MINUTES
IEA Bioenergy Agreement
Task 33: Thermal Gasification of Biomass
Spring 2004, Task Meeting, May 3-5, 2004
Vienna, Austria
Prepared by
Suresh P. Babu, Task Leader
Des Plaines, IL 60018, USA
October 27, 2004

The first Task Meeting for the 2004-2006 triennium was held with assistance from Vienna University of Technology (TUV) from May 3 to May 5, 2004. The list of Task Meeting attendees, and the complete list of invited speakers and observers for the one day seminar on, May 3, 2004 on "Short, Medium, and Long Term Perspectives on biomass Gasification Technologies" are shown in Attachment 1. The Agenda for the entire Task Meeting is shown in Attachment 2.

The one-day seminar on Short, Medium, and Long Term Perspectives on biomass Gasification Technologies was organized with 10 speakers and about 35 participants.

Monday, May 3, 2004: Work Shop on Short, Medium, and Long Term Perspectives on biomass Gasification Technologies

Summary: The first workshop in the current triennium was hosted by TUV, with support from the Federal Ministry of Transport, Innovation, and Technology of Austria from May 3 to 5, 2004. The workshop included presentations on perspectives of BMG in Austria, Sweden, U.K., the Netherlands, Germany, and USA. In addition, selected industrial stake holders were invited to discuss the drivers for their business interest in BMG.

The workshop was inaugurated by **Ms. Brigitte Weiss, from the Austrian Ministry of Transportation, Innovation and Technology. Austria** which derives nearly 12% of the primary energy from biomass, is investing in gasification for the development of efficient CHP Systems, power production, and liquid biofuels. The Austrian electricity directive requires that 4% electricity sale in 2007 should be derived from new renewable energy. The current annual energy research budget is about € 30 million/yr, two-thirds of it is spent on energy efficiency and renewables (EERE). 60% of the EERE funds are set aside for biomass energy conversion technologies. The focus is on developing technologies for sustainable energy supply. About € 12.3 million/yr is now spent on biomass gasification and combustion. The main BMG projects include the CHP demonstration of the TUV process in Güssing and the moving bed gasification process at Wr. Neustadt/Civitas Nova. Although the MCV fuel gas produced from the TUV process is initially used in gas engines, the process could produce a fuel gas suitable for high-temperature fuel cells and also to produce liquid biofuels and hydrogen, the basic building blocks in an overall sustainable energy future for Austria. The Austrian programs have both industrial and international partners (ex: Japan and USA).

Ms. Ann Segerborg-Fick from STEM/Stockholm, Sweden emphasized that the key national issue is the increasing demand for transportation fuels. This in combination with the concerns about greenhouse gases (GHG) and security of energy supply, clearly identify the importance of biomass energy in Sweden. In addition, the desire to replace nuclear energy and the limits on hydroelectric power production are the contributing factors to focus on biomass energy. At the present rate of consumption, Sweden may have to import 70% of oil for transportation by 2030. Hence security of energy supply is an important national issue. Sweden has set a goal to produce by 2020, 20% of liquid fuel from alternative sources. Short term, alternative fuels include cellulosic ethanol, Fischer-Tropsch liquids, DME, and hydrogen. DME will be used to displace imported diesel in trucks. The technical success accomplished by the Sydkraft Ab, pressurized CFBG process at the Värnamo demonstration plant will be reactivated to become the centerpiece for RD&D for testing and evaluating a variety of advanced biomass energy conversion schemes. The Chemrec black liquor gasification pilot plant tests at Pitea will also include investigations on the production of synthesis gas for subsequent conversion to liquid fuels. The focus will be on pressurized steam-oxygen gasification of biomass in general, to produce synthesis gas for subsequent conversion to F-T diesel, DME, and hydrogen. With the ability to produce theses green fuels, Sweden expects that BMG will play a major role in its energy supply, in about 5 years. For this year, Sweden's budget for renewables and biomass programs is about € 72 million.

Dr. Josef Spitzer, Joanneum Research, Graz, Austria spoke about the Sustainable Energy Strategy for Austria. The primary goal for developing biomass gasification in Austria is to produce heat and electricity while reducing GHG emissions. Although CO_2 sequestration is not under consideration, the national programs focus on GHG mitigation. Four sustainable energy scenarios are under consideration; these could add 12,000 to 30,000 new jobs. In addressing the European Vision, Dr. Spitzer stated that Europe's goal is to double biomass energy by 2010, to 12% of the primary energy supply. Some of the European initiatives to reach these goals include European Commission's Framework 6, ALTENER, and European Research Area, a visionary sustainable energy research initiative.

Mr. Paul Grabowski, Biomass Program, Energy Efficiency and Renewable Energy, U.S. Department of Energy DOE), has reported that DOE in collaboration with the U.S. Department of Agriculture, direct the **United States** biomass program. The current program is driven by energy security considerations and the drive to stimulate rural economies. The program is focused on developing biorefineries which convert biomass to valuable fuels, chemicals, materials and power. The thermochemical biomass conversion program is designed to meet certain cost goals by 2010 (using $30/ton of dry biomass):

a. Reduce the cost of biomass derived synthesis gas from $6.14 to $5 per GJ
b. Reduce the cost of producing crude pyrolysis oil, equivalent to No.6 Fuel oil, from $7.62/GJ to $4.75/GJ.

USDOE and USDA have recently (July 2004) selected 22 projects worth over $25 MM (total of about $38 MM with private sector cost-share). These projects include ten biomass gasification projects, which are targeted for hot-gas clean-up, hydro-thermal gasification, black liquor gasification to produce fuels and chemicals, and hydrogen production. The budget for US DOE biomass research is about $79 million for FY 2004.

Professor Eckard Dinjus from the Institute for Applied Chemistry in Karlsruhe, reported that **Germany** is pursuing the option to convert the cheapest and most abundantly available straw, waste wood, paper, and plastic wastes to produce pyrolysis liquids, close to the resource and transporting these liquids to a central slurry gasification plant. The low ash melting point of straw is of concern. The resulting synthesis gas from gasification could be converted to methanol, DME, or FT fuels. The residual unconverted gas could be utilized to produce electricity using engines, turbines, or high-temperature fuel cells. This biomass energy conversion scheme involves several distributed biomass pyrolysis plants with a capacity of about 90,000 TPY of biomass/year from 25 km radius, feeding a 1 million TPY central pyrolysis liquid slurry gasification/refinery. Preliminary economic analysis estimates that a biocrude could be produced for about 30 Euros/bbl and a motor fuel for about 36 Euros/bbl, without taxes. Germany is investigating a variety of biomass pyrolysis schemes including fluidized beds, rotating cone, ablative pyrolysis, twin-screw mixer reactor, and vacuum pyrolysis. Future Energy in Freiberg set-up as a center for testing and developing these processes, will test a pressurized slagging gasification process to convert the pyrolysis slurries to synthesis gas.

Germany's goal is to produce about 1.0 GTOE/year of liquid fuels from biomass. The current consumption of liquid transportation fuels amount to 1.8 GTOE/year. Germany is also interested in producing hydrogen from biomass as a transportation fuel.

Prof. Dinjus described a twin-screw reactor which pyrolyzes approximately, 1 mm. biomass particles at about 500°C, during a short, 1.0 sec. residence time to produce: liquids = 60$\pm$ 15%, gas = 20$\pm$ 10%, and char = 20$\pm$ 10%. The liquid fuel properties are: density of 1200 Kg/m^3, viscosity of 40 cp at 40°C, flashpoint of 50-60°C, pH = 2 to 3, and a lower heating value of 16MJ/Kg. The pyrolysis step could be carried out at up to 60 bar pressure. The pyrolysis oils are gasified in an entrained reactor developed in the former East Germany, with oxygen at 1300°C to produce a tar-free synthesis gas. The synthesis route employs copper catalyst at about 250°C and 50 bar to produce fuels and chemicals. Another path for biomass utilization will evaluate hydrothermal treatment of biomass at 150 bar and 350^o C to produce synthesis gas.

Dr. Theo van Harwijnen, Energy Technology Consultancy, described a € 35 million/yr, 5-year **Netherlands** renewable research program; approximately € 7 million/year may be spent on biomass RD&D projects. The national goal is to produce 30% of the total primary energy demand from biomass by 2040. BMG plays a central role in the sustainable energy supply plans developed by the Ministry of Economic Affairs. Benefits are foreseen by integrating the production of fuels, chemical and materials. The focus is on three R&D areas: biorefining, electricity, and heat, including co-firing and co-feeding with fossil fuels. R&D in feed preparation includes concepts such as torrefaction and pelletization. The emphasis is on the development and implementation of high-efficiency biomass energy conversion processes. This sustainable energy scheme will be fueled by local and imported biomass from neighboring countries. The biomass gasification programs will include fluidized bed gasification with air or oxygen, dual reactor processes (such as FERCO Sylvagas and TUV FICFB processes), entrained gasification, pressurized gasification, and gas clean-up.

Mr. Nick Barker, Future Energy Solutions, U.K. presented the role of biomass and biomass gasification in UK's Sustainable energy programs. **UK**'s goal is to produce increasingly significant quantities of electricity from biomass (10% by 2010, 15% by 2015 and 20% by 2020), thus reducing up to 60% of CO_2 emissions by 2050. UK does not plan to produce liquid fuels from biomass. UK will also pursue the development of off-shore and on-shore wind energy, wave energy, and photovoltaic electricity. While these sources of energy may be considered intermittent, biomass based energy should be a steady source of energy supply. Both willow coppice energy plantations and miscanthus are expected to provide bulk of the biomass feed stock. Because of the recent setback of the ARBRE demonstration, advanced energy conversion schemes are put on hold. The evolving legislation to promote waste use, which may promote waste gasification should help advance biomass gasification schemes in general. One of the high priority energy needs include small CHP units where steam cannot compete. UK's success with small modular CHP plants include the100 kWe Brook Hall Estate, 200 kWe Blackwater Valley Museum, 130 kWe Beddington ZED, and Ecos Millenium Center gasifiers. UK is supporting the development of medium scale CHP plants, namely the two, 7 MWe CHP projects involving the Wellman BMG process at Somerset and a rotating kiln gasifier in Glocestershire. UK is planning to build a 22 MWe FERCO Sylvagas IGCC process employing a Siemens gas turbine, in Devon for a cost of about £11.5 million. Permitting is now under review and the plant could start as early at 2006. Other projects include the construction of a 7 MWe CHP Wellman gasification process in Somerset for an estimated cost of about £ 6 million. Plant construction and commissioning is expected to start in 2007. A 7 MWe rotating kiln gasifier for CHP applications may start in 2006, at an estimated cost of £ 2 million.

The waste to energy Compact Power plant in Bristol has been in operation for three years. The plant employs an indirectly heated gasifier followed by a char gasifier with excellent emissions performance. This plant produces steam for district heating and electricity generation.

Mr. Brian Igoe of Demag Delaval , fully owned by **Siemens**, described the development of an advanced gas turbine for biomass gasifiers, which has been tested and proven for 5000 hours as the European Gas Turbine at Varnamo, Sweden. The turbine combustors are designed to handle the high mass flow rates of low-calorific value (15 MJ/Nm^3) fuel gas. Besides biomass gasification product gases, these turbines can handle natural gas from depleted wells and other low calorific value fuel gases. The gas turbine employs a unique dry, low emission combustion system. It can also handle high H_2 content gases up to 35% H_2 by volume. With the current interest in indirectly heated gasifiers that produce an MCV fuel gas, Siemens, with support from DTI, is developing a lean pre-mix, dry, low-emission combustor for MCV fuel gases (15-37 MJ $/nm^3$). The development work is concentrated on Typhoon 4.7 gas turbine, which can handle fuel gases with high inert gas content and fuel gases with up to 20% H_2 by volume. Siemens is conducting this development work in support of the anticipated FERCO project in Devon.

Mr. Bram van der Drift, ECN reiterated the importance of synthesis gas production from biomass for **The Netherlands.** ECN proposes the use of large-scale entrained slagging gasifier for converting biomass to synthesis gas. The problems associated with pressurizing and feeding biomass were recognized. Besides these technical hurdles, it was recognized that a lock-hopper feeding system has a negative effect on the overall process efficiency. ECN believes that

dedicated systems developed exclusively for biomass would be more reliable compared to using commercial technologies used for coal gasification.

A separate report on this Workshop will be prepared as a Task Deliverable.

Tuesday, May 4, 2004: **Plant Visit to Güssing and Wr.Neustadt**

FICFB-gasifier at Güssing: The TUV gasifier is scaled-up to a 48 TPD capacity, 2.3 m diameter fluidized bed gasifier operating at 850^{o} to 900^{o} C with a superficial gas velocity of 0.5 to 1 m/s. The gas velocity in the entrained combustor is about 10 m/s. The product gases enters the bag filter at about 145^{o} C. The gases are scrubbed with rape seed oil to remove 98 to 99% of condensable tars and other hydrocarbons. The water contained in the wash liquids are separated in a settling tank and the oil with absorbed tars is ultimately combusted by injecting into the combustion zone of the gasifier. About 20 liters/hr of rapeseed oil is used to scrub the tars. The product gas with 40% H_2, 22% CO, 23% CO_2, 10% CH_4, 2-3% N_2 (coming from the fuel feeding system), and about 0.5% of hydrocarbons, at 66-75^{o} C and 80 mbar, is introduced into an Jenbacher gas engine to generate a gross 1.85 MWe power and 4 MWth heat. Other pertinent information include: feed moisture 25-30%, parasitic power consumption=0.2 MWe, and 1MWe power sales contract price is 16 Eurocents/kWhe and 2 Eurocents/kWh for heat, efficiency of Jenbacher gas engine=36-37%, and the total operating time with gasifier and gas engine= 7100 hours.

Downdraft gasifier at Wr. Neustadt: Here a 12 TPD gasification plant was built besides a biomass boiler and closely connected to the boiler. The gasfier produces about 720 kWth of district heat and 500 kW of electric power. The biomass boiler has an output of 5 MWth heat. The gasification plant consists of biomass preparation system, a twin-fire fixed bed gasifier, wet gas cleaning, and utilization of the product gas in a gas engine. The feedstock of this plant is fresh chipped wood from the forest. The stringent fuel specifications in terms of particle size and moisture content are accomplished by sieving and drying. Preheated air from the district heating boiler is utilized for fuel drying; the exiting air is fed back to the boiler and post combusted to eliminate any smells and dust emitted from the dryer. The sieved small fuel particles are fed into the boiler and used as additional fuel. The gasifier is a fixed bed type with two reaction zones and combines the benefits of up- and downdraft fixed bed gasifiers. The product gas leaving the reactor at about 650 °C, is first cooled in the air preheater of the gasifier, and then quenched with water to 50 °C. For the final gas cleaning a wet electrostatic precipitator is installed. After that the clean gas is compressed and cooled before being supplied to the gas engine. So far the drying, gasification and gas cleaning were operated for 550 hours and the gas engine for 340 hours. At the visit maintenance work was taking place and the ash discharge system was being revamped.

Wednesday, May 5, 2004: Task Meeting

Attendees: Matti Nieminen, Serge Biollaz, Reinhard Rauch, Bram van der Drift, Suresh Babu, Reinhard Rauch, Ruedi Buhler, Richard Bain, Anders Evald, Paul Grabowski, Lars Waldheim, Vann Bush (observer), Nick Barker, and Shusheng Pang

Members Unable to Attend: Kees Kwant and Emanuelle Scoditti

The Agenda (Attachment 2) was reviewed and approved as proposed.

The minutes from the Fall 2003 Task Meeting in Japan were distributed to the participants for final review and comments.

Pending Reports: All subtask study coordinators were requested to submit the final reports with updated information by the end of May 2004. A final Report on Task 33 activities for the last triennium, 2001-03, will be prepared and distributed by June 4, 2004. All updated and final reports will be posted on the Task website.

Country Updates: NOVEM has coordinated preparation of the latest Country Reports and distributed them to the Task Members on September 30, 2004.

METHODOLOGY FOR PERFORMING WORK DURING 2004-2006

The Task, as a whole selected topics for subtask studies that are critical to advance biomass gasification, by organizing technical workshops at the semi-annual Task meetings. Industrial and academic experts will be invited to participate in these workshops with Task members. Each subtask and the associated workshop will have a coordinator supported by a working team of 3 to 4 members. The presentations and discussion at the workshop will constitute the basic information and guidelines for the subtask studies. Reports resulting from these studies will be reviewed by the Task members, revised if necessary, and published to assist and aid private groups and government agencies interested in commercializing BMG. These reports should also be useful for national policy makers to identify the research needs for further development and advancement of BMG. Preliminary reports from the workshops will be published within 6 to 12 months from the workshop date and the final reports will be published in Fall 2006. The following table lists the subtask studies, workshops, and schedules developed for the current triennium. The date and location for holding the workshops have been revised due to the Task's inability to reach agreement with Task 32 and the expression of interest by Annex XVI, Subtask B, to join in the organization of the workshop, WS3: Hydrogen and Synthesis gas for Fuels and Chemicals.

Meeting	Workshop/Subtask	Workshop Date & Location
Spring 2004	WS1: Short, medium and long term perspectives of biomass gasification technologies Coordinator and team to be selected from: SE/NL/UK/USA	May 5-7, 2004 COMPLETED
Fall 2004	WS2: Gas Cleaning & Gas Engines for Small-scale Applications Coordinator and team to be selected from: UK/DK/FI	Date: Oct 25-27, 2004 Denmark or Finland
Spring 2005	WS3: Hydrogen and Synthesis gas for Fuels and Chemicals Coordinator and team to be selected from:	Date: TBD USA or SE

	SE/NL/AT/IT/USA	
Fall 2005	WS4: Health, Safety, and Environmental Aspects of Small Scale Systems Coordinator and team to be selected from: CH/AT/UK/FI	Date: TBD UK (No. Ir)
Spring 2006	WS5: Co-firing Applications by Biomass and Waste gasification Coordinator and team to be selected from: FI/NL/UK/BE	Date: TBD The Netherlands
TBD	WS7: TBD	Date: TBD Location: TBD

The semi-annual workshops and Task meetings as proposed will last for three days; one day for the workshop, one day for conducting Task related matters, and the third day will be used for plant visits.

Cooperation with Other Tasks: Task 33 is in active cooperation with some of the IEA Bioenergy Tasks, IEA Annex 16 on hydrogen, and European GasNet.

Ruedi Buhler presented an update on the continuing work related to WS4: Health, Safety, and Environmental Aspects of Small Scale Systems, which is being conducted in cooperation with GasNet.

- Improving the accuracy of estimation of the flammability limits at high temperatures
- Estimation of explosion pressure and the effect on gasifier design
- Investigation safety standards for gasifier design and system configuration (especially with regard to secondary flame resistors),
- Instructions for and integration of safety control system, and
- Instructions for safe operation (for the crew) and for handling emergencies.

This continuing work is partly financed by the program “Energy systems of tomorrow” of the Austrian Federal Ministry of Traffic, Innovation and Technology. Additional support is currently sought for completing this project.

Future Meetings: The next Task Meeting will organize and present WS2: Gas Cleaning & Gas Engines for Small-scale Applications, from October 25 to 27, 2004 in Copenhagen, Denmark.

ATTACHMENT 1
IEA Task 33 Work Shop 1 Participants

Name	Affiliation	Address	Country	Phone	Fax	E-mail
Hermann Hofbauer	Vienna University of Technology,	Dept. of CHE, Getreidmarkt 9/166	1060 Vienna, Austria	43-1-58801/15970	43-1-58801/15999	hhofba@mail.zserv.tuwien.ac.at
Reinhard Rauch	Vienna University of Technology,	Dept. of CHE, Getreidmarkt 9/166	1060 Vienna, Austria	43-1-58801/15954	43-1-58801/15999	rrauch@mail.zserv.tuwien.ac.at
Anders Evald	Force Technology		Denmark			
Matti Nieminen	VTT	P.O. Box 1601	FIN-02044 VTT, Finland	358-9-456-6587		Matti.Nieminen@vtt.fi
Bram van der Drift	Energy Research Center of The Netherlands	Westerduinweg 3 NL 1755 LE Petten PO Box 1	1 NL ZG PettenThe Netherlands	31-224 564515	31-224 568487	vanderdrift@ecn.nl
Shusheng Pang	University of Canterbury	Private Bag 4800	Christchurch New Zealand	64 3 364 2538	64 3 364 2063	shusheng.pang@canterbury.ac.nz
Lars Waldheim	TPS Termiska Processer AB	Studsvik, S-61182	Nykoping, Sweden	46-155-221382	46-155-263052	lars.waldheim@tps.se
Ruedi Bühler	Umwelt + Energie	Sagiweg 4	CH-8933 Maschwanden, Switzerland	41-1-767-1516	41-1-767-1554	rbuehler@mus.ch
Serge Biollaz	PSI	CH-5232 Villigen PSI	Switzerland	41-563-102923	41-563-102199	serge.biollaz@psi.ch
Nick Barker	Future Energy Solutions	153 Harwell, Didcot , Oxfordshire, OX11 0QJ	United Kingdom	44 870 190 6036	44 870 190 6336	nick.barker@aeat.co.uk
Richard L. Bain	Thermochemical Conversion Group, National Bioenergy Center	M.S. 3322, 1617 Cole Boulevard,	Golden CO 80401-3393	303 384-7765	303 384-7748	richard_bain@nrel.gov
Paul Grabowski	U.S. DOE, Office of Biomass Programs	1000 Independence Avenue, SW	Washington DC 20585	202 586 0478		paul.grabowski@ee.doe.gov
Suresh P. Babu	Gas Technology Institute	1700 So. Mt. Prospect Road	Des Plaines IL 60018	847 768-0509	847 544-3470	suresh.babu@gastechnology.org
Vann Bush	Gas Technology Institute	2800 Milan Ct. Suite #346	Birmingham AL 35211			vann.bush@gastechnology.org

Theo van Harwijnen	ETC Energy Technology Consultancy for NOVEM	NL	theovanh@euronet.nl
Christine Petscharnig	URBAS	AUT	petscharnig@urbas.at
Peter Ebenberger	URBAS	AUT	ebenberger@urbas.at
Christoph Pfeifer	TUV	AUT	christoph@pfeifer.at
Richard Zweiler	TUV	AUT	rzweiler@mail.zserv.tuwwien.ac.at
Karl Ripfel	TUV	AUT	kripfel@mail.zserv.tuwien.ac.at
Hermann Huettler	TUV	AUT	huettler@mail.zserv.tuwien.ac.at
Tobias Proll	TUV	AUT	tproell@mail.zserv.tuwien.ac.at
Markus Bolhar-Nordenkampf	TUV	AUT	markus@bolhar.com
Markus Kleinhappl	Austrian Bioenergy C.	AUT	markus.kleinhappl@abc-energy.at
Nguyen Xuan Quang	TUV	AUT	nguyen@mail.zserv.tuwien.ac.at
Brian Igoe	Demag Deleval Industrial Turbomachinery Ltd.,(Siemens)	UK	brian.igoe@industrial-turbines.siemens.com
Priyanka Kaushal	TUV	AUT	pkaushal@zserv.tuwien.ac.at
Markus Luisser	TUV	AUT	mLuisser@mail.zserv.tuwien.ac.at
Eckhard Dinjus	Forschungzentrum Karlsruhe	DE	eckhard.dinjus@itc-cpv.fzk.de
Brigitte Weiss	BMVIT	AUT	brigitte.weiss@bmvit.g.at
Josef Spitzer	Joanneum Reserich	AUT	josef.spitzer@joanneum.at
Ann Segerborg-Fick	STEM	Sweden	ann.segerborg.fick@stem.se
Peter Stiegler	Energie werkstaff	AUT	peter.stiegler@energiewerkstaff.org

ATTACHMENT 2
PROGRAM AND AGENDA FOR THE TASK MEETING

Mon. May 3, Thermal Gasification of Biomass Task Meeting Workshop:
"Short, medium and long term perspectives on biomass gasification technologies"
(Coordinators: SE/NL/UK/USA)

9:30 AM : Welcome and Introduction – Suresh Babu, GTI, Des Plaines, IL., USA

1. Brigitte Weiss, Ministry for Transport, Innovation and Technology, Vienna, Austria: Keynote Presentation on Energy R&D in Austria.

2. Ann Segerborg-Fick, STEM, Stockholm, Sweden: Increasing Role for Biomass in Sweden's Energy Future

3. Dr. Josef Spitzer, Joanneum Research, Graz, Austria: A Sustainable Energy Strategy for Austria

4. Paul Grabowski, USDOE, USA: USDOE Vision for Biomass Gasification.

Noon : LUNCH

5. Prof. Dr. Eckhard Dinjus, Forschungszentrum Karlsruhe, Institut fur Technische Chemie, Bereich Chemisch-Physikalische Verfahren, Karlsruhe, Germany: The role of Biomass Gasification in Germany's Future Energy Needs

6. Dr. Theo van Herwijnen, Energy Technology Consultancy, The Netherlands: The Dutch EOS (Energy R&D Strategy) Biomass program

7. Nick Barker Future Energy Solutions, Oxfordshire, UK: The Role of Biomass and Biomass Gasification in UK's Sustainable Energy Future.

8. Brian Igoe, Demag Delaval Industrial Turbomachinery Ltd , London, UK: The use of MCV gaseous fuels derived from biomass in an industrial gas turbine: Advanced Concepts for Biomass Gasification Applications.

9. Bram van der Drift, ECN, Petten, The Netherlands: Prospects for Biomass Derived Synthesis Gas

5 PM : Discussion/Wrap-up

7 PM: Task Dinner

8:30 AM, Tue. May 4, Plant Visit :
10:30a.m. Arrive in Güssing, plant visit and lunch
1:00p.m. Leave Güssing

2:30p.m. arrive in Wr. Neustadt and plant visit
4:00p.m. leave Wr. Neustadt
5:30p.m. Return to MERCURE NESTROY WIEN, Rotensterngasse 12, 1020 VIENNA, AT
Tel : (+43)1/211400Biomass CHP- Plant Güssing

9 AM, Wed. May 5, Task Meeting

Introduction

1. Review and Approve Agenda
2. Review and Approve Minutes from Fall 2003 Task Meeting held in Japan
3. Pending Subtask Reports and Technology Briefs, from last Triennium (2000-2003)

    - ***Small-scale systems – Updated Technology Brief, Check with Harry Knoef, BTG, NL.***
    - ***Gas Cleaning and Effluent Characterization for CFB and FB Gasifiers - Updated Technology Brief, Matti Nieminen, VTT, Finland.***
    - ***Biomass Gasification to produce Synthesis Gas and Hydrogen or Hydrogen-rich Gas and Gas Utilization in High-temperature Fuel Cells and Gas Processing to Produce Liquid Fuels and Chemicals - Reinhard Rauch, TUV, Austria, Richard Bain, NREL, USA and Suresh Babu, GTI, USA, Coordinators, Joint study with IEA Annex 16:H2, Revisions and Final Report***
    - ***Municipal Solid Waste / RDF Gasification and Energy Recovery – Nick Barker, AEAT, UK, Coordinator (Joint study with Task 36, Energy from Integrated Solid Waste Management Systems and Techno-economic Assessment for Bioenergy Applications)***
    - ***FINAL REPORT – Suresh Babu***
4. BMG RD&D: Country Reports
    - UK – Nick Barker, AEAT, UK
    - CH – Ruedi Buhler Umwelt + Energy/Serge Biollaz, PSI
    - FI – Matti Nieminen, VTT
    - DK – Henrik Christiansen, DEA/ Martin Hansen, FORCE Technology
    - SE – Lars Waldheim , TPS, Sweden(to be confirmed)

12:30 – 13:30 - Lunch

    - NZ- Shusheng Pang, University of Canterbury
    - AT – Renhard Rauch, TUV
    - NL - Bram van der Drift, ECN
    - USA – Rich Bain

    Discussion
5. Wrap-up/Actions
6. Next Task Meeting – Proposed Dates 25 to 27 Oct. 2004, Location TBD
7. Future Meetings : Spring 2005 and Fall 2005, Spring 2006 and Fall 2006

END OF TASK MEETING