

## Air Pollution and Urban Mobility

### Definitions

Air pollution is the introduction of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or damages the natural environment, into the atmosphere.

### Context and Policies

Most cities throughout the world experience dense concentrations of motorized emissions comprising particulate matter, lead, carbon monoxide, nitrogen oxides, and volatile organic compounds that react in the presence of sunlight to form ground-level ozone which poses risks to human health and plant life. Fine particulates, often associated with vehicular emissions, can cause health problems such as premature mortality and morbidity, as well as significant economic damage, and are thus of special concern in the developing world.

A primary environmental objective, therefore, is to reduce human exposure to harmful pollutants from urban transport sources by reducing ambient concentrations of pollutants arising from mobile sources, limiting the number of people exposed to elevated concentrations, and reducing the duration of exposure. This can be achieved through air quality management strategies that target the technology of individual vehicles and their fuels, and by improved management of the urban transport system as a whole. Both approaches require actions at national and city government levels.

### Issues

In many large cities, the poor tend to live closer to highways, where intense heavy-duty diesel vehicle traffic is concentrated, and their vulnerability to the associated negative impacts of air pollution is exacerbated significantly. Furthermore, many of the poor may be more susceptible to health effects of these emissions due to other contributing factors, such as poor nutrition, lack of access to health care, and general unhealthy environments in which they live (i).

### Actions

Even though there are no universal air quality management strategies that could be applied to all cities throughout the world, evidence suggests that a comprehensive sustainable urban mobility approach that takes advantage of a variety of instruments will have a significant impact on emission reductions and will result in extensive co-benefits through local improvements. Such approaches include the provision of cycling and walking facilities, attractive and reliable alternatives to the private vehicle, measures that restrict the use of the car; good land use planning practices; technological improvements such as cleaner fuels; and monetary incentives through appropriate economic instruments.

The World Bank report "Reducing Air Pollution from Urban Transport" (see under Key Documents, below) recommends using the following instruments within this comprehensive approach:



Photo credits: Beijing Car Pollution by "Iowahawk"  
Resources

### Documents

- **Air Quality Management, Module 5a, Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities**, 2004, Dr. Dietrich Schwela, GTZ, Eschborn (Germany)
- **Measuring the CO2 Consequences of Urban Transport Projects in Developing Countries: The Blind leading the Blind?** 2008, Lee Schipper, Maria Cordeiro and Wei-shiuen Ng, EMBARQ, Washington DC (USA)
- **Measuring the Invisible: Hanoi Case Study**, 2008, Lee Schipper, EMBARQ (USA)
- **Polluting cars to be phased out**, 2008, Xie Yu, China Daily, Beijing (China)
- **Promoting Global Environmental Priorities in the Urban Transport Sector**, 2006, Global Environment Operations, Environment Department, The World Bank, Washington DC (USA)
- **Reducing Air Pollution from Urban Transport**, 2005, Ken Gwilliam, Masami Kojima, and Todd Johnson, The World Bank, Washington DC (USA)
- **The Clean Air Initiative Strategy for Latin American and Caribbean Cities 2007-2012**, 2007, The Clean Air Institute, Washington DC (USA)
- **User Guide for Urban Transportation Emissions Calculator (UTEC)**, 2008, Transport Canada.

### Media

- **Better and cleaner urban transport for Europe**, 2008, DG Transport Video, European Environment Agency, Copenhagen (Denmark)

### Presentations

- **Air Pollution from Traffic Emissions: Major pollutants and their health impact**, 2009, Dr. Michael J. Gatari Gichuru, Institute of Nuclear Science & Technology, College of Architecture & Engineering, University of Nairobi (Kenya)
- **Mitigating Environmental Emissions from the Urban Transport System** 2002, Ram M. Shrestha, S.C. Bhattacharya, Nazrul Islam and N. T. Kim Oanh, Asia Institute of Technology (Thailand)

The global Transport Knowledge Partnership provides access to the best available information, expertise and technical advice to reduce poverty in the developing world.

www.gtkp.com

global Transport Knowledge Partnership,  
chemin de Blandonnet 2,  
1214 VernierIGeneva,  
Switzerland

Email: info@gtkp.com

- **Institutional framework.** Central governments should establish a predictable and consistent policy and regulatory framework for urban air quality management.
- **Air quality action plan.** Affected stakeholders -- private sector participants, different levels of government, and civil society -- should be engaged in developing an air quality action plan.
- **Fuel quality and vehicle emission standards.** Standards should be realistically set, progressively tightened over time, and stringently enforced.
- **Public transport.** Transit-oriented urban planning strategies and balanced land use should be developed to reduce trip lengths and concentrate movement on efficient public transport axial routes.
- **Fiscal policies.** Taxes, import duties, and vehicle licensing can be designed to discourage purchase and continuing use of polluting vehicles and engines. In many countries, raising taxes on automotive diesel should be considered. Separate vehicle charges based on vehicle weight, axle loadings, and annual mileage may also be justified. Free on-street parking should not be provided in congested areas, and subsidies to public off-street parking should be eliminated.
- **Non-motorized transport.** Provision for safe and comfortable walking, bicycling, and other forms of non-motorized transport can benefit air quality.
- **Scaling Down Air Pollution Modeling Tools for Urban Stakeholders**, 2008, Dr. Sarath Guttikunda, New Delhi (India)

### Recommended Links

- **The Clean Air Initiative** (CAI) (USA)
- **The Partnership for Clean Fuels and Vehicles** (PCFV), UNEP (Kenya)
- **URBANEMISSIONS.info** (India)

### Tools

**SIM-Air** (see Useful Links, below), used in World Bank Group projects in Asia, is a simple spreadsheet air quality model that assesses particulate pollutants and mitigation options for cities. It takes into account fleet characteristics, technologies, fuel types, routes, and inspection and maintenance to capture the synergies and tradeoffs in urban transport. The model simulates the emissions inventory, estimates the impact of air quality on health, and permits the evaluation of policy, economic, and technical options to address the environmental and health impacts of pollution. Reductions in vehicle density and improvements in fuel efficiency lead to lower emissions of air pollutants.

**The Urban Transportation Emissions Calculator** (see Key Documents, below) is a user-friendly tool for estimating annual emissions from personal, commercial, and public transit vehicles. It estimates greenhouse gas (GHG) and criteria air contaminant (CAC) emissions from the operation of vehicles. It also estimates upstream GHG emissions from the production, refining and transportation of transportation fuels, as well as from production of electricity used by electric vehicles. The primary input to the Tool is vehicle kilometres travelled (VKT) for road vehicles and passenger kilometres travelled (PKT) for rail vehicles. Modifying default values for other inputs, such as expansion factors, and fleet composition, to local conditions is not required to run the Tool, but is recommended to improve the accuracy of results.

Notes: (i) The Clean Air Initiative Strategy for Latin American and Caribbean Cities 2007-2012, 2007, The Clean Air Institute, Washington DC (USA)

### For further information

Contact Peter Midgley, gTKP Urban Mobility Theme Champion at [peter.midgley@gtkp.com](mailto:peter.midgley@gtkp.com)