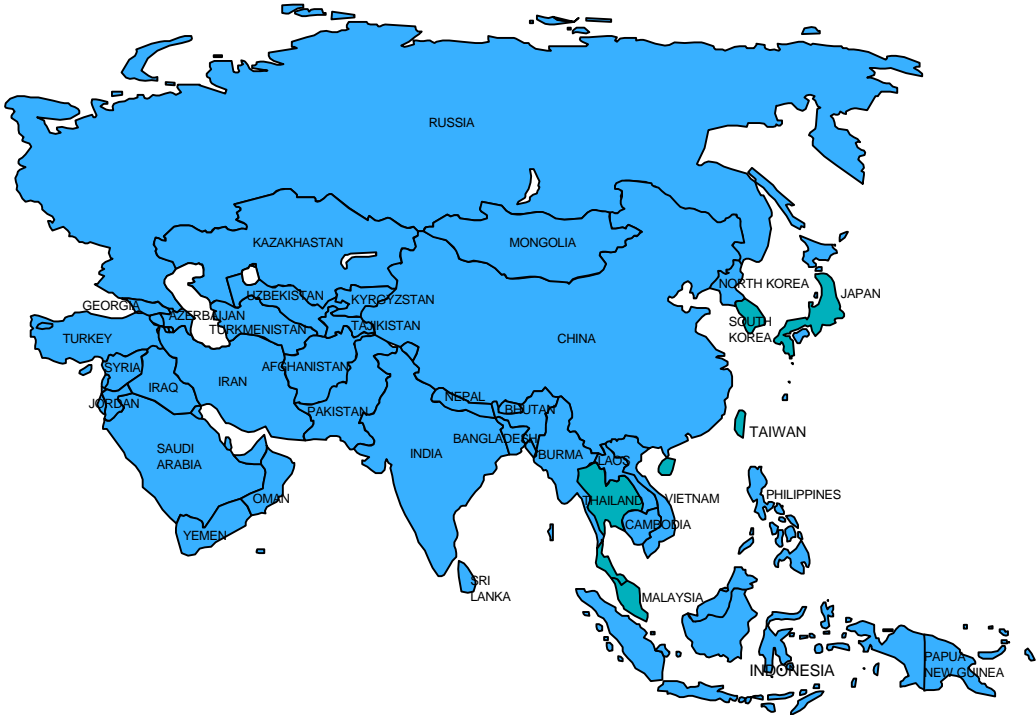
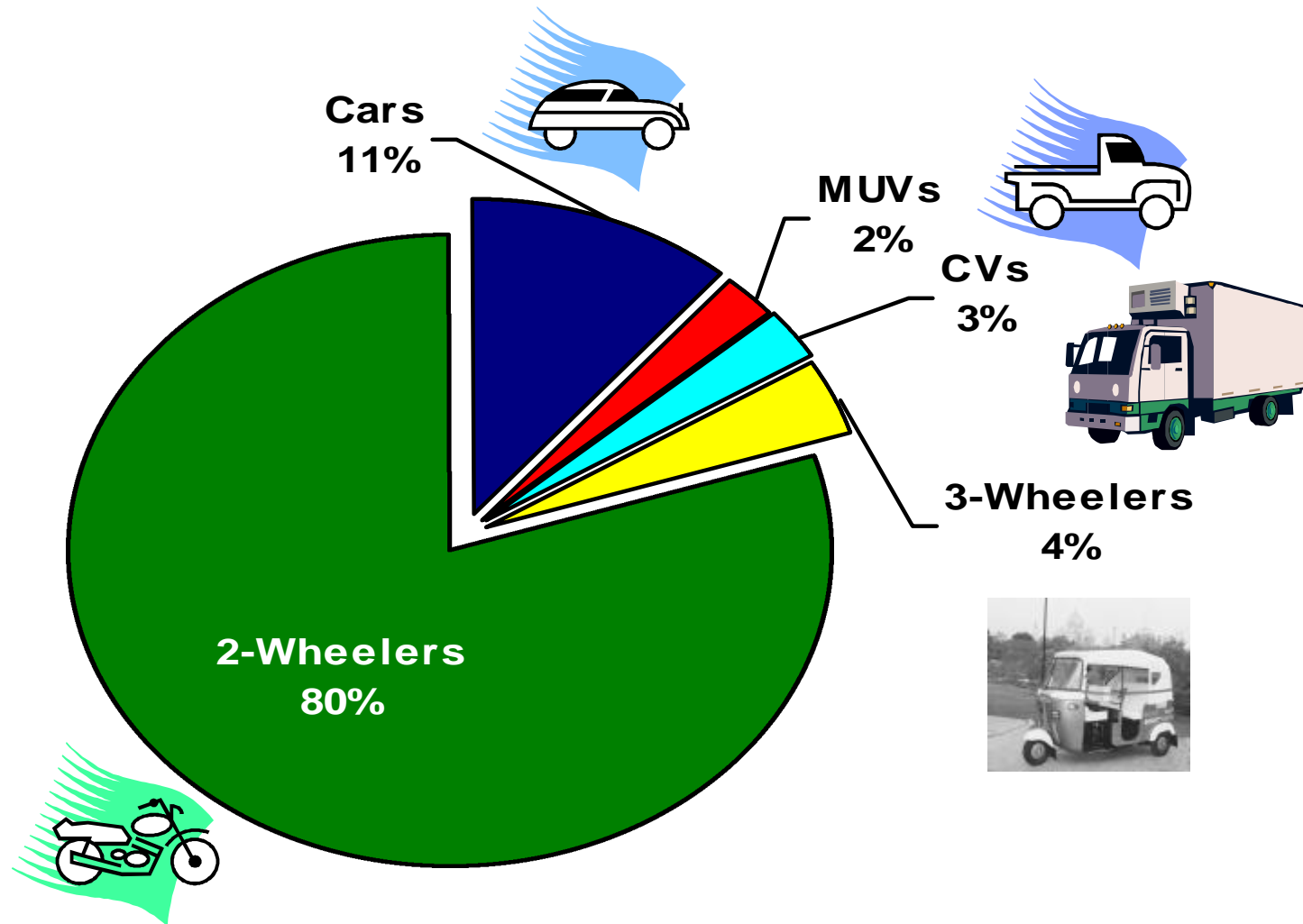


Asia



Vehicle Distribution by Type



Present Scenario

- India 2000 (Euro I equivalent/ Bharat Stage I) norms introduced from April 2000
 - For all vehicles
 - Across the country
- Bharat Stage II (Euro II equivalent) norms for Cars & Buses
 - Implemented in 2000 and 2001 respectively
 - Delhi, Mumbai, Chennai & Kolkata

Future Emission Standards

Future Roadmap/ Proposal (except 2&3 Wheelers)

- Bharat Stage II (Euro II equivalent) norms in seven more cities- 1st April 2003
(Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur, Agra)
 - Entire Country – 1st April 2005
- Bharat Stage III norms (Euro III equivalent)
 - Eleven cities – 1st April 2005
 - Entire Country – 1st April 2010
- Euro IV equivalent
 - Eleven cities - 1 April 2010

Future Proposal (2&3 Wheelers)

- Bharat Stage II norms
 - Entire Country - 1st April 2005
- Bharat Stage III norms
 - Entire Country – Preferably 1st April 2008 (Not later than 1st April 2010)

Fuel Specifications

Key Fuel Specs

Unleaded Gasoline only

	Regular	Premium
Density (Kg/m ³)	710-770	
RON min	88	93
Benzene (% Vol.) max	5	5
Sulphur (%mass)max	0.1	0.1

For Major Cities

Sulphur (% mass) max	0.05
Benzene (% Vol.) max	3.0

For Delhi & Mumbai

Benzene (% Vol.) max	1.0
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Diesel

Cetane No. min	48
Density (Kg/m ³)	820-860
Sulphur (%mass) max	0.25

For Major Cities

Sulphur (%mass) max	0.05
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Future Fuel Quality Improvements

	Euro II*	Euro III*	Euro IV*
• Gasoline			
Octane (RON) 88-93	91-95	91-95	
Lead(g/l)	0.013	0.005	0.005
Sulphur(%mass) 0.05	0.015	0.005	
Benzene(%vol) 3-5	1	1	
• Diesel			
Cetane 48	51	51	
Density(Kg/m ³)	820-860	820-845	820-845
Sulphur (%mass)	0.05	0.035	0.005

*Equivalent Norms

Sulphur Level Vs Emission Regulations

	2000	2005	2010
Diesel Sulphur (ppm)	2500/500 [#]	500/350*	350/50*
Emission Regulations	Euro I / Euro II [#]	Euro II / Euro III*	Euro III / Euro IV*

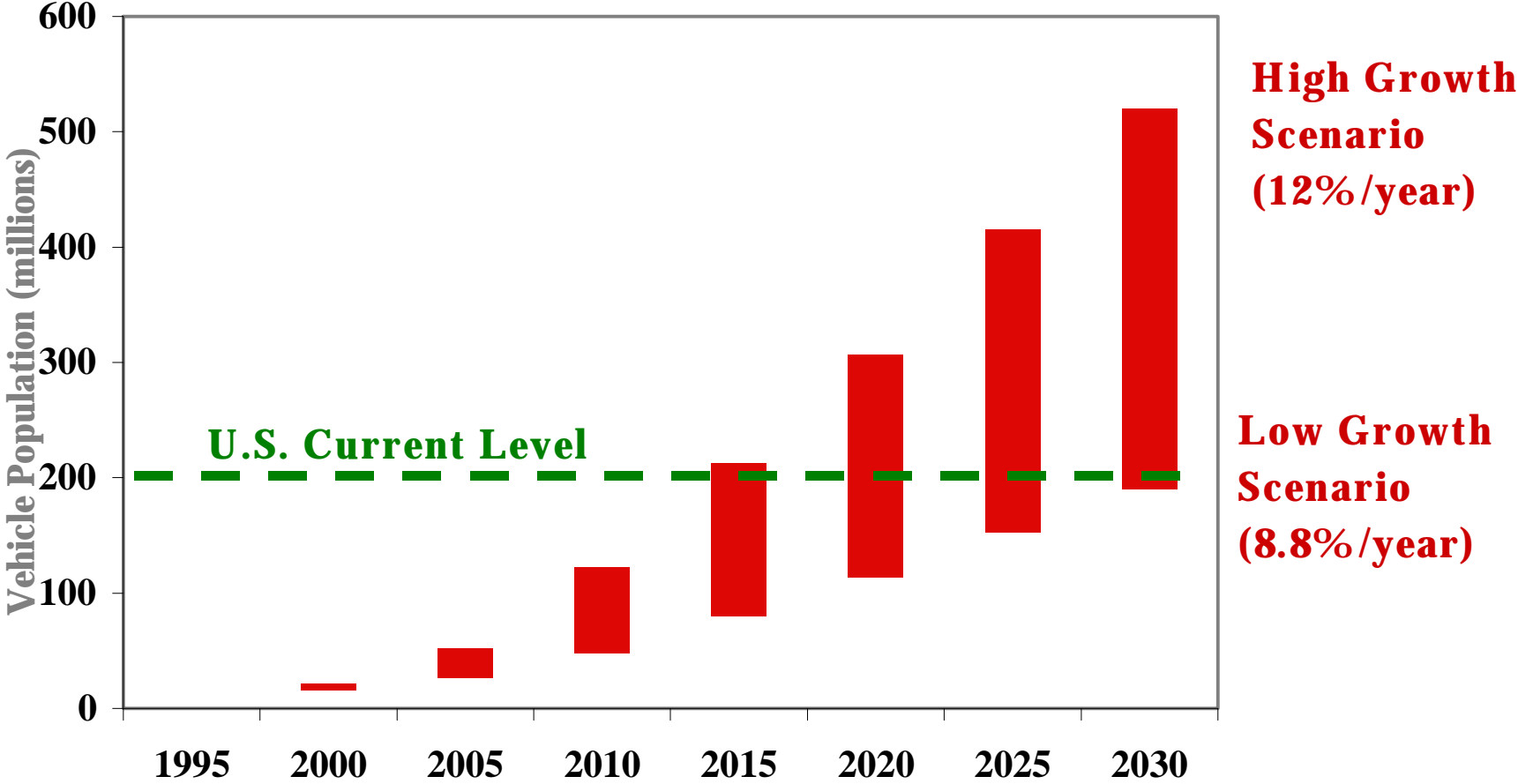
[#] Delhi in 2000 & 10 more cities by 2003

* 11 Principal cities- As recommended by expert Committee on Auto Fuel Policy

China
Has A
Growing
Love
Affair
With The
Car!



Staggering Vehicle Growth



Source: Tsinghua University, State Council DRC

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	ECE R 40	;	EURO I	;	;	;	EURO II

Overview of Fuel Quality

Specifications for Gasoline

ITEM	LIMITS	
	GB 484-1993	GB 17930-1999 ¹⁾
Code of Standards		
Lead (g/L, max.)	0.35, (0.45)	0.005
Sulphur (% Mass, max.)	0.15	0.08
Manganese (g/L, max.)		0.018
Phosphorus (g/L, max.)		0.0013
RON, Min.	90, 93, 97	90
(RON+MON)/2, Min.	85, 89, 92	85
Aromatics HC (vol. %, max.)		40
Olefins (vol. %, max)		35
Benzene (vol.%, max)		2.5
Vapour pressure		
Winter (Sep. - Feb.), kPa max.	88	88
Summer (Mar. - Aug.), kPa max.	74	74
Oxygen (wt. %, max.)		2.7

Note: 1) Implemented from Jan. 1, 2000

Overview of Fuel Quality

Specifications for Light Diesel in China

ITEM	LIMITS ¹⁾	
	GB 252-94	GB 252-2000 ²⁾
Code of Standard	GB 252-94	GB 252-2000 ²⁾
Cetane Number, min	45 (40)	45
Sulfur, % (m/m), max	0.2 (0.5, 1.0)	0.2
Flash point PM, , min	65 (45)	55 (45)
Ash, wt%, max	0.01 (0.02)	0.01 (0.02)
Acidity, mg/KOH/100ml, max	5 (10)	5 (10)
Oxidation stability, mg/100ml, max.	2.0	2.5
Density@ 20 , kg/m ³	—	—
CCR 10%, wt %, max	0.3	0.3
Note: 1) Limits in () are for basic qualified diesel; 2) GB 252-2000 went into effect on Jan. 1, 2002.		

Pollution Remains Severe



Adverse Health Effects are Considered Immense

