



# Newsletter

Issue 8: December, 2003

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## EDITORS NOTES

*D. J. Gregg*

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This is the last issue of the newsletter for Task 39. There will be a continuance to the work in this Task for the next three years as there was enough support at the Executive Committee recent meeting in Brazil for a proposal from Canada. The new Task will be lead by Jack Saddler from the University of British Columbia and more detail of the number of countries that are going to participate as well as overall structure will be forthcoming in the early part of 2004. I will be staying on as the newsletter and website creator/editor and look forward to finally pushing through some changes on the informational front.

I wish to thank our Task 39 administrative team (Don Stevens, Manfred Wörgetter, and Jack Saddler) for their help, advice and support over the last three years. However, most of all, I would like to thank all the participants for making my job so interesting and worthwhile.

Seasons Greetings and see you in 2004!

## WORLD EVENTS/INFORMATION

### DECEMBER

--December 10, 2003

EU research drive to reduce air pollution from traffic

[http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?n\\_action.gettext=qt&doc=IP/03/17010/RAPID&lg=EN&display=](http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?n_action.gettext=qt&doc=IP/03/17010/RAPID&lg=EN&display=)

Shell helps meet California's need for ethanol

<http://www.bbiethanol.com/news/view.cgi?article=914>

--December 8, 2003

Manitoba studies biodiesel potential

<http://www.bbiethanol.com/news/view.cgi?article=912>

--December 5, 2003

Biodiesel fuel debuts in N.H.

<http://www.bbiethanol.com/news/view.cgi?article=911>

--December 4, 2003

Scientist hopes to create cheaper biodiesel fuel

<http://www.bbiethanol.com/news/view.cgi?article=909>

--December 3, 2003

Cape to get \$58 million ethanol plant

<http://www.bbiethanol.com/news/view.cgi?article=908>

--December 2, 2003

COP9/Climate change: All Parties must maintain momentum to tackle the 21st Century's biggest environmental challenge

[http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?n\\_action.gettext=qt&doc=IP/03/16380/RAPID&lg=EN&display=](http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?n_action.gettext=qt&doc=IP/03/16380/RAPID&lg=EN&display=)

Climate change: More action required from Member States to cut greenhouse gas emissions

[http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?n\\_action.gettext=qt&doc=IP/03/16370/RAPID&lg=EN&display=](http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?n_action.gettext=qt&doc=IP/03/16370/RAPID&lg=EN&display=)

Studying Biodiesel

<http://www.bbiethanol.com/news/view.cgi?article=907>

--December 1, 2003

Soy biodiesel may have growing role in business

<http://www.bbiethanol.com/news/view.cgi?article=906>

## NOVEMBER

--November 25, 2003

MTBE flap stalls major energy bill

<http://www.bbiethanol.com/news/view.cgi?article=905>

--November 24, 2003

VeraSun Energy Begins Operations

<http://www.bbiethanol.com/news/view.cgi?article=903>

--November 21, 2003

Opponents Block Energy Bill In Senate  
<http://www.bbiethanol.com/news/view.cgi?article=904>

--November 20, 2003

Hydrogen, a universal energy carrier - a crossroad for global Energy policies International Partnership for the Hydrogen Economy (IPHE)- Ministerial Meeting Washington, 20 November 2003

[http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p\\_action=gettext=qt&doc=SPEECH/03/5990RAPID&lg=EN&display=](http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action=gettext=qt&doc=SPEECH/03/5990RAPID&lg=EN&display=)

--November 19, 2003

Ethanol Industry Applauds House Passage of Historic Renewable Fuels Standard, Urges Senate to Quickly Follow  
<http://www.bbiethanol.com/news/view.cgi?article=901>

--November 19, 2003

Biodiesel set to accelerate  
<http://www.bbiethanol.com/news/view.cgi?article=899>

--November 17, 2003

First calls for proposals of the EU 6th Research Framework Programme - Frequently asked questions and examples of projects

[http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p\\_action=gettext=qt&doc=MEMO/03/2200RAPID&lg=EN&display=](http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action=gettext=qt&doc=MEMO/03/2200RAPID&lg=EN&display=)

--November 11, 2003

Great Lakes Ethanol, LLC Announces Plans to Build New Ethanol Plant  
<http://www.bbiethanol.com/news/view.cgi?article=893>

--November 10, 2003

Metro Denver Opens First Retail Biodiesel Fueling Station - Supplied by Blue Sun Biodiesel and Shoco Oil  
<http://www.bbiethanol.com/news/view.cgi?article=892>

--November 7, 2003

State of play on GMO authorisations under EU law  
[http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p\\_action=gettext=qt&doc=MEMO/03/2210RAPID&lg=EN&display=](http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action=gettext=qt&doc=MEMO/03/2210RAPID&lg=EN&display=)

Energy Bill Update: Deal Reached on Ethanol Tax Issues  
<http://www.bbiethanol.com/news/view.cgi?article=891>

--November 5, 2003

Ethanol producers want Indy cars to use corn-based fuel  
<http://www.bbiethanol.com/news/view.cgi?article=889>

--November 3, 2003

Ethanol delayed till 2006  
<http://www.bbiethanol.com/news/view.cgi?article=888>

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## OCTOBER

--October 31, 2003

Ethanol Dispute Threatens Energy Bill  
<http://www.bbiethanol.com/news/view.cgi?article=887>

--October 29, 2003

National radio broadcast shows that Iowa's biodiesel future burns bright  
<http://www.bbiethanol.com/news/view.cgi?article=885>

--October 28, 2003

Biodiesel in demand after Nevada debut  
<http://www.bbiethanol.com/news/view.cgi?article=884>

--October 27, 2003

Energy taxation: Commission welcomes Council adoption of new EU rules

[http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p\\_action=gettext=qt&doc=IP/03/14500RAPID&lg=EN&display=](http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action=gettext=qt&doc=IP/03/14500RAPID&lg=EN&display=)

--October 24, 2003

State's switch to ethanol fuels production  
<http://www.bbiethanol.com/news/view.cgi?article=882>

--October 22, 2003

Canada unveils fund to build ethanol plants  
<http://www.bbiethanol.com/news/view.cgi?article=880>

--October 21, 2003

Kyoto Protocol: Commission hails agreement on monitoring greenhouse gas emissions

[http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p\\_action=gettext=qt&doc=IP/03/14310RAPID&lg=EN&display=](http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action=gettext=qt&doc=IP/03/14310RAPID&lg=EN&display=)

--October 20, 2003

Aventine to test ethanol use in fuel cells  
<http://www.bbiethanol.com/news/view.cgi?article=878>

--October 13, 2003

Abengoa Bioenergy Announces Groundbreaking For Starch and Biomass Conversion Pilot Plant  
<http://www.bbiethanol.com/news/view.cgi?article=873>

--October 9, 2003

Biodiesel Car Captures Highest Ratings in Six Performance Categories at the 2003 Michelin Challenge Bibendum  
<http://www.bbiethanol.com/news/view.cgi?article=871>

--October 1, 2003

U.S. Ethanol Industry Produces Record for August  
<http://www.bbiethanol.com/news/view.cgi?article=865>

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## BIOMASS REPORTS ON THE INTERNET

Stability of Biodiesel

After registration the download is free of charges.  
<http://www.biostab.info>

The Biomass Initiative provides a report on biobased products and bioenergy research and development.  
<http://www.bioproducts-bioenergy.gov/default.asp>

POWER-GEN Renewable Energy brings together the renewable energy (wind, solar, hydro power, geothermal en-

ergy, ocean/tidal, and biomass), renewable fuels (biofuels, ethanol, methanol, and biodiesel).

<http://pgre04.events.pennnet.com/>

#### Final Report - Multi-Stakeholder Process "Sinks and CDM/JI"

The final report of the multi-stakeholder process "Sinks and CDM/JI" informs about the potential role and implementation of sink projects within the Kyoto Protocol. Due to controversy in terms of reasonability of such projects the process intended to facilitate a discussion between relevant interest groups. The Wuppertal Institute as moderator tried to identify consensus and dissent of the various groups. The derived recommendations for policy-makers on the national and European level are compiled in the final report. The summary can be downloaded at:

<http://www.wupperinst.org/Sites/Projects/climate/1078-e.html>

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### BIODIESEL SUBTASK

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#### 4<sup>TH</sup> BIOFUELS FORUM BERLIN FINDS GOVERNMENT ROLE CRUCIAL

This meeting was attended by a number of Task 39 participants and I have provided an edited summary of the material provided by Novem on their website for this important meeting.

Biofuels in the EU can be really successful if governments guarantee a competitive price, such as through exemption from excise duty. Governments should ensure guaranteed availability of the raw materials. These are the most important conclusions arising out of the Forum, which was held 24-26 November in Berlin.

L.C. Carvalho spoke of ethanol in Brazil, where average production costs of ethanol are around 0.17 \$/l. Thanks to increased experience, production costs have dropped by around 3.5 %/a. In the long term biofuels should be competitive with commodities such as oil, even within the EU.

B. Cahill (PSA) spoke of the new European biodiesel standard, which will be published in the near future. D. Higgins (Novozyme, USA) discussed the challenges of producing ethanol from lignocellulose, as the enzymes required are currently far too expensive; a phased development and introduction could help to reduce costs. W. Krenn (Vogelbusch GmbH, Austria) focused on the largest bioethanol production unit in the world in China. The plant produces 600.000 t/a bioethanol from corn, which is then

mixed with petrol (at 10 %).

Ford Europe introduced the Ford Focus FFV. Ford has launched this vehicle on the market in Sweden, and P.R. Egbert agreed that it could also be introduced in Europe, but that a minimum number would be required. The FFV is well suited to ethanol-petrol mixtures of 0 - 85 % ethanol, where the mixture ratio may continually vary. P.Carstedt (Sweden) agreed that biofuels are necessary to reduce greenhouse gas emissions by the transport sector. The greatest challenge now is to activate the market for biofuels.

However, several obstacles were also highlighted. The Euro 4 and 5 standards are not possible for pure biodiesel, according to D. Bockey, UFOP, but are achievable for mixtures of fossil and bio diesel. D.Britton (Shell) saw biofuels as core business, and warned that consumers increasingly need to have a personal interest in the fuel. The introduction of biofuels should involve all stakeholders.

With regard to the new EU countries M. Rogulska (Poland) mentioned that although these new countries have an agricultural production surplus, there is a risk in competing for land. There are not enough financial resources available, plus a weak technical infrastructure that will hinder fast introduction of biofuels.

#### Source:

[http://gave.novem.nl/novem\\_new/index.asp?id=25&detail=77](http://gave.novem.nl/novem_new/index.asp?id=25&detail=77)

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#### WORLDWIDE REVIEW OF BIODIESEL PRODUCTION – RESULTS OF A PROJECT COMMISSIONED BY THE IEA BIOENERGY LIQUID BIOFUELS TASK

*M. Wörgetter<sup>a</sup>, W. Körbitz<sup>b</sup>, St. Friedrich<sup>b</sup>, Don Stevens<sup>c</sup>*

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*Wieselburg, Austria, <http://www.blt.bmlfuw.gv.at>*

*<sup>b</sup>ABI-Austrian Biofuels Institute, Vienna,*

*<http://www.biodiesel.at>*

*<sup>c</sup>Pacific Northwest Laboratory, Richland, USA*

Biodiesel activities in IEA Bioenergy have been on-going since 1995 mainly through three Tasks (12, 27 and 39). Initially in Task 12, Activity 3.1 "Liquid Biofuels", Austria, France, Italy and the European Commission co-operated on the following goals: (a) to collect scientific information on biodiesel, bioethanol and ETBE, (b) to influence the development of high yielding crops, (c) to support environmental-sound and cost-effective production processes, (d) to encourage quality standards, and (e) to collect

and disseminate information<sup>1</sup>.

Biodiesel was included in a separate Task for Liquid Biofuels i.e., Task 27 in 1998, which included the US, Austria, Canada, the European Commission, and Sweden. This Task focused primarily on policy issues and had a goal to determine why biofuels have been implemented more successfully in some regions than in others. To accomplish this goal, the Task conducted analyses and studies on the biofuels use in Europe and North America and on policies, mechanisms, and market factors influencing their acceptance<sup>2</sup>. The regulatory and market issues relating to biofuels are complex and varied significantly by region. There were a series of general conclusions reached and the authors urge readers to examine these reports<sup>3</sup>.

Task 39 "Liquid Biofuels" started in 2000 and the main objectives were to work jointly with governments and industry to identify and eliminate non-technical, environmental and institutional barriers, which impede the use of biofuels, and to identify remaining technological barriers. Task 39 was composed of 10 countries (Austria, Canada, Denmark, European Union, Finland, Ireland, The Netherlands, Sweden, USA and UK) interested in working together to successfully introduce biofuels for transportation into the marketplace. The Task reviewed both technical and policy/regulatory issues and provided participants with comprehensive information to assist them with the development and deployment of biofuels for motor fuel use<sup>4</sup>.

There was a subtask concentrating on biodiesel specific topics like raw materials, production technologies, biodiesel standardization, markets, cost reduction, etc. Technical and infrastructure issues specific to biodiesel are addressed. In detail work is carried out in the following topics:

- European biodiesel best case studies.
- Review on commercial production of biodiesel worldwide.
- Review on biodiesel standardization worldwide.
- Information exchange on environmental issue.
- Report on the use of pure rape oil as fuel for farm tractors.

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<sup>1</sup> M. Wörgetter: „Liquid Biofuels“, in „Accomplishment in Bioenergy production research“, University of Toronto Press (1998)

<sup>2</sup> <http://www.liquid-biofuels.com>

<sup>3</sup> Published in <http://www.liquid-biofuels.com/publicat.htm>

<sup>4</sup> <http://www.forestry.ubc.ca/task39/GT4/Frames/home.html>

Additionally the subtask continues its involvement with industry-related stakeholders including fuel companies, agriculture, authorities, and others.

### *REVIEW ON BIODIESEL PRODUCTION WORLDWIDE, PRELIMINARY RESULTS*

The lack of knowledge on the successful implementation of biodiesel on national and international markets limits the development. To overcome this barrier the Austrian Biofuels Institute was commissioned by Task 39 with a detailed documentation of the latest status in the development, production, utilization, marketing and legal framework of biodiesel worldwide. Based on the results of a previous study for the Liquid Biofuels Activity in Task XII<sup>5</sup>, the study should include biodiesel activities by countries, profiles of national institutions dealing with biodiesel, profiles of single biodiesel production enterprises, and a summary and forecast of the national biodiesel markets. The final report will be completed at the end of 2003.

### Method

The Austrian Biofuels Institute developed a 4-page questionnaire covering quantitative and qualitative aspects. The action covered nearly all countries around the world, in which biodiesel activities had been reported. In total more than 150 questionnaires were mailed to ministries, energy and environmental agencies, trade attachés, biodiesel producing companies, and other supportive institutions. Furthermore potential multipliers such as university institutes, trade associations, commercial production and consulting companies were asked to support additional distribution of this questionnaire. At the occasion of conferences related to biodiesel interview partners were identified, contacted and invited to spend 8 for filling in the questionnaire.

The data from the returned questionnaires were screened and evaluated, crosschecked with published data and completed via personal phone calls where necessary.

Additionally detailed Internet searches were completed in addition to the questionnaire and yielded valuable data, which were finally compiled covering both hard facts and personal judgments.

### State of the development

For the development of new biofuels systems a three-stage development can be assumed. Phase I represents the very first beginning of any activity from the intention till the

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<sup>5</sup> KÖRBITZ W.: Review on Commercial Production of Biodiesel World-wide, BLT Wieselburg (1998)

transport of the idea to the decision makers, which are driven to start first activity. The end of Phase I is the political decision to put money and other resources to this topic. Phase II is characterized through research efforts, pilot projects, setting of frame conditions and supported technical trials. Countries in Phase III show a biofuels economy based mainly on the economical feasible production, distribution and use of biodiesel and a self supported biodiesel economy.

We have defined the phase of development for every country concerned as followed:

Phase I	First activities	Argentina, Brazil, Canada <sup>a</sup> , Greece, Hungary, Ireland, India, Japan, Malta, Lithuania, the Netherlands, Norway, Philippines, Poland, Thailand
Phase II	Pilot projects	Australia, Belgium <sup>b</sup> , Malaysia, Nicaragua, Spain <sup>a</sup> , Sweden <sup>a</sup> , Switzerland, South Korea, UK <sup>a</sup> , USA <sup>a</sup>
Phase III	Biofuels on the Market	Austria, Czech Republic, (Denmark) <sup>c</sup> , France, Germany, Italy, Slovakia

<sup>a</sup> Transition to the following phase.

<sup>b</sup> Industrial scale non dedicated methyl ester production plant.

<sup>c</sup> Biodiesel production only for export to Germany, no home market.

## Global trends

**Legislation:** Numerous legislative measures have been developed in recent years. They vary according to the objectives and motivations, with the following examples:

1. Reduction of risks caused by inhalation of locally harmful exhaust emissions (e.g. CO, HC, PM, NO<sub>x</sub>, PAH): Typical examples are the Clean Air Act (USA), the Directive on Quality of Fuels (European Union), the EPA-Standards for Off-Road Engines (USA), the EURO-emission standards as defined in the Auto-Oil-programs (European Union).
2. Reduction of risks caused by greenhouse gas emissions and the resulting climate change: E.g. the new Directive on the Promotion of Biofuels (European Union) and a specific greenhouse tax on top of the mineral-oil tax (Germany).
3. Reduction of risks in supply of energy for the transport sector: E.g. the EPAAct (Energy Policy

Act – USA), and the new Directive on the Promotion of Biofuels (European Union).

4. Reduction of risks to the environment caused by toxic substances: E.g. a regional regulation to use biodegradable fuels in all boats on Lake Constance.

In justification for those legislations the macroeconomic factors such as creation of additional jobs and improvements of the trade balance are usually mentioned.

**Feedstock supply:** In a previous report of 1998 rapeseed oil was by far the leading feedstock for biodiesel production<sup>6</sup>, and this position has become even stronger, when analyzing the 2 leading nations Germany and France, as well as Austria, the Czech Republic, Denmark, Slovakia and Sweden. There can be observed a trend to a larger variety of blends of different feedstock sources:

1. Rapeseed oil: because of its favorable properties (oxidation stability, acceptable winter operability) and the yields per ha rapeseed oil is dominating the supply market.
2. Sunflower-oil: yields per ha are lower than rapeseed and the Iodine value is higher than 120 so sunflower oil would require blending with low IV-oils in Europe.
3. Recycling oils and animal fats: With the European biodiesel fuel standard EN 14241 clear parameters are set, which cannot be achieved with some recycling oils e.g. those with high polymer content. Careful practices are needed in order to achieve the required feedstock quality.
4. Soy-oil is the feedstock of choice in the USA, Argentina and other soybean growing countries, but with an IV higher than 120 it does not meet the EN 14214 standard. As the American biodiesel standard ASTM D-6751-02 does not limit the IV it is used in the US mainly mixed with fossil diesel fuel.
5. Palm oil: palm-oil-methyl-ester was used already in Malaysia in 1987 in Mercedes buses. With a limitation in the CFPP (Cold Filter Plugging Point) of + 11°C PME faces strong obstacles in colder climatic conditions, but it may also be used

<sup>6</sup> KÖRBITZ W.: Review on Commercial Production of Biodiesel World-wide, BLT Wieselburg (1998)



in multi-feedstock blends.

6. Other sources: The full scope of potentially suitable and useful oilseeds is not yet explored. A few oilseed plants can be mentioned, as they had been tested already: Physic nut (*Jatropha curcas*) was successfully produced in Nicaragua; Cottonseed oil was tested in Greece; oils from Sal (*Shorea robusta*), Mahua (*Madhuca indica*) and Neem (*Azadirachta indica*) may be of interest in India.
7. New oilseeds: for attractive biodiesel fuel the following fatty acid profiles are required
  - Low levels of polyunsaturated fatty acids such as linolenic acid (18:3) for increased stability.
  - High level of mono-unsaturated fatty acid such as oleic acid (18:1) for improved winter operability.
  - Low level of saturated fatty acids such as palmitic (16:0) and stearic acid (18:0) for improved winter operability.

Such new varieties are already planted and available (high-oleic rapeseed and sunflower, low-linolenic rapeseed) and represent an interesting feedstock from a quality point of view.

**Process technology development:** Industrial process technology has advanced significantly since the early days of 1988 and later<sup>7</sup>. The increasing requirements for quality according to biodiesel fuel standards has been the driving force for switching from batch processing to continuous process technologies with fast liquid-liquid separation of methyl-ester and glycerin and with accurate cleaning steps for the final biodiesel meeting the standard EN 14214.

**Biodiesel fuel standardization and quality management:** The assurance for consistently high quality was a key issue for developing confidence in biodiesel among all customer groups, specifically the Diesel engine and vehicle producer. In 1994 the Austrian Standardization Organization published the first final biodiesel standard ON C 1190, other standards followed in Czechia (CSN 65 6507), France (by decree), Italy (CUNA NC 635-01), Sweden (SS

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<sup>7</sup> The transesterification of triglycerides with methanol in the presence of a catalyst is well known. It appears to be very simple as well as a strong temptation for “hobby-inventors”, who quickly start to produce Biodiesel of undefined quality. Significant problems occur when this “fuel” is used in Diesel engines, which require a standardized quality fuel.

15 54 36), and the German DIN E 51606<sup>8</sup>.

With the objective to create a European standard the European Commission appointed the COMITÉ EUROPÉEN DE NORMALISATION (CEN) with a mandate to develop standards concerning minimum requirements and test methods for biodiesel. This work was started by end of 1997 in several working groups. In the in 3<sup>rd</sup> quarter of 2003 the new EN 14214 fuel standard for biodiesel was officially published.

The AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) has started its work on biodiesel standardization and has published in 2002 a “Standards Specification for Biodiesel Fuel (B-100) Blend Stock for Distillate Fuels” (ASTM D-6751-02).

**Marketing strategies:** Not unexpectedly quite a variation of different marketing approaches can be observed, which can be described as follows:

1. Commodity Strategy: Biodiesel is sold as a pure fuel, but there is no visible product differentiation in comparison to the competitive fossil Diesel at the fuel station; any existing differential advantage (e.g. low-sulphur fuel) is not utilized in the communication to the customer. In this case biodiesel is usually sold as a cheap fuel (e.g. Austria). Another commodity strategy is to blend biodiesel in refineries into fossil Diesel up to 5% and sell it anonymised at fuel pumps (e.g. France).
2. Quality Strategy: Biodiesel is sold as a 100-% pure fuel and is differentiated as a quality product, which is highlighted by a quality seal at the pump, where informative product information flyers are distributed to the customer (e.g. Germany). This is also a defense strategy against poor biodiesel quality.
3. Brand Strategy: The fuel (pure or blended between 1 – 20% with fossil Diesel) is differentiated by a specific trademark (e.g. “Soygold”, “Envirodiesel”). Differential advantages are promoted and linked to a differentiating pricing strategy (e.g. USA, UK).

## Market volumes and production capacity

Commercial biodiesel production started in Austria, France and Italy in the early nineties. The development of the past

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<sup>8</sup> See also H. Prankl, M. Wörgetter: „Biodiesel in Europe – Policy and Standardization“, presented at the Biomass meeting „Perspectives of Biofuels Utilization“, Campus Plaza Kyoto, Oct. 21, 2003

decade was deeply influenced by the framework conditions, especially by taxation schemes and the crude oil price. The following table gives an overview on the results of the enquiry.

#### Biodiesel production capacity in EU 25 in 1000 t

1.000 ton	1999	2000	2001	2002	2003	2004
Austria	20	31	40	54	97	127
France	232	232	380	390	420	500
Italy	107	107	153	241	300	330
Germany	103	229	314	625	1.050	1.100
Hungary	0	0	0	20	20	20
UK	0	0	0	30	110	332
Sweden	6	6	16	20	25	30
Czech Republic	55	55	55	80	110	130
Poland	0	0	0	0	0	300
Slovakia	20	80	127	90	90	90
<b>EU-25</b>	<b>543</b>	<b>740</b>	<b>1.085</b>	<b>1.550</b>	<b>2.222</b>	<b>2.959</b>

capacity at the end of each year; 2003 and 2004 estimated

Increasing oil prices and the measures of the German government have triggered an astonishing development of investments in biodiesel production.

#### BIOMASS NEWSLETTER

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I am publishing a quarterly national newsletter on Biomass for energy and industry. Our newsletter is published 4 times a year. We distribute the newsletter in a printed version to 1000 experts interested in biomass for energy and industry free of charge (supported by our institute, mailing is made by our Ministry). The main aim of the newsletter is to inform on past, current and ongoing projects as well as on institutes, persons, entrepreneurs etc. We do it in a very simple form by collecting contributions from interested groups. To make it easy I call for a standardized form similar to abstracts or project summaries (we call it "one pager").

Usually we publish in German but I also accept contributions in English. In the past volume 30 there were some contributions in English. These included the following:

Management of Recovered Wood – Cost E31

*Gerfried Junmeier, Bengt Hillring*

*Joanneum Research, Graz, Univ. Sweden*

Bioenergy in South Europe

*Myrsini Christou*

*CRES, Greece*

FARME in the Czech Republic

*Petr Jeví, Zdeňka Edviš*

*Czech Research Institute of Agriculture, Prague*

*EBB Welcomes Biofuels Detaxation*

*EBB, Brussels*

All newsletters are placed in our homepage in <http://www.blt.bmlfuw.gv.at/vero/mnawa/mnawa.htm>. For the next year we will inform our readers on new issues by e-mail so that you can download the actual version as pdf file in time.

#### ETHANOL SUBTASK

*Jack Saddler*

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A very successful final meeting for Task 39 was held in the Copenhagen area on November 19<sup>th</sup>-22<sup>nd</sup> (discussed below) and I would like to again thank the organizers and participants for all their effort.

I would also like to thank all the organizers and participants of our meetings/workshops over the last three years. We certainly have an active group of participants and hope to see you all again in the next three years for more lively interaction.

As discussed previously by the Task Leader and Editor, Canada will be taking on the role of the Operating Agent for the continuation of this Task. I will be taking on the role of the Task Leader and we are currently in the process of defining the transition and first activities for 2004. Please feel free to contact me with any comments on the past Task and ideas for the continuation into the next triennium.

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CURRENT STATE OF FUEL ETHANOL  
COMMERCIALIZATION  
COMWELL BORUPGAARD, DENMARK  
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## INTRODUCTION

*Jack Saddler (Forest Products Biotechnology, UBC)*  
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*Lisbeth Olsson (Biocentrum-DTU, Denmark)*  
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The workshop started with an introduction from Lisbeth Olsson and Jack Saddler, which reviewed the structure of the meeting and highlighted desired outcomes. All participants were invited to comment whenever possible on issues, and notes were taken by the rapporteur in order to ensure that the flow of discussion was properly documented.

The meeting was organized into seven sessions. An overview session examined the links between technical and policy issues; two sessions examined more specific country-level policies and technical programmes. Two further sessions examined technical research programs on specific components of the bioconversion process. The final two sessions focused on the commercialization process from an industrial point of view. Summaries of each session and the resulting discussion are provided on the following pages. The two-day workshop offered a number of opportunities for interaction between the various participants.

At the end of the meeting, Saddler 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 continuing to extend invitations to non-IEA ethanol producers, such as Brazil, India and China. The task will continue to operate in much the same fashion as in the past triennium with three newsletters and two or three workshop meetings every year. On the suggestion of the group, these meetings will vary in format and size depending on the task at hand. The Task website will be updated to reflect these ideas early in the new year.

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## SESSION 1 – SETTING THE SCENE – POLICY/TECHNICAL REVIEW

The first session introduced the concept that policy, in the short-term, may supersede technological innovation as a driver for the ethanol industry. The speakers discussed the policy behind ethanol success stories in both the United States and in Brazil, and reviewed policy initiatives and

projects in Europe that seek to emulate these successes. Each of the speakers highlighted the importance of policy drivers to the biofuels industry, including improving both economic and environmental performance and increasing security of energy supply.

*Warren Mabee (Forest Products Biotechnology, UBC)*  
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Mabee reviewed policy in Brazil and the USA. The case of Brazil illustrated the impact of policy decisions on E100 car sales, which plummeted in the early 1990's after the removal of significant policy support. The point was raised (and emphasized in discussion) that the external factors of both oil prices and environmental issues played an equal role to that of policy decisions. In the United States, combined state and federal policies have produced an environment that has attracted and supported the development of a significant starch-based bioethanol industry.

*Kyriakos Maniatis (DG-TREN, European Union)*  
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Maniatis reviewed European policy, and explained that the European Union has two primary policies on biofuels. One of these allows reduced taxation on biofuels, and one sets targets for biofuel use. As only six member states are currently producing biofuels, it is expected that the targets of biofuel use will be met in a variety of innovative ways that include trade and joint ventures. Although the targets are not mandatory, it was explained that the Commission can enforce these targets in countries that do not meet the set goals.

*Jörg Gigler (Novem, Netherlands)*  
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Gigler provided insight into the VIEWLS project, which seeks to generate Clear Data on Clean Energy. Its goal is to relate both economic and environmental performance of biofuels in an understandable framework, and to look at market introduction scenarios. The VIEWLS project works closely with other European and North American projects, and shares information accordingly. The final report will include scenarios that calculate the impacts of biofuel implementation. There will be a stakeholder meeting in Rome in the spring, and the final report will be released at the end of 2004.

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## SESSION 2 – TECHNO-POLICY BRIDGES A

*Lars Vallander (Swedish National Board for Industrial and Technical Development)*  
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Vallander discussed policy initiatives in Sweden. It was highlighted that future energy needs will be met by a vari-



ety of means, but that bioethanol will dominate biofuel use. Discussion pointed out that increased awareness of Kyoto and a sense of urgency surrounding the environment is also supporting biofuels in Sweden. Programs to promote biofuels include exemptions on both energy taxes and carbon dioxide taxes, which together are over 50% of petrol prices in Sweden. Today, about 100 filling stations offer E85 in Sweden, and about 9000 clean vehicles including 5000 flexible fuel vehicles are on the road.

*Jan Lindstedt (Bioalcohol Fuel Foundation, Sweden)*  
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Lindstedt discussed major technical initiatives in Sweden. The largest ongoing project is the 21 million euro pilot plant under construction, which will be commissioned in the spring of 2004. The goal of the plant is to be an R&D unit, to verify and optimise technique, and to get data on scale up (100/200x bench scale). Planned operation for the pilot plant is 8,400 hours per year. It was pointed out in discussion that this represents 95% efficiency, which is an extremely ambitious goal and one that may set unrealistic precedents for the industry. It was clarified that only half of the operating time is expected to be productive, while the other half of the time will be dedicated to ongoing research. It is hoped that a demonstration plant will be constructed by 2007-8 with ethanol production costs at about 0.18 euro/litre feedstock.

*Bill Cruickshank (Natural Resources Canada)*  
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Cruickshank discussed the status of biofuels in Canada. The principal policy drivers are environment, particularly as it relates to the Kyoto Protocol nationally, and the economy locally. The goal of biofuel production is to offer 35% of gasoline at the E10 level by 2010, which translates to 1.4 billion litres of ethanol production; there is also a target of 500 million litres of biodiesel by 2010. In the past, Canada's focus has been on cellulosic ethanol; there is a significant policy difference between lignocellulosic-based and starch-based ethanol (unlike Sweden). Today, there is interest in the syngas platform and in advanced bioproducts as well.

Discussion revolved around the availability of biomass. While new sources of biomass could include non-commercial thinnings and increased volume production due to fertilization, it was pointed out that there are shortcomings in technology for these removals; also, the policy supporting these approaches does not yet exist in many countries such as Canada. There is a chance that increased intensive forestry could change the positive public perception that the ethanol industry enjoys today. Other discussion focused on the syngas approach, and the level of interest it attracts. It was pointed out that increased interest in this platform may not be highly significant, due to the

technical challenges that remain in this area and the commitment to the sugar platform that many governments have already made.

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### SESSION 3 – TECHNO-POLICY BRIDGES B

*Don Erbach (USDA, United States)*  
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Erbach provided perspective on US bioenergy policy. In the past 30 years, an increased dependence on oil imports has driven the US government to pay increased attention to energy security. The Farm security and rural investment act of 2002 has been successful in creating increased revenue for farmers and increased investment in rural areas. The Energy policy act of 2003 (pending) aims to reduce US dependence on foreign energy sources from 58% to 45% by Jan 1 2013 by doubling ethanol production in that time period.

*Mark Finkelstein (USDOE, United States)*  
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Finkelstein continued reviewing technical initiatives linked to policy in the US. It was pointed out that despite increased dependence on foreign oil, there is a lack of political will and imagination in actually dealing with the problem. DOE biomass has decided to go with industry-led programs of investigation (6 contracts awarded with US\$80 million) into biorefinery development. There needs to be an integrated approach to get ethanol from lignocellulosics commercialized: technologies, markets, and policies must work together.

*Shiro Saka (Kyoto University, Japan)*  
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Saka examined the current situation in Japan. The Kyoto Protocol is a major driver in this country; Japan sees the use of available domestic biomass, in part for ethanol production, as a major component of their Kyoto strategy. There are three projects on lignocellulosic ethanol, examining the dilute sulphuric acid process, concentrated sulphuric acid process, and supercritical water process. Key Japanese legislation will mandate E10 fuel by 2010; it is anticipated that the market that year will require 6 billion litres of ethanol, which will require trade strategies coupled with domestic ethanol production.

*Jörg Gigler (Novem, Netherlands)*  
<mailto:j.gigler@novem.nl>

Gigler provided perspectives on ethanol use in the Netherlands. The goal of this country is 30% renewables by 2040, which is very ambitious and could be almost any target. The Nr. ONE project targets the use of bioethanol for fuel; the strategy is based on trade for feedstock and

chemicals to support the industry. Specific goals are set for 2005, 2010, and beyond to 2020. Strategies include a tax exemption and adherence to the EU directive on biofuels.

In discussion it was pointed out that Brazilian production cannot satisfy the entire world, and that strategies built on trade for biofuel may be at risk due to this fact. There is a credibility gap between what the industry promises and what it can actually deliver. There are also emerging issues to consider, such as the use of GMOs either within the ethanol production process, or as part of the source of feedstock. It will become important to identify specific sources of biomass in the future.

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## SESSION 4 – TECHNICAL INITIATIVES A

*Guido Zacchi (Lund University, Sweden)*

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Zacchi examined some of the technical and economic challenges with fuel ethanol production from softwoods. Technical issues that remain a challenge include finding yeast that ferments all sugars in real hydrolyzates, cheaper and more effective enzymes, the separation of solid material after SSF distillation, the recovery of yeast after SSF/lower concentration, and more tolerant yeast (for increased closure of water balance).

*Anders Thygesen for Anne Belinda Thomsen (RISØ National Laboratory, Denmark)*

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Thygesen looked at wet oxidation in the production of biofuels. Pretreatment was carried out on different feedstocks, including municipal solid waste, wood, wheat straw, and bagasse. Oxidation performed well, providing high recovery of solids, removal of ash (including KCl), and good recovery of lignin. Lignin recovery could be improved with a low addition of alkali.

*Folke Tjerneld (Lund University, Sweden)*

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Tjerneld examined methods for enhancing enzymatic conversion of lignocellulose. The role of surfactants (TWEEN) was found to be critically linked to the presence/absence of lignin. Hydrogen bonding between lignin and the surfactant seems to be the key chemical mechanism. Surfactant use could lead to a reduction in enzyme loading, faster fermentation and higher ethanol yield.

*Claus Felby (Royal Veterinary and Agricultural University, Denmark)*

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Felby provided an overview of current research. Four prin-

cipal activities are ongoing, with a primary focus on the hydrolysis of hemicellulose to fermentable C5 sugars. An EU-funded project to integrate biomass-to-ethanol pathways into CHP power plants is also ongoing. There are five participants in this project with a current budget of 18 million euro.

*Liisa Viikari (VTT Biotechnology, Finland)*

<mailto:Liisa.Viikari@vtt.fi>

Viikari provided a review of enzymes for efficient hydrolysis. Factors to consider include substrate composition and accessibility; cellulase activity; composition of enzymes and role of additional enzymes; hydrolysis technologies. Impression is that no breakthrough has been made by improving the activity of a single enzyme – but there are hundreds of enzymes to examine yet, as well as the composition of enzyme mixtures and the role of additional enzymes.

In discussion, the role of lignin removal as it relates to laccase production was brought up and explored. It was emphasized that lignin does not necessarily preclude hydrolysis, but that pretreatment plays a large role in lignin modification. The role of feedstock species is also not yet fully understood.

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## SESSION 5 – TECHNICAL INITIATIVES B

*Lars Rohold (Green Farm Energy, Denmark)*

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Rohold discussed the Green Farm Energy program in Denmark. The focus of the project is fuel production (in the future) and fertilizer production (which is ongoing). Waste utilized includes both solid and liquid biomass, as well as animal by-products. The current project was founded by an EU initiative (Flexfuel).

*Birgitte Ahring (Biocentrum-DTU, Denmark)*

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Ahring discussed pentose fermentation by thermophilic bacteria. The system is designed to use straw and perhaps manure, which is a cheap way of getting water into the system. Ethanol will eventually be produced through anaerobic digestion/fermentation. More than 30% of estimated value comes from methane/syngas output. The focus on thermophilic enzymes is designed to bypass need for yeast in SSF.

*Lisbeth Olsson (Biocentrum-DTU, Denmark)*

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Olsson discussed the manipulation of *S. cerevisiae* redox metabolism for improved xylose consumption. There are many (300+) biochemical pathways to choose from in xy-

lose consumption. One strategy is to change the use of redox equivalents during ammonium assimilation; another strategy is to reduce NADH formation in glycolysis. The second gives the best result, an improvement in glucose yield and a reduction in glycerol and xylitol production.

*Bärbel Hahn-Hägerdal (Lund University, Sweden)*  
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Hahn-Hägerdal provided an overview of some molecular methods to enhance pentose fermentation. The goal for yeast strain development is inhibitor tolerance, simultaneous utilisation of all sugars, and anaerobic growth. The strategy is to work on introduced enzymes at the laboratory level. On harsh lignocellulosic hydrolysate, different strains of yeast have different productivities. Goals can be technically met, but must be optimised for industry.

*Merja Penttilä (VTT Biotechnology, Finland)*  
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Penttilä examined L-arabinose utilization pathways of fungi. Many unknown genes are found in these pathways. Two genes were identified, and proven to be expressed in *Saccharomyces*. The current project is to identify useful genes from other yeasts that could be expressed in these fungi. Introduction of some genes from exotic yeasts provided improved production of glucose and reduced xylitol and glycol.

In the discussion, the issues of GMOs and modified yeasts were again raised. It was pointed out that increasing yields, particularly from pentose fermentation, can reduce the cost of ethanol by up to 20% as we are about 60% of theoretical yields today. A key step towards commercialization is integration of these technologies and processes into a single process. It will require a large investor with significant resources to do this. If the first plant succeeds, many more will come online in the future.

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## SESSION 6 – COMMERCIALIZATION OF LIGNOCELLULOSICS TO ETHANOL A

*Gary Punter and Tony Sidwell (British Sugar, UK)*  
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Punter gave a description of British Sugar's initiatives in the biofuels industry. Improving environmental performance is a key priority for the UK government, and a new incentive has been introduced to support the development of the industry domestically. British Sugar's strategy will be to use a market-led approach: they will design small businesses that utilize lignocellulosics in the markets of functional foods, personal care, pharmaceuticals, and biofuels. Eventually, ethanol will be introduced as these businesses succeed.

*Kendall Pye (Lignol, Canada)*  
<mailto:kpve@lignol.ca>

Pye described the work that Lignol is doing to develop a series of bioproducts from their patented process. The importance of the Kyoto Protocol, and the opportunity it represents, was emphasized. Lignol sees an opportunity for commercialization, not as a model for future facilities but as a successful business from the first plant. In order to succeed, the situation must be managed: a unique problem must be described that can be met by technology, and a technology must be engineered that minimizes cost and risk. The opportunity must offer exceptional return. The Lignol process will be introduced into existing sawmilling facilities, which will keep costs down; the process itself is engineered to provide high value end-products, including antioxidants, grease and lubricant additives, as well as lignin, acetic acid and ethanol as products with decreasing value.

*Per Carstedt (BioAlcohol Fuel Foundation, Sweden)*  
<mailto:per.carstedt@ecosystem.se>

Carstedt reviewed the global development of bioethanol. It was stressed that it is important to keep the bigger picture in mind, and to move beyond yeast and chemicals. Major issues that will influence biofuels uptake include changing perceptions and attitudes, and recognizing the realistic potential of the industry. In a way we need a paradigm shift in outlook. Some things are certain: on one earth, we have significant population growth and growing CO<sub>2</sub> output, largely from the transportation sector. Biofuels make sense to solve some of our energy requirements in the future.

The discussion session explored some of the fundamental barriers to adopting biofuels. It was pointed out that only two oil companies are in the World Business Council for Sustainable Development. Even hydrogen development is geared towards fossil fuels (natural gas). The usefulness of taking a product-based or market-based approach to biofuels development was discussed, and some advantages were seen in the scenarios that British Sugar and Lignol presented. It was clear that there is a disconnect between what the industry can realistically expect to achieve and the goals that policy can put upon it. We need to link short-term, realistic outputs to long-term goals of security and environmental improvement.

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## SESSION 7 – COMMERCIALIZATION OF LIGNOCELLULOSICS TO ETHANOL B

*Francisco Ronda (Abengoa)*  
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Ronda discussed ongoing efforts to demonstrate ethanol production based on enzymatic hydrolysis; Abengoa has

projects in both the US and in Europe. The acquisition of High Plains Corporation in January 2002 has added a lot of human capital to Abengoa and brought ethanol production experience to Europe. Abengoa Energy R&D (AERD) was incorporated in 2003 in order to lead all R&D efforts in the combined company. Currently, R&D in Europe is funded at 4.5 million euros, and R&D in North America is funded at US\$35.4 million through a US DOE project. Abengoa is involved in two pilot plants for lignocellulosic ethanol: one in Leon, Spain and one in York, Nebraska.

*Joergen Krag-Jensen (Genencor)*  
<mailto:JKrag-Jensen@genencor.com>

Krag-Jensen described Genencor's work on enzymatic hydrolysis. Genencor has always focused on corn stover in the past, but currently is including cottonwood and yellow poplar. The company partnered with NREL from 2000-2003 to reduce cost of enzymes for bioethanol production. The goal was to achieve a ten-fold reduction in cost, but the results showed a twelve-fold reduction. Costs were reduced by improving the efficiency of the production strain as well as the production process. Downstream processing was removed and a new carbon source for fermentation of the enzyme was discovered. In the future, a 3-4x improvement is still required to get to \$0.10/gal ethanol.

*Joel Cherry (Novozymes)*  
<mailto:cherry@novozymesbiotech.com>

Cherry provided an overview of Novozymes research in the area of enzymatic hydrolysis, which closely parallels the work that Genencor is doing. Novozymes also entered into a research project with NREL with the goal of reducing the cost of enzymes for the lignocellulose-to-ethanol hydrolysis process. The main problem is that starch-based ethanol requires the input of 1 g enzyme per gallon produced, while cellulose-based ethanol requires the input of 100 g of enzyme per gallon. At the conclusion of the project, Novozymes expects the cost to be reduced from US\$6.00 to US\$1.80 per gallon of ethanol; of this, the enzyme cost has reduced from US\$5.30 to \$0.50/gallon.

In the final discussion period, it was agreed that significant progress has been made in the area of enzymatic hydrolysis, and that the emergence of competitive products has moved the entire lignocellulose-to-ethanol industry closer to commercialization. Significant growth is expected as the industry enters a potentially lucrative phase. Again, the importance of some of these breakthroughs to specific commodity-based markets – for instance, the textile-producing sector – were highlighted and emphasized.

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## POLICY/REGULATORY ISSUES SUBTASK

*Don Stevens*  
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In the October issue of the Task 39 newsletter we had a contribution reviewing some of the North American policy issues with fuel ethanol. For this issue we will move across the Atlantic Ocean and review some of the biodiesel policy and standardization efforts in Austria and Europe in general.

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## BIODIESEL IN EUROPE – POLICY AND STANDARDIZATION

*H. Prankl, M. Wörgetter*  
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This contribution gives an overview of the European Bio-fuels directive, which is the driving force behind the development in Europe. Standardization is most important for the broad introduction of commodity products like transport fuels. In 1989 biodiesel standardization started at ON, the Austrian Standardization Organization. Similar work was carried out in the Czech Republic, in France, Germany, Italy and the US. In 1997 the European Commission gave a mandate to CEN, the European Standardization Organization, for a uniform European standard as tool for the market introduction of biodiesel. The contribution reviews the development of this standard, which was published in July 2003.

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## EUROPEAN BIOFUELS POLICY

The European Commission has set the ambitious goal to increase the market share of renewable energy to 12% until 2010. The ways and means used for accomplishing this aim, i.e. establishing regulations concerning the creation of favourable conditions for renewable sources of energy, are summarised in the "White Paper on Renewable Sources of Energy".

In May 2003 a Directive of the European Parliament and of the European Council on the promotion of the use of biofuels for transport was published. The objective is to provide for a Community framework to foster the use of biofuels for transport within the EU. Member States should ensure that a minimum proportion of biofuels and other renewable fuels is placed on their markets. A minimum share of 2% is proposed for 2005, which shall be increased by 0.75% per year up to 5.75 % for 2010.

Standards are important for the producers, suppliers and users of biodiesel as authorities need approved standards for the evaluation of safety risks and environmental pollution. Standards are necessary for approval of biodiesel operated vehicles and therefore for the market introduction and commercialisation of biodiesel.

Consequently a mandate was given by the European Commission to CEN to develop standards for biodiesel as well as the necessary standards concerning the methods applied.

## BIODIESEL STANDARDIZATION IN EUROPE

### STANDARDIZATION IN AUSTRIA

The development of biodiesel as a fuel for vehicles started very early in Austria. In 1973 the energy crisis has shown the importance of a secured supply especially of diesel fuel. BLT carried out various tests with vegetable oil/ diesel fuel mixtures in the beginning. The transesterification of rape seed oil was considered in the early eighties the first time. Between 1987 and 1990 a research project 'Pilotprojekt Biodiesel' aimed at developing biodiesel as market-ready fuel for the use in tractors. Already in 1989 a working group was performed within the ON – Austrian's Standardisation Institute. In 1990 the ÖNORM C1190 could be published as the world's first standard for rape seed oil methyl ester. The pre-standard was reissued by 1 January 1995. In view of a broader basis of raw materials the ON C1191 was developed for fatty acid methyl ester as diesel fuel. The standard contains a limit for the iodine number (120 max.) as well as a limit for linolenic acid (C18:3) and higher unsaturated acids (15% max.).

### NATIONAL STANDARDS IN EUROPE

The introduction of biodiesel as a fuel for diesel engines called for the development of standards in the respective countries. Working groups started to define the quality requirements in Germany, France and Italy, in the Czech Republic, Sweden, the United States and finally in Australia now. Standards or specification are available in the following countries:

Austria	ON C1191	1997	FAME
Czech Republic	CSN 656507	1998	100% RME
	CSN 656508		diesel fuel + 30% RME
	CSN 656509		(diesel fuel + 5% RME
France	JORF 14.9.1997	1997	VOME
Germany	E DIN 51606	1997	FAME
Italy	UNI 10946:2001	2001	FAME as automotive diesel fuel
	UNI 10947:2001		FAME for thermal uses
Sweden	SS 15 54 36	1996	VOME
USA	ASTM D6751-02	2002	Mono alkyl esters from vegetable oils/ animal fats

RME ..... Rape seed oil methyl ester  
VOME ..... Vegetable oil methyl ester  
FAME ..... Fatty acid methyl ester

It has to be mentioned that a formal decision to start work on elaborating a CEN standard is always accompanied by a status-quo decision in the CEN member institutes. The member states are committed to refrain from working on the same subject at national level. Due to the time needed for development the European standards, Italy requested for an exception and published two FAME standards in 2001. As the European standards are available now the national standards have to be withdrawn and the new European standards have to be adopted on a national level.

### BIODIESEL STANDARDISATION AT CEN

In 1997 the European Commission gave a mandate to CEN to develop standards and test methods concerning the minimum requirements of fatty acid methyl ester used as a fuel for diesel engines and for heating purposes. The proposed standards were aimed at:

- enabling a free movement of goods concerning biodiesel and



- providing guarantees for the use of biodiesel on the part of vehicle and plant producers.

As a consequence an essential contribution to the accomplishment of the common aims - preserving the environment, guaranteeing the energy supply and preserving jobs – was to be made.

Biodiesel is used as a fuel for diesel engines and as fuel used for the production of heat. Therefore, the mandate provided for the development of the following standards:

- biodiesel as sole diesel engine fuel (100%)
- biodiesel as extender to diesel engine fuel according to EN590
- biodiesel sole or as extender to mineral oil products, e.g. for the production of heat.

CEN divide the work between two existing Technical Committees (TCs):

- TC 19: Petroleum products, lubricants and related products
- TC 307: Oilseeds, vegetable and animal fats and oils and their by-products - methods of sampling and analysis.

A co-ordination group was installed where the Chairmen and Secretaries of TC19 and TC307 and the Convenors of the Working Groups were involved to ensure an overall co-ordination. The chairman was Mr Michel Girard from Total Fina Elf.

#### CEN/TC19/WG24: Specification of automotive diesel / Task Force 'Biodiesel'

The task was to standardise requirements for 100% FAME and for mixtures of FAME to mineral oil based fuel for diesel engines and to verify the applicability of EN590 for blends of mineral oil based fuel with FAME (5% maximum). A task force was entrusted with the standardisation work. First priority was given to work out drafts for 100% biodiesel and for biodiesel used as a 5% blend to mineral diesel fuel.

The difficulties consisted in the fact that so far most experience is concentrating on biodiesel produced from rape seed oil. But it was aimed by the European Commission that the new standards shall be valid for fatty acid methyl ester in general. The raw material is not pre-determined and thus the choice of the limiting values is attributed special importance. A 'finger print' system including limits

for specific fatty acids was rejected.

During the process it was decided to elaborate one standard being valid for biodiesel as pure fuel and as a blending component to EN 590 diesel fuel. Therefore an amendment to EN 590 had to be issued to allow a 5% incorporation of FAME into diesel fuel.

The final standard EN 14214 specifies the requirements and test methods for marketed and delivered fatty acid methyl esters (FAME) to be used either as automotive fuel for diesel engines (100%) or as an extender for automotive fuel for diesel engines in accordance with the requirements of EN 590.

#### CEN/TC19/WG25: Specification of FAME used as fuel for heating

The task of the working group was proposed as to specify requirements for FAME used as fuel for heating oil and as a blending component for the production of heating oil.

Heating oil has so far only been standardised on a national level, but not on a European level. Besides, the national requirements differ fundamentally. Thus, the instructions given to the WG have been altered. Henceforth, only one standard had to be developed, which determines the requirements for biodiesel as pure heating oil as well as the requirements for biodiesel used as mixing component for fossil heating oil. The resulting blends have to meet the requirements of the national standards for heating oil in the countries applying the standards.

The final standard EN 14213 specifies requirements and test methods for marketed and delivered fatty acid methyl ester (FAME) to be used either as a heating fuel (100%) or as a blending component for the production of heating fuel.

#### CEN/TC19/WG26: Verification of FAME related fuel test methods

The task of the working group was to establish the applicability of existing standards for petroleum test methods including precision data and to develop new standards for test methods. Round robin tests had to be carried out for each test method with sole biodiesel. Later the round robin tests were repeated with blends of biodiesel and fossil diesel fuel. The precision data from this programme are given in normative annexes of the standards EN 14213 and EN 14214, where these were found to be different from the precision data given in the test methods for petroleum products.

## CEN/TC307/WG1: Test methods on FAME

The task was to standardise necessary test methods for the determination of the composition of 100% FAME, including the establishment of precision data.

In some cases the precision level claimed by ISO 4259 (2R rule) could not be achieved with FAME. An improvement of the methods is necessary.

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### FUTURE WORKSHOPS/SYMPOSIA

Southern Bio-Products Conference

Beau Rivage Resort

Biloxi, Mississippi

March 4-6, 2004

Info: <http://www.ms-biomass.org>

20th Annual International Fuel Ethanol Workshop & Trade Show

"Where Practical Application & Research Meet to Design the Ethanol Plant of the Future"

Monona Terrace Convention Center

June 22-25, 2004

Madison, Wisconsin, USA

<http://www.bbiethanol.com/few/>

February 16-18, 2004

9th Annual National Ethanol Conference: "Policy & Marketing"

Miami, Florida, USA

Fontainebleau Hilton Resort

<http://www.ethanolrfa.org/nec.shtml>

## CONTACT INFORMATION

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

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## IEA BIOENERGY TASK 39 EXCO MEMBERS & COUNTRY REPRESENTATIVES

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Australia	✓ Bio-	✓	
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Belgium	✓ ✓ Bio-	✓	
Brazil		✓	
Canada	✓	✓	✓
Croatia		✓	
Czech Rep.	✓		
Denmark	✓	✓	✓
European Comm.	✓	✓	✓
Finland	✓	✓	✓
France	✓ Bio-	✓	
Germany	✓		
Greece	✓		
Hungary	✓		
Ireland	✓	✓	✓
Italy	✓	✓	
Japan	✓ Bio-	✓	
Korea	✓		
Luxembourg	✓		
Netherlands	✓	✓	✓
New Zealand	✓ Bio-	✓	
Norway	✓ Bio-	✓	
Portugal	✓		
Spain	✓		
Sweden	✓	✓	✓
Switzerland	✓	✓	
Turkey	✓		
UK	✓	✓	✓
USA	✓	✓	✓
Total	27	20	10