

Clean Gasoline Trends in East Asia

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ACFA

Clean Gasoline Trends in East Asia

Items:

- Asian Clean Fuels Association (ACFA): we would like to tell you more about us
- Gasoline Developments in East Asia: a snapshot of the situation
- Cost effective means of going unleaded and sulphur reduction
- Conclusions

Asian Clean Fuels Association

- Established in August-2000 as a non-profit organisation with its office in Singapore.
- Its role: to promote and advance the use of clean fuels in Asia.
- Members are largely oil and petrochemical producers.
- The use of cleaner burning fuels is considered the most logical approach to improve air quality: it is cost-effective with immediate benefits and obviates the need to introduce expensive technology.

Who are our partners?

- CAI-Asia (World Bank, ADB, others)
- Major Oil Companies
- Petrochemical Companies
- European Fuel Oxygenates Association (EFOA in EU)
- Auto-OEMs
- Other entities with similar mission-and-ambition

What have we achieved?

- ✓ Member of the 'Executive/Coordinating Council' in CAI-Asia
- ✓ Engaged with Governments, NGOs, key stakeholders on clean fuels initiatives in Asia:
 - China/Thailand/Australia/India/Indonesia (a lot of work done)
 - Japan/Philippines/Middle East (placed on higher priority)
 - Others (increasing on-going work)
- ✓ Organised/spoke on Clean Fuels conferences all over Asia
- ✓ Compiled a wealth of information related to health and environmental impacts of fuels and their components
- ✓ Assembled an Information Package on MTBE and its benefits
- ✓ Coordinated initiatives with related organisations around the world
- ✓ ACFA is now a high-profile and a well-respected organisation in Asia and beyond

East Asian Metro Air Quality



- Asian cities have some of the most chronic pollution problems.
- Even with reductions in emissions due to fuel and vehicle improvements, an increased number of vehicles will challenge any gains.

Source: M Walsh ADB workshop: May 2001.

Overview of East Asia Gasoline Quality

- Recognises the serious health threat posed by vehicle emission – tighten fuel specs and emissions
- Looking at 2005/2006 time frame and beyond (2009 to 2011)
- Tend to follow EU on fuel issues, and to a lesser extent, US guidelines
- Problems of established regulation without enforcement mechanisms

Lead Phase-out in East Asia

2005	
2003	← Indonesia nationwide ban (target)
2002	← Sri Lanka nationwide ban
2001	← Philippines nationwide ban ← Vietnam nationwide ban
2000	← India nationwide ban ← PR China nationwide ban ← Taipei, China nationwide ban
1999	← Bangladesh nationwide ban ← Hong Kong nationwide ban ← Nepal nationwide ban
1998	← Malaysia nationwide ban ← Singapore nationwide ban
1997	
1996	← Thailand nationwide ban ← USA nationwide ban
1995	
1990	
1985	← Malaysia gradual phase out
1984	← Thailand gradual phase out
1980	
1973	← USA gradual phase out

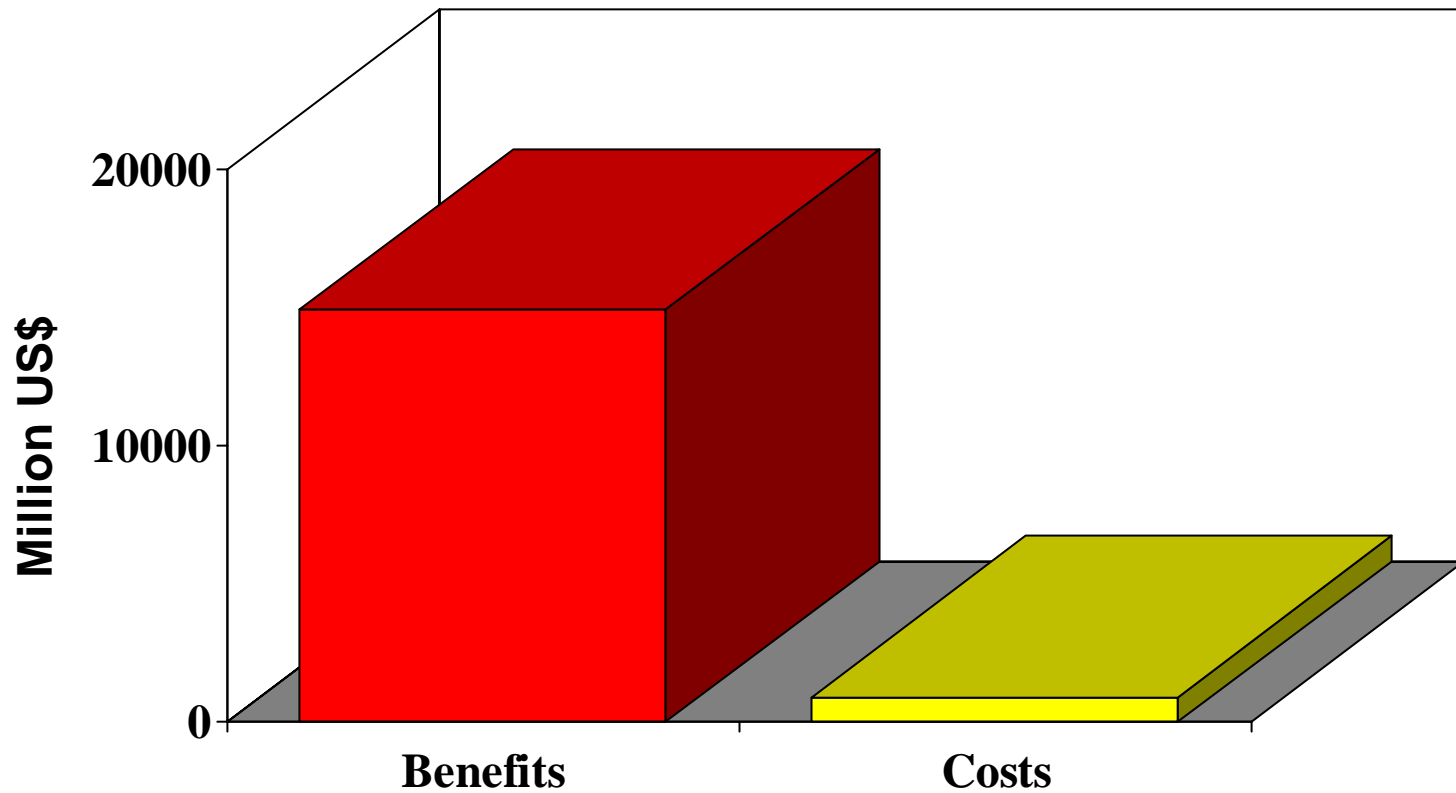
The Need For Lead Phase-out

- In Jakarta, lead pollution has reached 1.3 micrograms per cubic meter, surpassing WHO's recommended maximum of between 0.5 and 1.0 micrograms per cubic meter.
- Results of a study conducted by the State Ministry of Environment in 1994 showed that Jakarta's three million children below the age of 10 lost about 730,000 intelligence quotient points every year.
- Introduction of cars with catalytic converters (reduce emissions by 95%+).
- Modern cars don't run well with leaded gasoline.

No Technical Constraints

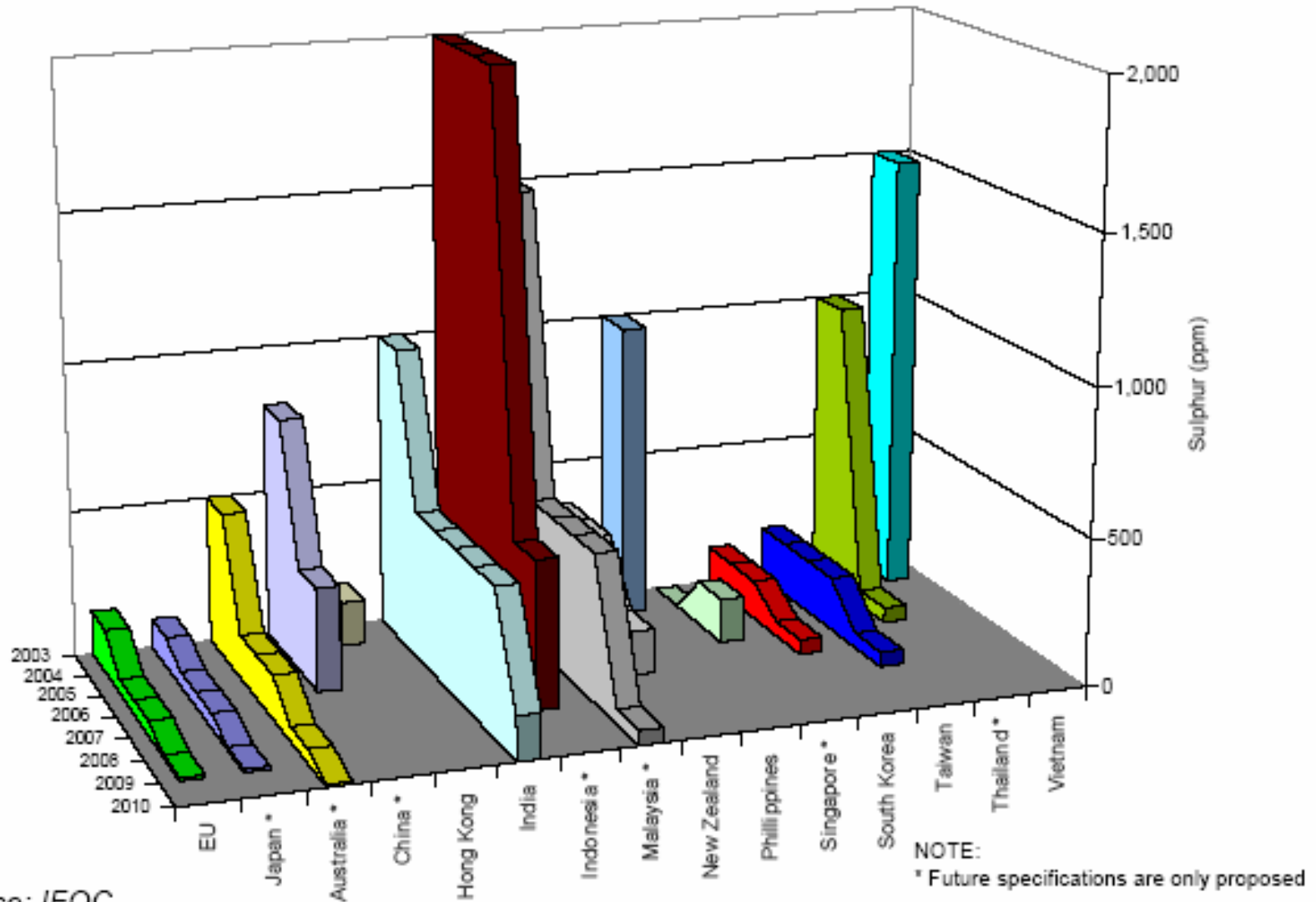
- All vehicles can run on unleaded gasoline
 - Catalytic converters are not needed
 - Valve seat recession only affects a few old cars
 - ‘Lubricating additives’ are available to protect such vehicles
- All refineries can adjust to produce unleaded gasoline
 - Process changes (catalytic cracking, isomerisation, alkylation)
 - Fuel components are useful (eg., oxygenates)

Benefits and Costs of Lead Phase-out in the US



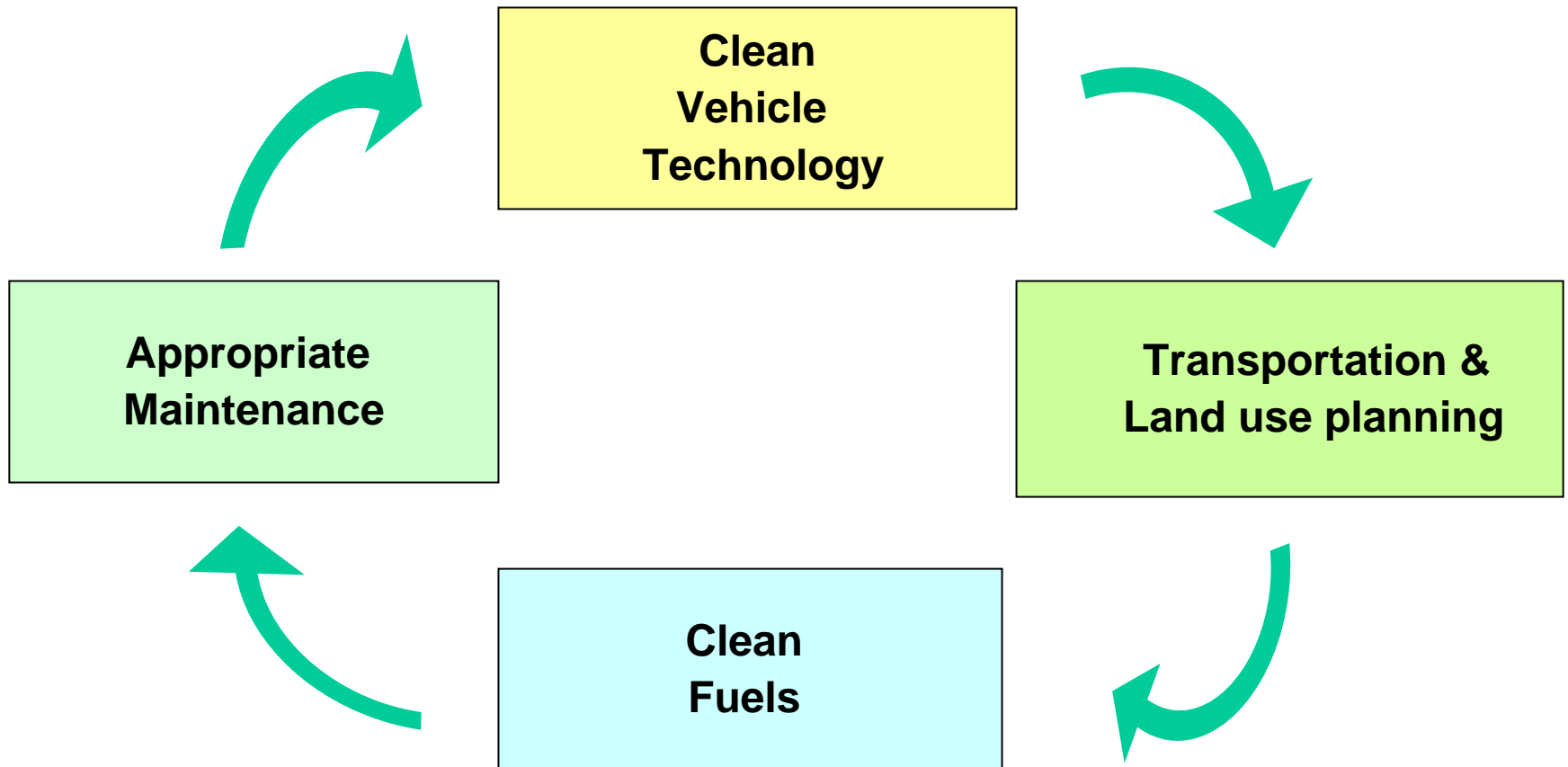
Source: World Bank

Reducing Sulphur in East Asia

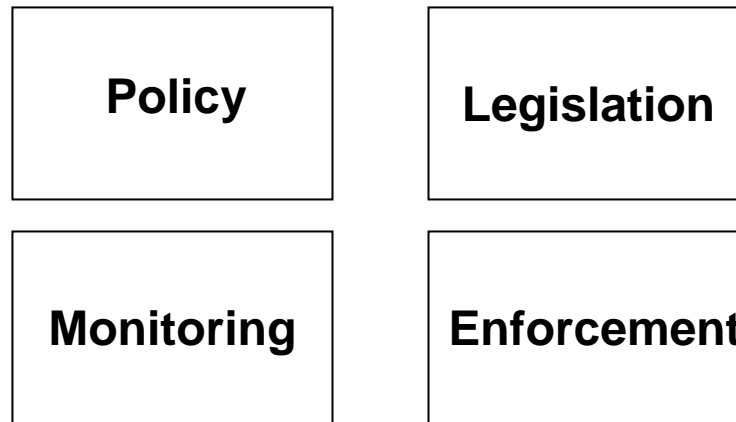


Source: IFQC

Elements of Comprehensive Air Quality Management Programme



Air Quality Management: Integration of Functions



Successful management of mobile sources needs to integrate policy making, legislation, monitoring and enforcement for fuel, emission standards, technology, I&M and transport management

Effects of Gasoline Properties on Emissions

Properties \ Emissions	HC	CO	NOx	Toxics
T50 ↓	↘		↗	
T90 ↓	↘			↘
Aromatics ↓	↘	↘	✕	↘
Olefins ↓			↘	
Sulfur ↓	↘ *)	↘ *)	↘ *)	↘ *)
Oxygenates ↑	↘	↘		
Detergent ↑	↘	↘	↘	

by After Treatment Catalyst

Unleaded Gasoline (ULG) in East Asia

Key Issues:

Manufacturing challenges

- Benzene (reduce)
- Sulfur (reduce)
- Aromatics (reduce)
- Olefins (reduce)

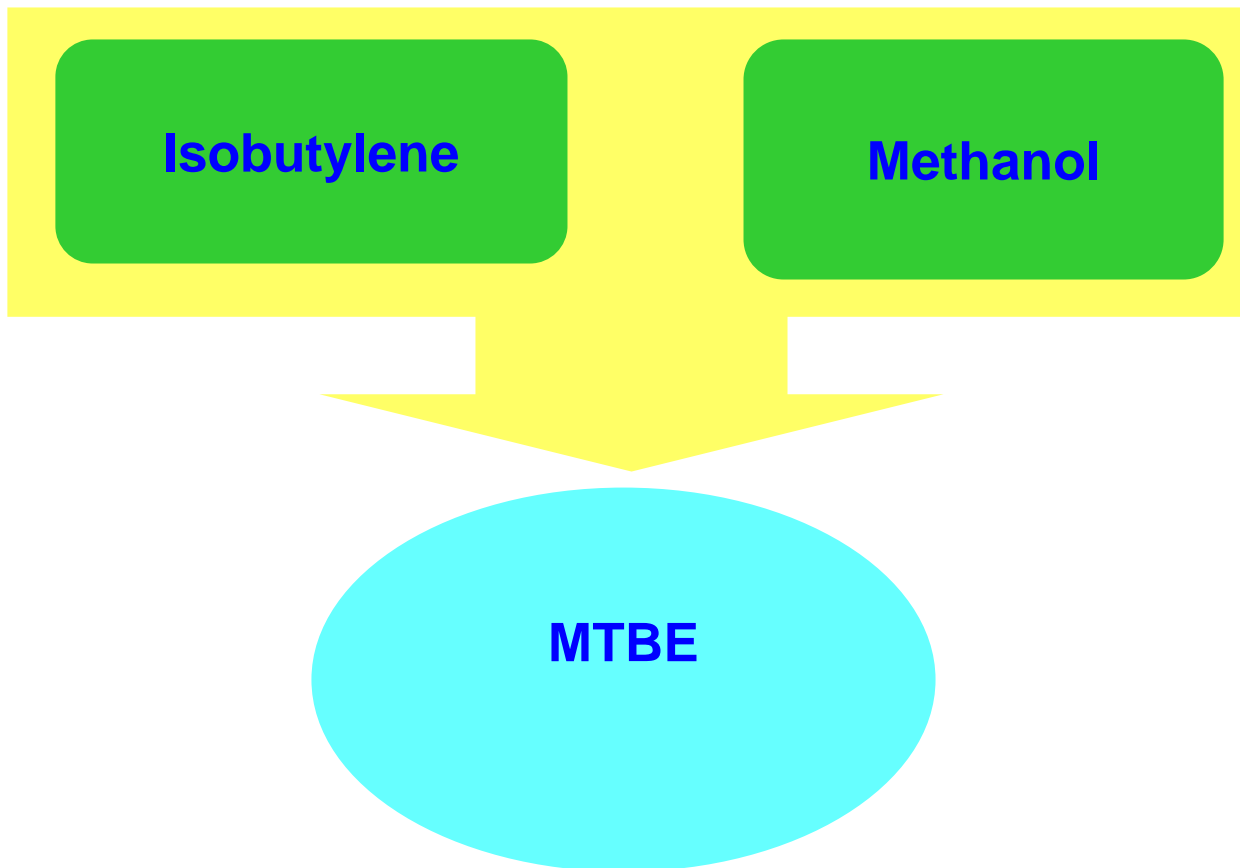
Marketing challenges

- Performance (increase)
- Quality (increase)
- Emissions (reduce)

➔ but there is a neat and elegant approach....MTBE

MTBE: A Classic Alternative Fuel

Oil companies look for oil but increasingly natural gas (NG) is found: the world has a virtually limitless supply of this vital resource

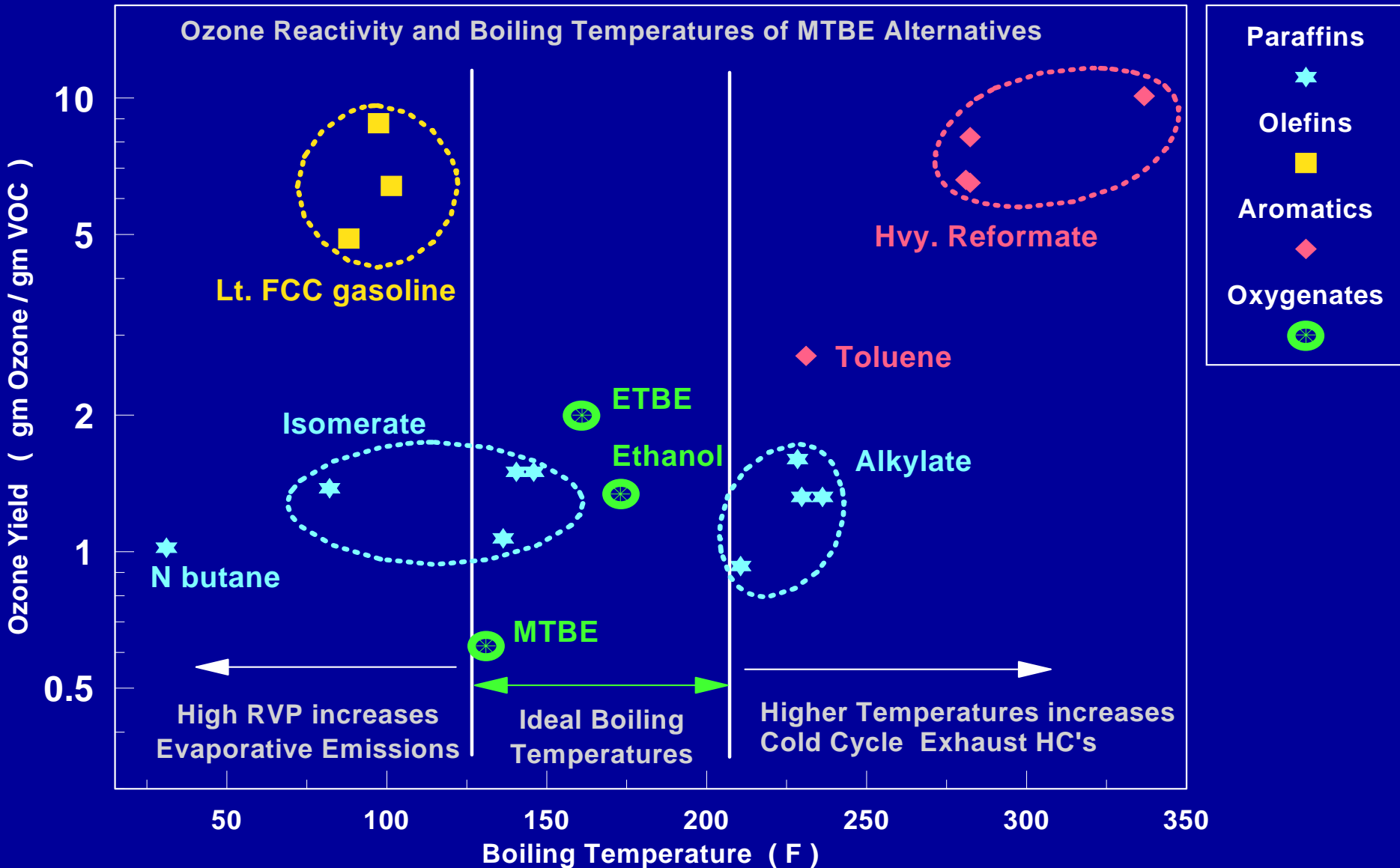


Comparison of Typical Blending Octanes in Unleaded Gasolines, (R+M)/2

MTBE	117 – 121
Toluene	112 – 115
Xylene	111 – 114
Alkylate	92 – 96

MTBE is an Excellent Component

Alternative Hi-Octane components have much less favorable properties than MTBE



Estimated Exhaust Emission Reductions with Gasoline Reformulated with 11% vol MTBE

Carbon Monoxide	- 13 %
Hydrocarbons	- 9 %
NOx	- 2 %
Toxics	- 20 %
Particulate Matter	- 25 %

FIGURE E

MTBE Expands Gasoline Production using Light Naphtha

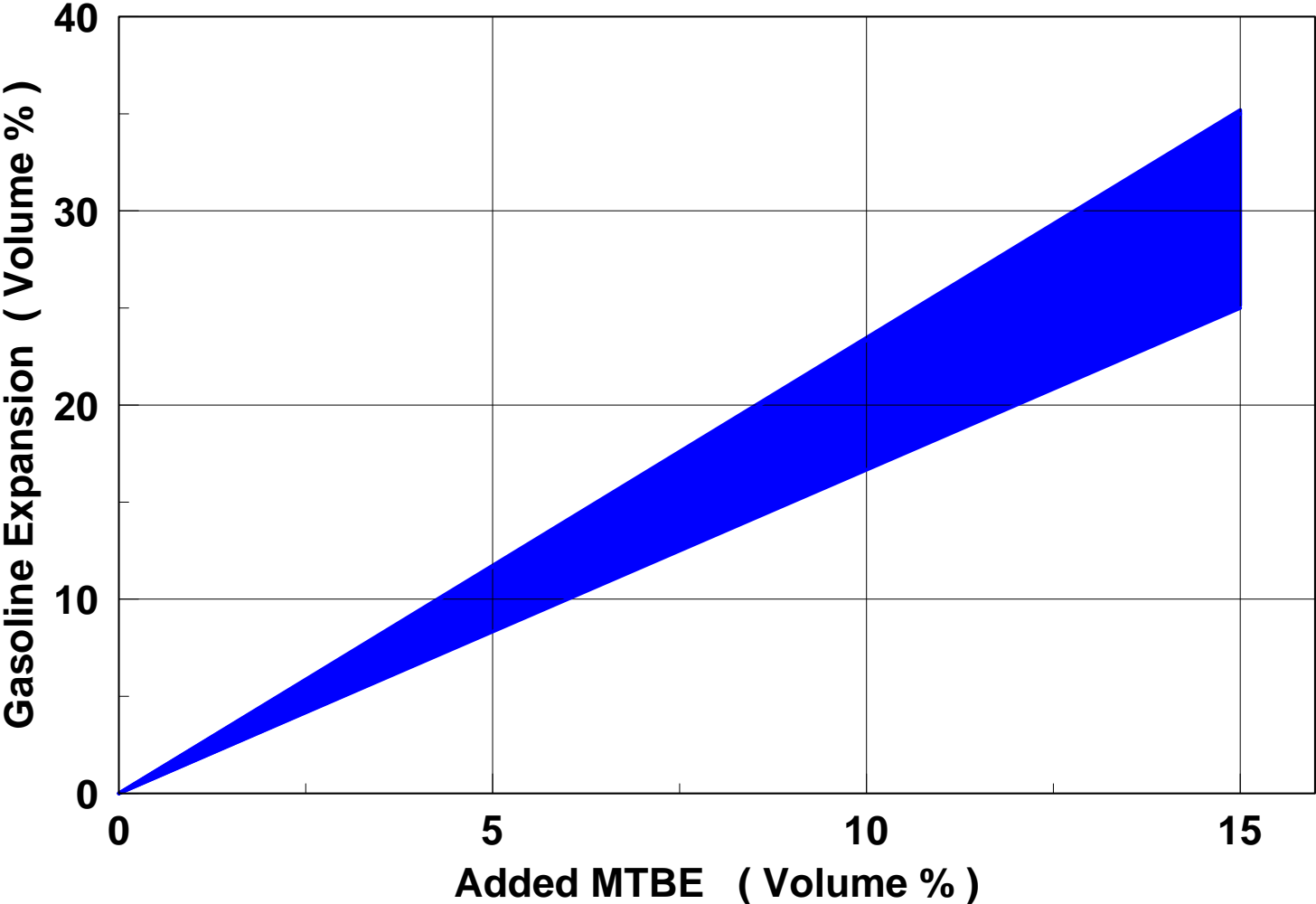
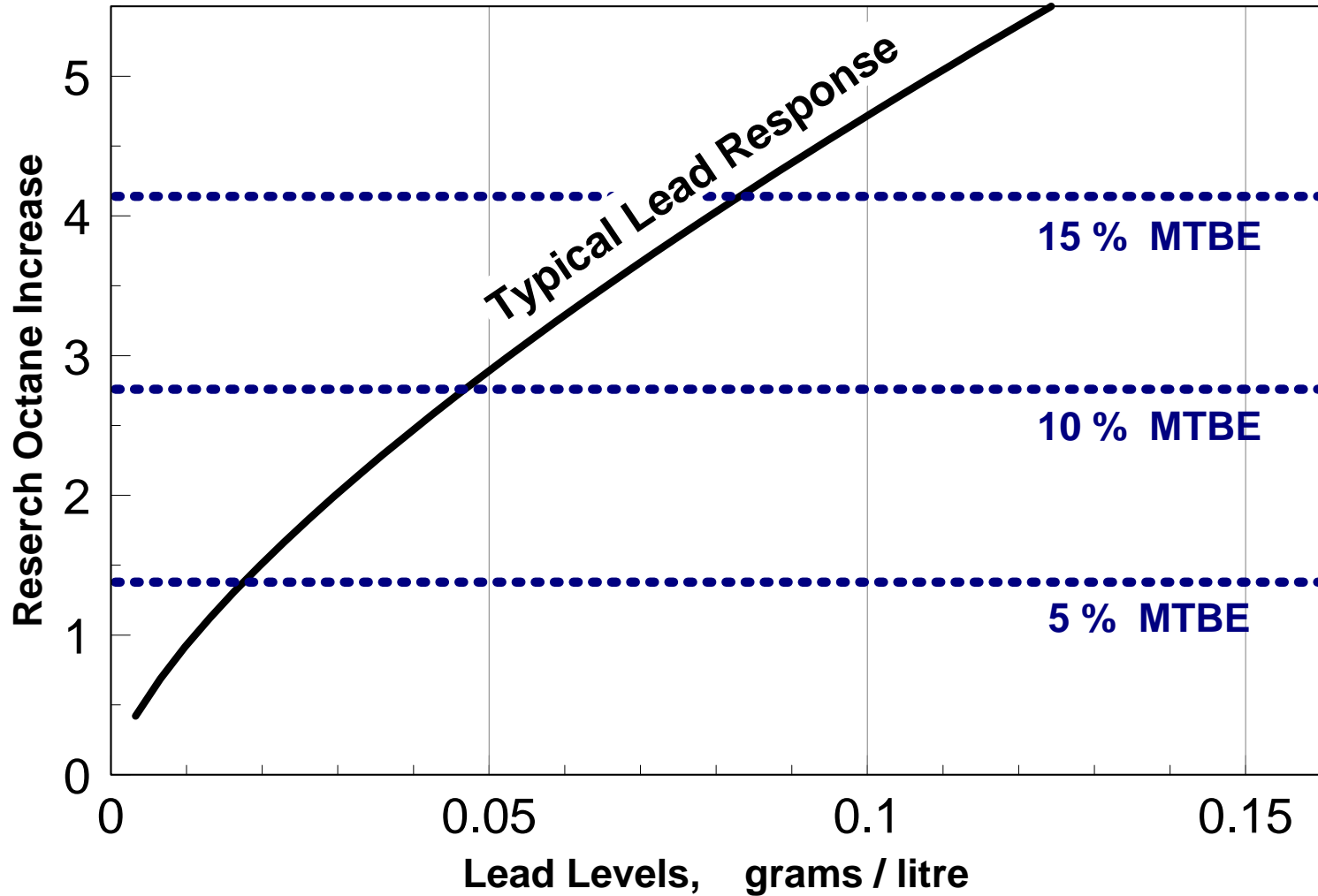


FIGURE F

MTBE used to Replace Octane from Lead Additives



Conclusions

I would like to make the following conclusions:

- We would like to work with you on 'clean air with clean fuels'
- Clean fuels are cost effective and have immediate effect on improving air quality
- Virtually all countries in East Asia have a programme to introduce clean(er) transport fuels over the next few years
- Oxygenates such as MTBE is a component of choice for cleaner burning gasoline

Thank you for your attention

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