

## CHAPTER 1

### INTRODUCTION AND GENERAL INFORMATION

#### 1.1 Project Background

Clean air is what all living humans and animals need for good health and well-being. However, due to unstoppable urban development, the air is continuously polluted. Urban ambient air is more polluted than the overall atmosphere, due to high density of human population and their activities in urban areas as it produces air pollutants with a higher rate as compared to less-developed areas and natural environment (Ling et al. 2012). Nowadays, air pollution in Malaysia becoming serious and getting worse. It is caused by both natural and man-made sources.

This issue can be considered as a dangerous issue because it can affect many things such as the economics of the country, the health of people, and causes diseases. Hence, there must be ways to prevent this issue from becoming dangerously like reduce using a vehicle. The air pollution comes mainly from land transportation, industrial emissions, and open burning sources. Among them, land transportation contributes the most to air pollution (Afroz, Hassan MN, Ibrahim NA, June 2003).

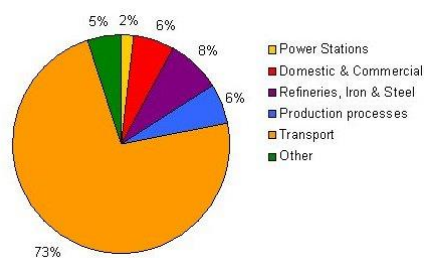


Figure 1.1: Sources of Carbon Monoxide Pollution in the UK (2001)

Source: <http://www.air-quality.org.uk/08.php>

In Malaysia, pollutants from the combustion of fossil fuels emitted by vehicles are one of the main cause of air pollution in Malaysia. In 2011, Malaysian roads witnessed more than 21 million registered vehicles and that number is very likely to be higher now and all those cars are producing dangerous gases that are detrimental to our health (Kadir Danial, 22 April 2016). Motor vehicles emit PM, NO, NO<sub>2</sub>, CO, organic compounds, and lead. Lead is a gasoline additive that has been phased out in industrial countries, but some developing countries still use leaded gasoline (Tord Kjellstrom, Madhumita Lodh, Tony McMichael, Geetha Ranmuthugala, Rupendra Shrestha, Sally Kingsland, 2006). These sources have negative effects and cause not only to nature but also to the human. Therefore, a particular attention should be paid by the government to this issue in order to minimize the effects and avoid the causes on health.

One of the option to overcome this problem is by using compressed natural gas (CNG). CNG is the cleanest burning transportation fuel on the market today. CNG burns cleaner than petroleum-based products because of its lower carbon content. CNG produces the fewest emissions of all other fuels and contains significantly fewer pollutants than gasoline. CNG produces 20-30% fewer greenhouse gas emissions and 95% fewer tailpipe emissions than petroleum products. Since, CNG fuel systems are completely sealed, CNG vehicles produce no evaporative emissions. Moreover, CNG fuel storage tanks are stronger and safer than gasoline or diesel tanks reducing the likelihood of accidental release. If released, CNG disperses quickly into the air instead of on the ground, reducing the risk of fire and ground contamination. Plus, CNG almost gives off no emissions during refueling (CNG-ONE Company).

A significant change has occurred in the energy policies of many nations throughout the world, including Malaysia. The implement of new policies and programs begins with a global transition away from oil as the dominant transportation fuel towards the use of cleaner, more abundant and eventually sustainable energy resources (Zulkifli Abdul Majid, Rahmat Mohsin, July 2013). Natural gas has proven to be cleaner, cheaper, safer and more domestically abundant than gasoline or other transportation fuels. Independent research has demonstrated that using natural gas for heavy trucking can reduce greenhouse gas emissions by up to 25% (Gas Energy Australia). For a sustainable development in the long term, the Malaysian government has launched a series of plans to encourage the utilization of

renewable energy. It is expected that by 2050 renewable energy will contribute 56% of electricity generation, whereas 43% will be contributed by large hydropower (Chinhao Chong, Weidou Ni, Linwei Ma, Pei Liu and Zheng Li, 15 April 2015). These clearly showed that a positive economic and environmental attributes from natural gas vehicles actually have an impressive growth in Malaysia.

To encourage more NGV users, the Malaysian government has provided a number of incentive programs, such as exempting the import duty and sales tax on NGV conversion kits that ultimately reduces the capital cost to the owner and reduces the payback period for the conversion. Moreover, NGV price is only RM1.05 cent/ liter which equivalent of petrol, is cheaper than other fuels (“Malaysia - Country Report May 05”).

Table 1.1: The reduction of road tax from existing levels.

<b>Level of vehicle</b>	<b>Reduction of road tax</b>
<b>Monogas vehicle (NGV only)</b>	50% off
<b>Bi-fuel vehicle (Petrol &amp; NGV)</b>	25% off
<b>Dual-fuel vehicle (Diesel &amp; NGV)</b>	25% off

Source: Supro NGV Malaysia

## 1.2 Problem Statement

The increasing number of vehicles from millions of cars and light-duty trucks, almost every vehicle in Malaysia operate using whether petrol or diesel fuel, which those two are major contributors to severe environmental problems such as global warming, haze and acid rain. The environmental impact of petroleum is often negative because it is toxic to almost all forms of life. When oil or petroleum distillates are burned, usually the combustion is not complete. This means that incompletely burned compounds are created in addition to just water and carbon dioxide. Fine particulates of soot also cause blacken to human and animals lungs and cause heart problems or death. Soot is cancer-causing (carcinogenic).