

Country Synthesis Report on Urban Air Quality Management

»» Afghanistan

Discussion Draft, December 2006



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Abbreviations

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
ADB	Asian Development Bank
AQ	air quality
AQM	air quality management
GDP	gross domestic product
KAQM	Kabul Air Quality Management Project
LPG	liquefied petroleum gas
NEPA	National Environmental Protection Agency
NILU	Norwegian Air Research Institute
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxide/s
O_3	Ozone
PAH	polyaromatic hydrocarbons
PM	particulate matter
PM10	particulate matter with a diameter of not more than 10 microns
SO_2	Sulfur dioxide

Note: "\$" means "US dollar" in this publication.

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General Information

Geography and Climate

Afghanistan is a landlocked country covering an area of 652,000 square kilometers (km²), one third of which are mountains. The Hindu Kush mountain range divides the country into south and north Afghanistan. Kabul, the country's capital, is also mountainous. Afghanistan shares borders with Iran and Pakistan and Central Asian countries, such as Tajikistan, Turkmenistan, and Uzbekistan. Large parts of the country are dry, and freshwater supplies are limited.

The variety of climate in Afghanistan is immense but is typical of a semiarid steppe climate—very cold, snowy winters and dry, hot summers. The climate differences, especially in the patterns of temperature and precipitation, are dependent primarily on the altitude differences.

Afghanistan experiences extreme range of temperatures. Intense cold (from -24°C to 8°C) can last several days during winter while summer temperatures, on the other hand, are exceedingly high especially in the Oxus regions (from 45°C to 50°C). The extremely low temperatures during winter cause severe atmospheric inversions and stagnation of air masses for prolonged periods—trapping air pollutants below a low mixing height.

Some areas are also prone to dust storms. These are located in the arid zones of southwestern Afghanistan, the Sistan deserts, Farah and Hirat provinces in the southwest, and Ghazni in the central portion.

Urbanization and Population

Population estimates in Afghanistan are varied because systematic census has not been conducted in decades. The Government's population estimate is at 23.6 million (mid-2005), which is a 34% increase from its 1990 levels (ADB, 2006a). Current population growth rate (2000 to 2005) is 2.4% annually, which is higher than the pre-2000 rate of 1.8% per annum (ADB, 2006a). Afghanistan has an estimated 1.5 million nomads and more than 5 million refugees or displaced people (ADB, 2006b).

The urban population share in Afghanistan is 20.3% (2005) and grows at a rate of 2.9% per annum (ADB, 2006). Kabul, the country's capital, is also the most urbanized area. Population density in the country is a low 46 persons per km² based on a United Nations 2005 estimate of the population (29.86 million as of July 2005) (United Nations, 2005).

Kabul, with its estimated population of 3.3 million, is the only city in the country with a population exceeding 1 million (Ministry of Economic Planning, 2004). The other major cities in Afghanistan are, in the order of population size, Kandahar, Mazar-e Sharif, Herat, Jalalabad, and Kunduz. Afghanistan is divided into 34 provinces, which are further divided into districts. Kabul City is the country's center of administration, trade, education, industry, and communication. The Khwaja Rawash International Airport lies just 5 kilometers from the city center. Limited employment opportunities in outlying provinces have necessitated people to relocate to Kabul and other major urban areas, putting additional pressure on urban energy and mobility resources. Villages and housing are scattered in the poorly planned city, adding more to problems of sanitation, waste management, and air pollution. A substantial part of the city is also dominated by small-scale industries, bakeries, auto mechanical works, and other facilities. In addition, a large number of brick factories, washrooms, industries, stone-crushing factories, and thermal stations operate on diesel-fueled generators.

Economy and Industry

The gross domestic product (GDP) growth of Afghanistan was 11.2% for 2004—up from 5.4% in the previous year. The agriculture and the services sector contribute largely to the Afghanistan GDP. In 2005, the agriculture sector share in GDP was 35%, while the services sector was 35.9%. The agriculture sector has contributed 57% to GDP in 2000. The manufacturing industry sector in Afghanistan is relatively small, as it contributes only 19.9% to the national GDP (ADB, 2006a). Although there is no large industry activity in the country, small- and medium-sized enterprises are increasing in numbers. About 85% of the population is engaged in traditional agriculture (ADB, 2006b).

Afghanistan's economic outlook has improved significantly after the end of 25 years of war and conflict. Infusion of more than \$80 billion in international assistance was channeled mostly toward the recovery of agriculture and infrastructural sectors and the growth of the services sector, as well as the reestablishment of market institutions (CIA, 2006).

Table 1.1 lists the number of active industries in Afghanistan as of 2004. There are various industries in operation but the largest in terms of number of active industries in operation are from the food, chemical, machinery, and metal industries.

The brick kiln technology available in the country is relatively outdated. The brick factories are generally of three types:

i) traditional—uses wood, waste plastic and rubber, reeds and other woody bushes as fuel; ii) *Batti* (Indian-style brick factory)—uses coal wood and rubber; and iii) Chinese style—uses only coal. In Kabul, it is estimated that 225 traditional kilns produce 80,000 bricks every week, 135 *Batti* produce 40,000 bricks a day, and one Chinese-style brick kiln produces 10,000 bricks daily. These brick kilns are a major source of smoke and dust emissions in the city (ADB, 2006b).

Increasing demand for construction and reconstruction in Afghanistan, specifically in Kabul, has encouraged the increase in the number of asphalt mixture machines and batch plants. Where in the past there was only one asphalt factory in Kabul, there are now many in operation. Apart from the emissions from fuels used to melt the asphalt tars, asphalt plants are also known for emissions that contain high levels of carcinogenic organic compounds.

Energy

Afghanistan is currently facing energy challenges, such as insufficient electricity-generating capacities and poor quality of imported fuel. Although the country has potential oil and gas reserves in the north, this has remained untapped due to the country's long history of conflict. Decades of conflict and war have also damaged power plants and electrical lines in the country, leaving Afghanistan industry and domestic sectors with very few energy options. The energy balance of Afghanistan showing Afghan production and consumption by sector for 2002 is shown in Table 1.2.

Shortage of electricity is common in Afghanistan, and only 10.06% of the population has access to electricity. It is expected, however, that 40% of Afghans will have access to electricity by 2009. The Government plans to import electricity from Tajikistan, Turkmenistan, and Uzbekistan through a project that will receive funding from India, ADB, World Bank, and the United States Agency for International Development (USAID) (Mohawid, 2006). The Government is also looking at increasing foreign investments to fund the expansion of the use of renewable energy, such as those from micro-hydro, solar, and wind sources. In this end, ADB is pioneered to sign the memo for developing a Renewable Energy Strategy for Afghanistan. This will help alleviate poverty in the rural and remote communities and reduce pressures on natural resources.

TABLE 1.1

Number of Active Industrial Enterprises in Afghanistan, 2004

Industry	Number
Electricity Power	20
Charcoal	6
Gas and Oil	2
Salt	2
Construction Material	2
Chemical	74
Product of Construction Material	36
Machinery and Metal	68
Pharmacy	11
Publishing	44
Carpeting and Paper	18
Light Industries	8
Food Industries	90
Other Industries	26
Total	377

Source: Ministry of Economy and Planning (2005).

TABLE 1.2

Afghanistan Energy Balance (000's TOE)

Item	Coal	Crude Oil	Petroleum Products	Gas	Hydro	Solid Biomass	Electricity	Total
Production								
Indigenous Production	121.59	41.00	—	265.60	51.60	2,547.77	—	3,027.52
Import	—	—	1,397.09	—	—	—	9.22	1,406.31
Export	—	—	—	—	—	—	—	—
Total Primary Energy Supply	121.59	41.00	1,397.09	265.56	51.60	2,547.77	9.22	4,433.83
Less: Public Electricity Plant	—	—	-48.06	-124.81	-51.60	—	61.77	-162.70
Autoproducer Electricity Plant	—	—	-66.67	—	—	—	9.37	-57.31
Distribution Losses	—	-8.20	—	-34.52	—	—	—	-42.72
Total Final Production	121.59	32.80	1,282.36	106.22	—	2,547.77	80.36	4,171.11
Consumption								
Industrial Sector								
Construction	28.00	—	—	—	—	—	—	28.00
Non-specified (Industry)	—	—	—	47.80	—	—	17.04	64.84
Subtotal	28.00	—	—	47.80	—	—	17.04	92.84
Transport Sector								
International Civil Aviation	—	—	19.80	—	—	—	—	19.80
Road	—	32.80	1,032.54	—	—	—	—	1,065.34
Subtotal	—	32.80	1,052.34	—	—	—	—	1,085.14
Other Sectors								
Agriculture	—	—	—	—	—	—	—	—
Commerce and Public Services	8.51	—	124.34	2.66	—	579.44	18.48	733.43
Residential	85.08	—	105.68	55.77	—	1,968.33	44.84	2,259.70
Subtotal	93.59	—	230.03	58.42	—	2,547.77	63.32	2,993.13
Total Final Consumption	121.59	32.80	1,282.36	106.22	—	2,547.77	80.36	4,171.11

TOE = tons of oil equivalent
Source: ADB (2006c).

Until these projects are operational, some residents will need to pay before they can be provided with power access. In the city of Kunduz, for example, a total of 500 families were provided with imported power from neighboring Tajikistan. Each family had to pay Afghani AF2,000–AF3,000 (about \$50–\$70) every month. The total amount collected from the households contributed to 20% of the total cost of installation of electric poles (Arman, 2006).

Detailed statistics on the quality and type of fuel imported to Afghanistan is currently unavailable due to lack of capacity for fuel analysis. The country has only one laboratory in the Department of Thermal Power that can conduct such analyses. It is suspected that the gasoline coming into the country may be adulterated and may still contain lead (tetra-ethyl lead) (ADB, 2006b).

The climatological conditions in Afghanistan also impose high demand for heating. In Kabul, there is only one central heating station that uses imported fuel from the northern part of Afghanistan. Individual buildings and factories have their own central heating systems that also contribute to air pollution. These heating systems use fuels, such as woods, kerosene, liquefied petroleum gas (LPG), charcoal, straw, etc. Emissions from these heaters are especially high during winter.

To meet the demand for daily cooking, households in urban areas often rely on fuelwood gathered from forests and sometimes also use waste plastic and rubber as fuel. Animal dung is also used in 85% of rural homes and in about 15% of urban homes. Table 1.3 describes the usage of fuel in the domestic sector.

TABLE 1.3

Usage of Domestic Fuels for Cooking, and Space and Water Heating, 2002

Fuel	Overall Share of Household Use (%)	Tons Per Year
Fuelwood	65	6,144,775
Charcoal/Others	25	1,012,875
Coal	3	121,545
Kerosene	2	54,676
Liquefied Petroleum Gas	5	135,050

Source: ADB (2006c).

Use of portable generators during power shortages is a major source of air pollution in the country. In Kabul alone, there are about 173,755 diesel (99%) and gasoline power generators with varying capacities. Almost all (99.5%) of these generators are used by households.

Transportation

Road traffic activity and emissions from vehicles is an important immediate source of air pollution in the city of Kabul. The transport sector faces challenges of illegal import of used vehicles, continued use of very old and poorly maintained vehicles (some vehicles are more than 60 years old), passenger and cargo overloading of vehicles, poor quality of transport fuel, and limited road capacity leading to air pollution.

The vehicle fleet in Afghanistan is dominated mostly by small cars and taxis, which together make up almost 50% of the total number of vehicles. The vehicle population data of Afghanistan

from 2002 to 2004 are given in Table 1.4. The total number of vehicles registered in Afghanistan as of 2004 was 402,422, about 18% increase from 2003 and 129% from 2002.

TABLE 1.4

Number of Vehicles in Afghanistan

Vehicle Type	2002	2003	2004
Lorries/Trucks	51,527	76,236	83,374
Buses	29,098	40,042	40,590
Passenger Cars (small Cars and Taxis)	71,222	176,723	197,449
Motorcycle	13,189	33,098	62,417
Foreign Vehicles	9,900	10,458	12,237
Rickshaws	419	3,044	6,355
Total	175,355	339,601	402,422

Source: Ministry of Economy and Planning (2005).

A vehicle census of Kabul in 2005 registered a total of 341,047 vehicles, mostly small cars (66.2%), followed by trucks. The vehicle population is estimated to increase by approximately 11% annually.

Illegal importation of second-hand vehicles is also a major issue in the country. It is estimated that there are about 300,000 of these vehicles and most are running in Kabul.

As of 2003, it is estimated that there is a total of 43,789 kilometers of road network in the country, 76.34% of which are unpaved (CIA, 2006). Unpaved road is a large contributor to resuspended dust. In Kabul, the road system is estimated to accommodate only 25,000–35,000 vehicles a day, which is not sufficient for the rapidly increasing number of vehicles. There is also no ring road to support the dense traffic in the city center.

» Part Two

Sources of Air Pollution

To date, the Government has not compiled a comprehensive inventory of air pollutant emissions or not even an inventory of greenhouse gas emissions. Likewise, no source apportionment has ever been conducted to evaluate how much of the various sources contribute to particulate matter (PM) air pollution.

Compiling one for the country is a challenge as the location of emission sources and operating data are not systematically tabulated, and there are no specific reporting requirements available (no emission reports or other data that could support estimation of emissions, e.g., fuel analyses, fuel-use rates and consumption, boilers type and capacity, material inputs and outputs, etc).

A comprehensive inventory of emissions from different sources in Kabul and two outlying provinces, however, is being compiled through the ADB project in Kabul. Table 2.1 shows the estimated emissions from various sources in Kabul. The Kabul emissions inventory will be the country's first air pollution emissions inventory. Activities under the ADB project include institutionalizing the capacity of emissions inventory not only with the National Environmental Protection Agency (NEPA) but also at the city level.

The emissions inventory indicates that the major source of pollution in the city is mobile sources followed by generators.

TABLE 2.1

Inventory of Emissions of Air Pollutants in Kabul (Annual Emissions, Tons)

Source	PM	NO _x	SO ₂	CO	CO ₂	TOC
Vehicles						
Gasoline Vehicles	310	1,700	113	34,450	—	—
Diesel Vehicles	1,387	9,475	1,625	9,615	—	—
Resuspension	7,278	—	—	—	—	—
Total Vehicles	8,976	11,175	1,739	44,065	—	—
Residential Sources						
Residential/Commercial Heating	5,562	1,241	381	38,077	511,833	7,333
Bakeries	463	44	7	3,492	—	736
Hammams	160	15	2	1,209	—	255
Total Residential Sources	6,408	4,431	597	45,807	632,655	8,648
Industrial Sources						
Thermal Power Plant	63	347	110	32	—	16
Industrial Generators	12	185	10	7,121	17,629	239
Brick Kilns	3,691	44	25	44	30	0.19
Asphalt	448	2	3	0.10	532	0.64
Total Industrial Sources	4,214	578	148	7,197	18,191	256
Grand Total	19,597	16,183	2,484	97,068	650,846	8,903

PM = particulate matter, NO_x = Nitrogen oxide, SO₂ = Sulfur dioxide, CO = Carbon monoxide, CO₂ = Carbon dioxide, TOC = total organic carbon.

Hammams = public bathhouse.

Source: ADB (2006d).

Status of Air Quality

Air Quality Monitoring

Air quality (AQ) monitoring is in its initial stages in the country. A Kabul air pollution monitoring network is being established under an ADB-funded project. The Kabul network will be composed of nine sampling stations that will monitor levels of particulate matter with a diameter of not more than 10 microns (PM10), Sulfur dioxide (SO₂), Nitrogen dioxide (NO₂), Carbon monoxide (CO), and Ozone (O₃), as well as measure meteorological parameters, such as wind speed and wind direction. The nine stations will be set up in the following selected sites:

- Thermal Power Station (upwind, WNW) Badam Bagh (northwestern part);
- Bagrami District Compound area (downwind) southeastern part);
- National Archive Compound (center city, north);
- Kabul Zoo area (center city, south) Dehmazang area;
- Khair Khana area (traffic-related, north);
- Qalacha area (traffic-related, south);
- Kalakan District Compound (upwind, north); and
- WAK Hill (effects of elevation above center city, and public awareness).

The nine stations have recently been set up and started operation only in June 2006.

In the absence of local capacity for analyses especially of gas samples, the samples will initially be sent for analysis to the United States then later to a contract laboratory in Dubai or India. Eventually, the goal is to have this capacity in Afghanistan.

Air Quality Data

Prior to the installation of the nine monitoring stations, project-based monitoring of air quality has been conducted in Kabul. The United Nations Environment Programme (UNEP) carried out air sampling at a number of urban sites. The results indicated high amounts of dust and polyaromatic hydrocarbons (PAHs). PAH pollution most likely originated from vehicle exhaust emissions (UNEP, 2003).

High PM10 concentrations have been measured in initial samples under the ADB Kabul Air Quality Management (KAQM) Project and in previous short-term studies conducted during 2003 by an Environmental and Industrial Health Hazard (EIH) Special Support Team (SST) deployed by the Canadian International Security Assistance Force (ISAF) contingent, and by Norwegian Institute for Air Research (NILU) on behalf of the Norwegian ISAF contingent during 2004.

Samples from air quality monitoring activities of from the KAQM project had to be shipped to the United States for analysis. Thus, air quality monitoring results will be made available by the last quarter of 2006. Due to lack of actual AQ data, the particulate concentrations in Kabul were predicted using American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). The highest predicted concentration is 401 micrograms per cubic meter (µg/m³). The maximum predicted 24-hour average PM concentration—with brick kilns as the major source—is 247 µg/m³ and the maximum predicted ambient concentration predominantly associated with vehicles is 144 µg/m³ (ADB, 2006d).

» Part Four

Impacts of Air Pollution

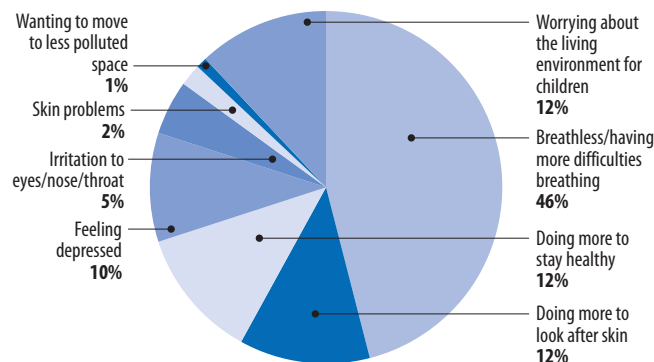
There has been no major epidemiological study conducted in Afghanistan to assess the impact of air pollution on public health primarily due to the absence of air quality data. A number of articles in newspapers, however, report about complaints from locals on the increasing pollution and its impacts on their health.

Dust storms in the northeastern province of Nimroz have reportedly caused vehicle accidents and claimed lives (Quirishi and Hyder, 2006).

Complaints on the impact of air pollution on public health are further supported by a public perception survey conducted by ADB and NEPA in Kabul from 28 May to 26 June 2005. The 3,500 respondents from 17 districts in Kabul had varying responses when asked how air pollution has affected them (Figure 4.1). Almost half (46%) of the respondents indicated that they experienced more difficulties in breathing while others reported skin problems and irritations to their eyes, nose, and throat (ADB, 2006b).

FIGURE 4.1

Impact of Air Pollution on Residents of Kabul



Source: ADB (2006b).

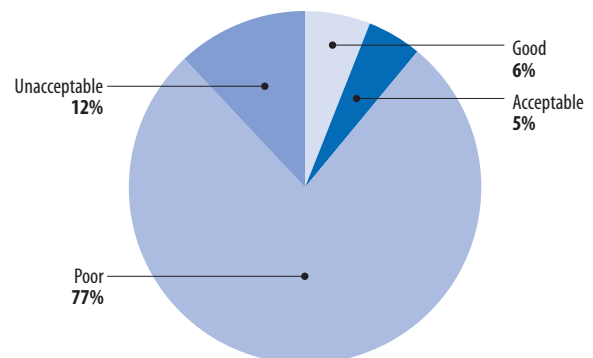
A more extensive survey will be conducted in Kabul to assess the actual health effects of air pollution in the city covering statistics from clinics, hospitals, physicians, and public

healthcare providers in addition to focused questionnaires for the public.

The survey also captured the general perception of the public about the air quality in Kabul. A high percentage of the respondents (89%) felt that the air quality was poor and unacceptable. The remaining 11% felt that air quality was generally good and acceptable. Not one respondent answered that the air quality was excellent (Figures 4.2 and 4.3).

FIGURE 4.2

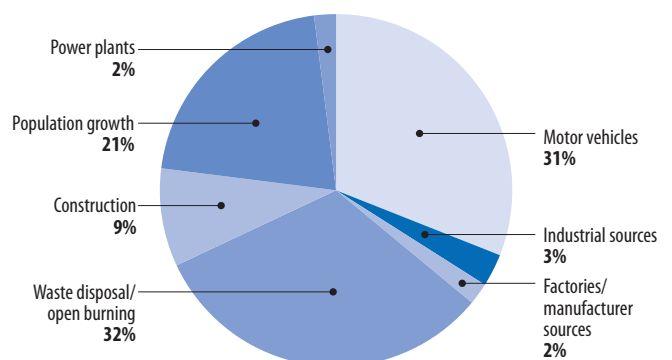
Public Perception on the Quality of Air in Kabul



Source: ADB (2006b).

FIGURE 4.3

Sources of Air Pollution



Source: ADB (2006b).

Although majority of the public agree that air pollution is poor and unacceptable (89%), only 30% felt that they are very much affected by air pollution in the city and another 58% felt that air pollution only had little effect on them. The remaining 12% felt that air pollution has no impact on their lives.

The public also had varying opinions regarding which pollution source contributes the most to the air pollution problem in

Kabul. Most of the respondents attribute air pollution to waste disposal (32%) and vehicle exhaust (31%).

Although the survey has been designed to be completed within a few minutes, the interview lasted longer than expected because of the respondents' lack of knowledge and awareness about air pollution. Many of them had no understanding of the cause-and-effect relationships of air pollution.

Air Quality Management

Legislation and Mandate

The country is just recovering from about 3 decades of war and conflict. It is only recently that environmental issues are given attention by both the Government and the citizens. NEPA, the agency responsible for environmental protection matters in Afghanistan, has been set up just a year ago.

As with other environmental issues that Afghanistan is facing, there is still no law that will specifically address the country's air pollution problem. The recently approved Environmental Act 2005 formalized the mandate given to NEPA to manage the environment and to provide the legal framework for environmental protection in Afghanistan.

With assistance from international organizations, such as ADB and UNEP, the Government is also working on drafting an Air Pollution regulation.

Although NEPA has the overall responsibility to protect the environment and manage the air quality of the country, other government offices have also been identified to potentially assist NEPA in air quality management. Table 5.1 lists the government agencies and their potential contributions to air quality management in Afghanistan.

Ambient AQ Standards

Afghanistan has not established its own ambient AQ standards. The Government is still in the process of adoption of standards.

Management of Mobile Sources

Currently, there are no regulations that tackle air pollution from mobile sources. NEPA, however, is studying various options for proposed measures to reduce air pollution from mobile sources. The following is a tentative list of these options:

- **Vehicle Emission Standards** Clean vehicle emission standards similar to those of other countries will be developed. These standards require vehicles with 4-stroke gasoline engines to be equipped with catalytic converters and heavy-duty vehicles to be equipped with diesel filters.
- **Vehicle Inspection and Maintenance.** Emission testing units will be procured to inspect emissions from all vehicles to address excessively polluting vehicles. The frequent inspection and maintenance of vehicles will result in substantial reduction of PM10, volatile organic compounds (VOC), and CO emissions.
- **Petrol and Diesel Quality Standard.** Diesel quality will be improved in terms of cetane number to reduce particulate emissions. The Afghanistan National Standardisation Authority (ANSA) proposed a maximum of 0.1% sulfur for diesel and 0.05% sulfur in gasoline. The Ministry of Commerce should maintain these standards while importing petroleum fuel.
- **Alternative Fuel.** NEPA is considering the introduction of gaseous fuels, such as LPG and compressed natural gas (CNG), to reduce air pollution.
- **Ban on Fuel Adulteration.** NEPA is coordinating with law enforcement agency to take stringent measures to control fuel adulteration.
- **Traffic Management.** A variety of traffic management measures, such as traffic control by police and traffic lights, one-way streets, and new roads, will be introduced to solve congestion problems and pollution. Stopping of public transport close to the immediate vicinity of the intersection must be avoided and drivers will be encouraged to stop at

TABLE 5.1

Government Agencies and Their Proposed AQ-related Responsibilities

Government Agency/Unit	Recommended Tasks and Responsibilities
Municipal Departments	Municipal Departments should plan urban and transport development considering all issues of air quality management. They should also plan reforestation and greening activities. They should have a broad range of means and policy instruments at their disposal to prevent and combat air pollution in Kabul. Such efforts and policies might include <ul style="list-style-type: none"> ■ More developed legal and institutional framework ■ Improved technical capacities ■ Improved administrative capacities ■ Improved knowledge of use of environmental management equipment ■ Public education and promotion of public support ■ Development of natural resource management and reclamation, and associated economic incentives for sustainable development
Ministry of Public Health (MoPH)	The Department of Environmental Health and Hygiene should collect and monitor health data to study the health effects due to air pollution.
Ministry of Commerce (MoC)	The Ministry of Commerce should monitor the quality of fuel being imported in the country. They should establish additional laboratories to test fuel quality.
Ministry of Agriculture, Animal Husbandry and Food (MAAHF)	Ministry of Agriculture, Animal Husbandry and Food should be responsible for development of nurseries for reforestation and urban greenery.
Ministry of Transport (MOT)	Ministry of Transport is responsible for overall management of the road transportation system. The Ministry should play a very important role in the improvement of urban air quality – and energy efficiency in the transport sector.
Ministry of Energy and Water (MEW)	The Ministry of Energy will play fundamental role in air quality control by introduction and encouragement of environmentally friendly and energy-efficient technologies, including renewable energy.
Ministry of Housing and Urban Development (MHUD)	The role of Ministry of Urban Planning is to manage the spatial organization of cities for efficient allocation of urban infrastructure and land use. Most cities in Afghanistan have been damaged or destroyed by war and internal conflict. Effective and satisfactory rehabilitation of such cities requires basic urban planning. The Ministry of Housing and Reconstruction has been responsible for urban planning, prohibiting the misallocation of land use and growth in urban areas that are not conducive to environmentally sound economic development. The Ministry is empowered to ban the siting of new industries in metropolitan areas and require industrial zoning to be established in proper directions and at proper distances from metropolitan or other sensitive areas. Moreover, the Ministry could translate the issue of reconstruction into an effective urban planning tool to improve overall environmental conditions
Ministry of Mines and Industries	Effective environmental management will require the support of the Ministry to integrate environmental considerations into industrial development and mining practices. Such controls are most readily implemented through a well-defined construction and operation permitting compliance and enforcement system. The Ministry is also empowered to prevent illegal trade in hazardous waste. Further development of best environmental practices in the private sector, subjected to economic instruments, including taxes, permits, emissions fees, performance of EIAs, and demonstration of environmental regulatory compliance-relevant regulations should be considered by the ministry.

Source: ADB (2006b).

designated areas only. Improved traffic management will also have other environmental benefits, such as less noise and congestion.

- **Addressing Resuspension of Dust.** Resuspension of road dust is a high-priority issue. All methods for reducing entrainment will be evaluated and applied in Kabul. Controlling resuspension of road dust may be the most cost effective way of reducing particulate exposure.
- **Rehabilitation of Electric Bus System.** The inoperative Electric Bus System will be rehabilitated to increase transport capacity and to reduce environmental problems due to increased private transport.
- **Vehicle Specifications.** NEPA is coordinating with the Ministry of Commerce on specifications of all vehicles

imported to Afghanistan. All imported vehicles should comply with the road design conditions and driving pattern in Afghanistan.

Management of Stationary and Area Sources

As with pollution from mobile sources, stationary and area sources of air pollution are still not regulated by any law to reduce their contribution to air pollution. NEPA, however, is looking at the following options to address pollution from these sources:

- **Addressing Industrial Combustion.** The use of cleaner fuel, such as low-sulfur fuel and natural gas, to reduce emissions of SO₂ and PM10 will be considered. National investment on renewable energy, such as hydropower, will be encouraged.
- **Addressing Domestic Emissions.** Domestic emissions and refuse burning, together with resuspension, are the main sources of air pollution in Kabul. Refuse burning will be avoided by extending the public refuse collection system. Domestic emissions are caused by residential heating and cooking on traditional stoves and are a major cause of indoor air pollution and pose a special threat to the health of women and children.

Public/Nongovernment Participation

Through the support of the ADB technical assistance, a consultative committee on Kabul air quality management will be established. This consultative committee will be composed of key decision makers from relevant ministries and institutions in Kabul.

The members of the consultative committee would initially meet once a month to i) review concise briefing notes for use by policymakers, nongovernment organizations, industry, academics, and researchers, highlighting issues, policy considerations, proposed approaches, and soliciting comments from potentially affected parties; ii) commission reviews and studies to evaluate the current state of knowledge and practices, and to make recommendations for improvement; and iii) work together for successful implementation of the ADB KAQM project and environmental regulatory measures.

Conclusion

After more than 3 decades of conflict, Afghanistan is busy rebuilding and establishing itself. A lot of preexisting services, facilities, and capacities have either been destroyed by war or no longer meet the growing demands of the population. As the economy grows, there are increasing demands for energy and mobility. Households and industries are forced to resort to using adulterated fuels and even garbage as fuels for heating and cooking. Second-hand vehicles using poor-quality fuel and with high rates of emissions are increasingly being imported into Afghanistan.

The major sources of air pollution in Afghanistan are the transport and energy sectors. The country's main pollutant is particulate matter. The predicted ambient concentrations are very high and are likely to result in significant impacts on the

health of the population. Toxic gas emissions may be expected from the use of plastic and rubber as fuels.

After more than 30 years, it will be the first time in decades that environmental issues, such as air quality, are given any attention. Afghanistan is still in its initial stages in establishing its capacity to manage the quality of air. A large number of the necessary components of air quality management are still lacking, but with the recent establishment of NEPA, pending approval of the Environmental Act and air quality regulations, the recently installed AQ monitoring network of stations in Kabul, and the pending adoption and implementation of the air quality management plan, Afghanistan may be headed toward the right direction of building a good air quality management system.

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