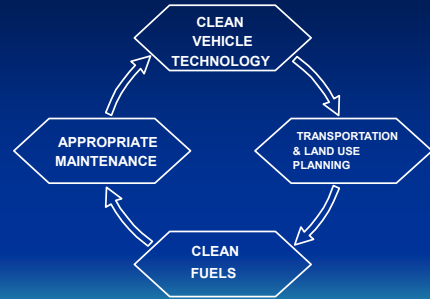


Status of Motor Vehicle Environmental Regulations in Asia

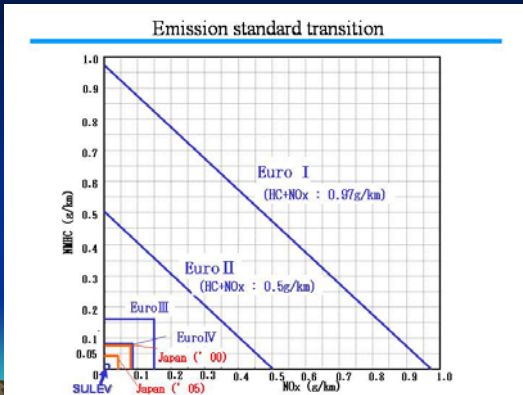


M. P. Walsh
 July 22, 2004
 Jakarta, Indonesia

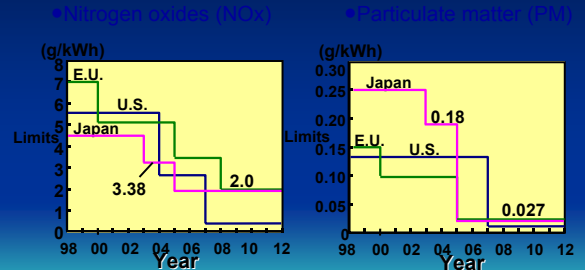
ELEMENTS OF A COMPREHENSIVE VEHICLE POLLUTION CONTROL STRATEGY



Light Duty Vehicle Emissions Standards

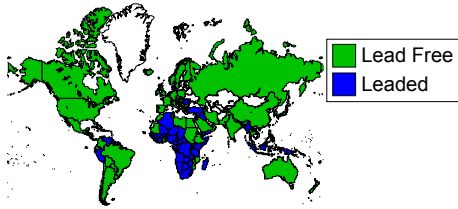


International Emission Regulations: - Heavy-duty vehicles (GVW>3.5t) -

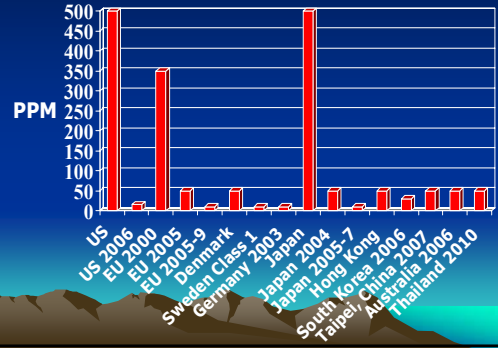


Low-sulfur diesel needed to meet 2005 regulations

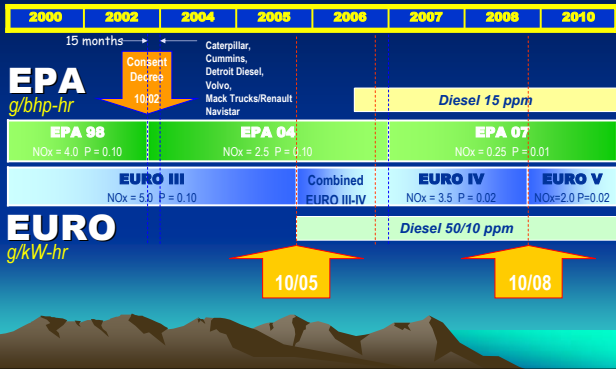
Lead Free Gasoline Worldwide 2004



Ultra Low Sulfur Diesel Fuel Is Spreading

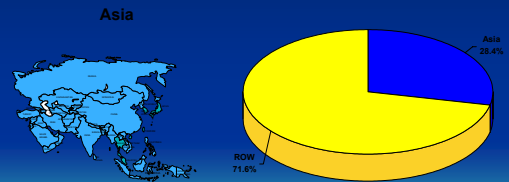


Close Linkage Between Vehicle Emissions Standards and Fuel Sulfur Levels



Asia

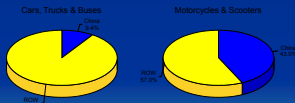
Asia New Vehicle Sales



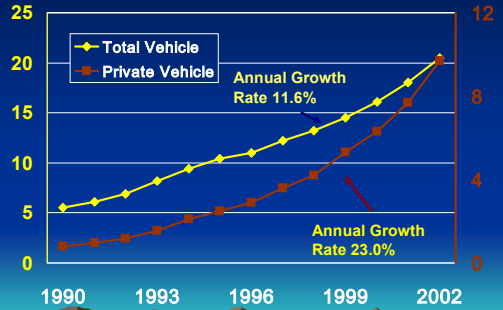
Asia Could Surpass Europe by 2010

China

China New Vehicle Sales

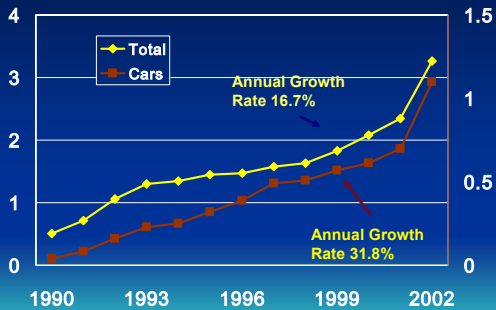


Chinese Vehicle Population Has Been Exploding (million)



Plus Approximately 50 Million Motorcycles And Over 20 Million Agricultural Vehicles

Growth in Annual Vehicle Production Has Been Even Faster (million)



By The End of 2003, China Has Become The 4th Largest Producer In The World

Control Measures on Motor Vehicle Pollution

Emission Standards For New Vehicles

Time Category	Before 2000	2000	2001	2002	2003	2004	2005
PC	ECE 1503	EURO I	←	←	←	EURO II	←
LDV&LDT	ECE 1503	←	EURO I	←	←	←	EURO II
HDDV	None	←	EURO I	←	←	EURO II	←
Motorcycle	ECER40	←	EURO I	←	←	←	EURO II

Beijing, Shanghai already introduced Euro 2 in 2003

What's In Play in China

- Nationally-SEPA
 - Mobile Sources
 - Developing 11th Five Year Plan Document
 - Will Put Strongest Environmental Case Together For Euro4 Stds & Fuels
 - Looking to adopt Euro 3 nationally in 2007, Euro 4 in 2010
- Beijing EPB
 - Pushing For Euro 3 Gasoline, Euro 4 Diesel & Cleaner Fuels in 2005
 - Interested in Accelerating Euro 4 before Olympics
 - MMT Concern
- Shanghai EPB
 - Also Interested in Leapfrogging to Euro 4

Potential Impact of MMT



California Civic 600
cpsi catalyst - 49,000
miles



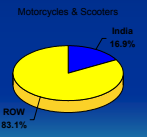
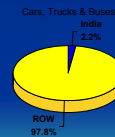
Canadian Civic 600
cpsi catalyst - 49,000
miles

MMT Becoming Serious Concern

- Canada
 - Expert Panel Under Royal Society Soon
 - Most Oil Companies Suspending Use
- EU
 - Accession Members Forcing Issue
 - Will Likely Set Up Testing Protocol
- US
 - Health Studies Underway
 - EPA Being Very Cautious
- CARB – Ban in Effect
- HEI Health Effects Study A Red Flag

India

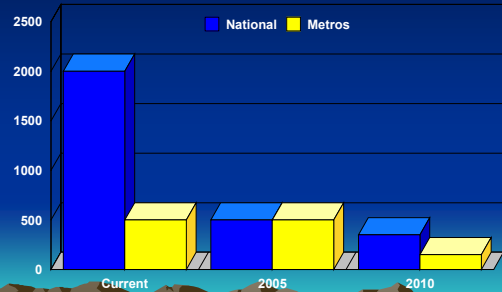
India New Vehicle Sales



New Vehicle Standards in India

- Entire Country
 - Euro 2 – April 2005
 - Euro 3 – April 2010
- Major Cities
 - Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad & Ahmedabad, Pune Surat, Kanpur & Agra Already Euro 2
 - Tighter emission norms for all private vehicles, city public service vehicles and city commercial vehicles
 - Euro 3 From April 2005
 - Euro 4 From April 2010

India Diesel Fuels Road Map



South Korea

- Vehicle Standards
 - Gasoline Vehicles – ULEV by 2006
 - Diesel Vehicles – Euro 4 by 2006
 - 50% Tighter by 2010
- Fuels
 - Diesel S from 430 to 30 by 2006
 - Gasoline S from 130 to 50 by 2006
- “Clean” Vehicle Incentives – (50-75% Lower)
 - Mandatory For Public Agencies
 - Economic Incentives For Others

Taiwan

- Starting January 2004, EU Diesel Car Standards Will Be Deemed Equivalent To Taiwan Light Duty Standards
- On January 2007, US 2004 HD & US Tier 2 Light Duty Standards Apply; EU Heavy Duty Standards Deemed Equivalent
- Gasoline S From 180 to 50 & Diesel S from 350 to 50 From January 1, 2007

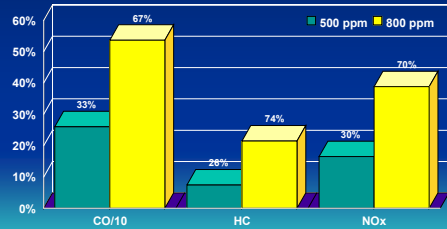
Emission standards for new vehicles (light duty)

Country	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10
European Union	Euro 1	Euro 2					Euro 3				Euro 4				Euro 5	
Bangladesh																Euro 2 (under discussion)
Hong Kong, China		Euro 1	Euro 2						Euro 3		Euro 4					
India ^a										Euro 1		Euro 2				E3
India ^b																Euro 3
Indonesia																Euro 2
Malaysia																
Nepal																Euro 1
Philippines																
PRC ^c																
PRC ^d																
Singapore ^e																
Singapore ^f																
Sri Lanka																
Taipei, China																
Thailand																
Viet Nam ^g																
Viet Nam ^h																

^a Entire country
^b Delhi and other cities; Euro 2 introduced in Mumbai, Kolkata and Chennai in 2001; Euro 2 in Bangalore, Hyderabad, Khamptur, Pune and Ahmedabad in 2003; Euro 3 to be introduced in Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad and Ahmedabad in 2005
^c Beijing and Shanghai
^d Gasoline vehicles under consideration
^e for gasoline vehicles
^f for diesel vehicles
^g for all types of diesel vehicles

Increase in In-Use Vehicle Emissions in Bangkok Due To Sulfur in Fuel (Gasoline)

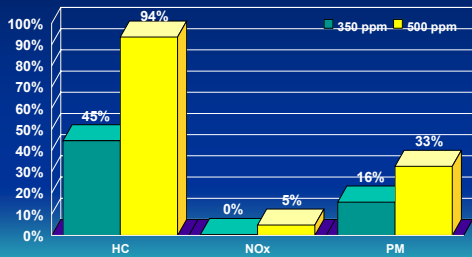
Percent Increase Compared to 150 PPM Sulfur



Impact on Vehicles Meeting EURO 3 Standards

Increase in In-Use Vehicle Emissions in Bangkok Due To Sulfur in Fuel (Diesel)

Percent Increase Compared to 150 PPM Sulfur



Impact on Vehicles Meeting EURO 3 Standards