FINANCING LOW CARBON TRANSPORT SOLUTIONS IN DEVELOPING COUNTRIES

Discussion Paper
November 2021
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Transport Decarbonization Investment (TDI) Series

The TDI Series is a partnership between the World Bank, the Government of the Netherlands, and the World Resources Institute (WRI) with the goal of sharing recommendations for overcoming investment barriers to decarbonizing transport and spurring joint action by governments, companies, civil society, and international development and financial institutions. This discussion paper on “Financing Low Carbon Transport in Developing Countries” is the last in a series of technical notes in the lead up to COP26 in November 2021.

The other reports in the series are:

1. Motorization management and the trade of used vehicles: How collective action and investment can help decarbonize the global transport sector
2. Cleaner Vehicles and Charging Infrastructure: Greening Passenger Fleets for Sustainable Mobility
3. Decarbonizing Cities by Deploying Public Transport and Improving Land Use Policies
4. Investing of Momentum in Active Mobility
5. Unlocking and adopting green freight and logistics.

For more information, please visit https://www.worldbank.org/en/topic/transport/publication/transport-decarbonization-investment-series

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# Abbreviations List

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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AfDB</td>
<td>African Development Bank</td>
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<tr>
<td>ASI</td>
<td>Avoid, Shift, Improve</td>
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<td>BRT</td>
<td>Bus Rapid Transport</td>
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<td>CapEx</td>
<td>Capital Expenditure</td>
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<td>CCAP</td>
<td>Climate Change Action Plan</td>
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<td>CCDR</td>
<td>Country Climate and Development Report</td>
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<td>COP</td>
<td>Conference of the Parties</td>
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<td>CPIs</td>
<td>Climate Policy Initiatives</td>
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<td>DFI</td>
<td>Development Finance Institutions</td>
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<td>ECA</td>
<td>Export Credit Agency</td>
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<td>ECR</td>
<td>Effective Carbon Rate</td>
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<tr>
<td>EMDE</td>
<td>Emerging Markets and Developing Economies</td>
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<td>ESG</td>
<td>Environment, Social and Governance</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>EV-RSP</td>
<td>Electric Vehicle Risk-Sharing Program</td>
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<td>EVs</td>
<td>Electric Vehicles</td>
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<tr>
<td>GCF</td>
<td>Green Climate Fund</td>
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<tr>
<td>GFTD</td>
<td>World Bank Global Facility for Transport Decarbonization</td>
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<td>GGRF</td>
<td>Greenhouse Gas Reduction Fund</td>
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<tr>
<td>GHG</td>
<td>Greenhouse Gas</td>
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<td>HICs</td>
<td>High Income Countries</td>
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<tr>
<td>ICEVs</td>
<td>Internal Combustion Engine Vehicles</td>
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<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
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<td>IDBG</td>
<td>Inter-American Development Bank Group</td>
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<td>IEA</td>
<td>International Energy Agency</td>
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<td>IFI</td>
<td>International Finance Institutions</td>
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<td>IMF</td>
<td>International Monetary Fund</td>
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<td>IMO</td>
<td>International Maritime Organization</td>
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<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>LDVs</td>
<td>Light Duty Vehicles</td>
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<td>LEZ</td>
<td>Low Emission Zone</td>
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<td>LMICs</td>
<td>Lower and Middle Incomes Countries</td>
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<tr>
<td>LRT</td>
<td>Light Rail Transit</td>
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<td>LVC</td>
<td>Land Value Capture</td>
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<td>MDBs</td>
<td>Multilateral Development Banks</td>
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<tr>
<td>MM</td>
<td>Motorization Management</td>
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<tr>
<td>MoU</td>
<td>Memorandum of Understanding</td>
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<td>MUL</td>
<td>Multi Use Lane</td>
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<tr>
<td>NDC</td>
<td>Nationally Determined Contributions</td>
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<td>NMT</td>
<td>Non-Motorized Transport</td>
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<tr>
<td>O&amp;M</td>
<td>Operations and Maintenance</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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<td>OEM</td>
<td>Original Equipment Manufacturer</td>
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<td>OHD</td>
<td>Off Hour Delivery</td>
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<td>PFI</td>
<td>Private Finance Initiative</td>
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<td>PIC</td>
<td>Private, Institutional and Commercial Capital</td>
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<td>PM</td>
<td>Particulate Matter</td>
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<td>PPIAF</td>
<td>Public-Private Infrastructure Advisory Facility</td>
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<td>PPP</td>
<td>Public-Private Partnerships</td>
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<td>SGDF</td>
<td>Shandong Green Development Fund</td>
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<td>SOE</td>
<td>State Owned Enterprise</td>
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<tr>
<td>SSA</td>
<td>Sub-Saharan Africa</td>
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<tr>
<td>TCO</td>
<td>Total Cost Ownership</td>
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<tr>
<td>TDI</td>
<td>Transport Decarbonization Investment Series</td>
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<td>TDM</td>
<td>Transport Demand Management</td>
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<tr>
<td>TOD</td>
<td>Transit-Oriented Development</td>
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<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<td>WRI</td>
<td>World Resources Institute</td>
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<td>ZEV</td>
<td>Zero Emission Vehicle</td>
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Executive Summary

The transportation sector is crucial to economic growth and development. It is also one of the largest contributors to global greenhouse gas emissions, which have grown faster than almost any other sector over the past 50 years. Transport is a key part of the climate solution and therefore pivotal to reaching the ambitious Paris Agreement. It requires coordinated policy actions and strong political commitment, and thus, targeted and more efficient policy interventions. These issues are discussed in this document, which is the final paper of the Transport Decarbonization Investment series, in which the Netherlands government, the World Bank, and the World Resources Institute joined efforts to address transport decarbonization in developing countries.

Climate change represents an existential threat that disproportionately affects low-income communities and developing countries. The challenge - and opportunity - is to reconcile the growing mobility needs of developing economies, with the imperative for climate action and improved resilience. On the other hand, developing countries face significant infrastructure gaps in terms of investment and mobility. A few common patterns emerge. In many developing world cities, most residents walk, bike or commute via public transport. However, transport investments have favored motorization, which is also coupled with inefficient pricing of motor vehicle use which conspire against sustainable public transport. Moreover, the demand for affordable motorized transport is growing quickly, whereby the oldest and most poorly maintained vehicles contribute disproportionately to the transport-related local air pollution, GHG emissions, road injuries and fatalities. E-mobility is a promising solution that needs to be embedded in a comprehensive sustainable transport and energy policies, but mobility is not exclusive to cars. Active mobility is a low-cost and high-impact alternative to achieve a low-carbon pathway. Equally important, is a more holistic approach to urban planning, land use, construction codes and territorial development which provides accessibility and is transit oriented.

The rationale to decarbonize transport is clear and the investment gap has been identified, but can governments gather the much-needed resources? There is no simple answer, and the solution depends on each country context. Nevertheless, price incentives can promote the transition towards a low-carbon economy. Carbon taxes, fees reflecting the true cost of road usage, land use taxes, and other instruments can create pool resources. Yet, capturing these externalities in prices and taxes should come along with investments and policies to facilitate the transition - taxation should not be the path to low carbon goal. Funding matters but it is not everything. Looking how resources are allocated is equally important, thus the quality of public spending and the prioritization of actions. Three messages are clear from this analysis: i) removing perverse subsidies is an essential first step towards transport decarbonization, ii) users of private motorized transport need to be faced with their full social costs, and iii) tax revenues from transport externality pricing need to be recycled into green investments.

What does the climate financing landscape look like for green transport? Recent estimates place worldwide climate financing flows at US$574 billion average each year, however this is unevenly distributed across countries and sectors, with energy capturing a large share. A few patterns emerge i) Development Financial Institutions lead financing on green transport, ii) Climate Funds provide limited support, iii) Export Credit Agencies are active although it is difficult to assess the magnitude, iv) private investments are lagging, and v) thematic investing is accelerating, driven by regulatory changes, including the integration of ESG preferences in investor choices, but not much on green transport.
Innovative approaches needed to offer affordable finance in developing countries. For instance, through a regional financing facility to support clean mobility. Such approach can bring scale, diversify risks, reduce transaction costs and provide greater flexibility in Sub-Saharan Africa. Other approaches to financing 2-3 wheelers are also discussed. Carbon pricing schemes can be explored in more advanced developing economies in addition to a global and voluntary carbon market to finance the transition in maritime shipping.

Concerted actions must be taken by every country along with a worldwide coordinated effort to guarantee an equitable transition to low carbon transportation. This document brings concrete recommendations by: i) setting climate action goals, ii) putting in place green transport-specific regulation and institutional frameworks, iii) incorporating a GHG analysis in transport planning to prioritize policies and investments, iv) deploying public transport and improving land use policies, v) managing motorization, vi) investing in e-mobility and charging infrastructure, vii) adopting green freight and logistics, viii) optimizing funding mechanisms to incentivize greening actions, ix) ensuring efficiency of public spending, x) focusing on research and development by leveraging private sector’s ability to innovate, and finally xii) developing a financing strategy including blend financing and credit enhancements as needed.
1. Introduction

Transport is a key component to climate solution and therefore, pivotal to reach benchmarks established by the ambitious Paris Agreement. We have the technology, tools, and opportunities to advance markets, unlock investments, and scale up action. The Climate Action Pathway -Transport1 provides clear insights to advance and align transport with the objectives of the Paris Agreement, and is complemented by the Global Roadmap Toward Sustainable Mobility.2 However, by most measures, action is well off-track, and greenhouse gas (GHG) emissions from transport are on the rise. At the same time, the momentum increases to drive action on transport and accelerate the transition to zero or low carbon transport modes. To mention a few of them, the United Kingdom initiated the Zero Emission Vehicle Transition Council, the Netherlands initiated process on a Global Memorandum of Understanding on zero-emission freight and the climate champions led Race to Zero campaign, and the World Bank’s new Climate Change Action Plan aims to align all World Bank projects with the Paris Agreement by 2023. In many segments of the transport domain, climate smart solutions are becoming increasingly attractive from a total cost of ownership perspective. Yet, market uptake and subsequent investment at scale are low and often markets fail to mature beyond pilot projects and niche markets, with a notable exception of electric vehicles in several advanced markets.

Targeted and more efficient interventions are needed. There are calls for decarbonizing transport and for improving the international community’s understanding of how specific investments and innovative finance solutions can create the conditions for market uptake of climate-smart solutions across transport sectors. For that purpose, the Netherlands, the World Bank, and the World Resources Institute collaborated to launch the Transport Decarbonization Investment series (TDI-series) with three main objectives:

- Delivering actionable recommendations for COP26, with a focus on overcoming investment barriers and developing innovative financial instruments to decarbonize transport.
- Promoting coordinated and joint actions by governments, cities, companies, and financial institutions on key levers that boost investments in decarbonizing transport.
- Provide an analytical basis and associated best practices to underpin the recommendations.

Policy, technology, and investment are all critical in accelerating the transition toward carbon neutral transport. The emphasis is on boosting investment and financial instruments, deepening the understanding of the barriers that hamper scaled up investments and introduction of innovative finance solutions and harnessing private sector and institutional investors.

The TDI series spans five areas summarized in this report.

- Decarbonizing cities by deploying public transport and improving land use policies
- Motorization Management and the Trade of Used Vehicles
- Cleaner vehicles and charging infrastructure: a sustainable and practical view of e-mobility
- Active mobility
- Unlocking and adopting green freight and logistics
In addition, this report features funding and financing issues to decarbonize transport. Lastly, while the focus of this work is on 'low-carbon' solutions, the discussion also brings some elements to guide policy actions for adaptation and resilience.

This document is organized as follows. Chapter 2 describes the trends on greenhouse gas emissions while Chapter 3 reviews the challenge to reduce emissions in developing countries summarizing the findings on the other TDI notes. Chapter 4 discusses the experience and trends in funding public investments and policies in the transportation sector while Chapter 5 describes the architecture of climate finance for transport decarbonization. Chapter 6 presents some innovative financial approaches and finally, Chapter 7 develops a series of recommendations for a transition to a low carbon pathway in transport.

Notes
2. Sizing the Challenge

The Climate change crisis makes decarbonization of the transport sector one of the most pressing development challenges of our time. Any scenario to stabilize climate change around the 1.5°C target above pre-industrial temperatures is feasible only with an aggressive approach to decarbonizing transport, which requires mitigation and adaptation. The demand for mobility continues to grow as economies develop and urbanize, and as populations and incomes increase. With the world population projected to reach 8.5 billion by 2030, annual passenger traffic (all modes) is expected to grow by 50 percent, while global freight volume is expected to grow by 70 percent over the same period. But emissions from the transport sector comprise approximately 17 percent of global greenhouse gas (GHG) emissions in 2018. Transport sector emissions have also grown faster than those of almost any other sector over the past 50 years. These emissions are predicted to increase by 60 percent by 2050, if no action is taken.

Table 2-1: Estimated transport emissions from multiple sources (% of total emissions)

<table>
<thead>
<tr>
<th>Source</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Calculator (2019)</td>
<td>12.8%</td>
<td>15.3%</td>
<td>17.9%</td>
</tr>
<tr>
<td>IEA (2017)</td>
<td>11.9%</td>
<td>14.2%</td>
<td>16.3%</td>
</tr>
<tr>
<td>ITF (2019)</td>
<td>8.8%</td>
<td>10.2%</td>
<td>11.6%</td>
</tr>
<tr>
<td>ICCT (2020)</td>
<td>13.8%</td>
<td>17.2%</td>
<td>21.0%</td>
</tr>
<tr>
<td>IRENA (2020)</td>
<td>8.2%</td>
<td>8.5%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Shell (2020)</td>
<td>10.6%</td>
<td>11.8%</td>
<td>11.5%</td>
</tr>
<tr>
<td>SLOCAT (BAU) (2019)</td>
<td>11.0%</td>
<td>12.6%</td>
<td>14.5%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>11.0%</strong></td>
<td><strong>12.8%</strong></td>
<td><strong>14.5%</strong></td>
</tr>
</tbody>
</table>

Source: SLOCAT - Transport Knowledge Base.

Power generation contributes the most carbon dioxide and transport emissions are growing faster. The ratio of transport to power emissions represented 61 percent in 2011 but increased to 67 percent by 2018. The effort to decarbonize the power sector is paying off in most developed economies. It is driven by policy actions along with the capacity of these economies to fund the transition while also tapping into innovative climate finance solutions. In emerging markets and developing economies (EMDEs), larger economies in South and East Asia are experiencing an increase in their power demand that is accelerating carbon dioxide emissions even when investments in renewables and clear energies are also taking place. Transport emissions, however, continue to grow worldwide for different reasons in each country. An increase in the motorization rate, partially explained by the lack of public transport along with insufficient urban planning is likely to drive emissions in most EMDEs in the next decade. Worldwide, road transport is largely accountable for the total transport emissions—74 percent in 2018.
Transport emissions from emerging and development economies. These countries contributed as much in transport-related emissions to those counted in higher income economies in 2018 (IEA 2021). In effect, some lower- and middle-income countries (LMICs) show emission levels similar to those observed in higher income countries. However, emissions per capita in higher income economies were more than five times higher than those in EMDEs. While all emissions matter, countries of high-, middle- and low-income economies would likely differ in their transition path in policy actions and investment to achieve low carbon transport sector as their capacity and development aspirations require different solutions.

A less green future if no actions taken to decarbonize transport. Undoubtedly, developed economies are better suited to address the challenges and to apply much-needed technological innovations. On the other hand, many LMICs have some mobility and aspirational needs that are not necessarily aligned with their capacity to implement and finance clean infrastructure and mobility solutions, with a higher risk on locking in not so clean technologies. Transport emissions are closely linked to rates of motorization. Projections on growth in the global vehicle fleet show that future
growth will primarily be driven by increasing numbers of vehicles in LMICs while motorization rates in developed countries have reached saturation and vehicle stock is projected to remain broadly stable. With rapidly growing motorization rates, the developing world is likely to be the main driver of increasing transport carbon dioxide emissions over the coming decades unless governments act to significantly mitigate the risks.

Reaching the Paris Agreement requires coordinated policy actions and strong political commitment. The Agreement requests each country to outline and communicate their post-2020 climate actions, through their nationally determined contributions (NDC). These are nonbinding commitments. The first version of the NDC highlighted efforts to decarbonize transport but went further in the second version with more concrete actions. Nonetheless, 84 countries submitted their second version, out of 197 countries signing the Agreement (SLOCAT 2021). Middle-income countries lead the effort by proposing mitigation and adaptation measures in the transport sector. However, fewer countries have set targeted emission reductions.


Figure 2-3: Future projections: Growth in motorization rate and transport CO2 emissions

Figure 2-4: Tracking Climate Strategies for Transport (number of countries)

Source: SLOCAT 2021.
The COVID-19 pandemic has affected the way we move and could change transport patterns in the long term in every part of the world. During the worst of the health crisis, a significant population shifted to home-based work, but for the many who were required to continue traveling to work, they faced reduced transport options. Demand for public transport and air travel plunged. Walking and cycling rates surged on reconfigured streets. Global maritime trade dropped as large numbers of container fleet idled at the peak of initial lockdowns. On the positive note, these changes translated to a decline of fossil fuel consumption and GHG emissions. Moreover, if telecommuting trends continue post-pandemic crisis, the reduced growth rate of transport might ease GHG emissions. Globally, governments implemented stimulus and recovery fiscal packages as COVID-19 surged, in some cases, with considerable resources going to support investments in fossil fuel-related companies than in clean energy. Moreover, stabilization measures did not emphasize green transport measures but as countries turn to longer term recovery, investing in sustainable mobility is of utmost importance.3

Notes

1. Per IPCC research reflecting the consensus views of 830 scientists, engineers, and economists from more than 80 countries and was formally endorsed by the governments of 194 countries—identified many possible pathways to reach carbon neutrality by the end of the century.

2. Other relevant transport emissions such as Particulate Matter 2.5 (PM2.5) and Particulate Matter 10 (PM10), Nitrogen Oxides (NOX), Sulphur Dioxide (SO2), Carbon Monoxide (CO) among others also have an impact on health locally.

3. Challenges to Reduce Carbon Emissions in Developing Countries

The impact of climate change is already evident. Climate change-induced natural disasters are estimated to account for approximately US$15 billion annually in direct damage to transport infrastructure (Hellegate et al. 2019). This figure does not account for the wider social, economic and environmental costs such as fatalities, impoverishment, and disruption to the economy.

Climate change represents an existential threat that disproportionately affects low-income communities and developing countries. The frequency and severity of climate change-induced disasters has increased. The South Asia region recorded more than 1000 such disasters between 1990 and 2019 (Mani et al. 2018). Collectively, these disasters affected approximately 1.68 billion people, and were responsible for the deaths of 267,000 people, and caused an excess of US$127 billion in damage. Without climate action, it is estimated that 800 million people in the South Asia region—equivalent to 44 percent of its total population—will live in locations that are expected to become moderate or severe climate hotspots by 2050. It is projected that by 2030 up to 62 million people risk being pushed below the extreme poverty line. By the same date, it is estimated that damage from floods alone will cost US$215 billion annually.

The challenge—and opportunity—is to reconcile the growing mobility needs of developing economies, with the imperative for climate action and improved resilience. Transport and mobility play a central role in the development agenda, facilitating access to employment, education, health, social services, as well as to local, regional, and global markets. Sustainable solutions are therefore required to decouple the relationship between growing transport or mobility demand and fossil fuel dependency, without constraining development to ensure people and communities can prosper.

Low and middle-income countries (LMICs) face significant infrastructure gaps in terms of investment and mobility. It is estimated that governments globally will face an annual transport infrastructure financing gap of between US$244 to US$944 billion through 2030 (Lefevre et al. 2016). Financing and financiers therefore need to become more innovative and challenge the status quo of dependency on year-to-year budgetary allocations. Furthermore, infrastructure provisions must seek to facilitate climate action and improve resilience. The traditional funding and financing instruments have demonstrated limited success with a number of projects being shelved because of a lack of bankability.

The Transport Decarbonization Investment series (TDI) published five discussion papers with the objective of identifying, framing, and proposing actionable recommendations to key challenges that are impeding the successful transition to a decarbonized transport sector. Each of the five discussion papers focused on a key aspect of transport decarbonization. A high-level overview of the challenges identified in each paper has been provided in the subsections below.
3.1 Decarbonizing cities by deploying public transport and land use policies

In a typical city in the developing world, the majority of residents walk, bike, or commute via public transport, thereby using very low levels of motorization. These characteristics leave developing cities well positioned to pursue a low carbon mobility pathway. However, as economies continue to develop and income levels rise, demand for motorization will also increase. Investment that strategically targets improvements and enhancements in public transport, sidewalks and cycle-lanes is critical to combat growing demand for motorization.

**Transport investment has favored motorization.** Transport policy has often focused on the construction of roads, which incentivizes motorizations. As a consequence, public transport is forced to compete with private vehicles to access the road network. This is highly inefficient for public buses, which leads to increased congestion and greater journey times, reducing its competitiveness and incentivizes car ownership which compounds the issues and reduces revenue from the farebox. Equally, other modes such as active transport, walking and cycling, lack the proper infrastructure, which increases risk of injury and fatalities.

**Inefficient pricing of motor vehicles conspires against sustainable public transport.** Car use is subsidized, although implicitly, in most countries. For example, car registration fees cover the cost of recording ownership but little else, while the parking fee is often priced below the real cost. Finally, car users are not made to pay for the negative externalities imposed on other users. In some cities, traffic fines raise significant revenue generating a perverse incentive for traffic enforcement to encourage unsafe driver behavior. A safe system should have zero revenue from fines. Managing transport demand becomes another key pillar to promote lower carbon mobility.

**The lack of sustainable mobility is exacerbated by urban developments which fall short of regulations, creating housing which is substandard.** Often public housing developments are built in more remote areas resulting in residents being dispersed and networks disconnected. This model is very expensive to serve with public transport due to low density and walking and cycling are not possible. Consequently, residents are unable to access the labor market, hindering economic prosperity.

3.2 Motorization management and the trade of used vehicles

**Developing countries are witnessing quick growth in demand for affordable motorized transport.** Many developing countries heavily rely on imports of second-hand vehicles from countries of the Organization for Economic Co-operation and Development (OECD). The global trade in used motor vehicles is valued at more than US$18 billion annually and is expected to grow as incomes rise in developing countries. The fleets of light duty vehicles, such as passenger cars, and heavy-duty vehicles, such as trucks and buses, are expected to double within the next two decades in developing countries, thereby increasing emissions from the road transport.

**The oldest and most poorly maintained vehicles in a national fleet contribute disproportionately to the transport-related local air pollution, GHG emissions, road injuries, and fatalities.** This is particularly the case in the developing world where fleets tend to be older, more polluting, less safe, and suffer from weak regulations and lax enforcement. Used vehicles may also be a major barrier to the transition to sustainable low carbon transport if the pollution and other externalities they generate are not properly priced (box 3-1). This widens green divide between developed and developing countries in the quality of their vehicle fleets and outcomes such as GHG emissions, road fatalities and injuries, and local air pollution.
Box 3-1: Growing problem of used vehicles

At least 60% vehicles on Africa’s roads are used and imported: regulations are weak in as many as 44 countries. West African nations are likely to introduce stricter emissions compliance testing from 2021. Germany and the Netherlands will measure particulate emissions of diesel vehicles at their annual inspections in 2022. But a significant number of diesel vehicles in these countries may not pass the test and yet, could be exported to African nations. This may impact West African nations such as Nigeria, a major importer of used cars from the EU and without any strict regulations to enforce. These used vehicles pump out fine particulate matter and nitrogen oxides, which are major sources of air pollution, and threaten the environmental health of African nations.

Since January 1, 2021, all used light-duty vehicles would need to meet Euro 4 vehicles emission standards in the West Africa. As of July 2020, however, only Nigeria and Libya had adhered to the emission standards, which, too, were low at Euro 3 level. Under the Euro 4 emissions standard introduced in 2006 across Europe, diesel cars were found to emit 27 times more particulate matter (PM) than petrol cars and 10 times more nitrogen oxides.

Of the total vehicles registered every year in Africa, 60% are used vehicles. But regulations are weak in nearly 82% of the region (44 countries), including Burundi, The Democratic Republic of Congo, Libya, Nigeria and Uganda, where government has allowed import of vehicles that are older than nine years. Of the 100 (out of 146) countries with no standards for emissions from light duty vehicles (LDVs), 46 are in Africa.

As developed countries replace more of these older cars, the export of used cars to Africa increases. This requires urgent and strict regulations for exporting and the importing nations. The stricter an importing country is on regulating the import of used vehicles and associated technology, the cleaner and more efficient the vehicle technology brought into a national market. When combined with appropriate fuel quality in the importing country, used vehicles that meet emission standards can lower the impact from both carbon dioxide (CO2) and non-CO2 emissions. This becomes even more important when the global fleet of light duty vehicles is likely to double by 2050, and nearly 90 per cent of this growth will take place in low- and middle-income countries (LMICs), including African nations.

Source: UNEP 2020: Used Vehicles and the Environment

Collective actions to strengthen the international framework for the trade of used vehicles.

Motorization management (MM) is an underutilized technique in the arsenal of strategies to decarbonize transport because of gaps in knowledge, institutional capacity or resources in LMICs. International stakeholders, exporting countries, and high-income countries (HICs) can support increased use of MM and end the trade of poor-quality used vehicles through concerted action. Managing the impacts of internal combustion engine vehicles (ICEVs) on climate change, air pollution, and traffic safety require both global and national actions aligned through MM. At the global level, trade norms must be put in place to regulate the entry of substandard used vehicles and poor-quality fuels into LMICs. At the national level, all countries need to manage the motor vehicle flows and stock throughout their vehicle use life.
3.3 Cleaner vehicles and charging infrastructure

Mobility is essential for economic and social development, but the transport sector in most countries is not sustainable in its prevailing form. Reducing GHG emissions and local pollutants in the transport sector will create a cleaner, healthier, and sustainable future for all. The transport sector contributes to around one-fifth of total global carbon dioxide emissions, of which road transport sector is responsible for more than 77 percent.

Despite the global commitment to electric transportation, many countries and cities face the daunting task of how to transition from ICE to electric vehicles (EVs). The deployment and growth of e-mobility requires a transition which involves all levels of government, private companies, and civil society, all with their respective roles and responsibilities. EV uptake requires the development of a new ecosystem that comprises two building blocks: transitioning the vehicle fleet from ICE to EVs; and deploying the needed charging infrastructure\(^1\) to power the EV. This is in addition to greening their power sector. Governments need to use several tools to foster the transition toward EVs, covering the full spectrum of EVs and charging infrastructure. While governments around the globe have to date provided generous consumer subsidies to support the EV market, this strategy is neither sustainable nor the most cost-effective. Supporting the deployment of charging infrastructure is an important and cost-effective way of promoting EV adoption.

Developing countries face barriers to apply similar measures as developed countries to develop charging infrastructure for large scale deployment of e-mobility. Governments have a myriad of tools available to foster their planned EV transition. Adopting e-mobility consists of a series of common government policies to boost the economic viability of EVs, but country roadmaps differ because of their unique local contexts. In many cases, policies that are used to promote the private adoption of EVs, apply to other types of uses as well, while specific use cases—buses, taxies, fleet cars—need additional sets of incentives and regulations. The electrification of public and shared transport requires congruous measures that combine both demand creation or management and supply management, such as: regulatory strategies; financial and non-financial incentives; budgetary allocation or incentive for public and private charging infrastructure; manufacturing or partnerships; supply incentives; reforms in utility companies; and policies for charging infrastructure.

E-mobility is an important way to decarbonize the transport sector, but it needs to be couched in a comprehensive sustainable transport policy. Efforts to promote e-mobility require a comprehensive approach toward sustainable transport; otherwise, e-mobility adoption will only lead to cleaner congestion. Experiences of the Global North should inform most suited approaches for the Global South. E-mobility requires differentiated approach by geography, level of development, nature of travel needs and aspirations, and sources of funding available to countries to support adoption efforts.

Promoting electric mobility requires an integrated approach between the transport and electricity sectors. Every country needs to develop its own long-term sustainable EV ecosystem. Governments need to think about energy and mobility together from the outset, facilitating the EV transition, deploying charging infrastructure, and supporting the transition toward clean and smart electricity grids. A successful EV market rests on cooperation and holistic approach with different sectors—such as energy and real estate.
3.4 Active mobility

Active mobility is a low-cost and high-impact alternative to achieve low-carbon pathways and contribute to the decarbonization of the transport sector. Walking and cycling produce a wide range of social benefits, including road safety, economic, transport integration, and health and social equity. Despite its cost-effectiveness, the financing of active mobility in urban environments is often overlooked by authorities at all levels. Although active mobility has become a prominent element in the international development agenda, funding is still a major obstacle in consolidating active mobility initiatives in the global South. The onset of the COVID-19 pandemic has led to an increased urgency to implement policies that benefit and protect active travelers, which has translated into the implementation of pop-up bike lanes and pedestrianized streets in different cities around the world.

Focus of road planning and design caters to motorized vehicles and to detrimental impacts on pollution, GHG emissions, and road injuries and fatalities. Traditional infrastructure investment has been focused on the perspective of the car user and failed to accommodate active mobility modes. In low- and middle-income countries (LMICs), many of the challenges are about retaining the already high modal share for walkers and cyclists. To promote active modes of transport, authorities need to implement high-quality planning and design projects that consolidate networks of streets where people can walk can cycle safely. A planning approach that integrates land-use planning and public transport is fundamental to promote proximity, accessibility, and connectivity among active modes of mobility.

Financing active mobility infrastructure can be one of the main obstacles for many communities wishing to expand walking and cycling opportunities. While countries in the global North have developed sophisticated funding mechanisms for active mobility, the global South has struggled to articulate effective financial tools that improve and expand active mobility networks. Governments must realize and highlight the viable role of active mobility as part of an integrated urban transport system and include walking and cycling in public transport investments. Moreover, there is a large potential in considering climate funds to fund active transport as part of global mitigation and adaptation investments in cities.

Active mobility has yet to become an institutional priority at all levels: local, regional, national, and international. For instance, cycling and pedestrian projects need to be integrated into international climate funding, national transport plans, local infrastructure design standards, and national and metropolitan financing schemes. Setting a 20% of the transport budget for active mobility, like Nairobi Ireland have done at the local and national levels respectively, is the most straightforward way to fulfill active mobility goals in a sustained form. Despite the challenges, there are significant opportunities to finance active mobility in the developing world and make a shift that would meet transport needs, address economic constraints, and relieve climate change impact.

3.5 Unlocking and adopting green freight and logistics

Freight and logistics are a major source of carbon dioxide emissions, accounting for approximately ten percent of worldwide emissions. These emissions are predicted to rise steeply, principally on account of demand growth, which is estimated to increase freight ton-kilometer 2.6 times by 2050 (ITF 2021) According to the International Transport Forum’s (ITF) scenario, 82 percent of surface freight’s carbon dioxide emissions between 2015 and 2050 will come from non-OECD countries.
Few cities and countries have developed structured and sustainable freight policies. A significant amount of all global trade originates from, traverses, or is destined for urban areas. Yet, few cities and countries have developed structured and sustainable freight policies, dedicated programs or partnerships with the private sector to address the core issues related to urban freight. Some 20–25 percent of freight vehicle kilometers is related to goods leaving urban areas, and 40–50 percent is from incoming goods. In the absence of sustainable freight planning, this imbalance is likely to be aggravated further with the rise of e-commerce and an increasing customer expectation of ever faster deliveries.

Most LDCs are at a stage in their economic development when freight transport intensity is rising, in some cases steeply. The main inhibitor to any action on this decarbonization lever is a natural reluctance to restrain processes intimately linked to economic growth. Demand management is now widely advocated and accepted as a legitimate and effective means of cutting carbon emissions from personal travel, but generally dismissed as a policy option for decarbonizing freight, particularly in LDCs. The absence of policy measures to restrain the growth of goods traffic, LDCs are likely to follow a similar logistics development path to wealthier countries, locking themselves into transport-intensive production and warehousing systems that are subsequently difficult, costly and slow to decarbonize.

Most urban freight transport is undertaken by road transport and is almost completely fossil-fuel dependent. The introduction and use of fuel-efficient and environmentally friendly vehicles and vessels (for cities with navigable rivers) is crucial to achieving lower carbon emissions. These include, for instance, expanding the use of electric freight vehicles (EFVs) particularly for last-mile deliveries, the implementation of light modes such as cargo bikes or drones, and the usage of high-capacity vehicles such as trams and vessels. This section discusses the advantages of these modes and the niches where they could be feasible.

Heavy Fuel Oil (HFO) which contains high sulfur and carbon levels accounts for 79 percent of the shipping sector's energy matrix with the remaining 21 percent from other fossil fuels and liquified natural gas (LNG). Maritime transport is the backbone of globalized trade and the manufacturing supply chain, with more than four-fifths of global merchandise trade (by volume) carried by sea. For the maritime sector to decarbonize, zero carbon bunker fuels need to account for at least five percent of the energy mix by 2030 and scaled up rapidly to achieve GHG reductions. This will require significant investment zero-carbon bunker production facilities and acquisition of new shipping fleets with typically have 20-30 year asset life. Therefore, investment decisions taken today will set the path through to 2050. Electrification of vessels is increasingly possible, but principally limited to short distance ferry routes due to battery storage.

Energy efficiency in the maritime sector has improved but greater efficiencies are needed. While global seaborne trade has increased by 28 percent between 2011 and 2018, total CO$_2$ emissions caused by maritime transport “only” increased by 8 percent during the same period. This decoupling of transport work and energy consumption (and by extension CO$_2$ emissions) was achieved largely due to sailing speed reductions (“slow steaming”) as well as increasing ship sizes. There are a number of technical and operational improvements that could be undertaken to improve shipping efficiency (e.g. wind assistance technologies, air lubrication, hull and propeller maintenance), however as the shipping fleet is often leased to operators, there is currently little incentive to the ship owners to pursue energy efficiencies.
Notes

1. Linked to this is the need to bolster electricity supply and sources of electricity.

References


4. Identifying Resources to Decarbonize Transport

By most estimates, the scale of financing channeled toward meeting Paris Agreement targets and the 1.5°C pathway are falling far short of required investment. The Intergovernmental Panel on Climate Change (IPCC) estimates that US$1.6–$3.8 trillion investment is required annually, with the US$600 billion annual climate financing flows falling far short, leaving an investment gap to fill if the Paris Agreement targets are to be achieved. The World Bank (2019) provides a quantification of the estimated increased investment required to pursue a decarbonization pathway for low- and middle-income countries. Under the preferred scenario—ambitious goals, high efficiency—investment in infrastructure within the transport sector needs to increase by 1.3 percent of GDP, with an overall investment per year of US$417 billion between 2015 and 2030. Ongoing expenditure on maintenance is found to be of similar order, requiring an increased expenditure of 2.6 percent of GDP overall. But these figures could be even higher if other investments and policies are included.¹

The rationale to decarbonize transport is clear and the investment gap has been identified, but can governments gather the much-needed resources to finance the transition? In principle, the answer for developing countries is not straightforward. Financing the transition to a low carbon transport would be possible only if enough resources are available to pay back investments and fund the cost of decarbonization policies. Opportunities can present themselves to create revenue streams capable to finance selected investments and fund policies. In the capacity to generate revenues, the transport sector shows mixed results across the different infrastructure and transport modes. A review of the funding mechanisms used by most governments in the transport sector shows some stylized facts.²

- General budgets are the main source of funding for large infrastructure investments.
  - Fares, tolls, user charges and fees are complementary funding sources, but their use is limited to some sectors and countries.
  - Projects with high traffic of passengers and/or freight have been concessioned and generate substantial revenues from users. Even so, such revenue generated projects capable to cover the total project costs are limited.
  - And when it comes to public transit systems, fares are in most cases insufficient to cover capital expenditures
  - Grants represents a very minor portion of the transport capital expenditures in lower income countries

- A larger tax collection from transport-related activities does not necessarily translate into more resources for the sector
  - Budget laws determine a cap on resources that sectoral authorities can use to finance investments and policies. Disposable budgets could be lower depending on the treasury capacity during the year. Transport-related taxes collected do not equate to a similar amount of disposable budget for the transport sector.
  - Earmarked funds and other schemes created may direct resources for some pre-established spending. Typical example are fuel funds and carbon taxes,³ but other revenue streams can be channeled to a dedicated fund such as toll revenues or royalties. These funds can be used as collateral for commercial loans in some cases. Governance and financial management issues—from a treasury perspective—are usual concerns when creating new earmarked funds. On the other hand, a specially dedicated fund contributes to a predictable revenue stream for specific investments and policies.
National and subnational treasuries collect different transport-related taxes.

- In general, national treasuries regulate the processing from fuel and carbon taxes, embedded in fuel prices, whereas subnationals manage taxes on vehicle ownership, licenses and others.

- Other taxes, not directly related to transport, are being used to fund transport investments and policies. Revenues from land value capture and transport-oriented developments, royalties, and eventually, the profits from state-owned enterprises (SOEs) at port and airports for instance, or dividends from shares in private companies.

**Tax revenue collections from transport on capital spending, recurrent taxes on ownership, registration, and road use of motor vehicles are shown in Figure 4-1 while Figure 4-2 shows tax revenues from oil or fuel.** Expectedly, the average tax collection, as a percentage of GDP, decreases with the level of country income. Tax revenues from oil or fuel are larger than the other transport-related taxes but the effect could be driven by the taxation of fossil fuels for power production. Unless these revenues are earmarked, the public treasury channels such resources and delinks them from the budget allocation to transport.

*Figure 4-1: Taxation in the Transport sector as % of GDP in 2019 or latest available information*


Note: a. One-off import or sales taxes on transport equipment, recurrent taxes on ownership, registration or road use of motor vehicles, and other transport-related taxes, excluding excise taxes on automotive fuels.
How much are governments spending on clean transport solutions? It is difficult to estimate. The information is scattered and limited in many cases to a few modes at national level. The complexity of the transport governance with multiple modes and leading institutions, at national and subnational level, makes data gathering difficult. The same difficulty applies to all transport investments, whether motorized or nonmotorized. The Public-Private Infrastructure Advisory Facility (PPIAF) (2017) provides a snapshot of some investment figures for roads, ports, railways, and airports along with their delivery mode—state-owned enterprises, public entities and private. On the other hand, these investments are not necessarily on low carbon solutions and do not distinguish funding sources. Figure 4-3 (left panel) shows that SOEs and public entities in EMDEs deliver most of the investments. Financing sources for public sector delivery, SOEs and other public entities are shown in Figure 4-3 (right panel).
4.1 The underfunding trap in the urban space

The lack of proper funding and financing underpins urban transport system. Funding refers to the transport system’s capacity to raise funds from its users, ranging from public transport passengers to car drivers. Financing refers to the capacity to access equity or loans to finance the large investments required, such as the construction of a metro line which has high upfront capital expenditure costs. Some infrastructure assets can monetize revenues while others cannot. The streets and urban roads cannot be tolled with the prevailing technology—but smart phones may disrupt this technological constraint, while tolling is feasible in some urban expressways. Car owners pay a registration fee that covers the cost of recording ownership but is insufficient to finance the expansion and maintenance of roads. Public transport fares partially cover the costs of providing public transport service, which are usually the costs associated with rolling stock, but not for the infrastructure. It is neither fair nor possible to exclude nonpayers, yet the city must provide sidewalks and bike paths. Indeed, these roads, public transport systems, sidewalks, and bike paths provide access to opportunities and therefore their benefits extend beyond the users themselves. A blend of funding sources and heavy subsidies are necessary, beginning with the property tax.4

Many large cities in developing countries usually have ambitious plans for expanding the transport system, ranging from roads to mass transit. These cities need ambitious investments in the transport system because basic infrastructure is lacking or absent—sidewalks and safety measures. On the other hand, their available resources represent just a fraction of the investment required. Cities therefore fall into an underfunding trap because actual expenditures for capacity expansion and maintenance of existing assets—key aspect for sustainability—are insufficient. Primarily four factors could explain why cities fall into this trap.

- First, the transport system and related infrastructure fail to collect enough revenues from users and become a political pawn when public budgets are defined. It is unthinkable to charge pedestrians and cyclists a toll for walking on a sidewalk or for using a local street. Public transport fares do not typically recover the full cost of operations and maintenance, let alone the upfront capital costs for infrastructure. Hence, public transport receive subsidies, which appear explicitly in the city budget and are frequently subject to politics.
Moreover, public budgets are often biased toward the expansion road infrastructure which ends benefiting the wealthy owners of motorized transport. Not exclusive in EMDEs, these patterns occur even in the more advanced economies.

- **Second, cars demand large infrastructure investments but contribute minimally, ultimately receiving implicit subsidies.** Registration fees cover mostly the cost of recording who owns the car or truck. Fuel taxes are a further funding source, they contribute with a share of the collection to transport investments or are earmarked for capacity expansion, such as expressways, which in turn encourage further car use. A key example is the public budget cost and opportunity cost from a space perspective of offering free parking space in most cities. In sum, users of private motorized transport need to be faced with their full social costs.

- **Third, in many countries, decentralization efforts have assigned responsibilities to local governments who lack the funding and expertise to deliver.** Roads that used to be national could be transferred to the municipalities. Yet, the municipalities are ill equipped to perform this role. Another example is the property tax and the associated cadastre of properties. The property tax works better when the cadastre is updated annually to reflect the property value more accurately. However, national governments often retain the responsibility for cadastre management and updates. An outdated cadastre reflects lower property values and results in lower revenues from the property tax.

- **Fourth, expanding transport infrastructure requires large, upfront capital investments, but creditworthiness is a barrier for many cities.** The available funding for many cities is insufficient to match the required upfront investments. Cities must be able to gain access to financing—bonds, loans from banks, and guarantees. Yet many cities do not have credit ratings and cannot issue bonds or obtain a bank loan. Moreover, financing institutions often show their appetite to engage in large infrastructure projects that have monetizable revenue stream rather than small public transport projects and investments in activity mobility.

**The underfinancing trap leads to increased congestion at low levels of motorization.** For instance, the intersections of roads that are poorly operated lead in many cases to severe bottlenecks. This particularly impacts on the competitiveness of public transport options as buses cannot navigate congestion as well as cars. As a consequence, the majority that depend on and travel by public transport, suffer longer delays, incentivizing car ownership. Congestion is therefore a regressive tax, as it penalizes public transport users who are often from lower income groups but does not raise revenue. Table 4-1 shows an assessment of selected funding schemes based on different characteristics. This table is not exhaustive; other tax and policy schemes can be also added. For instance, feebates for cleaner vehicles, energy efficiency standards for vehicles, a ‘cash-for-clunkers’ program to retire high-emitting vehicles, fleet efficiency mandates, or differentiated import duties, all of which could drive individual financing towards greener transport. These issues are discussed in the Managing Motorization TDI note.
Table 4-1: Selected funding schemes and their characteristics

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<th>Funding instrument</th>
<th>Government level involved</th>
<th>Resource level</th>
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<th>Political acceptability</th>
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Source: Ardila-Gomez & Ortegon Sanchez 2016

4.2 Fiscal measures to fund decarbonization

The composition of funding that governments raise in the transport sector varies by country. The nature of the fiscal arrangements and revenue raising channels adopted can have important implications on the path toward decarbonizing the sector. Fiscal measures can fall into the following categories:

- Pull factors – toward decarbonization
- Push factors - away from decarbonization
- Neutral - supportive to decarbonization

Pull factors – Toward decarbonization

Taxes and charges commonly levied on private vehicle users are vehicle import or registration tax, fuel duties, road user charges, and parking charges. These act as a pull factor toward decarbonization by discouraging the use of vehicles, particularly high emitting vehicles. Many countries are using tax incentives to encourage EV adoption. Once such example is Indonesia, which issued a government regulation in 2019 on luxury taxable goods for motor vehicles subject to sales tax, yet which gives tax reduction for plug-in hybrid, battery, and fuel cell vehicles (Nugraha 2020). Another example is Thailand, where the government is promoting EV investments through tax incentives. The latest package approved in early 2021 covers a comprehensive range of electrical vehicles, namely passenger cars, buses, trucks, motorcycles, tricycles, and ships (BOI 2020). The structure of car taxes, or vehicle excise taxes, is emissions-based, ranging between 20 and 50 percent for ICE vehicles and 10 percent for hybrid electric and fuel cell vehicles. The government is discussing a restructuring of oil taxes, or fuel excise taxes, and indexing the rates to emissions. In addition to these taxes, governments can strategically impose road user charges, congestion charges, or parking charges to discourage private car use in hotspot zones while increasing revenues for decarbonizing activities. While toll roads are prevalent in the developing world as a means of funding and financing new highway construction, the use of other forms of user charges have been less widely adopted in developing countries such those shown in Table 4-1.
Carbon pricing instruments have increasingly drawn attention from policy makers as a mechanism for disincentivizing carbon-intensive activities. By putting a price on carbon emitted, the external costs of emissions can be internalized to encourage a low carbon transition. The carbon pricing instruments that governments apply include carbon tax and emissions trading. Emitters are either required to pay a carbon tax at a fixed rate or are allocated emissions allowances, which can be further traded to keep the overall emissions of a system within the cap. Using the effective carbon rate (ECR), composed of emission permit price, carbon tax, and specific taxes on energy use to measure carbon prices of its member jurisdictions and G20 countries, the OECD found that taxes on fuels account for 99 percent of the ECR in road transport (OECD 2018). The carbon pricing gap is the lowest for road transport —9 and 20 percent relative to the EUR30/tCO2 and EUR60/tCO2 benchmarks in 2021—compared to other sectors. However, the gap remains to be filled and its studies find that the ECR should be raised to EUR50–100/tCO2 in 2030 for countries to decarbonize in line with the Paris Agreement. In addition to acting as financial disincentives, revenues collected from the above-mentioned fiscal instruments may also be channeled toward decarbonizing activities. For example, the ENCON Fund in Thailand set up in 1992 and capitalized by partial levies on petroleum products, has played a crucial role in providing funding support to the country’s energy efficiency and renewable energy promotion initiatives.

Apart from carbon emissions, other external costs in road transport also occur from congestion and land occupation. Governments can therefore impose road user charges, congestion charges, or parking charges to discourage private car use in hotspot zones while increasing revenues for transport investment. As a concern that may arise from the emissions-based tax regime is the erosion of the tax base in the long run. A mix of charges for the road user or congestion or parking based on different principles may help stabilize the inflow of fiscal revenues from road transport. Pull measures can also help in shifting investment towards more sustainable modes. For instance, local taxes to support public transport and general road fund maintenance budgets can support sustainable infrastructure such as cycling/footpaths (which are not expensive) and other active mobility solutions.

**Push factors (away from decarbonization): Fuel subsidies**

An important push factor in public spending that hinders decarbonization is that of fuel subsidies. The IMF estimates that US$305 billion or 0.4 percent of global GDP and US$4.7 trillion or 6.3% of global GDP were spent on pre-tax and post-tax energy subsidies in 2015. While pre-tax subsidies were estimated to decline to US$295 billion—0.37 percent of global GDP—in 2017, post-tax subsidies were estimated to have increased to US$5.2 trillion—6.5 percent of global GDP. Emerging economies in Asia account for about 40 percent of global post-tax subsidies. The highest post-tax subsidies in GDP share were observed in emerging and developing Asia, the Middle East, North Africa, Afghanistan, Pakistan and the Commonwealth of Independent States, at more than 12 percent of regional GDP.

Fuel subsidy reform has seen positive steps in recent times. Indonesia, as a major producer of fossil fuels, has kept gasoline and diesel prices below market levels through heavy subsidies. Reform of the subsidy in January 2015 delivered savings of approximately IDR 211 trillion (US$15.6 billion), or 10 percent of all government expenditure in 2015 (IISD 2016). Also, Nigeria, as the largest oil producing country in Sub-Saharan Africa is ending the era of fuel subsidy for the use of fossil products in the country, which has cost as much as 120 billion naira (US$294 million) per month as of March 2021. The removal of subsidies, which are higher than average OECD subsidies, is aimed at addressing the negative net energy tax revenues. Nigeria has the potential to increase revenue by as much as 0.5 percent of GDP through a reformation of subsidies on fuel use which could further be channeled into transport decarbonization investments.
The phasing out of fossil fuel subsidy is an important policy to support decarbonization. Revenue gains from such removal at a global level were estimated to be about US$2.8 trillion—3.8 percent of global GDP—in 2015 and US$3.2 trillion, or 4 percent of global GDP, in 2017. A reallocation of the savings from subsidy reform can be used to support clean energy transition, magnifying the impact of the subsidy removal.

Shifting fiscal support from grey infrastructures to fund low carbon mobility. As discussed, when looking at the budget allocation for large infrastructure in the transport sector in most countries, most of them are focusing on improving road usage, or creating new urban developments without addressing mobility and GHG emissions. This statement is valid whether developed or developing economies even when the former has different mobility needs. A shift in fiscal support will lead to a double dividend by creating fiscal space for clean mobility and reduce GHG from grey infrastructure.

Neutral factors – other levies and revenues

More innovative solutions generate public revenues for funding transport, such as developer financial contributions to local sustainable transport infrastructure and services and land value capture (LVC). This links to the general perception that transport infrastructure has positive impacts on local economic development, and therefore can be at least partially funded by private sector contributions. These sources of revenues are not new to some developed countries such as the US and the UK. However, they represent a good opportunity for developing cities that have scarce public resources to crowd-in private funding for public goods.

An example of raising alternative sources of public revenue to fund infrastructure investments in developing countries is São Paulo, Brazil. Applying the concept of LVC as a revenue generating mechanism, the municipality of São Paulo introduced the charges for additional building rights—or Outorga Onerosa do Direito de Construir (OODC)—in the early 2000s, and later the certificates of additional construction potential (CEPACs), a form of charges based on land value and sold at auctions in the stock market. Revenue collected from the sale of CEPACs is used as a financing mechanism for local projects in urban operation areas. The first project CEPACs financed was the Água Espraiada Urban Operation (OUCAE), which involved a variety of investment and policy interventions. While about one tenth of the total investments under the OUCAE between 2004 and January 2009 were for public transportation, nearly six times more funding was invested in road infrastructure (Mahendra et al. 2020). LVC therefore does not necessarily lead to decarbonizing investment activities unless authorities commit to the effort of decarbonizing the sector.

4.3 Fuel and carbon taxes

Carbon pricing initiatives around the world generated US$53 billion in revenue in 2020 and covered 21.7 percent of global GHG emissions. This is an increase of nearly US$8 billion compared to 2019. However, potential for revenue generation from pricing transport emissions remains limited. While road transport has the smallest explicit inclusion of carbon tax in fuel excise rates compared to other sectors, 99 percent of the carbon price signal resulted from fuel taxes rather than carbon pricing initiatives. The difference is not trivial as carbon taxation often imposes some restriction on how the money can be used, which are often times aligned with climate action objectives.
Among developing economies, Ukraine, South Africa, Mexico, Colombia, Chile, and Argentina have implemented a carbon tax scheme, but the tax rates are generally low. The size of revenues collected from carbon taxes ranges from less than US$1 million in Argentina to US$9.632 million in France. A key question is how the revenues are used or recycled. In Colombia, carbon tax revenues are directed to the “Sustainable Colombia Fund” or later renamed “Colombia in Peach Fund”, which is dedicated toward environmental protection activities. In Japan, Ireland, and Switzerland, carbon tax revenues are used to support energy efficiency or renewable energy activities. Meanwhile, some countries such as South Africa are prohibited from earmarking carbon revenues due to fiscal regulations.

Several factors may have contributed to the limited uptake in carbon pricing for transportation. (i) Governments are averse to additional taxation as a number of taxes on fuel use and vehicle ownership already exist, hence a reluctance from industry and households to see further taxation for carbon emissions. (ii) Concerns stem over social inequality, as in the absence of restructuring of taxation, carbon pricing would increase the cost of travel, and through increased logistics costs also potentially feed through to commodity prices. (iii) While the higher income group is more financially capable of acting on the changing conditions, the lower income group risks will be penalized by the rising prices due to the high proportion of income spent on fossil fuel-based travel. (iv) Establishing buy-in from relevant stakeholders and overcoming technical complexity in designing a cost-effective and socially equitable carbon pricing mechanism are keys to successful implementation.

For many countries, the story is not about adding carbon pricing to fuel prices but to channel fuel tax revenues into climate-friendly actions. In fact, most countries have fuel taxes above a low end of carbon benchmark and many above of EUR 100 T/CO2 (figure 4-3). Carbon prices, however, have some positive effects as thy tie the collection to specific uses and can be seen as a commitment to decarbonize transport mobilizing commercial finance. A recent survey of investors’ perception on climate finance point highly to the role of carbon prices and subsidies for institution investors.

Figure 4-3: Effective fossil carbon rates by country in 2018
Carbon pricing faces challenges in gaining public acceptance. This is particularly problematic for road transport, which is, in many countries, already heavily taxed. Carbon pricing may also disproportionately affect low-income households and impact negatively on business competitiveness. These potential impacts need to be addressed. However, the role of carbon pricing in the road transport sector is not as clear as for other sectors such as power, where it is often used as the central mitigation mechanism. In the road transport sector, nonpricing policies can be better placed to incentivize specific actors. For example, vehicle efficiency standards provide a more direct signal for manufacturers to innovate or fuel standards promote development and uptake of low carbon or renewable fuels. While carbon pricing may not necessarily be the central mechanism to mitigate for the road transport sector, it does have a role to play.\(^\text{12}\)

- It addresses imperfections in other policies—rebound effect in vehicle efficiency standards.
- It decarbonizes supporting sectors such as electricity.
- It promotes equity across sectors allowing the market to determine if or when road transport can offer least cost abatement.

On the other hand, carbon pricing has the potential to generate revenue, which will be particularly, advantageous as the world recovers from the COVID-19 crisis. Furthermore, unlike direct taxes, a carbon price can be placed upstream on fuel producers or importers, which allows for a broad coverage of transport activities. This can reduce administrative costs, promote compliance, and reduce tax evasion. Road transport needs a comprehensive policy suite to ensure mitigation opportunities are realized. It includes how best to design carbon pricing in road transportation to promote public acceptance; and how to promote fuel tax reform to help ensure the relative price of fuels accurately reflects their environmental and social damages.

Decarbonizing the road sector would affect the tax structure and the financing of the governments. Oil and fuel taxes represent on average 6.8 percent of total taxation in high income countries to 10.2 percent in middle-income countries in 2019.\(^\text{13}\) In some countries, such as Thailand, more than a quarter of tax revenues comes from taxation on oil and fuel products. The progress on fossil fuel efficiency on new vehicles and the transition to clean energies will decrease tax collection. A study in Slovenia (ITF 2019) quantifies the effects and simulates some policy options. Under the existing policies, tax revenues from fossil fuels for transport are likely to decline substantially in the coming decades. The reduction in tax collection will be influenced by the rate of adoption of clean technologies, which by many estimations, are likely to be faster for cars and light duty vehicles, and slower for heavy duty ones. Technology permitting, as well some improvements in the processing of information, a tax or levy scheme based on distance traveled can compensate for the missing revenues. The report concludes that gradual reforms of the tax system will allow for a smooth adaptation to technological changes in the vehicle fleet and the timely implementation of accompanying measures. Moreover, shifting from taxes on fuels to charges on distances driven can contribute to more sustainable tax policy over the long term, improving environmental and mobility outcomes.

A second effect in decarbonizing transport is the impact on fossil fuel exporting countries on tax revenues and their capacity to finance the governments and clean energy programs. For instance, some estimations for the Middle East and North Africa (MENA) countries show that the effects could be dramatic if governments do not anticipate for such changes.\(^\text{14}\) In fact, the use of sovereign welfare funds can place these countries at the forefront of technological innovations while also ensuring some long-term cashflows.
Opportunities arise to create international voluntary carbon markets or other cooperative measures within industries. Maritime shipping, for instance, is discussing the addition of a carbon tax scheme to main transport companies and using the collection to help the sector with funding capacity to decarbonize the industry. Eventually, a similar approach can be used for the aviation industries. Indeed, creating voluntary carbon markets face advantages and challenges. But some industries, for instance, in the US, are adopting implicit carbon pricing to facilitate their transition when mandatory carbon pricing or cross border carbon taxes are implemented.\[15\]

Finally, there are some clear messages that emerge from this chapter: i) removing perverse subsidies is an essential first step towards transport decarbonization, ii) users of private motorized transport need to be faced with their full social costs, and iii) tax revenues from transport externality pricing need to be recycled into green investments. Moreover, the implementation of transport decarbonization policies should be also assessed in the context of equity impact across countries and income groups.

4.4 Funding matters but it is not all encompassing

Increasing funding to support decarbonizing of transport activity is vital but how resources are allocated is equally important. Transport sector funding is overwhelmingly directed toward transport infrastructure as opposed to provision of mobility services. Investment in increasing the transport infrastructure capital stock has primarily been channeled toward expanding the highway network through road construction, resulting in increasing motorization rates and motorized vehicle activity.

Sustained and dependable funding support for mobility services in the majority of developing countries is limited to the national government subsidies. In most advanced developing economies, these funds are provided to rail systems or subsidy support and bailouts for publicly owned bus companies despite much of the motorized travel being carried by the informal public transport operators, who are typically nonsubsidized. Lack of sufficient funding for public transport, alongside low regulated fares imposed on the private sector operators lead to low quality and inefficient service provision. It also restricts the ability of the sector to invest in decarbonizing through modernizing of the fleet or improving the efficiency of operations.

While a significant proportion of the population may be restricted in choice of mode of travel because of the cost, inadequate public transport inevitably encourages greater motorization. This is translated through the desire for private vehicle ownership as a result of a lack of attractive alternatives. Insufficient funding, public and private, undermines the power and effectiveness of regulations and vehicle standards as instruments to support decarbonization, as increasing standards typically comes at increased cost.

Even when new funding sources to support government policies can be identified, other actions on the spending side need to be addressed. Governments can revise tax structures to accommodate the arrival of clean technologies. New levies can be created such as distance-based charges, convert fuel taxes to carbon prices, adjust vehicle ownership taxes to reflect the emission, create new taxes from transit-oriented development (TOD). However, it is unlikely that new revenues would be enough given the demand for clean transport solutions. First, governments can benefit from new information technologies to design better projects and work on the public investment management framework to improve the efficiency of their spending. Second, a review of spending priorities is likely necessary, for instance, when considering new land developments that contribute to urban sprawl instead of expanding highway capacities, or providing more public transport solutions. On
the other hand, increasing public transportation is necessary, but insufficient if other actions are not taken considering last mile connectivity and how economic activity is organized—housing, job and business opportunities, and supply chains. It is a weighty societal decision how far decarbonization can go. It is not only about carbon dioxide emissions but about overall consumption level and the capacity of the earth to supply resources.

Notes

1. Such could be, for instance, on investments on activity mobility (sidewalks, bike lines, etc.) and transport decarbonization policies when including the costs on banning ICE vehicles or standards on used vehicles among others.
2. This is a main difference with the power sector where the share of budget funding has been limited to some capital subsidies for some large projects (hydropower and nuclear), to support a share of the renewable program or through some feed-in-tariff subsidies where users pay for it, or to fund social programs.
3. Some countries are not able to channel the processing from carbon taxes into earmarked funds. Such is the case of South Africa.
4. This discussion is based on Ardila-Gomez & Ortegon Sanchez, Sustainable Urban Transport Financing from the Sidewalk to the Subway: Capital, Operations, and Maintenance Financing, 2016.
15. Why the US should establish a carbon price either through reconciliation or other legislation, by Sanjay Patnaik and Kelly Kennedy, October 7, 2021.
References


5. Financing the Transition

COP26 will make several announcements geared toward the transportation industry, including the path to phasing out internal combustion engines (ICE), and the transition to EVs. As countries around the world are debating how they can strategize and deliver in line with their development path, an important question has entered the debate: where will the financing for sustainable transport come from? Majority of the financing for low carbon transport in developing countries originates from development finance institutions (DFI). So far, neither the public nor private sectors have played a significant role. At the same time, thematic funds and instruments such as climate-related funds and bonds have yet to commit fully to the transport sector and continue to focus on the energy sector. This section discusses the global architecture of climate change financing, the barriers, and limitations to mobilize different investors, and review some selected experiences toward the decarbonization of transport.

5.1 What does the climate financing landscape look like for green transport?

Estimates of worldwide climate-related investment ranks climate financing flows across all sectors in 2017–2018 at US$574 billion on average each year. The financing of low-carbon transport accounted for US$136 billion or 24 percent of that investment making transport the second largest beneficiary of climate finance after the renewable energy sector, which accounted for 59 percent of all financing. The vast majority, or 93 percent, of climate finance flows were for mitigation. Two-fifths of this flowed to non-OECD countries.

The source of low carbon transport financing is primarily from international development finance institutions worldwide. DFI and international financing for low carbon transport totaled US$82 billion—about 60 percent—while domestic public finance accounted for US$13 billion or about 10 percent, and the rest came from private sector (figure 5-1). By comparison, the energy sector attracts almost two and a half times the climate-related financing and is sourced mostly from the private sector. The role and importance of financing from international finance institutions (IFIs) for low carbon transport is notable.

Figure 5-1: Sources of Climate Finance for Low-Carbon Transport in US$ billion

Source: CPI. 2020. Data derived from “Global Landscape of Climate Finance.”
Note: Public includes national DFIs, public funds, SOEs, State-owned FIs; Private includes commercial FIs, households, corporations, institutional investors; DFIs include multilateral and bilateral FIs, ECAs.
Financing for low carbon transport is increasing rapidly. Average annual finance to transport projects rose by 54 percent from its 2017–2018 level to US$175 billion in 2019 and 2020. This was primarily led by increased investment in rail and transit projects by corporate and public actors, and increased purchases of EVs by households. In addition, Climate Policy Initiative’s (CPI) methodology started including investment in EV charging infrastructure starting in 2017-2018.

Development Financial Institutions (DFIs) are leading financing on green transport

Among the DFIs, multilateral development banks (MDBs) are taking an important role in supporting financing of low carbon transport investment. They account for a quarter of the investment by DFIs and international finance for year 2017–18 (Figure 5-2). The scale of transport sector financing extended by the MDBs collectively has averaged approximately US$20 billion per year over the last decade, exceeding the target set by the MDB working group on sustainable transport to provide more than US$175 billion—US$17.5 billion per year—of loans and grants for transport in developing countries between 2012–2022 under the Rio+ commitment. Asian countries are the largest recipients of development financing flows to the transport sector, with just three countries, India, the Philippines and Bangladesh - receiving more than half of the mobilized finance in 2017–2018.

Figure 5-2: Total climate finance from multilateral development banks (US$ millions) to LMICs in 2020


* Financing for Low-carbon technologies ($89), Non-energy GHG reductions ($96) and Miscellaneous financing ($82) are omitted for visual purpose
The amount of climate finance from MDBs to all sectors in LMICs decreased in 2019–2020. Most MDBs set post 2020 climate finance targets, which is a positive outcome even when the COVID-19 pandemic impacted their goals. Some banks—the Asian Infrastructure Investment Bank (AIIB) and the New Development Bank (NDB)—took important steps toward transparency and accountability. Adaptation finance was about 24 percent of total climate finance.

Mobilization of private finance decreased for the second consecutive year in 2019–2020. In effect, for every dollar financed by each MDB in 2020, a smaller share was mobilized in cofinancing from private sources. Even the most successful MDB for private cofinancing, the Inter-American Development Bank Group (IDBG), did not exceed one dollar in private capital for each dollar lent. The African Development Bank (AfDB) and AIIB reported more than US$3 in other public cofinancing for each dollar financed through the country’s government and aid agencies of developed countries (figure 5-3).

Figure 5-3: Cofinancing mobilized for each dollar of MDB climate finance to LMIC (2020)

Source: Authors adaptation from the 2020 Joint Report on Multilateral Development Banks’ Climate Finance.

The limited mobilization of private finance in 2020 could be justified by the impact of the COVID-19 pandemic even when the figures were also low in the preceding years. Financing instruments that MDBs use most are loans, while guarantees and equity investment represent a minor share of climate finance in LMICs (Figure 5-4). More effort will be required to mobilize commercial financing through a derisking approach. Other approaches to attract private financing include support to state-owned enterprises (SOEs) and public entities, or eventually, the use of other regulatory schemes such as the regulatory asset-based model. However, given the scale of financing needed to close the investment gap and the limited capacity of MDBs to offer loans and derisking instruments, closing the gap requires innovative solutions. With the entry of private sector investment in public infrastructure though models such as UK’s private finance initiative (PFI) and public-private partnerships (PPPs), derisking mechanisms such as monoliner’s construction risk mitigation products emerged as an innovative solution. At this urgent need of green financing, it is fully plausible that private sector globally rises up to accept green start up financing and come up with innovative mechanisms to leverage investments. Lessons learned from monoliners unique coverage of construction risks in greenfield projects, can help to identify new investors that can work along with MDBs in derisking climate finance.
Climate Funds are limited in their role to support green transport

Transport-related projects are only securing limited funds to mitigate climate change risk. Climate funds were established under the United Nations Framework Convention on Climate Change (UNFCCC) as financing mechanisms designed to channel funding to climate-related mitigation and adaptation initiatives. A review of three of these funds—Green Climate Fund, Clean Technology Fund, and Global Environment Fund—concluded that transport-related projects have not featured significantly either by the number of projects or the investment volume in transport as compared to energy sector.

The number of transport projects financed has shrunk from 50 in 2010 to fewer than five in 2019 but increased to 10 in 2020. The volume of investments has been cyclical reflecting the trend, with exceptions of significant financing support for projects such as the Karachi Bus Rapid Transit scheme with the Green Climate Fund (GCF), which provided US$49 million cofinancing for the US$583 million scheme, the largest climate fund contribution to date. The downward trend reflects climate funds’ focus on energy-related projects, which are readily packaged as green. Climate funds do not operate on fixed percentage allocation for any sector and consider finance proposals on first-come basis. The upward trend in 2020 could be a good signal that climate funds are prioritizing the role of transport-based emissions in the overall climate action.
Export credit agencies are supporting mobility in developing countries

Official export credit agencies (ECAs) play a crucial role in financing cross border transactions for large-scale transactions denominated in a foreign currency in developing countries. ECAs arranged US$53 billion in export credit in 2019, of which US$15 billion was destined for low or lower middle-income countries (LMICs). Transport and storage accounted for the largest share at 39 percent of total export credits in 2019. Transport-related activity by ECAs has supported developing countries to procure rail infrastructure and rolling stock. Financing and guarantees have also been pivotal in procuring bus fleets for the bus rapid transit (BRT) systems. Such financing tools have enabled local commercial banks to extend finance to newly formed operating companies, which would not have been feasible without ECA financing guarantees and insurance against losses.

The scale of specific climate-related export credit remains small, between US$1.5–2.5 billion per year between 2013 and 2018. The energy sector benefited with 81 percent of the credit, with only seven percent of export credits going to climate-related projects in transport and storage activities between 2016 and 2018. Asia (36%) and Africa (32%) are the two largest beneficiaries (OECD 2019). The statistics are however constrained by data classification. The actual volume and share of export credits supporting climate-related transport activities are likely to be larger since different companies seeking ECA financing are classified under different categories.

Private investment is lagging behind

Private investment accounts for nearly 30 percent of overall investment in low carbon transport. It represents a much lower proportion than investments in the renewable energy sector at about 80 percent. However, the private investment is on an upward trend in transport. One reason for accelerated growth is the rapid increase in individual households’ adoption of electric vehicles and the fiscal incentives along these investments. Individual households’ spending on EV purchases made up the largest portion at US$32 billion—68 percent of the private investment numbers. Other significant subsectors for private sector transport investment included urban transit at 13 percent and heavy rail at 12 percent, both of which received private funding from a mixture of commercial financial institutions, corporate entities, funds, and institutional investors.

This rapid growth in EV uptake can be largely ascribed to the impact of increasing public awareness and knowledge of the benefits of EVs. It has been, aided by government backed subsidy programs in many countries (IEA 2021). As governments continue to expand EV education programs, subsidy schemes, and charging infrastructure, EVs are primed for continued strong growth, with potential to become a key contributor to global decarbonization of the transportation sector.

Institutional investors are focused predominantly on financing road infrastructure

Pension funds, sovereign wealth funds, and other institutional investors have demonstrated keen appetite in financing major transport assets in the developed world, including high speed rail lines, airports, and toll roads. Ideally, institutional and wholesale investors expect a thematic focus in their investments to improve the long-term performance. According to the OECD (2021), of the total amount tracked institutional investment in infrastructure was US$130 billion. Only 16 percent, or US$21 billion, was allocated to green infrastructure in the G20 countries. The largest single subsector was roads with US$42 billion. Roads (which include toll roads, bridges, tunnels, and highways), airports, seaports are core infrastructure assets. Such assets generally offer steady revenue streams, often through concessions or availability payments.
For the majority of investors, the main goal in using thematic investing strategies is sustainability and environment, social, governance (ESG) factors. The ability to enhance investment returns is the next attraction and includes a more innovative or disruptive investment approach, and increased diversification. Institutional investors invest also mainly through equities, followed by private markets.

The growth of thematic investing is accelerating, driven by regulatory changes, especially in the EU. It embraces ESG preferences in investor choices as well as demand from institutional investors. According to a new survey7 conducted by Greenwich Associates and sponsored by BNP Paribas Asset Management nine out of 10 investors expect thematic investing to benefit long-term performance, while three-quarters are using thematic funds to access strategies with a focus on sustainable investing. Moreover, 88 percent of experienced investors and 36 percent of institutional investors already use or plan to use thematic strategies. Finally, 90 percent of investors believe that thematic investing has a positive impact on long-term performance.

Capital markets and thematic bonds have yet to become a major source of green transport financing in developing countries

The transport sector has been successful in channeling the proceeds from thematic bonds and it is only a beginning. Tapping the capital markets through thematic bonds is a rapidly growing source of financing for projects, which demonstrate positive social or environmental impacts. Since the first green bond issued by the World Bank Group and European Investment Bank in 2007–08, the market has grown significantly with green bond issuance covering all sectors in 2019, estimated to have reached US$269.5 billion,8 and growing at a rate of 38 percent per year. While more than 75 percent of the issuance was from the developed world, at the end of 2020 more than US$100 billion sustainable or ESG debt was issued from emerging countries, seeing even more rapid year-on-year growth.

Transport related investments account for nearly 20 percent of green bond proceeds, garnering US$52 billion in 2019 (SLOCAT 2021). This represents more than a 70 percent increase from 2018, highlighting the scale of growth in this form of financing. Within the transport sector, issuers have included automobile and auto parts manufacturers, railroad, and logistics companies. Vehicle manufacturers including Tesla, among others, have issued bonds to support investment into their electric vehicle programs.

Most bond issuance originated in developed countries and is from private companies. Increasingly, sovereign issuance from emerging economies supports the transport sector, including the Government of Thailand’s THB 30 billion Sustainability Bond issued in 2020. About THB 10 billion of the proceeds are designated to support the construction of the Bangkok Mass Rapid Transit (MRT) system. Other emerging countries which have successfully issued thematic debt in the transport sector include Mexico, Russia, Brazil, China, South Korea, Chile, Greece, Taiwan, and Bulgaria.

Credibility and transparency for investors improves by developing climate bond standards and certification processes. The list includes the Green Bond Principles, the Climate Bonds Standards, and the Green Financial Bond Directive. Certain public transport schemes, including BRT and rail electrification projects are pre-certified under the bond standards. Other projects that demonstrate delivery of passenger transport meeting thresholds can meet certification requirements for: (i) per passenger kilometer direct emissions or (ii) specific emission reduction thresholds.
5.2 What are the barriers and limitations to mobilize for financing green transport?

The barriers and limitations to mobilize investors toward infrastructure finance are multiple. Some of them are specific to large transport infrastructures, others to the mobility solution. When it comes to transport infrastructures, investors look for: (i) the predictability and transparency of the procurement process, as well as (ii) any financial sustainability and bankability issues that may affect their return on equity or (iii) the capability of the project to payback its debt obligation. Furthermore, investors seek robust regulation for dispute resolutions or an early termination process. Therefore, the overall enabling framework—general macroeconomic framework, sector governance, and implementation capacity—funding restrictions such as affordability or competitiveness and government creditworthiness, influence the cost of capital. The literature of infrastructure financing has largely analyzed these barriers and limitations.

Decarbonizing transport adds a new layer of complexity when it comes to mobilizing climate change finance. While challenges are abundant, they also offer opportunities. The evidence shows how green energy transition is financed increasingly by the private sector and thus, the question remains whether transport can achieve a similar trend. MDBs are playing a larger role in direct financing of green transport. Perhaps the challenges facing commercial investors can serve as an opportunity from the perspective of MDBs to leverage their role in developing countries to catalyze more commercial investment.

**MDBs need to shift from direct financing to mobilizing commercial finance**

MDBs have agreed to expand the mobilization of private capital for infrastructure. The OECD tracks mobilization of private sector financing from ODA in multiple sectors (OECD 2016). This database does not distinguish whether these investments are attributing to climate action indicators, its mitigation or adaptation, or not. In this context, transport and storage captured a 3.6 percent of the private finance (figure 5-6). Mobilization of private climate cofinance, in particular, is tracked as part of the climate finance commitment by MDBs (figure 5-3). Private finance is mostly driven by the guarantees, lines of credit, policy-based bond financing (figure 5-5). MDBs should consider developing innovative solutions to mobilize commercial financing and private capital, adapted to each country’s context.
Dedicated climate funds: Is the project eligible or green enough for funding? Finding projects to fit project eligibility criteria presents a major challenge:

- Calculate the potential mitigation and adaptation impacts accurately is debatable. The impact of a transport scheme is dependent on user or traveler’s response, and therefore projections are more complicated than that of a renewable energy scheme, for instance.
- Demonstrate additionality, in other words, that the scheme would not have taken place in the absence of support from the climate fund. Programs such as fleet renewal may arguably occur in any event although separated over a longer timeframe.
- Demonstrate that the scheme will facilitate a paradigm shift, perhaps through the use of new and innovative forms of technology, which will transform the status quo.
- Synchronize decarbonization efforts with the sectors involved in upstream activities, such as energy and power sectors. Fleet electrification should be coupled with clean energy sources to justify its mitigation impacts.

Institutional capacity presents additional hurdles to many developing countries. The process for accessing climate finance, differs from fund to fund, and typically requires an accredited entity to engage with the climate fund and to propose projects for investment, which are then considered by the climate fund governing board. Many countries gained accreditation for direct engagement with the climate funds, so they require to partner with a national or international accredited agency to submit proposals on their behalf.
Climate funds do not lead in financing, making them dependent on other DFIs. Even where projects succeed in financing support from climate funds, the scale of financing support typically represents a small fraction of the project investment cost. Most climate funds focus on smaller projects and invest smaller amounts in larger projects (figure 5-7).

Figure 6-7: Climate fund financing for transport schemes as a proportion of overall project cost

![Graph showing climate fund financing for transport schemes as a proportion of overall project cost.]

Source: Authors’ derivation based on various climate fund project databases

**Commercial investment faces fundamental financial viability issues**

Attracting commercial financing in green transport poses additional layers of challenges. First, services like public transport often involve a longer return on investment than projects like toll roads. Rail or metro systems are characterized by a costlier upfront capital investment and are often dependent on government subsidies to be profitable. In many cities in LMICs, nonmotorized solutions may also require some infrastructure investments in sidewalks, bridges, bike lanes and others, for which some large capital expenditure (capex) can challenge municipal balance sheets.

Second, because of poor policy support or economic disincentives such as fuel subsidies, the demand for sustainable transport options may be kept artificially low as opposed to private vehicles. Finally, the unfamiliarity of fewer carbon-intensive transport modes may drive up the cost of capital. In the financial sector, a lack of certainty translates into greater perceived risk. Returns from sustainable or low carbon transport are less well established, and therefore those transport modes are perceived as riskier investments.

Commercial finance for transport infrastructure has traditionally been successful mainly in investments that yield dependable future returns, including port and airport projects, toll-roads, and parking. Public transport, while generating returns through the farebox, in many cases does not collect sufficient returns to cover its investment costs. Therefore, commercial financing...
arrangements require significant cofinancing or ongoing subsidy support, as seen in the case of the rail operations in Addis Ababa and Manila, and the scale of public investment in the light rail transit (LRT) line under construction in Lagos.

**Aversion to private investment in transport projects likely reflects the following common characteristics of transport project investment:** i) low rates of return on investment by comparison with other sectors, ii) long project lifecycles, and iii) higher levels of perceived risk by comparison with other sectors, with risks relating to project delivery, capital cost overrun, institutional risk and traffic risk.

**Institutional investment will take time to transition to green assets or finance projects in some non-investment grade countries**

First, green transport should be an ideal investment for long-term investors such as pension funds and insurance companies. However, institutional investors face transition risks of the existing portfolios and regulatory limitations. Their portfolio is usually affected by nonliquidity of their investments and by the uncertainty of the regulatory framework for clean infrastructure. Some evidence points to companies with large GHG emissions may also suffer from higher credit risk. For instance, research from the EDHEC Risk Institute finds an increase in the probability of default—shortening of distance to default—for high-emitting companies after the passage of the Paris Agreement. Exposure to climate risks in the event of stricter climate regulation is beginning to be priced into syndicated loans, especially those extended to fossil fuel companies.

Second, transport assets are particularly susceptible to demand shocks such as the one caused by the COVID-19 public health emergency. Historically, revenues from transport infrastructure have been comparatively stable, as revenues from concessions or availability payments are generally predictable, following broader economic activity trends. However, they may not be immune to large economic shocks. The demand shock caused some investors to devalue some transport assets in their portfolios, notably shares of airport operators. Third, the lack of emission data for all assets, especially buildings included in the portfolios, makes it difficult to distinguish the share of green investments. Finally, institutional investors have some limitation to engage in non-investment grade countries. Other investors may have the risk appetite, but such finance could jeopardize the affordability of these projects. Derisking instruments can help on that matter, along with blended finance mechanisms.

**Thematic bond markets remain an untapped opportunity for green transport**

The rapid growth in the thematic debt market presents opportunities for the transport sector, with growth in issuance in the sector outstripping that of the wider market. However, this trend manifests a very low base at four percent of total issuance. Challenges identified in the adoption of this channel of financing for sector investment include:

- The need for creditworthiness on the part of the issuer – institutions and companies in a position to issue green bonds are already likely to have access to alternative channels of finance
- Limited evidence that the cost of finance sits significantly below that of other financing channels, and
- Institutional or corporate readiness to issue certified bonds.
Notes:

1. Climate finance refers to local, national, or transnational financing that seeks to support mitigation and adaptation actions that will address climate change (UNFCCC). The investments for climate financing are complex and continually evolving. Distinguishing which flows of finance may be attributed to climate related investment is challenging. A number of collated datasets provide insight into the scale of climate finance flows. However, reflecting the wide definition and wide range of potential sources of financing, accurate tracking of climate related financing remains problematic.


3. The six MDBs are the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, the European Investment Bank, the Inter-American Development Bank Group, and the World Bank Group.

4. The working group consists of the following banks: AfDB, ADB, CAF, EBRD, EIB, IADB, IsDB and WB.


7. Climate Bonds Initiative https://www.climatebonds.net/

8. Accredited Entities are defined by GCF to implement projects. Accredited Entities can be private or public, non-governmental, sub-national, national, regional or international, as long as they meet the standards of the Fund. Accredited Entities carry out a range of activities that usually include the development of funding proposals and the management and monitoring of projects and programs.

References


SLOCAT 2021 Transport and Climate Change Global Status Report, 2nd Edition
6. Innovative Approaches that Finance Transport Decarbonization in Developing Countries

This section presents a few selected approaches to finance transport decarbonization with a spotlight on the financing of clean mobility solutions.

6.1 Financing mobility in Sub-Saharan Africa

Road transport emissions are growing faster in developing nations, with Sub-Saharan Africa (SSA) region showing the highest growth. Emissions are mainly driven by a rapid increase of motorization rates along with unplanned urbanization and the lack of public transport solutions. While road transport emissions in SSA are small relative to those on developed economies, the mobility needs and the aspiration to own a vehicle has the potential to make the region as one of the larger polluters. These economies risk locking into unfriendly climate solutions, which bring higher transition costs to more efficient and clean technology in the future.

Financing transport climate actions in SSA needs innovative solutions reaching infrastructure and mobility. DFIs along with other international finance institutions (IFIs) have been financing hard infrastructure, given the region’s needs to improve connectivity, rather than providing financing for clean mobility. On the other hand, with the growth of the urban population, and a shortage of public transport solutions, more resources are needed to fulfil goals of connectivity and green mobility. The World Bank Group and other DFIs are working on projects aimed to address the much-needed supply for public transport, which in most cities is insufficient or inexistent.

A regional financing facility to support clean mobility can bring scale, diversify risks, reduce transaction costs, and address financing needs more flexibly at the country or asset level. Many markets in the region do not have the requisite demand for capital to mobilize financing at country level. This is particularly relevant when it comes to financing large fleet acquisition or renewal for instance, of buses, vans, and heavy and light trucks running on more efficient technologies. These markets are traditionally financed by the private sector in more advanced economies. However, because of varying reasons such as risk appetite, imperfect information, and sector specific issues, these institutions are not capable to provide financing products focusing on clean mobility in most SSA countries. Governments have a role to step in by facilitating the creation of these markets. At the same time, evidence shows that many governments lack access or the track record to mobilize commercial financing without DFI involvement. Also, it is expected that a regional solution can attract more original equipment manufacturers (OEMs) to compete for the market, making the financing of clean mobility more affordable.

Given the market gap, the World Bank is developing a concept for a regional financing facility to support the decarbonization of transport. The facility will bring commercial finance along with concessional resources to offer blended financing, credit enhancements, and technical assistance to support and accelerate development in a low carbon transport sector (figure 6-1). It assumes a leasing company will offer buses—electricity or efficient fossil fuel—for public transport to a city bus operator or to a municipality. The facility will offer some financing and credit enhancements.
The loop will be closed by a long-term agreement between the bus operator and the grantor regulating the service level, fares, and other revenues. Other assets are also envisaged such as modern trucks, light duty vehicles, or e-mobility and charging stations. The leasing model is just one of the possible solutions. Eligibility conditions will be based on commonly accepted principles: avoid, shift, and improve. Moreover, these investments should be consistent with the Paris agreement even when some solutions still rely on (more) efficient fossil fuels. It is expected that road emissions will be offset, for instance, by shifting trips from cars to public transport or by more efficient trucks (less fuel consumption, few emissions from more efficient ICE). The facility will focus on implementable solutions which are context specific. Hard infrastructure (roads, railways, TOD, others) will continue to be financed by traditional instruments offered through DFIs and PFIs.

Figure 6-1: A concept model for a regional financing facility

Recognizing that financing of climate-friendly transport solutions is one of the pillars to achieve a low carbon transport, an ecosystem approach in place would deal with other issues. Some levels of interventions that bring more innovative solutions and attract private sector investment simultaneously are:

- An enabling environment at the policy level: Create a favorable transport decarbonization environment through policy, legal, and regulatory interventions such as World Bank country level engagements.
- Technical capacity in public sector agencies: Support capacity-building for investment prioritization, asset selection, financing options, and implementation support.
- ASI framework transport in public investment planning: Support development of business, financing, and implementation models, project preparation and pipeline development of bankable projects.
- Funding and financing to implement climate actions: Develop targeted financial instruments to mobilize financing for transport decarbonization investments by both public and private sectors.

The recently launched World Bank Global Facility for Transport Decarbonization (GFTD) will provide analytical support to the regional financing facility. The GFTD works at both policy and technical level to build an enabling environment and capacity to implement policies that pursue the decarbonization of transport.

6.2 Financing e-mobility

Electrifying transport requires a programmatic approach capable of dealing with the demand. It not only offers mass public transport systems that run on clean energies, but also facilitates the transition to these climate-friendly technologies of the large fleet of vehicles. Such is the case of replacing 2- and 3-wheelers in India or Indonesia, among other countries with large fleets of ICE. The World Bank is analyzing some financial solutions to mitigate risks and facilitate the transition. Similar to the regional financing facility, a programmatic approach is necessary to work with lenders on issues, such as lack of sector knowledge for credit appraisal and creditworthiness risk. Potential solutions encompass risk-sharing funds and technical assistance to develop the ecosystem for EV. Similarly, high-cost and limited financing options are one of the main challenges for borrowers, along with resale value. For these challenges, fiscal and non-fiscal incentives should be identified, as well as specific regulations covering the transport and energy sector. Some technical assistance to calibrate the fiscal incentives and defines the necessary regulation should be part of the ecosystem. Finally, a programmatic approach should also bring manufactures to develop the right product for each country, the capacity to supply the demand, and operation and maintenance (O&M) including battery recycling and warranty programs.

Three high level options are considered within the overall EV risk-sharing program (EV-RSP) architecture for ease and speed of implementation. The approach can be designed to provide first loss partial credit guarantee to derisk lending to 2- or 3-wheeler EV purchases. It should be capable to scale quickly in case of market demand. A structured approach in phases reduces lending rates and improves credit terms through the co-lending model or derisking of private finance initiatives (PFIs). A local development bank implements it as a sole co-lender or as a program manager along with multiple PFIs. It can incorporate structural mitigants in EV-RSP design, for instance lending and underwriting requirements, single borrower limits, maximum tenor, minimum loan-to-value, among others. The risk sharing instrument can be combined with technical assistance to develop an EV lending ecosystem (figure 6-2).
6.3 Carbon pricing can help accelerate the transition to green transport targets

Environmental taxes, such as a carbon price, can be an efficient means for governments to mitigate negative externalities and collect funds to finance assistance and adaptation programs. They can have a lower marginal cost of public funds than direct taxes on labor and capital, for instance. They have a less distortionary effect on the economy for example, through broadening the tax base and minimizing or avoiding distortions that result from higher tax rates on labor and capital. (Barrios et al. 2013; Barrios et al. 2014) In addition, carbon pricing can be placed on a few large upstream points of regulation, which covers all downstream uses including the informal sector—representing 70 percent of all employment in developing and emerging economies (OECD and ILO 2019). This can make carbon price more difficult to evade than direct taxes, increasing coverage and compliance (OECD 2021). Approximately US$45 million was raised from carbon prices around the world in 2019. Carbon pricing as a potential source of revenue is particularly important in the prevailing context as it contributes to the sustainable macro-fiscal frameworks needed for funding social assistance and post-COVID-19 crisis recovery programs.

Two cases at the state and global level illustrate the revenue-drawing power of carbon pricing.

- **California has used the carbon pricing, specifically the Cap-and-Trade program quite ambitiously to reduce GHG emissions and achieve carbon neutrality.** The Cap-and-Trade program sets a cap or limit on total GHG emissions that declines over time. Large emitters, such as oil refineries and power plants, can buy, sell, and trade carbon allowances during quarterly auctions. The state’s first two appropriations of Cap-and-Trade auction proceeds, in fiscal years 2013–2014 and 2014–15, netted more than $900 million. The state’s portion of the Cap-and-Trade auction proceeds are deposited in the Greenhouse Gas Reduction Fund (GGRF) and used to advance the objectives of the California Global Warming Solutions Act.
of 2006 (Assembly Bill No. 32; Núñez, Chapter 488, Statutes of 2006). The Legislature has appropriated an excess of US$15 billion as of 31 May 2021, to state agencies implementing GHG emission reduction programs and projects. California Climate Investments projects include affordable housing, renewable energy, public transportation, zero emission vehicles, environmental restoration, more sustainable agriculture, recycling and much more (figure 6-3). At least 35 percent of these investments are made in disadvantaged and low-income communities and households. Communities where investments occur are realizing a wide range of benefits, including increased affordable housing opportunities; improved mobility options through transit, walking, and biking; cleaner air through zero emission vehicles; job creation, energy, and water savings; and greener, more vibrant communities.

**Figure 6-3: California Climate Investment Fund as of 31 May 2021**

Estimated Greenhouse Gas (GHG) Reductions

Projects are expected to provide the estimated GHG reductions over time periods ranging up to 100 years. GHG reductions and funding amounts are displayed by default for all investments.

- Climate Smart Agriculture
- Forest Health Program
- Low Carbon Transportation
- Low Carbon Transit Operations Program
- Sustainable Agricultural Lands Conservation
- Waste Diversion Program
- Food Production Investment Program
- Transit and Intercity Rail Capital Program
- Affordable Housing and Sustainable Communities
- Water-Energy Efficiency
- Climate Adaptation and Resiliency Program
- Urban and Community Forestry Program
- Low Carbon Fuels Production
- Water-Energy Efficiency
- All Other Programs

![Graph showing estimated greenhouse gas reductions over time](image)

Source: California Climate Investments, 2021.

- **A global and voluntary carbon market can help to finance the transition, as in the case of maritime transport.** A simplified estimation of carbon revenues from international maritime transport highlights the scale of potentially available financing, which offers a new set of additional actions. Carbon revenues are the product of the ton of carbon equivalent and the carbon price applied per ton of carbon equivalent. Carbon pricing for shipping is gaining traction to enable and accelerate the transition. In the regional and national context, the European Union, the United States, and China have been taking steps to charge shipping for its emissions (EU 2021; US Congress 2020; Chambers 2021). On a global level at the International Maritime Organization (IMO), governments are increasingly considering carbon pricing as an effective midterm measure with recent submissions to the IMO making this policy option a keenly debated topic (figure 6-4). Tabled proposals range from a from a revenue-neutral feebate scheme, allowance trading of emissions trading systems (ETS) as well as a carbon levy on marine bunker fuel. Based on a linear carbon dioxide equivalent (CO2e) reduction pathway under a scenario consistent with the IMO Initial GHG Strategy and a scenario consistent with net zero in 2050, aggregate estimated carbon revenues collected over a period between 2022 and 2050—and at a carbon price of US$100/ton—could amount up to US$1.0 to US$1.7 trillion (World Bank 2021). Under these assumptions, annual revenues in 2022 could range between US$70.9 and US$75.8 billion. To put these numbers into perspective, public climate finance—including through state-owned companies—in 2018 amounted to US$261 billion. Thus, carbon revenues from shipping could change the landscape of climate finance significantly.
Figure 6-4: Carbon revenue projections under the Initial IMO Strategy (50 percent GHG reduction) and a linear net-zero pathway to 2050

Source: World Bank’s calculations
Note: a. Simplified estimation based on submission to the IMO by Marshall Islands, Solomon Islands assuming an initial carbon price of US$100/ton CO2e. The sponsors emphasize the need for 5-yearly upward ratchets, but do not specify the incremental steps further, but express the need for a carbon price by 2030 of up to US$300/ton CO2e. For simplification reasons we assume a flat carbon price of US$100/ton CO2e as a conservative assumption of carbon revenue generation.

6.4 Supporting local bus operators using blended finance model

Mozambique’s Transport and Communications Development Fund (FTC) blending-to-lease model

Local bus operators face high barriers to invest in purchasing fleet, so the Government of Mozambique established a dedicated institution to broker the financing. The Transport and Communications Development Fund (FTC) is a public institution established in 2010 to boost the integrated development of the transport and communication system. One of the main activities of the FTC is to support public transport sector operators in the procurement of buses, addressing the investment barriers faced by both public and private sector operators within Maputo and other major cities. During the five-year period 2015–2019, FTC acquired 611 buses and distributed throughout the country. It allocated more to the Metropolitan Area of Maputo, part of which through a donation of 180 buses from the Government of China, local bank financing of 100 buses, suppliers and the General State Budget (OGE) financed 250 buses. The state budget indirectly supported those financed by banks and suppliers. The blended finance model mixes grants from international partners, national or public budget concessional money, and preferential loans from local commercial banks.

Local private bus operating companies consist of individuals and cooperatives with limited capital. As the bus fares are regulated at levels that do not enable operators to recuperate costs and invest in modernization of the fleet. Vehicles procured through the FTC are leased to operators under preferential loans (figure 6-5). The FTC has been successful in procuring and making available
buses to operators, helping to address under capacity in system and filling the loss of market share in formal public transport operations. Main sources of revenues for FTC are five percent of the Fuel Tax, 60 percent of permit revenue, and state property assets and revenues from different sources.\textsuperscript{6}

\textbf{Figure 6-5: Cashflows in Moçambique’s Public Transport Scheme}

However, loan servicing by operators on the vehicle leasing scheme has been poor, pressuring the viability of the financing model. Operators reported lack of commercial performance and consequently the high rates of delinquency, on low fares and low demand because of the COVID-19 pandemic. The implementation of automated fare collection underway using the FAMBA Card, presents an important opportunity to address the prevailing challenges. This has seen success through increased transparency over operator revenues and a means of collecting vehicle financing repayments before distributing farebox revenues to the operator.

\textbf{This structure can be scaled up in a regional financing facility.} The financial inability of the local bus and other public transport operators to purchase and modernize their fleet is an issue not only in Mozambique but everywhere. Section 6.1 elaborates on the issues in detail and consequently suggests a scaled approach—such as a regional financing facility to provide blended financing solutions to SSA—may make greening the public transport more feasible.

\textit{Shandong Green Development Fund (SGDF) – Blended Finance Approach}

Blended finance is crucial to mobilize significant private financing for scaling up climate investment. The Shangdong Green Development Fund is one such pilot project that uses international and public capital to crowd in private, institutional, and commercial (PIC) capital. This is used for climate positive subprojects assessed against both climate and financial eligibility criteria (figure 6-6). Initial capitalization was estimated at US$1.5 billion. The Qingdao Municipal Government (QMG) invested about US$375 million and international financial institutions including the Green Climate Fund provided approximately US$400 million of sovereign loans as catalytic funding. Private capital raised from PIC sources stood at nearly US$626 million and another US$15 million came from general partners. Loan proceeds are channeled toward a 20-year Catalytic Fund. The Catalytic Fund is further transformed into four shorter-term Shandong Green Development Funds (SGDFs),\textsuperscript{7} of which each has an investment period of four or five years. Distributions of the SGDFs will be made to the Catalytic Fund and reinvested in the next round SGDF after deduction of the payments to the IFIs. A fund management company (FMC) was appointed as the manager of the Catalytic Fund and the SGDFs.
Concessional sovereign and development finance help mitigate risks with clear conditionalities. The return on investment from the SGDFs will be satisfactory, due to the low hurdle rates required by each counterpart investor—PIC investors at eight percent; public investors at two percent, and SDIHG at three percent. A mix of these funding resources allows the SGDFs to invest in the subprojects with higher risk profiles that would otherwise rely exclusively on long-term sovereign funding or not proceed because of public funding gap.

To ensure the harvest of transformational and advance benefits, all subprojects are categorized into three climate-related levels. These levels—transformational, advanced benefits, and good practices—are based on the GCF Investment Framework with different catalytic and financing terms and conditions from the most favorable to the least (table 6-1). More than 10 percent of the funds should be invested in transformational subprojects, and more than 60 percent in advanced benefits and transformational subprojects. The investment of all SGDFs is expected to achieve a minimum actual carbon emissions reduction of 1.5 million tons per annum.

Table 6-1: Indicative terms and conditions for debt and equity investment

<table>
<thead>
<tr>
<th>Climate-related level</th>
<th>Maximum Catalytic Funding</th>
<th>Maximum Tenor</th>
<th>Indicative Interest Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformational</td>
<td>67%</td>
<td>10</td>
<td>Discounted</td>
</tr>
<tr>
<td>Advanced Benefits</td>
<td>50%</td>
<td>8</td>
<td>In line</td>
</tr>
<tr>
<td>Good Practice</td>
<td>25%</td>
<td>5</td>
<td>Premium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Climate assessment</th>
<th>Maximum Catalytic Funding</th>
<th>Exit Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformational</td>
<td>50%</td>
<td>&lt; 10 years</td>
</tr>
<tr>
<td>Advanced Benefits</td>
<td>30%</td>
<td>&lt; 10 years</td>
</tr>
<tr>
<td>Good Practice</td>
<td>0%</td>
<td>not applicable</td>
</tr>
</tbody>
</table>

While the actual projects and their success are yet to be seen, the financing mechanism makes the blended financing model more relevant for lower income countries.
Notes


2. This is quite different from direct taxes (which tend to be the default revenue source in many countries) which need to be collected from a vast number of individuals and struggle in covering the informal sector of economies.


5. Carbon price of USD 100/ton is the only proposed figure in IMO submissions (Marshall Islands and Solomon Islands. (2021). Reduction of GHG Emissions from Ships: Proposal for IMO to establish a universal mandatory greenhouse gas levy. MEPC 76/7/12.)

6. Further information available at [https://www.ftc.gov.mz/](https://www.ftc.gov.mz/)

References


7. Moving toward Green Pathways in Transport

Every country should act concertedly to change the trajectory of growth in carbon emissions generated in the transport sector. Identifying the opportunities and learning from the successes seen internationally can provide the necessary pathway for actions and investments in countries of all contexts. Common to every success story, are some underpinning elements of an effective transport decarbonization strategy. These elements comprise: (i) setting a target to reduce emissions; (ii) enacting the necessary regulation to create incentives along with funding strategy that factors the impact and needs of each actor; (iii) enhancing the governance capacity efficiency of the public investment management framework; and (iv) engaging the private sector to contribute with solutions and financing. Aligning roles to implement a transport decarbonization strategy will lay on different government levels and the international community to create the necessary environment.

The Paris Agreement, with its universal requirement on all countries to submit nationally determined contributions (NDCs), marks a significant change in the framework of international cooperation to reduce GHG emissions. The landmark creates a unique opportunity to coordinate for global and country specific actions. Many governments from the developed and developing world have not yet submitted a concrete plan for transport. This section presents a few investments and policy recommendations to develop a decarbonization strategy in developing countries and some guidance for the international community.

7.1 Set transport decarbonization climate action goals

Recognizing the role of transport as one of the main contributors to GHG emissions is a fundamental step; doing something to reduce them without compromising mobility is even better. The world recognizes that GHG emissions from economic activities are accelerating climate change and detrimentally impacting human health. The causality between emissions and transport is well documented when it comes from ICE mobility or electric powered if fossil-fuel generated. Thus, decarbonizing power production and transport is a strident priority. The challenge remains in addressing the effort without limiting economic growth and development, in particular for the less advanced economies that are less resilient and more accountable for these emissions. Developing economies can benefit from opportunities by decarbonizing transport and development.

Most countries signing the Paris Agreement have still to submit their commitment target to reduce GHG emissions from the transport sector through the NDC. Approximately 20 high-income countries and 45 middle-income countries have recognized an economywide effort to reduce emissions spanning multiple sectors—infrastructure, agriculture, industries. The number of countries that submitted a reduction target for transport in their NDC is much lower (figure 2-4). Notably, the commitment is higher in middle-income countries. In general, the solutions are not always straightforward, and, in many cases, the solution could affect vested interest. Clean technologies are not necessarily available to all countries and users, and multiple short-term priorities impact on limited resources allocated. And finally, while most people agree that some actions are required, legacy conditions could prevent them from transitioning to clean transport mode.
The international community is called to support developing countries set climate goals. The World Bank launched a series of Country Climate and Development Reports\(^2\) (CCDRs) to investigate how climate change and decarbonization align with each country’s development aspirations, and identify potential drivers and pathways toward diversified, low-carbon and resilient economy. The CCDRs will serve to guide governments with their transport decarbonization strategy and the preparation of NDC.

### 7.2 Establish green transport-specific regulatory and institutional frameworks

Stable and robust regulatory frameworks, based on transport specific climate action goals, provide a clear message and level of certainty to all stakeholders on which to base future investment decisions. Political, and regulatory uncertainty, on the contrary, can be detrimental and increase perceived risk preventing investments and innovations to decarbonize transport. An example of that uncertainty would be a country’s absence of global standards and certifications, and a lack of granular policies and economy-wide transition plans. Moreover, the eligibility criteria—whether investments and actions are aligned with the Paris Agreement—requires fixing persistent data gaps across portfolio alignment metrics, transition plans and investment performance of climate-solutions. While all emissions matter, some equity considerations should be addressed when defining a growth-and-efficiency path to decarbonize transport for each country.

Effective regulations support decarbonization and they span a plethora of transport and non-transport-related issues. The responsibility lies with different levels of government and the effort of the international community. Authorities can leverage from the international experience when extrapolating these regulations to each country-specific context. These regulations also can be seen in the context of the Avoid–Shift–Improve (A–S–I) framework and their cost or emission reduction efficiency. For instance, avoid and shift measures—such as allocating road space for dedicated bus lanes—may be far less costly for enhancing transport access than others improve measures, particularly in rapidly urbanizing developing countries (SLOCAT 2021). Governments must cease subsidizing fossil fuel-based transport, instead of redirecting the same subsidies to support greener alternatives. This step is even more applicable to developing countries where resources are limited and a reallocation to the climate action-oriented pathway is needed urgently. On the other hand, importing blueprints without preparatory work, or by not addressing their impacts, the costs and incentives, and the capacity to enforce these rules is likely to fail.

### 7.3 Incorporate a GHG analysis in transport planning to prioritize policies and investments

Decarbonizing transport is likely to follow different paths across countries. For instance, investing in public transport is likely to be a common measure in most cases. Some cities would rely on e-buses, for others, such technology could not yet be accessible if the conditions to power the grid through clean energies are not met. Efficient diesel buses could be the second-best solution while the authorities work on decarbonizing generation. Similarly, the use of nonmotorized solutions, such as walking and cycling, are likely to differ across cities. Such is the case of cycling and walking that depend on the proximity to jobs, land use regulation, and whether the supporting infrastructure exists. For large cities with low density of population, nonmotorized solutions are unlikely to capture a modal shift unless a combination of policies and fiscal incentives are implemented to make cities more compact. Likewise, investments in roads could be necessary in some rural areas along with other policies for territorial developments assessing their impact on GHG emissions. In the end,
the strategy will push for low carbon paths where feasible, being pragmatic and considering the constraints and wider benefits.

**Public investments in transport along with the regulatory framework have to assess their impacts on GHG emissions.** It is recommended that transport masterplans contain an integrated analysis of infrastructures and services, through a multimodal angle and with a focus on urban and territorial development. While multiple criteria determine the most convenient solution, GHG emissions should be addressed in all scenarios. Similarly, when it comes to new policies or to a review of the existing regulatory framework, the recommendation calls for an analysis of their impact on GHG emissions and how they contribute to mitigation and adaption compared with their cost and funding plan. Ultimately, the pace to a low carbon transport sector would be driven by the adoption of a regulatory framework, by the planning and implementation capacity along with the necessary resources, and last but not least, by the willingness to change business-as-usual (BAU) scenario.

**The roadmap of the decarbonization strategy has to recognize the complexity of transport governance and its ecosystem.** National and subnational institutions, in many cases with unclear boundaries of responsibilities, cohabit with regulated and unregulated transport solutions. Many institutional arrangements are such that the focus when setting decisions is based on infrastructure rather than on mobility and it is often disconnected from other developments in the urban and rural space. No unique transport governance structure exists even when policy, implementation, and oversight functions are clearly recognized in most modes. Moreover, each transport mode is characterized by its own governance structure depending on whether it is necessary to regulate on different dimensions. Even within the same transport mode, different regulatory governance structures are adopted based on the sector’s maturity. These issues have to be factorized in the strategy to decarbonize transport and its implementation. It will signal the conditions for which public and private actors can take actions and become accountable to decarbonize the sector.

**7.4 Decarbonize cities by deploying public transport and improving land use policies**

**Investments in walking infrastructures, like sidewalks or integrated corridor management can help cities can improve conditions for all users, and public transport in particular.** Improved corridors can induce denser space, with well-designed, diverse land use when coupled to more efficient land use regulations. In turn, this additional built space will demand more public transport and generate more pedestrians. Some fundamental steps improve public transport: switching to competition for the market and separating the fare box revenue from the formula to remunerate operators allow better commercial risk allocation, for example. Ultimately, cities need mass transit solutions, which will benefit from dense, diverse, and well-designed urban space.

**Yet, investments in infrastructure alone are not enough to produce efficient and green travel patterns in cities, even if they are directed toward green infrastructure.** The pressures of increased individual motorization as a result of economic growth in developing countries require policy priorities that target maximum efficiency of the urban transport system through a shift to public transport, walking, and biking. Transport demand management (TDM) is part of the solution. TDM may include a set of planning, regulatory, pricing, and informational and technological instruments that create set of incentives and disincentives to influence individuals toward choosing more sustainable travel behavior. TDM has both a short-term and long-term impact on individuals’ travel choices. Important tools of TDM such as parking management and road pricing, should be complemented by softer measures of policies, technology, and informational instruments to persuade users toward green behavior, such as social marketing, corporate incentives, telework policies, among others.
While the recommendations proposed in this document are not easy to adopt—they require both political and financial capital—the returns on investment are substantial. Many of the enabling environment reforms encourage greater revenue generation. More intense land use increases the efficiency of the property tax, and TDM measures such as pricing of parking and road use also bring in revenue. These revenues can be reinvested into the mobility system to continue to improve infrastructure and service for the majority of travelers using public transit and active modes. The recommendations proposed consider the budget constraints that make cities fall into the underfunding trap. Specifically, cities should invest in projects that do not increase the transport system’s deficit. For example, a congested intersection can lead planners and decision makers to build an overpass. Yet proper traffic management in tandem with building sidewalks and other elements can solve the bottleneck at intersections without building the overpass.

- Improve basic facilities for walking such as sidewalks, and in accessing public policy.
- Formulate a parking policy.
- Improve public transit operational structures and incentives, encouraging competition for the market.
- Use transport demand management (TDM) to reduce implicit subsidies for private cars and implement measures to better internalize the social cost of car ownership and use. This can generate revenues to compensate for distributional impacts and invest further in public transit infrastructures and service improvements.
- Adopt complete street standards. Reallocate and manage existing street and curb space for formal and informal public transit (priority lanes) and active modes.
- Review land use regulation.
- Bring opportunities closer to people through better land use planning.
- Embrace ICT technologies for integrated corridor management and improved multimodal integration (physical operational, and financial).
- Expand coverage of mass transit infrastructure and services.

### 7.5 Manage motorization and the trade of used vehicles

As motorization in LMICs increases, addressing the trade and quality of used vehicles and managing motorization throughout the vehicle lifecycle are critical for decarbonizing the road transport sector and achieving other sustainable development goals. Managing the impacts of used vehicles is critical not only to reduce global GHG emissions but also to avoid widening the green divide of air pollution and road safety outcomes between HICs and LMICs. If these impacts can be successfully managed, then the global trade in good quality used vehicles can be an important component in promoting sustainable transport. It can also benefit the wider economy through industry and technological transition, job creation, and lowering vehicle operating and maintenance costs. Two sets of recommendations are presented, for LMIC and the international community, while a more detailed discussion is provided in this specific TDI note.

**For low- and middle-income countries:**

- Establish goals for motor vehicle management
- Gather and assess data about the motor vehicle stock
- Adopt vehicle and fuel standards
Strengthen selected systems and programs: (i) motor vehicle information management system; (ii) first-use certification or homologation; (iii) quality assurance of vehicle parts; (iv) quality assurance of vehicle construction or modification; (v) periodic technical inspection; (vi) on-road enforcement; (vi) fuel quality assurance; (vii) preventive maintenance and repair industry strengthening; and (viii) end-of-life vehicle management.

For the international community:

- Strengthen international used vehicle trade frameworks: (i) set rules; (ii) share and manage data; (iii) enhance trade accountability; (iv) align standards; and (v) strengthen protocols for material recovery
- Support LMICs with technical assistance and investments

7.6 Cleaner vehicles and charging infrastructure: a sustainable and practical view of e-mobility

Electric mobility is an important way to decarbonize the transport sector, but it needs to be couched in a comprehensive sustainable transport policy. Efforts to promote e-mobility need to be articulated as a comprehensive approach toward sustainable transport. Otherwise, e-mobility adoption will only lead to cleaner congestion. E-mobility adoption experiences of the Global North needs to be carefully managed to inform the approach that would most suit the Global South. E-mobility requires differentiated approach by geography, level of development, nature of travel needs and aspirations, and sources of funding available to countries to support adoption efforts.

- **Each country needs to develop its own long-term sustainable EV ecosystem in:** (i) transitioning the vehicle fleet from ICE to EV and (ii) deployment of charging infrastructure. It is based on its own infrastructure condition. Governments need to think about energy and mobility together from the outset, facilitating the transition toward EVs, deployment of charging infrastructure, and supporting the transition toward clean and smart electricity grids.

- **Targeted monetary and nonmonetary incentives are needed.** Given that e-mobility is a nascent industry, EV and charging infrastructure incentives, subsidies, and financial supports should be designed, targeted, and implemented in the long term and in sustainable ways rather than using a one-time policy. It is important to differentiate user groups to determine right incentives. Also, several studies have demonstrated the cost effectiveness of supporting deployment of charging infrastructure to facilitate e-mobility adoption, but the effect tappers off as a network gets larger.

- **Governments need to develop and enforce standards in several areas to derisk private sector investments.** These include: (i) use of innovative financing options like guarantees to derisk financial investments from private sector; (ii) establishment of various standards: for vehicles, for interoperability between EV charging infrastructure, and for payment models with easy accessibility; (iii) development of local EV capacities, battery management and electric infrastructures, from installation to maintenance and operations; and (iv) developing and enforcing vehicle disposal strategy and standards, and building local capacity in management of reuse and recycle of hazardous and non-hazardous materials.

- **A myriad of financial models for public transport and fleet operations (see section 6).** These range from public- to private-led models—but based on public–private partnership models—to fleet operator-led models. Depending on the total cost of ownership (TCO)
differential and underlying conditions, different public-private financial models can be applied to share costs and distribute risk.

- **Charging infrastructure investment needs may scale disproportionately with the size of the EV fleet.** Sustainability in this direction requires an understanding of how the power ecosystem responds to the introduction of new charging infrastructure and identifying needed investments. To the extent possible, coordinated charging should be introduced early in the process. Charging management can significantly impact the need to increase electricity generation. Installation of charging infrastructure requires a host of complementary actions, including but not limited to establishing regulations, ensuring availability and augmentation electric power grid, and planning land use.

- **Equity considerations are a priority when facilitating e-mobility adoption.** One-size-fits-all type incentives for purchase of EVs or deployment of charging infrastructure can perpetuate existing inequalities in the transport sector. In particular, charging infrastructure should be deployed in a sustainable manner to optimize use of EVs and make EVs accessible for all: (i) economically by optimizing on overall charging costs; (ii) environmentally by maximizing charging from RES; and (iii) socially, so it is financially and location-centric accessible.

### 7.7 Shift to active mobility

- **Roads and public space must be reclaimed and redesigned to make active modes safe and more attractive.** Yet, the most effective way to encourage walking and cycling will also include network integration with public transport systems, changes to land use planning, setting, and managing safe speeds and efforts to establish prices correctly to users of highly subsidized and carbon-intensive transport modes.

- **Gearing substantial amounts of international climate funding and investment toward active mobility.** Active mobility should be featured as the greenest, most resilient, and most equitable form of transport, as we seek to mitigate and adapt to climate change. Multilateral developmental banks (MDBs) can be game changers by financing active mobility through corporate and sector commitments for major urban transport projects or by pioneering standalone operations for citywide transformation through nonmotorized transport (NMT) infrastructure.

- **Setting a minimum percentage of the transport or infrastructure budget for active mobility.** Funding seems to be the most straightforward way to fulfil active mobility goals in a sustained form. For cities and countries just starting out, setting a lower percentage is better than setting none, but the United Nations Environment Programme (UNEP) recommends a minimum percentage of 10 percent.

- **Prioritizing active mobility in policies at national and local levels.** It should be achieved by aligning it to broader goals on climate, road safety, health, and build back better strategies. For example, cutting 50 percent of emissions by 2030 or achieving zero traffic deaths by 2050.

- **Integrating cycling and pedestrian infrastructure into long term transport plans.** It should be done as a key component of integrated transport systems and on standards for design in local practices for urban infrastructure and on financing schemes from the national and regional or metropolitan levels.

- **Encouraging tax incentives for private investors, developers, and suppliers.** This can take place on the local or national level depending on the type of tax or service. For example, a city can set an incentive for a developer to include new sidewalks or state-of-the-art biking
facilities in their projects, while the national government is better equipped to set tax breaks and incentives on import or local industries for bike vendors.

- **Setting plans that reflect the political economy of each country or city is paramount.** Europe’s record suggests the most advanced planning and funding for active mobility, and it is an example to follow. Binding financial resources to a clear plan will ensure these investments are in the right place and can provide mobility options for people that are willing to walk or cycle, rather than isolated interventions. For example, countries of the EU must prepare a viable active mobility plan to receive funding from the EU.

- **Realizing the opportunities to finance active mobility in the developing world and make a shift.** Such approach would allow meeting the transport needs, addressing the economic constraints, and relieving climate change impact. In the developing world, where motorization rates are lower, where most people walk and cycle, and where the economic impact of COVID19 will be felt stronger, opportunities to make change are also higher.

### 7.8 Unlock and adopt green freight and logistics

Freight and logistics is a major source of carbon dioxide emissions and these emissions, predicted to rise steeply, will be hard to abate particularly in non-OECD countries according to the ITF Forum’s ambition scenario. A significant amount of all global trade originates from, traverses, or is destined for an urban area. However, very few cities and countries have developed structured and sustainable freight policies, dedicated programs, or partnerships with the private sector to address the core issues of urban freight. Global maritime transport plays a crucial role in facilitating trade and fostering economic development at an international scale. However, maritime transport accounts for an estimated three percent of global greenhouse gas emissions and emits about 15 percent of some of the world’s major air pollutants annually.

**For low- and middle-income countries:**

- Reduce the demand for freight transport or moderate or arrest its growth: segregate the growth of ton-kilometer from economic growth, while being cognizant of the need to ensure green, resilient, and inclusive development.
  - Improve transport planning to encourage greater efficiency of use of prevailing networks.
  - Introduce price signals to use available infrastructure capacity better or enhanced where necessary.
  - Improve the regulatory framework to encourage greater efficiency of freight operations—for instance, urban consolidation centers, low emission zones (LEZs), off-hour deliveries (OHDs), and use of cargo bikes.

- Shift freight, where economically justified and possible, to the lower carbon transport modes of rail, and inland water transport:
  - Introduce policies to encourage intermodality—from ship to rail, road to rail, road to smaller load carriers—to facilitate the shift to cleaner, lower carbon modes, including improving the performance of state-owned enterprises (SOEs).
  - Introduce pricing signals to encourage intermodality and modal switch, by removing any subsidy and ensuring that the price users face reflects the full marginal social cost. This directs the cost of air quality, decreased carbon dioxide emissions, and reducing traffic-related fatalities of their choice of mode.
- **Optimize freight loading:**
  - Seek to reduce empty running of trucks on the backhaul through supporting the development of logistic platforms to convey information on available loads.
  - Remove regulations that prohibit domestic and international trucks from collecting loads on the backhaul—known as Cabotage in the latter case—which mean many runs empty back to the main port.
  - Improve utilization of existing capacity through better enforcement of overloading. This would reduce damage to the infrastructure, safety risks, and emissions.
  - Support the piloting of urban consolidation centers, low emission zones (LEZs), off-hour deliveries (OHDs), multiuse lanes (MULs), and pick-up points.

- **Increase vessel, vehicle and locomotive and rolling stock energy efficiency:**
  - Adopt a progressive tightening of regulation, voluntary action, fuel standards and prices to send clear signals to improve fuel efficiency on all modes.
  - Adopt a progressive tightening of vehicle standards to send clear signals to markets to improve fuel efficiency for imported and new vehicles and rolling stock.
  - Improve asset management and ensure adequate maintenance of the publicly provided infrastructure for road and rail.
  - Require haulage firms and railways to ensure their drivers receive eco-driver training and appropriate monitoring.

- **Switch vessels, vehicles, locomotives, and rolling stock to lower carbon energy sources:**
  - Support the sector’s energy transition by facilitating the initiation of urgently needed pilot and demonstrator projects where appropriate climatically and physically.

### For the international community:

- **Support the commitment to decarbonize the maritime sector by 2050:**
  - Support the International Maritime Organization’s (IMO) 2018 strategy, to reduce GHG emissions from ships by at least 50 percent by 2050.
  - Provide support to strengthen the IMO’s initial target, to reduce GHG emissions from ships to 100 percent (net zero) by 2050.
  - Agree collective public policy measures to improve the energy efficiency of shipping through a combination of pricing-based mechanisms, regulation, and voluntary standards.
  - Support collective action to introduce market-based measures to allow revenues raised to incentivize changes in the sector (in vessels and on land). Specifically support LMICs that may suffer disproportionately negative impacts as a result of the decarbonization initiatives in the sector, and thereby contribute to fulfilling their wider development goals.

- **Support LMICs with technical assistance and investments:**
  - Conduct diagnostic studies of the potential for green fuel production and use, and decarbonization options.
  - Support the piloting of initiatives to decarbonize the freight and logistics sector at different levels.
  - Support development of the institutional framework that introduces policies, regulations, and market mechanisms.
Provide grant financing—through mechanisms like the Global Facility to Decarbonize Transport—to allow piloting. And scale pilot or larger investments of the freight and logistics sector, whether on land or sea.

The next set of recommendations focus on funding and financing issues which address needs of the developing countries and the international community.

7.9 Optimize funding mechanisms to incentivize greening actions

Any strategy to support transport decarbonization must be supported by a credible funding plan. A share of transport-specific taxes and fees collected, including those of fossil fuels, should return to the transport sector. Fuel taxes are the main source of fiscal revenues in most countries, but other options optimize fiscal revenues such as distance-based fees, which support transport decarbonization. Many governments apply some of these instruments in practice, although with different tax rate per jurisdiction. However, a share of the revenue stream generated by these instruments is not necessarily earmarked for transport but added to the general budget to finance the government expenditures. In other cases, fuel taxes are collected in earmarked funds that also finance other social policies beyond transport. The challenge remains in developing a strategy to decarbonize transport that comes with a credible funding plan. The experience of the World Bank shows that often many opportunities come by to bring efficiencies in transport’s governance issues—public investment management, procurement, monitoring, and oversight—and in public sector spending. Finally, if this is insufficient, it is a sovereign decision to prioritize spending to address climate change.

- One of the main challenges to decarbonize transport is to find a sustainable revenue stream to support public investments and transport policies. For most governments, the solutions are based on optimizing tax schemes rather than on an expansion of the tax base. It would also demand rationalizing fares and fees toward transport infrastructures and services while addressing affordability and competitive issues. Carbon taxes or the trading emission rights reveal some interesting opportunities for the more advanced economies in the large spectrum LMICs. Even so, more tax collection does not translate into more sectoral resources, but it can facilitate implementing a decarbonization path if the political will exists. Moreover, in the search for funding sources, fixing the funding gap requires a combination of policies such as those about fossil-fuel subsidy, land use regulation, freight, and public transport that efficiently allocate resources. Review the menu of transport specific taxes and fees in line with the polluter pays principle and other externalities, such space occupancy for cars and road safety.

- Review fuel tax schemes and phase off subsidies. The tax rate is high in many countries but for others, their low fuel tax rates represent missing opportunities to green the sector. Phasing off subsidies—diesel, petrol, gas—especially in oil exporting countries should accelerate along with measures to compensate for the transition.

- Fuel decarbonization may require new funding schemes to compensate for missing tax fuel tax revenues. Distance-based fees is a technological feasible solution, which holds some challenges of the costs of the technology and collection or administration of the fees. It also raises some issues of fairness when it applies to rural and semi-urban areas in the absence of substitutes or if fuel taxes are higher.

- Assess the impact of implementing carbon prices on fuel producers or importers. Such schemes have the potential to generate revenue, which will be particularly advantageous
as the world recovers from the COVID-19 crisis. Further, unlike direct taxes, a carbon price can be placed upstream on fuel producers or importers. It allows for a broad coverage of transport activities. This can reduce administrative costs, promote compliance, and reduce tax evasion.

- **Fund transport decarbonization.** For many countries, their path is not about adding carbon pricing to fuel prices but to channel these resources into climate-friendly actions. Even so, more advanced developing economies have options to introduce some carbon taxes or emission rights. This approach can help mitigate the impact on cross border carbon taxes as demonstrated in the EU or by other developed economies if implemented. The revenues can help provide for low carbon trade in developing economies, at least from a transport perspective.

- **Apply voluntary global carbon taxes.** Such schemes could potentially work in the maritime and aviation sectors to finance the transition. The countries should assess governance of such global schemes and the eligibility criteria to allocate the resources, and the impact on small economies and LICs.

### 7.10 Ensure efficiency of public spending and prioritization

**Resources matter, but the quality of public spending is paramount.**

- **Identify measures to improve the efficiency and impact of public spending.** Review recurrent and capital public spending in transport at national and subnational levels covering planning, procurement, investment, and oversight. The experience of the World Bank demonstrates ample opportunities to enhance efficiency and the capacity to implement investments and policies, in particular, at the subnational level. A consolidated GHG emission analysis, national and subnational, can better inform policy decisions.

- **Prioritize actions based on multiple criteria including GHG emissions.** Optimizing funding opportunities and enhancing the quality of public spending can create some extra fiscal space. However, a limited fiscal space can cap the ability of authorities to deliver a transport decarbonization program. Eventually, prioritization of public policies can help reallocate actions as well as the transition to a low carbon economy. Moreover, adaptation and mitigation solutions are likely to differ across countries in their benefits and costs, which can be factorized in the country’s roadmap to a low carbon sector.

### 7.11 Focus on research and development by leveraging private sector’s ability to innovate

Innovation in the public sector is a particular challenge. Public agencies are understandably risk averse in matters involving safety, noticeably in transportation policy makers. Moreover, public procurement practices, which often depend on producing detailed specifications and awarding contracts to the lowest bidder, inhibit the introduction of new concepts, technologies, and practices. For these reasons, the classic centralized model of investing in basic research does not work well in the largely public sector environment of transportation systems. Neither does the private sector willingness to draw on the fruits of these efforts to innovate. Entrepreneurs have little incentive to take risks when they face high barriers to market entry and relatively low assurance that they can derive profit from the introduction of new products.

In the large public presence of transportation infrastructure, government must therefore be more involved in the funding of research. This is to ensure that the public will reap the benefits of improved
products, services, and technologies being developed throughout the private economy. Numerous firms are offering new products and services in the emerging field of intelligent transportation systems. Federal applied research, demonstrations, and support for open standards are needed to facilitate the procurement of those products and services by public agencies.

7.12 Finance the transition toward net zero carbon transportation

Transition finance signifies any form of financial support that helps high carbon sectors start to implement long-term changes to become greener. It bridges the gap between traditional and sustainable financing as governments begin the journey to net zero. Traditional forms of sustainable finance are not always a good fit for the transitional phase and for traditional investors. For example, an airline company may use a green bond to finance research into bio jet fuel, but investors may not be willing to accept the financing of a new, less carbon-intensive fleet of airplanes. Helping transport sector transition toward net zero emissions is a vital part of combating climate change. DFIs, investors and policy makers must step up their support.

For policy makers in developing countries:

- **Address the fundamental bankability issues in projects, which are reinforced even more in green transport projects.** It’s easier to mobilize private financing for a bankable green project than for nonbankable green project. It is usually claimed that the issue is not a lack of financing, but a lack of bankable projects. A balanced risk-return profile to both public and private sector partners entails: (i) an enabling environment to attract fair and transparent private sector competition; (ii) robust regulations for contract management, and (iii) government’s commitment in the concessions contracts. Adding climate mitigation and adaptation factors to the already sound commercially viable project will increase its marketability and economic value in the long term.

- **Establish green taxonomy and standards to package transport.** The European Union leads in standardizing the taxonomy of green finance and assets. Similarly, the Climate Bond Initiative has set its green standards for transport projects. Many countries are moving in this direction. More developing countries move toward including transport in their climate action roadmaps and recognize an urgency to establish the definitions, eligibility, measurement criteria, and benchmarks for green transport. Such measures unblock green regulations, financing, and manufacturing in the domestic markets.

- **Identify green pipeline of projects.** While most of the public investment planning focuses on large scale economic needs and benefits, the typology of green projects may differ. In many cases, green projects require smaller investments, more spread out among diverse stakeholders, less defined as one cohesive project, and have shorter life span. For instance, buses in a small town have many operators and suppliers. In parallel, the type of investors looking to invest to bigger transport projects such as ports may not be a good match for such smaller green projects. Governments need to distinguish and set up dedicated units to build green project pipeline based on green taxonomy and standards, as mentioned above.

- **Consider the applicability of proven regulatory approaches such as the regulatory asset based (RAB) model, commonly used in energy and water utilities.** Such a model can help reduce uncertainty, making the return on investments more predictable, attracting private investors, and facilitating investments. In general, the RAB model, when compared to those regulated by contracts provides a different risk-reward return, which is more suitable for some investors.\(^5\)
- **Carbon pricing can be a tool to augment the transition to net zero transport.** As seen in California, the revenues from carbon pricing can add up substantially to support major investment programs on climate action. Countries need to match pricing mechanism with proper governance of the funds to be reappropriated in a planned and transparent way.

*Public policies for private financiers and companies:*

- **Public and private actors must coordinate rapidly to develop green transport asset class.** Lesson learned from renewables, such as solar and wind, can help. Standardizing technical requirements in green transport projects and procurement practices can facilitate the creation of an asset class more suitable to private financing. As GHG emissions from transport sector overtake those from energy production, financing efforts must accelerate to stop the upward trend.

- **Harness new financiers who are focused on sustainability.** Institutional investors and climate funds look for fully packaged projects, which can transparently prove their green purpose. These may not be the same lenders and investors as for traditional projects. Developing countries must establish services to ensure and verify investments as green, and enact regulations for green bonds, climate reporting and data measurement. Climate-oriented funds are dependent on good quality certification services of projects as green before investment. Financiers require verification services during implementation to ensure that the project is delivering the results originally planned and certified. These services are often not available in developing countries and are procured from international firms. As a result, the cost of preparation of green products and projects can weigh heavily on the public sector. This is an area of innovation and ingenuity for the private sector to step up and expand their services to countries where these investments are needed the most.

- **Scale-up investments in non-traditional green transport sectors and harness domestic capital markets.** The private sector so far has focused on ports and airports; however, climate mitigation and adaption investments are opportune in other transport sectors such as roads and urban mobility. Traditional investors seeking large scale investment and high return profile may not be the right fit for green transport projects as they are smaller in scale and are more localized at subnational levels. Investors are looking to invest in long term ESG in emerging markets and in parallel, for more stable capital markets instruments such as bonds. Domestic capital markets are largely untapped and underutilized for green bonds. Private investors can aggregate investments in these green assets using the domestic capital markets or private placements in international markets. Investing in climate adaptation can pay off attractively, as in contrast, not making such investments can cost companies. For instance, the road sector has a huge opportunity for climate adaptation. Given that most or transport’s GHG emissions, infrastructure and mobility are road-based, the urgency is compelling to modernize road-based modalities with climate adaptation investments. Swiss Re reports that it is far cheaper to invest ahead of climate disaster than to pay to fix it afterwards. The private sector needs to step up and recognize the opportunities in transport sector transition, especially the ones which are win-win for both public and private sectors.

*For financial institutions:*

- **DFIs need to scale up their financing to climate mitigation and adaptation in transport.** Not many governments in the developing world have taken active steps by implementing green transport in their Paris Agreement. And more specifically, MDBs can help countries develop a transport decarbonization strategy. A good example is the Country Climate and
Development Report series that the World Bank launched which serves to identify a course of actions. Such roadmap, with other measures, can facilitate investments by providing certainty on long-term policies and expanding the investor base for climate finance. The low ratio of climate cofinance demonstrates that more effort is necessary.

- **DFIs can play a larger role in providing derisking instruments to mobilize private capital.** A majority of climate financing is channeled through traditional investment loan instruments (figures in Chapter 5), which means that DFIs are financing the projects with direct financing instead of leveraging other sources of financing, particularly from the private sector. Use of derisking instruments such as guarantees, lines of credit, and policy-based financing remains a small part of the overall portfolio across all MDBs. Consequently, the low level of private cofinance demonstrates that more effort should be applied to create the conditions that attract private financing.

- **The private sector can provide better derisking instruments.** Given the scale of financing needed to close the investment gap and the limited capacity of MDBs to offer loans and derisking instruments, closing the gap requires innovative solutions. With the entry of private sector investment in public infrastructure though models such as UK’s private finance initiative (PFI) and public-private partnerships (PPPs), derisking mechanisms such as monoliner’s construction risk mitigation products emerged as an innovative solution. At this urgent need of green financing, it is fully plausible that private sector globally rises up to accept green start up financing and come up with innovative mechanisms to leverage investments. Lessons learned from monoliners unique coverage of construction risks in greenfield projects, can help to identify new investors that can work along with MDBs in derisking climate finance.

- **Domestic finance mobilization will be a key factor in moving towards green pathways.** It would reduce asymmetric information between foreign and local investors when the cost of capital in proportion to the country and political risks are taken into consideration. It helps to create national ownership. Financing regulatory reforms could be necessary, as well the role of project sponsor in search for domestic financiers and partners.

- **Scaling-up small projects will bring private sector investment and innovation.** Many low carbon solutions are at local level in cities, which can be brought together in a scaled-up portfolio as in a regional financing facility. The World Bank is proposing such a facility for smaller and low-income countries, so a variety of blended finance instruments can be made available to support local bus operators for lease schemes of an electric bus, 2- or 3-wheelers, bicycle programs, construction of bike and pedestrian lanes, and charging stations, for instance.

- **Blending concessional and commercial financing will leverage new financiers in green transport.** Mozambique and China have demonstrated success (Chapter 6), based on the local needs of the schemes. DFIs can set up facilities to combine their convening power, concessional lending terms and in-depth country or sectoral knowledge with domestic stakeholders. These actors could be bus companies at the municipal level and local private manufacturers or financiers. The presence of DFIs will ensure a link between the public sector and facility while the presence of private sector would bring the rigor of a commercial operation, which most of these schemes need. Over time, once the track record and operation are established, the DFI’s support can be moderated to lever additional projects and investments.
Notes


2. UNFCC: NDC stands for Nationally Determined Contributions for national emissions reduction and adaptation to the impacts of climate change as part of the national climate action plans. Second round includes 1st, 2nd and updated climate actions plans till year 2030.

3. Defined here as including the terrestrial and maritime modes only.

4. Distance-based fees is technological feasible solution that possess some challenges in terms of the cost of the technology and collection/administration of the fees. It also raise some issues of fairness when it comes to rural and semi-urban areas if there is not substitutes or if fuel taxes are higher.


6. Swiss Re Institute, April 2021, “The economics of climate change: no action not an option”.

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