



A Monthly Publication by
Asian Clean Fuels Association
Vol. 7 Issue 8 - December 2009

EU Fuel Quality Status - Today and Tomorrow

In the European Union (EU) current fuel quality requirements are the result of a long and complex process that started in the early 1990s. The standards implemented over time provide for a comprehensive strategy to control atmospheric emissions from road transport

AUTO OIL PROGRAMMES

In the 1990s, the European institutions recognized the need to meet new air quality objectives of 70% reduction of carbon monoxide, benzene, nitrogen dioxide by 2010 in the most cost effective way. To find the answer to this question, the European Commission invited all relevant stakeholders – automobile sector, refining sector, experts from the Commission and Member States – to take part in the first Auto Oil Program (AOP) and work together to deal with pollution from the road transportation sector. The cooperative research program established associations between fuel properties, engine technologies and exhaust emissions. It confirmed both fuels and engine technologies are important determinants of motor vehicle emission levels and they work as a system.

AOP's findings were incorporated into the European legislation, developed in two directions:

- measures to be taken against air pollution by emissions from motor vehicles, and
- measures to be taken to regulate the quality of gasoline and diesel.

This approach ensured the gradual introduction of cleaner vehicles (Euro II – Euro IV emission standards) and cleaner fuels as of 2000. Cleaner fuels are achieved through implementation and enforcement of mandatory fuel quality specifications, amongst which the ban of leaded gasoline and reductions in sulphur limits (150 ppm for gasoline and 350 ppm for diesel) were the most important. The next step in tightening fuel quality requirements took effect as of 2005. Sulphur limits were reduced to 50 ppm for both gasoline and diesel and aromatics' content in gasoline was reduced from 42 vol% to 35 vol%. Additionally, Member States were obligated to ensure that 10

INSIDE THIS ISSUE

EU Fuel Quality Status - Today and Tomorrow

Interview with Dr Graeme Wallace, Executive Director, EFOA

Vietnam Clean Fuels & Vehicles Workshop Develops Roadmap

Fuel Industry Updates

ppm sulphur gasoline and diesel are available in their markets "on a balanced geographical basis". Starting in January 2009, all conventional fuels cannot contain more than 10 ppm sulphur.

FUEL QUALITY REQUIREMENTS

Fuel quality parameters in the EU are regulated by binding legislation because of their impact on the environment and human health. They do not address certain gasoline and diesel properties that are considered "technical" due to their impact on vehicle performance, such as copper corrosion in gasoline or water content in diesel. Determination of those properties is left to technical experts working on standards for fuels under the umbrella of the European Committee for Standardization (CEN). They prepare European Standards for gasoline (EN 228) and diesel (EN 590) and update them when necessary. Most recently altered in 2008 for gasoline and in 2009 for diesel fuel. European standards are not mandatory; however all European fuel producers and distributors follow them.

This policy-making process of incorporating scientific and technical progress based on the experts' intelligence has established the EU as a world leader for implementing clean fuels and vehicles. European standards serve as a benchmark for other regions, which follow "Euro" stages when introducing their own national legislation governing fuel quality and vehicle emission requirements. Table 1 illustrates main current European gasoline and diesel quality requirements, based on both legislation

(Continued on p3)

CLEAN AIR THROUGH CLEAN FUELS



Expert Talk

Interview with Dr Graeme Wallace, Executive Director, EFOA



Dr Graeme Wallace was appointed Director General of EFOA in October of 2004 having for the previous 3 years provided their secretariat support. Educated in his native Scotland, he received doctorate and bachelor degrees in chemistry from the University of Edinburgh. He started his working life with Mobil Oil before moving to Ethyl Corporation where he progressed through a range of fuel and lubricant

product development, customer service and management positions. He joined the European Chemical Industry Council (CEFIC) in 2001 where his fuels experience led to him becoming involved with EFOA.

Q: Could you give us a brief overview about the European Fuel Oxygenates Association (EFOA) and describe your role and key responsibilities within the association?

EFOA was established in 1985 as a sector group of the European Chemical Industries Association – CEFIC. EFOA brings together 11 producers of the fuel ethers ETBE, MTBE, TAAE and TAME, which represent the majority of EU production. EFOA is dedicated to the promotion of ethers as fuel components towards a cleaner and sustainable future. EFOA is a key stakeholder on biofuels and fuel quality vis-à-vis the European institutions and is recognised as such by the European Commission, who has the initiative of drafting legislation, and the European Parliament, who eventually adopts legislation.

The role of the director general is twofold: to work with the Chair and Board to develop the long term strategy for EFOA, and the management of the annual work programme. The latter is achieved by continuously liaising with members to provide support and direction for specific issues.

Q: Concerns about climate change and CO₂ emissions from fuels uses are significant issues lately. What impacts to your industry do you envision from directives and regional efforts to address these issues?

The European Union began to focus on renewable energy in transport fuels in 2003 when the Biofuels directive 2003/30/EC was adopted. This initial attempt to foster the development of biofuels was justified by three objectives; reduction in CO₂ emissions, improved security of supply and support for the rural economy. This has been further strengthened and refined in two major new directives adopted a few months ago: the revised Fuel Quality directive 2009/30/EC and the directive on the promotion of the use of energy from renewable sources (2009/28/EC). Here the emphasis is to address the climate change challenge by imposing minimum levels of renewable fuels in transport, and specifically biofuels. The directives also

set targets for the reduction, in the entire life cycle of gasoline and diesel fuels, of greenhouse gas emissions per unit of energy, and for minimum standards for the CO₂ reductions of individual biofuels, the so-called “sustainability criteria”.

As for the impact of these changes on the refining and ether industries, the introduction of the 2003 Biofuels Directive saw a major shift in EU ether production from MTBE to ETBE. It provided the oil industry with a “drop in” solution for the rapid introduction of bio-gasoline, ETBE being substantially similar to MTBE, and easier to blend than ethanol. Japan has recently come to a similar conclusion and is favouring ETBE in order to introduce low level ethanol blending in gasoline.

The two new European directives have also recognised the ability of ethers to deliver emission savings by setting default values of CO₂ reduction “equal to that of the ethanol production pathway used”. EFOA is pleased with this recognition, but we believe that recent studies, for instance from independent experts such as CE Delft and Hart Energy, which show that ETBE typically offers an additional saving of 24 kg of CO₂-equivalent/GJ of ethanol, mean the directives significantly underestimate the benefits of bio-ethers.

Q: The European Union fuel quality standards are among the most stringent in the world. Can you tell us about the latest developments and how EFOA and its membership successfully addressed these developments?

EFOA has been a consistent supporter of EU efforts to improve air quality through the introduction of tighter vehicle emissions limits and fuel quality standards. The introduction of MTBE in the 1980's allowed the phase out of leaded gasoline, essentially achieved in 2000. Likewise the availability of high octane blending components such as ethers also enabled the introduction of tighter aromatics limits. More recently the bio-ether ETBE has made it easier for refiners to meet the EU biofuels requirements.

As I mentioned, Europe has just recently revised its fuel quality standards. Directive 2009/30/EC was published in June 2009. It does not only focus on reducing the greenhouse gas emissions from transport fuels. As part of this revision, the oxygen limit was increased to 3.7% and with it the maximum limit for all oxygenates. For ethers this means a rise in the permitted level from 15% to 22% in volume.

Q: Clean air strategies are recognizing the critical link of clean fuels with clean vehicles. In what ways can some of the programmes adopted by the EU be transferred to other regions, such as transitioning countries in the Asia-Pacific region?

(Continued on p3)



Expert Talk

Interview with Dr Graeme Wallace, Executive Director, EFOA

(continued from p2) The EU strategy has always been to ensure that the correct fuel is available to enable the introduction of the next generation of clean vehicles. This coupling of the vehicle with its fuel has been critical to the successful reduction of emissions in Europe.

The EU approach to emissions standards has been widely copied and it is not unusual to see references to new national standards as being "Euro 3" or "Euro 4 equivalents". However, the importance of the fuel in enabling these emissions standards is sometimes overlooked. I would re-emphasise that any country wishing to take advantage of the European experience should always ensure that it matches its fuel standards to the needs of the new vehicle emissions technologies. It is worth noting that one of the benefits of fuel ethers is that their positive effect on the gasoline pool will immediately result in emissions benefits irrespective of the vehicle car park.

Q: Can you briefly describe what is REACH and EFOA's response to this extensive regulatory effort?

The acronym REACH stands for the Registration, Evaluation and Authorization of CHemicals. REACH is a new, more comprehensive, system of assessing the safety of chemicals placed on the market in Europe. It came into force on June 1, 2007, and replaced most of the previous regulations concerning the assessment of chemicals. REACH requires all producers or importers of chemicals into the EU, in quantities greater than one tonne, to provide test data to demonstrate that the substance does not pose a risk to human health or the environment. The data requirements are tiered based on the

volume produced or imported, as are the deadlines for submission of the dossiers. The first such deadline is November 30, 2010, for substances above 1,000 tonnes.

EFOA proactively sought to gather all the producers and importers of ETBE, MTBE, and TAME into a single consortium to jointly prepare the required information. This consortium, the Fuel Ether REACH Consortium (FERC), was created in May 2008 and consisted of some 23 companies. The consortium was then handed to an independent project management organisation, Reach Centrum, to complete the dossier preparation. The existing EU risk assessments of MTBE and TAME, which were completed before REACH was enacted, are expected to provide a good base for FERC to work from.

Q: Finally, how is your association, and its member companies, working within the structure for development of European transport policy?

Fuel ethers are components that can be blended into gasoline to enhance engine performance and reduce toxic exhaust emissions. Bio-ethers also represent a quick and straightforward way for delivering bio-ethanol into gasoline due to their ability to improve its compatibility with fuel systems in cars and reduce problems in the fuel supply chain. In addition they augment the greenhouse gas savings delivered by the bio-ethanol. EFOA considers that ethers have an important role to play in creating a cleaner environment based on sustainable transport fuels.

EU Fuel Quality Status - Today and Tomorrow

(continued from p1) (Directive 1998/70/EC as amended) and CEN standards (EN 228:2008 and EN 590:2009).

CHANGES IN FUEL QUALITY

In 2007, the European Commission undertook a review of these fuel quality requirements. The review addressed fuel specifications meeting stricter EU air quality targets and future auto emissions requirements, and also greenhouse gas (GHG) emissions from transportation fuels. The review outcome was incorporated in a new directive: Directive 2009/30/EC of the European parliament and of the Council of April 23 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards to specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC. This directive constitutes part of the EU Climate Change and Energy Package, adopted by the European Union in April 2009. The main issues addressed in the directive are:

- The introduction of E10 (gasoline with up to 10 vol% ethanol and 3.7 wt% oxygen; other oxygenates increased as well with the exemption of methanol, which remains at the cur-

Table 1: Certain Gasoline and Diesel Properties (applicable in Europe – January 2009)

Parameter	Limits
GASOLINE	
RON	min 95
MON	min 85
Sulphur	max 10 ppm
Olefins	max 18 vol%
Aromatics	max 35 vol%
Benzene	max 1 vol%
Oxygen	max 2.7 wt%
DIESEL	
Cetane number	min 51
Cetane index	min 46
Sulphur	max 10 ppm
Flash point	min 55°C
Density at 15°C	820 kg/m ³ – 845 kg/m ³

Source: International Fuel Quality Center compiled from Directive 98/70/EC as amended and EN 228:2008 and EN 590:2009

- rent level of 3 vol%).
 - On the request from the auto sector, EU Member States will have to ensure that gasoline meeting current requirements (E5 – with ethanol content no higher than 5 vol% and
- (Continued on p4)



EU Fuel Quality Status - Today and Tomorrow

(continued from p3) oxygen content no higher than 2.7 wt%) remains in their market at least until 2013 (“protection grade”). Member States may decide to keep E5 for a longer period if considered necessary.

- Different RVP limits:
 - 60 kPa max,
 - 70 kPa max allowed in countries with low summer ambient temperatures under the condition that the European Commission will not raise objections;
 - 60 kPa plus a waiver (0 kPa to 8 kPa) for ethanol blends directly linked to the percentage of ethanol blended into gasoline, allowed for countries with no low ambient summer temperatures under the condition that ethanol used is a biofuel and the European Commission will not raise objections.
- The introduction of B7 (diesel with up to 7 vol% FAME – fatty acid methyl ester); however, Member States may permit higher FAME content and there is no limit for other biofuel components.
- Polycyclic aromatic hydrocarbons (PAH) reduced to 8 wt% for on-road diesel.
- Alignment of sulphur levels in non-road diesel (intended for use in non-road machinery, agricultural/forestry tractors, inland waterway vessels, rail vehicles, etc.) with on-road diesel (10 ppm) as of January 2011 (with a one year transition period for rail vehicles and agricultural/forestry tractors); however, Member States may allow for 20 ppm sulphur at the final point of fuel distribution.
- The presence of MMT (methylcyclopentadienyl manganese tricarbonyl) in fuel should be limited to 6 mg manganese per liter starting Jan. 1, 2011, and to 2 mg/l starting Jan. 1, 2014; however these limits will be revised based on the results of a risk assessment conducted by the European Commission by the end of 2012.
- Fuel suppliers are required to reduce as gradually as possible life cycle GHG emissions per unit of energy from fuel and energy supplied for the transportation sector by 6% by 2020 compared to the 2010 baseline standard. The possibility of achieving the 10% target will be assessed by the Commission together with Member States.

All 27 EU Member States are obligated to shape their national legislation with the new directive and to enforce new require-

ments by the end of 2010. CEN is also working on new versions of diesel and gasoline standards that will be in compliance with new legislation.

Table 2:
Comparison of EU Gasoline and Diesel Requirements (2009 vs. 2011)

Parameter (unit)	Directive 2003/17/EC	Directive 2009/30/EC
GASOLINE		
Research octane number (min)	95	95
Motor octane number (min)	85	85
Vapor pressure, summer period (kPa, max)	60 (70 summer)	60 (70 summer, waiver)
Distillation:		
— Percentage evaporated at 100 °C (vol%, min)	46	46
— Percentage evaporated at 150 °C (vol%, min)	75	75
Hydrocarbon analysis:		
— Olefins (vol %)	18	18
— Aromatics (vol %)	35	35
— Benzene (vol %)	1,0	1,0
Oxygen content % m/m	2,7	3,7
Oxygenates		
— Methanol (stabilizing agents must be added) (vol %)	3	3
— Ethanol (stabilizing agents may be necessary) (vol %)	5	10
— Iso-propyl alcohol (vol%)	10	12
— Tert-butyl alcohol (vol %)	7	15
— Iso-butyl alcohol (vol %)	10	15
— Ethers containing five or more carbon atoms per molecule (vol %)	15	22
— Other oxygenates (vol %)	10	15
Sulphur content (ppm)	10	10
Lead content (g/l)	0,005	0,005

Source: International Fuel Quality Center compiled from Directives 2003/17/EC and 2009/30/EC



ACFA

If you have any enquiries or feedback on ACFA News, please contact us at info@acfa.org.sg

You may also Contact Joanne Chong at (+65) 6866 3209 or email joanne@acfa.org.sg.

Visit us online at www.acfa.org.sg



Vietnam Clean Fuels & Vehicles Workshop Develops Roadmap

The National Consultation Workshop on Clean Fuels and Vehicles was held last month in Hai Phong, Vietnam. This programme brought together representatives from local and national government agencies, academe and researchers, private industry, and non-governmental organizations to help develop a national roadmap and work plan for fuel quality improvements and stricter vehicle emission standards.

Mr Le Ke Son, deputy general administrator, Pollution Control Department at the Vietnam Environmental Protection Agency, opened the workshop by noting that transport is an essential part of economic development. He stated that with economic growth, however, came concerns about air pollution caused by greater numbers on vehicles on the country's road, particularly in urban centres. He emphasized that advancement towards cleaner fuels and vehicles in Vietnam is a key vision for the Agency and for the country.

International and local experts gave presentations during the workshop that demonstrated policy options and strategies for fuel quality and vehicle emissions improvements. Participants engaged in discussions for the "Draft Work Plan for Implementing Fuel Quality and Vehicle Emission Standards Improvement in Vietnam." Highlights of the presentations include the following.

Mr Michael Walsh, International Council on Clean Transportation, presented on "Motor Vehicle Pollution Control: The importance of fuel quality." He summarized the human health risks created by air pollution and the cost-benefits of clean fuels and vehicles. He demonstrated that direct emissions reductions and indirect benefits of advanced vehicle technologies and retrofits can be achieved by reducing sulphur levels in fuels

Ms Glynda Bathan, policy and partnership manager for Clean Air Initiative for Asian Cities Center, talked about "Managing Air Pollution from Fuels and Vehicles in Asia." She reviewed issues on achieving sustainable transport systems for the region (Figure 1), and reinforced the need for stricter vehicle emission standards and better fuel quality. She noted that Vietnam is now at a crossroads for developing its long-term direction for transportation.

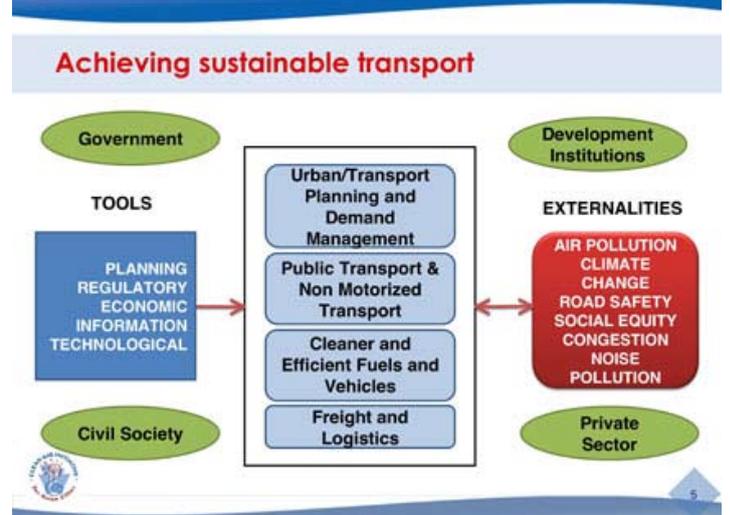
Ms Siwaporn Rungsiyanon, Air Quality and Noise Management Bureau of Thailand, shared the successful experience and achievements in Thailand to improve fuel quality requirements and vehicle emissions standards that resulted in reduced air pollution levels. She showed the connection between fuel improvements and better air quality parameters (Figure 2). Gasoline reformulation in Thailand has substantially lowered aromatic and benzene content levels and reduced sulphur levels while maintaining performance in vehicles.

Mr Do Huu Duc, deputy director at the Vietnam Register, Ministry of Transportation, presented on "Transportation Vehicles and

Emission Control." He reviewed the current transport situation in Vietnam, and summarized trends and policies on fuel and emission standards. He emphasized the need to involve all stakeholders in developing effective strategies – including fuel manufacturers and suppliers, auto and vehicle manufacturers, technology providers, government and regulatory agencies, and maintenance and inspection facilities.

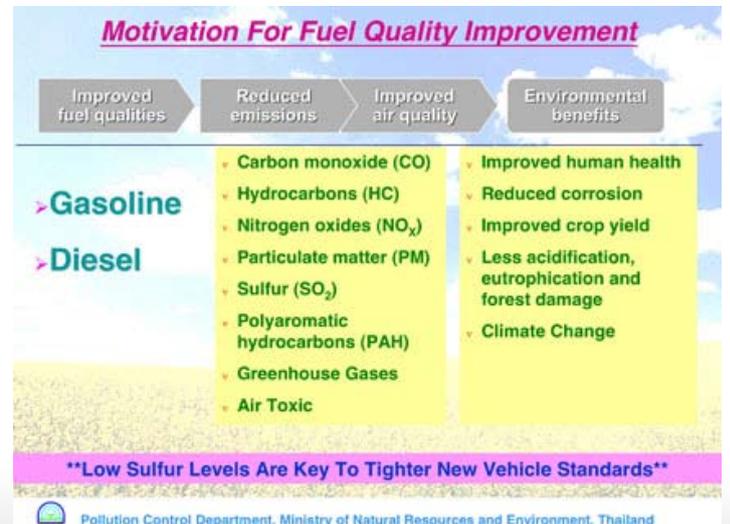
Mr Luong Van Phan, deputy director at the Vietnam Standards and Quality Center, Ministry of Science and Technology, talked about "Outline on Standards and Quality Control of Fuel and Transportation." He summarized the existing fuel standards and technical regulations that control fuel qualities. He highlighted that market
(Continued on p7)

Figure 1: Sustainable Transport Issues & Strategies



Source: Glynda Bathan, CAI-Asia, National Consultation Workshop on Clean Fuels & Vehicles, Hai Phong, Vietnam, 2009

Figure 2: Thailand Fuel Quality Improvement



Source: Siwaporn Rungsiyanon, Thailand Air Quality & Noise Management Bureau, Hai Phong, Vietnam, 2009



Fuels Industry Updates

EU FUEL QUALITY DIRECTIVE RESULTS IN LEGAL CHALLENGE ON MMT

The European Union's (EU) Fuel Quality Directive – 2009/30 issued earlier this year, and scheduled for Member states to bring into law by the end of 2010, has resulted in legal challenge by the producer of the metallic fuel additive methylcyclopentadienyl manganese tricarbonyl (MMT). The Directive sets limits on MMT, which is used as an octane additive for gasoline, at maximum of 6 mg/litre as of 1 January 2011, and at maximum of 2 mg/litre after 1 January 2014. The Directive also requires pump labeling on all fuel containing metallic additives. MMT producer, Afton, has filed a case in the United Kingdom, England's High Court of Justice, questioning the lawfulness of the specific limit values and labeling requirements. The High Court has in turn referred the questions to the European Court of Justice, in Luxembourg.

The Directive mandates the European Commission to conduct an environmental and health risk assessment of metallic additives by the end of 2012, but nonetheless established the MMT maximum limits.

The industry and other parties hope that the European court will issue its ruling before January 2011 when the limit is to go into effect. The European Court has notified the EU Council of Ministers of the legal challenge. The ruling will impact all EU Member states.

EU CHEMICALS AGENCY LAUNCHES WEBSITE FOR REACH

The European Chemicals Agency (ECHA) has started up in November a webpage that describes chemicals being controlled under the REACH (registration, evaluation, and authorization of chemicals regulation), and the procedures for proposing new chemicals for restrictions. The webpage will help member states and stakeholders understand core information about controls by providing relevant guidance documents and detailing the steps being taken to achieve new or modified restrictions. Proposals for control restrictions can be prepared by EU member states, the ECHA, or upon request by the European Commission. The webpage can be accessed at http://echa.europa.eu/reach/restriction_en.asp

EU AIMS FOR VEHICLE FUEL CO2 TAX NEXT YEAR

The European Commission is expected to propose adding a carbon dioxide (CO2) tax to various fuels next year, according

to draft documents being circulated to member states. The Commission's directorate-general for taxation and customs union noted that the directive would seek to bring current energy taxation into line with the EU's climate objectives and accordingly include a levy on heating and transport fuels not already included in Europe's carbon trading scheme. Under the draft proposal, varying CO2 tax rates would be based on whether the fuel is for passenger cars or commercial vehicles. The Commission plans to consider the fuel-tax proposal next year with rates starting in January 2013.

COPENHAGEN – COP-15 ON CLIMATE CHANGE

On Dec. 7, 2009, delegates from some 190 countries, plus thousands of other participants, converge on Copenhagen, Denmark, for the international climate change meetings to work out details aimed at an agreement that will succeed the Kyoto Protocol after it expires in 2012. The official name of the climate change negotiations taking place is the United Nations Framework Convention on Climate Change – 15th Conference of the Parties. The 12-day conference is structured to review compliance with the existing climate change treaty, make decisions for practical and effective implementation, and allow ad hoc working groups and multiple side events to occur in parallel with the official negotiation sessions.

High-level members of participating national governments, including presidents, ministers and similarly senior officials, attend and address the conference. U.S. President Barack Obama is to address the conference, as well as various other heads-of-state, including China Prime Minister Wen Jiabao. Despite these high-level attendees, the Copenhagen negotiations are unlikely to result in any final treaty that establishes binding greenhouse gases (GHG) emissions limits to succeed the Kyoto Protocol targets. The most likely outcome is a "political declaration" on climate change response. Politically, the COP-15 seeks clarity on four key issues:

- ambitious emission reduction targets for developed countries;
- appropriate national mitigation actions for developing countries;
- additional financial and technological support for adaptation and mitigation; and
- acceptable and effective institutional framework for governance systems that address the needs of developing countries.

In light of economic realities still facing many countries, the real outcome is likely to be modest.



National Consultation Workshop on Clean Fuels and Vehicles



Source: CAI-Asia Center

Vietnam Clean Fuels & Vehicles Workshop Develops Roadmap

(continued from p5) surveillance of product quality is an important element of compliance with standards.

Mr Bui Ngoc Duong, Refinery Board of the Vietnam Petro Corporation, provided details on current fuel production and supplies in the country. He reviewed the design and product outputs for the Dung Quat Refinery that came online this year. He also presented plans being considered for upgrade projects at the refinery to achieve Euro 4 and 5 equivalent product specifications. He noted other infrastructure needs for higher quality gasoline, such as storage facilities and retail filling stations.

Prof Pham Ngoc Dang, Vietnam Clean Air Partnership, reviewed current air quality conditions in the country's urban centres. Rap-

id urbanization and increasing fuels use for transportation impacts the local and regional economy, energy supplies and demands and environmental conditions. These impacts support the need to develop a sound roadmap for cleaner fuels and vehicles for Vietnam.

The open forum conducted during the workshop lead to consensus that Vietnam work towards accelerated efforts to reduce transport-caused air pollution. The work plan being developed would recommend advancing from current Euro 2 equivalent standards to the Euro 4 equivalent standards by 2018. This timeline would allow domestic refinery upgrades to take place for producing the higher quality fuels. The draft roadmap and work plan will be offered as a recommendation to relevant government agencies for further consideration with stakeholders.

Upcoming Conferences & Events

ACFA/GCC Fuels Quality Technical Workshop

13 Dec 2009
Doha, Qatar

2nd Middle East Refining Conference

22-23 Feb 2010
Bahrain

3rd Indo Oil, Gas & Power Conference

3-4 Mar 2010
Indonesia

Energy World Expo 2010

10-13 Mar 2010
Mumbai, India

7th Middle East Refining & Petrochemicals Conference

24-26 May 2010
Bahrain