Strategy on Controlling Vehicle-Source Air Pollution
(A Comparison between Indonesia and the Netherlands)

THESIS

A thesis submitted in partial fulfillment of the requirements for the Master Degree from the University of Groningen and the Master Degree from the Institut Teknologi Bandung

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DOUBLE MASTER PROGRAMME

ENVIRONMENTAL AND INFRASTRUCTURE PLANNING
FACULTY OF SPATIAL SCIENCES
UNIVERSITY OF GRONINGEN

AND

DEVELOPMENT PLANNING AND INFRASTRUCTURE MANAGEMENT
DEPARTMENT OF REGIONAL AND CITY PLANNING
INSTITUT TEKNOLOGI BANDUNG
2006

DOCUMENT INFORMATION

a. Author: **Syahrial**
b. Title: **Strategy on Controlling Vehicle-Source Air Pollution (A Comparison between Indonesia and the Netherlands)**
c. Keywords: **Air pollution, air pollution control, air pollution strategy, air quality, policy measures, transport and environment**
d. Supervisors: **Dr. ir. P. Ike (RUG), Prof. dr. ir. G.J.J. Linden (RUG), Dr. Boy Kombaitan (ITB), Dr. Uton Rustan (ITB)**
e. Year: **2006**
f. Organization: **Rijksuniversiteit Groningen (RUG) and Institut Teknologi Bandung (ITB)**
g. Internet address: **www.rug.nl**
h. Description: **This research compares between Indonesia and the Netherlands in relation with the strategy on controlling vehicle-source air pollution. The aim is to result in recommendations for the improvement of the strategy on air pollution control in Indonesia based on reflections from the similar strategy in the Netherlands.**

ABSTRACT

Big cities in Indonesia are facing serious air pollution problems, particularly those caused by automobile traffics. This study argues that one of a good way to improve the current practices of air pollution control in Indonesia is through understanding on and comparing with related strategies in other countries. By doing so, one can reflects on the questions of "what are the lacks in the current Indonesia's strategy?"; "what can be changed?" and "what are the requirements and consequences for such changes?" This research is intended for such reflection purpose. The Netherlands is chosen as a source of comparison because of several reasons. The Netherlands as a developed country may have a better strategy on air pollution control. Therefore, the research is focused on comparing Indonesian and Dutch strategies on air pollution control in order to see the possibilities of transferring certain policies into Indonesia.

The ultimate objective of this research is to result in recommendations for the improvement of the strategy on air pollution control in Indonesia based on reflections from the similar strategy in the Netherlands. To achieve the objectives, this research employs exploratory case study method. In addition, this research relies on literature reviews as main sources to explore the policies and the context of air pollution control in Indonesia and the Netherlands. The result of exploration is compared to get lesson learned for Indonesia. Finally, recommendations are derived from the discussion.

This research has shown that air pollution control through technological measures in Indonesia is focused particularly for fuels, such as reducing sulfur content and lead content in fuels. In the Netherlands/EU, the government adopts a more comprehensive measure that comprises measures to improve fuel, vehicles and information technology. The administrative and economic measures have been well established in both countries with a different that that the Netherlands/EU has established a more stringent air quality standard and more economic measures than Indonesia. There are also limited measures through transport and spatial planning in Indonesia case. On the contrary, this measure type has been well established in the Netherlands/EU.

The discussion in this study has derived lesson learned as recommendations for Indonesia government as the following: (i) Indonesia can improve the current efforts to combat air pollution by including more measures related to vehicles and information technology; (ii) there is the possibilities for Indonesia to make the current air quality standard becoming more stringent; (iii) Indonesia can implement more economic instruments, such as tax incentives and disincentives for fuels and vehicles; (iv) cities in Indonesia, particularly new cities and less urbanized cities, should consider combating air pollution through the improvement of transport planning and spatial planning. However, it is important to note that the feasibility of these measures is beyond the scope of this research. Therefore, a further study is needed to examine the feasibility to implement the measures.

Keywords: air pollution, air quality, policy measures, transport and environment.

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General Introduction

1.1 Introduction

The awareness of the impacts of motor traffic on environment has increased during the last three decades of twentieth century. While transport sector contributes to the economic growth, it also highly concerns with environmental problems such as air pollution. Its effects on global warming and the quality of life have been increasingly proven. The focus of concern particularly is in urban areas where "the problem has been most acute" (Vigar 2002, p.10). The recognition of the transport impacts on environment has contributed to a shift on policy discourse. From the focus on growth and equity it later broadened to incorporate the environmental effects of transport and the possible ways to deal with them (Feitelson 2001, p.3). Strategies are developed to deal with the environmental impacts of traffic and transport infrastructure while at the same time transport sector is optimally functioned to support economic growth.

Dealing with the environmental impacts of transport is not a simple matter. It requires the integration of a complex set of policy measures and instruments. Feitelson (2001, p.6) grouped the strategies on controlling air pollution from mobile source into four categories, which are administrative instruments, spatial measures, economic instruments and technological measures. A greater use of economic rather than regulative instruments has been the main emphasis of recent discussion on pollution abatement policy. The use of advance technology to reduce emissions at source is particularly discussed in technical literature. Another important discourse related to the air pollution control is the use of spatial aspect as policy measure. All of these measure and instrument categories can be used as a based on developing strategies on controlling air pollution from mobile sources.

Nowadays, big cities in Indonesia such as Jakarta, Surabaya, Bandung, Semarang, Denpasar and Medan are experiencing serious air pollution problems, particularly those

caused by automobile traffic. In order to soften the problems, Indonesian Medium Term Development Plan 2004-2009 introduced some programs on sustainable transport development, aimed particularly at urban areas. The programs, among others, are the implementation of environmental friendly technology on transport, increasing the use of mass transport system in urban area, the gradual implementation of incentive system and global standardization on road transport and synchronizing transport system with spatial plan (Bappenas 2004a). In addition, Indonesian Ministry of Environment launched 'Program Langit Biru' (Blue Sky Program) in 1991 with the aim of addressing air pollution, particularly those originating from mobile source. However, the discussion in this research will be mainly focused on Jakarta, the capital city of Indonesia, where the air pollution and traffic problem is the most acute.

One of a good way to improve the current practices of air pollution control in Indonesia is through understanding on and comparing with related strategies in other countries. By doing so, one can reflects on the questions of "what are the lacks in the current strategies?"; "what can be changed?" and "what are the requirements and consequences for such changes?" This research is intended for such reflection purpose. The Netherlands is chosen as a source of comparison because of several reasons. The Netherlands as a developed country may have better strategies on air pollution control. There may some good practices to be adopted for air quality improvement in Indonesia. For example, cities in the Netherlands have successfully integrated environmental quality improvement and spatial policy (Miller 2000; VROM 2003). Therefore, the research will be focused on comparing Indonesian and Dutch strategies on air pollution control in order to see the possibilities of transferring certain policies into Indonesia.

Bearing the contextual differences between planning culture in Indonesia and the Netherlands in mind, this research will also investigate the possibilities of transferring the policies into the context of Jakarta and other cities in Indonesia. Before describing related strategies, the research will illuminate the similarities and differences in institutional context in both countries. The institutional context refers to the legislations and organizations related to air pollution control. The understanding of the institutional context can be used as a base on examining the policy transferability.

1.2 Air pollution problem in Jakarta

> In the early 1990s, UNEP (United Nations Environment Program) ranked Jakarta as the third most polluted mega-city in the world after Mexico City and Bangkok. Indonesian authorities argued that in the case of Jakarta - unlike some other cities - the monitoring stations were situated beside roadsides. To avoid any further bad press, the concerned stations were immediately moved into less polluted areas (Walton 2003, p.18).

Major cities in Indonesia have been experiencing rapid urbanization. Despite of its positive effects, various environmental impacts have become parts of the urbanization externalities. One of the most important impacts is air pollution problem. There are no other cities in Indonesia which have been experiencing more severe air pollution problem then the city of Jakarta. An air quality monitor in 1998 showed the figures as follow: nitrogen oxides (NOx) = 120 μg/m3; sulfur dioxide (SO2) = 28 μg/m3; fine particles less than 10 μm in diameter (PM10) = 81 μg/m3; and ozone (O3) = 42 μg/m3. The economic loss in this period because of health problem associated with low air quality was estimated equal to IDR 1,786,803 million (or equal to USD 181 million). If there is no serious efforts to control the problem, it was projected that the number will reach 4,348,558 million (USD 403 million) by 2015 (Syafruddin 2002). The overview of air pollution in Jakarta is shown in table 1.

Automobiles are regarded as the main source of air pollution in Jakarta. It is indicated with high concentration of air pollution at roadsides. The emissions from vehicles are not only the results from the increase in the number of vehicles, but also "the unit emission amount at an exponential rate by slowing down travel speed with the congestion" (Asri 2005). Automobiles as the main source as air pollution is also common in other Asian cities as identified by ADB (2003a):

> "In the majority of Asian cities, mobile sources are the most significant contributor to air pollution. This is especially so for PM, CO and NOx, the pollutants that most often do not meet the ambient air quality standards. Mobile sources are expected to continue to be the main source of pollution in the future." (p. 7)

In 1998, the emission shares from vehicles to the total emission in Jakarta showed the figures as follow: NOx = 71%; SO2 = 21%; and PM10 = 71 % (Syafruddin 2002). These figures show the significance contribution of automobile emission to overall air pollution in Jakarta.

Table 1.1: The overview of air pollution in Jakarta

Pollutants	**Sources**	**Effects**	**Indonesian Standard (μg/m3, 24-hours avg)**	**Concentration in Jakarta (μg/m3, 24-hours avg)**
Lead (Pb)	Gasoline	Affects the nervous, reproductive, hepatic, cardiovascular and gastrointestinal system; affects children's IQ, cognitive development and behaviour.	2	Increases from 0.42 in 1990 to 1.3 in 2000
Particulates (PM_{10})	Fuel combustion, traffic, industry, construction and waste disposal	In combination with SO_2 causes high health risks	150	70 in 2000
Sulfur Dioxide (SO_2)	Mainly from industry and power plants	Lung irritation, in combination with moisture forming "acid rain" which affects crops, forests, building and surface water quality	365	28 in 1998
Nitrogen Dioxide (NO_2)	Motorized traffic and industry	Infections, lung irritation; causes oudema, bronchitis and pneumonia ; and induces asthmatic attacks	150	120 in 1998
Carbon Monoxide (CO)	Primarily due to the incomplete combustion of vehicular fuel	Impairs perception and thinking, slows reflexes, brings on angina, causes unconsciousness and death	10,000	13 million tons/year in 2000
Ozone (O_3)	Formed by the action of sunlight on NO_2	Eye, nose and throat irritation; chest discomfort; cough and headache; and affects children's pulmonary function	50 (1-year avg)	42 in 1998

Source: adapted from Walton (2003)

As shown in table 1.1 above, the Indonesian standard for PM_{10} is 150 μg/m3 in 24-hours average, while the EU standard for the same type of pollutant is 50 μg/m3 in

24-hours average (based on Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air). A study on PM_{10} concentrations (micro grams per cubic meter) in residential areas of world cities larger than 100,000 (Pandey, forthcoming 2006) shows a large difference of PM_{10} concentrations between cities in Indonesia and cities in the Netherlands. For the purpose of a comparison, only data from some areas with the highest population in both countries are selected to be presented in table 1.2 below.

Table 1.2: Air Pollution Data by Country and City PM10 concentrations (micro grams per cubic meter) in residential areas of cities larger than 100,000

Country	**City**	**City population** in 2000	**PM_{10} concentration** in 1999
Indonesia	Bandung	2,803,673	119
Indonesia	JAKARTA	10,844,963	103
Indonesia	Medan	2,260,862	123
Indonesia	Palembang	1,600,965	106
Indonesia	Semarang	1,617,777	109
Indonesia	Surabaya	3,198,024	120
Indonesia	Ujung Pandang	1,292,564	132
Netherlands	AMSTERDAM	1,131,229	37
Netherlands	Eindhoven	405,386	38
Netherlands	Rotterdam	1,106,234	41
Netherlands	s-Gravenhage	713,961	43
Netherlands	Utrecht	561,556	35

Source: The World Bank, Development Economics Research Group Estimates

Many programs and studies have been conducted aimed at the improvement of air quality in big cities in Indonesia. The programs and studies are particularly targeted to control air pollution originating from automobiles. To make the current effort become more effective, Indonesia can get benefit from examining how other countries deal with their air pollution problem. By doing so, Indonesian authority can improve the current strategies or develop new strategies on addressing air pollution.

1.3 Research objectives and research questions

Research questions and objectives are the main elements of the research conceptual design. They are used to navigate the whole research process into a desired end. The ultimate objective of this research is to result in recommendations for the improvement of the strategy on air pollution control in Indonesia based on reflections from the similar strategy in the Netherlands. The research objectives can be further formulated as follow:

1. To identify and compare the strategies related to vehicular air pollution control in Indonesia and the Netherlands/ European Union (EU);
2. To investigate the possibilities of transferring the strategies into Indonesia; and
3. To point out recommendations for the improvement of air pollution control strategy in Indonesia through policy adjustment or new policy development.

Research questions are formulated to focus the research into achieving research objectives. The questions will be answered through out the process of the research. The following research questions have been identified.

1. What are the world-wide policy options to control air pollution originating from vehicles?
2. What are the requirements and the constraints in policy transfer?
3. What are the current strategies related to controlling air pollution from automobile source in Indonesia and the Netherlands/ EU?
4. What are legislations and organizations related to the air pollution control in Indonesia and the Netherlands/ EU?
5. What are the possibilities of transferring the strategy from the Netherlands to Indonesia? and
6. What are recommendations from this research for the improvement of the strategy on controlling air pollution from automobile source in Indonesia?

1.4 Research framework

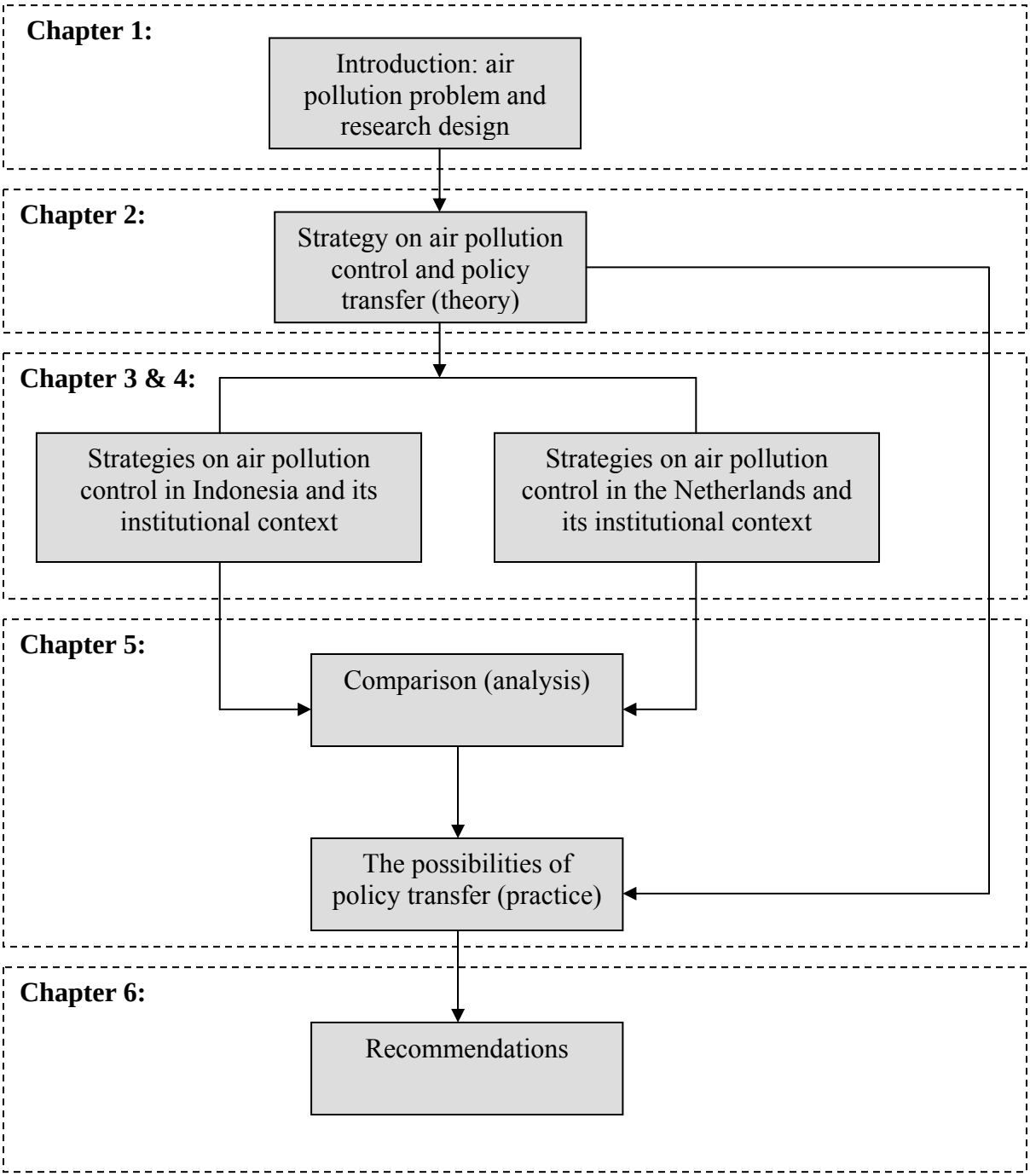

Figure 1.1: The research framework

The research framework is also an element of the research conceptual design. It can be used to overview the overall research process and to lead a researcher in systematic way in answering research questions and arriving into research objectives. The theoretical framework for this research is shown in figure 1. The research is divided into five chronological stages. It starts with the problem formulation and research design (e.g. proposal writing). The second stage deals with theoretical background to support the researcher doing the research. The theoretical background includes the concept of strategy on air pollution control and theories on comparative study (e.g. policy transferability). The third stage focuses on exploring policy documents regarding strategies on vehicular air pollution control in both countries. In this stage, both countries will be compared to see the similarities and the differences. The comparison includes the approach; the integration; and institutional arrangement related to air pollution abatement, transport and spatial planning in both countries. The fourth stage explains the results derived from the third stage in the form of lessons learned. The possibilities of transferring the strategies into the Indonesian context will also be discussed in this stage. Finally, the last stage produces recommendations from this research for the improvement of vehicular air pollution strategy in Indonesia.

1.5 Research methodology

The research methodology refers to the technical design of the research. It explains how this research will be conducted and what sources of evident this research will be used. The research employs an exploratory case study method. It meets the criteria as discussed by Yin (2003). The research uses predominantly a type of "what" questions which is common in "exploratory case study" (p. 6). Another characteristic of a case study is that "it is preferred in examining contemporary events, but when the relevant behaviors can not be manipulated" (p. 7), which also fit with the characteristic of this research.

Yin (2003) proposed a technical definition of a case study based on its two main features. Firstly, "a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 13). Secondly, "the case study

inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, relies on multiple evidence, and benefits from the prior development of theoretical propositions" (p.14).

Specific information and knowledge should be collected to be able to answer the research questions. Therefore, relevant sources of information and knowledge should be selected. The research relies mainly on documents, particularly policy documents. Some possible sources of these documents are: the Indonesian Ministry of Environment; the Indonesian Ministry of Transport; the Indonesian National Planning Agencies (Bappenas), the Indonesian Statistic Bureau (BPS), the Dutch Ministry of Public Transport, Public Works, and Water Management, the Dutch Ministry of Spatial Planning, Housing and Environment (VROM), the Dutch National Institute for Public Health and the Environment (RIVM), and other government bodies in both countries. The information may also be obtained from the previous researches on the same subject. In addition, literatures will be the main sources for the research theoretical framework.

Chapter II

Policy options on Controlling Vehicle-Related Air Pollution and Policy Transfer

2.1 Introduction

This chapter will discuss the available-strategy related to vehicle-source air pollution control according to literatures. The strategy will be grouped in several categories. It will be use in identifying and assessing the current policy in Indonesia and the Netherlands. Subsequently, the section on the policy transfer will be presented. This section will be used as a source of knowledge on examining the possibilities of transferring policy from the Netherlands to Indonesia.

The discussion regarding policy option in this chapter will be divided based on types of policy measure category proposed by Feitelson (2001) - that is administrative, spatial, economic and technological policy measures. Each following subsection will deal with each type of categories. Description of each category will be presented together with its advantages and disadvantages. However, the category being used is not rigid. There may be overlaps for some categories. For example, policy measures aimed at encouraging the use of public transport may be discussed as spatial measures, administrative measures, or economic measures. The framework on policy transfer in this research will be mainly taken from two articles by Dolowitz and Marsh (1996, 2000). The reason is that both articles have provided a very coherent framework of policy transfer.

2.2 Policy option with the emphasis on Technological measures

The policy option on the category of technological measures includes technologies on traffic such as travel information system and technologies on vehicle such as electric vehicle. Kemp (2001) has summarized the possible solutions to deal with problems of environmental pollution and congestion caused by transport sector as shown in figure 1.

The following descriptions will only deal with some solutions that related with the technological option.

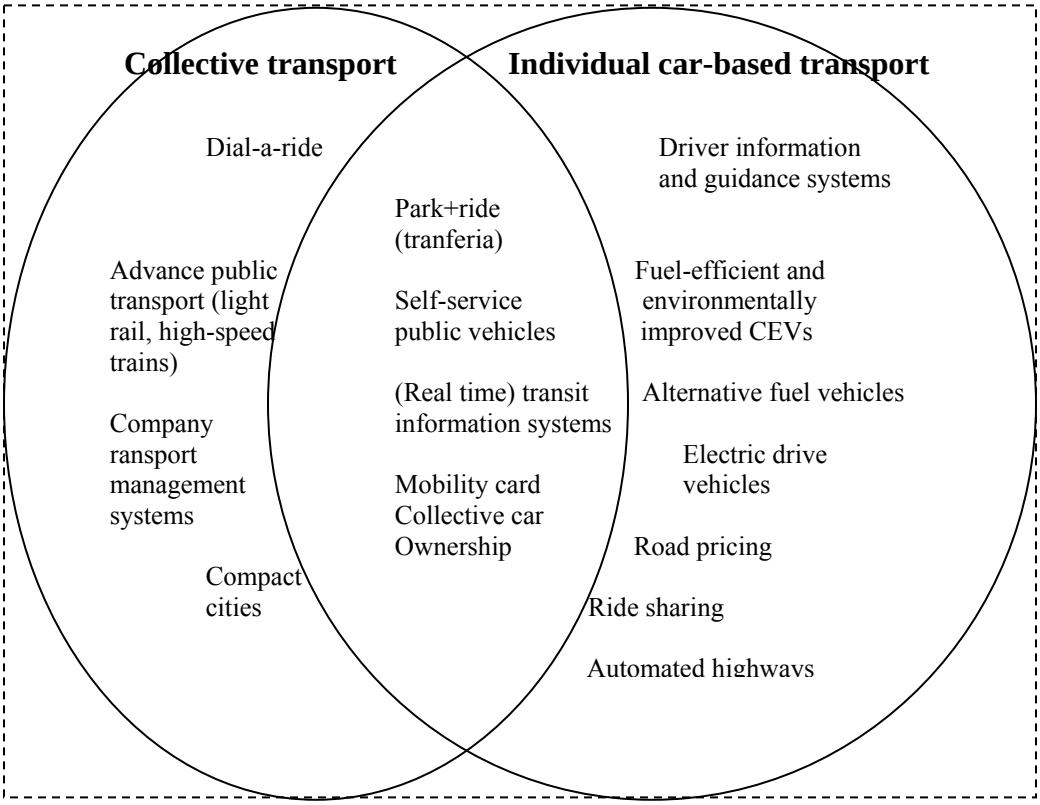

Figure 2.1: Possible solutions to deal with problems of environmental pollution and congestion caused by transport sector
Source: Kemp (2001, p. 116)

A. Traffic and telecommunication technology

- *Dial-a-ride* is a service provided by bus companies that give the possibilities for customers to be picked up from their home or other meeting points. The service utilizes the advance in information and telecommunication technology. Dial-a-ride is an intermediate service between individual and public transport that offers customers with flexibility and ensures transport efficiency (Kemp 2001, p.113).
- Reliable *travel information systems* can be used to increase convenience in using public transport. The other instrument is the establishment of *mobility-*

chip-cards that can be used for different means of transport. Another example of technology related solutions is the development of *advanced means of public transport* such as high-speed trains (Kemp 2001, p. 114-115). All of these advance technologies can be used to promote the use of public transport.

B. Fuel and vehicle technology

- *Gasoline* and *diesel* are used by most today's internal combustion engine vehicles (*ICEV*). Johansson (2003) identified some recent developments on these types of fuels and engine. They are:
  - The reduction of lead in fuels.
  - The reduction of sulfur content in fuels.
  - The reduction of harmful hydrocarbons in gasoline.
  - Improvement of engine efficiency.
- The invention of *catalytic converter* is another important technical development related to vehicles' engine. A catalytic converter is a device used to reduce the amount of pollutants produced by the exhaust system of a vehicle. This device converts CO to CO2, unburnt hydrocarbons to CO2 and H2O, and NO to N2 through the process of oxidation and reduction (Wikipedia). The introduction of catalytic converter combined with the development in vehicles and fuels can significantly reduce pollutions.
- Beside of the above types of fuel, there have been some developments for the less-polluting fuel alternatives (Johansson 2003, p. 146-148), which are:
  - *Methane gas*. This type of fuel includes natural gas from fossil and biogas from organic waste. Based on their form, there two types of gas – that is compressed natural gas (CNG) and liquefied petroleum gas (LPG). The advantage of these types of fuel is that it produces very low emissions. According to Khare (2003, p. 168) there are over 1 million vehicles in the world using CNG. However, there are some disadvantages of CNG such as the lack of refueling facilities (as gasoline stations), the water content of CNG causing corrosion in gas cylinders, and the expensive investment for CNG compressors.

- *Biodiesel*. This type of fuel is produced through the oil extraction from oliferous plants such as rapeseed, soybeans, or sunflowers. The fuel can be used instantly in diesel engines. Studies show that the uses of this fuel in diesel engines produce lower emissions of hydrocarbon and particulates and higher NOx emissions.
- Other alternative fuels include *Ethanol, Methanol, dimethyl ether (DME), and Hydrogen.* These types of fuel are not yet produced on a commercial scale.

o In addition, there are also developments of new types of vehicle-engine such as hybrid electric vehicle (*HEV*); fuel cell electric vehicle (*FCEV*); and battery powered electric vehicle (*BPEV*). These types of engine have potential for lower emission and higher efficiency compared to the conventional ICEV engine (Johansson 2003, p. 142).

2.3 Administrative and economic instruments

Most literatures often discuss the use of administrative and economic instruments by comparing both of them; therefore, the administrative and economic instruments are placed in the same sub-section of this chapter. Economic or market based instruments include emission tax, vehicle ownership tax, gas tax, road pricing and other vehicle fees and charges, while the administrative or command and control regulations include emission standards, inspection and maintenance requirements, and fuel composition. Market based approaches have some advantages such as cost effective, stimulating innovations and flexible. The rational for the command and control regulations is that market often does not put appropriate concern on environment in decision making; therefore, there is the need for the government regulations to control the externalities on environment.

World Bank (1997) has grouped policy instruments into four broad categories as shown in table 2.1. The first category is policy instruments with the emphasis on using markets. This category consists of subsidy provision and reduction, taxes and fee. The second category, that is creating markets, includes privatization and decentralization and

tradable permits. The third category, Environmental regulations, includes standards, bans and quotas. The last category is engaging the public, which consist of information disclosure and public participation.

Table 2.1: Policy on air pollution control: instruments and sample applications (**part 1**)

Using Markets							
Subsidy reduction	Environmental taxes on			User fees for			Targeted subsidies
	emissions	Inputs	Products	natural resources	services	Bonds/ Deposits	
Reduction in energy subsidies	*Emission taxes*	*Energy taxes, differentiated gasoline price*	*Car ownership taxes*	*Royalties for fossil fuel extraction*	*Road pricing, parking fees*	n.a	n.a.

Source: adapted for vehicle related air pollution from World Bank (1997, p. 8-9) and Feitelson (2001, p. 44-46)

Table 2.1: Policy on air pollution control: instruments and sample applications (**part 2**)

Creating Markets		**Environmental Regulation**			**Engaging the Public**	
Privatization/ decentralization	Tradable permits	Standards	Bans	Quotas	Information disclosure	Public participation
Private energy production	n.a.	*Emission standards, Inspection and maintenance*	*Closure of city center to private vehicles*	*Area licensing for vehicle*	*Public disclosure program*	n.a.

Source: adapted for vehicle related air pollution from World Bank (1997, p. 8-9) and Feitelson (2001, p. 44-46)

Each instrument in the table 2.1 has its own advantages and disadvantages. Instruments with the emphasis on using markets are generally ready to use and the most flexible compared to other types of instruments. However, it should be introduced with careful considerations because policies with regard to taxes are often used to gain political support by politicians. Creating markets is aimed at a more efficient use of fuels, but it needs strong partnerships between public and private organizations. It particularly works in countries with high degree of economic liberalization. Implementing regulations as instruments need strong enforcement to make it work. Otherwise, it will be implemented partially or even none. Public participation on air pollution control is particularly important to stimulate public awareness over the important of clean air quality and to gain support for air pollution programs. All of these types of instrument are complemented to each other in achieving the goal of a better air quality.

2.4 Policy options with the emphasis on transport and land-use planning

Controlling air pollution from mobile sources through transport and land use planning is aimed at promoting non-motorized and public transport and increasing mixed land uses in urban areas in order to reduce the need for mobility. Many literatures emphasis the important of integration air pollution control into transport and land-use planning. To achieve the integration, there is need for a good cooperation and coordination between all actors involved. Planning measures included in this type of policy options are among others:

A. Compact city with mixed land uses

As mention earlier, creating compact city with mixed land uses has the potentiality to reduce the need for mobility – that is to reduce distance traveled and number of travel – and to encourage the use of non-motorized transport. Maat (2001, p.214) identified the characteristics of compact city as follows.

- *Concentration* refers to the optimal use of the existing urban areas and discouraging development in sub-urban areas. This strategy can maximize the utilization of the existing transport infrastructure that already in use.

- *Urban containment policy* is a policy that disallows building outside the existing urban areas. This is a complementary policy for the concentration policy.
- *Mixed-use development* refers to the integration of housing, workplace and services at the city region scale. This policy can reduce the need to travel for long distance because there is the possibility for people to live close to their offices and close to shops and other public facilities.
- *High density* is determined with the number of hectares land occupancy by settlements. The higher the number of population per hectare land means the denser the area. "Compactness can reduce the distance between urban activities, which is also in favor of non-motorized transport" (p.214).
- *Form* is related with the layout of urban structure and transport. The nodes of public transport networks should be put on high density points. In addition, urban layout should be designed to minimize obstacles for people to reach public transport nodes.
- *Development at public transport nodes* is aimed at maximizing the capacity of the existing public transport locations.

B. Non-motorized and public transport oriented urban design

A non motorized urban design is aimed at facilitating people to use a more non-motorize way transport such as walking and biking. These modes of transport are only for short distance of travel. For long distance travel, urban areas should be design to encourage people to use public transport. Marshall (2001) argues the functions of public transport systems can be seen in different levels of scale. "At the macro scale, the main public transport routes may act as 'structural axes' or 'spine routes' which help shape the structure of settlements as a whole. At the micro scale, the location and detailed design of public transport stops can influence local accessibility and environmental amenity, both of which can boost the attractiveness of traveling by public transport" (p. 181). In addition, He describes the public transport-oriented urban design as characterizes with a

hierarchical system of roads, circuitous loop roads and culs-de-sac, with direct pedestrian connectivity.

C. Non-motorized and public transport infrastructure orientation

Policy measures included in this category are such as *cycling path* provision, particularly for short-range travelers; *light rail* for commuters to central business district; *metro* for commuters within metropolitan area; and suburban rail for commuters to the central city (Feitelson 2001, p. 34).

2.5 Policy transfer

There has been the increase on policy transfer all over the world. The topic on policy transfer has attracted attentions from many scholars. Wilson (2003) discussed the influence factors for the increases of interest on policy transfer. Firstly, there has been the increase on the demand for new policy ideas in recent decades. The existing policies and programs can not anymore deal with the new emerging problems, which lead governments to look for the solutions over their policy problems outside the policy frameworks. The second factor was globalization. As Wilson explained further:

> "The unusually rapid rate of increase of world trade and international capital movements in the late twentieth century produced much speculation that many countries would have to revise a wide range of previously cherished policies if they wished to remain prosperous and competitive." (p. 2)

The third factor was the growth in the importance of international networks and organizations such as World Bank, International Monetary Fund (IMF), and European Union (EU). These organizations have brought new ideas to countries on their networks through their experts and practitioners.

Although there are various definitions regarding the policy transfer, this research adopts a broad definition proposed by Dolowitz (1996), who defined the policy transfer as "a process in which knowledge about policies, administrative arrangements,

institutions etc. in one time and/or place is used in the development of policies, administrative arrangements and institutions in another time and/or place".

Dolowitz (2000) proposed a continuum line to represent a range of various reasons for doing policy transfer, ranging from a voluntary reason in one side to a coercive reason in another side. Between these two points, there is a mixture reason. The voluntary transfer is usually triggered by the dissatisfaction to the current policy practices, which lead policy actors to search new policy alternatives. Elections and party competition may also encourages candidates to search for lessons such as explained by Polsby and Heclo in Dolowitz (1996, p. 347). Policy lessons can also be used as source of evidence to legitimate decisions already taken. In addition, lessons can also be used to deal with uncertainty about causes of problems, impacts of certain policy and avoiding 'reinventing the wheel' or a policy failure.

The second bundle for transfer reasons proposed by Dolowitz (1996) is (direct) coercive transfer. The most direct coercive method is when a government forces another to adopt a policy. This method is rather rare in the current policy practices. The more common direct coercive transfer is when supranational institutions force a government to introduce a policy. For example, World Bank and IMF oblige developing countries to implement certain economic policies as a part of requirements for cheaper loans. Another example is the role of EU for policy transfer upon its member nations by establishing directives and regulations.

(Indirect) coercive transfer is another type of policy transfer introduced by Dolowitz. These include:

- *Environmental externalities* such as pollution on a national cross border can be a reason for a government to introduce a specific regulation;
- *Technology development* that causes changes can also push a government to search for a new idea;
- *Economic pressures and constraints* such as market dependency may push a government to adopt a similar policy as another government to which it relies on.
- *Competition among neighboring countries* can also result in policy transfer, when political actors feel that their country is being left behind.

- *Consensus* among countries in the world regarding a problem definition and solution can also act as a push factor for a government to introduce a certain policy.

The question then, "Who are actors of policy transfer?"; "What objects of policy transfer?" As identified by Dolowitz, there are six main categories of actors involved in policy transfer, which are: elected officials; bureaucrats/ civil servants; pressure groups; political parties; policy entrepreneurs/ experts; and supranational institutions. Among all of these actors; elected officials, bureaucrats/ civil servants, pressure groups and political parties are obviously involved in policy transfer because they are key players in policy formulation. EU is an example of the supranational institutions, which have a potential role in enforcing policy transfer to the member nations. Another category of actors in policy transfer – that is policy entrepreneurs/ experts - will be discussed below.

Policy entrepreneurs/ experts include actors such as 'think tanks', consultancy firms, foundations and university researchers. According to Stone (2001, p. 2) "to facilitate policy transfer, these organizations are dependent on other actors and cannot be viewed as independent or isolated agents of transfer". She emphases the role of these actors in "promoting collective policy learning" that is "to address the learning processes that lead to the creation of common identity and consensual knowledge that helps bind together policy networks that spread ideas" (p.7). It may be worth to note that the role of foreign students can not be ignored in the process of policy transfer. As noted by Stone:

> Also not be neglected is the manner in which the movement of foreign students has as a consequence policy transmission and diffusion. A significant proportion of graduate students are sponsored by their home governments, usually a specific ministry to undertake policy or economically relevant degrees in Europe and North America (…). Long-standing schemes of international student exchange such as the Columbo scheme, Rhodes scholarships and Fulbright fellowships, and the more recent example of Soros scholarship scheme as well as Erasmus and Socrates in the EU, represent significant channel for the international movement of ideas, policy and practice. (p.33)

In his earlier work, Dolowitz identified seven objects to be transferred: policy goals; policy content; policy instruments or administrative techniques; institutions;

ideology; ideology and attitudes; and negative lessons. Later, He made distinction between policy and program. As he argued:

> "…These are essentially the same categories as in our earlier work but with minor modifications, the main of which is the distinction between policy (itself sub-divided into policy goals, policy content and policy instruments) and programs. In most conceptions of the policy transfer process, including our original typology, programs and policies are conflated into a single category. This is clearly misguided. It is important to distinguish between policies, which are seen as broader statements of intention and which generally denote the direction policy-makers wish to take, and programs, which are the specific means of the course of action used to implement policies…" (Dolowitz 2000, p. 12)

With regard to degrees of transfer, Dolowitz identifies four distinctions of transfer: copying, emulation, combinations and inspiration. Copying refers to the process of transferring completely a policy – that is without any major changes. "Emulation involves borrowing ideas and adapting policy approaches, tools or structures to local conditions" (Stone 2001, p.6). Combinations category includes hybridization and synthesis, which involves mixing various policies or programs to develop a new policy or program. Finally, inspiration refers to the process that involves studying another policy as sources of reflection for related policy at home.

In doing a policy transfer, one should be aware that the more complex a policy the more difficult to transfer. Related to the policy complexity, Rose in Dolowitz (1996, p. 353) suggests six hypotheses:

1. programmes with single goals are more transferable than those with multiple goals;
2. the simpler the problem the more likely transfer will occur;
3. the more direct relationship between the problem and the 'solution' is perceived to be the more likely it is to be transferred;
4. the fewer the perceived side-effects of a policy the greater the possibility of transfer;
5. the more information agents have about how a programme operates in another location the easier it is to transfer; and

6. the more easily outcomes can be predicted the simpler a programme is to transfer.

In addition to the complexity, other constraints in policy transfer are (Dolowitz, p. 354):

1. past policy can limit what can be transferred and what actors look for transfer;
2. differences in institutional and structural arrangement may act as constraints in transferring a policy from one country to another;
3. the transfer tends to be more successful when a policy is consistent with the political ideology in the host country;
4. bureaucratic over-sizes and efficiency problems can limit the success of a policy transfer; and
5. low technological ability and limited economic resources can constraint a country from adopting a certain policy.

Finally, one should also be aware of the conditions that can lead to policy failures. Dolowitz (2000) has identified three factors that can lead to policy failure. First, the borrower country may not have sufficient information about the policy and the context in which the policy comes from. He calls this factor as *uninformed transfer*. Second, the policy failure may happen as the result of *incomplete transfer*. It refers to the condition when important components that made the policy success in the originating country are not transferred to the host country. Third, there is lacks of appropriate attention given to the differences between the economic, social and political conditions in the transferring country and borrowing country. He calls this condition as *inappropriate transfer*. To conclude this section, a summary of the policy transfer framework proposed by Dolowitz is presented in table 2.2. The framework will be used to see the possibilities of transferring policy related to air pollution control from the Netherlands to Indonesia based on a comparison between the economic, social and political conditions in both countries. However, it should be noted that this framework will not be used to examine the feasibility of transferring such policy because it will be out of the scope of this research.

Table 2.2: A Policy Transfer Framework

Why transfer? Continuum Want to……..Have to			Who is involved in transfer?	What is transferred?	From where?			Degrees of transfer	Constraints on transfer	How to demonstrate policy transfer?	How transfer leads to policy failure?
Voluntary	Mixtures	Coercive			Past	Within a nation	Cross-national				
Lesson drawing (perfect rationality)	Lesson drawing (Bounded rationality) International pressures : (*Image ; Consensus ; Perceptions ; Externalities*)	Direct imposition Conditionality (*Loans; Conditions attached to business activity; Obligations*)	Elected officials Bureaucrats Civil servants Pressure groups Political parties Policy entrepreneurs Experts Consultants Think tanks Transnational corporations Supranational institutions	Policies (*Goals; Contents; Instruments*) Programs Institutions Ideology Attitudes/ Cultural values Negative lessons	Internal Global	State gov't City gov't Local authority	Inter-national Organi-zations Regional, State, Local govern-ments	Copying Emulation Mixtures Inspiration	Policy complexity Past Policies Structural Institutional feasibility (*Ideology; Cultural proximity; Technology; Economic; Bureaucratic; Language*) Past relations	Media (*Newspaper; Magazine; TV; Radio*) Reports (*Commissioned; uncommissioned*) Conferences Meetings/ Visits Statements (*Written; Verbal*)	Uniformed transfer Incomplete transfer Inappropriate transfer

Source: Dolowitz (2000, p. 9)

Chapter III

Strategy on Vehicle-Source Air Pollution Control in Indonesia

3.1 Introduction

Indonesian Constitution states that Indonesia is a unitary state, taking the form of Republic. There is a separation of executive, legislative and judicial power. The executive power is exercised by the government, with a President as the head of government. The legislative power is carried out by both the government and two People' Representative Council – the People's Consultative Assembly (Majelis Permusyawaratan Rakyat or MPR) and the House of People's Representative (Dewan Perwakilan Rakyat or DPR). The judicial power is independent from these three bodies and vested in a Supreme Court.

This chapter discusses the strategies employed by Indonesian government to combat air pollution, particularly those originating from vehicles. To give an overview of the context, this chapter first discussed the contextual aspects of Indonesian air pollution control. Section 3.2 to sections 3.5 deal with these contextual arrangements. Finally, the strategy related to air pollution control in Indonesia is presented in section 3.6.

3.2 Government structure

Indonesian government has been described as presidential with parliamentary characteristics. The head of government is the President and assisted by a Vice President. According to the 1945 Constitution, the President acts as head of government, head of state and supreme commander of the army force. The executive power of the President is delegated to a Cabinet which is appointed and dismissed by the President. Each Minister in the Cabinet deals with a specific field of governance.

After the Constitution amendments, there are three bodies of People's Representatives - the People's Consultative Assembly (Majelis Permusyawaratan Rakyat or MPR), the House of People's Representative (Dewan Perwakilan Rakyat or DPR), and the House of Regional Representatives (Dewan Perwakilan Daerah or DPD). This bodies show the parliamentary characteristics of Indonesian government structure. The DPR consist of 550 representatives elected from 69 Indonesian electoral districts. It main function is to consider and pass legislation. DPD is a Representative body of Indonesia's 32 provinces with each province having 4 representatives. This body has the authority to propose, evaluate and monitor legislation related to Regional Autonomy. It also has the right to comment legislation proposals that affect tax, education and religion. It is kind of an advisory and supervisory parliamental body. The MPR is the highest institution in Indonesian political system. It is formed from all the members of DPR and DPD with a total number of 678. The power to make Constitutional amendments and to impeach the President and Vice President are vested in this body. It also has the power to issue high level legislative and policy resolutions (Tabalujan 2005).

In the regional level, Indonesia is divided into 32 provinces (plus a new province established in 2004), headed by the Governor. The province also has its own elected-representative body called the Regional of House People's Representative (Dewan Perwakilan Rakyat Daerah or DPRD). Each province is divided into several Regents or Municipalities or Districts (Kabupaten and Kotamadya), which are divided again into districts. The regional government has been experiencing a greater regional autonomy by the establishment of Law number 22 of 1999 regarding Regional Autonomy. A lot of central responsibilities have been decentralized by the implementation of this law.

3.3 Air pollution legislation

The highest legislation in Indonesia is the 1945 Constitution (Undang-undang Dasar 1945 of UUD'45). It was adopted since August 18, 1945. Later, it was replaced with a Federal Constitution in 1949 and the Provisional Constitution in 1950, but restored in 1959. Since then until 1998, it was never amended. After the resignation of Soeharto in 1998, the 1945 Constitution was amended four times – in 19 October 1999, 18 August 2000,

9 November 2001, and 11 August 2002. Article 33 of the Constitution is often seen as a base for the environmental management in general. Point 4 of the article states:

> "The organization of the national economy shall be based on economic democracy that upholds the principles of solidarity, efficiency along with fairness, **sustainability, keeping the environment in perspective**, self-sufficiency, and that is concerned as well with balanced progress and with the unity of the national economy".

The text was added later in the fourth amendment of the 1945 Constitution. It clearly states that the sustainability and environmental perspective should be put into consideration in the management of national economy.

The second position in the Indonesian legislation hierarchy is MPR Resolution or MPR Decision (Ketetapan MPR). Then is Law or Act (Undang-undang or UU). Act No. 23 of 1997 Concerning Environmental Management regulates the Environmental Management aspects in Indonesia. Chapter III of the Act stipulates about the right, obligation and roles of society in the environmental management. Chapter IV regulates the responsibility of environmental management, which is vested in the Minister. Other aspects regulated in this Act include the obligation to conduct Environmental Impact Assessment for certain activities, the judicial dispute, and penalties for environmental violations (Tan 2002). In addition, Article 50 of Act No. 14 of 1992 concerning Traffic and Land Transportation regulates the obligation for the car owners to meet the emission standard and noise level standard.

The next type of legislation in Indonesian legal system is Government Regulation. There are some regulations related to air pollution control in Indonesia. Government Regulation No. 42 of 1993 concerning On-the-road Motor Vehicle Inspection states that one of the points to be included in the inspection of vehicles' physical condition is the emission gas. Other regulation, Government Regulation No. 44 of 1993 concerning vehicles and vehicle operators, regulates about vehicles' technical requirements, road worthiness, and driving regulations. Article 127 of the regulation specifies that the road worthiness testing for vehicles includes emission and noise limit. These two government

regulation only deal with pollution in a limited manner. Government Regulation No. 41 of 1999 regarding the Air Pollution Control is a regulation that specifically deals with air pollution problem in Indonesia. The regulation contains the air quality standard, air pollution standard, emission standard, efforts on air pollution control and the institutions responsible for air pollution control. In addition, it also covers the standard on noise. The regulation can be seen as the most comprehensive legislation related to air pollution control – e.g. both from stationary and mobile sources.

Other legislation in the hierarchy of Indonesian legal system as issued by MPR in August 2000 includes Presidential Decree (Keputusan Presiden) and Regional Regulation (Peraturan Daerah). In practice, however, there are some other legislation such as Presidential Instruction (Instruksi Presiden), Ministerial Decree (Keputusan Menteri), and Circular Letter (Surat Edaran) (Tabalujan 2005). Syafruddin (2002) has summarized complete air pollution legislation and regulations in Indonesia as presented in table 3.1.

Table 3.1: Air Pollution Legislation in Indonesia
Source: Syafruddin (2002, p. 33)

No	Legislation/ Regulations	Year	Component	Level				
A	National			N1	N2	N3	N4	N5
1	Act No. 22 (1999) on regional autonomy	1999	Regional	v				
2	Government Regulation No. 25 (2000) on government authority and provincial authority as a regional autonomy	2000	Regional		v			
3	Act No. 23 (1997) on environmental management	1997	AQ	v				
4	State Minister for Environment Decree No. 45 (1997) on air pollutant standard index	1997	AQ				v	
5	Head of Bapedal Decree No. 107 (1997) concerning technical guidelines on calculation, reporting and information related to air pollutant standard index	1997	AQ					v
6	Government Regulation No. 41 (1999) on air pollution control	1999	AQ		v			
7	General Directorate of Oil and Gas Decree No. 112 (1995) on Super TT specification	1995	F					
8	General Directorate of Oil and Gas Decree No. 108 (1997) on Premium specification	1997	F					
9	General Directorate of Oil and Gas Decree No. 112 (1997) on Premix specification	1997	F					
10	Presidential Decree No. 31 (1997) on the development and operation of oil and gas refineries by private business ventures	1997	F			v		
11	General Directorate of Oil and Gas Decree No. 2 (1998) on BBK 2L specification	1998	F					
12	Minister of Energy and Mineral Resources Decree No. 1585 (1999) on criteria for marketing gasoline and diesel in Indonesia, which specified the date for completion of lead phase-out as January 1st, 2003	1999	F				v	
13	General Directorate of Oil and Gas Decree No. 113 (1999) on ADO specification	1999	F					
14	General Directorate of Oil and Gas Decree No. 73 (2001) on fuel specifications, particularly gasoline premix	2001	F					v
15	Act No. 22 (2001) on oil and gas	2001	F	v				
16	State Minister for Environment Decree No. 35 (1993) on motor vehicle emissions standards	1993	ES				v	
17	Act No. 14 (1992) on road traffic and transport	1992	I/M	v				
18	Government Regulation No. 42 (1993) concerning vehicle inspection on the road	1993	I/M		v			
19	Government Regulation No. 43 (1993) concerning vehicles and transport	1993	I/M		v			
20	Government Regulation No. 44 (1993) on transport and motorists	1993	I/M		v			
21	Joint Ministerial Decree No. 581 and 79A (1999) on developing automotive workshops for regular inspections	1999	I/M				v	
22	Ministerial Decree No. 551 (1999) concerning accreditation of workshops and their assignment as vehicle inspection centers	1999	I/M				v	

No	Legislation/ Regulations	Year	Component	Level	
B	Local			L1	L2
1	Governor of DKI Jakarta Decree No. 551 (2001) on ambient air quality standards for DKI Jakarta	2001	AQ		v
2	Governor of DKI Jakarta Decree No. 1041 (2000) on motor vehicle emissions standards for DKI Jakarta	2000	ES		v
3	Governor of DKI Jakarta Decree No. 95 (2000) on inspection and maintenance of private cars in DKI Jakarta	2000	I/M		v
4	Local Government Regulation No. 6 (1999) concerning regional masterplan for DKI Jakarta	1999	TP	v	

Notes:

AQ	Air quality governance
F	Fuels
ES	Emissions standard
I/M	Inspection and maintenance
TP	Transport planning and management
N1	Act level
N2	Government level
N3	Presidential level
N4	Ministerial level
N5	Others
L1	Local government level
L2	Governor level

3.4 Air pollution institutions

In the national level, there are at least four ministries which are highly related to the air pollution control in Indonesia. The Ministry of Environment is Indonesia's central environmental authority. It has the responsibility for: (a) the formulation of national policy in environmental management and impact reduction; (b) coordinating the policy implementation of environmental management and impact reduction (c) establishing monitoring and evaluation on the environmental management. The structure of Ministry of Environment has been changed for several times. Since 2005, the Minister is assisted by his seven deputies dealing with specific task. The Second Deputy deals with environmental pollution control. Within this Deputy 'structure, the Assistant Deputy on Pollution Control of Emission from Mobile Sources deals particularly with controlling air pollution from mobile sources. Sections under this Deputy include Guidance Development Division, Technology Implementation Division, and Emission Evaluation Division.

The second national institution with regard air pollution control from mobile sources is the Ministry of Transport and Telecommunication. The responsibilities of this Ministry should not be confused with those of the Ministry of Public Works. It has the overall responsibilities:

- Formulate national policies include the operational and the technical policies in the sector of transportation;
- The implementation of administrative services within the Transportation sector;
- Manage the government assets and inventory which be handed by the Transportation sector;
- Control the operational of Transportation sector;
- Giving report of the evaluation, advice and the consideration of the main task and function within the Transportation Ministry to the President.

There are four Director General who help the Minister in carrying out the responsibilities. The Director General for Land Transportation has the responsibility that dealing with the management of land transportation in general. Under this Director

General, the Directorate for Traffic and Road Transport has responsibilities which are highly related with vehicular air pollution control. Sections within this directorate deal with road networks development, vehicles testing, technology development, traffic engineering and traffic monitoring.

The third institution with regard to air pollution control is the National Planning Agency (Badan Perencanaan Pembangunan Nasional or Bappenas). Bappenas runs the functions of planning national development for all development sectors. The functions are such as: formulation of development policy; development coordination and synchronization; planning implementation, monitoring, and evaluation. Thus, the function includes the national development planning for transport and environmental sector.

The fourth institution is Public Works, particularly Directorate General for Spatial Planning. It consists of five Directorates. One Directorate works for National Spatial Planning and the other four work for Regional Spatial Planning. One of the Sub-directorates within these all four Directorates deals particularly with the Spatial Planning for Metropolitan Areas such as Jakarta Metropolitan Area of Ja-Bo-De-Ta-Bek.

In the regional level (e.g. in provinces and municipalities), the structure is almost the same with those in the national level. The Regional Environmental Impact Management Agency (Badan Pengendalian Dampak Lingkungan Daerah or Bapedalda) represents the Ministry of Environment. Though, the name for this agency may vary for different regions; and it is responsible to the Governor, instead of to the Ministry. Similarly, the Regional Department for Transport and Communication; Regional Development Planning Agency; and Regional Office of Public Works also exist in the regional level.

It may be worth to note that there are also some local and international Non-Governmental Organizations which actively involved in environmental protection efforts in Indonesia. Tan (2002) describes the movement of Indonesian environmental NGOs:

> "The environmental NGO movement in Indonesia is significant. In 1980, the then State Minister for the Environment, Emil Salim, promoted the creation of WALHI, a forum for environmental NGOs in Indonesia. WALHI was created out of the first national meeting of 79 environmental organizations initiated by a

> group known as the *Kelompok Sepuluh* (Group of Ten). These organizations subsequently became participants in the WALHI network. There are now over 330 environmental groups affiliated to WALHI. In total, there are over 600 NGOs working on environmental issues throughout Indonesia."

The NGOs which focus their activity on air pollution control in Indonesia include Indonesian Pelangi Foundation (Yayasan Pelangi Indonesia or PELANGI), Mitra Emisi Bersih or MEB, Committee for the Phasing-out of Leaded Gasoline (Komite Penghapusan Bensin Bertimbal or KPBB), and Swisscontact (An international non-profit organization). These organizations together with government institutions in 2005 established a website called "Segar Jakartaku". It was emerged as a response to the increase of awareness on air pollution in problems in Jakarta. The aim is to provide information related to air quality condition in Jakarta, air pollution control efforts, air pollution studies and governmental policies on air pollution (For a more detail information visit http://www.segarjakartaku.or.id).

In addition, it is also important to realize that international institutions such as Asian Development Bank, The United States – Asia Environmental Partnership (US-AEP), The Clean Air Initiative for Asian Cities (CAI-Asia) also have played prominent roles in increasing public awareness and promoting a better air quality in Indonesia. For example, US-AEP has been a leading supporter of Indonesian efforts to phase out leaded gasoline for more than 5 years, facilitating cooperation between the Indonesian government, civil society, and international donors to secure lead-free fuel. In support of a 1999 government decree banning leaded gasoline by 2003, US-AEP teamed up with local NGOs and other donors to hold a high-profile conference on "Air Quality and Transport" (see http://www.usaep.org/accomplishments/indonesia.htm#1). A complete overview of the institutional arrangement related to air pollution control in Indonesia can be seen in Table 3.2.

Table 3.2: Institutional Arrangement of Air Pollution Control in Indonesia
Source: Syafruddin (2002, p. 35)

No	Institutions	MEB Member	Components					Description
			AQ	F	ES	I/M	TP	
A	**National**							
1	DPR		v					National Parliament
2	Bappenas	Yes	v					National Development Planning Board
3	MoE	Yes	v	v	v	v	v	Ministry of Environment
4	Ditjen Migas	Yes		v				Directorate General of Oil and Gas
5	Lemigas	Yes		v				Directorate of Indonesia National Petroleum Research and Development
6	Ditjen Hubdat	Yes					v	Directorate General of Road Transportation
7	Ditjen ILMEA	Yes			v	v		Directorate General of Industry of Metal, Machine, Electronic, and Divers
8	MoH	Yes	v					Ministry of Health
9	MoHA&RA		v					Ministry of Home Affairs and Regional Autonomy
10	State Police	Yes	v			v		
11	Puslitbang Jalan Raya		v					
12	BPPT	Yes	v	v	v			Agency for Assessment and Implementation Technology
13	BTMP	Yes			v			Thermodynamic and Motor Propulsion Laboratory of BPPT
B	**Local**							
1	DPRD						v	Local Parliament
2	Bapeda						v	Local Development Planning Board
3	BPLHD DKI	Yes	v		v	v	v	BPLHD DKI Jakarta
4	LLAJ	Yes					v	Traffic and Road Transport Division
5	Dinas Industri				v			
6	Dinas Pertamanan						v	
7	Dinas PU						v	
8	Dinas Tata Kota						v	
9	Diskes		v		v			
C	**Private**							
1	AISI	Yes		v	v			Association of Motorcycle Assemblers and Manufacturers
2	Asbekindo					v		Association of Automotive Workshops
3	Gaikindo	Yes		v	v			Association of Indonesian Automotive Industries
4	IAF	Yes		v	v	v		Indonesian Automotive Federation
5	IATO	Yes		v	v	v		Society of Automotive Engineers
6	IPA	Yes		v				Indonesia Petroleum Association

7	Organda				v	v	Association of Public Transport Operators
8	OTOGAS.			v			Gas Company
9	Pertamina			v			State-own Mining and Oil Company
10	PGN			v			State-own Gas Company
11	PT. ELNUSA			v			
12	PT. KAI					v	Railway Company
13	PT. SAWU				v		Surveillance Company
14	PT. SUAR	Yes		v			Biodiesel Company
15	taxi company				v		

No	Institutions	MEB Member	Components					Descriptions
			AQ	F	ES	I/M	TP	
D	**Civil Society**							
1	ICLEI		v					
2	KPBB	Yes		v				The lead phase-out committee
3	MTI						v	
4	Pelangi	Yes	v				v	
5	Swisscontact	Yes				v		
6	Walhi		v					
7	YLKI		v					
8	ITB	Yes	v	v	v	v	v	Institute Technology of Bandung
9	Trisakti	Yes			v			
10	UGM						v	University of Gajahmada
11	UI	Yes	v				v	University of Indonesia
12	Unika				v			University of Atmajaya

Note:

AQ	Air quality governance
F	Fuels
ES	Emissions standard
I/M	Inspection and maintenance
TP	Transport planning and management

3.5 Other relevant aspects of air pollution control in Indonesia

A better insight on the policy of air pollution control in Indonesia should also consider the wider context of its social, economy, and cultural condition. The explanation below tries to give a brief description of these aspects.

A. Economy condition

The Indonesian economy has been undergoing a process of recovery since 1999, after experiencing a huge economic crisis in 1997. Base on statistical data from the Indonesian Central Bank (Bank Indonesia or BI), the Indonesia' GDP has increased from 353773.2 Billions of Rp in December 2000 to 438500.2 Billions of Rp in December 2005. However, according to the World Economic Forum's 2005 competitiveness rankings, Indonesia is ranked in the 74th position of 117 economies world wide.

It seems that in the coming years the economic growth is still the main priority of Indonesian government. The Long-term National Development Plan has put the National Competitiveness as the first point of the Seven Development Missions to be achieved from 2005 to 2025.

B. Technology ability

The Document of Indonesian Long-term National Development Plan identified that the ability to use, to develop, and to master knowledge and technology has been increased. Various products of researches, technology development and engineering have been utilized by industry and society. Scientific publication has also increased gradually. However, internationally the technological ability is still on the low category.

C. Bureaucracy inefficiency and corruption

The rampant corruption has been major hindrance for the overall Indonesia's development. It has been realized by the government. Efforts have been made to combat corruption, which has already reached the judicial system (Bappenas

2004b). Winbourne (2002) describes the corruption on environmental sector as follow.

> "The causes of corruption in the environmental sector, in broad brush, are similar to any other sector and include, among others: insufficient legislation, lack of respect for the rule of law, weak democracy, wide authority given to public officials, minimal accountability and transparency, poor enforcement, low levels of professionalism, and perverse incentives. The weight of each component of this generic set of corruption causes varies from country to country and changes over time. " (p.6)

In addition, the conflict is in particular emerged when the commercialization of natural resources and reduction of production cost by using environmentally unfriendly technology confronted with the public interests in a healthy habitat (Winbourne 2002). With regard air pollution control, Syafruddin (2002) described as the following.

> "Commercial vehicles continue to emit noxious smoke fumes as random roadside checks are not implemented effectively, and there is a high incidence of bribery. It is virtually unheard of for a vehicle to fail the regular roadworthiness test on emission grounds, and rare that any vehicle fails the test on any grounds. This runs counter to the common sense observation that many of the heaviest polluting vehicles are commercial vehicles. Record keeping is poor as the testing stations do not have databases and test results are simply filed in paper stacks."

Moreover, the test measurements and performance have been described as ineffective for several reasons, such as: (i) defective and poorly maintained test equipment; (ii) test mechanics with limited or no knowledge of test equipment operation, and (iii) the complete absence of vehicles to be tested.

3.6 Strategy on air pollution control

The Information related to policy efforts on air pollution control in Indonesia are obtained from official documents established on governmental publications or websites. The awareness in the important of a better air quality has forced Indonesian government and other local and international institutions to make efforts combating air pollution in

Indonesia's big cities. The efforts have been delivered through programs and studies. For instance, the "Blue Sky Program" or BSP was initiated by the Environmental Impact Management Agency in 1992. Resodudarmo (2002) explains, "BSP is designed to serve as an umbrella for various government programs and activities to control air pollution".

In Asian level, a program called "Better Air Quality" or BAQ workshop is established regularly to discuss topics related to air pollution control in Asia's cities. The program is sponsored by the Clean Air Initiative for Asian Cities (CAI-Asia), a network of 29 cities in Asia. Its members include 24 government agencies, 59 NGOs and academe, 9 international development agencies and international foundations, 10 private sectors. The goals of the CAI-Asia are: (i) sharing knowledge and experiences on air quality management; (ii) improving policy and regulatory frameworks at the regional level; (iii) piloting projects to encourage innovation; and (iv) assisting cities in implementing integrated air quality strategies. In September 2006, the workshop is scheduled to be held in Yogyakarta, Indonesia.

The Indonesian government policy regarding air pollution can be summarized as follows (Ministry of Environment, the Assistant Deputy on Pollution Control of Emission from Mobile Sources):

1. Establish emission standards in accordance with automotive technology development to produce lower emission vehicles;
2. Encourage the use of cleaner fuel including the introduction of unleaded gasoline and low sulphur diesel fuel. This also includes energy diversification by introducing gaseous fuel such as CNG and LPG. Other considerations are the use of bio-fuel and other alternative technologies (hybrid, etc.);
3. Increase the program of inspection and maintenance (I/M) to control in-used vehicle emissions;
4. Develop good transportation management including improvement of traffic management, road development, developing alternative modes of transportation and public transport;
5. Increase public's awareness and participation on air pollution control.

The following sub sections describe the measures taken by Indonesia government to combat air pollution.

A. Technological measures

The technological measures can be further divided into technology of fuel and technology of vehicle. The technology measures include introducing unleaded fuel, low-sulfur fuel, and other alternative fuels. The Minister of Energy and Mineral Resources Decree No. 1585 of 1999 stipulated lead elimination from gasoline by 1st January 2003. This target is scheduled through "Blue Sky" program. This program was designed to tighten fuel specifications, reduce harmful emissions, and improve urban air quality. Although implementation was delayed from a proposed 1999 start-up, Pertamina and the GoI initiated the first sales of unleaded gasoline sales in the greater Jakarta and Cirebon areas in July 2001 (Syafruddin 2002).

According to Tamin (2004), the unleaded gasoline is scheduled to be introduced in stages in big cities such as Bali, Batam Island, Surabaya and Semarang before 2005; and nationally 2005. He described the achievement of the target as the following. "Consecutively, Jakarta already lead-free since June 2001; unleaded gasoline was introduced in Bali in February 2003; in Batam on July 2003; in most parts of Surabaya in 2004; and nationwide 40% unleaded in 2005".

The gasoline marketed in Indonesia has already met the World-Wide Fuel Charter (WWFC) for category 2 for sulfur-content requirements. However, the sulfur content in Indonesia's Automotive Diesel Oil (ADO) only meets the requirement of WWFC for category 1. Therefore, the sulfur content is scheduled to be reduced in ADO to 0.03% before 2004, and as low as 0.003 before 2007.

Indonesia can take benefit from the abundant natural gas resources. The world's market share of Indonesian LNG is about 26.1%. Since 1987 and 1995 respectively the government has introduced the use of CNG and LPG as

alternative fuels. However, there are some disadvantages of these types of fuels as discussed by Syafruddin (2002):

"…most current users complain about the limited number of fueling stations. Moreover, the 1997 economic crisis caused a significant increase in the price of converter kits, which prevented potential users from converting to natural gas fuelled vehicles. There is also widespread public misconception about the safety of gas, with many people fearful of its alleged explosive capacity and wary of riding in vehicles containing gas cylinders. On the supply side, the retail price of natural gas has been uncompetitive with gasoline and ADO prices, which were subsidized. The total elimination of gasoline subsidy and large reduction in ADO subsidy should become a positive precedent in order for natural gas suppliers to promote the use of their product."

With regard vehicle technology, the measures correspond to the gradual establishment of new emission standards. The introduction of new standard is expected followed by the replacement of the existing vehicles. In addition, in 1999, the government built the Thermodynamic and Motor Propulsion Laboratory (BTMP) under the Agency for Assessment and Application for Technology. This facility is intended to support the implementation of new emission standards for type approval.

B. Administrative and economic instruments

The administrative and economic instruments taken by Indonesian government consist of the establishment of new vehicle emission standards, regulatory on inspection and maintenance, fuel pricing policy, regulatory on public participation, and institutional building. With regard to the emissions, Indonesia's Law No. 14 of 1992 concerning Road Traffic and Transport regulates that to prevent air and noise pollution, every motor vehicle has to meet emission and noise standards. The responsibility to issue the emission standard is on the Ministry of Environment. However, local governments can apply their own standards on the condition that they are at least as stringent as the national standards (Law No. 41 of 1991).

Since 1995, the government has been working to prepare new emission standards for type approval. According to Syafruddin (2002), the standards have some new features such as: (i) the public concern will be extended to motor vehicle as a one of pollution sources; (ii) the standards include recent improvements in motor vehicle engine technology; (iii) the potential for increased air pollution due to the addition of more vehicles and the entry of foreign in-use vehicles; and (iv) improvement to the current emission standards which rely on idle testing; therefore, they do not reflect the real emission load introduced into the air.

The regulatory instrument through vehicles inspection and maintenance is regulated by Law No. 14 of 1992 and some other Government Regulations. Government Regulation No. 44 of 1993 concerning Transport and Motorists states that emission tests are integrated into the roadworthiness test. In Indonesia, there are two types of roadworthiness tests for vehicles: (i) type approval tests for new type vehicles, and (ii) regular inspections for in-use vehicles. The type approval tests are conducted before the vehicles entering Indonesia's automotive market. The results must meet the national emission standards. The test is conducted under the authority of Ministry of Transport and Communication. The test results are valid throughout Indonesia.

Indonesian government has also taken action to control air pollution through fuel pricing policy. Based on Presidential Decree No. 9 of 2002, the government applied a new fuel-pricing scheme for the domestic market since January 17, 2002. Premium gasoline prices are set at world market prices while kerosene for heavy industry, automotive diesel-oil, and industry diesel-oil are set at 75% of the market price. The government has increased fuel price for several times. The last fuel hike was on October 1, 2005. However, fuel rise is a sensitive issue in Indonesia. It has caused some protests. A high increase in 1998 has triggered riots that helped to the collapse of Suharto's regime. Protests also forced former President Megawati Sukarnoputri to scale back a fuel price increase in 2002. A statement by the Minister of Energy and Mineral Resources Purnomo Yusgiantoro

in a national newspaper suggested that the government aimed at gradually eliminating fuel subsidies by 2010.

Other measures include increasing public participation and developing institutional capacity. The government efforts to combat air pollution related institutional building comprise: (i) Plans by the Ministry of Environment to enlarge its mandate under the new cabinet and be more instrumental in facilitating enforcement through local government; (ii) Empowering environmental institutions in local government based on the recently revised local government law (Law No. 32 Year 2004); and (iii) the establishment of a forum comprising government, private and public society (Mitra Emisi Bersih or Clean Emission Partnership) to address the various unresolved issues on vehicle emissions (Tamin 2004).

In addition, a program called Mandatory Disclosure of Automotive Emissions is established by the Ministry of Environment. This program obliges the automotive industries to inform the public (e.g. potential customers) regarding the emission of new produced vehicles. It is aimed at encouraging automotive manufactures to produce environmental friendly vehicle types.

C. Transport and land-use planning

The efforts of air pollution control through transport and land-use planning are usually undertaken by the regional or local government. For example, recently, Jakarta' government made a planning document called the Jakarta Macro Transport Planning Document containing transport and traffic management action plan for DKI Jakarta metropolitan area in Period of 2003 to 2010.

In 2004, Jakarta's government took an impressive decision to develop exclusive bus-lanes through a program called Trans-Jakarta Bus Way. The first segment, out of 14 planned, with length of 12.9 km connecting the city's northern rail station to the Blok M bus terminal and a shopping area in south Jakarta. In

addition, the Jakarta's government has shown their initial agreement with an elevated monorail system proposed by private investors. The proposal is to construct a 27 Kilometres elevated monorail serving in a circular manner the city's triangle area of Kuningan, Sudirman and Senanyan, and a line connecting Kampung Melayu in the eastern part of Jakarta and Roxy in the west (Tamin 2004).

The Transport Demand Management (TDM) has been adopted in Jakarta since the early 1990's through restricting accesses for private cars to certain areas during morning peak hours (6.30 – 10.00 am), except for those with three or more passengers. This strategy has been implemented only for two busiest corridors: Jl. Jend. Sudirman –Jl. Medan Merdeka Barat (± 8 kilometres) and Jl. Jend. Gatot Subroto (± 5 kilometres). However, this strategy has been ineffective as described by Syafruddin (2002):

"Instead of reducing congestion, the "three-in-one" has generated more congestion on parallel streets, and prolonged the duration of congestion. On the other hand, the implementation of this rule has provided new income for some people, who are paid to join a vehicle and boost its number of passengers to the obligatory three. The incidence of these 'jockeys' entering and leaving vehicles has, however, increased road accidents in TDM areas. In sum, the implementation of three-in-one has not been as effective as expected."

The services provided by public transport system in Jakarta are still inadequate, both in quantity and quality. This poor public transport system has been encourage people to own and use private vehicles. With regard to this condition, Syafruddin (2002) explained:

"The current situation in Jakarta is that all public transport services are operated under the obligation to carry passengers (Wajib Angkut Penumpang) system, whereby a driver hires a vehicle from a company on a daily basis. The driver has to pay a fixed rate that does not include fuel or vehicle operating and maintenance costs (…). This system has resulted in reckless drivers who compete to carry as many passengers as possible without concern for their safety."

The situation has been also happened to the rail based transport. Commuter trains serve travellers entering and leaving Jakarta from and to its suburbs: Tangerang in the west, Serpong in the southwest, Depok in the south and Bekasi in the east. Syafruddin (2002) explained further that, "The quality of the service is even worse than the bus service: the load factor for commuter trains averages 250% (…), with passengers resorting to train rooftops during peak travel hours."

Other more environmental friendly mode of transport, the non motorized transport, is not very common in Jakarta. For example, the Action Plan for Integrated Vehicle Emission Reduction Strategy for Greater Jakarta Document described this situation as follows:

"Pedestrian facilities are very limited in terms of both quantity and quality. Zebra-crossings are largely non-functioning due to the behavior of drivers who ignore the presence of pedestrians. To overcome this, pedestrian bridges have been built for people to cross streets. These facilities are also seldom used however, as they require more effort from pedestrians and also increase their travel distance. It is very common to see pedestrians cross the road under a bridge instead of on it, a condition that has increased the number of road accidents."

Moreover, the Action Plan has also identified the lack of integration between transport planning and land-use planning, as mentioned in the document:

"The development of Jakarta since early 1970s has been towards expanded residential areas in the suburbs while business activities have remained central. The city is not compact, and as a consequence, people commute on average more than ten kilometers daily. The situation has worsened as public transport facilities to transfer people from their homes to work are very limited, with the result that they must either drive their private vehicles or use public transport in congested traffic. On average, Jakartans spend more than two hours daily on the road."

Chapter IV
Strategy on Vehicle-Source Air Pollution Control in Netherlands

4.1 Introduction

This chapter discusses the strategies employed by Dutch government to combat air pollution, particularly those originating from vehicles. Firstly the context is presented in section 4.2 to section 4.4. Then, the strategy related to air pollution control introduced by the EU Commission and those introduced by the national government in The Netherlands is discussed in section 4.5 and 4.6. **Most of the content about the Netherlands' context in this chapter is taken from the book of "Environmental Policy of the Netherlands: An Introduction", which was published by the Dutch Ministry of Housing, Spatial Planning and the Environment in January 1997; otherwise, the text sources will be stated**.

Dutch environmental policy is developed as part of a wider context of European Union (EU). Therefore, discussion over air pollution strategy in the Netherlands must also take account related policy in EU level. However, this study will not attempt to discuss the organizational aspects of EU. It will only describe some EU legislation related to air pollution control.

4.2 Government structure

Similar to Indonesian system, The Netherlands is also a unitary state, but with the form of Constitutional Monarchy with Queen Beatrix as its head of state. Legislative and executive powers are vested in the government and parliament. There are also three levels of government in the Netherlands: national government, the provinces and municipalities. In addition, there are the water boards, which have their own authorities and responsibilities in the Dutch system. The water boards concern specifically with water management.

The national government consists of 13 ministers and the prime minister. The parliament consists of a First Chamber with 75 members and a Second Chamber with 150 members. The parliament's members are elected every four years in which the Second Chamber is through direct election and the First Chamber is through the provincial councils. Critical decisions such as new legislation are reviewed and approved by both Chambers. A legislation proposal is firstly discussed by the Second Chamber. This chamber has right to amend the legislation or make its own proposals. When the proposed legislation has been approved, it is submitted to the First Chamber for a review. For dealing with environmental issues, both Chambers have their own Environmental Committee.

There has been a significant shift of powers from government to the provincial and municipal authorities over the last few decades. It is aimed at making the distance between the administrative levels and public in general as small as possible. The province, municipals and water boards have a certain degree of freedom to formulate environmental policy for their own areas.

There are 12 provinces in the Netherlands. The Provincial Executive is in charge of the day-to-day operational of the province's affairs and headed by the Queen's Commissioner. Each province has an environmental committee and an environmental management department. The provinces publish provincial environmental policy plans every four years referring to national environmental policy and adjusted to the needs of their own areas. Every year, they develop provincial environmental programmes with specific measures and cost estimates. In addition, the Association of Provincial Authorities (IPO) deals with important issues affecting the provinces. The IPO consults central government on general policy issues that concern all provinces.

A municipality is headed by a mayor appointed by the Crown. The highest authority within the municipality is the municipal council - a representative body elected every four years. The municipal executive consisting of the mayor and aldermen execute the day-to-day municipal's administration. Every municipality has at least one department dealing with environmental matters. Large municipalities have a separate executive board dealing with environmental issues. Municipal roles include licensing and enforcement of environmental legislation. The Municipalities also help in raising the

public's awareness towards environment. They have no obligation to draw environmental policy, but every year they have to prepare a municipal environmental programme.

4.3 Air Pollution legislation

In the EU level, there are some directives related to air pollution control, which applied to the EU member countries including the Netherlands. These directives have been summarized by McCormick (2001, p.187) as shown in Table 4.1 below.

Table 4.1 Key pieces of EU law on air quality

70/220	Directive on road vehicle emissions. Sets limits for emissions of carbon monoxide and unburned hydrocarbons from petrol-engined vehicles other than tractors and public works vehicles.
72/306	Directive on emissions from diesel-engined vehicles. Sets limits on the opacity of emissions from diesel-engined vehicles except tractors and public works vehicles.
78/611	Directive on lead in petrol. Set limits for lead content of petrol sold in the EC.
80/779	Directive on sulphur dioxide and suspended particulate concentrations. Sets limits for ground level concentrations of SO2 and suspended particulates.
82/884	Directive on lead in the air. Sets limit values on concentrations of lead in the air, and mandatory sampling methods to be followed.
85/210	Directive on lead in petrol. Builds on 78/611 by requiring member states to make unleaded fuel available.
88/609	Directive on large combustion plants. Requires staged reduction of emissions of SO2, nitrogen oxides, and dust from plants with a rated thermal input greater than 50 MW.
92/72	Directive on air pollution by ozone. Requires member states to establish network for monitoring collection of information and public warnings on ozone.
96/61	Directive on integrated pollution prevention and control. Requires application best available technology to prevent or minimize air, water or soil pollution by industrial plants.
96/62	Directive on ambient air quality assessment and management. Outlines common methods and criteria for air quality assessment.
99/30	Directive on air pollutants. Sets limit values for sulphur dioxide, nitrogen dioxide, oxides of nitrogen, particulate matter, and lead in ambient air.

Source: McCormick (2001, p.185)

In addition, a newer and important legislation, **Directive 2001/81/EC of the European Parliament and the Council on National Emission Ceilings for certain pollutants (NECs)**, sets upper limits for each Member State for the total emissions in 2010 of the four pollutants responsible for acidification, eutrophication and ground-level ozone pollution (SO2, NOx, VOCs and ammonia), but leaves it largely to the Member States to decide which measures to take in order to comply (European Commission 2006).

In national level, the main Netherlands' environmental legislation is **the Environmental Management Act** which was adopted since March 1, 1993. The Environmental Management Act is established in the form of modular piece of legislation. New chapters of environmental legislation will continue to be added. Apart from the Environmental Management Act, there is other legislation for specific issues. For example, **the Air Pollution Act** lays down standards governing air pollutants and regulates levies to combat air pollution.

With the establishment of EU directives, the Netherlands is obligated to transpose the directives into its national law. For example, the European Air Quality Framework Directive is adopted into the national law by the establishment of the Dutch Air Quality Directive (Besluit Luchtkwaliteit) on July 19, 2001. Dutch government is working on some proposals for new legislation of air pollution control. The relevant legislation proposal include: the Air Quality Decree of 2005, the Air Quality Bill, and the Calculation and Measurement Regulation on Air Quality (VROM 2006).

The Air Quality Decree of 2005 is intended to replace the old Air Quality Decree of 2001. It provides the legal framework for the short term, contains the following new elements:

- At locations where a norm is exceeded, new developments are possible providing the air quality improves as a result or at least remains the same.
- If air quality is harmed by a project, this must be outweighed by an improvement in air quality elsewhere, so that the net effect is better air quality.
- In evaluating the air quality in relation to fine dust, the naturally present particles that are not harmful for human health, such as sea salt, will not be

taken into consideration. How this is to be carried out is explained in the Measurement Regulation on Air Quality 2005 (VROM 2006).

The Air Quality Bill emphases the use of a programme with specific measures for condition when the norms are exceeded. For certain problems, to be identified by ministerial order, the corporation of all levels of government from national government to relevant local governments will develop a "locally applicable programme". This locally program will include "supplementary location-specific and regional measures, to deal with the sources of pollution, but will also include relevant spatial planning developments in the area, such as new infrastructure and industrial parks, that will influence the air quality in their localities 'to a significant extent " (VROM 2006).

The Calculation and Measurement Regulation on Air Quality will regulate the standardized method in calculating and measuring air quality. The models for the calculation and measurement are developed through cooperation with various national research institutes. The aim is to establish the "unambiguous" regulation for the calculation and measurement of air quality in early 2006 (VROM 2006).

In addition to the above mentioned legislation, there are also the 4th National Environmental Policy Plan, The Traffic Emissions Policy Document, The Mobility Policy Document and the National Air Quality Plan 2004 (Nationaal Luchtkwaliteitsplan 2004). The 4th National Environmental Plan introduced 6 point principles of the future environmental policy: (i) sustainable development (the environmental, economic and social quality dimensions are managed in a balance way); (ii) prevention (adverse effects of activities must be prevented); (iii) precaution (not waiting to take action against serious threats until scientific evidence has been provided); (iv) prevention at source; (v) the polluter pays; and (vi) ALARA (As Low As Reasonably Achievable; the best protection that can be reasonably demanded). The content of these plans and policy documents with regard air pollution control is discussed further in section 4.6.

4.4 Air pollution institutions

The Ministry of Housing, Spatial Planning and the Environment is the institution that responsible for coordinating the Dutch environmental policy at national level. In addition, the Ministry of Agriculture, Nature Management and Fisheries is responsible for nature policy; the Ministry of Transport, Public Works and Water Management is responsible for water quality control; the Ministry of Economic Affairs is responsible for energy policy; the Ministry for Development Cooperation is responsible for environmental policy for development cooperation. These ministries work together to develop the National Environmental Policy.

The responsibilities of Ministry of Housing, Spatial Planning and the Environment (VROM) include:

- responsible fro general environmental policy;
- coordinates the environmental policies of different ministries;
- responsible for the Environmental Management Act; and
- directly responsible for specific legislation concerning air, soil, environmentally hazardous substances etc.

Within this ministry, the Directorate-General for Environmental Protection is responsible for the development of environmental policy and partly for its implementation. This Directorate-General consists of 10 directorates and an Environmental Protection Inspectorate. From these directorates, 8 of them have responsibilities which are directly or indirectly related to air pollution control. The directorates and their responsibilities are described below.

A. Directorate of Air and Energy:

- policy on air quality;
- target group management: refineries and energy sector;
- coordinates

B. Directorate of Chemicals, External Safety and Radiation Protection:

- responsible for controlling environmental risks from substances, including radio-active substances and genetically modified organisms;
- coordinates the theme of dispersal of substances and genetically modified organisms harmful to the environment;
- determines the system for setting environmental quality standards.

C. Directorate of General Policy Affairs:

- develops legal, economic, social instruments for environmental policy-making;
- coordinates environmental policy with the regional and local authorities;
- coordinates spatial planning projects and policy on specific geographical areas;
- coordinates the cooperation with environmental organizations;
- concerns itself with environmental education.

D. Directorate of Noise and Traffic:

- policy preventing and limiting noise pollution;
- target group management: traffic and transport;
- policy of emission reductions of means of transport;
- promotion of sustainability of transport policy;
- coordinates the theme disturbance.

E. Directorate of Industry and Consumer Policy:

- target group management: industry, retail trade and consumers;
- development and coordination of sustainable production and consumption strategies;
- development and coordination of life cycle based product policies.

F. Directorate of International Environmental Affairs:

- takes international initiatives, develops international environmental policy and conducts international consultations and negotiations;

- coordinates contributions from the other directorates in an international context;
- coordinates consultation with other departments;
- coordinates the implementation of EU policy into national environmental policy and legislation.

G. Directorate of Strategic Planning:

- responsible for observing new issues for the development of strategic environmental policy;
- coordinates the compilation of the National Environmental Policy Plans and the annual Environmental Programmes; and
- promotes environmental technologies.

H. Environmental Protection Inspectorate

- responsible for the enforcement of environmental policy;
- evaluates and promotes the quality of implementation of environmental policy and the enforcement by the regional and local authorities.

In addition, there are also some other institutions which usually involve in environmental issues in general. These institutions can be divided into five groups: (i) advisory councils; (ii) environmental protection organizations; (iii) consultative committees; (iv) research institutions; and (iv) branch organizations and pressure groups.

The advisory councils assist government by providing recommendations on their own initiative or on request. For example, the VROM-Council advises the Minister on matters concerning environmental Management. The research institution, the National Institute of Public Health and Environmental Protection (RIVM), conducts environmental researches for the VROM. The research includes recording emission levels, constructing environmental models and calculating scenarios. The consultative committees consist of employers' and employees organizations, sectoral organizations, consumer groups and other

interest groups. These organizations will be involved in the implementation of environmental policies. Thus they should be consulted in the formulation of any environmental policy.

4.5 EU Strategy on air pollution control

The air pollution control in the EU level according to McCormick (2001, p. 185) consist of various measures and instruments, from establishing air quality standard to the idea of imposing 'green taxes' to incorporate environmental costs into the price of goods and services. He has summarized the EU method regarding air quality control as the following:

- Introducing legislation concerning **emission limits** for individual plants/processes or road vehicles and also fuel quality standards limiting the content of certain compounds in fuel.
- The setting of air quality standards notably for those for sulphur dioxide, suspended particulates, lead and nitrogen dioxide. National or European **air quality concentration limits**, mandating threshold levels to be met at ambient background areas (objectives or standards).
- Monitoring programmes aimed at improving the quality of information about specific pollutants.
- National **economic instruments** (energy or pollution taxes and charges). For example, there is a controversial idea of imposing 'green taxes' designed to make the price of services or goods reflect their environmental costs.

European Union adopted a programme called Auto-Oil Programme Since July 1998. The Programme introduced a number of measures to combat air pollution from passenger cars and light commercial vehicles, and new measures on the quality of petrol and diesel fuels. It involved the oil and motor industries to investigate ways of reducing vehicle emissions and promoting cleaner fuels in the most cost-effective manner by 2010 (McCormick 2001, p. 191).

The Auto-Oil II programme continued the Auto-Oil I programme. It was designed to expand the agreement on emissions controls to sources of pollution not covered by the

first programme – these include motorcycles, outboard motors, air compressors and other petrol-driven machinery and tools. Where motor manufactures bore much of the burden for Auto-Oil I, the follow-up progrmme is likely to affect oil producers more squarely (EU Environmental Commission 2006).

According to the EU Environmental Commission, the aims of the European Auto-Oil II Programme (AOPII) were to make an assessment of the future trends in emissions and air quality and establish a consistent framework within which different policy options to reduce emissions can be assessed using the principles of cost-effectiveness, sound science and transparency; and to provide a foundation (in terms of data and modeling tools) for the transition towards longer term air quality studies covering all emission sources. The potential measures include:

- Tighter emission standards for motorcycles;
- Promotion of enhanced environmentally friendly (EEV) passenger cars;
- Changes in fuel specifications for gasoline and diesel (though not for sulphur or aromatics in gasoline which had already been fixed for 2005);
- Promotion of alternative fuels in captive fleets;
- Promotion of a city fuel to reduce PM emissions;
- More sophisticated dynamometer testing of catalyst-equipped cars for inspection and maintenance;
- Local measures, including parking charges, differentiated road pricing, improved infrastructure, public transport priority, and improved logistics for freight;
- National scrappage schemes;
- Fiscal instruments, including fuel duty increases or replacement of registration or circulation taxes with fuel duty increases.

The European Commission realizes that legislation alone is not enough and, through a range of other tools, is helping Member States to improve their air quality by: (i) entering into agreements with industry; (ii) supporting scientific research and technological development; (iii) assisting sectoral and spatial planning; (iv) improving the quality and quantity of environmental data; (v) examining alternative fiscal measures to favour sustainable development; (vi) supporting public information and educational

campaigns; (vii) promoting professional education and training; (viii) providing financial support.

At city level, EC imposes strict monitoring requirements on cities for a number of pollutants as well as the duty to prepare action plans to deal with poor air quality over the short and long term. An important option offered to city authorities by the framework directive is the right to 'suspend activities, including motor-vehicle traffic when there is a risk of limit values being exceeded'. Information is a major requirement of the framework directive. When air quality standards are breached cities must make public their plans to improve the situation.

4.6 Dutch Strategy on air pollution control

Dutch policy regarding air pollution control can be found mostly in the 'Traffic Emissions Policy Document'. The document discusses the government policy, strategy and measures to control emissions from traffic. The measures are particularly planned to meet the EU directive on National Emission Ceilings (NECs). In addition, the measures related to mobility, such as road charges and infrastructure policy can be found in the 'National Mobility Document' or 'Nota Mobiliteit'. Measures related to spatial planning is discussed in the 'National Spatial Strategy'.

A distinction is made between the policies with the target of 'reduced air pollution from road traffic' and those with the target of 'reduced CO2 emissions from road traffic'. The policies of 'reduced air pollution from road traffic' relate particularly to NOx (nitrous oxide) and PM (particulate matter) emissions from heavy good vehicles, diesel-driven cars and delivery vans. In addition, the Traffic Emissions Policy Document states that the air quality control comprise international, national and local measures. However, for the purpose of comparison (in the next chapter), the policy will be regrouped similar as those in section 3.6 about Indonesian air pollution control strategy.

A. Technological measures

The technological measures employ by Dutch government in combating air pollution comprise measures that related to vehicles, fuels and information

technology. According to the 'Traffic Emissions Policy Document', the government is working to ensure that sulphur-free diesel is available in 2005 through the introduction of a differential excise duty structure. As explained in the document:

"The introduction of the Euro 4 standard in 2005 will enable diesel to close the gap a little with petrol. Nevertheless, Euro 4 diesel-driven cars will continue to pollute more than Euro 4 petrol-driven cars. Negotiations are currently being held in the EU concerning the standard for NOx and particulate matter for new cars. This so-called Euro 5 standard is to be implemented around 2010."

In the European level, the Dutch government supports the EU commission's agreement with automotive industry to reduce average CO2 emissions per kilometer from new cars, particularly through technological improvements in engine fuel efficiency. According to the policy document, "hybrid cars offer many prospects in this respect. No standards have yet been set for CO2 emissions per kilometre for any single vehicle type. In order to stimulate sales of hybrid cars in the Netherlands, they are under certain circumstances (A energy rating label or zero emission) exempt from the purchase tax on passenger cars and motorcycles (BPM) and partially from road tax."

With regard to the information technology the government is working to ensure that new cars are fitted with 'fuel-saving' built-in devices, such as: on-board computers with econometers which give drivers information on fuel flow, speed limiters and navigation control. These devices can help drivers to adopt a fuel-saving driving style.

In addition, the government also used 'fuel mix policy' to encourage the innovation of fuel technology. The aim is to influence the proportion of each fuel type used by vehicles so that there are as many clean vehicles as possible on the road. As explained in the 'Traffic Emissions Policy Document':

"Among the large-scale use of 'climate-neutral' fuels, such as biofuels and sustainably produced hydrogen and electricity, only biofuels can be introduced on a small scale from 2006. The introduction of second generation biofuels is expected to scale down the costs by a factor of 3 to 5, which are high at the present first generation of biofuels. By ensuring biofuels availability, emissions

from vehicles can be reduced and the market will be led to the introduction of second generation biofuels as soon as possible. In addition, this sustainable energy technology also gives an impulse to research and development."

The approach to encourage the use of biofuels is through the introduction of financial incentives which offer financial compensation of the additional costs relevant to the use of this fuel type.

B. Administrative and economic instruments

In the EU level, the national policy of the Netherlands is to support EU for the implementation of a stringent tightening-up of standards for NOx and PM from cars, delivery vans and heavy goods vehicles. It is aimed at ensuring that the standards for NOx and PM from diesel-driven cars and delivery vans are so stringent by 2010 (fulfilled the Euro 5 standard). The government is also examining the possibility for the traffic sector to take part in the EU's CO2 emission trading system, which might take the form of an emissions trading scheme a CO2 ceiling for fuel suppliers.

In the national level, the 'Traffic Emissions Policy Document' mentioned that the national approach to maintain air quality in the Netherlands comprises:

- the establishment of standards for engines, vehicles and fuels as the main instrument of air pollution control. This approach has been most effective to date. This include tightening up limit values, improving testing method, introducing additional requirements and making systems that monitor on-road emissions - known as 'on-board diagnostic' (OBD) systems
- tax incentives in 2005 for the earlier introduction of cleaner heavy goods vehicles (Euro 4 and Euro 5) by means of the Pollution Prevention Investment Tax Credit, if the necessary funds (€ 23 million) can be found in the budget of VROM;
- The Government is preparing to introduce a incentive scheme for biofuels from 2006, including the necessary research, preparation and funding. The preparation will be worked out in cooperation with the private (oil companies, chemical companies, etc.) and non-governmental organizations.

- tax incentives, which have no effect on the budget, for soot filters in new diesel-driven cars by means of the purchase tax on passenger cars and motorcycles (BPM);
- national standards that have been set for LPG units will be updated so that the standards set for cars that have been retrofitted to run on LPG keep pace with those for petrol-driven cars.
- examine how the amount of purchase tax imposed on passenger cars and motorcycles (BPM) can be linked to the fuel efficiency of cars. For example, the government is examining the possibility of exempting hybrid cars and hydrogen-powered cars which meet certain requirements from BPM for a long period.
- promoting a driving style that reduces fuel consumption (ECODRIVING or Het Nieuwe Rijden) through media campaign and compulsory part of the practical driving test for passenger cars. It is designed to make drivers to adopt their driving style so that result in significant decreased of fuel consumption.

In the local level, the measures of air pollution control include:

- a reduction of the speed limit in combination with proper enforcement, such as the 80 kilometre per hour speed limit on the A13 at Overschie in Rotterdam, which is also possible on other stretches of road.
- Municipalities are being sent information outlining the possibilities for designating areas as exclusively for 'clean' vehicles. An example is excluding dirty heavy goods vehicles from city centres, such as currently happens in Amsterdam. At the same time it is important to ensure, however, that city centres remain accessible and that goods delivery is possible.
- implementing an Air Quality Innovation Programme in order to develop solutions for air quality problem areas. A total of € 20 million has been reserved for this until 2010.

C. Transport and land-use planning

The Netherlands is well-known as one of the countries with a very good established transport systems and spatial arrangements. The spatial policy has

been set systematically from national to local level. Dutch government has also successfully developed good pubic transport system. The policies relevant to transport and land-use planning are particularly discussed in the 'National Mobility Document' and the 'National Spatial Strategy'.

As explained earlier in chapter 2, the air pollution control through transport and land-use planning are aimed at encouraging the use of public transport and non-motorized transport, reducing mobility and improving traffic flows. The Dutch strategies to improve traffic flow stated in the 'National Mobility Document' include:

- *Solve accessibility bottlenecks and increase free flows of traffic*, particularly those include in main corridors such as in the triple A link (A2, A4 and A12).
- *Strengthen interrelationships between mobility, economy and space*, as explained further in the document:

  > "Choices with regard to housing and work locations can significantly help to prevent mobility. During the development of new city and town expansion projects and centre city projects, the connections to existing infrastructure and the capacity of existing infrastructure must therefore be taken into account. The objective is optimal utilisation of the existing infrastructure and of the opportunities offered by junctions in the existing infrastructure… Infrastructure developments must also anticipate opportunities in the area of urbanisation and centre forming. New housing locations in the city result in fewer movements than housing locations at the edges of urban areas and create greater support for existing public transport facilities." (p.36)

- *Road construction and expansion*. This measure type also takes into account the construction of elevated highway in urban areas with limited space.
- *Make the network more robust*. The government will create new parallel routes along the most intensively used road. The availability of good alternative routes can make the road network less sensitive to disruptions.
- *Separate traffic flows*. This involves separation of local and regional traffic from national and international traffic, such as in the case on the southern section of the Utrecht ring (A12).

- *Better road utilization*. The measure includes narrowing existing lanes to creates space for an extra lane, dynamic lane structures (for temporary extra lanes) and merging assisted by lights in the road surface.
- *Improve urban distribution*. This measure type is achieve through cooperation between neighboring municipalities and regional business to optimized the movement of freight traffics and their activities in loading and unloading goods.
- *Expand traffic management and traveler information*. The government wants to implement dynamic traffic management, for both national and regional road network, with the aim of improving traffic control. It will be achieved through technological renewals. In the international level, joint efforts are also being made with Belgium and Germany to develop cross border traffic management systems.
- *System innovations*. This measure type focuses on the future traffic and traffic system, particularly based on research and development activities in the European context. The possibilities include 'automatic vehicle control', 'dual mode system' and 'personal rapid transit'.

Chapter 3 of the 'National Mobility Document' also discussed Dutch strategies to promote public transport and bicycle transport. The public transport is served by various mode of transport: train, metro, tram and bus. The strategy with regard train transport is to improve the service of the existing rail network thorough 'rail renewal plan' and expand rail network information system and management. The aim is to maintain and increase the existing market of rail transport. In addition, the service of freight transport by train is also being improved to make it closer with people transport.

Bus, metro and tram play dominant role serving public transport in city or municipal level. The strategy is to encourage regional and local parties to take initiative in developing local and regional public transport. However, the network will not be expanded to rural areas. Instead, the service in rural areas will be served by forms of transport that can response to demand flexibly, such as

neighborhood buses or collective demand-dependent transport (CDD). The CDD is available on call and that is accessible to everyone.

The bicycle occupies a relatively high share of transport in the Netherlands. The governments, particularly in the local level, work to maintain this condition. The government ambition is to increase 'bicycle kilometers'. This ambition is achieved through the strategy of providing safe routes and good facilities for bicycles. In addition local governments also take into account the bicycle during spatial planning.

In the 'National Spatial Strategy' or 'Nota Ruimte', concentration of urbanization and infrastructure is still one of national spatial strategies. Thus, it can maintain the compact urban form which characterizes cities in the Netherlands. The concentration is focused in 6 urban networks and 13 economic core areas. The 6 urban networks are: Randstad Holland, Brabantstad, Southern Limburg, Twente, Arnhem-Nijmegen and Groningen-Assen. Almost all economic core areas are situated in these urban networks. As explained further in the summary document of the 'National Spatial Strategy':

> "Within each national urban network, the national government designates a number of areas where urbanization will be concentrated. Provinces, urban regions and municipalities will incorporate these concentration areas into their plans and elaborate on the urbanisation policy. It is not the intention that these concentration areas be fully urbanised." (p. 9)

To conclude, measures with regard spatial planning is mainly responsible of local governments. The central government only plays a stimulatory role and contributes to the necessary investment.

Chapter V
Air Pollution Control in Indonesia and the Netherlands: A Comparison and Discussion

5.1 Introduction

This chapter compares the context and strategy of air pollution control in both countries – Indonesia and the Netherlands. The comparison of Indonesia and the Netherlands cases will result in lessons to be learned for Indonesia. The next section will firstly compare the contextual aspects of air pollution control in both countries. Then, section 5.3 deals with the current strategies in both countries to combat air pollution. The comparison will result in lessons to be learned for Indonesia. Finally, the lesson learned will be presented in section 5.4 together with a short discussion about the possibilities of transferring the policies into Indonesia.

5.2 The context comparison

Based on description of Indonesian and Dutch context in chapter 3 and chapter 4 respectively, some point of similarities and differences can be drawn as the following:

- *The government structure* of Indonesia and the Netherlands are almost the same. Both countries are unitary states with the government exercise executive power and the parliament bodies have legislative power, except that Indonesia takes the form of Republic and the Netherlands adopts a Monarchy system. In both countries, the government consist of three level of government with an addition that the Netherlands has the water boards. Regional governments in both countries have their own autonomous responsibilities.
- *Air pollution legislation* in Indonesia is rather complex compared to Dutch legislation. There are a lot numbers of air pollution legislation in Indonesia case

issued by various authorities from national to local level. In the Netherlands case, the air pollution control is regulated in a limited number of legislation. The legislations are mainly transposed from the European Directives.

- *The main Air pollution institutions* at national level in Indonesia consist of several ministers. The responsibilities related to air pollution control are dispersed among these ministers. In some cases there is no clear division of responsibilities. The coordination problems may occur in such dispersed organization. In the Netherlands case, Spatial Planning and Environment are handled by one institution. Transportation and Public Works are also under the same organization. Such simple arrangement can make coordination easier. In addition, while the public in Indonesia is mainly represented by NGO, in the Netherlands there are various groups to represent the public.
- With regard *economic and technological ability*, the Netherlands is more advance compared to Indonesia. Thus, it may hindered Indonesia in implemented certain measures to combat air pollution. In addition, bureaucracy inefficiency and rampant corruption may weaken efforts to improve air quality in Indonesia.

5.3 The strategy comparison

The strategy to combat air pollution in both countries has taken many forms of efforts, ranging from regulative such as establishing the standards to stimulating the public. The differences and similarities in strategy between Indonesia and the Netherlands/EU can be pointed out as the following.

- *Technological measures* in the Netherlands/EU are rather advances compared to the Indonesian context. For example, while Indonesia is struggling to replace old vehicles, the Netherlands/EU is moving towards the introduction of hybrid cars and the government is working to ensure that new cars are fitted with 'fuel-saving' built-in devices, such as: on-board computers with econometers.
- *Administrative measures* in both countries are significant. However the Netherlands/EU has employed a more stringent emissions standard and air quality standard compared to Indonesia. For example, the Netherlands/EU established the standard of 50 μg/m3 in 24-hours average for particulate matter (PM) compared

to the Indonesian standard for the same pollutant, which is 150 μg/m^3 in 24-hours average. In addition, the Netherlands/EU is moving toward the standard of EURO5 for vehicles, while Indonesia is working for a lower standard that is EURO2.

- Economic measures are not well-developed in the Indonesian case, the measure limited to eliminating subsidies from fuel prices. In the Netherlands context, there are some economic instruments, such as tax incentive for EURO 5 vehicles, incentive scheme for biofuels and tax exemptions for hybrid cars.
- Regional government in Indonesia, such as Jakarta's government, can be said still in the preliminary stage to introduce a good public transport system. This is shown by some efforts such as developing the first exclusive bus lanes in Jakarta and a proposal to build an elevated monorail system. In the Netherlands, public transport has taken a strong position in transport system. The current efforts are focused at improving management system and developing advance transport information system.
- Spatial planning or land-use planning is not well established in Indonesia, particularly due to lack of enforcement. For example, the development of Jakarta since early 1970s has been towards expanded residential areas in the suburbs while business activities have remained central. The city is not compact, and as a consequence, people commute on average more than ten kilometers daily. On the contrary, spatial planning in the Netherlands can be said as 'culturally embedded'. The cities layout in the Netherlands is well organized through a long history of spatial planning. This condition makes the cities in the Netherlands 'compact'.

5.4 Lesson learned and its transferability

The preceding section has discussed the similarities and differences of air pollution control and its context in Indonesia and the Netherlands/EU. Lessons to be learned for Indonesia can be derived from the discussion. The main points of lesson learned from Dutch/EU policy have been summarized as the following:

- There are the possibilities to implement more types of technological measures in Indonesia, particularly those related with vehicles. For example, the Indonesian government can start with preparing for the introduction of 'hybrid cars' and encouraging car owners to equip their cars with environmental friendly devices. However, the Indonesian government should consider technological constraints in transferring such measures. The introduction 'hybrid cars' may require other supporting measures. Thus, the consequences of such transfer should be carefully studied.
- There are the possibilities to implement a more stringent air quality standard in Indonesia. However, this stringent air quality standard may result in various consequences. A comprehensive study is needed to investigate the possibilities of transferring this measure type into Indonesia. In addition, such strict standard need a very good enforcement; otherwise, it may not work, particularly due to bureaucracy inefficiency and rampant corruption in the current Indonesian context.
- More economic measures such as tax incentives and tax disincentives can be implemented in Indonesia as the case of the Netherlands. However, this measure type needs also thorough consideration of its consequences.
- Indonesia can improve air quality through the improvement of transport and spatial planning. This measure type can be very expensive in cities which have already highly urbanized such as Jakarta. Thus, the economic feasibility may obstruct the possibility of transferring such policy in Indonesia. As the alternative, such measures can be implemented in less developed or new developed towns. This measure type can result in a more sustainable air quality control compared to other measure types. However, enforcement can be the key for the success of implementation such measure. Indonesian context is very different in this point with the Netherlands. The Netherlands has a very good public transport systems and spatial planning. On the contrary, public transport systems and spatial planning can be said inadequate in Indonesia.

In general, two important points should be considered in transferring the above lesson learned to Indonesia context. Firstly, thorough studies are needed to investigate the requirements and feasibilities for transferring the measures into Indonesian context. From such thorough study can also be determined the degrees of transfer – that is copying, emulation, mixtures or inspiration. Such studies are beyond the scope of this research; therefore, further researches are needed to advance findings from this research. Secondly, enforcement is a must and should be put into consideration in the implementation of the measures. In Indonesia case, efforts to control air pollution control has been partially hampered by lacks of enforcement and rampant corruption.

Chapter VI
Conclusion and Recommendation

5.1 Conclusion

The discussion about the context in Indonesia and the Netherlands has shown both countries adopt almost the same government structure. This fact can make the process of policy learning from the Netherlands to Indonesia becoming easier. However, Indonesia is less developed with regard to technological and economic conditions compared to the Netherlands. This factor may constraint the process of policy learning from the Netherlands to Indonesia. Air pollution control has been well established in the legal systems in both countries with a difference that the legislation in the Netherlands consists of national legislation and EU directives. In addition, bureaucracy inefficiency, particularly due to corruption, is an important note about the Indonesian context.

There are various types of measures to control air pollution world-wide based on literatures. These measures can be grouped into some broad categories: technological measures, administrative and economic instruments, transport planning and spatial planning. While air pollution control through technological measures in Indonesia is focused particularly for fuels, such as reducing sulfur content and lead content in fuels, the efforts in the Netherlands/EU adopts a more comprehensive measure that comprises measures to improve fuel, vehicles and information technology. The administrative measures, such as establishing standard and increasing public awareness have been well established in both countries with a different that that the Netherlands/EU has established a more stringent air quality standard and more economic measures than Indonesia. There are also limited measures through transport and spatial planning in Indonesia case. On the contrary, this measure type has been well established in the Netherlands/EU.

5.2 Recommendation

This study has broadly investigated air pollution control in Indonesia and the Netherlands/EU and their relevant context. The description and discussion related to this topic has derived lesson learned as recommendations for Indonesia government as the following:

- This study suggests that Indonesia can improve the current efforts to combat air pollution by including more measures related to vehicles and information technology. For example, the Indonesian government can start with preparing for the introduction of 'hybrid cars' and encouraging car owners to equip their cars with environmental friendly devices.
- There are the possibilities for Indonesia to make the current air quality standard becoming more stringent. This measure type has been the most effective measure in the Netherlands/EU.
- This research argues that Indonesia can implement more economic instruments, such as tax incentives and disincentives for fuels and vehicles.
- It is suggested that cities in Indonesia, particularly new cities and less urbanized cities, should consider combating air pollution through the improvement of transport planning and spatial planning.

However, it is important to note that the feasibility of these measures is beyond the scope of this research. Therefore, a further study is needed to examine the feasibility to implement the measures. Another important note is that the policy enforcement is a must to guarantee the success for the implementation of these measures.

References:

Asian Development Bank (2003a), *Reducing Vehicle Emissions in Asia: Policy Guidelines for Reducing Vehicle emissions in Asia*, Manila, Philippines: ADB

Asian Development Bank (2003b), *Transport Planning and Traffic Management for Better Air Quality: Policy Guidelines for Reducing Vehicle emissions in Asia*, Manila, Philippines: ADB

Asri, D.U. and Budi Hidayat (2005), "Current Transportation Issues in Jakarta and Its Impacts on Environment", in: *Proceedings of the Eastern Asia Society for Transportation Studies*, Vol. 5, pp. 1792 - 1798, 2005

Bappenas (2004a), *Peraturan Presiden No.7 Tahun 2005 tentang Rencana Pembangunan Jangka Menengah Tahun 2004 -2009*, Jakarta, Bappenas, URL:http://www.bappenas.go.id/index.php?module=ContentExpress&func=display&ceid=2050, visited on February 3rd, 2006

Bappenas (2004b), *Action Plan for Combating Corruption 2004 -2009 (Rencana Aksi Pemberantasan Korupsi 2004-2009 or RAN)*, Jakarta, Bappenas,

Dolowitz, David P. and David Marsh (1996): "Who Learns What from Whom? A Review of the Policy Transfer Literature", *Political Studies,* Vol. 44, pp. 343-357.

Dolowitz, David P. and David Marsh (2000): "Learning from Abroad: The Role of Policy Transfer in Contemporary Policy-making", *Governance,* Vol. 13, No. 1, pp. 5-24.

Feitelson, E. and Erik T. Verhoef (2001), "Transport and environment: from policy measures to sustainability notions and back", in: Feitelson E. and Erik T. Verhoef (Eds), (2001), *Transport and Environment: In Search of Sustainable Solutions*, Cheltenham, UK: Edward Elgar Publishing.

Johansson, B. (2003), "Transportation Fuels – A System Perspective", in: Henser, D. A. and Kenneth J. Button (Eds), (2003), *Handbook of Transport and the Environment*, Amsterdam, The Netherlands: Elsevier B.V.

Kemp, R. and Benoit Simon (2001), Electric vehicles: a socio-technical scenario study, in Feitelson E. and Erik T. Verhoef (Eds), (2001), *Transport and Environment: In Search of Sustainable Solutions*, Cheltenham, UK: Edward Elgar Publishing.

Khare, M. and Prateek Sharma (2003), "Fuel Options", in Henser, D. A. and Kenneth J. Button (Eds), (2003), *Handbook of Transport and the Environment*, Amsterdam, The Netherlands: Elsevier B.V.

Maat, K. (2001), "Effects of the Dutch compact city policy on travel behaviour", in: Feitelson E. and Erik T. Verhoef (Eds), (2001), *Transport and Environment: In Search of Sustainable Solutions*, Cheltenham, UK: Edward Elgar Publishing. Chapter 10, page 208-230

Marshall, S. (2001), "Public transport-oriented urban design: plans and possibilities", in: Feitelson E. and Erik T. Verhoef (Eds), (2001), *Transport and Environment: In Search of Sustainable Solutions*, Cheltenham, UK: Edward Elgar Publishing. Chapter 9, page 181-207

Miller, D. and Gert de Roo (Eds.) (2000), *Resolving Urban Environmental and Spatial Conflicts*, Groningen, the Netherlands: Geo Press

Ministry of Housing, Spatial Planning and the Environment (1997), *Environmental Policy of the Netherlands*. The Hague, The Netherlands: Ministry of Housing, Spatial Planning and the Environment (VROM).

Ministerie van VROM (2003), *Liveable cities. A Dutch recipe for environmental policy and spatial planning in the City and Environment project*, The Hague, Ministry of VROM, www.vrom.nl

McCormick, John (2001), *Environmental Policy in the European Union: European Union Series*. Hampshire, UK: Palgrave Publishers Ltd.

Pandey, K. D., et al. (forthcoming 2006), *Ambient Particulate Matter Concentrations in Residential and Pollution Hotspot areas of World Cities: New Estimates based on the Global Model of Ambient Particulates (GMAPS),* The World Bank Development Economics Research Group and the Environment Department Working Paper, Washington DC: World Bank

URL:http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:20785646~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html, Access to Dataset: Air pollution in world cities database
Visited on Friday, April 14, 2006

Resosudarmo, Budy P. (2002), *Indonesia's clean air program*, Economics and Environment Network Working Paper EENO209, Australia: Australian National University.

Stone, Diane (2001), *Learning lessons, policy transfer and the international diffusion of policy ideas*, CSGR Working Paper No. 69/01, University or Warwick, UK.
URL: http://www.csgr.org

Syafruddin, A., et al. (2002), *Integrated Vehicle Emission Reduction Strategy for Greater Jakarta, Indonesia: Action Plan*, Jakarta: Asian Development Bank

Tabalujan, Benny S. (2005), *The Indonesian Legal System-An overview*, CommAsia Resources Pte. Ltd.
URL: http://www.indobizlaw.com

Tamin, Ridwan D. and Rachmatunisa, A. (2004), *Integrated Air Quality Management in Indonesia*, A paper presented in BAQ 2004, Agra-India, 6-8 December 2004. The Indonesian Ministry of Environment: Deputy V for Vehicles Emissions Affairs.

Tan, Alan K.J. (2002), *Preliminary Assessment of Indonesia's Environmental Law*, Singapore: Faculty of Law, Nation

Vigar, G. (2002), *The Politics of Mobility: Transport, the environment and public policy*, London: SPON Press

Walton, T.E., et al. (2003), *Indonesian Environment Monitor 2003*, Jakarta: World Bank Indonesia Office

Wikipedia contributors, "Catalytic converter," *Wikipedia, The Free Encyclopedia,* http://en.wikipedia.org/w/index.php?title=Catalytic_converter&oldid=65920774 (accessed July 29, 2006).

Wikipedia contributors, "Politics of Indonesia", *Wikipedia, The Free Encyclopedia,* http://en.wikipedia.org/wiki/Politics_of_Indonesia, (accessed June 1, 2006)

Wilson, Graham K. (2003), "Policy transfer versus varieties of capitalism in environmental", a paper for the Conference: *The International of Regulatory Reform*, Berkeley, California: University of California-Berkeley

Winbourne, S. (2002), *Corruption and the Environment: Sectoral Perspectives on Corruption*, Prepared by MSI and Sponsored by USAID

World Bank, (1997), *Five years after Rio: innovations in environmental policy*, Washington, D.C., USA: World Bank

Yin, R. K. (2003), *Case study research: design and methods*, New Delhi, India: Sage Publications, Inc.