Energy and pollution control opportunities for Lahore

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Abstract

Urban population explosion has increased motor vehicular usage tremendously. Lahore once called city of gardens has been plagued with swelling air pollution. Extensive car ownership rate results in more usage of energy and higher vehicular emission in environment. To achieve acceptable air quality, the popular available opportunities for the big cities of Pakistan are the use of alternate fuel (conversion to CNG), improved traffic management, greater role for Mass Transit System and effective emission control for two or three wheelers. There has been a tremendous trend in conversion of vehicle to CNG. Public transport and huge proportion of vehicles operating in Lahore are diesel fuelled and as per policy guide lines by Asian Development Bank their conversion is not possible. Traffic management measures have become exhausted and cannot be sustained further. Data shows that the Mass Transit System did not depict any significant change in the pollution scenario. The effect of the Mass Transit System on the environment of Lahore has been discussed in this paper. The paper presents a workable environmental option/opportunity conducive for the city of Lahore.

Keywords: mass transit, para transit, CNG, chingchees, double decker.

1 Introduction

World population reached at 6.3 billion at beginning of 2003. Urban population of world has increased four times and expected to be 3.18 billion by 2005 [1]. Pakistan being a country of third world is facing enormous pressure of population growth. The population of Pakistan is 142 million and becomes double after each twenty-four years [2].
Urban population accounted for 17.8% of total population in 1951 rose to 28.3% in 1981 census report. It was 53 million by 2000. Country’s 54% of population now resides in eight big cities. Only three cities namely, Lahore, Karachi and Faisalabad accommodate 40% of total urban population [3].

Urbanization and gigantic expansion of cities have increased motor vehicular usage tremendously. In world today automobile is over 430 million, which is eight fold as to 53 million in 1953. Over 4.3 million vehicles are playing on roads of Pakistan. Growing motor vehicular usages have jeopardized the environment of world. Vehicular emission is a major source of air pollution in 20 mega cities and nearly in half of them it is a single important source. Among these vehicles Para transit vehicles contributes a huge share in overall air pollution of big cities of Asia.

2 Case study

The current population of historic city of Lahore is 7.2 million with growth rate of 3.35%. District Lahore comprises upon 1772 sq.Km [4]. Registered Vehicular fleet for Lahore comprises upon .85 million excluding inter city vehicles [5]. Lahore once called the City of gardens has been plagued with swelling motor vehicular air pollution. The unchecked vehicular emission is disaster for human health, in particular in Metropolitan cities of Pakistan. Lead level in blood level of traffic policemen in Lahore is about 35 µg/dl (microgram per delite) and in school children around mall, circular road, Yakki Gate and Shalimar heavily congested areas it is 38.0 µg/dl as against the maximum accepted level of 20g/dl [6].

Table 1: Statistic of registered vehicles.

<table>
<thead>
<tr>
<th>MODE OF TRANSPORTATION</th>
<th>VEHICULAR FLEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.CYCLES/SCTRS</td>
<td>507374</td>
</tr>
<tr>
<td>M.CARS</td>
<td>237937</td>
</tr>
<tr>
<td>JEEPS</td>
<td>6766</td>
</tr>
<tr>
<td>PICKUPS</td>
<td>3186</td>
</tr>
<tr>
<td>BUSES</td>
<td>9572</td>
</tr>
<tr>
<td>AUTO RICKSHAWS</td>
<td>35653</td>
</tr>
<tr>
<td>PUBLIC CARRIER</td>
<td>3368</td>
</tr>
<tr>
<td>PRIVATE CARRIER</td>
<td>7160</td>
</tr>
<tr>
<td>DILIVERY VANS</td>
<td>18987</td>
</tr>
<tr>
<td>MINI BUSES</td>
<td>3685</td>
</tr>
<tr>
<td>TAXIES</td>
<td>10535</td>
</tr>
<tr>
<td>OTHERS</td>
<td>7150</td>
</tr>
<tr>
<td>TOTAL</td>
<td>851373</td>
</tr>
</tbody>
</table>
Figure 1: Mass Transit Vs Para Transit.

Figure 2: Annual vehicular emission in Lahore.

Vehicles playing on roads of Lahore emit significant amount of various pollutant with varying effects. Increased car ownership rates, prevailing car financing schemes and social trends have two tier effects on economy. On one hand they are putting enormous pressure on infrastructure facilities and on other they allow more usage of energy.

Pakistan consumes 17 million ton of petroleum products with 7.8 million ton for transport sector only (~ 20% petrol & 80% diesel), with an annual growth rate of 6% [7]. Pakistan has to spend US$2.5 billion a year on import of crude oil and deficit petroleum products.
Currently the consumption of the fuel becomes more than 20 million tonnes. Statistics shows that 46.2\% of total consumption of fuel goes to transport sector as compared to 10.9\% for Industry. Fuel consumption trend with sectoral oil consumption highlighted above [8].

There is a direct relationship between energy consumption and vehicular emission, more the consumption high the rate of emission. Squeezing road capacity, lack of parking facilities, changes in land use, encroachments are putting fuel to fire. Consequently environmental picture of city is becoming gloomy, setting aside all international standards.

Recent Environmental data for six crucial sites of Lahore shows a divergent gap between WHO standards and local figures [9].
Table 2: Current air pollution table in Lahore.

<table>
<thead>
<tr>
<th>SITES</th>
<th>NOX (ppb)</th>
<th>PM10(Ug/m3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO ST.</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>Y. KHANA</td>
<td>175</td>
<td>1123</td>
</tr>
<tr>
<td>CH CROSS</td>
<td>328</td>
<td>1100</td>
</tr>
<tr>
<td>LOHARI GATE</td>
<td>68</td>
<td>1180</td>
</tr>
<tr>
<td>BANK SQUARE</td>
<td>208</td>
<td>1050</td>
</tr>
<tr>
<td>QURTABA CHK</td>
<td>105</td>
<td>1030</td>
</tr>
<tr>
<td>R. STATION</td>
<td>97</td>
<td>900</td>
</tr>
</tbody>
</table>

3 Option/opportunities for pollution control

To achieve an ambient air quality keeping in view the precious energy, traffic demand for Lahore, the available options are
- Alternate fuel (conversion to CNG)
- Traffic control measurement/management
- Greater role to Mass Transit System
- Emission control for two three wheeler
- Workable option

3.1 Alternate fuel (conversion to CNG)

Hydrocarbon Development Institute of Pakistan (HDIP) has been the main driving force for promoting CNG as an alternate fuel for transport sector. CNG claimed to be more environments friendly in terms of NOX. But nevertheless it is a cheap source of energy used in motor vehicles. Estimation shows that 50000 vehicles have been converted to CNG in sole city of Lahore. The rapid conversion of gasoline /petrol vehicles to CNG causing wrong impact on economy as pointed out by Dr. Noman in his paper on ambient air quality vs. transport planning. Refineries are reducing diesel and gasoline production, resultantly forcing government to import high priced diesel to meet local demand. Further public transport and huge proportion of vehicles being operated on roads of Lahore are diesel fuelled. The policy guide lines for reducing vehicular emission by Asian Development Bank does not recommend the conversion of diesel vehicle to CNG fuel.

Conversion of existing diesel vehicles to natural gas is difficult and problematic, and very often result in higher NOx emissions [10]. Therefore replacement of diesel vehicles should be considered rather than conversion.

Thus option for the conversion of alternate fuel has very limited role to play in achieving ambient air quality.
3.2 Traffic control measurement/management

Variety of traffic control measures being exercised in metropolitan city. These include entry of classified vehicles, loading and unloading during special hours, channelization of traffic etc. Traffic management system has three key legs, namely, Renewal of Infrastructure, Operation and Regulation.

Various government agencies are held responsible for providing these functions.

The sharing responsibility among different government agencies creates mess. There are duplication of functions which now provide them a safe passage from accountability.

All effort to decentralize unnecessary departments under auspices of PLGO 2001 has been hijacked by redtapism. Lack of Urban transport policy has led to persistent ignorance towards high priority projects and misdirection of financial resources towards low demand transport schemes. Further traffic management measures have now been exhausted and cannot sustained further against growing menace of environmental pollution.

3.3 Mass transit system

Use of Mass transit system In an ideal circumstances not only contribute towards achieving environmental conservation but also save half of the energy to be used as fuel to Para transit vehicles. Government policy regarding Mass transit system, particularly about selection of mode remained inconsistent and vague. During 1970’s, for only two million people, a sufficient fleet of double decker buses (which are less polluted, low fuelled and high transit capabilities) were available as compared to 2002, wherein for seven million people we did not have a single double decker operating in city. In later years rather than expanding role of mob carrying transit government could not sustained with tiny fleet of Bus
transit (each comprise on 75 seats) and thereby allowed an influx of privately owned (15 seater) wagons. These wagons with low transit capabilities cause a huge damage to environment of city. The comparative emission (by equating passenger carrying capacity) analyses highlighted below [11].

![Emission Analysis Chart]

Figure 5: Emission analysis of various modes.

Further this transit system, being an uncomfortable, less transit capable, highly overloaded forced people to have their own riding. Thus results in uncontrollable rise of Para transit. By counting high vehicular emission and growing concern about congestion in city, Government redefined its role. Incentives to bus transit operators are introduced and a ban has been imposed on allotment of routes to wagons. Thus government switched on again to its former policy but this time in private control. But how far this transit system can bring us closer to objective of achieving environmental conservation can be accessed by the example of renowned junction of Lahore. Secondary data (by environmental protection agency) for Qurtaba chowk (solely polluted by motor vehicles) shows no significant decrease in air pollution after introduction of franchised buses there. Detail is as under fig 6.

Government policy has been focusing merely upon single mode since long, despite feasibility and scope of other mass transit system. Master Plan for greater Lahore (still operative) accentuated the need of circular railway around city of Lahore, keeping in view the future spiralling demand of motor vehicles and environmental concerns. But regretfully Govt. did not pay heed to the assertion even after pass of thirty-one years. In 1994 a comprehensive study on transportation system of Lahore was carried out by cooperation of JICA. It was again asserted that LRT and HRT are highly feasible for city. Introduction of LRT save energy and also helps in environmental conservation. But can it achieve environmental target? Looks ominous. All Mass transit achievements are being offset by Para transit as is in case of bus transit, especially mushroom growth of Motor Cycle Rickshaws (chingchees).
3.4 Emission control for two/three wheeler

Two and three wheelers contribute a huge proportion of overall traffic plying on roads of Lahore. About 0.6 million of these vehicles are registered for Lahore. A two-wheeler is marked as symbol of lower middle class riding and heavily found in central areas. They are by-products of insufficient and poorly organized public transport. Travelling in these vehicles leads to high exposure of TSPM.

Among these Para transits, the highly polluted are locally invented motorcycle rickshaws called chinghees. They were primarily introduced to replace tongas, a traditional and historical mode of passenger transit. Their presence, therefore supposed to be confined to operational areas of tongas. But regrettfully they gripped all over the city. Their mushroom growth has profound effects on Bus transit system of city. Its conspicuous example is sanda road, where these vehicles not only disrupt the smooth flow of bus transit but also manage to attract considerable amount of passengers. The reason primarily time factor and more access. Chinghees can be stopped any where on road, resultanty cause mess to smooth flow of traffic. Ban on these vehicles neither possible nor look sane. Inspection and maintenance measures have already been choked due to long range of vehicles. Natural death of these Para transit vehicles lies in an efficient and reliable public transport system.

3.5 Workable option

Energy/fuel is meager source and involves billion of rupees on import. Environment is the breath to be intact at any cost. Every workable opportunity should encompass these realities. The option stem out from narrated facts include the following five tier steps

- Announcement of transport policy
- Route rationalization
- Separate Bus lane
3.5.1 Announcement of transport policy
For instance lack of urban transport policy is choking Lahore. It is therefore foremost important to announce transport policy.

3.5.2 Route rationalization
Regional Transport Authority may adopt route-rationalizing scheme. Under this scheme long routes, passing arterials with high passenger demand shall be operated on by buses and short routes serving secondary streets may be assigned to mini buses. Routes where passengers demand is not considerably high or not viable for standard bus operations may assign to wagons.

3.5.3 Separate bus lane
A separate lane may be reserved for bus transit, as has already been experimented for segregation of slow and fast mode of transit. This action not only creates a feeling of superiority in mind of bus riders (especially when they subject to an obvious area of congestion) but also motivate them for bus riding rather than to commute on personal conveyance.

3.5.4 High capacity bus transit (double decker)
A tiny fleet of high capacity bus transit (double decker) under Monolite Urban Transport Company started its operation on single route this year. These high capacity buses need to be expanded throughout the city. However it is also a fact that high capacity buses may not be able to operate on some roads. In this context RTA must be equipped with positive and negative List of roads.

3.5.5 LRT or HRT/circular railway
Comprehensive study on Transportation System in Lahore forecasts intense parking demand in Lahore for year 2010. It is therefore highly desirable to commence LRT or HRT operation in capital city of Lahore. Circular railway as proposed in Master Plan may be constructed (with an arterial link to Central Business District). A Semi loop of track already exist but it may subject to review in accordance with existing boundaries of city.

References


