Economics, Finance and Capacity Building for Transformative Change in Transport

SLOCAT Partnership on Sustainable, Low Carbon Transport

TRANSPORT, CLIMATE AND SUSTAINABILITY GLOBAL STATUS REPORT

4TH EDITION

MODULE 6

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Financing Sustainable Transport in Times of Constrained Public Budgets

KEY FINDINGS

Transport Investment Needs

- As the demand for transport grows, the scale of investment required to support global transport infrastructure is immense, with an estimated USD 50 trillion needed between 2015 and 2040 to meet rising demand across key sectors such as roads, railways, ports and airports.
- No single global estimate of transport investment needs is available; however, different sources have estimated investment needs by region, with varying numbers and wide ranges. The most rapid transport growth is anticipated in Asia – driven by increases in trade and travel between major emerging economies such as China and India – as well as in Europe and North America.
- Given the ambitious investment needs, different types of financing sources will be needed. Currently the two primary financing sources are the public and private sectors. Specific sources of funds include money for climate action, official development assistance (ODA) from donors and development agencies, and issuances of green bonds in global capital markets.

Financing and investment trends

- In 2022, central governments in the Group of Twenty (G20) countries directed a substantial 42% of their total infrastructure investment to the transport sector (USD 416 billion, out of a total of USD 990 billion); this was more than double the share allocated to social infrastructure (17%) and roughly 2.5 times the combined investment in the energy, communications, and water and waste sectors.
- The road sector continued to dominate investment in transport, driven by the central role of roads in enabling freight and passenger movement and supporting economic development.
- Transport has continued to rely heavily on public sector funding – primarily government subsidies and grants – for capital investments, with only limited private sector participation. Many national governments directly finance the construction of transport infrastructure, particularly for public transport (bus rapid transit, light rail and metro systems).
- Private investment has remained an underutilised financing instrument, as indicated in a 2024 survey of public transport operators on transport infrastructure projects. The use of carbon credit mechanisms in low- and middle-income countries (LMICs) has been minimal, despite the potential of such schemes to unlock significant capital for low-emission transport projects.
- In 2023, total private participation in infrastructure across LMICs reached USD 86 billion, equivalent to just 0.2% of their combined GDP.

KEY FINDINGS

- Private investment in transport infrastructure hit a two-decade low in 2023, plummeting 76% to just USD 13.6 billion across 45 projects, or 69% below the five-year average.
- Transport accounted for only 16% of total private participation in infrastructure investments in 2023. Despite the recovery of international travel, which led to a spike in transport investment in 2022, private participation in transport infrastructure investment in 2023 fell below even pandemic-era lows.
- During 2020-2023, the road sector continued to dominate private sector investment in transport with a 59% share, while 15% of investment went to railways, 17% to airports and 9% to ports.
- The gap is widening between needs and actual climate finance for transport. In 2023, the sector received around USD 545 billion from public and private sources for climate mitigation, seven times below the estimated USD 2.7 trillion needed annually by 2050 to align with global transport climate action targets.
- Climate finance for adaptation also lags: in 2023, adaptation financing for transport totalled USD 1.8 billion, or only around 3% of the overall global adaptation financing of USD 65 billion. Emerging economies require an estimated USD 222 billion per year between 2024 and 2030.
- To stay on track, annual transport investment in LMICs (excluding China) must reach an estimated USD 575 billion by 2030. However, half of the USD 545 billion in transport-related climate finance in 2023 went to high-income countries, and the majority (77%) went to road transport followed by rail and public transport (23%).
- LMICs received only a small portion of climate finance for transport in 2023, with 0.03% (USD 145 million) going to least developed countries and 4% (USD 22 billion) to emerging markets and developing economies (excluding China). Notably, the 10 countries most affected by climate change between 2000 and 2019 received less than USD 23 billion, or under 2% of the global total.
- Against the backdrop of current climate finance flows to transport, the 2024 United Nations Climate Change Conference in Baku, Azerbaijan (COP 29) was a missed opportunity to set a new ambitious climate finance target and align it with sectoral needs, including for transport. The climate finance goal has also attracted criticism regarding its qualitative criteria.
- Official development assistance to transport has increased. Between 2019 and 2023, the transport sector received an average of USD 10 billion annually from bilateral ODA flows, including 5% of total ODA in 2022 and 8% in 2023, a share that has grown post-pandemic.

- Road transport received the largest share of transport ODA between 2013 and 2022 (around 50%), followed by rail transport (30%) and transport policy (10%).
- Overall, the distribution of transport ODA to vulnerable groups such as least developed countries and small island developing states was broadly in line with total ODA patterns.
- There is a growing need to modernise ODA labelling codes and categories (green investments, for example, are currently allocated under road infrastructure). Because of the limited range of codes, the true nature of infrastructure and services needs in transport is not reflected in ODA data.
- Global issuance of sustainable bonds, including green and other thematic bonds, rose 8% in 2024 to USD 609 billion, up from USD 567 billion in 2023; however, transport-related bonds accounted for just 9% of total issuance, or USD 57 billion.
- Growth in transport-related bond issuance has remained modest compared to the transport sector's potential. Infrastructure assets in the sector are expected to become increasingly attractive due to predictable cash flows and reasonable returns. However, the key challenge for most LMICs is the insufficient creditworthiness of cities, which limits their ability to issue bonds themselves and is often compounded by national governments not allowing sub-national governments to issue bonds.

KEY FINDINGS

- Diversification of revenue sources – such as through real estate development, advertising and regional transport taxes – increases the financial sustainability of public transport agencies. Public transport operators have traditionally relied on customer fares to cover a portion of operating costs; however, farebox coverage has remained low across most regions, commonly in the ranges of 31-40% and 41-50%.
- In cities that require employers to offer commuter benefits to employees, various options are available to fund these benefits. They include: pre-tax payroll deductions, employer-paid direct benefits, subsidies and reimbursements, and combinations of these measures.
- Non-fare revenues, which are generated through commercial or ancillary activities within public transport networks, have become an increasingly important component of financial sustainability. Newer funding mechanisms include levies on car use, freight, deliveries and property-related charges from land-value capture.
- The COVID-19 pandemic prompted transport agencies worldwide to reconsider their revenue sources and fare policies, with some offering fare-free services.
- In 2023, implicit and explicit subsidies for fossil fuels totalled around USD 7 trillion, equal to 7.2% of global GDP; per capita subsidies ranged from USD 198 in Africa to USD 2,172 in North America.
- Fuel excise taxes are a vital source of government revenue and are often used to fund road infrastructure; however, the current taxation model is unsustainable in an electrified future. In 2023, electric vehicles displaced nearly USD 12 billion in global fuel tax revenues, while generating only USD 2 billion through electricity taxes – a net loss of USD 10 billion. Even though China led the world in electric vehicle uptake in past years, 60% of fuel revenue losses were in Europe, where petrol and diesel taxes were much higher.
- This trend is expected to intensify, with net fuel tax losses projected to grow more than five-fold, based on International Energy Agency projections for electric vehicle adoption.

Way forward

- Funding is considered critical to making public sector investments viable. Governments need to find alternative ways to fund transport services, instead of relying on direct funding to transport agencies.
- The way forward for sustainable transport financing requires major rebalancing action to reduce the massive gap between current financial flows and the USD 50 trillion investment needed by 2040. However, there are key challenges in implementing this. They include: constrained public budgets, under-utilisation of private capital, inequitable climate finance flows, high upfront costs and long payback periods, weak institutional capacity, outdated funding and reporting systems, revenue loss from electrification, policy and regulatory gaps, and lack of adaptation focus.
- The way forward will require significant action in several key areas:
  - Governments must prioritise subsidising sustainable transport instead of fossil fuels. Fossil fuel subsidies still exceed most forms of climate-aligned transport finance.
  - Climate finance for transport must be scaled up significantly – with a greater share directed to LMICs, especially for adaptation – and structured to prioritise concessional lending and grants over market rate loans. As the global community works on the Baku to Belém Roadmap for 1.3T, which aims to mobilise USD 1.3 trillion in climate finance for LMICs annually by 2035, investing in sustainable transport must be part of the solution.
  - Mobilising private capital is essential.
  - Public finance mechanisms need modernisation.
  - Updating outdated transport investment taxonomies is important.
  - Institutional capacity building, especially in LMICs, is critical.
  - As electric vehicles reduce fuel tax revenues, governments must explore alternative revenue models.
  - Transport investments must be fully integrated into both national climate change mitigation and adaptation strategies and national development strategies.

KEY FINDINGS

OVERVIEW

Financing in transport refers to the various methods and sources of money that are used to support the development, operation and maintenance of transport infrastructure and services. Infrastructure and services such as roads, bridges, airports, railways and public transport networks require significant investments to be built and maintained effectively.

Funding versus financing:

- **Funding** is money provided for a specific purpose, often by an organisation or government, and typically does not need to be repaid and is not dependent on the creditworthiness of the receiver. Examples: Grants, donations, government subsidies.
- **Financing** is the process of obtaining capital (money) through various means, including borrowing (debt) or attracting investors (equity). Debt financing, such as loans or bonds, requires repayment with interest. Equity financing involves selling ownership shares in exchange for capital. To raise financing, the creditworthiness of the borrower plays a role in its ability to access the market. Examples: Bank loans, lines of credit, issuing shares, venture capital.

Transport projects can be financed from multiple sources, whereas funding comes from user fees/charges and taxpayer monies. Financing in transport involves obtaining the necessary resources to cover the costs associated with these projects and operations. It includes the following:

- **Borrowing and loans** – money that governments and transport agencies borrow (through either issuing bonds or taking out loans from financial institutions) and then repay over time, often using revenue generated from transport-related activities.
- **Capital investment** – financing for the construction, expansion or renovation of transport infrastructure, which includes building new roads, bridges, airports and other facilities.
- **Climate finance** – financing that is channelled to reach the scale of climate change mitigation and adaptation that is required in the transport sector to achieve Paris Agreement targets.
- **Earmarked taxes** – taxes (such as fuel taxes, vehicle registration taxes, etc.) collected from motorists that are generally earmarked for transport-related purposes, such as funding road construction and maintenance projects.
- **Environmental and impact fees** – payments or mitigation efforts that transport projects might require to offset the environmental impacts caused by construction or operation.
- **Grants and subsidies** – funds that governments provide to transport projects, particularly projects that serve a public interest but that may not be financially self-sustainable.
- **Innovative financing** – cross-cutting term linked to the mechanisms mentioned above but utilising new resource mobilisation mechanisms that are being explored to help finance transport projects sustainably and efficiently, such as congestion pricing, carbon credits and value capture strategies.
- **Operations and maintenance** – funding to operate and maintain transport systems, covering expenses such as staff salaries, maintenance of vehicles and infrastructure, and other operational costs.
- **Private investment** – financing from private companies and investors, whether through direct investments or in the form of public-private partnerships (whereby private entities might handle the construction, operation or maintenance of infrastructure in exchange for certain revenue-sharing arrangements).
- **Public funding** – funds provided by various levels of government to support transport projects, which can come from taxes, tolls, fees and other revenue sources dedicated to transport.
- **User fees and tolls** – funds that users of transport infrastructure pay to help finance the construction and maintenance of facilities, such as tolls used to fund highway upkeep.

Effective financing is crucial for the development of modern transport networks that facilitate sustainable economic growth, improve connectivity and enhance quality of life. It involves a combination of public and private resources, strategic planning and careful allocation of funds to ensure the efficient operation and expansion of transport infrastructure and services.

Context, challenges and opportunities

Transport is now the second largest and fastest growing contributor to global greenhouse gas emissions. In 2023, the sector was responsible for 21.9% of carbon dioxide (CO_2) emissions, driven by a staggering 95.4% reliance on fossil fuels.[1] Road vehicles alone accounted for nearly three-quarters of transport emissions.[2] Despite technological advances, emissions, air pollution, noise, and road fatalities in the sector have continued to rise, fuelled by economic growth, increased personal mobility and surging freight volumes.

Transport demand is projected to more than double by 2050, especially in low- and middle-income countries (LMICs), where a lack of access to transport services still isolates hundreds of millions of people from health care, education and economic opportunity.[3] One billion people lived more than 2 kilometres from an all-weather road as of 2019, and only half of the world's urban population had convenient access to public transport in 2022.[4]

At the same time, transport infrastructure is increasingly vulnerable to climate change. In 2023, climate-related disasters caused USD 250 billion in insured losses – more than double the five-year average – with USD 15 billion in direct damage to transport systems annually.[5] LMICs have borne the brunt, absorbing more than half of these losses relative to their gross domestic product (GDP).[6]

The transition to sustainable transport is urgent but costly. Clean transport solutions require an estimated USD 2.7 trillion annually until 2050, seven times the investment level in 2023.[7] Yet climate finance for transport remains woefully inadequate and inequitable. In 2023, the sector received just USD 545 billion per year, mostly directed to high-income countries and road transport.[8] LMICs, particularly the most climate vulnerable, received only a fraction: 3% went to least developed countries, and adaptation finance for transport averaged just USD 1.5 billion annually in 2023, barely 2% of global adaptation funding.[9]

Implementing sustainable transport financing faces several interlinked challenges. Despite constrained public budgets that limit the ability to invest, governments continue to subsidise fossil fuels. Both private capital and capital markets remain underutilised in LMICs. In 2023, private participation in transport infrastructure totalled only USD 86 billion in LMICs.[10] Although official development assistance (ODA) has increased, public funding still dominates, and climate finance continues to bypass the countries that need it most. These challenges are compounded by outdated funding classifications, limited institutional capacity, high borrowing costs and the erosion of traditional revenue sources (such as fuel taxes) due to the rise of electric vehicles. The result is a widening gap between transport investment needs and actual financing.

Sustainable transport is not simply a cost, but rather a catalyst for inclusive, low-carbon and resilient growth. It unlocks access to jobs, markets, and services, and delivers long-term returns that far exceed initial investments. The challenge now is to mobilise the right mix of public, private and climate finance to close the gap and drive a just and sustainable transport transformation.

To address the challenges of sustainable transport financing, a multi-faceted approach is essential. Governments and stakeholders must diversify funding sources by blending public, private, and climate finance, while leveraging tools such as green bonds, carbon credits and land-value capture. Equitable allocation of climate finance is critical, with greater emphasis on grants and concessional funding for LMICs, especially for adaptation.

Strengthening institutional capacity and enabling sub-national access to finance can help unlock private investment. Public finance systems need reform, including phasing out fossil fuel subsidies and introducing sustainable revenue models such as road usage charges. Updating outdated investment classification systems will improve transparency and alignment with sustainability goals. Finally, integrating transport into national climate and development strategies, and prioritising inclusive, multi-modal systems, will ensure that investments not only reduce emissions but also enhance access, resilience and economic opportunity.

Transport investment needs

As the demand for transport grows, the scale of investment required to support global transport infrastructure is immense, with an estimated USD 50 trillion needed between 2015 and 2040 to meet rising demand across key sectors such as roads, railways, ports and airports.[11] By 2050, passenger and freight transport activity (measured in passenger-kilometres and freight tonne-kilometres, respectively) is projected to surge between 55% and 100%, compared to 2019 levels.[12] Higher demand for transport necessitates expanding and improving transport networks and infrastructure (including roads, railways, ports, airports and public transport systems) and enhancing efficiency (for example, through better logistics, efficient road allocation and demand management).

No single global estimate of transport investment needs is available; however, different sources have estimated investment needs by region, with varying numbers and wide ranges (Table 1).[13] **The most rapid transport growth is**

TABLE 1. Projections for transport investment needs by region

Region	Transport investment needs
Africa	An estimated USD 411 billion in transport infrastructure is needed by 2030 to fully realise the African Continental Free Trade Area (AfCFTA). Key investment needs that are critical to unlocking AfCFTA's full economic potential include: USD 4 billion for 135 vessels USD 25 billion for 243 aircraft USD 36 billion for 169,000 rail wagons USD 345 billion for over 2.2 million trucks.
Asia-Pacific	The region will need an estimated USD 43 trillion between 2020 and 2035 to develop, maintain and repair transport infrastructure – or around 2% of regional GDP. This includes: Roads: 63% of total investment (1.3% of GDP), driven by rising vehicle ownership and connectivity needs Railways: 17% (0.4% of GDP), including high-speed rail Urban transit: 11% (0.2% of GDP) Ports: 4% (0.1% of GDP) Airports: 5% (0.1% of GDP) Maintenance: roughly 24% of total transport spending.
Latin America and the Caribbean	To meet the targets of Sustainable Development Goals (SDGs) 9 and 11 by 2030, the region requires an estimated USD 548.3 billion for new transport infrastructure, with nearly 60% allocated to roads. An additional USD 427.8 billion is needed to maintain and replace existing road assets, bringing the total to around USD 976.1 billion. Port infrastructure alone will require USD 50 billion by 2030 to close existing gaps.
European Union (EU)	Achieving carbon neutrality in the EU's transport sector will require an estimated USD 780 billion (EUR 754 billion) annually to 2030, with 80% allocated to road transport, including passenger and freight services, as well as electric vehicle charging infrastructure. While transport needs the most investment in absolute terms, clean energy supply will require the largest relative increase (around 1.7 times the historical annual average) by 2030 to accelerate decarbonisation.

Source: See endnote 13 for this section.

anticipated in Asia – driven by increases in trade and travel between major emerging economies such as China and India – as well as in Europe and North America.[14] Transport forecasts remain uncertain, as they must account for both the expected and unforeseen effects of major macroeconomic shifts and their impact on global transport systems. In the wake of the COVID-19 pandemic, new challenges have emerged including the Russian Federation's invasion of Ukraine, tensions in the Middle East, supply chain disruptions, rising inflation and fears of a global trade conflict – further destabilising global markets. Despite this volatility, long-term transport demand is projected to rise, driven by economic growth.

Given the ambitious investment needs, different types of financing sources will be needed. Currently the two primary financing sources are the public and private sectors. Specific sources of funds include money for climate action, official development assistance from donors and development agencies, and issuances of green bonds in global capital markets.

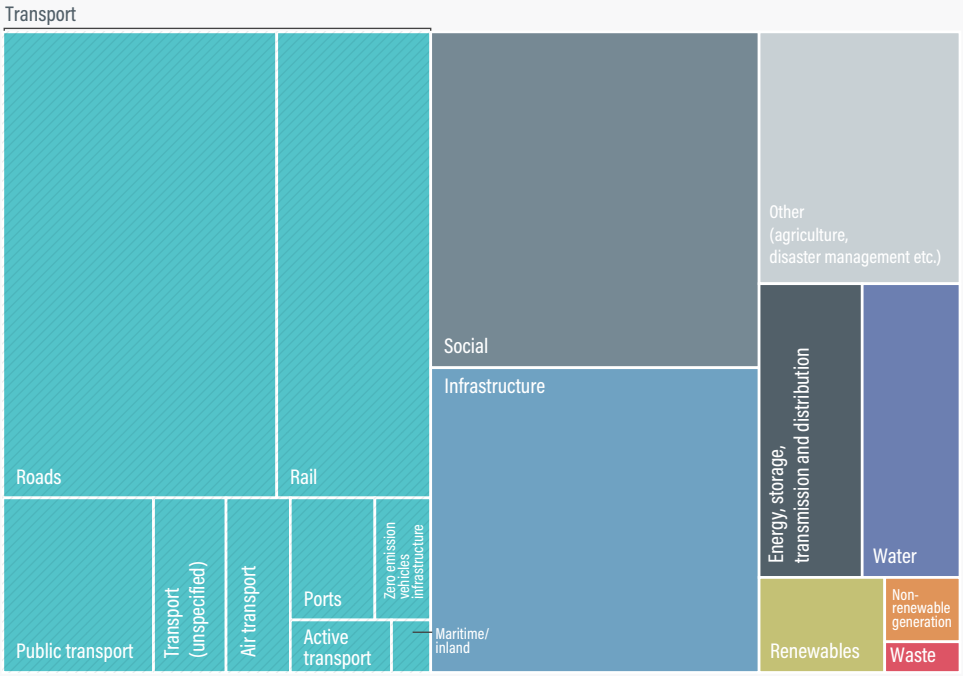
Financing and investment trends

In 2022, central governments in the Group of Twenty (G20) countries directed a substantial 42% of their total infrastructure investment to the transport sector (USD 416 billion, out of a total of USD 990 billion); this was more than double the share allocated to social infrastructure (17%) and roughly 2.5 times the combined investment in the energy, communications, and water and waste sectors (Figure 1).[15] The strong focus on transport was consistent across advanced and emerging G20 economies, where it received the largest share of central government infrastructure funding.[16]

The road sector continued to dominate investment in transport[i], driven by the central role of roads in enabling freight and passenger movement and supporting economic development. Efficient road transport infrastructure lowers transport and logistics costs for trucks, helping businesses access broader markets and operate more productively, ultimately driving jobs and economic growth. Well-developed

i Note that most finance is directed towards hard infrastructure, such as road infrastructure. The financing numbers in this report do not represent the usage and types of services that are dependent on road infrastructure.

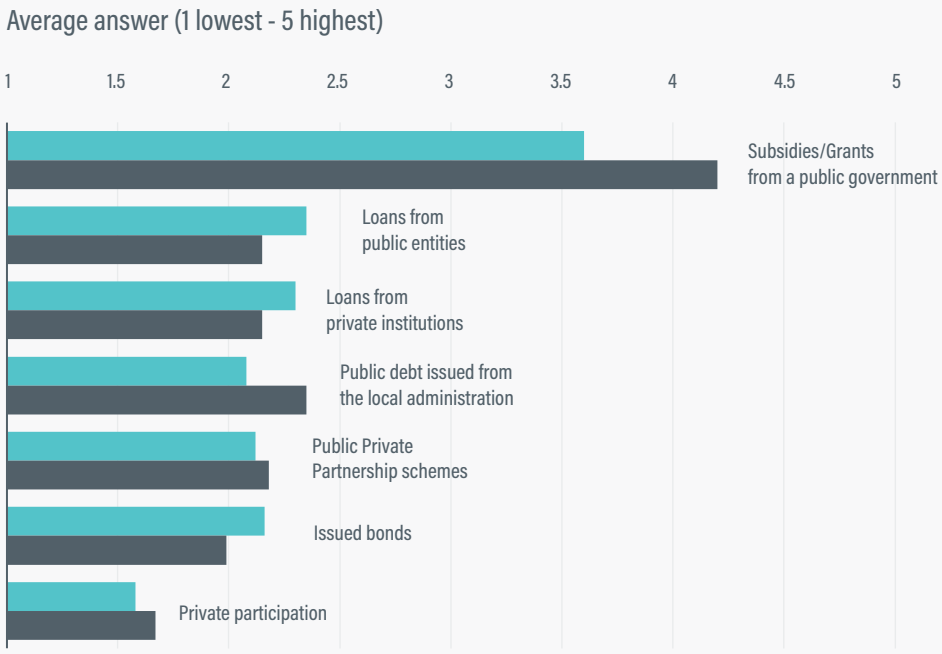
FIGURE 1. G20 investments (in USD millions) in transport compared to other sectors, 2022



In 2022, central governments in the G20 countries directed a substantial 42% of their total infrastructure investment to the transport sector (USD 416 billion, out of a total of USD 990 billion). This was more than double the share allocated to social infrastructure (17%) and roughly 2.5 times the combined investment in the energy, communications, and water and waste sectors.

Source: See endnote 15 for this section.

FIGURE 2. Survey of instruments used to finance public transport infrastructure projects, 2024



Private investment has remained an underutilised financing instrument, as indicated in a 2024 survey of public transport operators on transport infrastructure projects.

Source: See endnote 20 for this section.

roads connect rural and urban areas, ensuring equitable access to jobs and services, including education and health care. Improved connectivity reduces regional disparities and supports inclusive economic development. However, road transport is a major source of greenhouse gas emissions, contributing nearly three-quarters (74%) of global transport emissions in 2023.[17]

Transport has continued to rely heavily on public sector funding – primarily government subsidies and grants – for capital investments, with only limited private sector participation. Many national governments directly finance the construction of transport infrastructure, particularly for public transport (bus rapid transit, light rail and metro systems).[18] Funding from national governments typically cascades down through the state and local levels, with all tiers reporting some contribution to public transport funding. A survey of transport authorities found that public subsidies are the primary financing tool, whereas mechanisms such as private investment and bond issuance remain low priorities.[19]

Private investment has remained an underutilised financing instrument, as indicated in a 2024 survey of public transport operators on transport infrastructure projects (Figure 2).[20] **The use of carbon credit mechanisms in LMICs has been minimal, despite the potential of such schemes to unlock significant capital for low-emission transport projects.** Barriers include a lack of capacity to identify and design eligible projects, low market readiness, few institutional systems geared towards carbon financing and a limited presence of carbon markets in LMICs.

In 2023, total private participation in infrastructure across LMICs reached USD 86 billion, equivalent to just 0.2% of their combined GDP.[21] This was down slightly from USD 91.3 billion in 2022 but still exceeded the five-year average of USD 85.5 billion (2018-2022).[22]

Private investment in transport infrastructure hit a two-decade low in 2023, plummeting 76% to just USD 13.6 billion across 45 projects, or 69% below the five-year average (Figure 3).[23] This was the sector's lowest level in 20 years and reflected projects for ports (36% by investment USD in Brazil, Cabo Verde, Ecuador, Egypt, Ghana, India, Peru, Sri Lanka, Suriname and Tanzania), roads (33% in Brazil, China and India) and railways (23%).[24] The biggest investment project in 2023 was the USD 1.8 billion Metro Manila transit line 7 in the Philippines.[25]

Transport accounted for only 16% of total private participation in infrastructure investments in 2023.[26] **Despite the recovery of international travel, which led to a spike in transport investment in 2022, private participation in transport infrastructure investment in 2023 fell below even pandemic-era lows.**[27] Major contributors China and India, traditionally leading countries in road investments, both reported steep declines and the withdrawal of sub-national investments. The retreat of state-level investments reflects a contraction in fiscal affordability and private operators willing to take sub-national credit risk as public-private partnership (PPP) granting authorities.[28]

During 2020-2023, the road sector continued to dominate private sector investment in transport with a 59% share, while 15% of investment went to railways, 17% to airports and 9% to ports.[29] Projects mainly focused on building new roads, expanding capacity and improving maintenance.

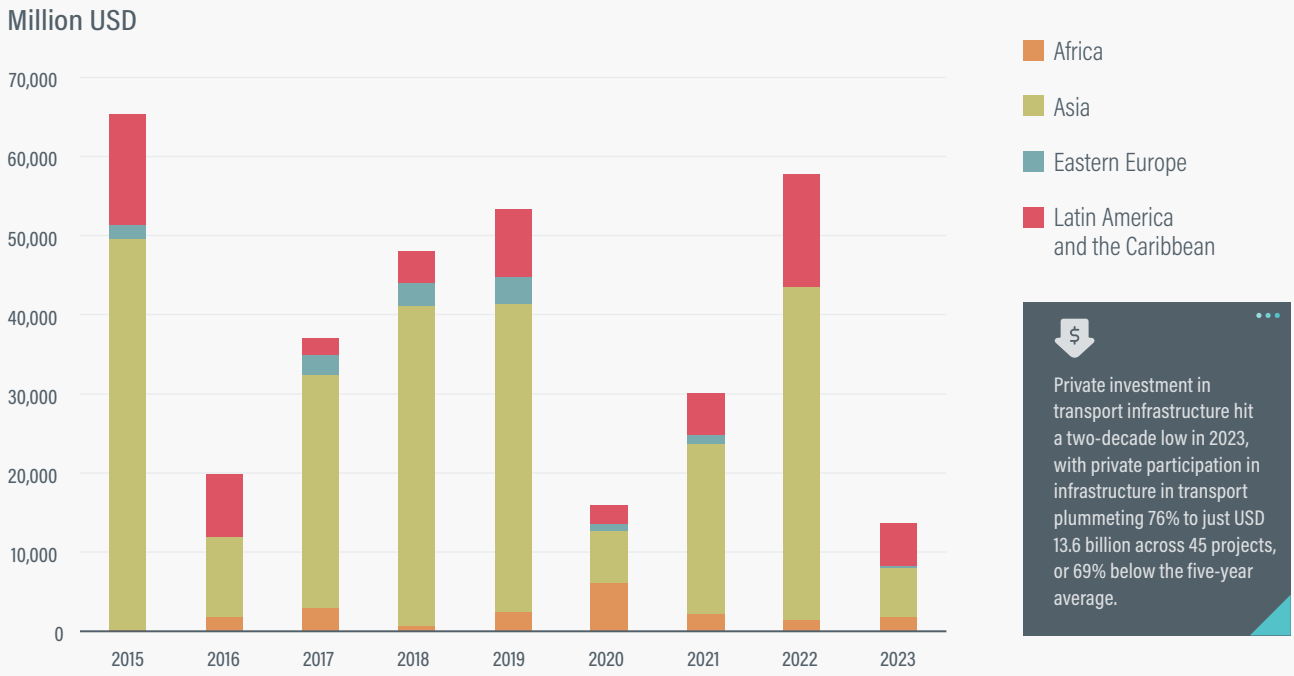
- Several highway upgrade (brownfield) PPPs were initiated in Brazil, with a few projects also in Colombia and Paraguay.[30]
- India concessioned several greenfield road projects, but at a lower volume than pre-pandemic.[31]
- In China and Vietnam, an uptick in greenfield build-operate-transfers for highways occurred in 2022.[32]

The gap is widening between needs and actual climate finance for transport. In 2023, the sector received around USD 545 billion from public and private sources for climate mitigation (Figure 4), seven times below the estimated USD 2.7 trillion needed annually by 2050 to align with global transport climate action targets.[33] **Climate finance for adaptation also lags: in 2023, adaptation financing for transport totalled USD 1.8 billion, or only around 3% of the overall global adaptation financing of USD 65 billion.**[34] **Emerging economies require an estimated USD 222 billion per year between 2024 and 2030.**[35]

To stay on track, annual transport investment in LMICs (excluding China) must reach an estimated USD 575 billion by 2030.[36] **However, half of the USD 545 billion in transport-related climate finance in 2023 went to high-income countries, and the majority (77%) went to road transport followed by rail and public transport (23%).**[37] Overall, global climate finance in 2023 totalled USD 1.9 trillion, with 79% directed to East Asia and the Pacific, North America and Western Europe.[38]

LMICs received only a small portion of climate finance for transport in 2023, with 0.03% (USD 145 million) going to least developed countries and 4% (USD 22 billion) to emerging markets and developing economies (excluding China).[39] **Notably, the 10 countries most affected by climate change between 2000 and 2019 received less than USD 23 billion, or under 2% of the global total.**[40] Meeting climate targets in transport will require greatly scaling up climate finance for developing economies and leveraging these funds to attract additional investment.

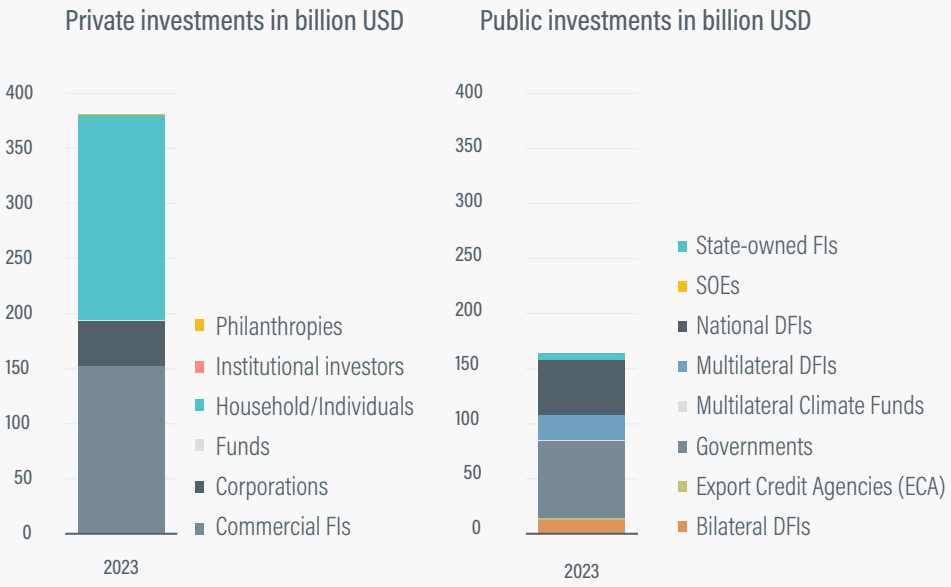
FIGURE 3. Private sector participation in transport infrastructure in low- and middle-income countries, 2015-2023



Private investment in transport infrastructure hit a two-decade low in 2023, with private participation in infrastructure in transport plummeting 76% to just USD 13.6 billion across 45 projects, or 69% below the five-year average.

Source: See endnote 23 for this section.

FIGURE 4. Climate finance for transport, by private and public sector, 2023



In 2023, the sector received around USD 545 billion from public and private sources for climate mitigation, seven times below the estimated USD 2.7 trillion needed annually by 2050 to align with global transport climate action targets.

Source: See endnote 33 for this section.

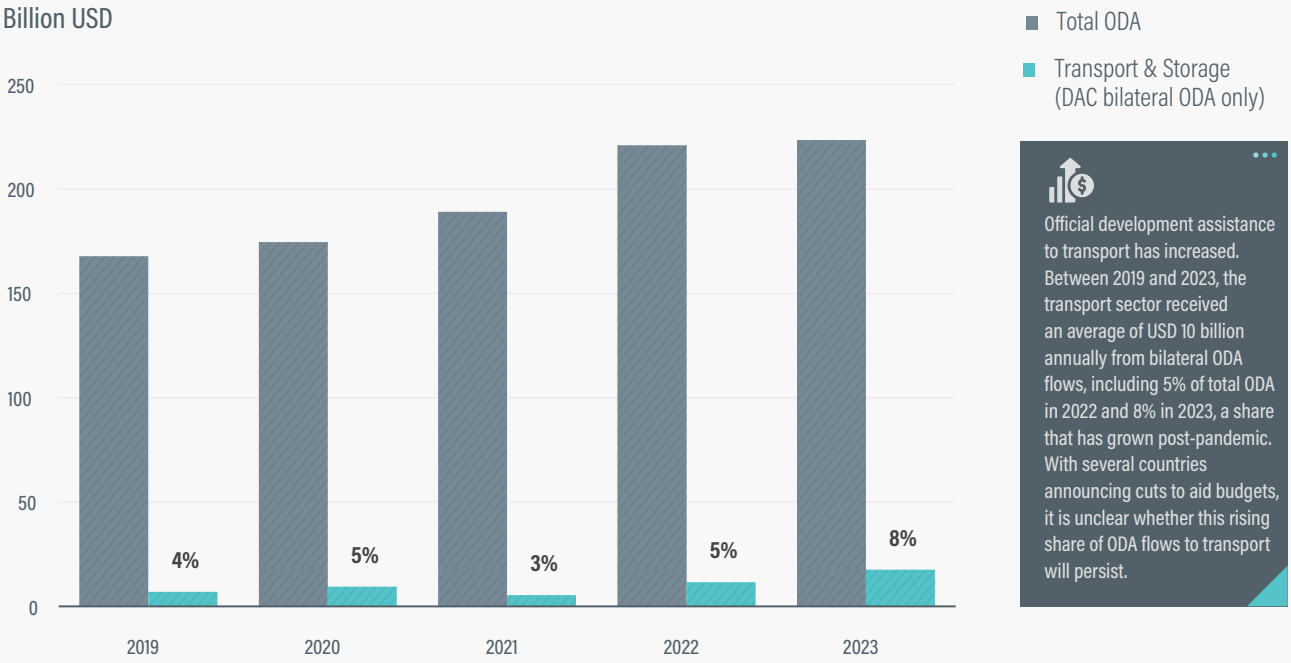
Against the backdrop of current climate finance flows to transport, the 2024 United Nations Climate Change Conference in Baku, Azerbaijan (COP 29) was a missed opportunity to set a new ambitious climate finance target and align it with sectoral needs, including for transport. High-income countries pledged to contribute USD 300 billion by 2035 to LMICs, starting in 2026.[41] In addition, all actors are supposed to scale up financing from public and private sources, amounting to at least USD 1.3 trillion per year by 2035.[42] Despite high-income countries tripling their climate finance commitments to LMICs (from the previous goal of USD 100 billion annually), the new climate finance goal, known formally as the New Collective Quantified Goal on Climate Finance, falls well short of meeting LMICs' calls for the trillions required. As a result, most of the financing agreed at COP 29 will rely on private investment and alternative sources, both of which carry uncertainties in realisation.[43]

The climate finance goal has also attracted criticism regarding its qualitative criteria. The new goal is not accompanied by minimum allocation floors for sub-groups of LMICs (such as small island developing states), nor does it set sub-targets for mitigation, adaptation, and loss and damage. Moreover, it provides no obligations to prioritise grants over loans, and no safeguards to preclude investments in fossil fuel infrastructure from being classified as "climate finance". This combination of factors brings little guarantee that the finance needed to transition to sustainable and low-carbon transport will be delivered at the speed required to meet the Paris Agreement targets and the SDGs.

Official development assistance to transport has increased.[44] Between 2019 and 2023, the transport sector received an average of USD 10 billion annually from bilateral ODA flows, including 5% of total ODA in 2022 and 8% in 2023, a share that has grown post-pandemic (Figure 5).[45] With several countries announcing cuts to aid budgets, it is unclear whether this rising share of ODA flows to transport will persist.

Road transport received the largest share of transport ODA between 2013 and 2022 (around 50%), followed by rail transport (30%) and transport policy (10%).[46] Japan was the largest donor of global transport ODA, contributing 51%, with funding directed mainly towards rail (50%) and road (33%).[47] The EU followed with 23%, and France with 9% (France allocated 63% of its transport ODA to rail).[48] Germany and the United Kingdom had a strong focus on transport policy, with the UK directing 47% of its transport ODA to this area.[49] Top recipients of transport ODA included India, the Philippines, other Asian countries and Egypt.[50] **Overall, the distribution of transport ODA to vulnerable groups such as least developed countries and small island developing states was broadly in line with total ODA patterns.**[51]

FIGURE 5. Share of bilateral overseas development assistance going to transport, 2019-2023



Source: See endnote 45 for this section.

There is a growing need to modernise ODA labelling codes and categories (green investments, for example, are currently allocated under road infrastructure). Because of the limited range of codes, the true nature of infrastructure and services needs in transport is not reflected in ODA data (Box 1).[52]

Box 1. Call to action to modernise the transport coding system

In the official development assistance (ODA) system, each sector is classified using specific reporting codes within the Creditor Reporting System (CRS) of the Organisation for Economic Co-operation and Development's (OECD) Development Assistance Committee (DAC). Notably, the "Transport and Storage" sector has a much simpler coding structure than sectors such as "Energy". Whereas the energy sector includes 27 detailed codes, distinguishing between renewable and non-renewable energy sources, transport is divided into just 7 sub-sectors: Road, Rail, Water, and Air Transport, along with Transport Policy, Transport Education and Training, and Storage.

This difference does not reflect funding levels, as both sectors receive comparable ODA. Rather, it highlights how transport codes have remained unchanged for decades, whereas energy codes have been revised multiple times to align with evolving priorities, particularly the SDGs and sustainable energy targets. **As a result, key transport themes – such as cycling, walking, public transport, electric buses, mobility access for women and the poor, and road safety – are not explicitly visible in the current creditor reporting framework. Although funding for these areas does exist, it is not clearly tracked or reflected in published statistics.**

By contrast, other global taxonomies focused on development, sustainability and climate finance have introduced more nuanced and modern classifications for transport, capturing these emerging priorities. This highlights a disconnect between the growing international focus on sustainable, inclusive transport systems and the outdated way that transport ODA is categorised and reported. Bridging this gap is essential to better align development co-operation with global climate and sustainability goals.

Source: See endnote 52 for this section.

Global issuance of sustainable bonds, including green and other thematic bonds, rose 8% in 2024 to USD 609 billion, up from USD 567 billion in 2023; however, transport-related bonds accounted for just 9% of total issuance, or USD 57 billion (Figure 6).[53] The growth in sustainable bond issuance was driven mainly by investments in energy, transport, information and communications technology, waste and industry.

Growth in transport-related bond issuance has remained modest compared to the transport sector's potential. Infrastructure assets in the sector are expected to become increasingly attractive due to predictable cash flows and reasonable returns.[54] However, the key challenge for most LMICs is the insufficient creditworthiness of cities, which limits their ability to issue bonds themselves and is often compounded by national governments not allowing sub-national governments to issue bonds.[55] Urban transport operators and certain governments (not only in high-income countries) are ranked among the Top 10 Certified Issuers of green bonds.[56]

- As of mid-2025, Top 10 Certified Issuers of green bonds included the New York Metropolitan Transit Authority and the Republic of Chile, which issued several bonds targeting low-carbon transport in recent years.[57]
- Only a few cities in emerging economies (such as in Indonesia, Mexico and South Africa) have been able to issue green bonds themselves. Most green bonds were issued by development finance institutions including the World Bank and the Asian Development Bank.[58]

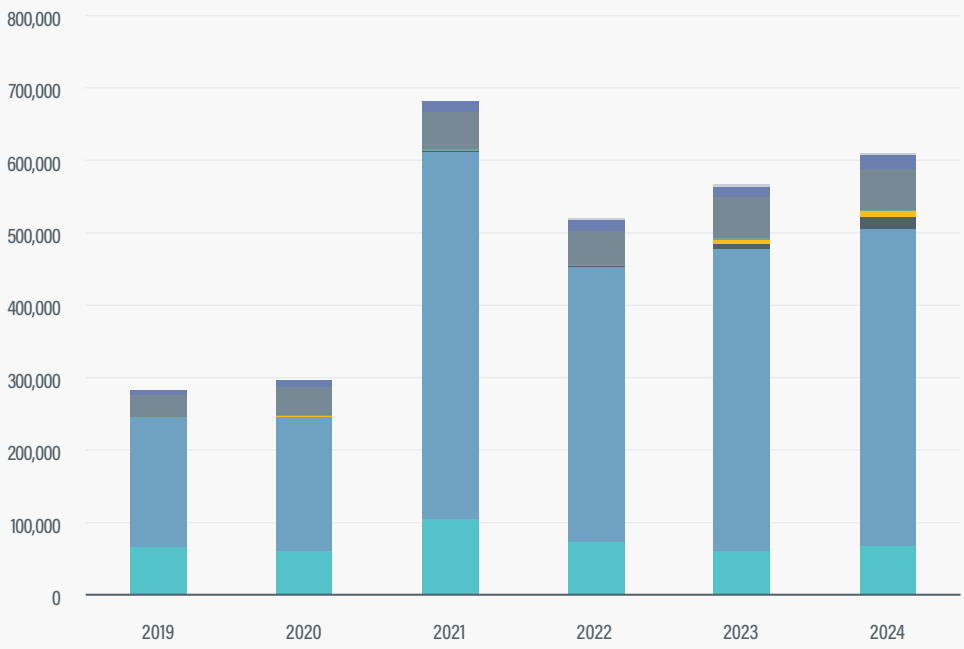
Diversification of revenue sources – such as through real estate development, advertising and regional transport taxes – increases the financial sustainability of public transport agencies.[59] Public transport operators have traditionally relied on customer fares to cover a portion of operating costs; however, farebox coverage has remained low across most regions, commonly in the ranges of 31-40% and 41-50%, based on a 2024 survey (Figure 7).[60] The highest farebox coverage rates were reported in Europe, the Middle East and North Africa, and Latin America, although a large share of public transport operators and transport authorities did not know or were still assessing their coverage rates.[61] Different definitions of farebox coverage and its funding structures result in large variations in reporting.

In cities that require employers to offer commuter benefits to employees, various options are available to fund these benefits. They include:

- **Pre-tax payroll deductions** – employees set aside a portion of their income pre-tax to pay for commuting expenses, saving on taxes, while employers also benefit from reduced payroll taxes.
- **Employer-paid direct benefits** – employers directly provide employees with transit passes or subsidies, which are generally tax-free for both the employer and employee up to certain limits.
- **Subsidies and reimbursements** – programmes such as the FareShare programme in Montgomery County, Maryland (United States) reimburse employers for a significant portion of employee commuting costs.[62]

FIGURE 6. Sustainable bond issuance by sector, 2019-2024

Green bonds by sector, issued per year in million USD

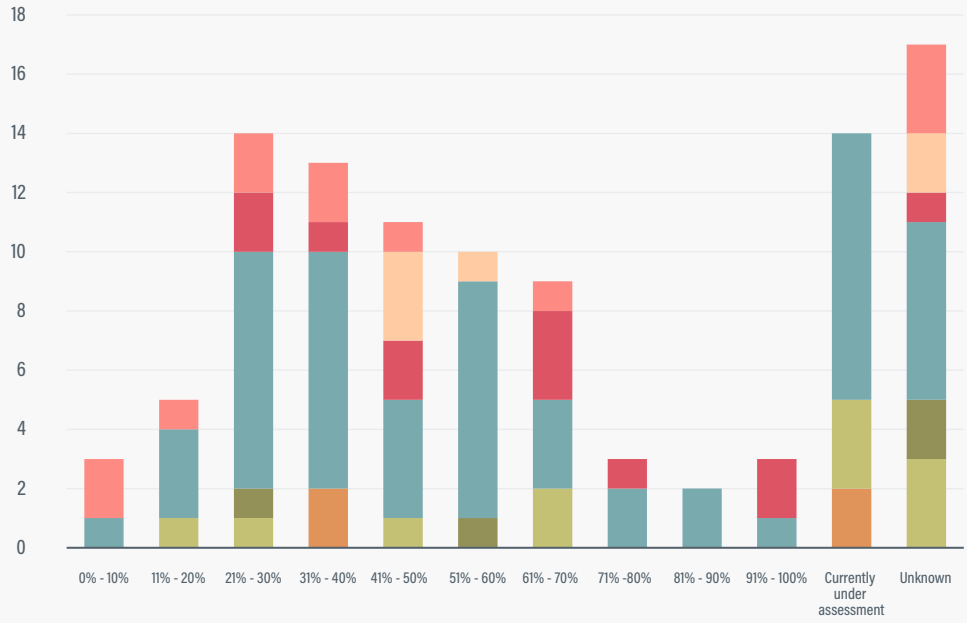


Global issuance of sustainable bonds, including green and other thematic bonds, rose 8% in 2024 to USD 609 billion, up from USD 567 billion in 2023; however, transport-related bonds accounted for just 9% of total issuance, or USD 57 billion.

Source: See endnote 53 for this section.

FIGURE 7. Reported farebox coverage rates by region, 2024

Number of responses (107 in total)



Public transport operators have traditionally relied on customer fares to cover a portion of operating costs; however, farebox coverage has remained low across most regions, commonly in the ranges of 31-40% and 41-50%, based on a 2024 survey.

- **Combination** – employers combine pre-tax deductions with employer contributions to maximise employee savings.

Non-fare revenues, which are generated through commercial or ancillary activities within public transport networks, have become an increasingly important component of financial sustainability. Newer funding mechanisms include levies on car use, freight, deliveries and property-related charges from land-value capture. Common non-fare activities include advertising, retail and in-station sales, real estate and land development, earmarked taxes and levies, and other commercial ventures such as special transport services for events or businesses. Overall, for public transport, a strong focus remains on identifying new market opportunities, increasing fare revenues, expanding digital services, and developing alternative funding sources.

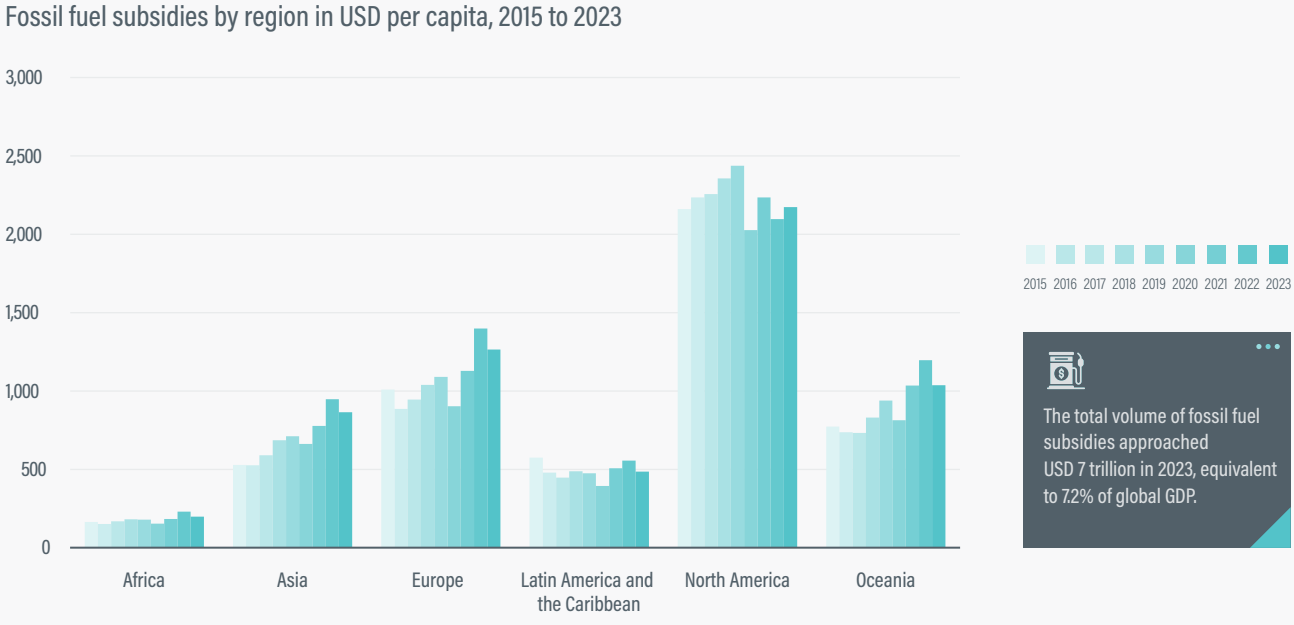
The COVID-19 pandemic prompted transport agencies worldwide to reconsider their revenue sources and fare policies, with some offering fare-free services.[63] Advocates of fare-free transit argue that eliminating fares repositions public transport from a market commodity to a public good, thereby addressing social exclusion and inequality. However, critics raise concerns about potential deterioration of service quality due to funding shortages for operations and maintenance. They suggest that targeted policies – such as subsidies for specific populations (e.g., students, elderly, etc.) – may be more sustainable than blanket fare-free systems, since transport infrastructure requires funding regardless of the fare structure. Ultimately, effective fare policies must balance access, sustainability and financial viability within broader integrated transport strategies.[64] (See 4.5 Public Transport.)

In 2023, implicit and explicit subsidies for fossil fuels totalled around USD 7 trillion, equal to 7.2% of global GDP; per capita subsidies ranged from USD 198 in Africa to USD 2,172 in North America (Figure 8).[65]

Fuel excise taxes are a vital source of government revenue and are often used to fund road infrastructure; however, the current taxation model is unsustainable in an electrified future. In 2023, electric vehicles displaced nearly USD 12 billion in global fuel tax revenues, while generating only USD 2 billion through electricity taxes – a net loss of USD 10 billion.[66] **Even though China led the world in electric vehicle uptake in past years, 60% of fuel revenue losses were in Europe, where petrol and diesel taxes were much higher.**[67] The petrol tax rate in France, Germany and Italy is more than six times that in China.[68] Overall, electric vehicles are taxed less per kilometre than internal combustion engine vehicles. The loss of fuel tax revenue could further limit the availability of state and local funds for public transport.

This trend is expected to intensify, with net fuel tax losses projected to grow more than five-fold, based on

FIGURE 8. Per capita fossil fuel subsidies by region, 2015-2023



Source: See endnote 65 for this section.

FIGURE 9. Net tax implications of electric vehicle adoption based on International Energy Agency policy scenarios, 2023-2035

Source: See endnote 69 for this section.

International Energy Agency projections for electric vehicle adoption (Figure 9).[69] By 2030, the global electric vehicle stock (including two- and three-wheelers) is expected to reach 460 million under the States Policies Scenario (STEPS) and nearly 500 million under the Announced Pledges Scenario (APS).[70] By 2035, fuel tax losses could total USD 105 billion in the STEPS and USD 110 billion in the APS, doubling the shortfall from 2030 as road transport electrification gains momentum.[71] In the STEPS scenario, fuel tax revenue losses by 2035 approach USD 70 billion in Europe and USD 17 billion in China, while remaining under USD 300 million in the United States due to low federal taxation of petrol and diesel (although greater impacts could be seen at the state level).[72]

Way forward

Funding is considered critical to making public sector investments viable; for instance, the use of capital grants reduces the upfront financing cost of an infrastructure asset or the operational costs of running a metro system or buses, or building an airport. However, funding often conceals the actual cost of building and operating a transport asset such as a road, port or railway. For example, fossil fuel subsidies that provide money to transport public works, service companies, concessionaires and users artificially reduce the real cost of owning a mode of transport such as a truck, airplane or ship.

Governments need to find alternative ways to fund transport services, instead of relying on direct funding to transport agencies. Government funding typically provides money for a specific purpose, often without requiring repayment (such as through grants, subsidies, donations and other forms of public support). In contrast, financing involves borrowing or lending money, typically with a requirement for repayment and interest.

The way forward for sustainable transport financing requires major rebalancing action to reduce the massive gap between current financial flows and the USD 50 trillion investment needed by 2040.[73] However, there are key challenges in implementing this. They include:

- **Constrained public budgets:** Many governments, especially in LMICs, face limited fiscal space due to high debt burdens and competing development priorities. This restricts their ability to fund large-scale transport infrastructure or to provide subsidies for sustainable transport services.
- **Under-utilisation of private capital:** Despite the growing need, private investment in transport hit a two-decade

low in 2023, with only 16% of total private participation in infrastructure investment going to transport.[74] Barriers include perceived risks, lack of bankable projects and limited creditworthiness of national and sub-national entities.

- **Inequitable climate finance flows:** Climate finance for transport is heavily skewed towards high-income countries. LMICs, particularly the most climate vulnerable, receive a disproportionately small share of both mitigation and adaptation finance, exacerbating the investment gap.
- **High upfront costs and long payback periods:** Sustainable transport solutions such as electric mobility, rail systems and multi-modal infrastructure require significant upfront investment and have long return horizons, making them less attractive to private investors without public support or guarantees.
- **Weak institutional capacity:** Many LMICs lack the technical, financial and institutional capacity to design, implement and manage complex transport projects or to access climate finance effectively.
- **Outdated funding and reporting systems:** The current classification systems for ODA and other funding streams do not adequately reflect modern transport priorities such as cycling, walking, and electric mobility, making it difficult to track and allocate resources effectively.
- **Revenue loss from electrification:** As electric vehicles replace internal combustion engine vehicles, governments are losing fuel tax revenues, a key source of transport funding. This creates a growing fiscal gap that is not yet offset by electricity taxes or alternative mechanisms.
- **Policy and regulatory gaps:** Many countries have no clear policies or incentives to support sustainable transport investment, such as enabling transport-based bond issuance, implementing transition clean transport pricing and reforming fossil fuel subsidies.
- **Lack of adaptation focus:** While decarbonisation receives attention, financing for the adaptation of transport infrastructure remains minimal, despite growing climate risks and damages, particularly in LMICs.

The way forward will require significant action in several key areas:

- **Governments must prioritise subsidising sustainable transport instead of fossil fuels. Fossil fuel subsidies still exceed most forms of climate-aligned transport finance.** Structural shifts are needed to mobilise adequate levels of funding and financing for multi-modal infrastructure and services in both passenger and freight transport that strengthen efficient and low-carbon solutions.
- **Climate finance for transport must be scaled up significantly – with a greater share directed to LMICs, especially for adaptation – and structured to prioritise concessional lending and grants over market rate loans.** **As the global community works on the Baku to Belém Roadmap for 1.3T, which aims to mobilise USD 1.3 trillion in climate finance for LMICs annually by 2035, investing in sustainable transport must be part of the solution.**[75] The climate finance decisions taken today will shape transport infrastructure and systems for decades.
- **Mobilising private capital is essential.** This requires improving the creditworthiness of LMIC governments and cities, enabling bond issuance, and expanding the use of green bonds and carbon markets.
- **Public finance mechanisms need modernisation** through tools such as land-value capture, congestion pricing and reform of fossil fuel subsidies.
- **Updating outdated transport investment taxonomies is important** to better track and align funding with sustainability goals.
- **Institutional capacity building, especially in LMICs, is critical** to designing bankable projects and attracting investment.
- **As electric vehicles reduce fuel tax revenues, governments must explore alternative revenue models** such as road usage charges and electricity taxation.
- **Transport investments must be fully integrated into both national climate change mitigation and adaptation strategies and national development strategies.**

PARTNERSHIPS IN ACTION

Globally, many multi-stakeholder transport initiatives are focused on reducing the environmental impact of transport by promoting eco-friendly modes, adapting to changing demographics and rising transport demand, creating resilience to socio-environment changes and reducing reliance on fossil fuels. Measures include encouraging the use of public transport, cycling and walking, and electric vehicles, as well as supporting the development of sustainable infrastructure such as energy storage, green fuels and charging stations for road, rail, air and marine transport. Many partnerships are mobilising philanthropic capital, grants and donations, and concessional financing from impact investors.

- In April 2023, the **Climate Bonds Initiative** updated its criteria for land transport to version 2.2, which can be used to certify use-of-proceeds instruments, sustainability-linked debt instruments, assets and entities related to land transport activities and assets.[76]
- The **European Investment Bank** (EIB) is using its future mobility financing platforms to champion investments in green, innovative mobility around the world. Using innovative financing tools such as intermediate loans, guarantees, and venture debt, it is helping companies access affordable funding, secure competitive pricing and attract investors. The EIB also empowers entrepreneurs to bring their ideas to market and compete globally through initiatives such as Future Mobility, InnovFin, and InvestEU, all backed by the European Commission. Through its investments, the EIB is accelerating the green and digital transformation of the transport sector.
- The **Grow Cycling Toolkit** developed by the **Institute for Transportation and Development Policy** offers practical steps to tackle immediate investment barriers to cycling, while laying the foundation for long-term cycling growth.[77] By helping cities prioritise the most effective funding actions now, it supports a shift away from car dependency, leading to cleaner air, reduced congestion and more liveable streets. The toolkit supports scenario building for both high-income countries and LMICs and provides links to useful resources for urban planners and investment modellers.
- The **LEAP Fund** (**Leapfrogging to E-mobility Acceleration Partnership**) is an effort from Climateworks' Drive Electric Campaign to support low-carbon transitions and avoid the lock-in of fossil fuel vehicles by investing in "leapfrogging" to electric transport technology.[78] Under the fund's first phase, 10 projects in Africa, Latin America and South-East Asia received a total of USD 1 million in grant funding.[79]
- The urban mobility workstream of the **World Resources Institute's** (**WRI**) **Ross Center for Sustainable Cities** promotes high-quality, integrated public transport systems such as bus rapid transit, urban buses, informal transport, micromobility and autonomous vehicles.[80] The programme encourages shifts to cycling, walking and public spaces that safely accommodate these modes. By helping cities navigate the transition to cleaner-burning fuels and electric vehicles, WRI accelerates transformative urban initiatives that turn cities into resilient, inclusive, low-carbon places that are good for people and the planet.
- Supported by the **Mitigation Action Facility**, WRI is working with the government of Kenya and the **Africa Guarantee Fund** to expand Kenya's electric vehicle sector through industrial growth, workforce upskilling and reskilling, charging infrastructure, public awareness of opportunities and benefits, and greater accessibility for purchasers.[81] The project focuses on increasing the uptake of electric two- and three-wheelers in peri-urban and rural areas, with the goal of propelling the market towards critical mass to support further market-driven transformation of the sector.

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SPOTLIGHT

Evolving the Economic Appraisals for Land Transport Investments

This spotlight is an excerpt from the paper Evolving the Economic Appraisals for Land Transport Investments, developed by SLOCAT and the Transformative Urban Mobility Initiative (TUMI), in collaboration with the European Cyclists' Federation (ECF), the International Institute for Sustainable Development (IISD), the MobiliseYourCity Partnership and Walk21.

Economic appraisals: An important piece of the economics and investments for transforming transport

Despite recent progress, the use of standardised, comprehensive sustainability criteria in transport investment appraisals remains far from the norm, compared to conventional methods. A more integrated approach is needed – one that captures additional impacts and outcomes, along with the broader economic, social and environmental synergies emerging from public transport, walking and cycling.

Economic appraisals are only one part of the broader landscape of transport investment challenges. Yet evolving them is essential to redirecting and scaling up investments towards transport systems and services that are socially inclusive, economically viable, environmentally responsible and resilient. Too often, current mechanisms work against this transition – for example, fossil fuel subsidies, tax-free fuel for high-polluting transport modes, externalised costs and "free" parking. Meanwhile, investments in sustainable, low-carbon transport remain insufficient across international finance institutions, governments and the private sector. Scaling up will require improvements in institutional frameworks, project preparation and financing, implementation and evaluation.[1]

Institutional frameworks must account for social and environmental impacts – both positive and negative – within economic appraisals to avoid short-term, one-sided decision making. This broader lens will build the evidence base needed for political decisions to redirect funding towards solutions that have the highest social and environmental returns. Greater investment in sustainable transport will improve infrastructure efficiency, lower user costs, and enhance equity in access to mobility and economic opportunity. It will also generate wider societal benefits such as improved air quality and environmental outcomes – enhancing value for money for both public and private investment.

A collaborative, multi-level approach to planning and implementation is critical. Co-ordinated strategies ensure integration across local, regional and national actors in delivering comprehensive transport solutions.

Issues with conventional economic appraisals for land transport

ISSUE 1

Narrow scope of the methods used for the quantitative analysis

The methods currently being used to inform investment decisions in transport remain narrowly focused. They primarily consider: 1) capital and operations and maintenance costs, and 2) performance indicators of the transport infrastructure (e.g., ridership, revenue generation).[2] However, investments in sustainable, low-carbon infrastructure for land transport generate much broader benefits – by enhancing connectivity and access to services. These benefits are typically undervalued in quantitative assessments.

To fully capture the direct, indirect, and induced benefits of sustainable transport, broader indicators are needed that enable greater recognition of its societal and economic value.[3] This includes capturing indirect and induced impacts, such as increased income through better employment opportunities.[4]

ISSUE 2

Disconnect between the investor and beneficiaries

Sustainable infrastructure often does not generate enough benefits for a single investor, although it generates considerable benefits for society as a whole.[5] Investments in infrastructure (especially public infrastructure) are typically centralised and made by a single organisation or entity. However, the benefits of sustainable infrastructure, including for transport, are often shared among many beneficiaries.[6]

The key is to develop planning and financing strategies involving multiple beneficiaries of the investment, beyond the direct beneficiaries and transport actors. This may require co-ordinated policy frameworks, actions and cross-sectoral performance indicators to embed and monetise shared benefits. Transport planners and investors should look beyond direct beneficiaries and engage stakeholders from sectors such as health, equity and employment. Joint planning and co-ordinated responsibility – via a high-level strategy or framework – can help ensure that these broader benefits are reflected in transport investment assessments.

ISSUE 3

Absent or limited economic valuation of so-called intangible benefits

Many benefits are labelled "intangible" simply because they have not been measured – and thus are not valued by the system. This can be due to data gaps – which are more pronounced in low- and middle-income countries – or to measurement methods that bias outcomes. For example, prioritising distance and travel time often undervalues walking compared to other transport modes.

Moreover, many of the benefits of investing in sustainable, low-carbon transport infrastructure do not generate direct cash flows, despite achieving other desirable goals.[7] For example, expanding public transport or electrifying it with renewable energy cuts emissions and air pollution. This leads to better air quality, which reduces respiratory illnesses, lowers healthcare costs and minimises income loss, especially in polluted urban areas. While these avoided costs benefit society, they do not represent direct cash transfers unless policies are introduced to put a price on emissions and air pollution.[8]

Expanding the analysis to quantify and value such broader sustainability outcomes allows their full impact to be assessed (see Box 1)**. This supports better policy and investment decisions, reduces project risks and strengthens the case for integrating public transport, walking and cycling.** For example, showing economic gains from improved health and productivity can justify greater investment in sustainable, low-carbon transport.

Box 1. Economic, environmental and social benefits related to public transport, walking and cycling

- Reduction in average household expenditure in transport, as a result of the avoided costs associated with car ownership such as purchase price, maintenance, fuel, parking and insurance.
- Time savings from avoided or reduced traffic congestion and increased economic productivity.
- Improved air quality and reduced noise pollution.
- Reduction in greenhouse gas emissions.
- Improved health through more physical activity, better air quality, less noise pollution, and fewer road deaths and injuries.
- Improved access for people with disabilities through inclusive design.
- Higher perception of individual safety in public spaces for women and girls and vulnerable groups.
- Savings for governments from reduced car infrastructure and fossil fuel subsidies.
- Higher property values and municipal revenues due to increased gains from property taxes and value capture. The risks of gentrification and displacement must be addressed.
- Improved use of public space and less soil sealing.

Source: See endnote 9 for this section.

ISSUE 4

Limited systemic vision and integration of knowledge across different stakeholder groups

The challenges above underscore the need for more systemic and integrated approaches, although achieving this in practice is not easy. Integrating knowledge allows for identifying, quantifying and assessing the mutually reinforcing benefits of combined walking, cycling and public transport solutions.

A truly systemic approach requires input from diverse stakeholders, including experts, local actors and decision makers across fields such as engineering, planning, infrastructure and economics – each bringing different priorities and visions. In such multi-stakeholder settings, it can be difficult to share information effectively, interpret it objectively and focus on optimising the system as a whole rather than improving individual components.

Working at the systems level often means setting aside the goals of individual parts to achieve better overall outcomes. This demands inclusive, transparent, and participatory multi-stakeholder engagement, supported by a strong, ambitious vision and political commitment, ideally led by the highest levels of government. Such vision can unite diverse actors, challenge status quo biases in data and perceptions, and drive the integration of walking, cycling, and public transport into sustainable, low-carbon transport strategies.

The robust economic case for investing in public transport, walking and cycling

The economic case for public transport, walking and cycling has been well verified through scientific research and is visible in many practical case studies.[9] Economic appraisals based on broad sustainability criteria demonstrate how public transport, walking and cycling offer a high return on investments.

Much of the literature focuses on active mobility, combining efforts on cycling and walking. The benefit-cost ratio resulting from appraising active mobility with sustainability criteria ranges from 1.3 up to 19 for every US dollar invested, with health benefits being central (Table 1).[10]

TABLE 1. Economic case for investments in public transport, walking and cycling solutions

Transport mode	Return on investment range	Benefits most often evoked
Public transport	Every USD 1 invested returns USD 5	Avoided CO_2 emissions Mexico City bus rapid transit saves 26,000 tonnes per year.
Cycling	Every USD 1 invested returns between USD 2 and USD 19	Health benefits Estimated annual value of USD 80 billion in Europe. Patna (India) saves an estimated USD 166 million per year and averts 755 premature deaths per year. Fuel cost savings
Walking	Every USD 1 invested returns between USD 1.3 and USD 20	Longer and healthier lives Job creation Walking projects create on average 9.9 jobs per USD 1 million invested. Transport cost savings People walking to city centres spend on average 40% more than those arriving by car.
Active mobility (combined walking and cycling)	Every USD 1 invested returns between USD 1.3 and USD 19	Job creation Cycling projects generate on average 11.4 jobs per USD 1 million invested. Health benefits Interventions in London (United Kingdom) of USD 105 million investment would generate USD 950 million in health benefits after 20 years. Avoided costs of crashes Addis Ababa (Ethiopia) projects 80% fewer pedestrian and cyclist fatalities once the non-motorised transport strategy is implemented.
Integrated public transport, walking and cycling	Every USD 1 invested returns between USD 1.1 and USD 4.5	Improved access Congestion relief Safety benefits An urban transport improvement project in Tianjin (China) reduced crashes involving cyclists or pedestrians by 8%.

Source: See endnote 10 for this section.

Fewer studies focus on the economic case for integrated public transport, walking and cycling solutions. Such integrated approaches deliver a benefit-cost ratio of 1.1 to 4.5 for every US dollar invested, based on several projects in Argentina, China, Peru, Tanzania and the United Kingdom. The identified benefits include improved accessibility, congestion relief and localised safety benefits.[11]

Four recommendations to evolve conventional economic appraisals for land transport

RECOMMENDATION 1

Establish suitable policy and institutional frameworks

Policy and institutional changes can create an enabling environment for investments in sustainable, low-carbon transport. Sending the right policy and institutional signals and adopting phased implementation mechanisms from the short to the long term will incentivise transport economists to embed in their economic appraisals the appropriate sustainability criteria (see Recommendation 4). This will lead to the development and wide adoption of standardised, comprehensive and integrated economic appraisals and tools (Recommendation 2).

Efforts should focus on achieving a systemic and ambitious guiding vision – preferably established by national governments – that can galvanise multi-stakeholder action. Raising awareness among decision makers of systemic and integrated frameworks for sustainable, low-carbon land transport is key. While these frameworks should be based on best practices, it is essential to customise them to the local context.[12] For example, the Avoid-Shift-Improve Framework[i] can offer a structured approach to reducing carbon-intensive transport activities and their inducers, as well as to integrating public transport, walking and cycling solutions.[13] Applying such frameworks consistently across planning, financing and procurement can help phase out fossil fuel subsidies and align financial mechanisms – such as taxes, costs and prices – to support integrated public transport, walking and cycling.[14]

Experts from different fields, government departments and levels of government should contribute their respective priorities (e.g., health, welfare, job creation, equity, etc.) to the systemic, integrated vision for sustainable, low-carbon land transport. This, in turn, will support the development of more robust sustainability criteria (Recommendation 4).

RECOMMENDATION 2

Standardise comprehensive and integrated economic appraisal approaches and tools

It is recommended to standardise the approach and tools used for integrating broad sustainability criteria in an economic appraisal, beyond conventional approaches. This can be achieved by: 1) defining challenges, 2) identifying opportunities and 3) determining social, economic, and environmental outcomes, for different stakeholders over time. Examples and guidance materials are presented in Box 2.

i The Avoid-Shift-Improve framework has been central to sustainable, low-carbon transport for more than a decade and it follows an implicit hierarchy, with appropriate and context-sensitive Avoid measures (that avoid and reduce the need for motorised travel) intended to be implemented first, followed by Shift measures (that shift to more sustainable modes) and finally by Improve measures (that improve transport modes). More information is available at https://slocat.net/asi/.
Original source: H. Dalkmann and C. Brannigan (2007), Transport and Climate Change, Module 5e: Sustainable Transport - A Sourcebook for Policy-Makers in Developing Cities, GIZ GmbH, https://changing-transport.org/wp-content/uploads/2007_dalkmann_brannigan_transportandclimatechange.pdf

Box 2. Illustrative example of how to evolve conventional economic appraisals

- **Focus on people and goods instead of vehicles.**
- **Focus on the transport system instead of on infrastructure.**

To respond to the Avoid-Shift-Improve Framework, the set of indicators used in economic appraisals for land transport projects needs to capture, where relevant, aspects such as the following:

Indicators to measure *Avoid*

- **Improvements in proximity planning:**
  - Urban population density (people per square kilometre)
  - Distance to services
- **Impact on transport demand: passenger-kilometre, tonne-kilometre, vehicle-kilometre**
- **Changes in motorisation: vehicle ownership rates**
- **Walking and cycling activity: distance and time spent walking and/or cycling**
- **Improvements of access to opportunities (via catchment areas or travel time): access to markets, education and jobs, employment opportunities directly through the project**

Indicators to measure *Shift*

- **Impacts on modal split:**
  - % of trips by collective transport, walking and cycling
  - % of goods transported by rail or waterways
- **Access to public transport and active mobility: % of population that has convenient access to public transport and to safe and convenient walking and cycling infrastructure**
- **Travel time changes: average time of travel per day**
- **Attractiveness of collective transport:**
  - Number of people transported
  - % of women feeling safe using collective transport
  - % of vehicle fleet/stops and stations that are accessible to people with disabilities
- **Impacts on costs:**
  - Changes in transport expenses for households
  - Changes in the freight transport costs for operators
- **Access to all-weather roads in rural areas: % of the rural population who live within 2 kilometres of an all-season road**

Indicators to measure *Improve*

- **Uptake of fleet electrification: % of fleet that is/can be electrified**
- **Improvements in efficiency:**
  - People and goods transported on corridor per hour
  - Fleet energy consumption in megajoules per kilometre
- **Renewable energy uptake:**
  - % of energy provided through renewable electricity
  - Volume of advanced biofuels
- **Road safety-focused infrastructure and service improvements: number of traffic fatalities and injuries compared to exposure (volume of different mobility modes)**

Additional overarching indicators

- **Avoided fuel use: barrels of oil avoided**
- **Greenhouse gas emissions avoided or reduced: absolute emissions in tonnes of CO2-equivalent and well-to-wheel transport emissions in grams of CO2 per kilometre**
- **Improvements to air quality: particulate matter (PM10 and PM2.5) pollution levels**
- **Improvements in mobility-related noise levels: % of population exposed to mobility-related noise over specific decibel (dB(A)) levels**
- **Increase of physical activity: minutes of moderate-intensity physical activity per week**
- **Improvements in adaptation and resilience:**
  - Infrastructure resilience
  - Transport adaptation towards extreme weather events
- **Enhancement of just transition: number of new jobs created and people trained, % of women in the workforce**
- **Improvement of gender responsiveness:**
  - % of women feeling safe commuting/travelling
  - % of women employed in the project
  - Access of women through the project

To fully capture the social, economic and environmental impacts of sustainable, low-carbon land transport projects, it is essential to use several methods and to develop a diverse set of models. No single model offers a complete overview of all relevant indicators. For example, the SAVi methodology uses systems thinking, system dynamics simulation, spatial modelling, and project finance modelling, all integrated into a single analytical framework. Cost-benefit analysis and cost-effectiveness analysis, together with multi-criteria analysis, can be used to assess the economic viability of a project:

- **Cost-benefit analysis** provides information on the financial and economic (i.e., societal) viability of the investment.
- **Cost-effectiveness analysis** determines value for money when a specific target needs to be realised.
- **Multi-criteria analysis** allows for the use of an integrated set of indicators in the analysis, even if some of these cannot be quantified.

Ideally, the methods and tools used should be open-source and easily accessible. Otherwise, stakeholders with limited resources may find it difficult to apply them.

Appraisal criteria and perspectives are always influenced by normative and political choices on which criteria to include and what weight to attach to each of them. Additionally, any appraisal relies on input data, which may be biased or not fully representative of all relevant aspects. Therefore, it is crucial to raise decision makers' awareness of the limitations. This will ensure the long-term impact and effective adoption of evolved economic appraisals for land transport.

RECOMMENDATION 3

Build multi-stakeholder engagement in the economic appraisal process

The economic appraisal process should ensure the inclusive, transparent and participatory engagement of all relevant stakeholders. This includes municipal, regional, and national governments, private sector actors, non-governmental organisations, local communities and civil society.[15]

Engaging with these diverse actors enables better identification of issues and solutions, and thus of the key performance indicators to include in the economic appraisal and assessment. It also supports the creation of a broad and representative support base for the project, countering and challenging the leverage that lobbies would normally be able to exert on decision makers. The economic appraisal process is even more robust if the key performance indicators of different officers and departments include the existence of such a broad and representative support base.

The local knowledge provided by relevant multi-stakeholder groups can also support the collection and interpretation of data. This can reduce reliance on assumptions based on secondary data, and hence improve the reliability of the overall assessment performed. It ensures that the local context is adequately reflected, avoiding generalisations based on standardised assumptions that would otherwise lead to sub-optimal planning.

RECOMMENDATION 4

Quantify and monetise all costs and benefits

Planners, engineers and policy makers should avoid using only conventional methods, such as cost-benefit analysis, when appraising and assessing sustainable, low-carbon land transport projects. This is especially the case when decision makers are limited to financial indicators that consider solely the direct costs and benefits of a project and only scratch the surface of its full sustainability and decarbonisation potential.

In sustainable, low-carbon land transport projects, the economic and social impacts are often more prominent than the revenues collected and budgets invested. Therefore, it is crucial to identify, quantify and analyse (e.g. via economic valuation) all impacts surrounding a project, including the social and environmental impacts.[16] The lack of data should not prevent the creation of a comprehensive assessment. Methods and models exist to facilitate this analysis, including to assess the variability of results under different assumptions using the Health Economic Assessment Tool (HEAT) for walking and cycling.[17]

An evolved cost-benefit analysis should consider:

- **Financial performance** – using cash flows directly related to the project.
- **Holistic economic performance** – adding the economic valuation of all social and environmental impacts to determine the broad societal contribution of the project.
- **Financial and economic returns by economic actors** – including the private sector, government and civil society.[18]

These considerations determine the:

- **Financial sustainability** – the sustainability of the project for the investor.
- **Economic sustainability, including all costs and benefits** – the contribution of the project to sustainable human development and prosperity.
- **Formulation of the most adequate financing strategy** – whether the project generates sufficient positive impacts for all beneficiaries.

Using a systemic or societal approach, especially when interpreting the results of the cost-benefit analysis, allows for more explicit consideration of important concepts related to sustainable development. This includes concepts such as transport poverty – that is, the lack of adequate transport services necessary to access general services and work, or the inability to pay for these transport services.[19]

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SPOTLIGHT

Improving Access to Climate Finance for Transport in Low- and Middle-Income Countries

This spotlight draws on the findings of the project Improving Access to Climate Finance for Transport Projects in Low and Middle-Income Countries, carried out in the framework of the High Volume Transport (HVT) Applied Research Programme and funded by UKAID through the UK Foreign, Commonwealth & Development Office (FCDO).[1]

KEY FINDINGS

What is climate finance for transport?

- The UN Framework Convention on Climate Change (UNFCCC) defines climate finance as financial resources, whether from public, private or alternative sources, aimed at supporting actions to mitigate and adapt to climate change.

Climate finance falls short of meeting transport needs

- Global climate finance nearly doubled between 2010 and 2020, to account for 2% of global gross domestic product (GDP) in 2023; however, it remains largely insufficient as well as inconsistent across regions. Overall, global climate finance in 2023 totalled USD 1.9 trillion, and 79% was directed to East Asia and the Pacific, North America and Western Europe. Only 3% or USD 20 billion of total global climate finance was directed to the least developed countries, where it is most needed, and 15% to emerging markets and developing economies (excluding China). Notably, the 10 countries most affected by climate change between 2000 and 2019 received less than USD 23 billion, or under 2% of the global total.

- As one of the most capital-intensive sectors, transport received around 29% of climate finance in 2023 but faces the largest investment gap of any sector. In 2023, the sector received around USD 545 billion from public and private sources for climate mitigation activities - seven times below the estimated USD 2.7 trillion needed each year by 2050 to align with global transport climate action targets. Adaptation financing for transport totalled USD 1.8 billion in 2023, or only around 3% of the overall annual global adaptation financing of USD 65 billion on average.

- The investment gap is particularly acute in LMICs because their transport systems are still developing. To support the development of the transport sector, annual transport investment in LMICs (excluding China) must reach an estimated USD 575 billion by 2030. However, in 2023, half of the USD 545 billion in transport-related climate finance went to high-income countries, and the majority (77%) went to road transport, followed by rail and public transport (18%).

- LMICs struggle to attract international climate finance due to unstable macroeconomic and political landscapes, high interest rates, growing levels of debt, and insufficient understanding and technical capacity to develop bankable projects. As a result, significant investment gaps in transport infrastructure are projected for 2040, amounting to an estimated USD 0.8 trillion for Africa and USD 1.6 trillion for Asia.

- Meeting climate targets in transport will require greatly scaling up climate finance for developing economies and leveraging these funds to attract additional investment. Against this backdrop, the 2024 UN Climate Change Conference (COP 29), held in Baku, Azerbaijan, was a missed opportunity for setting a new ambitious climate finance target.

- Because the climate finance decisions made today will shape transport infrastructure and systems for decades to come, investing in sustainable transport must be part of the solution. This is especially important as the global community works on the Baku to Belém Roadmap for 1.3T, which aims to mobilise USD 1.3 trillion annually by 2035 to address multiple priorities in climate action for LMICs.

KEY FINDINGS

Challenges to accessing climate finance for transport

- Project sponsors and policy makers often encounter significant barriers – financial, institutional, informational and technological – that impede their ability to access climate finance effectively.
- Financial barriers typically take the form of inadequate financing sources, difficulty in accessing suitable financing sources, and challenges in identifying accompanying private investors and financeable projects.
- Institutional barriers often relate to inadequate policy and regulatory frameworks and limited institutional and technical capacities to develop bankable project proposals, conduct feasibility studies, and implement and monitor projects.
- Informational barriers include a lack of understanding of the importance of sustainable transport measures, such as electric mobility and active mobility (cycling and walking).
- Technological barriers, such as technical limitations of new and emerging technologies, are particularly evident in electric mobility projects.
- The project Improving Access to Climate Finance for Transport Projects in Low- and Middle-Income Countries identified that the key challenges revolve around the difficulty of securing adequate climate finance for transport and the capacity to effectively use available funds. These challenges are intertwined and compound one another.
- In addition, research has identified five key barriers to accessing climate finance for transport, namely: 1) the lack of enabling policy and regulatory frameworks, 2) limited capacity for project preparation and implementation, 3) high upfront costs and long life cycles of sustainable transport infrastructure, 4) high risk perception and low potential for returns, and 5) inadequate quantity and quality of climate finance and its complex nature. These five barriers are nested within financial, institutional, informational and technological contexts.

Four steps to facilitating access to climate finance for transport in LMICs

- With these barriers and operating contexts in mind, the project Improving Access to Climate Finance for Transport Projects in Low- and Middle-Income Countries elaborates a step-by-step guide that targets primarily project sponsors but also has great relevance for national and sub-national governments in LMICs.
- **STEP 1**
  Secure the necessary enabling environments
  - The creation of an enabling policy and financial environment that supports climate action in transport is an important preliminary step for project sponsors, in close dialogue with national and sub-national governments in LMICs. It enhances the appeal of projects for climate finance; it secures financial incentives for implementation (e.g., subsidies or tax breaks for electric vehicles); and ultimately ensures the project's compliance with the high environmental standards typically required by climate finance providers.
- **STEP 2**
  Develop capacity on sustainable, low-carbon transport
  - The next step is to raise capacity on sustainable, low-carbon transport. LMICs often face gaps in institutional arrangements, expertise and mandates for the required roles to implement climate finance-backed projects.
  - To demonstrate a project's eligibility for the requirements set by financing entities, and to strengthen its business case while garnering local community support, it is essential to build capacity to adapt the evaluation models and cost-benefit analyses to reflect broader benefits. Such benefits may include improved air quality, accessibility, safety, reduced travel time, congestion and job creation.
  - Raising awareness and addressing informational barriers of sustainable transport projects and initiatives is equally important.
  - Leveraging data and technology solutions can play a key role in addressing the issue of high upfront costs of low-carbon technologies.
- **STEP 3**
  Develop capacity on climate finance mechanisms
  - Almost in parallel with step 2, it is important to raise capacity on accessing climate finance. This step is central to providing clarity on the climate finance landscape and best approaches to accessing it in the country concerned. Once capacity has been built, stakeholders should be able to develop financing strategies, identify priority projects and mobilise finance.

KEY FINDINGS

- Project preparation facilities (PPFs) are important avenues through which many financial institutions provide grants, loans and technical assistance for all transport modes.
- Multilateral development banks and development finance institutions are another key source of capacity building support.
- The capacity of project sponsors to make smart use of financial instruments also needs to be enhanced.
- Not least, capacity building should focus on ways to attract private investments through the use of de-risking instruments.

STEP 4

Design suitable and impactful projects

- With the right tools and knowledge on climate finance and transport, the final step is to design and implement impactful projects.
- Climate finance for transport serves as a catalyst for systematic transformations within the sector. The current funding volumes are insufficient to fully develop a country's transport sector, nor is that the primary aim of climate finance. Instead, in the transport sector, climate finance acts as a driver for creating new markets and piloting innovative projects.
- This step includes both the development of bankable projects and the improvement of project implementation.
- Improving pipeline development and project design, however, will necessitate engaging policy makers to secure improved policy alignment between Nationally Determined Contributions and Long-Term Strategies under the Paris Agreement, and national policies.

Drawing on the findings of the project Improving Access to Climate Finance for Transport Projects in Low and Middle-Income Countries, carried out in the framework of the High Volume Transport (HVT) Applied Research Programme and funded by UKAID through the UK Foreign, Commonwealth & Development Office (FCDO), this spotlight shares the actionable guidance that was developed through the project. It outlines key solutions to barriers to accessing climate finance for transport in a variety of contexts: financial, institutional, informational and technological.[2]

What is climate finance for transport?

The UN Framework Convention on Climate Change (UNFCCC) defines climate finance as financial resources, whether from public, private or alternative sources, aimed at supporting actions to mitigate and adapt to climate change. Global climate finance involves providing transnational funding to countries, particularly LMICs, to address the challenges posed by climate change. A growing body of financing entities and instruments provide climate finance specifically for the transport sector.

Although eligibility criteria may vary, climate finance for mitigation in the transport sector typically refers to resources allocated to activities that fall within the scope of the so-called Avoid-Shift-Improve (A-S-I) framework[i]. The A-S-I framework follows an implicit hierarchy, with appropriate and context-sensitive "Avoid" measures intended to be implemented first, followed by "Shift" measures and finally by "Improve" measures. Practical examples of relevant climate finance include investments targeting improved land use practices and urban design to avoid or reduce unnecessary motorised trips (Avoid); efforts to shift goods and passenger traffic towards more environmentally efficient modes such as railways, walking and cycling (Shift); and, not least, measures to improve efficiency and performance, such as through electrification (Improve).[3]

In the area of adaptation and resilience, climate finance activities tend to focus on reinforcing transport assets as well as strengthening the ability of infrastructure and transport systems to withstand, adapt and recover from extreme weather events and the impacts of a changing climate. In addition to efforts targeting the physical resilience of infrastructure assets, an example of adaptation and resilience-related climate finance is activities aimed at improving operational and organisational resilience – for example, offering redundancy and diversity of mode choice for communities with differing income levels and geographies.

Typically, climate finance provided by domestic or international public entities takes the form of grants (which are scarce) and loans (which make up the majority). In contrast, once private sector entities become involved, a broader suite of financing instruments is used (for example, equity, blended finance, structured finance products, innovative bond structures, etc.).

Jashim Salam

i The Avoid-Shift-Improve framework has been central to sustainable, low carbon transport for more than a decade. It follows an implicit hierarchy, with appropriate and context-sensitive "Avoid" measures (which avoid and reduce the need for motorised travel) intended to be implemented first, followed by "Shift" measures (which shift to more sustainable modes) and finally by "Improve" measures (which improve transport modes). See https://slocat.net/asi and H. Dalkmann and C. Brannigan (2007), Transport and Climate Change, Module 5e: Sustainable Transport – A Sourcebook for Policy-Makers in Developing Cities, GIZ GmbH, https://changing-transport.org/wp-content/uploads/2007_dalkmann_brannigan_transportandclimatechange.pdf.

Climate finance falls short of meeting transport needs

Global climate finance nearly doubled between 2010 and 2020, to account for 2% of global gross domestic product (GDP) in 2023; however, it remains largely insufficient as well as inconsistent across regions.[4] Overall, global climate finance in 2023 totalled USD 1.9 trillion, and 79% was directed to East Asia and the Pacific, North America and Western Europe.5 Only 3% or USD 20 billion of total global climate finance was directed to the least developed countries, where it is most needed, and 15% to emerging markets and developing economies (excluding China).[6] Notably, the 10 countries most affected by climate change between 2000 and 2019 received less than USD 23 billion, or under 2% of the global total.[7]

As one of the most capital-intensive sectors, transport received around 29% of climate finance in 2023 but faces the largest investment gap of any sector.[8] In 2023, the sector received around USD 545 billion from public and private sources for climate mitigation activities - seven times below the estimated USD 2.7 trillion needed each year by 2050 to align with global transport climate action targets.[9] Adaptation financing for transport totalled USD 1.8 billion in 2023, or only around 3% of the overall annual global adaptation financing of USD 65 billion on average.[10]

If the critical financing needs linked to workforce development are factored in, the magnitude of the climate finance shortfall is likely far greater. Moreover, most estimates exclude adaptation and resilience needs, focusing solely on emission reduction efforts. Accounting for the financial costs related to climate-proofing transport infrastructure assets, along with the financial costs of loss and damage from extreme weather events (such as reconstructing rail infrastructure after flooding), will result in a much larger climate finance gap. Climate-induced disasters and extreme weather events already inflict an estimated USD 15 billion in direct damage to transport systems annually, with LMICs bearing a disproportionate high share: around USD 8 billion, the highest costs relative to their GDP.[11]

The investment gap is particularly acute in LMICs because their transport systems are still developing. To support the development of the transport sector, annual transport investment in LMICs (excluding China) must reach an estimated USD 575 billion by 2030.[12] However, in 2023, half of the USD 545 billion in transport-related climate finance went to high-income countries, and the majority (77%) went to road transport, followed by rail and public transport (18%).[13]

LMICs struggle to attract international climate finance due to unstable macroeconomic and political landscapes,

high interest rates, growing levels of debt, and insufficient understanding and technical capacity to develop bankable projects. As a result, significant investment gaps in transport infrastructure are projected for 2040, amounting to an estimated USD 0.8 trillion for Africa and USD 1.6 trillion for Asia.[14]

Meeting climate targets in transport will require greatly scaling up climate finance for developing economies and leveraging these funds to attract additional investment. Against this backdrop, the 2024 UN Climate Change Conference (COP 29), held in Baku, Azerbaijan, was a missed opportunity for setting a new ambitious climate finance target. High-income countries pledged to contribute USD 300 billion by 2035 to LMICs, starting in 2026.[15] In addition, all actors are supposed to scale up financing from public and private sources and alternative sources, amounting to at least USD 1.3 trillion per year by 2035. [16] Despite tripling climate finance to developing countries (from the previous goal of USD 100 billion annually), the newly agreed climate finance goal falls well short of meeting LMICs' calls for the trillions required.[17] As a result, the majority of the financing agreed at COP 29 will rely on private investment and alternative sources, both of which carry uncertainties in realisation.[18] (See 6.1 Financing Sustainable Transport in Times of Constrained Public Budgets.)

The climate finance goal also has attracted criticism regarding its qualitative criteria. The new goal is not accompanied by minimum allocation floors for sub-groups of LMICs (e.g., small island developing states), nor does it set sub-targets for mitigation, adaptation, and loss and damage. Moreover, there are no obligations to prioritise grants over loans, and no safeguards are established to preclude investments in fossil fuel infrastructure from being classified as "climate finance". The combination of these factors results in little guarantee that

the much-needed finance for the transition to sustainable and low-carbon transport will be delivered at the speed required to meet the Paris Agreement and the Sustainable Development Goals (SDGs).

Because the climate finance decisions made today will shape transport infrastructure and systems for decades to come, investing in sustainable transport must be part of the solution. This is especially important as the global community works on the Baku to Belém Roadmap for 1.3T, which aims to mobilise USD 1.3 trillion annually by 2035 to address multiple priorities in climate action for LMICs.[19]

Read more about the outcomes of COP 29 and what these mean for the transport sector in **SLOCAT's Transport in COP 29 Outcomes Analysis.**[20]

Challenges to accessing climate finance for transport

Project sponsors and policy makers often encounter significant barriers – financial, institutional, informational and technological – that impede their ability to access climate finance effectively (Figure 1).[21] The specific challenges vary depending on a country's circumstances and available funding sources.

Financial barriers typically take the form of inadequate financing sources, difficulty in accessing suitable financing sources, and challenges in identifying accompanying private investors and financeable projects. The long-term nature of transport infrastructure projects implies that the cost recovery is distributed across many years and is subject to future unpredictability and delays, which complicate investment decisions.[22]

Institutional barriers often relate to inadequate policy and regulatory frameworks and limited institutional and technical capacities to develop bankable project proposals, conduct feasibility studies, and implement and monitor projects. The absence of stable policy frameworks and clear signals increases the investment risk, particularly in nascent markets that lack regulation and an enabling environment for private sector entry. Weak governance, organisational silos, and overlapping or unclear responsibilities of government authorities can impede access to financing and hinder project planning and implementation. Project sponsors in LMICs often lack sufficient understanding of climate-related risks and the technical capacity to develop bankable projects.[23] (For more on capacity challenges and solutions, see 6.2 Capacity Building for Transport Transformations.)

Informational barriers include a lack of understanding of the importance of sustainable transport measures, such as electric mobility and active mobility (cycling and walking). International practices indicate that promoting awareness of electric vehicles and their benefits among customers and businesses is positively linked to higher deployment.[24] Informational barriers often arise from a lack of data and the ability to measure, verify and communicate the impacts of transport projects.

Technological barriers, such as technical limitations of new and emerging technologies, are particularly evident in electric mobility projects. These markets and funding streams are relatively new, making returns from related projects less well-established. This is exacerbated by the scarcer availability of knowledge on technical issues, such as battery range and charging technology.

The project Improving Access to Climate Finance for Transport Projects in Low- and Middle-Income Countries identified that the key challenges revolve around the difficulty of securing adequate climate finance for transport and the capacity to effectively use available funds. These challenges are intertwined and compound one another.[25]

In addition, research has identified five key barriers to accessing climate finance for transport, namely: 1) the lack of enabling policy and regulatory frameworks, 2) limited capacity for project preparation and implementation, 3) high upfront costs and long life cycles of sustainable transport infrastructure, 4) high risk perception and low potential for returns, and 5) inadequate quantity and quality of climate finance and its complex nature. These five barriers are nested within financial, institutional, informational and technological contexts. The key barriers can be broken down into detailed barriers and solutions framed within each of these areas of the operating context.

Four steps to facilitating access to climate finance for transport in LMICs

With these barriers and operating contexts in mind, the project Improving Access to Climate Finance for Transport Projects in Low- and Middle-Income Countries elaborates a step-by-step guide that targets primarily project sponsors but also has great relevance for national and sub-national governments in LMICs. The guide identifies key challenges and potential solutions and puts them in a step-by-step guide. By leveraging tools such as the A-S-I framework, collecting key resources and materials, and profiling climate finance mechanisms, the guide equips project sponsors and other

relevant stakeholders with the knowledge to design impactful, bankable transport projects. A summary of its key steps is provided below.

Read the **Policy Guide to Improving Access to Climate Finance for Transport** for holistic, high-level recommendations supported by pointers to case studies, guidance documents and other relevant material with a focus on LMICs.[26]

STEP 1

Secure the necessary enabling environments

Embedding a transport project within an enabling regulatory framework is crucial to ensuring the project's alignment with climate plans (e.g., Nationally Determined Contributions and Long-Term Strategies), while demonstrating to prospective funders that it is part of a well-governed and conducive ecosystem. This reduces the project's perceived risks.

The creation of an enabling policy and financial environment that supports climate action in transport is an important preliminary step for project sponsors, in close dialogue with national and sub-national governments in LMICs. It enhances the appeal of projects for climate finance; it secures financial incentives for implementation (e.g., subsidies or tax breaks for electric vehicles); and ultimately ensures the project's compliance with the high environmental standards typically required by climate finance providers.

By engaging actively with national and regional governments, private actors, and other relevant stakeholders, project sponsors can help bring about a conducive regulatory and financial environment. Any institutional and regulatory reform often takes time and is best supported by a series of projects.

For more on how to boost ambition for transport mitigation, adaptation, and resilience in Nationally Determined Contributions and National Adaptation Plans, see the Spotlights on Transport Ambition in NDCs 3.0 *and* Transport in National Adaptation Plans*, in Module 2.*

STEP 2

Develop capacity on sustainable, low-carbon transport

The next step is to raise capacity on sustainable, low-carbon transport. LMICs often face gaps in institutional arrangements, expertise and mandates for the required roles to implement climate finance-backed projects.[27]

To demonstrate a project's eligibility for the requirements set by financing entities, and to strengthen its business case while garnering local community support, it is essential to build capacity to adapt the evaluation models and cost-benefit analyses to reflect broader benefits. Such benefits may include improved air quality, accessibility, safety, reduced travel time, congestion and job creation.

Raising awareness and addressing informational barriers of sustainable transport projects and initiatives is equally important.

Leveraging data and technology solutions can play a key role in addressing the issue of high upfront costs of low-carbon technologies. For example, in the informal transport sector, tracking operators' daily revenue can provide evidence of the stable income of drivers and change the negative "high-risk" perceptions linked to informal transport that result in unfavourable payment and financing terms.

See the **Transport Decarbonisation Index (TDI) Benchmarking Report** to learn about the TDI's diagnostic toolkit, which seeks to enable policy makers in LMICs to evaluate the current state of their transport sectors, identify their respective strengths and gaps, and undertake high-impact policy and financing actions towards a decarbonisation pathway.[28]

STEP 3

Develop capacity on climate finance mechanisms

Almost in parallel with step 2, it is important to raise capacity on accessing climate finance. This step is central to providing clarity on the climate finance landscape and best approaches to accessing it in the country concerned. Once capacity has been built, stakeholders should be able to develop financing strategies, identify priority projects and mobilise finance. Given that project preparation takes place within a certain regulatory and institutional ecosystem, project sponsors must engage with governments and private entities, with the extent of collaboration varying based on the project approach.

Project preparation facilities (PPFs) are important avenues through which many financial institutions provide grants, loans and technical assistance for all transport modes. They can enhance capacity on important elements, such as the drafting of feasibility studies and the development of financing strategies.

Multilateral development banks and development finance institutions are another key source of capacity building support – including in preparing robust project pipelines, enhancing managerial and technical capacity for project implementation, and facilitating monitoring and reporting.

The capacity of project sponsors to make smart use of financial instruments also needs to be enhanced. Examples include the establishment of innovative financing mechanisms – such as separating bus ownership from bus operations with a view to lowering costs and facilitating the wider adoption of electro-mobility. Other mechanisms include combining the use of grants and development loans to cushion initial costs, using guarantees to lower interest rates and mitigate risks, and introducing de-risking measures to mobilise private capital for innovation.

Not least, capacity building should focus on ways to attract private investments through the use of de-risking instruments. This can be achieved through tailored initiatives and innovative finance mechanisms, and the use of grants and concessional financing with attractive terms to avoid increasing countries' debt stress, closing financial viability gaps, and achieving project bankability, among others.

STEP 4

Design suitable and impactful projects

With the right tools and knowledge on climate finance and transport, the final step is to design and implement impactful projects.

Climate finance for transport serves as a catalyst for systematic transformations within the sector. The current funding volumes are insufficient to fully develop a country's transport sector, nor is that the primary aim of climate finance. Instead, in the transport sector, climate finance acts as a driver for creating new markets (such as for transport electrification and shared mobility) **and piloting innovative projects** (for example, the first public transport service or high-speed rail system). The project design in this step should make use of a pool of actions on sustainable, low-carbon transport.

This step includes both the development of bankable projects and the improvement of project implementation. These can be achieved by deepening project sponsors' understanding of the bankability and eligibility criteria for funding proposals, identifying experts with relevant experience in the chosen climate finance mechanism to support the application process, and implementing projects under public-private partnership models to overcome financial barriers and minimise operational risks for the private sector, among others.

Improving pipeline development and project design, however, will necessitate engaging policy makers to secure improved policy alignment between Nationally Determined Contributions and Long-Term Strategies under the Paris Agreement, and national policies. This will aid the incorporation of more transport projects in such plans, while demonstrating commitment to climate objectives and increasing the chances of accessing climate finance.

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Capacity Building for Transport Transformation

KEY FINDINGS

- Capacity development is a foundational element of broader social, economic and institutional transformation.
- Capacity development and skills play a dual role as both enablers of economic and social change and as a protective buffer for transport professionals and workers against the impacts of socio-economic, technical, climate and environmental change.
- Between 2018 and 2023, public transport operators reported a 15% increase in engineering and maintenance roles, a 13% increase in drivers, and a 34% increase in management positions, reflecting expanded training needs across rail and bus systems.
- Transport service providers and infrastructure operators also require well-trained professionals in light of the large-scale investments needed in sustainable transport – such as railway systems, multi-modal logistics, intelligent transport systems, and transport planning and data.
- A key enabling factor for countries to be able to set and meet climate and sustainability targets is improving or developing the abilities of national-level and sub-national authorities. Realising climate and sustainability goals relies on the ability of professionals in both the public sector (e.g., institutions and communities) and the private sector (e.g., shippers, carriers, logistics service providers) to bring the needed capacities to implement ambitious national strategies.
- Although definitions vary, capacity is defined here as "the ability of people, organisations and society as a whole to manage their affairs successfully", while capacity development is understood as "the process whereby people, organisations and society as a whole unleash, strengthen, create, adapt, and maintain capacity over time, in order to achieve development results."
- Capacity development activities vary in format and duration. Recent research investigating capacity building activities in low- and medium-income countries in Africa and in South Asia identified 14 capacity development formats, ranging from seminars and workshops to customised knowledge reports and open-access data portals.
- Capacity building formats with short durations (usually taking less than a month) include workshops, seminars, trainings, conferences and study tours. In contrast, activities such as scholarships and formal education programmes can extend up to several years.

Identifying capacity gaps

- The formulation of capacity development programmes is ideally preceded by an assessment of existing capacity assets and needs. This ensures that the designed programme is both relevant to the transport institution's defined capacities and responsive to the identified gaps.
- Despite broad expert agreement on the importance of conducting such capacity needs assessments, practice across transport entities does not always reflect this ideal. The approach to capacity development in many transport bodies tends to be *reactive* rather than *proactive*.
- A 2025 study by the Transformative Urban Mobility Initiative (TUMI) included a capacity gap analysis conducted across the three levels of capacity: individual, institutional and societal. Participating transport stakeholders were asked to rate the importance of specific capacities in enabling low-carbon transport in their local context, compared to their current levels of capacity. In doing so, the study was able to identify the three largest capacity gaps currently faced by transport stakeholders: sustainability within educational programmes, enabling societal frameworks, and number of staff.

KEY FINDINGS

Lack of sustainability within educational programmes

- Although education is increasingly acknowledged in international climate and sustainability policy, investment in climate and sustainability education has not matched the urgency of the current climate crisis. The 2025 TUMI study highlighted that the largest capacity gap identified across the different capacity levels was the lack of sustainability within formal educational programmes.
- The study's thematic analysis revealed that the most prevalent disciplines addressing transport in formal education are transport engineering, urban planning and architecture, transport economics, and transport logistics and supply chain management. It points to the under-representation of sustainability and climate change themes within existing transport curricula.
- A key implication of the gap in sustainability within educational programmes is that transport stakeholders struggle to hire qualified personnel. Existing staff members at transport entities often face challenges in carrying out their responsibilities due to both technical and functional capacity gaps.
- Trends such as digital transformation, electrification, and platform-based mobility and logistics services, along with the transformational needs and growing complexities of urban and mobility planning (such as adaptation and resilience to the impacts of climate change, shocks and crises), require a wide range of transport professions and jobs to acquire new skills.
- Promoting learning and professional development of employees is one of the cornerstones of staff attraction and retention policies. In such settings, the costs and risks associated with developing the educational and technical backgrounds of employees are either fully borne by the employer, or shared between the employer and employee.
- Transport stakeholders do not always have dedicated resources and/or policies in place to support individual employees to continue their professional development. Consequently, staff members are often forced to self-fund and self-manage their time to pursue external educational programmes. In other cases, employees may take an (unpaid) leave of absence, particularly when the educational programme mandates in-person (synchronous) engagement.
- Without institutionalised policies and budgets for continuing professional development, employees may struggle to engage in further learning, leading to bigger institutional knowledge gaps.
- Educational opportunities abroad can bring valuable exposure to global practices and networks, but reliance on them for professional development carries important implications and raises questions around accessibility, equity and scalability.
- If individuals seek educational programmes abroad to address the local sustainable educational gap, a potential outcome is brain drain, or the migration of skilled professionals from low- and middle-income countries to high-income countries.
- Alternatively, ensuring that the knowledge and skills for climate and sustainability action in transport are locally taught and nurtured can support lasting and scalable human and economic development in a given region, country or city.

KEY FINDINGS

Addressing the gap in sustainability in educational programmes

- The international transport community provides a variety of capacity building activities aimed at addressing the gaps around sustainability within educational programmes.
- International organisations, non-governmental organisations and foundations are collaborating with local organisations and universities to offer capacity development opportunities that range from in-depth multi-year university-level degrees and curricula development, to specialised executive education and graduate diploma programmes, to shorter term certified courses.
- Some capacity development programmes promote the inclusion and participation of applicants from low- and middle-income countries and of women by offering scholarships or reduced tuition fees.

Way forward

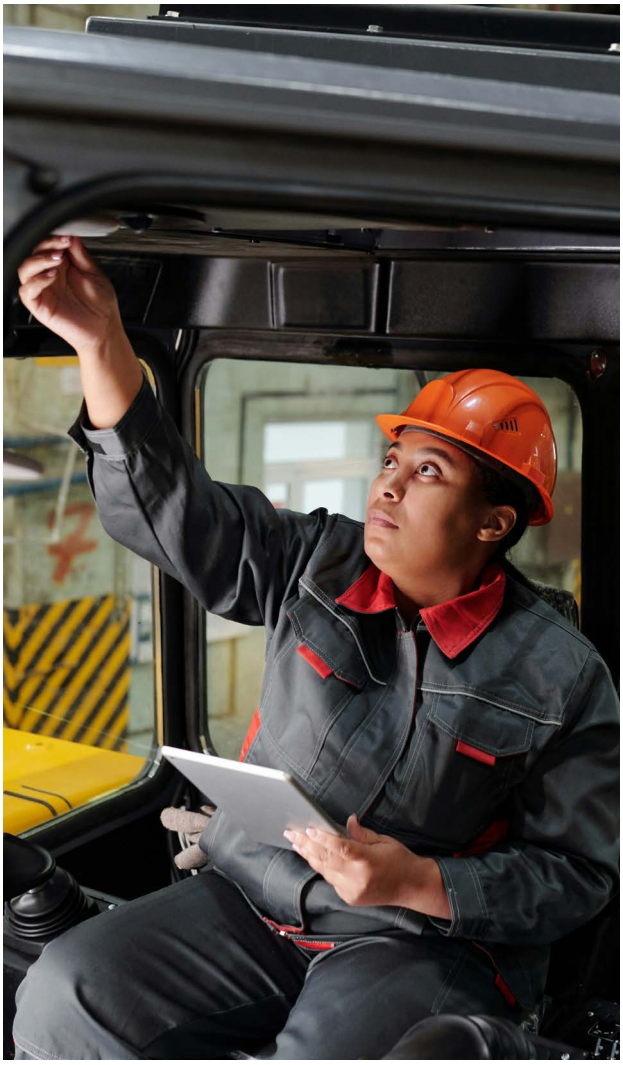
- Education remains an undervalued instrument in formulating and implementing emission mitigation, adaptation, resilience and broader sustainability solutions in transport. A significant structural gap in current curricula and institutional arrangements prevails, particularly the lack of systemic integration of sustainability into education and the persistent disconnect between theoretical research and its application in practice.
- This disconnect is symptomatic of broader global challenges in ensuring equitable access to quality, relevant, and actionable education and knowledge and effective knowledge transfer, particularly in low- and middle-income countries. Such inequality deepens disparities in how regions can respond to transport, climate and sustainability challenges. In response, various international organisations and institutions have support capacity through international development co-operation and official development assistance (ODA).
- A geographically balanced design of capacity development programmes is essential, as many current initiatives remain concentrated in capital cities or national-level agencies, often leaving sub-national and local authorities underserved.
- Successful capacity building initiatives demonstrate that multi-stakeholder collaboration can bridge these gaps.
- Sustainable, long-term strategies should prioritise structural changes in higher education curricula, and foster collaboration among local universities, global institutions, the transport sector and development co-operation actors.
- To ensure that these structural reforms and partnerships are effective over time, it is essential to implement continuous monitoring and evaluation systems.
- In the near term, one option could be to create a globally supported scholarship fund dedicated to studies in sustainable transport, backed by stakeholders across the international transport sector.
- Investing in stronger academic collaboration between universities in the Global North and the Global South presents a strategic opportunity for capacity building in the transport sector. ODA funding could be effectively channelled to support such partnerships, particularly by engaging second-tier universities that serve broader societal segments beyond economically privileged groups.
- By promoting equitable and sustainable access to specialised education and ensuring its relevance to practice, the international transport community can accelerate the transition to sustainable transport systems and services.

Context, challenges and opportunities

Capacity development[i] is a foundational element of broader social, economic and institutional transformation. Labour markets are being reshaped, new types of jobs are emerging, and existing roles are being redefined. These structural shifts require long-term strategies for education, training, workforce development and institutional transformation.

Capacity development and skills play a dual role as both enablers of economic and social change and as a protective buffer for transport professionals and workers against the impacts of socio-economic, technical, climate and environmental change. This broader framing is particularly important in the context of the transitions required towards sustainable passenger and freight transport.

Between 2018 and 2023, public transport operators reported a 15% increase in engineering and maintenance roles, a 13% increase in drivers, and a 34% increase in management positions, reflecting expanded training needs across rail and bus systems.[1] Some metro systems, as in Chile, have introduced automation with negotiated transitions where new employees directly enter automated roles, while existing workers may voluntarily transfer with wage incentives.[2] Technical upskilling, particularly for electric buses and automated metro lines, is being implemented through dedicated training centres (e.g., in Ireland) and pipeline programmes (e.g., the bus captain school focused on women in Jakarta, Indonesia).[3]



Despite this, older workers in metro systems face adaptation challenges, and shortages remain in technical roles such as electric vehicle maintenance, signalling a continued need for structured training investment.[4] For the rail sector, recruiting young talent, strengthening rail freight transport, and increasing capacity are key actions deemed essential to making railway technology fit for the transport transition.[5]

Transport service providers and infrastructure operators also require well-trained professionals in light of the large-scale investments needed in sustainable transport – such as railway systems, multi-modal logistics, intelligent transport systems, and transport planning and data. In the freight sector, emerging research shows that logistics managers will need new competencies to drive decarbonisation efforts, including an understanding of climate science, greenhouse gas auditing, and familiarity with evolving policy frameworks and technologies.[6] This need also extends to the construction of climate-resilient transport infrastructure, including roads, both within and outside urban areas, highlighting the importance of skills in construction engineering, sustainable transport planning and street design.

A key enabling factor for countries to be able to set and meet climate and sustainability targets is improving or developing the abilities of national-level and sub-national authorities.[7] **Realising climate and sustainability goals relies on the ability of professionals in both the public sector (e.g., institutions and communities) and the private sector (e.g., shippers, carriers, logistics service providers) to bring the needed capacities to implement ambitious national strategies.**[8] Key strategies include Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), Long-Term Strategies for Low-Emission Development (LT-LEDS) and the Voluntary National Reviews (VNRs) of the Sustainable

i In this section, "capacity building", "capacity development" and "capacity enhancement" are used synonymously. For the nuances behind these terms, see (Mizrahi, 2004), Capacity Enhancement Indicators: Review of the Literature, https://documents1.worldbank.org/curated/en/117111468763494462/pdf/286140Capacity0enhancement0WBI0WP.pdf

Development Goals (see 2.1 National Transport Pathways to Reach Climate and Sustainability Goals). Researchers have highlighted a widening disconnect between global climate commitments aimed at limiting global warming to 1.5 degrees Celsius (°C), and the actual policies and actions that countries are implementing.[9]

The previous edition of the SLOCAT Global Status Report (GSR) highlighted the need for an overview of existing (and missing) capacity development programmes and activities. It found that information on capacity gaps remains fragmented, sporadic and unquantified at the regional and international levels. As a first step, the third edition of the GSR called for a global stocktake to assess current training programmes, identify institutional and professional skills gaps, promote best practices and strengthen international co-operation to accelerate sustainable transport implementation. It outlined 6 capacity development formats, which have been further expanded into 14 in this edition.

Moreover, the GSR emphasised the need for better data to support planning and evaluation of capacity development activities, and proposed a range of data dimensions to guide more effective capacity development efforts. Three main action areas were identified: standards and guidelines, professional associations, and education.[10]

This fourth edition of the GSR explores recent research trends and developments in capacity development for sustainable transport and mobility transformations. It draws on the findings of two recent studies, conducted on behalf of the High Volume Transport (HVT) Applied Research Programme, and of the Transformative Urban Mobility Initiative (TUMI)[ii].[11]

Capacity development extends beyond training individuals

Although definitions vary, capacity is defined here as "the ability of people, organisations and society as a whole to manage their affairs successfully", while capacity development is understood as "the process whereby people, organisations and society as a whole unleash, strengthen, create, adapt, and maintain capacity over time, in order to achieve development results."[12] In other words, capacity development entails the conscious decision of stakeholders to assess and change the status quo to achieve better outcomes (Box 1).[13]

Box 1. Capacity development levels

International organisations and researchers agree that capacities can be developed across three distinct, but interrelated and mutually reinforcing, analytic levels: individual, institutional and societal (Figure 1). The distinction between these three levels serves to provide a holistic overview of capacity development as a concept, while also identifying the different objectives and skills implied for each capacity level.

Capacity development on the individual level has the objective to improve the knowledge, skills and competences of individuals. Therefore, the focus is on the workforce (its size and educational backgrounds) as well as on the existing educational programmes (both academic and non-academic).

Capacity development on the institutional level is geared towards institutional learning and change management processes to enhance organisational performance. Three sub-capacities are included on the institutional level:

- Governance capacity, which refers to an institution's legal and political authority to plan, finance and implement projects.
- Planning capacity, which reflects the presence of effective plans and procedures to manage projects efficiently; and
- Technical capacity, which indicates the staff's ability to plan and implement projects as desired without significant delays.

Capacity development on the societal level targets the broader context in which individuals and institutions operate, aiming to create conditions that enable and support effective actions. This involves strengthening two key components:

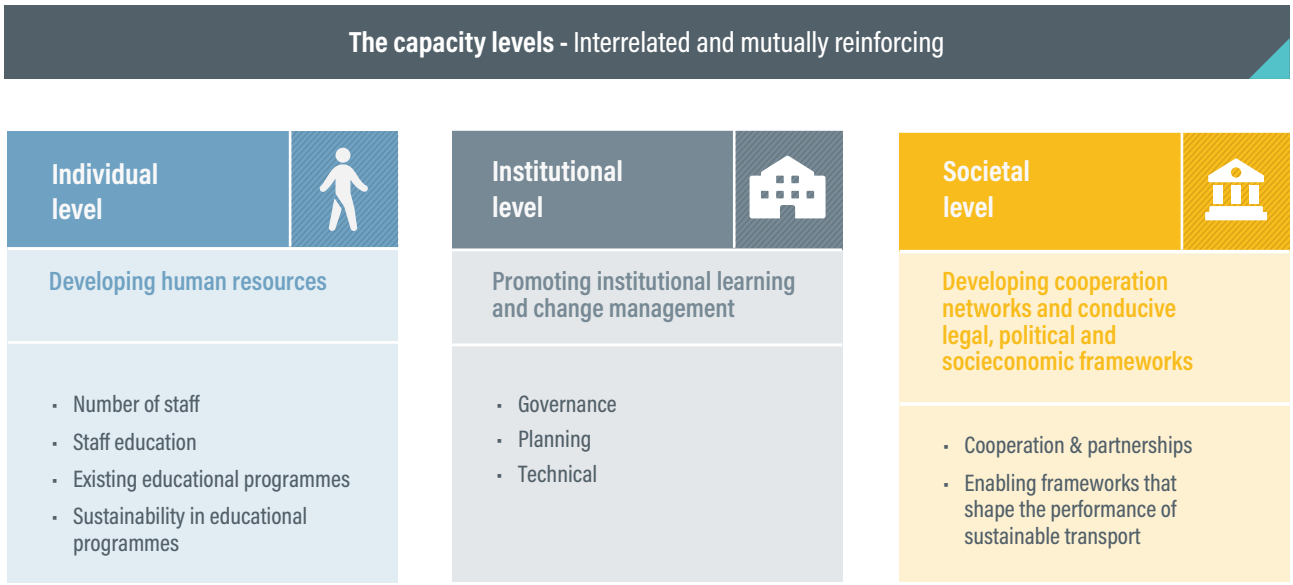
- Enabling environments, which refer to the development of supportive legal, political and socio-economic frameworks; and
- Co-operation partnerships, which focus on building and enhancing collaboration between institutions and individuals to improve co-ordination, knowledge exchange and joint action.

Some scholars further distinguish the definition of capacity based on the levels, where competence is defined as an individual attribute, capability as an organisational attribute and capacity as the combination of both competencies and capabilities.

Source: See endnote 13 for this section.

ii Both studies focused on the capacities of transport institutions without delving into the specific capacities of transport workers. For a good overview of the capacities and needs of transport workers, especially working conditions, see International Transport Workers Federation (2022), A Just Transition for Urban Transport Workers, and see 1.6 A Just Transition in Transport: A Double Challenge

FIGURE 1. Overview of capacity development levels



Capacity development support for stakeholders in passenger and freight transport

Capacity development activities vary in format and duration.[14] **Recent research investigating capacity building activities in low- and medium-income countries in Africa and in South Asia identified 14 capacity development formats, ranging from seminars and workshops to customised knowledge reports and open-access data portals.**[15] Capacity development support for (public) transport stakeholders is provided by thematic experts[iii], including financing institutions, global associations, partnerships, initiatives, think tanks and non-governmental organisations, as well as academic and private sector representatives.

Capacity building formats with short durations (usually taking less than a month) include workshops, seminars, trainings, conferences and study tours (Figure 2).[16] **In contrast, activities such as scholarships and formal education programmes can extend up to several years.** Some capacity building activities – such as the provision of knowledge resources like reports, data portals and libraries – are continuously available, making them an unlimited source of information and capacity building for stakeholders in passenger and freight transport.

Each of these capacity development formats has its strengths and weaknesses, which may be assessed through factors grouped under three main themes: content (thematic focus, profile of experts, context and practice components); target audience (language, profile of partners, incentives and accessibility); and logistics (setting, pace, duration, frequency and co-operation).

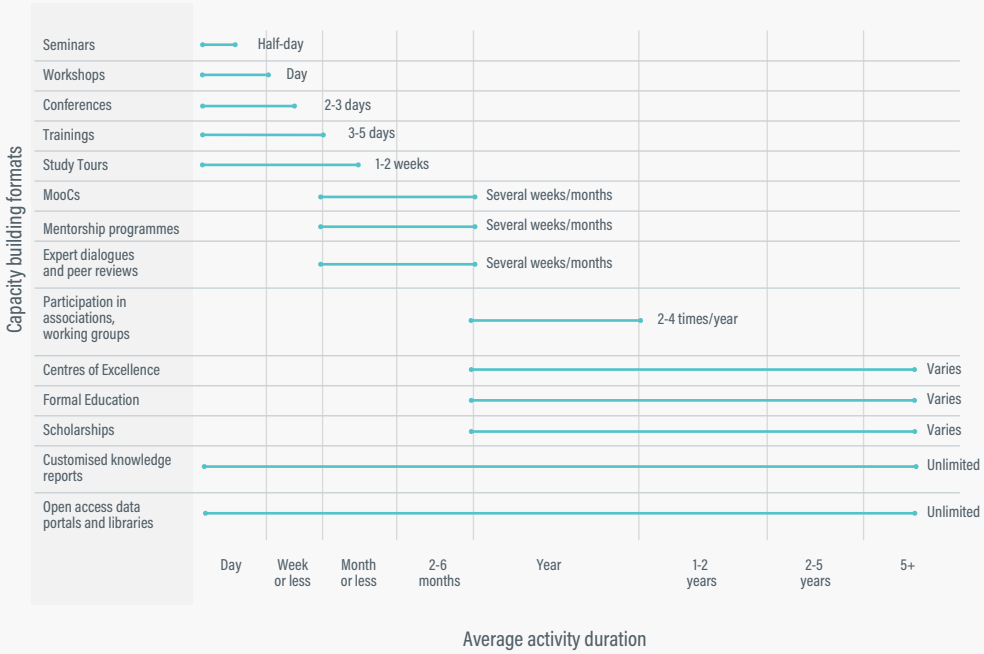
Identifying capacity gaps

The formulation of capacity development programmes is ideally preceded by an assessment of existing capacity assets and needs.[17] **This ensures that the designed programme is both relevant to the transport institution's defined capacities and responsive to the identified gaps.** Some transport authorities have embedded assessment processes and capacity building strategies in place, which

iii Capacity development activities are often organised under the umbrella of international development co-operation and technical assistance.

FIGURE 2. Comparison of average durations of the identified 14 capacity building formats

Comparison of average durations of the identified 14 capacity building formats



A wide range of capacity building formats is available, varying in duration and intensity

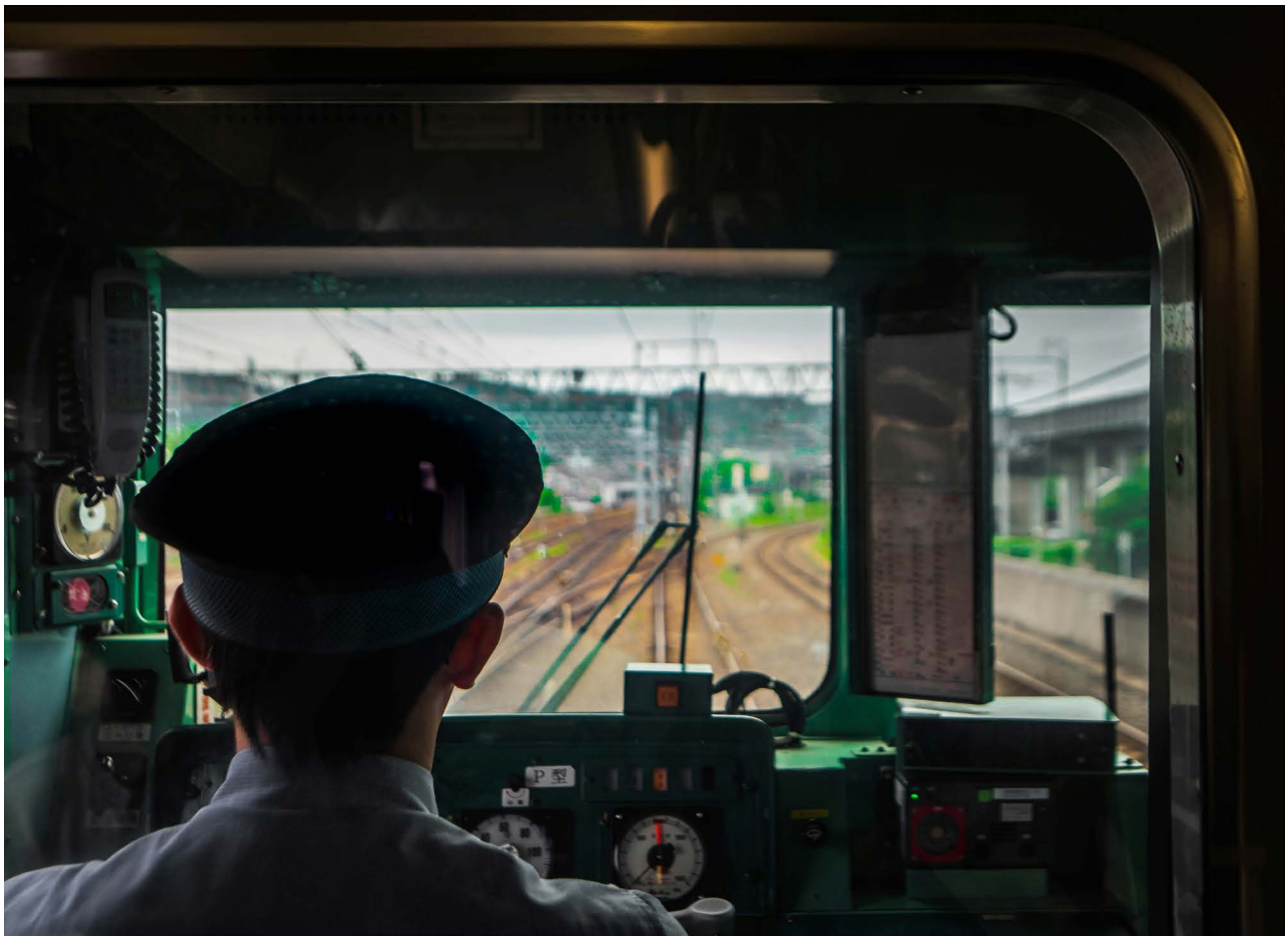
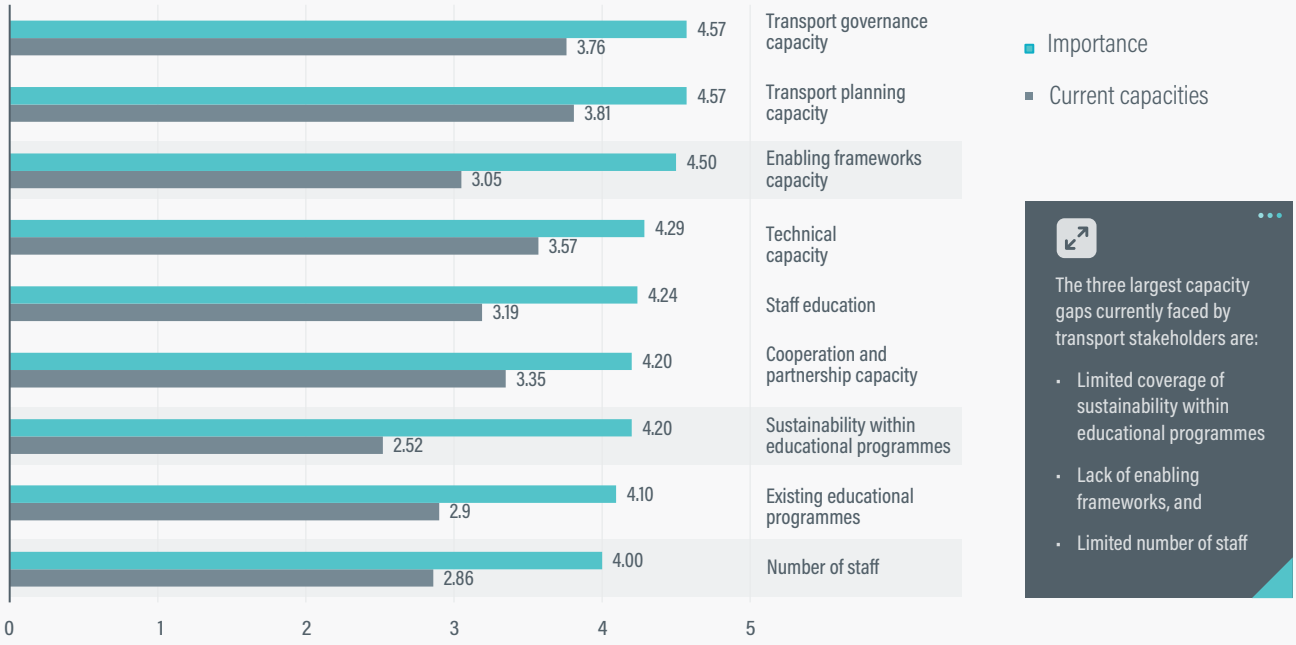


FIGURE 3. Average capacity gaps identified in 21 transport entities across 20 cities



Source: See endnote 26 for this section.

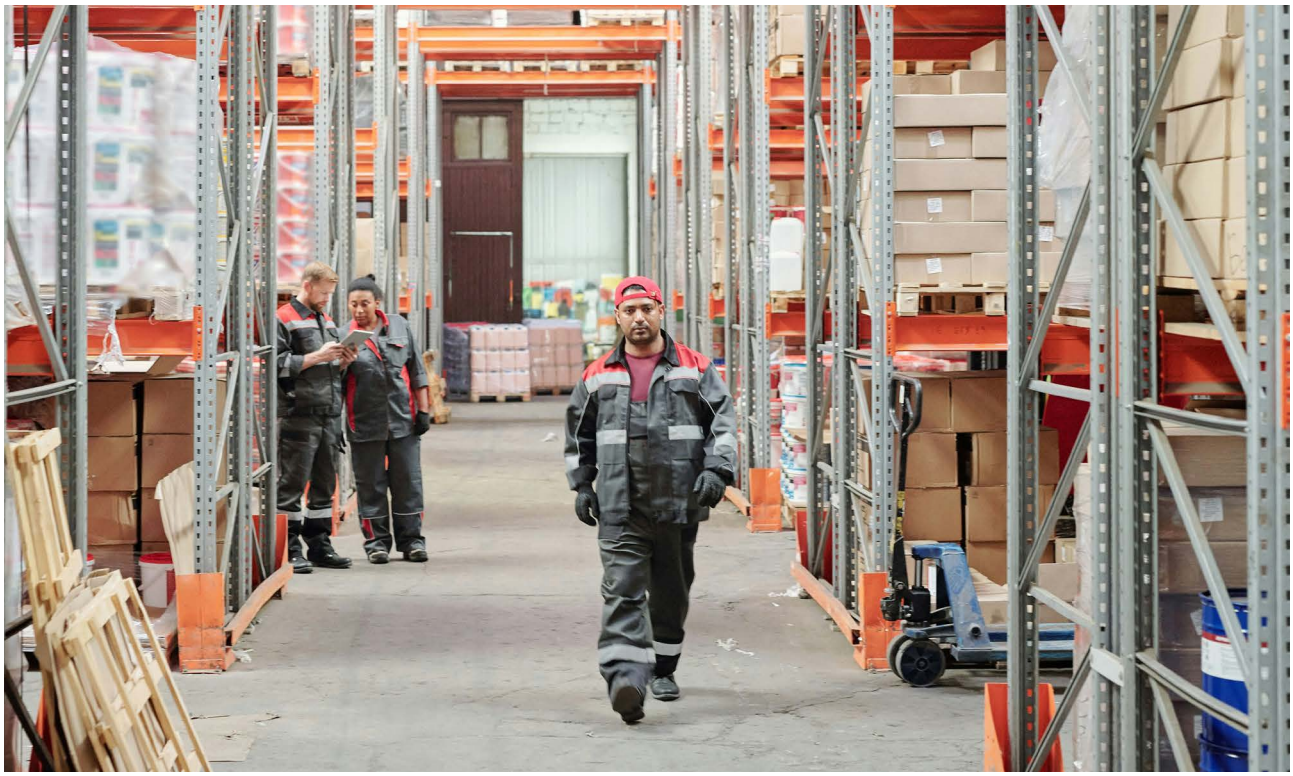
they often operationalise through institutionalised learning management systems. In Nigeria, the Lagos Metropolitan Area Transport Authority (LAMATA) conducts a comprehensive training needs assessment across departments to identify knowledge gaps and skills deficiencies.[18] This assessment is based on feedback from department heads, employee self-assessments and performance reviews.[19]

Despite broad expert agreement on the importance of conducting such capacity needs assessments, practice across transport entities does not always reflect this ideal.[20] **The approach to capacity development in many transport bodies tends to be *reactive* rather than *proactive*.**[21] This is because, in many cases, capacity assessment processes are not embedded within the internal procedures of passenger and freight transport stakeholders; instead, they are often ad-hoc exercises.[22]

A 2025 study by the Transformative Urban Mobility Initiative (TUMI) included a capacity gap analysis conducted across the three levels of capacity: individual, institutional and societal. Participating transport stakeholders were asked to rate the importance of specific capacities in enabling low-carbon transport in their local context, compared to their current levels of capacity. In doing so, the study was able to identify the three largest capacity gaps currently faced by transport stakeholders (Figure 3):[23]

- **Sustainability within educational programmes:** The existing educational programmes do not sufficiently cover sustainable mobility and thus do not equip graduates with the knowledge and skills needed to support the transition to new systems of sustainable transport. In the context of the study, formal education refers to academic and non-academic programmes offered by higher education institutions and local training centres: from university programmes for future transport and logistics managers and decision makers, to professional or executive education programmes and specialised courses and trainings. The definition, however, does not include technical and vocational education provided via apprenticeships, for example.
- **Enabling societal frameworks:** The lack of enabling legal, political and socio-economic factors can hinder actions towards sustainable transport. The transport stakeholders reported significant challenges such as fragmented governance structure, complex approval processes, funding constraints, and the shift in political will and priorities.
- **Number of staff:** The transport stakeholders reported a significant workforce shortage, where they would require nearly double the current number of staff across different departments[iv], covering both technical and functional capacities.

iv The departments included in the study are those focusing on procurement, regulation, marketing and customer management, operations and maintenance, planning, budgeting and construction.



Lack of sustainability within educational programmes

Although education is increasingly acknowledged in international climate and sustainability policy, investment in climate and sustainability education has not matched the urgency of the current climate crisis.[24] **The 2025 TUMI study highlighted that the largest capacity gap identified across the different capacity levels was the lack of sustainability within formal educational programmes.**[25] Transport stakeholders surveyed reported that most educational programmes offered within and outside of universities at the national or sub-national levels provide only a foundational understanding of transport.

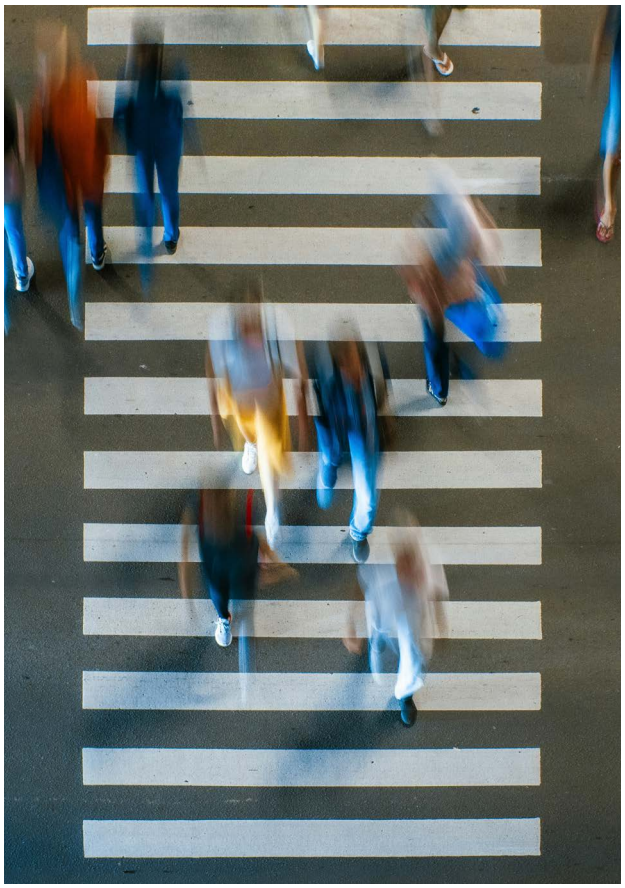
The study's thematic analysis revealed that the most prevalent disciplines addressing transport in formal education are transport engineering, urban planning and architecture, transport economics, and transport logistics and supply chain management. It points to the under-representation of sustainability and climate change themes within existing transport curricula. These themes are most often covered within stand-alone courses, or as modules within an existing course, although a few examples do exist of specialised programmes on sustainable mobility. However, the study was not exhaustive and did not cover all educational programmes in the surveyed countries.

Implications of the gap in sustainability within educational programmes

A key implication of the gap in sustainability within educational programmes is that transport stakeholders struggle to hire qualified personnel. If applicants do not have the right educational background covering sustainable transport and mobility, transport stakeholders may need to undertake a longer and costlier process to allocate the human resources required to successfully plan and implement sustainable transport projects and services within their cities and districts.

Existing staff members at transport entities often face challenges in carrying out their responsibilities due to both technical and functional capacity gaps. On the technical side, staff members may not be equipped with the (up-to-date) knowledge in areas such as sustainable mobility, or integrating climate considerations into transport policies. On a functional level, staff may struggle with cross-departmental co-ordination, budgeting, and project management, which are important in completing day-to-day tasks. These gaps can lead to delays, inefficiencies and poor outcomes in service delivery.

Trends such as digital transformation, electrification, and platform-based mobility and logistics services, along with the transformational needs and growing complexities of urban and mobility planning (such as adaptation and resilience to the impacts of climate change, shocks and crises), require a wide range of transport professions and jobs to acquire new skills. These new requirements



also impact professional education curricula, calling for the adjustment of existing programmes, the development of new ones and the emergence of new professions.

Transport stakeholders that have policies for continuing professional development

Promoting learning and professional development of employees is one of the cornerstones of staff attraction and retention policies.[26] Some employers provide continuous learning opportunities through partnerships with local and national academic institutions and research centres, or by providing trainings and generally supporting employees in attending courses in their field of work.[27] Some transport entities have dedicated person-days and budgets allocated for staff professional development.

In such settings, the costs and risks associated with developing the educational and technical backgrounds of employees are either fully borne by the employer, or shared between the employer and employee. Under a typical employer initiative, the employer assigns individual staff members to pursue short- or long-term educational programmes as part of their daily work arrangements (Box 2).[28] This can be done based on the findings of a capacity and/or training needs assessment conducted by human resources, strategy or other relevant departments.

Box 2. Employer initiative: capacity development process at Liberia's Ministry of Transport

In Liberia, the Ministry of Transport is responsible for developing the capacity of its staff in line with national service training policies. It must designate a training co-ordinator to co-ordinate with the Civil Society Agency and the Liberia Institute of Public Administration, prepare biennial training plans and ensure that all staff have individual development plans that align with their job profiles. Staff are also encouraged to undertake learning opportunities.

Although no formalised procedure exists for obtaining training leave, requests are usually approved and granted as normal working hours or paid leave, especially when aligned with annual capacity needs assessments. Staff members are then required to submit a post-training report by documenting insights and outcomes to ensure knowledge sharing and to contribute to the institutional memory by creating a record of relevant learnings that supports future staff development. This reflects an enabling approach that positions the Ministry as an active supporter of continuous capacity development, on both the individual and institutional levels.

Source: See endnote 29 for this section.

Under a typical employee initiative, individual staff members may put in a request to attend and/or participate in an educational programme, which they may deem as helpful for the delivery of their professional responsibilities (Box 3).[29] Their managers, human resources or other relevant departments would then assess the request based on the need and available resources, etc.

Box 3. Employee initiative: capacity development process at the African Union

At the African Union, learning opportunities, when officially approved, are treated as paid training leave, and in some cases, staff may receive a training allowance. Staff members are required to report on the outcomes of the training to ensure accountability and knowledge sharing, to help integrate new learnings into departmental practices.

In addition to supporting individually initiated opportunities, the African Union's training department pro-actively organises sessions on functional capacities such as leadership and management, inviting departments to nominate staff members to participate. This is complemented by an annual staff appraisal system, which allows supervisors to assess performance and carry out a basic training needs assessment, helping to identify relevant development opportunities for the upcoming year.

Source: See endnote 30 for this section.

Participation in educational programmes may be fully or partially funded by the employer through concepts such as paid training leave or training allowance. Other models may fully fund the programme but require employees to sign an agreement stating they will return to the workplace after successful completion and mandate their stay within the transport institution for a minimum number of years. Such arrangements are often used to avoid losing qualified personnel in whom the employers have invested.

Transport stakeholders that do not have policies for continuing professional development

Transport stakeholders do not always have dedicated resources and/or policies in place to support individual employees to continue their professional development. Consequently, staff members are often forced to self-fund and self-manage their time to pursue external educational programmes.[30] In some cases, staff members engage in short-term, hybrid programmes that take place on weekends and/or allow asynchronous (flexible) participation. This way, employees may complete the educational programme outside of regular working hours, without needing to step away from their positions.

In other cases, employees may take an (unpaid) leave of absence, particularly when the educational programme mandates in-person (synchronous) engagement. Employees step away from their positions in pursuit of the degree, which would allow them to better perform their jobs upon return. Some workplaces may ensure keeping the employee's position and return after successful programme completion, while others may not. Thus, the employee not only carries the risk of funding the programme and giving up their income channel in the meantime, but also risks not having a job to return to.

Both scenarios show that when the workplace does not value continuing professional development, employees fully carry the direct and indirect costs associated with pursuing educational programmes.

Without institutionalised policies and budgets for continuing professional development, employees may struggle to engage in further learning, leading to bigger institutional knowledge gaps. In cases where existing educational programmes do not sufficiently address the needs of the market, individuals working at transport entities (staff members) and those wishing to be hired (potential staff members) may look outside their countries for educational programmes focused on sustainable transport and mobility.

Educational opportunities abroad can bring valuable exposure to global practices and networks, but reliance on them for professional development carries important implications and raises questions around accessibility, equity and scalability. Educational opportunities abroad are often only accessible to individuals who have the financial and non-financial means to take leave from their jobs and to travel to pursue the programmes. Moreover, the acquired knowledge abroad may not always align with the contextual realities of a local institution's transport environment.

If individuals seek educational programmes abroad to address the local sustainable educational gap, a potential outcome is brain drain, or the migration of skilled professionals from low- and middle-income countries to high-income countries. Research suggests that studying abroad – whether at the beginning of one's professional trajectory or in the middle of it – may increase the likelihood of professionals choosing to stay and/or move to a country different from their own upon programme completion.[31]

Alternatively, ensuring that the knowledge and skills for climate and sustainability action in transport are locally taught and nurtured can support lasting and scalable human and economic development in a given region, country or city.

Addressing the gap in sustainability in educational programmes

The international transport community provides a variety of capacity building activities aimed at addressing the gaps around sustainability within educational programmes. International organisations, non-governmental organisations and foundations are collaborating with local organisations and universities to offer capacity development opportunities that range from in-depth multi-year university-level degrees and curricula development (Boxes 4-8)**, to specialised executive education and graduate diploma programmes** (Boxes 9-10)**, to shorter term certified courses** (Boxes 11-17).[32]

Some capacity development programmes promote the inclusion and participation of applicants from low- and middle-income countries and of women by offering scholarships or reduced tuition fees. Beyond offering scholarships or fee reductions, capacity building programmes must be intentionally designed to integrate gender equality and care responsibilities. Aligning these programmes with broader gender and care agendas not only enhances participation but also increases the transformative impact of mobility policies, making them more responsive to the lived realities of diverse populations.

University degrees and curricula development

Box 4. Post-graduate degrees at the Regional Transport Research and Education Centre in Kumasi, Ghana (TRECK)

TRECK was launched by the Kwame Nkrumah University of Science and Technology (KNUST) in 2018 and is dedicated to strengthening post-graduate education, applied research and professional training in transport. Established as part of the World Bank-funded African Higher Education Centres of Excellence (ACE) programme, TRECK aims to expand the academic-industry collaboration in West Africa, specifically in transport interdisciplinary fields.

LOCATION: Kumasi (Ghana)

FREQUENCY: Annual intake of MSc and MPhil students; short courses offered periodically based on demand

FORMAT: In-person higher education programmes (MSc, MPhil, PhD and short courses)

LANGUAGE: English

INCENTIVES: Dual accreditation by the Ghana Tertiary Education Commission (GTEC) and internationally by the Agency for Quality Assurance through Accreditation of Study Programmes (AQAS) in Germany

COST: Paid tuition fees apply for all programmes; limited scholarships available

TARGET AUDIENCE: Students and public sector transport practitioners

PARTNERS:

- Regional academic partners: Nigeria Building and Road Research Institute, Fourah Bay College (Sierra Leone), University of Sierra Leone, University of Liberia
- National academic partners: Takoradi Technical University, Kumasi Technical University, Building and Road Research Institute (BRRI) in Kumasi, Regional Maritime University
- Government partners: Ministry of Transport, Ghana Highway Authority, Kumasi Metropolitan Assembly
- International partners: World Bank

Box 5. Master in Transport and Sustainable Urban Mobility in Africa by Codatu in Lomé, Togo

The master programme "Transport and Sustainable Urban Mobility in Africa" (*Transport et mobilité urbaine durable en Afrique*) covers the fundamentals of urban mobility in African cities, including global dynamics, mobility demand, transport planning, urban mobility governance, multi-modal transport offer, road management, transport operations, environment and social affairs.

LOCATION: Lomé (Togo)

DURATION: 18 to 24 months

FREQUENCY: Recurring annually since 2015, but paused since COVID-19

FORMAT: Synchronous master programme that includes a 2-3 month internship with a transport authority/operator/consultancy and the preparation of a master's thesis

LANGUAGE: French

COST: Paid fees (USD 3933 or EUR 3,800), with possible support through partial or full scholarships

TARGET AUDIENCE: Students who already have a first master's in a related area, or practitioners who decide to continue their education (in some cases with the encouragement of their employer). EAMAU is affiliated with the West African Economic and Monetary Union (UEMOA), so students are recruited within the region, and part of the cohort did their internship in France.

PARTNERS:

- Université Senghor: delivering the degree
- Ecole Africaine des Métiers de l'Architecture et de l'Urbanisme (EAMAU): hosting the programme
- Codatu: preparing the curriculum, identifying experts beyond the local partners, internships and funding opportunities for scholarships

Box 6. Master in Transport and Sustainable Urban Mobility by Codatu in Rabat, Morocco

The master programme "Transport and Sustainable Urban Mobility" (*Transport et mobilité urbaine durable*) covers sustainable urban mobility, urban mobility planning, governance, financing, transport demand, conducting and implementing public transport projects, developing and operating public transport networks, transport demand and fare policy, and traffic engineering and management.

LOCATION: Rabat (Morocco)

DURATION: 16 months

FREQUENCY: Recurring training since 2017, with four cohorts in 2017, 2018, 2021 and 2023

FORMAT: In-person continuous training for professionals including an internship and the preparation of a master's thesis. Lectures traditionally take place over the weekend every second week to accommodate the schedule of the participating professionals.

LANGUAGE: French

COST: Paid fees (USD 4140 or EUR 4,000), with the possibility of getting a full or partial scholarship

TARGET AUDIENCE: Professionals already appointed, mainly in the Agences d'Urbanisme of various cities in Morocco, experts and consultants, practitioners from local and national authorities.

PARTNERS:

- University Senghor: delivers the degree
- Institut National d'Aménagement et d'Urbanisme (INAU): hosts the programme
- Codatu: conceives the curriculum, identifies external experts, and internship and scholarships opportunities.

Box 7. Master in Sustainable Management and Operations at Kühne Logistics University

Founded in 2010, Kühne Logistics University (KLU) has campuses in Hamburg (Germany) and Saigon (Viet Nam) offering bachelor's, master's, MBA, Ph.D, and executive education programmes in business and management, administration, supply chain management and global logistics. Sustainability is a key competence area within the university and is tackled within the different programmes as part of lectures, dedicated courses and entire study programmes. An example is the part-time Master in Sustainable Management and Operations (SuMO).

LOCATION: Hamburg (Germany)

DURATION: 12 to 18 months

FREQUENCY: Annual intake

FORMAT: Part-time, in-person master's (with a thesis) or a certificate (no thesis); both tracks are required to apply the acquired sustainability concepts directly to a workplace or industry challenge through "Impact Projects"

LANGUAGE: English

COST: Paid tuition fees are required per semester, with the availability of 50% scholarships for applicants from low-and middle-income countries, female executives and staff working in the humanitarian sectors

TARGET AUDIENCE: The programme is offered in part-time format to target professionals with a two-year work experience as a minimum key requirement for admission.

PARTNERS:

- Main donor of KLU is the Kühne Foundation

Box 8. Catalysing Curriculum Change via the VREF Mobility and Access in African Cities (MAC) programme

The Mobility and Access in African Cities (MAC) programme aims to strengthen research and educational capacity on urban access and mobility in sub-Saharan African cities. It focuses on building academic capacity while ensuring that its knowledge outputs reach decision makers, business leaders, civil society, students and other key actors.

In education, MAC has initiated Catalysing Curriculum Change at universities in sub-Saharan Africa to encourage developing and implementing new, research-based postgraduate courses and online learning resources. A scoping study in 2020-2021 identified gaps in transport education, leading to this targeted call for curriculum development rooted in African contexts.

LOCATION: Sub-Saharan Africa (focus on Anglophone regions in Western, Eastern and Southern Africa)

FREQUENCY: Ongoing programme with periodic calls for proposals, workshops, short courses and educational initiatives

FORMAT: Academic capacity building, research funding, study visit grants, curriculum development, workshops, online learning resources and dissemination platforms

LANGUAGE: English

TARGET AUDIENCE: Academic researchers, early-career scholars, sub-Saharan African universities, and institutions engaged in mobility and access research

Executive education and diploma programmes

Box 9. Leading Transport Transitions Programme for city leaders transforming urban mobility

The Leading Transport Transitions programme is an executive education programme focused on equipping urban transport leaders with the policy tools and leadership strategies necessary to drive sustainable mobility transitions in emerging economy cities. Thematically, it addresses critical issues such as rising motorisation, persistent congestion, social exclusion and carbon-intensive transport systems.

LOCATION: Online and in London (United Kingdom)

FORMAT: Hybrid, with online asynchronous and synchronous sessions plus an in-person module with three-day intensive sessions in London (study tour)

LANGUAGE: English

COST: Funded by the German Federal Ministry for Economic Cooperation and Development (BMZ)

TARGET AUDIENCE: Mayors and high-level transport leaders

PARTNERS:

- Transformative Urban Mobility Initiative (TUMI)
- C40 Cities Climate Leadership Group
- LSE Cities at the London School of Economics and Political Science
- BMZ (German Federal Ministry for Economic Cooperation and Development)

Box 10. UITP and TUM Asia Graduate Diploma in Transportation Engineering

The International Association of Public Transport (UITP) is collaborating with the Technical University of Munich Asia (TUM Asia) to bring public transport industry case studies to academia. Targeting mid-level transport professionals with at least five years of experience in the public transport sector, the Graduate Diploma aims to equip participants with the relevant knowledge from the focus areas of Traffic Engineering, Transportation Planning, and Road and Rail Infrastructure Design and Development.

LOCATION: Singapore

DURATION: One module spans 10 half-days on average

FREQUENCY: To be launched in September 2025

FORMAT: In-person block teaching

LANGUAGE: English

INCENTIVES: Upon successful completion of the six modules and passing the exams, participants are awarded the Graduate Diploma in Transportation Engineering

COST: Paid, with preferential pricing for UITP members and for those signing up to multiple modules

TARGET AUDIENCE: Transport professionals based in Singapore and in Asia

Specialised courses and training programmes

Box 11. UITP Academy's Public Transport Fundamentals Training Programme

The UITP Academy offers a large training portfolio focused on diverse aspects of public transport. The programmes address functional capacities such as marketing and communication, but more so technical capacities focusing on the Fundamentals of Public Transport, Planning, Operations and Infrastructure, New Mobility Services, as well as Policy, Planning, Funding and Regulation, etc. The courses are recurring and can follow both an online distance-based learning format, and an in-person classroom-style format.

The Public Transport Fundamentals Training Programme targets professionals who have been in the transport field for less than two years. The learning objective of this long-standing training programme is to provide participants with fundamental knowledge on public transport and sustainable urban mobility through expert-led interactive online sessions.

LOCATION: Varies

DURATION: About 2 weeks

FREQUENCY: Recurring since 2002

FORMAT: Eight interactive online modules (previously in-person)

PACE: Synchronous

LANGUAGE: English

INCENTIVES: Participants receive certification upon successful completion

COST: Paid, with preferential pricing for UITP members and participants from developing countries

TARGET AUDIENCE: Junior transport professionals

Box 12. International Road Federation Road Safety Auditor Training and Certification Programme

This programme aims to enhance road safety by building standardised auditing capacities. It focuses on developing technical skills and competencies necessary for conducting road safety audits, in line with international best practices.

LOCATION: Dar es Salaam (Tanzania), Kampala (Uganda), New Delhi (India)

DURATION: 10 days

FREQUENCY: Recurring annually over a three-year period since 2024

FORMAT: Training course including practical field exercises and a final exam

PACE: Synchronous

LANGUAGE: English

Incentives: Participants receive certification upon successful completion, qualifying them for inclusion in the International Registry of Road Safety Auditors as Road Safety Observers

COST: None; fully funded by the TotalEnergies Foundation

TARGET AUDIENCE: Consulting firms, ministries, national road agencies, private sector engineers and consultants

PARTNERS:

- International Road Federation (IRF): Organiser and content provider
- TotalEnergies Foundation: Funding

Box 13. International Road Assessment Programme training and accreditation: Road Infrastructure Safety and Safest Route Planning

The activities offered within the International Road Assessment Programme (iRAP) focus on the role of safer road infrastructure in improving road safety outcomes. It equips participants with the skills to undertake iRAP assessments and promotes awareness among fleets and logistics stakeholders about road safety risks and safest route planning.

LOCATION: Global

FREQUENCY: Recurring

FORMAT: iRAP training courses, in-person workshops, webinars, conferences, regional workshops and participation in the annual iRAP Innovation Workshop

LANGUAGES: Training and resources are offered in English, Spanish, Portuguese, French, Bahasa Indonesia, Vietnamese, Russian and Hindi.

COST: Most activities, especially webinars and knowledge sessions, are free of charge due to support from the FIA Foundation and other donors

INCENTIVES: The core iRAP training includes full learning management principles suitable for credit hours and associated accreditation and certificates of qualification

TARGET AUDIENCE: Government staff, road industry professionals, iRAP-accredited suppliers, World Bank, UN and regional development banks, investors, non-governmental organisations, youth groups, and fleet managers through the Network of Employers for Traffic Safety (NETS).

IMPACT: Over 1,300 courses and/or capacity building activities completed with more than 75,000 participants worldwide.

PARTNERS:

- Key donors: the FIA Foundation (main donor), Aleatica Foundation, FedEx, 3M and Prudential PLC.
- Strategic partners: United Nations Road Safety Fund, Millennium Challenge Corporation, Global Road Safety Facility, regional development banks and national/sub-national governments.

Box 14. Ochenuel Mobility Solutions' Africa Sustainable Urban Mobility course

The Africa Sustainable Urban Mobility Course focuses on diverse aspects of sustainable urban transport including a dedicated module on urban freight. The urban freight module is usually tailored to the needs of the audience each time the course is delivered in a city.

LOCATION: Varies, notably in: Lagos, Abuja and Benin City (Nigeria), Accra (Ghana), Addis Ababa (Ethiopia), Cairo (Egypt)

DURATION: 3-5 days

FREQUENCY: Conducted 14 times in six African cities since its inception in 2019

FORMAT: In-person workshops and trainings

LANGUAGE: Primarily English, with occasional French translation

INCENTIVES: Offers certification in urban mobility

COST: When supported by an international partner, the course is offered free of charge; otherwise, the hosting institution covers costs on a non-profit basis

TARGET AUDIENCE: City representatives, transport departments and traffic agencies

IMPACT: Since the first edition in Abuja, Nigeria (2019), the course has trained 1,025 participants from 42 African countries

PARTNERS:

- International organisations fund participation, provide expert trainers, or cover costs (e.g., UN-Habitat, UN Environment, GIZ, TUMI, Federal Ministry of Transportation Nigeria, French Development Agency)
- Academic partners support in preparing course content, sharing resources and providing expert trainers (e.g., National Open University of Nigeria Abuja, (Nigeria), Centre for Multi Modal Transport in University of Lagos, (Nigeria), Transport Research and Educational Center, Kwame Nkrumah University of Science and Technology Kumasi (Ghana)

Box 15. Smart Freight Centre Academy's Introduction to Road Freight Electrification

The Smart Freight Centre Academy is a knowledge and learning hub for freight and logistics decarbonisation. Hosted by the international non-profit Smart Freight Centre (SFC), the Academy delivers a wide range of self-paced and live virtual courses designed to build capacity across the logistics value chain – from emissions accounting and sustainable procurement to road freight electrification.

The Introduction to Road Freight Electrification course is designed for stakeholders participating in road freight electrification. Participants explore the urgency and importance of electrifying logistics, the role of road freight in supply chain decarbonisation and the socio-technical aspects of electrifying fleets. The course covers critical decision-making factors for prioritising which operations to electrify and the required groundwork, including vehicle and charging infrastructure.

DURATION: 3-4 hours

FORMAT: Online

PACE: Asynchronous self-paced course (MooC)

LANGUAGE: English

INCENTIVES: Participants earn a certificate of completion after completing the course

TARGET AUDIENCE: Sustainability professionals, logistics managers, procurement officers and corporate teams

Box 16. World Bank Leaders in Urban Transport Planning Workshop

The Leaders in Urban Transport Planning (LUTP) programme empowers policy makers and practitioners with the knowledge and skills needed to diagnose urban mobility challenges and craft effective strategies to promote more liveable, more sustainable cities.

LOCATION: Varies, most recently in: Kathmandu (Nepal), Arusha (Tanzania), Quito (Ecuador)

DURATION: 6-7 days

FREQUENCY: Recurring annually since 2012

FORMAT: In-person and self-study

PACE: Asynchronous self-study modules and in-person interactive training workshop

INCENTIVES: Case studies developed by the Harvard Kennedy School Case Programme, site visits, and certificate of completion upon full attendance and participation in group work

TARGET AUDIENCE: Mid-to senior-level managers and policy makers who occupy or will occupy leadership positions in urban transport planning, governance, management and operations in developing countries

IMPACT: The LUTP programme has trained more than 2,600 practitioners from 105 countries through 81 different workshops

PARTNERS:

- Korean Green Growth Trust Fund (KGGTF): financial partner
- Public-Private Infrastructure Advisory Facility (PPIAF): financial partner
- Partnership Fund for the Sustainable Development Goals: financial partner
- Africa Transport Policy Programme (SSATP): educational partner
- World Resources Institute (WRI): educational partner

Box 17. TUMI training and e-learning courses

The Transformative Urban Mobility Initiative (TUMI), implemented by GIZ and funded by the German Federal Ministry for Economic Cooperation and Development (BMZ), offers several specialised courses on its e-learning platform. From courses focusing on transport planning for sustainable cities to zero-emission vehicles deployment and data management for sustainable cities, the courses are recurring, free of charge and can be followed synchronously (live moderation) or asynchronously (self-paced via recorded sessions).

DURATION: 9 weeks

FORMAT: MooC

PACE: Asynchronous self-study modules

LANGUAGE: English

COST: None

INCENTIVES: Participants can obtain an optional certificate upon completion by subscribing to FutureLearn

TARGET AUDIENCE: Transport and city planning practitioners in the Global South, academics, researchers, students, national and city authorities, consultancies and civil society

IMPACT: Over 4,000 participants registered in this course as of July 2025

PARTNERS:

- UCL: course co-development and trainers
- FutureLearn Platform: hosts the MooC and provides the certificates

Way forward

Education remains an undervalued instrument in formulating and implementing emission mitigation, adaptation, resilience and broader sustainability solutions in transport.[33] A significant structural gap in current curricula and institutional arrangements prevails, particularly the lack of systemic integration of sustainability into education and the persistent disconnect between theoretical research and its application in practice.[34]

This disconnect is symptomatic of broader global challenges in ensuring equitable access to quality, relevant, and actionable education and knowledge and effective knowledge transfer, particularly in low- and middle-income countries. Such inequality deepens disparities in how regions can respond to transport, climate and sustainability challenges. In response, various international organisations and institutions have support capacity through international development co-operation and official development assistance (ODA).

Moreover, the persistent phenomenon of brain drain further weakens the local capacity of transport and mobility sectors. Talented individuals often leave their home countries due to limited opportunities for advanced study and professional development, exacerbating human resource shortages in key public and private institutions.

A geographically balanced design of capacity development programmes is essential, as many current initiatives remain concentrated in capital cities or national-level agencies, often leaving sub-national and local authorities underserved. Expanding outreach and tailoring content to smaller cities and rural areas is key to ensuring inclusive and context-relevant mobility transitions.

The interdisciplinary nature of sustainable transport and the multi-disciplinary competencies needed for transformative action in transport governance complicates these dynamics. Beyond traditional fields such as engineering and architecture, the transport sector depends on expertise from other multi-disciplinary areas, such as marketing, workforce development, data analytics, social sciences and political economy. Yet many educational programmes still fail to keep pace with shifting industry needs and market demands.

Successful capacity building initiatives demonstrate that multi-stakeholder collaboration can bridge these gaps. International development agencies, non-governmental organisations, think tanks, academic institutions, private firms and public authorities each bring complementary strengths. Together, they can support various stages of the capacity development project cycle and contribute to sustainable education for transport.

Sustainable, long-term strategies should prioritise structural changes in higher education curricula, and foster collaboration among local universities, global institutions, the transport sector and development co-operation actors. Such collaboration can promote co-developed, interdisciplinary programmes tailored to local contexts, embedding climate and sustainability education into formal qualifications and professional training.

To ensure that these structural reforms and partnerships are effective over time, it is essential to implement continuous monitoring and evaluation systems. These systems can measure not only the quality of capacity building programmes but also the progress in applying acquired knowledge to decision making and sustainable transport management. This approach helps identify gaps between training and real-world practice, enabling adjustments that enhance the transformative impact of education in the sector.

In the near term, one option could be to create a globally supported scholarship fund dedicated to studies in sustainable transport, backed by stakeholders across the international transport sector. This fund could specifically support undergraduate and post-graduate studies in sustainable transport (structured as full-time or part-time programmes). Eligibility criteria could prioritise professionals working in (public) transport institutions with a conditional return-to-origin clause requiring scholarship recipients to contribute to their home countries for a minimum period of time after programme completion.

Investing in stronger academic collaboration between universities in the Global North and the Global South presents a strategic opportunity for capacity building in the transport sector. ODA funding could be effectively channelled to support such partnerships, particularly by engaging second-tier universities that serve broader societal segments beyond economically privileged groups. An example is the Mexican Academic Network for Public Transport, an initiative in its initial phase with support from GIZ.[35] Likewise, the institutionalisation of post-monitoring and evaluation tools – such as impact surveys, institutional performance assessments and alumni networks – can strengthen the continuity and scalability of capacity development initiatives.

By promoting equitable and sustainable access to specialised education and ensuring its relevance to practice, the international transport community can accelerate the transition to sustainable transport systems and services. The range of potential initiatives would not only strengthen institutional capacity but also address the underlying causes of talent loss and skills mismatch.

6.1
FINANCING SUSTAINABLE TRANSPORT IN TIMES OF CONSTRAINED PUBLIC BUDGETS

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