

AMFI Newsletter



The AMFI Newsletter is prepared for the members of the Implementing Agreement on Advanced Motor Fuels of the International Energy Agency (IEA/AMF).

AMFI produces four electronic Newsletters each year, describing recent news on advanced motor fuels, vehicles, energy and environmental issues in general. The AMFI Newsletter is available online at:

www.iea-amf.vtt.fi

Plug-in FFV car running on E85 ethanol/gasoline blend and electricity. Helsinki Metropolia University of Applied Sciences has modified a Toyota Prius to a plug-in FFV car in cooperation with St1 and VTT within a TransEco research program in Finland. [Source: Transeco research program \(www.transecoco.fi\)](http://www.transecoco.fi). Photo with courtesy of St1.

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GENERAL INTEREST

CO₂ emissions drop in 2009

An early excerpt of IEA's World Energy Outlook 2009 was presented at the Bangkok UNFCCC meeting. This excerpt showed that CO₂ emissions could fall in 2009 by as much as 3% due to financial and economic crisis, as the investments in polluting technologies have been deferred. This may lead to 5% lower emissions in 2020 than estimated by the IEA 12 months ago. The economic downturn has created an opportunity to put the global energy system on a trajectory to stabilise greenhouse gas emissions at 450 ppm of CO_{2e}. According to IEA Executive Director Nobuo Tanaka "This gives us a chance to make real progress towards a clean-energy future, but only if the right policies are put in place promptly. The success of the UNFCCC process is crucial in this regard." *Source: IEA Press release, 6 October 2009 (www.worldenergyoutlook.org).*

Biofuels replace more gasoline than diesel in the US

BP stated that biofuels will supplant more gasoline than diesel in the U.S. over the next 20 years: about 25% of gasoline and 8% of diesel in 2030. U.S. biofuel production will rise more than fourfold to about 2.3 million barrels a day in 2030 from less than 500,000 barrels a day in 2007. *Source: BP Press Speeches, SPE Offshore Europe Conference. Katrina Landis, 08 September 2009. (<http://www.bp.com/>).*

Fiat to reach 2015 CO₂ levels

Fiat Automobiles has the lowest average CO₂ emissions of the 25 best-selling cars in Europe sold during the first half of 2009. Average CO₂ emissions of Fiat are already now below 130 g/km, which is the goal set for 2015 in Europe. Also Smart and MINI showed CO₂ emissions below 130 g/km, but Fiat is the only high-volume brand achieving the upcoming CO₂ limit. Of the top ten volume brands, the lowest CO₂ emissions are as follows: Fiat (129.7 g/km), Toyota (132.9 g/km), Lancia (134.1 g/km), Peugeot (134.5 g/km), Citroen (138.8 g/km), Hyundai (138.8 g/km), Renault (138.9 g/km), Ford (140.4 g/km), and Chevrolet (141.6 g/km). *Source: JATO Press release, 14 September 2009. (www.jato.com).*

Fiat Automobiles has been holding this leading position in Europe already for two years. According to Fiat, new engines, like the innovative MultiAir technology, can reduce CO₂ emissions from petrol engines up to 10%. The new generation of Common Rail Multijet diesel engines will be gradually adopted on all of the Fiat Group's cars. New technologies, like Start&Stop, can cut CO₂ emissions in the urban cycle up to 12%. New applications like "eco:Drive", the innovative software program that allows the driver to analyse his or her driving behaviour to optimize consumption and therefore emissions. *Source: Fiat News, 16 September 2009. (www.fiat.co.uk).* One contributor to low average CO₂ emissions of Fiat Automobiles is the growth of natural gas. About 65 000 Fiat Natural Power cars with an average CO₂ emissions of 115.8 g/km were sold in Europe during the first half of 2009. *Source: NGV Global News, 2 October 2009. (www.ngvglobal.com).*

GASEOUS FUELS (NG, LPG, biomethane, DME)

Biomethane/diesel bus in UK

A bus modified for dual-fuel operation primarily on biomethane has been developed within a project led by the University of East Anglia (UEA). Other partners are the bus operator Anglian Bus, the bus manufacturer Optare plc, and the engine conversion specialists Hardstaff Group of Nottingham. This is the first bus in the UK to run on biomethane. This bus is reported to reduce pollutant emissions and greenhouse gas emissions by around 50%.

The vehicle is an Optare Solo diesel midibus. The Mercedes-Benz engine has been adapted to run for 60-80% of the time on biomethane. According to project leader Dr Bruce Tofield, the cost of conversion of a diesel bus to dual fuel use is a small fraction of the cost of a new natural-gas bus.

Funding for the project came partly from the EU-sponsored Civitas programme promoting cleaner and better transport in Europe's cities. Biomethane reduces greenhouse gas emissions and also particulate and NO_x emissions to around half when using methane from landfill sites, food, and agricultural waste. Operating costs per mile basis are reduced as well. *Source: University of East Anglia, Press release, 9 September 2009 (www.uea.ac.uk).*



Dual-fuel diesel-biomethane powered bus in UK. (www.uea.ac.uk).

NGVs increase in Thailand

In Thailand, there are about 155,000 natural gas fuelled cars, and the number of heavy-duty CNG vehicles is 23,610 units. The types of heavy-duty CNG vehicles are 71% conversions of old engines, 8% repowered new engines, 6% OEM vehicles, and 15% Diesel Dual-fuel (DDF). The increasing number of NGVs consumes more natural gas, and new filling stations are needed. The recent vehicle conversion rate of 100 per day is lower than last year's average of 240 per day. The highest conversion rate was 450 per day when the crude oil price was 140 USD/barrel. *Source: NGV Global News, 8 October 2009 (www.ngvglobal.com).*

ALCOHOLS, (BIO)GASOLINE

IEA/AMF Ethanol report

Within the IEA Advanced Motor Fuels Implementing Agreement (IEA AMF), Annex XXXV, "Ethanol as a Fuel for Road Transportation" has been running since April 2007. The Technical University of Denmark has been the operating agent for this Annex. Within this Annex, a state-of-the-art report on ethanol application and the available technology for road transportation was prepared.

In addition to the main report, a second part covers country reports focusing on views on how to implement ethanol. The country delegates were asked to deliver a short report based on the following questions: How do you see the implementation of ethanol for transportation in your country in the future? How much ethanol will you produce and export/import? What are the motivation and expectations for ethanol as an engine fuel? Do you see any barriers for implementation of ethanol in your country? Country reports are available from Australia, Austria, Canada, China, Denmark, Finland, France, Japan, Spain, and Sweden for the IEA/AMF Members.

Source: Larsen, U., Johansen, T. and Schramm, J. Ethanol as a Fuel for Road Transportation. Report of IEA Advanced Motor Fuels Agreement, Annex XXXV. (...annex35report_final.pdf).

Biofuel progress in Japan

IEA Bioenergy Task 39 Newsletter, Issue #23, reports on recent progress in biofuels in Japan. This report focuses on ethanol and biodiesel. *Source: IEA Bioenergy Task 39 Newsletter, Issue #23, August 2009 (www.task39.org).*

Ethanol and biogasoline research in Finland

In Finland, national refinery Neste Oil, St1, and VTT Technical Research Centre of Finland collaborate within a project focusing on developing cost-efficient solutions that will enable blending of 20% of biocomponent in gasoline by 2020. St1 will concentrate on optimizing high-blend bioethanol, while Neste Oil will focus on developing other biocomponents for gasoline.

"The oil industry has proposed increasing the biocomponent content of traffic fuels in Finland on a phased basis to 10% by 2015," says Jari Suominen, Director, Renewable Energy of St1. "This would enable us to reach the EU target for 2020 significantly earlier than would otherwise be the case, and would allow us to target 20% in the same time frame. St1 is already pressing ahead in this direction with its launch of Refuel RE85, a high-blend bioethanol. We have been building a network of ethanol plants across Finland since 2007, and our goal is to produce around 300,000 m³/a of ethanol for traffic fuel use from waste and sidestreams by 2020. "

The cooperation project belongs to the five-year TransEco research program, which is coordinated by the VTT Technical research program of Finland. *Source: Neste Oil Corporation, Press release, 4 November 2009 (www.nesteoil.com).*

“Algaeus” Prius plug-in hybrid

The Algaeus is the world’s first plug-in hybrid vehicle (PHEV) running on a blend of algae-based renewable gasoline. The Veggie Van Organization sponsors a 10-day tour of “green” vehicles from San Francisco to New York, led by Algaeus, to celebrate the nationwide premiere of FUEL on 18 September. The movie FUEL inspires green energy solutions such as those demonstrated on the tour.

The Veggie Van Organization has partnered with Sapphire Energy, the leader in algae-based fuel production, to introduce Algaeus, which is the first legal on-road car using a blend of algae-based gasoline. Algaeus is based on a 2008 Toyota Prius that has been given an added battery pack, a plug, and an advanced energy management system. The PHEV gets 150 miles per gallon (~1,6 l/100 km). Sapphire Energy is providing the fuel, which is a mixture of hydrocarbons refined directly from algae-based Green Crude, extracted through Sapphire’s proprietary process, and fossil fuels to offer a high-octane gasoline. *Source: Sapphire, Press release 27 August 2009 (www.sapphireenergy.com).*

BIODIESEL ESTERS

Volvo Logistics drives with RME blend

Volvo Logistics starts using Diesel Bio30, containing 30% of rape seed methyl ester (RME) in Skandiahammen in Göteborg. This is a result of cooperation between Ikea, H&M, DHL, Preem, and Volvo Logistics. Volvo Logistics is challenged by its clients within the Volvo Group and Volvo Car Corporation to reduce the carbon dioxide emissions of transport to their plants by 20% by 2010. Using biofuel will help achieve this target.



Another example of cooperation to reduce carbon dioxide emissions is Viking Rail, a combination of truck and train. A train between Hannover and Göteborg carries mainly components for car manufacturers when going northwards, and other cargo when returning. Goods are transported by trucks to and from rail terminals. *Source: Volvo Press release, 20 August 2009 (www.volvo.com).*

Volvo Logistics uses Diesel Bio30, which contains 30% of RME. Photo with courtesy of Volvo. (www.volvo.com).

Argentina’s biodiesel exports to EU

Biopetrol Industries AG has published a statement, which points out that growing imports of indirectly subsidized biodiesel from Argentina are replacing US imports, which dropped by EU anti-dumping duties. Biopetrol Industries AG is operating in Germany, The Netherlands and Switzerland. Biopetrol Industries AG has annual productive capacities in Schwarzheide and Rostock of around 350,000 tonnes of biodiesel. In Rotterdam, Biopetrol is building an installation with an annual productive capacity of 400,000 tonnes of biodiesel. *Source: Biopetrol, Press release 27 August 2009. (www.biopetrol-ind.com).*

Algal biodiesel need more R&D

A life-cycle assessment of biodiesel production from algae is conducted by INRA in France. This study concludes that there is potential in microalgae as an energy source, but that it is imperative to decrease the energy and fertilizer consumption. This study also emphasizes the potential of anaerobic digestion of oilcakes as a way to reduce external energy demand and to recycle a part of the mineral fertilizers.

This study included a comparative LCA study of a virtual facility to assess the energetic balance and the impacts of the whole chain from the biomass production to the biodiesel combustion. Two different culture conditions, nominal fertilizing or nitrogen starvation, as well as two different extraction options, dry or wet extraction, were tested. The best scenario was compared to first generation biodiesel and oil diesel. *Source: Lardon, L. et al. Life-Cycle Assessment of Biodiesel Production from Microalgae. Environ. Sci. Technol., 2009, 43 (17), pp 6475–6481 (pubs.acs.org).*

Algal bioreactors acting as CCS

Scottish Bioenergy Ventures (SBV) has built a pilot-scale reactor at the Glenturret distillery in Crieff to capture CO₂ from the distillery's boiler through algae reactors converting it into protein, animal feed, and oil for biofuels. SBV won a Shell Springboard award for a trial of this carbon capture demonstrator process. The algae reactors successfully eliminated chemicals and captured copper from the wastewater, reducing costs and further reducing the impact of the distilling process. The whole process is carbon negative. The results from the trials were encouraging and thus development continues in the demonstrator project. *Source: Shell news, 6 October 2009 (<http://www.shell.springboard.org>).*

SYNTHETIC AND RENEWABLE DIESEL

Funding for algae, wood and sugarcane in Australia

Projects focusing on algae, wood (pyrolysis), and sugarcane are receiving funding from the Second Generation Biofuels Research and Development Program in Australia. The 3-year program is a part of the Australian Government's A\$4.5 billion Clean Energy Initiative.

Two projects on Algae received A\$3.76 million. The largest project by the South Australian Research and Development Institute, Flinders University, and CSIRO develops a pilot-scale biorefinery for microalgal biofuels and other products. University of Melbourne received funds for a project at Victoria's coal-fired Hazelwood Power Plant to increase the efficiency of systems to derive biofuels from microalgae.

Three projects on wood-based biofuels received funding. Curtin University of Technology and Spitfire Oil raised A\$2.5 million to investigate production of biofuels from Mallee trees biomass by pyrolysis and utilising the biorefinery concept. Licella received A\$2.3 million to develop a demonstration of lignocellulosics to stabilize bio-crude, and Monash University with the Renewable Oil Corporation received A\$1.4 million to develop a pyrolysis biorefinery.

The Bureau of Sugar Experiment Stations Limited with CSIRO won A\$1.3 million for work on optimised and sustainable sugarcane biomass input system for the production of second-generation biofuels, while Sydney's Microbiogens raised \$2.5 million to produce commercial volumes of ethanol from bagasse using patented yeast strains. *Source: Australian Government, 5 August 2009 (www.ret.gov.au).*

OTHER FUELS AND VEHICLES

BioDME in Sweden

In Sweden, Chemrec started construction of the BioDME plant with a ceremony on 18 September 2009. The plant is a part of the BioDME project, in which Chemrec, Haldor Topsøe, Volvo, Preem, Total, Delphi, and ETC cooperate, supported by the Swedish Energy Agency and the EU FP7. The BioDME project will demonstrate the production and use of DME from the biomass in heavy-duty trucks.

Volvo Trucks will run a field test with bioDME using 14 Volvo FH trucks at four locations in different parts of Sweden between 2010 and 2012. The first field-test truck was shown in the inauguration of Chemrec's plant in Piteå. The Volvo Group, of which Volvo Trucks is a part, is one of the co-owners of Chemrec via its subsidiary, Volvo Technology Transfer.

BioDME based on forestry or agricultural residues is a renewable and environmentally superior automotive fuel. The Chemrec process is used to produce BioDME from black liquor, a by-product of the pulp and paper industry. Sweden breaks ground on unique BioDME development.

Sources: *Volvo trucks, Press release, 18 September 2009 (www.volvo.com).* and *Chemrec News, 18 September 2009. The BioDME project on track! (www.chemrec.se).*

Germany seeks leadership in electric cars

In Germany, the government has approved a development plan to put a million electric cars on German roads by 2020. The government will spend €500 million to promote and develop electric cars, i.a. battery technology and a network of charging stations. *Source: Federal Ministry of Economics and Technology, Press release 19 August 2009. (www.bmwi.de).*

Electric Vehicles in Canada

The summary of the Electric Vehicle Technology Roadmap for Canada identifies 21 strategic initiatives of critical importance in the next five to ten years to help industry, its supply-chain, academic research groups, and governments come together to jointly identify and prioritize the technologies, policies, regulations, and other actions needed to accelerate the introduction of electric traction vehicles in Canada. The roadmap says, "by 2018, there will be at least 500,000 highway-capable plug-in electric-drive vehicles on Canadian roads, as well as what may be a larger number of hybridelectric vehicles. All these vehicles will have more Canadian content in parts and manufacture than vehicles on the road in Canada in 2008." The Roadmap is the result of a Canada's wide consultative process held during 2008 and 2009. *Source: Presentation in Plug-in Hybrid and Electric Vehicles Conference (PHEV'09) in Montreal. 29 September 2009. (www.emc-mec.ca).*

MISCELLANEOUS

Gasoline over diesel cars?

By 2015, advanced spark-ignited engines have the potential to become a major powertrain in the diesel-dominated medium-duty commercial truck and off-highway segments, including agricultural and construction vehicles. This vision was presented in the 2009 DEER conference by Ricardo. Technology is available for spark-ignited engines to deliver performance, economy, and durability that are competitive with diesel for a broad cross-section of applications. This, however, can be offered with lower cost. For example, emissions regulations can be met at a lower cost than with diesel applications. *Source: Ricardo, Press release 4 August 2009. (www.ricardo.com).*

Wärtsilä sulphur oxides scrubber

The Wärtsilä sulphur oxides (SO_x) scrubber has been granted the Sulphur Emission Control Area (SECA) Compliance Certificate by the classification societies Det Norske Veritas and Germanischer Lloyd. Wärtsilä's solution is the first marine scrubber to be awarded this certification.

The full-size SO_x scrubber test plant was installed on board the 'MS Suula' and was used to clean the exhaust gases from the ship's 4-cylinder in-line Wärtsilä 20 auxiliary diesel engine. This Neste Oil-owned, Finnish-registered product tanker operates mainly in the SECA Baltic Sea area, where regulations governing sulphuric oxide emissions are very stringent. The tests were performed with both high-sulphur (3.4%) and low-sulphur (1.5%) heavy fuel oil. *Source: Wärtsilä Corporation, Trade press release, 10 September 2009. (www.wartsila.com).*

Tyre rolling resistance

The Goodyear Assurance Fuel Max tire contains a new tread compound that reduces rolling resistance. This means that a car needs less fuel. In highway driving, fuel economy is improved by 4% with the new Fuel Max tires. *Source: Goodyear Corporation, Press release 18 August. (www.goodyear.com).*

IEA & IEA/AMF News

From the Executive Committee

The 38th ExCo Meeting of Advanced Motor Fuels Implementing Agreement of International Energy Agency will be held on 17-20 November 2009 in Bangkok, Thailand.

Progress of Annexes

Progress of Annexes will be reported in the next ExCo meeting in Thailand. A final report of Annex XXXV: Ethanol as Motor Fuel, including country reports, is revised and printed. An updated version of report is available on the website.

Both IEA Bioenergy Implementing Agreement and Hybrid and Electric Vehicle Implementing Agreement have now confirmed their participation in the Bus Project initiated by AMF (Annex XXXVII: Fuel and technology options for buses). This will be first tripartite Annex involving three Implementing Agreements.

38th ExCo Meeting

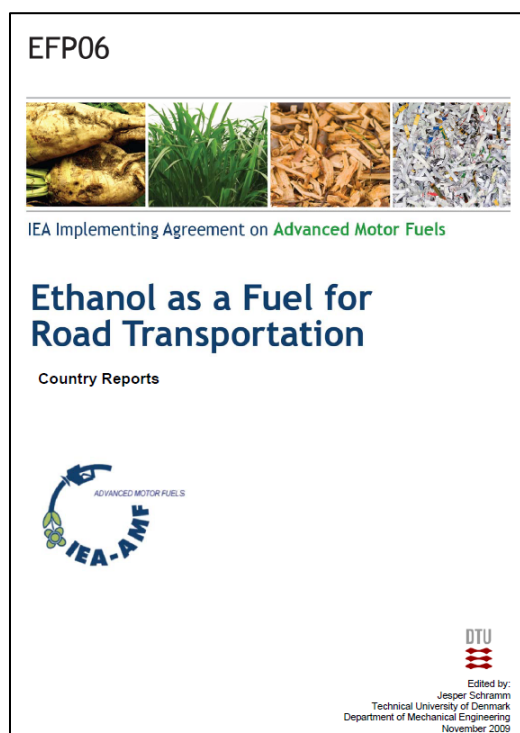
38th ExCo Meeting will be held in 17-20 November 2009 in Bangkok, Thailand, 2009.

Report on Ethanol

Revised report on Annex XXXV is now available at website.

PUBLICATIONS

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- A sustainable future for transport. © European Communities, 2009. http://ec.europa.eu/transport/publications/doc/2009_future_of_transport.pdf
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- Japan Automobile Research Institute (JARI) and Economic Research Institute for ASEAN and East Asia (ERIA): Sustainable Automobile Society in East Asia (SASEA) project. <http://www.eria.org/research/y2008-no7.html> and mpra.ub.uni-muenchen.de



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