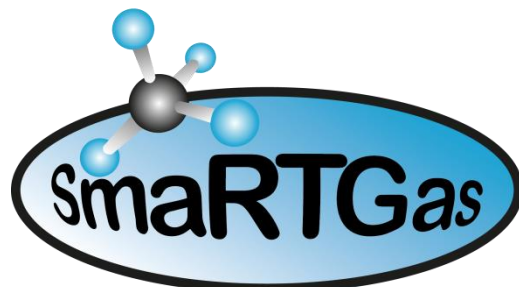




Renewable Energy Technology International AB

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SmaRTGas Baltic

Jürgen Held
Renewable Energy Technology International AB

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Skarpskyttevägen 10 D

SE-226 42 Lund

SWEDEN

info@renewtec.se

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SMARTGAS BALTIC

Dr. Jörgen Held
Renewable Energy Technology International AB (Renewtec AB)

Postal address
Skarpskyttevägen 10 D
SE-226 42 LUND

Phone
+46 (0)723-182 582

Email
info@renewtec.se

Website
www.renewtec.se

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Preface

This project has been financed by the Swedish Institute, Tallinn University of Technology, Lithuanian Energy Institute, Institute of Power Engineering, Poland and Renewable Energy Technology International AB (Renewtec AB). The project has been coordinated by Jörgen Held, Renewtec AB in close collaboration with the project partners and carried out during the period September 2015 to January 2016.

Project partners

Dr. Tomasz Golec, Institute of Power Engineering
Dr. Jörgen Held, Renewable Energy Technology International AB (Renewtec AB)
Janina Ilmurzynska, Institute of Power Engineering
Dr. Ülo Kask, Estonian Biomass Association
Dr. Siim Link, Tallinn University of Technology
Dr. Nerijus Striūgas, Lithuanian Energy Institute
Dr. Andrius Tamošiūnas, Lithuanian Energy Institute



SMARTGAS BALTIC

Summary

The aim of the project was to arrange a meeting and a seminar on small scale biomethane production in order to initiate collaboration between Sweden, Estonia, Lithuania and Poland within the field of small scale gasification and methanation of biomass and waste. More specifically the target was to expand the SmaRTGas network with partners from Estonia, Lithuania and Poland and to include at least two of them in the application to the Swedish Energy Agency for the creation and establishment of an innovation cluster on Small Scale Renewable Methane Technology based on Gasification.

On the 29th of October all the project partners met at Scandic Triangeln, Malmö, Sweden in a pre-meeting where the details of the SmaRTGas initiative were presented. Later on in the evening all the international and national experts invited as speakers to the SmaRTGas Baltic Seminar joined the meeting.

On the 30th of October the SmaRTGas Baltic Seminar took place at Scandic Triangeln. The seminar was successful with participants from 9 countries. 4 stakeholders from Estonia, Lithuania and Poland, committed themselves to participate and co-finance the SmaRTGas Innovation Cluster. The seminar attracted media attention and the Swedish journal Energimagasinet published an article about the event, http://smartgas.se/Resources/EM_6_2015.pdf.

On the 18th of December the application for public funding of the SmaRTGas Innovation Cluster was submitted to the Swedish Energy Agency. In total 28 partners from 12 countries have committed themselves to participate in, and co-finance the SmaRTGas Innovation Cluster. The project period is 3 years and the total project budget 9.74 million SEK (approx. 1 MEUR) out of which 50% is expected to be granted as public funding. The innovation cluster will be the world's largest on small scale thermochemical conversion of biomass and waste to biomethane and comprises members conducting spearhead research and development within the area as well as market actors interested in the business opportunities offered by biomethane.

The project has its own webpage, www.smartgas.se/smartgas-baltic, with all the seminar presentations available for download, free of charge.

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Abbreviations used in this report

CTH	Chalmers Tekniska Högskola
ECN	Energy Research Centre of the Netherlands
ESME	ECN System for Methanation
GoBiGas	Gothenburg Biomass Gasification
KTH	Royal Institute of Technology (Kungliga Tekniska Högskolan)
MILENA	Multipurpose Integrated Lab-unit for Explorative and Innovative Achievements in biomass gasification
Nm ³	Normal cubic metre (Temperature: 0 °C, Pressure: 1.01325 bar)
OLGA	A Dutch acronym for oil-based gas wash
PSI	Paul Scherrer Institute
SFC	Swedish Gasification Center (Svenskt förgasningscentrum)

SMARTGAS BALTIC

Content

1. Background.....	7
1.1 International technology development	7
1.2 Motives for the idea of an innovation cluster	8
1.3 Motives for the inclusion of Baltic Sea Region partners	8
2. Methodology	9
3. Results and discussion	10
3.1 Communication.....	11
4. Conclusions	13
5. Acknowledgement.....	14
6. References	15

SMARTGAS BALTIC

1. Background

Indirect gasification has seen a rapid development during the last decade and opened up the possibility to produce biomethane through gasification and methanation in the small scale¹. Renewtec AB conducted a study² in 2013 financed by the Swedish Energy Agency and industry on technologies for small scale production of biomethane through thermal gasification. The year after BioMil AB and Renewtec AB conducted a project³ financed by Region Skåne, Region Halland, industry and academia on the production cost of biomethane through gasification and methanation of wood chip in small (5.6 MW_{th}) and medium scale (30 MW_{th}).

In the study it was found that production of biomethane through gasification and methanation of woody biomass is advantageous from several aspects

- Biomethane can be produced with the highest conversion efficiency of all second generation transport fuels, 60-70% plus heat.
- Biomethane can be distributed in an easy, efficient and environmentally friendly way through the gas grid.
- Biomethane can be used with the highest efficiency and lowest emissions of today's commercially available fuels.
- The feedstock doesn't compete with food production.

There are several advantages with small scale plants compared to large scale production

- It's easier to secure the feedstock supply and the logistics are simpler since less feedstock needs to be transported.
- It's easier to match the excess process heat with the local heat and steam demand.
- Lower economic risk due to the lower investment cost compared to a large scale facility.

Small scale gasification and methanation seems like a promising route and in 2015 Region Skåne granted Renewtec AB funding to investigate the conditions for starting up an innovation cluster within this field. The project was expanded with public funding from the Swedish Institute to include partners from the Baltic Sea Region.

1.1 International technology development

Sweden has a strong tradition in biomass gasification and there is national spearhead research and development within the field of gasification and methanation. This work is mainly carried out by CTH, and Cortus Energy AB in collaboration with KTH. However, technologies suited for small scale gasification and methanation are mainly developed on the international arena. Leading players are among others Technische Universität Wien (the Güssing gasifier), Paul Scherrer Institute

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(fluidised bed methanation), Energy Research Centre of the Netherlands (MILENA gasification technology, OLGA tar removal and ESME methanation), Technische Universität München (three phase methanation) and Friedrich-Alexander Universität Erlangen-Nürnberg (Heatpipe Reformer).

The GoBiGas plant in Gothenburg is for example based on gasification technology developed at Technische Universität Wien, Austria and gas cleaning and methanation developed by Haldor Topsoe in Denmark.

1.2 Motives for the idea of an innovation cluster

There are numerous research facilities⁴ in the form of lab, pilot and demonstration scale plants all over the world and it's hard to comprehend the amount of money that has been invested in international research infrastructure and development projects within gasification and methanation during the years.

The question is how to take advantage of these investments and the research infrastructure? How to bring market players interested in the business opportunities offered by small scale gasification and methanation in contact with the international development?

It is in light of those questions that the idea of an innovation cluster was born. Why not create a platform for national and international actors conducting cutting-edge research and technology development together with national and regional operators and other actors interested in the market potential of biomethane as a fuel? The funding from Region Skåne made it possible to investigate the conditions to build up such an innovation cluster.

It has been of paramount importance to get leading universities and research institutes to engage themselves in the innovation cluster. It is therefore particularly gratifying to note that most of the world's leading research nodes in the area have signed letters of intent to participate and co-finance the innovation cluster.

1.3 Motives for the inclusion of Baltic Sea Region partners

In the project reported here the aim was to include partners from Estonia, Lithuania and Poland in the SmarTGas network, and in the application to the Swedish Energy Agency regarding the creation and establishment of an innovation cluster within small scale gasification and methanation. Tallinn University of Technology, Lithuanian Energy Institute and Institute of Power Engineering, Poland participated as project partners in this project. These countries have vast resources for biomethane production and a strong interest in reducing the dependency of imported Russian natural gas.

2. Methodology

To initiate the collaboration between the project partners a meeting and a seminar with invited international and national experts were arranged at Scandic Triangeln, Malmö, Sweden.

SMARTGAS BALTIC

3. Results and discussion

The project has consisted of 4 parts

- Arrange seminar on small scale biomethane production with invited leading international and national experts and technology developers/suppliers.
- Arrange a pre-meeting for the project partners
- Expand the SmaRTGas network and get Letters of Intent to participate in, and co-finance the SmaRTGas Innovation Cluster from at least 2 Baltic Sea Region stakeholders
- Include the Baltic Sea Region stakeholders who sign a Letter of Intent in the application to the Swedish Energy Agency regarding the creation and establishment of an innovation cluster on small scale thermochemical conversion of biomass/waste to biomethane.

On the 29th of October all the project partners met at Scandic Triangeln, Malmö, Sweden in a pre-meeting where the details of the SmaRTGas initiative were presented. Later on in the evening all the international and national experts invited as speakers to the SmaRTGas Baltic Seminar joined the meeting.

On the 30th of October the SmaRTGas Baltic Seminar took place at Scandic Triangeln. The seminar was successful with participants from 9 countries.

09:00	REGISTRATION	
09:15	Dr. Jörgen Held, CEO Renewtec AB and coordinator of the SmaRTGas network	Welcome and introduction
09:35	Prof. Jürgen Karl, University of Erlangen-Nuremberg	Heatpipe reformer technology for small scale biomethane production
10:00	Mr. Sebastian Fendt, Technische Universität München	Methanation R&D at Technische Universität München
10:25	Dr. Anni Alitalo, Natural Resources Institute of Finland	Biological methanation of syngas (presentation not available due to pending patent application)
10:50-11:15	COFFEE BREAK	
11:15	Dr. Luc Rabou, Energy Research Centre of the Netherlands	ESME – ECN System for Methanation
11:40	Mr. Rolf Ljunggren, CEO Cortus AB	WoodRoll® – ultraclean syngas for biomethane production
12:05	Mr. Matt Babicki, Principal, G4 Insights Inc.	PyroCatalytic Hydrogenation for biomethane production
12:30-13:30	LUNCH	

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13:30	Dr. Siim Link, Tallinn University of Technology	The energy situation and biomethane market conditions in Estonia
13:55	Dr. Nerijus Striūgas, Lithuanian Energy Institute	The energy situation and biomethane market conditions in Lithuania. Potential of LEI toward biomethane production.
14:20	Dr. Tomasz Golec, Institute of Power Engineering	The energy situation and biomethane market conditions in Poland
14:45	Dr. Attila Kovacs, European Biogas Association	The present status and future prospects of biomethane production and policies in Europe
15:10	Dr. Jörgen Held	SUMMARY

Tallinn University of Technology, Estonian Biomass Association, Lithuanian Energy Institute and Institute of Power Engineering, Poland committed themselves to participate in, and co-finance the SmaRTGas Innovation Cluster.

On the 18th of December the application for public funding of the SmaRTGas Innovation Cluster was submitted to the Swedish Energy Agency. In total 28 partners from 12 countries have committed themselves to participate in, and co-finance the SmaRTGas Innovation Cluster. The project period is 3 years and the total project budget 9.74 million SEK (approx. 1 MEUR) out of which 50% is expected to be granted as public funding. The innovation cluster will be the world's largest on small scale thermochemical conversion of biomass and waste to biomethane and comprises members conducting spearhead research and development within the area as well as market actors interested in the business opportunities offered by biomethane.

3.1 Communication

The project has its own webpage, www.smartgas.se/smartgas-baltic, with all the seminar presentations available for download, free of charge.

The SmaRTGas Baltic seminar was successful and attracted media attention. The Swedish journal Energimagasinet published an article about the event, http://smartgas.se/Resources/EM_6_2015.pdf.

The project partners have published information about the project and the seminar through their websites and Newsletters, e.g.

http://www.smartgas.se/Resources/LEI_naujienlaskis_42.pdf

<http://www.lei.lt/main.php?m=237&l=3142&k=9&i=0>

<https://ien.com.pl/international-projects/items/80>

<https://ien.com.pl/aktualnosc/items/seminarium-projektu-smartgas-baltic>

<https://www.ien.com.pl/news/items/seminarium-projektu-smartgas-baltic-kopia>

<http://www.eby.ee/repromo.htm>

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Information about the project and the seminar has been presented to the industrial members forming the reference group for the SmaRTGas project (financed by Region Skåne) and on LinkedIn.

The internal communication has resulted in three status reports in order to keep the project partners updated on the progress.

4. Conclusions

The project has been very successful and all the targets have been met by a wide margin. 4 stakeholders from Estonia, Lithuania and Poland have signed a Letter of Intent to participate in, and co-finance the SmaRTGas Innovation Cluster. The funding has also made it possible for the project partners to meet face-to-face and to get to know each other on a deeper level. This is beneficial not only for the collaboration within the SmaRTGas Innovation Cluster but also for future potential collaboration efforts.

5. Acknowledgement

The financial support from the Swedish Institute is highly appreciated and has been crucial for the possibility to conduct the project.

The author would like to take the opportunity to thank the project partners for their contribution to the success of the project. Much of the information exchange has been done by e-mail and the rapid and professional response by the project partners has facilitated the project coordination.

6. References

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- ¹ Held, J. Gasification – Status and technology. Swedish Gas Technology Centre, 2012.
- ² Held, J. Small and medium scale bioSNG production technologies. Renewtec Report 001:2013, Renewable Energy Technology International AB, 20013.
- ³ Held, J och Wiklander, L. Småskalig förgasning. Renewtec Report 002:2014. Renewable Energy Technology International AB, 20014.
- ⁴ Held, J. The present status and future prospects of biomethane production through biomass gasification. Presentation at European Biogas Association Workshop on Biomethane, Bryssel , 3 September 2015. http://european-biogas.eu/wp-content/uploads/2015/09/2_Jorgen-Held-EBA_workshop_3sept_2015.pdf

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