

## IN THIS ISSUE:

IEA Task 39 Workshop Overview (Ystad).....	2
IEA Task 39 Country Rep. Meeting (Ystad) .....	3
Future Workshops & Symposia .....	4
Contact Info .....	5

## EDITOR'S NOTES

Welcome to the November 2005 issue of the Liquid Fuels from Biomass newsletter. In this issue, we bring you a summary of Task 39's recent meeting held in Ystad, Sweden. Many thanks to Drs. Guido Zacchi and Bärbel Hahn-Hägerdal for their organizational help, to Christian Roslander for his tireless efforts, and to all the participants - faculty and students - for their contributions!

Next issue, we will start our series of *Institutional Overviews*, where we will highlight the research organizations that are so important to the development of liquid biofuels. In keeping with our Swedish theme, we will highlight Lund University.

As always, we encourage all IEA Bioenergy Task members to make use of this newsletter, to contribute content, and to suggest improvements. The next issue of the Newsletter will be released in February 2006. We look forward to your contributions! - [Warren Mabee](#)

## FROM THE TASK LEADER

In this issue of the IEA Task 39 Newsletter, we have summarized the events that occurred at our recent Task meeting in Ystad, Sweden, which was very successfully hosted by our colleagues at Lund University. Special thanks to Christian Roslander, Guido Zacchi, and Bärbel Hahn-Hägerdal for making this event such a success! Our two-day meeting was characterized by excellent discussion and interaction between the forty participants, which included a good selection of senior researchers, students, and industrial representatives. We also would like to take this opportunity to welcome Anke Swets as an Associate Task Leader (Policy) and Country Representative for the Netherlands. She replaces Eric van den Heuvel, who has taken a position with a consulting firm; many thanks to Eric for his contributions to Task 39. Finally, we would like to welcome Prof. Dr. -Ing. Axel Munack as the official Country Representative to Task 39 for Germany.

We have organized two IEA Task 39 meetings for 2006. One will be a business meeting for country representatives at the 28<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals on April 30. The second will be an inclusive workshop in Vancouver, BC at the end of August. We hope to see many of you at the Vancouver workshop!

As always, the success of Task 39 rests upon the dedication and contributions of our members. Happy holidays to you all! - [Jack Saddler](#)

## UPCOMING MEETINGS

As was recommended at our meeting in Ystad, we will hold our Next Country Representatives business meeting in Nashville, Tennessee, on Sunday April 30, 2006. This meeting will be held in conjunction with the 28<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals. We have already contacted the organizers and have a room booked for our meeting.

We have also finalized the date of our bigger, more inclusive workshop that will be held in Vancouver, Canada, from August 27 to September 1<sup>st</sup>, 2006. We are proposing to host several other IEA Bioenergy Tasks at this meeting, with at least one day of joint presentations. We hope to have one or two days with our own group and one day of combined sessions, followed by one or two days of tours around British Columbia to look at forestry and bioconversion sites. The weather in BC should be excellent at this time of year!

We look forward to seeing you in Vancouver next summer!

## IEA TASK 39 WORKSHOP YSTAD, SWEDEN – 12-14 OCTOBER 2005

[Warren Mabee](#)

The workshop started on Wednesday evening with an informal meet and greet in the lobby of the Continental Hotel. The first session began with introductions from Bärbel Hahn-Hägerdal and Jack Saddler, who reviewed the structure of the meeting and highlighted desired outcomes. Dr. Saddler discussed the role of Task 39 as seen by the IEA ExCo, which has directed us to direct more efforts towards collaboration and network building, and less towards consultant's reports and documents. Jack then reviewed the structure of the meeting and highlighted desired outcomes from the workshop and from Task 39. Finally, a more formal session introduced two keynote speeches. Guido **Reinhardt** asked the question 'how sustainable are biofuels?' There are fairly large discrepancies between some different life cycle assessment (LCA) studies on biofuels, which can be in part explained by examining the system boundaries that are considered in each study. A problem that was identified is the need to interpret the output of LCA's; these types of analyses provide numbers, but what do they mean? Don **O'Connor** then asked the question 'who moved the goalpost?' in bioethanol production. By examining experience curves of the starch-based and cellulose-based industries, it can be seen that the improvements that have been made by the cellulose-based industry are matched by strong improvements in the starch-based industry. Comparing the costs of a starch vs. cellulose ethanol mill, the leveraged internal rate of return (IRR) over ten years is about 25% for starch and 3% for cellulose. Options for improving the economics of cellulose-based ethanol include utilizing the lignin for higher-value coproducts, and generating other products from points in the process.

**Session 1** provided an overview of some of the drivers that are promoting different biofuels. Don **O'Connor** questioned whether high oil prices would help or hurt biofuels commercialization. He found that high oil prices have removed the price gap between petroleum-based and bio-based fuels. This has created a disconnect; while project proponents look forward and see extremely high financial returns with the new market prices and historical levels of government support, governments look at the situation today and see that high financial returns are being achieved, and question the need to continue support. Manfred **Wörgetter** then explored some biodiesel drivers, highlighting the role of Kyoto targets, security of supply, and rural development in biofuel development. Finally, Jan **Lindstedt** discussed bioethanol drivers in Sweden, where the European biofuels directive, a positive taxation regime, and incentives for biofuel and flexifuel vehicle use have combined to drive industrial and regional growth.

In **Session 2**, Torbjörn **Lindgren** discussed the history of ethanol in Sweden and presented some of the experiences from the Etek ethanol pilot in Örnsköldsvik. In the first year, the challenges faced included calcium (gypsum) build-up, lignin build-up, and acid leakage. Lignin in particular forms a problem because it is sticky, and adheres to the walls of reactors and to membranes.

Bill **Cruickshank** then presented on Canadian biofuels from a policy and a technology standpoint. Of particular interest was the report on logen's pre-commercial demonstration plant, which began producing ethanol from wheat straw in April 2004 at a rate of about 1000 litres/day. To date, logen has produced about 185,000 litres of ethanol.

**Session 3** continued the country program overview with a presentation by Norbert **Vasen**, who discussed prospects for biofuels in Italy. Italy has targeted 1% biofuel content by 2005, and 2.5% by 2010. In order to meet this goal, biodiesel will be tax exempt, up to 200,000 tonnes per year (reduced from 300,000 tons in 2004). There is also a new allocation of €73 million per year, corresponding to tax relief for 100,000,000 l/year. Anke **Swets** then gave an interesting overview of the VIEWLS project, which is in its final phase now. It was reported that the importance of lignocellulosic fuels rises with increasing energy costs, with a break-even cost calculated at about €67/barrel (US\$80/barrel).

**Session 4** gave us a presentation from Bernard **Prior** on biomass processing research in South Africa. It is estimated that up to 1.26 billion litres of bioethanol could be produced from maize (corn), which is 12% of the fuel demand in South Africa. Ethanol Africa, a consortium of 400 farmers, a foreign biofuels company, and the Central Energy Fund, will finance up to eight plants to produce ethanol. A biodiesel plant capable of producing about 100,000 tonnes per year of biodiesel from soybeans is also scheduled for completion in 2007. Don **Erbach** then presented on US biofuels issues. He addressed the question of net energy balance raised by Pimentel and Patel; he pointed out that others have found a positive balance (USDA, Argonne, etc.). Recent legislative activities include the new Federal Energy Bill, and the Gasoline for America's Security (GAS) act of 2005 (designed to raise refinery capacity).

In **Session 5**, Matti **Siika-aho** discussed issues enzymatic hydrolysis of lignocellulose for fuel ethanol production. In particular, the use of thermophilic enzymes that could possibly improve the overall process performance and give new options for more efficient process integration and improved economics were discussed. Marie-Francoise **Gorwa-Grauslund** then introduced some novel yeast strains for the fermentation of lignocellulosic hydrolysates. In comparison to other strains, the ethanol yield using the modified yeast is favourable, particularly since it is not necessary to detoxify the hydrolysate. Xylose conversion to ethanol is improved when small amounts of glucose are continuously released from the enzymatic hydrolysis step.

**Session 6** saw Kurt **Messner** investigate microbial degradation mechanisms for lignocellulose. Biomimetic systems are a new generation of reagents for lignin oxidation. They consist of transition metal-complexes, using copper, a coordination compound (pyridine-

derivatives), and hydroperoxide (both H<sub>2</sub>O<sub>2</sub> and organic peroxides like CHP, TBHP). Right now, this system is being investigated as a potential pretreatment system. Lars **Rohold** then presented information on the Maxifuels project, which is taking Danish technology from the laboratory to pilot scale. By the end of May 2006, it is hoped that a pilot plant will be running (SSF and separation, xylose fermentation, and ethanol distillation/anaerobic digestion).

In **Session 7**, we considered the industrial perspective. Tony **Sidwell** of British Sugar considered why one might invest in bioethanol in the UK. Low cost UK production could theoretically displace Brazilian imports of ethanol, but this must be supported. One approach that the UK is considering is a renewables transport fuel obligation, which would match the EC Directive (5.75% by 2010). The government has to lead by setting challenging targets. Instead of trying to drive the market with technology, we really need demand in the market place which will pull the technology along! Per **Carstedt** then discussed the big picture around biofuels. To make a simple analogy, if 100 billion barrels of oil is a bottle of champagne, then we have used 9 bottles of champagne over the past 120 years. We have spent 4.5 bottles in the last 20 years. We still have about 9 bottles of champagne in the refrigerator. Each bottle is being used every three years. Even if we find 3 or 4 more bottles, the party will be over soon.

**Session 8** examined some of the product and engineering questions that remain in biofuel production. Guido Zacchi discussed process design. Some of the remaining technical challenges include development of yeasts that ferment all sugars in real hydrolysis; cheaper and more effective enzymes; increased consistency, improved process integration, and waste water treatment. There needs to be proof of process at the pilot scale. Bob Benson then addressed the commercialization of lignin products. Existing markets for lignin include binders in

animal feed pellets and carbon black pellets, wood adhesives, and road stabilization. However, in most cases lignin is at best a secondary product. At Tembec (a Canadian forest products company), only 3% of profits come from the chemical group.

The two-day workshop offered a number of opportunities for both formal and informal interaction between the various participants; these opportunities were maximized by scheduling no more than two presentations per 90-minute session. Final comments from participants indicated that, while it is difficult to combine both policy and technical issues, it is important to try and cover the whole picture. Many technical experts benefit from a review of the policy side, and industry appreciates both sides to support their decision-making process. Having lots of time for discussion is important, and the program as designed this year provided for this. It was also beneficial to mix policy and technical talks; while this might not have been deliberate, it was effective.

At the end of the meeting, Saddle reviewed the list of desired outcomes and discussed the mission of Task 39 as it continues into the next triennium of IEA funding. The group emphasized the importance of combining technical and policy issues, and the students in particular were very supportive of this approach. The task will continue to operate as collaboratively as possible for the next year, with three or four newsletters and one major workshop. The next Country Representatives meeting of IEA Task 39 will be in Nashville, TN, on the Sunday before the 28th Symposium on Biotechnology for Fuels and Chemicals (April 30th). The next workshop will likely be held in late August (Aug 27-Sept 01) in Vancouver, Canada.

The meeting was concluded by thanking the hosts and organizers for their efforts. In particular, Christian **Roslander** was acknowledged for his strong effort in securing the location and dedication to the program.

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## IEA TASK 39 COUNTRY REPRESENTATIVES MEETING YSTAD, SWEDEN – 12 OCTOBER 2005

A meeting of Task 39's country representatives was held on October 12 at the Continental Hotel in Ystad. Representatives from 10 member countries were present; Ireland, the United States, and the European Union expressed regrets. It was announced that Anke Swets replacing Eric van den Heuvel as Associate Task Leader (Policy) and as Country Representative for the Netherlands. It was also announced that Germany had joined IEA Bioenergy and Task 39, and that Axel Munack would join Task 39 as a Country Representative.

The meeting included a formal report from the biodiesel, policy, and ethanol subtasks, which are each involved in specific activities around technical or policy areas. The work between subtasks is being coordinated in order to develop visions of biofuel availability based on implementation policies being pursued in member countries. Each of the subtasks presented a workplan which was discussed and approved by the Country Representatives. It was emphasized that the strength of

our Task is in our collaborative efforts, which have been promoted between laboratories in the different member countries of Task 39 by our activities. The twice-yearly meetings provide an invaluable forum for information exchange and development. It was also pointed out that the Task can do more to promote student and faculty exchanges, some of which are being undertaken by members of Task 39 now. Each subtask organizing end-of-triennium sessions to discuss their findings; these may be incorporated into Task 39's final workshop in Vancouver in the summer of 2006.

The growing interest in new biofuel technology available 10, 20, and 30 years from now was highlighted. There is a need for an integrated platform that can move from one type of biofuel (i.e. starch-based ethanol) to another (i.e. lignocellulose-based ethanol). An understanding of the prices associated with production from different platforms should be built into a vision statement and strategy; this will be addressed by Task 39 in the next triennium.

## FUTURE WORKSHOPS/SYMPOSIA

### Bioenergy Australia 2005 Conference

December 11-13, 2005

Melbourne, Australia

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### Canadian Renewable Fuels Summit

December 13-15, 2005

Toronto, Ontario – Toronto Royal York Hotel

<http://www.bbibiofuels.com/crfs/>

### 1<sup>st</sup> European Fuel Cell Tech & Applications Conf.

December 14-16, 2005

Rome, Italy

<http://www.asmeconferences.org/EFC05/index.cfm>

### The Pacific Rim Summit

January 12-13, 2006

Honolulu, Hawaii

<http://www.bio.org/pacrim/>

### National Biodiesel Conference & Expo 2006

February 5-8, 2006

San Diego, California – San Diego Convention Center/Omni San Diego Hotel

<http://www.biodieselconference.org/2006/>

### Bioenergy World 2006

February 9-12, 2006

Verona, Italy

<http://bees.sas.free.fr/bioenergy-world/>

### BBI International's 22<sup>nd</sup> Annual International Fuel Ethanol Workshop & Expo

June 20-23, 2006

Milwaukee, Wisconsin – Midwest Airlines Center

<http://www.fuelethanolworkshop.com/>

### Biofuels Markets

February 16-17, 2006

Brussels

<http://www.greenpowerconferences.com/Biofuels.htm>

### World Sustainable Energy Days 2006

March 1-3, 2006

Wels/Austria

<http://www.esv.or.at/esv/index.php?id=217&L=1&contUId=0>

### Hydrogen Expo US

March 12-14, 2006

Long Beach, CA

<http://www.hydrogenexpo.com/>

### New Energy 2006

March 16-18, 2006

Shanghai, PR China – Intex Shanghai

[www.coastal.com.hk](http://www.coastal.com.hk)

### Central Biofuels Conference & Expo II

March 21-23, 2006

Panama City, Panama

[www.centralbiofuels.com](http://www.centralbiofuels.com)

### Biofuels Markets in Latin America

March 27-28, 2006

Rio de Janeiro

<http://www.greenpowerconferences.com/Biofuels.htm>

### Group Exhibit Hydrogen and Fuel Cells

April 1, 2006

Hannover, Germany

<http://www.fair-pr.com/>

### International Conf. on Commercialization of H2 FC

April 25, 2006

Hannover, Germany

<http://www.fair-pr.com/>

### 28<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals

April 30-May 3, 2006

Nashville, TN, USA

<http://www.simhq.org/html/meetings.html>

### Eastern Biofuels Conference and Expo II

May 30-June 1, 2006

Budapest, Hungary – Intercontinental Budapest

[wendy@biofuelsconference.com](mailto:wendy@biofuelsconference.com)

### Biofuels Markets Asia

June 5-6, 2006

Bangkok

<http://www.greenpowerconferences.com/Biofuels.htm>

### 2006 Challenge Bibendum

June 9-12, 2006

Paris, France

<http://www.challengebibendum.com/challenge/front/index.jsp>

### 16<sup>th</sup> Annual World Hydrogen Energy Conf.

June 13-16, 2006

Lyon, France

<http://www.whec2006.com/main2.asp?version=an>

### The 3<sup>rd</sup> Annual World Congress on Industrial Biotechnology and Bioprocessing

July 12-14, 2006

Toronto, ON

<http://www.bio.org/>

### World Forum on Energy Regulation

October 8-11, 2006

Washington, DC

<http://www.worldforum2006.com>

### Asia Biofuels Conference & Expo IV

October 10-12, 2006

Beijing, China – The Great Wall Sheraton Hotel

[wendy@biofuelsconferences.com](mailto:wendy@biofuelsconferences.com)

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## CONTACT INFORMATION

Please find information below for both the IEA Bioenergy contacts and IEA Bioenergy Task 39 contacts. Additional information is available at [www.iea.org](http://www.iea.org) and at [www.ieabioenergy.com](http://www.ieabioenergy.com)

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