

# Overview of the Asian fuel ethers markets and opportunities for Europe

**World Biofuels Markets Congress  
Rotterdam, The Netherlands**

**March 22-24, 2011**

## Who is ACFA?

*Working closely with fuel policymakers, regulators and stakeholders in the fuel industry, ACFA supports and promotes the use of **cleaner automotive fuels** based on principles of **sound science, cost efficiency and sustainability of the environment.***

## Agenda

- **A bit of history**
- **Where is Asia now:**
  - in gasoline quality
  - in fuels ethers usage
  - in bio-ethers development
  - Japan: bio-ETBE biofuel of choice
- **Opportunities for Europe**

## A bit of history

- **Early 90's: development of clean gasoline and fuel ethers in Asia.**
  - **Two poles : Middle East and Asia/Pacific.**

### **Middle East:**

- **promoted by local MTBE producers;**

### **Asia/Pacific:**

- **driven by real necessity of better clean air (Bangkok and Jakarta being the cities among the ones with the worst air quality in the world).**

## A bit of history

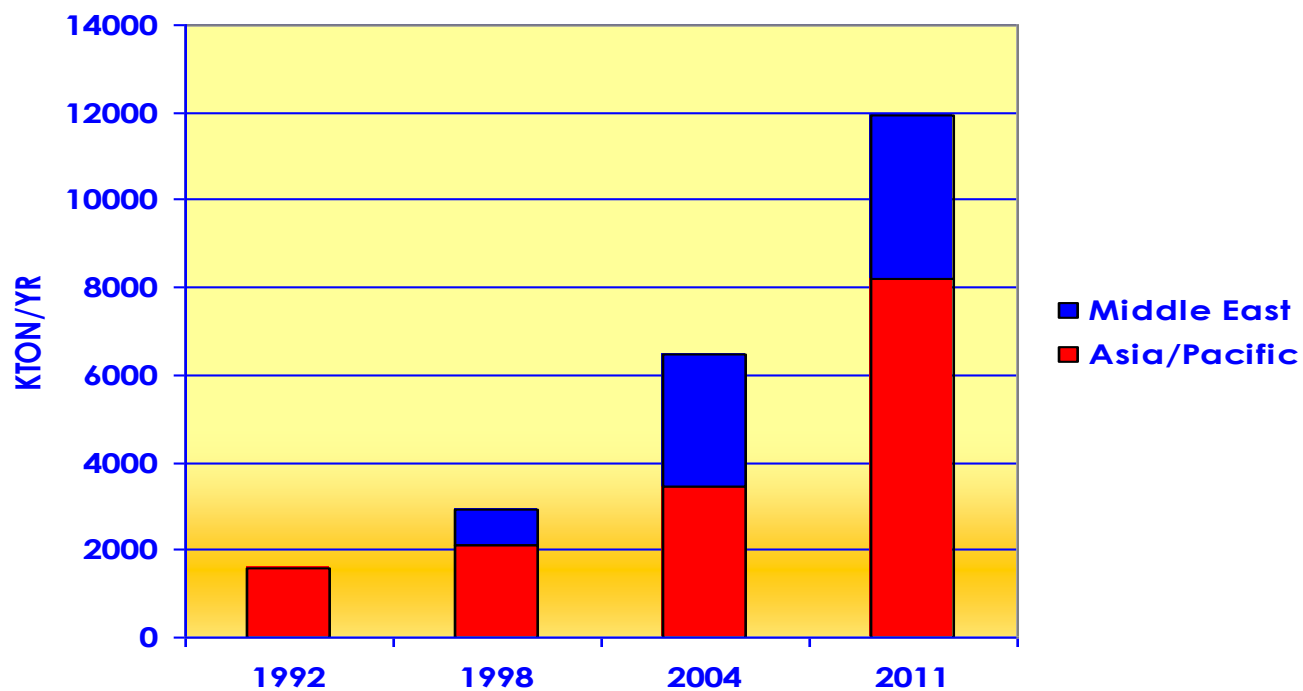
- **MTBE begun to be largely produced and consumed in Saudi Arabia, South Korea and China and commonly imported in Taiwan, Thailand, Indonesia.**
- **In 1992 the MTBE consumption in Asia (1.6M ton) was only 16.5% of total world demand(\*).**
- **In 2011 the expected demand of MTBE+ETBE in Asia is at 11.9M ton, 56.4% (\*\*) of world demand.**

(\*) Source: DeWitt & Co., Inc.

(\*\*) Source: JJ&A

## A bit of history

### FUEL ETHERS DEMAND IN ASIA 1992-2011



Sources: DeWitt & Co, Inc. 1995, 1999, 2006-2007 JJ&A 2010

## Where is Asia now in gasoline quality

- Despite the undoubted progress made, gasoline quality in many Asian countries is still far away from being satisfying.
- Still 13 over 15 of the world's most polluted cities are in Asia.
- Therefore, the way to clean fuels in Asia is still long.

## Where is Asia now in gasoline quality

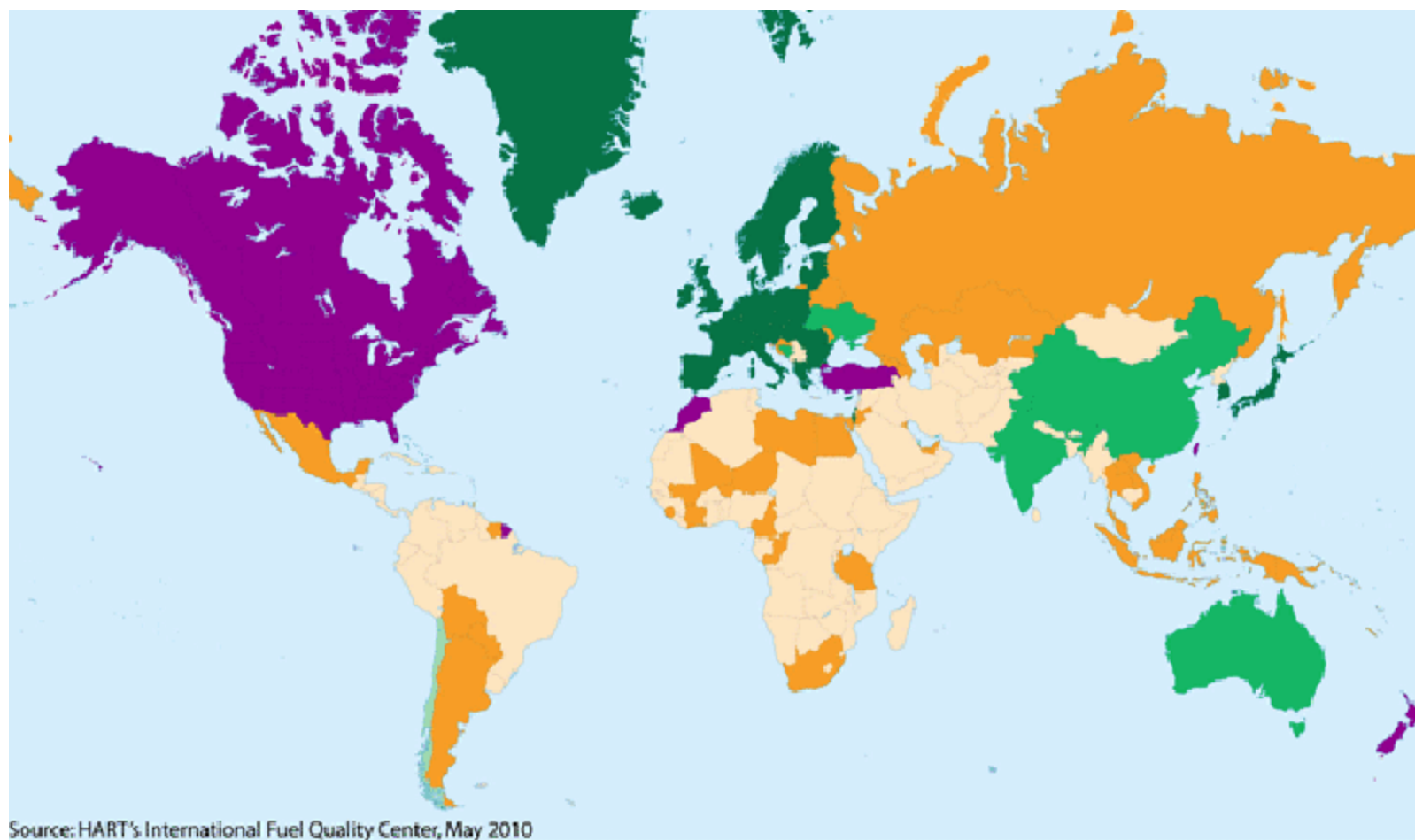
- **Main reasons:**
  - lower level of complexity of Asian refining system compared to Europe and United States.
  - somewhere the clean fuels process has yet to start: Iraq, Myanmar, Palestine, Yemen still have leaded gasoline.
  - only five Asian countries have reached 50 ppm sulphur content or less: Hong Kong, Japan, Singapore (diesel only), South Korea, Taiwan.
  - barrier to free trade (including fuel ethers trade) caused by adulteration and governmental subsidized prices.



## Where is Asia now in gasoline quality

- **Summarizing:**
  - Asia has a variegate reality;
  - there is still lead around, although in marginal countries;
  - sulphur content is a big issue;
  - the other quality key parameters (olefins, benzene, aromatics contents) are quite good in North Asia but somewhat poor in Southeast Asia;
  - the biggest Asian countries, China and India, are going to have Euro III standard next year.

## Global Gasoline Sulphur Limits



Source: HART's International Fuel Quality Center, May 2010

10 ppm

30 ppm

30 - 80 ppm

150 ppm

200 - 600 ppm

1,000 - 2,500 ppm

## Current Select Gasoline Standards (North Asia)

<b>GASOLINE</b> (selected specification)	<b>Japan</b>	<b>Taiwan</b> (01/2007)	<b>Hong Kong</b> (01/2005)	<b>S. Korea</b> (01/2009)	<b>China</b> (12/2009)
<b>RON</b> -	<b>89/96</b>	<b>92/95/98</b>	<b>95</b>	<b>91/94</b>	<b>90/93/97</b>
<b>Aromatics</b> vol%, max	-	<b>36</b>	<b>35</b>	<b>24**</b>	<b>40****</b>
<b>Olefins</b> vol%, max	-	<b>18</b>	<b>18</b>	<b>18</b>	<b>35</b>
<b>Benzene</b> vol%, max	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>0.7</b>	<b>1.0</b>
<b>Oxygen</b> wt%, max	<b>1.3</b>	<b>2.7</b>	<b>2.7</b>	<b>2.3</b>	<b>2.7</b>
<b>Sulphur</b> ppm, max	<b>10</b>	<b>50</b>	<b>50</b>	<b>10</b>	<b>150</b>
<b>RVP</b> kPa	<b>65/93*</b>	<b>60</b>	<b>60</b>	<b>60/96***</b>	<b>72/88*</b>

\* Summer/winter

\*\* Either aromatics 24 vol% max and olefins 16 vol%, or aromatics 21 vol% max and olefins 19 vol% max.

\*\*\* Jun-Aug 60kPa; Oct-Mar 96kPa

\*\*\*\* If total aromatics and olefins content is controlled, the maximum allowable aromatics limit is 41 vol%.

## Current Select Gasoline Standards (Southeast Asia)

<b>GASOLINE</b> (selected specification)		<b>Vietnam</b> (01/2007)	<b>Indonesia</b> (2006)			<b>Thailand</b> (2009)	<b>Philippines</b> (2005)	<b>Malaysia</b> (2009)	<b>Singapore</b>
<b>RON</b>	-	<b>90/92/95</b>	<b>88</b>	<b>91</b>	<b>95</b>	<b>91/95</b>	<b>81/93/95</b>	<b>95/97/99</b>	<b>92/95/98</b>
<b>Aromatics</b>	vol%, max	<b>40</b>	no limit	<b>50</b>	<b>40</b>	<b>35</b>	<b>35</b>	no limit	report
<b>Olefins</b>	vol%, max	<b>38</b>	no limit	no limit	no limit	no limit	no limit	no limit	report
<b>Benzene</b>	vol%, max	<b>2.5</b>	no limit	<b>5.0</b>	<b>5.0</b>	<b>3.5</b>	<b>2.0</b>	<b>5.0</b>	report
<b>Oxygen</b>	wt%, max	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>11*</b>	<b>2.0</b>	no limit	report
<b>Sulphur</b>	ppm, max	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>
<b>Lead</b>	g/l, max	<b>0.005</b>	<b>0.3</b>	<b>0.013</b>	<b>0.013</b>	<b>0.013</b>	<b>0.005</b>	unleaded	<b>0.013</b>
<b>RVP</b>	kPa	<b>43-75</b>	<b>69 (max)</b>	<b>45-60</b>	<b>45-60</b>	<b>62</b>	<b>85/62</b>	<b>65</b>	report

\* Oxygenates content vol% maximum 11

## Fuel Specifications by 2012 (Asia Pacific)

### EURO V equivalent

Australia, Hong Kong, Japan, New Zealand, South Korea, Taiwan

### EURO IV equivalent

Singapore, Thailand

### EURO III equivalent

China, India

### EURO II equivalent

Brunei, Fiji, Indonesia, Laos, Malaysia, Philippines, Sri Lanka, Vietnam

### PRE-EURO or EURO I equivalent

Bangladesh, Burma, Cambodia, Nepal, Pakistan



Source: IFQC, June 2010

## Where is Asia now in fuel ethers

- China is the world's largest MTBE producer with approx 6.8M ton/yr of installed capacity at the end of 2010(\*);
- China became MTBE net importer in 2009, importing approx. 400 Kton(\*). During 2010 such figure has increased, up to 740 Kton(\*);
- Despite the announcement of new units being in construction or projected, China is likely to remain a net importer for the medium-long term.

Source: C1 Energy

## Where is Asia now in fuel ethers

- Singapore, South Korea and Taiwan are big producers and importers. Overall, their 2009 installed capacity is 1.75M ton/yr (\*) and their imports in 2009 was in excess of 800 Kton(\*).
- Malaysia owns the biggest MTBE merchant unit in Asia/Pacific, with an installed capacity close to 350 Kton/yr(\*). The country in the last few years became a medium-size MTBE importer.

(\*) Source: JJ&A

## Where is Asia now in fuel ethers

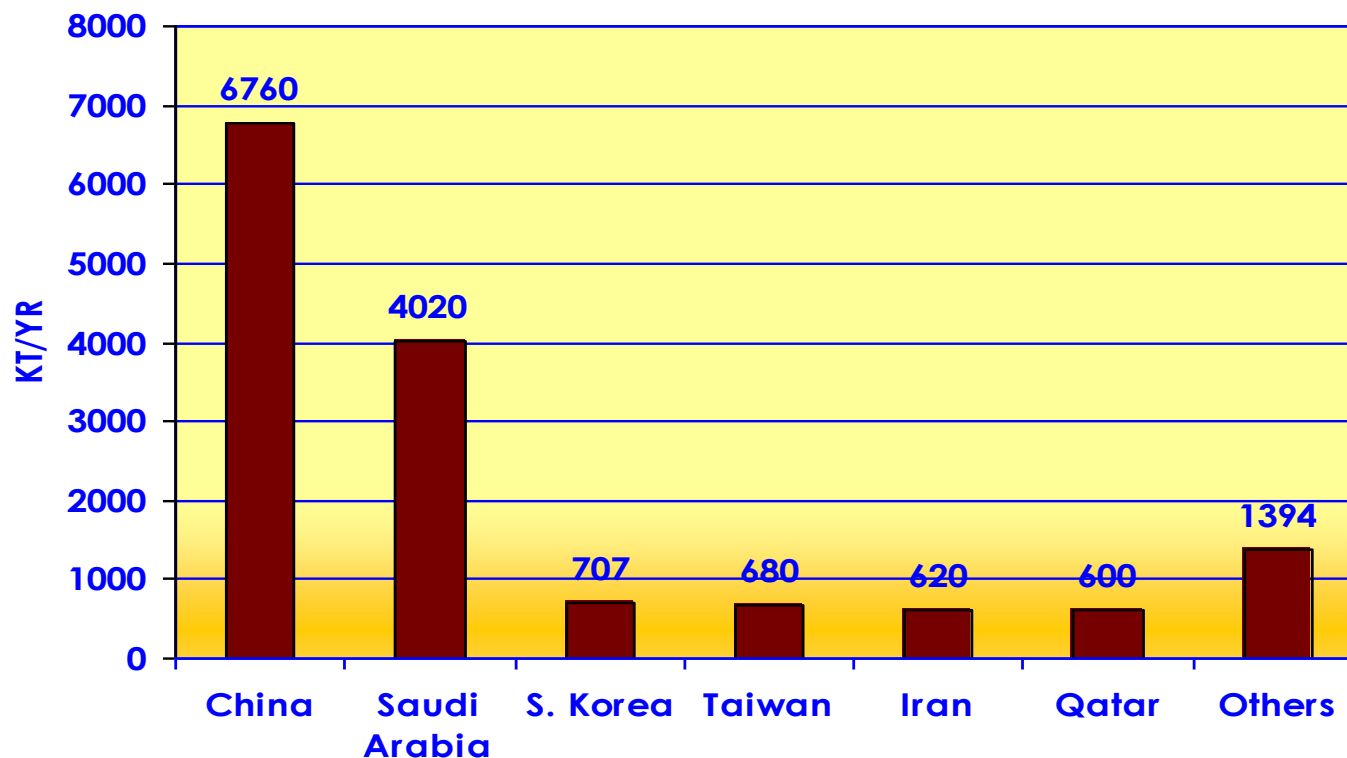
- **Saudi Arabia is the world's second largest producer;**
- **Middle East is the world's second largest MTBE production area with approx. 30% of production capacity(\*);**
- **Contrary to Asia/Pacific, Middle East is a large exporter of MTBE. It covers the excess of demand of Asia/Pacific and Europe. On the long term the supply/demand balance of the area will be more driven by the local consumption.**

(\*) Source: JJ&A



# Where is Asia now in fuel ethers

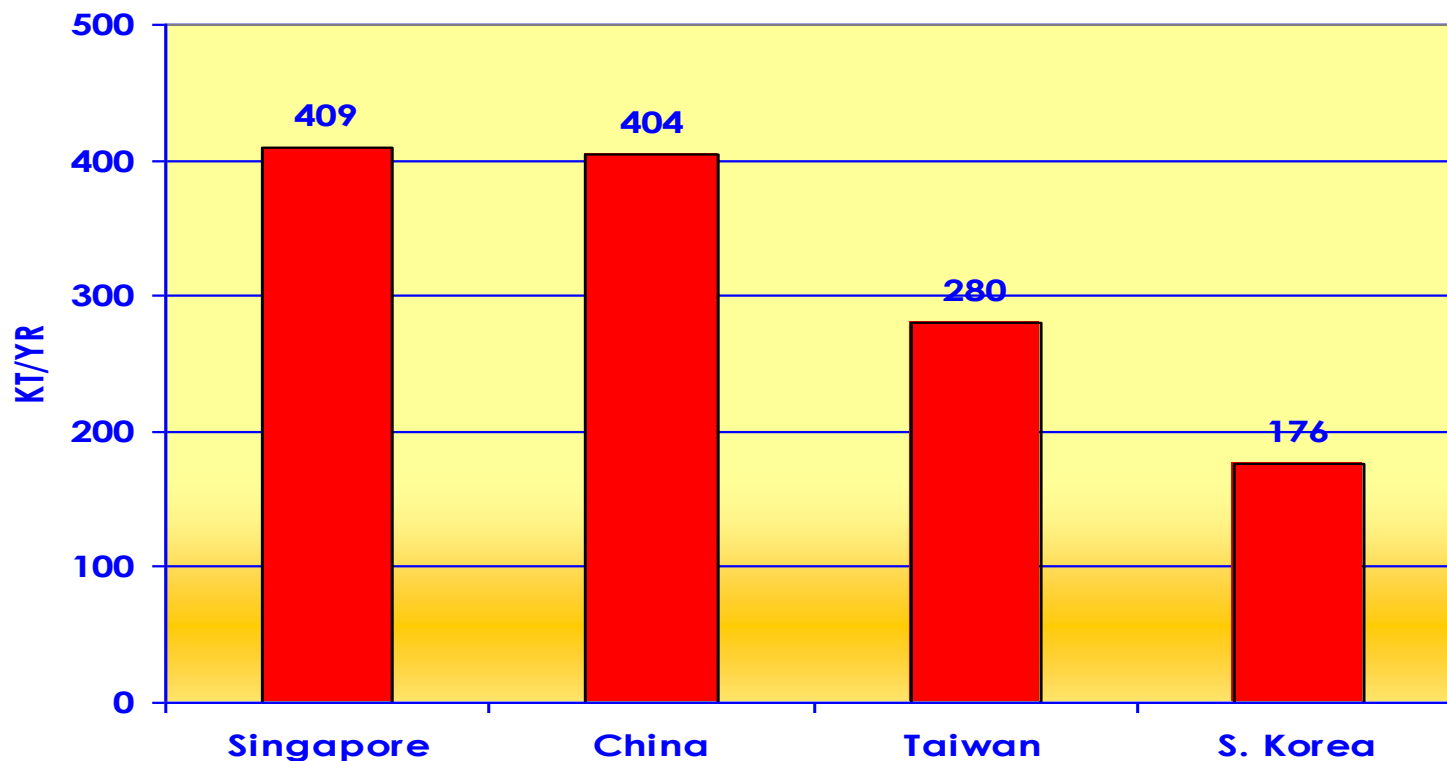
## ASIAN MTBE PRODUCTION CAPACITY



SOURCE: JJ&A 2010 and C1Energy

## Where is Asia now in fuel ethers

### 2009 MTBE IMPORT: MAIN ASIAN COUNTRIES



SOURCE: JJ&A 2010 and C1 Energy

## Where is Asia now in fuel ethers

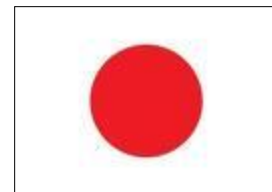
- **Summarizing:**
  - **Present fuel ethers demand is mainly concentrated in North Asia;**
  - **However, gasoline quality is worse in South-Asia an Middle East;**
  - **Therefore, there is still a big potential for fuel ethers in the entire Asia, in the North mainly driven by gasoline demand expansion and in the South and Middle East mainly by quality improvements.**

## Where is Asia now in bio-ethers

- The bio-ethers era in Asia began in Japan during 2007;
- Japanese METI and the Japanese trade association of refiners, PAJ, launched a test program of distributing gasoline containing 7% bio-ETBE in 50 gas stations in Tokio area starting April 27, 2007.
- The test program aimed to introduce a generalized blending of bio-ETBE as from 1st January 2010.

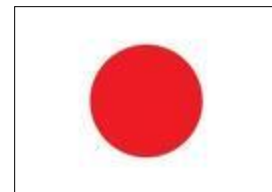
## Japan: bio-ETBE biofuel of choice

- **Main drivers towards biofuels:**
  - Lack of petroleum resources
  - Need to cut emission of GHG (Kyoto Protocol)
- **Bio-ETBE undergone rigorous evaluation before being selected as the biofuel of choice for gasoline in Japan;**
- **Most Japanese refiners prefer bio-ETBE because it requires less investment and modification on the USTs and control of the fuel quality is also easier;**



## Japan: bio-ETBE biofuel of choice

- Auto manufacturers prefer bio-ethers (over alcohols) on the basis of emissions benefits, vehicle performance and existing regulations;
- By blending 7% bio-ETBE into gasoline, a greater utilization of bio-ethanol in the production of gasoline is possible without compromising the gasoline quality.

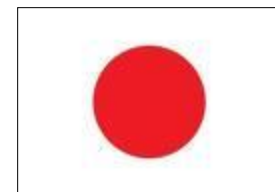


## Japan: bio-ETBE biofuel of choice

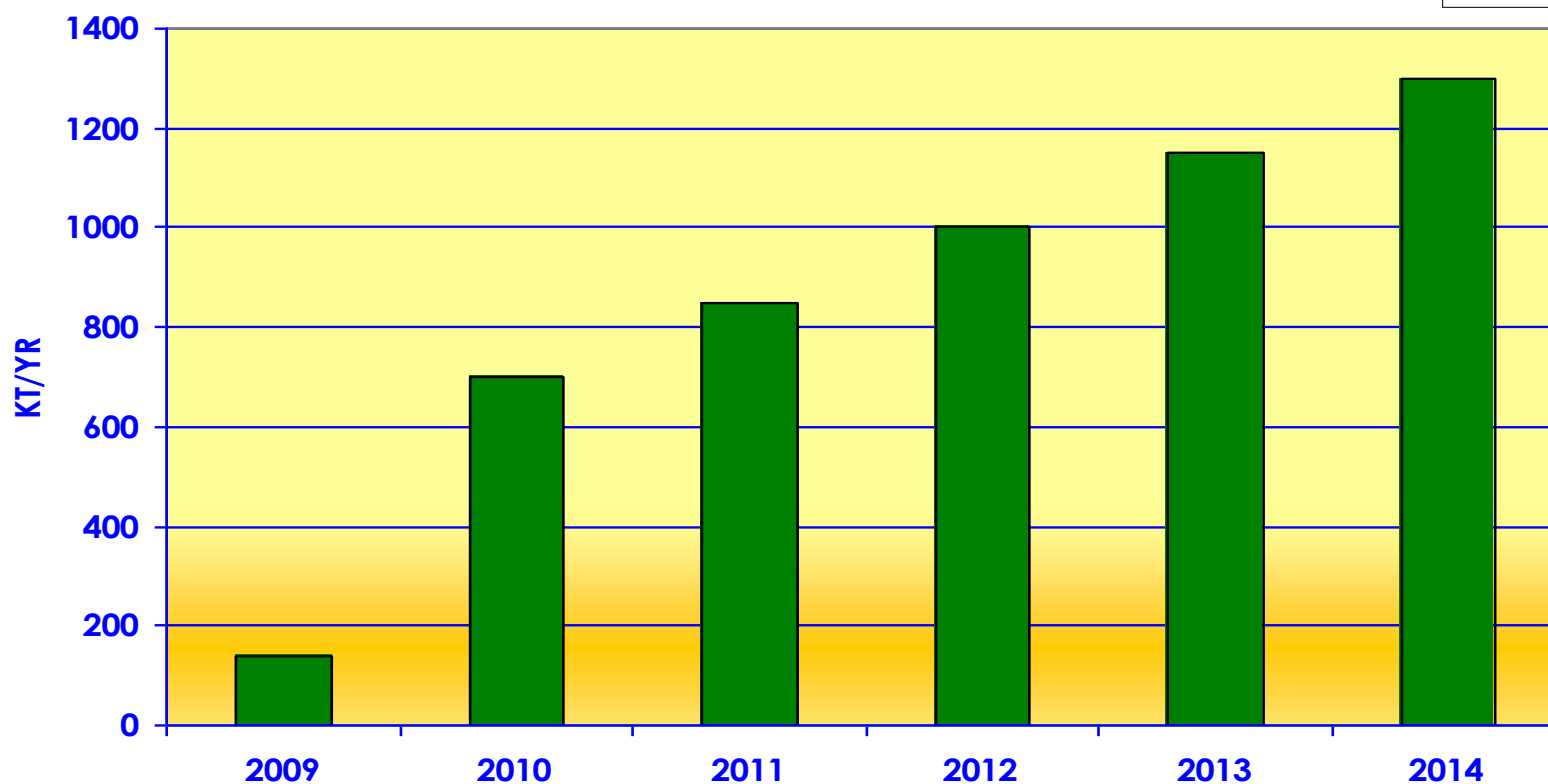
- The program was supported by an investment plan to modify for ETBE production the four existing, although idled, Japanese MTBE plants: Idemitsu Chiba, Nippon Oil Negisi, Cosmo Oil Sakai and JOMO Kashima.
- Nippon Oil unit started up in December 2010 and Cosmo Oil unit announced its start-up during 2011.
- To cover the remaining demand Japan is massively importing ETBE. Japanese ETBE demand has been estimated 700 kton during 2010 and is expected to rise gradually in the following years.



## Japan: bio-ETBE biofuel of choice



### EVOLUTION OF ETBE DEMAND IN JAPAN



SOURCE: JJ&A 2010



## Where is Asia now in bio-ethers

- So far, the Japanese way for biofuels has not been followed by any other Asian country yet. Only KPetro in South Korea is testing bio-ETBE, but it is not a national trial.
- However, PetroVietnam has shown interest in the project of a bio-ETBE unit for an approximated capacity of 150 Kton/yr in its refinery at Dung Quat.

## Opportunities for Europe

- **Investments in Asian new plants;**
- **Technology export by the European engineering companies specialized in technology for the production of fuel ethers and bio-ethers;**
- **Bio-fuel export in countries which are massive importers of bio-ETBE such as Japan ;**
- **Export of legislation principles: main Asian countries for their legislation on pollutant emissions and for fuel quality have adopted the European pattern (Auto Oil programs and Euro I, II, III etc., standards).**

# THANK YOU !