In The Name of God
Air Quality Management in Tehran

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Advisor to the Mayor of Tehran on Environmental Affairs

November 2000
Tehran - IRAN
Tehran is located at latitude 35°31` north and 51°19` longitude east

Total population: more than 10 millions

Total area: more than 2,000 Km²
Table -1: Logical element at the meteorological bureau of Mehrabad International Airport in Tehran

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual mean temperature</td>
<td>17.5 °C</td>
</tr>
<tr>
<td>Annual mean humidity</td>
<td>40%</td>
</tr>
<tr>
<td>Annual precipitation</td>
<td>229.9 mm</td>
</tr>
<tr>
<td>Annual most frequent wind direction</td>
<td>West</td>
</tr>
<tr>
<td>Number of clear and partly cloudy days</td>
<td>317 days/year</td>
</tr>
<tr>
<td>Number of days with precipitation more than one mm/day</td>
<td>41.1 days/year</td>
</tr>
<tr>
<td>Annual number of days with snow or sleet</td>
<td>13.2 days/year</td>
</tr>
<tr>
<td>Number of days of thunderstorms</td>
<td>17.5 days/year</td>
</tr>
<tr>
<td>Inversion occurrence</td>
<td>More than 250 days annually</td>
</tr>
</tbody>
</table>
The topography of Tehran
The Present Air Pollution Situation in Tehran Is Alarming

Table -2: Annual average concentration of air pollutant in city of Tehran

<table>
<thead>
<tr>
<th></th>
<th>CO (ppm)</th>
<th>NO₂ (ppb)</th>
<th>SO₂ (ppb)</th>
<th>PM-10 (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average in 1999</td>
<td>9</td>
<td>39</td>
<td>48</td>
<td>112</td>
</tr>
<tr>
<td>Estimated in 2010</td>
<td>26</td>
<td>300</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>WHO/EPA Standard</td>
<td>2-4</td>
<td>50</td>
<td>30</td>
<td>50</td>
</tr>
</tbody>
</table>
Various Factors Complicating the Overall Environmental Situation

- The climatological and geographical conditions of the city which is surrounded from three sides by mountains, contributing to low winds and low rainfall,
- Lack of adequate public transportation system,
- Obsolete transport vehicle technology and high average life of vehicle fleet,
- The large number of cars, minibuses, buses, vans, trucks, and motorcycles,
- Low fuel prices subsidized by the government causing little incentive for fuel conservation,
- Low quality of fuels (leaded gasoline and high sulfur content of diesel fuel),
- Low proportion of trees and green areas,
- The public excessive use of private cars and heavy traffic due to not observing the traffic rules by the public which has contributed to congested road space,
- Lack of efficient urban planning in the city, and finally, and
- The economic and social problems caused in part by the population growth due to the immigration to the capital, and unsatisfactory levels of public awareness on environmental issues.
Annual variation of SO₂ is high in winter and low in warm seasons, because of higher fossil fuel consumption in winter.

The NO and NO₂ concentrations are high in winter and low in early summer.

The annual concentration of CO is almost constant.
Table-3: Emission quantity of air pollutants in GTA (1994) (Ton/year ,%)

<table>
<thead>
<tr>
<th>Source</th>
<th>SO$_x$</th>
<th>NO$_x$</th>
<th>CO</th>
<th>HC</th>
<th>SPM</th>
<th>(Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary</td>
<td>253,981</td>
<td>95,971</td>
<td>51,421</td>
<td>34,701</td>
<td>25,113</td>
<td>460,786</td>
</tr>
<tr>
<td>Mobile</td>
<td>8,340</td>
<td>39,610</td>
<td>826,806</td>
<td>81,690</td>
<td>182,717</td>
<td>1,139,163</td>
</tr>
<tr>
<td>(Sub-total)</td>
<td>262,321</td>
<td>135,181</td>
<td>878,227</td>
<td>116,391</td>
<td>207,830</td>
<td>1,599,949</td>
</tr>
<tr>
<td>Stationary</td>
<td>96.8</td>
<td>70.7</td>
<td>5.9</td>
<td>29.8</td>
<td>12.1</td>
<td>28.8</td>
</tr>
<tr>
<td>Mobile</td>
<td>3.2</td>
<td>29.3</td>
<td>94.1</td>
<td>70.2</td>
<td>87.9</td>
<td>71.2</td>
</tr>
<tr>
<td>(Sub-total)</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Countermeasures for Air Pollution Control in Tehran
In response to problems facing the city due to urban transport and the associated air pollution, a number of initiatives have been undertaken since 1989, including improvement in the physical infrastructure and management of urban transport operations. Some of these initiatives are briefly listed as follows:

1. Restricted Traffic Zone
2. Adoption of Alternative Fuels
3. Inspection and Maintenance of In-Use Vehicles
4. Ambient Air Monitoring
5. Conversion of Heating Systems to Natural Gas
6. Bus Operations
7. Green Space Development
8. Relocation of Industries and Urban Jobs
9. Solid Waste Management
10. International Cooperation
A. Tehran Transport Emissions Reduction Project

B. The Study on an Integrated Master Plan for Air Pollution Control in GTA
The purpose of the project has been to identify a comprehensive strategy for reducing motor vehicle air pollution and to identify means of reducing GHG (Green House Gases) emission from the transport sector.

The Global Environmental Facility (GEF) and Tehran Municipality have provided funds for the technical assistance.

The study has been carried out in close cooperation among Swedish joint venture (JV). The study commenced in November 1995 and finished in September 1997.
Objectives of the study

a) Evaluating present and future contributions of motor vehicles in Tehran to air pollution and greenhouse gas emissions, by analyzing the existing motor vehicle emissions data and preparing an emission inventory;

b) Establishing an air pollution monitoring system for collection of data on present levels of air pollutants, and development of appropriate dispersion models for predicting air quality levels under various scenarios;
c) Reviewing existing and proposed standards and policies to control vehicle emissions and fuels, recommending appropriate standards, tests and certification procedures, and R&D strategies for each class of motor vehicle and fuel type, and assessing cost impacts, lead-times, and air quality benefits. Recommendations were to consider current air pollution levels, future increases, and the timing of emission reductions needed for a phased program of air quality improvement;
(d) Evaluating the feasibility, costs, and effectiveness of other measures such as fuel pricing, traffic planning, transport pricing, land use, transportation demand management, and use of alternative fuels; and

(e) Recommending a set of cost effective intervention to reduce transport emissions in the short (0-5 years), medium, (5-10 years), and long term (10-20 year) ,and providing assistance in drafting appropriate regulations, and establishing certification and enforcement mechanisms for emissions regulation, including transferring this know-how to Iranian professionals and technicians.
Task 1 - Problem definition

This task involves a review of available data in order to form a baseline for the vehicle fleet in Tehran, a comprehensive emission inventory, an assessment of the quality of emission laboratories, and a summary of health effects;
Task 2 - Assessment of current emissions control strategies:

This involves review of compliance requirements and institutional arrangements, review of vehicles standards and pricing, assessment of conventional fuels and pricing policies, assessment of inspection and maintenance programs, and review and assessment of issues related to transportation management;
Task 3 - projection of future problems under currently planned controls:

On the basis of projections of economic change, Population, and vehicle population, projection of future emissions and air quality will be made assuming “Business- as- usual”;
Task 4 - Identification of alternative strategies for emissions control on the basis of the previous tasks:

A set of feasible strategies for emissions control will be identified, including new vehicle standards, inspection/maintenance improvements, improvements in conventional and alternative fuels, and transportation management (traffic and land use);
Task 5 - Development of an evaluation framework:

An evaluation of various actions will be carried out in order to form a ranking of actions based on the amount of pollutants reduced, impact on local pollutants versus greenhouse gas reduction, short term versus long term impacts, and associated costs (both direct and indirect);
Task 6 - Development of institutional arrangements:

Based on the result of Task2, technical assistance and advice will be provided on setting up certification and enforcement mechanisms to verify manufactures compliance with emissions standards, and mechanisms for periodic review of emissions standards. Proposals will be prepared for the development of efficient institutional arrangements and resources needed to implement the strategies adopted for emissions control;
Task 7 - Draft final report

Task 8 - Finalization of action plan.
### Table 3: Timetable of action plan

<table>
<thead>
<tr>
<th>Action/Measure</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light-duty vehicles (LDV, and LDT)</td>
<td></td>
</tr>
<tr>
<td>ECE R-83 B App. For imported LDV and LDT</td>
<td></td>
</tr>
<tr>
<td>Retrofit of Paykans less than 10 years and improved standard on new Paykans</td>
<td></td>
</tr>
<tr>
<td>Exclusion of petrol in LPG taxis and introduction catalyst</td>
<td></td>
</tr>
<tr>
<td>ECE R-83 B app. for all new LDV and LDT</td>
<td></td>
</tr>
<tr>
<td>Emission regulation according to proposed EU standard for year 2000</td>
<td></td>
</tr>
</tbody>
</table>

**Planning period**

**Implementation period**
### Table-3 : Timetable of action plan (ditto)

<table>
<thead>
<tr>
<th>Action/Measure</th>
<th>Period</th>
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<tbody>
<tr>
<td></td>
<td>1997 2000</td>
</tr>
<tr>
<td></td>
<td>2001 2005</td>
</tr>
<tr>
<td></td>
<td>2006 2015</td>
</tr>
<tr>
<td><strong>Motorcycles and mopeds</strong></td>
<td></td>
</tr>
<tr>
<td><strong>EU-97 limits for motorcycles and mopeds</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Catalysts for motorcycles non EU-97 standards</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Minibuses</strong></td>
<td></td>
</tr>
<tr>
<td><strong>ECE R49 “Euro2” standard for all locally minibuses</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Particulate traps for all minibuses</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Planning period/decision on implementation**

**Implementation period**
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</thead>
<tbody>
<tr>
<td>ECE R49 ‘Euro3” standard for all minibuses</td>
<td></td>
</tr>
<tr>
<td>Full-size buses</td>
<td></td>
</tr>
<tr>
<td>Installation of particulate traps in all full-size buses</td>
<td></td>
</tr>
<tr>
<td>ECE R49 ‘Euro2’ for imported buses</td>
<td></td>
</tr>
<tr>
<td>Catalysts for CNG converted buses</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
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<th>Action/Measure</th>
<th>Period</th>
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</thead>
<tbody>
<tr>
<td>[2006 2015] ECE R49 ‘Euro2” for locally produced buses</td>
<td></td>
</tr>
<tr>
<td>[2006 2015] ECE R49 ‘Euro3” for all buses plus catalyst</td>
<td></td>
</tr>
<tr>
<td>[2006 2015] ECE R49 ‘Euro3” for bi-articulated buses for trunk bus network</td>
<td></td>
</tr>
<tr>
<td>[2006 2015] Trucks</td>
<td></td>
</tr>
<tr>
<td>[2006 2015] ECE R49 ‘Euro2” standard for all imported trucks</td>
<td></td>
</tr>
</tbody>
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Planning period/decision on implementation

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<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE R49 ‘Euro2’ standard and particulate traps in all locally produced trucks</td>
<td></td>
</tr>
<tr>
<td>Conversion to DME plus catalyst</td>
<td>1</td>
</tr>
<tr>
<td>Inspection and maintenance</td>
<td></td>
</tr>
<tr>
<td>Improved I&amp;M for LDV</td>
<td>1</td>
</tr>
<tr>
<td>Introduction of an I&amp;M program for light duty trucks</td>
<td></td>
</tr>
<tr>
<td>I&amp;M, smoke measurements, and sealing of injection pump in heave duty vehicles</td>
<td>1</td>
</tr>
</tbody>
</table>

Planning period/decision on implementation

Implementation period
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<tr>
<td>Training of vehicle inspectors</td>
<td></td>
</tr>
<tr>
<td>Improvement of fuels</td>
<td></td>
</tr>
<tr>
<td>Unleaded petrol</td>
<td></td>
</tr>
<tr>
<td>Reformulated Petrol +15% MTBE</td>
<td></td>
</tr>
<tr>
<td>Import of low sulfur diesel (S= 0.05%) to be used minibuses and full-size buses</td>
<td></td>
</tr>
<tr>
<td>Production of low sulfur diesel (S=0.05%) in Iran</td>
<td></td>
</tr>
</tbody>
</table>

**Planning period/decision on implementation**

**Implementation period**
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<table>
<thead>
<tr>
<th>Action/Measure</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of DME as a fuel for diesel engines</td>
<td>1997 2000</td>
</tr>
<tr>
<td></td>
<td>2001 2005</td>
</tr>
<tr>
<td></td>
<td>2006 2015</td>
</tr>
<tr>
<td>Oil mixing equipment at petrol stations</td>
<td></td>
</tr>
<tr>
<td>Vehicle traffic and parking</td>
<td></td>
</tr>
<tr>
<td>Parking policies</td>
<td></td>
</tr>
<tr>
<td>Traffic signals</td>
<td></td>
</tr>
<tr>
<td>Construction of Park and Ride parking areas</td>
<td></td>
</tr>
</tbody>
</table>

**Planning period/decision on implementation**

**Implementation period**
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<th>Action/Measure</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of parking restrictions and increased parking fees</td>
<td></td>
</tr>
<tr>
<td>Land use development policies</td>
<td></td>
</tr>
<tr>
<td>National spatial and physical planning</td>
<td></td>
</tr>
<tr>
<td>Regional planning policies Tehran Metropolitan Area</td>
<td></td>
</tr>
<tr>
<td>Tehran Municipality development policies</td>
<td></td>
</tr>
<tr>
<td>Tehran Municipality implementation policies</td>
<td></td>
</tr>
</tbody>
</table>

Planning period/decision on implementation

Implementation period
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<table>
<thead>
<tr>
<th>Action/Measure</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of a Co-ordinating unit for transport</td>
<td>1997 2000</td>
</tr>
<tr>
<td>planning and urban planning</td>
<td>2001 2005</td>
</tr>
<tr>
<td>Public transport</td>
<td>2006 2015</td>
</tr>
<tr>
<td>Introduction of a trunk bus network</td>
<td></td>
</tr>
</tbody>
</table>

**Planning period/decision on implementation**

- **Implementation period**
The objective of the study is to formulate an integrated master plan for air pollution control based on the research, survey and analysis on socioeconomic activities and the situation of air pollution in Greater Tehran Area (GTA) which is the area within the administrative boundary of Tehran.

The study was funded by JICA (Japan International Cooperation Agency) and carried out in cooperation between Japanese Joint Venture and its Iranian counterpart.

The study started in April 1995 and finished in November 1997.
The studies comprise the following main parts:

Current situation and planned development,
Establishment of a baseline for the mobile and stationary sources in Tehran,
A mobile and stationary source emissions inventory,
Assessment of emissions laboratories,
A summary of health effects,
Monitoring and inspection,
Compliance requirements and institutional arrangements,
Environmental laws and regulations,
Vehicle standards find pricing,
Conventional fuels and pricing policies,
Inspection and Maintenance,
Transportation management,
Public transport,
Land use and air quality simulation
Measures for air pollution reduction in the GTA:

1) Establishment of environmental management systems in Tehran,
2) Management of vehicular sources,
3) Management of stationary sources.
A) Establishment of environmental management systems in Tehran City in the central government and municipal level

1) Organization of environmental management,
2) Plan of environmental laws and regulations,
3) Analysis of present air pollution caused by vehicles and stationary sources facilitating policy making,
4) Study of environmental management systems in foreign countries,
5) Establishment of environmental management systems,
6) Regional & wide area monitoring system including meteorological observation,
7) Establishment of systems for monitoring and inspection for emission sources,
8) Establishment of inventory systems, 
9) Improvement and research of analytical technologies for analyzing air polluting substances, 
10) Preparation of emission reduction guideline, 
11) Research in health impacts and economic loss due to air pollution, 
12) Support of the private sector in reduction of air pollution, 
13) Research and development in energy conservation, 
14) Manpower development for environmental protection, 
15) Promotion of technical cooperation with foreign countries,
B) Management of vehicular sources

1) Monitoring of transportation and traffic volume in the GTA,
2) Improvement of traffic regulations and monitoring of traffic conditions,
3) Execution of vehicle inspection,
4) Determination of traveling modes and operation of chassie dynamo tests.
5) Expansion of vehicle maintenance capacity,
6) Improvement of vehicle manufacturing technology,
7) Research and development in vehicle emission reduction technology targeting in-use vehicles,
8) Research and development in urban planning,
9) National programs for vehicle fuel renovation,
10) Research and development in the energy economy,
11) Promotion and coordination of introduction of foreign technology for emission reduction,
C) Management of stationary sources

1) Improvement of emission inventory systems,
2) Improvement of monitoring and inspection systems,
3) Preparation of air pollution reduction guidelines through a manufacturing sector study as well as promotion of development of industrial technology,
4) Promotion of activities for dissemination of technology and information among manufacturing sub-sectors on saving of energy including cleaner production technologies which are being used worldwide,
5) Improvement of combustion technology and promotion of import of technology and related equipment,
6) Development of manpower relating to the key technologies described above and management of pollution control,
7) Dissemination and demonstration of model facilities for air pollution technology,
8) Rehabilitation of regional inspection laboratories in GTA,
9) Enforcement of emission standard regulations for flue gas,
10) Promotion of technical cooperation with overseas organization.
### Table- 4: Summary of countermeasure for air pollution control for GTA

<table>
<thead>
<tr>
<th>No.</th>
<th>Countermeasure</th>
<th>Implementation Period</th>
<th>Project cost (US$ 1000)</th>
<th>Expected amount of pollutants to be reduced (ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CO</td>
</tr>
<tr>
<td>1</td>
<td>Air pollution control management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-1.</td>
<td>Establishment of inventory system</td>
<td>1998</td>
<td>283</td>
<td>12699.3</td>
</tr>
<tr>
<td>1-2.</td>
<td>Ambient air monitoring system</td>
<td>1999</td>
<td>522</td>
<td></td>
</tr>
<tr>
<td>1-3.</td>
<td>Municipal environment research and promotion center (establishment)</td>
<td>2003</td>
<td>24630</td>
<td>5079.72</td>
</tr>
</tbody>
</table>
Table- 4: Summary of countermeasure for air pollution control for GTA

<table>
<thead>
<tr>
<th>No.</th>
<th>Countermeasure</th>
<th>Implementation Period</th>
<th>Project cost (US$ 1000)</th>
<th>Expected amount of pollutants to be reduced (ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CO</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------</td>
<td>-----------------------</td>
<td>-------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>2</td>
<td>Vehicular sources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-1</td>
<td>Enhancement of public transport system</td>
<td>2003</td>
<td>231150</td>
<td>12402</td>
</tr>
<tr>
<td>2-2</td>
<td>Strengthening of I/M program</td>
<td>1998</td>
<td>25300</td>
<td>16500</td>
</tr>
<tr>
<td>2-3</td>
<td>Enforcement of emission standard</td>
<td>1998</td>
<td>354</td>
<td>41340</td>
</tr>
<tr>
<td>2-4</td>
<td>Establishment of I/M training course</td>
<td>2000</td>
<td>1050</td>
<td>82680</td>
</tr>
<tr>
<td>2-5</td>
<td>Establishment of vehicle engineering center</td>
<td>2001</td>
<td>8520</td>
<td>11000</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>No.</th>
<th>Countermeasure</th>
<th>Implementation Period</th>
<th>Project cost (US$ 1000)</th>
<th>Expected amount of pollutants to be reduced (ton)</th>
<th>Cost (US$/ton)</th>
<th>Cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-6</td>
<td>Improvement of main parts of car manufacture</td>
<td>2000</td>
<td>5560</td>
<td>2200 00</td>
<td>25.27</td>
<td></td>
</tr>
<tr>
<td>2-7</td>
<td>Introduction of catalytic converter</td>
<td>2005</td>
<td>148780</td>
<td>1100 00, 3000 00</td>
<td>1352.55</td>
<td></td>
</tr>
<tr>
<td>2-8</td>
<td>Desulfurization of diesel oil</td>
<td>1999</td>
<td>44780</td>
<td>6000</td>
<td>7463.33</td>
<td></td>
</tr>
<tr>
<td>2-9</td>
<td>Construction of MTBE plant</td>
<td>2007</td>
<td>139980</td>
<td>1450 00</td>
<td>965.38</td>
<td></td>
</tr>
<tr>
<td>2-10</td>
<td>Implementation of scrappage program</td>
<td>1999,2004 ,2008</td>
<td>53560</td>
<td>1520 00</td>
<td>352.37</td>
<td></td>
</tr>
<tr>
<td>2-11</td>
<td>Promotion of public awareness</td>
<td>1998</td>
<td>400</td>
<td>2480 4.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CO</td>
</tr>
<tr>
<td>3</td>
<td>Stationary sources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-1</td>
<td>Improvement of regional inspection lab.</td>
<td>1999,2003</td>
<td>990</td>
<td>10159.4</td>
</tr>
<tr>
<td>3-2</td>
<td>Investigation and preparation of master plan on manufacturing sub-sector in GTA</td>
<td>1998</td>
<td>1310</td>
<td>25398.6</td>
</tr>
</tbody>
</table>
Table 4: Summary of countermeasure for air pollution control for GTA

<table>
<thead>
<tr>
<th>No.</th>
<th>Countermeasure</th>
<th>Implementation Period</th>
<th>Project cost (US$ 1000)</th>
<th>Expected amount of pollutants to be reduced (ton)</th>
<th>CO</th>
<th>SO</th>
<th>NOx</th>
<th>Cost (US$/ton)</th>
</tr>
</thead>
</table>
| 3-2 | 1) sub-sectoral study  
2) Measure for saving of energy  
3) Introduction of cleaner production technology  
4) NOx reduction measure | 2005                  | 114  
1820  
190  
340   |                                                   |                 |                           |       |     |     |                |
| 3-3 | Construction of de-sulfur plant                                   | 2005                  | 976490                   | 15300  
0    | 6382.29                                                          |          |     |     |                |
| 3-4 | Fuel conversion to natural gas                                    | 2005                  | 3140                     | 20000  
0    | 40000  
16                                                       |          |     |     |                |

Remarks:  
1/ Operation start-up  
2/ Per ton of targeted pollutants
Presently the results obtained from the implemented projects are combined and given in order to be executed. In this junction, the section of results gained from projects which is related to the mobile sources are extracted, for their share in polluting the air is approximately 70% and in planning priority is given to them.

The outcome to this junction is comprehensive plan to reduce air pollution. It contains 7 major areas, which are:

- a) New vehicles,
- b) Old vehicles,
- c) Public transportation,
- d) Fuel,
- e) Inspection and Maintenance,
- f) Traffic management and
- g) Training
a) New vehicles: 1235 tons reduction in air pollution/one million US$

b) Old vehicles: 391 tons reduction in air pollution/one million US$

c) Public Transportation: 186 tons reduction in air pollution/one million US$

d) Fuel: 233 tons reduction in air pollution/one million US$

e) Inspection and Maintenance: 257575 tons reduction in air pollution/one million US$

f) Traffic Management: 18621 tons reduction in air pollution/one million US$

g) Training: At least 20% reduction in air pollution
Second to mobile sources, industrial establishments are the most important sources of air pollution in Tehran. They are responsible for 25% of the air pollution.
The red color indicates in WHO guideline are exceeded.
Simulated CO concentration in year 2015 (*Do nothing*)
CO ambient air concentration, 1998

Simulated CO concentration in year 2015 (*If measured proposed in action plan are implemented*)
PM-10 ambient air concentration, 1998

The red color indicates in WHO guideline are exceeded.
Simulated PM-10 concentration in year 2015 (*Do nothing*)
PM-10 ambient air concentration, 1998

Simulated PM-10 concentration in year 2015

*(If measured proposed in action plan are implemented)*
Monthly average concentration of CO in 1999