Fuel Consumption & Air Pollution analysis by vehicles coming into MIT CAMPUS & Compare with DTI

Pshtiwan N. Shakor [1], Somnath Kekan[2]

[1] Head of Department of Surveying, Darbandikhan Technical Institute, Kurdistan Region-Iraq
M.E (construction and management) Civil Engg. Dept., MIT College, Pune-india
(Email: pshtiwann@yahoo.com)

[2] Irrigation Departments, Water Resource Directorate, Government of Maharashtra, India
M.E. (construction and management) Civil Eng. Dept., MIT College, Pune-Maharashtra, India
(Email:somnathkekan85@rediffmail.com)

Abstract

Air pollution is the introduction into the atmosphere of chemicals, particulates, or biological materials that cause discomfort, disease, or death to humans, damage other living organisms such as food crops, or damage the natural environment or built environment. The atmosphere is a complex dynamic natural gaseous system that is essential to support life on planet Earth.

Mostly pollution known put something in the air and hurt it.

So here will show some data and confirm how the impact effect of vehicle in environment, and directly polluted by huge ratio in the air approximately 1/3 known as transportation pollution.

The second sector is consume of fuel by huge rate which economically not accepted beside that contribute in crowd traffic and more accident on highway and roads.

The report aims to identify the necessity of understanding the impact of vehicular pollution on the environment. In order to bring the fuel consumption and emission levels to a minimum, various mitigation measures are to be implemented, which are also pointed out in the report.

Keywords

Fuel consumption, Vehicle and Pollution.

1 Introduction

Earth the human lives on it, face a lot sort of pollution one kind of this pollution is known as Air Pollution.

Human for ages participate and have disadvantages for this Earth, such as rolling in negative way for utilize things. One sort of things, vehicle is used by badly way and drive with no reason it urges to increase the CO & CO_2 and the other poisons chemical compound.

Motor vehicle emissions are composed of the by-products that come out of the exhaust systems or other emissions such as gasoline evaporation. These emissions contribute to air pollution and are a major ingredient in the creation of smog in some large cities.

During the first couple of minutes after starting the engine of a car that has not been operated for several hours, the amount of emissions is very high. This occurs for two main reasons:

- Rich Air-Fuel ratio requirement in cold engines: Right after starting the engine the walls as well as the fuel are cold. Fuel does not vaporise and it would be difficult to create enough combustible gaseous mixture. Therefore very rich operation is required at the beginning, sometimes even 1:1. The excess of fuel in the chambers is subsequently burned generating great amount of Hydrocarbons, Nitrogen Oxides and Carbon monoxide.
- Inefficient catalytic converter under cold conditions: Catalytic converters are very

inefficient when cold. When the cold engine is started, it takes several minutes for the converter to reach operating temperature. Before that, gases are emitted directly into the atmosphere. There are many ways of reducing this effect: Locating the converter closer to the engine, Super insulation, electric heating, thermal battery, chemical reaction preheating, and Flame heating

2 Finding from Literature review

There are some points figured out from above review:

- EPA (Environmental Protection Agency) anticipates that full implementation of the NOx transport rule will reduce total emissions of NOx by an average of 28% in the affected states and the District of Columbia. This rule will remove about 1.2 million tons of NOx from the air. This is roughly equivalent to getting 166 million cars off the road. With regard to attainment status for the new 8-hour ozone standard, implementation of the regional NOx reduction program is expected to bring a majority of the new nonattainment areas into attainment. Cost impacts depend on the controls put in place by the affected states and the District of Columbia. EPA analyses show that reducing one ton of NOx from electric utility plants costs about $1500, significantly less per ton than implementing local controls (which range as high as $9500/ton). EPA calculates that the costs of reducing utility emissions could cause residential electric rates to increase less than 2 percent. Utility restructuring during this same period, however, is expected to substantially cut residential electric rates 20-30 percent, thus making the 1 percent increase negligible[2].
- From the research of EPA, figured out such as: Air Quality Index. EPA has developed the Air Quality Index, or AQI, (formerly known as the Pollutant Standards Index) for reporting the levels of ozone and other common air pollutants. The index makes it easier for the public to understand the health significance of air pollution levels. Air quality is measured by a nationwide monitoring system that records concentrations of ozone and several other air pollutants at more than a thousand locations across the country. AQI Colors. To make it easier for the public to quickly understand the air quality in their communities, EPA has assigned a specific color to each AQI category. You will see these colors when the AQI is reported in a color format—such as in a color-print newspaper, on television broadcasts, or on your State or local air pollution agency's web site. This color scheme can help you quickly determine whether air pollutants are reaching unhealthy levels in your area. For example, the color orange means that conditions are "unhealthy for sensitive groups," the color red means that conditions are "unhealthy" for everyone, and so on. Ozone Maps. In many areas of the country, measurements of ozone concentrations are converted into color contours of the AQI categories (green, yellow, orange, red, and purple, shown below) and displayed on a map to show ozone levels in the local area. The map is updated throughout the day and shows

how ozone builds during hot summer days. In some areas, ozone maps are used to show a forecast of ozone levels for the next day. Once you understand the color scheme, you can use the maps to quickly determine whether ozone concentrations are reaching unhealthy levels in your area[1].

Ozone Concentration(ppm)(8-hour averge, unless	Air Quality Index Values	Air Quality Descriptor
0.0 to 0.064	0 to 50	Good
0.065 to 0.084	51 to 100	Moderate
0.085 to 0.104	101 to 150	UnhealthyforSensitiveGroups
0.105 to 0.124	151 to 200	Unhealthy
0.125 (8-hr.) to 0.404 (1-hr.)	201 to 300	Very Unhealthy

- The European Commission today proposed a comprehensive new strategy to reduce carbon dioxide (CO2) emissions from new cars and vans sold in the European Union. The new strategy, together with a revision of EU fuel quality standards proposed last week, further underline the Commission's determination to ensure the EU meets its greenhouse gas emission targets under the Kyoto Protocol and beyond. The strategy will enable the EU to reach its long established objective of limiting average CO2 emissions to 120 grams per km by 2012 - a reduction of around 25% from current levels. By improving fuel efficiency, the revised strategy. I will deliver substantial fuel savings for drivers. To encourage the car industry to compete on the basis of fuel efficiency instead of size and power, the Commission is also inviting manufacturers to sign an EU code of good practice on car marketing and advertising[3].
- A number of factors can be identified as influencing the amount of emissions attributable to the transport sector, and an effective strategy will need to take all these factors into account. They include: (a) the amount that vehicles are used in a given country or metropolitan area, including the extent to which this use can be called “excessive”; (b) the age of the vehicle fleet and the technology used within it; (c) the extent to which vehicles are properly maintained; (d) the availability of appropriate fuels and the extent to which they are used properly; and (e) atmospheric, climatological and topological conditions. Four of these factors can be influenced through policy[7].
- Automobiles are largely contributing to the environmental pollution. The different fuel consumption and air pollution models discussed in this report help us to estimate how much fuel we are using and how much emissions we are causing. As the population and number of vehicles are increasing unhindered, more amounts of pollutants are being discharges and the energy resources are depleting at an alarming rate. If this trend continues, there will not be any more energy sources left for the future generations. Also, the world will be so polluted that living organisms may not be able to thrive. Hence, we need to understand the importance of saving the environment. Alternate

sources of fuels maybe used which also help in reducing the pollution. Our aim must be to preserve the nature and have the best transportation system, along with a sustainable environment [4].

- Here the plausibility of the results of the calculations is verified using construction and agricultural machinery as examples. The verification was made on the basis of the average specific pollutant emissions (emissions per level of fuel consumption in g/per kg for 2005). The pollutants in question are particulate matter and nitrogen oxides. In the table lists the specific pollutant emissions per kilogram of fuel consumption and compares them with the figures in the Emission Inventory Guidebook (EMEP/CORINAIR2006) of the European Environmental Agency (EEA). Since the EEA figures represent aggregated levels for all engine-power classes, a corresponding figure was calculated from the data in the non-road inventory[6].

Table (1) Consumption-specific emission factors for construction and agricultural machinery in g per kg of fuel consumption compared with the levels in the Emission Inventory Guidebook

Pollutant	Machine category	Enginepower class							EEA-Guidebook
		<18 kW	18–37 kW	37–75 kW	75–130 kW	130–300 kW	300–560 kW	aggregated	
PM	Construction machinery	5.38	3.69	2.88	1.89	1.72	1.71	2.30	2.29
PM	Agricultural machinery	5.66	4.35	3.85	2.29	2.03	-	3.16	3.93
NO_X	Construction machinery	27.35	29.25	35.30	36.75	35.34	34.24	35.18	50.30
NO_X	Agricultural machinery	34.31	32.54	36.69	37.70	36.09	-	36.67	48.80

- In literature review shows that lots of efforts have been made to reduce air pollution by national government and Municipality of Tehran. Some of efforts are passing laws, regulations, standards, establishing some relating organizations and companies, studies by helping international agencies, approval of master plan and implementing of some parts of master plan. However the results of implementing of master plan are not completely satisfying according to the program. There is relatively enough and acceptable laws, regulations and standards. However effectiveness of them is not properly acceptable. Because executing of some sections laws and regulations need budget, suitable interaction between the municipalities, Ministry of Oil, the DOE, Ministry of Industry, Traffic Police and Radio and Television organization, a powerful management system to enforce related authorities, people to comply the laws and enough equipments and expertise. Compliance of public relating to the laws is not enough, because people need to be educated and be aware about laws and impacts of air pollution to human health[5].

3 Objectives of the study

1. Understand the major pollution of cities. Which compare with Darbandikhan Technical Institute- Darbandikhan Town and Mahrashtra Institute of Technology-

Pune City.

2. To know how vehicles effect on ecosystem by different chemical components.
3. Study the financial aspects of fuel consume it is so effective for economics in spite of the harm environment.
4. Decide to choose best way to protect earth from pollution and mitigate unhealthy weather.

4 Methodology of the study

In order to achieve the objectives set, data was collected from the college of MIT and Darbandikhan Institute. Data has been collected from different persons and those who drive the different vehicles. Also depend on the standard that used for this purpose.

The data is collected as follows below:

Table (2). Daily vehicles in mit campus & dti.

VEHICLE TYPE	Numbers
TWO WHEELER (MIT CAMPUS)	8000
FOUR WHEELER (MIT CAMPUS)	200
FOUR WHEELER(CAR) (DTI)	150
FOUR WHEELER (MINI BUS) (DTI)	72

In above table shows the different wheeler entering the campus even change from country to others.

In table no.(3) show the distance travelled by two wheeler and four wheeler.

Table (3) Distance Travelled By 2wheeler Vehicles

%Of Vehicles Out Of Total	No Of Vehicles	Distance Travelled From Origin To College In Km	Total Distance Travelled Per Vehicle In Km	Total Distance Travelled By All Vehicles In Km
40	3200	5	10	32000
30	2400	10	20	48000
15	1200	15	30	36000
10	800	20	40	32000
5	400	25	50	20000
			TOTAL	168000

In the table no.(4) show the distance travelled by four wheeler.

Table (4) Distance Travelled By 4wheeler Vehicles

NO OF VEHICLES	AVERAGE DISTANCE TRAVELLED IN KM	TOTALDISTANCE TRAVELLED IN KM
200	30	6000
222	4.4	977

TOTAL FUEL CONSUMPTION

-Total petrol consumption (MIT)= total distance travelled by all 2wheelers/ average of 40km/litres

Total petrol consumption(MIT) = 168000/40= 4200 litres

-Total diesel consumption= total distance travelled by all 4wheelers /average of 10km/litres

Total diesel consumption= 6000/10 = 600 liters

-Total petrol consumption (DTI) =Total distance travelled by all 4wheelers/average of 5 km/litres=977/5= 195 liters.

For one day can consume cost of fuel for vehicles,

as in this table below:

*Table no. (5)*Per Day Cost Of Fuel Consumption By Vehicles Coming In MIT Campus and DTI

TYPE OF FUEL	TOTAL FUEL CONSUMPTED	RATE/LITRES	TOTAL RATE
PETROL(MIT)	4200	49.64 (Rs.)*	208488 (Rs.)
DIESEL(MIT)	600	38.75 (Rs.)	23250 (Rs.)
PETROL(DTI)	195	850 (ID)**	165750 (ID)
		TOTAL RUPEES	4769.71 (US$)

*During 2010 1 US Dollar=50 Rupees

** During 2010 1 US Dollar=1230 Iraqi Dinar

According to those specification and standards used for the purpose of emission for different vehicles shown in those tables below:

Table no. (6) Emission norms for passenger cars

Norms	**CO(g/km)**	**HC+ NOx(g/km)**
1991Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998Norms	4.34-6.20	1.50-2.18
stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35(combined)
Bharat Stage-IV	1.0	0.18(combined)

Table no. (7) Emission norms for Heavy Diesel vehicles

Norms	**CO(g/kmhr)**	**HC (g/kmhr)**	NOx (g/kmh	PM(g/kwhr)
1991Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Table no. (8) Emission Norms for 2/3 wheeler

Norms	**CO(g/km)**	**HC+ NOx)(g/km)**
9911Norms	12-30	8-12 (only HC)
1996 Norms	4.5	3.6
stage 2000	2.0	2.0
Bharat stage-II	1.6	1.5
Bharat Stage-III	1.0	1.0

5 Results and Conclusions

Those collection data shows compare between two different places in different countries that (Maharshtra Institute of Technology, Pune City), India and (Darbandikhan Technical Institute, Darbandikhan Town-Sulaimani City) KRG-Iraq, even those two places different in population like Pune city reach up to five million people live in and Darbandikhan Town reach two hundred thousand people.

According to the conclusion and results of the table shown below:

- Vehicles coming in MIT campus consume daily fuel of Rs: 231738(4634.8 US$).
- Vehicles emitted 282 kg of CO & 255 kg of HC+NOx daily
- Vehicles coming into DTI consume daily fuel approximately ID:165750(134.75 US$)
- Vehicles emitted 2.15 Kg of CO & 0.5 Kg of HC+NOx daily

Table no. (9) Pollutants emitted daily due to vehicles coming in MIT campus & DTI

- If decide to use public transport system for a single day can save a fuel of 4769.71 (US$) i.e around 4400 litres of petrol & 600 litres of diesel.
- And also can keep the environment clean by not emitting 284.15kg of CO and 255.5kg of NOx.

As part of solution will suggest doing those action will reduce the effect of pollution:

- Use of public transport system, or minibus such as used in Darbanidikhan Technical Institute, it effects good role to reduce pollution even reduce burden money.
- MITIANs those wish to come by auto should come by sharing so that there will be no any financial burden, or by take sharing cab by DTIANs or who is using own car sharing with others. It leads to save fuel, money and environment and maintain free spaces in parking area.
- Those MITIANs and DITIANs who will come on bicycle are most welcomed & we can appreciate them by giving them a flower of rose.

Type of vehicle	Total distance travelled	Co emitted g/km	Hc+nox emitted g/km	Total co emitted Kg	Total hc+nox emitted Kg
2WHEELER(MIT)	168000	1.6	1.5	268.8	252
4WHEELER(MIT)	6000	2.2	0.5	13.2	3
4WHEELER(DTI)	977	2.2	0.5	2.15	0.49
			TOTAL	284.15	255.49

In this report demonstrate that in Darbandikhan Technical Institute compare to Maharshtra Institute of Technology- Pune City used vehicle more than constrain case with analysis according to the population, in spite of it is small town but because of high GDP in this country and some other reasons. As a result for this case DTI the ratio of used vehicle two times than MIT- Pune City.

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