Restoring Blue Skies:
International Forum on Air Quality Management

Pollution Control Strategy for Transportation Sector (Auto)

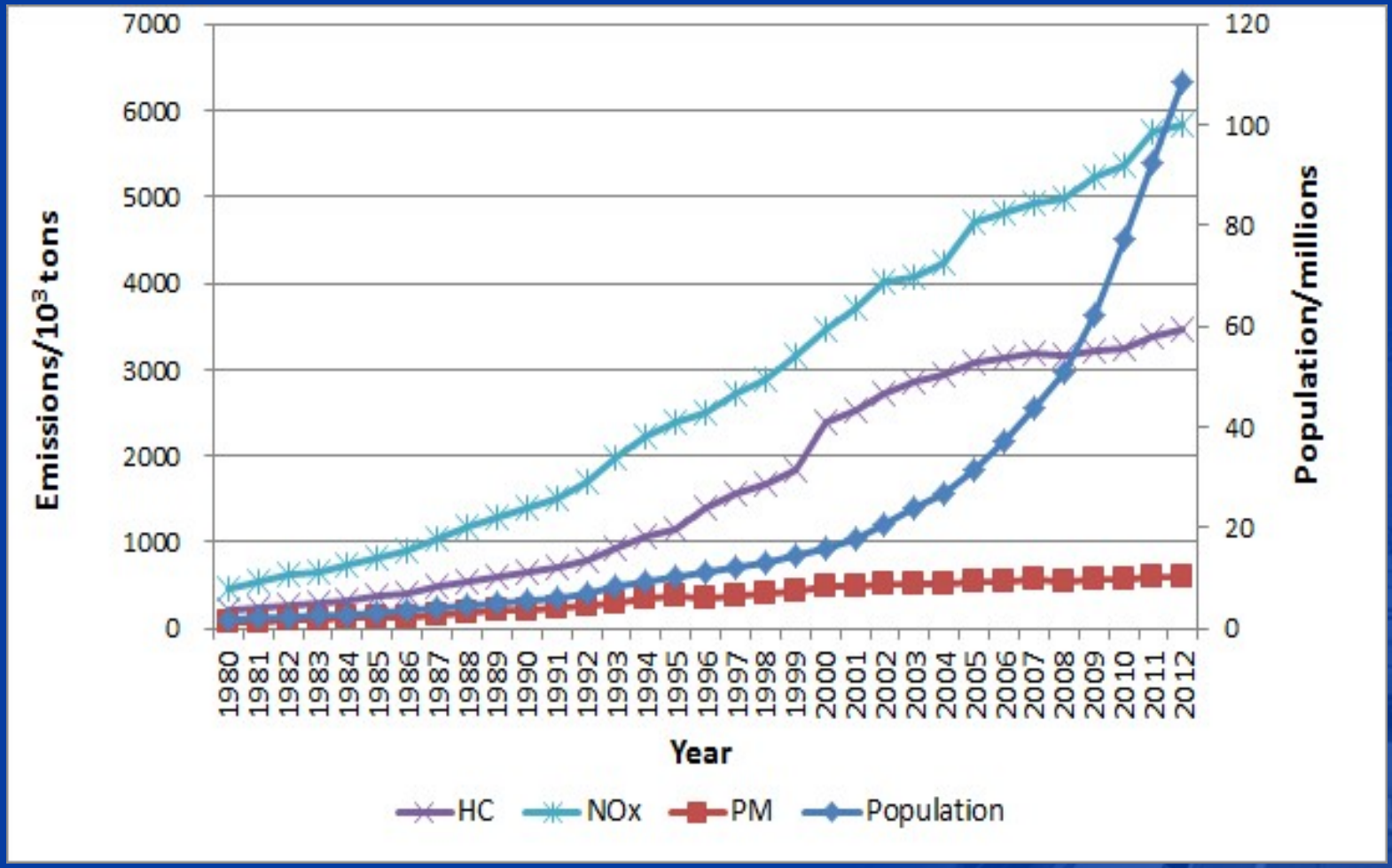
Dagang Tang
VECC-MEP

2013-11-16 Beijing

Outline

- Consensus needs to be reached ASAP
- Actions need to be taken immediately

Auto Population &Tailpipe Emission in China



Auto emission is a major cause of urban and regional air pollution

- The national auto population increased from 77.217 million to 108.378 million with an average annual increase of 18.5% during 2010-2012. Tailpipe VOCs emission increased from 3.237 million tons to 3.452 million tons, NOx emission increased from 5.368 million tons to 5.829 million tons, PM emission increased from 565,000 tons to 592,000 tons. Evap. and refueling VOCs emission estimated over 2 million tons each year.

- China scrapped 690,000 " yellow-label " auto in the year 2012. The national “yellow-label ” auto was 14.5million, accounting for 13.4% of total. But the emissions of CO, VOCs, NOx, PM of these “yellow-label” accounted for 53 %, 57% , 58 %, 82% of the total auto emission respectively.

- VOCs，NOx，PM/PN from auto are important cause of urban and regional ozone and PM2.5 pollution and haze problem. Minimization emission from auto will improve the ambient air PM2.5, O3 pollution, reduce heavy haze and visibility declination, and have positive impact on climate change.

Consensus needs to be reached

Consensus 1: Mobile emissions control could and must meet the most stringent requirements ASAP in order to improve urban and regional air quality. NOx, VOCs, and PM/PN are major pollutants which cause excessive ambient PM and O3.

Consensus 2: ZEV or PZEV should be the control target in new vehicles.

Consensus 3: A joint-action community with all key responsible parties should be formed to achieve the control target.

Consensus 4: DPF should be mandated in urban area and phase in to the whole country once 50 ppm sulfur diesel fuels are available.

PN Data

Indicative values of particle number

	Particle number		
	HDV PN 1/kWh	LDV PN 1/km	Indicative PN per cm^3
Engine-out (upstream DPF)	1×10^{14}	CI 1×10^{14} SI DI 1×10^{13} SI PF 1×10^{12}	1×10^{8}
Swiss limit value for construction machines	1×10^{12}	-----	1×10^{6}
Euro VI limit value Euro 5/6 limit values	8 resp. 6×10^{11}	6×10^{11}	1×10^{5}
Emission downstream DPF	1×10^{10}	1×10^{10}	1×10^{4}
Pure ambient air	----	----	2×10^{3}

HDV = Heavy duty vehicle
LDV = Light duty vehicle

CI = Compression ignition
SI = Spark ignition

DI = Direct injection
PF = Port fuel

Sulfur requirement by diesel after-treatment device

Fuel quality and after-treatment technologies

Technology	Sulfur content of fuel			
	10 ppm	50 ppm	350 ppm	2000 ppm
DOC	☺	😐	☹	☹
SCR (+ASC)	☺	☺	☺ (☹)	☺ (☹)
DPF with Pt, Pd	☺	😐	☹	☹
DPF without Pt, Pd	☺	☺	☺	😐

DOC = Diesel Oxidation Catalyst
SCR = Selective Catalytic Reduction
ASC = Ammonia Slip Catalyst

DPF = Diesel Particle Filter
Pt = Platinum
Pd = Palladium

Characteristic analysis of transport emission

1. Gasoline, diesel, and natural gas consumption continue to grow rapidly
2. Growth is concentrated in mega cities and regions with fast economic development and high human population density
3. Emissions from buses and taxis make considerable contributions to urban air pollution
4. Long-haul freight transport has important impacts on regional air quality
5. Rapidly increasing private cars use put high pressure on urban traffic and air quality
6. Slow progress on clean fuel supply and weak emission standards lead to high emissions from new vehicles
7. The main pollutants include NOx, VOCs, PM/PN (black carbon), toxic and harmful particulate matter
8. Morning rush hour and cold weather-onset are two periods with high-intensity emissions in cities

Strategy for effective emission reduction

1. Speed up the process of reducing sulfur content of gasoline and diesel to below 50ppm across the country. Summer Vapor pressure of gasoline should be in the range of 45-60kPa. Continuously tighten the technical requirement of gasoline components with high emission effects such as aromatic hydrocarbon.
2. Formulate the most stringent national standards for vehicle and ship emissions, which can be mandated under 50 ppm sulfur fuels, within 6 to 12 months. Zero-emission standards should be included in these standards. The standard for diesel vehicles (engines) should require DPF and gasoline vehicles should require ORVR.
3. Develop zero-emission urban trolleybus and trams as well as 1km short-range battery powered vehicles
4. Designate zero-emission urban zones, promote the development and use of ZEV

Strategy for effective emission reduction (cont.)

5. Designate low-emission urban zone, promote the development and use of PZEV
6. Promote urban buses with DPF in the near term. Early introduction can be implemented in low-emission zones.
7. Retrofit taxis with electronic or hybrid vehicles so as to meet the requirement of zero-emission and low-emission zones in the near term
8. In the process of yellow-label vehicles scrappage, only DPF diesel vehicles and China V light-duty vehicles should be subsidized

Division of responsibilities and cooperation

1. MEP, SAQSIQ, SAC: formulation and implementation of national emission standards and national fuel standards
2. Ministry of Transportation: issuing permits, annual inspections, and random inspection of in-use vehicles and ships
3. Ministry of Commerce: access and annual inspection of gas stations
4. Ministry of Public Security and Traffic Departments: registration, migration (in or out), cancellation and road traffic monitoring
5. Local governments: implementation of emission zone management, vehicle environmental protection standard conformance management
6. Manufacturers: produce more PZEV and ZEV

Thank You!