URBAN AIR QUALITY MANAGEMENT STRATEGY IN ASIA pdf

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Urban air quality management strategy in Asia - Kathmandu Valley report (English) Abstract. This report aims to assist policy makers in the design and implementation of policies, monitoring, and management tools to restore air quality in Kathmandu, the political and commercial hub of Nepal.

Urban Air Quality and its Management in Asia: Outline of Presentation Objective: Present an overview of current status of AQM in Asia: Total Energy Consumption in Asia Source: Energy Mix in Asia Source: Electricity Generation in Asia Source: Electricity Generation in Asia and other Regions Source: Coal Production - Coal Consumption Source: Coal Consumption, Mtoe China, P. Refinery Capacities in Asia Source: Natural Gas Consumption, Mtoe With the exception of Hong Kong and Singapore, all countries in Asia have increased consumption of natural gas from to Share of Asia in world natural gas consumption has increased from 8. Energy Information Administration Motorization Trends in Asia India Thailand Indonesia Emission inventories are often often conducted as part of donor-funded programs and academic researches, only in few cases it is used for government regulatory purposes such as in PRC and Thailand With the exception of China and Hong Kong, EIs are usually partial and not covering all sources. Mostly mobile sources are covered, less often stationary and seldom area sources Criteria pollutants PM, CO, SO2, NOx, HC are usually covered in the EIs Most of the emission inventory studies are ad-hoc meaning that they are not repeated on a regular basis which makes trend analysis difficult Important study which was started recently is the India Clean Air Program which is the most comprehensive effort to develop emission inventory in India yet. However, also this project is an ad-hoc effort and not part of a regularly repeated effort. Methodology and Accuracy Compiling emission inventories remains a challenge in Asia due to non-standardized source categorization, operating data not systematically tabulated, inaccurate information and no specific reporting requirements Most studies have used the WHO and US EPA emission factors, requiring a need to evaluate the applicability and representativeness of these numbers to Asian sources and conditions Comparisons of emissions between different base years are difficult to assess due to differences in methodology e. Fair amount of experience is now available with source-receptor techniques both outside and in Asia, but they are not being applied on a routine basis in Asian countries in support of AQ policy making or the evaluation of AQ policy measures. Example is the IAEA PM characterization studies which after years of piloting have not been taken up by regulatory agencies in the countries where implemented. The source apportionment studies that are conducted in Asia for PM show large ranges in the sources mobile, stationary, area, biomass burning. The ranges are so large that they can not be explained by vehicle fleet data. Disclosure and Utilization Only a few countries such as P. China, Philippines and Thailand have published the emissions inventory in full however no information is available on the quality assurance methods being implemented. Source apportionment techniques are not being utilized for validation and improvement of the emissions inventory and enhancement of understanding of the linkages between particular emission sources and ambient air quality. Turning these data into useful input for decision-making remains an enormous challenge as EIs and SAs are not being utilized in identifying control strategies rules, enforceability and compliance, voluntary measures, availability of inputs to evaluate control effectiveness. Policymaking generally based on no-regret policies and not based on detailed emissions inventories and source apportionment which can effectively focus resources on integrated control measures and requirements for the sources most responsible for the resulting poor air quality. Positive exception is P. China where SO2 emission inventories are now being used on a routine basis to formulate SO2 control measures. Air Quality Monitoring With the exception of few countries, most Asian countries do not have immediate and clear plans to expand or upgrade existing AQ monitoring systems Pakistan has indicated its plans to establish continuous AQ monitoring stations in five major cities in CPCB in India has established real-time continuous monitoring of pollutants in four locations in Delhi and is now considering expansion of AQ monitoring capacity The number and location of existing monitoring stations are generally not representative of the population Programs to ensure the sustainability of operations of AQ monitoring stations and regular maintenance of equipment have caused degradation and inoperability of

several AQ monitoring stations in Asian countries such as Indonesia Air Quality Reporting In China, the government is continuing its drive to expand the coverage of its AQ monitoring stations but there is no indication of plans to report actual ambient AQ data instead of APIs After more than five years of not reporting AQ information, Malaysia is now releasing AQ data to the public in the form of APIs More cities and countries are starting to publish AQ data on websites and in media Hong Kong Bangkok Roadside particulate levels are always higher than ambient confirming that vehicles are major PM source Increased number of policies on mobile sources e. Benchmarking Air Quality Management Capabilities in Asia The Benchmarking study involved 20 cities in Asia representing various economic levels and geographic coverage. The cities were categorized according to four AQM capability indices â€" 1 AQ measurement; 2 data availability and assessment; 3 emission estimates; and 4 AQ management enabling capacity. Cities with high levels of economic development tend to have well-developed AQM systems Benchmarking of AQM capability can assist cities in setting priorities and developing strategies for strengthening their AQM capability Increased urbanisation, mobilization and industrialisation. Only ad hoc AQM. Deterioration of air quality through rising levels of air pollution Urbanisation, industrialisation and mobilisation continued. Initial systematic AQM procedures applied High but stabilising levels of air pollution. Serious health and environmental impacts Cleaner processes developed. Systematic AQM procedures developed Air pollution decreasing from high levels Maturing of cleaner processes, use of cleaner fuels and mature emission controls. Compared to five years ago, more Asian countries have now adopted or have legislated plans to adopt stricter vehicle emissions standards as well as fuel standards Emphasis has been on institutionalizing new vehicle emissions standards and not enough attention has been given in addressing emissions from in-use vehicles More attention has been given as well to light-duty vehicles compared to heavy duty vehicles One of the most pressing problem of Asian countries is the rapid increase in the motorcycle fleet but not enough attention has been given towards appropriate regulatory measures to control the associated emissions Vehicle Emissions Standards Vehicle Emissions Standards new light duty vehicles Source: CAI-Asia, Italics â€" under discussion a â€" gasoline b â€" diesel c â€" Entire country d â€" Delhi and other cities; Euro 2 introduced in Mumbai, Kolkata and Chennai in ; Euro 2 in Bangalore, Hyderabad, Khampur, Pune and Ahmedabad in , Euro 3 to be introduced e â€" Beijing and Guangzhou as of 01 September have adopted Euro 3 standards; Shanghai has requested the approval of the State Council for implementation of Euro 3 f â€" Euro 4 for gasoline vehicles and California ULEV standards for diesel vehicles g â€" Gasoline vehicles under consideration Land-use Planning and Transportation Land-use planning, perhaps the most powerful regulatory tool that can be used to address vehicular emissions, is still seldom used by most Asian countries Governments and development institutions have started to place an increasing emphasis on urban transportation issues, particularly on public transportation International organizations have acknowledged the direct relationship between climate change mitigation and the promotion of public transportation and have initiated several projects on this Several countries in Asia have now started to develop sustainable urban transportation policies promoting public transportation, i. Bus Rapid Transit in Asia Systems in operation Systems in planning or under construction Retrofitting Buses Seoul has implemented a comprehensive project on retrofitting all its buses with after-treatment devices in Seoul, Incheon and Gyeonggi In , over 29, vehicles were fitted with either diesel particulate filters or DOCs, according to the class of vehicle. The scheme has now entered its Main Program phase, and in a further 83, vehicles will be fitted with after-treatment devices In Tokyo, a program which started in has paved the way for the wide circulation of low sulfur diesel fuel and continuous regeneration DPFs Several cities like Beijing, Bangkok, and Pune have pursued pilot projects on retrofitting Electric bikes in China, P. Electric bikes in China increased from only 40, in to 10 million in Sales increased from about 7. ADB, ; Cherry, ; Weinert, ADB, ; and http: Standards Although countries in Asia have Industrial Emission Standards in place, their implementation and monitoring is generally weak and needs to be strengthened Compliance to stationary standards is hindered by lack of access to resources allowing for investments in pollution control, low level of technology, non-availability of trained personnel, and the unwillingness of management to invest in environmental protection Many countries have substantial number of small and medium-sized industries interspersed in residential areas making it more difficult to monitor and

regulate these sources The Philippine Outsourcing Sampling Project showed: While international roadmaps for vehicular emissions are in place, stationary sources standards are not readily available for comparison thus absence of roadmaps makes it difficult to promote stricter standards. With the exception of the UNEP GERIAP which has ended , there are very few regional initiatives and programs on stationary sources compared to mobile sources which have resulted in lesser exchanges and policy-dialogues Reduction of air pollution from stationary sources in Asia are still mostly "end-of-pipe" treatments: Control Strategies 1 This has sparked off: Improved base-line monitoring of emissions Structural shifts to new, less energy-intensive industrial products Reducing the energy intensity of existing industrial production through process changes and optimizing industrial energy systems. Although China, India, Thailand, the Philippines, and Indonesia all increasingly rely on coal and oil for electricity, they have also all established national goals to increase renewable energy and improve energy efficiency. Control Strategies 2 SO2 Control in China, P. Pollution Levy System PLS , which is based on the polluter pays principle Two Control Areas TCA , is not an instrument like the pollution levy for affecting abatement behavior, but rather a means for prioritizing SO2 control efforts, designating the standards, and identifying cities and regions that should receive extra attention and resources from the national government Total Emissions Control TEC limits the polluters to discharge under a specified level and levies the charge when any pollution is discharged China has been engaged in sweeping energy policy reforms over the last two decades to promote energy efficiency and conservation. Measures taken include the following: These measures represent emission savings equal to nearly the entire U.

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Urban Air Quality Management Strategy in Asia Letter of Support 5 adverse health effects, rising health costs, damage to ecological and cultural properties, deterioration of built.

Chapter 43Air and Water Pollution: Environmental pollution has many facets, and the resultant health risks include diseases in almost all organ systems. Thus, a chapter on air and water pollution control links with chapters on, for instance, diarrheal diseases chapter 19 , respiratory diseases in children and adults chapters 25 and 35 , cancers chapter 29 , neurological disorders chapter 32 , and cardiovascular disease chapter 33 , as well as with a number of chapters dealing with health care issues. Nature, Causes, and Burden of Air and Water Pollution Each pollutant has its own health risk profile, which makes summarizing all relevant information into a short chapter difficult. Nevertheless, public health practitioners and decision makers in developing countries need to be aware of the potential health risks caused by air and water pollution and to know where to find the more detailed information required to handle a specific situation. This chapter will not repeat the discussion about indoor air pollution caused by biomass burning chapter 42 and water pollution caused by poor sanitation at the household level chapter 41 , but it will focus on the problems caused by air and water pollution at the community, country, and global levels. Estimates indicate that the proportion of the global burden of disease associated with environmental pollution hazards ranges from 23 percent WHO to 30 percent Smith, Corvalan, and Kjellstrom These estimates include infectious diseases related to drinking water, sanitation, and food hygiene; respiratory diseases related to severe indoor air pollution from biomass burning; and vectorborne diseases with a major environmental component, such as malaria. These three types of diseases each contribute approximately 6 percent to the updated estimate of the global burden of disease WHO These numbers may look small, but the contribution from most risk factors other than the "top 10" is within the 0. Because of space limitations, this chapter can give only selected examples of air and water pollution health concerns. Clearly, disease control measures for people working in or living around a smelter may be quite different from those for people living near a tannery or a brewery. For detailed information about industry-specific pollution control methods, see the Web sites of industry sector organizations, relevant international trade union organizations, and the organizations listed above. Air Pollution Air pollutants are usually classified into suspended particulate matter PM dusts, fumes, mists, and smokes ; gaseous pollutants gases and vapors ; and odors. Suspended PM can be categorized according to total suspended particles: Much of the secondary pollutants PM2. Types of suspended PM include diesel exhaust particles; coal fly ash; wood smoke; mineral dusts, such as coal, asbestos, limestone, and cement; metal dusts and fumes; acid mists for example, sulfuric acid ; and pesticide mists. Gaseous pollutants include sulfur compounds such as SO2 and sulfur trioxide; carbon monoxide; nitrogen compounds such as nitric oxide, NO2, and ammonia; organic compounds such as hydrocarbons; volatile organic compounds; polycyclic aromatic hydrocarbons and halogen derivatives such as aldehydes; and odorous substances. Volatile organic compounds are released from burning fuel gasoline, oil, coal, wood, charcoal, natural gas, and so on ; solvents; paints; glues; and other products commonly used at work or at home. Volatile organic compounds include such chemicals as benzene, toluene, methylene chloride, and methyl chloroform. Emissions of nitrogen oxides and hydrocarbons react with sunlight to eventually form another secondary pollutant, ozone, at ground level. Ozone at this level creates health concerns, unlike ozone in the upper atmosphere, which occurs naturally and protects life by filtering out ultraviolet radiation from the sun. Sources of Outdoor Air Pollution Outdoor air pollution is caused mainly by the combustion of petroleum products or coal by motor vehicles, industry, and power stations. In some countries, the combustion of wood or agricultural waste is another major source. Pollution can also originate from industrial processes that involve dust formation for example, from cement factories and metal smelters or gas releases for instance, from chemicals production. Indoor sources also contribute to outdoor air pollution, and in heavily populated areas, the contribution from indoor sources can create extremely high levels of outdoor air pollution. Motor vehicles emit PM, nitric oxide and NO2 together referred to as NOx , carbon monoxide, organic compounds, and lead. Lead is a gasoline additive that has been phased out in industrial

countries, but some developing countries still use leaded gasoline. Mandating the use of lead-free gasoline is an important intervention in relation to health. It eliminates vehicle-related lead pollution and permits the use of catalytic converters, which reduce emissions of other pollutants. Catastrophic emissions of organic chemicals, as occurred in Bhopal, India, in box The Bhopal plant, owned by the Union Carbide Corporation, produced methyl isocyanate, an intermediate in the production of the insecticide carbaryl. On December 2, , a ,gallon storage tank containing methyl isocyanate more Another type of air pollution that can have disastrous consequences is radioactive pollution from a malfunctioning nuclear power station, as occurred in Chernobyl in WHO Radioactive isotopes emitted from the burning reactor spread over large areas of what are now the countries of Belarus, the Russian Federation, and Ukraine, causing thousands of cases of thyroid cancer in children and threatening to cause many cancer cases in later decades. Exposure to Air Pollutants The extent of the health effects of air pollution depends on actual exposure. Young children and elderly people may travel less during the day than working adults, and their exposure may therefore be closely correlated with air pollution levels in their homes. Children are particularly vulnerable to environmental toxicants because of their possibly greater relative exposure and the effects on their growth and physiological development. Meteorological factors, such as wind speed and direction, are usually the strongest determinants of variations in air pollution, along with topography and temperature inversions. Therefore, weather reports can be a guide to likely air pollution levels on a specific day. Workplace air is another important source of air pollution exposure chapter Resource extraction and processing industries, which are common in developing countries, emit dust or hazardous fumes at the worksite table Such industries include coalmining, mineral mining, quarrying, and cement production. Developed countries have shifted much of their hazardous production to developing countries LaDou This shift creates jobs in the developing countries, but at the price of exposure to air pollution resulting from outdated technology. In addition, specific hazardous compounds, such as asbestos, have been banned in developed countries Kazan-Allen , but their use may still be common in developing countries. Impacts on Health Epidemiological analysis is needed to quantify the health impact in an exposed population. The major pollutants emitted by combustion have all been associated with increased respiratory and cardiovascular morbidity and mortality Brunekreef and Holgate The most famous disease outbreak of this type occurred in London in U. Ministry of Health , when 4, people died prematurely in a single week because of severe air pollution, followed by another 8, deaths during the next few months Bell and Davis In the s and s, new statistical methods and improved computer technology allowed investigators to study mortality increases at much lower concentrations of pollutants. A key question is the extent to which life has been shortened. Early loss of life in elderly people, who would have died soon regardless of the air pollution, has been labeled mortality displacement, because it contributes little to the overall burden of disease McMichael and others Long-term studies have documented the increased cardiovascular and respiratory mortality associated with exposure to PM Dockery and others ; Pope and others A year follow-up of a cohort of , Americans living in different cities found that the associations were strongest with PM2. Another approach is ecological studies of small areas based on census data, air pollution information, and health events data Scoggins and others , with adjustments for potential confounding factors, including socioeconomic status. Many urban areas of developing countries have similar or greater levels of air pollution. The major urban air pollutants can also give rise to significant respiratory morbidity WHO For instance, Romieu and others report an exacerbation of asthma among children in Mexico City, and Xu and Wang note an increased risk of respiratory symptoms in middle-aged non-smokers in Beijing. Asthma is another disease that researchers have linked to urban air pollution McConnell and others ; Rios and others Ozone exposure as a trigger of asthma attacks is of particular concern. The mechanism behind an air pollution and asthma link is not fully known, but early childhood NO2 exposure may be important see, for example, Ponsonby and others Leaded gasoline creates high lead exposure conditions in urban areas, with a risk for lead poisoning, primarily in young children. The main concern is effects on the brain from low-level exposure leading to behavioral aberrations and reduced or delayed development of intellectual or motoric ability WHO Lead exposure has been implicated in hypertension in adults, and this effect may be the most important for the lead burden of disease at a population level WHO Other pollutants of concern are the carcinogenic volatile organic compounds,

which may be related to an increase in lung cancer, as reported by two recent epidemiological studies Nyberg and others ; Pope and others Urban air pollution and lead exposure are two of the environmental hazards that WHO assessed as part of its burden-of-disease calculations for the World Health Report The report estimates that pollution by urban PM causes as much as 5 percent of the global cases of lung cancer, 2 percent of deaths from cardiovascular and respiratory conditions, and 1 percent of respiratory infections, adding up to 7. This burden of disease occurs primarily in developing countries, with China and India contributing the most to the global burden. Eastern Europe also has major air pollution problems, and in some countries, air pollution accounts for 0. The global burden of disease caused by lead exposure includes subtle changes in learning ability and behavior and other signs of central nervous system damage Fewthrell, Kaufmann, and Preuss WHO concludes that 0. Water Pollution Chemical pollution of surface water can create health risks, because such waterways are often used directly as drinking water sources or connected with shallow wells used for drinking water. In addition, waterways have important roles for washing and cleaning, for fishing and fish farming, and for recreation. Another major source of drinking water is groundwater, which often has low concentrations of pathogens because the water is filtered during its transit through underground layers of sand, clay, or rocks. However, toxic chemicals such as arsenic and fluoride can be dissolved from the soil or rock layers into groundwater. Direct contamination can also occur from badly designed hazardous waste sites or from industrial sites. In the United States in the s, the government set in motion the Superfund Program, a major investigation and cleanup program to deal with such sites U. Environmental Protection Agency Coastal pollution of seawater may give rise to health hazards because of local contamination of fish or shellfishâ€”for instance, the mercury contamination of fish in the infamous Minamata disease outbreak in Japan in WHO Seawater pollution with persistent chemicals, such as polychlorinated biphenyls PCBs and dioxins, can also be a significant health hazard even at extremely low concentrations Yassi and others Sources of Chemical Water Pollution Chemicals can enter waterways from a point source or a nonpoint source. Point-source pollution is due to discharges from a single source, such as an industrial site. Nonpoint-source pollution involves many small sources that combine to cause significant pollution. For instance, the movement of rain or irrigation water over land picks up pollutants such as fertilizers, herbicides, and insecticides and carries them into rivers, lakes, reservoirs, coastal waters, or groundwater. Another nonpoint source is storm-water that collects on roads and eventually reaches rivers or lakes. Paper and pulp mills consume large volumes of water and discharge liquid and solid waste products into the environment. The liquid waste is usually high in biological oxygen demand, suspended solids, and chlorinated organic compounds such as dioxins World Bank The storage and transport of the resulting solid waste wastewater treatment sludge, lime sludge, and ash may also contaminate surface waters. Sugar mills are associated with effluent characterized by biological oxygen demand and suspended solids, and the effluent is high in ammonium content. In addition, the sugarcane rinse liquid may contain pesticide residues. Leather tanneries produce a significant amount of solid waste, including hide, hair, and sludge. The wastewater contains chromium, acids, sulfides, and chlorides. Textile and dye industries emit a liquid effluent that contains toxic residues from the cleaning of equipment. Waste from petrochemical manufacturing plants contains suspended solids, oils and grease, phenols, and benzene. Solid waste generated by petrochemical processes contains spent caustic and other hazardous chemicals implicated in cancer. Another major source of industrial water pollution is mining. The grinding of ores and the subsequent processing with water lead to discharges of fine silt with toxic metals into waterways unless proper precautions are taken, such as the use of sedimentation ponds. Lead and zinc ores usually contain the much more toxic cadmium as a minor component.

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Severe air pollution is threatening human health and the gains of economic growth in Asia's largest cities. This report aims to assist policy makers in the design and implementation of policies.

8: EconPapers: Urban Air Quality Management Strategy in Asia. Metro Manila Report

This report aims to assist policy makers in the design and implementation of policies, monitoring, and management tools to restore air quality in Kathmandu, the political and commercial hub of Nepal.

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