



## **Sustainable transport: a priority for Greater Tehran area**

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THE GREATER TEHRAN Area (GTA) with an area of approximately 2300 Square km and a population of more than 8 million is seriously suffering from life-threatening atmospheric pollution arising from the rapid urbanization during the last 3-4 decades.

Means of transportation in Tehran mainly consist of private passenger car, bus, minibus, taxi, motorcycle and trolley bus, while the first one plays an important role in daily trips in the city.

The city of Tehran is considered to be one of the most polluted cities in the world, ranking with Mexico City, Beijing, Cairo, Sao Paulo, Shanghai, Jakarta and Bangkok. Therefore, the city is in need of urgent action for environmental protection. Like most of the large urban centers of the world, Tehran is suffering from many environmental problems, particularly air pollution, which is caused by three major sources namely motor vehicles, factories and power plants, and residential and commercial sources. The figures show these sources respectively produce 60-80%, 10% and 10-15% of pollution in the Greater Tehran Area.

Motor vehicle-related air pollution is a major source of environmental problems in the city of Tehran as well as the whole GTA. According to the Department of Environment of Iran (DOE), passenger cars and buses respectively emit 1,327,178 and 14,455 tones of hazardous poisonous gases in Tehran. Consequently regulations on emission standards or permitted concentration need to be prepared and introduced by the Department of Environment (DOE) with the cooperation of other organizations and agencies such as the Municipality of Tehran, the Ministry of Industry, the Ministry of Transportation and the Ministry of Oil. These regulations must get the approval by the Supreme Council of the Environmental Protection Affairs. The police force of the Islamic republic of Iran is also responsible for the enforcement of the regulation and rules, which are set and approved by the council.

Although, for many years, there has been considerable efforts to study the environmental problems, but probably because of lack of coordination and cooperation between related organizations and agencies and other shortages not much success have been felt. This paper will consider some important aspects and contributors of air pollution in Tehran and introduce a practical model to deal with the problem.

### **Transportation planning and environmental consideration**

The biggest environmental problem the city of Tehran is currently faced with is air pollution. The chief source of the air pollution is generated by motor vehicles. About 1.5 million tons of pollutants are produced in Tehran annually, with carbon monoxide from car exhaust making up a large percentage of these pollutants. More than 500,000 of Tehran's nearly 2 million cars are over 20 years old and lack catalytic converters that filter auto exhaust. (United States Energy Information Administration, April 2000).

In order to deal with the problem of air pollution, the Iranian Parliament in 1995 approved the Clean Air Act. This law includes 6 sections and 36 articles and classifies the air pollution sources into three categories as follow:

- 1) Motor vehicles
- 2) Factories, workshops and power plants
- 3) Business, domestic and miscellaneous sources.

Section two of the Act (Articles 4-11) is related to motor vehicles. According to this section of the Act, Municipalities together with the police force are responsible for regulating urban transportation planning.

### **Major contributors to air pollution in the Greater Tehran area**

There are many contributors of air pollution in Tehran, which make it a unique case for consideration compared to other major polluted cities in the world, particularly in comparison to those of more advanced countries, such as Los Angeles.

The following are some of the main contributors to air pollution in Tehran:

- 1) Low price of fuel.
- 2) Low quality, leaded gasoline (Fortunately by the end of year 2001 no leaded gasoline was distributed in GTA.).
- 3) A dramatic rise in the energy consumption in the country. Much of this energy accounted for gasoline consumption.
- 4) Large number of old cars.
- 5) Very high price of vehicles, particularly passenger cars.
- 6) Tehran's geographic position. (The city is hemmed in by mountains to the north which causes the volume of pollutants to become trapped and when wind is not strong enough to blow, the pollution covers the sky over the city.)

- 7) High dependency on private passenger car. This itself is a consequence of facts such as low price of fuel, shortage of public transport facilities particularly during the peak hours, and the use of private cars as a source of income.
- 8) Improperly enforced driving rules and regulations by the police force and drivers. This has caused, for example, drivers to stop and drive more often and therefore use low-gear where normally it is not needed.

The combination of these man-made and natural contributors to air pollution, has made Tehran an environmentally unsuitable place to live and work. However, the evidence doesn't show any serious and considerable improvement, even after the approval of the Clean Air Act of 1995. The reason can partly be traced in the following factors.

### The price of fuel

In the year 1377 (1998-1999) land transportation section in the country had consumed a total of 13.5 billion liter of gasoline and 11.9 billion liter of diesel. Considering the number of cars in the country, these figures show a serious misuse of fuel as a natural resource and at the same time causing degradation of the environment. It should, however, be noted here that a considerable amount of fuel is smuggled to the neighboring countries including Pakistan, Afghanistan, Iraq and Turkey.

The Green Party of Iran reports that Iran ranks second, after the United States, in gasoline consumption with 4345 liters consumed annually per car. Petroleum products in Iran are highly subsidized and this fact has caused that the car producers have incentives to make the cars more fuel-efficient while importing cars is prohibited. Also car drivers don't really care about the efficient use of gasoline.

The following table presents the price of gasoline.

With such low prices, sustainable transport seems unachievable. It is interesting to mention that while the price of gasoline is the lowest in the world the price for cars are extremely high both for new and old ones.

### The price of vehicles

Car prices in Iran are extremely high; this is not only compared to the people's income but also compared to the world prices. For example a 1978 Toyota Corolla is valued more than US\$5000 in Iran, while a new one is valued more

than eight-times as much. This has caused even very old cars to have values and therefore the owners will not retire or scrap them. This is mostly a result of prohibiting foreign cars to be imported and at the same time domestic car manufacturers can not cope with the demand.

One of the main environmental problems that arises as a result of these high prices of passenger cars is that very old cars which usually consume more fuel and produce higher level of emission, compared to new imported cars, are running uncontrollably in the country. The Greater Tehran Area, as the main center of population and economic activities of the country, houses most of these cars and therefore suffers most. However, very few authorities consider this factor (high car prices) as important and consequently no workable and feasible solution is undertaken so far.

Interestingly, while importing cars is prohibited, the vehicle manufacturing technology in the country is mostly old and out-of-date, causing the majority of new cars not to be environmentally friendly.

### Number of vehicles

In comparison to developed countries and also most of the developing countries, there is little number of cars in Iran. According to the figures released by the Air Quality Control Company, affiliated to the Municipality of Tehran, there were less than one million vehicles in 1994 in Tehran. In 1997 the number of private passenger cars went up to 790000. However, while the car ownership in Iran, as a whole, is very low but the pattern of car-use and air pollution generated is completely unique. The car ownership in Tehran is about 1 passenger car for 10 people (almost one car for three households).

Although this may be considered an environmentally positive factor, but since most of these cars, particularly the older ones, are used as a mean of earning additional income and in fact cover the shortage of means of public transport, the fuel consumption and exhaust emission is quite high.

### Age of vehicles

On the other hand, most of these cars are quite old and produce a lot of emissions. In 1994 the average age of vehicles in Iran was 15.9. This situation is even worse today. Importing cars has been prohibited for about 10 years and domestic car producers can not respond to the demand and therefore almost no cars have been scrapped

**Table 1. The price for one litre of gasoline in Iran**

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002
<b>Gasoline Price*</b>	50	100	130	160	200	350	385	450	500
<b>Percentage increased</b>	-	100	30	23	25	75	10	17	11

\*Prices are in Iranian Rial (8000 IRR=US\$1). One liter of gasoline in 2002 is just over 6 cents!

and therefore the average age of vehicles is now much higher.

Interestingly most of the new cars produced in Iran are not environmentally friendly and in some cases consume more fuel and produce more engine emission even in comparison to Japanese or European 1970s and 1980s cars. Therefore, even scrapping the old cars in Iran does not seem to be a workable solution unless up-to-date cars or car manufacturing technologies are imported. If so, the price for the cars will be significantly reduced and the new cars will make less pollution. Therefore, the old cars will be slowly retired and people can afford to buy new and environmentally friendly cars. Of course, increasing the price for fuel will help to implement the retirement of old vehicles. Without application of such practical considerations, any decision to scrap and retire vehicles is destined to a failure.

### Shortage of public transportation system

Tehran has long lacked a good and efficient public transport system. Shortage of an efficient public transportation system has made people highly dependent on the private passenger cars. For about three decades people of Tehran have dreamed of a metro system. Only recently two limited lines of metro have been functional. The bus and minibus systems are also limited and can not fully cope with the demand. Although the taxi system, both official and unofficial, is almost an efficient mode of public transportation in the city, a lots of pollution is generated by these mostly old and non-fuel-efficient cars.

### Bad driving manner

To any visitor or newcomer, driving and traffic scene in Tehran would seem unusual. In spite of the relatively low number of cars and relatively good transport infrastructure, Tehran is suffering badly from traffic congestion and vehicle accident. These have not only created economic costs but also environmental problems. This can be partly traced in the way people drive and poor law enforcement by the traffic police.

Also due to the large number of old cars and not properly enforcing the vehicle inspection regulation, leaky engines and cars spewing black smoke are familiar sights which contribute to the Tehran's hazardous air pollution.

### Conclusion

There are many transport-related factors causing or contributing to the air pollution in Greater Tehran Area. Some of which are common in other polluted cities, but few are unique and therefore need special consideration. A sustainable transport can not be achieved without such particular considerations. Since a comprehensive study had been done by the Japan International Cooperation Agency (JICA) and an integrated master plan for air pollution control in GTA was proposed and with approved Clean Air Act, it seems that no new rules and regulations are needed and the guidelines are already in place. What needs to be highly and seriously considered is strengthening and fully implementing the approved rules and regulations.

The following model, however, is suggested if sustainable transport is to be achieved:

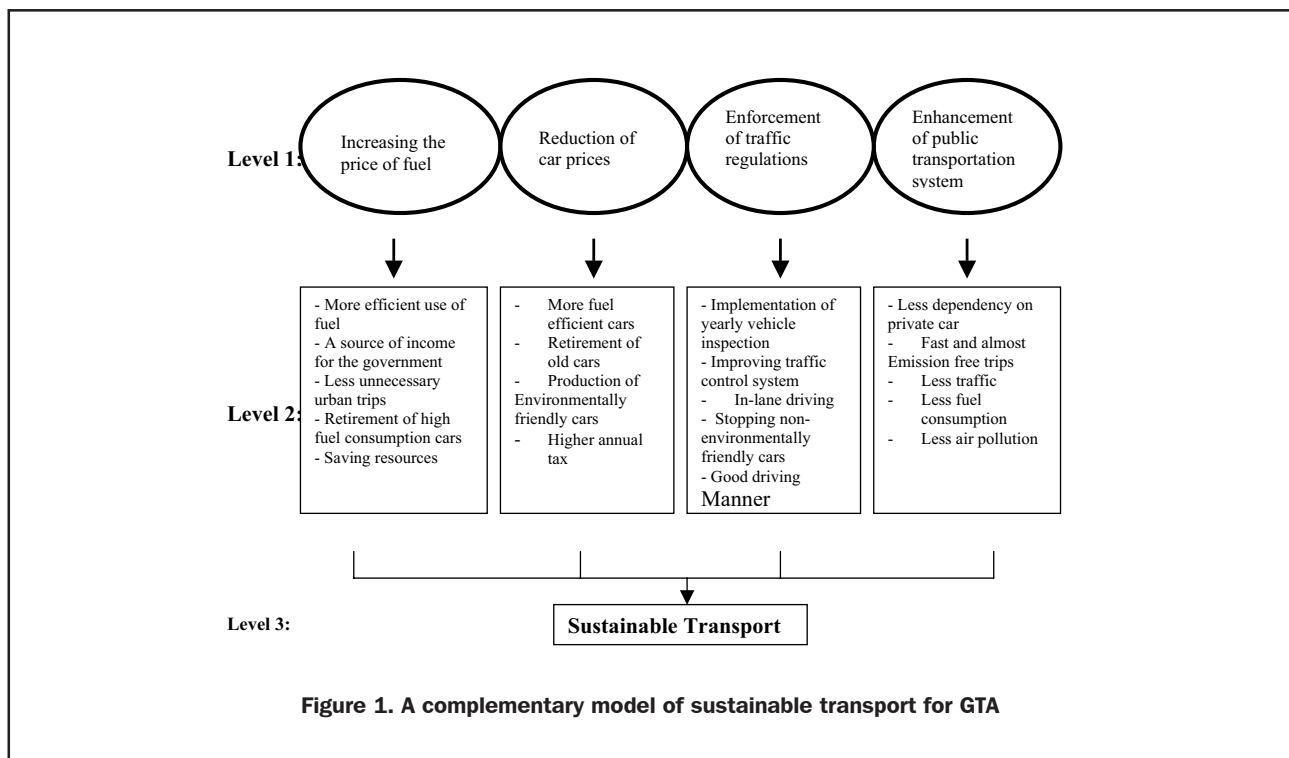


Figure 1. A complementary model of sustainable transport for GTA

This model consists of 3 levels. Level 1 includes the actions should be taken together with the articles in the Clean Air Act. The four actions presented in level 1 are in fact referring to the unique situation in Iran and without this considerations a sustainable transport in GTA doesn't seem to be reachable.

In general, it can be noted here that the environmental problems in the GTA can not be avoided unless there is a complete coordination and cooperation among all the related organizations and agencies in the city and considering all the regulations very seriously and fully implement them.

Level 2 refers to the consequences arising from the actions recommended. These consequences will lead the city to a sustainable transport situation.

## References

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