CAPACITY BUILDING NEEDS ASSESSMENT AND STRATEGY TO PROMOTE LOW CARBON DEVELOPMENT IN HIGH VOLUME TRANSPORT FOR SELECTED LOW-INCOME AND LOWER-MIDDLE-INCOME PRIORITY COUNTRIES IN AFRICA AND SOUTH ASIA

Project Reference: HVT/007

Applied Research Programme in High Volume Transport

Theme 3 – Low Carbon Transport

Part 1 - State of Knowledge study to formulate the Applied Research Programme and implementation strategies

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ABSTRACT

This study assesses why low carbon high volume transport solutions are not being actively implemented in the selected priority low-income countries in Africa and South Asia and looks at what could be done to strengthen their capacity to accelerate the implementation of such solutions.

It is based on primary research with active outreach to key experts in research institutions, government departments, the private sector, and implementing agencies in the group of project countries. Peer-reviewed and grey-literature reviews were also conducted.

The principal findings show that the respondents prioritise transport interventions that address the mechanics of improving transport services for their core constituents. Highest priority is given to the reduction of road congestion (67% of respondents cited this as a high priority), the provision of affordable transport and mobility (cited this as high priority by 62%) and the provision of improved access/accessibility (cited by 40%). Of lower priority were air quality (18% of respondents) and climate change mitigation—mentioned by only 11%.

The responses tell a story of how, because low carbon is not a central priority for transport interventions, funding is lacking, regulations and applicable legislation are not in place, and there is often no clear policy that promotes low carbon transport.

The study analyses specific barriers to low carbon transport and proposes a capacity building strategy to fill this gap with a practical focus on accelerating low carbon transport implementation.

Keywords: low-income countries, low-carbon transport, sustainable mobility, climate change strategies, transport policy, capacity building, tacit knowledge, explicit knowledge, implementation

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EXECUTIVE SUMMARY

The basis for the Low-Carbon Transport study (Theme 3) of the Department for International Development of the United Kingdom's (DFID) Applied Research Programme into High Volume Transport (HVT) is to identify reasons why low carbon high volume transport solutions are not being actively implemented in a selected priority cohort of LIC/LMIC countries. Also, it assesses what could be done to strengthen the capacity of this cohort to accelerate the implementation of such solutions.

Theme 3 explores the current state of knowledge of, interest in, and capacity to implement low-carbon, high-volume transport (LC-HVT) in selected countries in Africa and South and Southeast Asia among selected study respondents. The current deliverable, within Theme 3, proposes a capacity building strategy to close identified knowledge gaps.

The main primary research for this study includes active outreach to key experts in research institutions, government departments, the private sector, and implementing agencies in the project countries, using an online survey, individual expert interviews, and a curated workshop with participants from project countries in South Asia[1]. Peer-reviewed and grey-literature reviews were also conducted, and additional primary research was undertaken for the capacity building strategy.

The principal findings show that the respondents prioritise transport interventions that address the mechanics of improving transport services for their core constituents. Highest priority is given to the reduction of road congestion (67% of respondents cited this as a high priority), the provision of affordable transport and mobility (cited this as high priority by 62%) and the provision of improved access/accessibility (cited by 40%). Of lower priority were air quality (18% of respondents) and climate change mitigation—mentioned by only 11%.

While respondents do not assign a high priority to air quality, or climate change mitigation as a primary driver for the choice of transport intervention, according to our respondents, both may be considered as useful co-benefits. Climate change mitigation is not a stated high priority in this limited sample for transport interventions for any level of government. These responses suggest that, because low carbon is not a priority for transport interventions, funding is lacking, regulations and applicable legislation are not in place, and there is often no clear policy that promotes low carbon transport at national or local levels.

Specific barriers to accelerated implementation of low carbon transport interventions include the existence of other government priorities, followed by weak or poor political leadership, weak regulatory framework and a lack of clear policy direction to lower the carbon intensity of the transport sector. A significant observation was that all the barriers mentioned by the respondents were related to process: i.e. *how* to implement low carbon high volume transport rather than *what* strategies to implement. Only 3% of respondents were concerned about what they would have to implement to move towards low carbon transport; all the other concerns were about how to go about it.

[1] The Workshop was divided into breakaway groups comprising national, local, private, or research stakeholders.

The study showed how many of the stakeholders that would be involved in implementing low carbon transport projects lack the tacit knowledge that such involvement would generate from experience gained. Due to this, most of the themes that they identified as critical and in need of knowledge exchange are intended to compensate and supplant this lack of hands-on experience. The respondents explained that explicit knowledge about policies, technologies and procedures is not a problem because it is easy to find online, in published papers, books, courses, from international agencies, and suppliers.

The importance of air quality and its impact on health was considered an issue by respondents in larger cities where urban degradation is visible. These local-level authorities see the promotion of cleaner, lower carbon transport—*if framed as a pollution reduction strategy*—could be a possible 'win' among voters and end-users.

The main needs of local respondents (i.e. local and regional/provincial government and transport authorities) that are involved in implementing transport policies and projects cover an eclectic mix of practical concerns that impact how they do their day-to-day work. Many of these local practitioners are clear in *what* they would like to accomplish, but their list of priority topics demonstrates the need for knowledge exchange on *how* to do it. A literature search revealed sparse sources of this knowledge, and most available sources are from developed countries and not necessarily applicable to project countries.

The proposed capacity building strategy aims to fill this gap with a practical focus on low carbon transport implementation. The proposal is for a two-tier organisation composed of the following elements to bring *explicit knowledge* on low carbon transport from international partners combined with a strong infusion of *tacit knowledge* from peers in the country and other DFID priority countries on the minutiae of implementation. This could take the form, for example, of step-by-step guidances, templates and mentoring to avoid the need to re-invent forms, steps, agreements, contracts and procedures where best practices have been developed elsewhere.

1. **The Low Carbon Transport Implementation Partnership,** to be hosted by DFID in combination with other international partners
2. **Centres of Excellence for Low Carbon Transport Implementation,** to be established in existing institutes in each participating country

The Low Carbon Transport Implementation Partnership would include cooperation partners to ensure synergy between this programme and other related programmes that aim to improve the sustainability of urban and long-distance freight and passenger transport.

Each Centre of Excellence would be hosted by a leading existing capacity-building institute in the country and would provide project and policy support under three components:

- In-country support for pilot project development
- Practical capacity building for pilot project replication and implementation of best practices
- Institutional strengthening

To be effective, each Centre of Excellence should demonstrate high-level national government support and commitment through nodal agencies and sub-national level support covering the leading stakeholders involved in policies/projects that are actively being developed. The funding committed by the Low Carbon Transport Implementation Partnership to the Centre of Excellence should be at least matched by in-country financial support. Its indicator of success should not relate to the number of people trained but rather to the number of pilot projects replicated in other cities, to ensure that it maintains this highly practical focus on low carbon transport implementation.

In a proposed second phase to this project, it would be necessary to evaluate the interest of ministries in selected DFID priority countries to participate, and their willingness to commit resources to a capacity building/knowledge exchange programme of this extension in support of their nationally determined contributions (NDCs)[2] and sustainable development commitments and plans.

Then for each selected country, an initial list of policies and low carbon projects where implementation support would be most welcome would be defined in collaboration with the government. A detailed discussion would be established with the stakeholders directly involved in the low-carbon transport project implementation and operation (principally local and regional government, and private sector actors), including prospective implementation partners. This process would serve to generate a clear vision of the most critical knowledge gaps among implementors for these specific projects, what would be needed to address them, and where resolving such gaps could promote an acceleration of low carbon transport interventions and activities.

[2] The Paris Agreement of the UNFCCC requires each participating country to prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve.

1.5DS	1.5 degrees Centigrade global warming scenario
2DS	Two degrees Centigrade global warming scenario
BAU	Business as usual
BRT	Bus rapid transit
CAN	The Climate Action Network
CDM	Clean Development Mechanism of the UNFCCC
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent emissions
CTCN	Climate Technology Centre and Network
DFID	Department for International Development - GOV.UK
EU	European Union
HVT	High Volume Transport
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoI	Government of India
Gt	Gigatonnes CO_2e
gTKP	global Transport Knowledge Practice
HVT	High Volume Transport
IPCC	The Intergovernmental Panel on Climate Change
ITS	Intelligent transport systems
LC HVT	Low-Carbon, High Volume Transport
LCS	Low-carbon scenario
LCT	Low-carbon transport
LIC	Low Income Country
LMIC	Lower-middle Income Country
MDB	Multilateral Development Bank
MRV	Monitor, Record, Verify
Mt	Million tonnes CO_2e
NAMA	Nationally Appropriate Mitigation Action UNFCCC
NDC	Nationally Determined Contribution
NGO	Non-governmental organization
NMT	Non-motorized transport
OECD	Organisation for Economic Co-operation and Development
PPP	Public-private partnership
SLoCaT	Partnership on Sustainable, Low Carbon Transport
SUTP	Sustainable Urban Transport Program
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
US	United States
USD	United States Dollar

UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction

This study forms part of the research output of the Department for International Development of the United Kingdom's (DFID) Applied Research Programme into High Volume Transport (HVT). The Low-Carbon Transport (Theme 3) of the Programme aims to explore the current state of knowledge and capacity of low-carbon, high-volume transport in a sample of Low-Income Countries (LICs) and Lower Middle-Income Countries (LMICs)[3] in Africa and South Asia that are priority countries for DFID.

This part of Theme 3 aims to assess stakeholder capacity and define a capacity building strategy on low carbon transport in this cohort of countries. Its activities include identifying the key stakeholders for implementation and the primary capacity building opportunities and constraints for implementing low carbon HVT. It also explores the steps required to strengthen and activate sub-national, national, and global networks and resources to accelerate the incorporation of low carbon transport in priority countries.

One objective is to provide recommendations to DFID regarding the direction and content for Part 2 of the Applied HVT Research Programme on Low Carbon Transport and propose capacity building and knowledge management strategies for Part 2.

2. Study Context

The Intergovernmental Panel on Climate Change's Special Report on 1.5°C degrees[4] (1) delivered a clear message that dramatic changes would be needed in the coming decade across multiple sectors, including transport, to limit global temperature rise to the threshold laid out in the Paris Agreement.

In 2014, transport accounted for 28% of global final energy demand and 23% of global energy-related CO_2 emissions. Emissions increased by 2.5% annually between 2010 and 2015, and over the past half century, the sector has witnessed faster emissions growth than any other. (2)

A mix of mitigation and adaptation options is needed to enable the rapid, systemic transitions in urban and rural areas that are necessary elements of an accelerated transition to a 1.5°C world. Scenarios consistent with 1.5°C pathways depend on an almost 40% reduction in final energy use by the transport sector by 2050 (3). Decarbonising transport is challenging because it is the least diversified energy end-use sector; the sector consumed 65% of global oil final-energy demand, with 92% of transport final-energy demand consisting of oil products (4). Such a transition depends on cities that enable modal shifts and avoided journeys, provide incentives for accelerated uptake of improved fuel efficiency and electric vehicles, and implement changes in urban design that encourage walkable cities, non-motorised

[3] Low-income countries (LICs) and lower-middle-income countries (LMICs) are defined as economies with a per capita gross-national income (GNI) of USD 995 or less; and between USD 996 and USD 3,895 respectively in 2017. See The definition of World Bank Country and Lending groups on https://bit.ly/2bBWnzX

[4] above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty

transport and shorter commuter distances (5)(6)(7) accompanied by the challenge of decarbonising heavy-duty vehicles, aviation, and shipping for longer distance travel for passengers and freight.

With emissions projected to rise in most global BAU scenarios, transport is off-track to meet Paris Agreement targets, and is likely to generate up to 13.6 Gt[5] of CO_2e and potentially up to 18 Gt of CO_2e by 2050 under an average scenario (8). Most of this growth is expected to come from developing countries where emissions from transport are forecast to grow at two to four times the rate of economy-wide emissions. As developing countries become richer their transport sector share in total emissions increases. With a continuation of current policies, per-capita CO_2e transport emissions are expected to decline slightly in high-income countries while in middle-income countries they are forecast to increase by 127% and in low-income countries by 167%. BAU transport projections would be roughly 3.5 times higher than a "2 degrees" scenario (2DS) goal and more than nine times higher than a 1.5 DS goal (see Figure 1). Since transport infrastructure-related decisions can 'lock-in' transport demand for decades to come, policy decisions in the next two to five years would determine whether we are set on a course for a low carbon transport future (9).

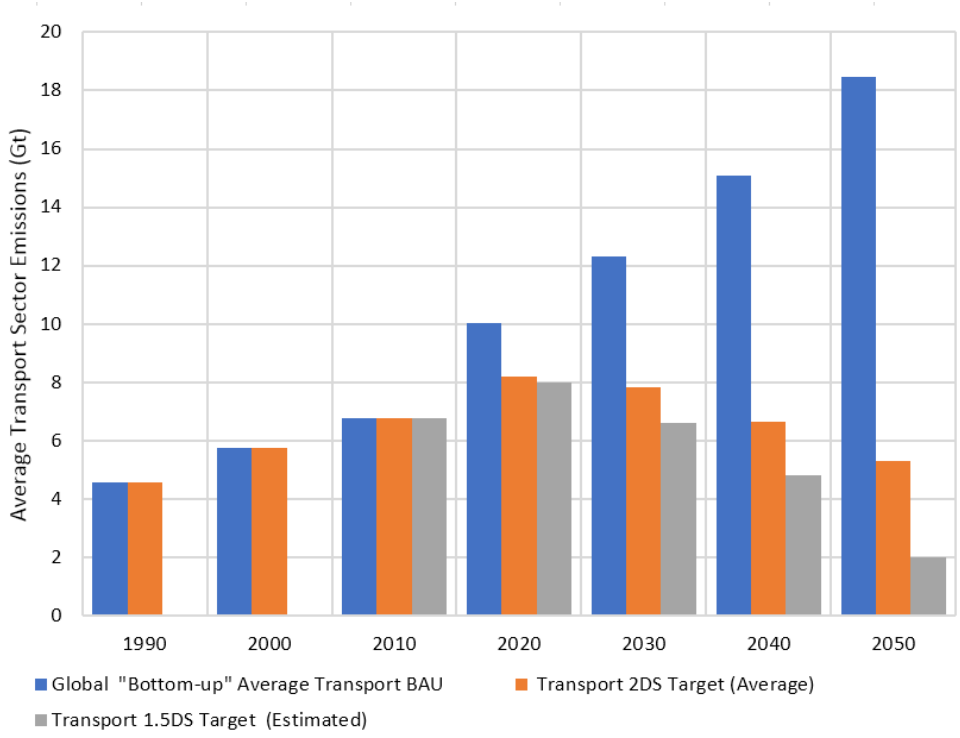

Figure 1 - Transport Emissions BAU Estimates and 2DS-1.5 DS Targets

As a result, many developed countries are setting a vision for a climate neutral economy by 2050 but few developing countries have created such a vision. The EU has already started this transition (10) and according to the Commissioner for Transport, Violeta Bulc, "All transport modes should contribute to the decarbonisation of our mobility system. The goal is to reach net-zero emissions by 2050". The

[5] ITF, (2017). ITF Transport Outlook 2017. *OECD Publishing*, Paris, https://doi.org/10.1787/9789282108000-en

purpose of this long-term EU strategy is not to set targets, but to create a vision and sense of direction, plan for it, and inspire as well as enable stakeholders, researchers, entrepreneurs and citizens alike to develop new and innovative industries, businesses and associated jobs. Since developing countries, in general, are expecting significant increases in their transport sector per-capita CO_2e emissions, there is a clear need and opportunity for them to consider adopting similar visions.

3. STUDY BASIS AND METHODOLOGY

The basis for Theme 3 is to identify reasons why sufficient low carbon high volume transport solutions are not being actively implemented in the selected priority cohort of LIC/LMIC countries and assess what could be done to strengthen their capacity to accelerate the implementation of such solutions.

It explores the current state of knowledge of, interest in, and capacity to implement low-carbon, high-volume transport (LC-HVT) in selected countries among selected study respondents. The current deliverable, within Theme 3, proposes a capacity building strategy to close the knowledge gaps identified.

Country Selection: The countries were selected through a robust, quantitative selection process which focused on identifying DFID countries in Africa and South Asia that have the highest need for low carbon transport.

The selection process was based on a ranking system with six indicators, each of which contained two sub-indicators with national-level data:

i. Gross Domestic Product (GDP) per capita in 2017 and GDP per capita growth between 2000 and 2017;
ii. Motorisation level and motorisation growth between 2005 and 2015;
iii. Current transport CO2 emissions per capita in 2016 and per capita emissions growth between 2000 and 2016;
iv. Current (aggregate) transport CO2 emissions in 2016 and emissions growth between 2000 and 2016;
v. Projected transport CO2 emissions per capita for BAU in 2050 and per capita BAU emissions growth between 2020 and 2050; and
vi. Projected transport CO2 emissions for BAU in 2050 and BAU emissions growth between 2020 and 2050.

The final list comprised three Asian countries (Bangladesh, India, Indonesia) and six African countries (South Africa, Ghana, Nigeria, Rwanda, Uganda, Kenya). See Figure 2.

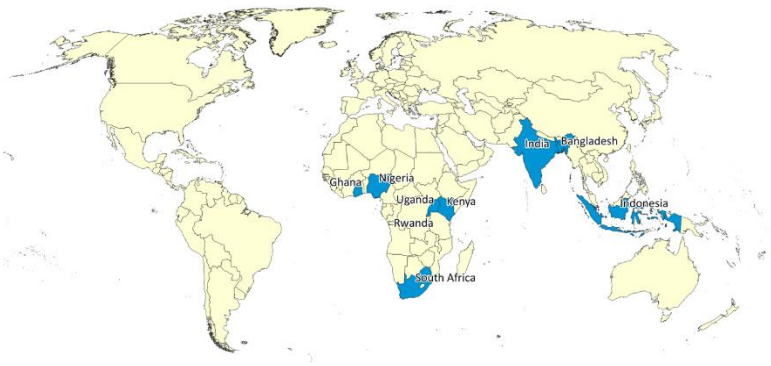

Figure 2 - Selected Countries

Primary Research: The main primary research for this study includes active outreach to key experts within these countries in research institutions, government departments, the private sector, and implementing agencies in the project countries, using an online survey, individual expert interviews, and a curated workshop with participants from South Asia[6].

Primary data is reported as a single source – in other words, unless relevant, the report does not distinguish between data collected by survey, expert interview, or face-to-face. These interviewees are referred to as stakeholders, experts, or (study) respondents interchangeably. The intention is not to differentiate between Africa and South Asia, but to focus on commonalities between the low- and middle-income country cohort, and relevance to low-income countries other than those selected; thus, data is reported by country or region only where exceptions are noted, or particular points of interest are evident[7].

The main variables of interest in this research are the concerns raised in the key questions: challenges, barriers, constraints and knowledge gaps. Where possible, findings were reported in terms of these expert categories, further refined to indicate whether these are national or local government respondents, or from the private sector. The sample size precluded further segregation of responses by class of on-road transport activity (freight, urban and inter-urban passenger transport) although differences are noted when these are apparent.

Stakeholder Survey: A survey on LC-HVT knowledge and capacity in Africa and South Asia was designed and administered to SLoCaT's expert stakeholder network (from which the expert interviewees were also drawn). The study, conducted in September and October 2018, contained qualitative and quantitative questions exploring how low carbon transport knowledge is gained, how capacity is achieved, and how transport users and other affected parties are engaged. A profile of the survey respondents is included in Annex 1.

[6] The Workshop was divided into breakaway groups comprising national, local, private, or research stakeholders.
[7] Broadly, differences are evident where South Asia is further down the road in terms of electric mobility and ride/bike-share applications.

Expert Interviews: 23 interviews were conducted with experts from research institutions, government departments, and implementing agencies in the selected countries[8] between October and December 2018 to gain more detailed insight into the state of knowledge on low carbon transport and capacity needs. The interview protocol and the list of the interviewees are included in Annex 2.

Capacity-Building Workshop*:* On 2 October 2018, a Workshop on Capacity Building Strategy for the Implementation of LC-HVT in South Asia was organised under this project to obtain input from relevant national and local stakeholders on the needs and barriers in capacity building for implementing LC-HVT in the region. The workshop was a pre-event to the Eleventh Intergovernmental Regional Environmentally Sustainable Transport (EST) Forum in Asia, hosted by the United Nations Centre for Regional Development (UNCRD) from 2 – 5 October 2018 in Ulaanbaatar, Mongolia. The workshop overview is available i**n** Annex **3.**

Additional primary research was conducted for the capacity building strategy which is documented in section 8.

Secondary Research: Peer-reviewed and grey-literature reviews were performed, that in combination allow LC-HVT to be analysed on a global scale, examining the current situation of LC-HVT in the selected countries and potential future strategies.

4. Overview of the implementation of low carbon transport interventions in low-income countries

4.1. What is happening and what is needed

Transport interventions in many developing countries are not currently being guided by a compelling vision of decarbonising their mobility systems to reach net-zero emissions by 2050. For many LICs, the supply of transport is struggling to keep pace with accelerating demand for transport services driven by economic development and population growth. As a result, LIC's Nationally Determined Contributions (NDCs) to the Paris Agreement on climate change continue to show increasing GHG emissions from the transport sector.

At the national level, these countries by and large have a desire to reduce transport emissions, both as part of their international commitment and to deliver other national co-benefits, such as health. However, as far as interventions on the ground are concerned, these are driven by the need to improve transportation infrastructure and mobility for a growing urban population (including private vehicle drivers) and rural connectivity. In most of the LICs, car-ownership is growing from a low base, driven in part by rising affluence and by poor quality public transport. This leads to stakeholders focusing their

actions on (often unsuccessfully) building infrastructure in the attempt to limit increasing congestion[9] although sometimes energy security (reduction of oil imports) and air quality concerns also play a part in the decision-making process.

Growth of absolute transport emissions between 2000 and 2016 was highest in the project's focus regions: Asia (92%) and Africa (84%) (11,12). This growth is attributed primarily to increased prosperity, which in turn increases passenger and freight transport activities. Africa's contribution to global transport demand has historically been low, though there has been a steady growth rate in motorisation of 33% between 2005 and 2015. On the other hand, most of the global transport demand between 2005 and 2015 was added in Asia, with an 88% increase in its motorisation rate. Meeting Paris Agreement targets would depend to a large extent on whether low carbon, sustainable transport is rapidly and broadly implemented, especially in the project's priority focus areas, as these have recorded not only rapid emissions growth in recent years, but also show rapid growth in population.

Population growth rates from 2000 to 2017 were highest in Africa, whose urban population nearly doubled from 277 million to 504 million in the same period. Asia's population reached 4.48 billion in 2017, with high annual growth in urbanisation (2.5%) and GDP (6.5%)[10]. Decision-makers would need to develop sustainable policies to meet this growing demand in their transport systems. There remains a need for research to show evidence that a context-appropriate shift to low carbon transport solutions has the potential to not only meet the demand on the transport systems and reduce emissions but also to allow citizens to experience the benefits of increased access, cleaner air, improved economic development and reduced inequality.

SLoCaT developed a global meta-analysis of transport sector emission in 2016 by aggregating 'bottom-up' country transport CO_2 estimates for the timeframe of 2020 to 2050 (13). Estimates for the BAU and the Low Carbon Pathway have been developed in order to show the magnitude of required actions to reduce emission in the transport sector.

Emissions in the BAU projections assume that no additional low carbon policy actions are adopted in the countries. The low carbon scenario (LCS) shows what would have to be done proportionally to be compatible with the 1.5-degree scenario target of the Paris Agreement (13). However, current commitments from these countries (conditional and unconditional targets as well as actions in NDC[11] submissions) are fall short of this goal, with GHG emissions increasing in real terms over this period.

An analysis of the needed transport emission pathways for the nine project countries shows that the transport emissions in the low carbon pathway compatible to the 1.5-degree scenario target would have to be 83% below the BAU by 2050. In this desirable low carbon pathway, transport emissions would

[9] There is an old saying "You cannot build your way out of congestion" (95) which many cities do not realize applies to them too.

[10] 2017 average for South Asia from WDI database, World Bank

[11] The Paris Agreement of the UNFCCC requires each participating country to prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve.

subsequently have to decrease. To contribute to the estimated 1.5-degree scenario target of 2Gt by 2050, the project countries would have to reduce absolute emissions to 356 Mt CO_2.

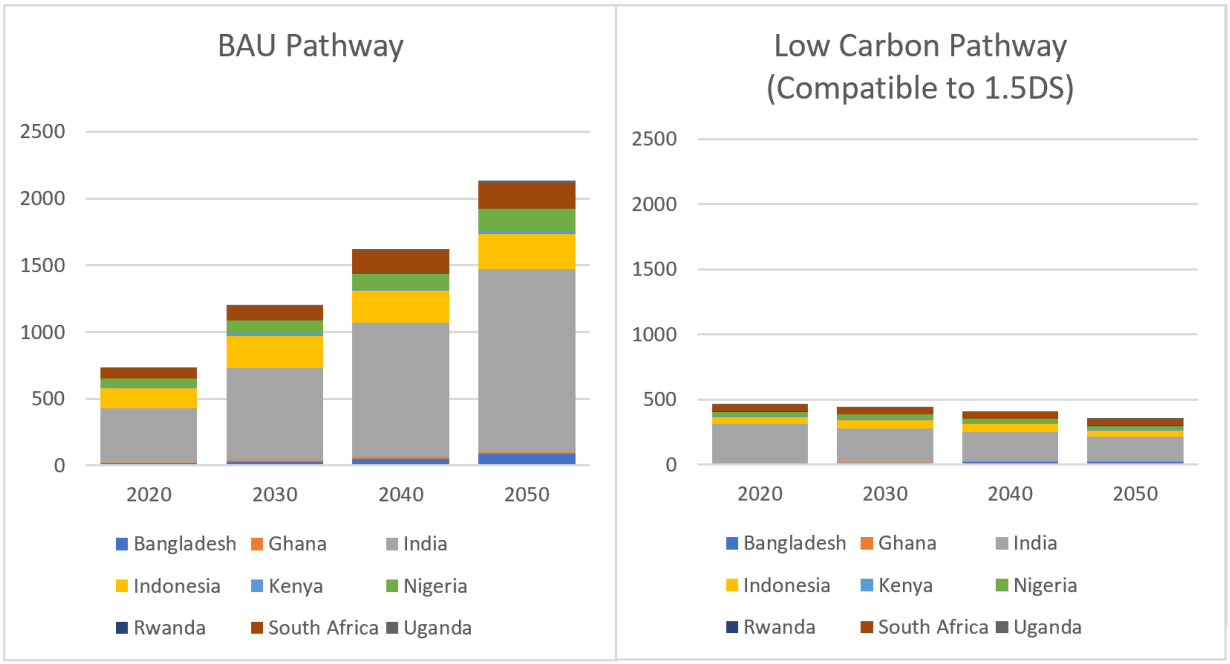

Figure 3 - Comparison between BAU and Low Carbon Pathways of project countries

5. NEEDS THAT ARE DRIVING TRANSPORT INTERVENTIONS

The respondents in the three field studies (i.e. stakeholder survey, expert interviews, and capacity building workshop) were asked to define the reasons that drove the choice of what type of transport project to implement. They defined their motives as high, medium, and low priority. Figure 4 shows their high rated need or 'problem' driving the choice of transport interventions.

Overall, the respondents indicated that the highest priority that drives the implementation of transport projects is the reduction of road congestion (67% of respondents cited this as high priority), the provision of affordable transport and mobility (cited this as high priority by 62%) and the provision of improved access/accessibility (cited by 40%) were also themes of importance. Of lower priority were air quality (18% of respondents) and climate change mitigation—mentioned by only 11%--and regional trade and movement (cited as high priority by 9%).

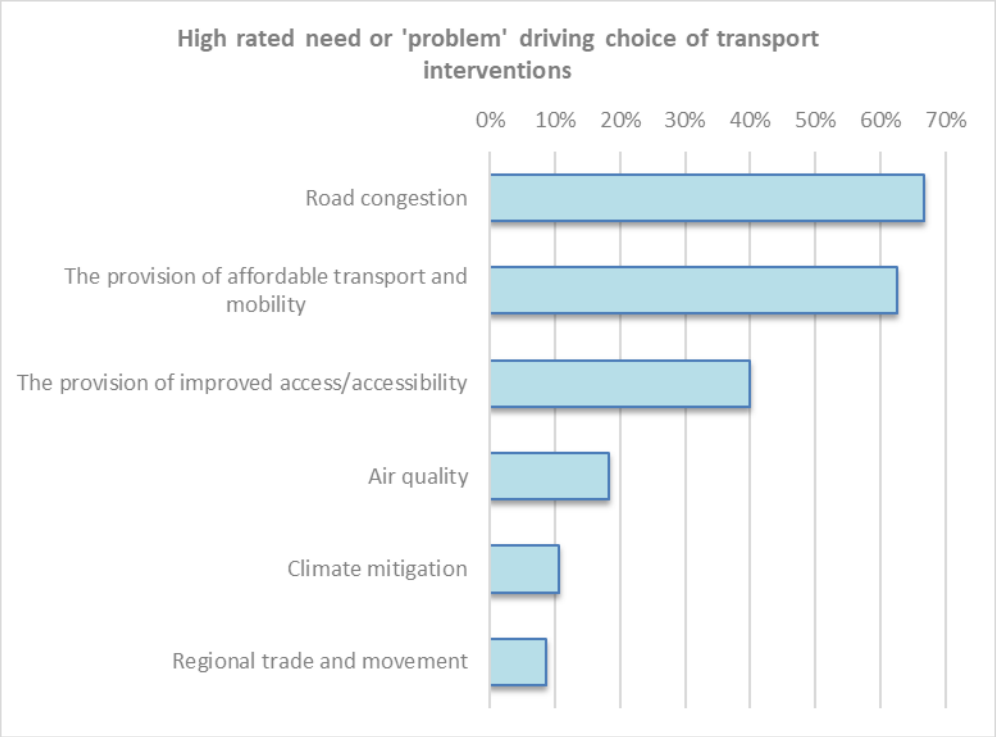

Figure 4- High rated need or 'problem' driving choice of transport interventions

The following figures drill-down into these results showing the perception of each of four different cohorts of stakeholders (see Table 1) as to the importance (high, medium, low) of the theme as a driver for transport interventions or policies. The self-classification of each participant defines the cohorts.

Table 1 - Classification of cohorts of respondents

Cohort	Includes:
'Academic'	Academic and research institutions
'Private Sector'	Practitioners, consultants and private companies
'Government'	Local, regional or provincial, and national government agencies
'Agency'	NGO or other similar organisation, financing or funding agency, and international agencies

5.1. ROAD CONGESTION

Road congestion (see Figure 5) received the overall highest priority rating of 67% driving the choice of transport interventions. Across cohorts, somewhat surprisingly, Agency gives this the highest priority (80% classified it as a high priority) while Government gave it the lowest (only 55% of respondents classified it as a high priority.

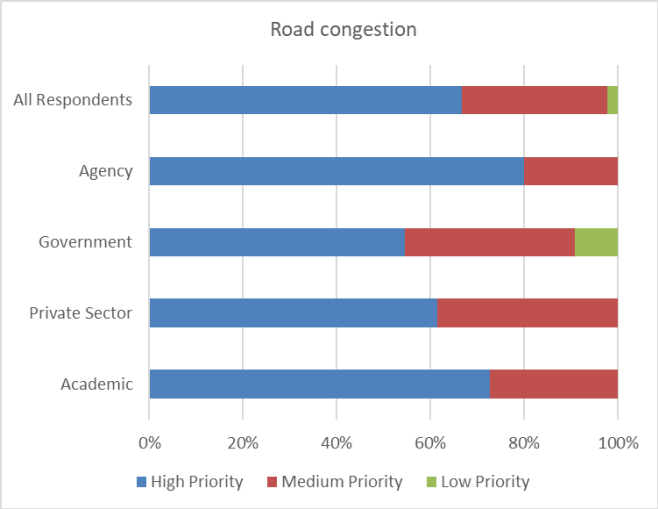

Figure 5 – Priority of road congestion as the need or 'problem' driving the choice of transport interventions by cohort of implementing stakeholder

5.2. THE PROVISION OF AFFORDABLE TRANSPORT AND MOBILITY

In all DFID priority countries, more people travel by public and para-transit transport than in private vehicles and satisfying this demand (see Figure 6) received a high priority rating from 62% of respondents as the driver for the choice of transport interventions. The cohorts that gave this the highest priority were Government (82%) and Academic (75%). The Private Sector with a high priority rating by only 42% of participants, is the cohort that least feels this social pressure.

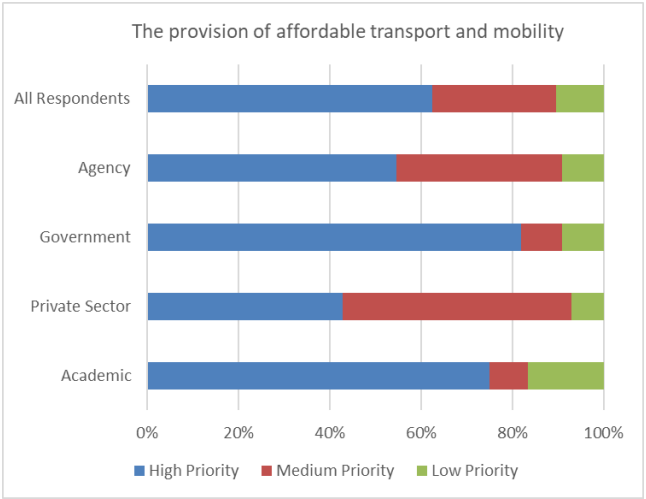

Figure 6 - Priority of affordable transport and mobility as the need or 'problem' driving the choice of transport interventions by cohort of implementing stakeholder

5.3. THE PROVISION OF IMPROVED ACCESS/ACCESSIBILITY

On average, the provision of improved access/accessibility (see Figure 7) received a high priority rating from 40% of respondents as the main driver of the choice of transport interventions. As this typically

involves the building of new infrastructure and infrastructure improvements it is of no surprise that it is seen as the greatest importance by the Private Sector cohort (67% of respondents). However, the response of the Agency cohort, of which 27% gave this a low priority rating, was somewhat surprising given their traditional role of lobbyist/financier for poverty reduction and increase in shared prosperity.

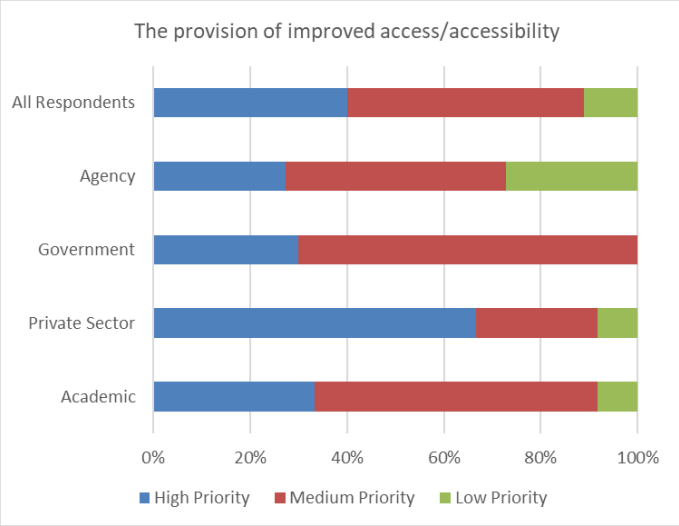

Figure 7 - Priority of the provision of improved access/accessibility as the need or 'problem' driving the choice of transport interventions by cohort of implementing stakeholder

5.4. AIR QUALITY

Improving air quality is not seen as the driver for the choice of transport intervention by any of the cohorts of implementing stakeholder (see Figure 8). In general, it was given a high priority rating by 18% of respondents and a low priority rating by 59%. Improving air quality may be an essential co-benefit of sustainable transport projects, but it is not seen as the main reason for implementing these projects by most stakeholders. Within the DFID priority countries, there are cities with evident and severe air quality problems which could account for the high rating given by the minority of stakeholders.

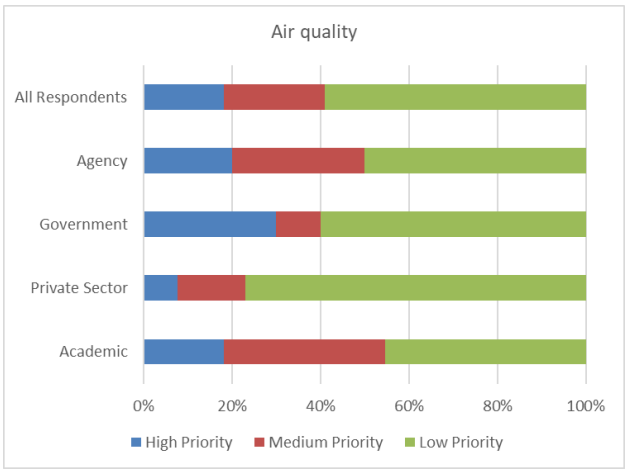

Figure 8 - Priority of air quality as the need or 'problem' driving the choice of transport interventions by cohort of implementing stakeholder

5.5. CLIMATE CHANGE MITIGATION

Climate change mitigation was given a high priority by 11% of all respondents and a low rating by 70% (see Figure 9). No respondent in the Government cohort gave it a high rating as a driver for the choice of transport intervention. Twenty-one per cent of respondents in the Private Sector cohort have it a high rating, but in the same cohort, 71% gave it a low classification. As for improving air quality, climate change mitigation may be an important co-benefit of sustainable transport projects, but it is not seen as a driving reason for implementing these projects.

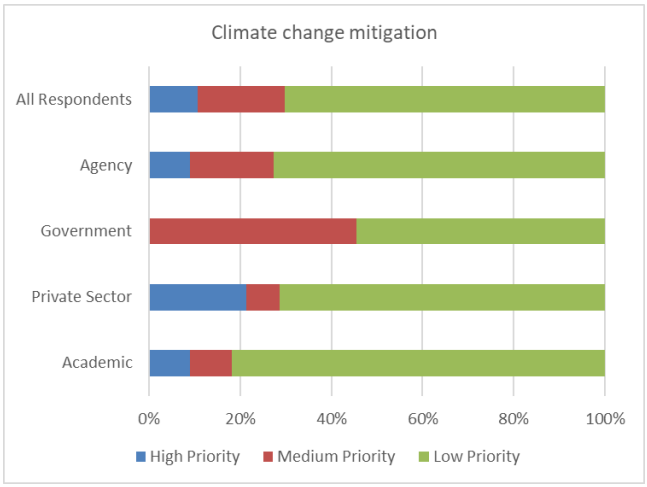

Figure 9 - Priority of climate change mitigation as the need or 'problem' driving the choice of transport interventions by cohort of implementing stakeholder

5.6. REGIONAL TRADE AND MOVEMENT

While improving regional trade and movement received a lower overall high priority rating (95) than mitigating climate change, its medium priority rating was higher at 48% compared with 19% for climate change mitigation (see Figure 10).

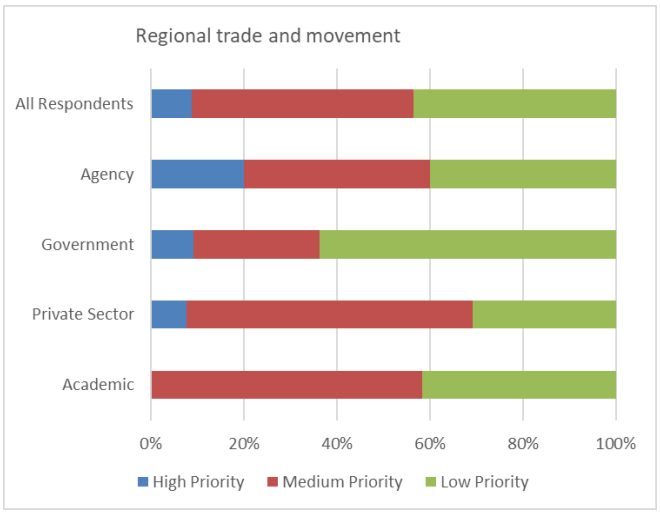

Figure 10 - Priority of regional trade and movement as the need or 'problem' driving the choice of transport interventions by cohort of implementing stakeholder

5.7. Conclusions

The respondents, in general, prioritise transport interventions that address the mechanics of improving transport services for their core constituents:

- the reduction of road congestion
- the provision of affordable transport and mobility
- improving access/accessibility

They do not assign a high priority to air quality, or climate change mitigation as the driver for the choice of transport intervention even though both may be considered as useful co-benefits. Climate change mitigation is not a stated high priority in this limited sample for transport interventions for any level of government.

Regional trade and movement received the lowest “high priority” rating, but its “medium priority” rating put it above air quality and climate change mitigation but far below the three areas of interest of core constituents.

Civil society plays a significant role in this. Changing the priorities dictated by core constituents by building civil society alliances and enhancing capacity and knowledge of civil society actors may be vital in changing the priorities for transport interventions. However, if this comes at the cost of reducing priorities of the transport services, which are generally deficient in all LICs, then the sale may be a difficult one.

Since climate change mitigation is not currently a high priority within the sample at any level of government for transport interventions, and lowest priority as a driver of transport interventions for all other cohorts, the field-work set out to define the obstacles that prevent climate change mitigation receiving higher priority.

6. Barriers and Challenges to low carbon transport solutions

6.1. Funding availability for low carbon transport

So far, finance flow to the transport sector through dedicated climate instruments has been small relative to other sectors such as energy.

6.1.1. Clean Development Mechanism (CDM)

In terms of the Clean Development Mechanism (CDM), of a total of 7632 registered CDM projects[12], only 30 have been transport projects, and of these, half were for Bus Rapid Transit (BRT) and metro projects.

6.1.2. Other carbon funding instruments

Similarly, transport's share of other carbon funding has been small but growing (14). By the end of 2017, there were a total of 237 Nationally Appropriate Mitigation Actions (NAMAs) under development and 22 at the implementation stage[13]. 12% of the NAMAs focus on transport and three transport NAMAs have reached the implementation stage (15). In 2017, 29% of multilateral development bank (MDB)[14] mitigation finance (USD8.116 billion) was for transport (14).

Public sector financing, while an important catalyst for these developments, would not be enough to meet these mobility requirements. Using limited public funding and international climate finance to incentivise the right choices in transport and crowd-in finance from the private sector would be necessary to change these growth patterns in the future positively. International donor and climate financing, together with public-private partnerships (PPP), have been identified as essential to incentivise different choices in transport provision and to shift growth patterns (16).

Private sector investment is scaling up but primarily in developed countries. In low-income countries, private sector investment in transport represents around 30% of the total, so current leverage is low. In 2010, private-sector investment represented 58% of the **total global transport investment** (mean value estimate of USD 1.015 trillion), or approximately USD 589 billion. Private-sector investments in transport were distributed by sub-sector as follows: (i) roads, about 50%; (ii) rail/metro, about 22%; (iii) airports 19%; and (iv) ports 9%. Private-sector investment **commitments in developing countries** totalled USD 71.5 billion across 242 projects in all sectors. Transport represented 36% of these investments (USD 44 billion). Transport represented about 29% of the estimated mean private investment in 2010 in low-middle income countries, excluding China. In Africa in 2016, the non-public-sector investment in transport accounted for 20% of total investment. Moreover, for example in India and China, transport

[12] https://cdm.unfccc.int/Projects/index.html

[13] NAMAs refer to any action that reduces emissions in developing countries and is prepared under the umbrella of a national governmental initiative. They can be policies directed at transformational change within an economic sector, or actions across sectors for a broader national focus. NAMAs are supported and enabled by technology, financing, and capacity-building and are aimed at achieving a reduction in emissions relative to 'business as usual' emissions in 2020 (source: UNFCCC)

[14] A multilateral development bank (MDB) is an international financial institution chartered by two or more countries for the purpose of encouraging economic development in poorer nations (Source: https://www.investopedia.com)

infrastructure (including roads, railways, airports, and seaports) in 2011, accounted for more than 30% of total private infrastructure investment (17).

In the expert interviews and workshop, many respondents commented that once the government has committed to implementing a project, they can usually assign enough funding to be able to bring it to a conclusion. However, it could well be that the converse is true; that the government only commits to implement projects for which there is enough funding available and that higher investment project options (that may include low carbon alternatives) do not get funded.

6.2. Level of Ambition

Since climate change mitigation rated so low among the drivers for transport interventions, all respondents were asked for their definition of a low carbon transport intervention to determine their level of ambition.

The common theme among many respondents that are involved in implementing projects was that any alternative form of transport that emitted less carbon than the business-as-usual option should be considered as "low carbon".

Respondents did not assign any minimum reduction of GHG emissions to this classification: *Low carbon transport is that transport solution that emits less GHG emissions than the baseline (BAU) alternative, independent of the reduction that is being achieved.*

This is in line with the concept of "low-carbon development" (18), in which national or local development priorities are the starting point, and when these can be realised in a way that reduces emissions below BAU (or does not emit GHGs), can be called low-carbon development.

Although reaching a 1.5 Degree Scenario requires global transport emissions to be 80-90% below BAU in 2050, the global and country pathways to reach this target are not established. However, participants recognised various interventions as categorised under the 'Avoid-Shift-Improve' framework:

'Avoid' interventions:

- Reducing demand for motorised passenger trips/freight loads; reducing trip length through increased density and improved access to essential services and opportunities

'Shift' interventions:

- Shifting trips or loads from current transport mode to another that offers lower GHG emissions per person/km or freight/ton/km transported.

'Improve' interventions:

- Fuel and technology changes to current transport modes that reduce the implicit emissions per vehicle km, such as cleaner fuels, greener technology, engine and driving

The Academic cohort tended to acknowledge more the importance of including walking and cycling as low carbon, high volume modes and suggested a greater focus on spatial urban form, efficient cities, and

transit-oriented development. This cohort also raised an issue concerning the need to evaluate the full life-cycle emissions in the definition (including manufacturing the transport asset and disposing of it at the end of its useful life) particularly for public transit vehicles at low occupancies. Other cohorts did not have this concern, considering that manufacturing and end-of-life emissions are often small compared to in-use emissions.

Somewhat unfortunately, the definition "low carbon transport will emit less carbon than in the business-as-usual (BAU) scenario" makes it easy for stakeholders to claim that projects are low carbon even when these are far from what would be needed to achieve any international climate goal.

This definition, combined with the general lack of interest in implementing low carbon solutions in the studied countries, is in contrast to the high level of ambition expressed in the EU and similar economies. The EU has started the transition towards a climate neutral Europe by 2050 (10) and has a defined vision that "All transport modes should contribute to the decarbonisation of our mobility system. The goal is to reach net-zero emissions by 2050".

6.3. Other barriers and challenges to low carbon transport solutions

Consistent messages have come out of the four primary research channels: while many project countries have implemented low carbon transport solutions, this has happened principally as a co-benefit of policies or projects that aim to solve other transport needs rather than to reduce carbon emissions.

The view of most of the respondents involved in implementing transport solutions (both political decision-makers and private sector entities), while transport is a basic need, making it low carbon transport is not. Many of the political decision-makers consulted highlighted the increased political risk involved in supporting activities such as low carbon transport which has limited kudos with their electorate (despite interest from national-level ministries, NGOs and the international community). This was clear in the expert interviews. This hesitancy is often driven by limited knowledge and experience of this area among them and their staff[15].

Figure 11 shows, according to the respondents, the top challenges (or barriers) to the implementation of low carbon transport interventions.

[15] See discussion of results below

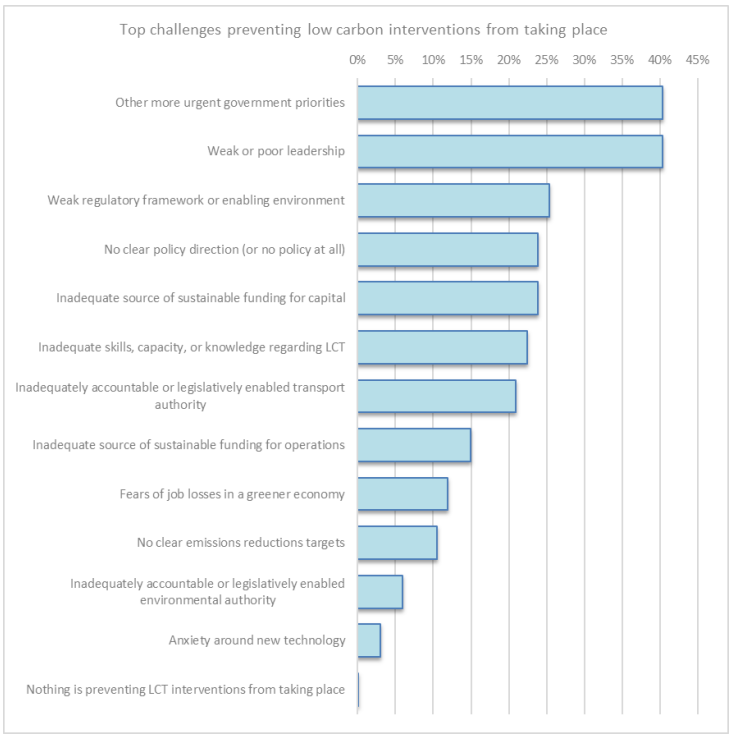

Figure 11- Needs or 'problems' that challenge the implementation of low carbon transport interventions

6.3.1. Other more urgent government priorities

The number one challenge according to 40% of the respondents is the existence of more urgent government priorities. Figure 12 shows that this is felt by all cohorts, with a lower impact on the Private Sector. This may be because the Private Sector mainly gets involved once projects have been prioritised.

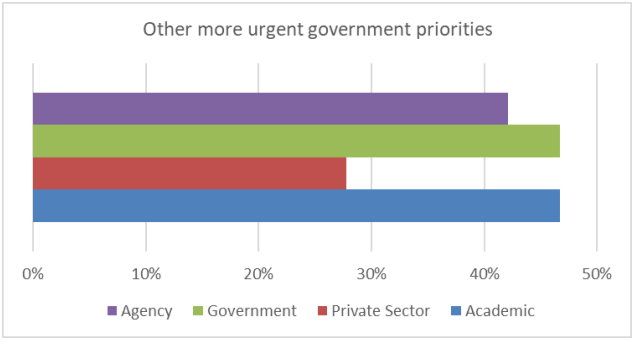

Figure 12 - Challenge of other more urgent government priorities

6.3.2. Weak or poor (political) leadership

In second place is weak or poor political leadership, mentioned by 40% of respondents. This barrier is felt most by Private Sector (50% of respondents)) and Agency (42%) cohorts but is also recognised as a problem by 30% of Government respondents (see Figure 13).

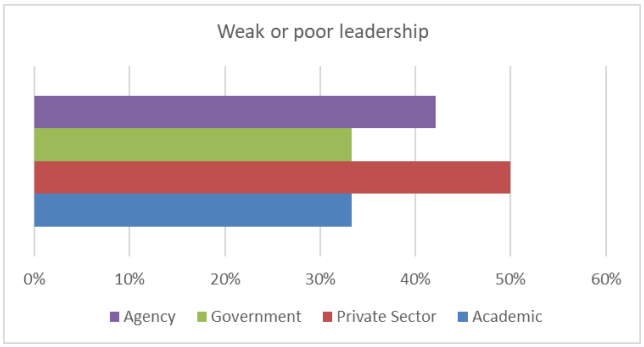

Figure 13 - Challenge of weak or poor political leadership

6.3.3. Weak regulatory framework or enabling environment

Weak regulatory framework or enabling environment was cited by 25% of respondents as a leading challenge. Here, the cohorts are divided into two groups; the Agency and Government (unsurprisingly) see this as being less of a barrier while for Private Sector and Academic it was cited as the main challenge by over 33% of respondents (see Figure 14).

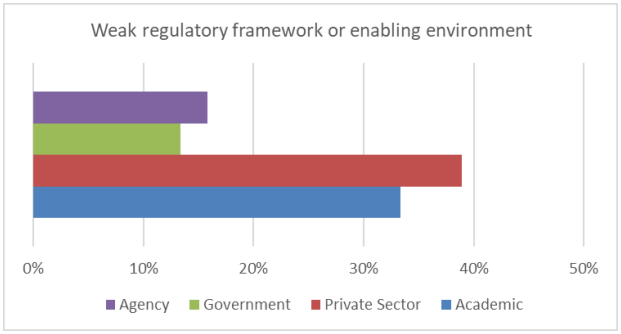

Figure 14 - Challenge of Weak regulatory framework or enabling environment

6.3.4. No clear policy direction (or no policy at all)

The lack of a clear policy that promotes low carbon development is seen as a significant challenge by 24% of the respondents, particularly by the Private Sector (39%). However, only 7% of the Academic cohort see this as a problem mainly because research is predominantly upstream of policy definition (see Figure 15).

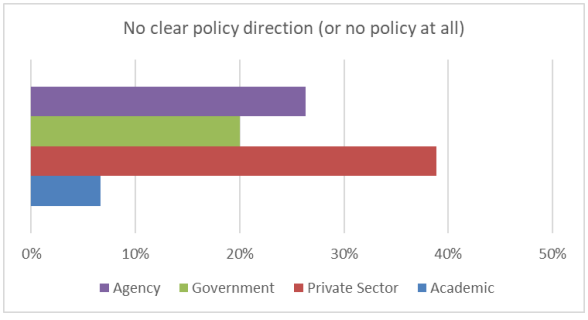

Figure 15 - Challenge of no clear policy direction (or no policy at all)

6.3.5. Inadequate source of sustainable funding for capital

Overall, 24% of respondents consider that inadequate source of sustainable funding for capital a major challenge for the implementation of low carbon projects. This impacts less the Private Sector because often their involvement happens after funding has been allocated (see Figure 16).

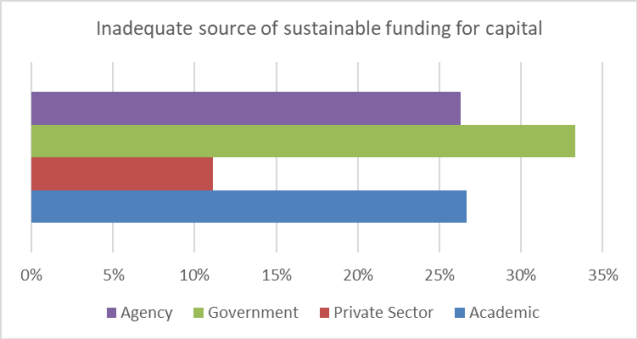

Figure 16 - Challenge of Inadequate source of sustainable funding for capital

6.3.6. Inadequate skills, capacity, or knowledge regarding LCT

Inadequate skills, capacity, or knowledge regarding LCT was cited by 22% of all respondents as a significant barrier to the implementation of low carbon projects. This problem was cited as critical by 40% of local government respondents (not shown on graph); however, when combined with regional, provincial and national government respondents the average for the cohort drops to 13% (see Figure 17).

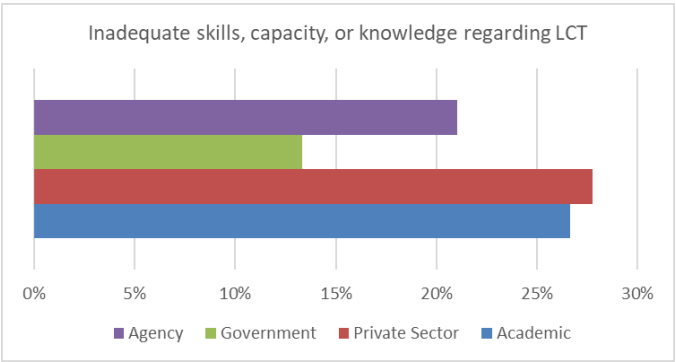

Figure 17 - Challenge of inadequate skills, capacity, or knowledge regarding LCT

6.3.7. Inadequately accountable or legislatively enabled transport authority

Twenty-one per cent of respondents stated that one of the major challenges to implementing low carbon transport is the lack of legal responsibility and accountability of the transport authority. Inadequately accountable or legislatively enabled transport authority was cited by 33% of respondents from both Government and the Private Sector (see Figure 18).

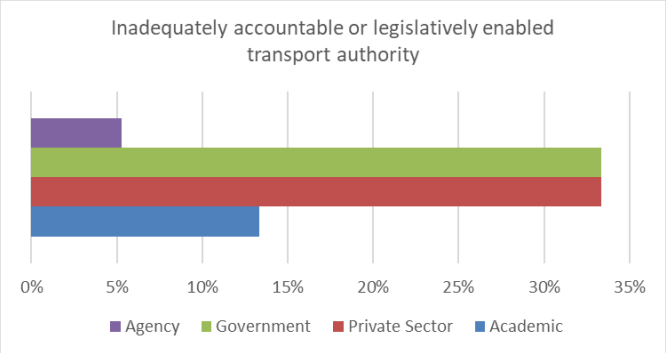

Figure 18 - Challenge of inadequately accountable or legislatively enabled transport authority

6.3.8. INADEQUATE SOURCE OF SUSTAINABLE FUNDING FOR OPERATIONS

Several respondents made a clear distinction between the availability of funding for investment (see section 6.3.5) and for operations. They made the case that international funding agencies, will if the case is made adequately, fund the additional investment cost for the construction of a low carbon project (for example a Metro) but then leave the local authority with the responsibility of covering all additional operating costs. Inadequate source of sustainable funding for operations was rated as a critical challenge by 15% of all respondents, with Academic giving twice the importance to this than Agency (20% vs 11%) and higher than Government and Private Sector cohorts(see Figure 19).

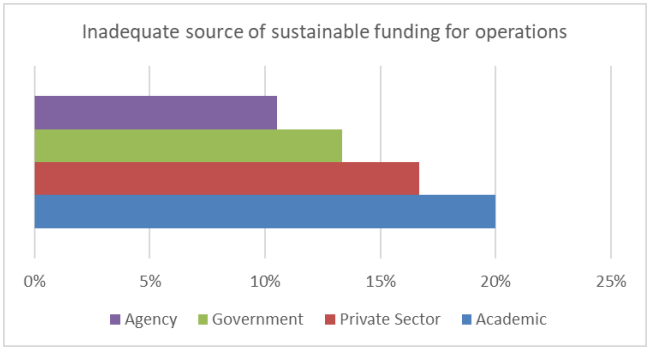

Figure 19 - Challenge of Inadequate source of sustainable funding for operations

6.3.9. FEARS OF JOB LOSSES IN A GREENER ECONOMY

Fears of job losses in a greener economy were cited by 12% of all respondents as a challenge in the implementation of low carbon transport projects. Interestingly, this concern was mentioned by the Agency and Academic cohorts; it was not mentioned by Government and only to a lesser degree by the Private Sector (see Figure 20).

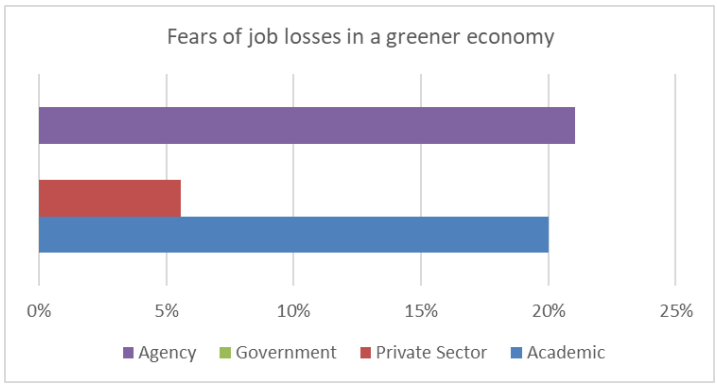

Figure 20 - Challenge of fears of job losses in a greener economy

6.3.10. NO CLEAR EMISSIONS REDUCTIONS TARGETS

Thirteen per cent of the respondents in the Academic and Government cohorts (and a lesser percentage in the other groups) mentioned that not having a clear emissions reduction target was a critical barrier to the implementation of low carbon transport projects (see Figure 21). If low carbon-transport solutions are not being demanded by the users (although they may recognise this as an interesting co-benefit) and there are no clear targets that the community (country or city) needs to meet, then it is more challenging to promote low carbon transport options.

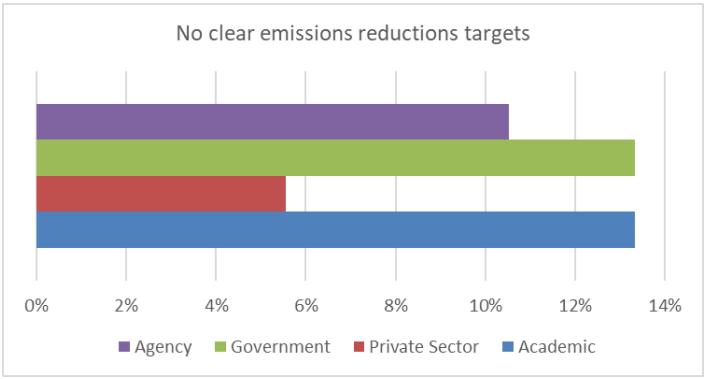

Figure 21 - Challenge of no clear emissions reduction targets

6.3.11. INADEQUATELY ACCOUNTABLE OR LEGISLATIVELY ENABLED ENVIRONMENTAL AUTHORITY

Related to the previous point, some respondents cited the problem as being caused by the environmental authority not having enough power or responsibility to enact low carbon standards or goals (see Figure 22). This was particularly seen as a challenge by the Academic cohort (13% of respondents).

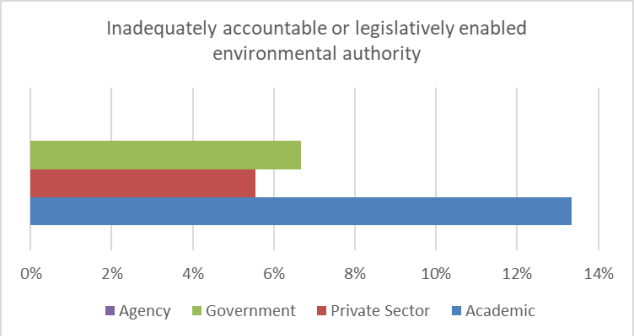

Figure 22- Challenge of an Inadequately accountable or legislatively enabled environmental authority

6.3.12. ANXIETY AROUND NEW TECHNOLOGY

Some respondents in the Agency and Government cohorts mentioned as a challenge anxiety around the adoption of new technology. Part of this is the political anxiety of adopting a measure that is not widely in use and could fail. This was more of a challenge to adoption than the technical challenge of using new technology (see Figure 23). While this is not shown on the graph, this opinion was expressed as a key issue among African respondents, but less so among Asian respondents.

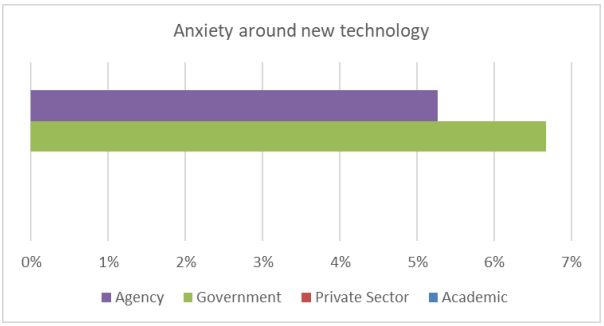

Figure 23 - Challenge of anxiety around new technology

6.4. CONCLUSIONS

In general, the responses demonstrate how low carbon is not a priority for transport interventions and because of this, funding is lacking, regulations and applicable legislation are not in place, and there is often no clear policy that promotes low carbon transport.

Specific barriers to accelerated implementation of low carbon transport interventions are illustrated in the preceding sections which include the existence of other more urgent government priorities, followed by weak or poor political leadership, weak regulatory framework for enabling environment, and a lack of clear policy direction towards lowering the carbon intensity of this sector.

The issues of liveable cities, air quality and its impact on health were also considered important by respondents in larger cities where urban degradation is visible. Local-level authorities see that promotion of cleaner, lower carbon transport—*if framed as pollution reduction*—could be a possible 'win' among voters and end-users.

A significant observation is that nearly all the challenges (or barriers) mentioned by the respondents are related to process: *how* to implement low carbon high volume transport. Only the last item in the list of priorities is related to the low carbon technology and products themselves: i.e. *what* to implement. It is observed that only 3% of respondents had anxiety or concerns about *what* they could implement to move towards low carbon transport; all the other concerns were about *how* to go about it.

To address these challenges, the respondents were asked to define the additional knowledge or assistance that they consider would be needed to overcome barriers to accelerated implementation of low carbon transport.

7. Knowledge Gaps and Knowledge Exchange

7.1. What are the gaps

Within the same field studies, respondents were asked to rate the five most important areas of knowledge exchange that they believe the country and institutions need about LC-HVT (see Figure 24).

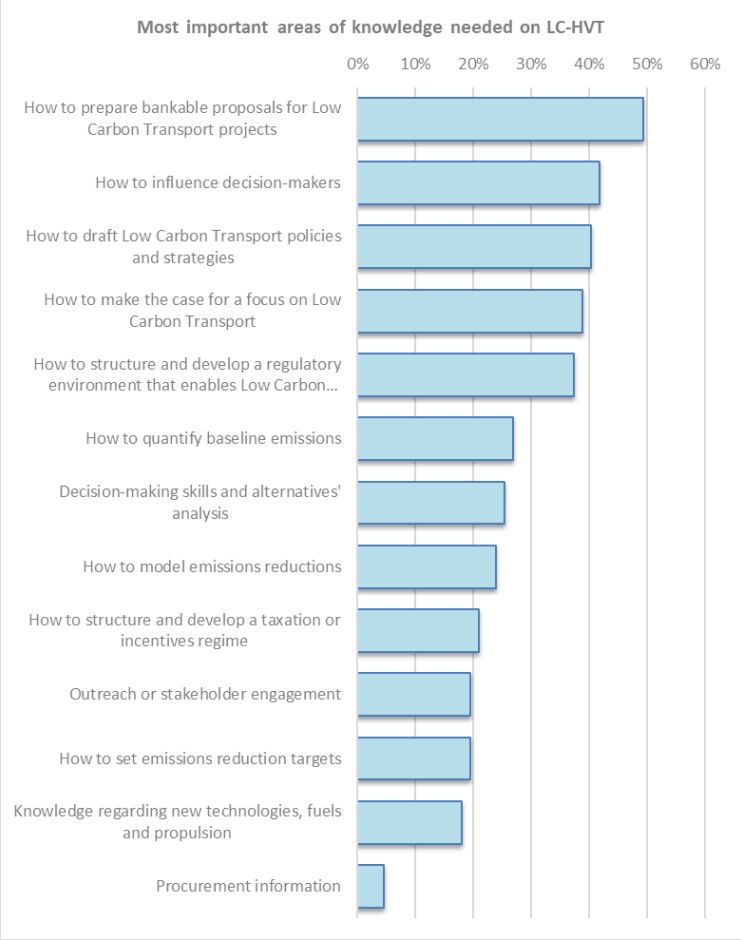

Figure 24 - Most important areas of knowledge the country/institution/organisation needs regarding LC-HVT

The primary knowledge needed can be divided into three groups:

- General process knowledge (see Table 2)
- Technical process knowledge needed about how to implement low carbon transport solutions (see Table 3)
- Technical knowledge needed about what to implement (see Table 4).

While there could be room for discussion as to whether any specific theme fits better in Table 2 or Table 3, there is a clear and robust stated preference for knowledge and support on process related themes--***how*** to implement LC HVT—rather than on ***what*** technology and products to implement (see Table 4).

Table 2 - General process knowledge that the country/institution/organisation needs regarding LC-HVT

General process knowledge	% of all respondents
How to influence decision-makers	42%
How to draft Low Carbon Transport policies and strategies	40%
How to make a case for a focus on Low Carbon Transport	39%
How to structure and develop a regulatory environment that enables Low Carbon Transport	37%
Decision-making skills and alternatives' analysis	25%
How to structure and develop a taxation or incentives regime	21%
Outreach or stakeholder engagement	19%

Table 3 - Technical process knowledge needed about how to implement low carbon solutions that the country/institution/organisation needs

Technical process knowledge needed about how to implement low carbon transport solutions	% of all respondents
How to prepare bankable proposals for Low Carbon Transport projects	49%
How to quantify baseline emissions	27%
How to model emissions reductions	24%
How to set emissions reduction targets	19%
Procurement information	4%

Table 4 - Technical knowledge needed about what to implement that the country/institution/organisation needs regarding LC-HVT

Technical knowledge needed about what to implement	% of all respondents
Knowledge regarding new technologies, fuels and propulsion	18%

7.2. WHO SHOULD BE THE RECIPIENTS OF THIS KNOWLEDGE EXCHANGE?

This need for knowledge is demanded across the four types of stakeholders. The following figures examine the specific needs of different levels of government.

7.2.1. General process knowledge needed about how to implement low carbon solutions that the country/institution/organisation needs.

The general process knowledge theme investigated knowledge exchange needs in seven groups (see Figure 25):

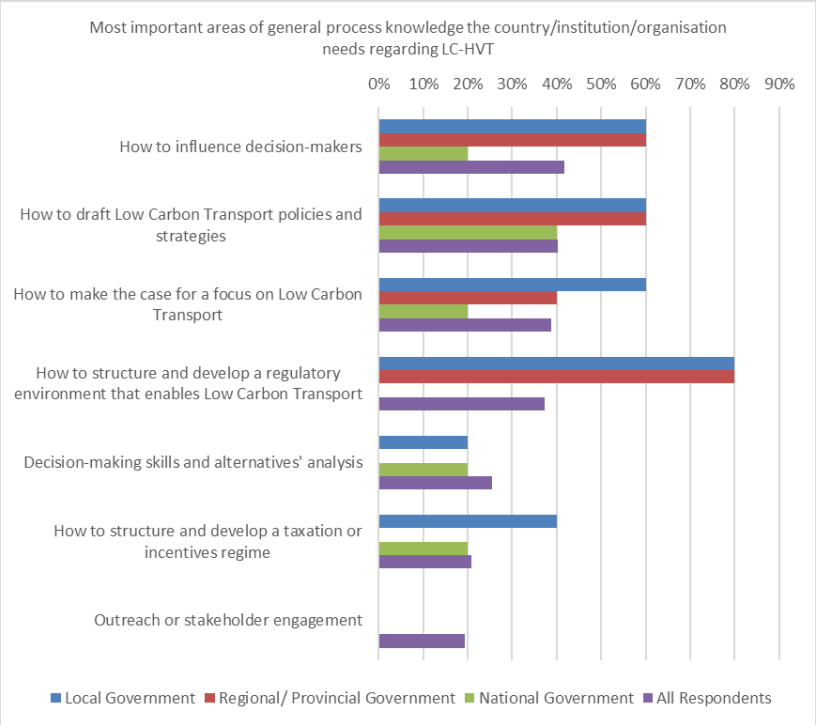

Figure 25 - General process knowledge the country/institution/organisation needs regarding LC-HVT

7.2.1.1. How to influence decision-makers

Forty-two per cent of all respondents considered that "how to influence decision-makers" is an important area of knowledge exchange that is needed to be able to accelerate the implementation of low carbon transport projects. However, this need is felt greater in local government and regional government (by 60% of respondents in each category) which are the areas that are directly involved in implementing projects and transport policies. They believe that there would be a demand for low carbon interventions if they were able to convince the decision-makers that need to authorise and assign resources to the project.

7.2.1.2. How to draft Low Carbon Transport policies and strategies

While 40 % of respondents highlighted the need for knowledge exchange in this area, 60 per cent of both local government and regional government respondents stressed its importance in accelerating the implementation of low carbon transport projects. Since "low carbon" is not a main driver for transport interventions, they often do not have practical experience in this area of expertise and need assistance in its development.

7.2.1.3. How to make a case for a focus on Low Carbon Transport

Similar to the previous case, 39 % of all respondents highlighted the need for knowledge exchange in the area of low carbon transport, and 60 per cent of local government stressed its importance. Regional government saw this as being less important than the previous case, but still, 40% highlighted it as being critical.

7.2.1.4. How to structure and develop a regulatory environment that enables Low Carbon Transport

This theme, although slightly less critical in general, was the area where local government and regional government saw the need for capacity building and assistance (by 80% of respondents in each category).

7.2.1.5. Decision-making skills and alternatives' analysis

This was seen by all respondents as less important and interesting. Overall, 25% of respondents highlighted this need and only 20% of local and national government respondents. No regional government respondent saw this as critical. This was surprising since it could be interpreted to indicate that the influence on decision-makers (7.2.1.1) is not dependant on strong analysis of alternatives, probably because the low carbon aspect of transport is seen as a co-benefit which is not monetised in the analysis. Hence it must be promoted to decision makers on a qualitative basis, and not quantitively.

7.2.1.6. How to structure and develop a taxation or incentives regime

Forty per cent of local authority respondents see the need for knowledge exchange in the area of how to structure and develop a taxation or incentives regime, far more than National government and respondents in general (20%). No regional government respondent saw this as critical. For local government this relates to the previous question. Since low carbon transport is often seen as a more expensive option where the cost increase is difficult to monetise, those that would like to implement LC projects have to consider developing a taxation or incentives regime to offset this cost difference.

7.2.1.7. Outreach or stakeholder engagement

Outreach and stakeholder engagement were not mentioned by any level of government. They are not used to having to promote transport options through user groups and social channels and as we will see in later sections of this document, do not realise how critical social outreach can be, and the skill sets needed to accomplish this effectively. Overall 19% of respondents highlighted this as a critical need.

7.2.2. Technical process knowledge needed about how to implement low carbon solutions that the country/institution/organisation needs.

The technical process knowledge theme investigated knowledge exchange needs in five groups (see Figure 26): These involve more technical skills related to the process of implementing low carbon transport solutions.

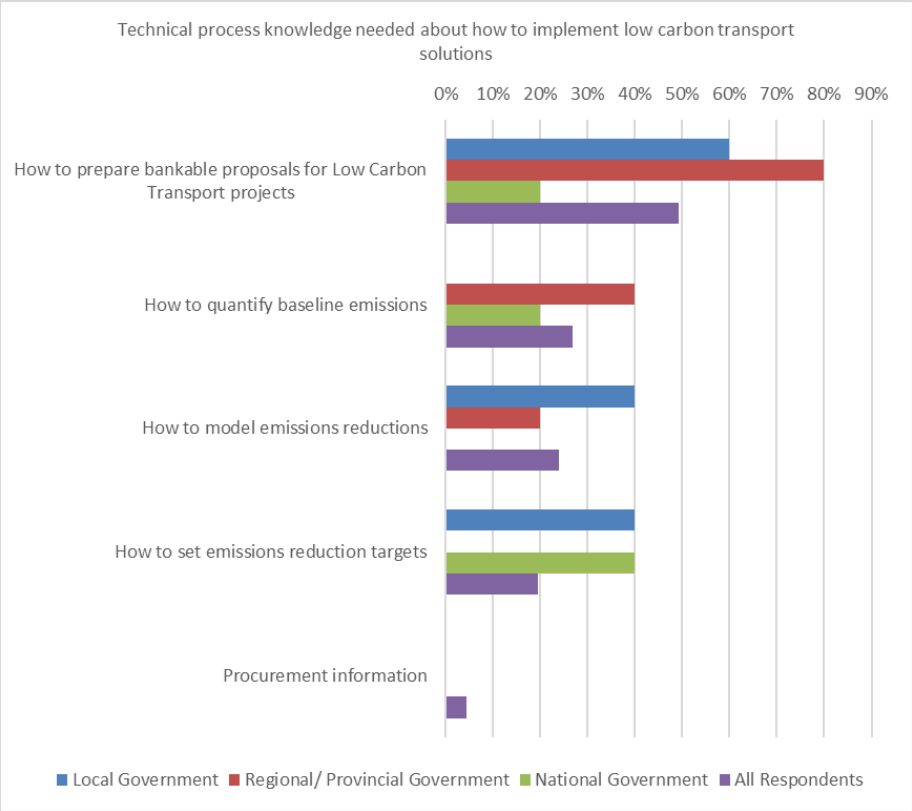

Figure 26 – Technical process knowledge the country/institution/organisation needs regarding LC-HVT

7.2.2.1. How to prepare bankable proposals for Low Carbon Transport projects

Most authorities would require access to private financing for the transition to low carbon transport. This requires developing a proposal or contract that the private investor (or operator) could use to secure funding. Many have not done this before, and consequently, 80% of regional government respondents and 60% of local government respondents identified the critical need for knowledge exchange in this area. For national government respondents, only 20% identified this need. The average across all respondents was 49%.

7.2.2.2. How to quantify baseline emissions

A sub-group of respondents had encountered the complexity of applying for climate finance for low carbon projects. As opposed to other possible funding sources, climate finance needs to identify in the project information, potential climate change mitigation impact. This involves calculating the with-project GHG emissions and comparing them to a counter-factual baseline in which the project is not implemented. Quantifying these ex-ante baseline emissions can be complex and 27% of all respondents identified this as a critical need for knowledge exchange. Among the different levels of government, 40% of respondents from regional and 20% from national identified this need. Somewhat surprisingly no local government respondent identified this need, perhaps because they have yet to be involved in low carbon interventions driven, and partially funded, by low carbon interests.

7.2.2.3. How to model emissions reductions

A similar theme "how to model emissions reductions" was identified as critical by 40% of local government respondents and 20% of respondent from regional government, reinforcing the need for knowledge exchange on this technical subject that forms part of any successful submissions of low carbon projects.

7.2.2.4. How to set emissions reduction targets

As many of DFID priority countries at national and sub-national levels have yet to internalise credible long-term emissions reduction targets from transport, respondents at the national and local levels (40% of respondents from each level) identified the critical need for capacity building on this theme. Regional government respondents were missing in the identification of this need, probably because most developing countries (with India being an exception) have not gone through the process of quantifying regional emissions goals.

7.2.2.5. Procurement information

Procurement information for low carbon solutions was identified as a critical training need by 4% of respondents including 11% of those from the private sector(see Figure 26). How to procure low carbon transport interventions were not mentioned as a critical need by any level of government.

7.2.3. Technical knowledge needed about what to implement for low carbon solutions that the country/institution/organisation needs.

Within this theme, only one topic was highlighted as important (see Figure 27).

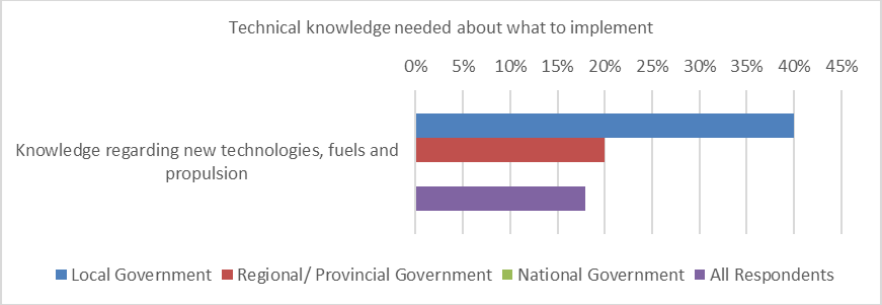

Figure 27 - Technical knowledge needed about what to implement

7.2.3.1. Knowledge regarding new technologies, fuels and propulsion

Eighteen per cent of all respondents mentioned their need to know more about new technologies, fuels and propulsion. This was split between local government (40% of respondents) and regional government (20%). Note that in Figure 27, 27% of Academic, 11% of Private Sector and 16% of Agency respondents expressed similar desires. For most levels of government, one of the main sources of information is the private sector (suppliers, consultants and practitioners).

7.3. Conclusions

In general, the responses from the primary research illustrate how stakeholders do not see low carbon as a priority. As a result, they lack the tacit knowledge and experience that involvement in such projects would generate. Due to this, most of the themes identified as critical, and in need of knowledge exchange to be able to accelerate low carbon interventions, are to compensate and supplant this lack of hands-on experience.

The majority of the capacity building needs identified by the respondents are process related, concerning how to implement LC- HVT. Some of these needs are technical. The following ten identified are listed below with the more technically-focused needs at the end of the list:

1. How to provide infrastructure for electric vehicles
2. How to structure an effective interaction among stakeholder institutions for low carbon transport
3. How to strengthen the political leadership and resolve, and clear policy direction
4. How to draft Low Carbon Transport policies and strategies
5. How to implement private-public partnerships (PPP) for low carbon transport
6. How to structure and develop a taxation or incentive regime for low carbon transport
7. How to regulate and promote dockless bike/e-bike/ e-scooter sharing schemes
8. How to set GHG and local pollutant emissions reduction targets
9. How to demonstrate cost savings to the business community
10. How to perform a cost-benefit or multi-criteria analysis over the life of low carbon vehicles.

Only one item on their list of priorities was related to the low carbon technology and products themselves: i.e. *what* to implement.

8. DEFINITION OF KNOWLEDGE NEEDS OF PUBLIC AND PRIVATE SECTOR PROJECT IMPLEMENTERS IN DFID PRIORITY COUNTRIES

8.1. METHODOLOGY AND SAMPLE SIZE

To gain insights into the capacity building needs that could accelerate the implementation of LC-HVT, additional primary research was conducted.

New topics were formulated and sent out to all participants in the primary research for this project (i.e. stakeholder survey, expert interviews and workshop). Also, the topics were sent to over 750 participants in Asia who had completed SUTP/GIZ courses on sustainable transport. The capacity building workshop participants also discussed the topics.[16] A total of 28 topics critical to the acceleration of low carbon transport were selected. Enhancing knowledge in these areas could facilitate the implementation of climate-friendly projects and policies.

In addition, a total of 37 practitioners provided further details on perceived knowledge exchange needs (see Annex 4). Figure 28 shows its distribution by stakeholder. These responses took the form of an email survey that followed-up with a discussion with each participant. The responses of all those that agreed to provide information were included in the analysis. The sample size precluded classifying responses from each type of stakeholder by type of on-road transport activity (freight, urban and inter-urban passenger transport).

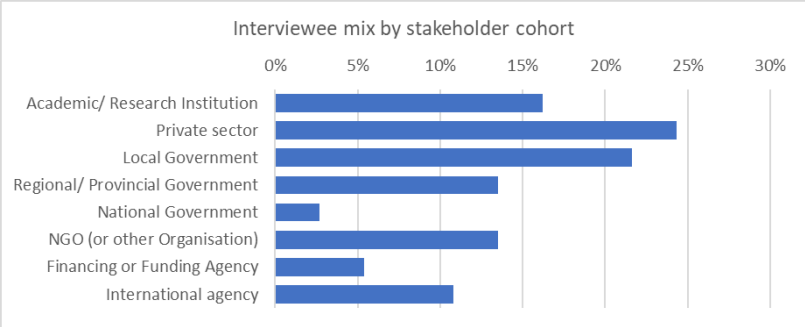

Figure 28 - Mixture or respondents in follow-up discussion

In the questionnaire, they were asked to give their opinion on which institutions would most benefit from information and guidance in each of the six thematic areas. This provides a proxy for assessing the capacity of institutions in the area of low carbon transport development and implementation. It also suggests areas of opportunity for capacity building,

[16] Capacity-Building Workshop: On 2 October 2018, a Workshop on Capacity Building Strategy for the Implementation of LC-HVT in South Asia was organised under this project to obtain input from relevant national and local stakeholders on the needs and barriers in capacity building for implementing LC-HVT in the region. The workshop was a pre-event to the Eleventh Intergovernmental Regional Environmentally Sustainable Transport (EST) Forum in Asia, hosted by the United Nations Centre for Regional Development.

For the sake of clarity, responses on which institutions would most benefit from knowledge exchange on each theme were divided into four categories (see Table 5)

Table 5 - Response classification of institutions that would most benefit from knowledge exchange on each theme

#	Responses
NA	Additional guidance is not needed. They stated that they know how to do this, or where to find the information they require, without additional assistance
National	National level ministries and transport authorities need information and guidance on this topic/theme
Local	Local and regional (provincial) government and transport authorities need information and guidance on this topic/theme
Other	Other organisations or stakeholders need information and guidance on this topic/theme

A literature search focusing on the same thematic areas was undertaken to identify publicly available information that could be useful for practitioners.

The literature search was for global knowledge and guidance, relevant to the selected countries, on each selected theme using public search engines such as Google and Google Scholar. Knowledge and guidance were found in web pages, reports from journals, other peer-reviewed and grey-source material.

It is important to note that many extracted references were not accessible to read or download free of charge for the independent practitioner due to journals' paywall policies. However, it was considered that many in the target audience, if sufficiently motivated, would be able to find a way of accessing the document, through universities or other institutions, so this was not a motive for excluding them from the attached reference bibliography.

Addressing knowledge need and knowledge availability provided insights on the importance of capacity building and knowledge exchange in each thematic area (see Table 6.).

Table 6 - Themes for perceived needs for knowledge exchange.

#	Theme
1	Transport Finance
2	Implementation of low carbon projects or interventions
3	Institutional Capacity
4	Transport Policies and Strategies
5	GHG Analysis, Monitoring and Reporting
6	Regulation (principally local or regional)
	Other topics

8.2. Perceived relative importance of knowledge exchange in each of the selected thematic areas

Figure 29 shows the perceived relative importance of knowledge exchange in each of the selected six themes. All six are of critical importance, with the highest rated (transport finance) being voted as

necessary by 95% of all respondents and the lowest (local or regional regulations) being voted as important by 92% of all respondents[17].

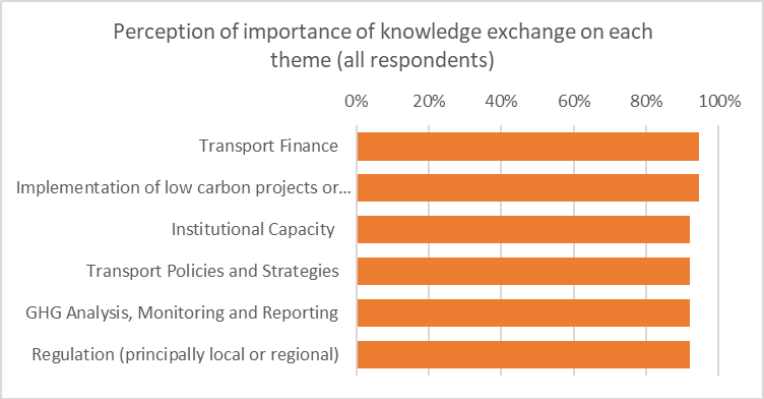

Figure 29 - The perceived importance of knowledge exchange in each of the selected six themes

8.3. Transport Finance

8.3.1. Perceived need for knowledge exchange

Ninety-five per cent of all respondents highlighted one or more topics in the theme of transport finance as being a critical need for knowledge exchange in their zone of influence for the adoption of low carbon transport to be accelerated (see Figure 30).

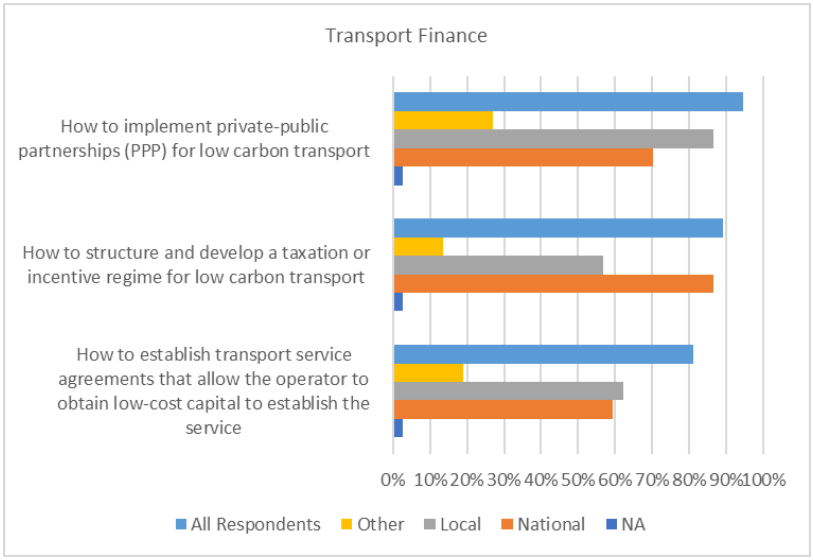

Figure 30 - Perceived need for knowledge exchange concerning transport finance

Note: Others include:

[17] The percentages are calculated on the number of total respondents that have indicated any of the topics in each theme as important

Topic 1: Transport operators, private financing sources.
Topic 2: Business, industry, civil society, NGOs, ministry of finance.
Topic 3: Affected communities, Private Sector, Industry, Private financing sources, Transport operators, General Public and associations.

Ninety-five per cent of all respondents considers that having better information and guidance on **how to implement private-public partnerships (PPP)** for low carbon transport is critical to its accelerated development (as seen in Figure 30). They have different criteria, though, on who should receive it, split between local and regional (provincial) government and transport authorities (86%) and national level ministries and transport authorities (70%).

How to structure and develop a taxation or incentive regime for low carbon transport is seen to be a critical need by 89% of all respondents. This is most important at the national level (86%) but also with specific needs, for 57% of the respondents at the local or provincial level.

How to establish transport service agreements that allow the operator to obtain low-cost capital to establish the service was considered a critical recipient for knowledge and guidance by 81% of all respondents, split similarly between national and local levels (59% and 62% respectively).

All three topics could be complicated for someone that has not done them before. All three require explicit technical and practical tacit knowledge for the practitioners, or if this is lacking, could benefit from documents, contracts and policies that have been negotiated for other projects to be used as templates, complemented by mentoring from someone who has formed the needed knowledge.

8.3.2. INTERNATIONALLY AVAILABLE SOURCES OF KNOWLEDGE

There are few reports or articles in the literature on these topics that provide a useful guide to a practitioner in developing countries.

A good overview of the challenges in overcoming funding gaps, financing and the role of climate finance for sustainable low carbon transport (19) help national policymakers understand how International climate finance and official development assistance could be used effectively to achieve sustainable, low carbon transport on a scale sufficient to mitigate climate change.

There are several documents (20)(21)(22)(23) (24) that explain how MDBs and other international funding sources are scaling up financing to help develop sustainable transport. However, many participants do not have papers that are easily discoverable that document what lending they have available and how to access.

For transport operators, there is some guidance for developed countries (25) (26) but not much that applies to priority developing countries.

Taxes and Feebates are discussed in the countries that have applied them, such as the UK (27). The discussion explores which type of vehicle taxation is most effective in accelerating the transition in fuel, technology and purchasing behaviour with:

i. Most tailpipe and life-cycle greenhouse gas emissions savings;
ii. Potential revenue neutrality for the Treasury; and
iii. Minimal adverse effects on car ownership and use.

There are many papers about the fiscal measures that can be applied (28) and their effect on fleet average fuel efficiency. The barriers to the introduction of electric vehicles receive good attention (6).

Recently, the OECD (29) has suggested the need to seek private investment to accelerate the implementation of low-carbon, climate-resilient infrastructure. One of the options explored was the use of Design, Build, Finance, Maintain and Operate contracts. Experience of these forms of Public-Private Partnerships is diverse, making government sustainability policies dependent upon potentially risky practices.

8.4. Implementation of low carbon projects or interventions

8.4.1. Perceived need for knowledge exchange

Ninety-five per cent of all respondents highlighted one or more topics in the theme of how to implement low carbon projects or interventions as being an essential need for knowledge exchange in their zone of influence to increase the adoption of low carbon transport (see Figure 31).

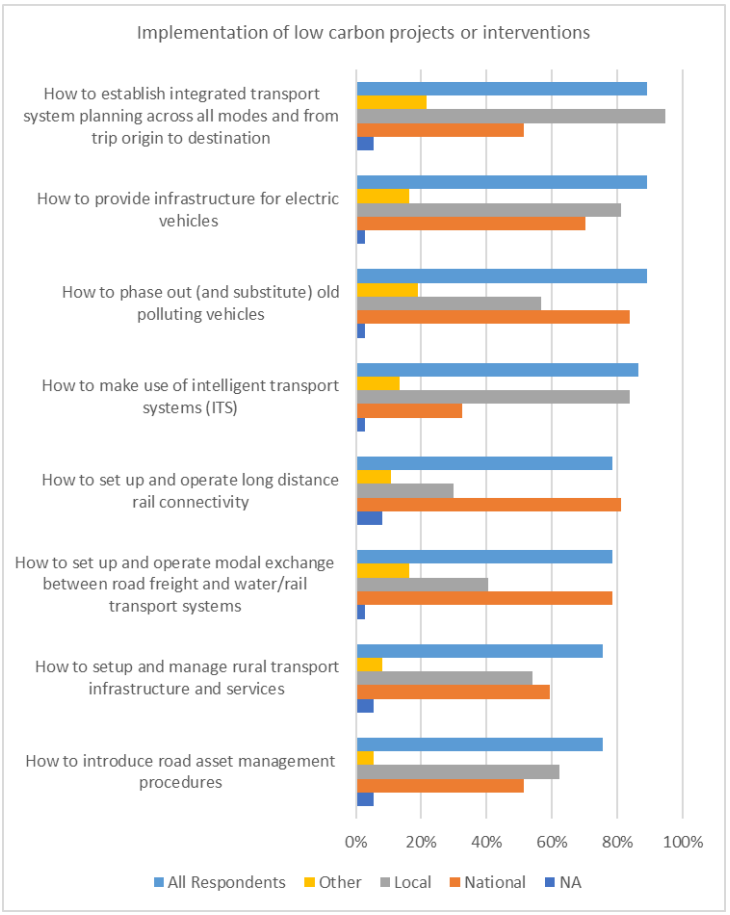

Figure 31 - Perceived need for knowledge exchange concerning the implementation of low carbon projects or interventions

Note: Others include:

Topic 1: International agencies, spatial planners, economists, civil society, NGOs, private sector, consultants, business; transport operators, universities and entrepreneurs.
Topic 2: Unions, syndicates related to transport services, industry, transport operators, private equipment providers for ITS.
Topic 3: Transport sector
Topic 4: Industry, transport sector
Topic 5: Private sector, business; transport operators; civil society, NGOs
Topic 6: Unions, syndicates related to transport services, recyclers, universities and affected associations like car dealers.
Topic 7: National treasury, provincial education & health depts, transport operators
Topic 8: None

The respondents felt all the topics in this theme required information and guidance to implement LC-HVT.

The respondents considered that local and regional (provincial) government and transport authorities need to be the primary beneficiaries of information and guidance on **how to establish integrated transport system planning across all modes and from trip origin to destination.** This was seen to be a critical need by 89% of all respondents and 95% of local and regional (provincial) government and transport authorities.

How to provide infrastructure for electric vehicles is a topic that does not have a clear solution in developing countries where many private vehicle owners do not have off-street parking and where grid-supplied electricity supply often struggles to keep up with expanding demand. This was as a critical need by 89% of all respondents and 91% of local and regional (provincial) government and transport authorities and 70% of national -level government and transport authorities.

Eighty-nine per cent of all respondents and 84% of national government and transport authorities would benefit from knowledge exchange on **how to phase out (and substitute) old polluting vehicles.** This theme is seen as less critical for local authorities (57%).

However, **how to make use of intelligent transport systems (ITS)** is of concern for local and regional (provincial) government and transport authorities (84%) more than any other stakeholder.

At the opposite end of the spectrum, **how to set up and operate long-distance rail connectivity** and **how to set up and operate modal exchange between road freight and water/rail transport systems,** while of high importance to all respondents (78% for each) are topics of concern almost exclusively for national level stakeholders (81% and 78% respectively).

The lowest rated topics, on an overall basis, considered critical by 76% of respondents were **how to set up and manage rural transport infrastructure and services**; and **how to introduce road asset management procedures** with responsibility evenly split between the local, regional and national government and transport authorities.

Interestingly, of all the 28 topics (across the six themes, **how to set up and operate long-distance rail connectivity** was the area that received the highest NA qualification from 8% of respondents (additional guidance is not needed. They stated that they know how to do this, or where to find the information they require, without additional assistance). No other area received this rating from over 5% of respondents.

8.4.2. INTERNATIONALLY AVAILABLE SOURCES OF KNOWLEDGE

Within this topic area (implementation of low carbon projects or interventions) there is considerable international literature dealing with the explicit knowledge that is more closely linked to low carbon **products,** (that is: ***what*** is being implemented)

The public transport authority (30) provides a catalyst for municipalities/authorities of all sizes to review the provision and management of transport in the face of increasing economic pressures, regulation and competition. Several reports such as (31) look at how national and urban low-carbon transport policies could assist countries in achieving smart, sustainable economic growth while stabilising and later reducing transport emissions. Other analyses examine how self-reinforcing socio-cultural and institutional barriers to local climate action can be used to facilitate change (32).

MDBs and other international development agencies have produced a series of manuals that can assist the local practitioner to develop transport solutions in different sub-sectors. A selection of these include:

- *Urban Transport Data Analysis Tool* (33) that assists the transport engineer to analyse whether the city needs additional road/mass transit capacity or whether it needs other interventions like improved intersection design or improved road maintenance to address rising congestion satisfactorily.
- *Economic appraisal of transport projects*: a manual with case studies (34) that provides a practical introduction to the economic appraisal of transport projects in developing countries
- Road monitoring for maintenance management: Manual for developing countries (35) that covers road pavement inspection applicable to Third World countries' conditions.
- *Urban Design Manual for Non-Motorized Transport-Friendly Neighbourhoods* (36) that bridges the knowledge gap by providing a guide on how to improve non-motorized transport (NMT), which is walking and cycling, at the neighbourhood scale.
- *The Urban Rail Development Handbook* (37) that synthesises and disseminates knowledge to inform the planning, implementation, and operations of urban rail projects
- *The Trade and Transport Corridor Management Toolkit* (38) that synthesises the experiences of the World Bank and other development agencies in assessing, designing, implementing, and evaluating the impact of trade and transport corridor projects. It saves project developers the task of looking for the best available tools and ensures greater consistency to facilitate comparison and benchmarking.
- *Toolkit on Intelligent Transport Systems for Urban Transport* (39) which is a self-learning tool for city transport leaders and their advisers.
- *Tools for Sustainable Urban Transport Experts* (40)
- *Mechanisms for Financing Roads*: A Review of International Practice (41) which provides an overview of the most commonly used means to charge road users to generate financial resources for supporting PPP projects or to finance totally public projects
- *Low carbon transport policy handbook* (42)

Improving freight system performance is critical to allow decoupling of freight traffic from economic growth, and to reducing GHG emissions in both long distance and urban travel modes (43). In freight system improvement, people matter. (44) looks at theoretical aspects of the qualitative assessment of logistics and transport specialists' potential, as well as provides research results on competence and capacity-building process in preparation of logistics and transport specialists. There are several useful reports on freight decarbonisation.

A good starting point is (45), which highlights policy areas that need adjustment for effective decarbonisation of road freight and highlights where robust evidence is needed. It presents insights from an International Transport Forum workshop held in Paris in June 2018 and features the results of an expert survey.

Several textbooks have been written for undergraduate class work. Of note is the *Transforming Urban Transport: The Ethics, Politics and Practices of sustainable mobility* (46) and others on urban form and its impacts on transport emissions (47). *The Handbook in Transport* series (48–50) address all aspects of transport policy and management.

Implementing low carbon transport in many cases involves overcoming several barriers. (51) explores those barriers by focusing on vehicle fuel efficiency and addresses wider a policy framework to improve transport efficiency and reduce emissions. The paper suggests that a combination of fuel pricing, differentiated vehicle taxation, vehicle standards and the provision of modal choice are necessary to minimise rebound effects and curb transport sector GHG emissions at low- or even negative cost.

However, it is not easy to define what the uptake of any specific measure may be. (52) empirically analyses the impact on transport mode choice of policies implementing metro network expansion, fare subsidies and automobile use and ownership regulation using data for 41 world cities, controlling socio-economic and demographic variables. It was found that an increase in metro network extension of 10% generates an average decrease in automobile use of 2%. The results also showed that regulation of car use or ownership leads to a significant rise in public transit use. By contrast, no evidence was discovered suggesting that transit fare subsidies produce significant increases in transit ridership.

The most significant contributor of knowledge and guidance in this area is the *Sustainable Urban Transport Program (SUTP).* See section 9 (plus Annex 5 and Annex 6) for more details.

8.5. Institutional Capacity

8.5.1. Perceived need for knowledge exchange

Ninety-two per cent of all respondents highlighted one or more topics in the theme of institutional capacity as being a critical need for knowledge exchange in their zone of influence to increase the adoption of low carbon transport (see Figure 32).

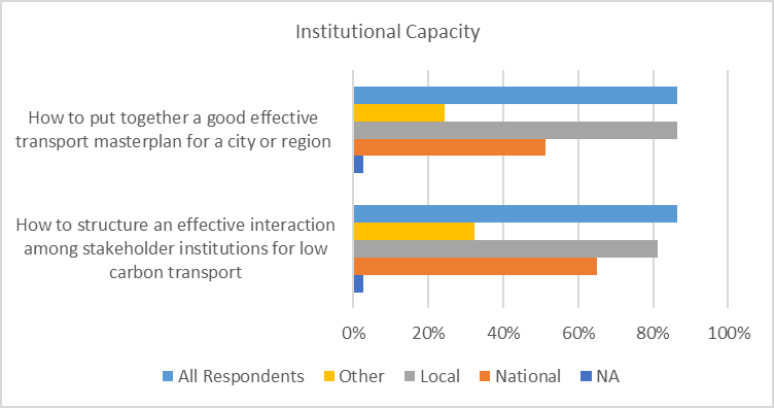

Figure 32 - Perceived need for knowledge exchange concerning institutional capacity

Note: Others include

Topic 1: Affected communities, national treasury, civil society, NGOs, private institutions, private business, universities & entrepreneurs, its system integrators, academics

Topic 2: Development community, civil society, NGOs, private business, universities, metro rail organisations.

Eighty-six per cent of all respondents considered that information or guidance would be beneficial to LC-HVT development on **how to put together a good effective city-level or regional transport masterplan** and that the primary recipient of this knowledge exchange should be local and regional (provincial) government and transport authorities (86%). See Figure 32.

Similarly, 86% of all respondents also considered that guidance is needed on **how to structure an active interaction among stakeholder institutions for low carbon transport**. Again, the primary recipient should be local and regional (provincial) government and transport authorities (81%) but also national level stakeholders (65%).

They considered that this knowledge exchange should be made inclusive to a wide range of stakeholders (see others below Figure 32**Error! Reference source not found.**) particularly the affected communities, the NGOs that represent them and civil society.

8.5.2. Internationally available sources of knowledge

Building effective interaction among stakeholder institutions is critical to implementing LC-HVT because they involve many stakeholders, both with technological and behavioural change solutions. Most

available information sources relate to theory or to specific projects; for example the *South Africa Low Emissions Development program* (53) that recognised the need to build capacity of South Africa transport and planning officials to enable the effective implementation of sustainable transport projects that would lower GHG emissions and contribute to the development of liveable communities. Others look at involving user-communities in the transport service provision as a way to increase user involvement (54,55). Other useful papers examine how cities are pioneering climate action while being constrained by multi-level governance where local decision makers are dependent on both higher political levels and other societal actors (56,57). The theme of transport investment to further regional development in sparsely populated regions (common in some developing countries) is also treated (58). Few documents offer guidance to LICs on this theme. Two of note, *Knowledge exchange (for busy researchers)* and *The Art of Knowledge exchange: A Primer for Government Officials and Development Practitioners* – which was originally written for the banking industry in Nepal (59,60), provide useful insights. Others give insights on the interaction with communities when promoting low carbon transport solutions and modal shift to high volume transport (36,57,61).

On the second theme,[18] the literature search revealed that there are many sites, principally in developed countries, that outline **how to put together a good effective city-level or regional transport masterplan**. However, few explain to smaller cities in developing countries how to build a master plan and what it should contain.

The *Toolkit for Preparation of Low Carbon Mobility Plan* (62) is a good starting point for smaller cities in less-developed and developing countries to prepare a Low Carbon Master Mobility Plan, or for cities in which no significant investments are envisaged in the short-term. The toolkit gives an initial view of the critical elements of the transport system, their characteristics, interrelationships and past trends. It discusses and presents a form to create a baseline for the city by estimating: 1) the emission from urban transport based on the travel patterns, fuel and technology choices, and 2) individual wellbeing measured as accessibility to jobs and other essential activities. It discusses who needs to be involved in the process and helps define the TORs of individual team members.

Other papers take cross-country experience (such as (63) from the United States (US)) to guide how a city can develop its roadways, coordinate infrastructure improvements with land uses, and respond to future growth and demands on the network. They identify goals and policies that include strategies to improve safety, minimise congestion, preserve local character, and protect the natural environment. They cover a broad framework of planning documents, such as, but not limited to:

- Complete Streets Plans
- Pedestrian Master Plans
- Bicycle Master Plans
- Active Transportation Strategic Plans
- Station Area Master Plans
- Roadway Master Plans

[18] How to put together a good effective transport masterplan for a city or region

- Parking Management Plans
- Vision Zero Action Plans[19]

Some papers that compare the decision-making process of sustainable urban transport planning across continents, (64) found that while European practices transferred reasonably well to South East Asia, various key factors required revisions in the approach. This is due to (i) differing traditions in planning, (ii) different weights in the transport-related objectives, (iii) use of only a limited set of potential policy instruments, (iv) fast growth rates (in both economic and travel terms), (v) differences in types of vehicle used, and (vi) lack of data for use in assessment and modelling.

8.6. Transport Policies and Strategies

8.6.1. Perceived need for knowledge exchange

Ninety-two per cent of all respondents highlighted one or more topics in the theme of transport policies and strategies as being a critical need for knowledge exchange in their zone of influence to accelerate the adoption of low carbon transport (see Figure 33).

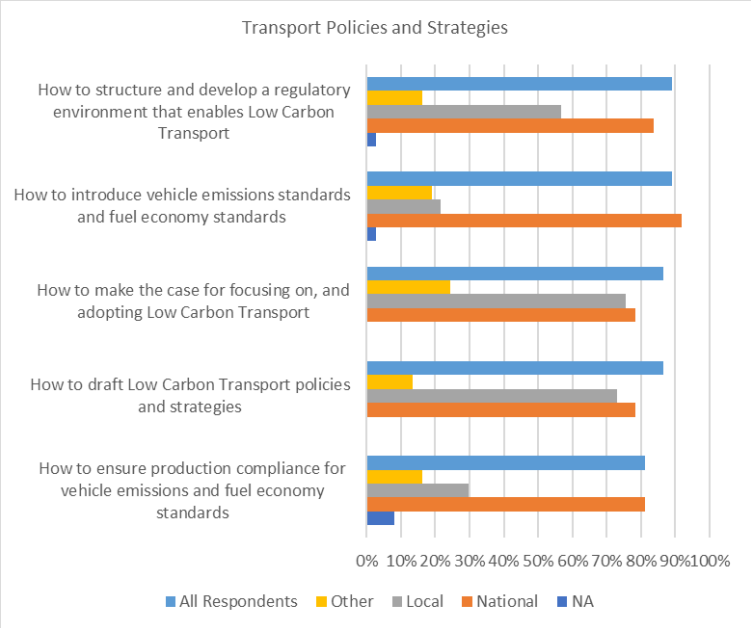

Figure 33 - Perceived need for knowledge exchange concerning transport policies and strategies

Note: Others include:
Topic 1: Workers, national treasury, civil society, NGOs, industry, business, transport operators, universities.
Topic 2: Civil society, NGOs, business, universities; transport operators.
Topic 3: Civil society, NGOs, business, universities.
Topic 4: Car manufacturers, civil society, business, universities, affected associations, certifying agencies.
Topic 5: Independent auditors, business, universities.

[19] Vision Zero is a global movement to reduce pedestrian deaths as a result of traffic collisions to zero

All the themes in this area were considered by the respondents to need information or guidance for local stakeholders to implement LC-HVT. The exception to this high overall ranking was **how to ensure production-compliance for vehicle emissions and fuel economy standards,** and this could be because there is a lower general perception of its need. Many stakeholders have the misconception that if vehicle emissions standards and fuel economy standards are published, then all new vehicles can be expected to meet the requirement, without any governmental oversight to ensures compliance. However, this is not always the case (65).

Most respondents see vehicle emissions standards, fuel economy standards and production compliance as being issues that need to be enacted and resolved at the national level.

National-level authorities were most in need of information or guidance on how to enact all five themes. Additionally, local and regional (provincial) government and transport authorities were highlighted as recipients of practical assistance on **how to make a case for focusing on and adopting low carbon transport** and **how to draft low carbon transport policies and strategies**

8.6.2. INTERNATIONALLY AVAILABLE SOURCES OF KNOWLEDGE

Several available books cover the theme of transport policies and strategies. *The Urban Transport in the Developing World: A Handbook of Policy and Practice* (66) highlights the demand for improved public decision making in urban transport policy-making, planning and management in developing countries supported by a commensurate investment in capacity building.

For example, the series *Handbooks in Transport* (67) covers in six volumes several areas from policy definition to modelling:

Volume 1	Handbook of Transport Modelling, 2007
Volume 2	Handbook of Logistics and Supply-Chain Management, 2008
Volume 3	Handbook of Transport Systems and Traffic Control, 2001
Volume 4	Handbook of Transport and the Environment, 2003
Volume 5	Handbook of Transport Geography and Spatial Systems, 2004
Volume 6	Handbook of Transport Strategy, Policy and Institutions, 2005

The *Handbook of Sustainable Travel* (68) discusses transportation systems from environmental, social and economic perspectives, to envisage potential strategies towards more sustainable travel.

Low-carbon land transport: policy handbook (42) is a practical guide for transport policymakers and planners to achieve low-carbon land transport systems. Based on wide-ranging research, it shows how policies can be bundled successfully and worked into urban transport decision-making and planning strategies.

Transport and climate change (69) examines the impact of transport systems on climate change. It argues that to achieve a stabilisation of GHG emissions from transport, policy to foster behavioural change would be required. While pressure on policymakers has tended to focus on long-term

technological solutions, achieving short-term behavioural change is crucial if the benefits of new technology are to be fully realised.

Other documents cover stakeholder engagement in specific travel models (such as (70) for the *Flexible Use of Airspace*).

The paper *Urban policy and governance in a global environment: Complex systems, scale mismatches and public participation* (71) discusses the challenging issues of integrating regional and global environmental concerns into urban policy and management practices because of the inherent temporal, spatial and institutional scale mismatch between urban policies and regional and global environmental issues.

Several reports look at success stories on sustainable urban transport. *Conditions of success in sustainable urban transport policy. Policy change in 'relatively successful' European cities* (72) gives a comparative analysis of five case studies dealing with relatively successful European cities in three countries to slow down the ongoing deterioration of traffic-related environmental problems. The paper uses a three-step approach to focus on the reasons and ways policy windows open-up for fundamental environmentally oriented changes of transport policies.

Other papers[20] such as (73) analyse the use of specific techniques and situations, explain how the complexity of sustainable development defies the traditional management and problem-solving capabilities of most local municipalities and also defies global considerations for long-term environmental conservation and social justice. Different types of informal and formal partnerships, networks and arenas have been formed to offset such deficiencies. This paper presents an example of a cross-sector, multi-level civil servant arena and examines its ability to provide a more integrative approach to planning and policy-making in western Sweden.

Production compliance enforcement is critical for low emissions standards to have a real effect. The US has the most effective system (74) which has been adapted with differing degrees of rigour by other countries (75).

8.7. GHG Analysis, Monitoring and Reporting

8.7.1. Perceived need for knowledge exchange

Ninety-two per cent of all respondents highlighted one or more topics in the theme of GHG analysis, monitoring and reporting as being an essential need for knowledge exchange in their zone of influence to accelerate the adoption of low carbon transport (see Figure 34).

[20] Institutional capacity-building in urban planning and policy-making for sustainable development: Success or failure?

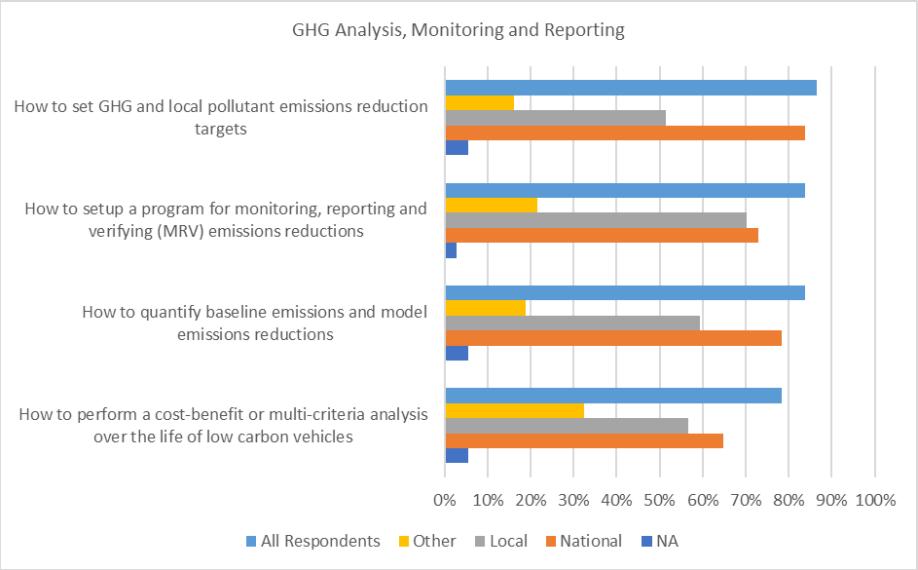

Figure 34 - Perceived need for knowledge exchange concerning GHG analysis, monitoring and reporting

Note Others include:

Topic 1: Civil society, NGOs, business; transport operators, certifying agencies
Topic 2: Civil society, NGOs, industry, business; transport operators, academics, institutes
Topic 3: Economists, sociologists, national treasury, civil society, NGOs, industry, business; transport operators, academics, institutes, vehicle manufacturers
Topic 4: Civil society, NGOs, business; transport operators, certifying agencies, third party inspection agencies.

For many practitioners in developing countries, GHG analysis, monitoring and reporting is a new requirement that they are battling with, driven by access to carbon funding, the requirement of international funders (MDBs and others) to report the climate change mitigation associated with any project investment, and the UNFCCC NDC process. This often requires setting up a new systematic data collection process to get a stream of consistent data over time, wherein the past such analysis has been based on ad-hoc data and studies. This requires decisions on reporting requirements for companies, and how to monitor and verify their data. It requires choices on which models they would use in the analysis since the choice of model can dictate the data requirements and requires choices on how to set up the counterfactual baseline against which changes in GHG emissions can be evaluated.

Only then could intelligent choices be made on GHG emissions reductions targets for each sector, where the complexity and cost of achieving a reduction differ across sectors and projects. Transport is usually considered a difficult sector to decarbonise because of its reliance on fossil fuels. This is seen in the IPCC SR15 special report, for example (76) where according to various models (integrated assessment and bottom-up sectoral), worldwide transport emissions can be 2-6 Gt in 2050 to meet the 1.5-degree target, whereas buildings, and industry should be in the range of 1-3 Gt, and electricity needs to be zero or negative emissions.

Therefore, it is not unexpected that the respondents highlight the need for knowledge exchange on these topics with national-level transport authorities and ministries, but it was good to see the recognition that local and regional transport authorities and ministries also need knowledge exchange.

How to set GHG and local pollutant emissions reduction targets is seen as a topic more focused on national level players (by 84% of the respondents) rather than local or regional level (51%). However, **how to set up a program for monitoring, reporting and verifying (MRV) emissions reductions** received a similar level of importance for each (73% national, 70% local and regional).

Modelling GHG emissions (**how to quantify baseline emissions and model emissions reductions**) is still recognised as in the national domain (78% national, 59% local and regional). However, the more technical analysis such as **how to perform a cost-benefit or multi-criteria analysis over the life of low carbon vehicles** is seen as having a similar level of criticality in both national, and local/regional levels (65% national, 57% local and regional) but lower than the other topics in these theme.

8.7.2. INTERNATIONALLY AVAILABLE SOURCES OF KNOWLEDGE

Several articles, reports and websites cover the theme of MRV, but very little direct assistance to practitioners in developing countries on how to go about setting these things up.

There are many different models used in GHG analysis (77) provides an overview of some 150 of these with brief details of where to find and the strengths of each.

The GIZ-BMU TRANSfer project[21] assists stakeholders to assess the impact of transport-based mitigation efforts with guidance on where to find good measurement, reporting and verification (MRV) practices and on the requirements must be met in terms of data collection. The Centre for Clean Air Policy (CCAP)[22] offers guidance on transport MRV, as does the Institute for Global Environmental Strategies (IGES)[23] and several others. The EU presents several guidance documents for all subsectors, including shipping (78).

(79) presents a methodology to measure the environmental co-benefits of transport initiatives, defined here as carbon emissions in conjunction with local air pollution. An evaluation tool was developed and then tested on the case of the Delhi metro.

8.8. REGULATION (PRINCIPALLY LOCAL OR REGIONAL)

8.8.1. PERCEIVED NEED FOR KNOWLEDGE EXCHANGE

[21] https://www.transparency-partnership.net/documents-tools/reference-document-mrv-transport-sector
[22] https://ccap.org/transportation-mrv-its-complicated/
[23] https://pub.iges.or.jp/pub/measuring-reporting-and-verification-mrv

Ninety-two per cent of all respondents highlighted one or more topics in the theme of local transport regulations as being a critical need for knowledge exchange in their zone of influence to accelerate the adoption of low carbon transport (see Figure 35).

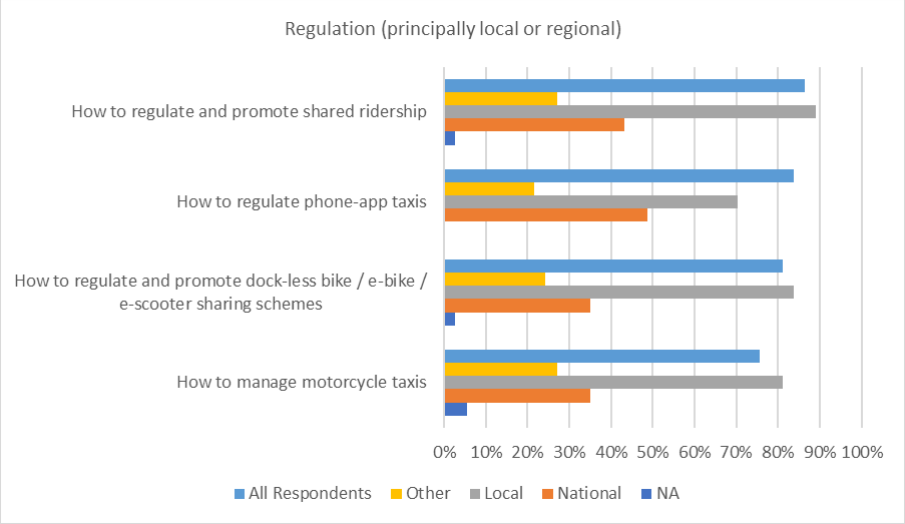

Figure 35 - Perceived need for knowledge exchange concerning local and regional regulation

Note: Others include:

Topic 1: Riders associations, research/academia, private sector, business; transport operators, land developers, private app developers

Topic 2: Industry, private sector, business; transport operators, private app developers.

Topic 3: Research/academia, business; transport operators, urban, service providers of ride-hailing apps.

Topic 4: Worker groups, civil society, NGOs, business; transport operators, service providers of ride-hailing apps

The four topics in this theme are ones where even in principal cities of developed countries, there is no clear definition of how to best manage. They have arisen through the current explosion of transport sharing schemes. As of December 2016, roughly 1000 cities worldwide have a **bike-sharing programme.**[24] The oldest dates back to 2002, but the explosion in this industry has been seen in the present decade. While traditional systems allow users to pick up and drop off bicycles at any of the automated stations within the network, recent changes into **dock-less bike schemes and electric bike and scooter sharing** are radically changing the service offering and the need for regulation.

Similarly, the integration of private vehicles into the public transport space through **phone-app taxis shared ridership schemes** and **motorcycle taxis** are providing a useful transport service that previously did not exist but bring about urban problems and need for regulation that did not previously exist either.

The respondents viewed all four topics as being principally of local concern, where local transport authorities and ministries may learn from experiences in other cities and hopefully implement the regulatory framework and needed infrastructure before these become problems, not in response to

[24] According to https://en.wikipedia.org/wiki/List_of_bicycle-sharing_systems

problems once they become critical. The respondent classified these as critical for local actors between 89% and 70%, with the highest rating going to how to promote and regulate shared ridership.

8.8.2. INTERNATIONALLY AVAILABLE SOURCES OF KNOWLEDGE

Being relatively new themes there is less material readily available to help local authorities. Of mention is the report on *How to Allocate Contracts for the Provision of Regional and Local Transportation Services* (80) and a study (81) that used interviews with more than 40 transit system managers, to look at factors that have contributed to ridership increases and discusses the impact of each of the following five groups of strategies, programmes, and initiatives:

- Service adjustments,
- Fare and pricing adaptations,
- Market and information initiatives,
- Planning orientation, and
- Service coordination, consolidation, and market segmentation

8.9. OTHER TOPICS

8.9.1. PERCEIVED NEED FOR KNOWLEDGE EXCHANGE

The respondents also considered that information and guidance is required in other areas to be able to accelerate the move to LC-HVT. Their areas of concern include:

- How to ensure effective stakeholder engagement
- How to develop policies that design measures with a progressive medium/long term objective as opposed to immediate, politically expedient solutions
- How to ensure that National and Local governments are supported by technical expertise
- How to perform sectoral and integrated Public Social Obligation (PSO) mapping, batching and assignment
- How to ensure value for money in transport investments.

They also mentioned the need to Introduce these subjects in educational curricula to benefit the next generation of policymakers.

8.10. CONCLUSIONS

A lot has been written about low carbon development, particularly in the energy sector. From the mitigation perspective, transport is generally regarded as a demanding sector to decarbonise due to its defragmented nature affecting behavioural choices of a wide range of stakeholders and its high reliance on fossil fuels. Nonetheless, decarbonising transport is seen as critical because for many developing countries it is the largest emitting end-use sector and because choices made today can lock-in energy consumption and emissions patterns for decades to come.

In many developed countries, private vehicle ownership is close to saturation levels due mainly to high per capita income, which together with an ageing population (which limits the growth in the number of young drivers), causes GHG emissions from this sector to almost stabilise or even naturally decline. In lower-income and lower-middle income developing countries, the story is different. With expanding populations coupled with rural to urban migration and per capita incomes in the range where private vehicle ownership increases fastest, making a significant reduction in GHG emissions, in absolute terms, is practically out of reach for all but a limited cohort of economies.

Because of this difficulty in mitigating GHG emissions from transport in developing countries such as DFID priority countries, most of the literature addresses the experience of developed countries or provides a general overview of recommended policies, goals, technologies and approaches.

These can give the developing-country stakeholder involved in implementing low carbon development in transport an idea of what could be implemented but often lack practical guidance on how to achieve it and the steps to follow. Also, the priorities for action that he or she faces are likely to be different across disparate groups of countries with differences in income level and urban design.

The respondents from the sample countries gave almost equal importance to the need for knowledge exchange in each of the six themes (see Table 6), however most of the 28 topics that they encompass focus on filling this knowledge gap of how to implement.

If we drill down to see the most critical 50% of topics (top 14) for local respondents (local and regional/provincial government and transport authorities), we get the eclectic mix shown in Figure 36. These are the stakeholders directly involved in implementing transport, and low carbon solutions.

Figure 36 shows a list of practical concerns that impact how they do their daily work. Many of these local practitioners have a clear idea of what they would like to accomplish, but this list of priority topics shows the need for knowledge exchange on how to do it. In our literature search, we discovered limited sources of this knowledge, and most of what is available are from developed countries, and not necessarily applicable to the person that is needing it.

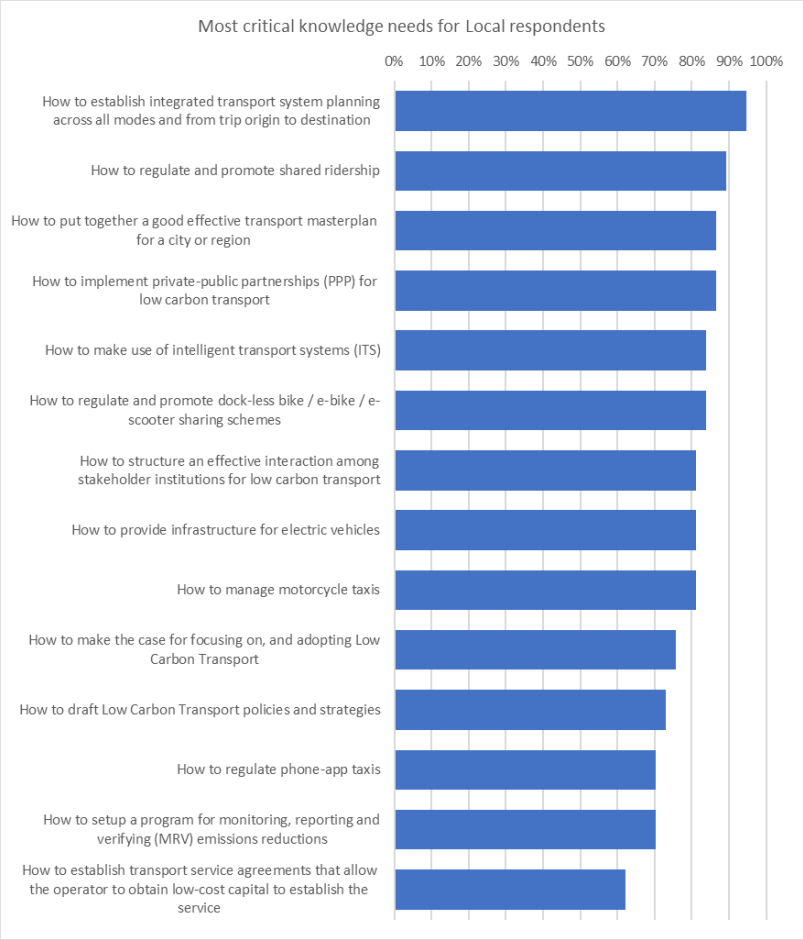

Figure 36 - Most critical top 14 topics for Local and regional/provincial government and transport authorities

8.10.1. OBJECTIVITY OF THE PERCEPTIONS

The question arose as to whether respondents were giving their legitimate knowledge needs or looking at the survey as a possible opportunity to receive funding (and just "ticking all the boxes" to strengthen the case for such funding to reach their cohort).

To verify the objectivity of these perceptions, an analysis was performed comparing for each respondent, the cohort of stakeholder to which they belong (national, local or other) to the cohort that they are recommending as the recipient of capacity building in each of the 28 topics in 6 themes (national, local or other).

The evaluation assessed if there was a preponderance of responses where respondents were identifying *themselves* as the cohort that would benefit from additional attention.

The findings showed otherwise: out of a total of 1354 tabulated responses[25], 345 (25%) included the respondent's cohort as a cohort that would benefit from additional attention, while 1009 (75%) indicated cohorts excluding that of the respondent as candidates for additional attention.

Thus, no indication was found of interviewees skewing their responses to favour their cohort.

9. PERSONAL EXPERIENCES OF RESPONDENTS ON KNOWLEDGE EXCHANGE

Seventy-eight per cent of the respondents had been personally involved in implementing low carbon transport projects or policies.
They were asked three questions;

- What information/guidance/consultant service did the project receive that, maybe unexpectedly, was key to "selling" the low carbon project to other stakeholders?
- What information/guidance/consultant service did the project receive that was critical in getting the project correctly implemented?
- What information/guidance/consultant service would have made implementing the project much easier, or have led to a better result if it had been received from the very beginning?

As expected, the answers given cover a wide range of topics including international funding and consultancy, but a significant volume of responses focused on the need for a stronger emphasis on the "soft" issues (i.e. education, consensus building and increasing involvement of civil society and other stakeholders) that are often sidelined when the project is seen as a technical implementation. Table 7, Table 8, and Table 9 highlight the strategic importance of involving all stakeholders - those directly involved in the project (e.g. Government agencies, operators and industry), and those interested in, and/or affected by the project (e.g. civil society, NGOs, businesses, workers federations, and the informal sector).

Several respondents mentioned the usefulness, and need for, capacity building on these themes and strategies to increase the buy-in of participating agencies. They commented on the benefits of selling low carbon projects based on the co-benefits that these would generate, which often have a larger impact on local stakeholders than that of reducing carbon emissions.

Several respondents mentioned how it is easier to get approval for locally implemented projects when the country provides the project proponents with nationally mandated policies, guidance, templates (for contracts etc) and analytical toolkits

9.1. GUIDANCE THAT WAS KEY TO "SELLING" THE LOW CARBON PROJECT TO OTHER STAKEHOLDERS

Table 7 shows the information, guidance or consultant service was unexpectedly key to "selling" the low carbon project to stakeholders. This consisted of improving the team's focus on consensus building and

[25] A response in this analysis is considered as one recommendation on which cohort of institutions (National, Local or Other) would most benefit from information or guidance in each of the 28 topics in six thematic areas:

awareness of the project amongst the wider stakeholder community, convincing them of the co-benefits of the project for companies and households affected (e.g. direct cost savings and traffic improvement).

This reinforces the practical aspects that for many stakeholders, GHG mitigation is a difficult to quantify co-benefit of a successful sustainable low carbon transport solution that needs to be justified by its other direct benefits to companies and households affected and the wider (local) community.

Various respondents mentioned improvements in their analysis via the use of different tools, which to some gave unexpected access to international funding and to others better integration and support from national plans.

Two participants directly mentioned the benefits of the support received from SUTP[26], while for others the ability to demonstrate that their project was internationally advanced bought them additional recognition.

Table 7 - Information/guidance/consultant service that, maybe unexpectedly, was key to "selling" the low carbon project to other stakeholders

Area of benefit	Response
International funding and consultancy	Information that the project could get soft loan International funding and consultancy
Direct benefits to stakeholders	Buy-in from industry due to cost reduction shown by smart truck pilot project, vehicle manufacturers and infrastructure providers Benefit to business community Potential savings to companies that were involved Cost benefits for transport to households and intensive commercial and industrial sectors, Labour impact assessment from international transport workers' federation
Awareness improvement	Government officials were taken on study tours and prior technical assistance (TA) project Literature on sustainable transport
Improved analysis	Used toolkit provided by national ministry Analysis of lifecycle costs and reliability from pilot project Quantification of the co-benefits of NMT using UN Environment's NMT project assessment tool
Consensus-building	Multi-sectoral participation from SUTP SUTP as a government initiative
GHG emissions reduction	Use of power from waste and renewable energy CNG availability
Effective traffic solution	Reduce congestion Move to mass transit and lower emissions
Demonstrated Technical leadership	The lack of existing information on low carbon issues Project was internationally advanced

9.2. GUIDANCE THAT WAS CRITICAL IN GETTING THE PROJECT CORRECTLY IMPLEMENTED

Table 8 shows the guidance that the respondents considered was critical in getting the project correctly implemented. This critical knowledge falls into three main groups:

[26] See Annex 5 for details

- Obtaining **international technical assistance** was paramount to many projects as this brought knowledge that was not otherwise available to the project participants.
- Obtaining **national and local government buy-in** was also critical in many cases to get the project fully implemented.
- Obtaining wider **society to understand and support the project** was also crucial, via consensus building, workshops, brainstorming groups and capacity building.

While the first group (obtaining international technical assistance) addresses knowledge gaps, the other two focus on the "soft" measures that are often forgotten in technical project implementation.

Table 8 - Information/guidance/consultant service that was critical in getting the project correctly implemented

Area of benefit	Response
International consultant	To completely manage CDM project Selection of experienced Design and Project Management Consultants Technical, legal and economic consultancy was critical to helping government frame the process.
International sourced Information/assistance	World bank advisory notes Report on technological aspects of e mobility transport Implementation of Environmental & Social Management Plan (ESMP) for construction & Operational
Capacity Building program	Delivered by SUTP
Consensus building on benefits	Collaboration from industry Workshops on the management of change Multi-Sectoral Brainstorming Formation of a workgroup involving the participating companies
Buy in of government	Buy-in of the local government Business Plan preparation Approval of State Government
Definition of policy by National Government	Alignment with National Government policy Developed EV policy Urban Transport Integration Guidance documents prepared by Ministry

9.3. GUIDANCE THAT WOULD HAVE MADE IMPLEMENTING THE PROJECT MUCH EASIER, OR LED TO A BETTER RESULT, IF IT HAD BEEN RECEIVED IT FROM THE BEGINNING

Table 9 shows the guidance that, according to respondents, would have made implementing the project much more manageable, or led to a better result, if it had been received it from the beginning.

Again, the emphasis is on obtaining buy-in from civil society, building consensus and involving wider stakeholder groups and aligning with national and local government plans.

The increase in the use of social media and social inclusion is bringing new challenges to project implementors, who may have been brought up implementing government-mandated programmes that required little involvement with a wider group of stakeholders. This is no longer the case, and some are having to play catch-up.

Table 9 - Information/guidance/consultant service that would have made implementing the project much easier, or led to a better result, if it had been received it from the very beginning

Area of benefit	Response
Education of Civil Society and other stakeholders	More effort on the education of the public and politicians of the reality and rate of climate change Higher level awareness creation/sensitisation of elected political representatives A document explaining how to get buy-in with civil society stakeholders How to properly market something to non-technical people, understanding their priorities and objectives.
Consensus and Involvement	Implications of Land Acquisition for Right of Way. Better Communication Strategy with Stakeholders/Media Project implementation plan including stakeholder consultation Better involvement of informal transport operators Earlier consultation with all stakeholders The involvement of all stakeholders, their expected outcomes and understanding of urban transport issues by them Guidance on better collaboration methods for participating organisations
Promotion of co-benefits	If the idea of Promoting Public transport had been set as the aim and policy, it would have led to a better result. Case studies, Business Case
Alignment with Government plans	Government alignment and support. Getting project into the local authority Master Plan Early Guidance in the proper implementation of ESMP Alignment with commitments of Departments of Transport, Environment & Treasury Better transparency, objectivity and tangibility while implementing the Environmental Management Plans
Toolkits and Analysis	Better experience on value sharing from land development Critical benchmarking on cities with similar contexts A toolkit or guidelines for implementation would be of great help preferably issued by Central Government to ensure uniformity. Status Quo Analysis of transport in the state
Funding	Funding is needed for research Funding: there is never any money for supporting those who are challenging governance decisions with their local bodies and shaping the sustainable mobility agenda.

10. TYPES OF EFFECTIVE KNOWLEDGE EXCHANGE

Knowledge exchange is sometimes viewed as information transmitted from international organisations or other more developed countries via reports, literature, workshops, or consultancy service to those that need it. However, these are not always the most effective channels, mainly depending on the type of knowledge that is to be transmitted.

10.1. EXPLICIT VS TACIT KNOWLEDGE

A distinction is made in literature between explicit and tacit knowledge (60).

- ***Explicit knowledge*** is usually written down to be shared. Academic papers, books, and data are typically considered explicit knowledge;
- ***Tacit knowledge*** is often unarticulated knowledge that practitioners gain through experience, insight, intuition and sometimes past failures. It can be hard to formalise and communicate.

The distinction was first made by Michael Polyani in the 1960s (82,83), and also Nonaka and Takeuchi's book *The Knowledge-Creating Company* (84), however others (85) show it not as a discrete difference but rather a continuum where the same content may be explicit for one person and tacit for another. Unlike explicit knowledge, tacit knowledge is not easily found in academic papers and books and can best be shared through knowledge exchanges.

In the surveys and expert interviews, government officials and practitioners articulated their need for knowledge on ***how*** to implement low carbon transport solutions. They increasingly demand more than *explicit knowledge* on what to implement (which they can obtain from the internet, suppliers and formal education). They need the insights of *tacit knowledge* that they can only get from peers who have faced similar challenges—to learn from practical experiences the "how-to" of development and policy reforms in order to enrich their analysis and understanding of their circumstances, opportunities, and constraints.

This *tacit knowledge* contains the minutiae of implementation. Whereas the explicit knowledge found in many articles and reports may express, for example, the need for a contract defining a private-public partnership (PPP) for low carbon transport, it typically does not lay-out the critical wording of important clauses and the arguments needed to convince stakeholders to accept them. Thus, for a team that has never negotiated a PPP before, this can be a major barrier to effective implementation since they are forced to learn from their own mistakes unless they have support from a consultant or other who has this prior experience.

A topical example of the difference between **what** and **how** is given by *The French Lesson on Climate Policy* (86). Most Western Europeans understand that the excessive use of fossil fuels must come to an end, and most economists agree that the best way of achieving this is by sending appropriate price signals (increasing taxes). Ghana and Indonesia recently reduced fuel subsidies.[27] Their governments consulted with labour unions, consumer associations and other stakeholder groups while running communication campaigns explaining the reform's rationale and benefits. When France tried to do the same in December 2018, the *gilets jaunes* (or "yellow vests") protests became the most significant social unrest in decades, so much so that Emmanuel Jean-Michel Frédéric Macron, President of the French Republic, was forced to cancel the tax increase.

10.1. "North-South" knowledge exchange

"North-South" knowledge exchange is a term used to describe the traditional flow of mainly *explicit knowledge* from a more developed country or international organisation to a less developed one.

10.2. "South-South" knowledge exchange

"South-South" knowledge exchange involves activities connecting policymakers and development practitioners within and across countries to learn mainly *tacit knowledge* from each other`s experiences for the purpose of identifying, customising, replicating, and/or scaling up workable development

[27] See https://www.reuters.com/article/ghana-subsidy/ghana-scraps-fuel-subsidy-to-reduce-budget-deficit-idUSL5N0EC3X920130531 and https://www.iea.org/newsroom/news/2016/december/indonesias-steady-progress-in-tackling-fossil-fuel-subsidies.html

solutions and policies. These activities could include workshops, dialogues, expert visits, peer consultations, study tours, and twinning arrangements[28]

The value of this "South-South" knowledge exchange has been highlighted in many papers (59,87). It is being applied by FAO on agricultural mechanisation (88), by TERI-India[29] as a platform to share experiences and knowledge in sustainable development, in China to pursue a successful path of deliberate and scientific economic development that has lifted hundreds of millions of its citizens out of poverty[30], and in Indonesia on "State Finance and Development Surveillance" experience.[31] The World Bank guide "The Art of Knowledge Exchange" (60) provides a step-by-step introduction to planning and designing knowledge exchanges, especially in the context of South-South partnerships.

10.3. TRIANGULAR COOPERATION

Often a South-South knowledge exchange can be usefully complemented by multilateral institutions and traditional donors taking the role of brokers and providing their expertise and knowledge. "Triangular cooperation" or "South-South-North" exchange combines the strengths of traditional donors and multilateral institutions, with providers of South-South cooperation to implement knowledge sharing programs in beneficiary countries (primary learners). Triangular cooperation provides access to diverse but complementary intellectual capital.

10.4. BENEFITS AND DIMENSIONS OF "SOUTH-SOUTH" AND TRIANGULAR COOPERATION

The World Bank's South-South Experience Exchange Facility[32] ('South-South Facility') is one example of triangular cooperation. It is a trust fund that enables the sharing of development experience and knowledge among World Bank client countries. This demand-driven funding mechanism allows the World Bank to respond quickly and efficiently to the needs of development officials and practitioners in the client countries.

Where there are many government officials and other practitioners in a country that would benefit from this experience, it can make sense to create "knowledge hubs" as a country-led institution or inter-institutional platform. They could be public or private. A hub supports and connects national and sub-national development practitioners (such as those involved in transport planning in second-tier cities), to peers and partners in the same country and abroad who offer or seek development experience and expertise.

[28] World Bank definition. See https://finances.worldbank.org/Other/LCR-South-South-Knowledge-Exchange-Activities/ait6-f4ye
[29] http://south-south.connect.teriin.org
[30] http://documentos.bancomundial.org/curated/es/292391534168200144/The-South-South-Knowledge-Exchange-Study-Tour-in-China
[31] http://www.gpoba.org/activities/indonesia-bpkp-south-south-knowledge-exchange
[32] https://www.knowledgesharingfordev.org/what-south-south-facility

Knowledge recipients usually gain the most when demand-driven knowledge exchanges are put in place. That is, participating in the knowledge exchange when they have a need and practical application for these insights. The benefits include (60):

- Lessons drawn from the practical experience of others can enrich the analysis and understanding of their problems, opportunities, and constraints, allowing for more holistic solutions.
- The knowledge exchange enables practitioners to validate their ideas and seek input and advice before putting them into practice.
- Exposure to best practices and success stories. Also, they can learn from their peers about approaches and tools that failed.
- They can gain valuable insights into successful and innovative solutions in other cities and can adapt these to their local contexts for effective capacity development.
- Knowledge exchanges can improve stakeholder buy-in. They also strengthen policymakers' capacity to lead their own development process.
- Knowledge exchanges can increase cost-effectiveness. Knowledge exchanges can share tested technologies, tools, and templates (such as contractual documents and approaches) without having to reinvent the wheel.

Additionally, a South-South exchange can help policy alignment. Accelerating the transition to low carbon high volume transport requires aligning policies across different levels of governments and between stakeholders to enable an efficient and cost-effective shift to a low-carbon economy (89). For example, to provide more energy-efficient and less carbon-intensive mobility land-use and transport planning must be well coordinated to discourage greater use of private vehicles. National frameworks and legislation sometimes leave local governments with little financial or political leeway to make low-carbon choices.

Geels et al. (90) highlight four foundations of a "socio-technical" framework that addresses this multidimensionality:

1. **Focus on socio-technical systems** rather than individual elements
   Any deep transformation needs to address "socio-technical systems"[33] that have developed over many decades, and the alignment and co-evolution of their elements make them resistant to change. An example is the perennial battle of private car users for more road space, confronting any efforts to give-up road space and move towards a more equitable use of public space, favouring public transport and NMT.

2. **Align multiple innovations and systems**
   Socio-technical transitions gain momentum when multiple innovations are linked together and act in combination. For example urban planning and transport systems can be integrated via transit-oriented development (building mixed-use areas around public transport stops),

[33] the interlinked mix of technologies, infrastructures, organizations, markets, regulations and user practices that together deliver societal functions such as personal mobility

compact cities, and intermodal transport (which facilitates mode-switching with seamless transfer facilities, smart cards, and aligned time-tables).

3. **Societal and business support**
   Accelerated transitions depend upon social acceptance and business support. Public support is crucial because any low-carbon transition in mobility could involve millions of citizens who need to modify their purchase decisions, user practices, cultural conventions and skills.

4. **Phasing out existing systems**
   Accelerated transitions can require actively phasing out existing technologies, supply chains, and systems that otherwise can lock-in emissions for decades. This can be met with considerable resistance from groups which would fight to protect their vested economic and political interests, and the sociotechnical framework must adequately address this.

To support and promote this accelerated transition it is vital that the knowledge exchange include all the affected stakeholders and other actors, and not just the transport development practitioners.

11. PREFERRED KNOWLEDGE TRANSFER MECHANISMS

Against this background, the respondents were asked to state their preferences on knowledge transfer mechanisms (see Figure 37-for overall and government, and Table 10 for other cohorts).

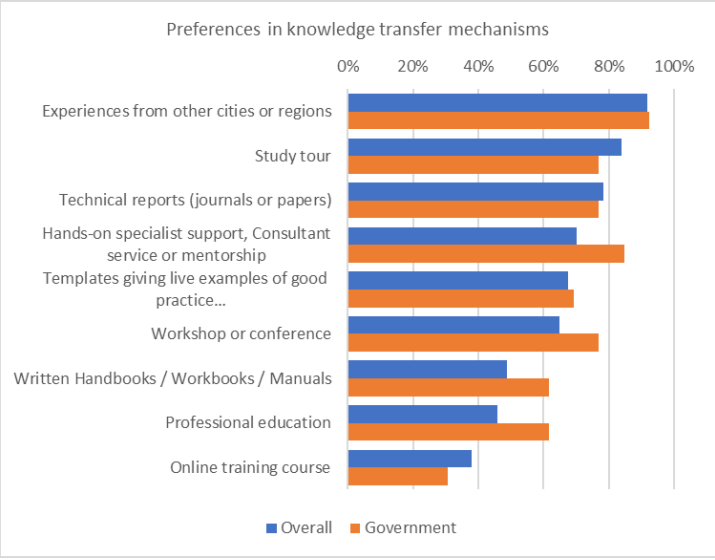

Figure 37 - Preferences in knowledge transfer mechanisms

The Government cohort (which includes national, regional, and local level ministries, agencies and transport authorities and NGO cohort prefer “experiences from other cities or regions” (92%), “hands-on specialist support, consultant service or mentorship” (85%), followed by study tour, technical reports (journals or papers) and workshop or conferences (with 77% each).

Academics and research organisations have a marked preference for study tours (100%) and technical reports (journals or papers) (83%).

The Private Sector cohort prefers technical reports (journals or papers) (100%) followed by experiences from other cities or regions (88%) and study tours (78%).

On-line training and professional education are of little appeal to any of the cohorts.

Table 10 – Preferences in knowledge transfer mechanisms

Knowledge Transfer Mechanism	Academic/ Research Institution	Private sector	Government	NGO and Funding Agencies	Overall
Experiences from other cities or regions	67%	89%	92%	91%	92%
Study tour	100%	78%	77%	73%	84%
Technical reports (journals or papers)	83%	100%	77%	45%	78%
Hands-on specialist support, Consultant service or mentorship	17%	56%	85%	82%	70%
Templates giving live examples of good practice (for contracts, funding applications, service provisions, etc)	50%	56%	69%	73%	68%
Workshop or conference	67%	56%	77%	45%	65%
Written Handbooks / Workbooks / Manuals	50%	22%	62%	45%	49%
Professional education	33%	22%	62%	45%	46%
Online training course	17%	44%	31%	45%	38%

Here again, we see the demand for tacit knowledge through South-South or triangular arrangements. This is noticeable for the cohorts that are involved in, and responsible for, project and policy implementation. Government and NGOs and funding agencies also show a high demand for hands-on specialist support, consultant service or mentorship programmes, which unsurprisingly has 57eagre interest for academic and research organisations. Explicit knowledge is in high demand from the private sector (technical reports, handbooks and manuals) but somewhat surprisingly slightly less so from academic and research organisations.

12. Existing Networks

So, what are the systematic knowledge exchange opportunities for developing-country practitioners that look to implement sustainable low carbon transport solutions?

While there are several organisations and consultancies that offer capacity building on sustainable transport (including low carbon transition), they tend to be ad-hoc solutions developed according to the needs of a specific client, and primarily North-South. There are few networks that systematically offer capacity building on low carbon transport and include the South-South peer knowledge exchange component demanded by many practitioners in the interviews and surveys. Several of the networks and programmes that cover this need are not focused on low-carbon transport but offer support over multiple sectors.

The programmes that have been identified as offering the best fit to the desired capacity building demand are mentioned below. Of these, the programmes most often highlighted explicitly by

participants, by far, is the International Sustainable Urban Transport Program (GIZ-SUTP), and SUTP India.

12.1. The International Sustainable Urban Transport Programme (GIZ-SUTP)

GIZ-SUTP deserves specific mention as the structured international capacity building programme most mentioned by respondents.

GIZ-SUTP is hosted by Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ). It is supported by numerous partners including the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and works with over 35 stakeholders in multinational and non-governmental organisations, development banks, academic institutions and the global Transport Knowledge Practice (gTKP) of which DFID is a member.

GIZ-SUTP, since 2003, has built an active portfolio of resources and capacity building programmes for international use. These include the SUTP Sourcebook series (which investigate the key areas necessary for a sustainable transport policy framework in developing cities), Technical Documents, Case Studies, Fact Sheets and Policy Briefs. Together these provide a specific focus and in-depth information on some of the critical issues surrounding sustainable urban transport. A list of topics covered in included in Annex 5.

GIZ-SUTP has delivered multiday capacity building courses based on these resources and complemented by detailed course material on various topics related to sustainable urban transport in Asia, Latin America, Europe and Africa (see Figure 38). Most courses are 1 or 2 days, targeted mainly towards familiarising policy makers, administrative and technical staff, with the concepts of sustainable transport with the longest around 6-7 days for more operative and training-oriented personnel. Until March 2016, GIZ-SUTP had conducted more than 140 courses that included over 5000 participants. Topics have varied from general issues such as Sustainable Urban Transport to specific issues such as Public Bike Schemes, Travel Demand Management, Planning for Mass Transit and Non-Motorised Transport systems, Financing Urban Transport, Mass Transit Options and Bus Rapid Transit Planning (91).

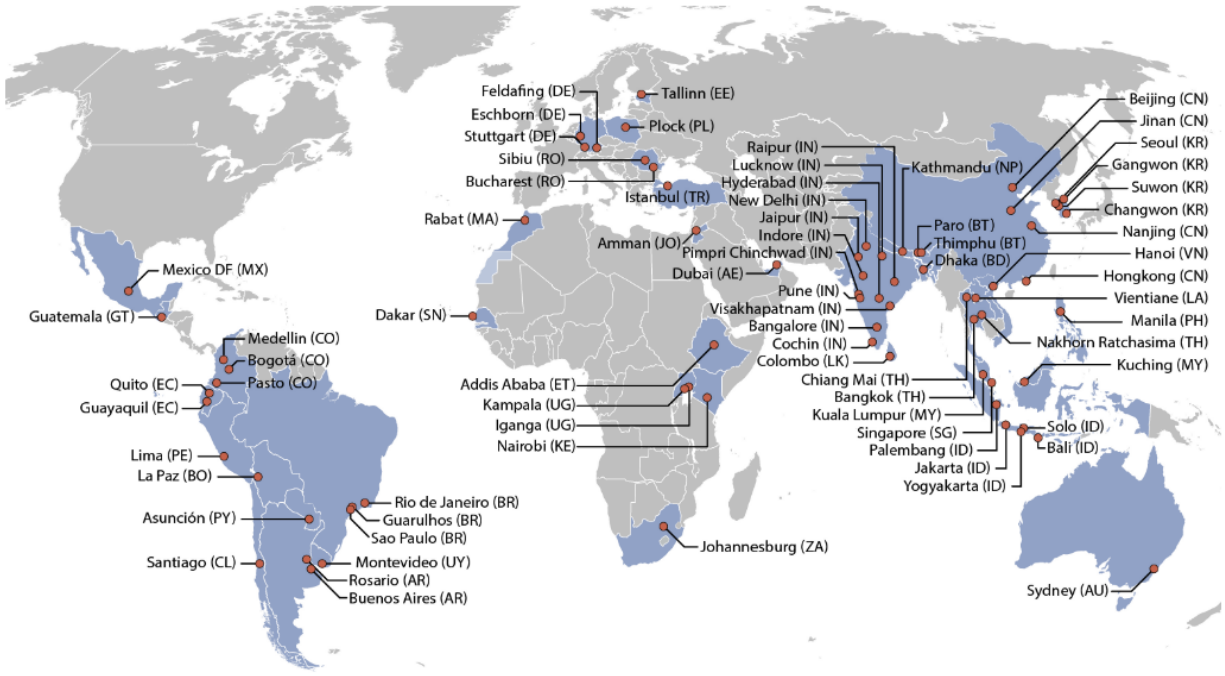

Figure 38 – Training courses held by GIZ SUTP until March 2016 (91)

This capacity building provides specific guidance towards achieving sustainable urban transport. Efforts to reduce or contain local environmental impacts (with the inclusion of climate change mitigation) form an important component of this but are not the primary objective.

12.1.1. Outcomes of SUTP courses

A review by GIZ of a recent 2-day course in Indonesia concluded that the participants seemed to like the training approach and outcomes. The capacity building aimed to raise awareness and give the participants the ability to stimulate debates and discuss the topic. However, the ability to apply the knowledge and become a crucial change agent towards more resilient urban infrastructure would require more substantial capacity development.[34]

Of interest to this study is, however, the more detailed guidance and assistance that has been provided by SUTP in India, which is intimately linked to the international GIZ-SUTP initiative.

12.1.2. Experiences of the GIZ-SUTP programme that are useful to the DFID Capacity building strategy

The GIZ-SUTP programme has developed the best consistent set of thematic reports and training material on a wide range of aspects of sustainable urban transport that give the practitioner explicit knowledge of ***what*** can be implemented and an overview of ***how*** to do it. It is suited to raising awareness of each theme and giving the participants the ability to stimulate debates and "sell" the concept to politicians, society at large and other stakeholders that are involved in the decision to adopt a sustainable transport solution. The material does not get into the minutiae of implementation; it does

[34] See https://www.sutp.org/en/news-reader/id-9th-isdb-giz-training-climate-change-is-not-an-issue-of-tomorrow.html

not provide guidance on the tacit knowledge that the persons charged with implementing a project would require to facilitate a successful conclusion. However, it could be complemented with practitioners' personal experiences in a workshop environment if used in a longer training course. The course length of normally 1-2 days and a maximum of 7 days is well suited to the declared purpose. On-going hand-holding and direct support to projects is left to separate consultant agreements.

12.2. SUTP-INDIA

SUTP-India takes the training material and explicit knowledge transfer from the GIZ-SUTP programme and adds the hands-on detail – tacit knowledge exchange—from pilot programmes to provide replicable sustainable transport solutions all under the framework of a national programme. The objective of SUTP-India was to provide a strong basis and incentive for cities to use good practice in the implementation of sustainable transport solutions.

The Government of India did this because it recognised that limited institutional and human capacity would be a major constraint at both national and local levels to sustainable transport development. SUTP-India was created to address this need by developing the skills for undertaking urban transport planning and management with practitioners in many Indian cities.

The project started in May 2010 for eight years funded by GEF, World Bank, UNDP, the Government of India and participating cities and states. Figure 39shows funding support.

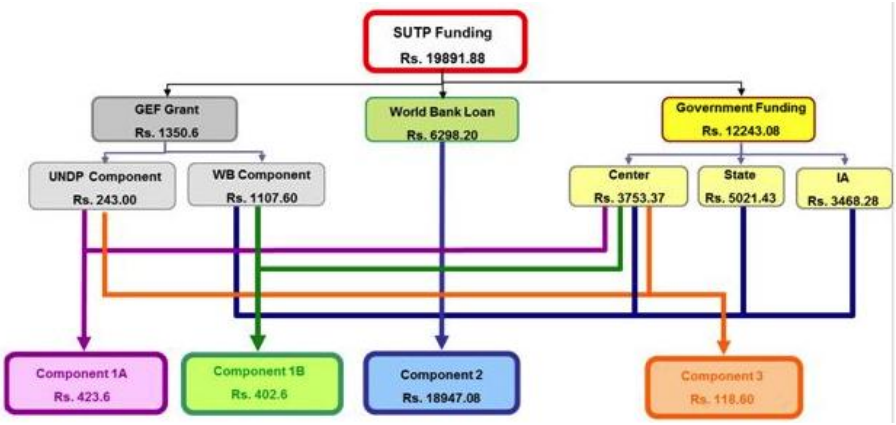

Figure 39 - Project Funding for SUTP India

The project had three components (see Figure 40). Capacity building was conducted under components 1A and 1B and component 2 covered demonstration cities. In component 1, ten training modules were

completed, 15 toolkits prepared,[35] and over 3000 participants were trained.[36]

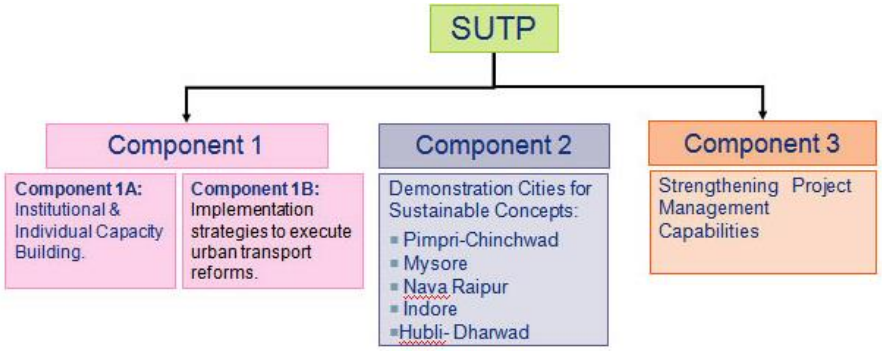

Figure 40 - SUTP India project components

Component 1A supported outputs and activities focused on Institutional and individual capacity development of government agencies and institutions already engaged in urban transport planning and implementation such as Ministry of Urban Development, state bodies, transport departments, and municipal corporations in identified cities. This component was funded by GEF through UNDP.

Component 1B provided technical assistance to the Ministry of Urban Development to improve national, state and local capacity to implement the capacity building elements, mass-transit, and NMT components of the National Urban Transport Policy. This component was funded by GEF through the World Bank.

Component 2 included demonstration capacity building and investment projects in five states and cities, supported by the World Bank. Models of sustainable transport solutions were created for other Indian cities to replicate, and these were used to develop tacit knowledge support under component 1B.
The projects that were taken up focused on four themes:

- Public transport development;
- Non-motorised transport development;
- Pilot Intelligent Transport System (ITS); and
- Integrated land use, transport planning and Transit-Oriented Development

Of interest to the LC-HVT programme was the preparation under component 1B of documents and guidance that focussed on the minutiae of sustainable transport implementation that is not found in other programmes, even GIZ-SUTP, including:

i. Operations Documents for Unified Metropolitan Transport Authority and selected cities
ii. Operations Documents for Traffic Management and Information Control Centre and selected cities
iii. Guidance Documents for Non-Motorised Transport (NMT) Plan, Bike Sharing Scheme and Transit Oriented Development (TOD) and selected cities
iv. Urban Transport Research

[35] See Annex 6 for details
[36] by September 2016 in various workshops with the support of the Ministry of Urban Development, the GEF, World Bank, UNDP, the Ministry of Environment and Forests, and the Institute of Urban Transport

v. GHG Emissions Assessment methodology
vi. Leaders Forum: Capacity Building for Leaders in Urban Transport Planning. This included international field visits for 200 senior and mid-level government officers to expose them to international best practices.
vii. Program Evaluation Study of Deployment of Buses by Cities
viii. Guidelines & Model Contract for City Bus Private Operations; and
ix. Project Preparatory Consultants in four cities: Jaipur, Mira Bhayandar, Bhopal and Chandigarh.

The combination of extensive capacity training in multiday courses focusing on explicit knowledge exchange (component 1A) with component 1Bs tacit knowledge support through standardised operation documents (activities i and ii), guidance documents (activities iii and viii), and standardised emissions assessment methodology (activity v) together with replicable pilot sustainable transport solutions (component 2), all under the framework of a National Urban Transport Policy provided a strong basis and incentive for cities to use good practice in the implementation of sustainable transport solutions.

This programme structure could provide an interesting model for the DFID LC-HVT capacity building strategy. The question is, how well did SUTP-India meet these objectives? As the programme has ended, we can look to the UNDP/GEF and World Banks terminal evaluations and to the opinion of the respondents of our primary fieldwork (who had experience of SURTP-India) to gain insights.

12.2.1. UNDP/GEF EVALUATION OF SUTP-INDIA

The UNDP/GEF evaluation of the programme in 2017 concluded that "because of implementing Component 1A of the SUTP, the capacity in India to promote sustainable urban transport as well as design and implement SUT projects has significantly improved in the five participating cities of SUTP. While this is a satisfactory achievement, the level of capacity built in India is not at a level where the number of transport professionals can fully satisfy the demand for planning and design of SUT projects in India, nor is there a critical mass of urban transport practitioners to grow the profession to meet this demand" (92).

Their lessons and recommendations were:

1. Implementation of Component 1A contained activities related to national research such as municipal level data collection for sustainable urban transport purposes. This activity was expanded too much from five cities to more than 40 cities, diffusing efforts to effectively manage data and provide knowledge management.
2. With a mandate to build the capacity of the Institute of Urban Transport as the main entity to advise the Ministry on all issues related to sustainable urban transport development in India, the project management should have paid more attention to networking with relevant national institutes on urban transport in addition to international institutes.
3. To ensure constant improvement of training programmes, aggressive follow-up on feedback surveys of training programmes is necessary.

4. An energetic and efficient project management unit is required to manage a large capacity building project where there are numerous consultations and approvals required to select attendees of various training programmes, especially within the Indian Government system

12.2.2. World Bank evaluation of SUTP-India

The World Bank in its 2018 evaluation (93) found "The national capacity building component (IB) is performing well. The Leaders in Urban Transport Planning training (see section 12.3), has covered over 400 officials working in the area of urban transport. Guidance Documents covering seven topics (Unified Metropolitan Transit Authorities, Urban Transport Fund, Transit-oriented Development, Non-Motorised Transport Masterplan, Traffic Management and Information Control Centre, National Urban Transport Helpline, contracting Private Bus Operations) have been released to enable cities to build-on and replicate the pilot developments under component 2.

Mysore ITS is successfully implemented and recognised within India as the first successfully operating ITS system on a city-wide bus system offering learnings and lessons to other cities. The BRT Lite in Naya Raipur is beginning to show an improvement in performance. Meanwhile, the system along with city bus service has been able to lock in a substantial proportion of trips to public transport. Mysore public bus service was launched on 4 June 2017, to a positive public response, becoming the first citywide bus service to be launched in India. In Pimpri-Chinchwad, two of the four BRT corridors have been launched, and the remaining two are in advanced stages of being launched. As a result of the interventions, the public transport mode share has more than doubled to roughly 9% in the city; In Indore, the ITS project though delayed is likely to be implemented by March end and in Hubli-Dharwad, the works are well advanced and launch expected in the next six months."

12.2.3. Respondents evaluation (from our primary research)

The interviewees that had participated in the SUTP-India programme were asked for their perceptions of:

- The best aspects of the SUTP-India Capacity Building Programme that should be replicated in other programmes; and
- The aspects of this programme that could be improved in other Capacity Building programmes

Over 90% of the respondents that had participated in the SUTP-India programme considered that the programme was worthwhile and had brought benefits to India in terms of accelerating the incorporation of sustainable urban transport to Indian cities. Their perception of the ten best aspects of this programme is shown in Table 11. However, the programme in their perception does have room for improvement as shown in Table 12.

They lauded the study tours, hands-on training and consultant support and mentoring once they started to apply what they had learnt in their cities but expressed that there should be more of all three, with longer and more interactive programmes. They liked the clear mandate on consideration of detailed environmental impacts, social impacts, impacts on heritage and cultural structures, but suggested that

the programme should make objectivity, transparency and tangibility of environmental management plan (EMP) implementation more stringent.

Procedurally, they suggested that the programme would benefit from (i) better identifying the people who would most benefit from this training programme; (ii) a more stringent training need assessment before designing each training programme for the selected participants; and (iii) a final performance evaluation of those trained to judge their suitability to get involved in implementation.

Overall, they are looking for programmes that provide detailed guidance and implementation support through case studies, exercises and exposure visits, minimising classroom lectures.

Table 11 – Interviewee perception of the ten best aspects of the SUTP-India programme

	Best aspects of the SUTP-India
1	Training at Centres of Excellence with mentoring to trainees taking up projects as part of capacity building.
2	Study Tour to best practice locations
3	Hands-on training and visit to live projects
4	The clear mandate on consideration of detailed environmental impacts, social impacts, impacts on heritage and cultural structures
5	Availability of Guidance Documents, case studies and exercises (most appreciated by participants)
6	Technological and policy aspects
7	The emphasis on active public engagement
8	The emphasis on third-party verification.
9	Stakeholder Engagement for the project.
10	The inclusiveness. Training the grassroots level who are involved in the implementation of the projects is of great help.
11	Interactive training with experiences of other cities
12	Examples of success and heterogeneous mix of participants

Table 12– Interviewee perception of 10 aspects for improvement of the SUTP-India programme

	Aspects for improvement of the SUTP-India
1	Better identification of the people who would most benefit from this training programme.
2	More interactive study tours should be planned which helps a lot in collaborating with new ideas and people
3	The programme should be more interactive
4	Duration of the programme should be longer and be at an appropriate level for the officials who participate
5	More focus on case studies and exercises as well as exposure visits. Classroom lectures should be kept to the minimum.
6	The organizers should conduct a training need assessment before designing each training program
7	The programme should make objectivity, transparency and tangibility of environmental management plan (EMP) implementation more stringent. Some software support could be mandated for this aspect.
8	Correct implementation of environmental management plan and stakeholder engagement plan
9	Better hand holding during implementation through a consultant or otherwise.
10	Performance evaluation of those trained to judge their suitability to get involved in implementation.
11	Equal emphasis on all the types of transport which can reduce carbon emissions.

12.2.1. Experiences of the SUTP-India programme that are useful to the DFID Capacity building strategy

The SUTP-India programme ticks all the boxes of a successful triangular (South-South-North) capacity building arrangement. It adopts all the documentation and training methods for explicit knowledge from

GIZ-SUTP, adds pilot programme support and uses this to develop specific tacit knowledge support for replication of the pilots to other cities and projects.

Participants praised the study tours, hands-on training and consultant support and mentoring once they started to apply what they had learnt in their cities. However, they felt that this should be over a longer extended period and that the courses should be more interactive to capture greater tacit knowledge.

The World Bank and UNDP evaluations considered that the component 1A and 1B training was progressing well as was the support to the five pilot projects. However, replication to other cities did not advance as hoped. Partly because the focus (and performance indicators) of the programme were more on training than pilot replication and (according to our respondents) greater care is needed in selecting the potential participants for the training.

For successful replication to occur requires a convergence of:

i. Political and societal consensus that the project is desirable, advantageous and should proceed
ii. Funding availability that covers initial investment and provides any required on-going operations expenditure support
iii. Practitioners with adequate explicit and tacit knowledge to develop a successful project (with on-going consultancy and mentoring to fill gaps)
iv. Feedback mechanisms that allow the lessons learnt in each project to enhance future projects.

Having knowledgeable practitioners (iii above) does not produce successful projects without (i) the political will to proceed and consensus among all involved stakeholders and other elements, and while SUTP-India trained many people, they were not selective enough to ensure that their support generated the needed convergence for successful replication.

12.3. The World Bank's Leaders in Urban Transport Planning Programme[37]

This programme helps participants develop a structured way of decision making that considers the complexities of urban transport. It was offered between 2012 and 2015 in around 30 different programs.[38]

It recognised that urban transport planning and management is complex which make choosing the right strategy for many transport professionals a problematic task. It is more than choosing technologies. It involves the consideration of a variety of factors such as affordability, local culture, environmental issues, financing, energy use, and impacts on special populations such as the young, the old, and gender-specific considerations.

[37] See http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTTRANSPORT/EXTURBANTRANSPORT/0,,contentMDK:23215585~menuPK:8717821~pagePK:210058~piPK:210062~theSitePK:341449,00.html

[38] With support from Energy Sector Management Assistance Program (ESMAP), Public-Private Infrastructure Advisory Facility (PPIAF), Australian Government (AusAID), Land Transport Authority (LTA) Academy, Singapore, Agence Française de Développement (AFD), Centre for Environment Planning & Technology (CEPT) University. Ahmedabad, India, and Korean Transport Institute (KOTI)

The programme was designed for senior and mid-level transport professionals. Policymakers and planners from national, state and city level governments who are responsible for "putting the pieces together" found the program very useful. Participants from civil society, consultants and potential faculty from local training institutions were also encouraged to apply.

The programme used a "hands-on" learning approach that makes extensive use of case studies, group exercises, and site visits to highlight the linkages among the different components of the urban transport system. It is structured a seven-day workshop sponsored by a local partnering institution. The workshop was preceded by a self-learning phase which involves about one hour of work each day over five weeks, and covered topics ranging from land use and transport planning to environmental and social issues in urban transport planning.

12.3.1. Experiences of the leaders in urban transport planning programme that are useful to the DFID Capacity building strategy

This programme fills an essential niche in sustainable transport development in building more detailed holistic knowledge among senior and mid-level transport professionals. The seven-day course structure fits nicely between the 1-2-day awareness raising needed for stakeholders (and politicians) that need to be brought on-board (such as that offered by GIZ-SUTP) and the extensive capacity building and mentoring that could be invaluable for the practitioners directly involved in implementing the project (that SUTP-India tries to provide).

Our respondents generally did not look favourably at on-line self-learning, and there is a general reticence to dedicate time to this before a lengthy capacity building session. However, it could be invaluable in bringing participants' knowledge to a level that allows informed groupwork and discussion.

12.4. The Climate Technology Centre and Network (CTCN)[39]

The CTCN is the operational arm of the UNFCCC technology mechanism. It is hosted by the United Nations Environment Programme (UN Environment) in collaboration with the United Nations Industrial Development Organization (UNIDO) and the support of a consortium of partners (see below) that are engaged in some 1,500 activities related to climate technologies in over 150 countries.

The CTCN facilitates the provision of information, training and support to build and strengthen the capacity of developing countries to identify technology options, make technology choices and operate, maintain and adapt technology. As part of this effort, the CTCN strives to identify, disseminate and assist in developing analytical tools, policies and best practices for country-driven planning to support the dissemination of environmentally sound technologies.

It has 478 members that provide technical assistance and capacity building. Of these, 32 mention transport as one of their areas of expertise (as shown in Annex 7)

12.4.1. Experiences of the CTCN programme that are useful to the DFID Capacity building strategy

[39] https://www.ctc-n.org/capacity-building

The Climate Technology Centre and Network, as the operational arm of the UNFCCC technology mechanism, provides a framework that facilitates one-on-one support to developing country projects and practitioners. As such, it could offer a valuable mix of abilities and tacit knowledge to complement any DFID low carbon capacity building strategy.

12.5. The South-South Experience Exchange Facility [40]

The South-South Facility is a multi-donor trust fund[41] that enables the sharing of development experience and knowledge among World Bank client countries. It has transitioned into a mechanism that supports World Bank operational teams in the design, delivery and monitoring and evaluation of South-South knowledge exchanges. A key feature is the inclusion of programmatic knowledge exchanges (a series of knowledge sharing interventions that build over time to address development challenges). It finances global knowledge exchange projects that draw upon the expertise of developing countries and provides a platform for sharing lessons. Between 2008 and 2017, it funded 230 knowledge exchanges with 94 countries as providers and 112 countries as recipients (see Figure 41). Of these, 13 programs included transport[42].

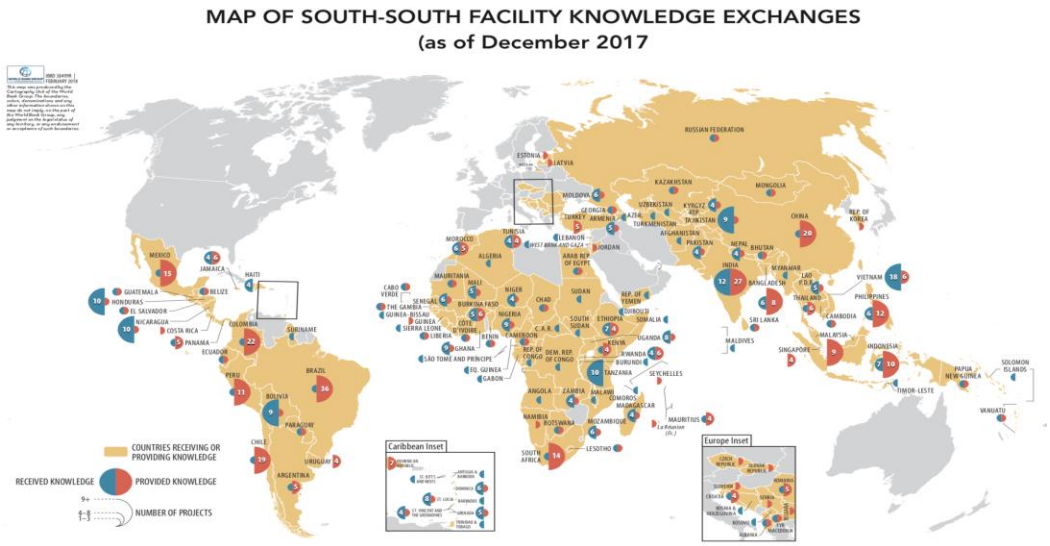

Figure 41 - Map of South-South Facility Knowledge Exchanges (as of Dec 2017)[43]

12.5.1. Experiences of the South-South Experience Exchange Facility that are useful to the DFID Capacity Building Strategy

[40] See https://www.knowledgesharingfordev.org/what-south-south-facility
[41] The partners are: China, Colombia, Denmark, Mexico, Russia, Spain, India, Indonesia; and the United Kingdom represented by the Department for International Development
[42] https://www.knowledgesharingfordev.org/funding/portfolio
[43] From: The South-South Experience Exchange Facility Implementation Progress Report 2017

The World Bank's South-South Experience Exchange Facility has funds and experience in setting up and managing programmatic knowledge exchanges to address longer-term development challenges that could be useful support for DFIDs low carbon transport capacity building strategy.

12.6. The Climate Action Network[44]

The Climate Action Network (CAN) is a worldwide network of over 1300 Non-Governmental Organizations (NGOs) in more than 120 countries, working to promote government and individual action to limit human-induced climate change to sustainable levels.

CAN facilitates this through information exchange and the coordinated development of NGO strategy on international, regional, and national climate issues. CAN has regional network hubs that coordinate these efforts around the world.

The project was started in 2013 in four pilot countries: Kazakhstan, Peru, Tanzania and Vietnam as a joint initiative by Friedrich-Ebert-Stiftung (FES), Bread for the World (BftW), World Wide Fund for Nature (WWF), Climate Action Network International (CAN-I) and ACT Alliance of Churches.

12.6.1. Experiences of the climate action network that are useful to the DFID Capacity building strategy

CANs worldwide network in over 120 countries can bring attractive additional knowledge and support for DFIDs low carbon transport capacity building strategy.

13. Capacity Building Strategy Proposal

This first component of the Theme 3 study explores the current state of knowledge of, interest in, and capacity to implement LC-HVT in selected project countries in Africa and South and Southeast Asia. The current study, within Theme 3, conducted additional primary research to dig deeper into the knowledge needs and propose a capacity building strategy to close the knowledge gaps that were identified.

The principal findings of this component show that the respondents, in general, are highly focused on their priorities for transport interventions on the mechanics of improving transport services for their core constituents. The research showed that in general, highest priority was given to the reduction of road congestion (67% of respondents cited this as high priority), the provision of affordable transport and mobility (cited this as high priority by 62%) and the provision of improved access/accessibility (cited by 40%).

While respondents do not assign a high priority to air quality, or climate change mitigation as a primary driver for the choice of transport intervention, according to our respondents, both can be useful co-benefits if presented in a way that generates interest and support among their core constituents.

Specific barriers to accelerated implementation of low carbon transport interventions include the existence of other more urgent government priorities, followed by weak or poor political leadership, weak regulatory framework for enabling environment, and a lack of clear policy direction towards

[44] http://www.climatenetwork.org/campaign/implementing-low-carbon-development

lowering the carbon intensity of this sector. A significant observation was that all the barriers mentioned by the respondents were related to process: i.e. *how* to implement low carbon high volume transport rather than *what* strategies to implement. Only 3% of respondents had anxiety or concerns about what they could implement to move towards low carbon transport; all the other concerns were about how to go about it.

No transport project in a lower income developing country can expect to get implemented only for its carbon-mitigation benefits; low carbon transport must directly benefit transport users, enhancing social and economic development, and thus should offer a definite range of benefits including that of low carbon. Effective promotion of the project may involve highlighting different benefits to different cohorts of stakeholders, with the remaining benefits occupying a co-benefit role.

The study showed how many of the respondents believe that they have, or can easily obtain, the explicit knowledge about what to implement[45] but because low carbon has not been a high priority for transport, much of the enabling framework such as funding, regulations, legislation and transparent policies that promote low carbon transport is not in place at the local level. According to the interviews, while they may be partially in place for the first tier of cities in each country, their presence is even more sporadic in the second tier and smaller cities. Consequently, many of the stakeholders that would be involved in implementing low carbon transport projects lack the tacit knowledge that the experience of such involvement would generate.

To address this, we propose a capacity building strategy focused on the practical aspects of low carbon implementation; a programme that can provide international best practice but with a clear mandate to fill the tacit knowledge gaps on how to deliver low carbon solutions in a way that is directly applicable to each local context. The capacity development strategy could also look at promoting the involvement of more women and young people into the transport decision–making process.

We believe that the World Bank's "Leaders in Urban Transport Planning Program" could be a good paradigm to follow particularly if complemented with the generally superior North-South documentation that the GIZ SUTP program has generated and if also complemented by stronger South-South tacit knowledge exchange that SUTP-India has brought into practice. However, there would be a benefit in addressing in this last case, the limitations highlighted in its terminal reviews and by this study's respondents.

We propose a two-tier organisation:

1. **Low Carbon Transport Implementation Partnership,** to be hosted by DFID in combination with other international partners
2. **Centres of Excellence for Low Carbon Transport Implementation,** to be established in existing institutes in each participating country

[45] They stated that it is easy to find on-line, in published papers, books, courses, from international agencies, and from suppliers

The organisation would deliver practical, operational support in the implementation of low carbon transport policies and projects to the local organizations and individuals who are responsible for implementing these policies and projects.

The organisation could look to initially establish Centres of Excellence for Low Carbon Transport Implementation in a group of no more than three DFID priority countries[46] and let this organisation "ripple-out" to a broader audience in more countries based on its demonstrated achievements, level of interest from individual countries, and the availability of financing and technical resources.

The selected project countries for this study could be a good choice as initial candidates. These countries were selected through a robust, quantitative process which focused on identifying DFID countries in Africa and South Asia that have the highest need for low carbon transport; the assumption was that urgency is the highest in countries with high motorisation rates, high current transport emissions, and high projected business-as-usual (BAU) transport emissions growth. They are:

South Asia: India, Indonesia, Bangladesh
Africa: South Africa, Ghana, Nigeria, Rwanda, Uganda, Kenya

13.1. The Low Carbon Transport Implementation Partnership

Hosted by DFID, the Low Carbon Transport Implementation Partnership would coordinate and combine the support from three cohorts of partners to the Centres of Excellence for Low Carbon Transport Implementation.

- **Funding partners**
  It is proposed that the partnership combine funding from DFID with other selected international funding agencies[47] and bilateral funding agencies[48]

[46] which include: Afghanistan, Bangladesh, Burma, The Caribbean, Democratic Republic of Congo, Ethiopia, Ghana, Indonesia, Iraq, Jordan, Kenya, Kyrgyzstan, Lebanon, Liberia, Malawi, Mozambique, Nepal, Nigeria, Occupied Palestinian Territories, Pakistan, Rwanda, Sierra Leone, Somalia, South Sudan, Sudan, Syria, Tajikistan, Tanzania, Uganda, Yemen, Zambia, and Zimbabwe. Note that China, India, and South Africa are not in this list but are considered DFID development partners.

[47] Possible partners include African Development Bank (**AfDB**), Asian Development Bank (**ADB**), Asian Infrastructure Investment Bank (**AIIB**), Caribbean Development Bank (**CDB**), Inter-American Development Bank (**IADB**), Islamic Development Bank (**IDB**), Organisation for Economic Co-operation and Development (**OECD**), United Nations Development Programme (**UNDP**), United Nations Environment Programme (**UNEP**), **World Bank** Group

[48] Possible partners include: **Australia**: Department of Foreign Affairs and Trade (Development Cooperation Division); **Canada**: Canadian International Development Agency and the International Development Research Centre (IDRC); **Denmark**: Danish International Development Agency; **European Union**: EuropeAid Development and Cooperation; **Finland**: Department for International Development Cooperation; **France**: Expertise France, Department for International Cooperation and French Development Agency; **Germany**: Federal Ministry for Economic Cooperation and Development, Kreditanstalt für Wiederaufbau (KfW), and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); **Japan**: Japan International Cooperation Agency and Japan Bank for International Cooperation; **Korea**: Korea International Cooperation Agency; **Netherlands**: Ministry of Development Cooperation and The Netherlands Foreign Trade and Development Agency; **Norway**: Ministry of Foreign Affairs: International Development Program and Norwegian Agency for Development Cooperation; **Saudi Arabia**: Saudi Fund for

- **Cooperation partners**
  The importance of participating cooperation partners is to ensure synergy between this program and other related programmes that look to improve the sustainability of urban and long-distance freight and passenger transport. While some have a focus on low carbon (see Existing Networks), there are many other national and international capacity building programs that have low carbon as a co-benefit. This programme must avoid being in "competition" with these, benefiting from their best practices and providing support to their programs. It is hoped that many of the organisations listed in footnotes in 47 and 48, who decide not to participate as funding partners would participate as cooperation partners.
- **Implementation partners**
  Implementation partners are the multilateral or international organisations that are a source of knowledge, experience and other resources on all aspects of low carbon transport implementation. They include many of the organisations listed in footnotes in 47 and 48 plus others [49]
  Each Centre of Excellence for Low Carbon Implementation would also be represented in the Partnership and have active participation in defining the strategic development of the program.

13.2. Centres of Excellence for Low Carbon Transport Implementation

Each Centre of Excellence for Low Carbon Transport Implementation would provide support to organisations and agencies in the country that are in the process of planning and implementing low carbon transport solutions. A leading existing capacity-building institute would host the Centre in each country providing support under three components:

1. **In-country support for pilot project development**
   This implementation support would coordinate and provide knowledge transfer from the Partnership, its coordinating and implementing partners and from Centres of Excellence in other countries to apply best practice in -line with the local context for the policy or project implementation. Examples of possible development policies and projects could include:
   - Improving inland waterway channels;
   - Improving berthing and intermodal freight hubs for containers and other specialized traffic;
   - Improving rural road connectivity, resilience, and infrastructure for passenger and freight services;
   - Developing intercity traffic connections in city-clusters;
   - Strengthening supply-chain-based freight connectivity;
   - Optimising urban railway, metro, BRT and bus service networks in cities;

Development; **Sweden**: Swedish International Development Cooperation Agency; **United States**: United States Agency for International Development (USAID)

[49] Including organizations such as C40; Cities for Mobility; Citynet; Clean Air Asia; Clean Air Institute,; ICLEI - Local Governments for Sustainability; Institute for Transportation and Development Policy; International Association of Public Transport (UITP); Sustainable Urban Transport Project (SUTP); TRANSfer; Transport Research Board (TRB); United Nations Centre for Regional Development (UNCRD); United Nations Development Programme (UNDP); United Nations Institute for Training and Research; World Resources Institute (WRI) - EMBARQ

- Establishing local area transport demand management to favour NMT and mass transit use;
- Promoting intelligent dispatching systems for passengers and freight;
- Introducing public and semi-public charging infrastructure for electric vehicles;
- Establishing fuel quality, vehicle emissions and fuel economy standards.

The Centre of Excellence for Low Carbon Transport Implementation would provide the technical and financial resources needed to leverage this knowledge transfer. It would also ensure that the resources, guides templates, contracts and tacit knowledge that lead to a successful pilot are documented and could be easily replicated in other cities and regions of the country and made available to the other participating country Centres of Excellence. The objective of this is to provide practitioners that are just starting in low carbon project development to benefit from the practical experience (and personally-developed resources) of what not to do, what to do, and how to go about it, that another, with many similar successful projects under his belt, has gained.

2. **Practical capacity building for pilot project replication and implementation of best practices**
   This component would take the resources, guides templates, contracts, tacit knowledge and lessons learnt in Component 1 (support for pilot project development) and apply these to other projects, cities and regions in the country. This component shall also build on the support for pilot project development in other associated Centres of Excellence. It would include study tours and expert exchange visits as part of its South-South knowledge exchange. It would provide the technical and financial resources needed to leverage good practice into further similar projects, providing the support and synergy so that the second project team can receive the full benefits from the material developed and lessons learnt by previous applications.
   The success of the overall programme and each Centre of Excellence would be measured by what is achieved under this component.
   By setting the programme indicator of success on the replication of pilot projects and the implementation of best practices in projects and policies, it proposes reinforcing the practical applicability of the programme and avoid gauging success on the gross number of people trained.
3. **Institutional strengthening**
   This is a support component that is specifically focused on creating the conditions for successful implementation of policies and projects that are being planned and implemented in components 1 and 2. As such, it looks to achieve a very practical outcome. Themes could include:
   - Structuring an active interaction among stakeholder institutions for low carbon transport;
   - Strengthening the accountability of a legislatively enabled transport authority;
   - Structuring and developing a regulatory environment that favours low carbon transport;
   - Developing an effective transport masterplan for a city or region that promotes low carbon transport;

- Involving social media and wider community involvement in low carbon transport projects;
- Involving the business community in cost-effective and robust low carbon transport solutions;
- Making transport project investment bankable to private financing;
- Improving access to international funding for low carbon transport projects and policies.

As in Component 1, the resources, guides templates, contracts and tacit knowledge that lead to a successful outcome would be documented and provided for easily replication in other cities and regions of the country and made available to the other participating Centres of Excellence.

In structuring this service provision, it is essential to differentiate:

- What the project implementors **know that they know.** Information and knowledge that is already accessible to them and is not needed via this programme.
- What the project implementors **know that they do not know.** Information and knowledge that they have identified as critical, but that they do not have readily accessible and would be a valuable contribution of this programme.
- What the project implementors **do not know that they need.** This could highlight and generate insights on what were the most critical knowledge areas that they had to develop along the way;
  i. information that maybe unexpectedly, was key to "selling" the low carbon project to other stakeholders and getting it implemented
  ii. knowledge that would have made the process far smoother if they had possessed it from the very beginning
  iii. templates (for example, for legal agreements, access to funding, service provisions) that, had good-practice examples from other entities been available would have significantly speeded-up the development and approval process.

13.3. Project Funding

It is not proposed that this programme fund the low carbon development policy and project; it would contribute resources to aid its implementation. As an example, for a BRT project, this programme would not pay for buses or infrastructure but would contribute to the implementation of the programmes through knowledge exchange and making technical resources available, at no, or limited cost to the project. However, the programme should, wherever needed, assist implementors in identifying prospective funding sources and helping put together all the documentation that a funding request to these sources requires. This would generate templates and documentation examples that can be applied in project replication in other (sub-national) entities.

13.4. Structure of Centres of Excellence

For a Centre of Excellence to be incorporated into the Partnership it should meet certain characteristics:

- **Political partners**
  It must demonstrate high-level national government support and commitment and sub-national level support covering the leading stakeholders involved in policies/projects that are actively being developed.

- **Funding partners**
  The funding committed by the Partnership to the Centre of Excellence must be at least matched by in-country financial support, preferably including funding from political partners. It may have additional direct financial support from some international agencies (for example the Global Environment Facility (GEF) which may earmark fund to the country from its 39 donor countries).

- **Cooperation partners**
  It should include as participating cooperation partners the national and sub-national government agencies that are actively involved in planning, implementing, and operating high volume transport solutions to ensure synergy between this programme and other related programmes that look to improve the sustainability of urban and long-distance freight and passenger transport. It is expected that universities, think-tanks, NGOs and other private organisations that have activities related to LC-HVT may also participate as cooperation partners. Additionally, some international organisations may provide direct cooperation to a country for example as in South Africa-Sweden knowledge exchange cooperation.

- **Implementation partners**
  The Centre of Excellence is expected to coordinate activities with local implementation partners including transport associations, research institutes, and private companies that are specialist in capacity building and knowledge exchange in the field of LC-HVT.

13.5. THEMATIC AREAS TO BE COVERED BY THIS PROGRAM:

The Low Carbon Transport Implementation Partnership shall provide coordination, North-South guidance, funding and other resources (such as manuals, case studies, templates and worked examples (e.g. for public service contracts) and technical documents) to the Centres of Excellence. This could follow the example of the material generated and provided by GIZ-SUTP to SUTP-India, or many of the practical manuals and workbooks that have been developed by the World Bank Group.

The Volvo Research and Educational Foundations also provide excellent examples of such support; for example, their “Urban Freight Platform Conference 2016 - Accommodating urban freight in city planning” shows that it is possible to learn from experiences in a wide variety of cities even though the theme being investigated has a strong local context.[50]

[50] The collection contains ten studies with examples taken from cities in Europe, the USA, Asia and South America, and covers different dimensions of planning including the way to accommodate freight needs within limited urban space, to deal with innovations in the last-mile and to involve stakeholders in order to integrate freight issues into planning.

The Low Carbon Transport Implementation Partnership would coordinate knowledge exchange to the Centre of Excellence from other Centres of Excellence and partners (study visits, hands-on training, consultant support and mentoring).

The Centres of Excellence would deliver capacity building and knowledge exchange to promote low carbon implementation of projects and policies with a practical, hands-on format. As such, the Centre of Excellence does not look to provide a full curriculum of superior education; its focus is on getting projects and policies implemented using best practice solutions, and to this end it looks to provide specific guidance, tools techniques, and knowledge (both tacit and explicit) to implementors at the moment that it would be most useful to them.

Projects and policies that would be supported by the Centre of Excellence shall be chosen based on the following criteria:

1. Their mitigation potential and alignment with NDC targets
2. Their replicability to other projects in the country
3. Their priority with Centres of Excellence in other countries.
4. The co-benefits of supporting this project in terms of sustainable transport, access, inclusion, air quality and health.

Choosing projects that have high priority in several Centres of Excellence allows important burden sharing in the preparation of resources that can be used (and shared) in multiple countries.

The following initial selection of priority themes was proposed by study respondents and is complemented by the quick wins developed in this study[51] and the future areas of research from the main report.

a) Implementation of low carbon projects or interventions
- How to establish integrated transport system planning across all modes and from trip origin to destination
- How to formulate sustainable urban mobility plans (SUMPs) supported by a national urban mobility policy or programme
- How to make use of intelligent transport systems (ITS)
- How to set up and operate long-distance rail connectivity
- How to set up and operate modal exchange between road freight and water/rail transport systems
- How to provide infrastructure for electric vehicles
- How to phase out (and substitute) old polluting vehicles
- How to set up and manage rural transport infrastructure and services
- How to introduce road asset management procedures

b) Institutional Capacity and Advocacy
- How to structure an active interaction among stakeholder institutions for low carbon transport

[51] The list of quick wins developed in this study used as its basis a process carried out from March to July 2016 in which a list of over 100 measures was compiled from inputs through an email invitation sent to over 100 organisations working on sustainable transport.

- How to reduce political risk
- How to strengthen political leadership and resolve, and clear policy direction
- How to strengthen the accountability of a legislatively enabled transport authority
- How to put together a good effective transport masterplan for a city or region

c) Transport Policies and Strategies

- How to make a case for focusing on, and adopting Low Carbon Transport
- How to draft Low Carbon Transport policies and strategies
- How to structure and develop a regulatory environment that enables Low Carbon Transport
- How to ensure that private-sector provision of public transport results in more equitable service, and avoid profit-driven pitfalls (e.g. infrequent services, or peak-services only, poor quality)
- How to make paratransit reform and transformation more politically palatable.
- How to implement long-term low carbon projects that span political legacies and election cycles.
- How to promote electric two- and three wheelers, including e-vehicle sharing systems.
- How to Improve freight efficiency (e.g. reduce empty load running by freight trucks) through route optimisation, asset sharing between companies, and increased use of ICT solutions
- How to introduce vehicle emissions standards and fuel economy standards
- How to ensure production compliance for vehicle emissions and fuel economy standards

d) Mobilising funding

- How to access International donor and climate financing,
- How to implement private-public partnerships (PPP) for low carbon transport
- How to demonstrate cost savings to the business community

e) Transport Finance

- How to establish transport service agreements that allow the operator to obtain low-cost capital to establish the service
- How to structure and develop a taxation or incentive regime for low carbon transport
- How to analyse life-cycle costs and reliability

f) Social Media, public and stakeholder engagement

- How to establish a detailed public engagement program
- How to maintain stakeholder engagement
- How to promote the benefits of low carbon transport solutions

g) Regulation (principally local or regional)

- How to regulate and promote shared ridership
- How to effectively regulate with social justice the import of second-hand vehicles into LICs (with and without vehicle industries)
- How to Implement (ultra-) low emission zones, including car-free zones in city centres
- How to introduce and scale up pricing for car-related travel options (e.g. congestion/road charging, parking pricing)

- How to provide and improve walking and cycling infrastructure (e.g. connected walking paths, protected cycle lanes, safe intersections), reallocating road space where necessary
- How to regulate and promote dock-less bike / e-bike / e-scooter sharing schemes
- How to regulate phone-app taxis
- How to manage motorcycle taxis

h) GHG Analysis, Monitoring and Reporting

- How to set GHG and local pollutant emissions reduction targets
- How to quantify baseline emissions and model emissions reductions
- How to perform a cost-benefit or multi-criteria analysis over the life of low carbon vehicles
- How to setup a program for monitoring, reporting and verifying (MRV) emissions reductions
- How to better understand the relative contribution of the transport sector (vs other sectors) to GHG emissions reductions in LICs, and how is this projected to change over time

13.6. SELECTION OF PARTICIPANTS FOR CAPACITY BUILDING AND KNOWLEDGE EXCHANGE

Since the focus of this programme is on implementing low carbon projects and policies and not training for training's sake, it is imperative to correctly identify the prospective participants in this programme to meet these goals. Under normal circumstances, this would require that decision leaders for the specific project participate in the programme before their staff are invited to participate.

Performance evaluations of prospective participants should also be considered to judge their suitability to be involved in implementation, and to ensure constant improvement of the programmes, aggressive follow-up on feedback surveys of training programmes is necessary.

13.7. FORMAT OF THE CAPACITY BUILDING AND KNOWLEDGE EXCHANGE

To ensure that this goal is met of getting low carbon projects and policies implemented, each specific course or programme must be in response to a needs assessment evaluation and consideration should be given to delivering it to different target audiences so that each course or programme matches the level, and needs, of the participants.

The experience of SUTP-India and the World Bank's leaders in urban transport planning programme suggests that a useful format would involve:

- Short courses and workshops at the Centre of Excellence.
- Mentoring of trainees taking up projects as part of their capacity building
- Hand holding support during program implementation (having an expert on-call for consultation when needed)
- Hands-on visits and interactive training at live projects (primarily within the same country but also projects covered by other Centres of Excellence)

- Tacit knowledge exchange (via courses, workshops, and mentoring) from people that have been directly involved in implementing similar projects (primarily within the same country but also projects covered by other Centres of Excellence)
- Generation and sharing of guidance documents based on concrete experience from other similar projects and pilots
- Generation and sharing of templates and case-study examples of documents successfully used in other similar projects. For example, as mentioned by respondents:
    - Procurement contracts
    - Transport service contracts
    - Detailed public engagement programs
    - Detailed stakeholder engagement programs
    - Informational documents required by bilateral and multilateral development partners such as project information documents (PID), project appraisal documents (PAD), project concept notes (PCN)
    - Terms of reference (TOR) for consultants and service providers
    - Environmental impact assessments
    - Environmental and social management plans (EMP, ESMP)
    - Social impact assessments
    - Cost-benefit analyses
    - Financial analytical models
    - Transport activity and emissions models
    - Definition of counterfactual base cases for mitigation analysis
    - Monitoring, recording and verifying (MRV) structures, documents, databases
    - Third-party verification programs
    - Documents to apply for, and support, carbon finance

13.8. Level of Resourcing

The cost of operating this capacity building program will depend on the number of countries actively involved (i.e. the number of Centres of Excellence for Low Carbon Transport Implementation that are established) and on their expected activity level. Limiting either of these (extension or scope) will reduce operating expenses but could also reduce the interest of funding partners (for the international Low Carbon Transport Implementation Partnership, or national Centres of Excellence for Low Carbon Transport Implementation levels).

A larger program is likely to generate more interest among countries and implementing agencies to participate, so the program needs to have sufficient ambition to be of interest. Interest can be heightened when it is possible to link this program with LCT implementation funding. For example, the UNDP capacity building project in India through the Sustainable Urban Transport Program with a five-year budget of US$8.55 million (including an international component of US$4.05 million) was linked to a World Bank/GEF specific Investment loan (over 5 years) of US$125.5 million, which undoubtedly made

it a more attractive proposition to the borrower/recipient. The overall program five-year budget (specific investment and capacity building) including local financing was US$357 million (see Table 13).

In the final evaluation of this project, UNDP concluded that:

> "…. The insertion of UNDP on a World Bank-GEF project for capacity building has worked well and served as a good foundation to enable [the lead transport institute] to improve the capacity of local government personnel to design and implement sustainable urban transport projects" (92)

Table 13 - Components and Costs of the SUTP-India five year programme (92) (94)

Specific Investment funding (US$m)			
	Local	Foreign	Total
Borrower/recipient	223.1		223.1
World Bank (IBRD)		105.2	105.2
Global Environment Facility (GEF)		20.3	20.3
Total	**223.1**	**125.5**	**348.7**
UNDP Capacity Building Component (values at endorsement) (US$m)			
Borrower/recipient	1.444		1.444
GEF		4.050	4.050
India counterpart financing	3.056		3.056
Total	**4.50**	**4.05**	**8.55**

This SUTP capacity building budget (of average US$1.71 million per year over five years, starting in 2009) in one country generated the following outcomes:

- The hosting transport institution developed into a transport knowledge centre
- The program provided technical assistance to 6 states and training and advisory services to 14 states
- Provided a "hand-holding" technical assistance to local governments in programme implementation
- Provided ten training programs and ten annual workshops throughout India
- Prepared manuals and toolkits to serve as reference documents
- Involved more than 60 cities in India on planning SUTP initiatives

It is important to note, however, that additional to this budget was:

- GIZ-SUTP international costs that developed the sourcebook series and most of the courses
- GIZ-TRANSfer project funding and support[52]
- Implicit funding support from Component 2 of this programme (pilot project development) which was the basis for the development of much of the local guidance and training documents. (94)

For the capacity building strategy proposed in this paper, the level of activity can be adjusted to the available budget; however, an illustrative annual operating budget could be as shown in Table 14. The

[52] See http://www.transferproject.org

table shows annual operating costs for three cases: with one, five and nine Centres of Excellence for Low Carbon Transport Implementation, each in a different country in Africa and South Asia. There is a definite synergy to be expected as more countries are added since much of the material that is prepared (guidelines, templates, reference and course material) can be used interchangeably with little or no alteration. The numbers presented in Table 14 underplay the impact of synergy since at the same time, having a more active overall programme can be expected to drive higher levels of interest in participating in each country. So, one could expect that if there were various centres, each centre would be able to accomplish more with the same level of resources than it could if it were alone.

Table 14 - Illustrative annual budget for capacity building strategy (in US$ millions) – author's calculations

Low Carbon Transport Implementation Partnership		With one Centre of Excellence		With five Centres of Excellence		With nine Centres of Excellence	
		#	USD$m	#	USD$m	#	USD$m
Staff							
	Local hire technical staff	2	0.2	2	0.2	3	0.3
	International technical staff	1	0.3	2	0.5	3	0.8
	Days, International consultants	180	0.1	720	0.5	1080	0.8
Expenses							
	Intenational staff		0.1		0.2		0.3
	Office space (Embedded in "lead" Centre of Excellence)		0.2		0.2		0.4
	Office expenses		0.0		0.0		0.0
Travel							
	International	6 weeks	0.0	12 weeks	0.1	18 weeks	0.1
	National	36 weeks	0.1	30 weeks	0.0	30 weeks	0.0
	Other associated countries			78 weeks	0.2	120 weeks	0.3
Workshops/clinics							
	Workshops/clinics: 30 @ 20000	6	0.1	30	0.6	50	1.0
	Total Annual cost		1.1		2.5		4.0
Centre of Excellence for Low Carbon Transport Implementation		**With one Centre of Excellence**		**With five Centres of Excellence**		**With nine Centres of Excellence**	
		#	USD$m	#	USD$m	#	USD$m
Staff							
	Local hire technical staff	2	0.2		1.1		2.1
	Days, local consultants	720	0.2		1.1		1.9
Expenses							
	Support to Embedded Institution		0.5		2.5		4.5
	Office expenses		0.0		0.1		0.1
Travel							
	International	12 weeks	0.1		0.4		0.6
	National	48 weeks	0.1		0.4		0.6
	Other associated countries	12 weeks	0.0		0.1		0.2
Workshops/clinics							
	Workshops/clinics:	12	0.1		0.6		1.1
	Total Annual cost		1.2		6.2		11.2
Total Partnership and Centres							
	Total Partnership and Centres		2.4		8.8		15.2
	Equivalent per Centre		2.4		1.8		1.7

This illustrative example shows an annual operating cost for one Centre of Excellence for Low Carbon Transport Implementation (including the international Partnership component) of US$2.4 million. With five countries on-board this rises to US$8.7 million, or US$1.8 million per Centre, and with nine countries included, the annual operating cost increases to US$15.2 million, or US$1.7 million per Centre.

Having a multi-country capacity building strategy can also be expected to attract greater interest and involvement from funding and implementing partners and from the countries themselves. So while in this example, a nine-country programme could have an operating cost of around US$15 million, as opposed to US$2.4 million for a single country programme, the cost to DFID could potentially be roughly half of that amount at around US$7 million (see Table 15) provided DFID is able to attract funding partners with the participation rates shown.

Table 15 - - Illustrative annual budget distribution by source for the case with nine centres of excellence (in US$ millions) – author's calculations

Low Carbon Transport Implementation Partnership		%	US$m
	DFID	60%	$ 2.4
	Funding Partners	40%	$ 1.6
	Total		$ 4.0
Centre of Excellence for Low Carbon Transport Implementation		**%**	**US$m**
	DFID	40%	$ 4.4
	Funding Partners	20%	$ 2.2
	Country counterpart financing	40%	$ 4.4
	Total		$ 11.1
Total funding by source			
	DFID		$ 6.8
	Funding Partners		$ 3.8
	Country counterpart financing		$ 4.4

This capacity building strategy proposes setting the programme indicator of success on the replication of pilot projects and the implementation of best practices in projects and policies, rather than on the gross number of people trained. This is a better indicator of the overall effectiveness of the programme but does imply a guaranteed funding window of at least five years.

13.9. POTENTIAL BARRIERS/RISKS THAT COULD IMPEDE IMPLEMENTATION/SUSTAINABILITY

Table 16 identifies potential barriers and risks that could impede the development of the capacity building strategy and proposes measures to mitigate these risks.

Table 16 - Potential barriers and risks and proposed mitigation measures

Potential barriers and risks	Proposed mitigation measures
Lack of government interest/commitment to participate from DFID priority countries	• Maintain high-level policy dialogue with possible political partners to obtain strong commitment • Form strategic alliances with other international donors that wish to invest in project and policy implementation. Link commitment to the capacity building strategy with a commitment to loans from other international donors • Start the programme with high ambition in a more limited set of countries and expand gradually based on strategy results • Obtain political commitment by supporting the client's strategies and programs
Awareness of political cycles and agendas	• As government support is critical in the start-up of the strategy, maintain awareness of political timeframes and agendas to avoid a loss of political support before the strategy is fully established
Inadequate national level project management	• Agree with the government that they hire a project management consultant to strengthen functions of overseeing, supervising, and monitoring the various project preparation and implementation activities.
Inadequate information sharing and broad public communication	• Particularly in multi-country/state/city projects strong dissemination and discussion of experiences and insights is critical and must be high priority for the strategy at international and national levels.
Lack of interest/commitment or ability in local training institutions that could embed this strategy	• Maintain high-level dialogue with the political and implementing partners to achieve strong commitment • Increase the institutional strengthening component. • Start coverage with organisation temporally embedded in a neighbouring country
Lack of interest/commitment from funding partners	• Increase the level of ambition by increasing the scope in each centre of excellence or adding more countries to the programme. • Form strategic alliances with other international donors that wish to invest in project and policy implementation • Concentrate initially on those countries where strong commitment exists.
Lack of technically competent staff	• Start initially with a higher percentage of international staff/consultants • Set up an exchange program for staff with other Centres of Excellence for Low Carbon Transport Implementation • Offer staff the opportunity to participate in part-time postgraduate education as part of their work schedule • Develop a career path for staff within the Partnership
Institutional and capacity development achieved under this strategy will not be maintained	• Maintain high-level policy dialogue with the political partners to sustain strong commitment • Careful design and implementation of key institutional reforms • Coordination with other donors and international institutions

Training does not achieve the desired results	• Carefully select participants to the program that work in an environment that will enable them to use their new skills. In many cases, this can mean not accepting a participant if his management has not been trained or does not share the same convictions and views of the programme. • Solicit and analyse app participant feedback
Pilot projects developed with international grants and funding will not be replicated in other cities without international support	• Strengthen the process of selection and preparation of program implementation that this strategy will support • Tightly link pilot projects to national transport (and urban) policy development • Actively promote knowledge sharing with other cities and coordinate possible implementation funding with other donor agencies
Adverse social, environmental and gender impacts	• Promote a uniform safeguards strategy in the programme design, implementation and operation processes that addresses environmental and social issues and provides a framework to ensure community involvement and transparent public disclosure
Organization loses the flexibility to adapt to local needs and requirements	• Solicit and analyse feedback carefully from participants and all stakeholders (both directly and indirectly involved) to maintain the relevance of the strategy and its programs
Lack of involvement of professional NGOs	• Ensure meaningful involvement of international professional NGOs, national think-tanks, universities and business associations to maintain relevance and best practices in the strategies support to program and policy implementation
Poor quality in project implementation damages the program's reputation	• Maintain close links and dialogue with the political partners to sustain strong commitment, with other implementing partners and with societal stakeholders (NGOs and others) • Adopt a phasing approach so that replication in secondary cities can learn from previous experiences • Intensify capacity building in participating cities and states.
Governance and corruption risks	• Provide regular training and capacity building to all project staff and consultants

14. NEXT STEPS

To develop these recommendations into a solid capacity building business proposal for DFID's research and activities in Part 2 of their Applied HVT Research Programme on Low Carbon Transport would require additional work.

These recommendations have been developed based on a limited set of survey responses and expert interviews that covered a wide breadth of themes from four cohorts of stakeholders:

i. National Government
ii. Local Government and Agency
iii. Private Sector
iv. Research Organizations

In Phase 2, it would be necessary to evaluate the interest to participate of ministries in selected DFID priority countries, and their willingness to commit resources to a capacity building/knowledge exchange

program of this extension in support of their NDC and sustainable development commitments and plans. Similarly, feedback from the nine selected project countries could be invaluable in strengthening this proposal and ensuring a tight focus on their operational needs.

It is considered that expressions of interest from two to three of the 32 DFID priority countries could be enough to set such a programme in motion, with additional countries being incorporated at a later stage.

Then, for each selected country, an initial list of policies and low carbon projects where implementation support would be most welcome could be defined in collaboration with the government. Detailed discussion may be established with the stakeholders directly involved in the low-carbon transport project implementation and operation (principally Local and Regional Government and Private Sector actors), including prospective implementation partners to generate a clear vision of the most critical knowledge gaps among implementors for these specific projects, what is needed to address them, and where resolving such gaps could meaningfully promote an acceleration of low carbon transport interventions and activities.

At the same time, a short-list of potential institutes that could host the Centres of Excellence could be developed.

In parallel, the partnership should gauge interest in participating with prospective funding, collaboration and implementation partners and build the business proposition around an initial cohort of participating countries.

15. CONCLUSIONS

Choosing a low carbon sustainable transport alternative to '*how things have always been done'* can be stressful to any practitioner that does not have experience of proposing and developing similar successful operations. It may require building consensus with local stakeholders and providing arguments for on innovative themes that the practitioner may have not fully mastered. This requires experience and tacit knowledge which under normal circumstances they would have gained from successfully completing a project.

The proposed capacity building strategy aims to fill this practical gap that inhibits the implementation of low carbon transport projects and policies with a two-tier structure that brings *explicit knowledge* on low carbon transport from international partners combined with a strong focus on *tacit knowledge* from peers in the country (and from other DFID priority countries) on the minutiae of implementation to avoid the need to re-invent in each new project practical solutions that have been developed elsewhere.

This proposal is seen as a crucial contribution to help convert international and national plans to lower the carbon intensity of the transport sector into a broader scaling up of low carbon transport measures.

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ANNEX 1: STAKEHOLDER SURVEY

A survey on LC-HVT knowledge and capacity in Africa and South Asia was designed and administered to SLoCaT's expert stakeholder network (from which the expert interviewers were also drawn) from September to October 2018. The survey contained qualitative and quantitative questions exploring how low carbon transport knowledge is gained, how capacity is achieved, and how transport users and other affected parties are engaged.

Survey questions

Please fill in your personal information (we will not share this information without your express permission):

- [ ] Name
- [ ] Job title or description
- [ ] Organisation
- [ ] Email Address
- [ ] Skype ID
- [ ] State/Province
- [ ] ZIP/Postal Code
- [ ] Country in which you live
- [ ] Email Address
- [ ] Phone Number

Type of entity

- [ ] Academic/ Research Institution
- [ ] Practitioner or Consultant (private sector)
- [ ] Local Government
- [ ] Regional/ Provincial Government
- [ ] National Government
- [ ] NGO (or other Organisation)
- [ ] Financing or Funding Agency
- [ ] International agency
- [ ] Other (please specify):

Academic background or qualification:

- [ ] Open-Ended Response

Professional memberships:

- [ ] Open-Ended Response

What are your primary research or practitioner areas? (Tick as many as are relevant)

- [ ] Freight
- [ ] Road-based passenger transport (scheduled)
- [ ] Road-based passenger transport (unscheduled, eg paratransit)
- [ ] Rail
- [ ] Two- or three-wheeled modes
- [ ] Capacity development and training
- [ ] Energy and emissions
- [ ] Travel demand management (TDM) measures
- [ ] Regulatory or enabling environments
- [ ] Advocacy, outreach or communication
- [ ] Transport investment and financing
- [ ] Aviation
- [ ] Water transport
- [ ] Electric mobility
- [ ] Other (please specify):

Please indicate the country or city about which you are responding.

- [ ] Open-Ended Response

How or where did you develop your interest and knowledge of LC-HVT?

- [ ] Attending a local conference
- [ ] Through academic training
- [ ] Reading a blog series
- [ ] Hearing a visiting speaker at a seminar or university
- [ ] Attending an international conference
- [ ] Through international agencies or consultants
- [ ] Reading academic journals
- [ ] Reading research reports
- [ ] Social media
- [ ] Other (please specify)

Is there anything you would add to the definition of Low-Carbon Transport (LCT). Please bear in mind that our focus is on High Volume Transport in particular. We have repeated our working definition here as a reminder:When we refer to low carbon transport in this project, our focus is on transport interventions that either reduce the implicit GHG emissions from baseline (Business as Usual), or produce zero GHG emissions. This could include:

- [ ] Open-Ended Response

What topics would you most like to learn more about regarding Low Carbon High Volume Transport?

- [ ] Open-Ended Response

In the past 12 months, have you attended any conferences, workshops or talks in the country about which you are responding, where Low Carbon High Volume Transport was

- [ ] Yes
- [ ] No
- [ ] If yes, please specify:

Have you ever provided training, capacity building or other knowledge sharing about Low Carbon High Volume Transport, in the country about which you are responding?

- [ ] Yes
- [ ] No
- [ ] If yes, please provide us with more information.

Do you know of academics, professionals or consultants who focus on Low Carbon High Volume Transport in the country for which you are responding?

- [ ] Yes
- [ ] No
- [ ] If yes, please share two or three names and contact details so we may invite them to this

What do you believe are the top three (3) gaps in Low Carbon High Volume Transport knowledge in the country/institution/organisation about which you are responding? You may add further insights under 'Other'.

- [ ] Making the case for low-carbon transport to decision-makers
- [ ] Quantifying baseline emissions and emissions reductions
- [ ] Understanding lifecycle costs of new technologies
- [ ] Preparing bankable proposals for LCT projects
- [ ] Decision-making and alternatives analysis
- [ ] Other (please specify)

What performance indicators are used to define or measure success in LC-HVT projects in the country about which you are responding (e.g. reduced emissions of carbon/local pollutants, increased ridership/mode share, reduced operating costs)?

- [ ] Open-Ended Response

Please give us the names of two or three important Low Carbon High Volume Transport interventions in the country which you are responding (this could be, for example, the Light Rail in Ethiopia, or the Cycling Strategy in South Africa).

- [ ] Open-Ended Response

What type of Low Carbon High Volume Transport programmes or interventions do you believe are most urgently needed in the city or country under discussion? Please tick three (3), and add further insights under 'Other'.

	Electric buses
	Electric paratransit vehicles (eg taxis, matatus)
	Alternative fuel incentives
	Carbon taxation and other regulatory interventions
	Two- and three-wheeler promotion/facilities
	Vehicle replacement programmes (replacing old with more efficient passenger vehicles)
	Public transport reform or transformation
	Freight-to-rail programmes
	Greener freight and logistics
	Travel Demand Management (TDM) measures
	Other (please specify)

What do you believe are the top three (3) challenges preventing such interventions from taking place? Please share further insights under 'Other'.

	Concerns around a reliance on non-renewable energy sources
	Weak or poor leadership
	Other more urgent government priorities
	Inadequately accountable or legislatively enabled transport authority
	Inadequately accountable or legislatively enabled environmental authority
	Inadequate source of sustainable funding for capital
	Inadequate source of sustainable funding for operations
	Weak regulatory framework or enabling environment
	No clear policy direction (or no policy at all)
	No clear emissions reductions targets
	Inadequate skills, capacity, or knowledge regarding LCT
	Nothing is preventing LCT interventions from taking place
	Anxiety around new technology
	Fears of job losses in a greener economy
	Other (please specify)

Who are the main actors or agencies driving Low Carbon High Volume Transport interventions in the country/city which you are responding?

	National transport ministry
	National environmental ministry
	Regional transport authority
	Regional environmental authority
	Local transport authority
	Professional bodies
	International agencies (eg the World Bank)
	International consultancies
	Teaching institutions
	Elected officials
	Other (please specify)

What need or 'problem' is driving the choice of transport interventions (not necessarily Low Carbon High Volume Transport) that are implemented in the country or city which you are responding? Please rank from 1 (most important) to 6 (least important).

	Air quality
	Road congestion
	The provision of improved access/accessibility
	Regional trade and movement
	Climate mitigation
	The provision of affordable transport and mobility

If other challenges are driving transport interventions, please provide more information below

	Open-Ended Response

What non-transport stakeholders do you believe are essential to activating Low Carbon High Volume Transport interventions?

	Trade union organisations
	National utilities
	Finance ministries
	Advocacy organisations
	Commuter associations
	Manufacturing companies
	Other non-transport stakeholders (please specify):

What are the five (5) most important areas of knowledge you believe the country/institution/organisation needs regarding Low Carbon High Volume Transport? Please add in your own insights under 'Other':

	How to make the case for a focus on Low Carbon Transport
	How to quantify baseline emissions
	How to model emissions reductions
	How to prepare bankable proposals for Low Carbon Transport projects
	How to set emissions reduction targets
	How to draft Low Carbon Transport policies and strategies
	How to structure and develop a regulatory environment that enables Low Carbon Transpo
	Decision-making skills and alternatives' analysis
	How to influence decision-makers
	How to structure and develop a taxation or incentives regime
	Knowledge regarding new technologies, fuels and propulsion
	Procurement information
	Outreach or stakeholder engagement
	Other (please specify):

Please indicate the five (5) most important organisations or entities you believe should have access to the knowledge referred to in question 22. Please add your own insights under 'Other'.

	National transport ministry
	National environmental ministry
	Regional transport authority
	Regional environmental authority
	Local transport authority
	Local environmental authority
	Professional bodies
	Teaching institutions
	Political decision-makers
	Elected officials
	Other (please specify)

How suitable are each of the following strategies to exchange knowledge about Low Carbon High Volume Transport?

	Regional conferences
	Workshops for specific organisations or institutions
	Webinars
	Publications and outreach
	Formal online learning (blended learning)
	Continuing professional education at a tertiary institution
	Local conferences
	Exchange programmes and study tours
	Mentorship programmes
	Internships
	Social media
	Other (please specify)

Please rank the feasibility of the following transport "quick wins"* in order of most promising to least promising in your city/country:(*Quick wins are those actions that can be taken immediately and which move the transport sector in the right direction toward long-term transformation. More information here.)

	Accelerate phase-out of fossil fuel subsidies
	Formulate Sustainable Urban Mobility Plans (SUMPs) in primary and secondary cities, supported by a National Urban Mobility Policy or programme
	Promote electric two- and three wheelers (including shared e-vehicles) in primary and secondary cities
	Limit imports of inefficient and polluting second hand trucks, complemented by age limitations for the existing fleet
	Implement (ultra-) low emission zones, including car-free zones in city centers
	Introduce and scale up pricing for car-related travel options (e.g. congestion/road charging, parking pricing) in primary and secondary cities
	Tighten fuel economy standards for passenger vehicles, coupled with labelling schemes and fiscal incentives such as CO2-based vehicle taxation
	Provide and improve walking and cycling infrastructure (e.g. connected walking paths, protected cycle lanes), reallocating roadspace where necessary
	Improve freight efficiency (e.g. reduce empty load running by freight trucks) through route optimization, asset sharing between companies, and increased use of ICT solutions
	Accelerate deployment of tighter diesel fuel quality standards to reduce emissions of black carbon and other short-lived climate pollutants

Do you know of university, online or other training opportunities on Low Carbon High Volume Transport in the region/country/city which you are responding?

	Yes
	No
	If yes, please provide details:

Does the country or city about which you are responding have a Low Carbon High Volume Transport policy or strategy (this could be a standalone document or part of a comprehensive mobility document)?

	Yes
	No
	Don't know
	If yes, please specify in which department or directorate it is sited and provide URL for more information.

Does this country have Low Carbon High Volume Transport targets to reduce transport GHG emissions? (e.g. reducing overall transport emissions, increasing the public/private transport mode split, or phasing out petrol vehicles by 2030).

	Yes
	No
	Don't know
	If yes, please specify in which department or directorate it is sited and provide URL for more information.

Does this country's input to the Paris Agreement (e.g. Nationally Determined Contributions) specifically mention Low Carbon Transport at all?

	Yes
	No
	Don't know
	If yes, please specify in which department or directorate it is sited and provide URL for more information.

Does this country have a climate change policy?

	Yes
	No
	Don't Know
	If yes, please specify in which department or directorate it is sited and provide URL for more information.

Does this city about which you are responding have Low Carbon Transport targets?

	Yes
	No
	Don't know
	If yes, please specify in which department or directorate it is sited and provide URL for more information.

Do you know (or know where to find) transport-related greenhouse gas emissions data for the country about which you are responding?

	Database developed by Multilateral Development Banks
	UN database
	IEA and other databases by (transport) organizations
	Government-run databases
	I do not know where to find transport emissions data
	others sources:

May we contact you for further information regarding your responses?

	Yes
	No

List of survey respondents:

Name	Organisation	Location
Michael Linke	Independent/Bicycling Empowerment Network Namibia	Brazil
Irene Namuyiga	Kampala Capital City Authority	Uganda
Anthony Dane	Change Pathways	South Africa
Jide Oduyoye	LAMATA	Nigeria
Roger Behrens	University of Cape Town	South Africa
Marcela Guerrero Casas	Open Streets	South Africa
Louise Scholtz	WWF SA	South Africa
Paul Mukwaya	Makerere University	Uganda
Yohnny Raich	WhereIsMyTransport	South Africa
Neluheni Ndivhuho	Department of Transport	South Africa
Neluheni Ndivhuho	Department of Transport	South Africa
George A. Makajuma	African Development Bank	Kenya
Hubrecht Ribbens	Ribbens Consultancy	South Africa
Manu Sasidharan	University of Birmingham	United Kingdom
Kazeem Sanusi	Kazeem Sanusi Group	Nigeria
Samuel Abejide	Walter Sisulu University	South Africa
Florence	Innovative Transport Solutions	South Africa
Christopher de Saxe	CSIR Built Environment	South Africa
Babatunde Obadina	Lagos Bus Service Limited	Nigeria
Sivuyile	City of Cape Town	South Africa
Joseph Anochie-Boateng	CSIR	South Africa
Mavis Mhlanga-Mochadibane	Tshwane Women in Transport	South Africa
Nwabisa Beba	City of Cape Town	South Africa
Helvi Ndilimeke Petrus	Stellenbosch University	South Africa
Constant Cap	Naipolitans	Kenya
Blake Robinson	ICLEI Africa	South Africa
Emmanuel Joen	Ochenuel Mobility	Nigeria
Kazeem Sanusi	Kazeem Sanusi Group	Nigeria
Victor de Abreu	SMEC SA	South Africa
Pablo Salazar Ferro	CODATU	Senegal
Michael kKhato	Nat Treasury SA	South Africa
Lize Jennings-Boom	Western Cape Government	South Africa
Carel Snyman	People | Energy | Mobility	South Africa
H M Shivananda Swamy	Centre of Excellence in Urban Transport, CEPT University	India
Innocentia Modau	WWFSA	South Africa
Nicky Sasman	City of Cape Town	South Africa
Andre Rautenbach	Mangaung Metro Municipality	South Africa
Helvi Petrus	Stellenbosch University	South Africa
Janneke Snijder	ITS Engineers	South Africa
Bob Stanway	none	South Africa
Jai Kumar Gaurav	GIZ	India
Lize Jennings	Western Cape government	South Africa

Name	Organisation	Location
Manu Sasidharan	University of Birmingham	United Kingdom
John Mark Mwanika	Amalgamated Transport and General Workers Union	Uganda
Ranjith	GFA	India
Justin Coetzee	GoMetro	South Africa
Gerhard Hitge	Self-employed	South Africa
Noor E Alam	Roads and Highways Department	Bangladesh
Ntimba Michael	Gauff Consultants (U) Ltd	Uganda
Mark Rountree	City of Cape Town	South Africa
Shambhu KC	Ministry of Urban Development, Nepal	Nepal
Constant	Naipolitans	Kenya
Herrie Schalekamp	University of Cape Town	South Africa
Andrew Dawson	University of Nottingham	United Kingdom
Melusile Ndlovu	Chemonics International	South Africa
Paul Vorster	ITS South Africa	South Africa
Aliasgher Janmohammed	Childsafe	South Africa
ROB DE JONG	UNEP	Kenya
Mbulelo Singapi	TS Traffic Safety (Pty) Ltd	South Africa
Priscilla Muchibwa	UN Habitat	Kenya
Shola Oni	Lagos Bus Services Limited	Nigeria
Chris Plano	University of Cape Town	South Africa
Sean Cooke	University of Cape Town	South Africa
Mandy Westwood	SMEC	South Africa
Carlos Esteves	Independent professional engineer	South Africa
Oluseyi Osiyemi	Transport Services Limited	Nigeria

ANNEX 2: EXPERT INTERVIEWS

A total of 23 interviews were conducted with experts from research institutions, government departments, and implementing agencies in the project countries from October to November 2018 to gain more detailed insight into the state of knowledge on low carbon transport and capacity needs. Additionally, seven experts were contacted for input via an email exchange and short in-person meetings.

Expert interviewees were generally university educated with over 70% having a master's or PhD (engineers, political scientists, or urban planners, with research as well as a practitioner focus. Many had experience working in multiple countries, not only the country for which they were responding, and regularly contribute to training programmes, workshops or conference proceedings.

Interview questions

Note: Questions in italics to be discussed as time permits

A. Introductory questions [5 min]

- How would you define low-carbon transport (LCT)?
- How or where did you develop your knowledge or interest in LCT?
- *Have you attended any conferences or workshops in your country/city where LCT is discussed?*

****Workstream A: Develop knowledge base of low carbon transport measures/appropriate best practices** [45 min total]**

B. Historic and projected LCT Trends [10 min]

- What changes are starting to happen in LCT in your country/city?
- Who/what entities are driving LCT trends? Are any entities trying to prevent these changes?
- What needs to happen over the coming [10 years]? What will be required to make this happen?

C. Implemented projects and policies [A3] [10 min]

- What low carbon transport projects have been implemented in your region/country/city so far?
- How successful have these projects been based on these measures (on a 1-5 scale, low to high)?
- Increasing transport efficiency (and shifting to more efficient modes)
- Increasing access and equity
- Maintaining financial sustainability
- GHG emission reductions
- Are you aware of any implemented low-carbon HVT projects that have proved to be financially/operationally unsustainable over time [despite successes elsewhere]?

D. Needed/Appropriate projects and policies [A3] [10 min]

- What are the most appropriate interventions (including transport "quick wins") are of particular relevance for your region/country/community? (see Annex 1 for definitions/examples)
- Which strategies have the highest feasibility to be transferred from other [developed or developing] countries to your region/country/city?
- *Which low-carbon measures have the greatest potential to shift from pilot studies to mainstream approaches in you region/country/city?*

E. Major opportunities and constraints to <u>implementing</u> LCT [A] [15 min]

- What are the strengths [and gaps] in national, sub-national, and multi-national policy priorities and ambition for low carbon transport measures?
- Which are the main actors that are blocking development and implementation of low carbon transport plans and targets? Which key barriers exists? e.g.
- Limited understanding of local contexts by international advisors
- Conflicts of interest (e.g. decision-makers, industries)
- Poor governance/corruption
- What trade-offs are made between low-carbon transport measures and other urgent and competing policy imperatives in LICs (e.g. economic growth, road safety)?

***Workstream B: Assess stakeholder capacity and define capacity building strategy** [40 min total]*

F. Current capacity for planning/implementing LCT [10 min]

- Who are the key low carbon transport stakeholders [national/provincial/regional or local] government ministries, transport agencies, researchers the following measures?
- Avoid and shift measures (local/national, transport agencies); often related to infrastructure
- Vehicle energy efficiency and low-carbon fuels (national mostly, energy, industry, finance, environment)
- Freight (private sector, national/local policy)
- Who are the "non-traditional" stakeholders that contribute to low carbon transport measures in your [region/country/city] (e.g. trade unions, community organisations)?
- *[In each sector], which organisations are reporting on activities and progress related to LCT regularly?*

G. Capacity building needs for LCT [B] [15 min]

- Where is institutional capacity needed to assess, refine and integrate research recommendations to accelerate prioritised low carbon transport measures [for three categories noted under Question F1]?
- National policy-making agencies
- Provincial /local operating agencies
- Non-governmental actors
- In each sector, what are the gaps and constraints in monitoring, reporting and verification (MRV) to evaluate the success of low-carbon programmes and projects?
- *Is there a need for appropriate performance indicators within transport authorities (including management, communication, governance skills)? [B.3.2]*

H. Capacity development opportunities for LCT [15 min]

- What are the most appropriate capacity building opportunities in LICs to accelerate and streamline the adoption and implementation of research recommendations?, e.g.
- Local and national peer-to-peer exchanges (and/or exchange programmes among institutions)
- Online/blended learning programmes (or short courses)
- Developing publication-quality research for inter-country sharing
- (How) could cooperation with global [bilateral and multilateral] donors help to accelerate and streamline the adoption and implementation of research recommendations?

- (How) could improved capacity change the way in which low carbon transport measures are financed, implemented, and evaluated?

I. Closing Questions [5 min]

- What do you believe your country/institution/organisation most needs to know regarding LCT?
- What do you feel would be the best way in which to share knowledge about LCT?
- What would you, personally, like to know more about in terms of LCT?

List of Interviewees:

Geo Scope	Interviewee Name	Designation & Organisation	Date of Interview
India	Anumita Roychowdury	Executive Director, Research and Advocacy, Centre For Science and Environment	15-Oct-18
India	Thennarasan Malaiyappan	Municipal Commissioner, Surat Municipal Corporation	4-Oct-18
Indonesia	Dr. Siti Mainumah	Head, Department of Research & Development, Ministry of Transport	10 and 17 October 2018
Indonesia	Dr. Elly Sinaga	Greater Jakarta Transport Authority, Indonesia/ Senior lecturer for the Sekolah Tinggi Transportasi Darat (Land Transport School)	8 October and 3 November 2018
Bangladesh	Mr. Noor-e-Alam	Project Director, Ministry of Road Transport and Bridges	4-Oct-18
Bangladesh	Mir Tanweer Husain	Senior Assistant Engineer, Ministry of Local Government, Rural Development & Cooperatives	4-Oct-18
South Africa	Rahul Jobanputra	University of Cape Town / Cty of Cape Town (head of transport planning)	11-Oct-18
South Africa	Maletlabo Handel or Ashanti Mbanga	UNIDO's Low Carbon Transport programme in SA	1-Oct-18
South Africa	Hiten Parmar	uYilo / EVIA	9-Oct-18
Nigeria	Pablo Salazar-Ferro	CODATU/SSATP	12-Oct-18
Ghana	Simon Saddier	SSATP/World Bank	12-Oct-18
Ghana	Magnus Quarshie	Committee: Ghana Environment Protection Agency	17-Oct-18
Nigeria	Seyi Osiyemi	Transportation Executive	10-Oct-18
Rwanda	Nico McLachlan	Transport Consultant, change management, low carbon transport	8-Oct-18
Uganda	Leonard Mwesigwa	Kampala Capital City Authority, Uganda	15-Oct-18
Kenya	Henry Kamau	Director, Sustainable Transport Africa	12-Oct-18
Kenya	Jacqueline Klopp	Center for Sustainable Urban Development, Earth Institute, Colombia University, NYC	15-Oct-18
India	Sarath Guttikunda		15-Oct-18
SSA	Mark Zuidgeest	University of Cape Town	28-Nov-18
SSA	Herrie Schalekamp	University of Cape Town	28-Nov-18
South Africa	Abdool Kamdar	Sustainable Freight Association	23-Nov-18
South Africa	Anthony Dane	SANEDI / MacroEconomic Study of impact of low carbon transport in SA	23-Nov-18

Geo Scope	Interviewee Name	Designation & Organisation	Date of Interview
Global	Arthur Ardila Gomez	World Bank - Global Lead Urban Mobility & Lead Transport Economist	29-Nov-18
Africa	Rebecca Campbell	Open Streets learning exchange, South Africa	24 October 2018
Africa	Marcela Guerrero Casas	Open Streets learning exchange, South Africa	24 October 2018
Africa	Constant Cap	Open Streets learning exchange, Nairobi, Kenya	19 December 2018
Africa	Richard Hamba	Training, Education & Empowerment for Neighborhood Sustainability (TEENS), Uganda	14 December 2018
Africa	Lerato Dladla	Open streets learning exchange, Johannesburg, South Africa	19 December 2018
Africa	Temesgen Tigistu	Open Streets Learning Exchange, Ethiopia	10 December 2018
Africa	Neels Basson	South African national department of transport, Open Streets Learning Exchange	10 December 2018

ANNEX 3: WORKSHOP ON CAPACITY BUILDING STRATEGY FOR THE IMPLEMENTATION OF LOW CARBON, HIGH VOLUME TRANSPORT IN SOUTH ASIA

The Workshop on Capacity Building Strategy for the Implementation of Low Carbon High Volume Transport in South Asia was organised by the Partnership on Sustainable, Low Carbon Transport (SLoCaT), under the framework of the Applied Research Programme in High Volume Transport (HVT) by the Department for International Development of the United Kingdom (DFID) on 2 October 2018. The workshop was a pre-event to the Eleventh Intergovernmental Regional Environmentally Sustainable Transport (EST) Forum in Asia,[53] hosted by the United Nations Centre for Regional Development (UNCRD) from 2 – 5 October 2018 in Ulaanbaatar, Mongolia.

The workshop was attended by more than 30 participants representing 11 EST countries (Afghanistan, Bangladesh, Bhutan, Cambodia, India, Malaysia, Maldives, Mongolia, Pakistan, Thailand, Vietnam) and 11 different transport organisations, research institutes, and non-government organisations.

A summary report of the workshop can be downloaded here.

Workshop programme design

Opening Session

- Introduction to this workshop. Motive and objectives
- Overview of DFID programme
- Goals of capacity-building programme

- Keynote message and overall context

- Organization and specific program of the workshop
- How the sessions are organized
- What we expect to achieve

Break-out Sessions

- The participants were split into three breakout groups looking at the same problems with different focuses

  Break-out Group 1: National-Level Ministries

  Break-out Group 2: Local-Level Authorities

  Break-out Group 3: Private Investors / Transport Operators

  Break-out Group 4: Research community

[53] Eleventh Intergovernmental Regional Environmentally Sustainable Transport (EST) Forum in Asia. http://www.uncrd.or.jp/?page=view&nr=1125&type=13&menu=198

Questions to be analysed by each group.

1) From the point of view of the cohort of stakeholders represented by your group for your country/city: what priority does reducing GHG emissions have in local decisions that affect transport?
   Please share experiences and lessons learned.

2) From the point of view of the cohort of stakeholders represented by your group, is it necessary and/or desirable to promote low carbon, high volume transport over the coming years? Why is it important (or not) to promote this? Do users/voters demand action?
   Please discuss how this could affect Passengers and Freight on Road, Rail, and where applicable, National Aviation, Inland waterways and Coastal shipping

3) From the point of view of the cohort of stakeholders represented by your group for your country/city What are the principle barriers/obstacles that could make this difficult to achieve?
   Please discuss barriers in in each of the following four categories.
   - Technical – Insufficient or inadequate knowledge of available low carbon solutions
   - Institutional – Lack of an effective network of organizations that can achieve the specific low carbon transport objectives on a sustainable basis
   - Political / Social – Low priority, interest, or acceptance of developing low carbon high volume transport solutions
   - Financial / Economic—The presence of barriers to implementation that disincentivize public or private investment in the low carbon high volume transport solutions. May include lack of ready access to targeted funding.

4) What needs to be done to remove these barriers?
   Please discuss how can this be implemented and who needs to take action for this to happen

Plenary Session

Each group elected a representative to report back to the plenary. The reporting will be done by themes (questions).

A. priority of reducing GHG emissions in local decisions that affect transport

B. necessity and/or desirability to promote low carbon, high volume transport

C. principle barriers/obstacles that could make this difficult to achieve

D. What needs to be done to remove these barriers

Discussion across groups

Closing Session

List of Registered Participants:

Total No. of Participants Attended (registered)	35	
Country Rep Attended:	19	
Countries represented:	11	(Afghanistan, Bangladesh, Bhutan, Cambodia, India, Malaysia, Maldives, Mongolia, Pakistan, Thailand, Vietnam)
Country Breakdown:	Afghanistan	1
	Bangladesh	2
	Bhutan	1
	Cambodia	2
	India	1
	Malaysia	2
	Maldives	1
	Mongolia	6
	Pakistan	1
	Thailand	1
	Vietnam	1
NGO Rep Attended:	16	
Types of NGO represented:	5	
NGO Breakdown:	Transport Organisation	2
	MDB	2
	Research	8
	Independent	2
	UN Organisation	2

No	Country/ Organisation	Title	Name	Surname	Organisation
1	Afghanistan	Mr.	Javid Ahmad	Shirzad	Ministry of Rural Rehabilitation Development
2	Bangladesh	Mr.	Noor-e-	Alam	Ministry of Road Transport and Bridges
3	Bangladesh	Mr.	Mir Tanweer	Husain	Ministry of Local Government, Rural Development & Cooperatives
4	Bhutan	Mr.	Wangchuck	Pemba	
5	Cambodia	Mr.	Sophal	Kong	Ministry of Public Works and Transport
6	Cambodia	Mr.	Ouk	Ourk	Ministry of Public Works and Transport

No	Country/ Organisation	Title	Name	Surname	Organisation
7	India	Dr.	Subhamay	Gangopadhyay	National Highway Authority
8	Malaysia	Mr.	Abd Hamid bin	Surip	
9	Malaysia	Mr.	Amran	Abdullah	KL City Hall
10	Maldives	Ms.	Nafha	Aujaaz	
11	Mongolia	Mr.	S.	Batbold	
12	Mongolia	Ms.	Nyamdavaa	Shagdar	National Agency for meteorology and environment of Mongolia
13	Mongolia	Ms.	Sarantsetseg	Khasaa	GASI
14	Mongolia	Ms.	Naraa	Narmanclah	GI
15	Mongolia	Ms.	Myagmarjgal	Mendloayou	ALAGAC
16	Mongolia	Mr.	Myagmarsureu	Turbai	MRTD
17	Pakistan	Mr.	Muhammad Maswood	Alam	Karachi Metropolitan Corporation
18	Thailand	Ms.	Manwipa	Koson	
19	Viet Nam	Mr.	Anh Duong	Tran	Ministry of Transport
20	Independent	Mr.	Holger	Dalkmann	Self-employed
21	Independent	Mr.	Peter	O'Neill	Independent
22	MDB	Mr.	Jamie	Leather	Asian Development Bank
23	MDB	Mr.	Arturo	Ardila-Gomez	The World Bank
24	Research	Dr.	Annabel	Bradbury	Cardno
25	Research	Dr.	Karlson James (Charlie)	Hargroves	Curtin University Sustainability Policy (CUSP) Institute
26	Research	Ms.	Catharina	Visser Bartel	Research for Community Access Partnership (ReCAP)
27	Research	Mr.	Robert James	Earley	Sino-Canadian Commodities Consulting Co. Ltd.
28	Research	Prof.	Tran	Thi Kim Dang	The University of Transport & Communication
29	Research	Dr.	Surya Raj	Acharya	Tribhuvan University
30	Research	Mr.	Daniel	Conley	University of Adelaide
31	Research	Ms.	Lauren	Gallina	University of Adelaide (Entrepreneurship Commercialization and Innovation Centre)
32	Transport Organisation	Mr.	Giok Seng	Lee	Asia Pacific Natural Gas Vehicles Association (ANGVA)
33	Transport Organisation	Ms.	Deliani Poetriayu	Siregar	Institute for Transportation & Development Policy
34	UN Organisation	Dr.	Madan B.	Regmi	United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
35	UN Organisation	Mr.	C.R.C.	Mohanty	United Nations Centre for Regional Development

ANNEX 4: ADDITIONAL PRIMARY RESEARCH FOR THE CAPACITY BUILDING STRATEGY

To gain insights into the capacity building needs that could accelerate the implementation of LC-HVT, additional primary research was conducted.

New topics were formulated and sent out to all participants in the primary research for this project (i.e. online survey, expert interviews and workshop). Also, the topics were sent to over 750 participants in Asia who had completed SUTP/GIZ courses on sustainable transport. The topics were also discussed by the capacity building workshop participants.[54] A total of 28 topics critical to the acceleration of low carbon transport were selected. Enhancing knowledge in these areas could facilitate the implementation of climate-friendly projects and policies.

In addition, a total of 37 practitioners provided further details on perceived knowledge exchange needs. These responses took the form of an email survey that followed-up with a discussion with each participant. The responses of all those that agreed to provide information were included in the analysis.

Research Questions

Respondent
Name
Email
Organization
Type of entity

- ☐ Academic/ Research Institution
- ☐ Private sector
- ☐ Local Government
- ☐ Regional/ Provincial Government
- ☐ National Government
- ☐ NGO (or other Organisation)
- ☐ Financing or Funding Agency
- ☐ International agency
- ☐ Other

Have you ever been involved in implementing a low carbon transport project or
Yes / No
What type of project or policy? Open-ended question

1 **What information/guidance/consultant service did the project receive that, maybe unexpectedly, was key to "selling" the low carbon project to other stakeholders?**
Open-ended question

Can you name a specific source?
Open-ended question

2 **What information/guidance/consultant service did the project receive that was critical in getting the project correctly implemented?**
Open-ended question

Can you name a specific source?
Open-ended question

3 **What information/guidance/consultant service would have made implementing the project much easier, or led to a better result, if you had received it from the very beginning?**
Open-ended question

Can you name a specific source?
Open-ended question

4 **How would you prefer information or guidance to reach you?**

- ☐ Technical reports (journals or papers)
- ☐ Written Handbooks / Workbooks / Manuals
- ☐ Templates giving live examples of good practice
- ☐ Experiences from other cities or regions
- ☐ Hands-on specialist support, Consultant service or mentorship
- ☐ Workshop or conference
- ☐ Professional education
- ☐ Online training course
- ☐ Study tour
- ☐ Other (please state what)

[54] Capacity-Building Workshop: On 2 October 2018, a Workshop on Capacity Building Strategy for the Implementation of LC-HVT in South Asia was organised under this project to obtain input from relevant national and local stakeholders on the needs and barriers in capacity building for implementing LC-HVT in the region. The workshop was a pre-event to the Eleventh Intergovernmental Regional Environmentally Sustainable Transport (EST) Forum in Asia, hosted by the United Nations Centre for Regional Development.

Please identify (with "Y" or "Yes") which institutions, in your opinion, would most benefit from information or guidance in each of the following 6 areas:

Put "Y" or "Yes" in box
You can identify as many as you want. For any of the questions where information or guidance is easy to find and additional help is not required, please leave blank

		Not needed. We know this	National Ministries	transport authority	Local/Regional govt	transport authority	Other (Who?)
5	**Institutional Capacity**						
	How to structure an effective interaction among stakeholder institutions for						
	How to put together a good effective transport masterplan for a city or region						
6	**Transport Policies and Strategies**						
	How to make the case for focusing on, and adopting Low Carbon Transport						
	How to draft Low Carbon Transport policies and strategies						
	How to structure and develop a regulatory environment that enables Low						
	How to introduce vehicle emissions standards and fuel economy standards						
	How to ensure production compliance for vehicle emissions and fuel						
7	**Transport Finance**						
	How to establish transport service agreements that allow the operator to						
	How to structure and develop a taxation or incentive regime for low carbon						
	How to implement private-public partnerships (PPP) for low carbon transport						
8	**Implementation of low carbon projects or interventions**						
	How to establish integrated transport system planning across all modes and						
	How to make use of intelligent transport systems (ITS)						
	How to set up and operate long distance rail connectivity						
	How to set up and operate modal exchange between road freight and						
	How to provide infrastructure for electric vehicles						
	How to phase out (and substitute) old polluting vehicles						
	How to setup and manage rural transport infrastructure and services						
	How to introduce road asset management procedures						
9	**Regulation (principally local or regional)**						
	How to regulate and promote shared ridership						
	How to regulate and promote dock-less bike / e-bike / e-scooter sharing						
	How to regulate phone-app taxis						
	How to manage motorcycle taxis						
10	**GHG Analysis, Monitoring and Reporting**						
	How to set GHG and local pollutant emissions reduction targets						
	How to quantify baseline emissions and model emissions reductions						
	How to perform a cost-benefit or multi-criteria analysis over the life of low						
	How to setup a program for monitoring, reporting and verifying (MRV)						
	Other						
	Open-ended question						
	Open-ended question						

11 **What are the most appropriate interventions ("quick wins") that are of particular relevance for your region/country/community in the short to medium term?**

Please rate the following on a scale from 1 (low or no priority) to 5 (high priority)

Most appropriate interventions (short to medium term)	Rating
Accelerate phase-out of fossil fuel subsidies.	
Formulate Sustainable Urban Mobility Plans (SUMPs) in primary and secondary cities, ideally supported by a National Urban Mobility Policy or programme.	
Promote electric two- and three wheelers, including e-vehicle sharing systems in primary and secondary cities as well as rural areas.	
Implement zero-emissions (last-mile) urban freight delivery through e-mobility and cycling solutions. (including limit import of inefficient and polluting second hand trucks)	
Implement (ultra-) low emission zones, including car-free zones in city centers.	
Introduce and scale up pricing for car-related travel options (e.g. congestion/road charging, parking pricing) in primary and secondary cities.	
Tighten fuel economy standards for passenger vehicles, coupled with labelling schemes and fiscal incentives such as CO2-based vehicle taxation	
Provide and improve walking and cycling infrastructure (e.g. connected walking paths, protected cycle lanes, safe intersections), reallocating roadspace where necessary.	
Improve freight efficiency (e.g. reduce empty load running by freight trucks) through route optimization, asset sharing between companies, and increased use of ICT solutions.	
Accelerate deployment of tighter diesel fuel quality standards to reduce emissions of black carbon and other short-lived climate pollutants.	

We know that as an acredited expert, you have experience with the Sustainable Urban Transport Project (SUTP)

Open-ended question

What do you consider are the best aspects of this Capacity Building Programme that should be replicated in other programs?

Open-ended question

What aspects of this programme could be improved in other Capacity Building programs?

Open-ended question

List of respondents to the additional questions:

Name	Organisation	Location
Noor e Alam	Roads and Highways Department	Bangladesh
Rishi Aggarwal	Mumbai Sustainability Centre	India

Name	Organisation	Location
Nwabisa Beba	City of Cape Town	South Africa
Constant Cap	Naipolitans	Kenya
Sean Cooke	University of Cape Town	South Africa
Anthony Dane	change pathways	South Africa
Carlos Esteves	Independent Transportation and Civil Engineer	South Africa
Gerhard Hitge	Transportation Engineer	South Africa
Namuyiga Irene	Kampala Capital City Authority	Uganda
Jinson Jacob	Kochi Metro Rail Limited	India
Kanika kalra	institute of Urban Transport (India)	India
Jai Kumar Gaurav	GIZ	India
Sudesh Kumar	Mott Macdonald	India
Michael Linke	Bicycling Empowerment Network Namibia	Brazil
George A. Makajuma	African Development Bank	Kenya
John Mark Mwanika	Amalgamated Transport and General Workers Union	Uganda
Ntimba Michael	Gauff Consultants (U) Ltd	Uganda
Ravinder Nath Batta	government of Himachal Pradesh, India	India
Melusile Ndlovu	USAID/ South Africa Low Emissions Development Program	South Africa
Pratish A Nitey	Maharashtra Metro Rail Corporation Limited	India
Oluseyi Osiyemi	TSL	Nigeria
Pranavant	Deloitte Touche Tohmatsu India LLP	India
André Rautenbach	Mangaung Metro Municipality	South Africa
Brahmananda Rao Peddiboyina	Andhra Pradesh State Road Transport Corporation	India
Mark Rountree	City of Cape Town	South Africa
Blake Robinson	ICLEI Africa	South Africa
Christopher de Saxe	CSIR, Pretoria	South Africa
Sivuyile	City of Cape Town	South Africa
Pablo Salazar Ferro	CODATU	Senegal
Kazeem Sanusi	Kazeem Sanusi Group	Nigeria
Sujata Savant	Rites Ltd.	India
Samir Sharma	Delhi Integrated Multimodal Transit System Ltd	India
Carel Snyman	People | Energy | Mobility	South Africa
Bob Stanway	Individual	South Africa
Paul Vorster	Intelligent Transport Society South Africa	South Africa
Avinash Yemde	Egis India	India
Mohammed Ziauddin	Greater Hyderabad Municipal Corporation, Hyderabad, India	India

ANNEX 5 - SUSTAINABLE URBAN TRANSPORT PROJECT (GIZ-SUTP)

GIZ-SUTP ACTIVITIES AND SERVICES

Since 2003, GIZ-SUTP has built an impressive active portfolio of resources and capacity building programmes for international use.

Resources:

Developing and disseminating resources on all aspects of sustainable urban mobility including the SUTP Sourcebook series, Technical Documents, Case Studies, Fact Sheets and Policy Briefs

GIZ-SUTP SOURCEBOOK MODULES

The 31 GIZ-SUTP Sourcebooks investigate the key areas important for a sustainable transport policy framework in developing cities.

Institutions, Financing and Policy Orientation

- 1a - The Role of Transport in Urban Development Policy
- 1b - Urban Transport Institutions
- 1c - Private Sector Participation in Urban Infrastructure Provision
- 1d - Economic Instruments
- 1e - Sustainable mobility: Getting people on board
- 1f - Financing Sustainable Urban Transport
- 1g - Urban Freight in Developing Cities

Land Use Planning and Demand Management

- 2a - Land Use Planning and Urban Transport
- 2b - Mobility Management
- 2c - Parking Management

Public Transport

- 3a - Mass Transit Options
- 3b - Bus Rapid Transit
- 3c - Bus Regulation & Planning
- 3f - Public Transport Integration & Transit Alliances

Walking and Cycling

- 3d - Preserving and Expanding the Role of Non-motorised Transport
- 3e - Car-free Development

Vehicles, Fuels and Intelligent Transport Systems

- 4a - Cleaner Fuels and Vehicle Technologies
- 4b - Inspection & Maintenance and Roadworthiness
- 4c - Two- and Three-Wheelers
- 4d - Natural Gas Vehicles

- 4e - Intelligent Transport Systems
- 4f - Eco-Driving

Climate, Environment and Health

- 5a - Air Quality Management
- 5b - Urban Road Safety
- 5c - Noise and its Abatement
- 5d - The CDM in the Transport Sector
- 5e - Urban Transport and Climate Change
- 5f - Adapting Urban Transport to Climate Change
- 5g - Urban Transport and Health
- 5h - Urban Transport and Energy Efficiency

Social Issues in Transport

- 7a - Gender and Urban Transport

GIZ-SUTP Technical Documents

Technical Documents provide a specific focus and in-depth information on some of the key issues surrounding sustainable urban transport for a broader audience.

- #1 - Demystifying Induced Travel Demand
- #2 - Social Change and Urban Transport
- #3 - Public Bicycle Schemes: Applying the concept in developing cities
- #4 - Transport Alliances - Promoting Cooperation and Integration to offer a more attractive and efficient Public Transport
- #5 - Assessing Climate Finance for Sustainable Transport: A practical
- #6 - Beyond Fossil City: Towards Low Carbon Transport and Green Growth
- #7 - Sustainable Transport Evaluation
- #8 - Rising Automobile Dependency: How to Break the Trend?
- #9 - Measuring Public Transport Performance- Lessons for developing cities
- #10 - Fighting Corruption in the Road Transport Sector
- #11 - Transport Elasticities: Impacts on Travel Behaviour
- #12 - Carsharing Services in Emerging Economies
- #13 - Urban Mobility Plans: National Approaches and Local Practices
- #14 - On-Street Parking Management
- #15 - Electromobility
- #16 - Taxis as a Part of Public Transport
- #17 - Using GPS Technology for Demand Data Collection
- Climate and Environmental Impact Assessment of Electro Mobility in China
- Introducing Congestion Charging

- Data Availability for Measuring and Reporting Transport related Greenhouse Gas Emissions in Chinese Cities
- Efficiencia energética y movilidad en América Latina y el Caribe
- GHG Reporting and Inventorying in Germany
- Modelling GHG Emissions of Road Transport in China
- Thailand Stocktaking Report on Sustainable Transport and Climate Change
- Transport Readiness for Climate Finance
- Reducing Carbon Emissions through TDM Strategies
- Financing Sustainable Urban Transport - The International Review of National Urban Transport Policies and Programmes

GIZ-SUTP Case Studies

This series introduces a range of specific case studies that highlight and analyse different themes.

- #1: Bangkok Rapid Transit - BRT System of Bangkok, Thailand: A Short Survey
- #2: An Example of Promoting Cycling in Cities - Components of a High-Quality Bicycle Infrastructure, Muenster, Germany
- #3: Sustainable Urban Mobility - The Example of Istanbul
- #4: Planning for Cycling in Germany - Cycling Coordinators and Officers
- #5: Mobility Management & Commuting
- #6: Reviving the Soul in Seoul
- #7: Negotiating the Deal to enable the first Rea Vaya bus operating company
- #8: Cycling in Monrovia - Transport and more
- #10: Urban Freight and Logistics. The State of Practice in India.
- Big Cities, Big Challenges - Sustainable Urban Transport across Major Middle East and North African Cities
- French District - Sustainable Urban Neighbourhood in Tübingen, Germany
- Lviv - The Cycling Capital of Ukraine
- Quartier Vauban - Sustainable District in Freiburg
- Sustainable Urban Transport Guide Germany - Berlin

GIZ-SUTP Fact Sheets

A collection of facts and policy recommendations for sustainable urban transport issues.

- Digitisation & Mobility
- Fact Sheets: strategical recommendations for cycling development
    - (T1) Incorporate cycling into city administration
    - (T2) Stakeholder involvement
    - (T3) Options for financing measures for cycling
- Fact Sheets: cycling infrastructure and services

    - (H1) Developing a cycling network and general design standards for bicycle infrastructure
    - (H2) Cycling facilities on the road
    - (H3) Cycling facilities off the road
    - (H4) Intersections
    - (H5) Situations of special interest
    - (H6) Rural cycling (daily and leisure routes)
    - (H7) Traffic calming measures
    - (H8) Bicycle parking facilities
    - (H9) Signposting and services
- Fact Sheets: soft measures and marketing for bicycle promotion
    - (S1) General public relations
    - (S2) Targeting bicycle relations
    - (S3) Means of public relations
    - (S4) Examples of targeted campaigns
- Can electricity replace Gasoline? Unlocking the potential of electric two-wheelers in Thailand
- Environmental (EZ) or Low Emission Zones (LEZ)
- Low Emission Zones - Examples from Berlin, London, and Beijing
- Cycling Expertise - German Experiences, Chinese Opportunities
- Good Practice in China - Bicycle sharing in Beijing
- Good Practice in China - Electric-taxi in Shenzhen
- Challenges of informal motorcycle transport in Liberia
- Speeding Up Cycling through special Infrastructure
- Sustainable Urban Transport - Avoid-Shift-Improve (A-S-I)
- Transport in a Green Economy

GIZ-SUTP Policy Briefs

- Urban Mobility in Ukraine: The 13 billion Euro gap
- Non-Motorised Transport Policy in India: The need for a reform agenda

Capacity Building

Designing and conducting training courses for organisations in developing cities, and providing an online guide to available training courses of partner organisations

SUTP Training Material

By complementing the sourcebook modules, these training materials offer a more detailed insight, where steps for planning and how to develop different urban transport strategies are explained.

- Bus Regulation and Planning & Bus Sector Reform
- Mass Transit
- Public awareness and behavioural change
- Transportation Demand Management

- Non-motorised Transport
- Cycling-Inclusive Policy Development: A Handbook

ANNEX 6 - SUSTAINABLE URBAN TRANSPORT PROJECT IN INDIA (SUTP-INDIA) [55]

MODULES DEVELOPED

Contracting

- Reference Guide - Contracting in Urban Transport Vol - 2.pdf
- Training Manual - Volume 1 - Contracting in Urban Transport.pdf

Demand Assessment

- Reference Guide Volume 2 - Demand Assessment.pdf
- Training Manual – Volume 1 – Demand Assessment.pdf

Environment

- Reference Guide - Volume 2 - Urban Transport and Environment.pdf
- Training Manual – Volume 1 – Urban Transport and Environment.pdf

Financing

- Reference Guide - Volume 2 - Financing, Fare Fixation & Cost-Benefit Analysis.pdf
- Training Manual – Volume 1 – Financing, Fare Fixation & Cost-Benefit Analysis.pdf

Institutional

- Reference Guide - Volume 2 - Institution.pdf
- Training Manual – Volume 1 – Institutions.pdf

Instruction Kit

- Instruction kit.pdf

Integrated

- Reference Guide - Volume 2 - Integrated Planning of Infrastructure.pdf
- Training Manual – Volume 1 – Integrated Planning.pdf

Public Transport

- Reference Guide - Public Transport - volume 2.pdf
- Training Manual – Volume 1 – Public Transport.pdf

Sensitisation

- Reference Guide - Volume 2 - Sensitization.pdf
- Training Manual – Volume 1 – Senstization.pdf

Traffic

- Reference Guide - Volume 2 - Traffic.pdf
- Training Manual – Volume 1 – Traffic.pdf

[55] http://www.sutpindia.com/TopMenuDescription.aspx?status=1&menu_id=1&mmenuid=1

Transport Planning

- Reference Guide – Volume 2 – Transport Planning.pdf
- Training Manual – Volume 1 – Transport Planning.pdf

Toolkits

- Finance and Financial Assessment Toolkit.pdf
- ITS Toolkit Sent to IUT_200614.pdf
- Land use Transport Integration Toolkit.pdf
- Public Transport Accessibility Toolkit.pdf
- SEA EIA Toolkit Report-_200614.pdf
- Social Impact Assessment Toolkit.pdf
- Transport Demand Management.pdf
- Travel Demand Modelling Toolkit.pdf
- Urban Road Safety Audit_200614.pdf
- Urban Road Traffic System Toolkit.pdf
- Urban Freight Transport & Management Toolkit.pdf

ANNEX 7 – CTCN MEMBER ORGANISATIONS THAT MENTION TRANSPORT AS AREA OF EXPERTISE

Organisation	Type of Organization	Country of registration:	Relation to CTCN:	Website	Description
Global Environment Centre Foundation	Not for profit	Japan	Knowledge Partner	http://gec.jp	The Global Environment Centre Foundation (GEC) is an entity that supports the UNEP's International Environmental Technology Centre (IETC), based in Japan. GEC is dedicated to the transfer of environmentally sound technologies, in both developing countries and countries with economies in transition. The foundation aims to contribute to Japan's international efforts on the environment, sharing project collaborations as well as promoting Japan's rich conservation knowledge and experience in developing nations.
Low Emission Development Strategies Global Partnership	Partnership	US	Network Member	http://Ledsgp.org	The Low Emission Development Strategies (LEDS) Global Partnership (GP) was founded to enhance coordination, information exchange, and cooperation among countries and international programs working to advance low-emission, climate-resilient development. Global topical working groups (Finance, Subnational Integration of LEDS, Benefits Assessment and Communications, Energy, Transport and AFOLU measures) provide technical support for activities that respond to regional priorities.
Wuppertal Institute for Climate, Environment and Energy	Research and academic institution	Germany	Network Member	http://www.wupperinst.org	Wuppertal Institute for Climate, Environment and Energy is a research and academic organisation established in 1991 with the mission to undertake research and develops models, strategies and instruments for transitions to a sustainable development at local, national and international level. Sustainability research at the Wuppertal Institute focuses on the resources, climate and energy related challenges and their relation to economy and society. Special emphasis is put on analysing and stimulating innovations that decouple economic growth and wealth from natural resource use.
Grue + Hornstrup A/S	Private sector organisation	Denmark	Network Member	http://www.g-h.dk	Active since 2001, the Energy and Environment Group of G+H is one of the leading European based consultancy firms providing innovative and tailor-made advisory services and solutions in the board fields of Climate Change, Development, Energy & Environment, and Sustainability.
Australian CleanTech	Private sector organisation	Australia	Network Member	http://www.auscleantech.com.au	Australian CleanTech is a research and advisory firm established in 2007 with the mission to incubate nascent clean technology firms and advocate on their behalf. The company manages a 300-member cleantech cluster and a national innovation competition, each of

Organisation	Type of Organization	Country of registration:	Relation to CTCN:	Website	Description
					which has a Global Development category that focuses on technologies suitable for developing countries.
Centre for Clean Air Policy	Not for profit organisation	US	Knowledge Partner	http://www.ccap.org	Centre for Clean Air Policy (CCAP) is a not for profit, non-governmental and research and academic organisation established in 1985 with the mission to significantly advance cost-effective and pragmatic air quality and climate policy through analysis, dialogue and education to reach a broad range of policy-makers and stakeholders worldwide. CCAP helps policy-makers around the world develop, promote and implement innovative, market-based solutions to major climate, air quality and energy problems that balance both environmental and economic interests.
Clean Energy Nepal	Not for profit organisation	Nepal	Network Member	http://www.cen.org.np	Clean Energy Nepal (CEN) is an independent, non-profit service oriented, policy, research and implementation organisation established in 1999 with a mission to educate and aware people on issues related to climate change, energy and other environmental issues and work for reducing air pollution and global warming impacts to natural and human system. It focuses on research-based education and advocacy campaigns with policy inputs and implementation on issues related to sustainable energy use and environmental conservation.
HEAT - Habitat, Energy Application & Technology	Private sector organisation	Germany	Network Member	http://www.heat-international.de	HEAT is an independent consulting company focussed on the development and implementation of projects for climate and ozone protection. HEAT has a focus on technology cooperation, policy advice for climate protection technologies, in the areas of energy efficiency, cooling and refrigeration, F-gases, inventories, roadmaps, carrying out technical and economic feasibility studies and capacity building measures such as training and certification. HEAT is also the Coordination Office of the NDE Germany.
Orizon Consulting LLC	Private sector organisation	US	Network Member	N/A	Orizon's mission is to enable new markets and empower leaders to transform local economies through the design of enabling policies and the application of breakthrough technologies promoting market-based approaches to low carbon emissions, carbon capture, and sustainable livelihoods. Orizon's team of seasoned experts provide technology solutions, capacity building and advice on policy, legal and regulatory frameworks tailored to the needs of regional, national, and local economies.
Perspectives Climate Change	Private sector organisation	Spain	Knowledge Partner	http://perspectives.cc/	Perspectives Climate Change offers high quality, comprehensive and tailor-made solutions for international climate policy and carbon market activities. Perspectives Climate Change consults the private sector as well as governments and non-governmental organisations

Organisation	Type of Organization	Country of registration:	Relation to CTCN:	Website	Description
					and seeks to maximise economic opportunities within the existing climate policy system, contributing to the enhancement of the international climate regime.
Carbon Africa Ltd	Private sector organisation	Kenya	Knowledge Partner	http://www.carbonafrica.co.ke/	Carbon Africa's mission is to catalyse climate action in Africa by providing policy, programme and project advisory services to public and private actors, with a focus on making things happen on the ground. The company offers services in project development, access to climate finance and impact monitoring, underpinned by efforts to support the enabling environment and build capacity. Carbon Africa is headquartered in Kenya with representation in Ethiopia, Mozambique and Rwanda.
Overseas Environmental Cooperation Centre	Non-governmental organisation	Japan	Knowledge Partner	http://www.oecc.or.jp/english/index.htm	The Overseas Environmental Cooperation Centre, Japan (OECC) is a non-governmental organisation supported by the Ministry of the Environment of Japan, promoting international cooperation activities related to climate change, global environment conservation, research, capacity building, and support to various non-government related activities.
New Energy and Industrial Technology Development Organization	Research and academic institution	Japan	Network Member	http://www.nedo.go.jp	NEDO is a public sector organisation established in 1980 with mission to address energy and global environmental problems and enhancing industrial technology. NEDO aims to address energy problems and raise the level of industrial technology through integrated management of technology development.
Fundación CIRCE - Centro de Investigación de Recursos y Consumos Energéticos	Not for profit organisation	Spain	Network Member	http://www.fcirce.es	CIRCE was established in 1993 as an independent Research Centre to create and develop innovative solutions and scientific/technical knowledge and to transfer them to the business sector in the field of energy. CIRCE's mission is to drive forward improvements in energy efficiency and to spread the use of renewable energy by means of the development of R+D+I activities and formative actions, thereby contributing to a sustainable development. CIRCE has conducted more than 1600 R&D&I projects.
Korea Institute of Civil Engineering and Building Technology	Research and academic institution	Korea	Network Member	http://www.kict.re.kr	KICT contributes to the development of the Korean construction industry, improves quality of life standards, furthers national economic growth and improves social welfare. KICT promotes original technology in the fields of land, infrastructure and construction
SUNJIN Engineering and Architecture	Private sector organisation	Korea	Network Member	http://www.sunjin.co.kr	SUNJIN Engineering and Architecture co. Ltd is a multi-disciplinary consultant company located in South Korea, founded in 1975. The firm is made up of over 750 specialists working across the disciplines of Feasibility Studies, Technical Assistance Engineering, Project Management, Construction Management etc. SUNJIN E&A can work

Organisation	Type of Organization	Country of registration:	Relation to CTCN:	Website	Description
					with a range of projects within the field of Environment, Waterworks, Urban planning, Roads & Traffic and Architecture.
Fundación Centro de Gestión Tecnológica e Informática Industrial	Non-governmental organisation	Costa Rica	Knowledge Partner	http://www.cegesti.org	CEGESTI is a non-profit organisation founded in 1990, with the mission of contributing to sustainable development in Latin America with special emphasis on three core topics: Environment and Development; Responsible Business and Impact on Social Responsibility. Since its beginnings, CEGESTI has collaborated with bilateral and multilateral cooperation agencies, local entities, enterprises and other society actors in formulating initiatives that facilitate an equitable and sustainable development.
Centro Mario Molina, Chile	Research and academic institution	Chile	Network Member	http://www.cmmolina.cl/	Centro Mario Molina, Chile (CMMCh)'s mission is to build the capabilities to face air pollution problems and climate change in South America. CMMCh has the vision to be a Centre for Development and Research for promoting cutting-edge research in association with prestigious entities.
Energy Changes Projektentwicklung GmbH	Private sector organisation	Austria	Network Member	http://www.energy-changes.com/	Energy Changes´ (EC) business activities solely focus on GHG mitigation activities applying renewable energies and energy efficiency measures. EC identifies, evaluates and develops renewable energy/ energy efficiency and GHG mitigation projects. EC's staff includes engineers, scientists, economists and business experts with many years of experience in sustainable energy, resource management and GHG mitigation. EC was founded in 2006 and has currently 15 employees and an annual turnover of approx. 2 million EUR
Greenhouse Gas Management Institute	Research and academic institution	US	Knowledge Partner	http://ghginstitute.org	GHGMI educates professionals on GHG accounting, auditing and management; trains professionals to meet the highest standards of expertise and ethical conduct; and conducts forward-looking research into critical GHG measurement, reporting, and verification (MRV) issues. GHGMI offers online courses, as well as workshops, courses and institutional academic partnerships. GHGMI's programming equips learners in all countries with the knowledge to succeed in reporting under the Paris Agreement.
Carbon Limits AS	Research and academic institution	Norway	Network Member	http://carbonlimits.no	Carbon Limits (CL) consists of a highly experienced team of technical experts, economists and project managers with deep sector insight into climate change and energy sector development, combined with local know-how and networks within the company's geographical target areas. CLs services cover three broad categories: Emission reduction project development through transfer of technology and know-how Consultancy and technical assistance

Organisation	Type of Organization	Country of registration:	Relation to CTCN:	Website	Description
					Capacity building and training.
South Pole Carbon Asset Management	Private sector organisation	Switzerland	Network Member	http://thesouthpolegroup.com	South Pole group (SPCAM) is a global sustainability solution and service provider with over 130 professionals across six continents. SPCAM offers a broad spectrum of advisory services related to climate change, in addition to high-quality carbon credits, renewable energy solutions and green finance services. Relevant activities in the field of climate technologies include carbon project development experience in developing countries across a portfolio of more than 500 projects in all climate-relevant sectors as well as advisory and climate finance services.
Energy and Environmental Development Research Centre	Private sector organisation	China	Network Member	http://www.eed.com.cn/	Energy and Environmental Development Research Centre (EED) is an institution committed to policy and economic research on energy and environment, technology development, as well as professional training, institutional strengthening, and capacity building. EED's service areas cover: i) climate change/low-carbon economic development; ii) new/renewable energy development; iii) energy efficiency improvement; iv) environmental protection in rural and regional areas; v) industrial and urban pollution control, and vi) energy and environment advisory.
RINA Consulting	Private sector organisation	Italy	Network Member	http://www.rina.org	With a history going back 150 years, the RINA Group is a global corporation that provides engineering and consultancy services, as well as testing, inspection and certification.
Basel Agency for Sustainable Energy	Not for profit organisation	Switzerland	Knowledge Partner	http://energy-base.org/	The Basel Agency for Sustainable Energy (BASE) is a Swiss Foundation and Specialised Partner of United Nations Environment. BASE develops innovative ideas and tailored market-driven solutions to drive investment in sustainable energy and to meet the challenge of climate change. BASE has implemented projects incorporating locally appropriate climate technologies in North and South America, Africa, Asia and Europe.
Ramboll Danmark A/S	Private sector organisation	Denmark	Knowledge Partner	http://ramboll.com	Ramboll is an engineering, design and consultancy company employing 13,000 experts worldwide. Ramboll provides services across de following sectors: energy, water, environment, health, buildings, transport, and management consulting etc. Ramboll's multidisciplinary approach allows them to provide best available solutions in mitigation and adaptation technologies, and their worldwide presence and expertise facilitates the transfer of technology to developing countries.

Organisation	Type of Organization	Country of registration:	Relation to CTCN:	Website	Description
EcoMetrix Africa	Private sector organisation	South Africa	Network Member	http://www.ecometrix.co.za	EcoMetrix Africa is a South African greenhouse gas management consultancy assisting organisations in greenhouse gas emissions inventories, defining mitigation strategies and developing renewable energy and energy efficiency projects. Moreover, they advise organisations in determining how to respond to the changing regulatory landscape as for example the carbon tax and the national energy efficiency strategy.
LAVOLA 1981, SA	Private sector organisation	Spain	Network Member	http://www.lavola.com/	Lavola has more than 35 years' experience in sustainability services. The company is specialised in: Consultancy in Energy Efficiency and Renewable Energies (including engineering), Carbon footprint, Climate Change mitigation and adaptation, Life Cycle analysis, Social Responsibility and Sustainable Urban and Regional Development. Sustainable Development Communication Sustainable Development Education including programmes, learning materials, activities and Management of centres.
Environmental Resources Management Southern Africa Pty Ltd.	Private sector organisation	South Africa	Network Member	http://www.erm.com	ERM is a leading global provider of environmental, health, safety, risk, social consulting services and sustainability related services. The Energy and Climate Change Technical Community of ERM has over 400 professionals globally.
Pure Energy Centre	Private sector organisation	UK	Network Member	https://pureenergycentre.com	Specialising in solar, wind, and energy storage technologies, the PEC has worked in Africa, South America and Asia. PEC has over 100 wind turbine installations, over 500kW of solar photovoltaic installed (on grid/off grid), and over 1MW of hydrogen storage technologies designed, manufactured and installed globally. PEC has provided over 100 consultancies, and their staffs are rapporteurs and energy experts for the EU commission.
Jeremy Benn Associates Limited	Private sector organisation	UK	Network Member	http://www.jbaconsulting.com	Jeremy Benn Associates Ltd (trading as JBA Consulting and referred to as JBA) is a specialist water and environmental consultancy founded in 1995. JBA now employs 450 permanent staff in 18 offices in the UK, Ireland, Singapore, Australia and Cambodia. The firm is a wholly owned part of JBA Group, a UK private limited company owned by its employees. The company typically undertakes 1,200 projects/year ranging from 1-2-week commissions to multi-year, multi-million $ frameworks.
Umweltbundesamt GmbH	Private sector organisation	Austria	Network Member	http://www.umweltbundesamt.at	Umweltbundesamt GmbH is a government-owned company which acts as the national agency for environmental protection and environmental control. The main tasks of the Agency are: - Assessment of the state of the environment and of its changes and trends

Organisation	Type of Organization	Country of registration:	Relation to CTCN:	Website	Description
					- Development of measures to avoid/reduce environmental impacts - Planning and implementation of environmental policy decisions and enforcement of laws - Analysis of environmental pollutants - Environmental reporting (incl. GHG and AP)