

IEA Bioenergy Task 42 Biorefinery Workshop

October 4 – 6, 2010
Chicago, USA

IEA Bioenergy

Task 42 Biorefineries

1. DOE Biomass Program – October 4

Participants

Country	Name	Organisation
Australia	Gill Garnier	IEA Bioenergy Task 42
Austria	Gerfried Jungmeier	IEA Bioenergy Task 42
Canada	Kirsty Piquette	IEA Bioenergy Task 42
Germany	Thomas Willke	IEA Bioenergy Task 42
Ireland	Patrick Walsh	IEA Bioenergy Task 42
The Netherlands	Ed de Jong	IEA Bioenergy Task 42
The Netherlands	Bert Annevelink	IEA Bioenergy Task 42
Turkey	Omer Faruk Gul	IEA Bioenergy Task 42
UK	Adrian Higson	IEA Bioenergy Task 42
USA	Melissa Klembara	IEA Bioenergy Task 42/ DOE
USA	Steve Lupton	UOP
USA	Rajita Majumdar	U.S. Department of Energy (DOE)
USA	Terry Marker	Gas Technology Institute (GTI)
USA	Aaron Myers	Oak Ridge National Laboratory
USA	Liz Moore	U.S. Department of Energy (DOE)
USA	Dennis Schuetzle	Renewable Energy Inst. Intern. (REII)
USA	Niels Udengaard	Haldor Topsoe
USA	Michael Wang	Argonne National Laboratory

Presentations

DOE invited a selection of their current projects to present some of the results. The emphasis was on thermochemical conversion. All PowerPoint presentations are available on the IEA Bioenergy Task 42 website in the section Publications/Workshops/2010/8th Task Meeting Chicago USA September 2010 (<http://www.iea-bioenergy.task42-biorefineries.com/publications/stakeholder-workshops-bi-annual-task-meetings/2010/>).

1. DOE Biomass Program Background and Strategy – Melissa Klembara

presentation not available yet → short description will follow.

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2. Integrated Biorefineries Current Status and Perspectives - IEA Bioenergy Task 42 on Biorefineries – Ed de Jong

Ed de Jong first gave a brief overview of the IEA Bioenergy and specifically on Task 42 Biorefinery. Then he presented the IEA 42 definition ‘Biorefining is the sustainable processing of biomass into a spectrum of marketable bio-based products and bioenergy’. The Task distinguished between product-driven and energy-driven biorefineries. Several examples were given of biorefinery initiatives. A special classification system has been developed by Task 42. Further information on Task 42 can be found on the website: <http://www.iea-bioenergy.task42-biorefineries.com/>.

3. Integrated Biorefinery Project Overviews – Melissa Klembara

Melissa Klembare presented the Integrated Biorefinery Projects of DOE. The IBR strategic goal is ‘to demonstrate and validate integrated technologies to achieve commercially acceptable performance and cost pro forma targets through public-private partnerships’. In total 29 projects are running at the moment: 2 R&D, 12 pilot scale (1 dry tonne or more), 10 demonstration scale (50 dry tonnes) and 5 commercial scale (700 dry tonnes). EPACT 932 commercial and demonstration scale biorefineries were selected in 2007 and 2008, and over half a billion \$ were allocated by DOE, with an additional \$2 billion in cost share from the public partners. The American Reinvestment and Recovery Act (ARRA) added another \$800M to the biomass program. All funds are under strict review processes. A map with the National portfolio of IBR demonstration projects can be found at the following website: www.eere.energy.gov/biomass/integrated_biorefineries.html.

4. Direct Production of Gasoline and Diesel from Biomass using Integrated Hydrolysis and Hydroconversion (IH²) – Terry Marker

Terry Marker introduced the IH² project focusing on Integrated Hydrolysis and Hydroconversion. Pyrolysis oil that has undesirable properties, and needs upgrading. The project is about an IH² Proof of Principle Unit. R&D is aimed at process optimization, feedstock testing and catalyst testing. The pilot plant will be tested semi-continuously with 50 kg/day for a few months in the beginning of 2011. The commercial size envisaged would be about 500 tons/day. Feedstock studied are wood, Lemna (minor duckweed) and corn stover. The biomass needs to contain at least 20% water, so it does not need to be dried. The H₂ that is needed in the process is produced within the process. The process uses a relatively cheap catalyst. The process is exothermic so it produces all the process energy needed. The products are a whole range of liquids. The % gasoline varies from 54-75%, the % diesel from 23-46%. The liquids are separated from the ashes and char.

5. Wood to green gasoline using Carbona gasification and Topsoe TIGAS processes – Niels Udengaard

Niels Udengaard first briefly described the Topsoe group that is devoted to R&D in heterogeneous catalysis and the production and sale of catalysts. They also license technology, supply equipment and perform engineering and construction of plants. The company is based in Denmark and Pasadena Texas. The project is about a pilot plant with a capacity of 21 tons/day of pelletized woody biomass, to produce 23 barrels per day of gasoline blendstock. The pilot plant combines Carbona/Andritz gasification with the Topsoe TIGAS syngas-to-gasoline synthesis process. The Carbona gasifier (fluidized bed) is already available at partner GTI. They use O₂ instead of air in the tests. This type of gasifier is already commercialized (6 MW power & 12 MW district heat). The tar refiner works catalytically. The DME synthesis reactions were described, including the optimal conversion (H₂/CO = 1). The Topsoe TIGAS demonstration units are in Houston (6 barrels per day). A Gasoline Pilot plant is located in Frederikssund, Denmark. The sources for the pelletized mixed wood waste are mill residues, chips & logging residues and non-merchantable roundwood. To come to a commercial sized biorefinery several tests will to be performed in the pilot plant. The expected size is 4,000 MT/day of wood (6% moisture content) at \$ 35/MT.

6. Life-Cycle Analysis of Biofuels with the GREET Model – Michael Wang

Michael Wang gave a presentation on the GREET model. This has been developed since 1995. The most recent version was released in July 2010. The GREET model estimates energy use and emissions of GHGs and criteria pollutants for fuel production and use. It includes more than 100 fuel production pathways, including many potential biofuel ones. The examples corn to ethanol and switchgrass to cellulosic ethanol were mentioned with their system boundaries. Issues that affect biofuel WTW results were described: continued technological advancements, methods of estimating emission credits of co-products of ethanol, direct and indirect land use changes and resulted GHG emissions, and finally LCA methodologies. Examples of Argonnes projects are an effort on LCA of algae biofuels production, and a biofuel water sustainability analysis.

7. Bioenergy Knowledge Discovery Framework – Aaron Myers

During a specially organised webinar a live demonstration of the Knowledge Discovery Framework was given by Aaron Myers. This was developed for the Million Ton study update. The system can be found at: <https://bioenergykdf.net>. E.g. animations of changing crops can be made. The TAG cloud technique is used to explore the knowledge.

8. Pilot Scale Biorefinery for Sustainable Fuels from Biomass via Integrated Pyrolysis and Catalytic Hydroconversion – Steve Lupton

UOP is leading supplier and licensor of processing technology, catalysts, adsorbents, process plants, and technical services to the petroleum refining, petrochemicals, and gas processing industries. The project presented is an Integrated Biorefinery (IBR) Demonstration. A pilot plant at the Tesoro refinery, Hawaii will be used. The size is 1 ton per day. The objective is to demonstrate scalability of feedstock-flexible technology to produce drop-in transport fuels from lignocellulosic feedstocks. The IBR complex consists of a Rapid Thermal Processing unit (converts biomass to pyrolysis oil), a H₂ generation unit and a Pyrolysis oil Upgrading/conversion unit (catalytic hydroconversion). The basic question of the project is where to integrate this system in a current oil refinery. A wide range of second generation feedstocks are considered: corn stover, cane bagasse, switch grass, guinea grass, algae, and forest residues. The biomass needs to have less than 10% moisture content. Initial LCA work indicates that GHG emission reductions of 70-80% are possible compared to fossil equivalents. The assumed biomass transport distances are 200 km for logging residues and 25 km for short rotation coppice crops. Commercial scale will be 6,000 barrels per day.

9. Demonstration of a Pilot Integrated Biorefinery (IBR) for the Economic Conversion of Biomass to Diesel Fuel – Dennis Schuetzle

Dennis Schuetzle described the IBR project. The objective is to scale-up an existing system with Thermochemical Conversion (TCC) and Liquid Fuel Production (LFP) for the production of renewable synthetic diesel, and confirm economical and operational feasibility. The project site is Toledo. The pilot scale is 25 dry tonnes per day for the fully integrated system. The first commercial scale-up after that would be to 300 dry tonnes per day. One of the advantages is that the pyrolysis/ steam reforming process, in the absence of oxygen, produces significantly lower levels of syngas contaminants than from conventional TCC conversion processes. Another advantage is that biomass does not need to be dried, because the water is used in the process.

2. Minutes Task 42 Meeting – October 5

Members in Attendance

Country	Name
Australia	Gill Garnier
Austria	Gerfried Jungmeier
Canada	Kirsty Piquette
Germany	Thomas Willke
Ireland	Patrick Walsh
The Netherlands	Ed de Jong
The Netherlands	Bert Annevelink
Turkey	Omer Faruk Gul
UK	Adrian Higson
USA	Melissa Klembara
USA	Rajita Majumdar
USA	Liz Moore

Discussions and Action Items

1. Status Update on Task 42

The action list of the minutes from the Lille meeting in March 2010 was checked:

No.	Description	Responsible	Status
1	Preparation and distribution of concept minutes of the whole Task meeting	René	Done 310510
2	Comments on / additions to concept minutes Task Meeting	All, before 11 June 2010	Done
3	Final Minutes French Task Meeting send to partners by e-mail	René, 14 June 2010	Done
4	Update Country Reports - Set-up format and hand over to Henning - Sending out format to partners to be filled in - Preparation national country reports (Q2/Q3) and sending them to Henning - Preparing overall country report Task 42 - Putting national and overall country report(s) on internetsite	René Henning, asap All Henning René	Done Done Ongoing Ongoing Tbd
5	Copy BioFPR paper on classification to all partners	Ed	Done

FINAL MINUTES February 2011

6	<i>Copy of the book BBE to all partners (one per country)</i>	René	<i>Done 310510</i>
7	<i>Product-driven Biorefinery input to Gerfried concerning the Classification System</i>	Ed, Bert, Maria, asap	?
8	<i>Anaerobic fermentation / enzymatic hydrolysis and biochemical processes subdivision – new set-up suggestion</i>	Gill, asap	<i>Tbd</i>
9	<i>Distribution of the latest version of the classification system</i>	Gerfried, asap	<i>Done</i>
10	<i>Preparing a picture with flowing classification Energy – Materials</i>	Gill	<i>Tbd</i>
11	<i>Biorefinery Complexity Index – more info on current use conventional index, and +/- for biorefineries, discussion at next meeting</i>	Gerfried	<i>Tbd</i>
12	<i>Biofuel-driven Biorefineries format to be filled in to prepare the Gross List.</i>	Gerfried, asap	<i>Partly done</i>
13	<i>IEA Bioenergy Task 42 Newsletters - Set-up framework 1st one - Input partners - Distribution to stakeholders (goal July 2010)</i>	René Secretary, All Secretary, Site, All (nat. level)	<i>Rescheduled to Q1 2011</i>
14	<i>Joint Task meeting with Task 39 – 1st half of 2012</i>	Henning	<i>Ongoing</i>
15	<i>Preparation new concept Task 42 poster / leaflet before next Task meeting</i>	Secretary	<i>Ongoing</i>
16	<i>Biobased Products Report Preparation - directory on extranetsite to collect info - providing reports to this directory - sending out concept set-up report - agreement on set-up report - preparation of the report/deliverable</i>	René All René/Bert All UK or France?	<i>Done</i>
17	<i>Task Meeting US Q3/Q4 2010 - proposal dates to co-ordinator ASAP !! - date proposals to partners to check availability - fixation date - set-up programme</i>	Melissa/Alicia René DOE/coord. DOE/coord.	<i>Done</i>
18	<i>Future Task Meetings: potential dates/places - Italy - Australia - Denmark - Canada or the Netherlands</i>	Isabella/coord. Gill/coord. Henning/coord. Maria/coord.	<i>Ongoing</i>

Tbd: to be done

Remarks:

4. Country reports have been received, except from: the United States, Canada, Italy, and Australia (status 20 december 2010). **Please send these reports to Henning (hnj@life.ku.dk) and Merete (mema@life.ku.dk) ASAP, so that they can finalise their activity !**
8. Gill is still working on new set-up suggestion.
10. Gill is still preparing a picture with flowing classification energy – materials.
11. No further progress in the last couple of months.
12. The Gross List was sent to Rene, but he did not give feedback yet. Reaction given to Gerfried on 201210.
13. Ideas were discussed at this US-meeting.
14. A joint Task Meeting with Task39 is OK. Status 201210: Henning is preparing a large-scale Biorefinery and 2G ethanol conference for Spring 2012: 27-29 February 2012 in Copenhagen. This event will be co-organised by Tasks 39 and 42. Potential title (Rene): Advanced Biofuels - Sustainable Production using the Biorefinery Approach
15. Rene is working on a draft poster/ leaflet and will send this to everybody for comments.
16. Presentation on Biobased Products during this meeting.
18. Will be discussed during this meeting. Status 201210: Isabella has made the offer to organise the first Task Meeting of 2011 together with Dr. Giordano (corporate director Mossi & Ghisolfi) on **4-6 April 2011 in Tortona (northern Italy)** at the M&G technological park.

Ed de Jong provided quick updates on Task 42 activities and status:

- Turkey is a new entrant to the Task 42 Team and was represented by Omer Faruk Gul at the Chicago Workshop.
- European Commission has decided to stop contributing to Task 42 by the end of this year. At the moment, the Commission is focusing on other efforts.

Action Item:

1. Submit missing country reports by mid-November to Henning Jorgensen at hnj@life.ku.dk (**United States, Canada, Italy, and Australia**). Status 201210: still missing US, Canada and Australia.

2. Team Introductions

A round of introductions was made along with brief mention of respective country trends:

- Australia: Investments have been stalled in biorefineries R&D because of elections but is expected to pick up.
- UK: Investment has slowed down because of new administration. Secured 10 million pounds sterling for biorefinery projects.
- Germany: Trend is establishing biorefinery plants connected to chemical parks, using lignocellulosic material as feedstock.

- Austria: Pulp and paper industries are now also focusing on biorefinery activities (due to economic problems), converting black liquor to biofuels. A project has been started to check feasibility.
- U.S.: Has mandated biofuels production target of 36 billion gallons per year by 2022. Near-term goal is cellulosic ethanol but portfolio includes other advanced biofuels (renewable gasoline, diesel, and jet fuels). Also focus has expanded to include biopower and algae as feedstocks.
- Canada: Renewable Fuel Standards (RFS) is coming into effect in Canada, with renewable gasoline mandated at 5% and renewable diesel at 2% by 2012. A lot of provinces are implementing their own RFS mandates like Alberta. It appears the RFS legislation will be driving increased use of bioenergy in Canada.
- Turkey: A law has been prepared to incentivize using biomass to produce electricity, fixing a rate of 14 cents per kW, but no incentives for renewable fuel have been planned as yet.
- Ireland: Following the European guidelines for biofuels targets.
- The Netherlands: Working to comply with EU goals for biofuels but has its own vision that by 2030, 30% of the raw materials and fuels used for both industrial and energy purposes should be biobased. The Netherlands will make use of all available biomass resources, including algae. But the country will be relying on large bulks of imports to meet this goal.

3. Biorefinery Classification System / Complexity index (discussion led by Gerfried Jungmeier)

See PowerPoint presentation (also for agenda item 4), that was already adjusted directly after the meeting by Gerfried to take into account the detailed remarks (that are not recorded further in these minutes).

This discussion focused on agreeing on a nomenclature for biorefineries – how to specify the kind of biorefinery for holding discussions.

Q. Why do we need to classify a biorefinery at all? There exist so many biorefinery concepts / numerous possible pathways for the biomass-to-bioenergy supply chain. A framework is needed that can identify the kind of biorefinery amongst varied stakeholders. It will unify the vocabulary across the biorefinery industry in various countries and allow for discussions and comparisons of projects using the same biorefinery concept. It will also help us see what pathways are being addressed by countries and the ones that are not.

Biorefineries need to be defined in terms of feedstocks being used, processes and pathways utilized and the range of energy and material products. In order to further define the classification system, an open discussion was held on the list of energy products, material products, feedstocks, and platforms.

The aim is to identify 10 to 15 most interesting biofuel-driven biorefinery concepts and have an open discussion on them.

Discussions continued and feedback was taken to settle on different elements and how they should be represented / identified in the concept.

A general suggestion for nomenclature approach was to develop classification system at two levels: a high-level path specification and then a more detailed classification that identifies all the elements.

The complexity index was not discussed any further during the meeting

Action Items:

2. **All Team members** are asked to classify at least one example of their own country with the system and to also put this on the website. This way we can get some practice.
3. **Bert** will e.g. ask colleagues to try to classify their AlgaeParc project with the system.
4. **Melissa** could perhaps classify one of the pyrolysis cases that were presented yesterday.

4. Assessment Biofuel-Driven Biorefineries – Selection 10 cases and agreement on assessment methodology (discussion led by Gerfried Jungmeier)

An open discussion was held on establishing a value chain of a biorefinery and comparing it to a conventional fossil energy system, as well as to combined approach of using fossil feedstocks with biomass. Suggested activity for the Task 42 Team is to do case study comparisons, with keeping “basket of products” identical so the outputs are the same. The case study would do a lifecycle comparison in the social, economic, and environmental contexts. Benefits will be:

- Valuable exercise that could provide a sort of template or guidance document so users can do the assessments by themselves.
- Many countries do not have such thorough evaluation processes in place and this would create a framework for them to make comparisons.
- Such evaluations will make the value clear and inform decision making and policies

There was some lack of support for this activity. Following comments were made by some Team members:

- This would be valuable study but would require too much effort and probably beyond the scope of IEA Task 42.
- In the U.S., it is already being done and the burden of justifying the value chain of biorefinery is on the industry. DOE requires projects to perform lifecycle analysis as part of the requirements (Abengoa LCA is available publicly at the moment). Environment impacts studies are also being done by different projects. Further, from environment perspective, the U.S. Environmental Protection Agency has done “due diligence” already and based on impacts, identifies Renewable Fuel Standard mandates by fuel type.
- IBUS plant in Denmark also has done such a case study.
- The U.S. GREET model discussed yesterday already does many of the required assessments.

- Different countries have different decision-making processes in place and this may not be a relevant exercise for them.
- Biorefinery is one of the case studies that will be done within the EU-project PROSUITE under Sustainability Assessment (co-ordinated by Martin Patel of University Utrecht). The case study would be useful in this effort of Task 42. Maria Wellisch is in the advisory board of this project.

It was agreed that some country-specific examples would be good for such assessments. They will make good addition to the next meeting's Agenda. Not all countries have to provide, but whoever has interest and the resources.

Action Items:

5. **All Team members** please send details on the specific existing case studies to Bert Annevelink at bert.annevelink@wur.nl. (*Optional*).
6. **Melissa** will send us the (link to the) public Abengoa analysis and any other public ones.
7. For future meetings, one external expert could be identified in the social, economic, and environmental fields and invited to contribute to Task 42 discussions on the value chain of biorefineries (*a suggestion*).
8. Proposed follow-up (addition by René (201210)):
 - **Gerfried** made a Gross List of potential biofuel value chains to deal with
 - **René** will check asap if this list is sufficient to deal with the EC views -> Updated Gross List
 - **Gerfried and Henning** will compare the Updated Gross List (UGL) with the info on commercial, demo and pilot plants provided in the Country Reports, and will link the value chains in the UGL to specific countries in which these value chains are dealt with.
 - **Gerfried** will come-up with the Short List of value chains that will be assessed by **JR in co-operation with another Task partner** who has the link (data) of the specific value chain concerned.

5. Knowledge Dissemination, presented by Bert Annevelink

a) IEA Task 42 Website

The newly implemented IEA Task 42 Website was demonstrated.

(<http://www.iea-bioenergy.task42-biorefineries.com/>)

Some content has already been uploaded. Team members are now requested to provide content on their respective countries under different menu items. The uploaded data does not go live immediately but goes through an internal quality check. Once the content is reviewed and changes made if required, it is made available online.

Action Items:

9. All Team members: please provide content for following menu items:
- **News**> Provide country-specific updates for News. Include images with content so they can be hyperlinked on the page.
 - **Links**> Provide links under various categories – Industry, Governmental, Non-Governmental, Institutes, and Universities. You can provide as many links as you wish.
 - **Activities**> Provide content and updates for the Activities section assigned to you (Biobased Products, Chain Assessments, Sustainability Aspects, and Knowledge Dissemination).
 - **Database**> Provide information on 2-3 projects from your country in the next few months. Templates are provided to fill in details on each project.
 - **Publications**> Upload relevant documents to specific extranet folders. Please give file names descriptive of the content.

If you have questions, contact Hilde Holleman at hilde.holleman@wur.nl

Due Date: Ongoing

10. **Rene** will send an organisation template for the website again to all members.

b) Newsletter

A printed quarterly newsletter was suggested but Team members settled on an electronic version that will be uploaded on the IEA Task 42 Website. All members will send country-specific write-ups for first issue. Melissa Klembara of the U.S. will be the featured Country Representative in the first issue.

Action Items:

11. **All Team members** please send half-page write up on your country's biorefinery focus and activities to Rene at rene.vanree@wur.nl. Due Date: end of December.
12. **Melissa K (US)**: Send a profile of herself for the first issue to Rene. Due Date: end of December.

c) Training Courses/Conferences:

The Amsterdam 1-day Training held on Sep 13 2010 was a huge success. About 70 people had participated. It is a good idea to continue such 1-day training workshops. It would be best to attach it to an ongoing event to make it convenient for participation. Suggested frequency is once a year. More workshops can be held as per interests and feedback received. Next one could be held in conjunction with the Toronto Congress on Biofuels in June 2011 Action of whom?.

Addition 1) René 201210: Within the framework of the EC FP7 project BIOCORE, a 4-day Biorefinery Training Course will be organised by INRA/WUR a.o. by the end of August 2011 in France (Paris or Toulouse). This course will also be organised in Wageningen (NL) in summer 2012. The course will include: a general overview on biorefineries – IEA Bioenergy Task 42 a.o. (day 1.), some field trips to running biorefinery facilities (day 2.), core technology lectures – BIOCORE (day 3.), and in-depth training modulew (4) – Biocore (day 4.). For the organisation of the first day I will come back to you all with a concept programme set-up building upon the Amsterdam training of September 2010.

Addition 2) René 201210: Within the framework of EC FP7 projects StarColibri, Biocore, Suprabio and Eurobioref a networking event will be organised in Brussels (Renewable Energy House) on 7 February 2011 from 1 pm – 6 pm. IEA Bioenergy Task 42 will co-organising this important event (the Task will also be presented).

Action items:

13. Arrange workshop at Toronto congress, whom?
14. Invitation to participate in Biorefinery Training Course (lecturing), **René** January 2011 (travel & staying costs will be paid by the Task).
15. Invitation to participate in the networking event in Brussels on 7 February 2011, René January 2011.

6. Sustainability assessment activity (discussion led by Gerfried Jungmeier)

- Gerfried did not have any contact about this item with Maria anymore. The only information is in the e-mail that she has sent to everybody just before the Chicago meeting.
- Maria gave a presentation on sustainability at the Training Course in Amsterdam.
- Ed mentions that he and Bert had a meeting with her on the 16th of September.

E-mail Maria Wellisch

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- Adrian warns that we are running behind because a lot is happening already in the field of sustainability assessment.
- Comment/Suggestion René 201210: During the last ExCo Meeting it was decided to set-up a IEA Bioenergy Task Force dealing with sustainability issues within the whole IEA Bioenergy framework. We should come-up with a representative from Task 42.

Action items:

16. **All Team members** please send suggestions about this task to **Bert**, who will make a long list.
17. **All**: please let René know who would like to be the Task 42 representative in the IEA Bioenergy Sustainability Task Force.

7. Next IEA Task 42 Meeting (discussion led by Ed de Jong)

For the spring meeting two potential options were available, UK and Italy. Unfortunately shortly after the meeting it became clear that the UK is not an option. Fortunately Isabella de Bari has confirmed that Italy has accepted to host the next Task 42 meeting. Isabella has succeeded to arrange the meeting at the headquarters of Gruppo Mossi & Ghisolfi (M&G; <http://www.gruppomg.com/>). Dr. Giordano Corporate Director of M&G has given his availability for hosting and co-organising our spring meeting. The meeting will be in Tortona (Northern Italy, North of Genova and East of Torino) at the technological park of M&G. Chemtex (http://www.chemtex.com/templates/renewables_index.html) is part of M&G, and also located in Tortona. This park is also the Innovation Pole for Biofuels. The data for the spring meeting will be **4-6 april** 2011. Detailed information on the programme (including the site visits) and specific information on the travel and accommodation will be supplied in the near future.

The 2nd Task Meeting in 2011 is planned to be held in Queensland, Australia in the timeframe of November 28 to 1st week of December, 2011. This will be held in conjunction with Bioenergy Australia Conference. Gill Garnier suggested to have an IEA Task 42 session as part of the conference where each member can provide brief overview on their respective country's activities and goals. The ExCo68 will also be combined with this conference (however, it is suggested that the date for this was the end of October → to be confirmed). Patrick suggests to also invite colleagues from New Zealand.

The 1st task Meeting of 2012 will be in Denmark. Henning is preparing a large-scale Biorefinery and 2G ethanol conference for Spring 2012: 27-29 February 2012 in Copenhagen. This event will be co-organised by Tasks 39 and 42. Potential title (Rene): Advanced Biofuels - Sustainable Production using the Biorefinery Approach.

The 2nd Task Meeting of 2012 could be in The Netherlands or Austria. The NL because it is the last meeting within this Task triennium. Austria because at the end of 2012 also a IEA Bioenergy conference will be organised over there. To be decided at the next Task Meeting.

Action items:

18. **Rene** will send a letter of thanks to dr. Dario Giordano, Corporate Director, M&G for giving their availability in hosting the meeting.
19. **Isabella, Dr. Giordana, and René** will further specify the 2011 Spring Meeting in Italy.
20. **Rene** is asked to send the general IEA 42 presentation to Gill so that he can inform the National Team organising the Bioenergy Australia Conference.
21. **Gill** will confirm the dates of the second meeting by the end of this year.
22. **Henning** will keep us informed on the 2012 Spring Meeting in Copenhagen.
23. **All** have to decide on the location of the Autumn/Winter Meeting 2012 to be discussed at the next meeting.

8. Overview of Biobased Products, presented by Adrian Higson

See the PowerPoint sheets.

This report focuses on material outputs alone and intends to update DOE's 2004 report on Bioproducts. It will take stock of all current available studies in different countries and condense them into one single document. Adrian Higson is leading this effort.

The report is not a separate study, but more a dissemination activity. Existing literature will be surveyed. The targeted public is industry & policy makers.

Suggestions:

- Make the report more market driven.
- Start with the most promising products.
- Do not make it too academic.

Action Item:

24. **All Team members** please send relevant information resources you may know of but do not see in the current list of resources being utilized in assembling this report to Adrian. Due Date: By October end.

9. Closing

Ed thanks Melissa, Liz and Rajita for the perfect organisation of the whole IEA Bioenergy Task 42 Biorefinery Workshop.

Action List

No.	Description	Responsible	Due Date / Status
<i>Remaining Actions Lille Meeting</i>			
4	<p>Update Country Reports</p> <ul style="list-style-type: none"> - Set-up format and hand over to Henning - Sending out format to partners to be filled in - Preparation national country reports (Q2/Q3) and sending them to Henning - Preparing overall country report Task 42 - Putting national and overall country report(s) on internetsite 	<p>René Henning, asap All</p> <p>Henning René</p>	<p>Done Done Ongoing</p> <p>Ongoing Tbd</p>
7	Product-driven Biorefinery input to Gerfried concerning the Classification System	Ed, Bert, Maria, asap	?
8	Anaerobic fermentation / enzymatic hydrolysis and biochemical processes subdivision – new set-up suggestion	Gill, asap	Tbd
10	Preparing a picture with flowing classification Energy – Materials	Gill	Tbd
11	Biorefinery Complexity Index – more info on current use conventional index, and +/- for biorefineries, discussion at next meeting	Gerfried	Tbd
13	<p>IEA Bioenergy Task 42 Newsletters</p> <ul style="list-style-type: none"> - Set-up framework 1st one - Input partners - Distribution to stakeholders (goal July 2010) 	René Secretary, All Secretary, Site, All (nat. level)	Rescheduled to Q1 2011
15	Preparation new concept Task 42 poster / leaflet before next Task meeting	Secretary	Ongoing
<i>Actions Chicago Meeting</i>			
1	Submission lacking Country Reports ASAP to Henning and Merete	US, CAN, AUS	2010 ASAP
2	Classification of minimally one running biorefinery (commercial, demo or pilot) plant in your country and put it on the website	All	Q1 2011
3	Classification and putting on website of WUR AlgaeParc	Bert	Q1 2011
4	Classification and putting on the website of a US pyrolysis case	Melissa	Q1 2011
5	Send biofuel-driven biorefinery case studies to Bert Annevelink	All	Q1 2011
6	Link to public Abengoa analysis will be send to all	Melissa	2010

FINAL MINUTES February 2011

7	<i>Inviting an external expert on value chain assessments (suggestion)</i>	?	- (RR)
8	<i>Biofuel-driven BR assessments: - set-up Gross List - check Gross List - Comparison GL wth Country Reports - definition Short List - assessment</i>	Gerfried René Henning/Gerfried Gerfried Gerfried + partners	<i>Done 2010 2010 Q1 2011 1st half 2011</i>
9	<i>Input Task Website: news, links, activities, database, publications</i>	All	<i>Continuously</i>
10	<i>Organisation Template website to partners</i>	René	<i>Q1 2011</i>
11	<i>½ A4 on Country's biorefinery focus and activities for newsletter</i>	All	<i>JAN 2011</i>
12	<i>Profile Melissa for newsletter to René</i>	Melissa	<i>JAN 2011</i>
13	<i>Arranging a workshop at the Toronto Congress</i>	? (CAN)	<i>Q1 2011</i>
14	<i>Invitation to participate in Biorefinery Training Course, France August 2011 (lecturing)</i>	René	<i>Q1 2011</i>
15	<i>Invitation to participate in Biorefinery Networking Event in Brussels on 7 February 2011</i>	Rene	<i>JAN 2011</i>
16	<i>Suggestions for Sustainability Assessment Activity to Bert</i>	All	<i>Q1 2011</i>
17	<i>Task 42 Representative in IEA Bioenergy Sustainability Task Force – let know to René if you are interested</i>	All	<i>ASAP</i>
18	<i>Letter to Dr. Giordano (M&G) fot hosting the Spring 2011 Task Meeting</i>	René	<i>2010</i>
19	<i>Further specification Italy Meeting</i>	Isabella, Dr. Giordana, René	<i>Q1 2011</i>
20	<i>General IEA presentation to Gill for Australia Meeting</i>	René	<i>2010</i>
21	<i>Conformation dates Australia Meeting by the end of 2010</i>	Gill	<i>2010</i>
22	<i>Informing on 2012 Spring Meeting in Copenhagen</i>	Henning	<i>Next meeting</i>
23	<i>Decission Autumn/Winter Meeting 2012</i>	All	<i>Next Meeting</i>
24	<i>Info (reports etc.) for BBPs report to Adrian</i>	All	<i>2010</i>

3. Minutes Site Visits – October 6

3.1 UOP Riverside Facility tour

Group leader Vic Patton received the group with his team, and first gave a short PowerPoint introduction to the UOP Riverside McCook Facility. UOP was founded in 1886. UOP Technology furnishes 60% of the world's petrol producing processes, 70% of the world's modern detergents and 60% of the world's para-xylene. The 9 acres facility contains many pilot plants (about 100). Research was moved from here to Des Plaines in 1995 (with more specialty equipment). More information on UOP a Honeywell company can be found on www.uop.com. This contains no advertisements, but only information. UOP is not well known to the consumer, because they supply to industry. At the moment one of the projects deals with Green Jet Fuel. For this the Ecofining™ process is being used (H_2 + vegetable oil is converted to green diesel, while removing oxygen). The facility supports catalyst development, process development and provides technical service. Operating budget is about \$10.000 per pilot (x100 pilots). The facility is open 24/7, 365 days per year. They are all continuous pilot plants. From 0.5 cc to 5000 cc of catalysts can be loaded per reactor. The analytical capacity of the facility is about 65 people.

After the introduction a very interesting guided tour of the facility was given. A special training school, pilot test facilities and a state-of-the art chromatography lab with the most modern equipment were shown.



3.2 GTI Facility tour

In the afternoon the GTI Energy & Environmental Technology Campus in Des Plaines, Illinois was visited. The advanced gasification test facility that is operated e.g. for the project ‘Wood to green gasoline using Carbona gasification and Topsoe TIGAS processes’ with Haldor Topsoe is located here.



The facility could not be entered due to building operations. However, a brief explanation was given outside. Bay 1 (1) contains the Carbona syngas conditioning system, bay 2 the PWR gasification system and bay 3 an open 5-story test bay (available for TIGAS). Furthermore the flex-fuel test facility (2) contains the Carbona biomass gasification system. A Morphysorb installation (3) is used for absorption/stripping for CO₂ and H₂S removal. Furthermore SulfaTreat (4), a sorbent-based sulphur scavenger is used. The installation has high pressure oxygen and nitrogen supply (5).



Attachment

IEA Bioenergy Task 42 – Biorefining Workshop Agenda

Monday, October 4, 2010

DOE Biomass Program

Time	Title
8:30 am – 8:45 am	Welcome, Introduction and Agenda Overview – DOE
8:45 am – 9:15 am	DOE Biomass Program Background and Strategy – DOE
9:15 am – 9:45 am	IEA Bioenergy Task 42 on Biorefining – <i>Ed de Jong, Co-chair IEA Bioenergy Task 42</i>
9:45 am – 10:30 am	Integrated Biorefinery Project Overviews (briefings of 29 projects with Q/A built in) – <i>Melissa Klembara, DOE Biomass Program Technology Manager or Golden Field Office representatives</i> (Briefings on each of the 29 projects with Q/A built in)
10:30 am – 11:00 am	Coffee Break
11:00 am – 11:30 am	Feature Presentation: GTI Project – <i>Terry Marker (GTI Principal Investigator)</i>
11.30 am – 12:00 pm	Feature Presentation: Haldor Topsoe Project – <i>Niels Udengaard (Haldoe Topsoe Principal Investigator)</i>
12:00 pm – 1:30 pm	Lunch
1:30 pm – 2:00 pm	Feature Presentation: Biorefinery Life Cycle Assessments and the GREET Model – <i>Michael Wang (Argonne National Laboratory)</i>
2:00 pm – 3:30 pm	Feature Presentation: Bioenergy Knowledge Discovery Framework – <i>Aaron Myers (Oak Ridge National Laboratory)</i>
3:30 pm – 4:00 pm	Coffee Break
4:00 pm – 4:30 pm	Feature Presentation: UOP Project – <i>Steve Lupton (UOP Principal Investigator)</i>
4:30 pm – 5:00 pm	Feature Presentation: REII – <i>Dennis Schuetzle (REII Principal Investigator)</i>
5:00 pm – 5:30 pm	Wrap-up discussion

Tuesday, October 5, 2010

Task 42 Meeting

Time	Title
8:30 am – 9.00 am	Agenda and Status Task 42 – <i>Ed de Jong</i>
9:00 am – 10:30 am	Classification System / Complexity Index – <i>Gerfried Jungmeier</i>
10:30 am – 11:00 am	Coffee Break
11:00 am – 11:30 am	Update Country Reports / Summary status – <i>Ed de Jong</i>
11:30 pm – 12:30 pm	Assessment Biofuel-Driven Biorefineries – Selection 10 cases and agreement assessment methodology – <i>Gerfried Jungmeier</i>
12:30 pm – 1:30 pm	Lunch
1:30 pm – 2:30 pm	Knowledge Dissemination – <i>Bert Annevelink</i> <ul style="list-style-type: none"> • Website: inter/intranetsite presentation • Data-input tool for data-base pilot/demo/commercial plants & R&D projects • Newsletter(s): format/content • Training Course / Conferences • Other dissemination activities
2:30 pm – 3:30 pm	Sustainability Assessment Activity / Status activities and set-up specific Task activity – <i>Maria Wellisch / Gerfried Jungmeier</i>
3:30 pm – 4:00 pm	Coffee Break
4:00 pm – 4:30 pm	Fixing Dates and Locations Next Task Meetings – <i>Isabella De Bari, Gill Garnier, all</i>
4:30 pm – 5:30 pm	Overview Biobased Products – Introduction & discussion on preparation – <i>Adrian Higson (tbc) / Ed de Jong</i>

Wednesday, October 6, 2010

Site Visits to UOP Riverside and GTI/Haldor Facilities

Time	Title
9:00 am	Meet in the hotel lobby for taking a van to facility tour at UOP Riverside location
12:00 pm – 1:00 pm	Lunch (location to be decided by DOE)
1:30 pm – 3:00 pm	GTI facility tour
3:00 pm	Van returns Task Members to airport or hotel lobby