



Urban Mass Transport Infrastructure

In Medium and Large Cities in Developing Countries



Joint Paper from the World Bank
and the Asian Development Bank



Joint Paper prepared by staff from the World Bank and the Asian Development Bank for the Finance Ministers and Central Bank Governors at the G20 Summit in Los Cabos, Mexico, June 18-19, 2012. The team was led by Nancy Vandycke (World Bank) and Lloyd Wright (Asian Development Bank), and composed of Marc Juhel, Om Prakash Agarwal, Adam Diehl, and Eva Kolker from the World Bank, with input from the Transport Sector Board in the World Bank, and Ko Sakamoto and Arlene Chavez from the Asian Development Bank, with input from the ADB Urban Transport Community, under the guidance of Jose Luis Irigoyen (World Bank) and Gil-Hong Kim (ADB). Drafts of this paper were reviewed by the G20 Development Working Group on 19 March and 3 May, 2012. The paper will be jointly published by the World Bank and Asian Development Bank after the G20 Summit under the title: "Cities at a crossroads: Unlocking the potential for green urban transport". *The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of the World Bank or its Board of Executive Directors or the governments they represent; the Asian Development Bank or its Board of Governors or the governments they represent. The World Bank and the Asian Development Bank do not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of the World Bank or the Asian Development Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.*

Urban Mass Transport Infrastructure in Medium and Large Cities in Developing Countries

Summary: Urban transport determines the shape of a city and its ecological footprint. Many cities in low- and middle-income countries are at a crossroads. Policy decisions taken now, while car use is still relatively low and cities retain a relatively transit friendly, compact urban form, will affect how people will live in their cities for many decades into the future. A new paradigm of urban transport can be part of the solution to reversing the deteriorating situation in some cities of developing countries, and supporting others to embark on a sustainable, low-carbon, green growth path: developing a city for people rather than cars, and including public/mass transport as a major component of the modal structure. Implementing such a new paradigm can be truly transformational. This joint World Bank/Asian Development Bank paper lays out six aspects, which are most difficult to align, yet, are critical to ensure the sustainability of urban transport systems—visionary leadership, integrated strategy for land use and urban transport, coordination among agencies, domestic capacity, adequate cost recovery, and private participation in the operation and construction of urban transport systems. The paper proposes a set of new initiatives for G20 Leaders’ consideration, including the development of an umbrella toolkit to guide policy-makers in charge of urban planning to make transport decisions best suited to their local contexts.

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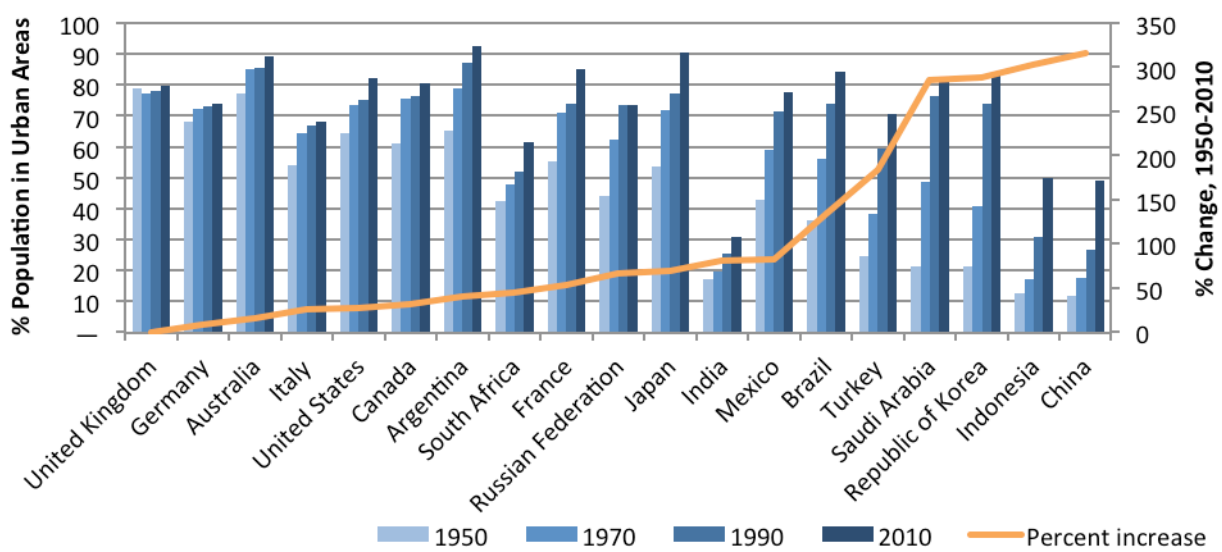
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1. The Context

1. **Rapid urbanization is the biggest structural transformation of the 21st century.** In developing countries—particularly those transitioning from low- to middle-income status—the next few decades will see a dramatic increase in the share of people living in cities. The world’s urban population will increase by 2.8 billion between 2010 and 2050.ⁱ Of this, 96 percent will be located in low- and middle-income countries. This will bring the world’s urban population to 4 billion. While urbanization began as a developed market phenomenon, it has switched to developing nations as they rapidly develop.

Figure 1: Urbanization Trends in G20 Countries, 1950-2010



Sources: World Bank; Population Division of Economic and Social Affairs of the United Nations

2. **The worldwide number of mega-cities, with over 10 million people, is expected to reach 37 by 2025, over twice as many as in 2000, serving as home to over 600 million residents.** The number of large cities (5-10 million people) will have doubled as well, approaching 60, while medium-sized cities with a population between one and 5 million will be nearly 600, again twice that of 2000. In the People’s Republic of Chinaⁱⁱ alone, at least 220 cities will have over a million residents. By 2025 over 2.1 billion people worldwide are expected to call cities of over a million home.ⁱⁱⁱ

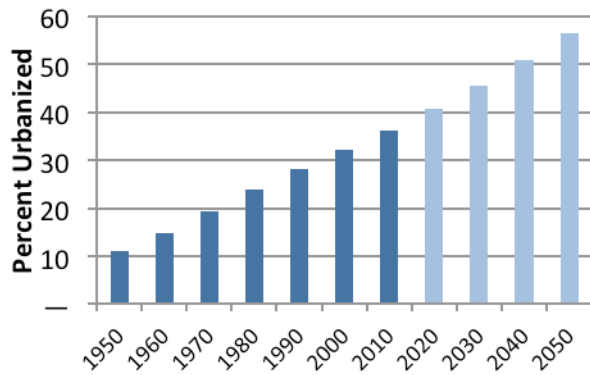
3. **The market forces of agglomeration, migration and specialization are driving this urbanization trend.** China’s cities continue to absorb about 13 million rural residents every year.^{iv} In Sub-Saharan Africa, small and medium-sized towns and villages become incorporated into cities as expanding urban areas push outward into the peri-urban and rural periphery. Drawn by the economic lifestyle and social opportunities of urban dwelling, the world’s population is migrating from rural areas to cities.

4. **Cities have become the engine of economic development and global growth.** The process of urbanization is integral to evolving towards a higher level of development: no country has become middle-income without industrializing and urbanizing, and no city has grown to a high-income level without vibrant cities. This explains evidence of a correlation between urbanization rates and economic growth.^v For example, Greater Cairo produces 50 percent of Egypt’s GDP. In Brazil, the south-central states of Sao Paulo, Rio de Janeiro, and Minas Gerais account for more than 52 percent of the country’s

GDP. While the growth potential of urban development was initially led by developed countries, it has now become a phenomenon largely driven by low- and middle-income countries.

Box 1: Africa is the most rapidly urbanizing continent

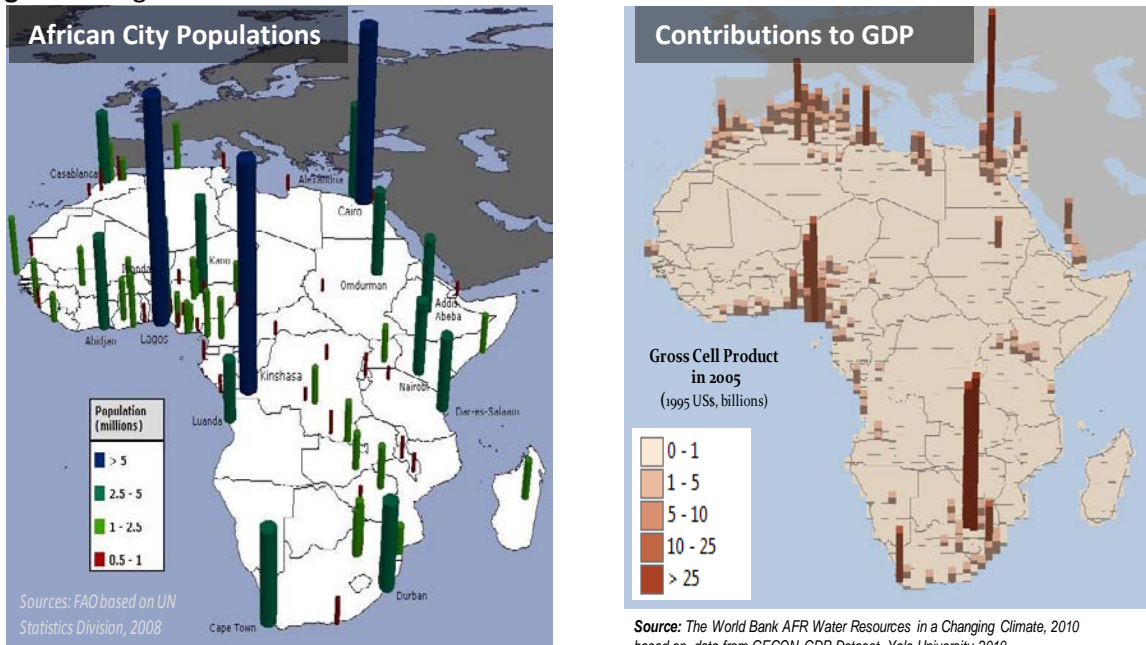
Figure 2: Africa, Urban Population, 1950-2050 (projected)



Source: Population Division of Economic and Social Affairs of the United Nations Secretariat

In 1980, residents of cities and towns accounted for 25 percent of the population in Africa. By 2040, the urban population is forecasted to reach one billion—equivalent to the total population in 2009. Urban growth rates, currently 3.4 percent, make Africa the fastest urbanizing continent. Urbanization, if done right, can help development in Africa more than in other regions. However, rapid urbanization can also contribute to social problems. Africa is home to nearly two-thirds of the world’s slum population and over 70% of the urban population suffers from inadequate housing, water supply or sanitation.^{vi}

Figure 3: Large African Cities and their Contribution to GDP



Sources: Integrating Urban Planning and Water Management in Sub-Saharan Africa, World Bank, 2012; UN-Habitat 2010, World Development Report 2009, World Bank.

5. **Urban development is at the heart of the transition towards a green global economy.** Cities and towns provide firms and families the benefits of proximity and concentration, but the compactness of activity can also produce social tensions, congestion, and road accidents, which undermine the quality

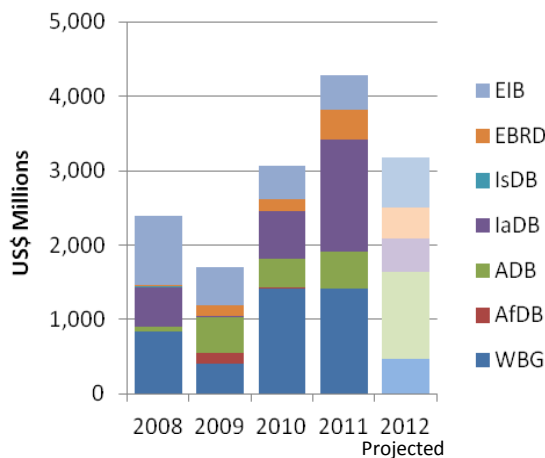
of life and economic efficiency. For example, chronic traffic congestion is estimated to cost the equivalent of 3 percent of GDP in cities in the Republic of Korea.^{vii} Cities are exerting pressure on fresh water supplies, sewage, the living environment, and public health. Finally, cities are a major contributor to pollution, carbon emissions and energy demand. The green growth paradigm posits that it is possible to spatially develop countries and cities to sustain growth while minimizing pollution and environmental impacts.^{viii}

6. **Designing efficient urban transport systems is an important factor to support this transition.** Transport enables access to jobs, education, healthcare, and other social activities. With mobility comes a range of associated economic costs, such as slow average traffic speeds in downtown areas and long commuting times. In Mexico City, for example, 20 percent of workers spend more than three hours travelling to and from work each day. It also generates pollution and environmental costs. For example, transport is a major contributor to CO₂ emissions; it is also one of the fastest growing sources of emissions.^{ix} Thus, transport becomes a critical element to embark on a green growth path.^x

7. **Multilateral Development Banks (MDBs) have long been supporting urban transport.** At its peak in 2011, MDB commitments for urban transport amounted to US\$4.3 billion (or 20 percent of total MDB commitments in transport). Over the past few years, the World Bank Group has been the largest financier in urban transport, followed by the Inter-American Development Bank and Asian Development Bank (Figure 4). Regionally, urban transport lending has been concentrated in Asia and the Pacific region, and Latin America and the Caribbean region.

8. **This policy paper, prepared by the World Bank with the Asian Development Bank (ADB) at the request of the G20 Mexican Presidency, outlines key issues and challenges faced by low-income and middle-income countries as they urbanize and proposes a set of global actions to unlock the green growth agenda.** The intended audience is the G20 Finance Ministers and Central Bank Governors at the G20 Summit in Los Cabos on June 18-19, 2012. A central theme of the G20 Mexican Presidency is Green Growth. Building on the G20 Summit in Cannes, and the recommendations of the High-Level Panel on Infrastructure Investment, the paper lays out the issues associated with urbanization in the broader context of economic development, with access as the crucial variable to ensure that urbanization triggers all its productivity-enhancing agglomeration benefits. In this context, urban transport in general, and public/mass transport in particular, if done right, can be truly transformational:^{xii} it will determine the shape of a city and its ecological footprint.

Figure 4: MDBs Urban Transport Commitments^{xi}



Source: MDB counterparts; by fiscal year

9. **The G20, as a thought leader with a global audience, can highlight the importance urban transport at the highest levels of decision making.** Concerted efforts from some governments and MDBs are already under way to advocate for the vital importance of transportation in the urbanization process and in the quest for green growth.^{xiii} The paper posits that there is no one-size-fits-all approach in urban transport. It lays out critical obstacles to overcome for sustainability of urban transport systems, illustrates them with examples from low- and middle-income countries, and proposes a set of

new initiatives for global impact. This paper complements the paper commissioned by the G20 Mexican Presidency, entitled “Incorporating green growth and sustainable development policies into structural reform agendas.”

10. ***This policy paper proposes a set of new initiatives for G20 Leaders’ consideration***, based on the framework endorsed by the High Level Panel on Infrastructure Investment at the G20 Summit in Cannes. They include: i) support for the development of an umbrella toolkit to guide policy-makers in designing and implementing urban transport systems best suited to local contexts; ii) creation of a global capacity development facility and a new leadership program for decision-makers; iii) creation of a global, city-level database; and iv) creation of a grant-based financing facility to support urban transport project preparation. If endorsed at the global level, these recommendations have the potential to impact sustainable development at scale. However, their implementation will be highly dependent on the availability of funding support.

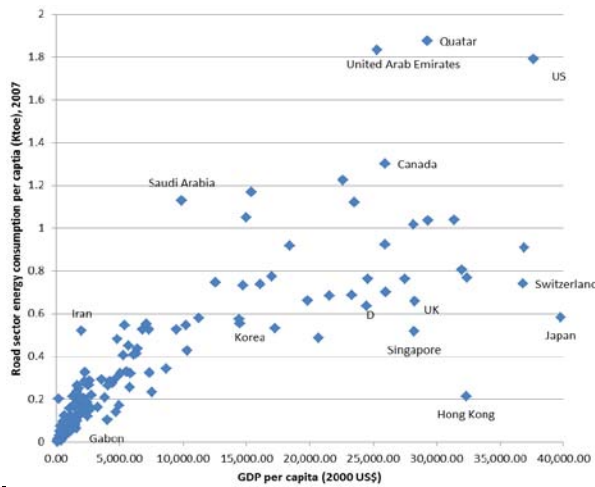
2. Vision – A Low-Carbon, Green Growth Development Path

11. ***There are genuine opportunities for national and city leaders to reduce pollution and carbon emissions, enhance ecosystems, and minimize environmental risks***. Efficiently planned and managed urban areas can yield significant improvements in the environmental impact of human activity for city dwellers relative to their rural counterparts. Urban infrastructure, including streets, railways, and water and sewage systems, comes at a considerably lower cost per unit as urban density rises. Integrated design strategies and innovative technologies and policies are available for the construction of buildings and the development of urban energy, water and waste water, facilitating urban transport in minimizing pollution and environmental impacts. The problem of congestion and its associated economic costs can be addressed and offset by developing efficient public transport systems.

12. ***Transportation is the most difficult area of environmental sustainability due to an ever increasing demand for transport services and its reliance on fossil fuels***. As countries have developed, vehicle ownership and transportation demand have increased dramatically.^{xiv} This has often translated into a positive correlation between energy use in transport and per capita incomes. A key driver of this increase has been the expansion of roads.^{xv} Transportation produces roughly 23 percent of global CO₂ emissions from fuel combustion. More alarmingly, it is the fastest growing consumer of fossil fuels and the fastest growing source of CO₂ emissions.^{xvi} With 1 billion cars already on the road, road transport accounts for about two-thirds of total transport emissions.

13. ***With rapid urbanization, energy consumption and carbon emissions from transport have increased significantly***. Cities contribute to 70 percent of energy-related carbon emissions. A recent World Bank study of 17 cities in China indicates that energy use and greenhouse gas emissions from urban transport have grown between 4 and 6 percent a year in major cities such as Beijing, Shanghai, Guangzhou, and Xian.^{xvii} The transportation system is thus at the heart of the transition towards a low-carbon, green growth development path.

Figure 5: Road Sector Energy Consumption by GDP per capita



Source: World Bank World Development Indicators

are a case in point: these countries have reached high levels of per capita income, but maintained very low emissions per head. Some European countries also have low energy per capita consumption in road transport relative to their income levels.

14. **However, some countries (and cities) have managed to keep energy consumption and related greenhouse gases (GHG) in road transport low, while achieving high levels of economic development.**^{xviii} Because development and the demand for mobility go hand in hand, energy use in transport generally increases with per capita income. Evidence shows that the demand for car ownership increases dramatically at annual household income of US\$6,000-US\$8,000. If historical correlations of economic growth and motorization rates continue, an additional 2.3 billion cars will be added by 2050, mostly in developing countries. But high levels of economic development are possible with very large differences in transport energy consumption. The high-income Asian countries

15. **These differences among countries/cities can be explained in part by strategic vision and supporting policies.** Developing countries, which still face a large transport infrastructure gap, have the opportunity to choose their transport development path: low-emission transport or car-dependent transport. Typically, the smaller the role of the road sector, the lower the intensity of GHG emissions. If public transport is included as a major part of the modal structure in urban transport, there is no conflict between a low emission transport sector and rapid growth or high income. An urban strategy that promotes rail over road and the use of urban mass transit over individual car use can lower the carbon intensity of a city. For example, Hong Kong SAR, China is a prime example of a metropolis that has maintained high mobility by refocusing on multimodality rather than concentrating only on the road sector. The integration of road building, mass transit, and demand management halved vehicle ownership by 1985, with taxis making up 10 percent of passenger cars, drastically reducing travel times without making the city less attractive for business.^{xix} Avoiding the congestion that plagues other megacities allows for agglomeration economies in an environment of sustained accessibility and mobility.

Box 2: Republic of Korea – a comprehensive action plan for greening transportation

In July 2009, the Republic of Korea adopted a National Strategy for Green Growth. The Strategy includes specific actions targeting urban areas, such as the development of eco-cities, green building projects and green infrastructure. A set of policy papers were developed to help local authorities implement the Strategy, including the following Action Plan for Greening Transportation:

- Implement compact city planning principles through transit-oriented development, the development of intermodal transit centers in major railway stations, and the efficient management of densely populated urban centers through cutting-edge technological initiatives, such as the Ubiquitous City or Smart City projects.
- Prioritize low carbon infrastructure investments by increasing the share of national spending on railway and restricting road investments by 2020.
- Control traffic demand through the expansion of congestion charges in major cities, more efficient road uses (via the Intelligent Transport Systems) and the introduction of a “Green Traffic Priority Region” to manage areas of heavy traffic volume.
- Expand pedestrian and bicycle infrastructure through the development of pedestrian priority districts and the construction of 3,114 km of bicycle lanes by 2018.
- Promote public transit use by expanding bus rapid transit (BRT) lanes, expanding the metropolitan-wide railway and completing the second bullet train line.
- Promote transit-oriented development and green transportation through the construction of a Multi- Modal Transfer Center, which entails:
 - Concentrating transport facilities such as railway stations and bus terminals in each multi-modal transfer centre to reduce transferring time/distance by 50% and improve convenience for travelers;
 - Connecting public transport services lines within the multi-modal transfer centers;
 - Developing multi-modal transit centers as multi-functional areas by installing various neighborhood living facilities such as commercial services, cultural facilities and offices; and
 - Promoting non-motorized transport (walking and cycling) around multi-modal transfer centers by reinforcing regulations including designating public transport exclusive zones or pedestrian exclusive zones.



Outlook of the BRT System in Sejong, Republic of Korea.
Source: *The Korea Transport Institute*

Sources: Korea Research Institute of Transportation Industries; Kamal-Chaoui, L., et al. (2011), “The Implementation of the Korean Green Growth Strategy in Urban Areas”, *OECD Regional Development Working Papers 2011/02*, OECD Publishing; *Toward an Integrated Green Transportation System in Korea, Convergence of Technologies and Policies*, Korea Transport Institute (2010)

16. **Once cities grow and define their spatial footprint, it is extremely costly to reverse their development path.** There is built-in inertia in infrastructure. For example, bridges are expected to last 100 years and more. Urban transport infrastructure also has a long lifetime. This means that, once

built, urban transport infrastructure is difficult and costly to modify. Specifically, the costs of shifting transport services to low-carbon modes are much higher than reducing emissions within the carbon-intensive modes. As a result, infrastructure policies to change the existing modal structure among roads, rail, aviation, and waterways are not easily implemented, unless a combination of factors are aligned (see part 4).

17. ***To add to the complexity, transport infrastructure must be made resilient to climate change and natural disasters.*** The effects of climate change are largely unpredictable at the local level, though the incidence of extreme events is expected to increase. Responding to such uncertainty will require a sequence of measures, such as improved infrastructure operations, increased resources available for maintenance, and enhanced design standards for new infrastructure construction. Such a response requires more than just additional funding; it requires precautionary policies informed by new decision making tools.

3. Conceptual Framework

18. ***A broader focus in urban transport is needed to improve access.*** In urban transport, building facilities that allow people to move from one point to another is not enough. It is necessary to think about how conveniently, safely and affordably people can access jobs, education, healthcare, recreation, and a host of other needs. However, gaining access is often accompanied by negative externalities, such as emissions, accidents, and congestion. The policy objective, then, is to determine how to improve access while minimizing these externalities. This could happen, for example, if people travelled in shared modes like public transport instead of personal vehicles or if people used non-motorized modes rather than motorized modes of transport.^{xx}

19. ***There are several options for a city to minimize negative externalities while improving access.*** International experience suggests that there is no easy solution to reduce these costs: a comprehensive approach for land use and urban transport is needed. Such an approach will combine three elements:^{xxi}

- **Avoiding** or reducing the number of journeys taken. This can be achieved by influencing the distribution of activities. For example, better land-use planning and compact city development can lead to fewer and shorter motorized trips and a larger share of public transport use for motorized trips.
- **Shifting** to/maintaining more environmentally efficient forms of transport. A city can influence the way transport activity is realized through choice of modes. It can improve the quality of relatively low emissions modes, such as walking, cycling, and various forms of public transport. Such steps can help a city attract trip takers to these modes and lower carbon emissions per trip. Cities can also establish other forms of incentives to encourage shifts to low-carbon options. These incentives include both non-price controls on vehicle ownership and use (for example, restrictions on parking or the days vehicles with certain plate numbers may be utilized), and price controls, such as fuel taxes, higher parking fees, and congestion pricing.
- **Improving** vehicle use and fuel technology. A city can take a range of measures that directly influence the types of fuels and vehicles being used. Transport systems may also be “improved” through the use of Intelligent Transportation Systems (ITS), which provide users with information that can lead to more efficient travel. Fuel and propulsion system strategies may include such technology options as electric and hybrid vehicles, natural gas vehicles, and biofuel

and flex-fuel vehicles. Fuel economy standards are also another form of an “improve” strategy that can lead to significant emission reductions.

20. ***This framework captures the important idea of spill-over effects.*** For example, one agency’s decision to expand a road to *improve* traffic flow may thwart another agency’s decision to *shift* the reliance from personal motor vehicles. Unless such actions are coordinated in a balanced urban development program that includes public transport provision, demand management, and supporting land-use policies, agencies may make decisions that contradict each other. In practice, piecemeal investments supported by separate agencies have led to an inefficient use of resources and unsustainable development patterns.

Box 3: Cities will need to find the right mix of options to suit their particular circumstances

Strategy	Developed Countries	Low- and Middle-Income Countries
<i>Avoid</i>	Reduce vehicle kilometers through Transport Demand Management, land use planning, Information and Communication Technologies (ICT), localized production, and shorter supply chains	Avoid unnecessary generation of vehicle kilometers through land use and transport planning
<i>Shift</i>	Shift from private vehicles to non-motorized transport and public transport, and from aviation to rail, transfer freight from road to rail and water transport	Enable conditions for the lowest-emitting moves (both freight and passenger). Ensure attractive alternatives to private vehicles exist
<i>Improve</i>	Improve existing vehicles. Down-scale vehicle engine size. Increase penetration of electric vehicles, and carbon-neutral liquid fuels. Use Intelligent Transport Systems (ITS). Electrify rails (for both freight and passengers)	Ensure future vehicles/fuels are cleaner, encouraging small, efficient cars. Design innovations for traditional non-motorized transport

Source: UNEP (2011), Green Economy Report, Transport, Investing in Energy and Resource Efficiency

21. ***As cities develop and expand, one of their priorities should be to ensure that their spatial footprint is supported by a strong public transport network.*** Providing public transport is more expensive than building roads, but public transport and individual transport are imperfect substitutes: in highly congested cities, public transportation becomes necessary for economic reasons, and the environmental benefits can be reaped with no or little additional cost.^{xxiii} Public transportation includes commuter rail, metro rail, light rail, tramway, monorail, bus rapid transit, trolley bus, bus with high level of service, standard bus service and informal mini bus service. Several large cities have public transport networks which are used extensively—the metros in Delhi, Kolkata, and Mumbai, the buses and metro in Sao Paulo, among others. Singapore offers another interesting example of a far-reaching, multi-modal public transit network, which consists of mass transit rail, light rapid transit, buses, and taxis. The transit systems have integrated operating institutions, service networks, and fare schemes. The stations are situated in or near commercial and office developments and are designed to facilitate efficient transfers between modes. Public transit is regulated to maintain its reliability, affordability, and

efficiency. These strategies serve to make public transport attractive even to relatively high-income users.

Box 4: Elements of an urban public transportation network

SERVICE TYPES	FUNCTION	CAPACITY	CONDITIONS	REQUIREMENTS
Feeder circulators (collectors and distributors)	Shortest trips (usually 1-3 km) within district or neighborhood	Low: small busses (7-20 m in length, 20-40 passengers)	Lowest population density, but with defined nodes	Local streets, low costs
Local (bus)	Medium trips (3-8 km) from district to city or district to district	Intermediate schedules: more than 1 minute headways	Medium-density nodes or corridors	Arterial roads, bus stops, and other facilities
Commuter express bus or suburban rail	Long trips (>20 km) from regional suburbs to city center or district	Intermediate	Few origins, limited destinations	Highways or arterials, bus stops, and other facilities
Bus rapid transit or light rail transit	All trips from district to city (usually 5-20 km)	Intermediate to high	high population density: 5,000-10,000 persons per km ²	Exclusive lanes on major arterials; 10-20 m of right-of-way; stations and terminals; intermediate investment, typically US\$5 million to US\$10 million per km for BRT, and US\$30 million to US\$50 million per km for LRT
Grade-separated mass transit (elevated or underground)	All trips from district to city (usually 5-20 km)	High	Highest population density: >15,000 persons per km ²	Underground or elevated stations and terminals; highest investment, typically US\$50 million-US\$200 million, depending on infrastructure
Intercity (bus or rail)	Longest trips from region to region	Medium to high	Limited origins and destinations	Intermodal stations and terminals

Source: World Bank, *Eco2 Cities, Ecological Cities as Economic Cities*, 2010.

22. **While there is a range of public transport options, their costs and benefits should be carefully assessed in each local context.** Mass rapid transit includes subways, suburban rail, and dedicated busways, which all have a capacity and performance superior to buses operating on un-segregated and congested roads. But suburban rail and subways require huge investments in fixed capital, so dedicated busways (plus their more sophisticated relation, “bus rapid transit”) have been gaining popularity.

- **Bus Rapid Transit**, most common in Latin American cities, requires rigorous physical planning. These systems generally cost in the range of US\$5 million to US\$10 million per kilometer to install. It consists of large buses using dedicated lanes and stopping periodically at roadside stations—rather like an above-ground subway without the rails. With high-quality precedents established in Bogota, Colombia and Curitiba, Brazil, there are now approximately 134 systems world-wide. Electric traction also reduces air and noise pollution (for example, in Sao Paulo, Brazil) and can be retrofitted into road systems (for example, in Quito, Ecuador).
- **Light Rail Transit** is a more expensive alternative, ranging in cost from US\$30 million to US\$50 million per kilometer, a modern form of tram covering short distances. It usually feeds a larger system of heavy metro rail. Some cities with light rail include Hong Kong SAR, Kuala Lumpur, Singapore, Sydney, and Tunis.
- A **Subway System** is the most costly mass rapid transit option, but with the largest capacity. Building costs average more than US\$100 million per kilometer, explaining why there are fewer than 200 systems in the world, most in industrialized countries. However, their number is growing in countries such as China, India, and Venezuela. Few cover their operating costs—Santiago, Singapore, Sao Paulo, Hong Kong SAR, and Buenos Aires are exceptions. Even Busan and Seoul metro systems fall short of covering their operating costs with revenue. However, when cities reach a certain size and density, metro systems are an efficient option for moving very large numbers of people to concentrated job centers. The benefits that come from enabling such density can outweigh the additional costs. They include efficiency and productivity gains—traditionally in industry, increasingly in services—but also lower energy consumption, less pollution, greater compactness, increased interaction and encouragement of non-motorized transport for short intra-city trips. Initial metro construction can be supported by land value capture in areas around metro stations. Subsidies for metro operations are often covered by earmarked funds from fuel or sales taxes.

4. Challenges in Implementation

23. ***In practice, public transport systems can quickly become inadequate and congested due to rapid population growth.*** Often, investments in regular maintenance and new investments in infrastructure, which are needed to sustain density in urban areas, are not planned. This policy paper focuses on six aspects that the World Bank and Asian Development Bank view as critical to ensure the sustainability of urban transport systems, as they are often the most difficult to align (see **Annex 1 and 2**):

- Visionary leadership and political will
- An integrated strategy for land use and urban transport
- Local technical and administrative capacity to implement transport solutions
- Regional transport coordination across government levels to give priority to investments in metropolitan and modal integration
- Cost-recovery to cover long-run variable costs
- Private participation in the operation and construction of urban transport systems, under certain circumstances.

4.1. Lack of Visionary Leadership and Political Will

24. **Champions and visionary leaders are necessary to shift the paradigm on urban transport planning from a piecemeal to a comprehensive approach.** Following the legacy of inter-city transport planning, the current modus operandi for urban transport planning works on a project-by-project basis, lacking the comprehensive vision necessary to integrate each project into broader urban development framework. Such a paradigm shift cannot be ushered in through technical specialists and city planners. Such a shift requires visionary leadership, a champion who understands the big picture of an integrated urban ecosystem. Such a leader must be able to navigate the political landscape to convince key stakeholders of the advantages of a holistic approach.

Box 5: The complex political economy of urban transport – Lessons learnt

Unlike many other urban challenges, urban transport is a ubiquitous problem that virtually every urban dweller must deal with on a day-to-day basis. "Congestion" is often the fallback technical position or justification for many investments. However, congestion is usually a symptom of some other problem, which could include poor road design, poor road network design, poor parking management methods, uncoordinated land-use control, distorted price signals for travelers, lack of transportation alternatives, or, in some limited cases, insufficient road space. If congestion is the underlying factor justifying an investment – and it should not always be – then any technical analysis of that investment should show how that particular investment is the most cost-effective way to address the particular cause of congestion that has been identified. Such an analysis is possible only if the problems have been identified, and the alternatives for solving the problem have been analyzed.

For many decision-makers, being seen as doing something to fix urban transport problems is sometimes more important than actually fixing the problems. This can result in either investing in infrastructure before appropriate service characteristics are known, or more commonly, purchasing large numbers of vehicles (buses), with no plan for how to deploy them in an effective manner.

Source: World Bank/Asian Development Bank

4.2. Lack of an Integrated Strategy for Land Use and Urban Transport

25. **Most cities do not have a comprehensive transport strategy.** As a result, the proposals for specific projects are often not integrated with other urban transport measures or with land use patterns. Yet, urban transport systems are complex. They encompass the road network, public transport systems, parking, , other infrastructure, regulatory systems, and land management systems, among others. All these components have close linkages and need to be looked at in a comprehensive and holistic manner rather than as individual fragments.

26. **By adopting a more holistic approach to transport, it is possible to reconcile high mobility with high quality of urban life.** For example, in Singapore, industrial, residential, and social infrastructure is placed within walking distance of bus stops and mass rapid transit stations. Road networks are designed to make bus service accessible from residential areas, and pedestrian walkways are covered to provide protection from rain and extreme weather. A mixed-use planning strategy puts work and home closer together, moderating the demand on transport systems. Policy makers have restrained traffic, through road pricing, and have “managed” to maintain a safe, efficient, and environmentally acceptable movement of people, not just vehicles. This implies prioritization of infrastructure to protect

movements of public transport and non-motorized transport against the unrestricted expansion of private motorized trips (as in Bogota, Colombia and Curitiba, Brazil through busway systems).

27. ***The World Bank and the Asian Development Bank are assisting clients in managing their urban transport networks as ecosystems.*** This approach includes focusing on urban design issues, such as including appropriate infrastructure and basic services for pedestrians, cyclists, and other non-motorized transport in city planning schemes, creating a variety of housing and transportation options that would minimize motorized vehicle transport for low-income groups in accessing city jobs, and using inclusionary zoning, shared-equity arrangements, and tax incentives to create affordable, mixed-income communities in transit corridors. A good example includes the support for a more holistic management of the transport sector through a bus-based mass transit system in Lagos. The World Bank is also assisting cities by supporting regional planning and integration analysis and strategy formulation, as well as related inter-agency coordination efforts that facilitate such linkages. The Asian Development Bank is supporting an integrative holistic approach to new bus-based mass transit systems in cities such as Dhaka, Bangladesh and Lanzhou, China. By focusing development around stations, providing high-quality pedestrian and bicycle facilities, and encouraging smart growth land-use, these projects are helping to offer a new alternative to urban development in these cities.

4.3. Fragmented Governance

28. ***The governance of urban transport is highly fragmented.*** It is fragmented across agencies within a city and across different levels of government. It is fragmented across modes and across jurisdictions. It is also fragmented across functions – for example, licensing is often separated from enforcement. This kind of fragmentation constrains comprehensive and holistic planning. Each agency is driven by its own agenda and, in the absence of a coordinating arrangement under visionary leadership, such fragmentation can lead to inconsistencies and inefficiencies. Effective management of urban transport requires several diverse skills and a wide range of institutions to come together. Agencies dealing with road infrastructure should work with agencies in charge of public transport management and operations, land allocation, planning, safety, environment, urban planning, and road traffic management.

29. ***Several cities around the world have set up unified agencies to regulate and manage urban transport.*** For example, the National Urban Transport Policy of India requires every city with a population of more than one million to set up a Unified Metropolitan Transport Authority. Dubai has recently set up a Land Transport Authority, with Kuwait and Saudi Arabia planning similar institutions. South African cities are developing integrated urban institutions in the wake of the National Land Transport Authority Act of 2009, which devolved responsibility for urban transport entirely to the cities. Setting up such institutions requires a deeper understanding of specific policies and regulations that are already in place. It also requires understanding the governance structure, functions, and inter-agency relations of the relevant local or national institutions and interest groups.

4.4. Limited Local Capacity

30. ***Project experience from the World Bank and the Asian Development Bank shows that urban transport requires a high degree of skills and specialized expertise.*** Urban transport projects are often planned and implemented out of a unit within the conventional civil service. But the issues facing the successful development and implementation of an urban transport project (not to mention several simultaneously, as is frequently needed) are complex and technical. They require specialized expertise

that can only be supported with compensation at levels competitive with the private sector. All too often, governments want to develop and manage complex urban transport projects without the local capacity to deliver.

31. ***Capacity building has to focus on building manpower skills among those who are responsible for urban transport planning as well as those who will be in charge in the future.*** This means a focus on training programs as well as educational programs. There is a need to develop legal, institutional, and policy frameworks for this in several developing cities where the old inter-city legal and policy frameworks still prevail. A good example of capacity building includes India's Centers of Excellence. MDBs have also invested in multiple capacity-building programs, including the PPIAF-World Bank Capacity Building Program for urban transport decision-makers, the World Bank's Leaders in Urban Transport Planning course, and the Asian Development Bank's recent training courses on Bicycle Sharing Systems, Bus Rapid Transit Systems, and Road Safety along with capacity-building events offered around ADB's bi-annual Transport Forum.

32. ***A sound urban transport database is critical for informed planning and decision making.*** The World Bank has expanded some of its flagship assessments, namely the Investment Climate Assessments and Doing Business Surveys, to the city level. Such data have been used to define appropriate entry points for technical assistance and investments in improving cities' economic prospects, through a more systematic approach. Unfortunately, a global city-level database is lacking, either because data is housed in multiple agencies or because data is not systematically collected. This makes planning uninformed. Often, high cost projects are taken up based on assessments using incorrect or "convenient" data. It is not surprising, therefore, that several high cost public transit systems do not get the kind of ridership that was projected. Such a database should be established, first at the city level, then at the national and global levels. Harmonized indicators and methodologies would be necessary to enable compatibility, establishing a globally accepted structure and collection protocol. The Asian Development Bank has established a framework under the Global Transport Intelligence initiative for local and national data collection and the effective dissemination of this information to policy-makers in the Asia and Pacific region.

4.5. Inadequate Cost Recovery to Cover Long-Run Variable Costs

33. ***Pricing and financing issues are at the heart of public transport systems.*** The financing needs for urban transport are daunting. On the basis of international comparisons of cities in developing countries, the funding of a city's transport requires between 1 percent and 2 percent of GDP to cover spending on urban road investments, public transport investments, and operating needs. For example, the Master Plan for Transport in Greater Cairo puts forward a public transport investment of 1.7 percent of GDP for the period between 2002 and 2022. Most countries lack resources of this magnitude within their public budgets. Funds are not just needed for one time capital investments, but also for annual operations and maintenance costs. Therefore, mechanisms that find other sources to help cover operating costs need to be put in place.

34. ***Lessons learnt from World Bank and Asian Development Bank projects shows that decisions are often made on the basis of upfront capital costs, rather than full, lifecycle costs.*** Often, decisions do not take into account future annual maintenance and operating expenses in making capital investment decisions. As an example, over the 30-year life of an investment in a rail facility, the initial capital investment corresponds to roughly 30 percent of the overall lifetime cost of that service. The

remaining 70 percent comes from operating expenditures associated with running the service, and maintenance expenditures associated with upkeep of the facility.

35. ***At the same time, efficient urban transport systems require affordable prices.*** Affordability refers not just to consumer prices but also to the time losses due to congestion, the consequences of accidents, the health costs of local pollution, and the damage that more severe climate events inflict on the population. Transport decisions, particularly those for infrastructure investments, will determine these costs for decades to come, offering opportunities to countries whose transport systems are less mature.

36. ***General fare controls should be determined as part of a comprehensive city transport financing plan,*** and their effect on the expected quality and quantity of service should be carefully considered. Fares are a public policy issue and depend on income levels and sensitivity to negative externalities, among others factors. Public policy considerations may require fares to be below cost recovery levels. In these cases, fare reductions or exemptions should be financed on the budget of the relevant line agency responsible for the categories (health, social sector, education) of the affected person. Modally integrated fare schemes should be assessed for their impacts on poor people.

37. ***There is a menu of financing options from which cities could chose from.*** Mechanisms that help recover operating costs from sources other than fares should be put in place:

- Road tolls and congestion charging
- Advertising and merchandizing
- Parking levies
- Fuel taxes and removal of fuel subsidies
- Capturing of energy security benefits of sustainable transport
- Capturing of health benefits of sustainable transport
- Land development and value capture cover techniques whereby the public entity sells surplus land to developers or develops land around transportation investments (e.g., public transportation system in Hong Kong SAR, China).
- Carbon financing, involving the sale of greenhouse gas emission credits to finance capital or operating costs (e.g., CDM used in Bogota's Transmilenio).

4.6. Lack of Private Participation in the Operation and Construction of Urban Transport Systems

38. ***Policies and investments in urban transport, including public transport, are a public choice;*** they are rightfully addressed by the public sector, following an effective stakeholder consultation and participatory process. Once those policy and investment decisions have been taken, it may be appropriate to engage the private sector to implement those decisions.

39. ***Public-private partnerships (PPP) require an appropriate allocation of risks.*** These partnerships are not always the lowest cost option; therefore, an appropriate allocation of risks (for example, construction, economic, and traffic risks) and accurate estimations of value are important. Examples include public transportation terminals financed by the private sector, such as cases in Brazil and Japan. Supply costs can also be reduced through competition between private sector suppliers. It is important to note that it is not privatization or deregulation per se that improves public transport, but rather the introduction of carefully managed competition in which the role of the public sector as regulator complements that of the private sector as service supplier.

40. ***Among the good examples of PPPs in public transport is the involvement of private operators in city bus services.*** Typically, a public agency determines the route network, the level of service on each route and the fare structure. Thereafter, it contracts bus services, through a bidding process, from private operators. Bids are invited on the basis of a positive or negative subsidy that the private operator may seek. London offers one of best examples of this form of PPP, but several other cities in Latin America and Asia are moving towards this kind of a structure. Most bus rapid transit (BRT) systems employ a form of PPP structuring through the use of private sector funds to supply the vehicle fleets. PPPs allow a sharing of risks, with the public entity taking the demand risk and the private entity taking the operating risk. Basic infrastructure is provided by the public entity, with the private operator investing in the rolling stock.

5. Recommendations for Global Action

41. ***Last year's G20 Summit in Cannes endorsed the MDB Infrastructure Action Plan, which built on the recommendations of the High Level Panel on Infrastructure Investment.*** This paper builds on last year's work and proposes several new initiatives related to urban transport that could unlock the green growth agenda in the context of rapid urbanization in developing countries. These joint recommendations from the World Bank and the Asian Development Bank are being proposed for consideration by the G20 Leaders at the Summit in Los Cabos. However, their implementation by relevant MDBs will be highly dependent on the availability of international funding support.

42. ***The World Bank and the Asian Development Bank will use their extensive operational experience to develop an umbrella toolkit for policy-makers in charge of urban planning by the end of FY12.*** The two institutions, as well as other regional development banks and international organizations, have long been engaged in urban transport projects. Out of this engagement, it is possible to create a toolkit outlining the menu of options available for addressing critical policy issues in a variety of contexts. While there have already been previous attempts at doing so, the World Bank and the Asian Development Bank's development of such an umbrella toolkit would go a long way in helping policy-makers to crystallize the issues, their complexity, and the trade-offs involved in considering various options. Such a toolkit is all the more important given that there is no one-size-fits-all approach, and policy-makers will have to find the right mix of options to suit their particular circumstances. The proposed toolkit will contain 8 modules (See **Annex 3**), and build on many sources, including the Sourcebook on Sustainable Urban Transport developed by the German Agency for International Cooperation (GIZ).

Box 6: Recommendations for Global Action

G20 Summit - Cannes, 2011	G20 Summit – Los Cabos, 2012	
HLP Recommendations on Infrastructure	Policy Analysis in the urban transport paper	Recommendations for global action
Centrality of infrastructure for growth and job creation in developing countries	Urban transport is critical for low-carbon/green growth	Advocate for transport as a key part of sustainable development
Focus on exemplary/transformational projects	Transformational opportunities exist in getting urban transport right, but trade-offs exist, and careful cost-benefit analysis is required.	Support the development of an umbrella toolkit, based upon existing sustainable transport toolkits, to present a menu of options for critical policy issues.
Enhanced support for capacity building (local expertise development, coordination)	Visionary leadership should be combined with local capacity building	Create a global capacity development facility Develop a new leadership program on urban transport for decision-makers.
Global infrastructure data benchmarking	Lack of core urban transport data and information results in poor investment decision-making.	Create a global, city-level database to quantify externality impacts and assist in better decision making on urban transport investments.
Lack of funding for project preparation. Scope for assessing/rationalizing existing project preparation facilities for enhanced effectiveness, if necessary	Lack of grant support for pre-feasibility and feasibility analysis limits the market potential for scaling-up successful sustainable transport interventions	Establish a grant-based financing facility to support preparation of urban transport projects.
Increased role for private sector financing	Policies and investments in urban transport are a public choice. A PPP is not always the lowest cost option; appropriate allocation of risks is required.	Consider the benefits to carefully-managed competition between public sector (regulator) and private sector (service supplier). Adopt PPP approach under certain circumstances

Sources: MDB Infrastructure Action Plan; World Bank and Asian Development Bank; Development Working Group meetings, 2012.

Annex 1 - World Bank Projects in Urban Transport and Lessons Learnt

Between 1999 and 2011, the World Bank supported more than 80 urban transport projects involving commitments totaling US\$10.5 billion. The objective of this support has been to increase the competitiveness and use of inclusive and “clean” modes, such as public transport services, including mass transit, walking, and biking relative to individually owned and used motor vehicles. The underlying, higher-level objectives of this support have included a mix of growth, poverty, energy and environmental concerns.

The approach features a combination of interventions in policy, institutions, and investments, as follows:

1. Allocation of street space in favor of public transport and non-motorized modes, both for the existing urban road systems as well as in expansion projects;
2. Pricing policies for parked and moving vehicles, to ration scarce road space and reflect the true cost of private motorized vehicle use;
3. Public private partnerships in the regulation and provision of public transport services: regulated competition with privately provided operations and a strong public role to protect public interest in both the transport and environmental spheres;
4. Objective and viable fare and subsidy policies in public transport services, stressing targets and links to the social assistance system for those in need;
5. Creation of feedback loops from transport demand to resource mobilization (fuel taxation, congestion charges) and other funding mechanisms;
6. Creation and empowerment of a range of city-based institutions, from traffic management departments and public transport regulatory bodies to mechanisms or institutions with area-wide, cross-modal responsibilities.
7. Development of tools and processes for management and planning of urban transport systems.
8. An array of supporting investments, some in roads and public transport infrastructure and equipment, and others involving capacity building, selected so as to make coherent wholes with the above-listed policy and institutional initiatives.

The World Bank has a comparative advantage in its global reach and experience, fostering regional expertise within a global framework, allowing for the cross-fertilization of knowledge, ideas and good practice across regional boundaries. The World Bank’s global presence allows it to analyze and compare conditions across regions, tailoring interventions to specific local needs and regional contexts.

1. Latin America and the Caribbean

Issues - Public transport modes still dominate urban transport in the region, carrying 60-70% of motorized trips, despite increasing motorization rates. Public transport also has a socio-economic dimension, as a large proportion of travelers are low-income. In most cities, public transport is limited to street-based bus services, largely in private ownership, with fragmented regulatory authority. In cities with commuter rail and metro, there are only weak links to bus networks.

Strategy - Public transport systems have dominated the Bank’s transport program in Latin America and the Caribbean. The World Bank has pursued public-private partnerships, supported the creation of public transport regulatory agencies, and pioneered the use of small-scale grants to act as seeds for larger BRT projects and policy reforms. In Brazil and Argentina, the Bank has focused on suburban

railways and metros, often through long-term PPP concessions, as well as the integration of rail and bus services and fares. In Columbia, Chile, and Peru, the Bank’s engagement has centered on BRT within a PPP framework to improve transport services and air quality. In Mexico, the Bank has worked with the government at a national level on sustainable urban transport finance, as well as on ‘greening’ Mexico’s urban transport network (such as through the Urban Transportation Transformation Project).

Project	Good practice project and lessons learnt
Colombia: Bogota Urban Transport Project (1996-2001)	This project financed the TransMilenio BRT system, a bus-based, rapidly implemented mass public transport system that has redefined the landscape for public transport globally and had a material role in inspiring the construction of over 100 BRT systems across the world.
Colombia: Integrated Mass Transport Systems (3 loans 2004-2012) and Support for National Urban Transport Program (2011-present)	This series of projects has financed planning and implementation of BRT projects in 6 of Colombia’s cities. Good practice in the transformation of medium-sized cities enhancing accessibility and quality-of-life using investments in BRT as an anchor, and on the restructuring of bus operations from competition-in-the-street to a structured, competitively-tendered competition for the market. Lessons learnt: there is a need to (i) balance fiscal discipline concerns associated with a city spending national funds, with exigencies of constructing in an unpredictable urban environment (with unexpected costs related to delay, utility relocation etc.); (ii) ensure consistent follow-through by cities on agreed reforms; (iii) build capacity and institutional support at the city level.
Argentina: Buenos Aires Urban Transport Project (2 loans 1997-2011)	Good practice in (i) rehabilitation of a subway line including stations, rolling stock, and systems (Line A) while the line is still under operation - transformation of the old rolling stock into a cultural heritage landmark that has become integral element of the city’s identity; (ii) development of a multi-modal transport station (Moreno) and a revitalized urban area by complementing investments in the transport transfer station with investments in public services (such as parks) and zoning changes; (iii) access to suburban rail stations with investments in sidewalks and related public facilities; (iv) systematic capacity building supporting a 18 month program of academic support for 30 young professionals who now form the backbone of the Ministry’s planning capacity.
Argentina: Metropolitan Areas Urban Transport Project (2011-)	Good practice in supporting the implementation of SUBE, a multi-modal contactless farecard system.
Brazil: São Paulo Metropolitan Transport Decentralization Project (1992-1998) and Rio Metropolitan Transport Decentralization Project	Good practice in decentralization of suburban rail systems from national to state governments accompanied by major upgrades in service capacity and standards, and institutional reforms of the operating and management companies.
Brazil: São Paulo Integrated Center- Urban Transport Project (2001-2007)	Good Practice for urban rail PPP: privately operated rail line within integrated transport system. Line 4 is one of the first successful urban rail PPPs in the world. State-of-the-art in terms of: (i) urban rail technology (driverless system, platform doors, modern rail cars), (ii) innovative PPP arrangement including a 30-year operating concession and built using a turnkey construction contract, and (iii) integration with several rail lines and multiple CBDs in the Metropolitan Region (<i>Paulista, Faria Lima, Morumbi, Pinheiros, Luz</i>). It is also generating significant mobility and accessibility benefits to lower-income areas on the periphery of the city because of efforts in the past few years to integrate fares (<i>Bilhete Unico</i>) and lines and modes (terminal stations with passenger connections between rail, metro, bus).

Brazil: São Paulo Trains and Signaling (2008-) and São Paulo Line 5 (2010-)	Ongoing projects for technology and capacity upgrades (improvements to signaling, communication, electrification, and alignment) of existing metro and suburban rail infrastructure to achieve higher service standards. Line 5 subway is also being significantly extended to integrate with the rest of the metropolitan network in the center of São Paulo.
Brazil: Rio State Reform and Privatization Loan (1998-2004); Rio Mass transit (2 loans (2000-2009) and Rio Mass Transit II (2 loans – 2009-)	Good practice for concession of existing suburban rail system to private operators in PPP model with shared state/operator investments in capital. Capital investments to enhance suburban rail to surface metro characteristics in terms of frequency and capacity. Going from significant subsidy to subsidy-free operations combined with significant increases in ridership (150k/day to 500k+/day). Support for introduction of unified multi-modal fare card in Rio city.
Peru: Lima Urban Transport Project (2003-2011) and Sustainable Transport and Air Quality Project	Good practice for introduction of successful BRT mass transport system in Lima – including infrastructure and reorganization of previously informal bus services. Lesson learnt: challenges of implementing infrastructure projects in urban settings are exacerbated by the possibility of disruption/negative impact on particular communities, even if overall net welfare gains are significant. Developing and implementing a continuous consultation process to understand and address community concerns remains a critical challenge.
Chile: Santiago Urban Transport Programmatic Development Policy Loan (2005-2006); Technical Assistance Loan (2005-2011) an GEF-financed Sustainable Transport and Air Quality Project (2004-2009)	Transantiago called for a complete transformation of the public transport system from a generally informal service provision to an integrated city and system wide network. Lessons learnt: initial big-bang approach caused serious start-up difficulties and adverse public reaction; over time as those have been addressed, system has emerged as model for integrated, high-quality, environmentally-friendly modern public transport system city-wide. Bicycle trips increased by 45% between 2004 and 2007; and modal shift from cars between 3.4% and 6.8% depending on the day and season. A series of innovative studies regarding sustainable transport were conducted under the GEF and TAL projects (e.g. on road pricing, school mobility, bus scrapping, bus depot and terminal management, street vendors and public transport).
Mexico: Urban transport Transformation Program (2008)	Good practice in the creation of a National Urban Transport Program through which the federal government supports a large scale investment program in mass transit and public transport reform in several Mexican cities. The program facilitates private sector participation, introduction of clean technologies, incorporation of top social and environmental standards, and support for projects that are consistent with sustainable urban transport plans.

2. East Asia and the Pacific

Issues - While East Asia was traditionally dominated by bicycle traffic, an unprecedented rise in incomes in the 1990s led to an acceleration of motorization. The early response from cities was to build more roads, however urban road networks are under increasing pressure from traffic growth. Existing municipal public transport companies mostly operate street-bus networks, though there have been trials with private sector operators, and there are plans to invest in urban rail.

Strategy - The World Bank is helping clients in the region shift from accommodating motorization towards promoting a greener modal split. Projects have focused on better planning and management of urban transport networks. For example, the World Bank is working with client countries to integrate non-motorized transport into the transport modeling process, such as through the China Urban Transport Partnership Program. The Bank is also helping cities build integrated urban road and public transport corridors, such as the Haiphong Urban Transport Development Project in Viet Nam.^{xxiii} The

Bank is also leveraging its cross-sectoral expertise in ICT, working with cities to improve transport planning and management through GPS systems, Hackathons and open-source databases, such as in the Manila ICT Capacity Building Program.

Project	Good practice project and lessons learnt
China: Changzhi sustainable Urban Transport Project	This project is the result of a strategic planning study for the sustainable development of urban transport in Changzhi, funded by a GEF grant. Currently, public transport and non-motorized transport represent nearly 80 percent of trips in Changzhi, and the city wants to preserve a high share for these modes in the future. The project will support an integrated demonstration corridor improvement including measures to develop public transport, bicycle facilities, and pedestrian needs, and will seek to address off street-parking challenges.
China: Wuhan Urban Transport Project - Phase I and Phase II	The Phase I project includes city-wide comprehensive improvements, including construction of primary and secondary roads, bus dispatching center, bus depots, procurement of new buses, area traffic controlling systems, and implementation of road safety 3 "e" measures (engineering, enforcement, and education). The Phase II project is focused on integrated improvements in public transport and road safety on selected main transport corridors of the city, and traffic demand management measures.
China: Urumqi Urban Transport Project	The project financed a bus dispatch system, among other components. The dispatch system helps the bus operator improve operating efficiency and safety.
China: GEF Urban Transport Partnership Program	Technical assistance program to promote a paradigm shift to public transport for 14 cities and one province. The studies led to the preparation of a new generation of urban transport projects focused on sustainable and integrated options.
China: Anhui Medium Cities Urban Transport Project	The project focuses on integrated corridor improvement to improve the efficiency of bus services and the safety of pedestrians and non-motorized transport.
Haiphong Urban Transport Development Project	Urban road and public transport demonstration corridor. This project provides a package of new busses, GPS visibility and control, street-scape redesign for safe pedestrian access to the public transport, and new signaling to provide safe crossing, and public transport priority.
Kunming Urban Transport Project	Metro financing and multi-modal integration support. A clear breakthrough was achieved in securing leadership commitment to rail and bus as well as land use integration to achieve compact city design.
Cebu BRT	BRT development and TA to develop new institutional forms to manage public transport and provide support to actually set up new Public Transport Authority.
Philippines: Manila - EAP ICT Capacity Building Program	Improving transport management and planning through establishment of an open source public transit database, which links transit service information across different modes and includes an intuitive web-based interface for easy data updates by multiple agencies. Reliance on open data protocols will enable a multitude of developers to engage and provide public transport users with service information and trip planning tools, as well as to provide service planning tools to government agencies.
Cebu Urban Transport Crowd Source ICT Demonstration	Leveraging low cost ICT solutions to improve transport data collection. GPS units are installed on fleets of vehicles such as taxi's for more effective transport planning and management decision-making.

3. South-Asia

Issues - In the 2000s, the South Asia region experienced sharp economic growth accompanied by motorization both in terms of cars and 2-3 wheelers. While the region as a whole observed a modal shift

towards motorized vehicles, major cities in India have also been active in the implementation of rail-based urban transport systems, such as the Delhi Metro. Most of the metros in South Asia are operated or plan to be operated by public corporations, with some exceptions of private concessionaires through PPP schemes. City buses in India are generally operated by state-owned companies. In Dhaka and Colombo, they are a mix of private and public companies, and in Kathmandu, Nepal, they are now all private.

Strategy – The Mumbai Urban Transport Project (MUTP) was a symbolic project in the region, adopting a comprehensive approach in the field of urban transport. It supported activities to improve the suburban rail system, increase road network functionality with two new east-west link roads, upgrade the bus service with new bus fleet, and introduce an area traffic control system. The Bank has also worked to provide technical assistance and financing for BRT investments in multiple cities in India.

Project	Good practice project and lessons learnt
Bangladesh: Clean Air & Sustainable Environment project	Through technical assistance, the Bank has supported the adoption of the Dhaka Transport Coordination Authority Act, which gives the new DTCA the necessary authority to plan, coordinate, and regulate urban transport in Dhaka. The project also supports feasibility study of the BRT line on one of the key corridors of central Dhaka.
India: Sustainable Urban Transport Project	The project provides technical assistance to the Ministry of Urban Development and supports the design and implementation of city demonstration projects, such as developing BRT and NMT networks and deploying ITS technologies.
India: Mumbai Urban Transport Project 2A	Following on the railway component activities of its preceding project, the Mumbai Urban Transport Project (MUTP), the MUTP2A aims to further improve the capacity and efficiency of Mumbai’s suburban rail network, through rolling stock replenishment, power supply conversion, and maintenance facilities improvement. The project also provides technical assistance on railway operation and expansion.

4. Sub-Saharan Africa

Issues - Urban transport in Sub-Saharan Africa (SSA) is characterized by rapid growth, with most urban road networks under-developed and under-maintained. The dominant public transport system is informal and privately run, mostly based on small buses and, increasingly, on motorcycles. At the outskirts of many urban settings in SSA are low-density, informal settlements occupied by migrant workers. The roads serving such informal settlements tend to be worse off than the average. The institutions which govern urban transport in the region tend to be fragmented, and are often confronted with funding constraints and weak capacity.

Strategy - The World Bank’s strategy in SSA is to pilot formal public transport services using the Latin American BRT approach adapted to the African context. There is also a strong push for creating urban transport planning and regulatory institutions, which are currently absent, and support their capacity building. These institutional aspects are combined with attention to traffic management issues and the possibility of putting urban transport on an environmentally-stable track.

The World Bank’s work on urban transport is ramping up with public transport components or stand-alone projects in Nigeria, Ghana, Tanzania, and Kenya. A notable project in SSA is the Lagos Urban Transport Project, which served as a catalyst for the creation of the first successful BRT line in Lagos metropolitan area. The project featured a four-pronged approach: (i) major package of improvements

on main urban roads; (ii) competitive public transport service licensing for routes operating on the improved network; (iii) creation of a semi-autonomous agency to regulate/manage the licensed operations; and (iv) creation of a transport fund fed from user charges and transfers.

5. Eastern Europe and Central Asia

Issues - In the 1990s, the urban transport program of the ECA region was part of a Bank-wide, multi-sector effort to assist the former socialist countries to adapt their institutions and policies to the new political and economic system. These projects invested in fleet replacement and infrastructure rehabilitation of state or city-owned public transport companies, helping them to maintain or increase service levels while facing competitive pressures from rising motorization. As the transition to market economies has progressed, motorization has risen, and there has been an increase in private sector urban transport operators.

Strategy - The World Bank has responded by making sure projects balance the public and private sectors as providers of public transport services, and by addressing motorization-induced problems through a combination of road and traffic management instruments.

6. Middle East and North Africa

Issues – Cities in the Middle East and North Africa (MENA) generally suffer from high urban density, limited supply of public transport, limited expertise in urban transport, and institutional fragmentation. The World Bank’s urban transport program in MENA reflects the local contexts in the countries.

Strategy - In Morocco, the World Bank contributed to the development of a national urban transport strategy and provided a Development Policy Loan (DPL) to support government reforms in urban transport, particularly for improving sector governance through institutional capacity building, improving the efficiency of public transport, and ensuring social and environmental sustainability. The Bank is also involved in providing technical support on planned mass transit systems in the major Moroccan cities. In Egypt, the World Bank provided technical support to the Cairo taxi replacement program, an ambitious and effective government program to renew the obsolete and largely inefficient taxi fleet in Cairo. The Bank also provided technical assistance for the elaboration of an urban transport strategy, and a study to assess and mitigate congestion in Cairo, which both feed into the development of an urban transport project. In Lebanon, the World Bank project has supported the alleviation of physical bottlenecks in Beirut, the creation of a traffic management system, and the design and implementation of a street parking charging scheme.

Project	Good practice project and lessons learnt
Morocco: Urban Transport Sector DPL	As the first DPL in the urban transport sector at the national level, it was effective in supporting the establishment and reinforcement of important institutional structures, such as the urban transport division within the Ministry of Transport and Casablanca's Metropolitan Transport Authority. Coupling DPLs with investment projects could become effective tools in supporting the necessary policy reforms in the sector in parallel to providing necessary investments to build public transport systems and reinforce the capacity at local level through investments projects.
Egypt: Urban Transport Infrastructure Development	This project under preparation anticipates the creation of the necessary integration between the different modes of existing public transport in Cairo (Metro, and buses particularly) and the support of effective parking and traffic management solutions.
Lebanon: Urban Transport Development	The street parking charging scheme contributed to rationalizing the use of limited street space and created public awareness on the cost of transportation. Further efforts are required to tackle increasing congestion problems in Beirut.

Annex 2- Asian Development Bank Projects in Urban Transport and Lessons Learnt

The Asian Development Bank is working in a region experiencing accelerating growth in urbanization. At current pace, the Asia and Pacific region is adding the equivalent of 120,000 persons to its urban population each day, which places stresses on the economic and social fabric of the region's cities.

To address these trends and to align its operations to a sustainable transport future, the Asian Development Bank (ADB) has established aggressive targets to transform its transport operations towards the organization's three strategic agendas of inclusive economic growth, environmentally sustainable growth, and regional integration. In order to operationalize these objectives in the transport sector, ADB has created its Sustainable Transport Initiative (STI). Under the STI, ADB will scale up investments in four new focus areas: (i) urban transport; (ii) climate change and energy efficiency; (iii) regional cooperation and integration; and (iv) road safety and social sustainability.

ADB is currently investing US\$3.5 billion annually into the transport sector. Through the Sustainable Transport Initiative, the bank has set targets to invest more in urban transport with public transport being the lead element of this investment. ADB has targeted that at least 30% of its transport lending portfolio will be dedicated to the urban sector by 2020. This commitment compares to the average annual investment of only 1% of its portfolio into urban transport between 2000 and 2009.

In 2011, the percentage of urban transport in ADB's actual transport lending stood at 15% of the transport portfolio. Some of the most recent initiatives to be developed under this portfolio include:

- (i) Bus Rapid Transit systems in Dhaka (Bangladesh), Lanzhou, Jiangxi Ji'an, Jiangxi Fuzhou, and Hubei-Yichang (China), and Ulaanbaatar (Mongolia)
- (ii) Metro projects in Ho Chi Minh City and Hanoi (Vietnam), Tbilisi (Georgia), and Baku (Azerbaijan)
- (iii) Light rail transit (LRT) projects in Almaty and Astana (Kazakhstan)
- (iv) Integrated urban transport and non-motorized initiatives in Davao City and Pasig City (Philippines), Kathmandu (Nepal), Vientiane (Laos PDR), Xian (China), and Yerevan (Armenia).

Several of ADB's active urban transport projects are showcased below.

1. E-Tricycles in the Philippines

ADB is working with national and local officials in The Philippines and the Clean Technology Fund to scale-up a pilot program that introduced locally-fabricated electric tricycles (E-tricycles) using lithium-ion battery technology across the country. Nationwide there are an estimated 3 million tricycles, which emit approximately 10 million-metric tons of CO₂-equivalent per year.

The principal benefit from the E-tricycle program is its impact on urban air quality. Energy security and reduced pressure on national balance-of-payments are other strong motivations for the E-tricycle

program. In 2010, The Philippines spent approximately US\$8.78 billion on imported oil, 39% more than in 2009, due to both higher demand and rising prices.

The project is being designed around a unique financing model in which tricycle operators can repay for the cost of the vehicles through the operating cost savings being realized. Lithium-ion battery technology has been selected due to its cost-effectiveness and overall performance. The transformation of existing tricycle manufacturing is another expected outcome. Due to the project's scale, it is expected that the local tricycle manufacturing base will grow from its nascent position of six suppliers to a mature industry with production capacity of more than 3,000 units a month. While certain components of the electric vehicle will initially be imported, there is also an emphasis on creating incentives for local business development.



Figure. Motorized Tricycle (left) and E-tricycle (right)

Due to the project's scale, it is expected that the local tricycle manufacturing base will grow from its nascent position of six suppliers to a mature industry with production capacity of more than 3,000 units a month. While certain components of the electric vehicle will initially be imported, there is also an emphasis on creating incentives for local business development.

2. Vientiane Sustainable Urban Transport Project

With increases in population and the number of vehicles, the traffic conditions in Vientiane (Lao PDR) are deteriorating. The city is starting to experience congestion and related problems of accidents and deteriorating local air quality due to the rapid growth of private motorized vehicle use. The Vientiane Sustainable Urban Transport Project will support the piloting of a sustainable urban transport system in central Vientiane. The project will focus on four components: (i) establishment and operation of a pilot environmentally sustainable transport agency, conceived as an integrated urban transport organization; (ii) pilot enhancements to pedestrian facilities and potential pedestrianization of the central area; (iii) pilot public transport services and facilities; and (iv) a demonstration traffic management scheme including a parking plan for the city center.

The Government of Japan, through the Japan International Cooperation Agency, continues to be an active development partner for Vientiane's urban transport sector. Recent technical cooperation by JICA include (i) the 2008 Vientiane urban transport master plan, including a follow up study to improve the public bus capacity in Vientiane; and (ii) the Vientiane urban master plan. JICA is also financing procurement of 42 new buses for the Vientiane State Bus Company. The buses will be used on 8 routes radiating from the central bus terminal in the Vientiane core area to other parts of the city.

3. Kathmandu Sustainable Transport Project

Kathmandu Valley (Nepal) is severely constrained in developing efficient urban infrastructure, notably its urban transport system. The city's population is expected to grow significantly from 2 million to 4 million in the next 10 years. Urban sprawl and increasing motorization rates are compounding congestion, pedestrian and vehicular conflict, environmental degradation, road accidents, and poor public transport operation and services.

The Kathmandu Sustainable Urban Transport Project will upgrade transportation through traffic management measures, the rationalization and upgrading of the public transport network, the pedestrianization of heritage routes within the city core, and air quality monitoring. The project is co-

financed by the Asian Development Bank's Special Funds, the Global Environment Facility and the Government of Nepal.

4. Metro System Development in Ho Chi Minh City

Motorcycles currently dominate the streetscape of Ho Chi Minh City, representing 85% of transport in the city. At the same time, growth in car sales is accelerating. High private vehicle usage has resulted in severe congestion. Conditions for pedestrians are particularly difficult, especially at street crossings. The existing public transport system consists of a poorly integrated bus network that cannot compete with private modes.

The Government of Vietnam (GoV) is planning major public transport infrastructure investments intended to induce a substantive modal shift from private transport to public transport modes. With financial support from the Asian Development Bank, European Investment Bank, Kreditanstalt für Wiederaufbau and the Clean Technology Fund, the GoV is developing of a line of the Ho Chi Minh City metro, which is expected to be operational by 2017. Amongst the integrative features of this initiative are improvements to pedestrian and bicycle facilities connecting to the MRT system, park-and-ride facilities for cars and motorcycles, and improved bus links and multi-modal interchanges to ease transfers between modes. The project's design and implementation is being guided by adherence to gender-sensitive features and the adoption of a fully inclusive design that will permit universal access for all user groups including the physically disabled.

Other metro lines, financed by Japan International Cooperation Agency and the Spanish government, are expected to be operational in 2016 and 2018, respectively. The GoV is preparing four additional lines in Ha Noi, with all expecting to be operating by 2020.

5. Greater Dhaka Sustainable Urban Transport Project

In order to improve traffic conditions and the overall urban transport system of Dhaka, the Asian Development Bank, in cooperation with the French Agency for Development and the Global Environment Facility, is developing a pilot Bus Rapid Transit (BRT) corridor in Dhaka. The corridor extends from the Uttara, near the international airport, to Gazipur City.

The BRT corridor features 20 kilometers of dedicated two-directional busways that will follow international good practice and quality standards. In addition to dedicated pedestrian and non-motorized transit (NMT) vehicle lanes along the corridor, the project will lead to the enhanced NMT access on 155 feeder roads that integrate with the corridor. Due to seasonal flooding issues in the Greater Dhaka area, the project also features the construction of efficient high-capacity drainage along the corridor. The project will also feature technologies and components that will enhance the travel experience, including: i) clean vehicle technology; ii) traffic management controls; iii) CCTV cameras; iv) real-time information displays; and, v) new street lighting. Another principal output from this initiative is the transformation of Dhaka Transport Coordination Board (DTCB) into Dhaka Transport Coordination Authority (DTCA), to undertake planning, regulation, and coordination of all mass-transit systems, following joint recommendations from the development partners.

Annex 3 – Umbrella Toolkit for Policy-Makers in Charge of Urban Planning

Several toolkits on aspects of urban transport have been developed to date.¹ Their focus has been primarily on technical solutions. The proposed new umbrella toolkit will enable urban policy-makers to better identify the policy choices that exist and guide them in selecting among options in a manner that is best suited to the local or national context. It would:

- Identify the major sustainable transport intervention options available
- Lay out the critical policy issues at each level of government
- Present a menu of options for each policy issue
- Identify the factors to consider when assessing the various options - there is no universal right answer and choices need to be made in the local context.
- Provide a guide to how these factors can be used in making policy choices
- Illustrate the options with examples of good practices
- Provide access to specific technical resources.

The toolkit would follow a decision tree structure in guiding the policy maker in a step by step, scenario-based process.

1. Effective institutional and governance structures

Policies need to be framed at multiple levels – national, provincial, regional and local. Each level has its areas of responsibility. For example, national levels will be responsible for setting fuel and vehicle standards and a framework for national level financial support for investments; provincial levels would be involved with taxation policies; and regional/local levels would be involved with other aspects of the policy. Therefore, the toolkit would address the needs at each of these levels.

Urban transport is complex and needs coordination across multiple dimensions. The local government is closest to users' needs, and thus may seem the natural choice for these roles. However, responsibilities often vary among agencies, depending on aspects such as technical capacity, financial strength or economies of scale – cities can benefit from a common entity undertaking this responsibility for them. Political issues need to be considered, such as higher levels of government unwilling to delegate some of their powers to lower levels. All of these issues are relevant in deciding which level of government should deal with urban transport.

Patterns vary across countries. Different levels are responsible for urban transport in different countries. For example, Ghana and Kenya have a department of Urban Roads that is responsible for the construction of roads in all urban areas, whereas in most other countries this is a local responsibility. In India, public transport is the responsibility of the provincial government whereas in several others this is a local responsibility.

¹ This toolkit will draw on many sources, including, among others, the Sustainable Urban Transport Sourcebook, GTZ, 2002; the World Bank Leadership Program in Urban Transport, Planning, 2012; the GEOGRAPHY OF TRANSPORT SYSTEMS, Jean-Paul Rodrigue, Claude Comtois and Brian Slack (2009), New York: Routledge, 2009; the Ministry of Urban development, Asian Development Bank, Guidelines and Toolkit for Urban Transport Development in Medium Size Cities in India, 2008.

In action...

Nigeria - In 2002, to address congestion problems in Lagos, a law was passed to create a metropolitan transport authority (LAMATA) with broad powers, independent resources and staff of international quality. The authority's mission is to coordinate and implement the transport policies, program and actions of all transport related agencies in Lagos. It is governed by a board of directors appointed by the governor and reporting to him. The World Bank supported the project via a loan and technical assistance. The first achievements of LAMATA were to improve the quality of its road network and to open Lagos first bus rapid transit (BRT) in 2008.

India - The national government launched the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) as a partnership of the national, provincial and local government for development of urban infrastructure. Launched in December, 2006, this program envisages structured and agreed grant support from the national and provincial governments for infrastructure creation in cities. There is a requirement for a certain set of reforms, primarily aimed at ensuring the financial sustainability of the assets created. An amount of US\$12 Billion (approximately) was set apart for the national government support, with an equal amount expected to be leveraged from the provincial and city governments, as well as the private sector.

Morocco - A metropolitan transport authority has been created for the city of Casablanca. Currently, its role remains limited to the coordination and planning of urban transport; however it is supposed to gradually assume more of a regulation and project execution role. Other cities in Morocco are studying similar coordination arrangements.

2. Land use policies

Urban space has to serve a variety of needs - housing, work space, social interaction – along with mobility of persons and goods. To create and preserve a livable urban environment, the requirements of these needs have to be balanced against each other. Land use planning serves to weigh the demands on limited urban space.

Mobility choices have a substantial impact on urban development. The decisions made concerning mobility lead to inherent tradeoffs:

- a compact city where people can access jobs, education and such other needs quickly and easily, but have smaller places to live in? Or,
- a sprawling city where everyone has plenty of space to live, but must travel longer distances, costing more money and time?

Different cities have used different norms. Most cities in India have a more or less uniform floor area ratio (FAR) whereas others use a diversified FAR norm that allows them to densify areas well connected with public transport. Curitiba and Singapore have done an excellent job of getting high densities close to high capacity public transit stations with a view to make such modes more attractive, while cities like Atlanta have a low FAR and are sprawling.

In developing countries, there is an increasing awareness of the need for steering urban development in order to avoid unsustainable structures, but institutional capacity is typically weak. Setting priority on road network capacity extensions without a clear vision of spatial development has failed to mitigate congestion everywhere in the world. Without acknowledgement of the interactions between land use planning, urban growth and transport development, no sustainable transport system can emerge.

In action...

Korea – Having experienced acute congestion problems in central urban areas, the Republic of Korea has initiated a formal program to promote Transit-Oriented Development (TOD) in new cities. The plan for TOD in the new town of Unjeong is the first of its kind in the Republic of Korea in terms of offering an alternative to standard car-oriented development. The new town will be developed based on two regional public transport networks which will link the new town with Seoul. Within the new town, bus rapid transit (BRT) will be the principal public transport option, with a regional railway offering access to Seoul within 35 to 45 minutes. The Unjeong TOD project is a comprehensive approach to coordinating green development and green transport in newly developing areas in order to reduce traffic congestion, enhance energy security, and reduce environment degradation. TOD in new towns helps achieves two core objectives, accommodating rapidly increasing population growth; and reducing the negative impacts of the transport sector on energy security and the environment.

3. Managing the growth of transport demand

The policy question that faces every city: to manage supply or to manage demand. Successful policies tend to use a mix of both. The challenge is to come with the right mix in the policy framework.

Most cities in the developing world are focused on supply side measures that seek to enhance road capacity and public transport capacity, largely due to the rapidly growing demand and high urbanization rates. Growing cities still at low levels of urbanization cannot escape significant investments in creating new capacity.

However, an early effort at demand side measures can greatly help to save significantly in future investment needs. In fact, in cities which are growing more slowly, it may be possible to deliver adequate transport capacity by focusing attention on reducing the demand to match the available capacity. London has used congestion charging as a demand management tool and Singapore also uses vehicle ownership restraints as a tool for reducing personal motor vehicle use. Several other cities have instituted high parking charges. With informed demand management, developing cities have an opportunity to leapfrog an era of car-dominated development, one which many major cities in developed countries are struggling to manage.

4. Principles for choosing between alternative public transport technologies

Alternative technologies for public transport have their own unique characteristics in terms of carrying capacity, fuel used, capital and operating costs, operating capabilities, appropriateness for difference city forms, etc. These technologies range from buses that share the same road space with cars and other vehicles to underground metro rail systems. While buses on a shared right of way are the least expensive and the most flexible in terms of the route they can use, they have the lowest carrying capacity. At the opposite end, underground metro rail systems are the most expensive and least flexible but offer the highest carrying capacity. Within these extremes are a range of intermediate possibilities like trolley buses, BRT systems, trams, monorail and light rail that have their own unique features. Hence a choice of technology can often be difficult and complex. A framework of policies can help in making the choices easier.

For example, a corridor-based approach to urban planning, which fosters high density development along a few corridors, would be a good choice for high capacity metro rail or BRT systems, whereas a more dispersed urban form may find buses on a shared right of way to be a good choice. Countries with

a high share of imported petroleum fuels may prefer electrical fuels when compared to those that have their own sources of petroleum fuels.

Longer term effects on poverty, city form, and the environment also must be considered. In order to maintain a transit-friendly city form and ensure that the urban poor have access to employment, contacts and services, a critical factor in deciding between public transport alternatives must be the long term impact on the share of people traveling by public rather than private transport.

5. Role of the public and private sector

In an ideal world, user fees, tolls, fuel taxes and other direct charges to beneficiaries would cover urban transport investments and operations and maintenance costs, taking into account the positive externalities of public transit. In reality, the funding equation is much more complex. Given the multitude of externalities and the difficulties in determining beneficiaries, fair user charges are often hard to define. Because urban transport governance is often fragmented and diffuse, with investments and maintenance costs separated from operations revenue, an overarching budget is often lacking. Thus, to ensure the sustainability and coherence of urban transport financing, some cities have partnered with the private sector to leverage its efficiencies and work together to deliver urban transport infrastructure and services.

PPPs in urban transport tend to take the form of concessions, where the private sector participates both in capital investment and in operations. While such concessions can help increase efficiency and ease the strain on public budgets, risks need to be properly shared and regulation needs to be in place to ensure that private profits are balanced with social responsibilities. Urban transport concessions need to be carefully planned to ensure that they fit as part of the broader urban transport network. The public sector needs to ensure a strong regulatory and institutional enabling environment is in place to help plan and implement the concession. The public sector is in charge of setting the scope of the project, determining the role (if any) for the private sector, establishing the legal framework necessary (including securing contract obligations and property rights), managing an open and transparent bidding process, and establishing an independent regulatory regime, among others.

A mix of models has been used around the world. While the US, Russia, and China use a dominant public share in the provision of urban public transport services, UK and countries in Latin America are largely using private operators. In Africa, small private operators of buses dominate the public transport market.

In action...

Korea - Under a Public-Private Partnership, the Korean government has set up a national standard and quality assurance system for smart card fare systems. In general, the private sector in Korea has assumed the lead in system operation since publically-operated systems have not proven to be as efficient. Also, the private sector has the better capability of developing new markets for smart card systems through convenience stores and commercial centers. The public sector's role has been to monitor and control fare levels and to oversee service quality through contractual arrangements.

6. Mode Share Policies

Mode share policies seek to maximize the share of trips by public transport or by non-motorized modes, as these modes are more sustainable, require less road space, consume less fuel and emit less pollutant per passenger. The key to sustainable outcomes in the mode share is the choice of the right policies

with regard to each of the above in the policy framework. In addition, the mode share of a city has longer term effects on poverty, city form and the environment.

The factors that influence, positively or negatively, the mode share are:

- Land use plans
- Cost of public transport
- Cost of fuel
- Quality of public transport
- Safe facilities for walking and cycling, segregated from motor vehicle traffic
- Policies relating to fuel and vehicle technologies

Historically, many cities have implemented policies which have reduced the appeal of non-motorized transit options, encouraging the use of cars for even short trips. However, an increasing number of city governments in developed and developing countries have reversed policy, and are actively promoting bicycling and walking as significant parts of their urban transit systems.

In action...

Korea – Changwon City introduced its Bicycle Sharing program in conjunction with new bike lanes connecting most parts of the city. The Bicycle Sharing program was initiated in 2008, and currently boasts 230 bike sharing terminals and 4,630 bicycles. Participants in the Bicycle Sharing system can register at the system's web site with a payment of US\$20 per year or US\$3 per month. These members are then permitted to use the bicycles for free if returned within a two hire period for each hire. A user survey has indicated that over 86% of the members are quite satisfied with the system. Members responded that they used the program to go to work/school (46.7%), to enjoy leisure activities (27.2%), and to make business visits or others (7.7%). Hence, the Bicycle Sharing System plays a central role in addressing peak hour travel in Changwon.

Dis-incentivizing private car use must be accompanied by well-run and extensive public transport systems and, where feasible, by making non-motorized transportation attractive for short trips. Examples of the latter include the bicycle sharing systems in Changwon and Hangzhou, cycle ways and car-free days in Bogota, Cape Town, and Jakarta, and pedestrian greenways in Seoul and Guangzhou.

7. Financing - Who pays?

The question is, who should pay for transport systems and who are the beneficiaries of such systems? Is it fair for the user alone to pay for public transport? Policies that permit some degree of subsidization recognize that non users are also beneficiaries. So the question becomes – what share should the users pay and what share should the non-users pay?

The financing of urban transport involves a variety of actors, who all play varied but important roles. City administrations, national and regional governments, citizens, international organizations, and the private sector can all be involved. However, the scope and the nature of the role each play varies by country, city, and context.

In determining the share that users should pay, affordability is an important consideration. It was often considered in the recent past that public transport is to be used by the poorer sections of society who cannot afford a private car, and so they should not be required to pay more than what they can reasonably afford. While this still holds true in terms of providing access to under privileged segments of the population, promoting public transport is now part of a broader modal shift agenda that requires it

to be appealing to people using cars, who likely pay a fare closer to the real cost of the service. Differentiated and targeted subsidies or cash transfers may therefore also be considered.

8. Social and environmental issues

Unsustainable urban development comes with a price. Impacts on the environment, health of urban residents, and loss of wellbeing can all be contributed, at least partially, to cities' failure to develop a sustainable urban transport system. The forms of non-motorized and public transport needed to face the social and environmental issues created by the worldwide increase in motorization require a paradigm shift in planning, incentives and education. Policies need to be put in place to make urban transport more energy efficient without compromising residents' needs for access and mobility.

Many forms of urban transport have obvious side effects in the form of air pollution and green house gas emissions. While policy actions in each of the areas of transport emissions can result in benefits, coordinated action through integrated planning can result in exponentially multiplied benefits.

In action...

Mexico – The Government of Mexico (GoM) created the PROTRAM (Federal Support Program for Mass Transit) within FONADIN (National Infrastructure Fund) to improve the efficiency of urban transport and to steer it towards a lower-carbon development path. Mexico has committed to cutting its green house gas emissions by 2050 to half the 2002 level. Urban transport is responsible for 18% of the national emissions total. Hence the need for a national mass transit program. PROTRAM finances planning studies and infrastructure investments for mass transit through grants, loans and guarantees. To be eligible, a city must have carried out a comprehensive planning exercise, known locally as an Integral Sustainable Mobility Master Plan (PIMUS in Spanish), to frame the overall transport policy. PROTRAM's technical unit analyses the requests to finance an urban transport project from technical, social, environmental, and financial viewpoints to determine basic feasibility. The final decision on funding rests with FONADIN's Technical Committee (CT), headed by SHCP and participation of SCT, SEMARNAT, Tourism Secretariat (SECTUR), BANOBRAS, three state governments and SFP. Currently, there are over 40 projects in PROTRAM's pipeline worth over 10 billion dollars. PROTRAM has signed financing agreements with five cities.

Egypt - The government of Egypt, through the ministry of Finance, has put in place a taxi replacement program in Cairo to replace the obsolete taxi fleet in Cairo. The program is well designed and combine a range of incentive (capital contribution, reduced taxes on vehicles, negotiated soft loans with Banks...).The program has been quite successful with estimated more than 20,000 taxis already replaced. It is estimated that the new taxi fleet will result in about 30% improvement in fuel efficiency, and associated emission reductions, relative to the old fleet.

The expansion of cities, and their concurrently expanding road networks, often comes at the expense of the safety of the most vulnerable road users. Road traffic accidents result in hundreds of thousands of deaths annually, with a disproportionate number (90%) in middle and low-income countries, many of which are not motor vehicle occupants at all, but pedestrians, motorcyclists, bicyclists and non-motorized vehicle occupants.

While urban transport systems can be frequently overlooked in discussions of quality of life issues for city dwellers, they are dynamic, influenced by and influencing the choices member of a society can make. Ensuring greater accessibility, with easier and safer transport, especially in and around low income settlements can benefit the poor, women, the elderly, and the disabled and are accompanied by greater mobility.

End Notes

ⁱ Source: United Nations Population Projections.

ⁱⁱ The "People's Republic of China (PRC)" is recognized as the official country name under ADB publication standards and guidelines. For the remainder of this document, though, the name "China" will be taken to represent the terms "People's Republic of China (PRC)" as per World Bank publication guidelines.

ⁱⁱⁱ See United Nations, Department of Economic and Social Affairs, Population Division (2012). World Urbanization Prospects: The 2011 Revision, CD-ROM Edition.

^{iv} See Sustainable Low-Carbon Cities Development in China, Axel Bauemler et al., (eds), World Bank, 2012.

^v See World Development Report 2009 – Reshaping Economic Geography.

^{vi} See States of the World Cities, UN-Habitat, 2010.

^{vii} See Toward an Integrated Green Transport System in Korea – Convergence of Technologies and Policies, Korea Transport Institute, 2010.

^{viii} See Kamal-Chaoui, L. et al. (2011), The Implementation of the Korea Green Growth Strategy in Urban Areas, OECD Regional Development Working Papers 2011/12, OECD Publishing.

^{iv} See Sustainable Low-Carbon Cities Development in China, Axel Bauemler et al., (eds), World Bank, 2012.

^x Urban mobility is particularly important for the poor. The urban poor in Beijing and Shanghai spend less than 5 percent of their income on transport because they walk or cycle. If they chose to travel by bus, the costs would be 40 percent of their income. Brazil's *vale de transport* is an effective way to subsidize poor workers in the absence of good urban transport—financed by the central government and by the employer in equal parts.

^{xi} Many thanks to Sturzenegger, Camilo Deza, Nestor Roa and Natalia Sanz (IADB); Ralph Olaye and Lise Weidner (AfDB); Dan Green, Witek Szpak and Sofia Keenan (EBRD); Farid Ahmed Khan (IsDB); and Corinne Him (EIB) for their help in accounting for MDB commitments in urban transport.

^{xii} See Transformation through Infrastructure: World Bank Group Infrastructure Strategy Update, 2012-15, World Bank Group, 2012.

^{xiii} See statement on behalf of the Partnership on Sustainable Low-Carbon Transport.

^{ixv} See Cities – Investing in Energy and Resource Efficiency, Green Economy Report, UNEP, 2011.

^{xv} See Kamal-Chaoui, L. et al. (2011), The Implementation of the Korea Green Growth Strategy in Urban Areas, OECD Regional Development Working Papers 2011/12, OECD Publishing.

^{xvi} See Sustainable Low-Carbon Cities Development in China, Axel Bauemler et al., (eds), World Bank, 2012.

^{xvii} In 2011, leveraging a grant from AusAID, the World Bank worked with three cities in South-east Asia – Cebu, Philippines; Da Nang, Vietnam; and Suabaya, Indonesia to estimate the overall energy consumption and GHG, as well as to identify illustrative actions that could be taken to improve city-wide efficiency of energy use. The study showed that the related GHG emissions from the transport sector account for a major share of total GHG emissions in each of the three cities (40% in Cebu, 46% in Da Nang, and 20% in Surabaya). While all three cities currently experience relatively low energy intensity in the transportation sector (9,000 to 11,000 MJ per capita per year – about 25% the intensity of New York), energy consumption for transportation is rapidly increasing, following motorization trends toward 2-wheel and 4-wheel modes of private transportation -- a trend that is representative of the sector across the East Asia and Pacific region.

^{xviii} See The Right Turn. Ensuring Development Through a Low-Carbon Transport Sector, world Bank, 2012.

^{xix} See The Right Turn. Ensuring Development through Low-carbon Transport Sector, World Bank, 2012.

^{xx} See Guidelines and Toolkits for Urban Transport Development in Medium-sized Cities in India, Ministry of Urban Transport and Asian Development Bank, 2008. It encourages cities to prepare "Comprehensive Mobility Plans" (CMPs) as part of long-term urban transport strategy providing for a sustainable improvement of people's mobility in metropolitan regions.

^{xxi} See Shomik Mehndiratta, Urban Transport and Climate Change, In Low-Carbon Cities Development in China, Axel Bauemler et al., (eds), World Bank, 2012.

^{xxii} See Inclusive Green Growth: The Pathway to Sustainable Development, World Bank, 2012 (draft). www.worldbank.org/inclusivegreengrowth.

^{xxiii} "Viet Nam" is recognized as the official country name under ADB publication standards and guidelines. For the remainder of this document, though, the name "Vietnam" will be taken to represent the terms "Viet Nam" as per World Bank publication guidelines.



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