

**Stakeholder Workshop on Air quality and transportation challenges in Ethiopia and agenda for Clean Air Action Plan**

A joint initiative of

Ministry of Environment and Forest, The Federal Democratic Republic of Ethiopia and

Centre for Science and Environment, India

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Worsening air quality and traffic congestion in cities of Africa and India is a cause for concern. These cities also have the opportunity to plan differently and leapfrog. Ethiopia like any other developing country is confronting problems of air pollution and traffic congestion. For the cities of India and Ethiopia, improving urban air quality, controlling congestion and protecting the sustainable urban commuting practices are some of the toughest challenges. The cities in the region, while having made some significant strides in meeting air quality challenges, face newer challenges. Ethiopia, and India, need air quality management approaches including technology leapfrog, scaling up of public transport, integrated multi-modal transport options, car restraints and walking for clean air.

In a joint initiative the India based Centre for Science and Environment (CSE) along with Ministry of Environment and Forest, The Federal Democratic Republic of Ethiopia has created a platform for multi-stakeholder consultation to deliberate on the framework for Clean Air Action Plan. The stakeholder workshop will scope and assess the needs for framing of Clean Air Action Plan for our cities and encourage learning from each other.

**The key highlights of air quality and public health challenge in Ethiopia and India**

**Air quality monitoring and management:** Air quality monitoring is limited and sometimes not existent in our cities. Only few cities are better prepared. India has close to 5000 cities and towns. But it monitors about 247 cities out of 5000 cities. Only 16 cities have online monitoring systems to generate real time data. The monitoring grid in the African region is still evolving. The published database of outdoor air pollution in cities in 2013 by the WHO has identified 11 African countries which monitor particulate matter. Air quality monitoring information in Ethiopia is very limited. There is only one air quality monitoring station in Ethiopia located at the Ethiopian Meteorological Agency (EMA) at Addis Ababa. However no data is publicly available. More ambient air quality monitoring stations are planned.

**Air quality trends:** Air pollution shows varying trends in cities of Indian and Africa. In India half of the urban population breathes air laced with particulate pollution that has exceeded the standards. Smaller and more obscure cities are amongst the most polluted. In cities of African continent the problem though not well assessed yet and not expected to be as bad as that of India is showing a rising trend. Most cities in Africa have not yet adopted air quality standards. The WHO guidelines are the key benchmarks. Though the reported PM10 levels in most African cities are lower than some of the worst hit cities in India, their levels are still much higher than the stringent WHO guidelines. Even at the comparatively lower levels of pollution than those in Indian cities the African cities have a cause of concern. The Global Burden of Disease (GBD) estimates show that the most health effects occur at lower levels. There is no reason to think that the risk in these cities is less.

Particulate pollution is a matter of concern for Ethiopia as well. The only time series data one could find is from a World Bank document showing PM10 data from 1991 to 2011. It shows increasing PM10 levels from 1996 till 2009. Few other available studies show monitoring of PM10, CO, NO2 and SO2.

Though there is an air quality monitoring station in Addis Ababa, information does not exist about the air quality monitoring. It is not clear whether the monitoring is being carried out or not. Only sporadic studies by researchers inform about the air quality levels. In 2003, the Ethiopian Environmental Protection Authority and the United Nations Industrial Development Organisation have prepared the guideline ambient environment standards for Ethiopia under the Ecologically Sustainable Industrial Development (ESID) Project. This also includes guidelines for air quality standards.

**Need inventive action to expand air quality monitoring in the two regions:** Globally there are efforts to support development and use of new but low cost monitoring technologies and develop guidelines for it to meet requirements of regulatory monitoring. This can be widely deployed at lower costs to supplement the conventional monitoring system that are very expensive for our regions. Our cities need to bridge the gap in data availability to citizens and also assess personal exposure. It is important to invest in data generation to inform policy action on health protection.

### **Public health challenge**

Air quality has significant impact on public health in both the regions. According to the GBD outdoor air pollution is the fifth largest killer in India. About 627,000 premature deaths occur every year in India. More than 18 million healthy life years are lost due to air pollution. Air pollution triggers stroke, cardiovascular and respiratory diseases, and cancer. Since 2000, at least one study a year has been published in Delhi to give clinching evidence of smog's toxic risk.

In Africa, according to the GBD estimates about 176,000 deaths occur every year due to outdoor air pollution. This is still less than Europe at 279 000 deaths. But this signals why Africa region needs to be preventive and precautionary.

According to the GBD, ambient particulate pollution is the 13<sup>th</sup> risk factor for disease burden in Ethiopia. According to a WHO report, the country has reported the highest number of air pollution deaths followed by Kenya and Uganda. This report has estimated the number of deaths associated to indoor and outdoor air pollution for 2004 at 72,400 and 2,500 respectively. According to an estimate, indoor air pollution is responsible for more than 50,000 deaths annually and causes nearly 5 per cent of the burden of disease in the country.

VOCs monitoring conducted in two Ethiopian cities – Jimma and Addis Ababa found higher levels. The African region is also reporting one of the highest death rates from non-communicable disease. Air pollution can exacerbate this. In Sub-Saharan Africa NCDs are projected to surpass infectious diseases by 2030. NCDs are estimated to account for 34 per cent of all deaths in Ethiopia.

### **Why vehicles are a special challenge**

Cities have many sources of outdoor air pollution and all require mitigation action. But vehicles pose a special challenge. Pollution concentration in our breathe is three to four times higher than what it is in the ambient air. People residing 500 metres from roads are the most exposed to vehicular fumes, says the Health Effects Institute of the US. For instance, about 55 per cent of Delhi's population lives within that zone; so it runs a serious risk of exposure. Air quality monitoring and studies conducted by the Centre for Science and Environment in New Delhi shows that the particulate levels that people are exposed to while traveling on the roads or while walking can be 2-4 times higher than the ambient concentration. Studies by University of California in Berkeley shows PM2.5 concentration inside vehicles while travelling in Delhi can be 1.5 times the background levels.

Vehicular fume is also extremely toxic. This can be further aggravated by rapid increase in use of diesel in cars and expansion of freight traffic. In June 2012 the WHO has reclassified diesel emissions as class I

carcinogen by putting it in the same bracket as tobacco smoking for its strong link with lung cancer. Diesel also has short term respiratory and cardiac effect. International studies, including one carried out in London, show diesel emissions have worsened the lung function in people with asthma. Given the poor quality of diesel in India, this is of special concern.

In African cities, the rudimentary data from sporadic studies show high exposure. According to a source apportionment study in 2004 in Addis Ababa, the air pollution sources include light and heavy-duty vehicles, industry, home heating and cooking, as well as fugitive sources such as biogenic emissions and dust.

A specific medical study of patients and their exposure to the pollution level was done in Addis Ababa. Out of the top 20 leading causes of out patient visit by region in all health centers and hospitals of Addis Ababa, the occurrence of acute respiratory infections was of prime concern. It was found that among 3,592 individuals living within 150 m of a road, the risk of wheeze increased significantly in linear relation to proximity to the road. The findings indicated that living in close proximity to road vehicle traffic is associated with an increased risk of wheeze but that other environmental factors are also likely to be present.

### **Sustainable mobility and clean air**

Mobility crisis begins to build up when an increasing share of our daily trips are being made by cars that occupy more road space, carry fewer people, pollute more, guzzle more fuel. They edge out pedestrians, bicycles, and public transport. This is now happening across all cities of Africa and India/Asia. This can further aggravate pollution.

**Explosive numbers:** Vehicle numbers growing rapidly in both Indian cities as well as in the cities of Africa. Although the levels in Asia and Africa remain comparatively low compared to other regions, the growth rate is high. However it is also said that if the estimates of personal vehicles include two-wheeled motorcycles then the rate of motorization is more than the developed countries.

Delhi has more than 8 million vehicles and is adding 1400 vehicles a day. Vehicle numbers have increased exponentially in Ethiopia. As of June 2014, Ethiopia had 519,816 registered cars. Around 30,128 cars were imported into the country last year showing an increment of more than 7,000 cars compared to the previous year.

**Congestion impacts:** Cities are paying a very high price for congestion. Traffic jams lead to fuel wastage, more pollution and serious economic losses. A normal commuting time has increased significantly during peak hours. On many arterial roads the traffic volume has exceeded the designed capacity and the service level of the road. A quick glance at the city development plans and other sources bring out the nature of mobility crisis in the cities.

Addis Ababa also remains affected with high levels of congestion, high transport costs, and long travel times. The transport policy of Addis Ababa states high congestion occurs in road intersections and squares. Traffic congestion renders inefficient traffic flow resulting in high transport costs and travel time. A study of East-West Corridor showed that on an average about 38 Veh-day and about 352-person-day are wasted at each major intersection entry and the city incurs annually about 5-8 Million Birr per intersection only for vehicle and fuel cost. Cities are paying a very high price for congestion. Traffic jams lead to fuel wastage, more pollution and serious economic losses. A normal commuting time has increased significantly during peak hours.

### **Walk and cycle**

Despite growing dependence on cars, walking and cycling and public transport share dominate travel in our cities. In African cities where a majority of people (nearly 50 per cent of the population) walk, not much emphasis is given to these vulnerable road users. Walking is the dominant mode in Addis Ababa. According to the 2005 Urban Transport Study, walking accounted for 60.5 per cent of all trips. In addition

to walking, minibuses and city buses constitute 20.6 per cent 10.9 per cent share of trips respectively. Cars have 4.7 per cent of the trips. Even though the city has most walking trips, facilities for pedestrians tend to be inadequate and substandard. Over 60 per cent of the street network lack footpaths.

The city's Local Development Plan aims to “promote cost-effective movement systems” and “accessibility through improving relationships between people, places and activities”. Addis Ababa Municipality is involved in Share the Road program with UNHabitat and UNEP.

### **Road safety**

Urban road design that give priority to vehicle speed and movement also compromise road safety. This discourages walking and public transport usage and adds to pollution. There is already very high death and injury impact of vehicle bulge in Delhi and other Indian cities. A rate of 16 deaths per hour and 58 injuries in India is equivalent to wiping out about 40 per cent of population of Maldives in a year. Despite the nominal reduction in total number of accidents over the last two decades, the share of fatal road accidents have increased phenomenally as the Indian cities are prioritising high speed roads for vehicles over ensuring safe access for all.

Africa is also said to have high road injury risk. Africa has less than 3 per cent of the world's motor vehicles, but more than 11 per cent of global road fatalities. Ethiopia's Ministry of Health was developing a three-year strategic plan to prevent injuries and establish emergency medical services. Ethiopia also had created a national road safety coordinating office, in line with WHO recommendations.<sup>i</sup>

### **Intermediate and informal public transport system**

In cities of India and Africa intermediate public transport systems like minis bus taxis etc play a crucial role in providing public transport services. Cities of India and African countries must not make the mistake of destroying the intermediate public transport system – White and blue mini buses/vans (blue donkeys), matatus, boda bodas, auto rickshaws, cycle rickshaws. In most cities of India and Africa intermediate public transport system are the most important form of transportation system. In Nairobi for example, *Matatus* or mini buses are the only form of public transport operating in Nairobi. This today meets nearly 70 per cent of the travel demand. These are very important for last mile connectivity and as feeders to public transport. These systems should be reorganized well to improve efficiency and deployment.

In Addis Ababa, minibuses/minivans known as blue donkeys with a capacity of 11 passengers are the lifeline. Around 10,000 minivans ply in the city. Though these are overcrowded, polluting and known for dangerous driving, yet because of cheap and affordable fares, these are life line of city's public transport.

Effort has been made to organise this system by making 13 owners' associations based on zoning system. These associations do service route management. This system should be protected and scaled up.

### **Formal public transport system**

Buses will play a crucial role in the mobility transition in the big and medium rung cities. Cities need well managed, well organised modern buses that deliver efficient public transport services at affordable rates. Cities need buses because these allow greater flexibility, greater geographical coverage, cost effectiveness, and space efficiency.

### **Public transport system in Addis Ababa**

A study done by the Addis Ababa Institute of Technology has assessed the existing operational and financial performance of the Anbessa City Bus Service Enterprise (ACBSE). The study findings show that the ACBSE has significantly low operational performance in almost all the parameters that were evaluated as compared to the standards.

According to the World Bank, the current public transport modes and services are not integrated, in terms of network coverage/routes, fares, schedules and facilities. The two main passenger transport modes, Anbessa bus and the independently operated mini-bus-taxis are somewhat weak in planning, organisation, operation, productivity and quality. These weaknesses are exacerbated by a lack of an integrated passenger transport agency unit or capability within Addis Ababa Road and Transport Bureau to effectively manage comprehensive network design, according to public needs, by poor enforcement on the behavior of operators, and by a general lack of effective traffic management.

In Ethiopia, the Ministry of Transport recently adopted a plan to reform public transport and invest in mass rapid transit solutions. The Ministry aims to implement a network of seven BRT corridors, as well as two LRT routes in the next few years.

### **Vehicle technology and fuel quality roadmap to reduce vehicular emissions**

India and countries in Africa are motorising at a level of technology and fuel quality that are not so clean and can lock up enormous pollution in the vehicle stock and compound health risks.

**Concerns over technology and fuel quality roadmap:** India has implemented Euro III and Euro IV emissions standards in about 30 cities and Euro III in the rest of the country, This is 10 to 15 years behind Europe.

African countries in the continent have also begun to reduce fuel sulphur levels in fuels to enable use of emissions control technologies. In 2002, there was no country in Africa which had 50 ppm sulphur in diesel. Since January 2015, Kenya, Uganda, Rwanda, Burundi and Tanzania have moved to 50 ppm sulphur fuel within East Africa. South Africa and Nigeria have already implemented the Euro 2 standards. South Africa has passed the regulation to implement 10 ppm by 2017. Morocco, Tunisia and Mauritius have met 50 ppm or below target. Kenya and Rwanda have also met the 50 ppm diesel fuel sulphur target from January 2015.

Ethiopia is developing draft emission standards. This will address the issues of fuel quality, vehicle fleet and types and age of the vehicle fleet. Unleaded gasoline is being used in the country. The sulphur content in diesel is also being lowered from time to time. But it is still high. The maximum allowable sulphur in diesel fuel is 5,000 ppm and 1,000 ppm in gasoline. Use of low sulphur fuel is recommended for the country by harmonisation of mixed grade import to 500 ppm and then moving to 50 ppm.

Transition to low sulphur fuel will lead to health benefits.

### **Unique challenge of old second-hand vehicles**

This is a special challenge of African cities where import of second hand vehicles dominate. Secondhand vehicles from Japan, Europe and other countries swamp. Because of the high price of new vehicles, people prefer buying second hand vehicles. Very few vehicles are new. Some of them are locally assembled or manufactured as in South Africa or in General Motors assembling plant in Ethiopia. Addis Ababa faces a rapid increase in air pollution due to increasing number of automobiles which do not follow emission standards set by various environmental agencies. Lack of retirement policy for the vehicles worsens the problem. This causes enormous emissions. This will require urgent attention.

### **Vehicle inspection**

Efforts are being made to organize the vehicle inspection centre to address the problem of inuse emissions. In Ethiopia, annual vehicle inspection is mandatory. The vehicle road worthy test is being conducted with machine which even measure the level of emission of exhaust pipes against the standard set by the Authority.

## **Vehicle taxation**

The scale of transition that is needed will require enormous investment. This demands innovative fiscal strategies. Implement polluter pay principles. Motorists should pay the full external costs that include congestion, pollution, ill health, and climate change. This can bring additional revenue to pay for the alternatives like public transport, walking and cycling infrastructure

It is ironical that across our regions – India and several African countries buses are made to pay more taxes than cars. Almost all state governments tax the buses higher than cars. This will have to be reversed. Currently bus operations are treated as commercial operations and taxed high. But cars will have to be taxed higher than buses. In Delhi for instance, cars pay a miniscule amount of one time road tax when they are purchased. But buses are made to pay much higher taxes annually. This increases bus fares.

But Ethiopia has set a good example of lowering taxes on public transport and imposing higher taxes on personal vehicles. This is a good practice among the developing country cities.

## **Car restraint measures: Parking as a TDM measure**

Globally, the governments are adopting measures to restrain use of cars. This is being done either through tax policies, road pricing or parking policy. The first generation restraint measures include parking policy as a demand management tool reduce parking demand and also use of personal cars. This is easier to implement in developing cities.

Conventional parking policies in most of our cities have aimed at increasing parking provisions to meet the growing demand for parking by earmarking as much public land as possible; by constructing multi-level car parks; and by mandating all buildings to provide minimum parking spaces. The underlying assumption has been that demand for parking will continue to grow with motorisation and therefore the local governments should set aside adequate parking spaces to meet this demand. But this policy assumption is now under attack. Decades of experience across the world has shown that parking demand is insatiable that only locks up valuable urban land that have more important usages. Moreover, uncontrolled parking supply incites more driving, more car ownership and defeats the purpose of reducing automobile dependence, pollution and congestion. This has led to serious policy rethink.

Parking policy can be redesigned in such a way that instead of encouraging unlimited parking supply and car usage it can be leveraged to restrain parking demand and thereby personal vehicle usage. But there is very little policy or public understanding of the key elements and principles of parking policy that can make it a tool for reducing parking demand and car usage to cut decongestion and pollution in cities.

Unlimited parking supply lead to more automobile dependence and congestion. This increases pressure on public land. For as much as 95 per cent of the vehicle lifetime these vehicles remain parked somewhere. This creates enormous demand for urban land which is limited, valuable and is needed for more important usage. Depending on the size of the cities and rate of motorisation the annual demand for additional parking spaces can be equivalent to as much as 310 football fields in Delhi.

The number of vehicles that are registered in Addis Ababa has created demand for land areas as big as 110 football fields. Cheap and free parking is a subsidy to rich car owners and loss to the local government exchequer. The costs of using valuable urban land for parking of personal vehicles are not recovered through proper taxes and pricing. Parking rates even in expensive parking structures are minimal and are not adequate to recover the cost of investment. This is a subsidy. This subsidy amount will work out to be much larger if the rental or the land cost is taken into account. Increased investment in expensive and prime areas of the city further enhances this subsidy as the parking rates are not expected to recover this cost.

Addis Ababa has taken the lead to introduce priced and variable parking to reduce demand for parking and car usage. Indian cities are also framing several strategies. These include variable and increased

parking pricing; parking district management plan, no car without proof of parking; barring parking on green areas etc.

**The way forward and issues for air quality management and sustainable mobility**

- Develop and expand air quality monitoring and air quality management
  - Develop source-wise action plan to control air pollution
  - Tighten fuel quality and emissions roadmap
  - Set emissions standards, impose age restriction and higher taxation on imported secondhand vehicles
  - Set fuel economy regulations and fiscal incentive to promote new and fuel efficient vehicles
  - Vehicle inspection for reducing emissions from in-use vehicles
  - Regulate informal public transport modes and integrate with formal public transport systems
  - Improve and scale up public transport system
  - Build safe and accessible non-motorised transport infrastructure. Develop non-motorised transport policy
  - Implement multimodal integration
  - Adopt car restraint measures including parking policy as travel demand management measure
-