A Contribution from the Malaysian Institute of Planners (MIP) Sabah-Sarawak Chapter in conjunction with the upcoming International Urban Public Transport Conference 2010 – A Platform for Change (4-6 August 2010) at the Borneo Convention Centre.

Traffic Congestion - The Effect on the Environment: Air Pollution

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> "All forms of transport, except possibly the pedal bicycle, are a nuisance...It's the motor vehicle that constitutes the main problem."
>
> (Thomson, 1977 p53)

Fuel combustion from motor vehicles is identified as the most significant contributor to environmental pollution. It is important to distinguish between local air pollutants such as carbon monoxide, nitrogen oxides, particles and hydrocarbons, and green house gas, mainly carbon dioxide, nitrous gas and methane.

Pollution emissions from motor vehicles depend on the type of fuel and the vehicle operating conditions. In most cases, motorized two wheelers (especially in cities of Africa, Latin American, South Asia and Southeast Asia) contribute to more air pollution as these machines are powered by 2-stroke engines (Cervero, 1998; Chan, 2001; Kathuria, 2002). Table 1.1 illustrates that 97% of the gas is emitted through the tailpipes of motorcycles. For this reason, it is suggested that besides four wheelers, motorcycles should also be targeted as part of the campaign to reduce pollution in city centers.

Table 1.1: Emission from Petrol Engine

Source	%age of Emission		Remarks
	4 stroke	2 stroke	
Crankcase blowby	20	-	carburreted air fuel mixture and combustion fuel under pressure escape the combustion chamber and enter the crankcase to be discharged into the atmosphere through this vent
Evaporative Emission	20	3	Fuel vapour lost to the atmosphere fuel tank and carburretor
Exhaust Emission	60	97	exhaust gas emitted with pollutant through tailpipe

Source: Kathuria, V (2002)

Generally, the urban and transport pattern and type of motorized vehicles used determines the emission patterns of a city. As Newman and Kenworthy (1989) had extensively demonstrated, dispersed and high income and motor vehicle-based cities expend much more fuel and generate much more pollution than compact, low or high income, transit-based cities.

In addition, the extent of air pollution in urban areas is also determined by the urban transport pattern and the type of vehicle used in a city . Table 1.2 illustrates the emissions per capita, in some cities in developing and developed countries.

Table 1.2: Emission per capita, in some cities in developing and developed countries

City	Emission per Capita Per year (kg)		
	CO_2	NO_x	CO
Developed			
Amsterdam	1475	13	34
Frankfurt	2813	20	68
Houston	5193	27	241
Sydney	2588	24	207
London	1704	16	97
Los Angeles	4476	20	181
Developing			
Bangkok	1304	4	85
Jakarta	653	16	58
Kuala Lumpur	1424	11	90
Manila	529	9	68
Seoul	605	9	29

Source: Vasconcellos, 2001 p189

From the Table, it is shown that all developing countries, with the exception of Seoul, have higher emissions per capita for carbon monoxide than Amsterdam. Bangkok and Kuala Lumpur's emission per capita of carbon dioxide are almost at par with that of London and Amsterdam even though their volume of vehicles is lower than the two European cities. One reason for this is the high use of motorcycles (2 stroke engines) which emit as much as ten times more hydrocarbon and smoke per kilometer as four strokes motorcycles and cars (Cervero, 1998). Secondly, pollution from motor vehicles in many cities in developing countries is also aggravated by the existence of as many old vehicles as there are new ones and the majority of these old vehicles which have never been well maintained will continue to emit more particulates (pm^{10}) and burn fuel inefficiently (Figueroa, 2001; Unworth, 2000).

The major air pollutants emitted from motor vehicles as well as their atmospheric reaction products are carbon monoxide (CO_2), nitrogen oxide (NO_x), lead (Pb), hydrocarbon (HC) volatile organic compounds and other particulate matters (TSP) as well as photochemical oxidants (e.g. ozone, formaldehyde and aldehydes) (Watkin, 1981;

OECD, 1988; Whitelegg, 1993; Hanley, 2001; Colman, 2003). Most of these pollutants have been listed by the World Health Organisation as toxic atmospheric pollutants and have the ability to cause illness, particularly respiratory problems among inhabitants in heavily polluted cities (Whitelegg, 1993; Hanley et al, 2001; Lidskrog et al, 2002).

Air pollution also causes physical damage to the vegetation by acidification and eutrophication with the former being often a trans-boundary or regional phenomena (Institute of Civil Engineers, 1992). Nagurney (2000) and Colman (2003) suggest that transport today is responsible for 50% of nitrogen oxide and 90% of carbon monoxide which are emitted to the atmosphere.

Emissions of pollutants from vehicles in cities are not constant but depend very much on how vehicles are used (Watkins, 1981; Houghton and Hunter, 1994; Wan Ibrahim and Wang, 2001). For instance, nitrogen oxide (NO_x) emission increases when the engine is under load, such as during acceleration and when travelling at high speed. Carbon monoxide and volatile organic compound (VOC) increase when it is necessary to 'run rich' (i.e. when the engine is cold) and also during acceleration (Watkins, 1981; Houghton and Hunter, 1994). Hence at a steady speed, emission is lowest (Colman, 2003). In a stop-start condition situation, emission will be higher than under free flow condition (Kroon and Diekstra, 1997; Haughton and Hunter, 1994).

Similarly, in a deceleration stop-drive situation, more carbon dioxide (CO_2) will be emitted when motorists are idling their vehicle at stop junctions or at traffic lights (Haughton and Hunter, 1994) or even stopping/waiting (illegally) at roadsides as happens in many Malaysian towns and cities. Thus carbon dioxide is usually found concentrated in most highways, near or at congested streets where vehicle density is high, and where engine efficiency is low and where ventilation is restricted by buildings (Haughton and Hunter, 1994; Zhou and Sperling, 2001).

In their studies on Shanghai's high street, Zhou and Sperling (2001) discovered that the design of buildings at road intersections plays a role in 'trapping' local pollution in an oversaturated traffic condition where cars are moving at very slow speed.

Walking along Bukit Bintang area, one could *not only* feel the heat but smell the odour of cars' emission. As we continue to depend on private cars to travel, it is worth knowing the impact of pollution and what it entails. Quality of life ? Let's have some answers.

The Malaysian Institute of Planners (Sarawak and Sabah Chapter) is organising an International Public Transport Conference with the theme "A Platform for Change" at the Borneo Convention Centre, Kuching on 4-6 August 2010. A total of 10 speakers will be sharing their knowledge and experiences on this subject.

The focus is on the practical strategies, collaboration of the stakeholders and exchange of workable ideas that will assist the conference participants in carrying out the works - ranged from the planning of the urban transport strategies to the implementation of the urban transport projects. The Institute invites you to join us for this international gathering of experts, practitioners and campaigners dedicated to promote sustainable urban public transport.

Please see the official website at www.kuchingptc.com for details.

The writer is a member of the Malaysian Institute of Planners. Opinions expressed are his and information quoted is from various sources and literatures used by the writer in his academic research.