URBAN AIR QUALITY MANAGEMENT:

Lesson Learned from Bangkok City

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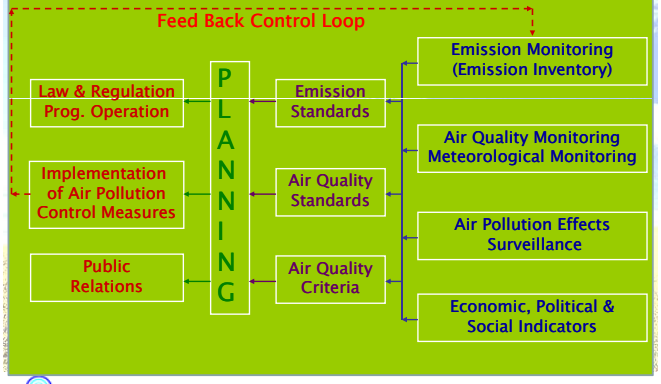
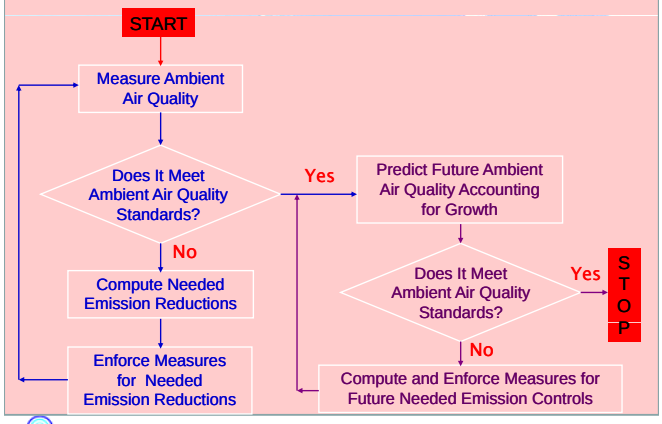
Air Quality Management System

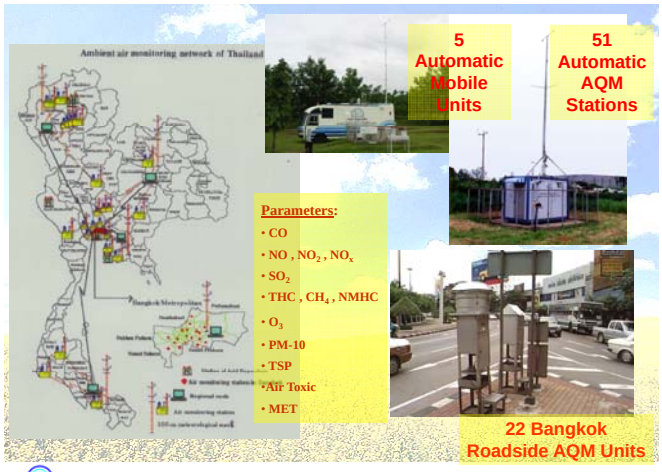


Air Pollution Control Planning Process

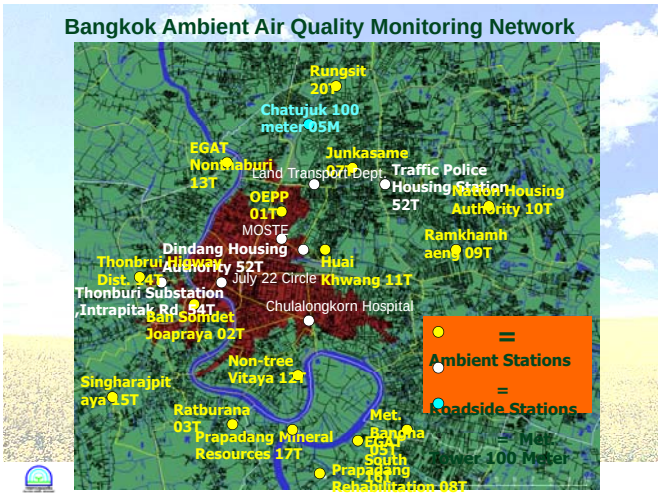


TWO Main Sources of Air Pollutions in Bangkok

1. **Transport sector (Energy Consumption)**
   - High emissions motor vehicles
   - Traffic congestion
2. **Construction**
   - Roads
   - Express ways
   - Mass transit system

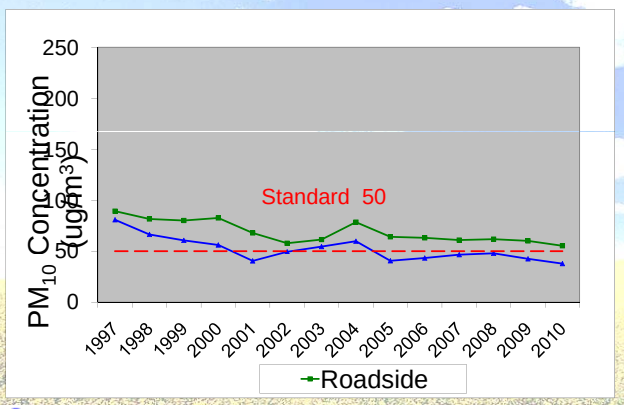


Bangkok Ambient Air Quality Monitoring Network

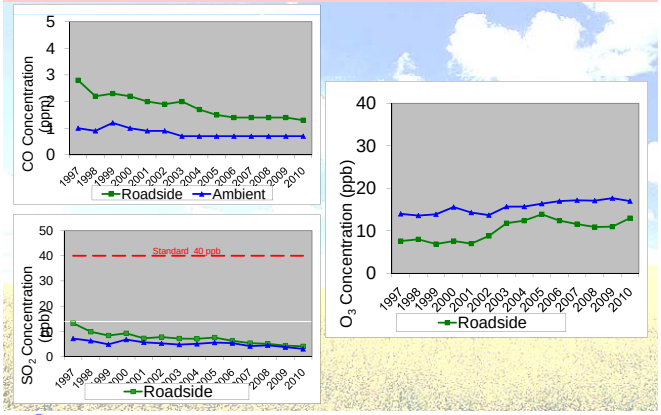


PCD central processing computer for data storage and analysis

Current State and Trends of Bangkok Air Quality



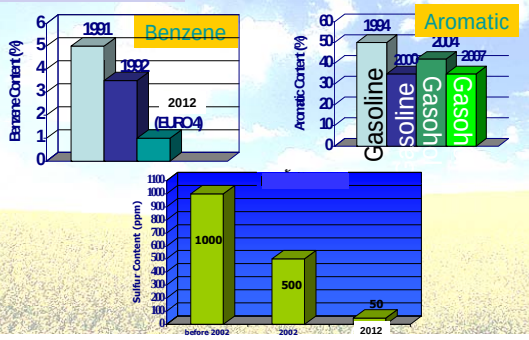
Current State and Trends of Bangkok Air Quality



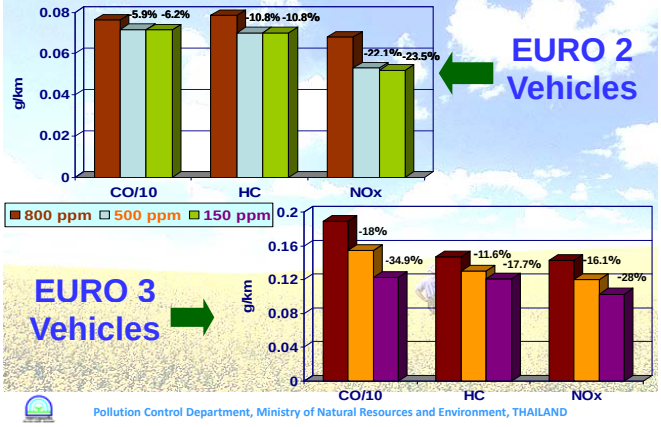
Air Pollution Control Strategies

1. Improvement of Fuel Quality

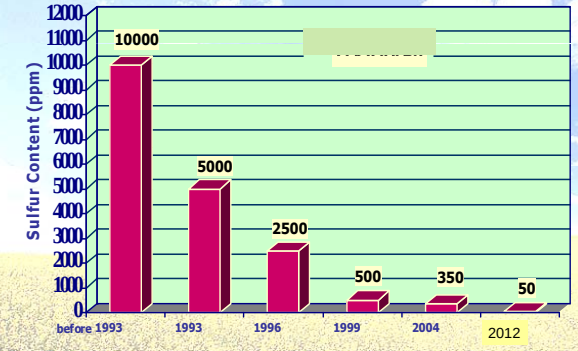
Gasoline Reformulation



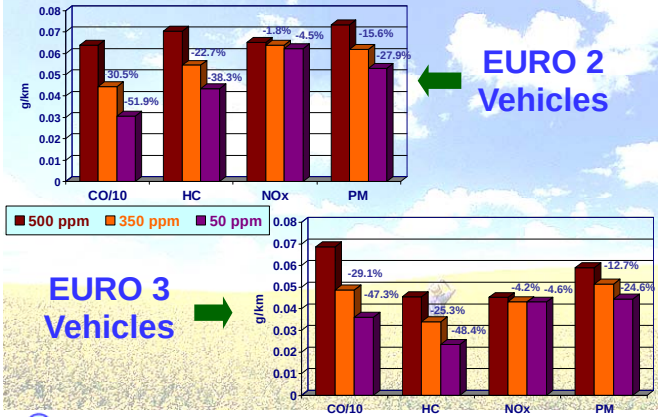
Impact of Sulfur On Gasoline Vehicle Emissions



Diesel Reformulation



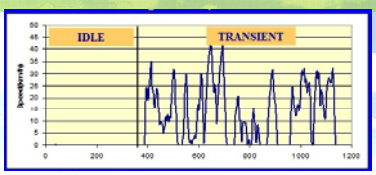
Impact of Sulfur On Diesel Vehicle Emissions



Effects on Tailpipe Emissions

Bangkok Driving Cycle

The transient cycle is 768s, represents driving cycle in Bangkok with an average speed of 13.86 km/h, frequent starts, stops, and idling.



3 EURO II Government Route Buses, 6 years, Brand= Isuzu, fueled with LSD

THC	NOx	CO	CO2	PM
30-50%	30-50%	35-53%	32-51%	29-51%

Thailand Fuel Specifications for 2012

Gasoline	2005	2012
RVP	62 kPa	60 kPa 62 kPa for Gasohol with VRU
Benzene	3.5 vol%	1 vol%
Aromatics	35 vol% (42 vol% for Gasohol Until	35 vol%

Diesel	2005	2012
CI or CN	51	50
Distillation 90°C	357	357
Polyaromatics	-	11 w%
Sulfur	350 ppm	50 ppm

Air Pollution Control Strategies

2. Vehicle Emission Standards

- **New Vehicles**

  Followed EU standards

- **In-use Vehicles**

  The emission standards are used as reference standards for inspection and maintenance programme, consisting of Black Smoke, CO, HC, White Smoke, and Noise

Emission Standards for New Vehicles

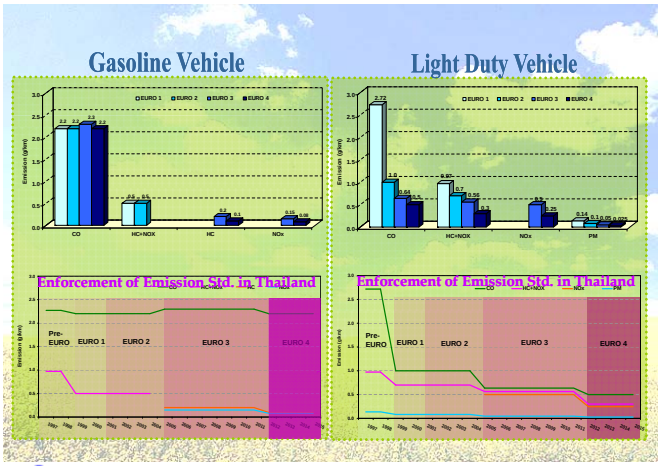
ASEAN Countries Adopted European Standards

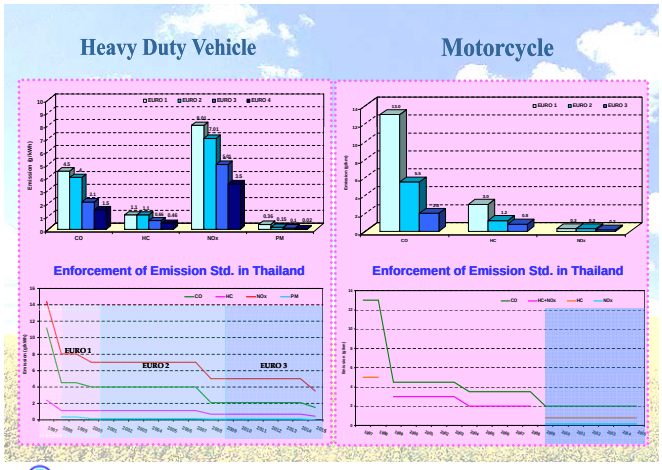
- Representatives of ASEAN countries met in a workshop in Singapore in 1992 in an effort to harmonize standards related to air pollution.
- It was decided to adopt European emission standards for new vehicles as reference standards for ASEAN countries.

Emission Standards for New Vehicles in Thailand

Type	Level	Reference Standards	Standards	Implementation
Motorcycles	1	ECE R 40-00	Pre EURO	1993
	2	ECE R 40-01	Pre EURO	1994
	3	USA, EU	--	1995
	4	Taiwan	--	1999
	5	Taiwan	--	2004
	6	97/24/EC(B)	EURO 3	2009
Light Duty Gasoline Vehicles	1	ECE 15-04	Pre EURO	-
	2	ECE 83(B)	Pre EURO	1995
	3	ECE 83-01 (B)	Pre EURO	1996
	4	93/59/EC	Pre EURO	1997
	5	94/12/EC	EURO 1	1999
	6	96/69/EC	EURO 2	2001
	7	1999/102/EC(A)	EURO 3	2005
	8	1999/102/EC(B)	EURO 4	2012

Type	Level	Reference Standards	Standards	Implementation
Light Duty Diesel Vehicles	1	ECE R 83(C)	Pre EURO	1995
	2	ECE R 83-01(C)	Pre EURO	1996
	3	93/59/EC	Pre EURO	1997
	4	94/12/EC	EURO 1	1999
	5	96/69/EC	EURO 2	2001
	6	1999/102/EC(A)	EURO 3	2005
	7	1999/102/EC(B)	EURO 4	2012
Heavy Duty Diesel Vehicles	1	ECE R 49-01	Pre EURO	-
	2	91/542(A)EEC	EURO 1	1998
	3	91/542(B)EEC	EURO 2	2000
	4	1999/96/EC	EURO 3	2008





Air Pollution Control Strategies

3. Inspection and Maintenance Programme

All vehicles are required to pass the in-use vehicle standards prior to the renewal of license.

Air Pollution Control Strategies

4. Roadside Inspection

incompliant car

Temporary

Repair in 30 days

no

US$ 25 fine for every violation

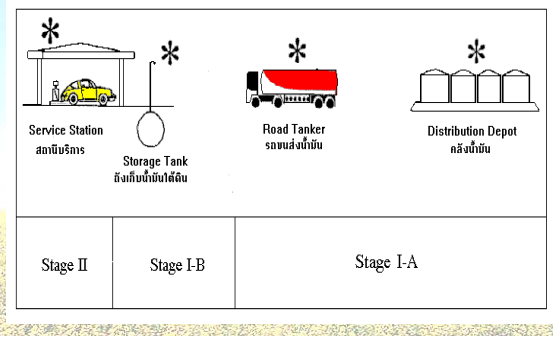
Permanent

yes

Pull out sticker

Air Pollution Control Strategies

5. Gasoline Vapor Recovery System (VRU)



Air Pollution Control Strategies

6. 2-Stroke Engine Limitation

Air Pollution Control Strategies

7. Stationary Sources Control

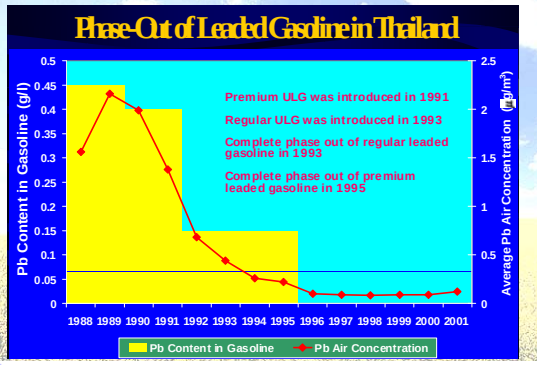
- **Environmental Impact Assessment**
- **Emission Standards**
- **Fuel Oil Standards**
- **Monitoring Requirement**

8. Construction Control

Trucks and construction areas are required to cover by material that can prevent PM emissions

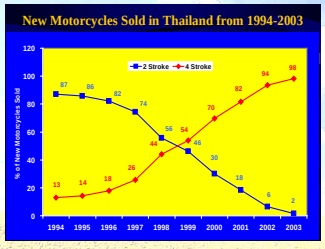
Experiences and Lesson Learned: Success Story

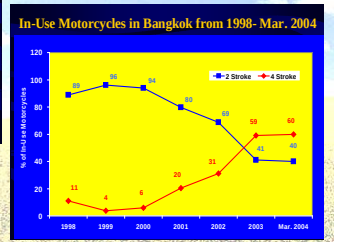
1. Lead Phasing – Out Programme



Experiences and Lesson Learned: Success Story

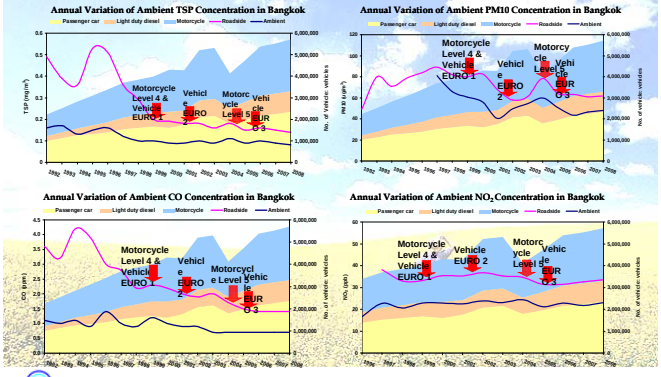
2. Reduction of 2-stroke motorcycle





Experiences and Lesson Learned

Positive Impacts on Bangkok Ambient Air Quality



Experiences and Lesson Learned

Challenges Ahead

- More effective I/M program
- Integrated area approach air quality management strategy (assimilative capacity)
- Update of emission inventories
- Strengthening enforcement
- Applying economic instruments
- Traffic management
- Encouraging non-motorization transport

Experiences and Lesson Learned

Challenges Ahead

- Increasing public participation, responsibility and willingness to contribute on an individual level to reduce pollution
- Improving the effectiveness of information dissemination to generate public and political support for actions
- Implementing public outreach program

Air and noise pollution management in Bangkok Action Plan 2012 - 2016

Target

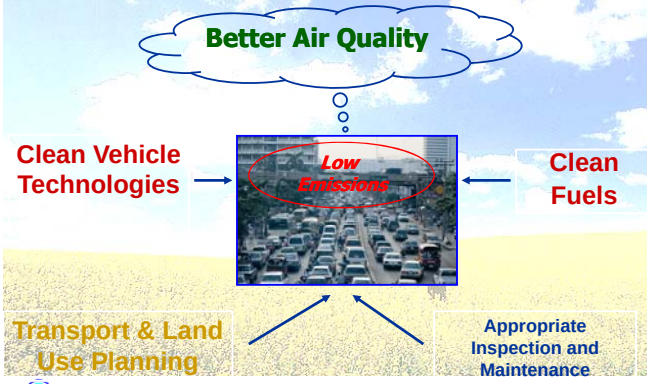
- **To improve air quality and reduce noise level in BMA area to meet the standards levels by stakeholders responsibilities:**
  - **1) Annual average PM_{10} is lower than 50 ug/m^3**
  - **2) O_3: meets the standards**
  - **3) Noise level: Annual average noise level follows the standards (lower than 70 dBA)**
  - **4) Reduction of VOC concentration by 50 % compared with 2010**

Vehicles

" High Quality New and In-use vehicles, proper maintenance, clean



Elements of a Comprehensive Vehicle Pollution Control Strategy



Stakeholders Seminar "Strategic and action plan for air and noise pollution management in Bangkok 2012 – 2016"


Mind Mapping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Bangkok, Other Cities of Thaila
Asian Region, Other Regions
and the World
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