

**IEA Bioenergy Agreement: 2007-2009**  
**Task 33: Thermal Gasification of Biomass**  
**Second Semi-annual Task Meeting, 2009**  
**Breda, Netherlands**  
**Mon 2 to Thu 5 November 2009**  
**Minutes**

**Day 1, Monday 2 November 2009**

The **list of attendees**, for the Task Meeting include: Lars Waldheim, TPS, SE, Thomas Kolb and Bernd Zimmerlin, KIT/FZK, Germany, Reinhard Rauch, TUV, Vienna, AT, Bram van der Drift, ECN, NL, Henrik Christiansen, DEA, DK, Ilkka Hannula, VTT, FI, Ian Gilmour, UofC, NZ, Ruedi Buhler, U+E and Serge Biollaz, PSI, CH, Fernando Preto, NRC, CA, Giuseppe Fiorenza, ENEA, Richard Bain, NREL, Vann Bush and Suresh Babu, GTI, USA.

**Others:** Invited speakers for the 3 Nov. 2009 WS6: Operating Experience with Biomass Gasifiers: Research and Technology Development Needs to Improve Gasification Plant Operations, & observers include: Esa Kurkela, VTT, FI; Andras Horvath, Carbona, FI; Tomoko Ogi, Biomass Technology Research Center, JP; Kasper Lundtrop, B&W, DK; Thomas Klotz, Ortner Anlagenbau, AT; Pilar Coca Llano, Elcogas, ES; Juhanni Isaksson, METSO, FI; and Jurgen Karl, Graz Univ. Of Tech, AT; M. Dumont, SenterNovem, NL; and Lee Bannon, IBT Bio., UK/USA

**Regrets for inability to attend** were received from: Philippe Schild, EC and Mehri Sanati, LTH, SE

The proposed Agenda was reviewed and approved. The final Agenda is shown in Attachment 1.

The minutes from the first semi-annual Task Meeting of 2009 held from May 13-15, 2009 in Karlsruhe, Germany were approved with minor revisions and posted on the Task 33 website.

1. Review of Task Deliverables for 2007-2009:

**WS 1: Situation Analysis and Role of Biomass Gasification (BMG) Technologies in Future Energy Needs:**  
A summary report is posted on the Task 33 website.

**WS 2:** Report on Procedures/Guidelines for Synthesis Gas Characterization is available on the Task 33 website. Further work on development of a Guideline will be explored in discussions between NREL, TUV, PSI, ECN, VTT, and GTI. Follow-up on resources and commitments will be explored by the Task during the 2010-2012 triennium.

**WS 3: HSE progress report** - With lead from M/S Ruedi Buhler U+E, CH & Harry Knoef, BTG, NL the interim guideline, posted at [www.gasification-guide.eu](http://www.gasification-guide.eu), will be the working documents until resources from IEA Task 33 and the European partners become available to incorporate any additional feedback that may become available from industrial partners.

**WS 4: A Case for Biomass Gasification** – See notes under WS 5

**WS 5: Raw Gas Clean-up, Gas Conditioning, and Synthesis Gas Conversion**

The significant observations and developments from WS 5 will be combined with the limited number of presentations from WS 4 and the presentations from the final **WS6: Operating Experience with Biomass Gasifiers: Research and Technology Development Needs to Improve Gasification Plant Operations**, to compile a comprehensive report addressing the objectives of the three workshops.

#### **Country Updates on Biomass Gasification:**

**Sweden, Lars Waldheim, TPS:** The current mission is to reduce GHG emissions by 4% by 2012. Under the current biofuels directive 3.1% of RE introduction was achieved in 2006, energy tax will be reduced on biofuels to ~ 9 billion SEK by 2011, and the import duty on ethanol was removed in 2008 (EU duty 290 €/m<sup>3</sup>). The national goal is to reduce GHG emissions by 40 % by 2020 outside ETS sector, 30% by flexible mechanisms, continued use of environmental taxation, follow EU new fuel directive for blending and sustainability, and eliminate fossil transport fuels by 2030.

The current major RE projects in Sweden include Gobigas (with TUV-FICFB /REPOTEC BMG) and Chemrec's BLG projects. A new company e.on was set-up to develop and exploit technology for thermal gasification of biomass in order to produce combustible gases, power and heat. The company's target is also to build and operate a 200 MW SNG plant by 2015. e.on is also a 20% stakeholder in Gobigas project while Goteborg Energie owns the remaining 80%. **Metso Power's** 100 MWth TUV/Repotec Gobigas plant will incorporate innovations from **CHALMERS** and **KTH** (on tar reforming) to produce pipeline quality bio-SNG as well as district heat. e.on is pursuing development of a BMG plant producing 200 MW SNG by 2015. The anticipated cold gas thermal efficiency to produce bio-SNG is 65-70% with an overall thermal efficiency of 90% for the district heat co-generation plant. Phase 1 of the project will install a 20 MWth plant producing 2000 N Cu.m/hr of bio-SNG. Phase 2 will scale-up the technology to 80 MWth capacity. As a part of the project development efforts, Metso Power is investigating hot-gas filtration with the addition of sorbents and capturing particulates with ceramic candle filters. The investment decision to proceed with the scale-up effort is set for CY 2010, while operator training is already in progress at the Guissing, CHP plant.

**Gotaverken's** CFBG at Norrsundert facility is now shut down.

**Malarenergi** is planning to build 2x100 MWth (waste and demolition wood) CFBG, similar to Lahti, for cofiring in a 600 MW pulverized peat and coal boiler, at about 150 KM west of Stockholm.

The **Varnamo Sydkraft Bioflow** gasifier is in the process of procuring industrial consortium sponsorship amounting to 46 MM Euros as well as supplementary funds from SE Energy Agency. Linnaeus University will be the academic partner in project activities and TPS will provide engineering support. Start of operations is expected in 1st quarter of 2010 to investigate production of second generation biofuels. The plant operations will ultimately transition to pressurized steam-oxygen gasification to demonstrate IGCC, SNG, and biofuels production. Mr. Erik Rensfelt will coordinate and lead the project activities.

**CHEMREC** has been operating the 2 MWth (17 MM Euros) Pitea entrained BMG demonstration plant for over 10,000 hours to convert black liquor into synthesis gas for subsequent conversion to MeOH and DME. At ~1050° C and 30 bar operating conditions, there is no CH<sub>4</sub> or tars in the product synthesis gas. At present the projected price of DME is twice that of equivalent in energy content diesel fuel. The industrial consortia supporting the project includes DuPont, Delphi, Preem, ETC, TOTAL, Volvo, and

Haldor Topsoe. A 300 MM Euro commercial scale-up is planned for 2013 to produce 132,000 tonnes of MeOH for subsequent conversion to 95,000 tonnes of DME per year. The plant may initially sell MeOH. In support of BLG, ETC is investigating the development of an entrained cyclone gasifier.

**Chalmers University** is retrofitting the existing 8 MWth CFB boiler with a 2 MWth TUV-FICFB BMG. While banking the gasifier with hot sand, it can be brought back to operation in about 10 minutes. A test unit is also under construction to investigate chemical looping (at 800° C) for heat recovery and downstream reforming of raw gases.

**KTH** is developing a high-temperature preheated air gasification process for both DD and UD gasifiers,

**Mitt Universitet** is commissioning hot tests with a 150 kW integrated biomass based CFBG to produce FTL and BTL employing the TUV-FICFB process.

**Netherlands, Bram van der Drift, ECN:** The **HOST** chicken manure gasifier is being developed for other applications such as pig manure gasification. The 1 MWe HOST plant built in Portugal will employ (Dahlman's) Olga solvent scrub to remove raw gas contaminants including NH<sub>3</sub>, before the gases are fed to a Caterpillar ICE to generate power.

**Essent** is continuing operation of the 85 MWth CFBG (~30 Mwe) with demolition wood. The resulting product gas represents 5% of the heat input to the co-fired coal boiler.

The 85 MWth **NUON's** Shell gasification IGCC plant is operating with 15% of energy input by co-gasification with demolition wood. Vattenfall is considering acquiring the NUON facility.

**BioMCN** has constructed a plant to clean the raw glycerin by-product from biodiesel plants into clean glycerin that will soon be used to produce 200 TPY Biomethanol. BioMCN is now considering co-reforming of glycerine and natural gas (on a 50/50 basis) in a natural gas reformer to produce 20, 000 TPY of bio-methanol.

**HVC**, a MSW incineration company is seeking ECN services to employ MILENA gasification and OLGA gas clean-up to build a 10 MWth MSW and demolition wood gasification process to produce SNG.

**Richard Bain, NREL, USA:** The significant bioenergy demonstration projects involving BMG include Abengoa, New Page, POET, TRI (at two locations in Wisconsin), Carbona, and Range Fuels (1<sup>st</sup> Stage Auger Pyrolysis reactor followed by steam reforming/gasification of devolatilized products and synthesis gas clean-up), NEXTERRA at University of South Carolina, a PRIME Energy plant to produce 15 MM GPY of EtOH, the Gulf Coast project employing the Pearson technology in Mobile, AL, and Coskata project (Westinghouse plasma gasification coupled with Prof. Gaddy's (University of Arkansas) synthesis gas conversion to EtOH. The Silvagas technology is now owned by Rentech, Denver, CO. Other plasma assisted gasifiers include Alter-NRG, Inentech Chem., Idaho & Florida, and Adaptive ARC, Carlsbad, CA.

Other bioenergy projects that utilize BMG include Frontline Bioenergy, Ames, Iowa (Bubbling FB, gasification with air/O<sub>2</sub>/steam, 5 bar pressure, with HGCU including tar reforming, This project is proceeding with the design of a 70 MWth (300 TPD) plant. TRI is building a new 4 TPD pulse-combustion gasification PDU, in Durham, NC. University of California, Davis has built a 5 TPD, Dual Fluidized bed, PYROX type gasifier for testing and evaluation, to be followed by demonstration in Japan. UPM-

Kymmene and Andritz/CARBONA are conducting advanced gas cleaning and synthesis research at GTI, Des Plaines, Illinois in support of a BtL project.

A DOW CRADA at NREL is investigating the development of Co-Mo modified FTL catalysts for producing mixed alcohols using synthesis gas. Another investigation worth tracking is high-pressure total dissolution of biomass with Fe catalysts.

CPC Modular BMG has now deployed 18 CHP type projects that include walnut shell gasification in California.

USA's present mission is to increase the present 10 bn gal/yr EtOH to 40 bn gal/yr by 2020 with a target price of \$ 1.81 – 2.08 / gal.

**Finland, Ilkka Hannula, VTT:** VTT completed the EU sponsored BIGPower project in 2008. The final report is now under review. The Ultra Cleangas fundamental studies for synthesis gas applications involving VTT, TKK, Abo Akademi (U of Tech) is financed (1.5 MM Euros for 2008-2010) by TEKES Biorefinery. The participating industrial partners include Carbona, Foster Wheeler, Metso Power, Neste Oil, Stora Enso, & Vapo. Research scope includes pressurized steam-oxygen gasification, ash behaviour, filter blinding, catalyst deactivation, and tar reactions in catalytic and non-catalytic processes, system studies on BTL applications and hydrogen production, and analytical methods for measuring tar and other contaminants. In the fundamental support research on filter binding, it was observed that at 700° C or above the barrier filters faced problems with increased tar deposition and filter cake build-up.

METSO is offering high-efficiency boilers involving CFBG for waste or high-alkali and high chlorine biofuels. Waste gasification projects are under consideration for Malerenergie (200 MW fuel, waste) and for Lahti (160 MWth fuel including waste). METSO is also searching for other biorefinery projects. In this regard METSO is initiating gas cleaning R&TD at Varo, Sodra Cell plant in Sweden. For these investigations, SEK 10 MM is provided by the Swedish Energy Agency. Besides METSO and FWE, Andritz/Carbona also offers CFBG technology.

The following organizations are involved in the Finnish biodiesel and biofuel ventures:

- a. A (50/50) JV of Stora Enso & Neste to start demonstration of biocrude production in 2009. This initiative is confronted with a problem of possible shut-down of the Stora Enso's Varkaus plant.
- b. UPM, Andritz/Carbona, and GTI of USA is jointly developing BMG-IGCC & FTL processes incorporating high-temperature gas cleaning. Based on the current research UPM will decide in 2010 on building commercial plants in 3 locations to produce 100,000 TPY of FTL.
- c. VAPOIL is in early stages of project development to convert wood, peat, and Reed Canary grass (employing ultraclean gas) to liquid fuels.

**New Zealand, Ian Gilmour, U of Canterbury (U of C):** In 2008, the ruling National Party has removed the bio-oil obligation but introduced tax incentives to promote bio-oil application. One of the national goals is to attain carbon neutrality in power production by 2040.

The national mission is to reduce GHG emissions by 50% of the 2007 levels by 2040. Further, it is anticipated that by 2025, 90% electricity will be generated from renewable sources. Emission Trading Scheme is being pursued in support of these goals. The government plans to promote bio-oil application through tax incentives. The government has also increased funding on bioenergy R&D.

The major biomass resources in New Zealand are wood wastes from wood processing industry, pulp and paper wastes, and forest harvesting residues. Wood residues available for energy conversion amount to approximately 1.5 million m<sup>3</sup>/year. At present, bioenergy contributes about 6% to New Zealand's primary energy supply of about 25 PJ; 4 PJ are consumed for domestic space heating. In the next five years, over 50PJ/year should be available from forestry industry..

The primary national Program on BMG R&D is at the University of Canterbury. From October 2008, University of Canterbury started a new 6 year research program on biomass to synthesis gas and liquid fuels and to conduct related LCA studies. The objectives of the new program will also investigate gasification of biomass and coal blends and blending of biomass with bio-solid wastes and pyrolysis of biomass.

The biomass gasification research employing the FICFB gasification system at University of Canterbury is progressing well. Following a HAZOP safety review, gasification research was initiated involving six new postgraduate students (4 PhDs, 2 MEs) to investigate the effect of different bed materials on product gas yield and composition, hydrogen yield, tar yield and composition, overall energy efficiency, and catalytic effect on tar cracking, attrition loss etc.,

The R&D Activities at CRL Energy Research Ltd., is focused on fluidised bed gasification of low rank coal and syngas clean-up for production of fuel cell grade hydrogen. It has now begun research into co-gasification of coal and woody biomass and assessing the suitability of the syngas for Fischer-Tropsch conversion to synthetic fuels. This program is now being conducted in collaboration with University of Canterbury and the Coal Industry of New Zealand.

The commercial BMG players in New Zealand include Fluidyne Gasification Ltd., with their Mega Class Series of gasifiers (300kWe-2MWe) for CHP in Canada and development of a Tasman Class (15kWe) wood gasifier for remote locations in Australia, and Alternative Energy Solutions (AES) representing the sales of Indian Ankur gasifier in Australasia, for 30kW-5.5MW range CHP applications. In this effort AES has developed a high temperature gas conditioning filter (HTF).

**Switzerland, Ruedi Buhler, U+E** : Remuneration (up to 15 Euro cents/kWh) for feed-in to the electricity grid is one of the incentives in planning for 5,400 GWh/a from renewables (i.e., 10% of total) by 2030. CHP employing ORC and gasification are of interest. There is no news on the Woodpower Wila project . After certain improvements to the Netpro design, the IISC type of gasifier may be back in operation at this project. XYLOPOWER is created as a new company by former subcontractors of Dasagren, the manufacturer of Wila gasifier. Pyroforce is operating the 2-zone DD gasification system with a new control system. Occasional problems are encountered with slag formation on the grid. The next Pyroforce/CTU/PYCON commercial installation at Nidwalden, CH will employ 8 trains of gasifiers and two Jenbacher gas engines to produce 1200 kWe.

**Italy, Giuseppe Fiorenza, ENEA, IT** : in September 2009 ENEA was turned into the Italian national Agency for new technologies, energy and sustainable economic development. The abbreviated name of this new Agency still remained ENEA and its mission will be even more focused on energy, with a special attention to nuclear power.

Incentives on power production via biomass were adjusted in July 2009: an all-inclusive value of 0.28 € per kWh is now available regardless of supply chain length, if plant capacity does not exceed 1MW. No new BMG system having a significant capacity was installed in Italy during the last six months period.

The primary competition for CHP production comes from ORC based systems. A national ORC manufacturer, Turboden, has 13 operating plants in Italy, with capacities ranging from 200kW to 1.5MW (on average 1MW). Nine of these plants were constructed in the last two-year period and, according to Turboden announcement, 18 more new plants are under construction. Another constraint is represented by alternative biomass utilization. The price of olive waste, which was the planned feedstock for the Rossano Prime Energy gasifier, has gone up since the commissioning of the gasifier, because of olive waste demand as fuel for wood burning stoves. According to the information provided by Guascor Italia, this is one of the main reasons why the Rossano gasification power plant is not running now.

There are no significant implementations at national level on BMG for synthesis gas production. A wide-ranging RD&D activity on BMG is carried out at the **Trisaia Research Center**, where a technological platform is being completed, including:

- (1) air-blown fixed bed downdraft gasifiers, with conventional gas cleaning: filtration units and water scrubber, combined with ICE (30 to 80kWe);
- (2) dual fluidized bed steam gasification pilot plant (500kWth) with hot gas cleaning including an adsorption reactor and a filtration unit consisting of a cyclone and a ceramic filter;
- (3) air/steam-blown fixed bed updraft gasifier (150kWth) with advanced gas cleaning: coalescent filters and bio-diesel scrubber (under construction);
- (4) interconnected fluidized bed steam/oxygen gasification pilot plant (1.3MWth, patented by ENEA/University of L'Aquila) with catalytic ceramic candles inside the gasifier (under construction);
- (5) molten carbonate fuel cell (by AFCo) 125 kWe to be tested with producer gas by different pilot plants (under construction).

**Denmark, Henrik Christiansen, DEA :** At present DK generates surplus wind power, a total of 2.4 PJ.

The status of Danish demonstration programs are summarized below:

- (6) Skyve demonstration with Carbona gasification technology– has completed successful operations.
- (7) The 1.3 MWe Harboore facility is operating at 25% electrical efficiency while the district heat system operates at 50-60% thermal efficiency. About 10-20% of the input energy is recovered in the form of condensed tars.
- (8) The 2-stage Viking Gasifier, developed by DTU is being scaled-up under the Weiss Project to 400 kWe or higher for future applications. This technology claims an electrical efficiency in the range of 32 to 35% at 150 kWe, during 250 hours of operation in 2009.
- (9) The 500 kW, LT-CFBG pilot plant at DTU funded by Dong Energy is currently being scaled-up to a 5 MWth capacity unit. Graested demonstration plant – The two-step DD wood chips and pellet gasifier has been scaled up to 300 kWe . The plant has operated a gas engine for 1200 hours in 2007, 2200 hours in 2008, and 2600 hours in 2009.
- (10)Gjol - The BMG biomass gasification project with the TKK 2-step DD gasifier has been completed. Plans are underway to utilize the gasifier for making glass wool from sewage sludge.
- (11)AMONGAS has built a twin bed BMG research facility.

Based on these and other technology development efforts, it is observed that new technologies take 10 years before they operate with reliability and availability approaching 90% or higher.

Char production and utilization for replenishing soil carbon is gaining popularity in Denmark.

**Austria, Reinhard Rauch, TUV:** Austria is on target to reduce GHG emissions by 16% by 2020. This would be accomplished by 9% improvement in energy efficiency and increasing the contribution of RE to 34% (half from biomass), increasing biofuels in transportation from 5.8% to 10%, and by increasing R&D expenditure to 3% of GDP by 2020.

The bottom- up R&D funding instruments includes:

- Austrian science fund (FWF) – Basic research
- Austrian promotion agency (FFG) – General Programmes for R&D in businesses and basic research with the potential for commercialisation

The top-down Instruments include:

- FFG – Thematic programmes
  - Energy 2020
  - Energy of Tomorrow - Factory of Tomorrow - Buildings of tomorrow
  - Transport and Mobility (A3PS)
- Climate & Energy Fund (agreed by Parliament act in 2007) of 150 Million Euro per year with the following mission: Reduction of harmful greenhouse gas emissions and securing a sustainable energy supply
- Three more programme lines:
  - Research and development on sustainable energy technologies and climate research
  - Promotion of environmentally friendly goods traffic as well as mobility management projects
  - Promotion of projects which support market break-through of climate relevant and sustainable energy technologies

Under COMET, a new competence center, Bioenergy 2020+ was set-up by merging Austrian Bioenergy Center and Renet of Austria. Bioenergy 2020+'s technology development interests include F-T synthesis reactor and tubular SOFC.

Support research for BMG is continuing at Graz University of Technology – Institute of Thermal Engineering on heat pipe reformer (former Technical University Munich) , distributed SNG production, and health, safety and environmental issues for gasification systems

Other related activities at the Graz University of Technology - Institute for Apparatus Design, Particle Technology and Combustion Technology include research on gasification and combustion in a fixed bed of solid fuel, fundamental research on biomass particles under gasification conditions. Research at Joanneum Research Graz is focused on life cycle assessment and microchannel FT technology

The MCI – University of Applied Sciences for Environmental-, Process- and Biotechnology, Innsbruck is investigating Multi-staged fixed bed gasification systems

*The on-going R&D projects at Vienna University of Technology, Institute of Chemical Engineering include:* R&D in dual fluidised bed steam gasification, Production of Fischer Tropsch fuels, Production of BioSNG, Production of mixed alcohols, Pressurised gasification, F-T synthesis, use of Güssing product gas in a SOFC (as part of Bioenergy 2020+), and cogasification of biomass with coal (in cooperation with REPOTEC).

The Güssing CHP and Bio-SNG operations are proceeding successfully. REPOTEC is actively pursuing the development of TUV-FICFB BMG projects in Germany.

**Germany, Thomas Kolb, ITC-TAB:** The significant BMG activities in Germany are listed below:

**Artfuel** CUTEK is pursuing the development of a 100 kg/hr (400 kWth), atmospheric pressure, steam/oxygen CFBG, operating at 900°C to produce synthesis gas for F-T and bio-SNG synthesis from different types of biomass materials. This effort includes investigating additives to increase ash fusion temperature of straw feed stocks.

**AER** is considering the development of a 10 MWth TUV-FICFB system similar to the one at Güssing. The plant will initially produce power followed by bio-SNG. This is central to a large 'Technology platform for bio energy and methane 'at Geislingen-Türkheim' (near Stuttgart), 50 miles east of Karlsruhe. The project involves regional energy suppliers, public services, communities, the Center for Solar Energy and Hydrogen Research and Universität Karlsruhe (TH)/KIT.

**CHOREN** – start-up of the 45 MWth (65,000 dry TPY) beta plant with wood chips at 6 bar, is now scheduled for the end of 2009. The 2-stage gasifier will provide clean synthesis gas at 30 bar to produce 18,000 cu.m of FTL. The estimated plant cost is 100 MM Euros. Basic engineering work is in progress for locating the sigma plant (10xbeta plant) at the Schwedt refinery. The decision to proceed with this >500 MM Euro facility will be made by the end of 2009. Feed biomass will be obtained from Baltic Countries.

**bioliq** – pyrolysis of straw ( at ~500 C, at <10 seconds) was started first in July 2009, at the KIT-Air Liquide/Lurgi facility. The pilot plant capacity is 500 KG straw/hr which is equal to ~2 MWth. Upon successful operation of the pyrolysis plant the resulting char (40% char limit) plus liquid hydrocarbons will be gasified with oxygen at 80 bar and ~1200 C, in an entrained flow gasifier with membrane wall, designed by Lurgi. The clean synthesis gas is suitable for producing fuels, chemicals and/or power. If required a flux will be added to lower ash softening temperature and to control ash viscosity which is critical for reliable gasifier operation. Ultimately, the process will produce MeOH and DME. Funding for this effort is provided by the Ministry of Agriculture.

The design of the bio-slurry gasifier was finalized in October 2009. When planned to be commissioned in December 2011, the 1000 Kg/hour gasifier will be operated at >1200° C and 40 to 80 bar pressure. Support research to atomize the ~40% solids containing (1 Pa-sec, non-Newtonian) slurry is in progress along with the REGA gas clean-up investigations.

**Canada, Fernando Preto, NRC:** The RE drivers include the national goals to reduce GHG emissions by 20% below the 2006 level by 2020 and 60-70% by 2050, and producing 90% electricity from non-emission sources by 2050. About 80% of Canada's agricultural residues are not used at present. To pursue the utilization of these biomass resources, Canada has set-up SDTC in 2001 with an initial budget of \$550 MM. The two year old EcoEnergy program does not offer adequate incentive to promote biomass use. About \$150 MM is made available for R&D for the last 5 years. Additional support could come from \$650 MM for CCS projects and \$200 MM available for clean energy systems demonstration projects over a 5 year period. Besides federal support, provincial governments, notably in Ontario, Alberta, and British Columbia are poised to provide significant amount of money for RE projects.

The Nexterra BMG at Tolko is successfully operating to provide clean heat for wood drying kilns. The NORAMPAC BLG is operating at 50% of design capacity. The bed overburden damaged the pulse



combustors in the lower half of the bed. updraft gasifier with very low dust in raw gas can handle feed of -6+3 inches with about 7% moisture.

Besides the Enerkem demonstration at Westbury to produce EtOH, EPI and Taylor are pursuing power projects in Canada.

**Discussion on Scope of Work and Workshop Topics for 2010-2012:** Copies of the proposed scope of work & workshop topics prepared by Reinhard Rauch & Rich Bain were distributed and the Task Members were requested to send-in their review comments etc., to the prospective Task Leaders Reinhard Rauch & Rich Bain by Friday 13 June, 2009. Task members are requested to send in any additional comments to Reinhard & Rich at their earliest convenience.

**Next Task Meeting:** tentatively scheduled for Week 17, at the end of April 2010. Finland will confirm whether to host the first semi-annual task meeting of the 2010-2012 triennium.

END

Attachment 1

**IEA Bioenergy Agreement: 2007-2009**

**Task 33: Thermal Gasification of Biomass**

**Second Semi-annual Task Meeting, 2009**

**Breda, Netherlands**

**Mon 2 Nov to Thu 5 Nov 2009**

**Agenda & Program**

(Please plan on reaching Breda, NL by Sun 1 Nov PM)

**Note:** Breda is located ~115 KM south of Amsterdam Schiphol Airport. There is a **direct train** link and at least two trains per hour; travel to Breda, takes approximately 90 min.

For **shuttle** Information visit:

[http://www.shuttledirect.com/en/php/what\\_is\\_the\\_nearest\\_airport\\_to.php?dest=589&letra=B&countryIsoCode=NLD](http://www.shuttledirect.com/en/php/what_is_the_nearest_airport_to.php?dest=589&letra=B&countryIsoCode=NLD)

**Lodging:** Golden Tulip Keyser Hotel, Breda  
Keizerstraat 5

4811 HL Breda, Telefoon : +31 (0)76 520 51 73, E-mail : info@hotel-keyser.nl

[www.hotel-keyser.nl](http://www.hotel-keyser.nl)

**(Book lodging by directly contacting the Hotel before October 15 and mention "ECN, group 6328" to get a special rate of ~Euros 100 per day. Suggest booking rooms with arrival on 1 November and departure on 6 November 2009)**

**Local Contacts:** Yvonne Vriendjes ([vriendjes@ecn.nl](mailto:vriendjes@ecn.nl)) and Bram van der Drift ([vanderdrift@ecn.nl](mailto:vanderdrift@ecn.nl))

**Day 1, Mon. 2 Nov**

**Meeting Location:** Golden Tulip Keyser Hotel, Keizerstraat 5, 4811 HL Breda,

**Ph: +31 (0)76 520 51 73**

**08.30 – Task Meeting**

2. Welcome: Suresh Babu/Bram van der Drift
3. Introduction of Task Members and Observers
4. Review and Approval of Agenda
5. Review and Approval of Minutes from first Semi-annual Task Meeting, 2009, 13-15, May 2009, Karlsruhe, Germany
6. Review Task Deliverables : WS Reports & A Case for Thermal Gasification : SP Babu

**7. Country Updates on Biomass Gasification: Detailed Highlights with Technical Information**

- a) Sweden, Lars Waldheim, TPS (20 min+10 min for discussion)
- b) Netherlands, Bram van der Drift, ECN (20 min+10 min for discussion)
- c) Austria, Reinhard Rauch, TUV (20 min+10 min for discussion)
- d) Germany, Thomas Kolb, ITC-TAB (20 min+10 min for discussion)
- e) Canada, Fernando Preto, NRC (20 min+10 min for discussion)

**8. Short Updates on Presentations from May 2009**

- a) USA, Richard Bain, NREL
- b) Finland, Ilkka Hannula, VTT (10 min)
- c) Denmark, Henrik Christiansen, DEA (10 min)
- d) New Zealand: Shu-sheng Pang, Uof C (10 min)
- e) Switzerland, Ruedi Buhler, U+E, (10 min)
- f) Italy, Giuseppe Fiorenza, ENEA (10 min)

**9. Invited Overview of BMG in Japan: Tomoko Ogi**

**10. Discussion on Scope of Work and Workshop Topics for 2010-2012**

Next Task Meeting: TBD

**5:30 PM - Adjourn for the day**

**Day 2, Tue. 3 Nov**

**Meeting Location:** Golden Tulip Keyser Hotel, Keizerstraat 5, 4811 HL Breda,

**Ph: +31 (0)76 520 51 73**

**IEA Task 33 Workshop: Operating Experience with Biomass Gasifiers; Research & Technology Development Needs to Improve Gasification Plant Operations**

Speakers invited/to be invited from:

- a. Thomas Klotz, Ortner Anlagenbau, Oberwart, TUV-FICFB demonstration
- b. Reinhard Rauch, TUV-FICFB/Repotec Guissing Plant operations
- c. Andras Horvath, Carbona/Andritz/GTI
- d. Esa Kurkela, VTT, R&TD and Operating Experience
- e. Pilar Coca Llano, Elcogas, Cogasification at Puertollano, ES
- f. Jurgen Karl, Graz Univ. Of Tech, AT
- g. Kasper Lundtrop, Babcock & Wilcox Vølund
- h. Juhanni Isaksson, METSO Power
- i. Fernando Preto, Canadian Biomass Gasification Operations
- j. Marco Kanaar, NUON Cogasification

**Day 3, Wed. 4 Nov**

**Bus will leave at (time TBD) from:** Golden Tulip Keyser Hotel, Keizerstraat 5, 4811 HL Breda, Ph: +31 (0)76 520 51 73

**Visit NUON Buggenum (Shell Co-gasification Plant, 1.5 h driving distance from Breda)**

Return to Hotel: Time TBD

**Day 4, Thu. 5 Nov**

**Bus will leave at (time TBD) from:** Golden Tulip Keyser Hotel, Keizerstraat 5, 4811 HL Breda, Ph: +31 (0)76 520 51 73

**Drive to Essent - Co-firing plant at Geertruidenberg (10 km North of Breda) to attend a special event hosted by Essent on 'Lessons learned' briefing etc.,**

**"Technological developments and innovation in biomass gasification"**

9.30h Registration and coffee

10.00h Welcome from the Chairman: Pier Nabuurs, Chairman of the Executive Board KEMA

10.10h Opening Address: Huib Morelisse, Chief Technology Officer Essent

10.25h Essent's wood gasifier project and process redesign: Wim Willeboer, Manager Process Technology Essent Production

10.55h Coffee

11.10h Gasifier modification and commissioning: Martijn Spanjers, Process Engineer, Essent Production

11.30h Operational gasifier results: Fred Hooijmaijers, Asset Engineer, Essent Production

11.50h Questions and discussion

13.00h Lunch (with Gasification information market)

13.45h Innovative technologies including Pyrolysis and Torrefaction: Jan de Jong, Innovation Officer Essent New Energy

**Parallel programme**

**Group 1**

14.15h Pre-Feasibility study of zero emission power plant in cooperation with Shell: Jan Eurlings, Manager Conceptual Design Essent Business Development

**Group 2: Excursion**

Excursion to the demolition Wood Gasifier connected to Amer 9

14.35h Discussion

15.05h Gasification information market

15.30h **Group 1:** Excursion (see schedule above right)

**Group 2:** Submeeting(see  
schedule above left)

16.45h Concluding remarks: Huib Morelisse, Chief Technology Officer Essent

17.00h Closing the conference: Pier Nabuurs, Chairman of the Executive Board KEMA

17.10h Farewell snacks/beverages

18.00h End of programme

**Those interested in attending this special event hosted by Essent should visit on-line: [the programme](#)**  
and register by using the [registration form](#). You can also access the registration form at:  
(<http://acties.essent.nl/bioconference/index.html?org=IEA&volnaam=Van%20der%20Drift&em=vanderdrift@ecn.nl>)

**END**