

## Retrofitting of Diesel Exhaust After Treatment Devices in Hong Kong

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### Hong Kong (1999)

- Population: 7 million
- Area: 1,098 square km
- Road: 1,885 km
- Licensed vehicles: 521,076
- 276 vehicles per km
- 33 vehicles per km (USA)
- 93 vehicles per km (California, USA)

## Air Pollution

- Industry pollution no longer a major source of air pollution
- Street canyon effect due to congested high rise buildings
- Regional effect
- Exceed Air Quality Objectives

## Air Pollution Problem Caused By Diesel Vehicles

- Taxis, goods vehicles and buses are all diesel vehicles
- 29% of vehicle population (17% at Singapore, 16% at Sydney, 10% at UK, 4% at USA)
- 70% of all mileage
- 98% of vehicle particulate emissions
- 100% of excessive smoky vehicles
- 75% of vehicle NO<sub>x</sub> emissions
- Cause of recent record high Air Pollution Index

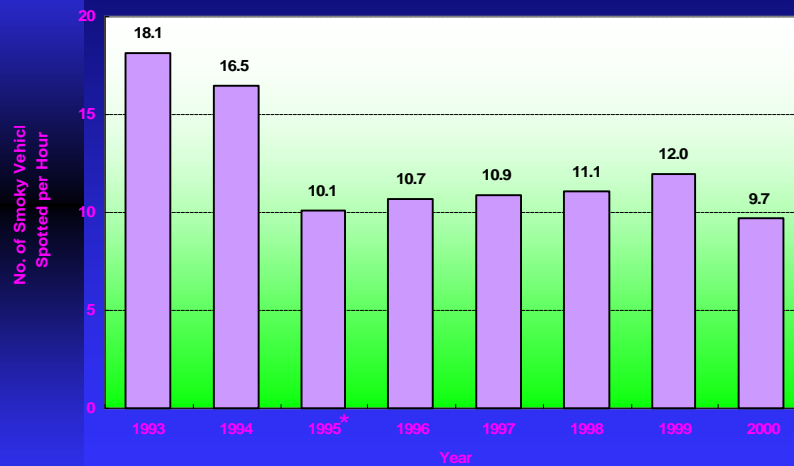
### Current Motor Vehicle Emission Control Strategy

- Clean alternatives to diesel vehicles
- Stringent new vehicle emission standards and fuel specification
- Strengthen in-use vehicle emission inspection
- Strengthen enforcement against smoky vehicles
- Retrofitting in use vehicles with locally practicable technology
- Promote environmentally friendly driving and awareness of proper vehicle maintenance

### Diesel Vehicle Emissions Control Current Status

- New vehicles now meeting most advanced emission standards
- Ultra Low Sulphur Diesel ( < 50 ppm Sulphur and > 51 cetane ) is available at all refueling stations
- Excessive smoky vehicles must pass dynamometer lug down test
- About 5,000 LPG taxis on road

## Average Number of Smoky Vehicles Spotted per Hour On-road Smoke Limit = 60 HSU



\* FAS smoke test limit lowered to 50 HSU for post 90 vehicles

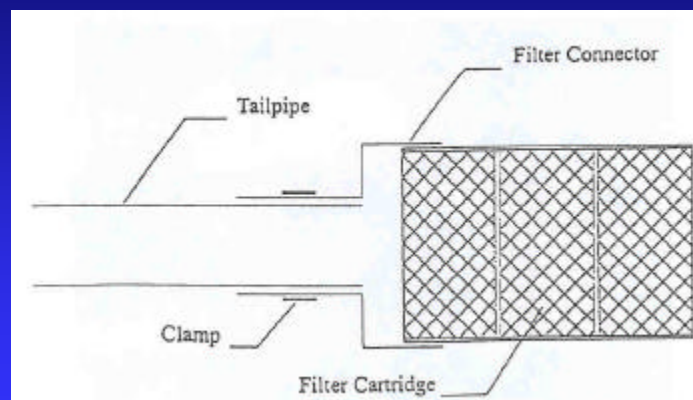
## Why after treatment devices on in-use diesel vehicles

- Still many excessive smoky vehicles on road
- Older vehicles (pre-Euro / 1995) emit more emissions
- Trade demand simple solutions
- US and UK bus program, Sweden environmental zone program are good examples showing the effectiveness of such technology

### Low cost trap for less than 4 tonnes pre-Euro vehicles

- Results of the petrol taxi public consultation during 1997
- Mechanical impact filtration
- Low cost but requires regular cleaning
- About 30% particulate removal efficiency
- Intermediate measure
- Installation started at September 2000
- Government grant for purchase and installation
- About 40,000 vehicles qualify
- About 8,500 vehicles installed

### Basic construction of the low cost particulate trap



Taxi equipped with the low cost particulate trap



Cleaning of the low cost particulate trap



### Diesel Catalyst for large buses

- EPD started a diesel catalyst trial with a franchise bus company in 1996
- A diesel catalyst shown 37% particulate reduction after 2 years of use
- Franchise bus companies installed over 1600 catalysts on all pre-Euro and Euro buses
- Over 2,200 franchised buses will be equipped with catalyst by year end

### Diesel Catalyst for over 4 tonnes vehicles trial - objective

- To draw up catalyst specification
- To enable trade to be familiar with the technology
- To study the effects of local operations on the catalyst
- Trial started December 1999
- 57 vehicles installed with catalysts of about 30% particulate efficiency
- Smoke reduction test results and trade comment are all positive
- Will complete the trial by April 2001

## Diesel Catalyst for over 4 tonnes vehicles trial - Issues

- Many many vehicles / exhaust configurations
- Long idle white smoke issues
- Specifications and certification requirement
- In use monitoring
- Cross boarder high sulphur diesel

## Diesel Catalyst for over 4 tonnes vehicles trial

### Way forward

- Consult trade to decide the best way forward
- Installation on how many in use vehicles subject to result of trial and trade consultation
- Government will assist in purchase and installation
- About 50,000 vehicles potential

## High efficiency particulate trap trials

- Feasible as ULSD is now widely available in Hong Kong
- Bus companies testing traps on Euro I and II buses
- Government testing traps on Euro I and II vehicles
- Government will option for trap equipped new vehicles if available

## Conclusion

- We strongly support the technology
- Trade cooperation through consultations and trials is a must
- Upon completion of all the programs, over 90,000 diesel vehicles in Hong Kong will be equipped with after treatment devices