Diesel Vehicle Emission Control in China

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Outline

- Diesel Vehicle Emission Situation in China;
- New vehicle emission standards and fuel quality improvement;
- In-use vehicle emission control;
- Conclusions;
National Clean Air Initiatives

- 2017: national 10% PM2.5 concentration reduction
  - Beijing: annual PM2.5 mean concentration below 60μg/m³;

- 2013: 5 billion RMB allocated by the central government to Jing-Jin-Ji region;
- 2014: 10 billion RMB allocated by the central government to the three regions;
- 2013-2017: Beijing government will allocate 50 billion RMB;

State Council CAI Plan
**Vehicle and Fuel Standards**

- **Gasoline**
  - New Vehicle Standards (by the end of 2013)
  - 2014: Beijing, Shanghai implemented the China V standards for light duty and heavy duty vehicles; by the end of 2014, Guangdong will update to China V.
  - 2014.10: non-road diesel machineries updated to China III.
  - By the end of 2014: new diesel vehicle PN requirement or DPFs in Beijing.

- **Diesel**
  - By the end of 2014, 50 ppm S diesel fuel nationally.
  - By the end of 2017, 10ppm S gasoline and diesel fuels nationally.
In-Use Vehicle Emission Control

- Built and initiated nationally-implemented environmental compliance labeling system;
- Increasing scrappage rate of high-emitting vehicles;
  - Vehicle driving restriction;
  - Financial support to phase out yellow label vehicles;

Government subsidies document for phasing out yellow label vehicles

Restriction board for yellow label vehicles
2014 target: 6 million yellow label and old vehicles phased out;

By the end of 2015, almost all the 5 million yellow label vehicles in Jing-jin-ji area, Yangtz River Delta, Pearl River Delta will be phased out; nationally all the yellow label vehicles for business before 2005 will be phased out;

By the end of 2017: almost all the yellow label vehicles phase out nationally;
In-Use Vehicle Emission Control

- Capacity building for vehicle emission supervision: 13 provincial level institutions, 141 city-level institutions
- I/M system: Regular vehicle environmental inspections (Free acceleration, Lugdown testing);
- Road sampling tests;
- Remote sensing devices;

**Graphs:**

- Lugdown
  - X-axis: 国0 国1 国2 国3
  - Y-axis: Smoke

- Free acceleration
  - X-axis: 国0 国1 国2 国3
  - Y-axis: Smoke
City Network of Vehicle Emission Control

- Founded: March, 2012
- Members: 3 provincial-level, 13 city-level, VECC of MEP
- Leader: the department of pollution prevention and control of MEP
- Aim: promote information exchanging, experience sharing, inter-regional vehicle emission control; Serve as paradigms to other cities;
- Secretariat: VECC of MEP
Beijing:

- Before the 2008 Olympic Games, Beijing Automotive Institute carried out the DPF-retrofit feasibility research under the support of Beijing EPB; Retrofit guideline and evaluation procedure were defined with the pilot testing.
- Beijing government sponsored the retrofit program for related heavy-duty vehicles;
- 13 products of 6 companies accord with the technical manual in Beijing;
- About 10,000 diesel vehicles retrofitted and got the green labels;
DPF Retrofit Programs (2)

- Sino-Italian Diesel Vehicle Emission Control Project:
  - FBC-DPF retrofit program supported by Foreign Economic Cooperation Office of MEP in 2010;
  - Four cities with different diesel qualities and different latitudes participate in pilot test: Shanghai, Nanjing, Xining, Shenzhen;
  - Demonstration vehicle fleet include city buses, garbage trucks;
  - Vehicles with DPF run for one month;
  - Smoke was tested with LUGDOWM method on the chassis dynameters.
  - EPLI was used to measure the PM/PN reduction efficiencies;
PM Reduction Efficiencies

- PN reduction: 90% above
- PM reduction: 95% above
- Smoke: reduce to the limit of instrument
DPF Retrofit Programs (3)

- Sino-Swiss BC Reduction Project:
  - Starting from 2011, Supported by Swiss SDC and MEP of China;
  - 20 on-road vehicles in Nanjing and Xiamen for 30,000km running;
  - 25 construction machineries in Beijing;
  - Lab evaluation of BC reduction technologies (on-road and off-road) in Xiamen and Jinan;
  - National diesel vehicle aftertreatment guideline drafted based on experience learned through test bench evaluation and pilot tests and international retrofit experiences;
Vehicle selection standards;

Running Condition was monitored with CPK software vehicle by vehicle;

With the feedback information from the datalogger, different types of DPF were chosen to adapted to the vehicles;

National diesel vehicle after-treatment guideline drafted and submitted to MEP;
Nanjing Retrofit Program

- Nanjing First Stage of Retrofit program: 2013.8.1~2014.8.1
  - Large driving restriction areas for yellow labeled vehicles;
  - Green labels applied to original yellow labeled vehicles after retrofitted;
  - No subsidies from the government;
  - So far, there are more than 2000 vehicles (bus\ heavy duties) applied to be retrofitted;
Green Transportation in China

- **Green Freight:**
  - World bank Guangzhou Green Trucks Pilot Project (2008-2010);
  - Guangdong GEF Green Freight Demonstration Project (2011-2015);
  - Wuhan Low Carbon Freight and Logistics Project (2011-2012);
  - China Green Freight Initiative (CGFI) (2012-)

- **hybrid vehicle or electric vehicle promotion:**
  - 1000 unit/13 cities demonstration in 2009/2010;
  - half year of 2014: more than 20 k units, government subsidies, policies, supporting facilities construction (Charging station/Pile construction) in Beijing, Shanghai, et. al,

- **Public transportation promotion:**
  - Rail transportation: 19 cities in mainland, 2125 km (by the end of May of 2014); 35 cities applied the rail construction projects in 2012, above 7000 km in 2020;
  - BRT: more than 25 cities, 16 cities under construction in 2013;
  - Public bicycles promotion: 165 cities in 30 provinces of mainland of China;
Conclusions

- China government took the strong measures to deal with the air pollution problems;
- Heavy duty diesel vehicles is the key for PM/BC control;
- DPFs show high PM/BC reduction potentials; Retrofit guideline is necessary for DPF evaluation and durability check;
- green transportation programs demonstrated in China, promotion in a larger scale is under going by multi-ways;
Thanks for your attentions!
Vehicle Emission Control Center (VECC) was founded by the Ministry of Environmental Protection in 1997, operating the functions under the Chinese Research Academy of Environmental Sciences (CRAES).
## Major Works of VECC

<table>
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<th>Work Category</th>
<th>Details</th>
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| Compliance and Enforcement of New Vehicle Emission Standards | - Type Approval  
- Confirmatory of Production  
- In-use Compliance  
- Recall  |
| Implementation of In-use Vehicle Emission Standards | - I/M Assessment  
- Test facilities management  
- Test station certification  
- Labeling Management  |
| Fuel and Additives Management                     | - Certification for detergents  
- Local fuel standards development  
- Fuel quality survey  
- Vapor recovery Management  |
| Enforcement and Accounting of total vehicle NOx emission amount | - National level  
- 31 provinces  
- 347 cities  
- Annual audit  |
| National Emission Inventory Development           | - Chinese Vehicle Emission Model  
- 31 provinces  
- 347 cities  
- Off-road  |
| Vehicle Emission Control Technology Management    | - After-treatment device assessment  
- In-use vehicle retrofit pilot program  
- Off-road engine pilot program  
- BC program of HD dyno. test  |
| Training Program                                  | - Local EPBs  
- Vehicle and Engine manufactures  |
| Information and Database                          | - New vehicle emission database  
- In-use vehicle emission database  
- Label database  
- VIN database  
- Annual report  
- Website management  |