

Vehicles for Environmentally Sustainable Transport in Asian Cities

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Sustainable transport requires sustainable vehicles ...

- Near-zero emissions of urban air pollutants
- Renewable fuels (or energy sources)
 - No net emissions of CO₂
- Quiet and safe
- Equipped with information technology for efficiency/safety and to implement transport demand management
- Regulatory/incentive framework such that vehicles remain clean and safe over their operating lives

Public Transport

- Primacy of buses in public transport
 - Even in Singapore, buses carry 2.5 times the passenger trips of trains
 - Advantages of bus rapid transit
- Buses can implement advanced technology first
 - Emission standards for new buses: Euro V or U.S. 2007
 - Retrofit existing buses: DPF with ULSD or B100, SCR
 - Monitoring of in-use emissions / preventive maintenance



Regulatory Oversight

- Periodic vehicle emissions/safety checks
 - High-volume inspection facilities, privately operated under close government supervision
 - Inspection linked to vehicle registration
 - Low emitters qualify for discount on road user charges
- Supplement with random on-road checks using remote sensing (eyeball for smoke)

Renewable Fuels

- Ethanol from fermentation of cellulosic biomass
- Biodiesel from vegetable, coco, palm oils, and from waste oil
- (possibly) Biogas, methanol from biomass, other biofuels
- Hydrogen from renewable energy sources IF distribution/storage/infrastructure problems can be overcome

Near-zero pollutant emissions

- Gasoline cars are already there (e.g. U.S. EZEV)
 - Stoichiometric with three-way catalyst
 - Hybrid-electric drive for fuel economy in congested driving
 - Same technology (even same vehicles) can be used with alcohol
- Heavy-duty diesel engines will be there by 2010.
 - Particle filter plus NO_x trap or SCR,
 - Hybrid electric for stop-and-go operations such as buses
 - Biodiesel can use same technologies
- Technology for motorcycles/three wheelers still a challenge