WORLD BANK ENGAGEMENT ON AIR QUALITY MANAGEMENT

Asia Development Bank Workshop on Scaling Support- Discussion with MDBs

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23 November 2020
Countries often reach critical breaking points before a sustained effort is made to gain control.

There is no quick fix. Capacity development is the #1 need in most countries to put the long-term critical building blocks in place.

Countries require a sustained, multi-sector, and multi-jurisdiction (airshed) approach to decouple growth from air pollution.

The science of air pollution continues to evolve, and investment approaches must too:
- Long-range and secondary emission sources are better understood today.
- Technology and tools to understand and address the problem are expanding.
- Inter-connections with other environmental challenges like climate change are becoming better understood.
<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
<th>Project</th>
<th>Key activities</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>IPF</td>
<td>‘94-‘99</td>
<td>Transport and AQM</td>
<td>Vehicle, fuel, transport management, AQM planning</td>
</tr>
<tr>
<td>Mexico</td>
<td>DPL</td>
<td>‘11-’13</td>
<td>Low-Carbon DPL</td>
<td>Policy reforms to RE, EE, Transport</td>
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<tr>
<td>Peru</td>
<td>DPL (3)</td>
<td>‘09-’15</td>
<td>Environment DPLs</td>
<td>Policy reform on AQM, Contingency plan</td>
</tr>
<tr>
<td>China</td>
<td>P4R (2)</td>
<td>‘16-’21</td>
<td>Hebei and JJJ Programs</td>
<td>EE, RE, industrial, HH, Agriculture</td>
</tr>
<tr>
<td>Vietnam</td>
<td>DPL</td>
<td>‘16-’19</td>
<td>CC &amp; Green Growth</td>
<td>Policy Reform on Initial AQM, vehicle emission control etc.</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>IPF (3)</td>
<td>‘00-’19</td>
<td>AQM and Clean Air Projects</td>
<td>AQM, vehicle, brick kilns</td>
</tr>
<tr>
<td>Pakistan</td>
<td>P4R</td>
<td>‘18-’23</td>
<td>Punjab Green Development</td>
<td>AQM, EE, RECP</td>
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**Ongoing Bank-Executed Technical Assistance in:**
- China; India; Egypt; Ghana;
- Vietnam; South Africa; Nigeria;
- Bulgaria (EU funds)

**A Global Practice supports knowledge sharing across teams and cross-fertilization through peer reviews**

**Recent 2020 Loans:**
- **Egypt (IPF)** had a significant focus on waste management
- **Mexico (DPL)** – Climate and Air Quality linked and part of a COVID-19 response
EXAMPLES OF WORLD BANK SUPPORT CONTRIBUTING TO AIR QUALITY IMPROVEMENTS (Reductions in PM$_{10}$ concentrations in select cities from 1985-2018)

**China - Jiujiang: 2016 - 2021**
- Hebei Air Pollution Prevention and Control Program (USD 500 mn)
- Multi-sectoral AQM project in P4R mode
- Innovative Financing for Air Pollution Control in Jing-Jin-Ji (USD 500 mn)
- P4R project to reduce Energy sector emissions

**Mongolia Ulaanbaatar: 2012 - 2019**
- Ulaanbaatar Clean Air Project (USD 15 mn)
- Multi-sectoral IPF focusing on domestic, industrial & transport sectors

**Bangladesh Dhaka: 2009 - 2019**
- Clean Air & Sustainable Management Project (USD 97.8 mn)
- Multi-sectoral IPF focusing on domestic, industrial & transport sectors

**Vietnam Hanoi: 2016 - 2019**
- Climate Change and Green Growth Development Policy Financing (USD 90.0 mn)
- Broad DPL focusing on Coastal conservation, AQM & Natural Resource Management

**Mexico City: 1994 – 1999**
- Transport Air Quality Management Project (USD 220.0 mn)
- Transport sector was addressed in this IPF

**Chile Santiago: 2005 /06**
- Santiago Urban Transport Project (USD 30.2 + 70.0 mn)
- DPL focusing on the AQM and Transport service quality of Santiago city

**Peru Lima: 2009**
- Environmental Development Policy Loan (USD 330 mn)
- Multi-sectoral DPL in Air Quality Monitoring, Transport, Fisheries and Mining Sectors

- 60% (＞25 yrs)
- 63% (＞25 yrs)
- 21% (10 yrs)
- ＞50% (7 yrs)
The approach in China has been adapted to other countries

- Prioritized in the World Bank’s Country Partnership Framework
- Use a combination of lending instruments and TA
- Support an expansion to airshed level planning
- Introduced cost-effectiveness modeling for integration in AQM plans for airshed regions (JJJ+Hebei)

**Cost-effectiveness Analysis Integrated in AQM Planning**

- PMEH Grants (technical Assistance)
- JJJ+ Performance-based Lending
- Hebei Performance-based Lending
- GEF Grants
Many “no regret” sector specific measures can align well with climate change benefits.

Build awareness & evidence base

Develop Airshed Modelling and fill analytic gaps on rural sources

Introduce reforms for airshed-based AQM management

Develop state or Province level action plans and mobilize financing

Develop regional action plan and mechanisms for implementation

But to identify measures with highest cost effectiveness, cross-jurisdictional level planning with an understanding of secondary emissions is necessary.
South Asia Region is a GLOBAL HOT SPOT FOR HIGH AIR POLLUTION (2019)
Most cities in the region are 3 – 12x higher than WHO standard for PM$_{2.5}$

Source: Calculations from 2019 AQ data from openaq.org and airnow.org
Population in entire SAR area is exposed to PM$_{2.5}$ concentrations above WHO standards (except parts of Sri Lanka).

In most cases, concentrations are substantively above WHO’s interim target I (35 µg/m$^3$) and SAR countries own PM$_{2.5}$ air quality standards:

<table>
<thead>
<tr>
<th>Country</th>
<th>Standards</th>
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<tbody>
<tr>
<td>Afghanistan</td>
<td>35 µg/m3 (WHO IT 1)</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>15 µg/m3 (WHO IT 3)</td>
</tr>
<tr>
<td>India</td>
<td>40 µg/m3 (&gt; WHO IT 1)</td>
</tr>
<tr>
<td>Nepal</td>
<td>n/a (40 µg/m3 daily concentration)</td>
</tr>
<tr>
<td>Pakistan</td>
<td>25 µg/m3 (WHO IT 2)</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>25 µg/m3 (WHO IT 2)</td>
</tr>
</tbody>
</table>
Large Industrial Sources (incl. Brick Kilns)
Residential and Commercial Sources
Power Generation
Small Industrial Sources
Mobile Sources (Transport)
Other Agricultural Sources (fertilizer, manure)
Municipal Waste Burning
Agricultural Waste (crop residue) Sources

Modeling can improve the focus of effort
### EXAMPLES OF “BUILDING BACK BETTER” RECOVERY MEASURES ACROSS KEY SECTORS

<table>
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<tr>
<th>Power Generation</th>
<th>Large Industrial sources</th>
<th>Small Industrial sources</th>
<th>Residential and Commercial sources</th>
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<tr>
<td>Continue improving de-dust, de-NOx and de-SOx installation in power plants</td>
<td>Continue improving de-dust, de-NOx and de-SOx installation in large industrial sources</td>
<td>Promoting manual emission monitoring systems</td>
<td>Dedicated national clean cooking policies to transition and adapt to the best available stoves for local manufacture (Biogas, LPG, natural gas, etc.)</td>
</tr>
<tr>
<td>In certain hotspot areas, consider tightened emission standards</td>
<td>Establish and accelerate Continuous Emissions Monitoring (CEM) installations in larger industrial clusters</td>
<td>In brick kilns, newer technologies like zig zag to be increasingly applied to reduce emissions from brick kilns</td>
<td>Government housing projects to align with green building standards</td>
</tr>
<tr>
<td>Enabling a green, least-cost energy system and system-wide energy efficiency</td>
<td>Enable scaling of energy storage and demand response implementation through incentives and mechanism including building markets for ancillary services</td>
<td>Establishment of smaller industrial parks, and zones</td>
<td>• Ensuring buildings are more energy efficient and supporting the circular economy.</td>
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**Transportation**
- Sustaining and transitioning the temporary passenger mobility demand reduction to non-motorized, shared public transports
- Incentives to boost EV uptake and streamline the freight sector and its supply chain
- Incentive-based policies continue to encourage scrapping vehicles older than 10-15 years

**Agricultural waste (crop residue)**
- In-situ or on-farm management of residues
  - Promote conservation agriculture
  - Recycle residues in the soil - build SOC & productive capacity
- Explore new designs for combine harvesters suitable for no stubble and for double cropping systems
- Involve the private sector for farm machinery solutions

**Other Agriculture Sources**
- Cost-effectiveness of ammonia ($NH_3$) management an important part of AQM Planning
- Need to pilot new technical solutions for $NH_3$ management in small scale farming in SAR region

**Municipal Waste Burning**
- Take actions to improve existing disposal site in short to medium term
- An opportunity in green recovery to seek greater circularity in supply chains, which can act both to improve resource efficiency as waste is minimized and end-of-life products are recovered for reuse, remanufacture, and recycling.

**Dust**
- Green infrastructure measures can be extremely popular to reduce ozone and particulate pollution in population-dense cities.
- Natural Dust
  - Accelerate dust management technologies already underway in several SAR countries
- Construction Dust:
  - Coverage of construction sites, placement of wind breakers, water sprinkling systems, etc.
Inform and leverage innovative financing mechanisms, including World Bank DPF and PforR instruments for implementation of investment plans.

Important new Policy Reforms

- Performance based funds to tackle air pollution announced for the first time (up to USD $3.6 billion, 6 years)
- Air Commission established to reduce air pollution in the Delhi NCR and adjoining states – acknowledging airshed† management (interstate and multi sector)
AIR POLLUTION: A MULTI-SECTORAL, MULTI-JURISDICTIONAL CHALLENGE
Over 50% of sources can come from secondary emissions

Neighboring states, and urban and rural sources contribute to pollution in Bihar*

Precursor gases (NOx, SO) responsible for secondary PM formation

*Source: The World Bank
Some emerging findings on airsheds in South Asia

Critical airsheds with high PM$_{2.5}$ concentration:

- **1-2**: West/Central Indo-Gangetic Plain (IGP): India extends into Pakistan and Central/East IGP extends into Nepal and Bangladesh.

- **3**: Brahmaputra (Bangladesh and India).

- **4-5**: Middle India: East Gujarat/West Maharashtra and Odisha/Chhattisgarh

- **6**: Northern/Central Hindus: Pakistan (Punjab), India (Punjab), part of Afghanistan

- **7**: Southern Hindus: South Pakistan, West Afghanistan extends into East Iran).

→ **Collaboration is needed between jurisdictions** (states/provinces) within the airsheds

→ Airsheds 1, 2, 3, 6 and 7 go across international jurisdictions
What it takes: A Large multi-Sector Bank staff team + International and Indian experts are mobilized to support India

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<th>SECTOR</th>
<th>WORLD BANK MEMBERS</th>
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<tr>
<td>Environment (Core team)</td>
<td>Karin Shepardson, Jostein Nygard, Sharlene Chichgar, Neha Sharma, Sayantan Sarkar, Ishaa Srivastava, Gaurav Joshi, Pyush Dogra, Urvashi Narain</td>
</tr>
<tr>
<td>Agriculture/Rural</td>
<td>Priti Kumar, Manivannam Pathy</td>
</tr>
<tr>
<td>Energy</td>
<td>Power Sector: Ashok Sarkar, Surbhi Goyal; Natural Gas and Fuels; Renewables and Clean Energy: Simon Stolp, Michael Stanley</td>
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<tr>
<td>Climate Change</td>
<td>Chandra Shekhar</td>
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<tr>
<td>Transport</td>
<td>Gerald Olivier, Reenu Aneja</td>
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<tr>
<td>Urban/Governance</td>
<td>Sumila Gulyani, Abhijit Ray, Farah Zahir, Pedro Arizti</td>
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<tr>
<td>Communication</td>
<td>Sudip Mazumdar, Nitika Mehta</td>
</tr>
<tr>
<td>Health</td>
<td>Suresh Mohammad</td>
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<td>MSME</td>
<td>Charu Jain, Vishal Agarwal</td>
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<td>Markus Amann</td>
<td>IIASA/Austria</td>
</tr>
<tr>
<td>Laurence Rouli</td>
<td>INERIS/France</td>
</tr>
<tr>
<td>Alan Lloyd</td>
<td>CARB/ICCT/USA</td>
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<tr>
<td>Franck Dauge</td>
<td>Norwegian Institute for Air Research</td>
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<tr>
<td>Steiner Larssen</td>
<td>World Expert on air pollution studies</td>
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<tr>
<td>Rohini Pande</td>
<td>Yale University</td>
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<tr>
<td>Prof. Sagnik Dey</td>
<td>IIT Delhi</td>
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<tr>
<td>Dr. Shrikant Baldi</td>
<td>(Retd) Former Chief Secretary and ACS Finance, Himachal Pradesh</td>
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<tr>
<td>Dr. Prasad Modak</td>
<td>Head Ekonnect knowledge foundation</td>
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<tr>
<td>Dr. Meena Sehgal</td>
<td>Air pollution and public health expert, TERI</td>
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