Land transport's contribution to a 2°C target

Key Messages on mitigation potential, institutions and financing of low-carbon land transport for policy makers on transport and climate change

Advance Draft

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This report has been jointly developed by the Bridging the Gap Initiative (BtG) and the Partnership on Sustainable, Low Carbon Transport (SLoCaT)

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Bridging the Gap and SLoCaT

Bridging the Gap, as a multi-stakeholder initiative, together with the Partnership on Sustainable Low Carbon Transport (SLoCaT) work to increase the visibility of the potential for land transport in mitigation actions within the UNFCCC process as well in other processes. This work builds on efforts, especially by SLoCaT, in the international Sustainable Development agenda as well the recent efforts to promote the integration of transport in the Climate Summit of Secretary General Ban Ki-moon.

Glossary of Terms

2DS	Two-Degree Scenario
4DS	Four-Degree Scenario
ADP	Ad Hoc Working Group on the Durban Platform for Enhanced Action
AS	Activity and Structure
ASI	Avoid-Shift-Improve
ASIF	Activity-Structure-Intensity-Fuels
BAU	Business As Usual
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BRT	Bus Rapid Transit
BtG	Bridging the Gap initiative
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CMP	Conference of the Parties Serving as the Meeting of Parties to the Kyoto Protocol
CO2	Carbon Dioxide
COP	Conference of the Parties
CTCN	Climate Technology Centre and Network
CTF	Clean Technology Fund
DECC	Department of Energy and Climate Change, United Kingdom
ETP	Ethical Tea Partnership
F	Freight
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GIZ	German International Cooperation
Gt	Gigatonne
HS	High Shift Scenario
ICCT	International Council on Clean Transportation
IEA	International Energy Agency
IF	Intensity and Fuels
IMT	Individual Motorized of Transport
INDCs	Intended Nationally Determined Contributions
INMT	Individual Non-Motorized Transport
IPCC	Intergovernmental Panel on Climate Change
ITDP	Institute for Transportation and Development Policy
ITF	International Transport Forum
JI	Joint Implementation
Joule	Unit of energy (that required to heat 1L of water by 1°C)
LDCs	Least Developed Countries
LEDS	Low Emissions Development Strategies
LLDCs	Landlocked developing countries
LRT	Light Rail Transit
MDB	Multi-lateral Development Banks
MRT	Mass Rapid Transit
MRV	Monitoring, Reporting and Verification
Mt	Megatonne
NAMAs	Nationally Appropriate Mitigation Actions
NGOs	Non-Governmental Organisations
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development

OWG	Open Working Group
PT	Public Transport
RTR	Rapid Transit System Length Per Resident
SDGs	Sustainable Development Goals
SIDS	Sudden Infant Death Syndrome
SLoCaT	Partnership on Sustainable, Low Carbon Transport
SUTRI	Sustainable Urban Transport Initiative
TNAs	Technology Needs Assessments
TOD	Transit Oriented Development
VKT	Vehicle kilometres travelled
UCD	University of California Davis
UK	United Kingdom
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America

Executive Summary

This paper provides key messages for climate change negotiators and policy makers on the potential contribution of the land transport sector to global climate change mitigation strategies. The report summarises key facts on the mitigation potential in the land transport sector for both passenger and freight, institutional and global governance perspectives and financing requirements.

The report argues that the transport sector can make a substantial contribution to global stabilisation pathways that can keep warming below 2 Degrees Celsius above pre-industrial levels. Effective mitigation of Greenhouse Gas (GHG) emissions from land transport requires comprehensive strategies that combine measures to avoid the need for individualized motorized trips with measures to shift passenger and freight transport to the most effective mode, while improving the energy efficiency of fuels and vehicles. Cost-effective climate change mitigations strategies for the transport sector are readily available and have been tested as scale. An integrated approach to sustainable transport not only reduces GHG emissions, but can also make a substantial contribution to other objectives, such as air quality, safety, energy security, mobility access and productivity. This is also reflected in the transport related targets in the proposed Sustainable Development Goals.

The report emphasises that as energy demand in the transport sector is rapidly increasing, it is important to act now. Concerted efforts across all modes of transport are required to move towards a stabilisation pathway that keeps warming below 2 Degrees above pre-industrial levels. Analysis presented in the report concludes that while absolute reductions are required in GHG emissions from land transport in the developed OECD economies that relative reductions in the non-OECD countries would allow for a limited growth in absolute emissions in non-OECD countries. This will enable these countries to meet growing travel demand in support of poverty alleviation, economic growth and social development, but doing so more efficiently.

New evidence is presented on the mitigation potential of mode shifting, in particular for urban passenger transport, which is found to be greater than previously reported. This is in line with the IPCC Fifth Assessment Report, which also concluded that the mitigation potential of transport is greater than in previous assessments.

A shift towards low-carbon mobility could potentially result in savings of up $100 trillion in public and private spending on transportation vehicle and infrastructure and vehicle capital and operating costs along with fuel costs, primarily from a reduction in road construction requirements and vehicle purchase requirements. This does not yet factor in the economic impacts of co-benefits related to safety, air quality, reduced congestion and energy security.

UNFCCC mechanisms, especially those related to funding, had in the past limited effectiveness in promoting low-carbon transport. Recent changes bode well, however, for the transport sector. The Intended Nationally Determined Communications (INDC) as well as the NAMA concept can both stimulate the interest in low-carbon transport. The initial conceptual design of the Green Climate Fund, which acknowledges low-carbon transport as one out of four key

programs, emphasizes a programmatic approach over a narrower project based approach. This supports the comprehensive mitigation approach recommended in this report.

Although the overall economic impact of low-carbon transport is found to be highly positive there are substantive costs linked to the transformation of the current mostly car dependent transport infrastructure and systems. Part of these transformational costs can be passed on to the users of transport, e.g. in the case of improved fuel economy. In other cases beneficiaries of low-carbon transport will be able to contribute through e.g. capture of increased land values resulting from public transport. The report recommends a change in approach to the financing of low-carbon transport especially in the case of Climate Finance and Overseas Development Assistance. Increasingly such funds should be used to leverage a greater involvement of public and private sector funds for the realization of low-carbon transport infrastructure and services.

The transport related commitments at the Secretary General's Climate Summit on urban electric mobility, railways and public transport under the Transport Action Area; as well as the fuel economy commitment under the Energy Action Area and the Green Freight Commitment under the Industry Action Area aim to make a substantial impact on the future emissions from land transport. The messages in this paper can enhance their scaling up and thereby their impact on both climate change and sustainable development.

1. Transport's role in achieving mitigation targets

The transport sector needs to play a substantial role in global climate change mitigation efforts that can keep warming below 2 Degrees Celsius above pre-industrial levels. The transport sector will need to play an important role in global climate change mitigation strategies, which cannot be offset by other sectors.

Transport in total currently accounts for about 23% of global energy-related greenhouse gas emissions of which 75% are derived from land transport. Driven by motorisation, urbanisation, economic and population growth land transport greenhouse gas emissions are set to double by 2050 if current trends persist (IPCC 2014). This increase will happen largely in the emerging and developing economies as this part of the world rightfully expands its transport infrastructure and services in support of much needed economic and social development.

This paper's overall objective is to:

Convey to climate change negotiators and policy makers that there is a great potential to reduce land transport greenhouse gas emissions cost-effectively and at the same time generate synergies with other sustainable development objectives.

The messages contained in the paper aim to facilitate the further scaling-up of the commitments on transport to be made at the Secretary General's Climate Summit. These commitments on urban electric mobility, railways and public transport under the Transport Action Area; as well as the fuel economy commitment under the Energy Action Area and the Green Freight Commitment under the Industry Action Area by themselves will have a significant impact on the future emissions from land transport.

There is substantial potential for mitigation of emissions from all land transport modes (IPCC 2014). Information presented in this paper indicates that a combination of technological and behavioural measures could decrease final-energy demand in 2050 for urban passenger transport by at least 55% below an IEA defined baseline of a 4^{o} Celsius temperature increase scenario (IEA, 2014). Some of these mitigation measures could be tapped at very low or even negative costs from a societal perspective along with generating substantial sustainable-development benefits (IPCC 2014), even though some of which may require considerable up-front investment to improve transport systems and their operation.

While it is acknowledged that current measures in most countries are insufficient to bring transport onto a 2°C stabilisation pathway, it is also apparent that there are successful examples of policies and technologies already available which would contribute to the decarbonisation of the transport sector (IPCC 2014).

Some countries have shown reasonable progress in curbing their transport emissions. For example France, Japan, the UK and Germany have experienced a policy-led decline in transport GHG emissions in recent years, with stabilised or even decreased road GHG emissions despite growth in both the economy and road-freight over the same period (ITF 2010). The stabilization or decrease in GHG emissions from land transport in some countries can be attributed in part to saturation in the travel demand, but also to strong policies on the national and

local level that foster more efficient mobility behaviour and technologies (IEA 2013).

1.1 How to mitigate transport emissions

As transport is a complex sector there are a wide variety of measures that can be put in place at the policy level, behaviour change and choice architecture and by technical improvements. Much mitigation potential can be exploited through **avoided** journeys and modal **shift** resulting from behavioural-change, use of i**mproved** vehicle and engine technologies, low-carbon fuels, improved infrastructure and other changes to the built environment. None of these three approaches, which have become known as the Avoid-Shift-Improve (ASI) approach, is the silver bullet that can substantively reduce GHGs in the land transport sector. It is only if they are deployed in a complimentary manner that the reductions required in GHG emissions can be achieved.

A comprehensive climate change mitigation strategy includes both short- and long-term transport mitigation strategies that must be followed, and a mix of policies and measures put in place, to shift us onto low, rather than high, carbon trajectory. Technology and fuels improvements should be combined with travel demand and modal choice provisions.

A comprehensive transport mitigation strategy for land transport will address both passenger and freight transport. While, this paper focuses in its analysis of the mitigation potential on the example of urban passenger transport it should be kept in mind that GHG emissions from freight are considerable (40% of all land transport emissions in 2010, according to the IEA, are from freight and the 90% increase under a BAU scenario till 2050 is even faster than the 70% projected for passenger transport [IEA ETP 2014]). While more effort is needed to document GHG mitigation potential in the freight sector, there are considerable opportunities for applying best practices in trucking, railways, waterway and intermodal freight transport. Great gains in freight and logistics system efficiency have been demonstrated in more advanced economies. These should be extended to the developing world to realize equivalent GHG reduction to those discussed here for passenger transport (Dablanc 2009).

1.2 Co-benefit - opportunities for sustainable development

There is a cost to reducing emissions from transport. These costs differ per type of measure. In today's economic climate policy makers can be reluctant to agree to large-scale transport mitigation strategies because of the costs. However mitigation in the transport sector has the potential to go hand in hand with realizing other economic, social and environmental objectives. It would be wrong therefore to calculate the cost of climate change action in transport only in terms of cost per avoided tonne of CO_2. Instead this should include a quantification of the socio-economic benefits linked to: increased energy security (reduced oil dependence and exposure to oil price volatility); improved transport infrastructure and traffic management; improved road safety; reduced congestion and travel time reduction resulting in increased productivity; improved air quality; and affordable and accessible transport helping to alleviate poverty. Such co-benefits should not only be considered from an economic perspective but as well from a social perspective. Improved access to markets, schools, essential services and green spaces will also enhance the social

wellbeing of people. It is especially the lower income groups who will enjoy the benefits linked to improved access.

Often these so-called co-benefits address areas that are of much more pressing concern to decision makers than the climate impacts of transport. Traffic congestion and increased travel time in particular negatively impact development and are a major cost. This varies from 1.2% of GDP in the UK (Goodwin 2004), 3.4% of GDP in Dakar, Senegal, 4% in Manila, Philippines (Carisma and Lowder 2007), 3.3%-5.3% of GDP in Beijing (Creutzig and He 2009), 1%-6% of GDP in Bangkok (World Bank 2002) and goes up to 10% of GDP in Lima, Peru where travel can consume up to four hours daily (Kunieda and Gauthier 2007).

All these developmental benefits discussed above are part of most countries development aspirations yet they are typically not part of the economic analysis of climate change measures in transport in the developing world. Likewise, however, climate change impacts are typically also not part of the economic analysis of transport policies, measures and processes.

	Energy savings	CO2 reduction	Air pollution reduction	Safety improvements	Access / Mobility improvements	Congestion reduction
Avoid	moderate to high	moderate to high	moderate to high	high	high	high
Shift	moderate to high	moderate to high	moderate to high	high	high	high
Improve	high	high	high	moderate to high	low	low

Figure 2: Linkage co-benefits and components of Avoid - Shift - Improve approach

The co-benefits generated in a comprehensive climate change mitigation strategy can influence the make-up of the mitigation strategy. Figure 2 explains the linkage between the three components of the ASI strategy and the different types of associated co-benefits. It is clear that technological options, under the Improve component, have a high CO_2 reduction potential but compared to the Avoid and Shift component their developmental impacts are more limited.

1.3 CO_2 reduction potential of passenger transport

To bring transport onto the IPCC recommended 2°C pathway, significant action is required both on policies and investments. As an example from the passenger transport Figure 3 shows the projections of the International Energy Agency's *Energy Technology Perspectives* (ETP) for light-duty passenger-vehicle travel (in vehicle kilometres travelled) looking both at a two-degree scenario (2DS) and a

four-degree mean temperature increase scenario (4DS), which is only slightly better than the baseline projection.

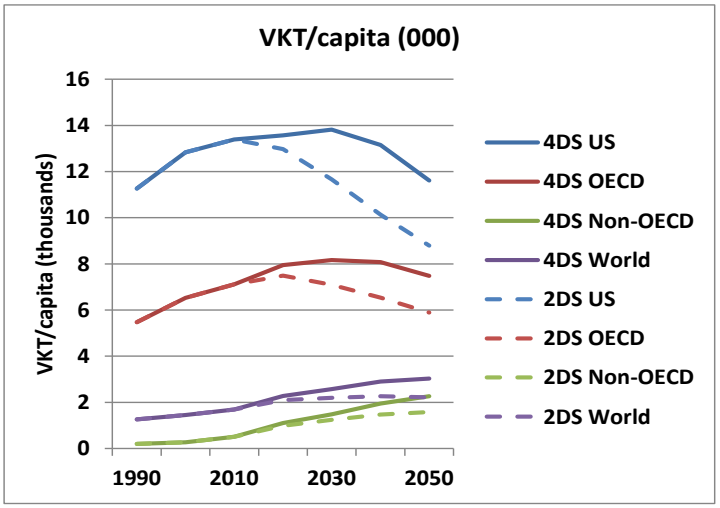

Figure 3. Projected passenger travel for light-duty vehicles for a 2 degree and a 4 degree scenario (IEA 2013)

Notably there is a major difference in mobility levels between the USA, total OECD and non-OECD countries, with yearly per-person per-capita travel in 2010 on the order of 24,000km, 16,000km and 4000km respectively (IEA ETP 2014). Looking at light-duty vehicle kilometres of travel per capita (Figure 3), the differences are even more stark: 12,000km, 7,000km and 1,000km respectively. There is very low availability of cars, and a low level of car-based travel, in non-OECD countries. Additionally, Figure shows the projections of vehicle travel in the 4 degree scenario (4DS) and the reductions in the 2 degree scenario (2DS) as part of an avoid/improve/shift strategy. The changes in car travel in non-OECD are not large since they do not provide extensive mobility even in the 4DS.

Both the 4DS and 2 DS scenarios' assume measures to cut travel growth and shift trips from the private (car) transport to public transport, walking and cycling, although with more ambitious targets under the 2DS. In the case of the OECD countries a reduction in car travel can be observed, not only for the 2 DS but also in the 4DS, which is in line with the emission reductions that can already be seen in some European countries. Especially in non–OECD countries, even a 2DS scenario requires an increase in personal travel to support more equitable social and economic development, especially through improved public and non-motorized transport, as is demonstrated in several recent studies.

Thus, if the transport sector is to be brought onto a 2°C stabilisation pathway, motorised travel must significantly decline in OECD countries over most of the projection period to compensate for the increase in developing and emerging countries.

The question is now on how to best structure the policies to achieve the intended impacts in both OECD and non-OECD countries. The Fifth IPCC Assessment Report suggests that a balanced approach of measures that manage and even reduce transport demand (Activity-A), along with efficient modes of transport (Structure-S), improved energy efficiency (Intensity-I) and low-carbon fuels

(Fuels-F) are the most feasible and also cost-effective way to bring transport emissions on a low-carbon development track.

The following Figures 4 and 5 show the emission reductions for OECD countries and non-OECD required to move to a 2 Degree stabilisation pathway. For OECD countries this would mean a 80% emission reduction from the land transport sector by 2050 and the Figure 4 shows that a focus only on the amount of transport Activity and Structure of passenger transport (AS) or on energy Intensity and Fuels (IF) will not be as effective as an integrated strategy that combines all factors (ASIF).

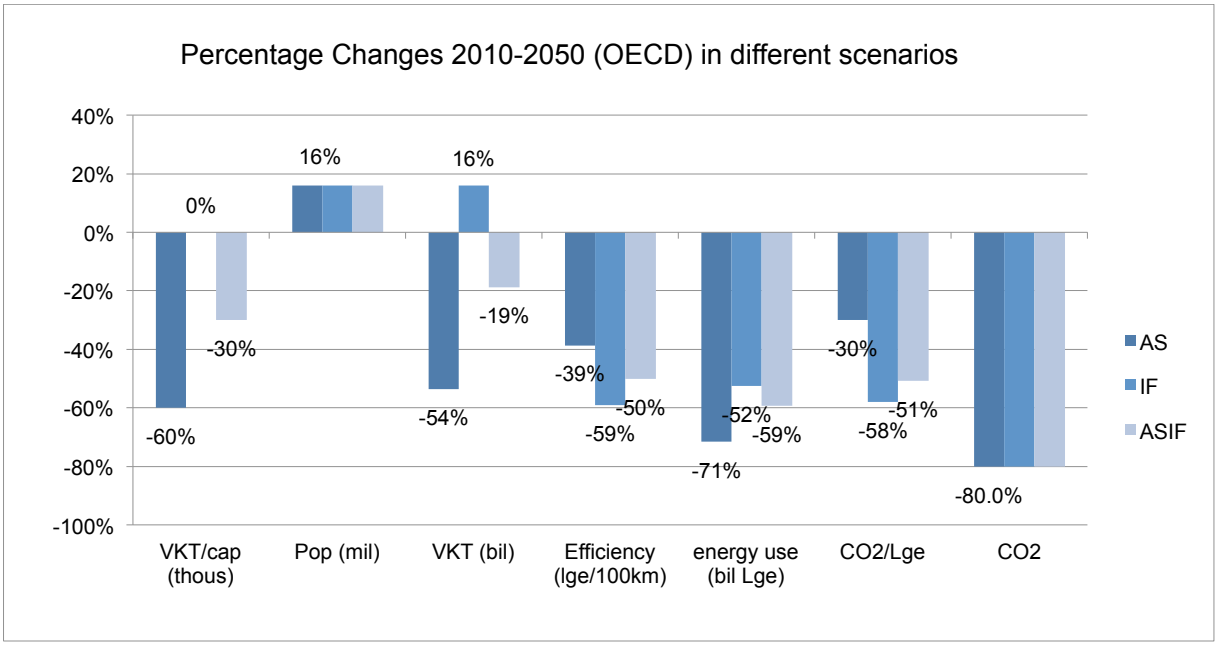

Figure 4. Light vehicle fleet until 2050 in OECD countries under different scenarios (Adapted from Fulton, Lah, Cuenot 2013)

Fuel efficiency, in particular in OECD countries will play an important role in reducing GHG emissions from land transport, this because the fleet and VKT are not growing as in the non-OECD countries. Yet, fuel economy measures are an integral part of policies as well in high growth developing and emerging countries.

Choices on infrastructure and technology made in the emerging and developing economies can lock-in a country to a fossil fuel dependent or low carbon pathway for the next 30 to 50 years.

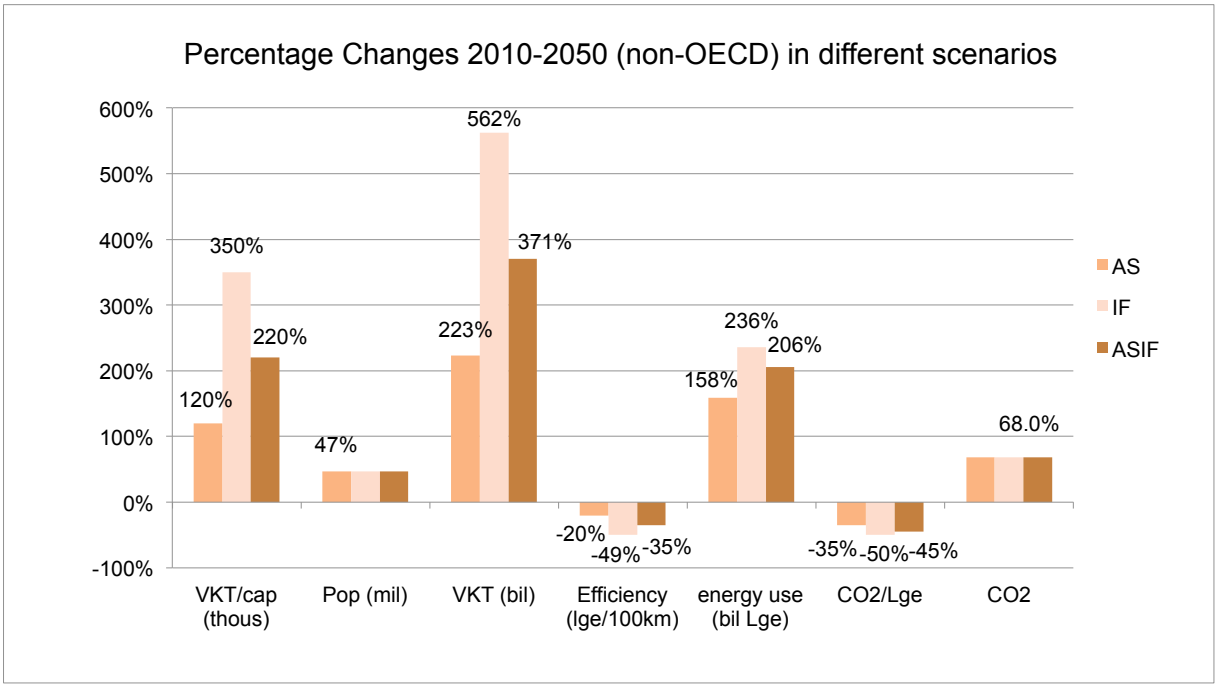

Figure 5. Light vehicle fleet until 2050 in OECD countries under different scenarios (Adapted from Fulton et al. 2013)

Potentially large CO_2 emission reduction potentials from urban transport are also shown in a new in-depth study, *A Global High Shift Scenario,* by the University of California Davis and the Institute for Transportation and Development Policy (UCD/ITDP, 2014). This new study assesses the benefits, especially in non-OECD but also in OECD countries, of reducing private vehicle travel through aggressive investments to improve the level of service of public transport, walking and cycling in non-OECD cities to be closer to those observed today in OECD cities.

Averaged across all world regions, urban light-duty vehicle travel (VKT) is cut by 50% in 2050 from the Baseline to the High Shift scenario. Substantial additional investments are then made to public transit (especially rapid transit modes such as metro, commuter rail and BRT), with the goal to provide the same total mobility as in the Baseline. The ratio of rapid transit system length per resident (RTR ratio) in most cities is at least doubled compared to Baseline projections, and in some regions it is quadrupled or more since the Baseline RTR level is so low per capita. The goal of replacing the reduced car travel with high quality transit and safe non-motorized modes (via, for example, extensive cycle lane infrastructure) appears achievable in every part of the developing world and is only problematic in some OECD countries, particularly car-dominated countries like the United States. In such countries, changes in urban planning to cut travel demand, along with lifestyle changes (e.g. substitution of communications technologies for some travel) may help to offset the large cut in urban light-duty vehicle travel. An interesting result is that in High Shift, most countries around the world achieve an average urban mobility level close to 8,000 kilometres per person in 2050, with a far narrower range than occurs in the Baseline scenario.

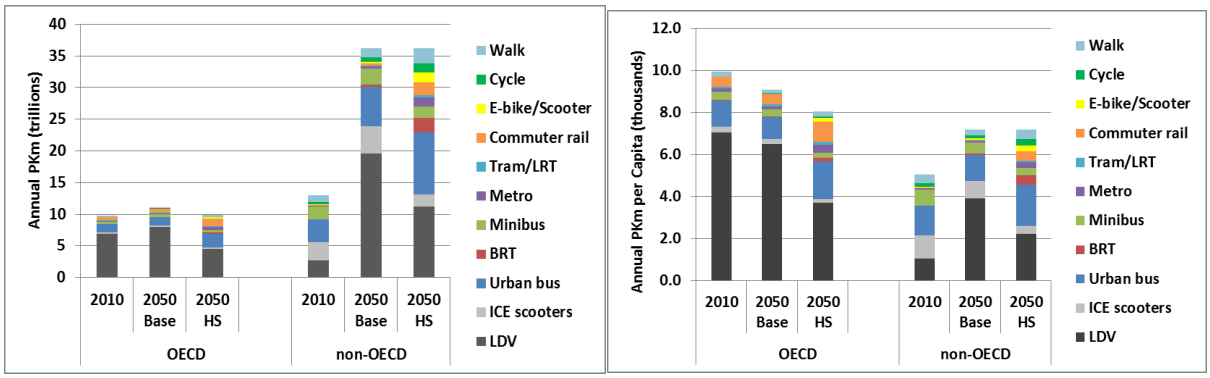

Figure 6. High Shift Scenario v. Base scenario, OECD and non-OECD, in 2050: total passenger-kilometres (top) and per capita (bottom)

In this study, for urban passenger transport, the mitigation potential in 2050 is estimated to be 1,700 Mt, or 40% reduction from the 4,400 Mt in the Baseline. If combined with strong fuel economy improvements as proposed by the Global Fuel Economy Initiative (goal of a 50 % improvement in motor vehicle fuel economy by 2030) the overall CO_2 emissions could be reduced an additional 700 Mt for a total of 2,400 Mt (2.4 Gt), or a combined 55% reduction in urban passenger transport CO_2 emissions by 2050 compared to the Baseline scenario. It is also worth noting that the cumulative CO_2 savings from 2010 to 2050 in HS v. Baseline is about 25 Gigatonnes, a 20% reduction from the 125 Gt in the Baseline, which reaches nearly 35 Gigatonnes when combined with the 50% fuel economy improvements.

In addition, the required front-investments to expand in public transport, walking and cycling in this High Shift scenario could generate very large cost savings, in excess of $100 trillion in public and private spending on transportation vehicle and infrastructure and vehicle capital and operating costs along with fuel costs, primarily from a reduction in road construction requirements and vehicle purchase requirements. The scenario also achieves a significant improvement in mobility equity across income groups (UCD/ITDP, 2014). In the High Shift scenario, public transport mobility by the poorest 20% of the world's population triples and by the second poorest 20% it doubles by 2050, compared to a 4 degree business as usual scenario.

Based on further analysis by the International Council on Clean Transportation (ICCT), combining the High Shift Scenario with more stringent (i.e. Euro VI) emissions standards would reduce air pollution that contributes to climate change as a short-term climate forcer and could save 1.36 million early deaths annually. Overall the High Shift Scenario and its extensions offer a roadmap to achieving far more sustainable, equitable, and lower cost urban passenger transport. But to achieve this will require a strong set of policies and well-targeted investments.

1.4 Policies to mitigate transport emissions

Effective policy development on low carbon transport will take into account the recommendations given earlier in this paper on the need for a comprehensive approach that brings together all relevant measures and which integrates all modes of transport. We emphasized that successful mitigation strategies in addition to climate change objectives also include other developmental objectives

and that in some cases it might be more pragmatic to incorporate climate change objectives in a wider transport policy or strategy than to aim for an explicit or exclusive transport climate change mitigation strategy.

Likewise it is crucial that national and local level policies mutually support and reinforce each other in order to maximise the success of both.

Support from the national level is vital for the success of a sector wide decarbonisation strategy for transport. A clear and ambitious vision is seen as being key and the full commitment of the highest decision maker such as the President or Prime Minister can make a large difference. This provides the impetus for other important sectors to include transport related climate change objectives in their development plans. This can be the Ministry of Energy (fuel economy); the Ministry of Urban Development (Urban Transport Policies); the Ministry of Public Works (transport infrastructure); or the Ministry of Finance (transport related taxes). In particular fiscal and regulatory measures are required to provide a policy framework in which other national and local transport related strategies and measures could be successfully implemented.

Transport is today heavily dependent on fossil fuels. Not sufficiently taxing or even subsidising fossil fuels makes any measure to reduce transport related greenhouse gas emissions very challenging. However, providing alternatives, such as high-quality public transport and gradually phasing out subsidies and introducing taxes can generate a multitude of benefits, not just efficiency gains and emission reductions, but also energy security and productivity. Moreover, the reduced subsidies and later the taxes can provide revenue that can be reinvested in a sustainable transport system.

Another fiscal policy that is usually implemented at national level is vehicle taxation (at purchase, import or on an annual basis while in use). Shifting this to include fuel efficiency and/or CO_2 emissions can substantially improve the performance of national fleets. Incentives for purchasing cleaner vehicles and the provision of alternative fuel infrastructure are needed to reduce dependence on fossil fuel. This helps to steer consumers' choice towards more efficient vehicles.

The combination of demand side taxes and supply side regulations can improve substantially the efficiency of the individual motorised transport and also encourages the shift to more efficient modes and fuels.

National policy measures provide an important framework for the implementation of measures at the local level, such as public transport, walking and cycling investments, compact urban planning and Travel Demand Management. There are a multitude of policies or measures that can be undertaken by local authorities in order to support transport-sector emissions reduction, many of which work in conjunction with the aforementioned national policies. Specific examples for successful local policy measures include number plate auctioning (e.g. Singapore, Shanghai and Beijing), improved traffic signal and parking management, registration fees linked to the efficiency of the vehicle, road user or congestion charging (London, Milan and Gothenburg), provision of infrastructure for cycling and pedestrians. Supply management improvements typically undertaken by cities include expansion and improvements of public transport and integrated ticketing and fares policies,

Box 1: Local Mitigation Action, the case of Sinchon Transit Mall, Seoul

In January 2014, Seoul opened a new commercial district in the Sinchon area, called Sinchon Transit Mall. This involved redesigning the streets Yonsei-ro (1,000m) and Myongmul-gori (450m) for bus and pedestrian use only, and excluding private cars. This transformed these streets from congested streets into vibrant areas full of people, shops, artists and restaurants.

In these streets, the space for motorised vehicles was reduced from four lanes to two, while the footpath width increased by as much as 8m. Only buses (>15 passengers), emergency vehicles and bicycles are permitted to use these streets at any time, while taxis may enter between 12am and 4am, and delivery vehicles can enter from 10am-11am and 3pm-4pm, albeit with a speed limit of 30 km/h to protect pedestrians.

The total cost of developing Sinchon Transit Mall was around US$6.9m and has brought about many benefits. Firstly, it has increased the speed of buses from 3-4 km/h to 14 km/h. Also, the number of bus passengers utilising nearby stops has increased by 15% (≈1,700 pax/mo) compared to 2013. The number of pedestrians on the streets has also increased by 50%. Monthly sales at the nearby shops have also increased by 4.2% according to an analysis of credit card use. Currently, transit mall projects are eligible for subsidies from the central government.

2. UNFCCC as a catalyst for Low Carbon Transport

The Kyoto Protocol has prompted governments to put in place legislation and policies to meet their commitments, businesses to make climate-friendly investment decisions, and the formation of a partial carbon market.

The second commitment period of the Kyoto Protocol began in January 2013 and will last until 2020. This was established in the adoption of the Doha Amendment at COP 18 in Doha, Qatar in December 2012. To date, only 13 Parties to the Kyoto Protocol have accepted the Doha Amendment, which requires acceptance by 144 Parties to the Kyoto Protocol in order to enter into force. The intention of the Secretariat of the UNFCCC is that the Doha Amendment will enter into force by the 11th meeting of the CMP to be held in Paris in 2015 (in combination with COP 20)[1]. The current expectation is that only 15% of the global GHG emissions would be covered by the second commitment period of the Kyoto protocol.

This reinforces the need for a new global climate change agreement. The on-going negotiations in the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) are different from past approaches in the sense that: (a) all countries (both developed and developing) are expected to commit to binding or voluntary emission reductions; (b) a greater acknowledgement of the role that cities and sub-national levels can play in climate change mitigation; and (c)

[1] http://unfccc.int/files/parties_and_observers/notifications/application/pdf/note_verbale_to_kp_parties_doha_amendments.pdf

acknowledgement of the need to focus on high mitigation potential areas; and (d) greater willingness to consult with and seek involvement of non party actors in the development of proposals.

This may work better for sectors like transport, which in the past had little chance to participate substantively in the discussions on the implementation of the Kyoto Protocol and associated mechanisms and arrangements under the UNFCCC.

2.1 Clean Development Mechanism (CDM) and Joint Implementation

The Clean Development Mechanism (CDM) is process under which Annex 1 countries are able to earn certified emission reduction (CER) credits by funding emission reducing projects in developing countries. These CERs are equivalent to one tonne of CO_2 and can be sold or traded to contribute to the country's emission reduction target under the Kyoto Protocol. CDM projects must provide emission reductions that are additional to what would have otherwise occurred.

The CDM mechanism aims to combine incentivizing emissions reductions in developing countries with the promotion of Sustainable Development. In practice the emphasis in CDM projects has been very much on realizing GHG emission reductions with great attention to the quantification of such emissions while the sustainable development benefits are usually secondary in all respects including the manner in which they are quantified and measured before and during the project.

CDM has been operational since 2006 with 7556 projects registered.[2] CERs amounts to over 2.9 billion tonnes of CO_2 equivalent during the Kyoto Protocol's first commitment period between 2008 and 2012.[3] (See Annex 1 for a list of transport sector CDMs). Overall, 29 CDM transport projects have been registered (as of September 2014). Transport projects makes up only 0.3% of all CDM projects.

As of September 2014, 16 CDM methodologies approved were for transport projects.[4] These covered: BRT, MRT and cargo transport projects to enhance energy efficiency through modal shifts; the use of electric and hybrid vehicles, and vehicles with cleaner and energy efficient technologies; and the production of biofuels.

There is a broad consensus within the transport community that CDM is not a relevant instrument for the land transport sector. This is mainly due to the complex and time-consuming procedures required to quantify emission reductions and meet the UNFCCC strict requirements. Furthermore, the conceptual design of CDM, which called for providing gap funding for the incremental costs of low carbon technologies worked well for the energy sector but not for the transport sector where the incremental costs are often not there or are difficult to define. Guided by the experiences in CDM the transport community generally has lost interest in crediting approaches as well as the narrow project approach.

[2] http://cdm.unfccc.int/index.html
[3] http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php
[4] http://cdm.unfccc.int/DOE/scopes.html

Likewise the transport community has also not been actively engaged in Joint Implementation (JI) projects. These are like CDM crediting schemes but in this case the transactions are mostly with countries in Eastern Europe. The JI mechanism is not well suited to the transport sector as the density of regulation and difficulties with monitoring mean there is less potential for JI-projects in the transport sector. For most project types in the transport sector, investment and transaction costs are much higher than the financial incentive provided by JI.

2.2 Some areas of promise for land transport under the UNFCCC

Within the UNFCCC structure there are a number of new initiatives, including Intended Nationally Determined Contributions (INDCs); Nationally Appropriate Mitigation Actions (NAMAs); Climate Technology Centre and Network (CTCN), and the Green Climate Fund (GCF) which may be able to provide the transport sector with opportunities to engage more pro-actively with the UNFCCC process.

2.2.1 INDCs

Intended Nationally Determined Contributions (INDCs) are a relatively new concept to come out of the international negotiations at COP 19 in Warsaw, Poland on a new global climate agreement to be adopted in 2015 and go into effect in 2020.

In Warsaw, Parties involved, agreed to submit INDCs addressing post-2020 emission reductions by March 2015, in order for these to be incorporated into the 2015 climate agreement. These INDCs are the starting point of a process that will build mitigation ambition over time.

As INDCs are still fairly new, there is currently a lack of detail and guidance with regard to the nature of these INDCs. As suggested in the name, INDCs will be guided by national development priorities, rather than the global need for climate change mitigation, a potential weakness of this process. It is likely that developed countries will focus their INDCs on precisely defined, economy wide, multi-year targets up to 2025 or 2030, similar to previous emission reduction pledges. It is not yet clear whether developing countries (non-Annex 1 parties) will follow the example of the developed countries and submit economy wide proposals for enhanced action or whether they would focus their INDCs on specific programs e.g. national energy efficiency or renewable targets or climate related governance structures and highlight the intended impacts of specific policies and projects that are due to be implemented [5].

It would be helpful to the sustainable transport community if all countries would submit economy wide INDCs with a sector breakdown that would include transport, as has been suggested in draft proposals by the co-chairs of the ADP working group. This would enable make the UNFCCC process in one stroke much more policy relevant from a low carbon perspective. Recently a number of initiatives have been started that can help countries to come up with sector wide low-carbon development strategies. A good example of this is the Low Emissions

[5] http://www.ecofys.com/files/files/ecofys-giz-2014-intended-nationally-determined-contributions-under-unfccc.pdf

Development Strategies (LEDS) Global Partnership, which has a dedicated transport working group active in a number of countries.[6]

It is relevant in this context to look at the manner in which transport has been addressed in the National Communications by the non-Annex 1 countries. So far, with a few exceptions this has been relatively disappointing and these have had little policy relevance for the transport sector. Transport has usually been dealt with in an aggregated – top down manner whereby emission estimates have been made on the basis of national fuel sales.

Most developing countries would have to make serious improvements in the collection and analysis of transport data before they could come up with meaningful transport specific INDCs.

Transport projects such as NAMAs have great potential to contribute to INDCs. Many developing countries already point to transport-specific NAMAs in the national communications, and could highlight the impact of these projects in their INDCs. Within INDCs, Parties are encouraged to endorse sectoral targets and initiatives, highlighting an opportunity for action in the transport sector to be incorporated into national emission reduction pledges.

2.2.2 NAMAs

Nationally Appropriate Mitigation Actions (NAMAs) are a useful opportunity to support national efforts to reduce greenhouse gas emissions from the transport sector in Non-Annex I (developing) countries under the UNFCCC. These actions can be part of a wider concept for sustainable transport and can also cut across sectors. They are recognised as an additional instrument that is available to complement wider mechanisms that are providing technical and financial support to low carbon transport activities in these countries. As of September 2014, the Ecofys NAMA Database consisted of 107 NAMAs and 23 feasibility studies across all sectors, in 37 countries.[7] 23 transport-related NAMAs are featured in the Transport NAMA Database[8]; these are shown in Annex 3. This gives transport the second highest number of NAMA activities of any sector (after energy supply).

The UNFCCC has its own knowledge-sharing platform, the NAMA Registry[9] where developing countries can record information for all NAMAs seeking support for preparation or implementation. As of September, six out of the 47 NAMAs included in the NAMA Registry were transport-related NAMAs.

International climate change policy for Non-Annex I countries has to date been dominated by project based approaches that have not been well suited to sustainable transport, mainly because of the need to prove additionality and their strict methodologies for measuring GHG emissions. It appears that NAMAs therefore present an enhanced opportunity for Non-Annex I countries to receive recognition and support under the UNFCCC for sustainable transport.

NAMAs can be implemented, voluntarily, by developing country Parties and be reported to the UNFCCC. There is no restriction on the nature of climate change

[6] http://ledsgp.org/sector/transport
[7] http://www.nama-database.org/index.php/Main_Page
[8] http://www.transport-namadatabase.org/index.php/Main_Page
[9] http://www4.unfccc.int/sites/nama/SitePages/Home.aspx

mitigation activities that can be submitted to the UNFCCC as a NAMA. They can be local, regional or national policies, projects or strategies - indeed any intervention, either new or existing, stand-alone or 'bundled,' sector specific or economy-wide, that can be shown to reduce emissions from a business as usual (BAU) scenario. The only requirement is that NAMAs requesting related financial, capacity building or technological support adopt an approach where impacts are Measurable, Reportable and Verifiable (MRV).

There are a number of initiatives for supporting NAMA, both technical and financial. The NAMA Partnership[10] is one such example, created in recognition of the demand from developing countries for support with preparing and implementing NAMAs. This is an international partnership of multilateral organisations, bilateral cooperation agencies and think tanks that is co-ordinated by the UNFCCC Secretariat[11]. Work by the partnership includes identifying best practices, and facilitating the preparation and implementation of NAMAs in developing countries. It primarily focuses on aspects such as finance, MRV and national sustainable development.

A recent financial initiative is the 'NAMA Facility'[12], launched jointly by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and the UK's Department of Energy and Climate Change (DECC) with 70 million EUROS committed, to support developing countries that want to implement 'transformational country-led NAMAs'. Two of the five NAMA projects selected for funding from the first call of proposals are transport NAMAs[13]: the Transit Oriented Development (TOD) NAMA in Colombia, and the Sustainable Urban Transport Initiative (SUTRI NAMA) in Indonesia.

Although NAMAs are a much more promising mechanism to engage sustainable transport under the UNFCC some concerns have emerged in the transport community in the last year, some of which are specific to the transport sector, while others are more general in nature. It appears that the number of transport NAMAs entering the NAMA pipeline is starting to slow down while the (transport) NAMAs included in the Ecofys NAMA database are only slowly moving forward. The emphasis in the scope of the NAMAs has been mostly on policy, program or project design while few, if any of the current transport NAMAs have a direct implementation focus. In this respect NAMAs do not yet offer an alternative to other climate funding mechanisms like GEF, CTF or CDM, which all have a strong implementation focus.

Some of these problems experienced in transport NAMAs might be related to outstanding questions to NAMAs in general, especially on the financing arrangements. So far there are no clear guidelines on structuring NAMA support

[10] http://www.namapartnership.org/.
[11] The members are as follows: United Nations Environment Programme Division of Technology, Industry and Economics (UNEP-OTIE), UNEP Risø Centre, United Nations Development Programme (UNDP), Food and Agricultural Organisation (FAO), Inter-American Development Bank (IDB), United Nations Institute for Training and Research (UNITAR), The World Bank, NEFCO, Asian Development Bank (ADB), African Development Bank (AfDB), Agence Française Développement (AFD), Japan International Cooperation Agency (JICA), KfW, GIZ, Climate Policy Initiative (CPI), International Fund for Agricultural Development (IFAD), World Resources Institute (WRI), Climate Marks and Investment Association (CMIA), Center for Clean Air Policy (CCAP), Climate Works Foundation, Organisation for Economic Cooperation and Development (OECD) and World Business Council for Sustainable Development (WBCSD).
[12] http://nama-facility.org/news.html
[13] http://nama-facility.org/projects/projects-selected.html

for implementation activities. Neither is there clarity on the Monitoring, Reporting and Verification (MRV) requirements for implementation NAMAs. The reluctance of the UNFCCC parties to take an active stance on this issues has a potentially damaging effect on NAMAs and could substantively reduce the interest of developing countries to engage in NAMAs, including transport NAMAs. This would be a disappointment for the transport community. Several organizations have been, and still are deeply, involved in the development of transport NAMAs.

2.2.3 CTCN

The Climate Technology Centre and Network (CTCN), hosted by UNEP, has been operational since 2013, and aims to enhance action on the development and transfer of technology for action on climate change,

Since its launch in late 2013, 93 countries have established national CTCN focal points (known as National Designated Entities) that can submit requests to the CTCN for technical assistance, and information on relevant climate technologies and good practices. The CTCN has the potential to support links between different UNFCCC processes for example the progression from Technology Needs Assessments (TNAs) to NAMAs. At the SBSTA 39th meeting in Warsaw, the third synthesis report on technology needs highlighted that 41% of Parties prioritised the transport sector in their TNAs in terms of climate change mitigation. A breakdown on the prioritized technologies within the transport subsector of the energy sector is shown in Figure 7.

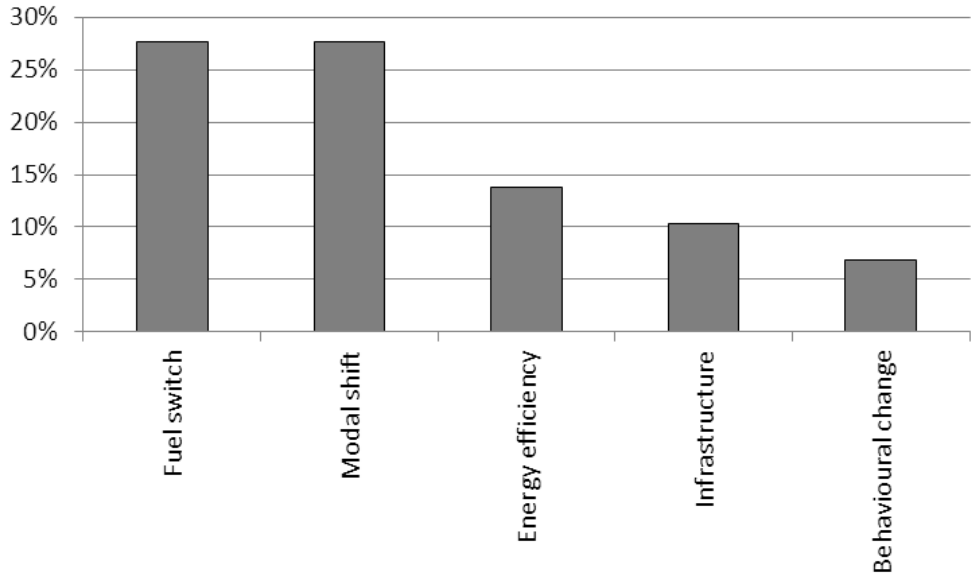

Figure 1: Prioritized technology categories in the transport subsector as reported in Parties' technology needs assessment reports (percentage of the Parties that undertook mitigation technology needs assessments)

(Source: http://unfccc.int/resource/docs/2013/sbsta/eng/inf07.pdf)

This highlights the common theme between countries that transport is becoming a higher priority in terms of technology needs. There is considerable potential for these technology priorities to be turned into transport NAMAs with the assistance of the CTCN, which can provide support in terms of the knowledge sharing as well as linking these technology needs with potential funding sources.

2.2.4 Green Climate Fund (GCF)

The Green Climate Fund (GCF) was established to provide (more) ambitious climate financing for mitigation of, and adaptation to climate change, especially in the developing countries.

The Green Climate Fund was agreed upon at COP 16, in 2010, in Cancun, Mexico. The Secretariat of the GCF is hosted by Republic of Korea. The agreed size of the fund by 2020 should be $100 billion per year. It is not yet clear whether this 2020 target will be met and what the annual size of funding would be in the years before 2020. Neither is it fully clear what the impact will be of the GCF on future funding for the Climate Change component of the Global Environment Facility or the Clean Technology Fund, which until now have been the major sources of Climate Finance for low carbon transport.

The GCF published in May an initial Results Framework, which outlines how the GCF intends to contribute to low carbon development.[14] Low-emission transport is identified as one out of four strategic level-impact results:

1. Increased low-emission energy access and power generation;
2. Increased access to low-emission transport;
3. Increased energy-efficiency in buildings, cities and industries; and
4. Sustainable land use and forest management, including REDD+.

In July, discussions between governments took place in Oslo, Norway ahead of the first formal GCF Pledging Conference scheduled to take place in November this year when contributors are to announce their initial contributions for the Fund. The meeting set out a pathway for contributors to mobilise finance to the GCF. Host country Norway pledged USD 1billion for the fund shortly before the event.

It is encouraging to see that low emission transport has such a prominent place in the initial Results Framework. It appears however from the Results Framework that only focuses on low-emission passenger transport and that it does not actively incorporates low-emission freight transport. Efforts must be made to ensure that the final Results Framework will also explicitly acknowledge the role of low-emission, or green, freight.

The GCF, in the design of its results framework, appear to have taken on board criticisms regarding the almost exclusive project focus of other main Climate Finance by emphasizing its intention to ensure that all GCF funding will create a shift towards low-emission development pathways. The initial Results Framework makes reference to "country-driven policy agenda". It suggests that countries focus on enabling legal and regulatory frameworks and that they focus on:

a) Developing a policy document that outlines its mitigation strategy;
b) Changing the legal and regulatory framework to be consistent with the proposed policies;

[14] Initial Results Management Framework of the Fund, GCF/B.07/04, 07 May 2014

c) Building the capacity to implement the proposed programme in government institutions provided with the funding needed to attract qualified staff;

d) Enabling the financing needed to support the development and implementation of mitigation projects; and

e) Establishing the monitoring and evaluation processes needed to support the evolution of the implementation programme.

Annex 4 to this document provides a more detailed overview of the initial Mitigation logic model and the initial mitigation performance assessment framework for the GCF.

A mitigation approach that adopts a sector wide approach is in line with the INDC and NAMA approach, which also are taking a sector wide approach. This is a welcome development from the perspective of the transport sector. In the first part of this paper it was argued that a combination of approaches is required to realize ambitious mitigation in the transport sector. The ASI approach, which brings together these different mitigation approaches, is much more suited to be applied at a sector level than at the project level.

By including a specific indicator in the performance assessment model on the contribution of private sector to mitigation activities funded by the GCF, it appears that the GCF has reached a similar conclusion as the sustainable transport community. Without a much-scaled up involvement of private sector in funding and implementing low carbon (transport) infrastructure and services the scale of climate change mitigation will be well below what is required.

It is important to realize that the concerns and limitations on availability of data on transport infrastructure, services and activity as well as associated GHG emissions that were raised earlier in the section on INDCs also fully apply to GCF's intended performance assessment model. Current levels of data in many of the developing countries will not be sufficient to provide the required baseline data and in the coming years detailed information on the impact of GCF funding for low-emission transport.

3. Funding needs and sources for low-carbon transport

The IEA (2012) estimates that the transport sector under a business as usual case would lead to investments in transport infrastructure, vehicles, operating costs, etc. of USD 500 trillion up to 2050. At the same time the IEA believes that the wide scale adoption of ASI based policies and investment programs can result in net savings of over USD 50 trillion in reduced vehicle purchases, infrastructure and fuel costs. Another modelling exercise, ITDP and UC-Davis (described in the first part of this paper, making use of the same IEA methodological and accounting approach focusing on public transport and with more ambitious mitigation assumptions suggests cumulative savings in excess of USD 100 trillion in public and private spending on transportation vehicle and infrastructure capital and operating costs. These savings accumulate at growing levels over time and require significant up-front financing of public transport system expansion. Neither calculation includes the additional co-benefits gained by sustainable transport, such as improved safety, air quality and reduced travel

time, which would make the cost-effectiveness of a shift towards sustainable transport even more compelling.

Those cost saving figures dwarf all available climate finance options, which currently only account for less than USD 5-7 billion annually. A clear indication of limited relevance of Climate Finance for the transport sector is the absence of clear data. This is also related to what is defined as Climate Finance. Funding provided through GEF and CDM is well below USD 1 billion per year. Multilateral Development Banks in 2012 reportedly invested USD 4.5 billion in sustainable, low emission transport[15].

Considering the size of existing and future Climate Finance, as well as the share that transport could rightfully claim based on its contribution to GHG emissions (about one fifth of energy related GHGs in 2012) it is unequivocally clear that Climate Finance will not be able to provide the financial resources to realize ambitious GHG reductions in land transport in the developing countries. It is important therefore to agree on a change in the best use of climate finance. It will be important to move away from considering climate finance as a source of funding to cover incremental cost of low carbon technologies deployed in specific projects. Instead, the limited climate funds should be used to promote the transition of other sources of financing, most importantly public and private sector funds towards low carbon, sustainable transport.

The concept of transitional costs of shifting towards a low carbon development pathway is relatively new and not incorporated well in Climate Finance architecture. Yet, in the case of the transport sector, where it has been proven that at the sector level there are negative incremental costs (or positive benefits) of implementing an ASI based approach to further development of transport infrastructure and services such new thinking on the role of climate financing could be very much beneficial in accelerating the scaling up of low carbon transport.

While considering how to best fund the transition to a low carbon development path for the transport sector it is important, in addition to the recommended changed role for Climate Finance also to consider the implications for other sources of funding.

- What part of GHG emission reduction measure, or other sustainability measures in the transport sector, can be funded through passing on the costs to users? Considerable improvements in fuel economy or fuel quality improvements can be achieved with consumers picking up the tab for realizing such improvements. Likewise, the promulgation of new tire manufacturing standards that can result in fuel savings of up to 5% do not require any large investments on the side of governments. This also includes payments by beneficiaries, e.g. value capture resulting from improved transit, or the use of compulsory or voluntary business taxes with the aim to develop transit that supports the business sector. Various taxes or levies such as congestion pricing, carbon taxes, and parking taxes that are directly related to transport activities by individuals also have a part to play here.

[15] Joint Report on MDB Climate Finance 2012.

- How can public sector funding be redirected from supporting and enabling a car dominated transport infrastructure towards multi-modal transport infrastructure services which can reduce the modal share of car or truck based passenger and freight transport in favour of more sustainable modes? At a societal level this does not require more funding, as demonstrated by the OECD, but it does call for changes in funding priorities. In many countries, central governments claim motor fuel and registration fee revenues and apply these to construction of highways, while cities lack access to funding for transport infrastructure and services and lack the mandate or capability to develop effective financing structures. The experiences of countries, including Colombia, Mexico, and India demonstrate the benefits of a program-based approach in which national governments co-finance worthwhile city based initiatives. This has proven to be more effective in scaling up the realization of sustainable transport than the traditional project approach;
- How can private sector funding become a more significant contributor to develop sustainable, low carbon transport infrastructure and services? There is agreement that public sector funding, even aided by Official Development Assistance (ODA) or Climate Financing will fall far short of what is necessary to put in place the sustainable, low carbon infrastructure and services to enable the eradication of poverty and the pursuit of sustainable prosperity called for in the new post 2015 agenda for sustainable development. There is a shortage of good instruments to tap the private sector at scale for sustainable transport. At the same time there is a lack of understanding and capacity within the sustainable transport community on how to best work with the private sector on realizing sustainable, low carbon transport;
- How can both public and private funding for sustainable transport be better leveraged with ODA? In 2012, the eight largest Multilateral Development Banks (MDBs) pledged USD 175 billion over 10 years towards more sustainable transport, with annual reporting. While an impressive amount it is estimated that this will cover at most 3-4% of required investments in sustainable transport in the coming decade. To improve the leverage of funding from both the private sector and institutional funders (e.g. pension and sovereign wealth funds) the public and private sector parts of MDBs will need to learn to work better together;
- What role could new or expanded financial intermediaries play at the national, regional, or sub-national level to channel multilateral or bilateral and private investments to front-line public or private transportation project, program, and service delivery agents operating at the local level or regional level? Many sustainable transport projects are relatively small, which makes them unattractive to larger development banks where there is intense pressure to make large loans. How might financial intermediaries or programs serve as catalysts to build the pipeline of investable sustainable projects? What role could such entities play in bundling projects to tap the rapidly growing market for Climate or Green Bonds? Could Climate Funds be used to help such entities support local

governments or regional agencies fund planning, stakeholder consultations, and capacity building to enable more rapid scale up of sustainable transport?

4. Conclusions and Recommendations

A new international climate agreement needs to be forged by COP 21 (2015) in Paris, or at least the broad principles agreed by then. An acceleration of efforts to ensure that that the land transport sector will be able to benefit from this new agreement is seen as being vital and necessary for land transport to make headway in scaling up its mitigation ambitions.

There is a growing evidence base on the mitigation potential of land transport, the sustainable development benefits of such action and the economic viability of doing so. This is a key message and Bridging the Gap and SLoCaT should intensify its outreach on these three messages of mitigation potential, sustainable development benefits and economic viability.

The remainder of 2014 and 2015 provide Bridging the Gap and SLoCaT with unique opportunities to mainstream low carbon transport in global policies on climate change and sustainable development:

- UNFCCC – as demonstrated in this paper are a number of opportunities to raise the profile of low carbon transport in the UNFCCC process including: INDCs, NAMAs, CTCN, and GCF. SLoCaT and Bridging the Gap have an opportunity to partner with the UNFCCC secretariat to ensure that this can happen. It will be important to increase the outreach to and dialogue with countries in developing and emerging countries. Part of this are also Transport Day 2014 in Lima, Peru during COP 21 and the ambitious plans to have a Transport Pavilion during COP 21 in Paris;
- Climate Summit Secretary General – land transport is well represented in the September 23 Climate Summit with 5 initiatives under three Action Areas: Transport (electric mobility, railways and public transport); Energy (fuel economy) and Petroleum and Industry (green freight). These initiatives have created the largest momentum for low carbon transport in the transport industry so far. This offers an excellent opportunity to work with the transport sector itself in demonstrating the reduction potential of land transport. This is a direct response to the call made at COP 19 in Poland for involvement of parties outside the convention to demonstrate mitigation potential;
- Post 2015 Development Framework – many of the proposed transport related targets are directly relevant for the scaling up of low carbon transport. It is in the interest of the sustainable transport community to ensure that they are integrated in the final SDGs adopted by the UN General Assembly in September 2015.

It is increasingly likely that as a result from global processes on sustainable development and climate change that the emphasis will shift in climate change mitigation from an individual project approach to sector wide programmatic or policy approaches. This is a key step in scaling up of the mitigation potential of sustainable transport. To help this shift happen it is important to:

a) Further develop the evidence base on the mitigation potential of the transport sector. This will require doing more global work on freight in addition to additional studies on passenger transport. In addition analysis will need to be carried out at the national level. This will also be important in support of INDCs and the low emission pathways called for in the Results Framework of the GCF;

b) To improve the availability and quality of transport data. There is an urgent need to improve the availability and quality of transport data. This requires a better coordination of existing data initiatives, including the exchange of data but it also calls for improved and expanded data collection by countries and cities in developing and emerging countries;

c) Further develop the conceptual linkages between the climate oriented Avoid-Shift-Improve approach and co-benefits associated with climate action in the land transport sector. This should also extend to integrated economic assessment tools that combine climate benefits with sustainable development benefits;

d) Undertake substantive capacity building on low emission transport planning in developing countries and cities. The planning and implementation of comprehensive mitigation strategies that combine climate and sustainable development objectives is challenging and in many countries and cities there is not enough capacity to do so effectively;

e) Take the opportunity offered through the INDCs and the scaling up of climate finance as described in the GCF Results Framework and, as in the case of NAMAs, identify countries that have an interest to develop transport related pilots for INDCs and the GCF;

f) Keep up the momentum on transport NAMAs. This can best be accomplished by working towards implementation of a number of transport NAMAs. Also, it is important that the transport sector, as the second largest sector in terms of the number of NAMAs coordinates with other sectors in getting clarity on the implementation and financing arrangements for NAMAs;

g) Develop recommendations on a better use of Climate Finance for Sustainable, Low Carbon Transport. The German funded TRANSfer project provides a process that can be used to accomplish such.

Annex 1: PROPOSED TRANSPORT RELATED TARGETS IN THE OWG FINAL REPORT (19 JULY 2014)

Proposed SDG	**Proposed Transport Target**
Proposed goal 2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	**Target 2.3** by 2030 double the agricultural productivity and the incomes from small scale food producers, particularly of women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets, and opportunities for value addition and non-farm employment **Target 2.a** increase investment, including through enhanced international cooperation, in *rural* infrastructure, agricultural research and extension services, technology development, and plant and livestock gene banks to enhance agricultural productive capacity in developing countries, in particular in least developed countries
Proposed goal 3. ***Ensure healthy lives and promote well-being for all at all ages***	**Target 3.6** by 2020 halve global deaths and injuries from road traffic accidents **Target 3.9** by 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination
Proposed goal 7. ***Ensure access to affordable, reliable, sustainable and modern energy for all***	**Target 7.3** double the global rate of improvement in energy efficiency by 2030 **Target 7.a** by 2030 enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies
Proposed Goal 9: ***Built resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation***	**Target 9.1** develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all **Target 9.4** by 2030 upgrade infrastructure and retrofit industries to make them sustainable, with increased resource use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, all countries taking action in accordance with their respective capabilities **Target 9.a** facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, LDCs, LLDCs and SIDS
Proposed goal 11. ***Make cities and human settlements inclusive, safe, resilient and sustainable***	**Target 11.2** by 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons **Target 11.6** by 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality, municipal and other waste management **Target 11.7** by 2030, provide universal access to safe, inclusive and accessible, green and public spaces, particularly for women and children, older persons and persons with disabilities **Target 11.a** support economic, social and environmental links between urban, peri-urban and rural areas into by strengthening national and regional development planning
Proposed goal 12. ***Ensure sustainable consumption and production patterns***	**Target 12.c** rationalize inefficient fossil fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities
Proposed goal 13. ***Take urgent action to combat climate change and its impacts***	**Target 13.2** integrate climate change measures into national policies, strategies, and planning

Annex 2: List of UNFCCC registered CDM transport projects

Name	Country	Type	Size	Estimated emission reductions in metric tonnes of CO_2 equivalent per annum
BRT Bogotá, Colombia: TransMilenio Phase II to IV	Colombia	BRT, urban transport	Large scale	246563
Installation of Low Green House Gases (GHG) emitting rolling stock cars in metro system	India	Low carbon vehicles	Small scale	41160
Cable Cars Metro Medellín, Colombia	Colombia	Cable car, urban transport	Small scale	17290
BRT Chongqing Lines 1-4, China	China	BRT, urban transport	Large scale	218067
Plant-Oil Production for Usage in Vehicles, Paraguay	Paraguay	Vegetable oil production and usage in transport	Small scale	17188
Modal Shift from Road to Train for transportation of cars	India	Freight mode shift	Small scale	23001
BRT Lines 1-5 EDOMEX, Mexico	Mexico	BRT, urban transport		145863
BRT Zhengzhou, China	China	BRT, urban transport	Large scale	204715
Metro Delhi, India	India	Metro, urban transport	Consolidated methodologies	529043
BRT Metrobus Insurgentes, Mexico	Mexico	BRT, urban transport	Consolidated methodologies	46544
Mumbai Metro One, India	India	Metro, urban transport	Consolidated methodologies	195547
BRT Transmetro Barranquilla, Colombia	Colombia	BRT, urban transport	Large scale	55828
BRT Macrobus Guadalajara, Mexico	Mexico	BRT, urban transport	Large scale	54365
MIO Cali, Colombia	Colombia	BRT, urban transport	Large scale	242187
BRT Metroplus Medellin, Columbia	Colombia	BRT, urban transport	Large scale	123479
Bus Rapid Transit (BRT) in Guatemala City	Guatemala	BRT, urban transport	Large scale	536148
Lanzhou Bus Rapid Transit (BRT) Project	China	BRT, urban transport	Large scale	12621
MEGABUS, Pereira, Colombia	Colombia	BRT, urban transport	Large scale	33956
Metro Line 12, Mexico City	Mexico	Metro, urban transport	Consolidated methodologies	136983
BRT Metrobus 2-13, Mexico	Mexico	BRT, urban transport	Consolidated methodologies	134601
EKO electric vehicles, India	India	Electric vehicles	Small scale	24563
Hero Electric Vehicles, India	India	Electric vehicles	Small scale	37647

Nittsu Fuel Efficiency Improvement with Digital Tachograph Systems on Road Freight Transportation CDM Project in Malaysia	Malaysia	Installing digital tachograph systems to commercial freight transport fleets	Small scale	239
Electrotherm Electric Vehicles, India	India	Electric vehicles	Small scale	36175
Lohia Auto Industries Electric Vehicles, India	India	Electric vehicles	Small scale	25518
Mode-shift of passengers from private vehicles to MRTS for Gurgaon metro	India	Metro, urban transport	Consolidated methodologies	105863
LRT System in Tunis	Tunisia	Metro, urban transport	Consolidated methodologies	29193
Demonstration project for annual production 4, 000, 000 m3 biogas from organic waste in Anyang City	China	Use of biofuels in transport applications	Small scale	50739
Guiyang MRTS Line I Project	China	MRT, urban transport	Consolidated methodologies	335188

(Source: http://cdm.unfccc.int/Projects/projsearch.html)

Annex 3: List of Transport NAMA projects

Name of NAMA	Country	Development Stage	Scope of action	Type of Approach (A-S-I)	Transport mode (category)
City wide mitigation programme of Greater Amman Municipality	Jordan	Feasibility study	Sub-national	Not known	Not known
Comprehensive mobility plan for Belo Horizonte, Brazil	Brazil	Feasibility study	Sub-national	A (Avoid) S (Shift) I (Improve)	Bus (PT) Rail (PT) Car (IMT) Motorcycle (IMT) Other motorized transport (IMT) Walking (INMT) Cycling (INMT) Other non-motorized transport (INMT)
E-mobility readiness plan	Chile	Under development	National	S (Shift) I (Improve)	Bus (PT) Other public transport (PT)
Electric Vehicles NAMA	Colombia	Under development	National	I (Improve)	Other public transport (PT) Car (IMT) Road cargo (F)
Enhancing Vehicle Renovation and operating efficiency in Mexico´s federal freight sector	Mexico	Feasibility study	National	I (Improve)	Bus (PT) Car (IMT) Road cargo (F)
Integrated improvement of transit management	Chile	Feasibility study	National	I (Improve)	Bus (PT) Other public transport (PT) Car (IMT) Motorcycle (IMT)
Integrated Urban Mobility Systems as a Crediting Mechanism	Mexico	Under development	National	A (Avoid) S (Shift) I (Improve)	Bus (PT) Rail (PT) Car (IMT) Motorcycle (IMT) Cycling (INMT)
Low Carbon Climate Resilient Development Strategy in Dominica	Dominican Republic	Under development	National	Not known	Not known

Master Plan on Comprehensive Urban Transport of Vientiane	Laos	Feasibility study	Sub-national	S (Shift) I (Improve)	Bus (PT) Other public transport (PT) Car (IMT) Other motorized transport (IMT) Road cargo (F) Other freight (F)
Mexico's Energy Efficiency Program for Freight Vehicles	Mexico	Under development	National	I (Improve)	Road cargo (F)
Modernization of freight train infrastructure	Argentina	Feasibility study	National	S (Shift) I (Improve)	Rail cargo (F)
Optimization of the conventional bus system in the valley of Mexico City	Mexico	Feasibility study	Sub-national	S (Shift) I (Improve)	Bus (PT)
Passenger Modal Shift from Road to Rail – The Gautrain Case	South Africa	Implementation	Sub-national	S (Shift)	Bus (PT) Rail (PT)
Programme for Energy Efficiency in the Transport Sector in Chile	Chile	Feasibility study	National	I (Improve)	Bus (PT) Road cargo (F)
Public transport development	Lebanon	Feasibility study	Sub-national	S (Shift) I (Improve)	Bus (PT) Rail (PT) Car (IMT)
Public Transport Route Optimization and Vehicle Fleet Renovation	Mexico	Under development	National	S (Shift) I (Improve)	Bus (PT)
Rehabilitation of Arterial Roads in Serbia	Serbia	Under development	National	I (Improve)	Bus (PT) Car (IMT) Motorcycle (IMT) Road cargo (F)
Rollout of electric private passenger vehicles	South Africa	Feasibility study	National	I (Improve)	Car (IMT)
Santiago Transportation Green	Chile	Under development	Sub-national	S (Shift) I (Improve)	Bus (PT)

Zone					Other public transport (PT) Car (IMT) Walking (INMT) Cycling (INMT)
Supported NAMA for Improvement of Road-based Freight sector	Colombia	Feasibility study	National	A (Avoid) S (Shift) I (Improve)	Road cargo (F)
Sustainable Urban Transport Initiative (SUTRI)	Indonesia	Under development	National Sub-national	S (Shift) I (Improve)	Bus (PT) Rail (PT) Car (IMT) Motorcycle (IMT) Walking (INMT) Cycling (INMT)
Transit-Oriented Development in Colombia	Colombia	Under development	National	A (Avoid)	Bus (PT) Rail (PT) Walking (INMT) Cycling (INMT)
Transport NAMA in Peru	Peru	Feasibility study	National	A (Avoid) S (Shift) I (Improve)	Bus (PT) Rail (PT) Car (IMT) Motorcycle (IMT) Other motorized transport (IMT) Walking (INMT) Cycling (INMT) Road cargo (F)

(Source: http://www.transport-namadatabase.org/index.php/Main_Page)

Annex 4a: Initial Mitigation Logic Model GCF

Paradigm shift objective	**Shift to low-emission sustainable development pathways**			
↑	↑	↑	↑	↑
Impacts *(Strategic level)*	**1.0 Increased low-emission energy access and power generation**	**2.0 Increased access to low-emission transport**	**3.0 Increased energy efficiency in buildings, cities and industries**	**4.0 Sustainable land use and forest management, including REDD+**
↑	↑			
Project/programme outcomes *(Country-driven from NAMAs, climate change strategies, mitigation policies, etc.)*	**5.0 Increased gender-sensitive low-emission development mainstreamed in government** **6.0 More small, medium and large low-emission power suppliers** **7.0 Lower country energy intensity trajectory** **8.0 Increased use of low carbon transport** **9.0 Stabilization of forest coverage**			
↑	↑			
Programme / project outputs *(to be defined by executing entities)*	*Possible examples include:* • More small, medium and large low-emission power suppliers; • Increased use of incentives and technologies for low-carbon transport; • Improved management systems of entities responsible for forests and protected areas; • Increased energy efficiency of building, industry and appliances.			
↑	↑			
Indicative activities *(to be defined by executing entities)*	*Possible examples include:* • Capacity-building to foster government support for policy reforms through training and knowledge-sharing; • Upgrading the legal and regulatory framework; • Increased investment in renewable energies; • Increased investment in energy efficiency; • Increased investment in low-emission transport; • Increased support for decreased deforestation and increased afforestation.			
Inputs	Grants, concessional loans			

Annex 4b: Initial mitigation performance assessment framework GCF

Annex IV: Initial mitigation performance measurement framework[1]

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Expected results	**Indicators (indicative)**	**Baseline data**	**Targets**	**Data sources and collection methods**	**Frequency**	**Respon-sibility**	**Assumptions/notes**
			Paradigm shift objective				
Shift to low-emission, sustainable development pathways	M.1 Tonnes of carbon dioxide equivalent (t CO_2 eq) emitted by countries receiving mitigation funding	Assumed business-as-usual emissions trajectory measured in t CO2 equiv. emitted by countries		The Fund would coordinate with the UNFCCC data	Every five years	Fund Secretariat	
	M.2 Cost per t CO_2 eq decreased for all Fund-funded mitigation projects	Not required		Executing entity (EE)/implementing entity (IE) results reports and energy balances	Every five years	Fund Secretariat	Provides information to help reduce the expected cost of mitigation
	M.3 Volume of public and private funds catalysed by the Fund (core indicator)			Project/ programme proposals and end-of-project reports	Beginning and end of an investment	IEs	To effectively bring about a paradigm shift in the way that societies approach mitigation, the private sector must be engaged given its sizeable role in the energy sector. This indicator – consistent with the Fund's Governing Instrument – is a proxy indicator that measures catalysed funding, including private sector funding. It should be tracked by all projects and programmes.

Expected results	Indicators (indicative)	Baseline data	Targets	Data sources and collection methods	Frequency	Respon-sibility	Assumptions/notes
			Impacts (strategic level)				
1.0 Increased low-emission energy access and power generation	1.1 Level of national/regional capacity (MW) from low emission sources (renewable energy).	Existing mix of power generation		Data from the transmission system operator or dispatch centre	Mid-term and end of investment	IEs	
2.0 Increased access to low-emission transport	2.1 Emissions levels from vehicles	Existing transport emissions		Data from Ministry of Transport	Annually	IEs	Draw on data available from UNFCCC reporting
			Project/programme outcomes				
8.0 Increased use of low-carbon transport	8.1 Number of passengers (disaggregated by gender where possible) using low emission vehicles	Existing transport use		Records of Ministry of Transport or licensing bureau	Annually	EEs	Assumes that a portion of investments will target vehicle fleets and possible car manufacturers.
	8.2 Modal share (by transportation type)	Existing transport use		Transportation household survey with sex disaggregated data	Annually	EEs	Survey would determine the predominant types of transportation used (pedestrian, bicycle, bus, rickshaw, collective taxi, rail, car, etc.) by women and men. Repeated over time to determine any movement to low-emission modes.

Annex 5 Bridging the Gap resources

More information can be obtained from the Bridging the Gap fact sheet on Climate Finance (http://www.transport2020.org/publicationitem/19/btg-factsheet-climate-finance).