

BRIEFING NOTE

Concern over worsening air quality and traffic congestion in South Asian cities, ongoing action must gather momentum

- **Kathmandu like the other South Asian cities has inherent advantage in its dominant commuting practice of using bus, non-motorised vehicles and walking, to manage its air pollution and urban mobility issues. These cities must avoid pro-car policies**
- **Otherwise, Kathmandu like Delhi may lose out on the benefits it had derived from its first generation action.**
- **Both Kathmandu and Delhi need second generation action, including scaling up of public transport, integrated transport options, car restraints and walking for clean air.**
- **Urban infrastructure once built cannot be reversed easily. But this will decide the travel choices. Therefore, ensure public transport, walking and cycling oriented urban design during the early stages of growth.**
- **Kathmandu has begun to take significant steps to reclaim and redesign public spaces and walkways and also its bus system**

Kathmandu, December 27, 2013: After the recent shocker from the global burden of disease estimates that one fifth of global deaths occur from outdoor air pollution in India and of equal concern in South Asia has forced a re-look at region specific solutions to cut the killer pollution. Cities in the region are witnessing rapid increase in air pollution and untamed motorization. They need urgent action to leapfrog vehicle technology, scale up public transport, integrate multi-modal transport options, and encourage car restraint, walking and cycling. For South Asian cities like Kathmandu and Delhi, maintaining urban air quality and protecting its sustainable urban commuting practices are some of the toughest challenges. Its strength remains in its huge base of zero-emission non-motorised and sustainable public transport. It just has to recognise and act upon this immense advantage and strength.

This conclusion emerged out of the Regional Stakeholder Workshop on Air quality and Transportation Challenges conducted jointly by the Ministry of Physical Infrastructure and Transport, Government of Nepal and New Delhi-based research and advocacy organisation, Centre for Science and Environment (CSE). This dialogue focused on the challenge of urban air quality and mobility in South Asian cities, and experts from CSE and a large number of stakeholders in Kathmandu participated in this event.

CSE, one of India's leading environmental think-tanks, has been in the forefront in combating air pollution and mobility crisis in Delhi. In the mid 1990s, its 'Right to Clean Air' campaign had kicked off a sequence of events which resulted in India's capital getting one of the largest CNG-run public transport service and other important measures. Air quality registered a visible improvement following this. But the recent data indicates Delhi is fast losing out on the gains from those transport reforms, largely due to its spiraling numbers of private and diesel-run vehicles. Today's meeting in Kathmandu is part of the series of media meetings that CSE is planning across the South Asian region. These meetings will focus on environment and development issues of country-specific and local relevance and interest.

South Asian pollution dilemma

Profile of air pollution is changing rapidly in South Asian cities with serious public health implications.

- **Particulate remains a killer in the region:** Alarming high levels of tiny particles continue to remain a serious concern in Kathmandu, Delhi and many other South Asian cities. A recent Environmental Performance Index (EPI) study of the Yale Centre for Environmental Law and Policy has ranked both Nepal and India's performance as very poor. A 2006 CAI-Asia report put Kathmandu amongst the most polluted amongst 22 Asian cities. Delhi is among the most polluted. These come from motor vehicles and construction,

smoky vehicles, small-scale industries, brick kilns, road dust. The high concentration of PM10 and PM2.5 in particular observed are known to cause serious health problems and excess mortality.

- **Finer particles more dangerous:** The new data on even tinier particles PM2.5 that go very deep inside the lungs and cause very serious health damage show unacceptably high levels especially during winter months. The levels go several times higher than the standards. During winter months PM2.5 levels have recorded critical levels – 1.5 times the standards -- on all days monitored in Delhi. In Kathmandu during -- January to February 2003 -- the MOPE/ESPS monitored PM2.5 levels in Patan and Bhaktapur area. The average PM2.5 levels in the Patan Hospital area was recorded at 166 microgramme per cubic metre. While the high concentration of PM2.5 in Patan Hospital area is due to diesel exhaust as the monitoring station is located along a busy road near the Lagankhel bus station, which has many diesel vehicles and brick kilns were the culprit in Bhaktapur. As the monitoring station in Bhaktapur is located in the Durbar Square with no vehicular movement, the high PM2.5 must then be due to the particles that have been transported to the area by westerly winds from Kathmandu and the surrounding brick kilns.
- **Multipollutant crisis:** South Asian cities are in the grip of multi-pollutant crisis. While the largest health impacts are due to exposure to very high levels of particulate pollution, and that continue to dominate the health concern, cities are also worried about other pollutants today. In Delhi, nitrogen oxides, ozone and a range of air toxics are increasing. Similarly, in Kathmandu limited data shows a range of air toxics including PAHs and benzene are of concern. The ESPS monitoring in 2003 have indicated that nitrogen dioxide levels were then highest in Putali Sadak due to vehicular emissions. Increase in benzene coincided with the introduction of unleaded petrol. The benzene concentration during January-February 2002 were as high as 77 microgramme per cubic metre in Putali Sadak. The average concentration at other monitoring stations, Chabahil, Thamel and Patan Hospital were also high.
- **Local pollution:** When we disaggregate air pollution challenge location-wise the challenge looks stark. Prominent and densely populated residential areas are in grip of harmful pollution. Particulate trends vary across locations in Delhi. While annual average levels are rising steadily in most locations, the annual maximum peaks are also hitting dizzying heights causing very high exposure. In Kathmandu as well Thamel monitoring station representing the urban residential site is of special concern showing high numbers of days with non-compliance. While Bhaktapur, another monitoring site has a different story to tell. There is a reduction in the number of days of PM10 non-compliance due to the ban on brick kilns using traditional technology in 2004. The ban introduced seemed to have a very positive effect on the air quality particularly in the Bhaktapur area.

Air quality gains

The first generation action in South Asian cities have shown overall PM10 average concentration in Kathmandu has reduced by 12 per cent from 2003 to 2007. PM10 is decreasing steadily from 2003 to 2006 and there has been no change in the annual valley average PM10 concentration from 2006 to 2007. The reduction found in 2003 to 2006 is observed in spite of an increasing number of vehicles registered in the valley. The registered two and four-wheelers numbers have been reported to increase by more than 10 per cent per year. This general decrease in PM10 concentrations is attributed to the actions taken by the government during 2000 – 2007 especially the implementation of the Euro I standard in 2003 and the ban on moving chimney bull's trench kiln. But the monthly average PM10 levels in 2007 showed an increasing trend especially during winters.

Delhi has also been able to arrest and even lower air pollution with its first phase of action. Studies have established air quality gains of the first generation action including the CNG programme in Delhi. The Central Pollution Control Board has stated that after the implementation of the CNG programme the particulate levels dropped by about 24 per cent from the 1996 levels.

However, the challenge remains. South Asian cities will have to make the ambient air quality standards legally binding and meet them in a time bound manner.

Health gains: There is now myriad of studies across the world as well as in India to prove that outdoor air pollution is a serious environmental risk factor that causes or aggravates acute and chronic diseases. Also given

the latency period of toxic risk Indian cities are likely to see more cancers due to increase in environmental health risk. This makes a strong case for control of air pollution.

The available evidence from Kathmandu shows that the health cost savings is close to 1 per cent of the GDP. Air pollution in the valley is taking a toll on the public health. A study conducted during February 2008 to January 2009 in Kathmandu and published recently in *Atmospheric Pollution Research* found high density traffic areas and road intersections of the valley severely polluted by PM10 and all the studied sites can be considered as "hazardous" in comparison with the MoPE's benchmark of 425 microgramme per cubic metre. The study indicated that occupational PM10 plays a significant dominant role in controlling ambient PM10 loads at the high density traffic areas and road intersections of the valley.

The Ministry of Environment, Science and Technology (MoEST) estimated in 2005 that the valley's air pollution results in approximately 1,600 premature deaths per year. According to an estimate by the Clean Energy Nepal/Environment and Public Health Organization (CEN/ENPHO) the total benefit of reducing valley's PM10 levels to 50 microgramme per cubic metre would amount to US\$1.86 billion per year. Benefits of reducing benzene and PAH concentrations to half their current values would amount to US\$ 30-70 million per year. A study found that Kathmandu's residents experienced over 1.5 million respiratory symptom days per year. A survey done by Clean Energy Nepal and Environment and Public Health Organization in 2003 of 331 patients with respiratory illnesses visiting the out-patient and emergency departments of major hospitals in Kathmandu indicate that most of them are from Kathmandu valley and belong to the age group of 51 to 75. Approximately, 80 per cent of the respondents said public transportation was their most common mode of transportation. The survey does indicate that patients visiting the hospitals with respiratory problems are mostly elder residents of Kathmandu valley who are regularly exposed to air pollution.

A South Asian Network for Development and Environmental Economics study says if Kathmandu and Lalitpur reduce air pollution to a safe level the annual welfare gain to an individual can be NRS 266 per year (USD 3.70) and if extrapolated to the total population the monetary benefits would be NRS 315 million (USD 4.37 million) per year.

Vehicles are a special problem

According to the Economic Survey of Delhi the city has about 6.4 million registered vehicles. It is also evident that the city is adding about 1200 vehicles a day. Industrial or power plant sources will not proliferate at this rate in any city. Vehicles will require special attention.

Dieselisation of cars adds to the challenge. These are legally allowed to emit several times more NO_x and PM compared to petrol cars that are the key concerns in Delhi's air today. The RFF study, as mentioned earlier, had found that cleaner diesel fuel has helped to reduce SO₂, and diesel cars have reduced CO. But diesel cars have been found to be contributing significantly to the increasing NO₂ in Delhi. International health agencies have also branded diesel particulates as human carcinogen. Diesel cars are already close to 40 percent of the new car sales.

A very recent study carried out in Delhi by the researchers of University of California, Berkley proves that commuters in Delhi breathe far more harmful particles inside vehicles while traveling than from the ambient air. The PM_{2.5} concentrations inside vehicles on an average can be 1.5 times higher than the surrounding background air and the short-term peaks can go 10 times higher than the daily limit.

In Kathmandu vehicle emissions contribute 38 per cent of the PM10 levels. Vehicular emissions and emissions of re-suspended dust from poorly maintained and uncleaned roads together are responsible for 63 per cent of the PM10 emissions in the valley. Agriculture and brick kilns are the third and fourth-highest contributors of PM10. Other industries and domestic sources are minor contributors of PM10. The pollution levels drop significantly on weekends and during 'bandhs' or strikes when there are fewer vehicles on the road. This is according to the University Medical Journal.

Kathmandu source apportionment study shows that PM10 and PM_{2.5} emissions from road transport are higher by one to two orders of magnitude than the emissions from combustion in manufacturing industry, residential

emissions, and emissions waste burning and agricultural activities. Residential emissions of CO and NMVOC are higher than those from road traffic while NOx emissions are mainly due to transport. Emissions of PM10 from road traffic are approximately 16 times higher than those of CO and 26 times than those of NOx.

A study conducted during February 2008 to January 2009 in Kathmandu and published recently in *Atmospheric Pollution Research* found high density traffic areas and road intersections of the valley severely polluted by PM10 that can be termed “hazardous” in comparison with the MoPE’s benchmark of 425 microgramme per cubic metre.

Bagmati zone had 0.19 million registered vehicles in 2001-02. This number is increasing at 16 per cent per year. Nearly 59 per cent of the total registered vehicles in Kathmandu comprise of two-wheelers and cars and taxis. However the public transport and bicycle share is 19 per cent and 22 per cent respectively. Since 2001, there has been a dramatic rise in new registrations of motorcycles. The reason is not known but could be due in part to various financial options offered by local financial institutions and motorcycle distributors.

Increase in vehicle numbers is leading to traffic congestion and choked roads in the city. According to a study by Department of Transport Management (DoTM) the number of vehicles in Kathmandu had already exceeded the valley’s carrying capacity by about 30,000 in 1999/2000 fiscal year. As more than 50,000 vehicles have been added since then, while the road infrastructure has remained more or less the same.

South Asian cities have begun to act

Action on air pollution has begun in our cities and even shown results. Kathmandu has already initiated its first generation action that includes a wide gamut of measures. It has phased out leaded petrol, introduced unleaded gasoline, banned import of two-stroke three wheelers, introduced ambient air quality standards and introduced EURO I emissions standards and introduced in use vehicle emission standards, and spear headed electric vehicles programme. It has further announced EURO III standards.

Despite the barriers the electric vehicle programme is a unique initiative of Kathmandu. The combined effort of government, private sector and civil society groups have promoted and expanded battery operated electric three-wheelers to fulfill the vacuum created by expulsion of diesel three wheelers. This successful introduction of zero-emission electric three-wheelers is an important step though challenges exist. According to the safe tempo owners, there are issues pertaining to high operation costs and conflicting government policies. The number of SAFA tempos has not increased significantly since 10 years as compared to other fossil fuel run vehicles.

But like the other mega cities Kathmandu’s air pollution remains elevated. Kathmandu and all other key South Asian cities will have to act fast to recover the right to clean air again. This gives the immense confidence for the future action -- if we act we will see results. Kathmandu, like other prominent cities in the region, faces the second generation challenge.

Mobility crisis

The biggest challenge that confronts the South Asian cities including Kathmandu and Delhi is the rapidly increasing vehicles numbers that threatens to undo the small incremental gains. Growing congestion is crippling cities. CSE’s review of available information brings out the strength of Kathmandu. More than 63 per cent of the daily travel trips in Kathmandu are still carried by buses. Cars and two-wheelers are as much 42 per cent of the vehicle fleet but they carry a miniscule 10 and 5 per cent of the daily trips respectively. Thus, cars occupy more road space, carry less number of people but use more fuel and pollute more per person. It is also very significant that walkers and cyclists together meet close to quarter of the daily travel demand in Kathmandu. This is the low polluting and low carbon mobility paradigm that the world is trying to achieve today to be more sustainable. Kathmandu must sustain this strength.

Kathmandu must not repeat the same mistake that Delhi and many other cities have made – focus on road widening, flyovers and facilitate personal mobility. Even though it still has high usage of bus, walk and non-motorised trips, car centric policy is steadily marginalising and edging out the bus and non-motorised trips. Already within a decade bus ridership in Delhi has dropped from 60 per cent in 2000 to 40 per cent now. Delhi is now under immense pressure to reverse this trend. The Delhi master Plan has now set the target of 80 per cent of

public transport ridership by 2020. Only such stringent targets and aggressive action can have the potential to check the slide. Both the cities are paying a very high price of congestion. Traffic jams lead to fuel wastage, more pollution and serious economic losses. A normal commuting time of half an hour has increased two-hours during peak hours. In fact the difference between peak and non-peak hour is nearly disappearing.

Revising bus transport: Both Kathmandu and Delhi have proven increase in bus ridership in the recent times. The state owned Sajha Yatayat bus system in Kathmandu that has nearly shut down has been revived with good results. Its daily passengers have already increased to more than 10,000. This will now continue to expand the bus fleet, adopt service level guidelines to improve overall operations and performance of the bus service. This is a very critical area of intervention as bus forms the spine of public transport system and is also the most affordable and flexible transport system. Delhi has also reported 25 per cent increase in bus ridership over the last couple of years. Cities can not delay transportation plan to promote public transport, walking and cycling. If dependence on personal vehicles continue to increase pollution and congestion will increase.

Last mile connectivity: Public transport may not work optimally if accessibility and last mile connectivity is not improved. Walking, cycling and para transit like the three-wheelers and small transport systems play a very important role. In almost all South Asian cities three-wheelers and mini buses are popular high frequency and affordable public transport systems. Instead of discouraging them in city centres integrate them with the public transport and neighbourhoods to improve accessibility, connectivity and reduce dependence on personal vehicles.

Only more roads are not the answer: Learn from Delhi's experience. Delhi has not been able to solve its problem of pollution and congestion by building more roads and flyovers for cars. Delhi is most privileged to have more than 21 per cent of its geographical area under road space. Delhi has built the maximum roads and flyovers. Yet its roads are totally gridlocked. Peak hour traffic has even slumped to below 15 km/hour. Cars and two-wheelers in Delhi occupy 90 per cent of the road space but meet less than 20 per cent of the travel demand. More roads are not the answer.

Kathmandu must not repeat the mistakes that Delhi other mega cities are making of following pro car policies. Kathmandu still has the chance to plan its future growth differently and avoid the path of pollution, congestion and energy guzzling. Cities need to make maximum investment in redesigning their existing road space and travel pattern to provide the majority of the people (more than 90 per cent of people in Kathmandu use public transport and non-motorised transport) affordable and efficient mode of public transport that can be an alternative to personal vehicles. Kathmandu must build on its strength.

Impact of car centric infrastructure on travel and CO2 emissions: Kathmandu is also proposing to build wide roads and flyovers. CSE checked out the impact of car centric infrastructure – flyovers, signal free corridors that give priority to vehicle movement on the travel distances in their vicinity and its impact on carbon emissions. In some places in Delhi like near Nehru Place flyover a walking trip replaced by a car trip because of the detours can lead to CO2 emissions as much as 434 gramme/person trip. In other areas resultant CO2 emissions can be up to 504 gram/person trip. The city-wide cumulative impact of these changes can be enormous and completely negate the efforts made to reduce emissions and energy intensity of travel in our cities.

Need parking restraints: This is a common challenge in all South Asian cities. In the conventional paradigm, the parking policy is expected to continuously satisfy the growing demand for parking spaces as vehicle numbers are growing. The policy then seeks to ensure adequate parking supply by stipulating parking requirements. But this wisdom is not accepted any more when it comes to meeting the goals of sustainable mobility. Globally, cities are now adopting multiple goals for parking policy.

Kathmandu is facing major parking crisis due to tremendous increase in the number of personal vehicles. Haphazard parking is common in core areas. The demand for land to park the current vehicle fleet in Kathmandu requires is equal to 730 football fields. The annual increase in vehicle numbers will require 73 football fields a year. KMC has formally issued Temporary Standard, 2013 for the operation of 73 free parking lots in Kathmandu. There has been a directive from the Public Account Committee to remove parking from blacktopped roads. The KMC has fixed parking charges for the parking lots operated by the private operators at Rs. 5 and Rs. 10 for two-wheelers and four-wheelers respectively for one hour parking. The proposal for free parking has been stayed. The

city authorities have to formulate a parking policy as a travel demand management measure. There is a court stay on the proposal of free parking.

The South Asian cities need to accept that land is limited and there is a limit to the additional parking space that can be created in the city. Therefore, the available parking space will have to be managed efficiently to meet the parking demand. This will also require demand side management through a well thought out pricing policy to control the demand for parking. Individual user of personal vehicle should pay for the use of the space for parking and user pay principle should be applied. Parking facilities – underground, surface, and multilevel parking – are provided at an enormous cost. This uses up a lot of public money and cheap/free lands. The full cost of providing parking in public places that includes the land cost, capital cost, and the O&M costs – should be recovered from the user of the parking. Government should not subsidise this cost. Globally governments are applying parking restraints to reduce dependence on automobiles.

Global good practice: -- Even car manic global cities are changing the way they design cities: California has enacted Sustainable Communities and Climate Protection Act (SB 375) since 2008 that aims to reduce per capita emissions by -- about 7 per cent by 2020 and 15 per cent by 2035. This requires each of California's 18 Metropolitan Planning Organizations to develop a regional strategy for reducing vehicle miles traveled to address climate change. They need to develop integrated landuse and transportation plans, to focus on development around transit. Cities who comply with SB 375's regional plans receive a larger share of transportation funds as well as regulatory streamlining for projects. California is beginning to see results of these interventions. 2/3rd households living near transit in Los Angeles own 1 or fewer cars, compared with 46 per cent of the region. Nearly 1/4th of commuters living near transit in LA take transit, walk, or bike, compared with just 8 per cent of the region. Many regionally important job, entertainment/educational/institutional destinations linked on the transit system. About 22 per cent of the jobs in LA County are within walking distance of high quality, fixed-guideway transit.

The way ahead

If South Asian cities do not want to wheeze, choke and sneeze then it has to act now. Kathmandu's and Delhi's work with CNG shows that it can make a difference. It is time to set new terms of action. Plan cities for people not vehicles. Design roads for public transport, cycling and walking. Not cars. This is the option for the city to cut killer pollution, crippling congestion, expensive oil guzzling and global warming impacts of vehicles.

The deliberation at the meeting today has brought out a wide gamut of priority measures to combat pollution, congestion and energy guzzling. These include:

- Strengthen air quality monitoring
- Link import policy with the technology and fuel quality leapfrog to cleaner fuel and vehicle technology. Introduce Euro IV fuels nation-wide.
- Scale up and accelerate bus transport reforms. Integrate public transport, and non-motorised transport. Cities need to integrate bus, cycling, walking and para-transit systems.
- Design pedestrian guidelines for approval of road projects and enhancement of the existing ones. Without proper walking facilities public transport usage cannot increase.
- Introduce a parking policy as a car restraint measures and to reduce congestion.
- Strengthen emissions checks on in-use vehicles.
- Use tax measures to discourage personal vehicle usage and inefficient use of fuels
- Ensure well planned, dense and compact city design to reduce travel distances and dependence on personal vehicles. Bring people and jobs closer to public transport systems.