5

Enabling Climate and Sustainability Action in Transport: Finance, Capacity and Institutional Support

SLOCAT Partnership on Sustainable, Low Carbon Transport

Transport, Climate and Sustainability
Global Status Report - 3rd edition

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Capacity and Institutional Support to Achieve Sustainable, Low Carbon Transport

MODULE 5 5.1

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Financing Sustainable Transport in Times of Limited Budgets

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Key findings

- Effective financing is crucial for the development of modern transport networks that facilitate economic growth, improve connectivity and enhance quality of life for residents. 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.

Current investment and financing for transport infrastructure

- Transport is the largest recipient of infrastructure investment among sectors globally, attracting an estimated USD 79 trillion from 2015 to 2040; of this, USD 26 trillion (one-third) goes to roads and USD 10 trillion to rail.
- The global market for transport services reached USD 7.3 trillion in 2022 and is projected to more than double to USD 15.9 trillion by 2032.
- Many countries have placed an emphasis on expanding the capital stock in the transport sector, and in particular on expanding highway networks, with the aim of improving connectivity and supporting economic development.
- The employment benefits of sustainable transport investments exceed those of other sectors (including building retrofits and solar/wind power conversion) and can be especially high in low- and middle-income regions. Globally, the transport investments with the highest potential to multiply employment opportunities are in walking and cycling infrastructure and in electric vehicle charging infrastructure.
- Transport was a major recipient of COVID-19 recovery investment. In the G20 countries, the majority of the stimulus funding for transport went to the rail and road sectors, with almost no funding for active transport; this is in line with overall G20 transport investment in recent years.

Impacts of the Russian invasion of Ukraine

- The Russian Federation's invasion of Ukraine pushed up energy prices for many consumers and businesses around the world, hurting households, industries and entire economies – most severely in low- and middle-income countries where people can least afford it.
- The war has had far reaching economic impacts and has halted the fiscal consolidation process of many low- and middle-income countries that started in the aftermath of the pandemic.
- Europe's quest for alternatives to Russian energy could supercharge investment in hydrogen, potentially leading to USD 1 trillion of new projects globally by 2030.

Major trends in transport financing

- The transport sector has dominated infrastructure investments in both the G20 countries and in the member countries of the Organisation for Economic Co-operation and Development (OECD). However, much of this investment has been for road construction and highway expansion, supporting rising motorisation rates while not necessarily enhancing travel opportunities and conditions.
- In 2022, around 42% of public funding in the G20 countries went to transport sector investments, of which nearly half (46%) were in road transport, followed by rail and public transport.
- The transport sector also represented a large share of spending in China and in some low- and middle-income countries. China spent 5.6% of its gross domestic product (GDP) on transport in 2022, compared with shares of only around 0.7% to 0.9% each in Denmark, France, Germany, Mexico, the Russian Federation and the United Kingdom.

Finance for transport decarbonisation

- Achieving the needed reductions in greenhouse gas emissions from transport will require strong regulations and fiscal incentives as well as large investments in infrastructure to enable low- and zero-emission transport.
- Climate finance totalled USD 653 billion in 2019/20, with around a quarter of it (USD 169 billion) going to the transport sector. This was more than in previous years – spurred by investment in rail and transit projects and by rising household purchases of electric vehicles – but represents only a fraction of the total estimated need.

- Despite significant pledges to increase multilateral financing through various low-carbon mechanisms, only a small share of these funds cover transport decarbonisation projects. Addressing this gap requires reassessing public sector funding priorities and exploring new opportunities to mobilise large-scale private investment towards development objectives.
- Public money was consistently the main source of financing for climate change mitigation and adaptation actions in the transport sector from 2017 to 2020.
- Of the green bond volume in 2022, two-thirds (67%) originated in developed markets, with the rest coming from emerging markets (23%) and from supranational issuers such as the World Bank and Asian Development Bank (9%).
- The EU's extensive green bond programme has driven much of the growth in green bonds, issuing a cumulative USD 39.9 billion over four deals since its debut in October 2021.
- Collectively, green bonds for energy, buildings and transport accounted for 77% of the total green debt volume in 2022 (down from 81% in 2021 and a high of 85% in 2021), with transport contributing just under USD 100 billion.
- Countries raised a record USD 95 billion in 2022 through carbon pricing schemes that charge firms for emitting carbon dioxide, covering around 23% of global greenhouse gas emissions.
- In the transport sector, progress in carbon financing is mixed. Most carbon markets have focused on aviation and maritime emissions and less on emissions from land-based transport. In road transport, 99% of the carbon price signal resulted from fuel taxes, not carbon pricing initiatives.
- Consumer and government spending on electric cars increased 50% in 2022 to reach USD 425 billion globally.
- As the electric car market matures, reliance on direct subsidies is expected to phase out over time. The focus of government policy incentives is gradually shifting from consumers to charging infrastructure and battery manufacturing, leading to announcements of record investments in new battery manufacturing capacity in 2022.
- The transport sector relied on fossil fuels for nearly 96% of its energy consumption in 2020 and 2021. In the transport sector alone, subsidies and other support for fossil fuels jumped 31% in 2021 due to the surge in fuel use following the lifting of COVID-related mobility restrictions.
- Despite a slump in revenues, auto companies maintained strong spending on research and development in 2020 and 2021, in a push to gain a technological edge in the fast-changing mobility sector. In 2021, low carbon mobility and battery start-ups accounted for a combined 35% of the spending growth and for 40% of the early-stage finance.

Projected transport investment needs

- Investment needs can change over time due to factors such as technological advancements, shifts in transport patterns, economic developments and policy changes. For transport sector decarbonisation, more focus is needed on addressing the service gap rather than the investment gap, as ensuring improved services often requires more than capital investment.
- An estimated USD 2.7 trillion in annual investment (USD 40.5 trillion in total) will be needed globally between 2016 and 2030 to achieve low carbon transport pathways, with 60-70% of the investment occurring in emerging economies. However, regional investment gaps for transport infrastructure by 2040 are significant, estimated at USD 0.8 trillion for Africa, USD 1.6 trillion for Asia and USD 6.0 trillion for the Americas.
- Global investment needs for transport infrastructure through 2050 are an estimated USD 50 trillion. Reducing emissions through low carbon urban mobility would require investments totalling USD 1.83 trillion (around 2% of global GDP), which would result in estimated savings of USD 2.8 trillion in 2030 and nearly USD 7.0 trillion in 2050.

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 mobility services. Infrastructure and services such as roads, bridges, airports, railways and public transport networks require significant investments to be built and maintained effectively. Financing in transport involves obtaining the necessary resources to cover the costs associated with these projects and operations. It includes the following:

- **Capital investment** – financing for the construction, expansion, or renovation of transport infrastructure, which includes building new roads, bridges, airports and other facilities.
- **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.
- **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.
- **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).
- **Borrowing and loans** – money that governments and transport agencies borrow – either through issuing bonds or taking out loans from financial institutions – and then repay over time, often using revenue generated from transport-related activities.
- **User fees and tolls** – funds that users of transport infrastructure pay to help finance the construction and maintenance of facilities, such as tolls that are used to fund highway upkeep.
- **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.
- **Fuel taxes** – taxes 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.
- **Innovative financing** – 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.
- **Climate finance** – financing that is critical to reaching the scale of climate change mitigation and adaptation that is required in the transport sector to achieve Paris Agreement targets.

Effective financing is crucial for the development of modern transport networks that facilitate economic growth, improve connectivity and enhance quality of life for residents. 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.

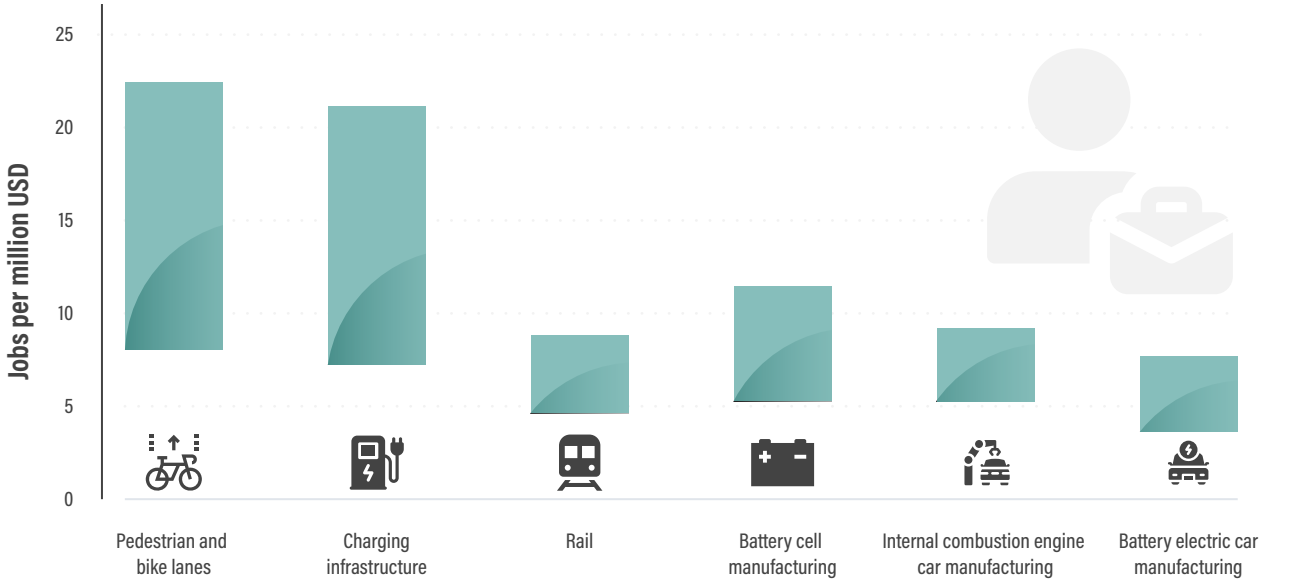
Current investment and financing for transport infrastructure

Transport is the largest recipient of infrastructure investment among sectors globally, attracting an estimated USD 79 trillion from 2015 to 2040; of this, USD 26 trillion (one-third) goes to roads and USD 10 trillion to rail.[1] The global market for transport services reached USD 7.3 trillion in 2022 and is projected to more than double to USD 15.9 trillion by 2032.[2]

Investments in the transport sector can be distinguished between investments in infrastructure and related facilities, and investments in mobility services. In general, the public sector supports investments in large infrastructure, such as airports and highways, whereas both the public and private sectors provide investments in mobility services, with the public sector focusing more on supplying public transport. Decisions on transport and mobility are highly influenced by access to infrastructure, which is more limited in low- and middle-income countries in terms of coverage and quality.

FIGURE 1. Potential jobs created through transport investments, 2020

Source: See endnote 7 for this section.



Many countries have placed an emphasis on expanding the capital stock in the transport sector, and in particular on expanding highway networks, with the aim of improving connectivity and supporting economic development.

- In Africa, transport has typically accounted for more than half of the total budget for infrastructure investment, ranging between 52% and 59% for the years 2016-2018.[3] Most of this investment is targeted at road transport, followed by rail, airports and ports.[4]
- Road transport represented around three-quarters of all transport infrastructure investment in Africa and the Americas in 2022.[5]

For investment in mobility services, the private sector plays a strong role. Private transport operators are typically the main providers of innovative urban transport services (for example, Uber, Bikeshare, Bird scooters and commuter buses) and of operations and maintenance services for public transport. In contrast, the public sector has invested mainly in rail and public bus/metro services. However, this varies by country, depending on the degree of decentralisation, the financial capacity and the set-up of transport systems. In some countries, public companies also provide freight transport (through rail and trucking services) and to a lesser extent air and maritime services.

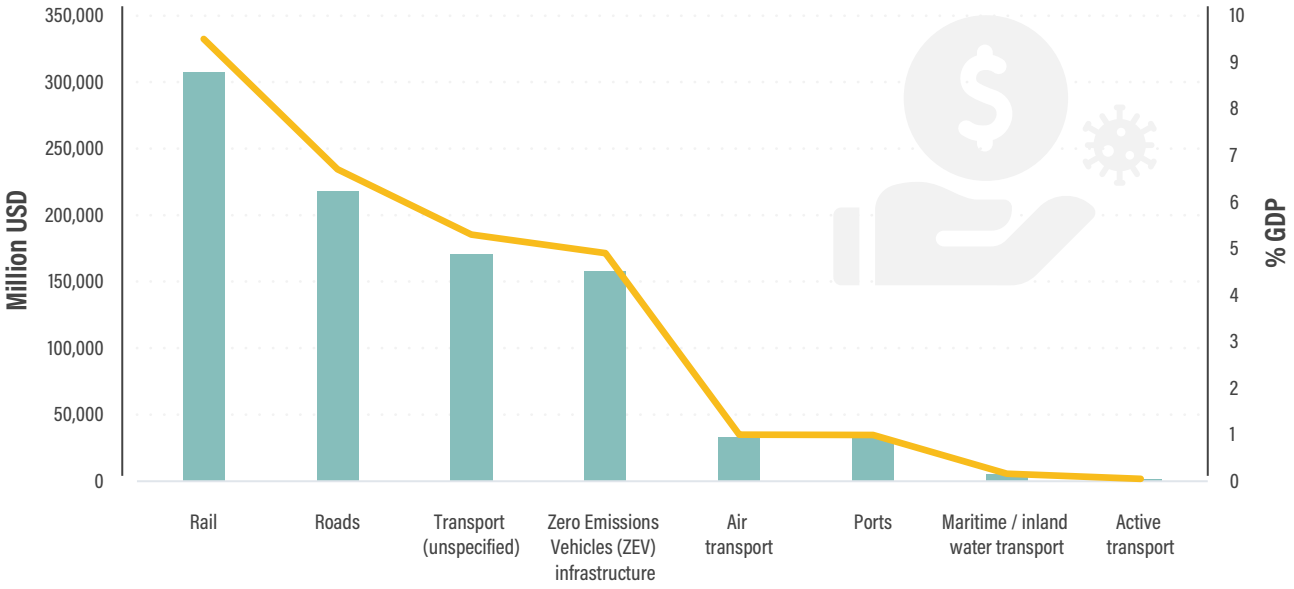
The employment benefits of sustainable transport investments exceed those of other sectors (including building retrofits and solar/wind power conversion) and can be especially high in low- and middle-income regions.[6] Globally, the transport investments with the highest potential to multiply employment opportunities are in walking and cycling infrastructure and in electric vehicle charging infrastructure (see Figure 1)**.[7]**

- Across 21 countries in low- and middle-income regions of Africa, Asia, Eastern Europe, and Latin America, investments in public transport and vehicle electrification could lead to the creation of more than 50 million jobs by 2030.[8]
- A green recovery strategy (as compared to a business-as-usual strategy) could have generated at least an estimated 10 million additional new jobs in low carbon transport from 2020 to 2030.[9]

Transport was a major recipient of COVID-19 recovery investment. In the G20 countries, the majority of the stimulus funding for transport went to the rail and road sectors (see Figure 2)**, with almost no funding for active transport; this is in line with overall G20 transport investment in recent years.[10]**

FIGURE 2. Investment in transport from the COVID-19 stimulus in G20 countries, by volume and share of GDP

Source: See endnote 10 for this section.



- Between February 2020 and August 2021, the G20 countries allocated USD 3.2 trillion (4.6% of the G20's gross domestic product, GDP) in stimulus funding to transport infrastructure, mainly to drive economic recovery and to achieve long-term transformative outcomes.[11] If this amount were spent over the following two years, it would represent a 45% increase in the average annual investment in infrastructure across the G20.[12]

Impact of the Russian invasion of Ukraine

The Russian Federation's invasion of Ukraine pushed up energy prices for many consumers and businesses around the world, hurting households, industries and entire economies – most severely in low- and middle-income countries where people can least afford it. The need to make up for immediate shortfalls in natural gas and other energy exports from the Russian Federation led to increased production elsewhere, and new infrastructure for liquefied natural gas was pursued globally to diversify the supply. Oil and gas investment increased 10% in 2022 but remained well below 2019 levels.[13]

The war has had far-reaching economic impacts and has halted the fiscal consolidation process of many low- and middle-income countries that started in the aftermath of the pandemic. In Sub-Saharan Africa, public debt more than tripled between 2010 and 2022.[14] In response to the reductions in food supplies from Ukraine and to the rise in food and fuel prices, countries in Sub-Saharan Africa have resorted to subsidies, temporary waivers of tariffs and levies, and income support for the most vulnerable groups – increasing the region's fiscal deficit from an estimated 4.8% of GDP in 2021 to 5.2% in 2022.[15]

Europe's quest for alternatives to Russian energy could supercharge investment in hydrogen, potentially leading to USD 1 trillion of new projects globally by 2030.[16] As of 2021, the hydrogen sector was already converting more of its bulging project pipeline into investment decisions, and companies were raising growing amounts of money. With the European Union's (EU) goal under the REPowerEU plan to use low carbon hydrogen, as well as higher hydrogen targets in the United Kingdom and elsewhere, it is increasingly likely that major projects will enter construction soon. If the hydrogen is produced mainly using new, dedicated wind and solar plants, these facilities would represent around 40% of total costs, whereas infrastructure for hydrogen transport – including port facilities, ships and storage – would represent 25% of costs (*see Section 4.1 Transport Energy Sources*).[17]

Major trends in transport financing

The transport sector has dominated infrastructure investments in both the G20 countries and in the member countries of the Organisation for Economic Co-operation and Development (OECD). However, much of this investment has been for road construction and highway expansion, supporting rising motorisation rates while not necessarily enhancing travel opportunities and conditions.

- **In 2022, around 42% of public funding in the G20 countries went to transport sector investments, of which nearly half (46%) were in road transport, followed by rail and public transport** (see Figure 3).[18]
- OECD countries greatly increased their investments in transport infrastructure between 2010 and 2021. Transport infrastructure spending grew 7% annually on average between 2010 and 2017 before falling nearly 5% in 2018, driven by reduced investment in rail and water transport.[19]
- Most of the OECD investment in transport infrastructure has been for road transport. In 2018, OECD countries spent on average 1.2% of their GDP on transport infrastructure, with roughly 0.9% going to road infrastructure and only 0.2% to rail infrastructure (see Figure 4).[20]

The transport sector also represented a large share of spending in China and in some low- and middle-income countries.

- **China spent 5.6% of its GDP on transport in 2022, compared with shares of only around 0.7% to 0.9% each in Denmark, France, Germany, Mexico, the Russian Federation and the United Kingdom.**[21]
- In Africa, 41.7% of infrastructure finance commitments in 2017 went towards transport.[22]
- Latin America and the Caribbean, which has a similar density of paved roads as Africa, spent around 44% of its total infrastructure investments on transport between 2008 and 2015.[23] During 2015-2019, around 1.2% of public spending in the region on average went to transport infrastructure, with higher shares in countries such as Belize (5.4%), Bolivia (5.3%) and Nicaragua (3.9%).[24]

FIGURE 3. Estimated public investment in transport (a) as a share of total public investment in infrastructure and (b) by transport sub-sector, in the G20 countries, 2022

Source: See endnote 18 for this section.

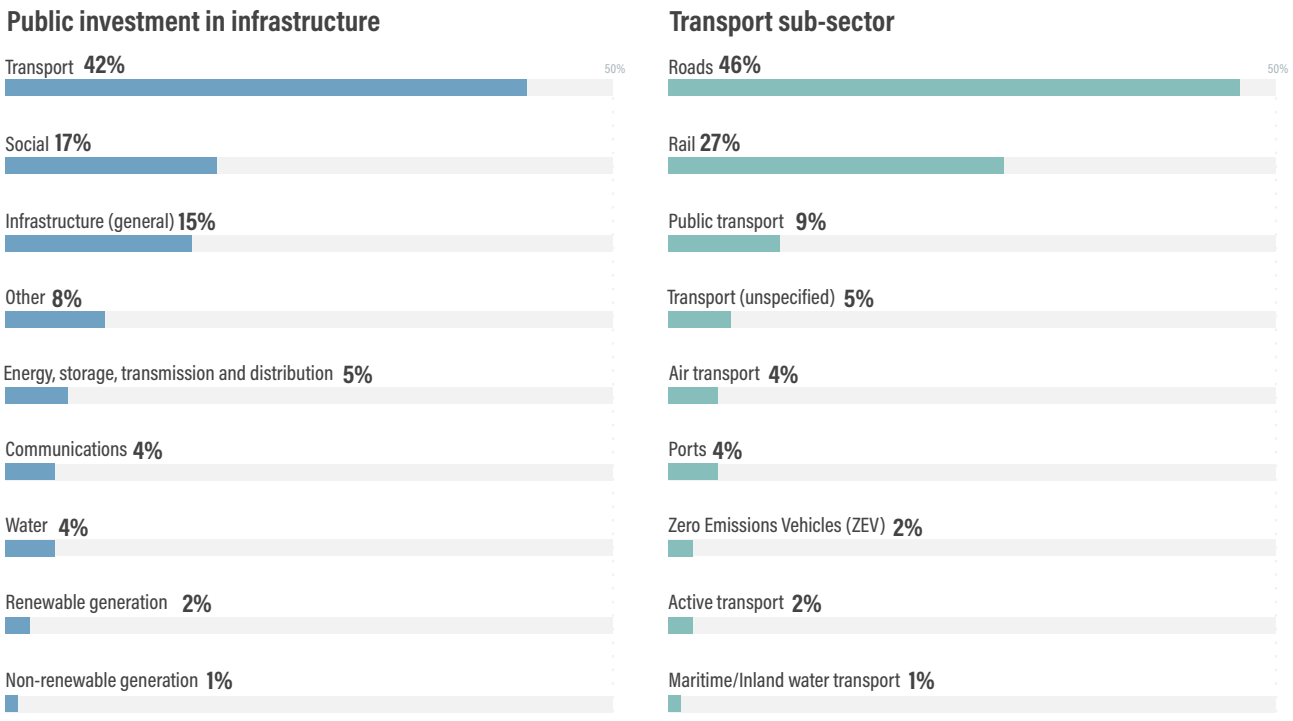
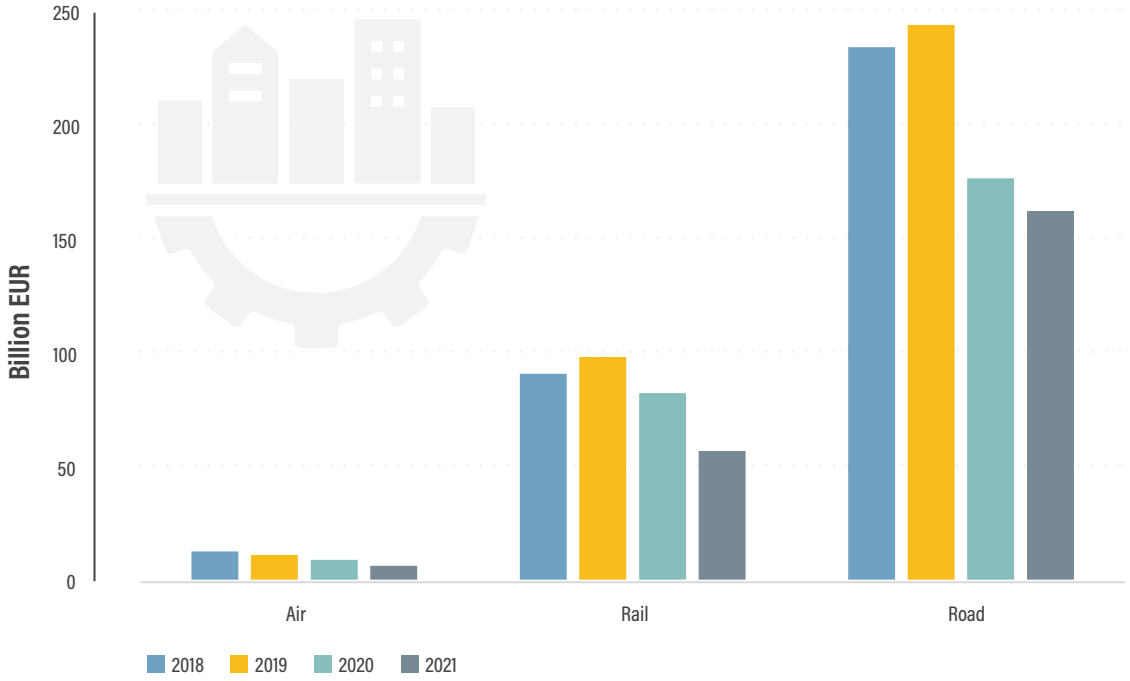


FIGURE 4. Transport infrastructure investments in OECD countries, 2018-2021

Source: See endnote 20 for this section.



Finance for transport decarbonisation

Achieving the needed reductions in greenhouse gas emissions from transport will require strong regulations and fiscal incentives as well as large investments in infrastructure to enable low- and zero-emission transport (see *Section 1.1 Transforming Transport and Mobility to Achieve the Targets of the Paris Agreement and the Sustainable Development Goals*)**.**

Climate finance totalled USD 653 billion in 2019/20, with around a quarter of it (USD 169 billion) going to the transport sector (see Figure 5)**.**[25] **This was more than in previous years – spurred by investment in rail and transit projects and by rising household purchases of electric vehicles – but represents only a fraction of the total estimated need.**[26] Estimates suggest that fully decarbonising the shipping industry alone would cost USD 1.4 trillion to 1.9 trillion; achieving net zero CO_2 emissions in aviation by 2050 would cost at least USD 5 trillion; and improving the efficiency of road transport in order to achieve the goal of keeping global temperature rise within 1.5 degrees Celsius by 2050 would cost USD 3 trillion.[27]

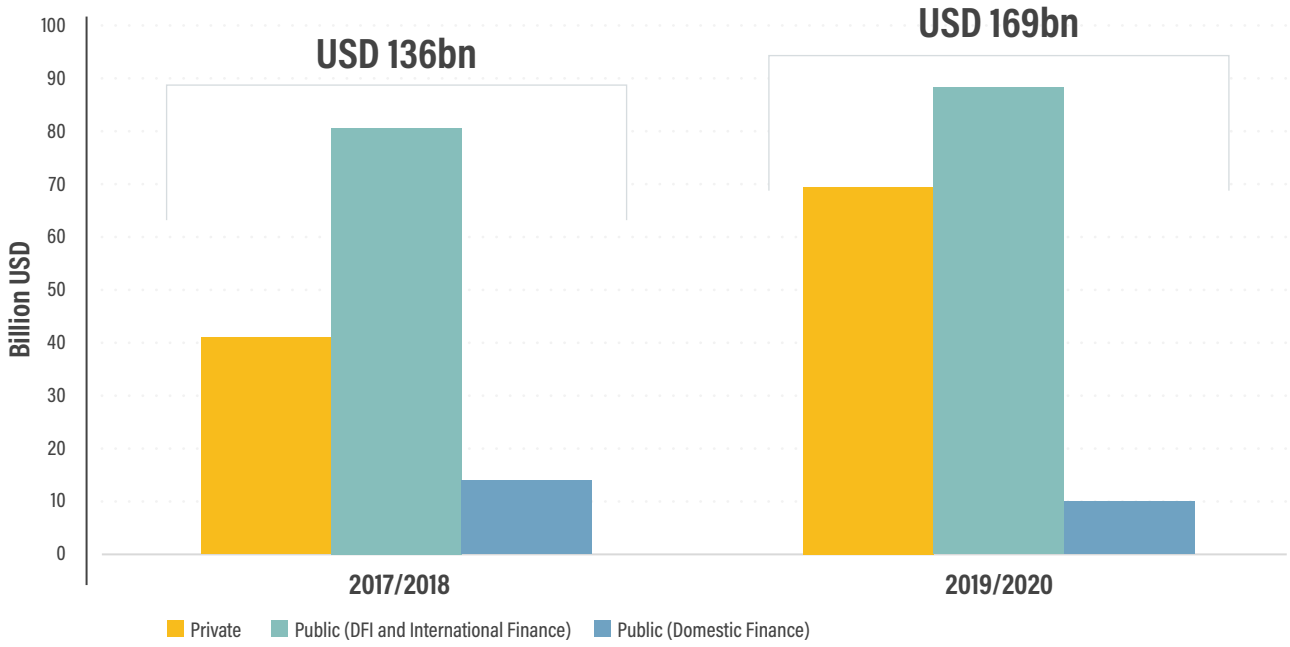
Despite significant pledges to increase multilateral climate financing through various low-carbon mechanisms, only a small share of these funds cover transport decarbonisation projects.[28] **Addressing this gap requires reassessing public sector funding priorities and exploring new opportunities to mobilise large-scale private investment towards development objectives.** Although greater spending on climate action is needed, public budgets – traditionally an important source of financing for green infrastructure and transport – are strained, and existing resources are often directed towards vehicle electrification and not necessarily to the areas covered under the Avoid-Shift-Improve framework for transport decarbonisation (*see Section 1.1 Transforming Transport and Mobility to Achieve the Targets of the Paris Agreement and the Sustainable Development Goals*).

Public money was consistently the main source of financing for climate change mitigation and adaptation actions in the transport sector from 2017 to 2020.[29] National development finance institutions were the leading funder of transport climate investments (see Figure 6), with the monies originating from international development finance institutions, capital market issuances and central government transfers.[30]

Of the green bond volume in 2022, two-thirds (67%) originated in developed markets, with the rest coming from emerging markets (23%) and from supranational issuers such as the World Bank and Asian Development Bank (9%).[31] A green bond

FIGURE 5. Global climate finance in the transport sector, by source, 2017/18 and 2019/20

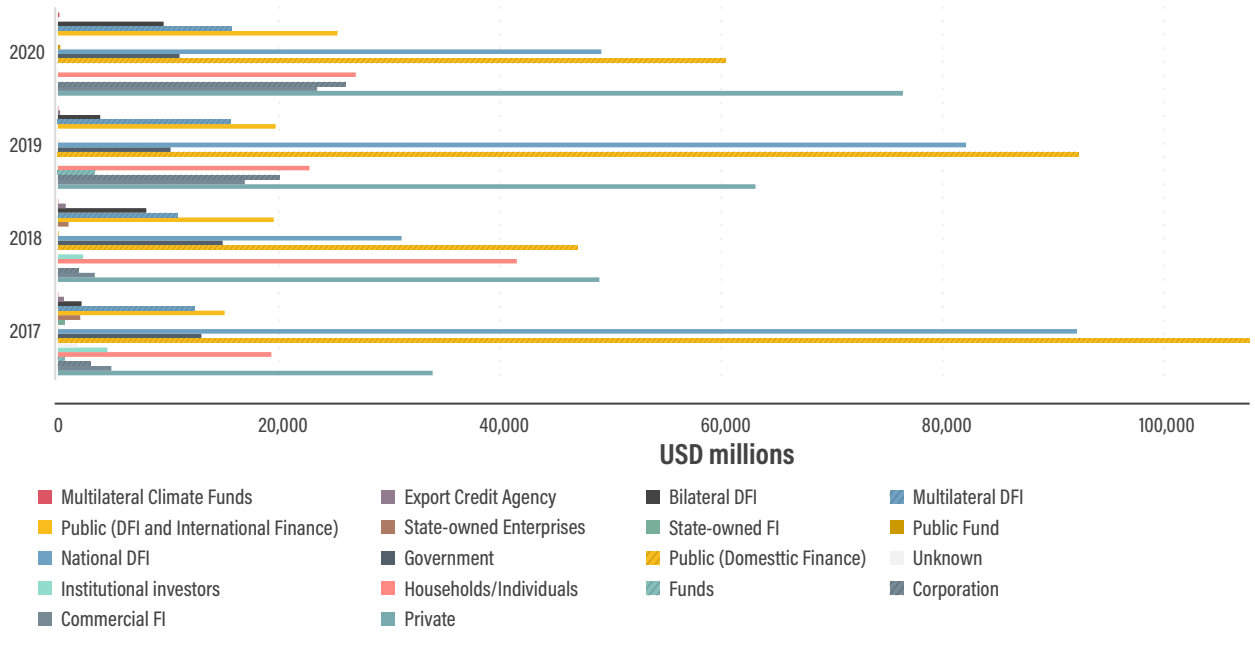
Source: See endnote 25 for this section.



Note: DFI = development finance institution

FIGURE 6. Financing for transport mitigation and adaptation, by type of financier, 2017-2020

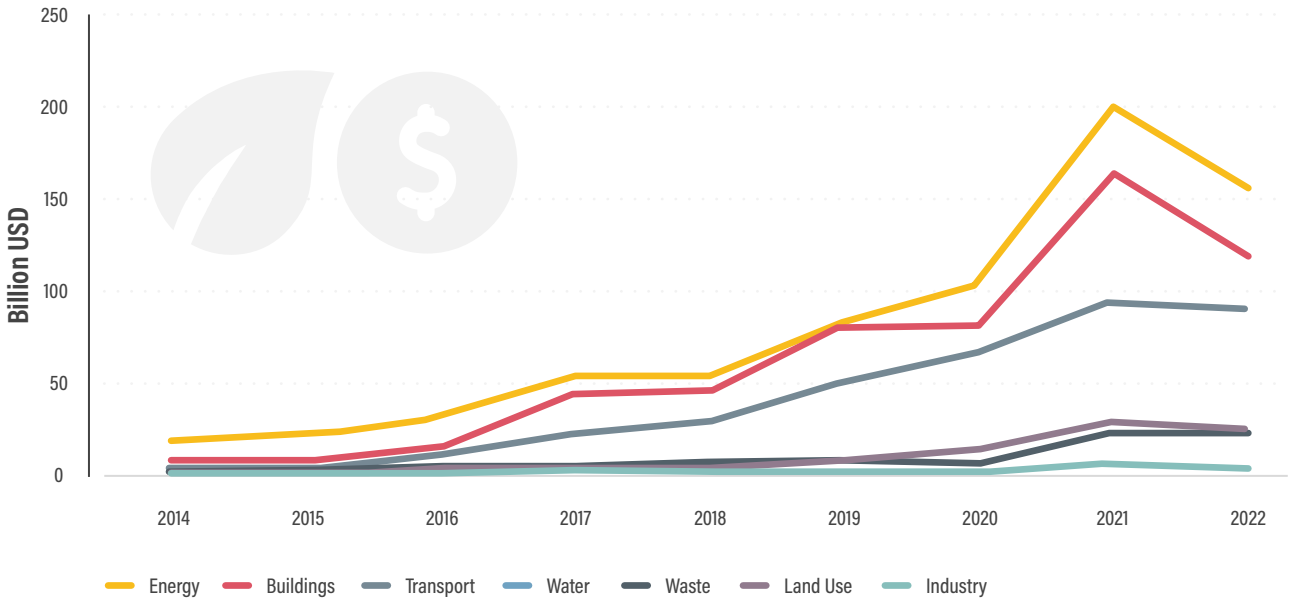
Source: See endnote 30 for this section.



Note: DFI = development finance institution FI = finance institution

FIGURE 7. Use of proceeds from global green bonds issuances, by sector, 2014-2022

Source: See endnote 38 for this section.



is differentiated from a regular bond by its label, which signifies a commitment to use the funds raised to exclusively finance (or re-finance) "green" projects, assets or business activities. Green bond volumes fell in 2022 from all sources except supranational, which increased 43% to USD 45.1 billion.[32]

The EU's extensive green bond programme has driven much of the growth in green bonds, issuing a cumulative USD 39.9 billion over four deals since its debut in October 2021.[33] Supranationals dominated the top ten sources of thematic debt in 2022, issuing USD 116 billion across the three categories of green, social and sustainability.[34]

- The United States was the largest country source and priced the highest share of sustainability deals (USD 21.5 billion).[35]
- China produced the largest volume of green bonds (USD 85.4 billion), while France dominated social bonds (USD 54.5 billion).[36]
- The Dominican Republic was the only country to join the green bond market in 2022, issuing a green bond to raise cash for the energy company EGE Haina to expand its Larimar I wind farm.[37]

Collectively, green bonds for energy, buildings and transport accounted for 77% of the total green debt volume in 2022 (down from 81% in 2021 and a high of 85% in 2020), with transport contributing just under USD 100 billion (see Figure 7).[38] Smaller use of proceeds categories (such as waste, land use, industry and ICT) are gaining share as more issuers (including large sovereigns) finance a broader range of projects. Adaptation-related investments gained the most share, although they still represent only a tiny portion of the market.

The Russian Federation's invasion of Ukraine affected capital market activity globally in 2022, triggering energy price spikes, inflation and rising interest rates. It also affected bonds bearing thematic labels, which represented 5% of total debt volumes (the same as in 2021) and fell 24% in value in 2022.[39]

Countries raised a record USD 95 billion in 2022 through carbon pricing schemes that charge firms for emitting carbon dioxide (CO_2), covering around 23% of global greenhouse gas emissions.[40] Several countries are using a price on carbon emissions to help meet their climate goals in the form of a tax, or under an emissions trading scheme (ETS) or cap-and-trade system. As of 2023, a total of 73 global carbon pricing instruments were in operation.[41] Carbon markets are evolving faster in high-income markets that have access to capital markets, while growth is slower in emerging markets where access to capital markets and integration of greenhouse gas emissions into a trading system are in development.

In the transport sector, progress in carbon financing is mixed. Most carbon markets have focused on aviation and maritime emissions and less on emissions from land-based transport.[42] **In road transport, 99% of the carbon price signal resulted from fuel taxes, not carbon pricing initiatives.**[43] Faced with declining tax revenues from fuel excise duty, countries face a shrinking tax revenue base as vehicles become more fuel efficient and as the penetration of electric vehicles increases. Addressing this evolution with a change in approach to carbon taxation of vehicle usage is increasingly important.

The largest carbon market globally is the EU Emissions Trading Scheme (EU ETS), the world's first, most extensive and longest-running international system for trading emission allowances. Since reforms to the scheme in 2018, the average annual price of carbon permits in the EU has increased significantly, and in February 2023, the carbon price reached a then-record high of EUR 100.34 (USD 108.93) per metric tonne of CO_2.[44] The EU ETS covers around 40% of EU greenhouse gas emissions and will include maritime transport emissions starting in 2024.[45] As maritime emissions come under growing scrutiny, the risk of "carbon leakage" and revenue loss for the EU ETS could grow, if ships opt to avoid ports that participate in the scheme.

On a global level, members of the International Maritime Organization are considering carbon pricing as a mid-term measure, with recent vigorous debate on this policy option *(see Section 3.8 Shipping)*.[46] Proposals by governments and industry range from a carbon levy on bunker fuel to an emission trading system coupled with a fuel emissions standard or a revenue-neutral feebate scheme.[47]

In the aviation sector, the International Civil Aviation Organization (ICAO) agreed on key parameters for its Carbon Offsetting and Reduction Scheme for International Aviation.[48] In 2022, the ICAO Assembly decided that the baseline above which airlines must offset emissions should be 85% of 2019 emissions, for both the voluntary and mandatory phases of the scheme. The ICAO also adopted a long-term and non-binding aspirational goal to reach net zero carbon emissions by 2050 (see *Section 3.7 Aviation*).[49]

Public policy support for electric vehicles

Government support to the transport sector takes a variety of forms, including setting up programmes and regulations, fiscal and public finance management support (such as grants, subsidies and taxation for infrastructure development) and climate action financing. Major economies have adopted important policies to support the uptake of electric vehicles and to promote transport decarbonisation across multiple modes. In Norway, where the share of electric car sales neared 90% in 2022, a comprehensive policy levies higher taxes on high-emission cars than on low- and zero-emission cars, helping to make the latter more affordable and enabling the country to offer incentives for zero-emission cars without any loss in revenue.[50]

Consumer and government spending on electric cars increased 50% in 2022 to reach USD 425 billion globally.[51] Most of this was spent by private or corporate consumers, while the government share of electric car spending remained at 10%, having fallen from more than 20% in 2017.[52] Maintaining strong growth in electric vehicle sales will depend on factors including the deployment of charging infrastructure, the availability of car models and battery costs – all of which require continuous support from government policies and private sector investment (*see Section 4.2 Vehicle Technologies*).

As the electric car market matures, reliance on direct subsidies is expected to phase out over time. The focus of government policy incentives is gradually shifting from consumers to charging infrastructure and battery manufacturing, leading to announcements of record investments in new battery manufacturing capacity in 2022. Budget-neutral feebate programmes – which tax inefficient internal combustion engine vehicles to finance subsidies for low-emission or electric vehicle purchases – can be a useful transition policy tool. Fuel taxation that reflects the societal and environmental impacts of driving more polluting vehicles, together with stringent vehicle efficiency or CO_2 standards, have helped leading markets increase electric vehicle adoption and are key to hastening the transition to electric mobility.

- The US Inflation Reduction Act of 2022 contains a suite of policies designed to accelerate electric vehicle adoption and the production of biofuels, synthetic fuels and hydrogen.[53]
- In 2022, the US Departments of Energy and Transport articulated a bold framework for transport decarbonisation, and the US Environmental Protection Agency has proposed multi-pollutant emission standards for light- and heavy-duty vehicles, aimed at helping to meet national targets for net zero emissions by 2050.[54]
- In February 2023, the EU advanced its transition to electric vehicles through the launch of the Green Deal Industrial Plan.[55] It also reached agreement on the Alternative Fuels Infrastructure Regulation, which will mandate Member States to roll out public charging infrastructure for light- and heavy-duty electric vehicles.[56]
- The EU reached agreement in 2022 on a law that will mandate the adoption of low-emission alternatives to fossil jet kerosene in aviation, as well as low-emission fuels in maritime transport.[57]

A proposal is being formulated to revise the EU ETS to cover maritime emissions in 2024 and to create a separate new ETS that also includes road transport emissions.[58]

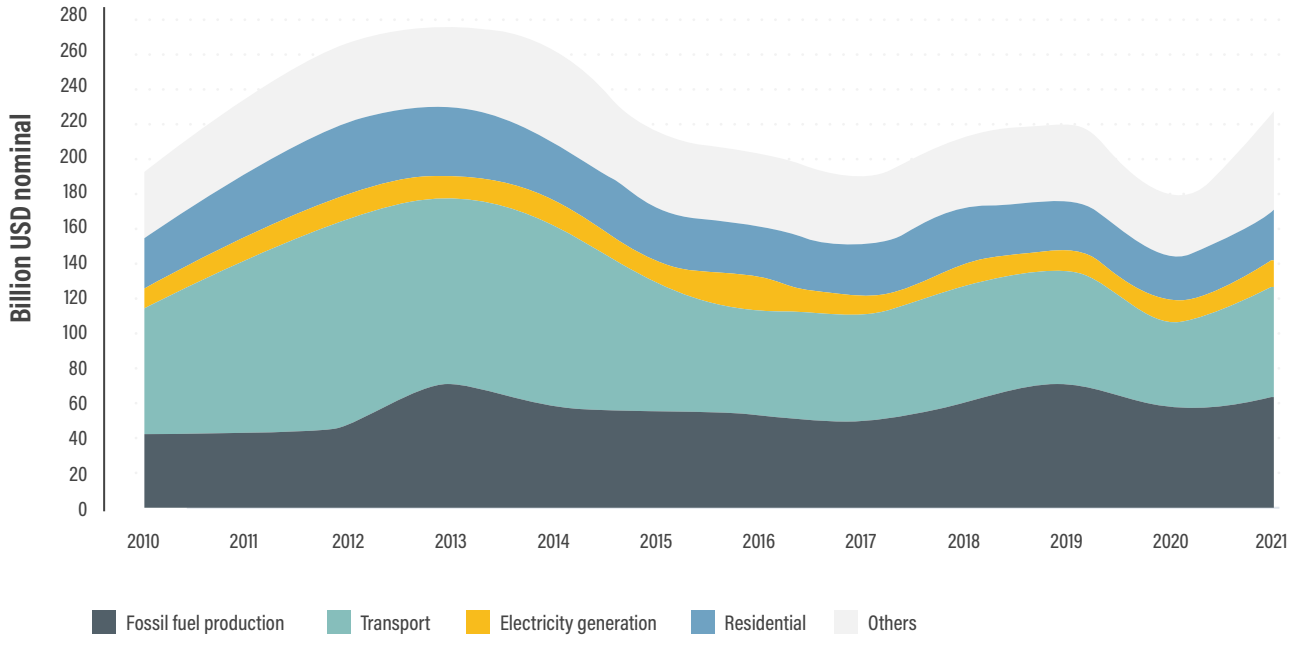
- In 2022, India adopted the Production Linked Incentives (PLI) scheme, which includes a programme to boost domestic battery manufacturing, with a budget of INR 181 billion (USD 2.2 billion).[59] India also adopted the Automobile and Auto Component PLI scheme, which grants incentives for sales of advanced automotive components and vehicles, including battery electric and hydrogen fuel cell vehicles.[60]
- In early 2023, Australia committed to putting in place a fuel efficiency standard for light-duty vehicles and formulated a National Electric Vehicle Strategy to accelerate the adoption of electric vehicles.[61]

Fossil fuel dependency of the transport sector

The transport sector relied on fossil fuels for nearly 96% of its energy consumption in 2020 and 2021 (*see Section 4.1 Transport Energy Sources*).[62] **In the transport sector alone, subsidies and other support for fossil fuels jumped 31% in 2021 due to the surge in fuel use following the lifting of COVID-related mobility restrictions** (see Figure 8).[63] Direct support for fossil-based fuels and electricity generation rose 23%, reflecting in part government interventions to shield households and firms from the impacts of high energy prices following the strong recovery in demand.[64] Support for fossil fuels had been trending downward since its peak in 2013, but it increased 27% in 2021 (to USD 227 billion) as energy prices rose with the rebound of the global economy.[65]

FIGURE 8. Fossil fuel support by sector in 51 OECD, G20 and Eastern Partnership countries, 2010-2021

Source: See endnote 63 for this section.



Major shift in venture capital for mobility technology

Despite a slump in revenues, auto companies maintained strong spending on research and development (R&D) in 2020 and 2021, in a push to gain a technological edge in the fast-changing mobility sector. In 2021, low-carbon mobility and battery start-ups accounted for a combined 35% of the spending growth and for 40% of the early-stage finance.[66] However, these shares are lower than in 2017-2019, as the growth in spending in 2021 was more evenly distributed among technology areas. Notably, early-stage mobility investment has been shifting away from companies developing electric vehicles and associated technologies. Overall, start-ups in the United States and Europe raised record funds despite the pandemic, boosted by energy storage, hydrogen and renewable energy technologies.

Electric vehicle start-ups have progressed rapidly through early-stage funding rounds (see Figure 9).[67] As the market consolidates around a smaller number of major players, their presence in later-stage funding has risen. In 2021, around USD 24 billion in late-stage venture capital – or more than half of all capital raised by clean energy start-ups – was channelled into electric mobility and batteries.[68] In China, new electric vehicle manufacturers have moved quickly from early to later stages, including Leap Motor, Zeekr, and Hozon, which together have raised more than USD 2.5 billion since 2021.[69] As near-term market expectations for electric vehicles are revised upwards, boosted by concerns about high oil prices and energy security, batteries remain an area of technology uncertainty and competition.

Meanwhile, funding for battery manufacturers has boomed, providing crucial capital to alternative chemistries and to emerging concepts for the extraction, processing and recycling of critical minerals.[70]

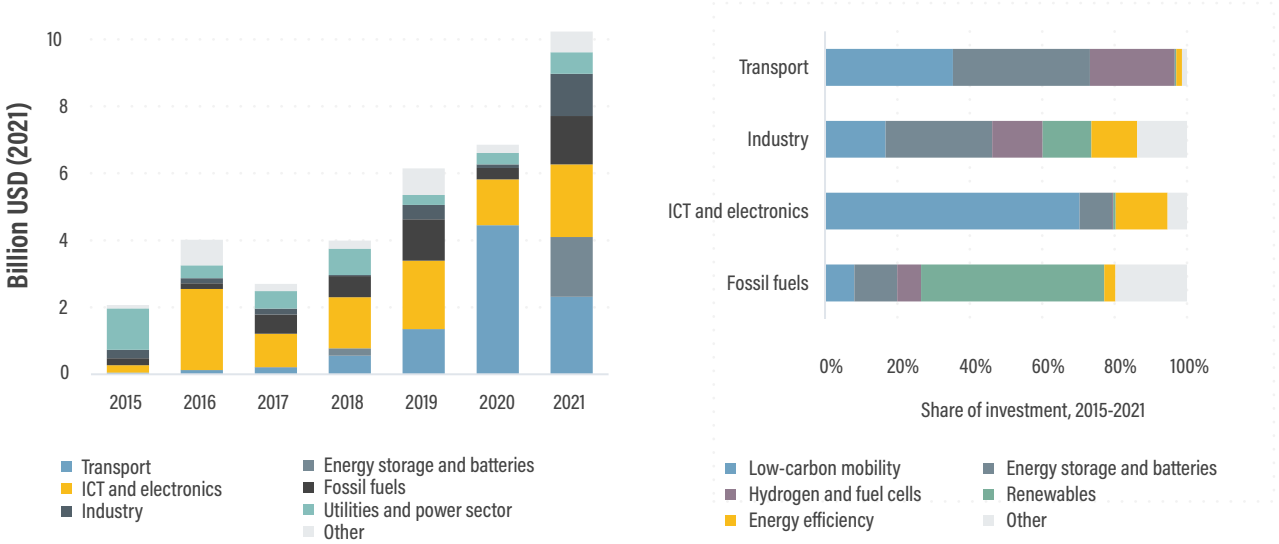
- Late-stage venture capital for energy storage and batteries surged to more than USD 12 billion in 2021, accounting for 45% of total year-on-year growth.[71]

FIGURE 9. Corporate venture capital investment in clean energy start-ups, 2015-2021

Source: See endnote 67 for this section.

Corporate VC investment in clean energy start-ups reaches an all-time high

Corporate VC investment in clean energy start-ups, by sector of corporate investor (left), and by technology area of start-up in which four of these sectors invest (right), 2015-2021



Notes: Includes early- and late-stage deals. Includes only investment by private sector investors. Where there are several investors, deal value is evenly split across them. ICT = information and communications technology. Left graph: Industry = chemicals, cement, commodities, construction (excluding real estate), iron and steel, and other equipment suppliers; Utilities and power sector = independent power producers, and electricity and renewables equipment and services.

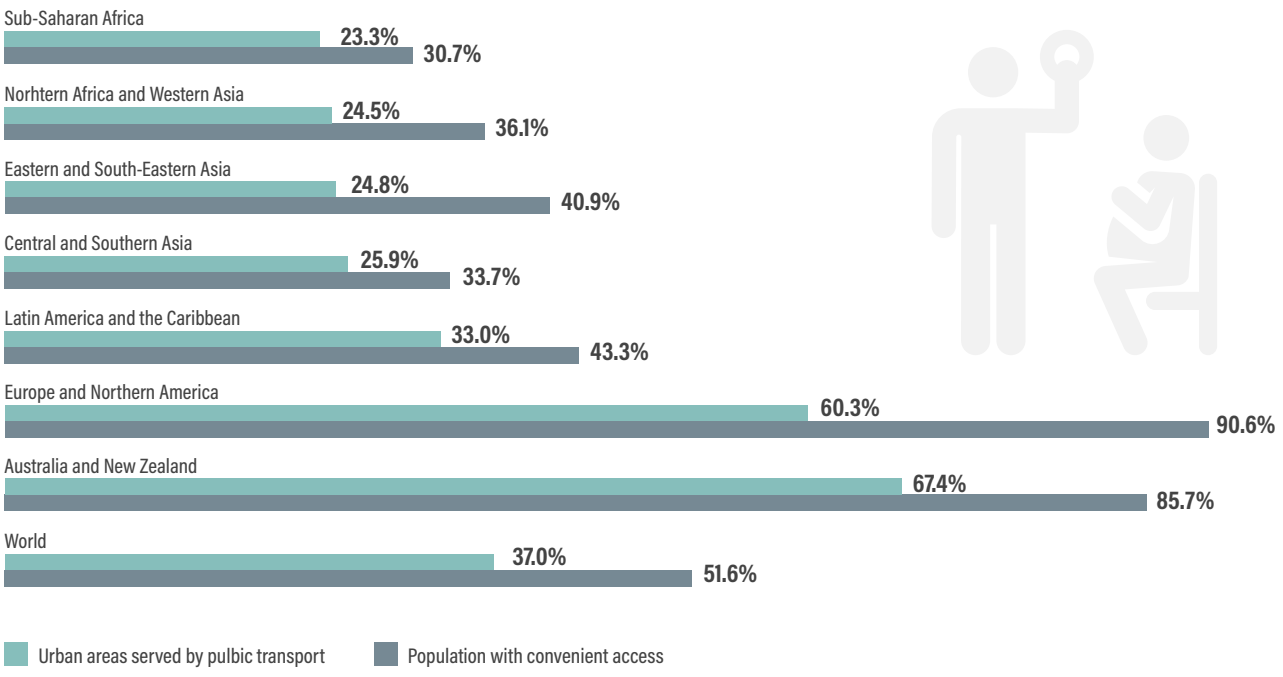
- In China, the battery developer Svolt raised more than USD 3 billion, and in Chinese Taipei the solid-state electric vehicle battery maker ProLogium Technology secured USD 326 million to expand production overseas.[72]
- In the United States, after raising USD 160 million from investors including BMW, Ford, and SK Group, the solid-state battery manufacturer Solid Power listed through a merger with a special-purpose acquisition company, raising more than USD 500 million.[73] Form Energy raised USD 240 million to develop long-duration iron-air battery storage, including via funds from ArcelorMittal.[74]
- In 2021, the French battery developer Verkor raised USD 118 million – including from the French government, Renault, Schneider Electric and Arkema – to build an R&D and pilot production facility.[75] In 2020, Verkor secured USD 1.4 billion in project finance for a 50 gigawatt-hour per year factory by 2030, as Europe expands public financing for the rapid scale-up of manufacturing by start-ups.[76]

Projected transport investment needs

Investment needs can change over time due to factors such as technological advancements, shifts in transport patterns, economic developments and policy changes. For transport sector decarbonisation, more focus is needed on addressing the service gap rather than the investment gap (see Figure 10)**, as ensuring improved services often requires more than capital investment** (for example, to cover the cost of maintenance over the life cycle of the asset)**.**[77] In many countries, improving the provision of sustainable transport services requires not just improved infrastructure and fleet modernisation, but also institutional change and capacity development.

FIGURE 10. Public transport coverage and share of the population with convenient access in urban areas, by region, 2022

Source: See endnote 77 for this section.



Note: Based on data from 1,507 cities in 126 countries.

BOX 1. Investment needs for the transport sector

Investment needs for the transport sector can vary greatly depending on the region, country, type of transport and specific projects being considered. Transport infrastructure includes roads, highways, railways, ports, airports, public transport systems and more. The investment needs typically cover various aspects such as construction, maintenance, upgrades and expansion of transport networks.

- **Low- and middle-income countries:** Many of these countries require substantial investments in basic transport infrastructure to improve connectivity, facilitate trade and support economic growth (see Box 2).[78]
- **Urban transport:** Urban areas often require investments in public transport systems such as buses, metros and light rail to alleviate traffic congestion and reduce pollution.
- **Rural connectivity:** In rural and remote areas, investments in road networks can improve access to essential services and markets for agricultural products.
- **Sustainable transport:** There is a growing emphasis on investing in sustainable transport modes such as electric vehicles, bike lanes, pedestrian-friendly infrastructure and integrated mobility solutions.
- **Maintenance and upgrades:** Existing transport infrastructure requires regular maintenance and occasional upgrades to ensure safety and efficiency.
- **Multi-modal connectivity:** Investment in seamless connectivity among different modes of transport (e.g., integrating roads, railways, ports and airports) can improve efficiency and reduce logistical costs.
- **Digital infrastructure:** Modern transport systems often require investments in digital infrastructure for smart traffic management, real-time information and efficient operations.

An estimated USD 2.7 trillion in annual investment (USD 40.5 trillion in total) will be needed globally between 2016 and 2030 to achieve low carbon transport pathways, with 60-70% of this investment occurring in emerging economies.[79] **However, regional investment gaps for transport infrastructure by 2040 are significant, estimated at USD 0.8 trillion for Africa, USD 1.6 trillion for Asia and USD 6.0 trillion for the Americas.**[80] Low carbon transport pathways entail an integrated approach of "Avoid", "Shift" and "Improve" measures that must be implemented quickly to avoid lock-in effects of carbon-intensive and cost-intensive infrastructure and behavior.[81]

Global investment needs for transport infrastructure through 2050 are an estimated USD 50 trillion.[82] **Reducing emissions through low carbon urban mobility would require investments totalling USD 1.83 trillion (around 2% of global GDP), which would result in estimated savings of USD 2.8 trillion in 2030 and nearly USD 7.0 trillion in 2050.**[83]

- In Africa and in the Americas, 95% and 88% respectively of the investment gap is associated with road transport, whereas in Oceania the gap for road infrastructure is much smaller.[84] Globally, 88% of roadways do not meet minimum walking safety requirements, and 86% do not meet minimum cycling safety requirements.[85]
- More than 9 out of 10 streets in Africa do not meet minimum walking and cycling safety requirements (s*ee Section 3.2 Walking*). The Rural Access Index, measuring the share of people with access to an all-season road within a walking distance of 2 kilometres, shows that African countries have the lowest access, with shares reaching only 11.4% in Malawi and 22.3% in Mali in 2017.[86]

BOX 2. Projections of transport investment needs for low- and middle-income countries

- In 2019, the **World Bank** estimated that to pursue a decarbonisation pathway, low- and middle-income countries would need to increase their investment in transport infrastructure by 1.3% of GDP, with overall investment of USD 417 billion annually between 2015 and 2030. Ongoing spending on maintenance would require increasing spending by 2.6% of GDP.
- The **Inter-American Development Bank** estimates that closing gaps in road infrastructure, airports and public transport requires an annual investment of 1.37% of the regional GDP of Latin America and the Caribbean from 2019 to 2030.
- The **Asian Development Bank** estimates that developing Asia will need to invest USD 26 trillion from 2016 to 2030, or USD 1.7 trillion annually, to maintain its growth momentum, eradicate poverty and respond to climate change. Without climate change mitigation and adaptation costs, USD 22.6 trillion will be needed, or USD 1.5 trillion annually (baseline estimate). Of the total climate-adjusted investment needs over 2016-2030, USD 8.4 trillion is for transport.

Source: See endnote 78 for this section.

Partnership in Action

SLOCAT partners engaged in dozens of actions during 2020-2022, including:

- **Climate Bond Initiative** released version 2 of the Low Carbon Transport Criteria certifying low carbon transport green bonds.[87] Bonds certified under these Criteria will also automatically meet the green definitions for transport in the EU taxonomy on sustainable finance.
- **Financing Fundamentals For the Decarbonization of the Transport Sector** was developed in 2021 to facilitate an understanding of the power of innovative financing, guide policymakers and practitioners through best practices and case studies, and incentivise and advocate for political leadership and buy-in.[88] This activity has been developed with the leadership of the Transformative Urban Mobility Initiative (TUMI), the German Federal Ministry for Economic Cooperation and Development (BMZ), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the World Resources Institute (WRI), in collaboration with the SLOCAT Partnership on Sustainable, Low Carbon Transport.
- The **Global Facility to Decarbonize Transport (GFDT)** at the World Bank was established in fiscal year 2021 as a multi-donor trust fund. The GFDT supports the deployment of low carbon mobility and resilient transport solutions through: 1) project design and implementation (targeting pilot projects with measurable climate benefits that use innovative technology); 2) research and data (understanding that robust analytics are essential in identifying specific challenges and identifying the right solutions); and 3) capacity building (helping clients modernise policies, regulations and institutions to catalyse more resources for low carbon transport).
- **Towards a Gold Standard for Transport Investment – A blog series by SLOCAT** features a range of experts and change makers who are powering the sustainable, low carbon transport revolution by advancing adequate financing to reach the scale of decarbonisation of the transport sector necessary to achieve Paris Agreement targets.[89]
- **World Resources Institute's Reimagining Public Transport programme** provides sustainable financing for cities in Brazil, China, India and Mexico to enable funding for high-quality infrastructure and operations that can provide reliable and frequent service, affordable to the public, from government, the private sector and new forms of finance such as demand management.[90]

MODULE 1 **SPOTLIGHT 5**

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Capacity and Institutional Support to Achieve Sustainable, Low Carbon Transport

The demand for both passenger and freight transport continues to grow, driven by global and regional integration and urbanisation. Capacity development plays a critical role in addressing the many challenges facing the transport sector, from ensuring integrated planning to fostering inclusive and equitable human development in harmony with nature. However, to achieve meaningful and lasting impact, it is imperative to better understand the strengths and weaknesses of existing capacity development programmes, identify gaps and tailor interventions to meet the evolving needs of transport professionals, city authorities and other stakeholders.

SLOCAT Partnership on Sustainable, Low Carbon Transport

Transport, Climate and Sustainability
Global Status Report - 3rd edition

Note: This spotlight explores the state of play of capacity development programmes in the transport sector. We invite feedback, advice and suggestions from practitioners, policy makers, researchers and all those invested in advancing capacity development in the sector. We also encourage international engagement and collaboration to foster knowledge sharing, best practices and the exchange of experiences across different regions and contexts.

Contexts and Challenges

Urban sprawl

A study by the International Transport Forum shows that despite global uncertainties, the world's urban population is expected to grow more than 40% by 2050, while urban passenger travel demand will almost double. Without sound regulatory frameworks, this will lead to significant urban sprawl.[1]

Investment gaps

As a result of the high growth in demand for passenger and freight transport, there are significant investment needs that can only be partially met. If investments do occur, they are often made in unsustainable infrastructure, with a road-centric focus that disregards integrated approaches to sustainable transport and mobility. Moreover, public administrations are frequently unable to adequately plan urban development (and with it urban transport), in particular using long-term perspectives.

City planning and management

According to the World Cities Report 2022, cities are facing a decrease in the share of planned areas **(see Figure 1)**.[2] Without sound planning and management capacities, urban areas are unable to achieve compact integrated and connected development.[3]

Administrative and institutional capacities

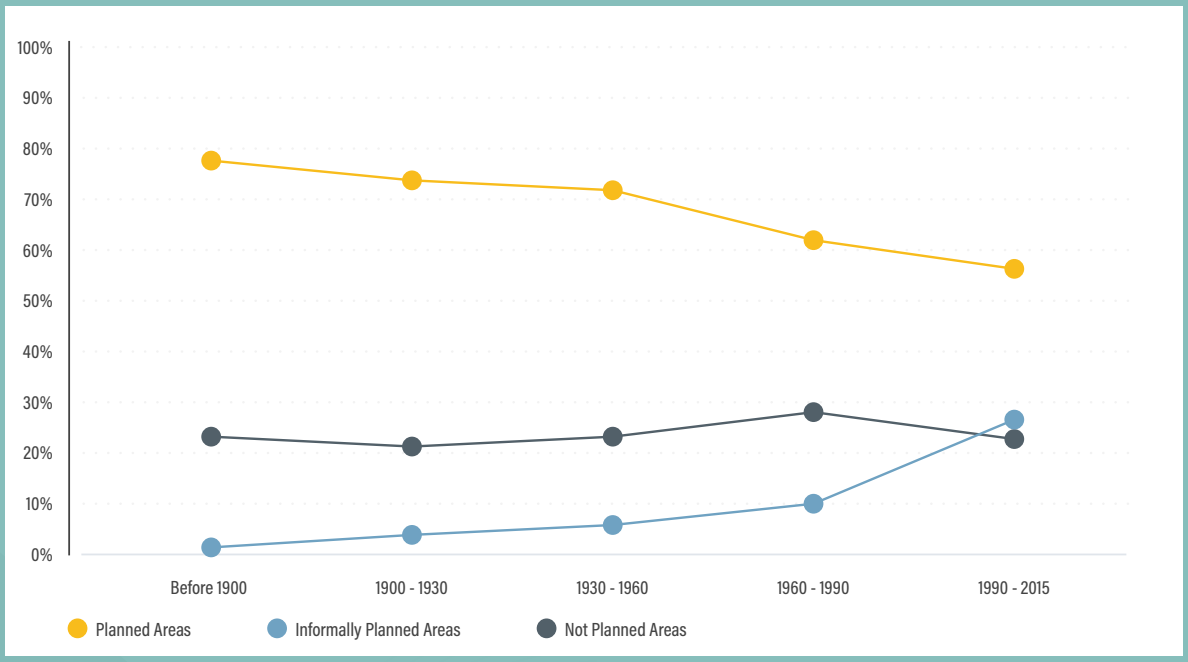
In addition to conflicting political directives or lack of investments at scale, deficiencies in administrative structures and limitations in personnel and institutional capacities are essential and frequent challenges that hinder integrated transport and mobility planning efforts.

Expectations for capacity building needs:

- **At the individual level**, transport experts are required to possess not only technical and economic skills but also abilities in areas such as reform support, negotiation management and financing to solve everyday transport issues while ensuring long-term sustainable mobility. The concept of lifelong learning is already being actively embraced, particularly in dynamic fields such as mobility, where innovation cycles are becoming shorter.
- **At the city level**, urban areas must manage the financing of transport infrastructure, establish reliable governance structures and consider a broad spectrum of environmental and societal requirements.
- **At the state level**, governments – particularly finance, transport, planning, and local self-government ministries – have the responsibility to establish appropriate regulatory frameworks for sustainable urban mobility.

FIGURE 1. Share of cities with planned areas, pre-1900 to 2015

Source: See endnote 2 for this section.



A stocktake on capacity development needs shows that only very limited, often sporadic information is available on the concrete needs for enhancing professional skills and strengthening institutions. There is no known regional or international quantified stocktaking.

As a first step, action is needed to conduct a comprehensive stocktake on capacity development in the transport sector, addressing the requirements and challenges facing transport experts, cities, states and the global community. This assessment should involve evaluating current training programmes, identifying gaps, sharing best practices and fostering international co-operation to accelerate the implementation of sustainable transport concepts worldwide.

Scale of challenge

Around 57% of the global population lived in urban areas in 2022.[4] By mid-century, the urban population is expected to near 68%, much of it in low- and middle-income countries.[5] The 20 largest cities in the fastest-growing nations – India, Nigeria, Pakistan, Ethiopia, Tanzania, Indonesia, Egypt and Congo – had an estimated combined population of 250 million people in 2018, which is projected to exceed 650 million by 2050.[6]

If we assume that 100 skilled personnel are needed to manage and plan urban mobility in cities with a population of under 1 million, and that 250 such personnel are required for cities with more than 1 million people, then around 25,000 skilled individuals would be required just for 160 cities. Considering the projected population increase, this number would increase to around 33,100 skilled personnel by 2050. The estimate does not account for the high turnover rate in public administration jobs or for the increasing complexity of these tasks in the future.

Since this calculation covers only less than 10% of the total urban population in low- and middle-income countries, a target number of at least 250,000 skilled staff across these countries would be a reasonable initial estimate. Notably, these figures do not account for the significant needs at the national and local levels for skilled planners in non-urban transport planning or in related areas such as urban planning and land management.

To refine the above calculations and provide a solid basis for decision making, the following questions need to be thoroughly assessed:

- How do the staffing requirements for urban mobility management differ based on city size and population?
- What are the potential consequences of not accounting for the high turnover rate in public administration jobs, and for the increasing complexity of urban mobility planning tasks in the future?
- What strategies can be implemented to attract and retain skilled personnel in urban mobility management positions?
- How does the estimated number of skilled personnel required for managing urban mobility in low- and middle-income countries compare to the current availability of such professionals?
- What are the potential impacts of a shortage of skilled staff in urban mobility management on the quality of urban infrastructure and services?
- How can the estimate of 250,000 skilled urban mobility planners across low- and middle-income countries be validated and refined based on the specific needs and characteristics of different cities and regions?

Approaches for capacity development

Various forms of capacity development are available in the transport sector. These vary by target group, size, methods, and content, reflecting the diversity of approaches used to enhance skills, knowledge and expertise in the field (see Table 1). By examining different methods such as webinars, e-learning, expert training, and on-the-job training, stakeholders can identify appropriate strategies to meet their specific capacity development needs (see Table 2). Gaining a better understanding of the range of approaches can lead to informed decision making and facilitate the adoption of effective capacity development practices in the transport sector.

What evidence exists regarding the impact and effectiveness of each form of capacity development mentioned above? The following questions include some of the aspects that must be thoroughly considered to get to such assessment:

- Are there any studies or evaluations that provide insights into the scalability and replicability of these capacity development approaches?

TABLE 1. Overview of different forms of capacity development in the transport sector

Form/Type of capacity development	Target group	Size	Methods	Content
Webinar	Transport experts, city officials, stakeholders	Variable	Online presentations, interactive discussions	Introduction to specific topics, knowledge sharing, case studies
E-learning	Transport professionals, city authorities, technicians	Variable	Online courses, modules, quizzes	Technical skills, policy frameworks, best practices
Dive-in training	City planners, engineers, project managers	Small to medium groups	On-site visits, field exercises, workshops	Hands-on experience, project-specific skills, problem solving
Expert training	Transport professionals, policy makers, government officials	Small to medium groups	Workshops, seminars, expert-led sessions	In-depth knowledge, policy development, strategic planning
On-the-job training	Transport operators, technicians, new hires	Individual or small groups	Mentoring, shadowing, hands-on practice	Practical skills, operational procedures, safety protocols
Formal education	Students, aspiring professionals	Large groups	Classroom lectures, coursework, examinations	Theoretical knowledge, technical skills, research methods

TABLE 2. Capacity needs and impacts of different stakeholders

Stakeholders	Needs	Impact
Political decision makers/ management in city administrations/transport companies – alignment of initiatives, programmes and projects towards sustainable mobility/e-mobility	■ Planning of initiatives, programmes and projects towards sustainable mobility/e-mobility ■ Initiation of reform steps ■ Innovation	■ Active on-the-job training/mentoring ■ Long-term: sustainable mobility in academic curricula and/or links to government career programmes
Employees in city/regional administrations in transport departments, etc.	■ Planning and implementation of projects in the field of sustainable mobility (infrastructure/ vehicles)	■ (Academic) training ■ Further education through training ■ On-the-job training
Employees in transport companies (bus drivers, mechanics, electronics technicians, etc.)	■ Education and training for the operation of sustainable infrastructure and (electric) vehicles	■ Training (dual vocational education and training) ■ Continuing education ■ On-the-job training

- How can we measure and assess the long-term impact of different capacity development methods on the skills, knowledge and performance of individuals and organisations?
- What are the potential barriers and challenges in scaling up these capacity development approaches across different contexts and regions?
- Have there been any successful examples of scaling up specific forms of capacity development? If so, what were the key factors that contributed to their scalability?
- What strategies and resources are needed to expand the reach and impact of webinars, e-learning and other technology-enabled capacity development methods?
- How can we ensure that expert training and on-the-job training programmes are accessible to a larger number of participants without compromising the quality of learning?
- What collaborative efforts and partnerships can be established to promote the scaling up of effective capacity development models, such as sharing best practices and lessons learned?
- How can data-driven approaches, including monitoring and evaluation, help inform the scaling up of capacity development initiatives in the transport sector?
- Are there specific policies, funding mechanisms or regulatory frameworks that need to be in place to support the scaling up of different forms of capacity development?
- What capacity development programmes and initiatives are in place at the individual, city, state and global levels?
- How effective have these programmes been in addressing the skills and knowledge gaps in the transport sector?
- What are the strengths and weaknesses of the existing capacity development initiatives?
- Are there any gaps or areas that require further attention?

In recent years, the global transport community has built up a substantial range of capacity developments offers. The following is a non-exhaustive list of example efforts and offerings funded by Germany's Agency for International Cooperation (GIZ):

- The **Leaders in Urban Transport Planning (LUTP)** programme empowers policy makers with the skills needed to identify, prepare and implement holistic strategies that address complex urban transport challenges.[7]
- The **Master 2 en Transport et Mobilité Durable dans les Villes Africaines programme** – created in 2014 by CODATU, Senghor University, the African School of Architecture and Urban Planning (EAMAU) and the National Conservatory of Arts and Crafts of Paris (CNAM) – supports the development professional sectors in the field of transport and urban mobility and contributes to the strengthening of expertise in African countries.[8]
- To scale and facilitate the capacity building process, **MobiliseYourCity** developed a full catalogue of training materials, summarising the most important knowledge on Sustainable Urban Mobility Planning.[9]

- The **Transformative Urban Mobility Initiative (TUMI)** is the leading global implementation initiative on sustainable mobility, formed through the union of 11 globally recognised partners. The TUMI Training Catalogue offers a range of tailor-made sessions to dive deep into the topic of accessibility in public transport modes (e.g., cycling, electric buses, gender, leadership, planning).[10]
- The e-learning course **Transforming Urban Mobility: Introduction to Transport Planning for Sustainable Cities** covers the different dimensions of sustainable urban mobility, including the "Avoid-Shift-Improve" framework, which strives to achieve significant reductions in greenhouse gas emissions, energy consumption, and congestion, with the ultimate objective of creating more liveable cities (see Table 3).[11]

Further questions for consideration:

- What capacity development programmes and initiatives are in place at the individual, city, state and global levels?
- How effective have these programmes been in addressing the skills and knowledge gaps in the transport sector?
- What are the strengths and weaknesses of the existing capacity development initiatives?
- Are there any gaps or areas that require further attention?

TABLE 3. List of e-learning courses of Transforming Urban Mobility: Introduction to Transport Planning for Sustainable Cities

Thematic field	Country	Target group	Contact	Web link
Transforming Urban Mobility: Introduction to Transport Planning for Sustainable Cities	Global	All stakeholders / Online	TUMI	https://www.futurelearn.com/courses/introducing-sustainable-urban-mobility
Transforming Urban Mobility: Components of Transport Planning for Sustainable Cities	Global	All stakeholders / Online	TUMI	https://www.futurelearn.com/courses/components-of-sustainable-urban-mobility
Achieving Transitions to Zero Carbon Emissions and Sustainable Urban Mobility	Global	All stakeholders / Online	Funded by EIT Implemented by UCL, TUMI, ICLEI	https://www.futurelearn.com/courses/achieving-zero-carbon-sustainable-urban-mobility
MRV – Emission Monitoring, Reporting & Verification (MRV)	Global	All stakeholders / Online	TraCs	Launch planned for 2023
Gender & Inclusive Mobility Course 1	Global	All stakeholders / Online	WMW (by TUMI)	Launch planned for 2023
Gender & Inclusive Mobility Course 2	Global	Advanced experts / Online	WMW (by TUMI)	Launch planned for 2023
Digitisation, E-Mobility	Global	All stakeholders / Public Transit Agencies / Operators	TUMI E-Bus Mission	https://www.mobility-academy.eu/enrol

Better data and capacity development

Data on capacity development in all its dimensions are crucial for effective planning, implementation and evaluation of interventions in the transport sector. Collecting and analysing relevant data can provide valuable insights into the effectiveness, impact and gaps in capacity development efforts. A comprehensive overview is lacking on the current offers, as well as on demand, quality of staff and institutions, etc. To fully assess the state of capacity development, the following data could be needed:

- **Demographic data:** Information on the target audience, such as transport experts, city officials, and stakeholders, including their profiles, qualifications and areas of expertise (capacity needs assessment).
- **Skill assessment data:** Assessments or evaluations of the skills and knowledge levels of participants before and after the capacity development programmes to measure the impact and effectiveness of the interventions.
- **Resource allocation data:** Data on the financial resources allocated to capacity development initiatives, including budgetary allocations for training programmes, infrastructure development and support systems like mentorship or coaching.
- **Stakeholder engagement data:** Information on the level of engagement and collaboration with stakeholders – such as transport agencies, academic institutions, private sector entities and civil society organisations – to understand the extent of partnerships and knowledge sharing.
- **Monitoring and evaluation data:** Data collected during the monitoring and evaluation process, including feedback from participants, surveys, and qualitative or quantitative assessments of program outcomes and impacts.
- **Performance data:** Data on the performance of trained individuals or teams, such as project outputs, achievements and improvements in their respective roles within the transport sector.
- **Sustainability data:** Data on the long-term effects and sustainability of capacity development efforts, including the retention of trained professionals, the integration of new skills and practices into policies or processes, and the establishment of knowledge sharing networks.
- **Training data:** Data related to the various forms of capacity development, including the number of participants, duration of training and types of training methods employed (e.g., webinars, e-learning, on-the-job training).

Collecting and analysing these types of data can provide valuable insights into the strengths and weaknesses of capacity development initiatives, facilitate evidence-based decision making, inform resource allocation and support continuous improvement in the field of transport capacity development. This should also reflect the current and potential role of national governments and institutions as well as international partners.

To institutionalise data collection and facilitate the provision of information, the establishment of a global transport and capacity development observatory (or similar format) could be encouraged. This should bring together stakeholders both from the transport arena and from education and skills backgrounds. Further, there is a need to better understand the financial implications (costs and benefits) of enhanced training and education in the field of transport.

Sustainability of capacity development efforts

Ensuring the sustainability of capacity development efforts requires continuously integrating the sustainability approach into global efforts for capacity development. To achieve lasting engagement from participants, simple measures such as establishing an alumni network and setting up a helpdesk should be implemented on the local, regional and international levels. Such resources enable participants to continue benefiting from ongoing communication and support even after completing the training.

To incorporate additional knowledge partners in the long run, a franchise-like approach with quality-assured individual products can be considered. By forming strategic partnerships, collaborating with experts in specific domains, and leveraging their knowledge, the training efforts can expand and address a wider range of topics.

Additional questions based on the given items include:

- How can we ensure the long-term sustainability of international capacity development approaches?
- What measures can be taken to continuously monitor and ensure the quality of the covered topics?
- What strategies can be implemented to foster lasting engagement and involvement from participants, such as alumni networks or helpdesk services?
- How can we effectively support participants and international partners in applying the knowledge gained during the training in real-life situations?

- What approaches can be adopted to involve additional knowledge partners and expand the training offerings while maintaining quality assurance?
- How can we develop sustainable approaches to finance training and education in the field of transport?

With a broader perspective, we should continue analysing the role of international co-operation and knowledge exchange:

- How are countries and cities collaborating and sharing knowledge in the field of sustainable transport?
- What mechanisms are in place for international co-operation and knowledge exchange, within and beyond the activities related to official development assistance?
- How can existing networks and platforms be strengthened or expanded to facilitate knowledge sharing and collaboration?

Way forward

To really make a difference in the area of capacity development for transport and mobility, a comprehensive approach is needed that ambitiously drives the transformation of transport and mobility systems worldwide. Concerted action is required that 1) develops new narratives, 2) penetrates the identified areas of public administration management, and 3) initiates the corresponding transformation course. Action areas comprise the following:

Standards and guidelines:

- Renew all construction standards, guidelines, related documents, etc. in the next 10 years and align them with the topics of climate and sustainable development (i.e., international promotion of "comprehensive renewal").
- Identify the best standards and regulations worldwide, extract the technical core and make it available internationally, and introduce it into dialogue formats.
- Ensure accessibility to sustainable infrastructure for populations, and set targets to build implementation capacity.

Professional associations:

- Provide broad support for (new) professional associations in the transport sector that meet ambitious objectives.
- Create wider impact through connection to neighbouring fields such as urban development, etc.
- Link to career development.

Education (among others):

- Modernise the curricula, teaching materials and supporting materials and underpin them with comprehensive audiovisual communication.
- Create and expand sustainability clusters (bubbles) and penetrate and transform existing bubbles (architects, investors).
- Use existing social platforms to democratise education, through the creation of bottom-up content (memes, infographics, local examples).
- Use a data point system similar to that used by architects and link it to the career process.

Together, it is possible to work towards enhancing the effectiveness and impact of capacity development efforts for more inclusive, sustainable, and efficient transport and mobility systems.

5.1
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SPOTLIGHT 5: CAPACITY AND INSTITUTIONAL SUPPORT TO ACHIEVE SUSTAINABLE, LOW CARBON TRANSPORT

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This report should be cited as:

SLOCAT (2023), Global Status Report on Transport, Climate and Sustainability – 3rd edition, www.tcc-gsr.com.

Data access and licensing:

The development of this report was led by Maruxa Cardama, Angel Cortez, Emily Hosek, Agustina Krapp, Nikola Medimorec and Alice Yiu from the SLOCAT secretariat. Our warm thanks to the many SLOCAT partners and experts from the wider transport community who have shaped this report. A significant share of the research for this report was conducted on a voluntary basis.

For a full list of acknowledgements, please visit the online page here.

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