

Sustainable Management of Two and Three Wheelers in Asia

Regulatory and Institutional Framework

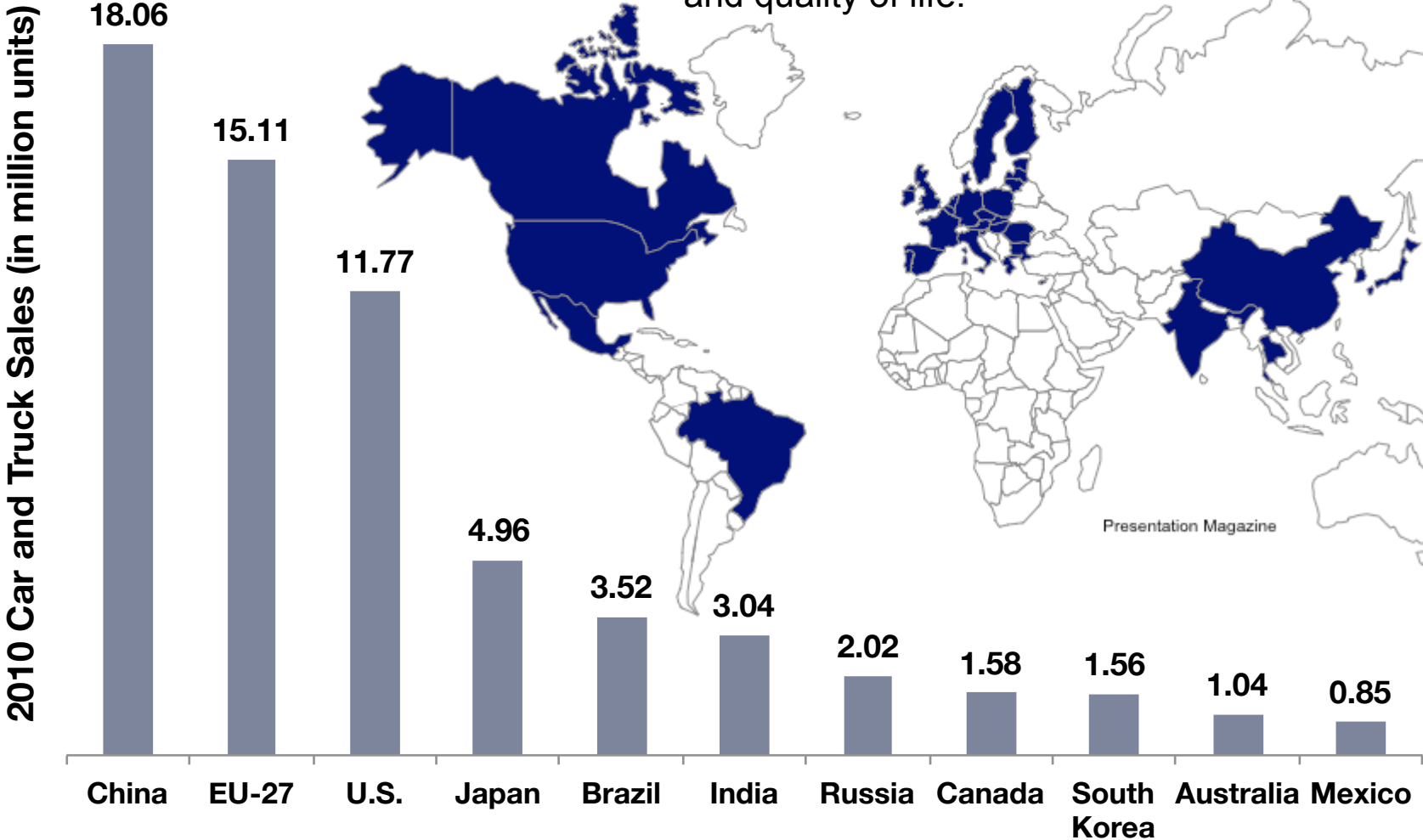
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The mission of the ICCT is to dramatically improve the environmental performance and efficiency of cars, trucks, buses, and transportation systems in order to protect and improve public health, the environment, and quality of life.

Top Eleven Vehicle Markets, 2010

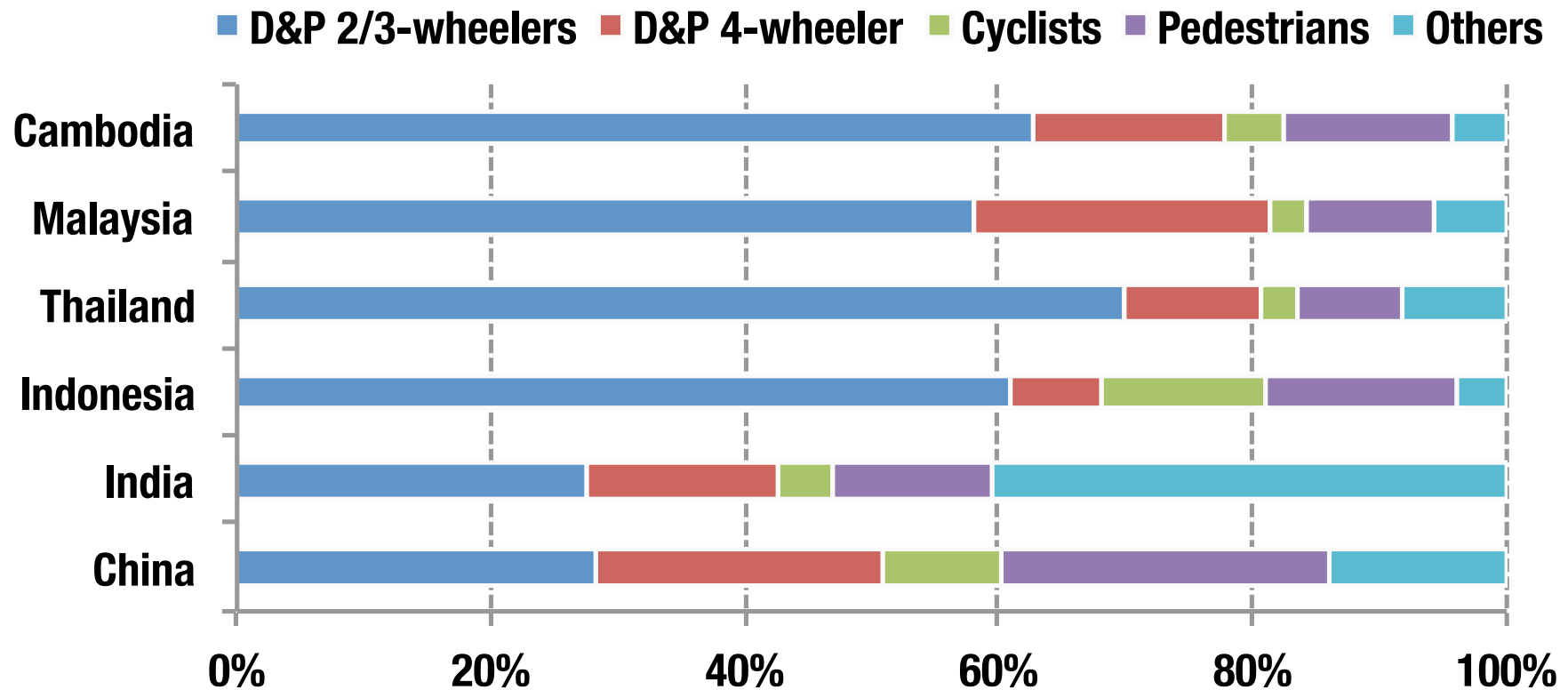


Motorcycle fleet in Asia is large & growing.

Country/ Region	Year	Other Vehicles	Motorcycles and Mopeds	Percent Motorcycles	Average Annual Growth* Other Vehicles	Average Annual Growth* Motorcycles
China	2009	62,136,896	95,805,176	60.7%	30.9%	10.4%
India	2009	21,200,140	82,402,105	79.5%	10.7%	12.1%
Indonesia	2009	18,281,437	52,433,132	74.1%	22.6%	20.9%
Vietnam	2007	1,146,312	21,779,919	95.0%	ND	ND
Thailand	2006	8,923,447	15,674,941	63.7%	6.8%	2.6%
Taiwan Province of China	2009	6,718,746	14,604,330	68.5%	2.3%	3.3%
Malaysia	2008	9,030,292	8,487,451	48.5%	7.1%	7.5%
Pakistan	2009	2,170,430	3,383,493	60.9%	10.4%	13.0%
Philippines	2009	2,990,743	3,200,968	51.7%	2.0%	23.5%
Sri Lanka	2009	951,362	2,339,916	71.1%	ND	8.0%

Source: World Road Statistics 2011

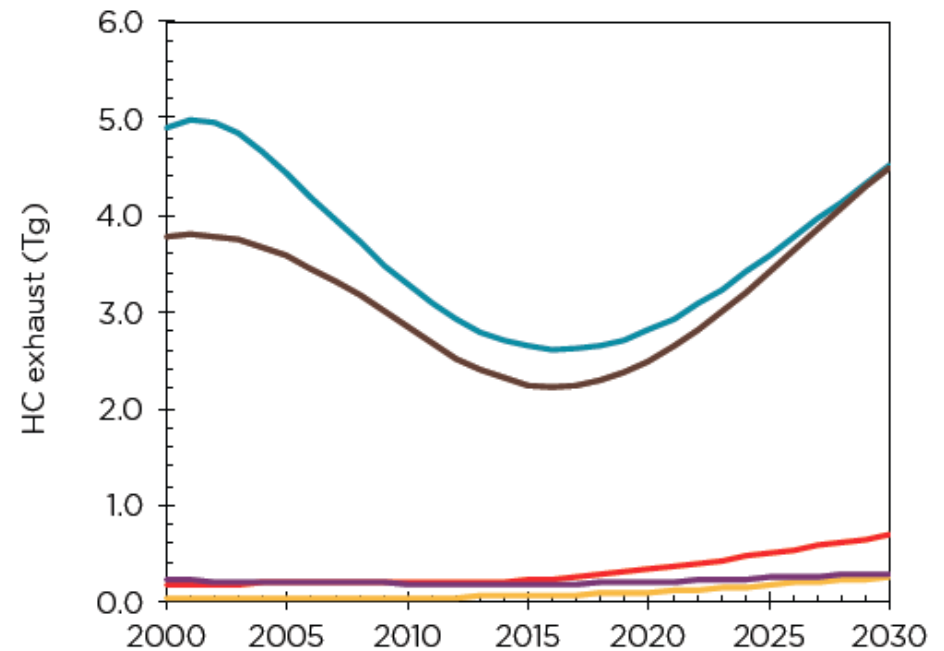
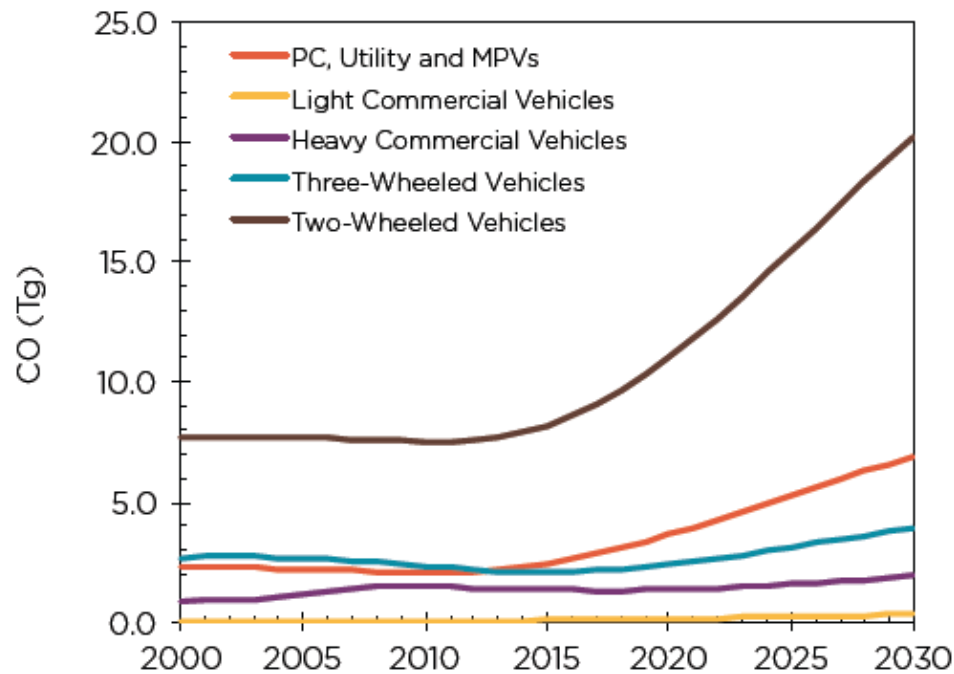
Motorcycles are also known to have higher safety hazard for driver and passenger than other transport mode.



Road Traffic Fatalities by mode

Note: D&P Driver and Passenger

2/3 wheelers are a significant source of air pollutant emissions across Asia.



Two/Three Wheeler Use Restrictions in Selected Countries

LOCATION	MOTORCYCLE TYPE	PROGRAM DETAILS
Dhaka, Bangladesh	Two-stroke three wheelers	Progressive ban from city: pre-1994 phased-out by January 2002, all remaining phased-out by January 2003
Guangzhou, China	All motorcycles and electric bicycles	Ban from entire city and suburban areas since January 2007
Jakarta, Indonesia	Two-wheelers	Restricted lane use proposed to be extended to peak hour ban
Katmandu, Nepal	Diesel three-wheelers	Ban from city since 1999
Lahore, Pakistan	Two-stroke three-wheelers	Ban from majors road to be progressively extended to entire city by December 2007
San Fernando, Philippines	Two-stroke three-wheelers	1970's models ban since 2003, 1980's since 2004
Taipei, Taiwan	Motorcycles above 550cc	Ban from urban districts

Sustainable management of 2/3 wheelers includes emissions, efficiency and safety/noise issues among other policy considerations

- Reducing emissions of pollutants
 - Exhaust emission standards
 - Evaporative emission standards
 - In-use monitoring and compliance
 - Fuel and lubricant quality
- Reducing fuel consumption/GHG emissions
 - Alternative fuels such as CNG
 - Electric vehicles
 - Fuel consumption standards
- Reducing traffic fatalities and injuries, as well as noise

Emission standards for 2/3 wheelers

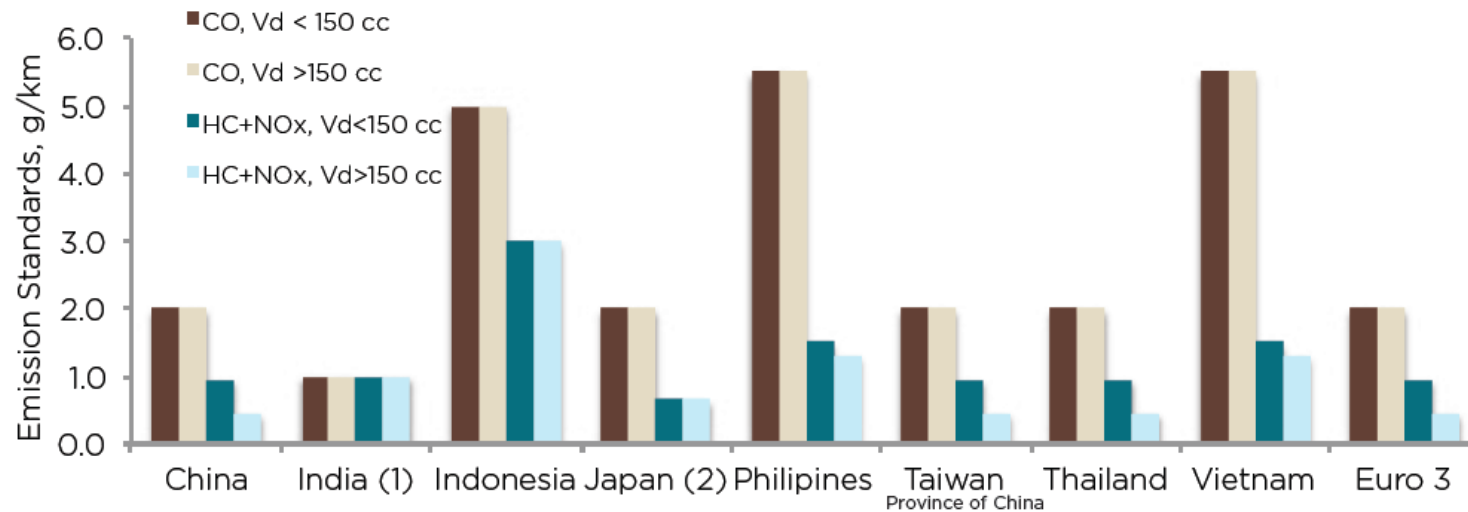


Figure 3. Latest Emission Standards for two different motorcycle categories for Selected Asian Countries. Note: (1) Test cycle corresponds to Indian Drive Cycle. (2) Japan does not include cold start for motorcycle <125 cc.

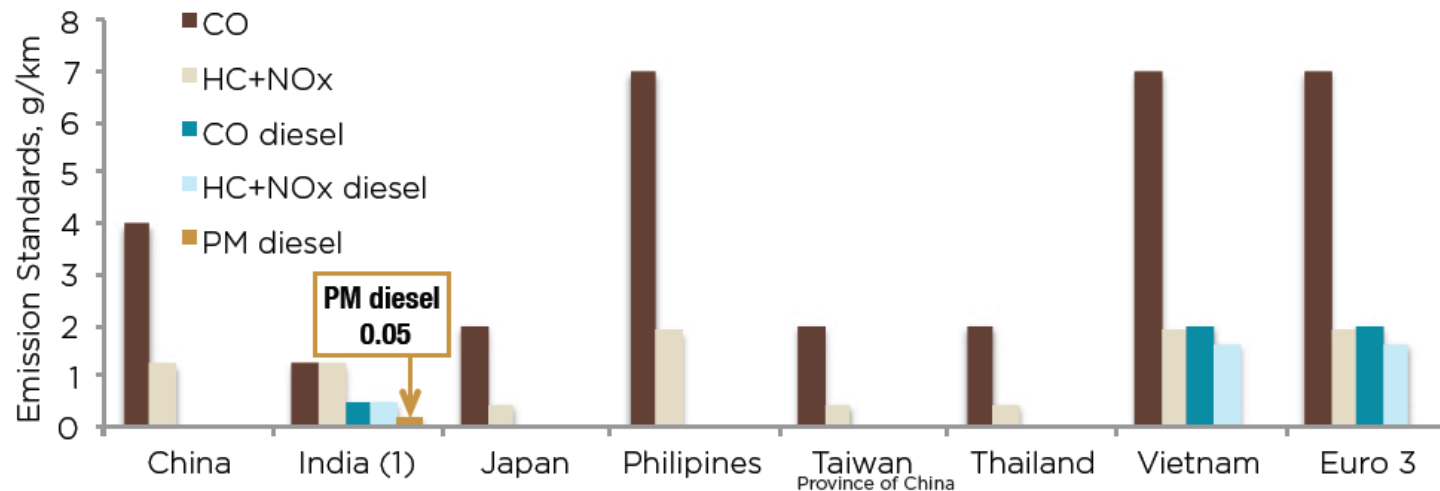
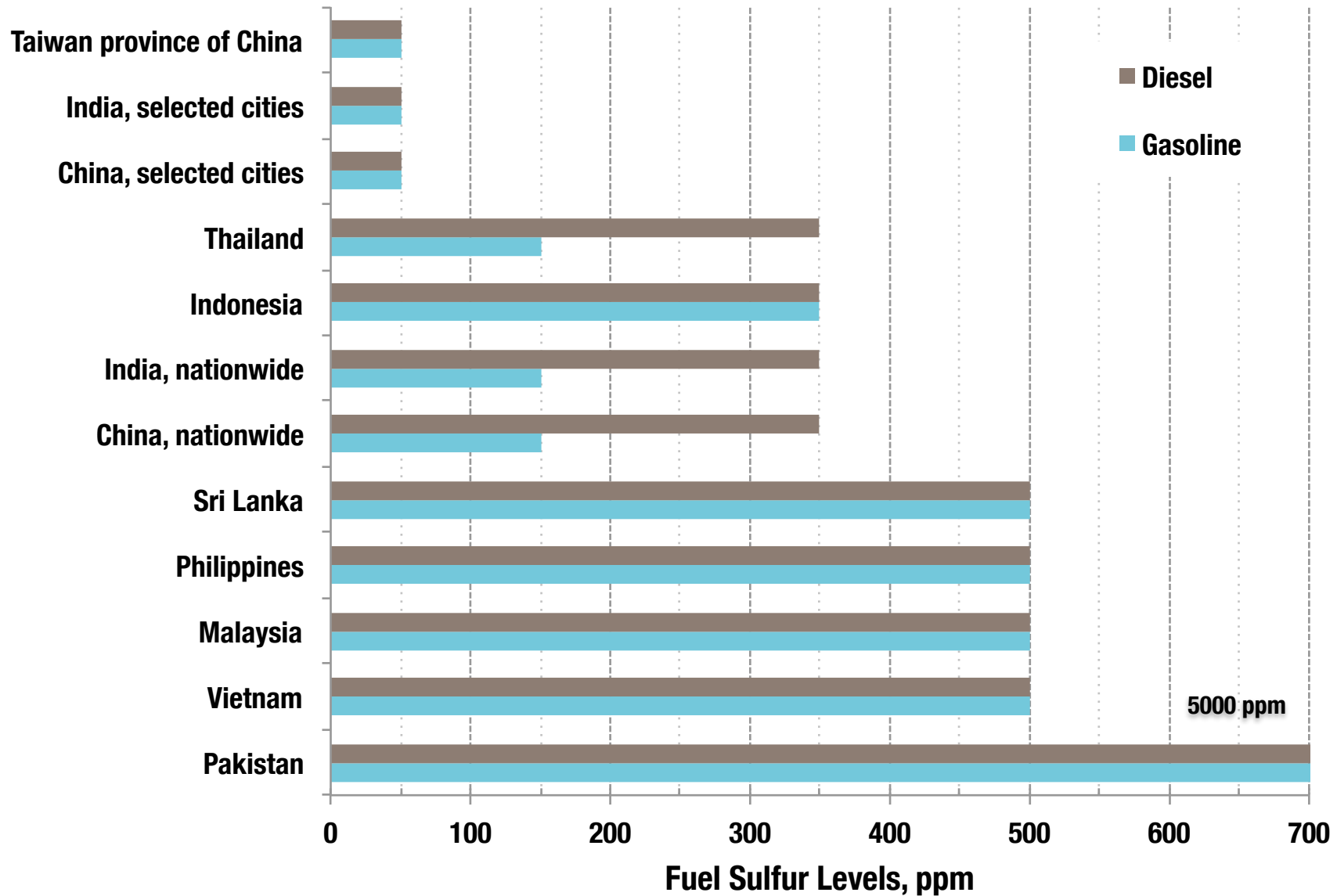


Figure 4. Latest Three-Wheeler Emission Standards for Selected Asian Countries. Note: (1) Test cycle corresponds to Indian Drive Cycle.

Cleaner fuels and lubricants are integral to realizing reductions in exhaust emissions



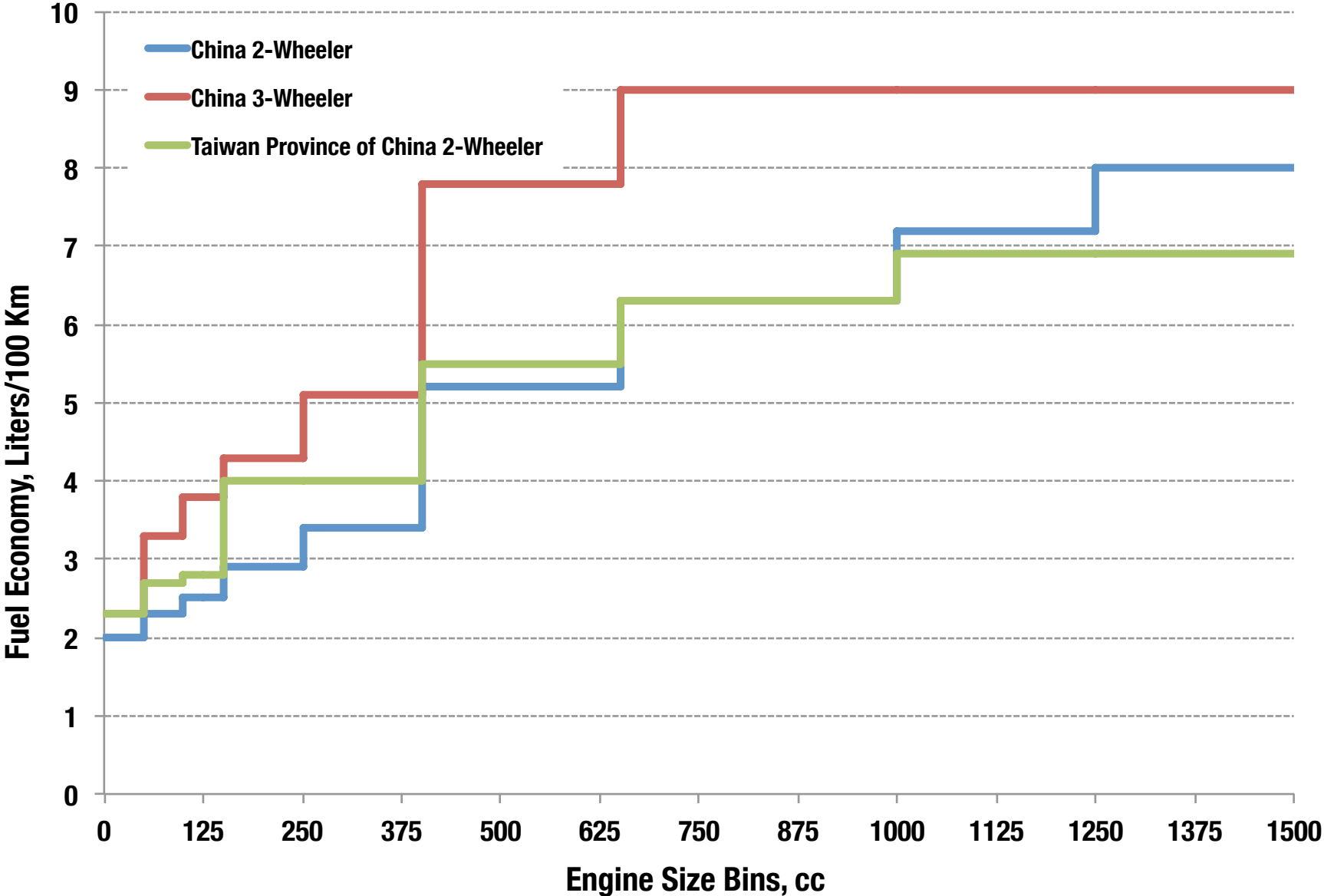
Alternative fuels and electric vehicles have an important role to play in reducing pollutant and GHG emissions of 2/3 wheelers

Emission Reductions	CNG	LPG
CO	60%	35-75%
NMHC+NOx	80%	30%
NOx	30%	75%

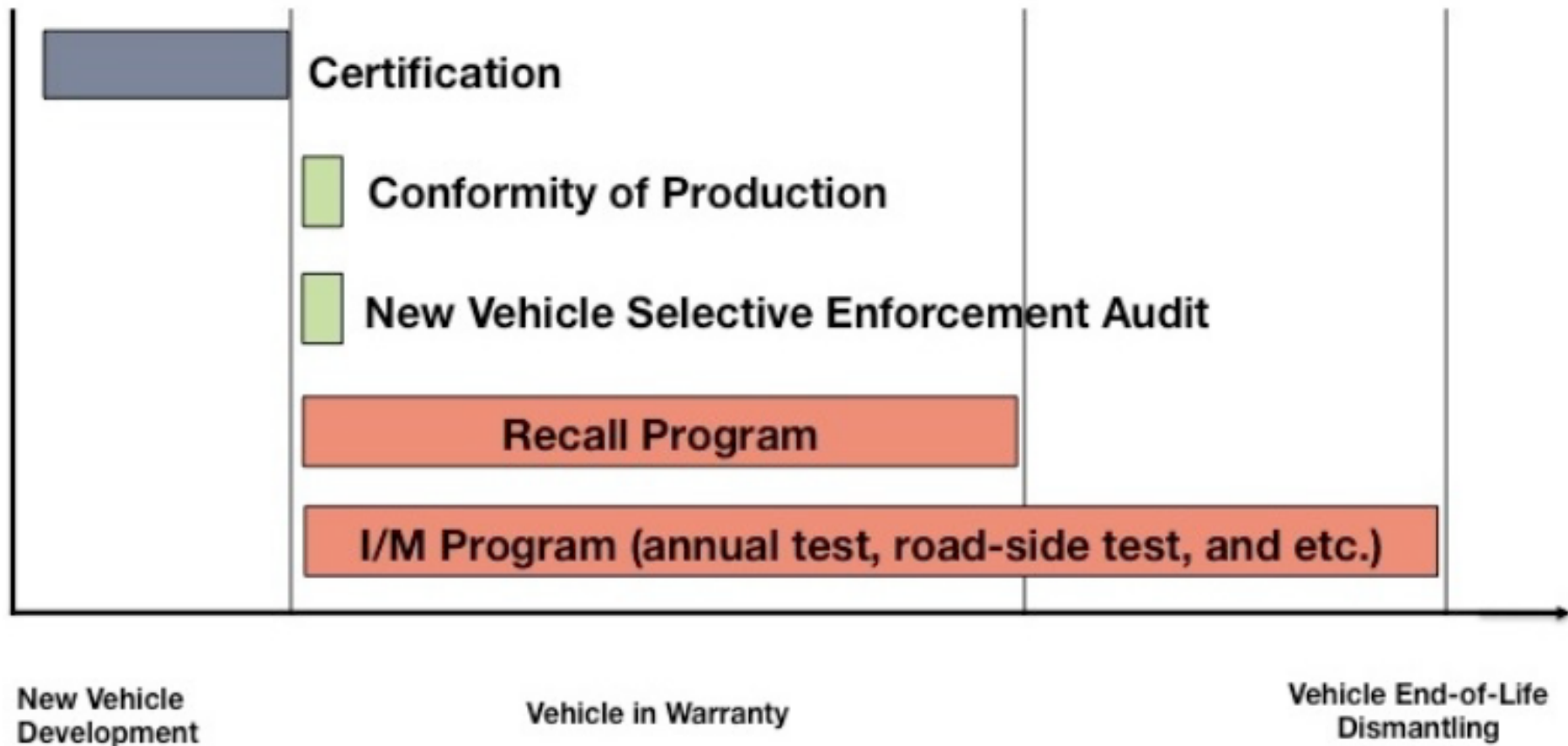
Table 2. Emission Rates of Typical Electric Scooters and Four-Stroke Motorcycles (ADB, 2009)

Network	CO, g/km	NOx, g/km	PM10, g/km	PM2.5, g/km	SO ₂ , g/km	VOC, g/km	CO ₂ , g/km
Guangdong Grid	0.007	0.025	0.007	0.004	0.043	0.003	19
North Network	0.018	0.072	0.018	0.011	0.153	0.007	25
Typical 4-stroke Motorcycle	12.5	0.15	0.1	-	-	2.25	55

Two and Three Wheeler Fuel Consumption Standards

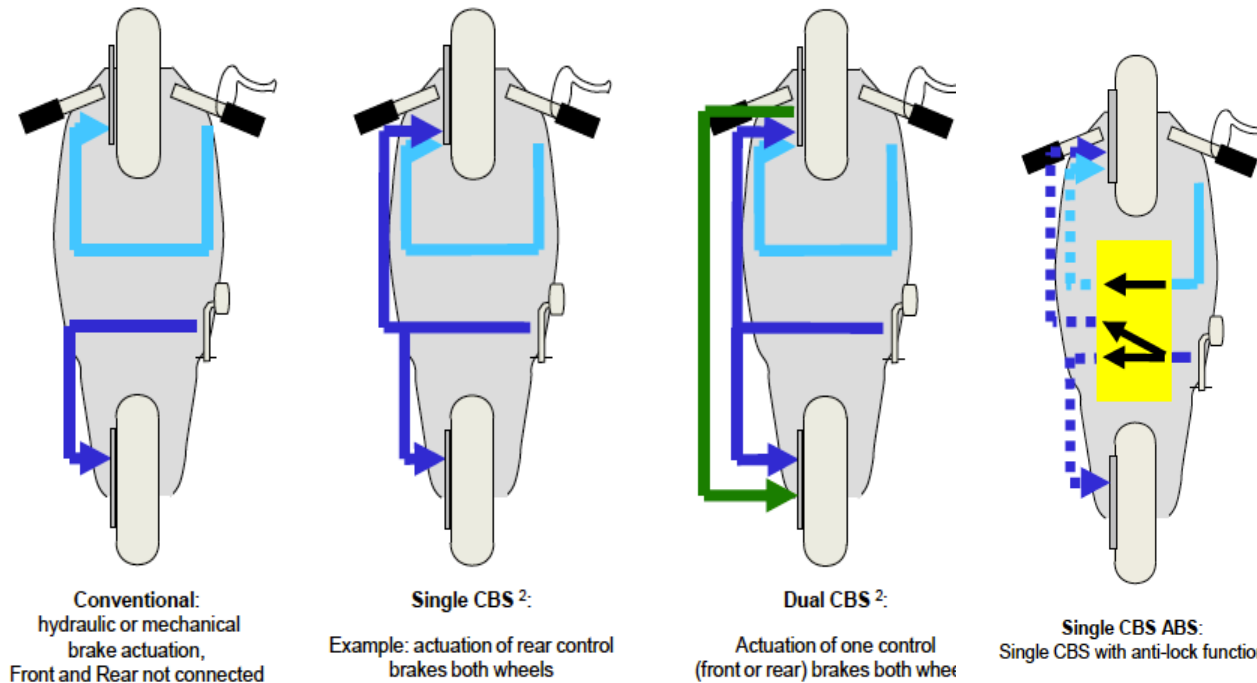


Institutional framework to regulate 2/3 wheeler emissions



Motorcycle safety extends beyond use of helmets

- Combined Breaking system and ABS



Source: Bosch, SMSA Annual Conference. 2011

- Daytime Running Lights

Policy roadmap for 2/3 wheeler for the next decade

- Adoption of Global Technical Regulation No. 2 (GTR 2), and movement towards Euro 4, 5 and 6 for motorcycles and three wheelers, along with enhanced durability and on-board diagnostics (OBD) requirements
- Adoption of fuel consumption standards
- Incentives for CNG and electric two/three wheelers
- Mandatory fitting of advanced braking systems and daytime running lights
- UN ECE Regulation No. 41 on Noise Control

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