

Expert Group Meeting on Innovative Technologies and Applications for Urban Air Pollution Control in Asia and the Pacific

Organizer: Asian and Pacific Centre for Transfer of Technology (APCTT),
UN Economic and Social Commission for Asia and the Pacific (ESCAP), New Delhi, India

Air Pollution Control Initiatives in Bangladesh: Opportunities and Challenges for Innovative Technologies and Application in Dhaka City

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May 25, 2023



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Country profile (2022)

- Total area - 147,570 km²
- Population- 165.15 million
- Density- 1160/km²
- GDP- \$416 billion
- Per Capita- \$2824
- Resources- Natural Gas, Water, Largest Mangrove Forests (the Sundarbans), Biodiversity(Flagship Royal Bengal Tiger), Longest Sea Beach, Cultural and Historical sites, Human resource etc.
- Paddy fields dominate the country's farmland. Bangladesh is a top global producer of rice (3rd), potatoes (7th), tropical fruits (6th), jute (2nd), and farmed fish (3rd)
- Development Goal- To become a Developed Country by 2041

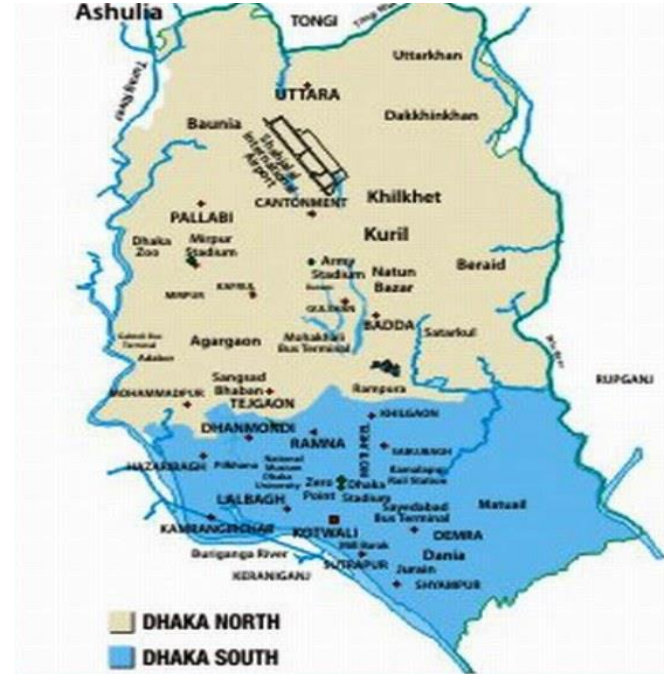


Dhaka the Capital City of Bangladesh

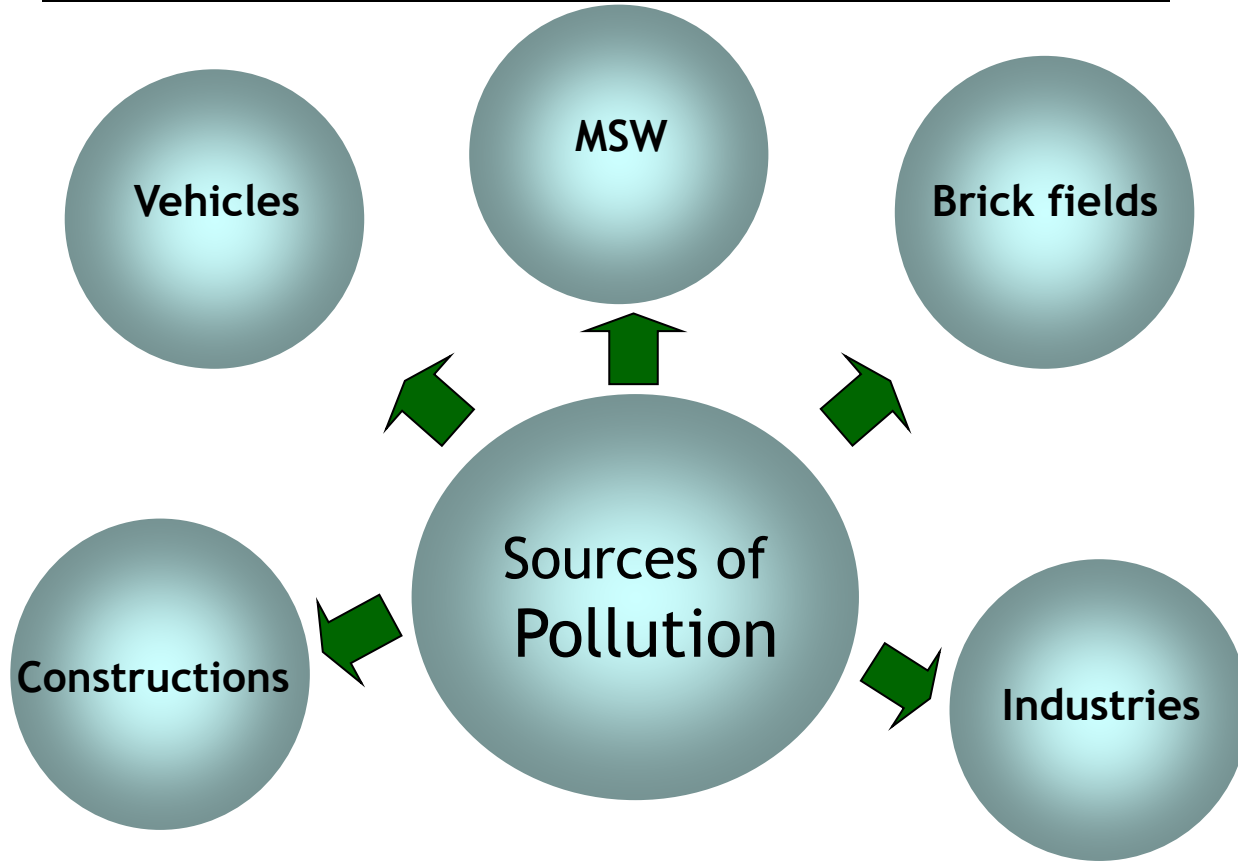
- Dhaka District Area: 1463 Sq KM
- Dhaka City Area: 126.34 Sq KM
- Population: 18 Million
- **Population by 2025: 24.6 Million** (Dhaka Structure Plan 2016-2035 RAJUK 2015)
- The city contributed 36% of the total country's GDP and 50 thousand people live per square kilometres area (Annual Report, 2022, MRTCL).

Table: Bangladesh National Ambient Air Quality Standard (BNAAQS) for PM₁₀ and PM_{2.5}

Pollutant	Standard	Average
PM10	50 µg/m ³	Annual
	150 µg/m ³	24 hours
PM2.5	35 µg/m ³	Annual
	65 µg/m ³	24 hours



Sources of Air Pollution in Dhaka City



Development and Energy Demand

Fuel Type	Capacity(Unit)	Total(%)
Coal	1768.00 MW	7.86 %
Gas	11476.00 MW	51.05 %
HFO	6278.00 MW	27.92 %
HSD	1341.00 MW	5.96 %
Hydro	230.00 MW	1.02 %
Imported	1160.00 MW	5.16 %
Solar	229.00 MW	1.02 %
Total	22482 MW	100 %

Installed Capacity of BPDB Power Plants as on August 2022

Source: Bangladesh Power Development Board (BPDB)

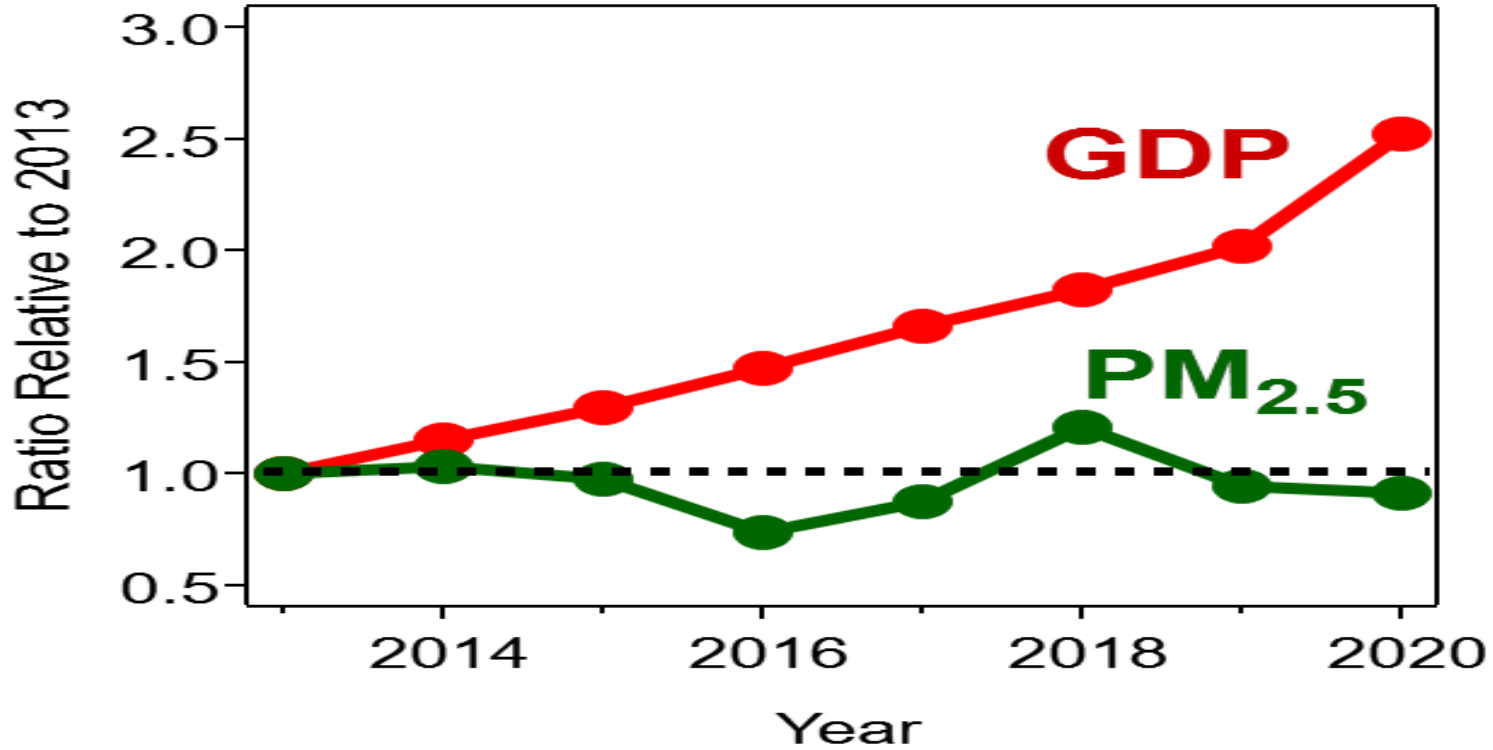


Air Quality and Health Effects in Bangladesh

- Annual average $PM_{2.5}$ ranges from 48-62 $\mu\text{g}/\text{m}^3$ at six stations in five cities to 81-103 $\mu\text{g}/\text{m}^3$ at seven stations in six other cities in Bangladesh. This is 5-10 times higher than WHO Air Quality Guideline (AQG) for annual $PM_{2.5}$.
- Air pollution is one of the biggest public health problems in the world and in Bangladesh ~2 million deaths per year in South Asia (World Bank, 2022) ~160,000 deaths per year in Bangladesh (McDuffie et al., 2021).
- Ambient and household $PM_{2.5}$ caused an estimated 2.5-2.8 billion days lived with illness in 2019.
- Disproportional impact on the poor and vulnerable groups, affecting their health, and productivity.
- The city produces excessive air pollution and makes economic losses (3.8 billion USD per year) (Annual Report, 2022, DMRCL).
- In 2020, daily per capita waste generation in Dhaka was 0.61 kilograms (kg), the estimated Waste generated per day is 6,464 tons. Only 73% of Waste is going to the city corporation existing waste disposal system and the rest of the waste destinations are open burning, canal, water bodies, low land, etc (Report, 2021, World Bank).



PM2.5 and GDP comparisons (2013-2020)



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Air Quality Improvement: Opportunities & Challenges

Implemented Strategies In Bangladesh To Control Air Pollution (Success Stories)

- Lead Phase Out from Gasoline (1999)
- Ban Two-Stroke Three-Wheelers vehicle (2001)
- Introduced CNG Vehicles (2005)
- Transformed the Brick Kilns technology (2002 and latest 2014)
- Promoted Low Sulfur containing Coal
- Most of the Urban stove uses natural gas (Since 1975 to 2015)
- Remarkable traditional cooking stove transformed to LPG stove (1990 to 2022)
- More than 4.5 million Improved Cook Stoves (ICS) are distributed in rural areas for Clean Cooking.
- Introduced Updated Vehicle Emissions Standards (2022)



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Air Quality Improvement: Challenges

Challenges are:

- Regular basis vehicle emission monitoring
- Online Industrial emission monitoring (Brick Kilns, cement factory etc.)
- Ensure the fossil fuel quality, the high sulfur content in fuel
- Controlling Biomass burning
- 100% uses of Improve cook stove and there is a big obstacle to the financial capability and socioeconomic conditions for mass-level people.
- Institutional strengthening
- Trans-boundary air pollution
- Scarcity of fund
- Waste, Road and soil dust management. Municipal waste segregation, collection, transportation, and proper management are the major challenges.
- Brick kilns, Steel and rerolling meal, cement, tire-burning and Used Lead Acid Batteries, and other big and small industries of Dhaka and adjacent Dhaka
- Unfit and economic life expired vehicle, huge traffic jam, Inadequate parking places, overloading, lack of maintenance, etc are the common problem.



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Current Initiatives to Reduce Air pollution

- A major transformation is underway in the transport sector shifting towards - Bus Rapid Transit (BRT), Express Way and Introducing Metro Rail Services in Dhaka city
- Upcoming Nuclear Power Plant to reduce fossil fuel used
- Revisited the Fuel quality standards (2018)
- Reduced Tax on electric vehicle
- Taken initiatives on Modernization of Vehicle emission testing procedure
- Improve Traffic management system
- Controlling Brick Emission/Industrial Emission
- Progressed Municipal Solid Waste Management System
- More than 4.5 million Improved Cook Stoves (ICS) are distributed in rural areas for Clean Cooking.
- Promoting green technology and achieving energy efficiency in industrial sectors are given special focus under the Energy Efficiency and Conservation Master Plan



Research & Development (R&D)

- ✓ Ministry of Science and Technology (MOST): Bangbondhu Fellowship for MS, PhD (Abroad), PhD (in country), Postdoctoral (in country), Special Research Allocation & R&D Project for university faculties and NST fellowship for MS students among the universities in Bangladesh.
- ✓ Bangladesh Council of Scientific and Industrial Research (BCSIR)
- ✓ Bangladesh Atomic Energy Commission (BAEC)

The R&D activities of MOST, BCSIR & BAEC to assess of air pollution level in the following areas:

- i) analysis of black carbon in air particulate matter,
- ii) chemical characterization of particulate matter in the atmosphere,
- iii) identification and apportionment of particulate air pollution sources using statistical models,
- iv) monitoring of atmospheric lead level in urban areas of Bangladesh,
- v) GHG Emission Scenarios and air quality monitoring



Laws, Regulations and Policy

- ❖ Air pollution (control) Guideline, 2020, DoE, Ministry of Environment Forest and Climate Change.
- ❖ Air pollution Control Rules 2022, DoE, Ministry of Environment Forest and Climate Change.
- ❖ Auto Mobile Industry development policy, 2021, Ministry of Industry.
- ❖ Bangladesh Renewable Energy Policy, 2008, SREDA, Power division, Ministry of Power, Energy, and Mineral Resources.
- ❖ Bangladesh Road Transport Act, 2018, BRTA, Road Transport and Highway Division, Ministry of Road Transport and bridge.
- ❖ Brick production and kilns set up (control) Act, 2013(Amended 2019) , DoE, Ministry of Environment Forest and Climate Change.
- ❖ Country Action Plan Clean Cooking. 2013, Power Division, Ministry of Power, Energy and Mineral Resources.
- ❖ Electric vehicle charging guideline, 2022, Energy Efficiency and Conservation Section, Power Division, Ministry of Power, Energy, and Mineral Resources
- ❖ Energy Audit regulations, 2018, SREDA, Power division, Ministry of Power, Energy, and Mineral Resources.
- ❖ Energy Efficiency and Conservation master plan up to 2030, Sustainable and Renewable Energy Development Authority (SREDA), Power Division, Ministry of Power, Energy and Mineral Resources
- ❖ Local Government (City Corporation) Act, 2009, BRTA, Local Government Division. Ministry of Local Government, Rural Development.
- ❖ Solid Waste Management Rules, 2021, DoE, Ministry of Environment Forest and Climate Change.



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Way Forwards

- Assessment the significant impact on human health, the environment, and the economies.
- Assessing the potential transboundary transport of air pollution and subsequent effects in the region;
- Strengthening air quality monitoring (AQM) network
- Policy formulation and implementation at the national and regional level
- Emphasizing to integrating planning on the solutions for air pollution intensity.
- Technology transfer and enhance regional cooperation to achieve existing regional and global commitments
- To address brick kilns pollution, the government has enacted Brick Manufacture and Brick Kiln Set-up (Control) Act, 2013 (Amendment 2019) whereby setting and running clay-fired brick kilns are restricted, and environment-friendly alternative building materials including blocks are promoted.



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