



Cities, Transport and Climate Change: Problems and Opportunities

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ABSTRACT:

The world is experiencing unprecedented levels of urbanization as the majority of people now reside in urban areas. By 2030, three-quarters of the world's population will be urban, and the biggest cities will be found in the developing world. As climate change threatens to change the face of the planet, mega-cities loom as giant potential flood or other disaster traps, especially for billions of the world's urban poor – who are often in slums – and who are always the most exposed and the most vulnerable.

However, (and this is key) it is no coincidence that global climate change has become a leading international development issue precisely at the same time and virtually at the same rate as the world has become urbanized. This is because how we plan, manage, operate and consume energy and transport in our cities is, in fact, the key driver behind the phenomenon of global warming.

Therefore it is crucial to recognize that cities and urban residents are not just seen as victims of climate change in terms of sea-level rise but part of the problem of climate change. And if cities are part of the problem, that means they are also inevitably part of the solution.

RESUME :

La majorité de la population mondiale est aujourd'hui urbaine. D'ici à 2030, les trois-quarts de la population mondiale seront urbains et les plus grandes villes se concentreront dans les pays en développement. Alors que le changement climatique menace notre planète, les mégapoles sont de plus en plus susceptibles de subir les effets dévastateurs de catastrophes naturelles. Les populations les plus pauvres des villes, au nombre d'un



milliard à l'échelle mondiale, ceux qui vivent dans des habitats précaires ou des zones à risque, sont les plus vulnérables

Cependant, et ce n'est pas une coïncidence, le changement climatique est apparu sur l'agenda politique mondial dans le même temps, et en parallèle à l'urbanisation du monde. Ceci parce que la manière dont nous planifions, gérons, utilisons et consommons l'énergie et le transport dans nos villes est en fait une des causes principales du réchauffement de la planète.

Par conséquent, il est essentiel de considérer les villes et leurs habitants non seulement comme des victimes du changement climatique. Ainsi, si les villes font partie du problème, elles font aussi et inévitablement partie de la solution.

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I. Introduction

As climate change threatens to change the face of the planet, mega-cities loom as giant potential disaster traps, especially for billions of the world's urban poor. At the same time, the world is experiencing unprecedented levels of urbanization as the majority of people now reside in urban areas. By 2030, three-quarters of the world's population will be urban, and the biggest cities will be found in the developing world.

However, it is no coincidence that global climate change has become a leading international development issue precisely at the same time as the world has become urbanized. This is because how we plan, manage, operate and consume energy and transport in our cities is, in fact, the key driver behind the phenomenon of global warming. 75% of global energy consumption and 80% of GHG (Greenhouse Gas) emissions that cause global warming come from cities.

Therefore it is crucial to recognize that cities and urban residents are not just seen as victims of climate change in terms of sea-level rise but part of the problem of climate change. And if cities are part of the problem of climate change that means they are also inevitably part of the solution.

Urban Transport and Urban Energy Challenges

Urban transport is the planet's fastest growing source of GHG emissions. However, more responsible planning and management are key concepts for the search of a less polluting



urban transport. This issue is compounded by the fact that millions, upon millions of urban residents living in developing country cities have virtually no access at all to any sort of motorized transport, much less a private automobile and so pollute next to nothing now. But we need to pay closer attention to the coming environmental implications when these same urban residents also demand mobility and transport just like any other urban resident.

As the world has moved into the 21st century, transport-related challenges have already grown quite severe in cities throughout the world and in countries at all levels of development. The growth of cities consumes space for natural areas; the generation of power for the cities contributes significantly to climate change and therefore, city residents are exposed to unhealthy levels of pollution.

At the same time that the negative environmental impacts of urban transport consumption are manifesting themselves on local, regional and global levels, the demand for transport continues to grow. Unfortunately, the environmental externalities generated by conventional energy systems are eroding the health and productivity of citizens in many developing country cities, and so new paths towards more efficient and sustainable patterns of transport consumption must be pursued in these areas.

The Paradox of the Urban Welfare

Historically, cities throughout the world have been arenas of tremendous economic and social development. The higher densities of people and material resources found in urban areas allow significant gains in productivity to be achieved, while reducing human impacts on natural ecosystems.

From both a human development and environmental point of view, it makes eminent sense to encourage the continued growth of high-density population centers — provided underlying developmental problems can be addressed. However, urban structures affect energy requirements and consumption patterns in many distinct ways. Low-income rural-migrant populations, generally used to relatively easy access to non-commercial fuels in their villages, find it hard to secure such fuels when they migrate to cities and are often forced to buy commercial fuels for the very first time and at great expense.

Cities, Pollution and Climate Change

The combined effects of energy overconsumption in affluent cities and inadequate energy sectors in developing cities are clearly producing serious pollution problems on local and regional levels. Though the casual connections are less obvious, it is also known that urban settlements are contributing significantly to the problem of global warming.

It has been estimated that more than 1 billion people throughout the world live in urban settlements where air pollution levels exceed health standards. On top of the human toll registered in these figures, there are growing financial costs as well. In developed countries, air pollution is estimated to cost around 2 per cent of GDP; in developing



nations such pollution can cost anywhere from 5 to 20 per cent of GDP. On a global scale, the health costs of urban air pollution are thought to approach US\$100,000 million annually (World Energy Assessment, UNDP, 2000).

Though the problems inherent in low-density, automobile-reliant cities are increasingly in evidence in more developed countries and cities, this model of urbanization is being replicated in many cities around the world. The rate of growth of motorized vehicles in the developing world can reach 10%, a rate much higher than in the USA, the bastion of motorized vehicles.

Changes in urban land use patterns can have important effects on the viability of the modes of transport that are most important to the urban poor: non-motorized transport (walking, cycling, animal traction etc) and public transport. These modes are vital to allowing low-cost mobility and hence access to a range of urban opportunities for the poor, including a wider choice of housing. Besides, these modes of transport are much more environmentally friendly since they produce almost no GHG emission. Unfortunately, certain common trends in land use as cities motorize have a tendency to undermine these low-cost modes to the detriment of the mobility of poor and increase the GHG emissions.

However, the urban poverty of the world does contribute to the problem of pollution in multiple ways. For example, the World Health Organization estimates that 1.6 millions deaths per year, of which 60 % are women and children, are associated with indoor air pollution from the use of biomass. UN-HABITAT recent studies show that the urban poor and especially slum-dwellers are particularly hard hit by lack of access to modern energy. They pay more for their cooking, water and electricity than wealthier people connected to the service networks. In order to cover the need for fuel without having to pay these high prices, sometimes they reproduce rural energy production techniques in the cities, causing serious local impacts. The primary responsibility for reducing such impacts therefore should rest on those living in the wealthiest regions of the world economy.

While cities in the developed world confront problems originating primarily from overconsumption, metropolitan areas in the developing world face a much more complex set of energy dilemmas. On the one hand, the vast majority of urban residents in cities throughout the Southern hemisphere suffer from inadequate access to modern energy systems. On the other hand, even at low per capita levels of consumption many of these cities are generating very intense forms of pollution. There are a number of factors that are producing this uneven combination of low per capita consumption rates with high aggregate urban emissions throughout the developing world. For example, the lack of a system for wastes management forces many slum dwellers to burn their own garbage in areas quite close to their own homes. This process does not only increase GHG emissions, but harms seriously the health of slum dwellers.

Cities themselves are thought to be particularly vulnerable to the consequences of climate change. It is expected that infectious diseases will proliferate in a warmer world,



especially in dense urban settlements. Regional temperature rises will foster more urban smog. Changes in precipitation will adversely affect urban water supplies. An increase in extreme weather events will cause damage to urban infrastructure, and a rise in sea levels will begin to threaten coastal cities throughout the world.

As the financial costs of global warming begin to mount, fewer and fewer cities will have the resources to foster the diffusion of new energy technologies that could reduce environmental impacts. The time for concerted action is clearly upon us. But are there alternative energy technologies that could provide solutions to the energy-related developmental constraints that are emerging in both affluent and impoverished cities?

A variety of options exist to reduce municipal outputs of greenhouse gases in the developing world: (a) Pricing energy products to cover their economic costs, thus encouraging conservation; (b) Removing market imperfections that impede efficient energy use in households, industries, enterprises, transport, and the public sector; (c) Reducing losses in the supply of energy, e.g., generation, transmission, and distribution losses to urban electricity consumers; (d) Promoting the substitution of cleaner alternative fuels and technologies, e.g. crop residues for agro-industries and households, and natural gas in industry and transport; (e) Improving transportation systems through pricing, investment, technological options, and regulatory measures to reduce urban traffic congestion; and (f) Managing peri-urban lands to maintain green zones and increase forested areas that, through photosynthesis, are important sinks for CO₂. However, even if they were successfully implemented now, these measures would not preclude the unavoidable need to develop urgent pro-poor adaptation measures in cities.

The Environmental Impacts of Transport

By allowing access to employment opportunities, housing quarters and services, the transport sector meets basic human needs. No city can survive without transport, so it is not about eradicating means of transport. It is about improving its management so that transport does not become a necessary disease for the city. This is why we need to take a careful look at the impacts of transport in the cities and the overall environment.

Transport has substantial impacts on global life-support systems, non-renewable resource consumption, sustainability of production of renewable resources, living conditions and human health and safety, e.g.

- (a) Global life-support systems can be significantly affected by transport-related emission of carbon dioxide and methane which contribute to the "greenhouse" effect.
- (b) Transport exerts a demand on land for the construction of infrastructure; and the production of vehicles and the construction of transport infrastructure require significant quantities of mineral and other natural resources with limited possibility of re-use.



- (c) Transport affects sustainability of renewable-resource production, because emissions of nitrogen and sulphur oxides lead to atmospheric acidity which causes water and soil pollution, degradation of vegetation and a decrease in agricultural and forestry outputs.
- (d) The movement of vehicles is the main source of noise pollution. These phenomena affect, directly or indirectly, physical and mental health.
- (e) Construction of the transport infrastructure often disrupts neighborhoods, decreases safety, degrades the amenity of public open spaces and creates visual intrusions, damaging social and community values. Yet inadequate or unaffordable transport leads to excessive building and population densities, causing deterioration of the living environment.

Transport strategies integrated with Environment Management

The demand for environmentally-friendly transport and the ways in which it can be met, depend to a large extent, on how human settlements are managed. Therefore, it is possible to reconcile requirements for transport with the standards against the adverse effects of transport-infrastructure installation and operation.

In devising transport strategies compatible with the objective of sustainable development, it is necessary to consider two issues simultaneously:

- (a) What is the indispensable level of transport provision, and what kind of transport facilities should be provided to meet this development within environmental parameters of resource use?
- (b) How should the transport sector be developed and managed to be sustainable itself, thus not undermining the sustainability of other sectors of the economy?

National policies on transport in human settlements are usually lacking, and transport planning at local levels tends to adopt, for the sake of simplicity, a strictly sectoral approach. The integrated approach significantly increases the complexity of planning in technical and decision-making aspects: It is however the only way to meet development in a sustainable way. Nevertheless, to be effective, integrated planning needs close interagency co-operation and strong urban management in general: this will be extremely difficult to achieve in developing countries where institutions tend to be unarticulated. Considerable efforts will have to be made to upgrade skills and improve management systems.



The political and managerial context throughout the Third World is too heterogeneous to propose universal recommendations. However, the following lines of actions deserve to be considered in any Urban Transport Plan:

- (a) Modifying and managing the demand for transport, including making changes in travel behavior;
- (b) Making modal composition in transport supportive of sustainable development;
- (c) Improving vehicles and fuel technologies
- (d) Controlling the impacts of investment projects in transport on the quality of life;
- (e) Increasing the efficiency of transport operation;
- (f) Improving the maintenance of existing infrastructure and of vehicle in use.

These lines of action can be fully effective only if they are well co-ordinated and undertaken simultaneously. Any programme designed to improve transport must identify measures of improvement and establish a means for monitoring progress.

Understanding Transport for a Better Urban Management

Transport is an imperfect market in which the costs borne by users of transport services and infrastructure neither reflect fully social, economic and, in particular, ecological costs. Therefore, there is a need to manage the demand for transport, by applying policies which will create such conditions for the users of transport that their behaviors become compatible with principles of sustainability.

Transport needs can be reduced, and their satisfaction at lowered costs and with lessened impact on the environment can be facilitated. This can be met if city planners aim a systematic distribution of activities throughout urban space, so that travel distances are shortened and transport units avoid excessive concentration.

In this context, the importance of subnational development planning and local land-use planning should be fully recognized. This pertains, in particular, to developing countries, where planning tools can be potentially effective if they are geared realistically to the current processes of structural transformation. For example, transport networks should be developed for the benefit of all sections of the community, in such a way that indispensable access to employment opportunities, housing opportunities and services is ensured for the sectors most excluded of society (economically and spatially).

Fiscal policies and other economic measures should enhance efficiency in transport, discourage excessive use of cars and make car-users pay the economic and environmental costs of their travel. At the same time, environmental-friendly travel behavior should be encouraged, e.g. by raising awareness of transport-related environmental impacts and providing education on energy-efficient driving habits.

How to reconcile Transport and Environment



The detrimental effects of the activities of the transport sector on the biosphere, including consumption of energy resources, are mainly related to road transport. It is estimated that, in the member countries of the Organization for economic co-operation and Development (OECD), the non-internalized social costs of the road transport amount to about 5 per cent of gross national product¹. Although individual transport has numerous advantages in flexibility, speed, privacy and comfort of travel, these advantages should be weighed against their impact on energy consumption, land use and amenity. In the conditions of large cities, the need for passenger accessibility and mobility should be largely met by public-transport modes which consume less energy and emit fewer pollutants per passenger-kilometer than private modes, which are economical in use of travel-way space and which support high urban-development densities. Travel-way space for exclusive use of public transport should be created or reallocated from automobiles to public transport, whenever the latter solution is feasible.

Buses are likely to retain, for a long time, an essential share in public transport; thus, there is the need to improve the operation, maintenance and management practices of bus transport and reduce its contaminant effects and, where feasible, use of electric trolleybuses and trams. Rail-bound high-capacity public-transport modes might become indispensable in very large cities with strong and intensively-developed centers: these modes are also preferable for environmental reasons.

The bicycle is by far the most energy-effective means of passenger transport and most affordable for the urban and rural poor. Adequate attention should be given to the provision of safe cycle routes and parking spaces. Likewise, policies must support walking as a prime mode of transport, thorough the provision and maintenance of walkways.

Freight-transport polices should explore the potential of bicycles, animal-powered vehicles and simple motorized vehicles for short-distance movement within settlements. Because of the variations in characteristics between modes and conventional motorized vehicles, special traffic-management measures will be needed to avoid conflicts.

Finally, the high dependency of transport on petroleum fuels makes the search for new fuels a very important issue. However, there is at present no economically viable alternative. Therefore, as long as science can not find economically and environmentally sustainable alternatives, the regulation of usage of conventional fuels should be a priority for governments.

Controlling Environmental Impacts of Transport-Infrastructure Projects

Investments in transport infrastructure have often been made worldwide without considering their impact on the environment. These projects always bring several types of impacts, such as smog, noise generation, land consumption, soil contamination,

¹ Organization for Economic Co-operation and Development, *Transport and the Environment (Paris, 1988)*, p.11



disturbances in water systems, deterioration of the built environment and visual intrusions. These issues are rarely taken in consideration in transport infrastructure projects.

This practice needs to be changed, by requiring each project to contain an integral environment-impact assessment. Such a requirement has already been introduced in several countries which have recognized the insufficiency of financial and economic cost/benefit analysis for justification of projects. However, the methodology of environment-impact assessment is not yet sufficiently developed, and there is usually a lack of appropriate data to carry out such an assessment. In particular, there is a lack of satisfactory indicators of the performance of transport systems, with regard to their impact on health and other quality-of-life factors.

Increasing the efficiency of transport operations

Providing for priority in traffic of public-transport vehicles, at the expense of the free movement of individual transport, is fully justified by principles of equity and sustainability. Special attention should be given to the segregation of public transport from general traffic, and the provision of busways is one promising option.

The objective of a public-transport development strategy is to optimize the effectiveness and efficiency of a multimodal public-transport network. This can be achieved by enhancing modal integration and by ensuring the co-operation of all transport operators. However, this should be done without introducing transport operators.

Conclusion

Rich and poor people and nations are all responsible agents of pollution and Climate Change. The responsibility for the management of the environmental impacts of transport should be addressed by the local, regional and national government. And in order to make this feasible, the different layers of public administration must re structure themselves for a real integral work with aligned objectives.

It is clear that cities are dependent on transport to survive. Therefore, an environmental management of the cities can not be about reducing or eradicating transport, but to look at the impacts that it causes in order to design an agenda that improves transport as well as the living conditions of the city. Urban transport as a necessary cancer for the cities should be a problem of the past. It is important to remark that this does not rely only on technologic improvement, but on multiple factors that cross all the layers of public management.

The threat of Climate Change is radically affecting the lives of the urban dwellers, so radical structural changes have to be addressed to meet sustainable cities for the future.