

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

*AMFI provides four yearly electronic Newsletters (three issues in 2006) describing recent news on advanced motor fuels, vehicles, energy and environmental issues in general. AMFI Newsletter is available on the AMF website:*

[www.iea-amf.vtt.fi](http://www.iea-amf.vtt.fi)

**Biofuel production was 66% higher in 2005 than in 2004 in Europe. However, biofuel share is still only slightly over 1% of the fuel consumption in road transport in Europe (on energy basis). Data: System Solaires n°173, *Biofuels barometer 57* – Mai 2006..**

## CONTENT

### GENERAL INTEREST

- European Biofuel Directive – Public review

### NATURAL GAS AND LPG (and biogas)

- NGV overview
- CNG not compatible with LPG cylinders
- Biogas in Sweden
- Swedish "Green car" ranking drops biogas behind FFV
- Volvo discontinues production of bi-fuel CNG cars
- OMV and Austrian Government: Biomethane Action Plan
- Biomethane to transport via LNG in US

### ETHANOL, ETBE, BIOGASOLINE

- Ethanol in gasoline: Evaporative emissions
- Biobutanol by BP and DuPont
- Diesel/ethanol: funding for O2Diesel

### BIOESTERS

- Neat biodiesel allowed by Scania
- B20 specification by EMA

### SYN- AND SUNFUELS (GTL, BTL)

- "H-Bio" hydrogenated biodiesel in Brazil
- Neste Oil to become leading biodiesel producer

### OTHER ADVANCED FUELS (HYDROGEN, DME), HYBRIDS

- Hydrogen-IC by Ford
- The first hydrogen station in Norway
- Plug-in hybrids
- Diesel hybrid: CO<sub>2</sub> below 100 g/km

### MISCELLANEOUS

- Windsor Workshop June 5-7, 2006
- Volvo Multi-Fuel prototype car
- EU's annual report on CO<sub>2</sub> emissions
- New Environmental Class 1 specification in Sweden
- California sues automanufacturers over greenhouse gases

### IEA & IEA/AMF News

- IEA AMF – an unofficial meeting
- Annexes
- Webpage updates

### PUBLICATIONS

## GENERAL INTEREST

### European Biofuel Directive – Public review

The European Union's biofuels directive was adopted in May 2003. The European Commission shall make a progress report to be a basis for a proposal to amend the directive. In preparing the progress report, the Commission asked for views of public authorities, businesses, non-governmental organisations and other interested parties, by 10<sup>th</sup> July 2006, on the following questions:

1. Is the objective of promoting biofuels still valid?
2. The directive sets a reference value of 5.75% for the market share of biofuels in 2010. Will this share be achieved with existing policies and measures? If not, why not?
3. Looking towards 2010, does the EU system of targets for biofuels need to be adapted? If so, how?
4. Should a certification system be introduced to avoid using "poor performing" biofuels or give more support to "better performing" ones?
5. Looking towards 2015 and 2020, should further measures be adopted to promote biofuels?
6. A number of more technical issues.

Now about 140 answers on the public consultation paper are available, and also a draft summary of responses can be found from the website: [ec.europa.eu/energy/res](http://ec.europa.eu/energy/res). A draft summary report is also available on the website, with analysis of the answers from different interest groups. For instance, when answers to question "Should the EU continue acting in favour of biofuels after 2010?" were analysed, it was noted that industry favours EU's promotion of biofuels, however, industry not directly related to biofuels often stated that this should not disturb other sectors using biofuel feedstocks. Longer-term EU support is needed, because investment decisions taken now will have most of their impacts after 2010. NGOs saw the situation more complicated: many were in favour, but a number of considerations were mentioned, especially certification and/or setting the target on GHG emission reduction instead of biofuels as such. Most governmental institutions were in favour, but the Netherlands and the UK only on a number of sustainability conditions, e.g. considering competition impacts with other biomass-using sectors. ([2006\\_08\\_23\\_summary\\_responses.pdf](#))

## NATURAL GAS AND LPG (and biogas)

### NGV overview

A report on NGVs from the International Gas Union (IGU) was presented to the World Gas Conference in June 2006. The report gives an overview of state of the art technologies of light and heavy duty vehicles (LDV, HDV), fuelling, fuel production and storage. The same vehicle technology can be used for CNG and bio-methane. Thus the emphasis in the case of bio-methane was put on different ways for biogas production and upgrading.

Analysis of state of the art technologies in 23 countries was made. In the case of CNG, main-stream technology in Argentina is converted cars, in Italy, a combination of converted cars and OEM products, in Austria, only OEM vehicles etc. The report includes case studies for selected countries (in the case of biogas, representative countries include Sweden and Switzerland). Trend analysis include number of new NGVs, fuelling stations etc., and experts provided their view on strengths, weaknesses, opportunities and threats (SWOT analysis) regarding their particular country/market. This report and the associated databases will be updated over the next three years to look more closely at the national, regional and global potential and markets for NGVs. *Source: Global Opportunities for Natural Gas as a Transport Fuel - Report Released, Source - NGV Global Wednesday, 14 June 2006.* The current report is available for download at the IANGV website. *NGV Global June 14, 2006.*



*CNG Tuk-tuk taxi service is starting in Brighton and there are plans to extend it to other areas in UK. ([news.bbc.co.uk](http://news.bbc.co.uk))*

### CNG not compatible with LPG cylinders

CNG is not compatible with LPG cylinders. Different operating pressures can result in catastrophic failure. In two recent instances, in different countries, vehicles fitted with an LPG tank were filled from CNG dispensers. In both cases, there was an accident with the vehicle being completely destroyed and damage caused to the refueling station. In both cases it is thought that an LPG cylinder was fitted to an NGV. *Source: NGV Global, 17 May 2006 <http://www.ngvglobal.com>*

### Biogas in Sweden

Stockholm, Linköping, Västerås and the gas company AGA Gas are promoting biogas as a vehicle fuel. There are eight new filling stations along "Biogas Highway" between Stockholm and Göteborg, and a lot of new biogas vehicles. This is a part of one of the world's largest biogas project, BiogasMAX. *Source: NGV Global, 23<sup>rd</sup> August 2006.*

## Swedish "Green car" ranking drops biogas behind FFV

In Sweden, criteria for "Green car" has been revised so that it is more favorable for FFV cars than CNG bi-fuel cars. Previously, ranking has been favourable for biogas vehicles. Now there is a criteria for renewable share of fuel, defined as 85% for FFV cars, but only 45% for methane (CNG and biogas). The ratio for biogas is calculated from true shares of natural gas and biogas in Sweden. However, E.ON Sweden increased the share of biogas to minimum of 50% in methane used as motor fuel. Btw. Swedish environmental minister Sommestad and Schwarzenegger, California announced about starting biogas co-operation. *Source: Miljöbilens värld, June and July 2006.*

## Volvo discontinues production of bi-fuel CNG cars

Volvo announced of discontinuation of the production of bi-fuel natural gas passenger cars. Since 1995, about 10,000 Volvo bi-fuel CNG-gasoline cars have been sold. *Dagens Nyheter, 4 October 2006. (www.dn.se)*

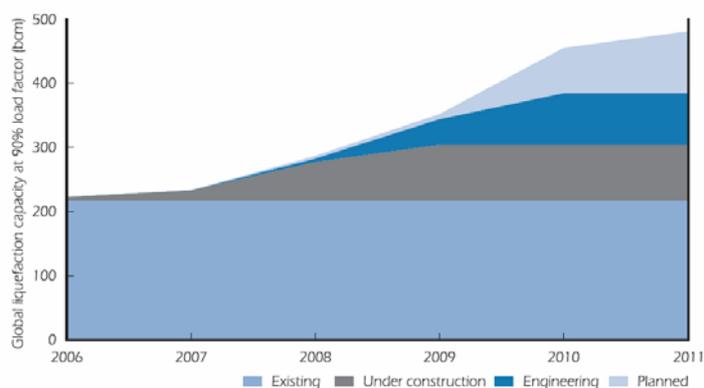
## OMV and Austrian Government: Biomethane Action Plan

OMV and Austrian Government signed Action Plan for Biomethane. The action plan targets at 50,000 NGVs and 200 CNG Stations by 2010. Austrian energy giant OMV and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management have signed a five point action plan to dramatically develop the use of biomethane for use in transport in the next four years. *Source: NGV Global July 12, 2006.*

## Biomethane to transport via LNG in US

Prometheus Energy has secured "\$US20.2 million in equity and a \$25 million line of credit" for biomethane projects to be used for transport, primarily through LNG production. The company expects to have it's first "landfill gas to LNG" project operational in Orange County, California, by the end of this summer, with capacity to be around 40,000 gallons per day (55 000 m<sup>3</sup> per year) within the next year. *NGV Global, 19 July 2006*

**Figure 20 Spectacular growth in LNG supply**



*Growth expectations of LNG supply. © OECD/IEA (www.iea.org)*

## ETHANOL, ETBE, BIOGASOLINE

### Ethanol in gasoline: Evaporative emissions

A Swedish report on evaporative emissions related to blending ethanol into petrol has been published. This report points out that cold start and evaporative emissions are more significant than running emissions. One third of the HC emissions from road traffic in Sweden are evaporative emissions. In-use testing program showed that 40% of the cars exceeded the 2 g limit value in Sweden, whereas in similar test program in Germany only 10%. One clear difference between countries is 5% addition of ethanol in Swedish gasoline. It was assumed that this might be reason for high evaporative emissions measured from cars running in Sweden. *Source: Åsman, P. Vägverket report on 3.4.2006 (mediacontent.ig.publicus.com)*

A JRC/EUCAR/CONCAWE study with various gasoline/ethanol blends showed that ethanol blends with DVPE 75 kPa gave considerably higher evaporative emissions than the fuels with DVPE in the range of 60-70 kPa. Only small differences in evaporative emissions were seen for the fuels with DVPE in the range 60-70 kPa. *CONCAWE Review, Vol. 15 no 1, Spring 2006. (www.concawe.org)*

### Biobutanol by BP and DuPont

BP and DuPont have joined forces to develop, produce and market next generation biofuels for transport sector. The first product will be biobutanol. Using existing processing technology, biobutanol is expected on market in commercial volumes during 2007 (9 million gallons, ~41 000 m<sup>3</sup>, per year). In a second phase, an improved conversion technology is expected to support broader commercialization before 2010. BP and DuPont are collaborating with British Sugar on

#### Potential maximum biofuel content in fuels for unmodified vehicles

 5 - 10%

typical blending limits with today's biofuels

 15 - 16%\*

blending potential with BP and Dupont's biobutanol, from 2007

 30%

future blending potential of advanced processes and more advantaged biofuel molecules

\*based on biobutanol being granted same oxygen content waiver as 10% ethanol blends in gasoline.

*Potential maximum biofuel content (www.bp.com)*

the introduction of biobutanol in the UK market. BP and DuPont are seeking also other partnership opportunities with other biofuel producers to extend production potential. *BP-DuPont fact sheet, September 2006 ([www.bp.com](http://www.bp.com))*

Existing ethanol capacity can be retrofitted to biobutanol production. Biobutanol production can utilize a variety of feedstocks such as sugar cane, sugar beet, corn, wheat, cassava and sorghum. In future, feedstocks such as lignocellulosics from energy crops (e.g. grasses) or agricultural byproducts could be used. Biobutanol has many advantages over ethanol: low vapour pressure, energy content closer gasoline (better on fuel economy), can be blended at concentrations currently up to 10% in Europe (16% possible). Risk of phase separation in the presence of water is lower for biobutanol than for ethanol, and therefore it can use the industry's existing distribution infrastructure, whereas ethanol has to be transported to storage terminals, where it is blended with gasoline. Biobutanol is well suited to current vehicle and engine technologies and does not require automakers to compromise on performance to meet environmental regulations. DuPont and BP calculations of biobutanol's GHG WTW initially indicate that, on the same feedstock basis, emission reductions with biobutanol are at least as good as with ethanol. *Source: BP-DuPont Biobutanol Fact Sheet, September 2006. ([www.bp.com](http://www.bp.com))*

### **Diesel/ethanol: funding for O2Diesel**

O2Diesel Corporation has received \$1 million in U.S. DOE funding to verify O2Diesel™, its ethanol blended diesel fuel under the California Air Resources Board (CARB) Diesel Emissions Control Strategy (DECS). O2Diesel™ is already verified by CARB as an "alternative fuel". DECS provides a higher level verification that enables companies, such as construction/off road, port, transit, utilities, public fleets, and solid waste haulers to meet both CARB and EPA air quality regulations. The testing to verify the emissions benefits of O2Diesel will begin immediately following finalization of the testing plans with CARB. The completion of this program along with O2Diesel's commercial fleet and demonstration experience establishes the value of O2Diesel™ as an alternate fuel. California is the largest consumer of diesel & distillate fuels in the United States with the strictest air quality regulations in the country. *August 8, 2006. [www.marketwire.com](http://www.marketwire.com)*

## **BIOESTERS**

### **Neat biodiesel allowed by Scania**

Scania guarantees operating reliability of using 100% RME for all its trucks with engines with unit injectors after completing long-term tests. Scania has already previously guaranteed operating reliability with RME blends of up to 5% in regular diesel fuel. "The comprehensive tests we have conducted show that the quality of RME as a fuel is decisive for the engine's performance and operating reliability," explains Jonas Hofstedt Scania's engine development manager. One condition is therefore imposed, that the RME used must meet the European standards, EN14212 for 100% use or the regular diesel standard EN590 for a 5% blend. Scania sees the biggest obstacle for RME the limited rapeseed cultivation capacity. "Calculations in Europe show that utilisation of all land available for rapeseed cultivation within the EU would result in fuel production to meet no more than 10-15 percent of the demand for commercial vehicle fuel requirements," says Jonas Hofstedt. *Source: Press releases, 31 May 2006. ([www.scania.com](http://www.scania.com))*

### **B20 specification by EMA**

Engine Manufacturers Association, EMA, has defined a specification for B20 fuel, a blend of diesel and 20% of bioester. *Engine Manufacturers Association, May 2006 ([www.enginemanufacturers.org](http://www.enginemanufacturers.org))*

## **SYN- AND SUNFUELS (GTL, BTL)**

### **"H-Bio" hydrogenated biodiesel in Brazil**

Petrobras in Brasil has developed the H-Bio biodiesel, which hydrogenates mixtures of vegetable oil and petroleum. Petrobras will start the production of the H-Bio in December 2006. H-Bio is expected to substitute diesel imports worth of US\$ 240 million per year on the medium run. The H-Bio was developed by the Research and Development Centre at Petrobras. The H-Bio has a lower sulphur content and better ignition quality than diesel, and therefore burns better resulting in lesser emissions. The oil used in the tests is soy oil, but the oil from other oleaginous plants may be used. Brazil already produces soy oil 5.6 million m<sup>3</sup> per year. In the beginning, Petrobras plans to use 256,000 m<sup>3</sup> per year of vegetable oil. According to Petrobras, the investments needed in the existing refineries to produce the new fuel are small; US\$ 38 million in the three chosen plants. In 2008, the company plans to introduce production on two more refineries. Then, the quantity of vegetable oil used will be of 425,000 m<sup>3</sup> per year, which will represent a reduction in 25% in the need for importing diesel. *Source: The Brazil-Arab News Agency 20 June 2006. © ANBA 2003. ([www.anba.com.br](http://www.anba.com.br))* There are also other activities on hydrogenated biodiesel. Neste Oil in Finland developed NExBTL process (see below), and e.g. the UK government encouraged to investigate the use of hydrogenation (AMFI Newsletter *Jan 2005, [www.nesteoil.com](http://www.nesteoil.com)*).

## Neste Oil to become leading biodiesel producer

Neste Oil's Board of Directors has approved a strategy aimed at making the company the world's leading biodiesel producer. However, oil refining will remain as Neste Oil's core business. "We are aiming to be the world's leading biodiesel producer, which means production volumes of millions of tons annually. Our proprietary biodiesel, which is based on a long-term R&D effort, can be produced from a variety of vegetable oils and animal fats – and is a premium-quality fuel that clearly outperforms both the vegetable oil and crude oil-based diesel fuels currently on the market," says Neste Oil's President & CEO, Risto Rinne. "We will build several biodiesel production facilities in various market areas, either alone or with partners, in the years to come." Rinne continues. *Neste Oil Corporation, Stock Exchange Release, 27 September 2006. [www.nesteoil.com](http://www.nesteoil.com)*

Neste Oil's proprietary NExBTL technology is a refinery-based hydrotreatment process using e.g. vegetable oils and animal fats as raw material (AMFI 1/2005, AMFI 2/2006). Properties of NExBTL biodiesel are similar to GTL and superior when compared to conventional diesel fuel. The production of NExBTL will start in a Neste refinery in 2007.

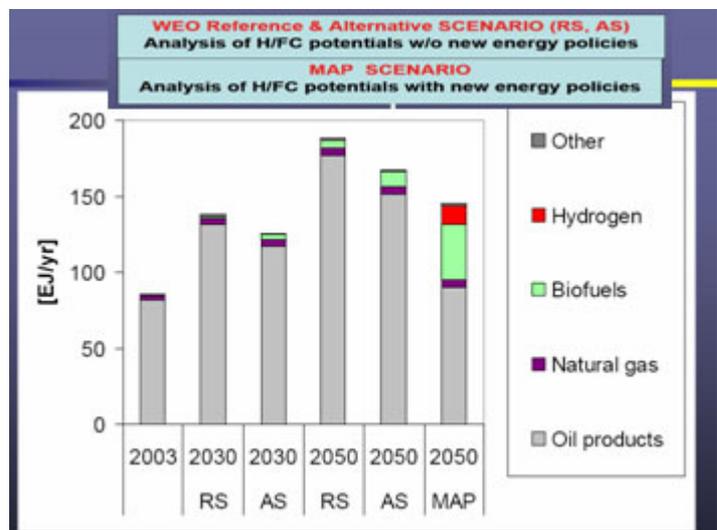
## OTHER ADVANCED FUELS (HYDROGEN, DME), HYBRIDS

### Hydrogen-IC by Ford

Ford Motor Company is the first automanufacturer to start production of dedicated hydrogen fueled V-10 engines. The supercharged 6.8-liter V-10 engine will power Ford's E-450 hydrogen fueled shuttle buses. The buses are to be delivered to fleet customers later this year, first in Florida and then in other locations across North America. Ford is also conducting research into next generation hydrogen internal combustion engines, including e.g. direct injection to enhance power and fuel economy. "We have only scratched the surface in terms of what can be achieved with hydrogen internal combustion engine technology and are serious about maintaining our edge in this field," said Vance Zanardelli, chief engineer, Hydrogen Internal Combustion Engines, Ford Motor Company. *Source - NGV Global. Wednesday, 26 July 2006 USA, Michigan*

### The first hydrogen station in Norway

Norway's first hydrogen filling station for motor vehicles was opened in Oslo, South-Norway. There will be five hydrogen stations between Oslo and Stavanger (western port) as a part of the HyNor hydrogen highway project. *Source: NGV Global, 30 August 2006.* In addition, there is a co-operation between NyNor, Swedish HyFuture and Hydrogen Link in Denmark to build up a hydrogen distribution net. *Source: Miljöbilens värld, July 2006.* There are 227 operable or planned hydrogen filling stations worldwide (<http://www.h2stations.org>).



*Prospects for hydrogen and fuel cells. © OECD/IEA. Presentation by D. Gielen, G. Simbolotti, Jan 2006. ([www.iea.org](http://www.iea.org))*

### Plug-in hybrids

Plug-in hybrid-electric vehicles (PHEV) can use electricity from the grid and this will reduce fuel consumption significantly. The plug-in function is an option, thus the benefits of an electric car are available, without the biggest limitation in driving distance. A plug-in hybrid with an electric-only range of 20 miles could be expected to reduce fuel use by about one-third relative to a current hybrid. A plug-in with a 60-mile range could cut gasoline consumption by about two-thirds. Battery cost is a barrier to the commercialization of plug-ins with extensive electric-only range. *Source: ACEEE, September 2006. [www.aceee.org](http://www.aceee.org)*

### Diesel hybrid: CO<sub>2</sub> below 100 g/km

In a UK research project, Ricardo, Qinetiq and PSA developed a prototype hybrid car in a family car size-class, Efficient-C, with CO<sub>2</sub> emission of 99 g/km; and fuel consumption only 3,75 l/100 km. *Automotive Engineer, June 2006.*

## MISCELLANEOUS

### Windsor Workshop June 5-7, 2006

21<sup>st</sup> Windsor Workshop "Transportation Technologies and Fuels Forum" sponsored by i.a. Natural Resources Canada (NRCan), US Department of Energy (DOE) and IEA, was organized 5-7 June 2006 in Toronto, Canada. Themes in of the Planery Sessions in the Workshop were:

- Energy technology drivers for change
- Oil supply and demand: Filling the gap- how far can you go with technology options
- Transport energy in 2025: Options, trade-off's and risk management

In addition, themes in other sessions were e.g. "Sustainable transportation", "GHG reductions", "policies", "vehicle technology", "demonstrations", "biofuels" and "hydrogen".

Steve Goguen from US DOE reviewed the biofuel policies in the US. He told e.g. the usage of biofuels for transportation in US will be triplicated by 2012 to level of some 7.5 billion gallons (~25 Mtoe/a). Biofuel projects will have subsidies of 50 million dollars annually. In 2004, ethanol was used some 0.126 MBD, which represents about 1.5% of the motor fuel consumed for light-duty vehicles in US. This required 11% of US corn harvest. Robert Dixon from IEA presented new publications of IEA: 2004 Review of National Hydrogen Programs, 2005 Prospects for hydrogen and fuel cells, 2006 Energy Technology Perspectives: Scenarios and Strategies to 2050. Robert Hirsch from SAIC gave a presentation on the "peak of oil". He pointed out that "peak of oil" is unforeseen problem with liquid fuels, which will mean the first non-voluntary, extreme change in energy sector. Strong investments should be started to mitigate the effects and to reduce damages in economy. Rick Zalesky told that Chevron is putting high investments on biofuels and hydrogen. Manfred Wörgetter, IEA Bioenergy, gave a presentation "Technology Option Biodiesel". *Source: Nils-Olof Nylund, TEC TransEnergy Consulting.*

### Volvo Multi-Fuel prototype car

Volvo Car Corporation has developed a system for a multitude of fuels. The Volvo Multi-Fuel is a prototype car, optimised for running on five different fuel types: hythane, biomethane, natural gas, bioethanol E85 and petrol. Hythane consists of 10% hydrogen and 90% methane, a blend that has tested to be the most effective one for this system. *June 10, 2006 ([www.media.volvocars.com](http://www.media.volvocars.com))* On October 4<sup>th</sup>, Volvo, however, announced the discontinuation of the production of bi-fuel natural gas passenger cars. *Dagens Nyheter, 4 October 2006. ([www.dn.se](http://www.dn.se))*

### EU's annual report on CO<sub>2</sub> emissions

CO<sub>2</sub> emissions from new cars are more than 12% lower than in 1995 according to EU's annual report. In 2004, average emissions were 12.4% below 1995's level (in 2003 they had been 11.8% below 1995). The report, however, underlines that the industry will need to make major efforts to meet its commitments to cut average CO<sub>2</sub> emissions to 140g/km by 2008/9, a reduction of around 25% from 1995 levels. *August 29, 2006. ([europa.eu](http://europa.eu))*

### New Environmental Class 1 specification in Sweden

From the beginning of June 2006, it is allowed to blend five percent of RME in Swedish Environmental Class 1 diesel (known as the world's cleanest diesel fuel). This required modification of Swedish specification for diesel fuel. *Privata Affärer, 27 July 2006 ([www.privataaffarer.se](http://www.privataaffarer.se))*

### California sues automanufacturers over greenhouse gases

California State sued six automanufacturers, i.a. Ford, GM and Toyota, charging that greenhouse gases from their vehicles cause global warming and billion of dollars of damages. This is the first lawsuit to charge automanufacturers for the damages caused by vehicle emissions. *Source: Reuters, September 20 2006. ([news.moneycentral.msn.com](http://news.moneycentral.msn.com))*

## IEA & IEA/AMF News

### IEA AMF – an unofficial meeting

Parallel to Windsor Workshop, an unofficial IEA/AMF meeting was held on 4-6 June, 2006, in Toronto, Canada. In this meeting, proposals for guidance on responsibilities of e.g. Chairman and Secretary of AMF Implementing Agreement were defined. These proposals will be discussed and agreed in the 32nd ExCo meeting, 17-20 October, in Beijing, China.

### Annexes

- Annex 26 report is published, available on the website: [annex26report\\_final.pdf](#)

### Webpage updates

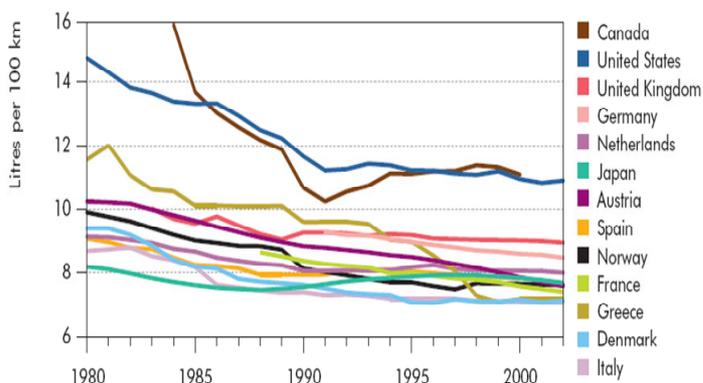
- New Delegate and Alternate from Spain.
- Updated information of the ExCo 32 Meeting (Beijing, China October 18-20, 2006).

IEA / AMF  
32<sup>nd</sup> ExCo Meeting  
Beijing, China  
October 17-20, 2006

## PUBLICATIONS

- **IEA: Energy Technology Perspectives: Scenarios and Strategies to 2050.** IEA publication takes a detailed look at status and prospects for key energy technologies in power generation, buildings, industry and transport. © OECD/IEA, June 2006. ([www.iea.org](http://www.iea.org))
- **IEA Natural Gas Market Review 2006 - Towards a Global Gas Market,** © OECD/IEA, June 2006. ([www.iea.org](http://www.iea.org))
- **International Energy Outlook 2006,** IEO 2006 published by US Energy Information Administration (EIA). June 2006. [www.eia.doe.gov](http://www.eia.doe.gov)
- **Biofuels in the EU – A vision for 2030 and beyond.** A final report. 14 May 2006 ([cordis.europa.eu](http://cordis.europa.eu))
- **ACEEE's Green Book® Online,** the 9th annual edition of ACEEE's environmental guide to cars and trucks is available online at [GreenerCars.com](http://GreenerCars.com).
- **Biofuels for transportation,** conference report. June 2006. [www.worldwatch.org](http://www.worldwatch.org)
- **Plug-In Hybrids** report, September 2006. [aceee.org](http://aceee.org)

**Figure 5.2** ▶ Average fuel intensity of the light-duty vehicle stock



Source: IEA and Odyssee.

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