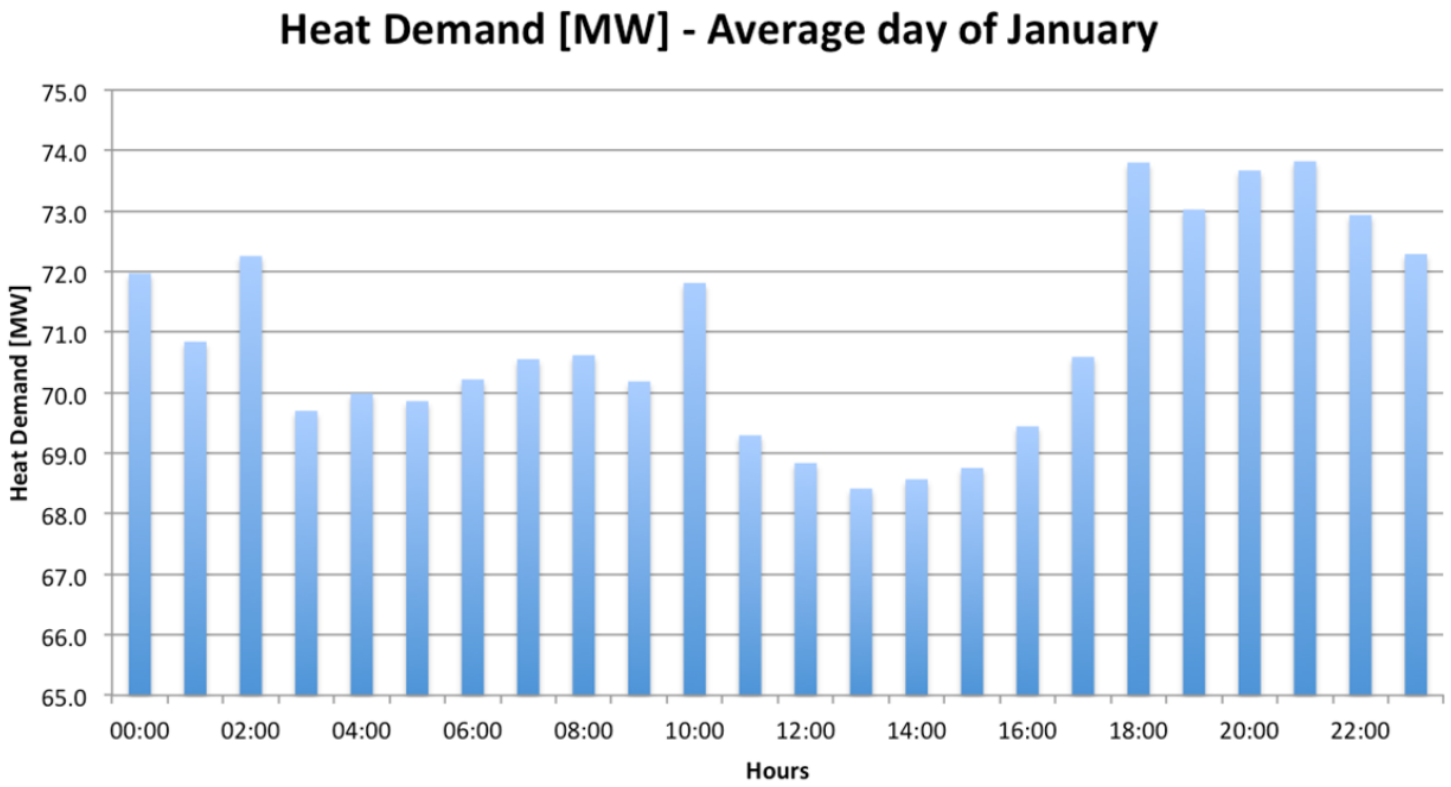
Gas



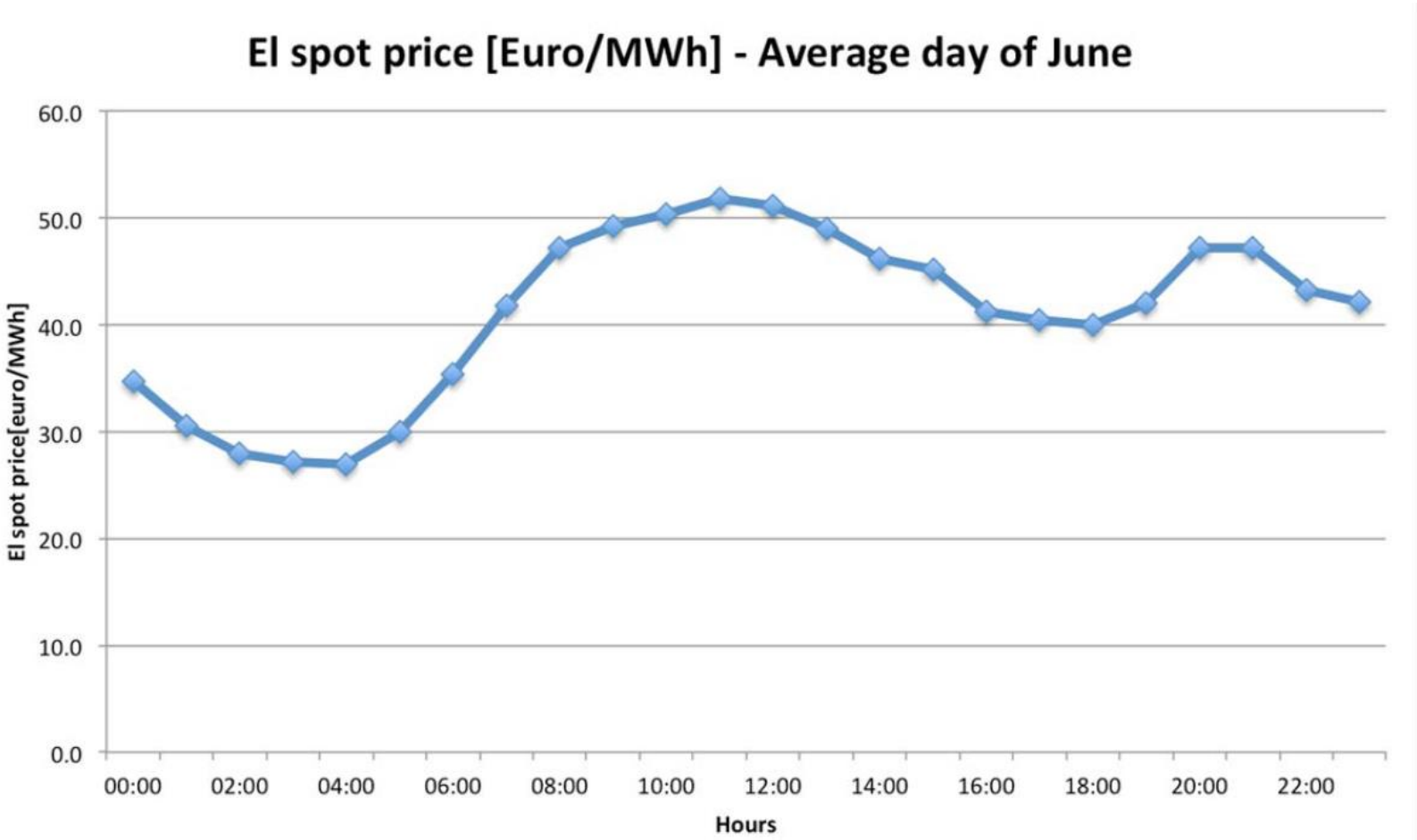
C. De Blasio et al. J Chem Technol Biotechnol 2016; **91**: 2664–2678

When do we use gas?

One example: peak demand.



C. De Blasio. 2013. CHP Power Plants Optimization. Aalto University reports.



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Specific Developments in Research

Within Gas CoE – National Gas Cluster of Excellence 1.1.2017-31.12.2018

Goals:

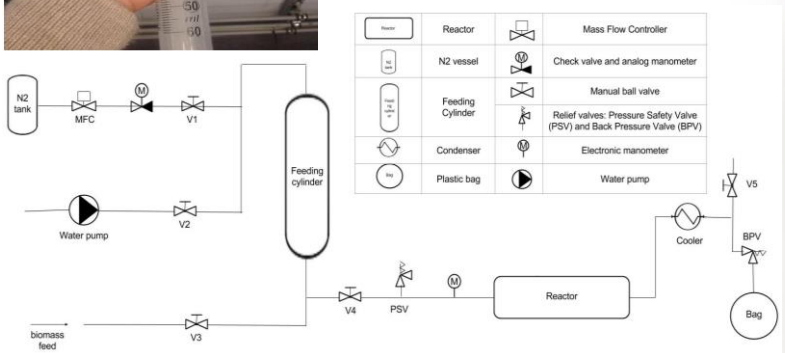
- Improvements in Gas Production
- Improvements in Gas Utilization
- Improvements in Gas management
- Proof of concept and demonstrations

Partners:

- Research done with companies
- Research done with university partners

Example 1. Gas Production from Biomass

Supercritical Water Gasification of Biomass, SCWG.



De Blasio et al. Journal of Chemical Technology and Biotechnology. Volume 91, Issue 10 October 2016. Pages 2664–2678.

Example 2. Improvements in gas utilization and research done with partners

Technobothnia

- Gas (system) related demonstrations and experimental activities in laboratory scale
- Serves both educational and experimental activities

Example 3. Improvements in gas utilization and research done with companies

Åbo Akademi (Energy Technology) - Wärtsilä

- Compression of boil-off gas from LNG Tank on boats.
- Measures to utilize online gas quality for engine operation.
- Simultaneous assessment of heat and mass transfer in non-steady state conditions.

Åbo Akademi

YRKESHÖGSKOLAN NOVIA

Vaasan yliopisto
UNIVERSITY OF VAASA

Example 4. Improvements in gas quality and processing. Research done with University Partners.

Advanced *power plant engine technology* for future energy systems in VEBIC (Experimental gas research and demo activities).

Flexible power generation
Focus of engine and fuel research

- Two medium-speed gas and diesel engines
- One to three high-speed gas and diesel engines

Activity plan and proposals

- Biogas & NG
- Various gas blends
- Test biofuels (Gas and Liquid) produced by Thermal Processing, SCWG, HTL,..
- catalyst elements
- Particulate and pollutants abatement in gas engines

”Living Lab”-activities

More efficient utilization of new infra in R&D activities

- Local gas supply
- Imported gas
- Biogas-natural gas-interaction
- Local gas distribution
- Storage (LG, CG) and conversion activities
- End users

KUVA 3.
(LÄHDE: VAASAN VESI)

Contacts

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Thank you.

Questions are welcome.