

# **Taiwan Regulatory Experience**

**Present to**

**Asian Vehicle Emission Control Conference  
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**By**

**Jeff S. C. Chuang**

**Environmental Protection Administration**

**Gov. of the R. O. C.**

# Outline

- **Introduction**
- **Previous and Current Emission Regulations**
- **In-Use Conformity**
- **Future Trend**

# Introduction

- **Status in Taiwan**

- Ä **Population density: more than 600 persons per square km**

- Ä **GNP: USD12,300.yr 1999.**

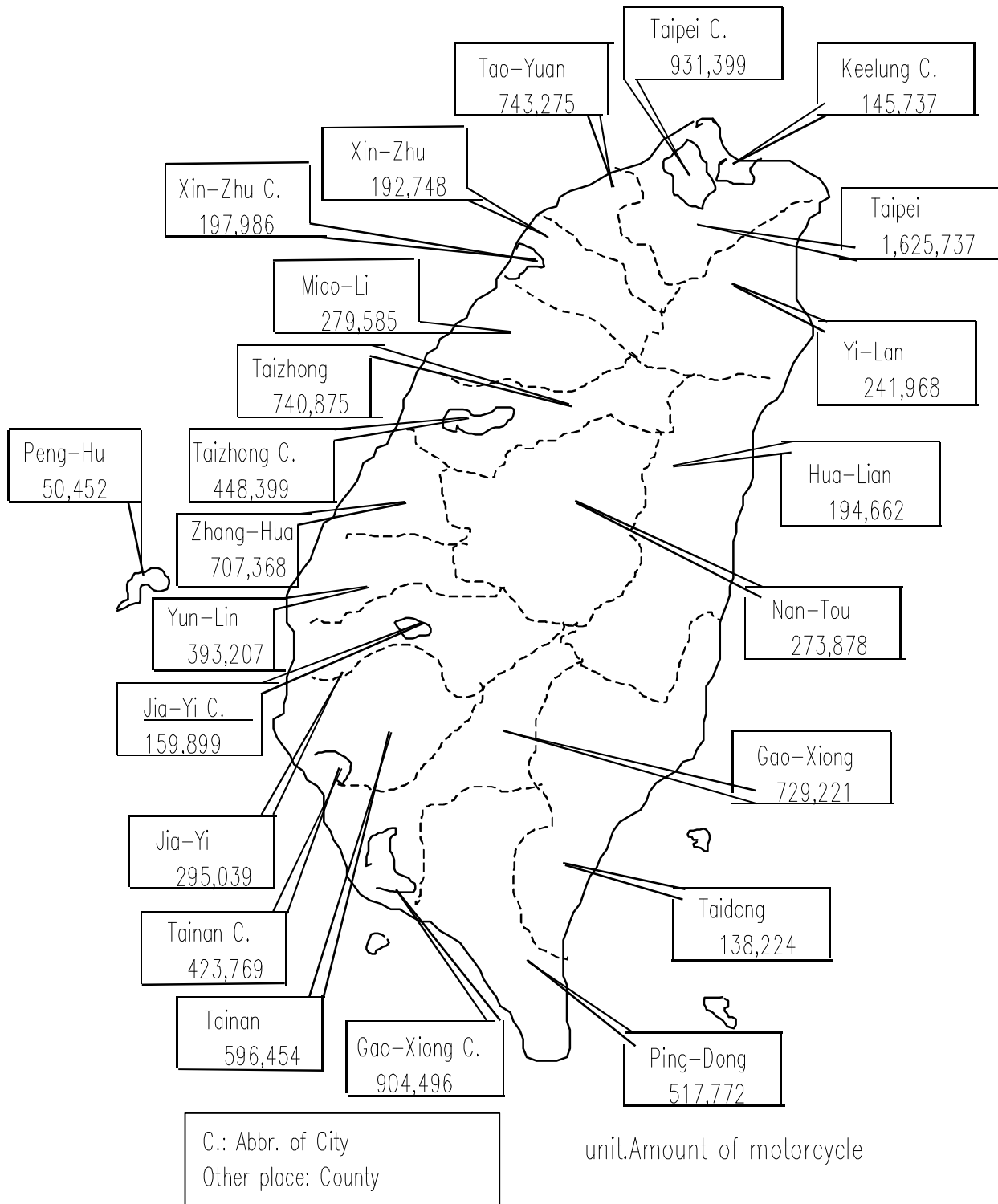
- Ä **Amount of registered motorcycle: 10,932,150.Dec. 1999.**

- **Environmental loading from motorcycle**

- Ä **Motorcycle density: more than 300 vehicles per square km**

- Ä **Nearly every two persons own a motorcycle**

# Distribution Map of Motorcycles in Taiwan



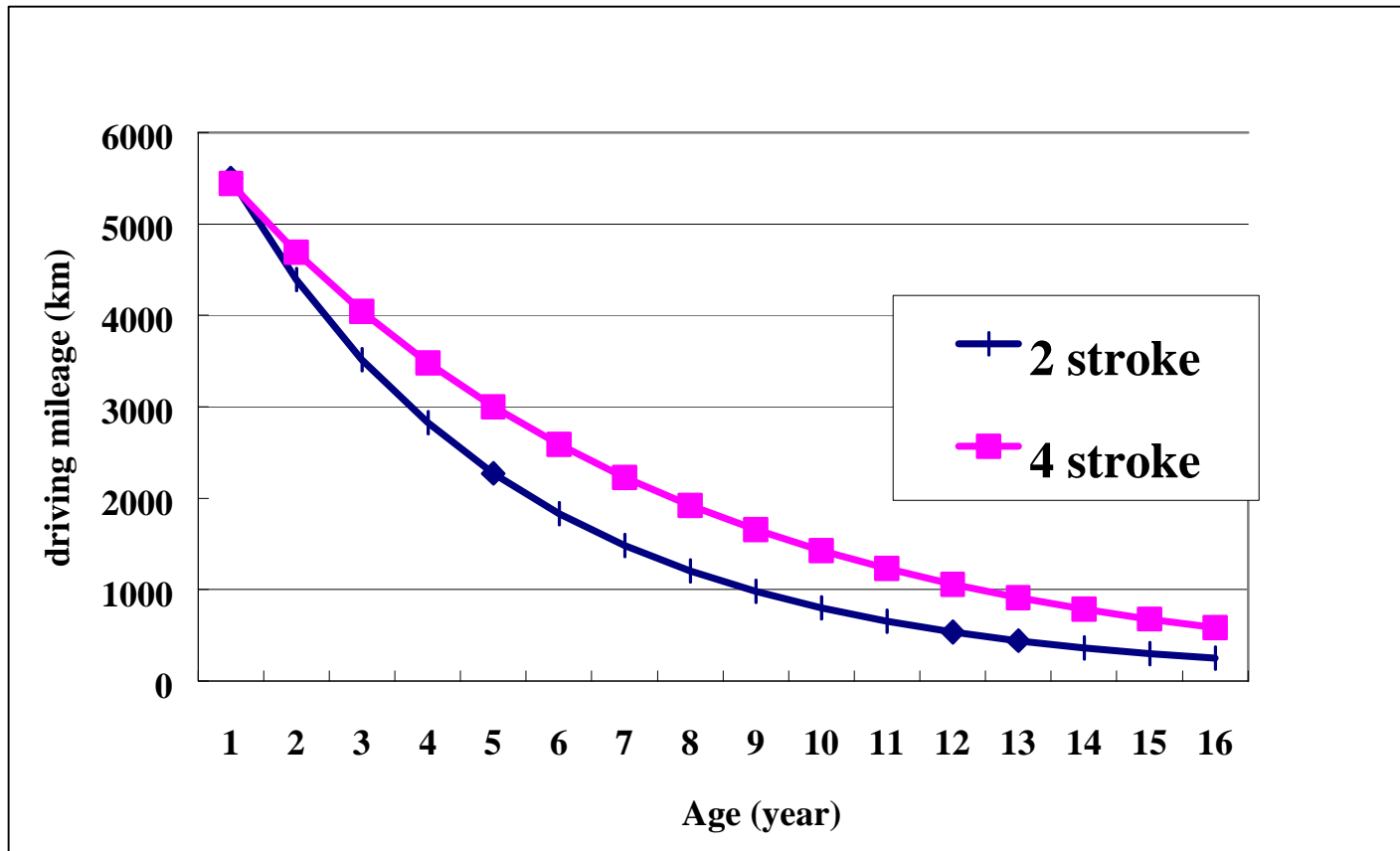
Amount of motorcycle in Taiwan.10,932,150

.12/1999.

## Sales Amount of Domestic Motorcycles

<b>Quantity/Ratio</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
<b>2 Stroke</b>	<b>547,003</b>	<b>549,166</b>	<b>396,970</b>	<b>370,236</b>	<b>266,111</b>
<b>Ratio %</b>	<b>58.0</b>	<b>54.2</b>	<b>46.0</b>	<b>46.1</b>	<b>35.1</b>
<b>4 Stroke</b>	<b>396,833</b>	<b>464,219</b>	<b>465,496</b>	<b>433,421</b>	<b>493,059</b>
<b>Ratio %</b>	<b>42.0</b>	<b>45.8</b>	<b>54.0</b>	<b>53.9</b>	<b>64.9</b>
<b>Total</b>	<b>943,836</b>	<b>1,013,385</b>	<b>862,466</b>	<b>803,657</b>	<b>759,170</b>
<b>Variation %</b>		<b>6.9%</b>	<b>-14.9%</b>	<b>-6.8%</b>	<b>-5.5%</b>

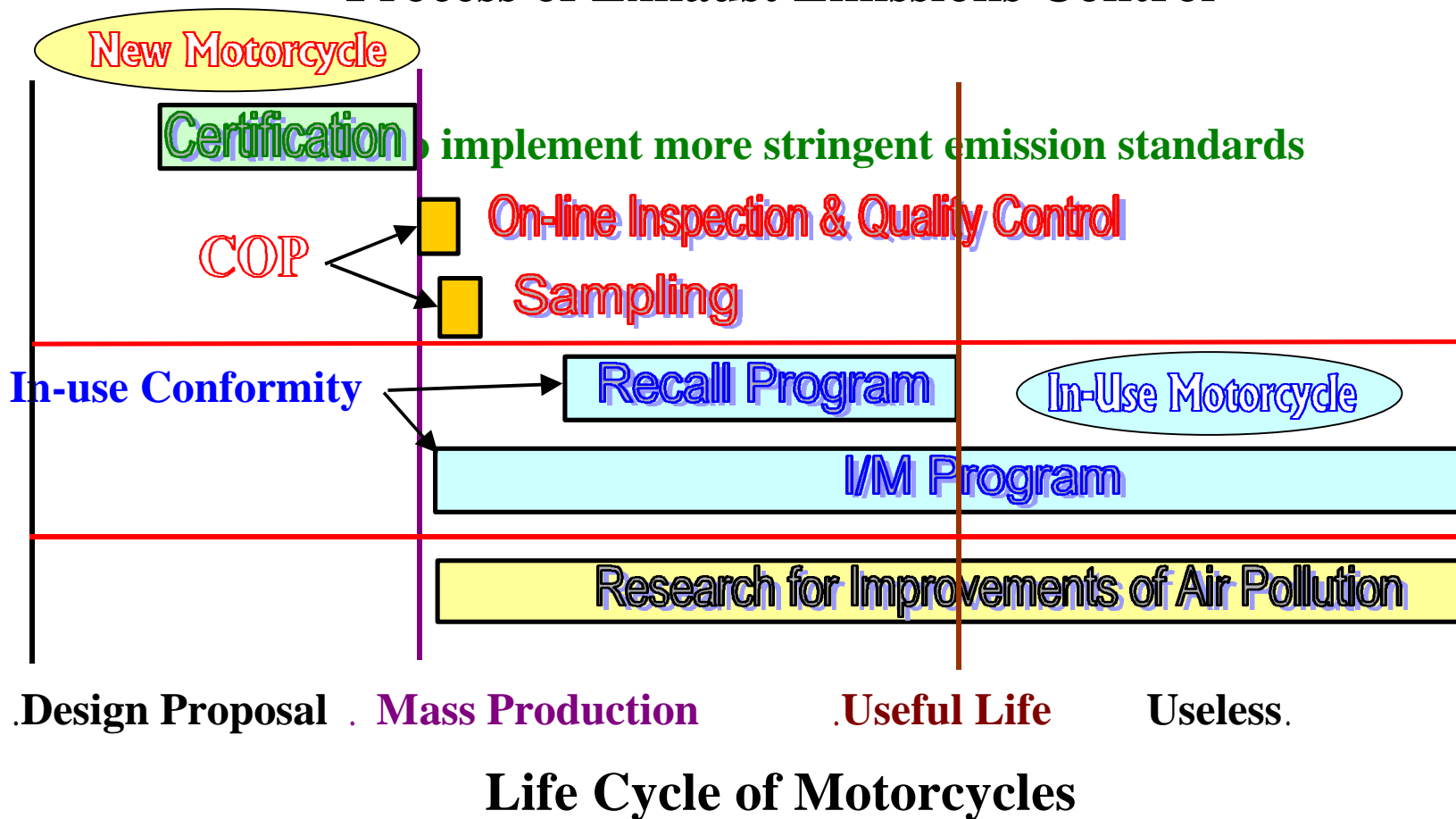
## Average Driving Mileage Per Year in Comparison between 2 and 4 stroke motorcycle



## **Previous and Current Emission Regulations**

- **Process of Exhaust Emissions Control**
- **Emission Standards for Motorcycles in Taiwan**
- **Technology Reviews in Each Phases**
- **Reduction Effectiveness in Last Decade**

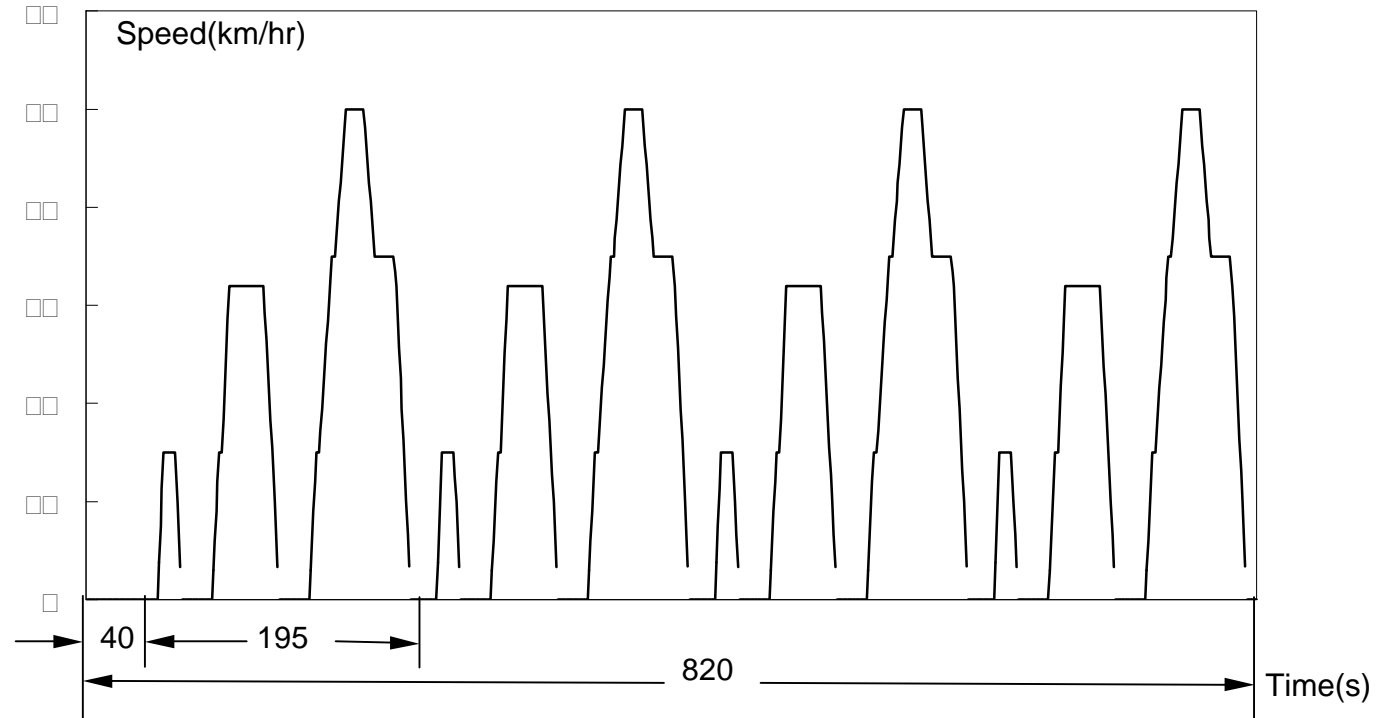
## Process of Exhaust Emissions Control



## Emission Standards for Motorcycles in Taiwan

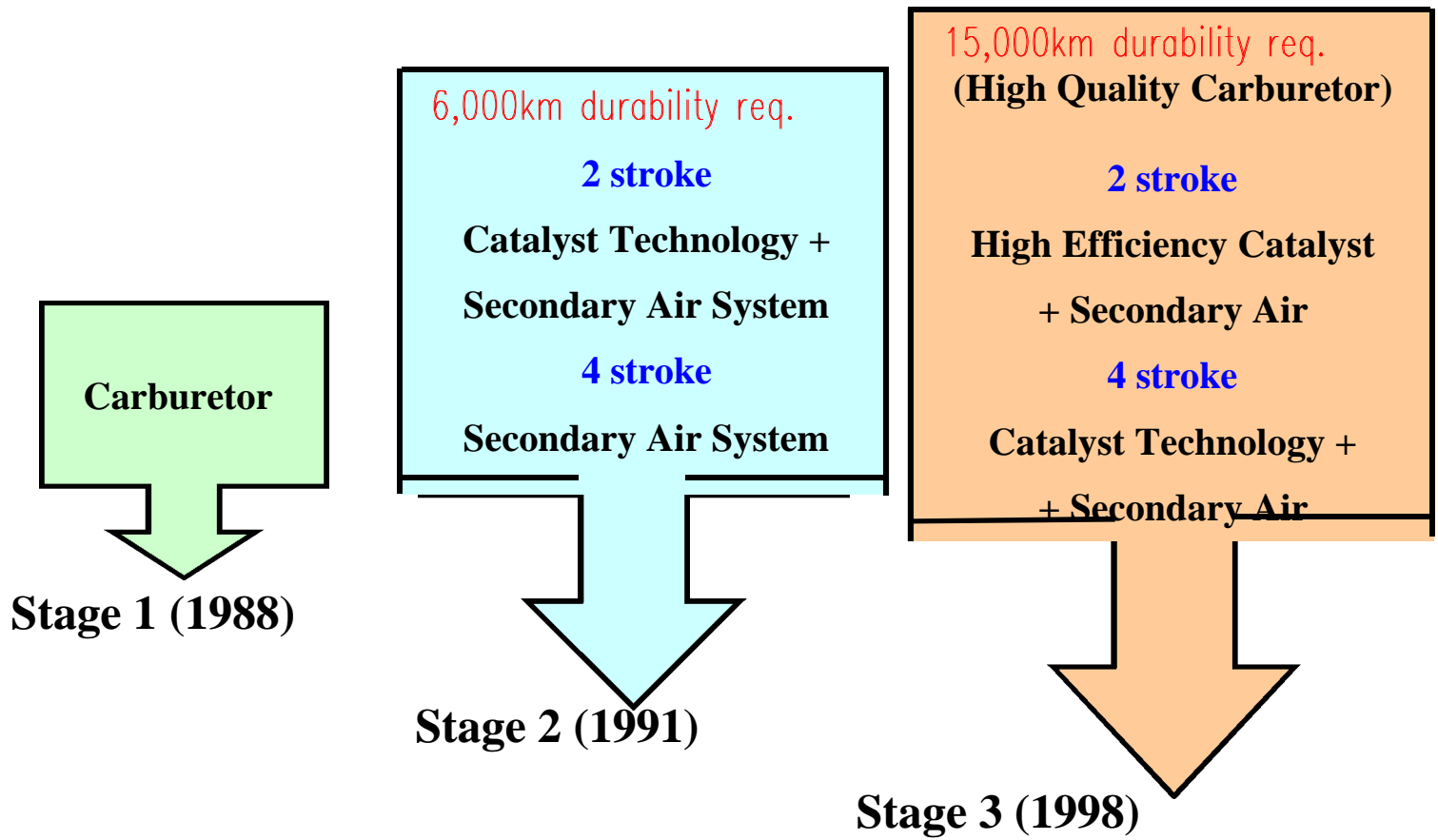
Category	Stage	Effective Date	Type Approval				Idle Test	
			HC+NO <sub>x</sub> (g/km)	CO (g/km)	Driving Pattern	Durability Require.	CO (%)	HC (ppm)
All	1	1988.1.1	5.5	8.8	ECE40	None	4.5	7000
	2	1991.7.1	3.0	4.5		6,000km	4.5	7000
	3	1998.1.1	2.0	3.5		15,000km	4.0	6000
2 stroke	4	2003.12.31	1.0	7.0	ECE15 (cold start)	15000km	3.5	2000
4 stroke			2.0					

**Remark: Emission Standards for in-use Motorcycle CO: 4.5%, HC: 9000ppm**

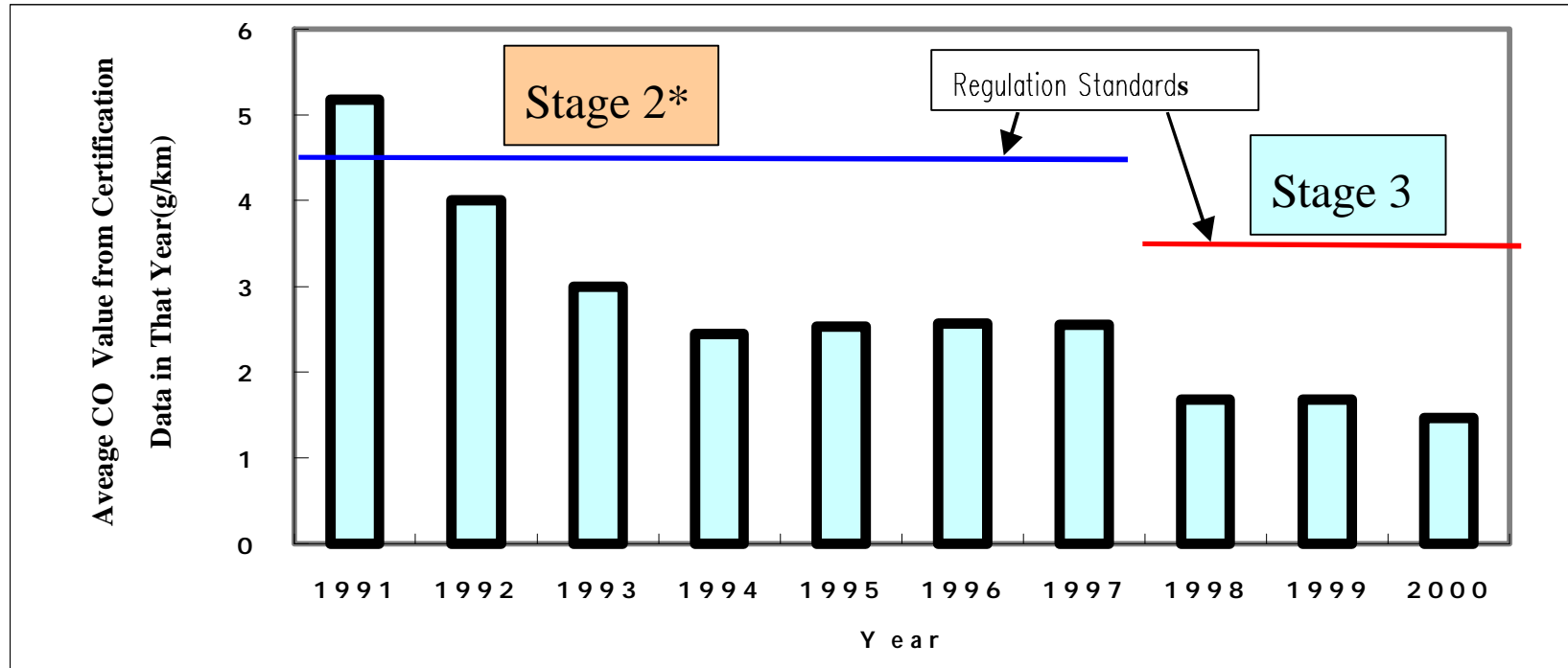


**Emission Test driving pattern for Motorcycle.as ECE 40.**

# Technology Reviews in Each Phases

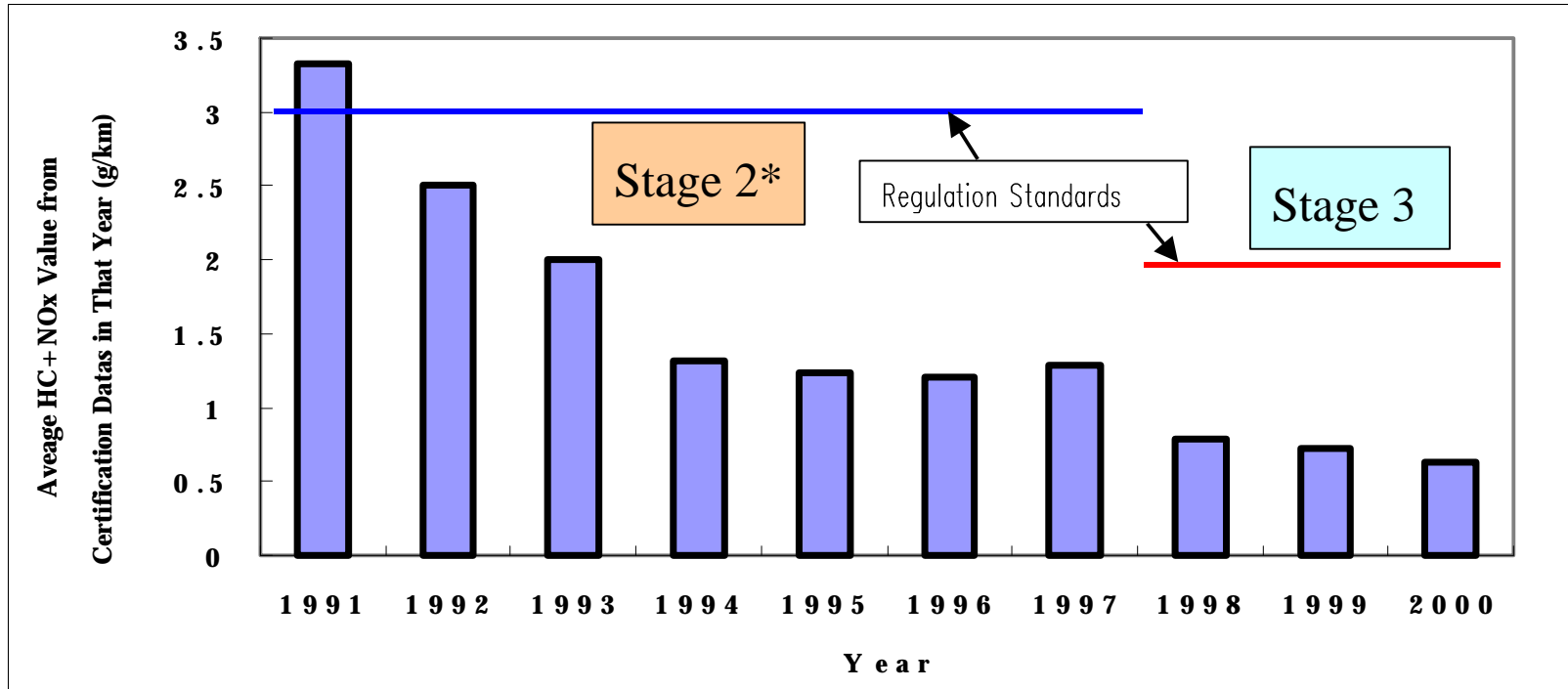


## CO Reduction Effectiveness in Last Decade



**\* These certification data must be qualified to meet stage 2 standard from 30 June 1991 for new motorcycle types and from 1 July 1992 for all new motorcycles.**

## HC+NOx Reduction Effectiveness in Last Decade



**\* These certification data must be qualified to meet stage 2 standard from 30 June 1991 for new motorcycle types and from 1 July 1992 for all new motorcycles.**

## **In-Use Conformity**

- **Recall Programs( Driving Pattern Test on Chassis Dynamometer)**

- Ä **Objective and Standard of Recall**

- Ä **Test Results of Recall Programs**

- **I/M Programs ( Idle Test )**

- Ä **Penalties and Incentives of I/M Programs**

- Ä **Test Results of I/M Programs**

## **Objective and Standard of Recall**

- **Objective:**

**Properly maintained motorcycles must meet regulation standards, otherwise manufactures must recall and repair them.**

- **Standard of recall:**

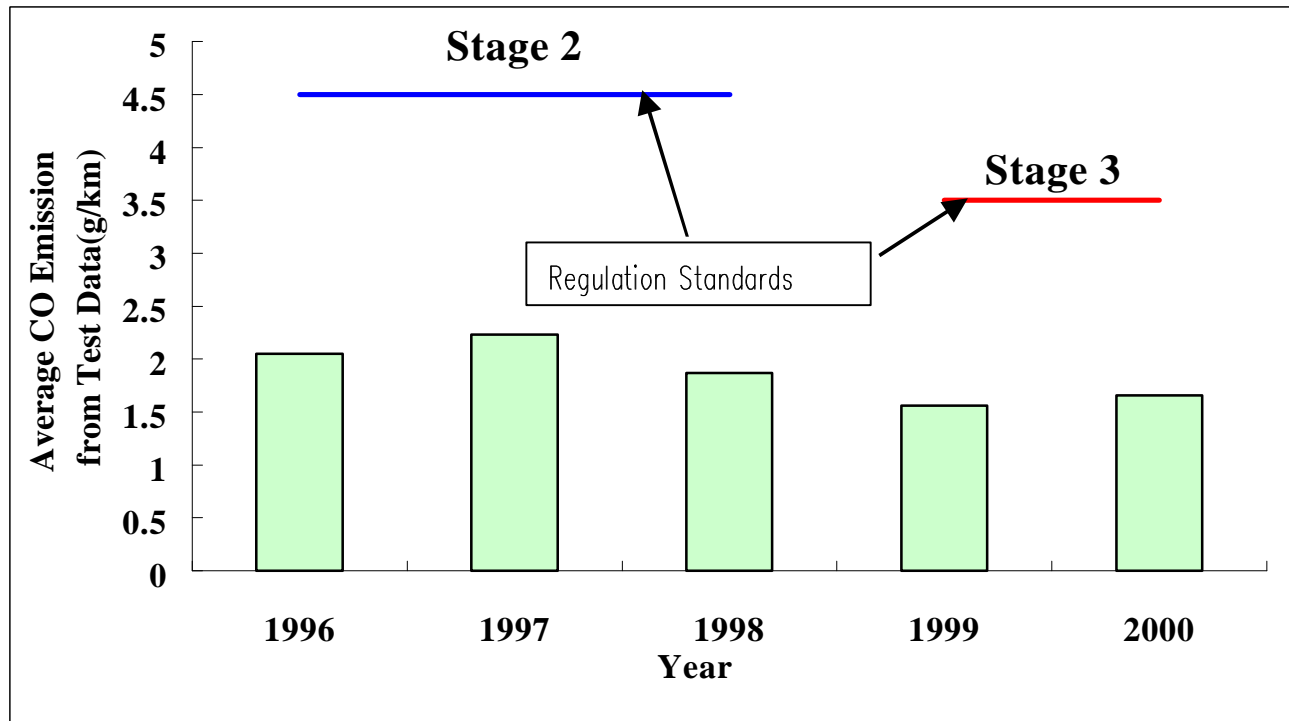
- Ä **Preliminary investigation test: Conformity test will continue if average emission from selection of 5 motorcycles in each selected engine family could not meet emission standards, or more than 2 test data from each engine family are failed.**

- Ä **Conformity test: Recall must be done if average emission could not meet mission standards from 10 data measured from the same engine family.**

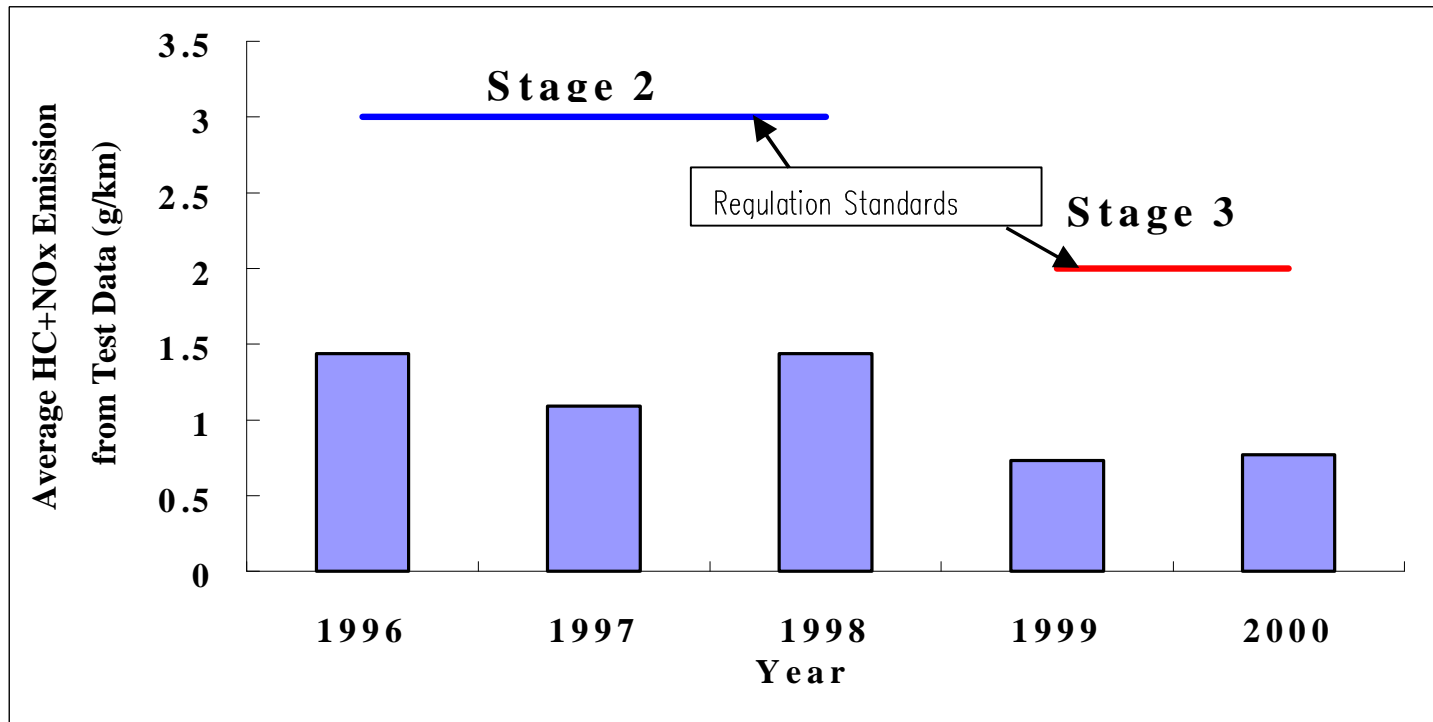
## Statistics of Motorcycle's Test in Recall Programs

Items	Year				
	1996	1997	1998	1999	2000
Engine Family	3	7	4	7	10
Quantity of Motorcycle's Test	16	36	20	35	50
Number of Test Failure	0	1	0	1	3
Number of Recall	0	0	0	0	0

# Test Results of CO Emission from Recall Programs



## Test Results of HC+NO<sub>x</sub> Emission from Recall Programs



## **Penalties and Incentives of I/M Programs**

- **Road-side Test.Idle.**

**To block motorcycles for an idle test beside roads by 23 local environmental authorities: The government will impose a fine NTD1,500 if the motorcycle could not meet the emission standards of I/M Programs.**

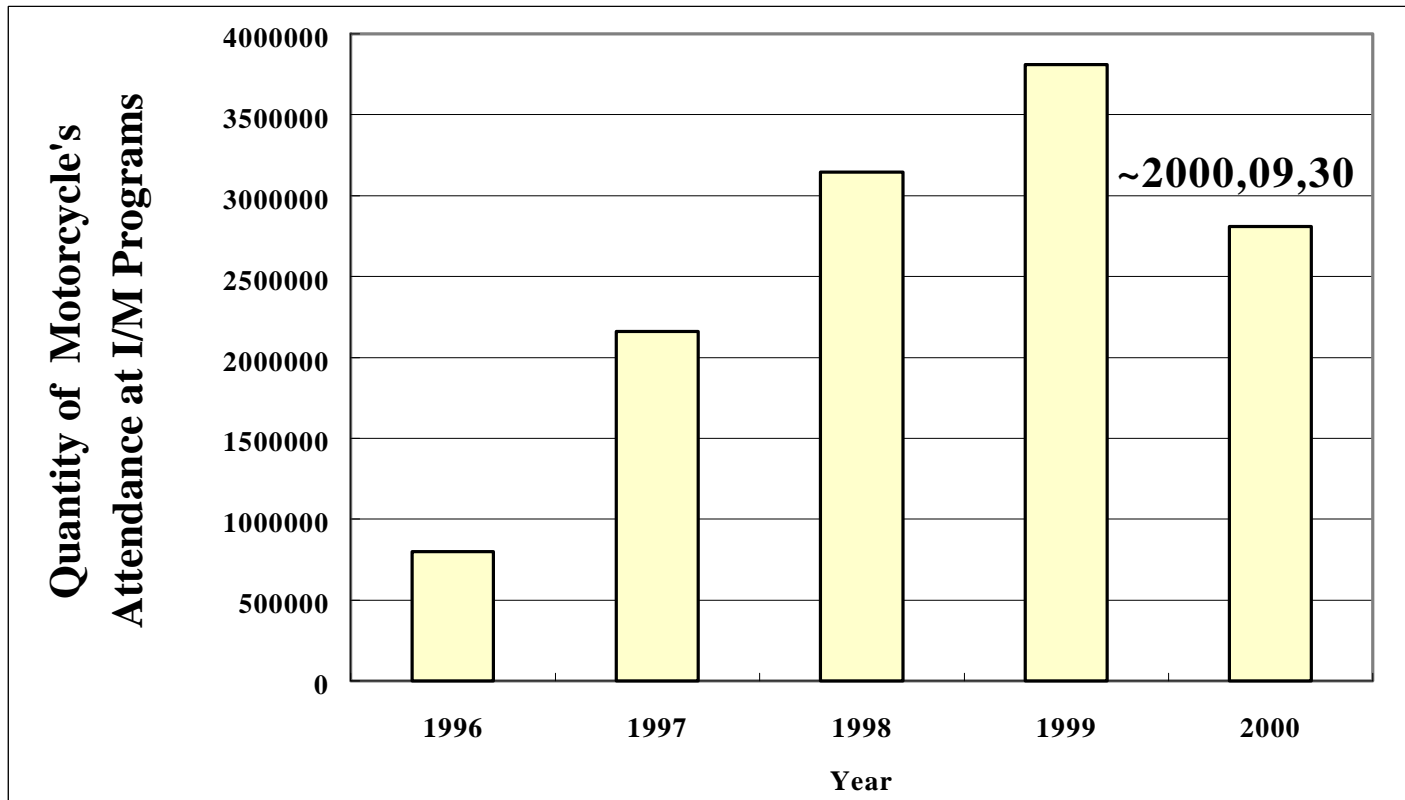
- **Periodical Test.Idle.**

**To inform owners for a periodical idle test in the local test station by the central environmental authority: The government will impose a fine NTD3,000 if owners do not obey the information to test on schedule.**

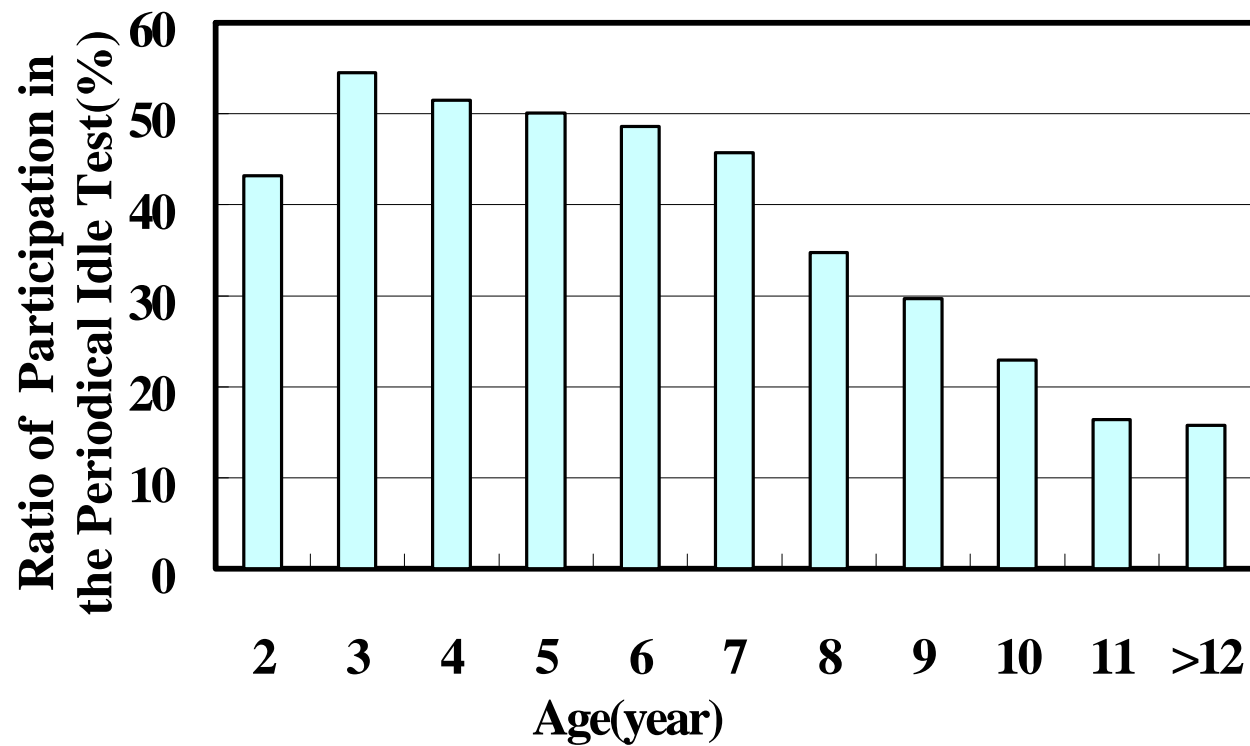
- **Encourage people to inform EPA of high emission motorcycle**

**Anyone could inform a high emission motorcycle to the environmental authority. The Taiwan EPA will order the owner to proceed an idle test for this motorcycle in the local test station. If it could not meet the emission standards, the informer could obtain bonus NTD100.**

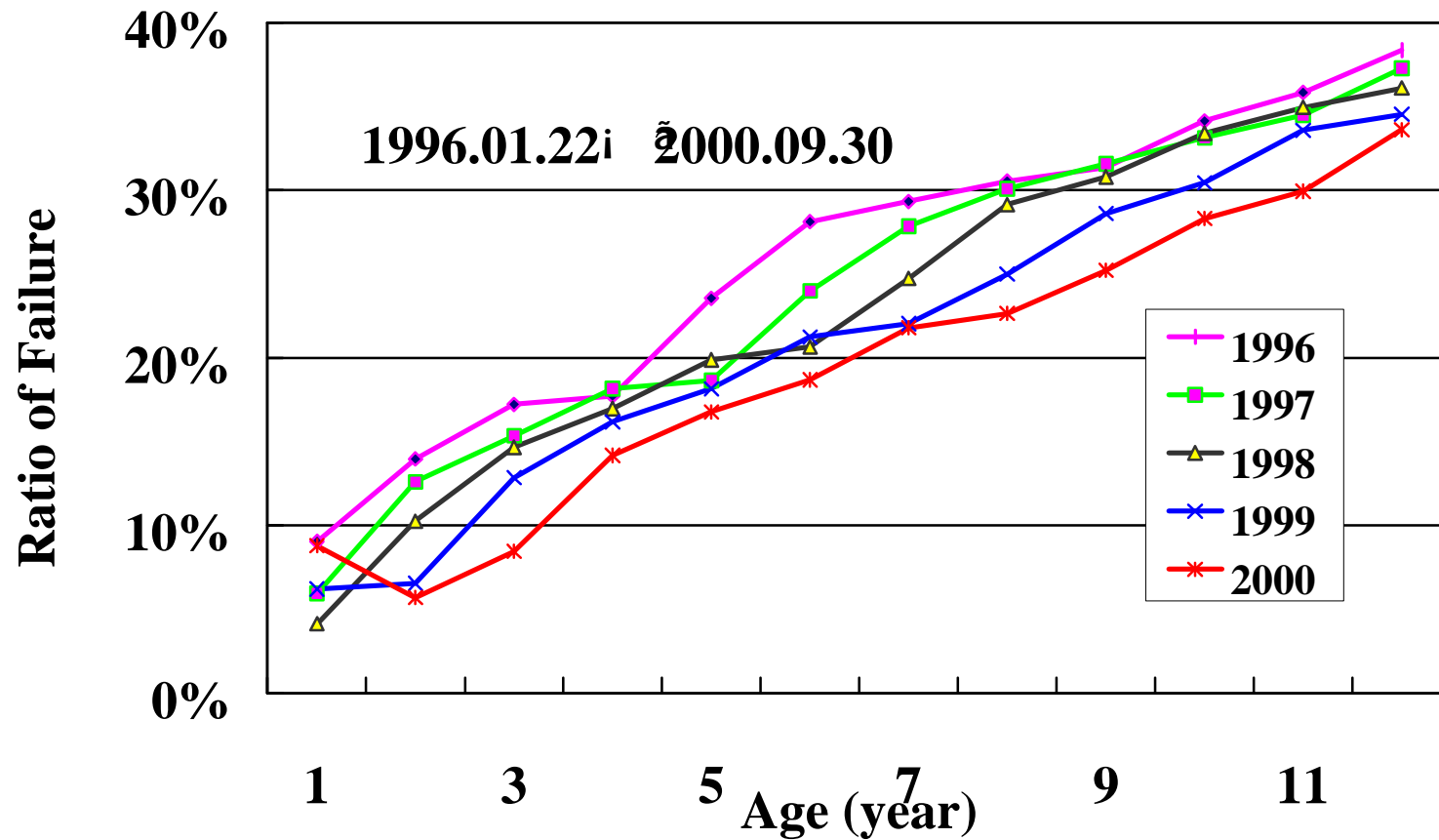
# Quantity of Motorcycle's Participation in the Periodical Idle Test for I/M Programs



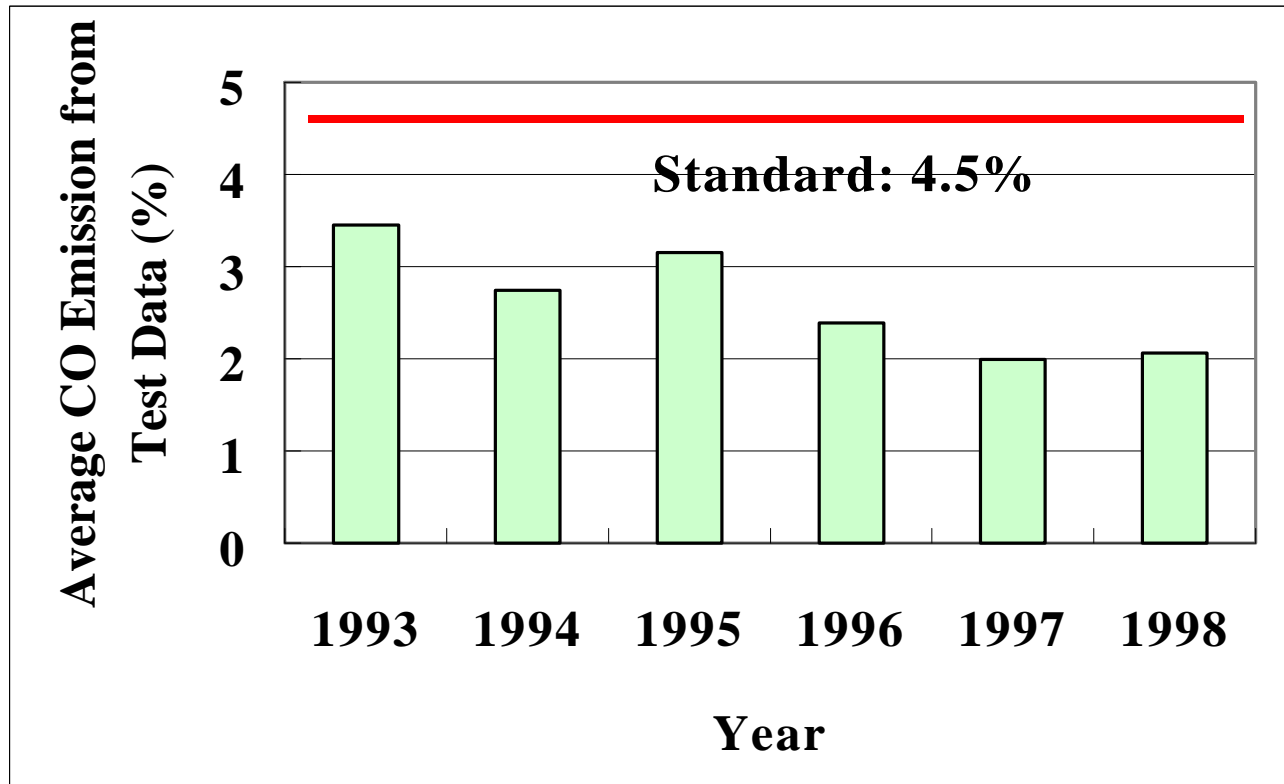
## Ratio of Participation in the Periodical Idle Test for I/M Programs in 1999



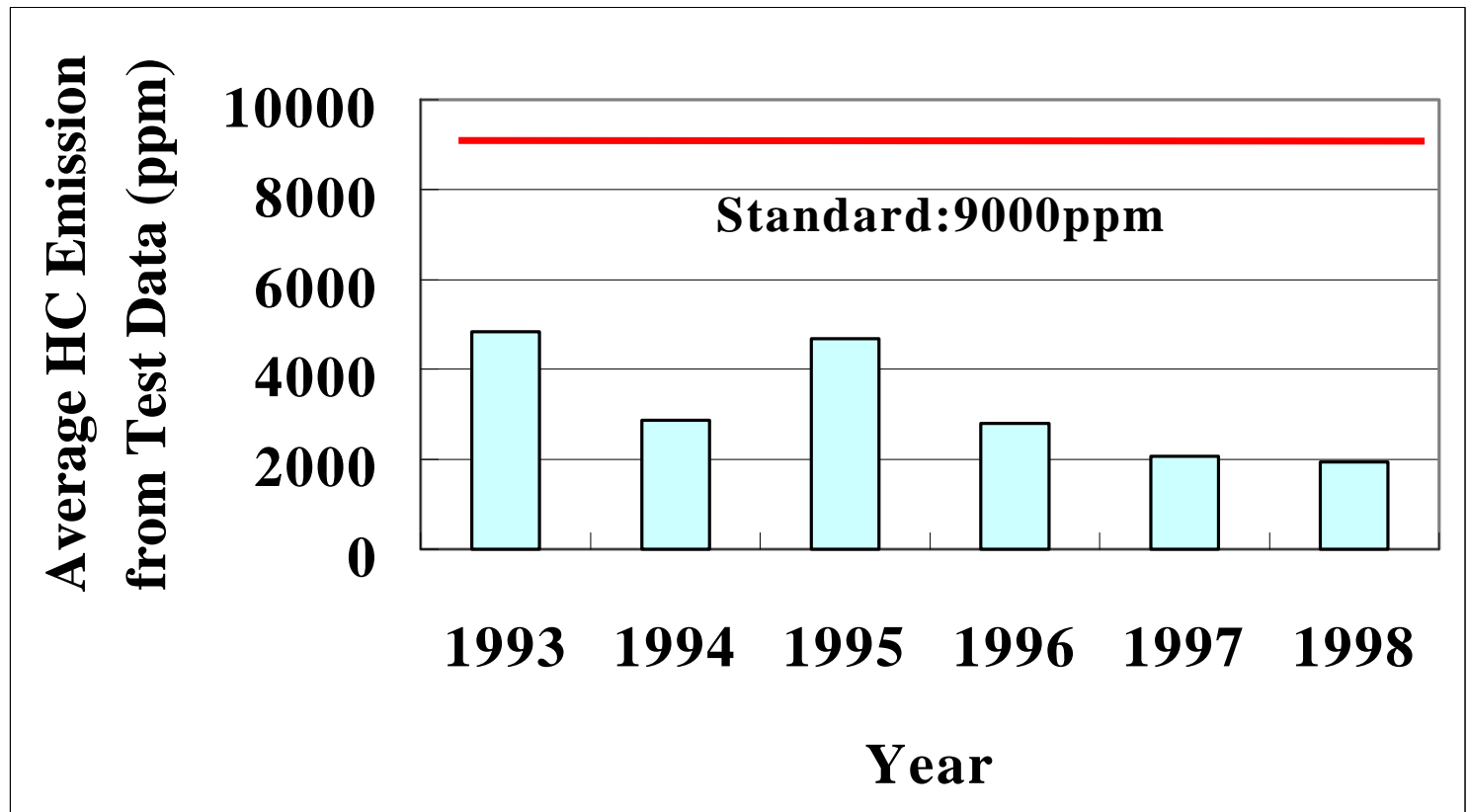
# Ratio of Failure in the Periodical Idle Test for I/M Programs



## Test Results of CO Emission from Periodical I/M Programs in Taipei City



## Test Results of HC Emission from Periodical I/M Programs in Taipei City



**Emissions Improvements for Motorcycles after Adjusted to Standards in Comparison with the Original from Periodical Idle Test for I/M Programs in 1999**

<b>Motorcycle's Emissions</b>	<b>2 Stroke</b>				<b>4 Stroke</b>			
	<b>CO (%)</b>		<b>HC (ppm)</b>		<b>CO (%)</b>		<b>HC (ppm)</b>	
	<b>Original</b>	<b>Adjusted</b>	<b>Original</b>	<b>Adjusted</b>	<b>Original</b>	<b>Adjusted</b>	<b>Original</b>	<b>Adjusted</b>
<b>Average</b>	<b>5.41</b>	<b>1.75</b>	<b>7,658</b>	<b>3,824</b>	<b>6.75</b>	<b>1.35</b>	<b>1,242</b>	<b>453</b>
<b>Reduction</b>	<b>67.5%</b>		<b>50.1%</b>		<b>80%</b>		<b>63.5%</b>	
<b>Samples</b>	<b>531,126</b>				<b>211,968</b>			

## **Future Trend**

- **Taiwan EPA provides subsidy for purchasing low emission motorcycles, including electric scooter, fuel-injection motorcycle, etc.**
  - Ä **To eliminate old motorcycles: A subsidiary payment is NTD2,000 for giving up motorcycles over ten years old.**
  - Ä **To encourage purchase of electrical scooters: A subsidiary payment is NTD20,000 for purchasing new electrical scooters accumulated more than 20,000 up to now.**
  - Ä **To encourage purchase of low emission motorcycles: Objects including EMS, fuel injection system & high efficiency catalyst technology, however, subsidiary payments have not conformed yet.**

- **Stage 4 emission standard will be implemented from 31 December 2003**
  - Ä **Cold start test will be adopted to simulate the normal riding condition**
  - Ä **To diminish 2 stroke engines: Standard of HC+NO<sub>x</sub> for 2 stroke (1 g/km) is more stringent than 4 stroke (2 g/km).**
- **Requirements to meet emission regulations in the future: Installations of accurate fuel metering, high conversion efficiency catalyst and low emission control strategies for motorcycles.**
- **Emission regulations for motorcycles of displacement greater than 700cc will be stipulated in half year after accession of WTO.**