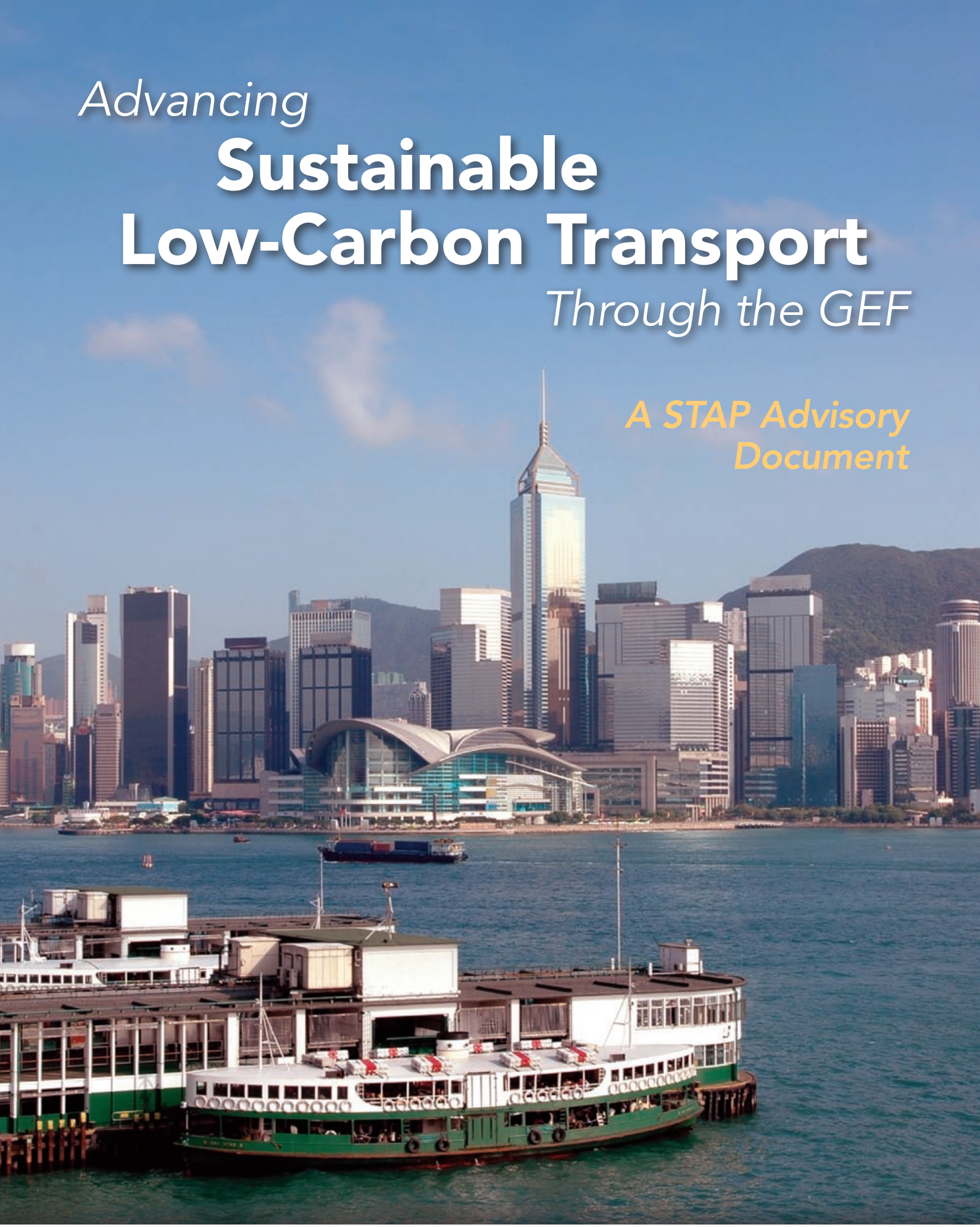

Advancing Sustainable Low-Carbon Transport *Through the GEF*

A STAP Advisory Document

Scientific and Technical Advisory Panel

The Scientific and Technical Advisory Panel, administered by UNEP, advises the Global Environmental Facility

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Advancing Sustainable Low-Carbon Transport Through the GEF

Prepared on behalf of the Scientific and Technical Advisory Panel (STAP) of the Global Environment Facility (GEF) by:

Holger Dalkmann (Transport Research Laboratory) and Cornie Huizenga (Partnership on Sustainable, Low Carbon Transport)*

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About STAP

The Scientific and Technical Advisory Panel comprises six expert advisers supported by a Secretariat, which are together responsible for connecting the Global Environment Facility to the most up to date, authoritative and globally representative science.

http://unep.org/stap

** Both authors contributed equally to this work.*

Preface

Advancing Sustainable Low-Carbon Transport through GEF Support

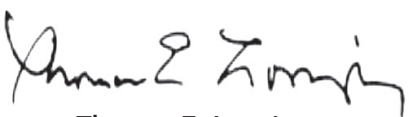
Transportation sector accounts for about a quarter of total energy used. Transport sector is projected to grow robustly over the coming decades. Unless there is a major shift in the current patterns of energy use, which is unlikely, projections show a continued growth in world transportation sector energy use at 2% per year, with energy use and CO_2 emissions projected to grow by 80% over the 2002 level by 2030, according to IPCC (2007). Emissions from transport sector represent the fastest growing source of GHG emissions. Further, urban areas will continue to dominate global GHG emissions. In addition to increasing GHG emissions the motorization of transport, based on fossil fuels, has created congestion and air pollution in large cities around the world. Thus, GEF has rightly emphasized the importance of transport sector and urban areas and has a strategic objective dedicated to the sector aimed at "Promoting energy efficient and low-carbon transport and urban systems". GEF, being a major multilateral agency and being an operating entity of the financial mechanism of the UNFCCC, has a critical role to play in promoting interventions aimed at reducing GHG emissions. In this context STAP initiated a study to provide information and guidance on options for advancing sustainable low-carbon transport during GEF-5.

This report reviewed GEF support to transportation sector over the years and the concept of sustainable low-carbon transport, and aimed at providing strategic advice on the options for GEF to "Promote energy efficient, low-carbon transport and urban systems". Mitigation decisions in transport sector are complex and characterized by some peculiarities which include; large and long term investment, requiring major infrastructural changes, dependence on a single fuel source, involvement of a large number of stakeholders, potential for large co-benefits and non-GHG factors playing a major role. Further, transportation sector is unique compared to other energy consuming sectors by its predominant reliance on a single fossil fuel namely petroleum and the immediate alternative of biofuel being a very controversial option, with questionable net GHG reduction potential as well as multiple environmental risks such as loss of biodiversity, land degradation and conflict with food production.

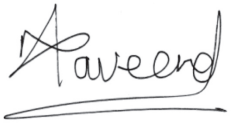
This report defines "Sustainable low-carbon transport" as a strategy to provide economically viable infrastructure and operation that offers safe and secure access for both persons and goods whilst reducing short and long term negative impact on the local and global environment. This is in conformity with the views of IPCC (2007) according to which transportation planning and policy has a direct linkage to sustainable development, which includes reducing oil imports, improvement of air quality, reducing traffic congestion and improving travelling facilities. Such a policy can have important synergies with reducing GHG emissions. STAP report makes the following suggestions for GEF-5 to enable promotion of energy efficient, low-carbon transport and urban system.

1. So far GEF support to transport sector has almost exclusively focused on passenger transport, but to ensure the overall sustainability of urban land transport systems it is important that GEF support also extends to freight and logistics. GEF has a particular important global role to support innovative/with less on the ground experience areas (i.e., freight logistics) and building a knowledge base and lessons on low-carbon transport and harmonization of existing transport GHG assessment methodologies.
2. To realize the transformational impact during GEF 5, it is aiming for the engagement of the private sector which needs to be substantially enhanced.
3. The integration of co-benefits should not only include the acknowledgement of co-benefits but also a quantification of such co-benefits.
4. GEF has a particular role in increasing the comprehensiveness, quality and effectiveness of national reporting under the UNFCCC, particularly to improve transport data availability, access and quality.
5. GEF support for capacity development should be comprehensive and in addition to training activities, include adjustment of institutional mandates, budgeting procedures, development of tools and instruments, data gathering and management, development of institutional coordination mechanisms, as well as awareness on financing structures and sources.

Thus this report could go a long way in assisting the GEF and its implementing agencies to achieve the objective of "Promotion of energy efficient, low-carbon transport and urban systems" during the GEF-5 period. GEF has an opportunity to show the pathway for addressing the difficult challenge of reducing GHG emissions reduction in the transportation sector in mitigation of climate change.



Thomas E. Lovejoy
Chair, Scientific and Technical Advisory Panel



N.H. Ravindranath
STAP member

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Abbreviations

ADB	Asian Development Bank
ASI	Avoid, shift and improve
BAU	Business as usual
BRT	Bus rapid transit
CDM	Clean Development Mechanism
CO_2	Carbon dioxide
CTF	Clean Technology Fund
EST	Environmentally sustainable transport
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gas
IDB	Inter-American Development Bank
IFAD	International Fund for Agricultural Development
IGSD	Institute for Governance and Sustainable Development
IPCC	Intergovernmental Panel on Climate Change
MDB	Multilateral Development Bank
MRV	Measuring, reporting and verification
NAMAs	Nationally appropriate mitigation actions
NMT	Non-motorized transportation
tCO_2	Ton of carbon dioxide
OECD	Organization for Economic Cooperation and Development
ODA	Official development assistance
STAP	Scientific and Technical Advisory Panel
TDM	Travel demand management
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development

Executive Summary

1. Transport and economic development are intrinsically linked, with the former enabling, facilitating and catalysing development. A sustainable future relies on a decoupling of economic growth and carbon emissions from the transport sector. GEF recipient countries will have to avoid creating the 'lock-in' of unsustainable travel behaviours that usually accompanies economic growth. Technical and financial support provided through the GEF could play an important role in this process. STAP Advisory Document "Advancing sustainable low-carbon transport through the GEF" is built on major priorities spelled out in Climate Change Strategic Objective 4: "Promote energy efficient, low-carbon transport and urban systems". It aims to provide strategic-level guidance to GEF partners on how the GEF can best support land transport (both land and inland waterways) during the next funding period of GEF-5 and beyond.

2. STAP document suggests the following definition of sustainable low-carbon transport for the GEF: *"Sustainable low-carbon transport provides economically viable infrastructure and operation that offers safe and secure access for both persons and goods whilst reducing short and long term negative impacts on the local and global environments"*. The definition reflects the fact that a sustainable transport system is one that can accommodate demand from all sectors of the population in the area served by the transport network, with geographical coverage adequate to ensure that there are no areas without access to central and core services and vital functions.

3. Sustainable transport interventions should be implemented as part of a paradigm shift that is accompanied by strong and consistent political will or strategy. A strategy is needed that uses a combination of measures to ensure a balanced approach between technological enhancement and changes in transport behaviour and more attention to the internalisation of external costs of transport. The strategy should be based on *Avoiding* unnecessary journeys and reducing the lengths of trips, *Shifting* transport demand to low-carbon modes, and *Improving* the carbon intensity of all modes of transport (so-called ASI framework). To have the optimal impact interventions should seek to combine elements from the Avoid, Shift and Improve strategy components and co-ordinated and selected according to local circumstances. They should also be viewed with the aim of replicating and scaling-up effective strategy components to catalyse actions on a wider scale in conformity with the 'programmatic approach'. While recognizing the importance of co-benefits (local air quality, less congestion, improved travel time, and an increase in the offering of transport services) for the adoption and implementation of sustainable low-carbon transport policies, trade-offs between GHG emissions reduction and other environmental and developmental goals have be avoided.

4. Mitigation in the transportation sector is characterized by often large and long-term capital intensive investments in infrastructure development on the one hand and the use of several not capital intensive "soft" options (such as improved transportation management, linking multi-mode transport options, non-motorized transport, optimal scheduling, capacity development and awareness building and etc.). Often GEF plays a critical role in mobilizing and directing capital investments in infrastructure through support for "soft" options aimed at reducing GHG emissions.

5. There is a need to plan for in the short- and long-term and employ an adaptive management approach which takes into account the local context. The inclusion of comprehensive stakeholder consultations in the implementation plan is a vital component from which many lessons can be learned from the experience of developed countries where public awareness and education campaigns have proved to increase the effectiveness of transport strategies adopted. Stakeholder engagement should therefore be planned and conducted at the same time as the transport strategy and implementation plan.

6. Data collection, the monitoring of indicators and reporting of the impacts of interventions is a requirement for obtaining a range of finance sources and is also needed to monitor the impacts of interventions and so provisions for providing these measurements should be incorporated into the policy formulation process. This requires from the outset the development of a 'business as usual' (BAU) or "reference" scenario together with the "with-project" scenario, setting objectives and quantifiable targets, as well as specifying milestones for their achievement over the project's implementation period.

Implications for the GEF

1. GEF transport investments should continue playing an important global role and remain complementary to the increasing number of funding channels available for climate change mitigation in the transport sector. Considering the relatively limited scale it might be considered beneficial to focus GEF investments more on catalytic activities directing investment flows such as capacity building, development of enabling policy frameworks at the national and local levels and public awareness raising. These should be complemented with revenue from flexible mechanisms, and/or investments coming from CTF, bilateral climate funds and MDB regular transport programs. Blending the use of different funding channels within one GEF program could be particularly effective when GEF financing is used to support early market take-off while other funds are used to accomplish maturity and market saturation. GEF has a particular important global role to support innovative/ with less on the ground experience areas (i.e., freight logistics) and building a knowledge base and lessons learned on low-carbon transport and harmonization of existing transport GHG assessment methodologies.

2. The broadening of assistance in the transport sector in GEF 5 to include urban policies and integrated approaches to promoting energy efficient, low-carbon cities provides an excellent opportunity towards operationalizing sustainable low-carbon ASI transport framework. The emphasis of GEF transport operations is on land transport in urban areas. As cities develop their economic importance increases as well. An important dimension of economic growth in

urban areas is freight and logistics. So far GEF transport operations have almost exclusively focused on passenger transport but to ensure the overall sustainability of urban land transport systems it is important that GEF support also extends to freight and logistics.[1]

3. To realize the transformational impact GEF 5 is aiming for, the engagement of the private sector needs to be substantially enhanced. GEF transport operations can support the development of enabling institutional and regulatory frameworks and financial structures to encourage private sector participation in sustainable transport operations. It would be of interest to implement a number of transport projects under GEF 5 in cooperation with the private sector to get a better insight into the specific opportunities and challenges that cooperation with the private sector brings.

4. GEF 5 projects will address not only climate change mitigation but also local air pollution, traffic congestion, and access to affordable and efficient transport and public utilities. Such a specific acknowledgement and targeting of co-benefits will help to create support for GEF interventions in the transport sector as in many cases the objective to reduce GHG emissions is not the primary reason for national or local decision makers to support these interventions. The integration of co-benefits should not only include the acknowledgement of co-benefits but also a quantification of such co-benefits.

5. GEF as one of funding mechanisms supporting sustainable low-carbon transport in developing and CEIT countries has a direct interest in better transport data and should be part of global capacity building efforts to improve transport data availability and quality. GEF has a particular role in increasing the comprehensiveness, quality and effectiveness of national reporting under the UNFCCC.

6. GEF support for capacity development should be comprehensive and in addition to training activities, include adjustment of institutional mandates, budgeting procedures, development of tools and instruments, data gathering and management, development of institutional coordination mechanisms, as well as awareness on financing structures and sources.

7. For GEF it is essential to be able to have reliable information on the GHG emission reductions of the programs/projects it supports. Measurement, estimation and monitoring of GHG emissions reduction in transportation sector projects is quite complex, especially for projects aimed at technical assistance and capacity development. The first GEF transport GHG emission reduction assessment methodology introduced in parallel with this Advisory Document addresses these needs (GEF/C.39/Inf.16).

[1] *This could also include transport of freight by inland waterways, railways, and related intermodal activities.*

1. Introduction

Demand for both passenger and freight transport in developing countries is expected to increase rapidly over the coming decades. The primary driver for this increase in demand will be economic development, which has been associated with an increase in the number, length and carbon intensity of journeys made in both developed and developing countries. Transport and economic development are intrinsically linked, with the former enabling, facilitating and catalysing development. However a sustainable future relies on a decoupling of economic growth and carbon emissions from the transport sector. Developing countries will have to avoid creating the 'lock-in' of unsustainable travel behaviours that accompanied economic growth in developed countries. Technical and financial support provided through the Global Environment Facility (GEF) can help in this. The negative environmental, social and economic consequences of not doing so are already manifesting themselves on all levels from the local to the global.

The GEF was established to tackle global environmental challenges whilst promoting sustainable development. GEF's climate change focal area supports projects aimed at climate change mitigation in several energy-related sectors including transport. The GEF provides grants to developing countries and countries with economies in transition to support projects that benefit the global environment, facilitate market transformation, and that have a catalytic and demonstration impact. It supports projects in partnership with ten multilateral organisations including UNDP, UNEP, UNIDO, FAO, IFAD, the World Bank and regional Multilateral Development Banks (MDBs).

GEF funding covers the incremental or additional costs incurred to deliver global environmental benefits over and above national benefits. By doing so it leveraged significant levels of co-funding with its allocated US$9.2 billion having been supplemented by over US$40 billion in co-financing since its inception (GEF, 2010a).

Over the last decade the GEF has developed and implemented a program to address emissions from the land transport sector. This paper describes the work undertaken under this program to date. Based on a review of the concept of sustainable low-carbon transport it aims to provide strategic-level guidance to GEF partners including GEF Council, GEF recipient countries, GEF Agencies and its Secretariat on how the GEF can best support land transport (both land and inland waterways) during the next funding period of GEF-5 and beyond.

While GEF climate change projects are designed to create a global benefit by reducing GHG emissions, the projects also produce significant co-benefits that often serve as the host countries' primary justification for undertaking the project activities. These co-benefits may include travel time savings; expanded travel options and opportunities that support economic development, income growth, and additional employment; air pollution reductions and increases in physical activity that improve public health; and user cost savings.

The paper first summarizes past and planned GEF operations on transport (Section 2) before it gives an overview of motorization in developing countries (in Section 3) and its impact on the environment, especially GHG emissions. Section 4 suggests a definition for sustainable low-carbon transport and lists key barriers and describes guiding principles for the establishment of sustainable low-carbon transport systems. Section 5 then describes certain aspects of the ongoing discussions on a post-2012 climate agreement and reviews their possible impact on future GEF transport operations. Section 6, the last and concluding section describes, based on the analysis carried out in Sections 3 through 5, how GEF transport operations can evolve and enable the development of sustainable low-carbon transport systems. It does so by listing a number of new priorities in terms of areas of assistance and the manner in which GEF transport operations are planned, implemented and assessed. Lastly a strategic framework is presented which outlines how GEF's classification of different types of assistance for barrier removal, catalytic change and innovation can be applied to the transport sector while further strengthening a comprehensive approach to GHG emissions reductions.

2. The GEF and Sustainable Low-Carbon Transport

GEF's mission in climate mitigation is to transform the market development paths of eligible countries into trajectories with lower GHG emissions in the energy, industry, transport and land-use sectors. GEF's interventions in the transport sector aim to facilitate market transformation for sustainable mobility and as such lead to reduced GHG emissions.

"Market" in the context of transport in this paper is understood to cover the provision of transport services for both passenger and freight transport, either by the public or the private sector. The scope of GEF's interventions in transport services covers not only the provision of the service itself but also the infrastructure planning and construction, supportive institutional and planning processes as well as the enabling financial, policy and regulatory structures and mechanisms. Technology does not refer solely to the vehicles, fuels and other mechanical aids enabling or facilitating transport but also to the planning and management systems of passenger and freight transport.

In the context of this paper GEF's desire to "transform the market" is taken to refer to a positive deviation from a 'business as usual (BAU) scenario. It is specifically understood as support for interventions that reduce the carbon intensity of the transport sector in developing countries and also lead to numerous other social, economic and environmental impacts.

2.1 Transport under GEF 2-4

The GEF has been supporting transport projects since 1999 (GEF 2) and has so far concentrated

on interventions in land transport, mostly in urban areas. To enhance the efforts in this sector, the GEF Council approved a sustainable transport program: the Operational Program #11– "Promoting Environmentally Sustainable Transport" (OP11) in 2000. Between 1999 and June 2010, the GEF has approved 45 projects that focus on various actions dealing with reduction of GHGs from transport sector. Latin America and the Caribbean, Asia and the Pacific, and Africa have been particularly well covered. During this period, the GEF has allocated approximately US$249 million to transport projects (an average of $5.5 million per project). This funding has leveraged more than US$2.5 billion in co-financing, the highest in all GEF programs (GEF, 2010c). No dedicated GEF assessment methodology for GHG reductions achieved through GEF interventions was in place at the time of these projects. Projects used a wide range of methodologies to calculate or estimate ex-ante GHG emission reductions. The data provided by the project documents indicate an expected direct CO_2 reduction of 31.5 $MtCO_2$, and an expected indirect CO_2 reduction of 34.5 $MtCO_2$ over the lifetime of projects (GEF, 2009c). It is, however, important to note that methodologies used for these ex-ante estimations remain largely inconsistent and provide a very large range in calculated emission reductions for similar types of projects and conditions. There are particular uncertainties about the indirect CO_2 reduction estimates as these figures incorporate an estimation of the replication of the project (which is linked to the need to demonstrate catalytic impacts) (World Bank, 2010b). This would have a direct impact on the accuracy of ex-post estimations which themselves often rely on the assumptions and data used in the ex-ante estimations

GEF-STAP in 2009 initiated the development of a dedicated GHG assessment methodology for transport projects and it is expected that this methodology will be used by most of GEF transport operations in GEF 5 (GEF-STAP, in preparation).

Under OP 11, the GEF applied a selective and catalytic approach to the transport sector to attract and leverage co-financing, given that the resources available for the GEF were limited. In 2004, with the benefit of several years of implementation and monitoring, the GEF's operational strategies were evaluated and judged successful (GEF, 2004). And as part of the GEF 4 replenishment process, the climate change strategy for mitigation was revised to focus primarily on six strategic programs, including "sustainable innovative systems for urban transport". The detailing of the strategic transport program incorporated what the 2004 evaluation report dubbed as the key issue facing transport: "the prevention of a modal shift to less environment-friendly transport in developing economies". The BAU scenario of growth in GHG emissions needs to be avoided. GEF 4 specifically emphasized "non-technology" interventions in the transport sector such as modal shift to lower GHG-emitting modes of public transport, better managed public rapid transit, and non-motorized transport.

As of 2009, 29% of the GEF transport projects involved bus rapid transit (BRT) systems or some form of transit system priority or restructuring. Another 29% focused on some form of non-motorized transport (NMT) infrastructure, normally cycling lanes but also some pedestrian facilities. Another 8% were for some form of travel demand management (TDM) measures. Only 6% of the projects dealt with alternative vehicles such as electric or hydrogen or some form of hybrid vehicles. Another 28% was spent on 'other' activities; including capacity building, land use programs, awareness raising, policy making, freight and bicycle manufacturing (GEF-STAP, in preparation).

One of the key principles of GEF is that support provided should play a catalytic role and facilitate market transformation by removing key barriers for sustainable mobility in urban areas. It is too early to decide whether this is happening in those countries with emerging economies where GEF support for transport has been concentrated: Argentina, Brazil, China, India, Indonesia and Mexico. These are typically larger countries in which GEF support for transport is implemented side by side with a range of other international and domestic efforts on sustainable transport. Also most of the larger GEF Transport projects in these countries have started implementation only recently and it is too early to judge their impacts.

It is clear however that the impact of GEF transport activities has reached beyond the individual projects that received GEF funding. They have helped to deepen the understanding of the contribution of transport to climate change and the manner in which transport can be part of effective and comprehensive climate change mitigation. GEF experience on transport was an important contributing factor to the development of the Partnership on Sustainable low-carbon Transport (SloCaT), which has emerged as the largest multi-stakeholder network on sustainable transport and which has created a new impetus to strengthen the integration of land transport in the ongoing negotiations on a new global climate change agreement.[2] The knowledge and experience

[2] *See www.slocat.net*

gained in GEF transport projects has also directly contributed to shaping the transport components in national projects under the Clean Technology Fund (CTF), which has now surpassed the GEF as the largest funder of sustainable transport in developing countries. Similarly, MDBs which have stated the intent to mainstream sustainable transport in their transport operations actively make use of concepts from GEF transport projects in doing so. A good example of the impact of GEF transport projects has been BRT which is now being supported by both national and local governments as well as the MDBs.

2.2 Transport under GEF 5

The overall goal of GEF's climate change focal area is "to support developing countries and economies in transition towards a low-carbon development path". The transport strategy in GEF 5 (2010-2014) is spelled out in Strategic Objective 4: "Promote energy efficient, low-carbon transport and urban systems". The movement towards a more comprehensive approach to reduce emissions from transport initiated under GEF 4 will continue throughout GEF-5, which will support measures promoting energy-efficient, low-carbon transport systems, public transit systems, energy efficiency improvements to vehicle fleets, TDM, and NMT (GEF, 2009a). Support provided will broaden to include land use and transport planning options leading to low-carbon transport systems that reflect the importance of rapid urbanization as a key driver of future growth of GHG emissions in developing countries. It is expected that the expanded scope of the transport objective will result in some projects that address urban systems as a whole.

In GEF 5 the GEF will attach more importance to programmatic approaches that can facilitate transformational impacts on a wider scale than isolated interventions (GEF, 2009b). The GEF's mandate to support catalytic actions to protect the global environment lends itself well to a focus on programs rather than projects, the latter of which provide recipient countries with relatively little leverage to realize sector wide transformations and synergy impacts. The GEF's investment in programs increased significantly during GEF-4 and there is scope for the land transport sector to benefit from this increased emphasis on programmatic approaches under GEF-5.

An amount of $ 250 million is planned to be invested in transport under GEF 5 with the expectation that this will leverage $ 1.3 billion and result in sustainable transport and urban policy and regulatory frameworks being adopted and implemented in 20 to 30 cities. Under GEF 5, transport continues to remain the only sector for which key targets are defined at the city level, rather than the national level as in the case of industry and building sectors; renewable energy; land-use and forestry. This is in line with the focus of GEF on the urban scale for its transport activities.

Photo: Thomas Sennett/World Bank

3. Trends and forecasts for transport activities in the developing world

3.1 Drivers of motorization

The motorised movement of people and goods increased more than a hundred fold over the 20th century while the total human population increased only four fold (UNEP, 1999). Economic development and transport are seen as closely connected. Development increases transport demand, while availability of transport is beneficial to development. One of the most critical drivers of increased economic development in the entire world was urbanisation. In 2008, for the first time in history, more than 50% of the world's population (3.3 billion people) lived in urban areas (UNFPA, 2007) and by 2050 it is expected that three out of four people will live in urban areas (IEA, 2008). The United Nations states that in 2005 75% of the population in 'more developed' countries lived in urban areas, while 42.7% of those in 'less developed' countries lived in urban areas. It predicts that these proportions will increase to 86% and 67% respectively by 2050 (UN, 2008). This increase will take place mostly in Asia and Africa (notably sub-Saharan Africa), which, to date, are amongst the least urbanized regions in the world. Urbanization takes shape through expansion of existing cities which can lead to the development of urban clusters or corridors or through the urbanization of current villages and rural communities. The process of urbanisation has led to cities becoming increasingly important as a source of GHG emissions. Collectively cities are estimated to account for 71% of global GHG emissions and 67% of global energy related CO_2 emissions (World Bank, 2010a).

At the same time as the population has increased, cities have grown larger. In 2002, 19 cities had a population over 10 million (WBCSD, 2002) and it

has been predicted that between 2000 and 2030 the urban population will double in developing countries and the size of the overall urban areas will triple (Angel et al., 2005). There is therefore a growing need for infrastructure serving urban areas, such as transport, to accommodate the additional and changing demand of these areas. Twentieth century trends in transport environmental performance have not, however, compared well with some substantial improvements in other sectors (such as power, industry and buildings), where growth in activity has not been accompanied by similar growth in emissions. Major improvements in environmental impacts of transport were associated with improvements in transport fuel efficiency and pollution control. However, these improvements have been offset by the global growth in transport activities.

3.2 Characteristics of urban transport in developing countries

The urban transport sectors of developing countries, which is where GEF interventions in the transport sector have been focused, differ from those of the developed countries. Although the rate of motorization is increasing rapidly, the number of vehicles per capita is still relatively low in developing countries; often less than 100 cars per thousand persons. The modal share of public transport and NMT is still higher than in most developed countries and the majority of trips are still made by these modes. In many cities it is expected, however, that the modal share of public transport and NMT will decrease under a 'BAU' scenario as users of NMT and public transport grow more wealthy and can afford a motor cycle or a car. Public transport and especially NMT receive limited public funding in comparison to road construction.

The transport systems vary significantly among countries, with a particular distinction to be made between those in least developed countries and those in emerging economies. Transport systems in least developed countries tend to be characterised by high modal shares of NMT (walking and cycling), low private car ownership per capita, and low modal shares of formal public transportation. Informal passenger transport (paratransit) tends to have a large modal share. Paratransit operations are a vital mode of transport in these countries. They are usually operated by the private sector and less subjected to regulation. The vehicles used in para-transit are often assembled locally in the informal sector and do not always meet emission or road safety standards. This situation is not conducive to high levels of efficiency, passenger comfort or convenience and can undermine public transport services, with poor environmental track records. This tends to be symptomatic of inadequate institutional structures and legal frameworks.

Emerging economies tend to reflect many of the trends experienced during the development of what are now considered developed countries. Car ownership (and the ownership of motorcycles, particularly in Asian countries) is increasing rapidly in cities owing to the widespread growth in incomes, availability of financing schemes, and the status associated with the ownership of a private vehicle. Other drivers of motorisation include the inability of public transport services to accommodate growing demand for transport, and the often uncomfortable, inconvenient and unsafe nature of public transport and NMT.

Increase in travel by private vehicles tends to be at the expense of demand for public transport and use of NMT. Emerging economies with rapid economic growth have modal splits becoming increasingly similar to those of developed countries. Cities in these countries, which are currently predominantly located in Asia and in Latin America, experience many of the negative impacts associated with high car ownership. Transport planning and environmental management generally are not able to keep up with the rapid motorization and as a consequence such cities often have high levels of congestion, noise and air pollution.

The expansion of economic activity in developing countries increases demand for both passenger and freight transport. The freight and logistics sector tends to be overlooked often when analysing challenges for the transport sectors of developing countries. Much of the demand for freight transport is accommodated by road freight movements with rail freight constituting a relatively low proportion of demand. This can be partly attributed to relatively low investment in freight rail networks in developing countries where geographic coverage of the rail network can be low and where its infrastructure can be in need of maintenance. It is also linked to the relatively fast and direct service provided by road that cannot be paralleled by either rail or inland waterways.

There are few examples of comprehensive sustainable low-carbon transport networks in cities in developing countries that have been able to break the link between economic growth and increase in demand for individual transportation. Low(er) carbon transport solutions are also currently still at a relatively low

stage of development in developing countries as a whole. There are, however, an increasing number of, often project-based, examples of where innovation and investment in the transport sector of developing country cities has managed to increase public transport patronage and the viability of more environmentally, socially and economically sustainable alternatives to the private car.

3.3 GHG Emissions from transport

The transport sector is currently responsible for 13% of GHG emissions (IPCC, 2007) and 23% of CO_2 emissions from global energy consumption (IEA, 2009). Provided that current trends are preserved, transport energy use and CO_2 emissions are projected to increase by about 80% by 2050. Although GHG emissions per capita are much higher today in Organization of Economic Cooperation and Development (OECD) countries, nearly 90% of future growth in emissions is expected to come from non-OECD countries (IEA, 2009).

The amount of GHG emissions from transport is directly related to the distances travelled, the vehicle occupancy load and the carbon efficiency of the vehicle. The projected growth in emissions in non-OECD countries results from an increase in both passenger and freight transport activity. Growth in freight transportation activity in non-OECD countries is expected to dominate transport activity worldwide growth in the future (See Figure 1).

The results of scenario planning by the International Energy Agency (IEA, 2009) underscores the need for full participation of the transport sector at the global level in order to realize the climate 2° Celsius stabilization target by 2050. This 2° Celsius target is the limit of global temperature warming that must not be exceeded if permanent and irreversible climate change is to be avoided (IPCC, 2007). The same IEA study shows reductions in CO_2 emissions of more than 50% by 2050 compared to 2005 for all regions in the world with the largest emission reduction potential being in OECD countries. This is because whilst the growth in emissions will be greatest in non-OECD countries the technology and knowledge required for achieving a 50% emission reduction in OECD countries already exists. The emission reduction potential of land transport has also been documented in other planning studies. For instance, the World Bank (2009) estimated a possible emission reduction of 19% by 2032 against a dynamic baseline for selected countries in East Asia.

Of special relevance to the transport sector are also short lived pollutants which contribute to global warming; especially black carbon and tropospheric ozone. Taking the impact of these short lived pollutants into consideration Unger et al. (2009) come to the conclusion that globally land transport has the highest overall warming potential of all economic sectors.

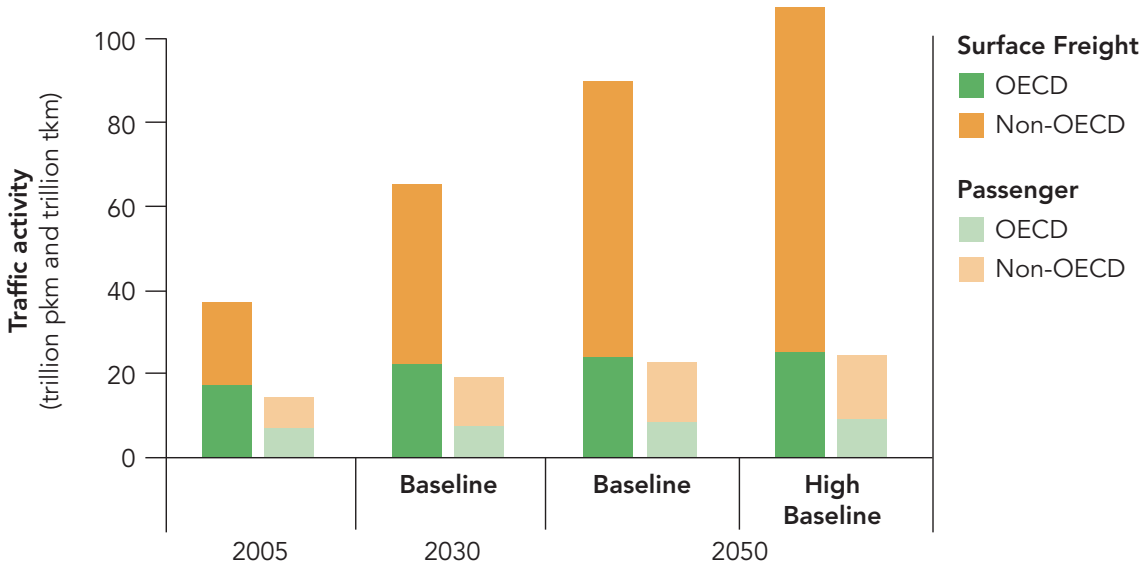

Figure 1. Mobility split by type of transport, OECD and non-OECD

Source: IEA (2009) Transport, Energy and CO_2. Moving towards sustainability.

4. Improving sustainability of transport systems in developing countries

4.1 Defining sustainable transport systems

It is important to first specify what is meant by sustainable transport. The sustainable transport concept is based on that of sustainable development as defined by the Brundtland Commission (1987) – a system that can operate to meet current demand without negatively impacting the ability of future generations to meet their needs. This Advisory Document is focused on land transport as the fastest growing sub-sector of transport and one which has a preponderant impact on the state of the global environment. The paper suggests the following definition of sustainable low-carbon transport for the GEF:

"Sustainable low-carbon transport provides economically viable infrastructure and operation that offers safe and secure access for both persons and goods whilst reducing short and long term negative impacts on the local and global environments".

This definition reflects the fact that a sustainable transport system is one that can accommodate demand from all sectors of the population in the area served by the transport network, with geographical coverage adequate to ensure that there are no areas without access to central and core services and vital functions. Whilst meeting local transport needs a sustainable transport system should also meet wider social, economic and environmental needs. It should contribute towards positive performance in all of these aspects in different ways and to varying degrees on all levels from the local to the international.

It should also support the long-term maintenance of the benefits that result from a sustainable transport system, achieving a balance between production and consumption. GEF investments should seek to support interventions that contribute to the creation and development of transport systems that reflect an understanding of these principles.

4.2 Key barriers to establishing sustainable low-carbon transport systems

There are several key barriers towards achieving sustainable low-carbon transport goals (Monzon et al., 2001; EST, 2004; Dalkmann et al., 2009), many of which are associated with lack of knowledge, primarily with the lack of understanding of individual and societal choices with respect to transport decisions. The GEF and those submitting proposals for funding to the GEF should be aware of these barriers and the potential impact that they could have upon the effectiveness of actions in the land transport sector. The key barriers that need to be considered are as follows:

- Political – including low or wavering levels of government commitment to measures to reduce growth of private vehicles and their use, to scaling up and replicating sustainable low-carbon policies and projects, and to reducing the role of the informal transport sector. There can also be vested commercial and political interests in developing unsustainable transport solutions (e.g. vehicle manufacturers, providers of transport services and land developers or land-use planning authorities). Political resistance can also be experienced through reluctance to curtail informal service provision owing to its flexibility and the employment that it creates. Projects requiring substantial infrastructure changes often cannot be accomplished within time-limited mandates of city and state officials and are sometimes difficult to include into political agendas.

- Legal and institutional – such as the mandates of and division of responsibilities between different agencies (decentralisation and subsidiarity), which can be subject to poor co-ordination, co-operation and integration. This barrier can be experienced within the transport sector (with institutions both horizontally and vertically) but also in its relationship with other public sectors. Demand for transport is intrinsically linked with decisions made in other sectors and a lack of integrated and strategic planning and communication with these sectors can compromise the development of a comprehensive transport strategy. It can also encompass the lack of legal power and/or ability to influence the activities of the private sector (such as developers), the informal sector, and inefficient or insufficient legal frameworks.

- Economic and financial – subsidies and pricing systems that favour private car ownership and do not address associated negative externalities. Another related barrier is the existence of restrictions on expenditure and budget, which can have a particular impact upon resource intensive measures. In the developing world there is limited or no compensation for the provision of mobility to the majority of citizens, yet this is the basic premise of public transport.

- Individual and societal – such as lack of awareness of the need for change as a result of poor understanding of local and global environmental impacts; poor public acceptance of an instrument; perceptions of public transport being for lower classes, and of the private car as a status symbol; absence and costs of transport alternatives.

- Methodological – in developing countries this barrier tends to be characterised by a lack of appropriate performance indicators and targets and the absence of full cost accounting methods for transport impacts. The land transport sector on an international level experiences barriers owing to challenges associated with measuring GHG emissions from the sector. There are similar difficulties in quantifying the impact of co-benefits that can be realised through transport interventions, which considerably enhance the cost effectiveness of activities in the sector.

- Capacity - lack of skills to develop and implement appropriate technologies and methods in a wide variety of fields such as integrated transport planning; vehicle, fuel and infrastructure standards; assessment, evaluation and accounting of transport impacts.

- Market or Commercial – in many countries the market for low-carbon alternatives is not fully developed. For example, although it may be possible to import a low-carbon vehicle technology, there is no local industry that enables its maintenance or service making the implementation and operation of such technology not feasible. Equally, certain countries have monopolies in the supply of specific low-carbon fuels, which makes their use not the most cost-effective option and serves as a deterrent for its wide application. In addition, in new markets, the business case for a specific low-carbon alternative may not have been explored yet.

4.3 Strategic approach for realising sustainable low-carbon transport systems

The nature of a sustainable transport system will vary from country to country and city to city but it should adhere to a number of guiding principles for sustainable transport. This section introduces a number of principles which if applied will help to develop a framework in which sustainable transport systems can be developed (GTZ et al., 2009).

Strong and consistent political will and strategies are a requisite foundation for a paradigm shift towards sustainable transport. There should be an overarching vision of sustainable transport and robust long-term political support for the realisation of this vision which can drive policy development, the creation or strengthening of institutional structures and appropriate financing structures. Strong leadership and political acceptance are critical at the national/sub-national and local/municipal levels to ensure sustainability of these efforts.

Sustainable transport systems should also be developed from a well thought out package of policies. A strategy is needed that uses a combination of measures to ensure a balanced approach between technological enhancement and changes in transport behaviour and more attention to the internalisation of external costs of transport. The strategy should be based on *avoiding* unnecessary journeys and reducing the lengths of trips, *shifting* transport demand to low-carbon modes, and *improving* the carbon intensity of all modes of transport (see Dalkmann and Brannigan, 2007).

The key elements of the **'Avoid'** strategy component *(avoid or reduce travel or the need to travel)* are integrated land-use and transport systems planning, for which there is considerable scope for improvement in both the procedures for land-use planning and the institutions who have responsibility for overseeing this process in developing countries. The continued urbanization process makes this strategic option particularly suitable to reduce the need to travel and to maintain a high modal share of NMT. The link between transport and land-use planning is specifically recognized by the GEF and is an emerging focus of GEF-5.

The **'Shift'** pillar of the ASI strategy *(shift to more environmentally friendly modes of transport)* is related to modal choice. In the passenger transport sector this emphasizes a need to shift private car travel to lower carbon modes such NMT (walking and cycling), shift to formal public transport options (bus, rail and other forms of mass rapid transit) and strengthening the attractiveness of these travel modes. In the freight sector it will similarly involve shifting demand for road freight movements to rail and, where possible, inland waterways. In the developing country context this strategy component also comprises avoiding a shift to private cars and motor cycles from NMT or public transport and instead maintaining a high modal share of NMT. Encouraging development of transport networks combining different modes and enhanced possibilities for intermodal exchange facilities for movement of people (e.g., between NMT and formal public transport) and freight (e.g., between rail and road connection for the "last mile" from origin and to destination) are important elements in the implementation of this pillar.

The implementation of the **'Improve'** *(the energy efficiency of transport modes and technologies)* pillar of ASI strategy can help to reduce emissions from private cars and other low occupancy vehicles (e.g. motor cycles) as well as from mass transit and freight vehicles. Technological improvements can help to make engines and fuels less carbon intensive. Energy efficiency of road vehicles can be improved through reduced vehicle loads (although equally capacity should be maximised to enhance efficiencies and reduce journey numbers), improved drive-train efficiency using a number of engine and transmission technologies, by developing longer-term options such as plug-in hybrids and hydrogen fuel cell vehicles (Kobayashi et al., 2009), eco-driving styles, improved maintenance, and better traffic management and route choice. Advanced technology vehicles (Electric Vehicles, Plug-in Hybrid Electric Vehicles, and Fuel Cell Vehicles) will play an increasing role, particularly after 2020 (IEA, 2009) yet in urban areas they will not alleviate present or future congestion levels. Alternative fuels such as biofuels, electricity and hydrogen can help to decarbonise transport systems, however the life-cycle GHG impacts of biofuels are still poorly understood which makes assessment of their mitigation potential in the transport sector uncertain. Traffic and public transport system management is another key element of this pillar. Improving fuel economy rather than increasing horsepower and vehicle mass has significant mitigation potential in the transport sector (IPCC, 2007). Its particular impact in cities with a high rate of motorization may however be more limited because efficiency gains are likely to be outstripped by increases in fleet size and increases in vehicle kilometres travelled (Darido *et al.*, 2010). Nevertheless an improvement in the energy efficiency of vehicles is essential as demand for private travel will inevitably remain high.

To have the optimal impact interventions should seek to combine elements from the avoid, shift and improve strategy components detailed above. **Policy measures developed under the ASI framework must be well co-ordinated and selected according to local circumstances.** Their development and implementation will be **facilitated by effective institutional structures at national and local level**, supported by capacity building. They should also be viewed with the aim of replicating and scaling-up effective strategy components to catalyse actions on a wider scale. This is in line with the '**programmatic approach**' that can facilitate transformational impacts on a wider scale (GEF, 2009b). Measures such as regulatory standards are likely to be taken in any case at the national level. A programmatic approach at the national level can accelerate the scaling up of effective strategy components by facilitating the development of integrated transport policies and the establishment of financial frameworks to support the implementation of sustainable low-carbon transport systems at the city level. Programmatic approaches should be compatible not only with local needs and aspirations but also with interventions in the sector at the regional and national scales where synergies can be obtained and where different types of policy measures and instruments can be employed.

There is a need to **plan for in the short- and long-term and employ an adaptive management approach** which takes into account the local context. The lead time for some type of transport infrastructure projects, e.g. subways, can be more than a decade and they will have an impact on transport in the city for sometimes more than a century. When implementing transport strategies a lot must be done in a short period of time to ensure transformational impacts but transport systems evolve over time. Transport strategies therefore need to recognise the long-term impacts of different policy measures and long-term revenue requirements, as well as the short-term dimension, to ensure that the effectiveness of the policy does not diminish. Policy measures should therefore be developed to compliment the different characteristics of each measure as well as the context in which it will be implemented. Their implementation should be phased and the details of their development and implementation should be formalised in an implementation plan, which clearly details the role of all stakeholders in the process, resource requirements associated with each phase, and monitoring and public reporting provisions. This will allow all components of the transport strategy to be reviewed and adapted and its social, environmental and economic impacts continually assessed.

The inclusion of comprehensive stakeholder consultations in the implementation plan is a vital component from which many lessons can be learned from the experience of developed countries where public awareness and education campaigns have proved to increase the effectiveness of transport strategies adopted. **Stakeholder engagement** should therefore be planned and conducted at the same time as the transport strategy and implementation plan are being developed to help to ensure widespread support, commitment, and to enhance impacts upon travel behaviours.

Data collection, the monitoring of indicators and reporting of the impacts of interventions is a requirement for obtaining a range of finance sources and is also needed to monitor the impacts of interventions and so provisions for providing these measurements should be incorporated into the policy formulation process. This requires from the outset the **development of a 'business as usual' (BAU) or "reference" scenario** together with the "with-project" scenario, setting objectives and quantifiable targets, as well as specifying milestones for their achievement over the project's implementation period.

To support sustainability at the national and local level data collection and measurement provisions should be accompanied by the **setting of objectives and quantifiable targets**, as well as milestones for achieving the objectives and targets set. These should be linked directly to the transport sector but should be wide-ranging to reflect the numerous co-benefits that interventions in the transport sector can have, such as improvements to congestion, road safety, noise, air quality and health.

Activities to reduce emissions from the transport sector should not be restricted to the transport sector only, rather **cross-sector linkages should be recognised and exploited** taking into account transaction costs implications. The development of transport networks is a complex process and the transport sector represents just one element of development. An integrated approach to planning that considers transport together with external sectors, such as social welfare planning and community and economic development strategy, and wider energy strategy can build a strong foundation for sustainable transport.

Political commitment and institutional capacity building to support a long-term vision for sustainable transport is required in institutions on all scales from the local to national. Key areas requiring institutional strengthening include data (e.g. to set a reference baseline, date and targets), allocating capital and revenue budgets, and monitoring environmental

but also social and economic impacts of transport systems. This will require education and training, knowledge sharing and funding.

Another guiding principle is the **recognition of co-benefits**. Transport strategies and policies can lead to GHG emission reduction but climate change mitigation is rarely the driver of the development of these schemes – instead it is often the local social, economic or environmental impacts that can help to realise the vision of sustainable low-carbon transport and to secure the required political support. Recognising potential co-benefits requires a better assessment of external costs of transport (such as environmental and health costs from collisions, air pollution, noise and GHG emissions, congestion and delays); the potential benefits of sustainable, low carbon transport and their inclusion in the decision-making process. While recognizing the importance of co-benefits (local air quality, less congestion, improved travel time, and an increase in the offering of transport services) for the adoption and implementation of sustainable low-carbon transport policies, trade-offs between GHG emissions reduction and other environmental and developmental goals have be avoided. Wide scale use of electric vehicles can reduce GHG emissions but can lead to increased congestion in cities.

A fundamental element in the development of all transport strategies that will be supported by climate finance is that they **must have environmental integrity**. Interventions that are funded using climate finance must be developed and assessed to ensure that they will significantly reduce emissions relative to a business as usual scenario. Impacts on GHG emissions must be significant and ensure that reductions are actual rather than being transferred to other sectors or double-counted elsewhere (carbon leakage effect). This will again require capacity building including for GHG life cycle assessment to ensure that appropriate expertise does exist in the host country.

Regardless of the source of funding interventions must also be **cost-effective**. This applies both to their development as well as their operation. Finance must be used in an accountable and responsible manner, which requires implementing least-cost options and ensuring that all funding is employed to optimum effect. This requires detailed understanding of the area in which interventions are to be implemented and knowledge of the local context and care should be taken to ensure that all benefits, including non GHG related ones are included in the assessment of costs and benefits. Transport sector interventions should also be fully transparent and accountable. The over-arching low-carbon vision should be built from the bottom-up taking into account the interests of key stakeholders. Monitoring and public reporting provisions need to be put in place to enable official channels for communication, and knowledge sharing. If interventions are to be effective then all relevant stakeholders should have the option of becoming involved throughout the process.

Photo: Tran Thi Hoa/World Bank

5. Evolution in Thinking on Climate Change Mitigation and its Relevance to GEF Transport Operations

GEF 5 will be implemented from 2010 to 2014. This coincides with the expected finalization of the design of the post 2012 climate governance structure and its initial implementation. Draft elements of the new climate agreement, based on the Bali Action Plan and influenced by the Copenhagen Accord, can be expected to affect GEF 5 interventions in the transport sector. Similarly in recent years a number of other financial climate instruments have been established which provide support to the transport sector. Also, MDBs are increasingly re-orienting lending in the transport sector towards sustainable transport whereby climate change is specifically mentioned as one of the driving factors.

5.1 Transformational Impact

The emphasis of GEF 5 on contributing towards a transformational impact is echoed throughout the mitigation community. Science recommends limiting the increase in global temperature to 1.5 to 2.0° Celsius to avoid catastrophic consequences from climate change. These temperature levels require ambitious emission reduction efforts from both developed and developing countries. To achieve it developed countries would need to reduce GHG emissions by 25 to 40%, by the year 2020, compared to 1990 levels, while developing countries would need to reduce their GHG emissions by 15 to 30% by 2020, compared to business as usual (den Elzen and Höhne, 2008). More radical GHG emissions reductions, of about 50 to 80%, would be required by 2050 for both developed and developing countries (IPCC, 2007). These emission reductions have not been formally agreed on but serve as a guide for the scale of

Photo: Simone D. McCourtie/World Bank

mitigation action required. The transport sector has an important contribution to make towards the 2020 and the 2050 emissions reductions goals. Due to infrastructure long life-spans, the transformational changes need to start occurring now in the transport sector to avoid locking countries to current emission trends.

GEF 5 will support a minimum of 20 to 30 cities with low carbon transport systems (GEF 2010b), yet there are many hundreds of cities in developing countries which will need to adopt better transport to make a difference in terms of lowering the growth of GHG emissions in transport. After having focused more on individual projects, many of which could be considered pilot projects, and establishing the viability of various mitigation approaches the time has now come for replication and scaling up of these efforts. The GEF will not be able to fund this replication effort and it will require a financial commitment from governments (national and local), the private sector as well as aid organizations to replicate or scale up successful programs and projects that have been implemented, both in developing and developed countries (SLoCaT, 2010b). These include:

- More efficient pricing of roads, parking, fuel, insurance and vehicle registration fees;
- Establishment of dedicated funding mechanisms in countries to provide funding for sustainable low-carbon transport;
- Promotion of public transport through mass transport systems and networks connecting different modes. BRT is an affordable option for the developing world with more than a hundred schemes in operation, under construction or planning in Europe, Africa, Asia and Latin America;
- Public bicycle and car sharing schemes of which there are now more than 160 in operation world-wide;
- Wide scale use of alternative fuels which reduce both air pollution and GHG emissions;
- Tighter vehicle emission and fuel quality standards, as well as fuel economy standards in many developing and developed countries.

Several developing countries have indicated economy wide emission reductions for the period up to 2020 (Dusha, et al.). So far limited detailing of sector contributions, including from the transport sector, has been made. It is discussed however that, in the future, National Communications will provide this type of information (Ellis, et al., 2010).

GEF transport operations will have to contribute to realizing the intended transformation of developing countries' economies along a low-carbon development path. This will be facilitated if GEF transport activities, in addition to their current emphasis, would include support for the establishment of national level enabling policies and institutional and financial frameworks. The outcomes at the national level could be reflected in the Results Framework for GEF 5.

5.2 Enhanced Mitigation Action

The expectation is that developing countries will agree to report on their mitigation efforts, including in the transport sector, through the periodic national communications to the UNFCCC (Ellis et al. 2010). It is plausible that the frequency of national communications or elements thereof will be increased, and discussions regarding the desirability and feasibility of doing so are currently taking place. Currently national communications for non-Annex I countries are being submitted about every 6 years on average. At present many countries are finalizing their second national communication which is based on activity data for the year 2000.

The need for more frequent and detailed national communications highlights the importance of better transport data, indicators and GHG assessment methodologies. There is a wide-ranging consensus that transport data are weak and often not suitable for their main functions: (a) planning and managing transport-efficient access to goods and services; (b) documenting transport activity that is taking place in support of economic and social development, and (c) monitoring environmental sustainability strategies for the transport sector (SLoCaT, 2010a).

GEF transport operations typically occur at the local level but can serve to improve knowledge and understanding of sustainable low-carbon transport on a national level. Local level interventions can therefore play an important role in improving the overall quantitative and qualitative knowledge base on transport in developing countries. Improved transport data would benefit national communications and help countries develop appropriate policies and investment strategies. At the same time this would also greatly facilitate the application of the GEF GHG assessment methodology (GEF-STAP, in preparation).

Under the Kyoto Protocol developing countries had no formal obligations to reduce emissions. The Bali Action Plan opened the door towards a stronger engagement by developing countries in mitigation through their agreement to undertake voluntary Nationally Appropriate Mitigation Actions (NAMAs)

in the context of sustainable development. These NAMAs will be supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner. Supported NAMAs are to be registered in a NAMA registry and will be subject to a MRV (Measuring, Reporting and Verification) process.

Following COP 15 and the Copenhagen Accord, by July 2010, 43 developing countries had communicated their proposed NAMAs to the UNFCCC.[3] 28 Parties specifically mention the land transport sector in their submissions (Dalkmann, 2010; Binsted, 2010).

The detailed guidelines for NAMAs are still under development, it is however clear that the formulation and implementation of transport NAMAs by developing countries can make a strong contribution towards creating a national policy framework on sustainable transport in developing countries. GEF transport operations can contribute to the development of such a policy framework and in those cases where initial transport NAMAs are in place they can also guide future GEF transport operations.

The GEF GHG assessment methodology will make an important contribution to the development of MRV procedures for transport NAMAs (GEF-STAP, in preparation). At the same time the discussion on NAMA guidelines (for the transport sector) is expected to lead to methodological insights that may benefit the further development of the GEF GHG assessment methodology which is planned to occur during the implementation of GEF 5.

5.3 Transport Activities under other climate change instruments and mechanisms and ODA

Apart from GEF there is a host of other channels through which developing countries have access to funding to implement activities to reduce GHG emissions in the transport sector. The volume of available climate finance will remain very low in comparison to more traditional sources of funding, such as Official Development Assistance (ODA) and domestic investment but it will still have a core role to play in the transformation of transport system in developing country cities. Sources of climate finance include:

a. *Flexible mechanisms under UNFCCC.* The most relevant of which for developing countries is the Clean Development Mechanism (CDM). Transport has not fared well, however, under CDM because of a range of barriers to participation, the most important of which has been difficulties in meeting additionality criteria and the development of reliable, detailed GHG emission reduction evaluation methodologies, as well as high transaction costs;

b. *Climate Funds.* In addition to GEF this includes funds operated by international organizations, most notably the Clean Technology Fund (CTF) and those which are bilateral in character, e.g. the German International Climate Initiative. The CTF was designed to fill an immediate financing gap before further details of the future (post 2012) climate regime are worked out, and aims to provide scaled-up financing for 'transformational actions' that contribute to demonstration, deployment and transfer of low-carbon technologies with a significant potential for long-term GHG emissions savings.

The expected emission reductions through CDM, CTF and GEF in the transport sector have been modest so far as listed in Table 1, although CTF, because of its less complicated requirements for GHG assessment, has been able to develop a portfolio of projects in a short period which potentially will result in 3 times the emission reductions of the CDM and GEF portfolio which were built up over a longer period of time.

In addition to dedicated climate instruments, developing countries in the coming years will also have more access to funding from MDBs and other bilateral development channels to implement activities to reduce GHG emissions from transport. The increased availability is the consequence of (a) increased funding for transport as part of a capital increase for several of the development banks, as part of a coordinated G8 response to the 2008 financial crisis[4], and (b) a policy shift away from an overwhelming emphasis on road construction and maintenance towards greater lending for land transport systems.

[3] *See http://unfccc.int/home/items/5265.php for latest overview of proposed NAMAs submitted to UNFCCC.*

[4] *In the Pittsburgh G20 meeting agreement was reached on a $350 billion capital increase for MDBs. (http://g20.gc.ca/toronto-summit/summit-documents/the-g-20-toronto-summit-declaration/).*

Table 1. Overview of transport projects in existing climate instruments

	Year of 1st project	No. of Projects	Funding [$ million]	Reported/expected direct emission reductions [$MtCO_2$-eq/yr]
CDM	2006	30(3)[a]	567 (CERs)[b] (63)	2.7 (0.3)
GEF2-4	2006	37	201 (grants)	3.1[c]
CTF	2009	7	600 (loans)	10[d]

[a] In pipeline (registered, requesting registration and at validation), bracketed numbers registered projects only; [b] expected total undiscounted revenues at 10 $/CER, 3x7 years crediting, excluding transaction cost; [c] assuming 10 years lifetime; [d] assuming 10-20 years life time depending on type of investment.

Source: Huizenga C. and Bakker S. (2010) Applicability of post 2012 Climate Instruments to the Transport Sector, ADB – IDB- SLoCaT, Final Consultants Report

Table 2. Scope of international finance mechanisms

	Instrument	Approximate scale*	Scope					
			Capacity building	Policy support	Innovative technologies, practices & financial mechanisms	Support for transport infrastructure	Investment (leveraged finance)	Public awareness
Flexible mechanisms	CDM	oo			✔	✔	✔	
Climate funds	GEF	oo	✔	✔	✔	✔	✔	✔
	Japan Cool Earth Partnership	o				✔	✔	✔
	German International Climate Initiative	ooo	✔	✔	✔	✔	✔	
	Clean Technology Fund	ooo	✔	✔	✔	✔	✔	
	Global Climate Change Alliance	oo		✔	✔	✔		
	Environmental Transformation Fund – International Window	oo	✔		✔			
ODA	MDBs – transport funding	ooo	✔	✔	✔	✔	✔	✔
	Bi-laterals transport funding	oo	✔	✔	✔	✔	✔	✔

* Total finance available for all sectors. o less than US$100 million oo between US$100 million and US$5 billion ooo more than US$5 billion.

Table 2 (on the previous page) gives an overview of how future GEF transport operations can be positioned in relation to other external forms of assistance. With the increase in the number of funding channels and overall amounts available for climate change mitigation in the transport sector there is a need for:

a. Coordination on the use of funds for activity type. Considering the relatively limited scale of GEF funds it might be considered beneficial to focus more on activities such as capacity building, development of enabling policy frameworks at the national and local levels and public awareness raising. These should be complemented with revenue from flexible mechanisms, and/or investments coming from CTF, bilateral climate funds or MDB regular transport programs. GEF would provide investment support especially in areas with less on the ground experience, e.g. freight logistics;

b. Blending the use of different funding channels within one GEF program. Under GEF 2 to 4, GEF resources have already been used in combination with MDB funding and domestic financing. World Bank (2010c) argues that if different funds (including e.g. CTF) are used in a coordinated manner, they can help speed up the adoption of particular (transport) technologies or (transport) systems. In such cases GEF financing is used to support early market take-off while other funds e.g. CTF are used to help accomplish maturity and market saturation.

c. Building a knowledge base and lessons learned on low-carbon transport and harmonization of existing transport GHG assessment methodologies. The latter need to consider *what* is measured, *when* it is measured and *how* it is measured.

d. Increase the comprehensiveness, quality and effectiveness of national reporting under the UNFCCC. GEF supports National Communications and it is essential for the GEF to continue and to consider scaling up support for these activities, building on progress already made.

6. GEF-5 Support for Sustainable Low-Carbon Transport Solutions

6.1 Shift in priorities and approach

Transport operations in GEF 5 build on the approach initiated under earlier GEF activities in the transport sector. At the same time however priorities and the overall approach will need to evolve in response to the changing strategic priorities of GEF and general developments with respect to climate change mitigation as outlined in the previous section. Items a to c below describe possible new priority areas for future GEF transport operations, while items d to f describe recommendations for improving the quality of GEF transport operations.

a) Orientation towards broader urban development

The broadening of assistance in the transport sector in GEF 5 to include urban policies and integrated approaches to promoting energy efficient, low-carbon cities fits well with the ASI approach which was recommended in chapter 4 as a conceptual framework to move towards sustainable low-carbon transport. Compact cities are better suited for mass transit or NMT and generally are associated with lower numbers of passenger and ton kilometer per capita than cities with a large amount of urban sprawl (Darido et al., 2009). Cities in developing countries will undergo their most rapid expansion in modern history over the next 10 years, which will require them to substantially strengthen transport infrastructure and services to provide access to services and goods. It makes good sense to help cities prevent future transport and sustainability problems by including urban development activities in future GEF transport activities.

The expansion of GEF transport operations to include land use policies will however pose a challenge to the newly developed GEF transport GHG reduction assessment methodology.[5] Very little experience exists with quantifying impacts of GHG emission reductions from land use change which often are only realized after 10 or 15 years. This is well beyond the time-frame of current GEF projects. Emission reductions from these types of activities should be estimated on a conservative basis making use of methodologies outside the GEF transport GHG reduction assessment methodology.

Urban planning and energy efficient, low-carbon cities are not only relevant concepts for the transport sector. They are equally relevant for other sectors such as energy and buildings. Coordination will be required with these other sectors to ensure that urban planning is dealt with in the required inter-sectoral manner and not just in the context of transport. This could in principle result in integrated, cross-sectoral, GEF urban development projects with funding coming from different strategic objectives under the GEF Climate Change focal area.

b) Freight and logistics

The emphasis of GEF transport operations is on land transport in urban areas. As cities develop their economic importance increases as well. An important dimension of economic growth in urban areas is freight and logistics. So far GEF transport operations have almost exclusively focused on passenger transport but to ensure the overall sustainability of urban land transport systems it is important that GEF support also extends to freight and logistics.[6]

The ASI approach, which is suggested as the conceptual basis for future GEF transport operations, also fits well with the freight and logistics transport sector. The development of logistics platforms and systems is an integral part of urban planning. To overcome the lag of freight and logistics compared to passenger transport GEF assistance would have to initially focus more strongly on awareness raising, capacity building including for carbon accounting, and the development of appropriate policy and investment concepts. Freight logistics in most cases involves transport between cities, in addition to freight related transport within cities. This makes it a topic which is best addressed in close coordination between local and provincial or national level.

There is useful learning that has been built up over the past 15 years from the developed world on managing urban freight and logistics. This includes low emission zones, restricting delivery time access, the use of electric vehicles and other measures that have substantially helped cities mange this aspect and that can be replicated in the developing world.

c) Private sector engagement

To realize the transformational impact GEF 5 is aiming for, the engagement of the private sector needs to be substantially enhanced. There are two fundamental reasons that require enhanced engagement which both fully apply to transport. First, investment needs in the transport sector are well beyond the capacity of the public sector and in many cases call for investments in activities which are within the domain of the private sector. Second, while moving away from a project driven approach towards a more programmatic and sectoral approach the need for active coordination with private sector stakeholders increases. The engagement of the private sector in sustainable transport in many countries and cities is hampered by poor enabling policies and regulatory frameworks.

There is a strong role for the private sector, either on its own or in partnership with international or national development finance institutions, e.g. in operating freight and logistics services or in operating public transport services. The private sector can also play an important role in land development as part of the process of urbanization. GEF transport operations can support the development of enabling institutional and regulatory frameworks and financial structures to encourage private sector participation in sustainable transport operations. It would be of interest to implement a number of transport projects under GEF 5 in cooperation with the private sector to get a better insight into the specific opportunities and challenges that cooperation with the private sector brings.

d) Assessment of GHG benefits

For GEF it is essential to be able to have reliable information on the GHG emission reductions of the projects it supports. The development of a GEF transport GHG emission reduction assessment methodology, which is introduced together with the Advisory Document is an important step towards acquiring more reliable information (GEF-STAP,

[5] *No module on land use planning is currently included in the draft GEF transport GHG emission assessment methodology and none is planned.*

[6] *This could also include transport of freight by inland waterways, railways, and related intermodal activities.*

2010). It must be acknowledged however that GHG assessment for the transport sector is complicated by the large number of diverse sources of emissions and the large number of assumptions that are required for a transport GHG assessment methodology that can be applied across countries and regions. Having better information on GHG benefits will provide opportunities for project developers to identify better low-carbon transport investments. The draft GHG emission reduction assessment methodology includes specific modules for several of the current and future priority areas for GEF in transport. As the methodology is further developed it is important that all major types of transport interventions that are supported by GEF are included. In this context, it is important that freight and logistics interventions are covered by the methodology. As GEF is widening its support to urban planning the methodology needs to be extended to assess GHG impacts of such actions as well.

The observed lack of reliable transport data in many of the developing countries means that any GHG assessment methodology for transport will need to find ways and means to overcome data gaps. As suggested in the draft GEF transport methodology, GEF assistance in the transport sector could allow for support for the improvement of transport data.

Ex-ante and increasingly also ex-post emission reduction assessments for GEF transport projects will be an important contribution to better transport policy formulation. Once sufficient experience has been gained with the application of ex-ante GHG assessment methodologies at the project level it might also be possible to develop assessment methodologies to assess the impact of various transport policies. Funding for collecting data during project implementation to be used for ex-post assessment of GEF impacts has to be accounted for in the project design.

e) Co-benefits

GEF 5 projects will address not only climate change mitigation but also local air pollution, traffic congestion, and access to affordable and efficient transport and public utilities (GEF, 2009a). Such a specific acknowledgement and targeting of co-benefits will help to create support for GEF interventions in the transport sector as in many cases the objective to reduce GHG emissions is not the primary reason for national or local decision makers to support these interventions. The integration of co-benefits should not only include the acknowledgement of co-benefits but also a quantification of such co-benefits. It is important that co-benefits are monetized where possible and that they are an integral part of project appraisal and approval. This requires strengthening of transport project evaluation and appraisal methodologies by adopting a multi-criteria appraisal methodology which values traditional economic benefits as well as GHG related benefits and other environmental or developmental benefits of transport projects.

There is an increasing body of scientific evidence that suggests that black carbon, which is emitted through the incomplete combustion of fossil fuels, could be the second largest contributor to global warming (after CO_2) and that its reduction could be the most rapid way of slowing climate change (IGSD, 2008). The GEF should take note of the increasing evidence of the effects of this pollutant and of the value that reducing it could add to climate change mitigation activities including those supported by GEF.

f) Improved reporting under UNFCCC

The transport sector has until now not featured as much as other sectors like energy and industry in the climate change mitigation efforts. This is also reflected in the limited coverage of transport in reporting to UNFCCC through national communications. So far transport in National Communications has been dealt with mostly as a sub-sector of the energy sector and in many of the cases transport emissions have been estimated on the basis of top-down fuel sales data. This kind of information is however not useful for the design or monitoring of local and national mitigation strategies based on the ASI approach. This will require bottom-up emission inventories which record vehicle numbers as well as vehicle activity.

The improvement of the availability and quality of transport data for purposes including improved National Communications to the UNFCCC is an ambitious task which will require support from a wide range of stakeholders and which is best addressed at the national level. For reasons of comparability it is important that national level data activities are part of a regional and global reporting system (SLoCaT, 2010a). GEF as one of the key agencies supporting sustainable low-carbon transport in developing countries has a direct interest in better transport data and should be part of global capacity building efforts to improve transport data availability and quality.

g) The importance of capacity development

Many, if not all, of GEF activities in the transport sector will have an institutional component, especially those which are aimed at scaling up and transformation of the transport sector. GEF support

for capacity development should not be limited to training but should also include adjustment of institutional mandates, budgeting procedures, development of tools and instruments, data gathering and management, development of institutional coordination mechanisms, as well as awareness on financing structures and sources. Capacity development can be focused at the local level in support of specific projects but can also be used to strengthen national or regional level institutions if they are involved in transport.

6.2 Framework for GEF 5 Transport

The main issue for the GEF in regard to transportation is how this sector can make a meaningful contribution towards GHG emissions reductions, so that the world as whole, on the basis of common but differentiated responsibilities, stays on track with the maximum 2° degree stabilization scenario. Due to high investment costs and long life spans of much transportation infrastructure, as well as the high level of interconnectivity with other economic sectors, there is the tendency for inertia and lock in to a certain emission level. It is therefore of utmost importance to influence investments in the present to achieve climate goals for 2020 and 2050.

GEF transport operations can be classified into three broad categories: (i) barrier removal - these are often technical assistance type of activities and focus on the removal or lowering of policy, financial, methodological and technical barriers; (ii) catalytic – this mostly concerns investments aimed at replication and scaling up of proven concepts and interventions, while optimizing the leverage of limited GEF resources, e.g. BRT or NMT; (iii) innovative – this includes both technical assistance and investments to develop or test new concepts related to sustainable low-carbon transport, e.g. urban planning concepts or freight and logistics.

The realization of GEF's goal for the climate change focal area of supporting developing countries and countries with economies in transition in their shift towards a low-carbon development path will require a balance between these three categories. As indicated earlier in this paper impacts of possible GEF operations will vary from short to the long term. The ratio between the three types of assistance will vary from country to country and depend on the stage of development of the transport sector and local and national level policy initiatives.

Taking into consideration the ambition of GEF to generate transformational impacts special attention will need to be given to the geographical scale on which GEF transport operations will focus. GEF transport activities in addition to their current emphasis on individual projects could also adopt a more comprehensive sectoral approach which includes support for the establishment of national level enabling policies as well as institutional and financial frameworks. The examples of India (Jawahl Nehru National Urban Renewal Mission – JNNURM) and Mexico (National Trust for Infrastructure – FONADIN) where the governments have created national level investment facilities to support local governments in the implementation of their mandate to provide public transport opens the possibility for GEF to increase its leverage and impact by supporting the development of similar initiatives. In some cases even a regional approach can be effective for GEF e.g. in the case of Association of South East Asian Nations (ASEAN) which is in the process of developing harmonized policies and standards in a number of areas including land transport.

Table 3. Example of Potential Initiatives under the GEF-5 Transport Framework

		Barrier removal	Catalytic	Innovative
Avoid	**Passenger**	• Parking policies • Fuel subsidies, vehicle registration fees • Promote quota system for passenger vehicle operating licenses	• Implement Road pricing/ congestion charging • Transit Oriented Development • Optimize demand and supply of public transportation system and route re-organization	• Develop and pilot test compact, mixed land-use cities
	Freight	• User charges • Awareness on opportunities to reduce emissions through integrated industrial and transport planning	• Mixed land-use development plans • Reverse logistics • Development of logistics platforms	• Develop and pilot test compact, mixed land-use cities
Shift	**Passenger**	• Parking policies • Enabling policies and regulatory frameworks for private sector participation	• BRT schemes • Urban rail schemes • Optimization conventional bus systems • Bike and pedestrian infrastructure	• Low/Zero Emission Zones • Performance assessment schemes for urban transport systems
	Freight	• Development comprehensive, long term vision for development freight and logistics infrastructure	• Investment in rail and inland waterway transport infrastructure	• Intermodal freight logistics schemes
Improve	**Passenger**	• Fuel Economy standards light duty vehicles • Speed limits	• Second generation bio-fuels • Low resistance road surfaces	• Charging infrastructure electric vehicles • ITS
	Freight	• Fuel economy standards heavy duty vehicles • Speed limits	• Improving load factors of vehicles • Second generation bio-fuels • Low resistance road surfaces	• Aero-dynamic design of trucks and low rolling resistance tires • Multi-modal infrastructure

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