Environmental Policies in Thailand and their Effects

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Environmental Pollution in Urban Area

Contents of Presentation

- Current condition
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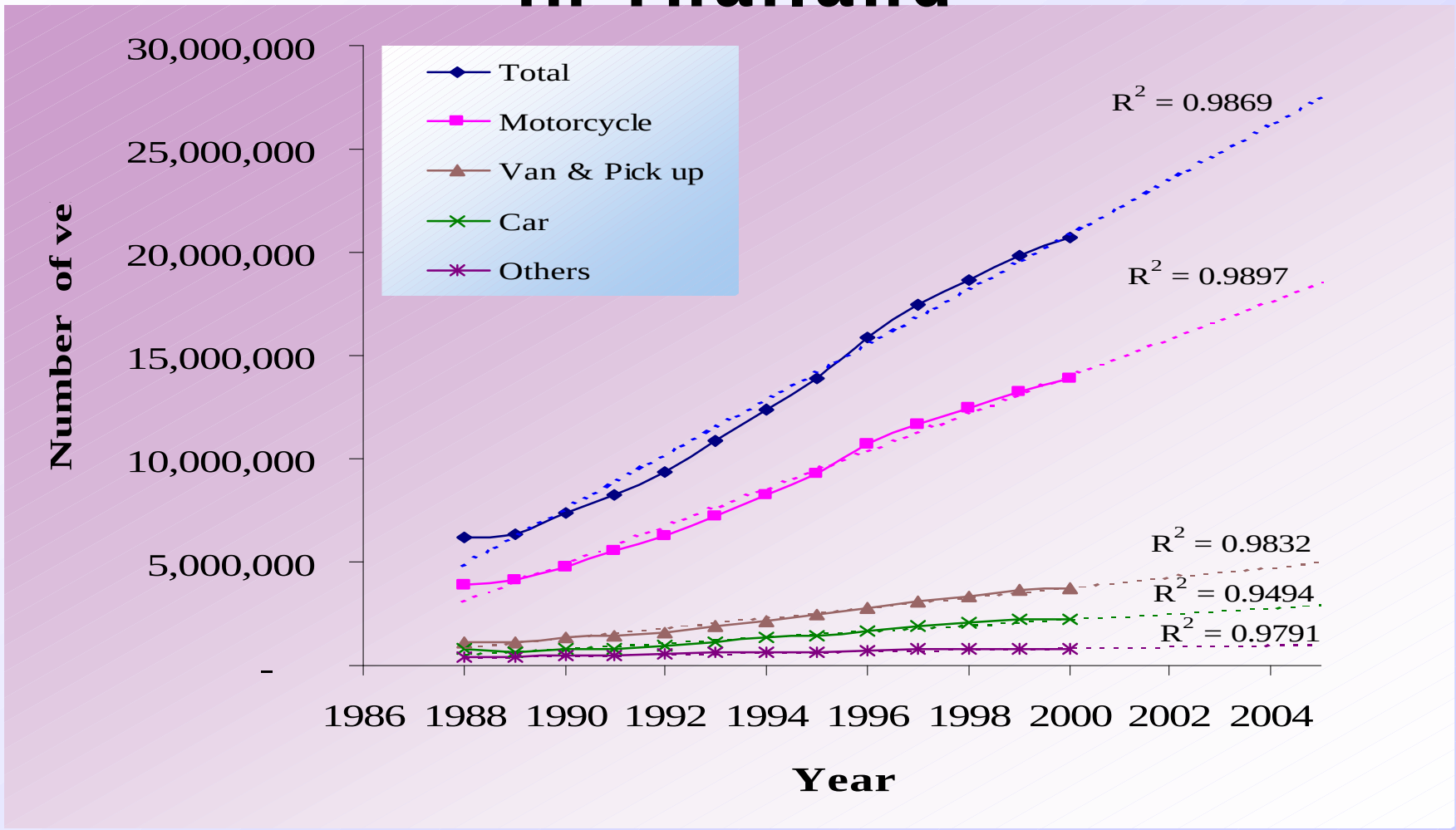
Current situation

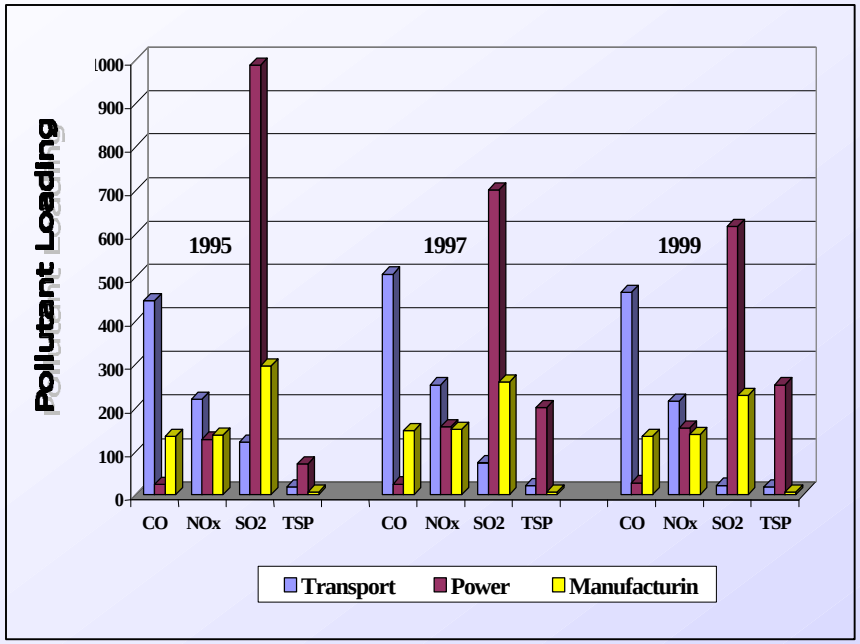
Number of registered vehicle & Trend

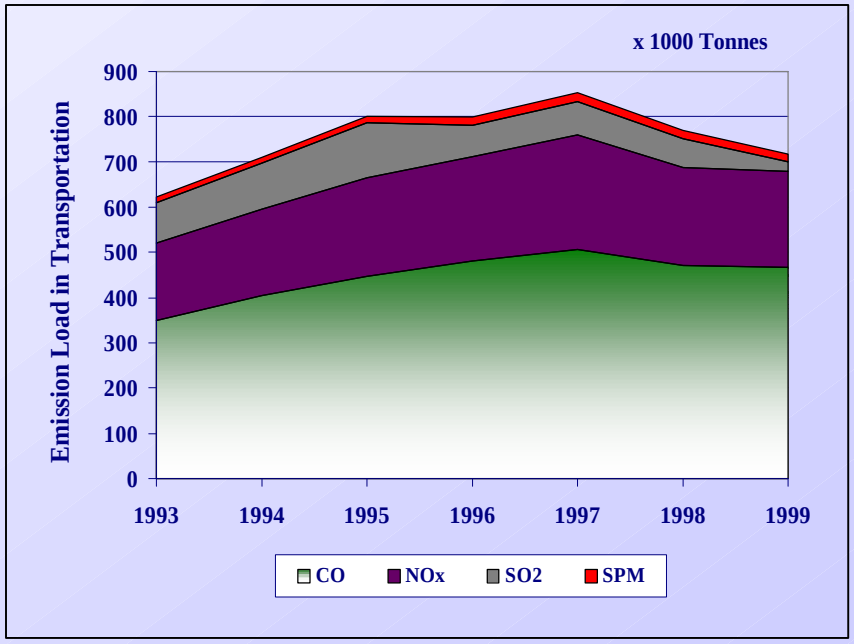
Type of vehicles	Whole Kingdom	Bangkok	Domestic
Motorcycle	13,916,560	1,964,850	11,951,710
Tractor	51,906	8,679	43,227
Car	2,188,534	1,315,016	873,518
Van & Pick-up	3,763,767	1,033,003	2,730,764
Bus	122,187	26,128	96,059
Truck	600,995	104,470	496,525
Trailer	51,525	15,693	35,832
Automobile Trailer	3,305	1,138	2,167
Total	**20,698,779**	**4,468,977**	**16,229,802**

Trends in the number of registered vehicles in Thailand



Ambient Air Quality





Pollution Control Measures

Thailand's Automotive Air Pollution Control Strategies

1. Improvement of Fuel Quality

1.1 Automotive Gasoline Reformulation

- Leaded gasoline has been no longer available in Thailand since January 1, 1996.
- Limited the benzene content to less than 3.5 percent.
- The aromatic content was set to be lower than 35 percent

1.2 Automotive Diesel Reformulation

- Reduction of the sulfur content of diesel fuel from 1.0 to 0.5
- Reduction of the 90 percent distillation temperature at end point of diesel fuel from 370 ^{o}C to 357 ^{o}C

2. Improvement of Emission Standards

Emission Standards for New Vehicles

Type of Vehicles	Level	Reference Standards	Implementing Date
Light Duty Gasoline Vehicle	6	96/69/EC	1 October 1999 for RM <= 1,250 kg 1 October 2000 for RM> 1,250 kg
Light Duty Diesel Vehicle	5	96/69/EC	1 October 1999 for RM <= 1,250 kg 1 October 2000 for RM > 1,250 kg 30 September 2001 for DI Diesel
Heavy Duty Diesel Vehicle	3	EURO II	1 January 1999
Motorcycles	4	- CO <= 4.5 gm/km - HC+NOx <= 3 gm/km - White Smoke <=15% - Evaporative 2 gm/test for sizes => 150 cc.	1 July 1999 for sizes <= 110 cc. 1 July 2000 for sizes <= 125 cc. 1 July 2001 for all sizes
	5	- CO <= 3.5 gm/km - HC+NOx <= 2 gm/km	Under Consideration

Emission Standards for In-use Vehicles

Pollutants	Type of Vehicles	Standards	Measuring Device	Test Procedure
Black Smoke	Diesel vehicle	50% 45% 40% 35%	Filter Opacity Filter Opacity	Snap Acceleration Test Snap Acceleration Test Full Load Test Full Load Test
CO	Gasoline vehicle registered from November 1, 1993	1.5%	NDIR	Idle Test
	Gasoline vehicle registered before November 1, 1993	4.5%	NDIR	Idle Test
	Motorcycle	4.5%	NDIR	Idle Test
HC	Gasoline vehicle registered from November 1, 1993	200 ppm	NDIR	Idle Test
	Gasoline vehicle registered before November 1, 1993	600 ppm	NDIR	Idle Test
	Motorcycle	10,000 ppm	NDIR	Idle Test

3. Inspection and Maintenance Program

Inspection system

Type	Pollutants					Methods	Weight (kg)	Max.speed (km/hr)
	CO	CO_2	HC	NO_x	PM			
Motorcycle	✓	✓	✓	✓		Direct, CVS	100-450	200
Gasoline Vehicle	✓	✓	✓	✓		Direct, CVS	400-3,500	200
Small Diesel Vehicle	✓	✓	✓	✓	✓	Direct, CVS	400-3,500	200
Large Diesel Vehicle	✓	✓	✓	✓	✓	Direct, CVS	5,000-21,000	100
Large Diesel Engine	✓	✓	✓	✓	✓	Direct, CVS	Horse Power 110-500 HP	Torque 2,500 Nm

4. Roadside Inspection

5. Traffic Management and VKT Reduction

- Two mass rapid transit systems, i.e. an elevated skytrain system, BTS, and a subway system.
- Bus system reform.
- Increasing road network and expressway.
- Automatic Computerized Traffic Light Management System.
- Parking restriction on major streets.
- Flexible working hours.
- Strict enforcement of traffic regulation.
- Bus lane.
- Reversible lane.

6. **Other Measures** such as

- **Alternative fuel such as natural gas, LPG, electricity, Bio-diesel, Ethanol**
- **Public campaign, such as Car Pool, Car-Free-Day, Walking street.**
- **Training technicians working in vehicle repair garages.**
- **Tax penalty and incentive for promoting the use of cleaner vehicles and cleaner fuels.**
- **Controlling the use of used engines.**
- **Special inspection and maintenance for bus fleet.**

Two Objectives

1-clarify the effects of current environmental policies.

2-clarify the effect of changing engine types.

Classification of effects

1-Car Usage

2-Fuel Consumption

3-Its Emission

Effects of current air pollution control policies

Effects of the Automotive Air Pollution Control Strategies

Strategies	Car Usage	Resource consumed	Emission
Improvement of Fuel Quality	Not change	Increase effectiveness of fuel usage	Reduce pollution specially Lead, CO, SO and MP-10
Improvement of Emission Standards		Increase effectiveness of fuel usage	Reduce all pollutant
Inspection and Maintenance Program	Effect in change of vehicle age		
Roadside Inspection	Not change	Not change	Less effect
Traffic Management and VKT Reduction	Reduce traffic congestion	Reduce total fuel consumption	Reduce pollution
Other Measures	Little change in number & type of car usage	Alternative fuel become more criticize	

Implemented policies effect to

1-fuel consumption

2-purification of gas emission

-->less effect to a change of the selection of engine types

Recent Technology

e.g.,CNG, LPG, Electric, Hybrid engines

Effects of changing the proportion of engine types

Condition 0 : Current situation

(Car 30%, Pick up 23%, Motorcycle 44%,Truck 3%)

Condition 1 : Shift in vehicle composition 10% from Pick up to Car

Condition 2 : Shift in vehicle composition 10% from Motorcycle to Car

Condition 3 : Substitute 50% of fuel by LPG in Car and Pick up

Forecasting of different conditions.

	Emission (10^9 g.)							
	NOx		CO		PM		HC	
Condition 0	126.67	-	78.62	-	8.57	-	28.56	-
Condition 1	121.29	-4.2%	81.79	+4.0%	7.89	-8.0%	28.71	+0.5%
Condition 2	128.42	+1.4%	84.36	+7.3%	8.55	-0.3%	28.65	+0.3%
Condition 3	117.00	-7.6%	74.80	-4.9%	7.81	-8.9%	28.33	-0.8%

Conclusion & Recommendations

- Replacement of the gas engine can be a key to a possible strategy applied for a new policy of car usage in Thailand.

- This policy can make a predominant effect to gas emission for a long-term plan while the current policies only focus on a purification of gas emission and reduction of fuel consumption.

- However, exclusive schemes, e.g., policy of taxation, to motivate the change of car engine are needed to examine.

- Modification of I&M