GreenGas Research Outlook Sweden

Örnsköldsvik 150323-150325

Sponsor

HYDROGENICS

SHIFT POWER | ENERGIZE YOUR WORLD

Organizer

Energiforsk

Welcome to the second Green Gas Research Outlook Sweden in Örnsköldsvik!

The event has been created in order to maintain an annually recurring meeting venue for the Swedish green gas research community, be it academia or industry. The ”green gas” designation is used in order to encompass all renewable energygases, including but not limited to methane-rich gases sourced from anaerobic digestion, thermal gasification and power-to-gas-concepts. The science and technology is spread across many fields, but when meeting up we learn and draw inspiration from each other, facilitating inter-disciplinary scientific cooperation and joint efforts in influencing the framework conditions and overall challenge of the renewable energy gas sector.

So I am hoping for a lot of cross-fertilization taking place this year in Örnsköldsvik, and the years to come. The site and content of next year’s event is yet to be determined - we welcome your feedback!

The main organizer of the event is Energiforsk - Swedish Energy Research Centre, a company created by the merger of four different energy research bodies, among them the former Swedish Gas Technology Centre. We also want to acknowledge the work of the co-organizing universities displayed below, giving valuable input to the program and helping us by increasing the scientific height of the conference as members of the scientific committee and by volunteering as chair persons.

Energiforsk, through Dr. Mattias Svensson

Energiforsk

KTH VETENSKAP OCH KONST

SVERIGES LANTBRUKSUNIVERSITET SLU

LUND UNIVERSITY

LINKÖPINGS UNIVERSITET Linköping University

Program

Monday Mar 23	**Location: Pinassen**
10:00 - 12:30	Brunch and Registration
12:30 - 12:40	Welcome to Green Gas Research Outlook Sweden, *Mattias Svensson, Energiforsk*
12:40 - 13:00	**Introductory keynote:** Örnsköldsvik now and in the future, *Leif Lindholm, Örnsköldsvik municipality*
13:00 - 14:40	**Session 1: Anaerobic digestion I** **Chair person:** *Mats Eklund, Linköping university* **1.1** Biogas from algae farmed in pulp and paper mill wastewater, *Karin Granström, Karlstad University* **1.2** Macroalgal biogasfuel optimisation, *Francesco Ometto, Scandinavian Biogas AB* **1.3** Enhanced fermentative biomethane production from inhibitory-fruit flavor medium with membrane-encapsulated cells, *Julius Akinbomi, University of Borås* **1.4** Digestate liquor recycles in minimal nutrients-suplemented anaerobic digestion of wheat straw, *Ivo Achu-Nges, Lund University* **1.5** Strategic multi-criteria assessment of feedstock for biogas production, *Jonas Ammenberg, Linköping University*
14:40 - 15:00	Break
15:00 - 15:20	**Special Presentation:** Prechamber ignition for improved ignition quality in gas engines, *Per Tunestål, Lund University*
15:00 - 16:40	**Session 2: Anaerobic Digestion II** **Chair person:** *Marcus Thern, Lund University* **2.1** Evaluation of forest residues as raw material for methane production through anaerobic digestion, *Leonidas Matsakas, Luleå University* **2.2** Experimental and economical evaluation of bio-conversion of forest residues to biogas using organosolv pretreatment, *Ilona Sárvári Horváth, University of Borås*

	2.3 In-situ Methane Enrichment System Coupled with Mesophilic Anaerobic Plug Flow Reactor and External CO_2 Stripper, *Ho Kang, Chungnam National University* **2.4** Rapid bio-methanation of syngas: Efficiency of high cell density in a multi-layer membrane bioreactor (MMBR), *Supansa Westman, University of Borås*
16:40 - 17:00	Break
17:00 - 18:15	**Interactive workshop: How to best organize the Swedish biogas research resources to achieve results?** **Moderator:** *Henrik Dahlsson, Energigas Sverige* **Introduction:** Overview of green gas research funding opportunities in Sweden, *Kalle Svensson, Swedish Energy Agency*
19:00 - 21:30	Gala Dinner Restaurant Bella, entrance floor

Tuesday Mar 24	**Location: Pinassen**
08:30 - 09:10	**Session 3: Gasification I** **Chair person:** *Klas Engvall, KTH* **3.1** Production of Green Gas through biomass gasification in the Netherlands, *Mark Overwijk, ECN (Energy research Centre of the Netherlands)* **3.2** Assessing the Integration of Biomass Gasification-Based Production of Chemicals - Case Study of an Oxo Synthesis Plant, *Matteo Morandin, Chalmers*
09:10 - 09:30	**Sponsor keynote:** HYDROG(E)NICS SHIFT POWER | ENERGIZE YOUR WORLD Power-to-Gas: how to convert green power into green gas via water electrolysis, *Denis Thomas, Hydrogenics*
09:30 - 09:50	Break
09:50 - 11:10	**Session 4: Integrated Biomass Gasification Systems for Gas Production** **Chair person:** *Klas Engvall, KTH*

4.1 From forest feedstock to green olefins via gasification. Value chains studied within the Skogskemi project, *Jonas Joelsson, Processum*

4.2 Integrated SNG-production in a typical Nordic sawmill, *Sennai Mesfun, LTU*

4.3 Bio-SNG produced in a PtG and biomass gasification system, *Klas Engvall, KTH*

11:10 - 11:50 **Poster opening session**

P.1 Content of volatile organic compounds in process water from biogas upgrading units, *Sören Nilsson-Påledal, Tekniska verken i Linköping AB*

P.3 Biomethane as a vehicle fuel – availability of filling stations across the European Union, *Christian Jenne, University of Duisburg-Essen*

P.4 Evaluation of the French biomethane production from WWTP, *Olivier Theobald, ADEME*

P.5 Effect of the Concentrated Phosphoric Acid Pretreatment on Solid-State Anaerobic Digestion of Different Woods, *Safoora Mirmohamadsadeghi, University of Borås*

P.6 Diesel-assisted CNG combustion in light-duty engine, *Pablo Garcia, Lund University*

P.7 A low-cost methane emission monitor, *Bakhram Gaynullin, SenseAir AB*

P.8 Improved biogas production from lignocellulose by a two-step consolidated bioprocess, *Eoin Byrne, Lund University*

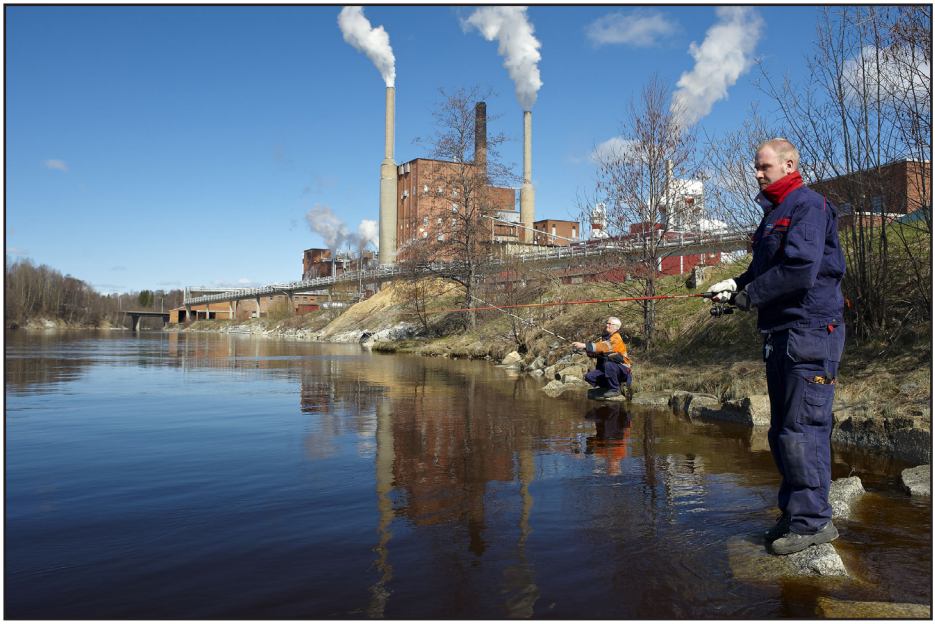
P.9 Biogas potential in Australia: Environmental and techno-economic considerations, *Bernadette McCabe, University of Southern Queensland*

P.10 Physio-chemical pre-treatments for improved methane potential of dried Miscanthus lutarioriparius, *Chao Li, Lund University*

P.11 Technical and economical challenges of an off-grid Green Gas Mobile Solution, *Laura Gil-Carrera, Gas Networks Ireland*

	P.12 Production of amorphous silica nanoparticles from rice straw residues of Solid-State Anaerobic Digestion, *Akram Zamani, University of Borås* **P.13** Development of process optimization tools for both efficient biogas research and operation of full-scale plants, *Alberto Benavides Cantú, Bioprocess Control AB*
11:50 - 13:00	Poster Luncheon
13:00 - 14:40	**Industrial and Applied Research Session** **Chair person:** *Mats Eklund, Linköping university* **5.1** Dry digestion of dewatered digested sludge at thermophilic temperature, *Katarina Stensen, Tekniska verken i Linköping AB* **5.2** Methods to measure methane emission from biogas plants used in Europe, *Magnus Andreas Holmgren, SP* **5.3** Anaerobic moving bed biofilm reactor (AnMBBR) for efficient treatment of pulp and paper wastewater, *Martina Uldal, Veolia Water Technologies AB* **5.4** Effects of temperature on UASB digestion of wastewater from a mill producing recovered fiber-based board, *Madeleine Larsson, Linköping University* **5.5** Improved energy and resource efficiency of biological treatment of wastewater from paper and pulp industries, *Björn Magnusson, Scandinavian Biogas Fuels AB*
14:40 - 15:00	Break
15:00 - 16:15	**IEA special Session** **Chair person:** *David Baxter, European Commission - JRC* **IEA.1** Overview of IEA Bioenergy Task 37, *David Baxter* **IEA.2** Digestate upgrading, existing technologies and ongoing development, *Bernhard Drosg, BOKU, Vienna* **IEA.3** Biogas development in Brazil, *Cícero Jayme Bley Jr, ITAIPU Binacional* **IEA.4** Food waste digestion in UK, experiences and ongoing development, *Charles Banks, Univ. Southampton*
16:15 - 16:30	Concluding remarks and closing of the conference
16:45 - 18:00	Networking Reception Restaurant Bella

Wednesday Mar 25	Technical visits
08:40 - 12:10	Technical visits to the Domsjö-Aditya Birla plant and the SP Biorefinery facility
08:40	Bus arrives outside the Elite plaza hotel
08:45	Departure to Domsjö
09:00 - 10:10	Speeches
11:10 - 12:10	Show and tell in split-up groups
12:10 -13:10	Lunch Restaurant Brux
13:15	Bus leaves for the train station and airport



Domsjö-Aditya Birla is the only pulp and paper industry in the world with a closed-loop-bleaching process, which is also totally chlorine free. The anaerobic treatment of the wastewater is the largest industrial based biogas producer in Sweden.

List of participants

Olivier Theobald	ADEME	FR
Alberto Benavides Cantú	Bioprocess Controll	SE
Bernhard Drosg	BOKU (Univ.), Vienna	AT
Matteo Morandin	Chalmers	SE
Ho Kang	Chungnam National Univ.	KR
Jonas Anders Dahl	Dansk Teknisk Institut	DK
Mark Overwijk	ECN	NL
Inga-Lill Olsson	Embassy of Canada	SE
Anna-Karin Jannasch	Energiforsk	SE
Mattias Svensson	Energiforsk	SE
David Baxter	European Commission, JRC	NL
Laura Gil Carrera	Gas Networks Ireland	IE
Denis Thomas	Hydrogenics	BE
Cicero Jayme Bley Junior	ITAIPU Binacional	BR
Gustav Rogstrand	JTI	SE
Karin Granström	Karlstad University	SE
Klas Engvall	KTH	SE
Jonas Ammenberg	Linköping Univ., BRC	SE
Eva-Maria Ekstrand	Linköping university	SE
Luka Safaric	Linköping university	SE
Madeleine Larsson	Linköping university	SE
Mats Eklund	Linköping university	SE
Leonidas Matsakas	Luleå University	SE
Sennai Mesfun	Luleå University	SE
Ulrika Rova	Luleå University	SE
Emma Kreuger	Lund University	SE
Eoin Byrne	Lund University	SE
Ivo Achu Nges	Lund University	SE
Marcus Thern	Lund University	SE
Pablo Garcia	Lund University	SE
Per Tunestål	Lund University	SE
Ulf Söderlind	Mid Sweden University	SE
Mathieu Dumont	RVO.nl	NL
Anna Karlsson	Scandinavian Biogas Fuels	SE
Björn Magnusson	Scandinavian Biogas Fuels	SE
Francesco Ometto	Scandinavian Biogas Fuels	SE

Marielle Karlsson	Scandinavian Biogas Fuels	SE
Xu-Bin Truong	Scandinavian Biogas Fuels	SE
Bakhram Gaynullin	SenseAir	SE
Carl Bengtsson	SenseAir	SE
Charles Banks	Southampton University	GB
Anneli Petersson	SP	SE
Magnus Andreas Holmgren	SP	SE
Jonas Joelsson	SP Processum	SE
Bertil Carlsson	Sundsvall municipality	SE
Kalle Svensson	Swedish Energy Agency	SE
Henrik Dahlsson	Swedish Gas Association	SE
Katarina Stensen	Tekniska verken i Linköping	SE
Sören Nilsson Påledal	Tekniska verken i Linköping	SE
Christian Jenne	UDE (Univ.), Duisburg-Essen	DE
Bernadette McCabe	Univ. Southern Queensland	AU
Ilona Sarvari Horvath	University of Borås	SE
Julius Akinbomi	University of Borås	SE
Supansa Westman	University of Borås	SE
Martina Uldal	Veolia Water Technologies	SE
Leif Lindholm	Örnsköldsvik municipality	SE

Niels-Bjarne Rasmussen Danish Gas Technology Centre DK

Exhibitors:

Welcome to meet up at any of our other events during 2015!

conference.sgc.se

GasAkademin

Sommarinternat 2015

Under the name of GasAkademin the gas industry and the academia in Sweden cooperate to offer a week-long summer school in end-August on the manufacture, transport and utilization of energygas.

www.gasakademin.se

IBBA

INTER BALTIC BIOGAS ARENA

Every year in early September, IBBA organizes a workshop on a specific biogas topic, for 2015 it is lignocellulosic substrates.
The purpose of the workshop is to create networking between researchers in the Baltic region.

www.ibbaworkshop.se

HYDROGENICS

SHIFT **POWER** | **ENERGIZE** YOUR WORLD

Hydrogenics

Hydrogenics is a worldwide leader designing, manufacturing, building and installing industrial and commercial Hydrogen Systems around the globe with over 60 years of experience.
We offer world leading expertise for a range of applications, including:

- Hydrogen generators for Industrial processes and Fueling stations
- Hydrogen fuel cells for electric vehicles, such as urban transit buses, commercial fleets, utility vehicles and electric lift trucks
- Fuel cell installations for freestanding electrical power plants and UPS systems (uninterruptible power supply)
- Hydrogenics is pioneering “Power-to-Gas” the world’s most innovative way to store and transport energy

Hydrogenics Corporate headquarters are located in Mississauga, Canada with manufacturing facilities located in Germany and Belgium. We have other corporate and sales offices, and hydrogen installations, operating in several countries around the world.
Hydrogenics Corporation is a publicly listed company on the NASDAQ (stock symbol HYGS) and the TSX (stock symbol HYG).

Power-to-Gas

Hydrogenics is pioneering Power-to-Gas—an innovative energy conversion and storage solution using electrolysis. It integrates renewable sources of generation, converts surplus electricity to produce hydrogen or renewable gas, and leverages the attributes of the existing natural gas infrastructure.
Power-to-Gas is a highly effective way of integrating renewables. It can provide a rapid, dynamic response to the Independent Grid Operator’s signal to adjust to the variations in renewable generation output. The sitting of a Power-to-Gas facility can be deployed wherever the power and gas grids intersect. It is a scalable technology.
Power-to-Gas provides the unparalleled energy storage capacity in the TWh range—seasonal storage capability. It can charge energy several days, or even consecutive weeks, without needing to discharge the stored energy.
Power-to-Gas has many synergies with other sectors (mobility, chemistry, refineries) and offers various possibilities to convert CO2 (and H2) into valuable products such as methane or methanol.
Hydrogenics is working with leading utilities worldwide in demonstration projects today and setting the stage for commercial-scale projects.

ANOTHER STEP FORWARD
in Swedish energy research

Energiforsk - Swedish Energy Research Centre is a research and knowledge based organization that brings together large parts of Swedish research and development on energy. The goal is to increase the efficiency and implementation of scientific results to meet future challenges in the energy sector. We work in a number of research areas, such as hydropower, energy gases and liquid automotive fuels, fuel based combined heat and power generation, and energy management in the forest industry. Our mission also includes the generation of knowledge about resource-efficient sourcing of energy in an overall perspective, via its transformation and transmission to its end-use.

Through cooperation and dialogue, we are working to improve the quality and utility of research in close collaboration with our clients that are energy companies, manufacturing companies, government agencies and others. Energiforsk is owned by the Swedish Energy Association, the Swedish National Power Grid (Svenska kraftnät), the Swedish District Heating Association, the Swedish Gas Association and Swedegas.

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