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# Indonesia Gears Up for Better Fuel and Air Quality

Realizing the need to reduce emissions that better aligned with other countries in the world, Indonesia's Ministry of Environment has set up emission standards equivalent to Euro II for light duty vehicles that were implemented beginning in 2006. Based on progress made thus far, the country is now planning to leapfrog to Euro IV-equivalent emission standards by 2012 for new model vehicles and two years later for the existing models. In 2005, motorcycles and cars accounted for 74.8% and 14.4% of the total vehicle fleet respectively.

To meet the national emission standards, a joint cooperation is needed between the Ministry of Energy and Mineral Resources, national oil company Pertamina and the auto industry. The Ministry of Energy and Mineral Resources through its Directorate General of Oil and Gas establishes fuel quality and performance specifications. The fuel specifications are classified under Public Service Obligation (PSO) and non-PSO. Fuels under PSO include automotive diesel, gasoline and kerosene. At this time, Pertamina is the only oil company in the country classified under the PSO, which grants the company authorization to sell subsidized fuel to the public. Private oil companies are classified under non-PSO requirements and only allowed to sell non-PSO fuels. Pertamina has the privilege to sell both PSO and non-PSO fuels to the public.

**Table I: Select Indonesian Gasoline Specifications**

Property	Grade	Grade	Grade	Test Method
RON, min	88	91	95	ASTM D 2699-86
Sulphur, ppm, max	500	500	500	ASTM D 2622-98
Lead, g/l, max	0.3/0.013	0.013	0.013	ASTM D 3237-97
Benzene, vol%, max	-	5	5	ASTM D 4420-94
Aromatics, vol%, max	-	50	40	ASTM D 1319-99
RVP @ 37.8°C, kPa, min-max	69 (max)	45-60	45-60	ASTM D 323
Oxygen, wt%, max	2.7	2.7	2.7	ASTM D 4815-94a
Oxygenates, vol%, max	Where oxygenates are used, ethers are preferred.			ASTM D 4086

Source: International Fuel Quality Center, MIGAS, 2008

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Currently, three grades of gasoline are marketed in the country, namely RON 88, 91 and 95 grades. Only RON 88 gasoline is classified under the PSO. Although the gasoline specifications still allow leaded additives, leaded gasoline has not been available in the marketplace since 2006. National oil company Pertamina has replaced lead with a High Mogas Octane Component (HOMC) to make up loss from lead removal. The maximum sulphur limit for all grades of gasoline is currently set at 500 ppm. Table I presents some of the key gasoline specifications and test methods applied currently in Indonesia.

Although at this time the government sets a max sulphur limit of 500 ppm for gasoline, Pertamina produces gasoline with a maximum sulphur content of 200 ppm in their refineries, with an average RON 88-89. As part of the government's plan to move to cleaner fuel and align with the Ministry of Environment's target to leapfrog to Euro IV compliant gasoline, Pertamina is working on plans to upgrade their refinery operations to meet the requirements. The refinery upgrading projects are expected to be completed during the 2014 to 2016 time-period. Furthermore, Pertamina has announced plans to build two new grass-roots refineries capable of producing Euro IV compliant fuels. *(Continued on p3)*

CLEAN AIR THROUGH CLEAN FUELS



## Expert Talk

# Interview with Mr Ade Palguna from Ministry of Environment, Indonesia



Mr Ade Palguna, Assistant Deputy for Vehicle Emissions Pollution Control, Ministry of Environment, Indonesia, is responsible for national level programmes for pollution control from mobile sources. He has held various positions at the Ministry, including for the national environmental laboratory, program development, policy coordination, and economic valuation and environmental funding and incentives. He

acquired his degree in social politics and international relations from Universitas Jayabaya in Jakarta.

**Q: Could you give us a brief overview about the Ministry of Environment and describe your functions and key responsibilities within the Ministry?**

The Ministry of Environment of Indonesia is responsible for the overall environmental quality across the country. The Ministry's primary mission is to improve environment quality through the application of sound environmental governance in order to reach sustainable development of the country. Currently, I am responsible for regulatory programmes to control vehicle emissions. In the future, I will take on responsibilities for controlling emissions from all transportations modes, not only on-road vehicles, including noise control efforts as well.

**Q: Significant changes such as environmental issues have been occurring in the oil industry and particularly in the Asia Pacific region in recent years. Can you tell us how the Ministry is adapting to these developments?**

The Ministry has been following environmental issues on fuels very closely. Currently, Indonesia is broadly implementing Euro 2 emission standards for fuels and vehicles and plans to leapfrog to implement Euro 4 emission standards in the next few years. However, we cannot work alone in setting up this policy. It will do no good to anyone if the Ministry applies and enforces Euro 4 emission standards without considering other issues such as fuel availability and concerns from the auto industry. So we are continuing to work on the best approach for successful implementation.

**Q: Indonesia continues to move forward with emissions standards and transportation fuel quality improvements to further align with regional and international standards. What are some of the key improvements recently accomplished and what has the national oil company done to meet these requirements?**

We recently revised our emission standards that aligned with Euro 2 standards to be more accurate. Previously we only allowed the use of reference fuel for emissions test procedure. However, the reference fuel is not available in the domestic market. Consequently, the revised emissions standards – Minister of Environment decree no. 4/2009 – allows the use of unleaded RON 95 gasoline and diesel with cetane number 51 with maximum sulphur content at 500 ppm to be used for emissions test procedure.

In line with the Euro 2 emissions standards, Pertamina has been marketing Euro II compliant fuels with 500 ppm sulphur since 2006. Presently, the availability of these fuels is limited to several cities in Java Island and some cities near the refineries. We are working with refineries to expand the availability of these fuels.

**Q: Expanding urbanization in Indonesia brings with it greater vehicle numbers and fuel demands, as well as air quality impacts. What has the country done to reduce emissions?**

We promote the use of alternative fuels such as LPG and CNG by distributing conversion kits freely to public transport companies, starting from Jakarta, Surabaya, Palembang and Yogyakarta. The LPG promotion just started this year and we are seeing good progress. From the policy side, we plan to mandate that emission testing results to be attached with vehicle tax renewals. This actually is an implementation of the new environmental law that stated motorists could face a maximum of three years' imprisonment and fines up to Rp. 3 billion (US\$310,000) unless they meet the national vehicle emissions standards. This effort will further increase compliance with emissions requirements.

**Q: Indonesia has successfully phased out leaded gasoline in the market. What are the next steps of improving fuel quality to further align with the emissions standards?**

As we plan to implement Euro IV emissions standards over the next few years, we expect that Pertamina can also supply the market with Euro IV compliant fuels at the same time, helping to advance further fuel quality.

**Q: The Clean Air Initiative for Asian Cities (CAI-Asia) has developed a report "A Road Map for Cleaner Fuels and Vehicles in Asia," in what ways can some of the recommendations from the CAI-Asia be adapted for Indonesia?**

The recommendation from the report is adaptable. However, every country is unique and hence the adaptation should consider Indonesia's specific conditions. For us here in Indonesia, we need an integrated solution to achieve better and cleaner fuels and vehicles. It

*(Continued on p3)*



## Indonesia Gears Up for Better Fuel and Air Quality

(continued from p1) Indonesia imports more than 40% of its petroleum demand and has been a net crude oil importer for a while. This resulted in the postponement of its OPEC membership pending further government action to reverse this condition. Consequently, the government has been trying to reduce its dependency on petroleum product imports by utilizing agricultural resources.

As the largest palm oil producer in the world, along with Malaysia, Indonesia aims to use this matured industry to reduce petroleum products import as well as increase palm oil absorption into fuels markets. In September 2008, the Indonesian government mandated the usage of biofuels through the Minister of Energy and Mineral Resources decree no. 32/2008. The decree mandates 1 vol% biodiesel (B1) to be blended with PSO diesel in the transportation sector in several cities from October to December 2008, which will continue and extend to the non-PSO diesel until the end of 2009. The blending requirement will then increase to B2.5 and B3 for PSO and non-PSO diesel respectively starting from January 2010. Furthermore, the blending level will increase in stages until finally reaching B20 for both PSO and non-PSO diesel by 2025.

The decree also mandates 3 vol% ethanol (E3) to be blended with RON 88 gasoline and 5 vol% ethanol (E5) with non-PSO gasoline from October to December 2008. The blending was decreased to E1 for the PSO gasoline and remained the same for the non-PSO gasoline from January 2009. The blending level is targeted to increase in stages to E3 and E7 for PSO and non-PSO gasoline respectively in January 2010 and finally reaching E15 for both PSO and non-PSO gasoline by 2025. Table 2 summarizes Indonesia's current and future biofuels mandate.

Indonesia's government and transport fuel producers and providers recognize the importance of improving fuel quality as integral to reducing vehicle emissions and helping improve air quality. The cooperative steps being taken demonstrate the progress being made to achieve these goals.

**Table 2: Biofuels Mandate in Indonesia (2008-25)**

Type		Oct-Dec 2008	Jan. 2009	Jan. 2010	Jan. 2015	Jan. 2020	Jan. 2025	Remarks
PSO	Gasoline	3%*	1%	3%	5%	10%	15%	From total fuel demand
	Diesel	1%*	1%	2.5%	5%	10%	20%	
Non PSO	Gasoline	5%*	5%	7%	10%	12%	15%	
	Diesel	-	1%	3%	7%	10%	20%	

Note: \* only in several cities

Source: Ministry of Energy and Mineral Resources, October 2008

## Interview with Mr Ade Palguna from Ministry of Environment, Indonesia

(continued from p2) should be a combination of fuel subsidy phase out, fuel quality improvement, reliable and available public transportations, public education, and other coordinated programmes.

**Q: Finally, what challenges do you see for your country to improve air quality?**

As long as there is fuel subsidy, the consumer will choose subsidized fuel over cleaner fuel. Therefore, the first challenge is to phase out fuel subsidy. This requires strong will on the part of the government and extensive public education efforts about why this is needed. We need to educate the public about the importance of clean fuels, clean vehicles and clean air. Perhaps a comparison between health benefits and clean fuel cost will be a good campaign for the public.

The other challenges are updating and advancing the rules and laws with regard to air quality standards. These also need to be updated to closer alignment with regional and international developments.

### Upcoming Conferences & Events

**ACFA/GCC Fuels Quality Technical Workshop**  
13 Dec 2009  
Qatar, Doha

**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



## 2nd Asia Pacific Refining Summit - Exploring Pioneering Solutions

Despite the past year of economic downturns and uncertainty, refiners in the Asia-Pacific region anticipate over the next year the return of demand growth that can bring them unique opportunities – provided they explore pioneering solutions to optimize production and meet product quality and stricter environmental standards. This was the general theme of the 2nd Annual Asia-Pacific Refining Summit held last month in Hanoi, Vietnam.

The Summit provided a four day forum for representatives from refining facilities, oil and gas producers, government agencies, research institutes and allied non-governmental organizations to present and discuss regional and global issues that affect operations, markets, and future outlooks. Mr Nguyen Anh Duc, deputy general director of the Vietnam Petroleum Institute, chaired the summit and welcomed participants from around the world. Several of the keynote addresses included:

- Mr Truong Van Tuyen, vice president of PetroVietnam and head of Dzung Quat Refinery project management, about commissioning this state of the art refinery and build-up to full capacity this year;
- Mr Maurice Bannayan, senior vice president for operations and technologies with Reliance Industries, about effective production strategies being implemented at the Jamnagar refinery and petrochemical complex;
- Mr Maizar Rahman, commissioner of Pertamina, about downstream challenges being overcome in Indonesia; and
- Mr Heru Sutrisno, vice president for strategic and business development at Pertamina, about building grassroots refinery projects to meet expanding demands.

Mr Clarence Woo, executive director of the Asian Clean Fuels Association, presented on “Clean Fuels Trends in Asia and Challenges for Refiners.” He noted the global drivers for fuel quality change in the region – namely, more income, more vehicles, more travel, and thus bigger demand. Transport energy use, along with GDP, will grow the most in the Asia region on percent per year basis.

He indicated that fuel quality standards for the region are not homogeneous, but generally aim to align fuel and emissions requirements with EU specifications. The outlook for Asian fuel quality will remain focused on on-road engines for lower sulphur levels and reduced aromatics/benzene and olefins contents in gasoline. He further indicated that more attention will be given to carbon-fuel links and greenhouse gases reduction measures. Finally, Mr Woo presented a

strategy for refiners to ensure cleaner fuels based on lower sulphur levels and high quality blending components. Refiners will continue to face challenges, like stricter environmental standards, market competition, higher capital and operational costs, and alternative/biofuel mandates, which need to be viewed as business opportunities.

Mr Mastura Hj Jarani, oil business director for Petronas, presented on “Euro @M in Malaysia: Petronas Implementation Strategies.” As directed by the Malaysian Government, the five refineries located in the country are implementing strategies to comply with Euro II-equivalent product quality specifications by September 2009. The primary efforts being undertaken include modification of production units, improvements to unit operations, and fuel flushing and blending adjustments. Mr Jarani reviewed some of the challenges to implementing the Euro II-equivalent standards, including:

- investments required for fuel quality improvements,
- ensuring compatibility with existing storage, handling, and distribution facilities,
- compatibility with current vehicle fleets,
- supply availability from local production and imports,
- pricing adjustment for the market, and
- quality monitoring to assure compliance.

Mr Jarani was pleased to report that the Euro II-equivalent standard was smoothly and successfully implemented in Malaysia within the timeframe directed.

Mr Dinh Van Ngoc, with Binh Son Refining and Petrochemical Company, Ltd. (BSR), spoke on the “The Leading Roles in Environmental Protection and Advance Technology in Vietnam.” He explained the company structure and business focus that includes ownership of the new Dzung Quat Refinery. The product quality from the refinery current meets the Euro IV-equivalent for sulphur specifications under 10 ppm levels. Mr Dinh highlighted the company’s commitment for safe operational practices and strong environmental protection, and efforts to optimize refinery outputs and product quality. He also indicated BSR’s interests to form long-term partnerships that explore new projects and services.

Upon completion of the formal summit programs, participants had the opportunity to tour the Dzung Quatt Refinery. This highly complex and efficient refinery includes sophisticated automation process control systems to ensure operational excellence and advanced technologies for the production of clean fuels.



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# Status of Gasoline Lead Phase-Out

Gasoline lead phase-out is expected to essentially be completed globally within the next few years. The phase-out in countries that still have leaded gasoline will not have much effect on the global octane requirements, as was the case in past years. Generally, the phase-out of leaded gasoline has been taking place at a rapid pace since 2000.

According to a new review by the International Fuel Quality Center (IFQC, part of Hart Energy Publishing LLC), as of mid-2009, fewer than 20 countries are still using leaded gasoline. This represents less than 1% of the global gasoline pool. The remaining use of leaded gasoline is mainly concentrated in developing countries where the existing refining infrastructure is often limited. Figure 1 compares the status of lead phase-out between 1996 and 2009.

Most of Sub-Saharan African countries have complied with the World Bank's Clean Air Initiative in completing their lead phase-out program by 2006. While these countries have formally removed lead, one challenge that remains is the sale of off-specification and illegal fuel containing lead in some markets. A few countries in northern and northwestern parts of Africa have not yet completed the lead phase-out process, including Algeria, Morocco, Tunisia and Western Sahara. In Algeria, unleaded gasoline accounts for about 20% of the gasoline market share. The phase-out is ongoing in Morocco, and Tunisia has reportedly progressed to unleaded gasoline (however, not confirmed).

In the Americas, only Cuba still uses leaded gasoline. Because of the lack of investment to upgrade local refineries, it is highly unlikely to complete phase-out anytime soon.

In the Asia-Pacific region, with Indonesia's phase-out starting in 2006, only Burma and presumably North Korea are still using leaded gasoline. Although legislation in both Cambodia and Nepal allows for the use of leaded gasoline, only unleaded product is being supplied to these countries.

Several countries in the European region continue to have leaded gasoline but most are working to achieve phase-out. Macedonia, FBR reportedly achieved unleaded status this year. Montenegro is in the process of completing lead phase-out efforts by selling off remaining stocks of leaded gasoline. Bosnia and Herzegovina have plans for phase-out during 2010. Leaded gasoline makes up about 50% of the Serbian market. Completion of any phase-out in Serbia is dependent on refinery upgrades.

In the Middle East, Afghanistan, Iraq and Yemen currently allow leaded gasoline. Yemen has introduced unleaded gasoline to the market and is working to achieve lead phase-out this year. Egypt likewise has small amount of

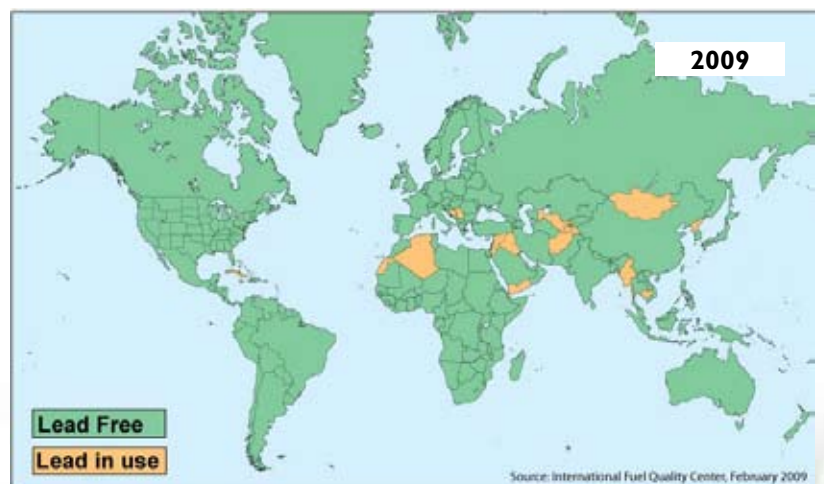
leaded gasoline still sold, although standards call for just unleaded gasoline.

For the Commonwealth of Independent States (CIS), most countries have phased out leaded gasoline with the exception of Tajikistan and Uzbekistan, which both have only a very small portion of leaded gasoline in their markets. As Uzbekistan completes upgrading of its refineries, and since Tajikistan imports fuel from Uzbekistan, both countries should become unleaded at the same time.

Some countries noted to have leaded gasoline may have issued standards for only unleaded but full implementation may lag behind real marketplace conditions. Similarly, there may be some countries that have moved to only unleaded gasoline being sold but have not yet changed specifications.

As the global phase-out of leaded gasoline is accomplished over the next few years, other fuel quality improvements, like sulphur and benzene content reductions, and fuel performance characteristics, like increased octane and driveability, will be more pronounced for emissions control. Other issues, such as fuel efficiency and greenhouse gases, will also become more important in many regions.

Figure 1: Lead Phase-Out Status – 1996 and 2009



Source: IFQC, 2009



## Fuels Industry Updates

### INDONESIA GOVERNMENT OPENS DOMESTIC PSO FUEL SALES

The Indonesian government recently decided to end national oil company Pertamina's status as the sole marketer for subsidized fuel (PSO - public service obligation) in the country starting from 2010. As of October 2009, the government through the Downstream Oil and Gas Regulating Agency (BPH MIGAS) under the Ministry of Energy and Mineral Resources has appointed three private companies to market PSO fuels alongside Pertamina, namely PT. Aneka Kimia Raya Corporindo Tbk (AKR), PT. Shell Indonesia and PT. Petronas Niaga Indonesia.

The government set early December 2009 as the due date for these private companies to establish their infrastructure. Although these private companies will be eligible to sell PSO fuels at their refueling they will account for only 0.37% of the national PSO fuel demand. PT. Shell Indonesia will be selling PSO fuels at one station, and PT. Petronas will sell PSO fuels at four stations in Medan, North Sumatera. AKR will provide the PSO fuels at 34 of their outlets (which are not refueling stations) in 10 cities on Sumatera Island and two cities on Borneo Island.

### USEPA STUDY SHOWS STRICTER PARTICLES STANDARDS CAN REDUCE HEALTH RISKS

A U.S. Environmental Protection Agency (USEPA) report notes that tightening fine particulate matter (PM) annual and daily standards could significantly reduce the risk of death from long-term exposure to the pollutant. The report, Risk Assessment to Support the Review of the PM National Ambient Air Quality Standards – External Review Draft, evaluates the health risks of PM exposures from 15 cities. The agency estimates that 1.7% to 6.7% of all deaths in 2007 in these cities were attributable to long-term exposure to fine PM. According to the assessment lowering the annual and 24-hour national air quality standards for PM<sub>2.5</sub> could reduce the risk of mortality by as much as 89% in some urban areas.

In 2006, the USEPA lowered the daily standard for PM<sub>2.5</sub> to 35 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) from the previous level of 65  $\mu\text{g}/\text{m}^3$  (the annual standard is 15  $\mu\text{g}/\text{m}^3$ ). Using monitoring data from 2005 to 2007, the risk assessment found long-term exposure to fine particles was linked to an increased risk of death from heart disease, cardiovascular disease and lung cancer. The agency's assessment estimated that further lowering of

the annual standard to 12  $\mu\text{g}/\text{m}^3$  combined with a 24-hour standard of 30  $\mu\text{g}/\text{m}^3$  would decrease the risk of death from long-term exposure to particulates by between 12% and 89% for 14 of the urban areas studied. The study noted that health risk and mortality data on short-term exposures were not as comprehensive as those available for longer-term exposures. The USEPA has also issued reports on the impacts of PM on visibility and contribution to climate change impacts. Access to the USEPA reports is found at [http://www.epa.gov/ttn/naaqs/standards/pm/s\\_pm\\_2007\\_risl.html](http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_2007_risl.html)

### BEIJING TIGHTENS VEHICLE EXHAUST CONTROLS

Starting from 1 October 2009, China's Ministry of Environmental Protection has restricted gasoline motor vehicles outside of Beijing from traveling along or entering the Sixth Ring Road (city's outermost highway ring) if they fail to meet National Emission Standard I. Diesel-powered vehicles must comply with National Emission Standard III or better to operate within the same area. Traffic police are monitoring vehicles and conducting checks on major road systems leading into Beijing to ensure high emitting vehicles remain outside the city. According to Ministry of Environment officials, high-emission cars and trucks constitute only about 28% of all vehicles, however they produce 75% of the pollutant emissions. Since March 2008, Beijing has been enforcing Standard IV (Euro 4-equivalent) requirements for new cars. Other major cities are also moving to equivalent standards to reduce vehicle exhaust and evaporative emissions because of continued concerns about urban air pollution.

### NIPPON OIL BUILD'S JAPAN'S FIRST ETBE UNIT

Nippon Oil Corp. recently reported that it has completed construction of its first facility to produce ethyl tertiary-butyl ether (ETBE) that uses bioethanol feedstock. The production unit is located at the Negishi refinery in Yokohama, and will have ETBE output of 100,000 kL per year (1,700 barrels per day) once commercial scale operations begin later this year.

Japanese oil companies began test-selling ETBE-blended gasoline at select refueling stations around the Tokyo area in 2007. Government mandated targets aim to have bio-based fuel blends account for up to 20% of the country's annual gasoline demand.