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HOW TO UNLOCK PUBLIC TRANSPORT FOR CLIMATE AND SUSTAINABLE DEVELOPMENT

Six Areas for Action



WORLD
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ABBREVIATIONS

APTA	American Public Transport Association
C40	C40 Cities Climate Leadership Group
ETF	European Transport Workers' Federation
ITF	International Transport Workers' Federation
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
ITDP	Institute for Transportation and Development Policy
MYC	Mobilise Your City
NDC	Nationally Determined Contributions
SLOCAT	Partnership on Sustainable Low Carbon Transport
SSATP	Africa Transport Policy Program
TfL	Transport for London
TUMI	Transformative Urban Mobility Initiative
UIC	International Union of Railways
UITP	International Association of Public Transport
UNFCCC	United Nations Framework Convention on Climate Change

FOREWORD

Since its inception in 2017, the Sustainable Mobility for All (SuM4All) Partnership has been advocating for sustainable mobility in international forums, with transport decarbonization being one of the four goals for transport systems to achieve globally. The Partnership's 56 Member organizations were instrumental in framing the policy knowledge around decarbonization, universal access, efficiency, and safety that would support cities and countries on the path to achieving these goals. In recognition of the Partnership's achievements, the [United Nations Climate Change Conference \(UNFCCC\)](#) in 2021 acknowledged the Partnership as a champion of transport decarbonization in climate change action around the world.

The 27th United Nations Climate Change Conference (COP27) will take place in Egypt between November 6 and 18, 2022. COP27 is expected to advance action on several fronts—adaptation, the just transition toward decarbonization, and climate finance. Early in 2022, the Partnership engaged with country decision makers at a roundtable discussion to identify the most pressing demands for action on transport to bring forward at COP27. Appropriate e-mobility choices, international cooperation, investing in public transport, and the business of exporting used vehicles to the Global South, were the issues that took center stage. The Partnership mobilized itself into working groups to delve deep into these issues, develop a clear policy agenda for action at COP27, and influence policy debates on these matters.

We are pleased to release five important contributions to COP27 in the “GRA in Action Series.” They include: (i) E-mobility in Low-Income Countries in Africa: Finance, Governance, and Equity; (ii) Decision-Making Tool for E-Mobility Investments; (iii) Electromobility and Renewable Electricity: Developing Infrastructure for Synergies; (iv) Empowering E-mobility In the Global South: The Case of Two Cities—Cuenca and Nairobi; and (v) How to Unlock Public Transport for Climate and Sustainable Development: Six Areas for Action. The products are the outcome of a year of engagement with Member organizations, countries' decision makers, partners, and field experts.

The “GRA in Action Series” aims at generating a better understanding of transport decarbonization, collecting global experiences, and deep diving into the associated policy measures in the Global Roadmap of Action (GRA) to make them more pragmatic for countries' decision makers.

We thank the World Resource Institute (WRI) and the World Bank for leading the preparation of this important paper on six areas for action for reimagining and rethinking public transport to recover, thrive, and meet climate, health, access, and equity goals. This paper also provides more than 30 recommendations for action, giving examples of how cities and countries have brought these actions to life.

Sustainable Mobility for All Steering Committee
(On behalf of our 56 Member organizations)
November 2022, Washington, D.C.

ACKNOWLEDGMENTS

The working group “Reimagining Public Transport” under the umbrella of the Sustainable Mobility for All (SuM4All) partnership co-led by Benjamin Welle World Resource Institute (WRI) and Georges Bianco Darido (World Bank) prepared this paper, which was authored by Stefanie Sohm (independent transport and climate policy consultant).

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PREFACE

Public transport is progressively recognized for its critical role in achieving the Paris Agreement and supporting sustainable, social, and economic development. Yet, the resolve to develop public transport has been inadequate to meet climate and development goals. Action must increase considerably.

While public transport has faced long-standing challenges, new ones have arisen: the COVID-19 crisis demonstrated how essential public transport is for societies' resilience, and, at the same time, put even more pressure on its financial health. The climate crisis makes the decarbonization of transport an urgency; new climate hazards pose threats to our transport systems and, to critical functions of society.

This paper provides international, national, and local decision makers with concise, pragmatic, and action-oriented guidance to unlock public transport's potential to fight the climate crisis and support sustainable social and economic development. In the introductory section 'Why it's Time to Act' we highlight the need and the growing momentum to accelerate the development of public transport. 'Six Strategic Areas of Action' presents essential elements and levers to craft a resilient and well-performing public transport system. 'Putting Public Transport Policy to Action' summarizes 34 recommendations to action, indicates potential roles of key stakeholders involved, and gives examples of how cities and countries have brought these actions to life.

The Public Transport Working Group under the SuM4All Initiative stands ready to support growing international action and to engage with the global community to unlock the potential of public transport.

RELATED WORK UNDER SUM4ALL

As part of the "GRA in Action" series, this paper aims to provide a better understanding, collect global experience, and deep dive into the associated policy measures in the GRA to make them more actionable for country decision makers. This paper adds to the body of GRA in action series publications dedicated to the sustainable transport sector. It is the first paper that sets a particular focus on reimagining public transport with key strategic areas of action after COVID-19 to deliver on climate and sustainable development. Other related papers of the GRA in Action series toward COP27 include:

- ▶ E-mobility in Low-Income Countries in Africa: Finance, Governance, and Equity (SuM4All 2022)
- ▶ Decision-Making Tool for E-Mobility Investments (SuM4All 2022)
- ▶ Electromobility and Renewable Electricity: Developing Infrastructure for Synergies (SuM4All 2022)
- ▶ Empowering E-mobility In the Global South: The Case of Two Cities--Cuenca and Nairobi (SuM4All 2022)

KEY TAKEAWAYS

Public Transport is vital to sustainable and low-carbon societies. Despite its many benefits, its expansion has long been neglected, and investments have prioritized private vehicle infrastructure in many places. During the COVID-19 pandemic, public transport demonstrated its key role for societies' resilience, while more pressure was put on its funding. Six strategic areas of action need to be addressed to unlock public transport's capacity to deliver on climate:

EMBRACE PUBLIC TRANSPORT AS A SOLUTION FOR CLIMATE AND SUSTAINABLE DEVELOPMENT.

A strong shift from individual motorization to attractive public transport systems, compact cities that favor shorter trips, walking and cycling, and electrification of vehicles will drive realization of climate goals. Also, public transport is key to achieving several sustainable development goals (SDGs) guided by ambitious targets. Therefore, it needs to be mainstreamed into both debates and its development be guided by ambitious targets.

RAMP UP FINANCE FOR PUBLIC TRANSPORT

Expanding public transport can lower the total cost of urban mobility by US\$ 5.3 trillion per year in 2050 (ITDP and UC Davis 2021). Budgets need to shift focus from car-centered mobility systems to public transport. Stable funding can come from different public and private sources. Public and private investments need to work together in a fair way; both need to be supported with national, climate, and development finance.

SHAPE CITIES AND PUBLIC TRANSPORT FOR ACCESS AND ATTRACTIVENESS

A city's attractiveness is determined by its ability to provide access to opportunities and a livable and healthy environment. It comes from a combination of mixed land use, compact cities and transit oriented development; well-connected and multimodal networks; flexible and shared transport services; digital technologies for transport's attractiveness; and prioritizing public transport while discouraging private motor vehicle use.

ANCHOR PUBLIC TRANSPORT IN STRONG INSTITUTIONS AND COLLABORATIONS

Sustainable urban mobility, with public transport as a backbone, requires a holistic approach. Transport authorities fundamentally determine the power to develop public transport and urban mobility, across modes and territories. Strong cooperation between transport authorities, transport providers, workers, and communities are the basis for greater service.

DRIVE PUBLIC TRANSPORT TO BE JUST AND INCLUSIVE

Public transport is a strong lever for a more inclusive society when developed with its users and workers in mind. Public transport policies should support those of lower incomes, be gender sensitive, and address the

needs of marginalized and vulnerable groups. It should consider informal public transport workers as part of the solution, and public transport workers as a central pillar of its performance.

EQUIP PUBLIC TRANSPORT FOR CLIMATE'S FUTURE

Meeting climate targets requires a rapid and massive increase in electric bus fleets and the phase-out of internal combustion engines (ICE) buses. New business models and multi-stakeholder Partnerships can facilitate electric bus deployments and associating the energy sector holds important synergies. Also, public transport needs to adapt to the hazards brought on by climate crises. Implementing measures of adaptation early on is most cost effective; and therefore, the right data and capacities are needed to support its transition.

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WHY IT'S TIME TO ACT

PUBLIC TRANSPORT IS VITAL TO SUSTAINABLE AND LOW CARBON SOCIETIES

Public transport contributes vitally to sustainable and low carbon societies. It is more energy efficient than other motorized modes across greenhouse gas (GHG) emissions per person and reduces fossil fuel dependency. Along with walking and cycling, public transport is one of the most equitable modes of transport. It offers access to social and economic opportunities regardless of people's ability to afford a vehicle. It uses space efficiently, reduces spending on road infrastructure and opens space for activities that create economic and social value. Public transport can support public health through fewer air pollutants and increased physical activity—people walk and cycle to and from stations—and through improved traffic safety for all road users (APTA 2018).

It has repeatedly been recognized that public transport contributes to reducing transport externalities—the cost that is not covered by the driver but by society. These comprise costs from GHG emissions, air and noise pollution, road crashes, congestion, lost land value among others, and thus the overall cost of transport for society (WRI 2019a, World Bank 2021a). And public transport pays back even more than it requires: a 2021 analysis showed that for every dollar invested, public transport generates five dollars in return; for every job created in a city, it creates another job nationally (C40 and ITF 2021).

DESPITE ITS MANY BENEFITS, PUBLIC TRANSPORT HAS BEEN NEGLECTED

In many places, a strong focus on car-centered urban mobility has for a long time prioritized spending on road infrastructure over investments in public transport (UITP 2021a). This led to a downward spiral: poorer public transport services attract fewer riders and generate less farebox revenues, which results in fewer resources to provide attractive transport services (WRI 2019a) With poor transport services, people choose individual vehicle ownership as soon as they can afford it (SSATP 2021).

The response to a greater number of vehicles on the road has traditionally consisted of more investments in car-centered road infrastructure. Yet, instead of solving

traffic problems, these investments have attracted more cars and with them, the adverse effects of highly individualized transport systems—greater congestion, pollution, road safety issues, and inequalities in access. Also, land use policies that favored urban sprawl have increased the need for longer motorized trips and, at the same time, made the efficient operation of public transport less possible and car dependency more likely (WRI 2019a).

In cities in the Global South, urban transport policies and investments have, in many places not been a priority and transport has emerged in an unplanned and often inefficient way. With rapid urbanization and increasing motorization, these cities are facing issues of congestion, air pollution, and road safety; and social inequalities are further exacerbated by a lack of access and mobility (SSATP 2021).

DURING THE PANDEMIC, PUBLIC TRANSPORT DEMONSTRATED ITS KEY ROLE FOR RESILIENT SOCIETIES

Public transport continued its services during the COVID-19 pandemic and ensured the mobility of essential workers and vulnerable persons. When restrictions were lifted, it contributed to cushioning the social and economic consequences of the crisis (UITP 2021b).

But the crisis put further pressure on public transport's funding and financing model, especially in places where it is highly dependent on farebox revenues with no or few other sources of funding. While investment

in and funding of public transport is necessary to kick start the economy in the short term, it is also needed to strengthen public transport's key role as the backbone of urban mobility in the long term (WRI 2019a).

COP27 IS THE NEXT OPPORTUNITY TO SPOTLIGHT PUBLIC TRANSPORT ON THE CLIMATE AND SUSTAINABLE DEVELOPMENT AGENDA

Many cities that experience the negative consequences of unsustainable transport on a day-to-day basis have already engaged more strongly in developing public transport. Since 2000, 86 new metros and approximately 150 bus rapid transit systems worldwide have opened. Transport authorities are being created to implement the right mechanisms to plan, support, and manage the mobility system (UITP 2021a).

More recently, public transport's role for sustainable and low carbon societies has received increasing attention also in national agendas. For example, in their 2022 declaration, the G7 have remarkably called to set up a goal to significantly increase public transport budgets (UNFCCC 2022). But transformations are not happening fast enough.

The United Nations' Climate Change Conference 2022 under the Egyptian presidency and with the ambition "to turn climate pledges into action" (Egypt Today 2022) is an important opportunity for raising public transport's profile in the climate and development agenda.

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SIX STRATEGIC AREAS OF ACTIONS THAT UNLOCK PUBLIC TRANSPORT'S POTENTIAL TO DELIVER ON CLIMATE AND SUSTAINABLE DEVELOPMENT

1

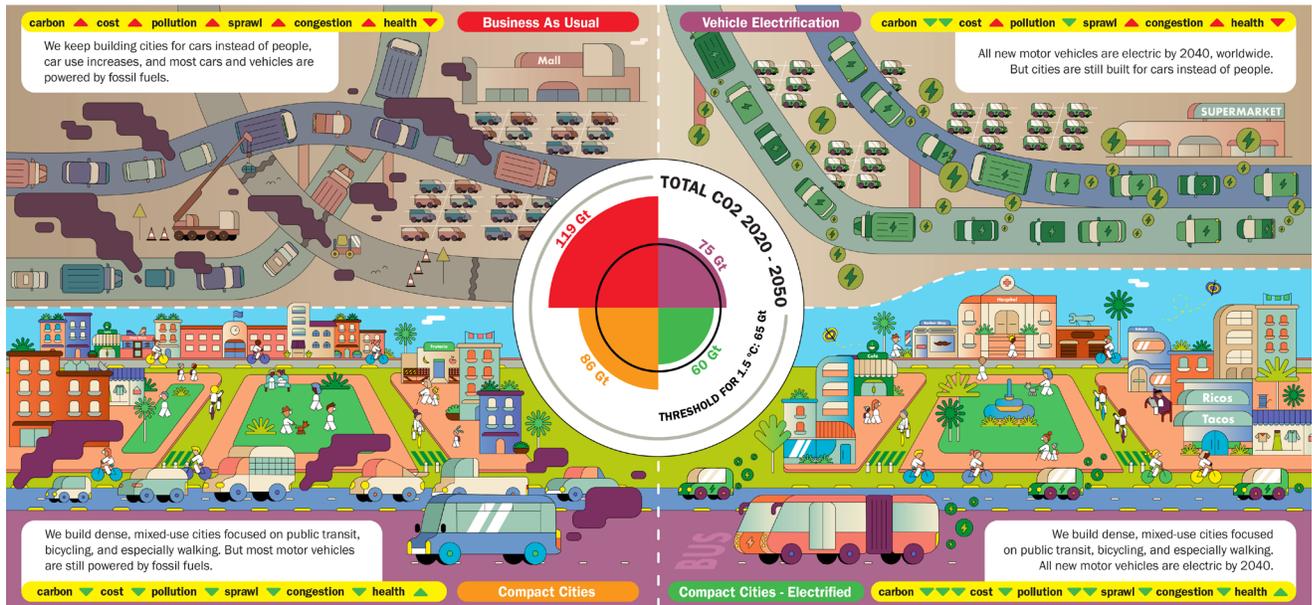
EMBRACE PUBLIC TRANSPORT AS A SOLUTION FOR CLIMATE AND SUSTAINABLE DEVELOPMENT

Public Transport is essential to achieve the Paris Agreement. Transport emissions are at eight gigatons of carbon dioxide globally and growing faster than any other sector. If global warming is to be kept to well below 2 degrees Celsius, preferably to 1.5 degree Celsius, the carbon budget of the transport sector in 2050 is estimated to be 2 to 3.8 gigatons annually (Axsen et al. 2020). With emissions being more difficult to abate in aviation and maritime, land transport is expected to contribute most to the reductions needed. For urban transport, the 1.5 degrees Celsius target leaves a cumulative 65 gigatons of carbon dioxide from 2020 to 2050. In a business-as-usual scenario, however, urban transport is estimated to emit 119 gigatons of carbon dioxide, almost double its budget (ITDP and UC Davis 2021).

An essential part of the solution is improving vehicles' energy efficiency and reducing their emissions by switching from fossil fuels to zero carbon energy through electrification. Electrification of land transport and improving energy efficiency are estimated to be able to deliver about 60 percent of the reductions needed in the transport sector. The remaining 40 percent are to come from measures that avoid unnecessary motorized trips and from a shift to more efficient transport systems, like public transport (Creutzig et al. 2021)

A combination of a strong shift from individual motorization to attractive public transport systems, compact cities that favor shorter trips, walking and cycling (also see #3), and electrification of transport (also see #4) is needed (ITDP and UC Davis 2021) to achieve the Paris Agreement.

FIGURE II.1. THE ONLY WAY TO 1.5°C: A COMBINATION OF STRONG PUBLIC TRANSPORT, COMPACT CITIES, AND ELECTRIFICATION.



Source: ITDP and UC Davis. 2021.

Beyond climate, public transport can deliver on many Sustainable Development Goals (SDGs)—and a new human right

Public transport is explicitly mentioned as a contributor to SDG 11 Sustainable Cities and Communities. Agenda 2030's goal is to "provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons."

Public transport delivers on many more of the SDGs.

- i. It helps reduce poverty (SDG 1) by providing access to economic opportunities and education.
- ii. It improves people's health (SDG 3) through reduced air pollution, increased physical activity and better road safety.
- iii. It empowers women and girls (SDG 5) by providing them with safe and independent mobility.
- iv. With greater energy efficiency, it is vital to support the shift to affordable and sustainable energy (SDG 7).

- v. It contributes to economic growth and decent work (SDG 8) as an investor, creator of jobs, and lever of efficient urban mobility.
- vi. It allows optimization of investments in resilient infrastructure (SDG 9).

FIGURE II.2. SDGS SUPPORTED BY PUBLIC TRANSPORT.

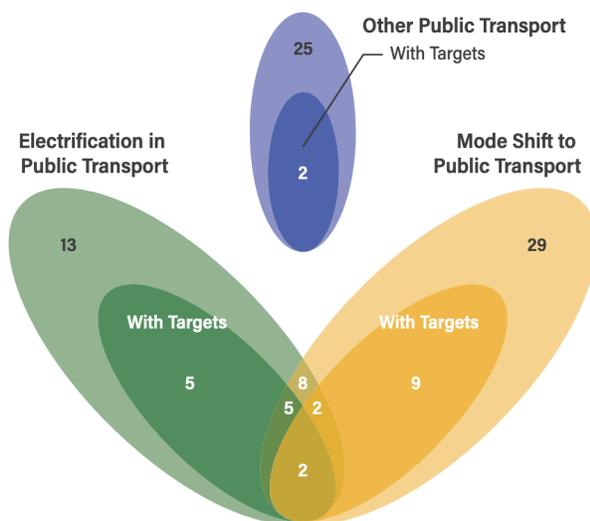


One hundred and sixty-one members of the United Nations voted in favor of declaring "access to clean and healthy environment" a universal human right in July 2022 (United Nations 2022). This strong consensus is one more important reason for scaling up public transport so it can support implementing the new human right into practice.

The climate and sustainable development debate needs to give public transport greater attention

While the awareness of public transport’s role in achieving climate and sustainable development targets has increased, it still does not get sufficient attention for action. Among 163 submitted nationally determined contributions (NDCs), half of them mention strengthening public transport as a measure for emission mitigation (Kustar et al. 2022). Only very few NDCs specify quantitative targets for public transport of kilometers of corridors to be built, fleets to be put in service or mode share to be achieved. The vast majority uses qualitative formulations, like 'expand', 'improve', or 'promote' public transport.

FIGURE II.3. NUMBER OF COUNTRIES THAT MENTION PUBLIC TRANSPORT AS A LEVER OF CLIMATE ACTION IN THEIR NDCS.



Source: WRI, Kustar et al. 2022.

The recognition of public transport’s role in "Agenda 2030" is at a similar status. An analysis of the 47 voluntary national reviews of the sustainable development goals that were submitted in 2020 — the voluntary reporting mechanisms of Agenda 2030— shows that transport in general is referenced by 42 out of the 47 countries. However, only 26 of the submitting countries reference public transport as a lever for achieving their development goals, while only two set specific targets (SLOCAT 2020).

Overlooking public transport’s role as a solution for climate and sustainable development comes with the danger of insufficient political and financial support and will ultimately put the achievement of both agendas at risk.

A strong programmatic approach and ambitious targets must be adopted

The many positive effects of public transport in various areas are its strength and challenge at the same time. While it constitutes a single solution to different challenges, the interest in solving each of the challenges is typically spread out over many sectors and actors.

Embracing public transport as a solution for climate and sustainable development requires its mainstreaming into debates and equally associating actors of climate, health, road safety, social, economic, and urban development (box II.1). A programmatic approach to implement and finance public transport must be adopted. And that approach should be guided by time-bound and quantified development targets— on the national and local levels.

BOX II.1: EXAMPLE OF INCREASED LOAD AS A RESULT OF EVS

Better Mobility Playbook^a (UITP 2021a)

This playbook is a tool to support cities in reaching Sustainable Development Goals with clear guidance on better urban mobility.

The Future is Public Transport^b (C40 & ITF 2021b)

Mayors, workers, unions, transport authorities, regulators, and civil society partners all call on national governments to collectively double public transport journeys in cities by 2030. Find out more and join the campaign.

Notes:

- a. <https://www.urbantransportgroup.org/system/files/general-docs/Report%20-%20TranspAuthorities%20-%20JUNE2022-web.pdf>
- b. <https://thefutureispublictransport.org/>

2 RAMP UP FINANCE FOR PUBLIC TRANSPORT

Just as it is for other larger transport infrastructure, the upfront investment in public transport systems can be considerable. But its social and economic benefits far outweigh the costs. Even better, is that sustainable, low carbon urban mobility system is expected to come at lower total direct cost for societies than car-dependent urban mobility (ITDP and UC Davis 2021). This consists of strong public transport, walking and cycling, compact cities, and the electrification of vehicles— “Shift + Electrified” scenario. Therefore, funds must be shifted away from expanding infrastructure for cars to improving public transport services. New ways of financing and sources of funding must be combined. The sources can be generated

from public and private sources as well as from all road users.

Expansion of public transport will lower the total cost of urban mobility

Latest research estimates that globally an additional 14 million buses, 340 million kilometers of bus lanes and 1.4 million kilometers of safe bike lanes will be required by 2050¹ to make urban mobility sustainable and compatible with the climate target which is “Shift + Electrified” scenario. In return, this will reduce the number of additional cars to be produced and bought by 800 million and building of new car lanes by 16 million kilometers compared to a business-as-usual (BAU) scenario (table II.1).

TABLE II.1. THE SHIFT + ELECTRIFIED SCENARIO COMPARED TO THE BAU SCENARIO IN KILOMETERS OF INFRASTRUCTURE AND NUMBERS OF VEHICLES.

WORLD	KM OF NEW PROTECTED BIKE LANES 2015–2050	KM OF NEW CAR LANES 2015–2050	KM OF NEW BUS LANES 2015–2050	TOTAL NEW CARS 2015–2050	TOTAL NEW BUSES 2015–2050
BAU scenario	1,100,000	51,000,000	580,000	3,300,000,000	32,000,000
Shift + Electrified scenario	2,500,000	35,000,000	920,000	2,500,000,000	46,000,000
Difference	+1,400,000	-16,000,000	+340,000	-800,000,000	+14,000,000

Source: ITDP and UC Davis. 2021.

In monetary terms, the same research estimates that the low carbon and sustainable urban mobility system is, in 2050, US\$ 5.2 trillion per year cheaper than the business-as-usual transport system (table II.2). Direct savings will essentially come from lower spending on private and shared cars and their infrastructure and cost of operations.

While savings from lower car use amount to US\$ 5.8 trillion, additional resources will be required for buses to the tune of US\$ 622 billion while urban rail would

need US\$ 40 billion including vehicles, infrastructure, operations, and energy (table II.3).

Budgets need to be shifted and supported with national, climate and development finance

The preceding data impress on the urgency for a strong shift from cars to public transport. The transition also requires shifting budgets from building infrastructure for cars to building infrastructure for public transport,

TABLE II.2. THE SHIFT + ELECTRIFIED SCENARIO VS. THE BAU SCENARIO IN ANNUAL COST OF TRANSPORT PER SYSTEM COMPONENT IN 2030 AND 2050.

ANNUAL COST OF WORLD'S URBAN PASSENGER TRANSPORT IN US\$ BILLIONS	2030 BAU	2030 SHIFT + ELECTRIFIED	DIFFERENCE SCENARIOS 2030	2050 BAU	2050 SHIFT + ELECTRIFIED	DIFFERENCE SCENARIOS 2050
Vehicles (all modes)	4,546	4,114	-432	8,342	6,291	-2,051
Fuel / Electricity	1,074	790	-283	1,361	590	-772
Infrastructure	2,218	1,749	-470	4,339	2,435	-1,904
System Operations	917	654	-264	1,577	1,064	-513
Total	8,755	7,307	-1,448	15,619	10,380	-5,239

Source: ITDP and UC Davis. 2021.

TABLE II.3. THE SHIFT + ELECTRIFIED SCENARIO VS. THE BAU SCENARIO IN ANNUAL COST OF TRANSPORT PER MODE IN 2030 AND 2050.

ANNUAL COST PER MODE IN US\$ BILLIONS	2030 BAU	2030 SHIFT + ELECTRIFIED	DIFFERENCE SCENARIOS 2030	2050 BAU	2050 SHIFT + ELECTRIFIED	DIFFERENCE SCENARIOS 2050
Bus ICE	625	483	-143	767	224	-543
Bus EV	8	235	228	30	1,194	1,165
Bus ICE + EV	633	718	85	797	1,418	622
Rail	40	44	5	64	103	40
Cars ICE + EV (private and shared)	7,462	5,826	-1,636	13,643	7,791	-5,852

Source: ITDP and UC Davis. 2021.

walking and cycling. Reduced spending on car infrastructure will free up resources for public transport; together with other measures to reduce car use. It will also allow public transport to become more attractive for more riders, increasing its economic performance.

National support programs can help local governments overcome the initial investment cost as well as help deploy electric fleets (see #6). This can be done through direct subsidies for vehicle acquisition, through demand aggregation and procurement across multiple cities for economies of scale, as well as through schemes that support public transport operations.

Public transport requires greater access to climate finance in all regions to support the transition. Therefore, public transport needs to be recognized as a climate action with wider benefits of sustainable development (see #1) and linked to local and national climate investment plans. Accessing different sources of climate finance often comes with high requirements of demonstrating a project's mitigation outcome. Yet such access may not sufficiently account for the wider socioeconomic benefits of public transport. Ways of simplifying these requirements to facilitate and speed up access to climate finance should be explored.

In 2020, Nine² of the leading multilateral development banks (MDBs) made US\$ 50 billion available

for mitigation action, of which 13 billion went to the transport sector, including public transport. Sixty-seven percent of it was invested in Europe, 20 percent in South-East Asia and the Pacific; and the remaining 13 percent went to Central Asia, Latin America and the Caribbean, and Africa together (EBRD 2020). For low- and middle-income countries (LMICs), challenges in accessing climate and development finance for public transport can have various reasons. The reasons include lack of creditworthiness at the city level, lack of institutional capacities to develop and manage public transport sustainably, or simply lack of awareness of available support. These can be addressed by a stronger collaboration between the national and local levels, greater technical support to develop public transport projects and strong transport authorities (also see #4), as well as support to transport policy reforms (box II.2).

Stable funding of operations will come from various sources

Leaving public transport largely dependent on fareboxes has proved its weaknesses, especially during the COVID-19 pandemic when numbers of riders plunged and with them, funds available for operations. This dependency has led to a dangerous downward trend where lower levels of service lead to even lower ridership (SSATP 2021).

BOX II.2. RESOURCE RECOMMENDATIONS

From Mobility to Access for All: Expanding Urban Transportation Choices in the Global South^a (WRI 2019a)

Many cities are experiencing a decline in access to jobs, services, and people due to a confluence of two trends: rapid urbanization and motorization. Read what they can do to make the urban transportation sector a lever for more equitable access to opportunities.

Decarbonizing Cities by Improving Public Transport and Managing Land Use and Traffic^b (World Bank 2021b)

Affordable, safe, and convenient urban passenger mobility systems are critical for the welfare of urban residents. Cities in developing countries have a unique opportunity to preserve and promote sustainable urban passenger mobility. Discover how this can be achieved.

Notes

- a. <https://www.wri.org/research/mobility-access-all-expanding-urban-transportation-choices-global-south>
- b. <https://openknowledge.worldbank.org/handle/10986/36517>

Public transport pays back to society in many ways, and its stable funding for operations should also come from various sources. Beyond the farebox, these can include:

- ▶ funds from road tolls, road user charges, fuel taxes, public and private parking,
- ▶ employer subsidies,
- ▶ land value capture instruments, like development fees and property taxes while attention should be given to avoiding gentrification effects, (also see #5,
- ▶ general local, regional, and national taxes, and
- ▶ funds earmarked for climate action.

Public and private investments need to work together in fair and sustainable ways

While the private sector can be an important source for financing public transport, many public-private partnerships of the past have not met expectations of better services at a lower cost. Failures often came with high costs for the taxpayers and poor services for the users (ITF n.d.).

Arrangements between public and private parties, therefore, need to make sure that investments and funding for a well-performing public transport system are made available with a long-term vision. Short-term profit interests must not come at the expense of public budgets, workers' rights, and public transport's ability to provide affordable access to all groups of society.

Projects should be prioritized based on their overall socioeconomic return to ensure the most sustainable use of resources. Reliance on immediate generation of revenues is not pragmatic, and instead decision makers should allow underserved communities outside the most profitable routes to be connected. Also, investments need to be assessed regarding their impact on local communities, paratransit operators, women, and informal and formal transport workers (also see #5).

Finance plans need to anticipate the forthcoming needs of a low-carbon and resilient public transport system

The introduction of low carbon, mainly electric, public transport fleets has started and will have to be brought to scale by 2040. Anticipatory shift in multiyear investment and budget plans is critical to avoid lock-in of unsustainable technologies and to avoid sunk costs as progress ensues at different speeds depending on the region.

Fleet investment plans and operational budgets should consider different cost structures of electric vehicles—high upfront cost, and low operation cost. Investment plans for infrastructure must include stations, depots, and charging facilities that are fit to progressively accommodate higher numbers of electric public transport vehicles. Such infrastructures will have to be equipped for greater resilience to the hazards of climate change (also see#6). These new needs also require training and upskilling of the workforce and examining respective budgets in financial planning. As electric fleets generate savings through their lower operation costs, electrifying high-mileage routes first —considering their duty-cycles are in line with charging needs—yields the highest return on investments.

3 **SHAPE CITIES AND PUBLIC TRANSPORT FOR ACCESS AND ATTRACTIVENESS**

A city's attractiveness is largely determined by its ability to provide its people with access to opportunities and a livable and healthy environment. Attractive public transport is at the city's service to achieve this: it is convenient to use, safe, affordable, and it responds to different user groups' mobility needs and travel patterns (also see WRI 2019a, WRI 2022, World Bank 2021a, UITP 2021a).

Mixed land use, compact cities, and transit-oriented development increase people's access

Mixed use and compact areas shorten distances to destinations—jobs, education, health services, shopping—and allow people to save time and money spent on transportation. Amenities clustered around transit stations let people combine their trips comfortably and accentuate the attractiveness of public

transport. Measures to reduce car use, congestion, and parking make public transport run more efficiently and cost effectively, meaning it can serve more riders and provide better services. Aligning these urban development policies with improving public transport brings essential synergies to both.

Well-connected and multimodal networks make cities, and their transport systems perform better

Reaching destinations safely and within reasonable times is paramount for a city and transport's attractiveness. Citywide public transport networks, connected with safe and comfortable facilities for walking and cycling increase people's access, public transport's catchment area and ridership—and with it, its economic performance. The articulation of urban, regional, and national public transport allows for smooth transitions between networks and makes all of them more attractive for its users (box II.3).

Flexible and shared transport services complement traditional public transport

Urban mass transit with light rail and bus rapid transit is most efficient for high volume corridors. Regular bus services provide mobility on less frequented

routes. Flexible and shared transport services, offered by public agencies, new private operators and established paratransit operators are needed to complement traditional public transport. Operated in synergy, traditional, flexible, and shared transport services provide riders with greater access to their city. Shaping these services for complementarity requires a new mindset in established industries, and new ways of collaboration among the actors of mobility (also see #5; also see UITP 2021b, SSATP 2021, ITF n.d.)

Digital technologies can enhance transport's efficiency and attractiveness

Digital technologies offer various opportunities for transport operators and their users. Multimodal route planning tools and real time travel information as well as digital and integrated payment across zones and operators make the use of public transport and its associated modes more attractive.

Information on travel patterns allows operators: (i) to improve their services to better meet users' mobility needs, and (ii) to manage their network and fleet capacity. Digital mapping of paratransit also known as informal or popular transport routes supports access to these services and facilitates their efficient integration with the wider public transport network.

BOX II.3. RESOURCE RECOMMENDATION

Vision of Rail^a (UIC 2021)

Rail networks connect cities and communities effectively; railway stations serve as multimodal mobility hubs with seamless integration. Read how rail can play its part to deliver sustainable urban mobility.

Investing for Momentum in Active Mobility^b (World Bank 2021a)

Walking and cycling are the most equitable modes of transport, and they support public transport to perform better. Find out about the benefits and opportunities of active mobility for accessibility, and how investment in active mobility can boost inclusive economic growth and shared prosperity.

Notes

- a. <https://www.wri.org/research/mobility-access-all-expanding-urban-transportation-choices-global-south>
- b. <https://openknowledge.worldbank.org/handle/10986/36517>

The shared use of digital technologies and data across public and private operators, with transparency and equity for all parties—cities, transport operators, workers, and users—is a crucial feature of the future of public transport.

Transport demand management supports public transport—and the livable city

Transport demand management that makes individual motorized transport less attractive is indispensable to increase public transport’s attractiveness and its economic performance. Measures of transport demand management are:

- ▶ Prioritize public transport in traffic, for instance, giving it more space while reducing space for cars,

providing dedicated lanes or temporary bus-only roads, and prioritization at intersections.

- ▶ Manage parking through pricing and reducing parking space, especially in areas that are well accessible with public transport, walking and cycling.
- ▶ Price roads, especially toward areas that are well served by public transport.
- ▶ Price car trips based on vehicle kilometers traveled.

These mechanisms may, at first sight, seem unpopular. However, experience around the world has shown that not only do they improve public transport’s performance and return on investment, but they also improve the livability of cities (box II.4).

BOX II.4. RESOURCE RECOMMENDATIONS

Digital Transport for Africa^a (DT4A 2022)

Informal transport or minibus systems play a significant role in most African cities, particularly in Sub-Saharan Africa. Informal transport systems are typically known for their flexibility, business model and dominance of second-hand vehicles. These systems can carry up to nearly all of many African cities’ public transport trips. Despite their importance, they are characterized by lack of basic data on where the routes go and stop. Digital Transport for Africa is a resource center that supports the development of knowledge, practices, and innovation projects to map public transport routes in Africa. It explores solutions to improve quality of services and integration of informal public transport.

Lessons Learned from Jakarta’s Journey to Integrated and Resilient Transport Systems^b (ITDP 2021a)

Jakarta has put pedestrians, cyclists, and transit users at the top of the transport hierarchy. The city shifted from a car-oriented city to one that is transit-oriented. The city prioritizes mass transit and active mobility over private motorized vehicles. The case study provides insights of how such a transition can succeed.

Notes

a. <https://digitaltransport4africa.org/>

b. https://www.itdp.org/wp-content/uploads/2021/11/Jakarta-Transport-Integration-Case-Study_11.18.21.pdf

4

ANCHOR PUBLIC TRANSPORT IN STRONG INSTITUTIONS AND COLLABORATIONS

Sustainable urban mobility, with public transport as a backbone, requires a holistic approach linked to the wider local and national policy goals and the collaboration of many different actors. Public transport authorities play a defining role: (i) in shaping the bigger picture of urban mobility, and (ii) in acting as integrators and facilitators, within the transport ecosystem and beyond, who link transport's development with other policy areas for synergies (UITP 2021b). Therefore, national governments should actively support such synergies (box II.5).

Collaborations across government levels and sectors unlock synergies to achieve various policy goals

Cross-sectoral collaboration creates benefits and synergies for public transport development in many areas: (i) between public transport and infrastructure development, urban planning, and housing (see #3); (ii) between public transport and social development (see #5), energy (see #6), and public health.

Collaboration of public health and transport, for example, can deliver strong arguments to achieve more funding for public transport. In return, a stronger public transport system will lower the cost of public health (WRI 2018; World Bank 2021a). Exchange of information on health impact of air pollution, traffic injuries, and on the benefits of active mobility, can inform urban transport policy making (box II.6).

BOX II.5. RESOURCE RECOMMENDATIONS

WHO Air Quality Database^a (DT4A 2022)

(WHO 2022)

Good collaboration between national and local national governments strongly leverages to support cities in developing well-performing public transport systems.

- Formulate a clear long-term vision of sustainable urban mobility on the national level.
- Adjust and harmonize supportive national frameworks e.g., in land use, traffic law, mode pricing, and budget allocation that empower cities to make locally appropriate decisions.
- Develop national urban mobility policies, funding schemes, and technical support programs.

Notes:

- a. <https://www.who.int/data/gho/data/themes/air-pollution/who-air-quality-database>

BOX II.6. RESOURCE RECOMMENDATIONS

National Urban Mobility Policies and Program Toolkits^a (MYC 2021a)

Find out how national governments can support cities and sustainable urban transport.

Notes:

- a. <https://changing-transport.org/toolkits/nump>

Transport authorities require the mandate and power to develop public transport and urban mobility, across modes and territories

In many places, different modes may be overseen by different entities, hindering the development of complementary and multimodal networks. Communal borders within urban areas may limit network connectivity. Dispersed ticketing schemes may reduce attractiveness for riders, even resulting in less affordable and unfair pricing. These fragmented jurisdictions hamper efficient public transport development.

Similarly, unfavorable, and bureaucratic procedures often hinder rapid implementation of new solutions and collaborations. When transport authorities had to respond urgently to the challenges of the COVID-19 pandemic, they showed new levels of agility, using shortcuts and pragmatic approaches. These new ways of thinking and doing should be translated into simplified procedures that transport authorities and their partners can use on a permanent basis.

Forming a strong metropolitan transport authority with the right capacities to plan, implement, and operate multimodal transport systems is a primary prerequisite for well performing urban mobility and public transport systems. While not all cities may have the maturity to immediately establish such powerful authorities, their roles and capacities should gradually be expanded (also see WRI 2022, UITP2021b) (box II.7).

Strong cooperation between transport authorities, transport providers, workers, and communities creates the basis for greater service

Public transport and its private mobility partners all need to act together to enhance transport's performance and to provide its users with attractive services. Such cohesive action requires new forms of collaboration and engagement across all stakeholders.

For example, transport authorities and formal providers in the Global South—where new public transport services are implemented in environments with established paratransit—need to engage with paratransit operators to shape urban mobility services for complementarity (also see #3) and attention to social impacts on workers (also see #5). Therefore, transport authorities need to develop locally adapted approaches for gradual reforms and increased collaboration (MYC 2021b).

Associating both formal and informal public transport workers—who are delivering the services on the ground each day—to transport's governance can inform planning for authorities and private operators in greater service and system efficiency.

Also, long-established transport authorities and the emerging providers of private shared and on demand services must work together to design complementary services that operate in defined and supportive legal frameworks.

Finally, engaging local communities to develop public transport services is crucial for understanding

BOX II.7. RESOURCE RECOMMENDATIONS

Transport Authorities in Metropolitan Areas^a (UITP 2022)

Transport Authorities are key in ensuring that public transport service is provided with public policy goals in mind and that considers citizens' expectations. The paper provides guidance for improving the governance of urban transport around the world.

Notes:

a. <https://www.urbantransportgroup.org/system/files/general-docs/Report%20-%20TranspAuthorities%20-%20JUNE2022-web.pdf>

and serving people's mobility needs. Their participation must be made integral to a city's transport development.

Capacity development is vital for accelerated expansion and greater performance of public transport

In some cities, public transport authorities and operators have developed capacities in planning and managing public transport over decades. In other cities, experience is still recent. Whether further qualifying established public transport actors or creating nascent organizations, capacity development is vital. Learning needs to be supported across all actors: transport agencies, operators of formal public transport, and paratransit providers.

Three areas of capacity development deserve special attention (also see UITP 2021b, WRI 2019a, WRI 2019b, World Bank 2021a):

- i. Effective multistakeholder partnerships and governance models;
- ii. Data and digital technologies for better transport planning and multimodal services, efficient and demand-responsive operations, and greater user attractiveness; and
- iii. Knowledge in the field of fleet decarbonization and adaptation of transport systems and infrastructure (also see #6).

5 DRIVE PUBLIC TRANSPORT TO BE JUST AND INCLUSIVE

Public transport is a strong lever for a more inclusive society. It must be developed with its users and workers in mind, particularly the often marginalized and most vulnerable.

Social public transport policy strengthens access for the poor

The way public transport networks are planned and operated determines their contribution to a more inclusive and equitable society. For example, connecting lower income neighborhoods, often at the outskirts of the city, with areas of employment

and education unlocks many social benefits. With increased connectivity at affordable prices, eventually applying targeted subsidies, the residents' ability to generate higher incomes increases, as does the area's attractiveness.

While an area's increased attractiveness is a desirable result of public transport investments, policies need to ensure that they favor local communities and not lead to gentrification. The latter may be caused through the rise in land value and land use regulation that limit the supply of built space. Measures of public transport development should therefore be coupled with housing and land use policies that allow to generate revenues from new and wealthier residents and businesses. At the same time, such measures should limit land value speculation and keep the area affordable to its original community.

Gender sensitive public transport ensures both: better mobility services and better working conditions for women

Public transport has long overlooked the different needs of female users, even though women depend on public transport more than men (ITDP 2018). With their many caring responsibilities, women are likely to make more and more connected trips. They tend to travel with children or the elderly, with strollers and with shopping bags. Also, many female riders—and transport workers—are being exposed to harassment. Their safety on board, on stations, and on the way to and from stations must be a priority for public transport authorities and operators.

An effective way in shaping public transport for female riders, and workers, is to increase the female transport workforce. With transport traditionally being a male-dominated area, female transport workers are in the minority, even more so in leading positions. In the EU, for example, 17.5 percent of the public transport workforce in 2011 were women (UITP and ETF 2016). This limits public transport's access to the workforce and its capacity to design services in line with women's mobility patterns and safety needs.

Finally, female transport workers in the formal, and even more so in the informal transport sector, are more likely to have lower and less stable income and poorer working conditions. Particular attention must be given

to working conditions for women, the impact that reforms and changes to the system may have on them, and the development of measures that help overcome gender inequalities in the workplace (also see ILO 2021, ITF 2021).

Paratransit workers can be part of the solution

Paratransit is providing the majority of urban transport services in the Global South. While these established structures come with its challenges when implementing new formal transport services, they can play an important role within or in co-existence with the formal system.

Experience has shown that transitioning all paratransit operators into the formal system may fail, as does suppressing or ignoring them (WRI 2019a). No single solution exists, yet an assessment of impacts that a large public transport project may have on paratransit workers must be mandatory. Worker-led formalization, training, and other—access to small-scale finance—can

protect their livelihoods and enable a just transition (also see #3 and #4).

High quality public transport services rely on transport workers' well-being and inclusion

Transport workers are at the forefront of delivering services. Ensuring decent work conditions, workers' rights and social standards must become the norm so that public transport can perform. This also includes the continuous upskilling and reskilling of transport workers to enable them to evolve in an increasingly digitalized work environment and a multi-actor urban mobility landscape (also see #4).

Mechanisms of social dialogue can be designed to support workers' active participation in the development of the sector and to prevent too strong a focus on profit generation that may come at the expense of workers' fair working conditions and well-being (box II.8).

BOX II.8. RESOURCE RECOMMENDATIONS

The Impact of the Future of Work for Women in Public Transport^a (ITF 2019)

Little attention has been given to the issues many women face as they participate in a variety of roles in the public transport workforce globally. This study fills in the gap and provides guidance on how to make public transport a better workplace for women.

Myths and Realities of “Informal” Public Transport in Developing Countries: Approaches for Improving the Sector^b (SSATP 2021)

Find out more on the role of paratransit in the urban mobility system and what reforms can do to support the transition to a complementary system.

Reforming the (semi-)informal minibus system in the Philippines^c (GIZ 2019)

Experiences from the Philippines illustrate how fleet modernization and reforming paratransit can go hand-in-hand for better transport performance and working conditions.

A Just Transition for Urban Transport Workers^d (ITF 2022)

Accounting for urban transport workers' security and welfare as well as for the communities who depend on urban transport is at the basis of just and equitable urban mobility. Based on research in the Global South, the paper suggests a just transition framework.

Notes:

- a. <https://www.itfglobal.org/en/reports-publications/impact-future-work-women-in-public-transport>
- b. https://www.ssatp.org/sites/ssatp/files/publication/SSATP_Informal_v_final_double_compressed.pdf
- c. https://changing-transport.org/wp-content/uploads/2019-11_GIZ_Jeepney-Modernisation_Early-Evaluation_final.pdf
- d. https://www.itfglobal.org/sites/default/files/node/resources/files/A%20Just%20Transition%20for%20Urban%20Transport%20Workers_Report.pdf

6

EQUIP PUBLIC TRANSPORT FOR THE CLIMATE FUTURE

Public transport needs to decarbonize to achieve the emission targets that align with the climate future. Additionally, it needs to adapt to the hazards of climate crises to ensure less cost and greater resilience of urban mobility. With long investment cycles, planning and implementation are urgent and imperative. Equipping public transport for climate future can be accomplished with help from finance (also see #2), new collaborations, and new capacities (also see #4).

Meeting the climate targets requires a rapid and massive increase in electric bus fleets and the incremental phase-out of ICE buses

The climate compatible “Shift and Electrified” scenario (see #2) estimates that the world will need a total of 14.3 million buses—EV and ICE, cumulative—more by 2050. The speed at which countries and cities have been deploying electric buses so far will have to increase critically. Compared to a business-as-usual scenario, an additional 9.3 million electric minibuses and 13.9 million large electric buses are needed; at

the same time, in the “Shift and Electrified” scenario, investments in 5.6 million ICE minibuses and 2.9 million ICE large buses will be avoided. The research by ITDP and UC Davis (2021) also estimates that from 2040 onward, only zero emission buses can be added to the fleet (table II.4).

New business models and multi-stakeholder partnerships can facilitate electric bus deployment

Electric buses are cheaper to run, yet they still come with considerably higher upfront costs for vehicles and charging infrastructure. Financial support is needed to overcome this initial barrier, and public and operators’ budgets need to be aligned to reflect the cost structure of such electrification.

New business models and financing mechanisms should involve national government, local authorities, bus manufacturers, bus operators, and energy providers at the same time. They can be designed to split costs, savings, and responsibilities across multiple actors. Such essential measures will facilitate the deployment of zero carbon buses at manageable risks.

TABLE II.4. THE SHIFT + ELECTRIFIED SCENARIO VERSUS THE BAU SCENARIO IN TYPES OF VEHICLES 2015–2050.

WORLD	MINIBUS ICE VEHICLES DEMAND 2015–2050	MINIBUS ELECTRIC VEHICLES DEMAND 2015–2050	TOTAL MINIBUSES (EV + ICE)	LARGE BUS ICE VEHICLES DEMAND 2015-2050	LARGE BUS ELECTRIC VEHICLES DEMAND 2015–2050	TOTAL LARGE BUSES (EWWV + ICE)	TOTAL BUSES (MINIBUSES EV + ICE; LARGE BUSES EV + ICE)
BAU scenario	16,150,000	260,000	16,410,000	15,240,000	240,000	15,480,000	31,890,000
Shift + Electrified scenario	10,510,000	9,570,000	20,080,000	12,250,000	13,890,000	26,140,000	46,220,000
Difference	- 5,640,000	9,310,000	3,670,000	- 2,990,000	13,650,000	10,660,000	14,330,000

Source: ITDP and UC Davis. 2021.

Associating the energy sector comes with important synergies

Collaborations with the energy sector are essential so that energy providers and utilities can plan for increased electricity demand and adapted distribution networks. The predictable electricity demand for rail and road transport can be an attractive business case and generate investments from public and private energy producers. Also, electric public transport buses can be an opportunity to increase a network's flexibility through decentralized battery storage, smart charging, and vehicle-to-grid technologies.

Using electricity for transport comes with benefits from reduced energy consumption and local pollution. Yet the parallel increase of low carbon electricity on the grid is vital to achieve not only zero carbon tailpipe emissions but also low carbon economies.

The way to scale starts with pilots

Pilots with electric buses have already allowed many cities to learn from experience, and to prepare to scale. Sharing these experiences is vital. As every city has its own context that needs to be considered, pilots are a great opportunity to test technologies, understand costs and benefits, and collect data to inform planning for large scale adoption at low risk. They also allow leeway to overcome initial resistance, get stakeholders on board, and develop capacities and a plan for roll-out based on joint experiences.

When moving from pilots to large-scale projects, thorough planning and coordination across stakeholders is necessary. Steps to prepare for large scale roll-out of electric buses (WRI 2019b) (box II.9):

- Formalize and implement a long-term infrastructure plan, including stations, charging, and depots.

BOX II.9. RESOURCE RECOMMENDATIONS

How to Enable Electric Bus Adoption in Cities Worldwide^a (WRI 2019b)

The paper provides a step-by-step guidance on how to move forward with the adoption of electric bus fleets. It aims to close knowledge gaps and provide actionable guidance for transit agencies and bus operating entities to help them overcome the most common barriers to electric bus adoption.

From Santiago to Shenzhen - How Electric Buses are Moving Cities^b (ITDP 2021b)

A number of cities, from Shenzhen to Santiago, have already successfully grown the number of battery electric buses in their public transport fleets. The paper examines the benefits of bus electrification around Access, Environment, Equity, Efficiency, and Health and Safety, and presents the major aspects of transitioning a bus fleet to electric. Here, it focuses on the broader framework in which decision-making should be applied in adopting battery-electric buses.

The TUMI e-bus mission^c (TUMI 2019)

The TUMI e-bus mission aims to inspire 500+ cities by 2025 and to ensure the readiness for procurement of 100,000 e-buses. Therefore, it supports 20 deep dive cities in their transition towards electric bus deployment. National and regional core groups work to upscale the efforts in a network of 100 cities until the end of 2022.

Notes:

- <https://www.wri.org/research/how-enable-electric-bus-adoption-cities-worldwide>
- <https://www.itdp.org/publication/from-santiago-to-shenzhen-how-electric-buses-are-moving-cities/>
- <https://www.transformative-mobility.org/campaigns/tumi-e-bus-mission>

- ▶ Formalize and implement e-bus procurement plans adjusted to city conditions, and financial instruments to reduce costs and risks.
- ▶ Provide training to bus operators based on international best practices and local experiences.
- ▶ Planning for the end-of-use of buses, especially their batteries.

Climate crisis comes with new hazards also for public transport

As climate crises progress, natural hazards like heavy rainfalls, flooding, mudslides, high winds, extreme heat, and cold spells are occurring more frequently. Also, slow onset changes like rise in temperature and sea levels impact transport systems and their users. Impacts may result in a decrease in passenger comfort from a failing air conditioning, but they may also lead to the suspension of services and consequently, to life-threatening situations. Assessing urban mobility and public transport for its vulnerability and implementing measures of adaptation are critical to ensure greater resilience.

Taking adaptation action early on is most effective and least costly

Planning for adaptation in the early stages of decision making can avoid expensive retrofitting, costs that arise from the suspension of services, and even sunk costs from the termination of the system altogether—if operations become impossible due to permanent flooding along coasts or rivers. Therefore, adaptation is rather about spending better than spending more.

Particularly in low- and middle-income countries (LMICs), where exposure to climate impacts are high and where transport systems will have to be expanded considerably, investing in resilience is found to generate

four dollars of benefits for each dollar spent (World Bank 2019).

When assessing the public transport system for its vulnerability, all its components as well as interdependencies with other potentially failing elements—buildings, power supply—should be considered.

- ▶ Impacts on transport infrastructure and rolling stock, for instance, damages to pavement or vehicles from heat or flooding;
- ▶ Impacts on operations and services such as power cuts or blocked roads;
- ▶ Impacts on riders' mobility behaviors for example, riders shifting away from public transport due to discomfort from rain or heat.

The right data and capacities are needed to inform planning, implement measures, and define budgets for adaptation

With climate hazards and vulnerabilities identified, it is possible to adapt and prioritize measures and budgets. This requires collecting the right data to understand hazards and risks and to assess the vulnerability of public transport. With the right capacities and continuous learning, adaptation options can then be developed and implemented.

Options to adapt to climate change can be manifold and should be chosen based on the prior assessments, and in line with objectives and budgets. They can be as simple as planning an alternative emergency timetable, providing shelters for waiting passengers, or increasing preventive maintenance measures. But they may also imply switching to new engine cooling technologies, choosing different materials for road building, or creating redundancy in the system which could partially compensate for disrupted services.

BOX II.10. RESOURCE RECOMMENDATIONS

Adapting Urban Transport to Climate Changea (GIZ 2021)

The sourcebook is intended for policy makers and their advisers in developing cities. It provides practical orientation and best practices for successful planning and implementation.

Adaptation and Mitigation Interaction Assessment Toolb (C40 n.d.)

The tool is designed to support city practitioners to understand the interactions and interdependencies associated with climate change adaptation and mitigation actions in urban mass transport.

Notes:

- a. https://www.transformative-mobility.org/assets/publications/SUTP_Sourcebook5f-2_AdaptingTransport-to-ClimateChange.pdf
- b. https://www.c40knowledgehub.org/s/article/Reducing-climate-change-impacts-on-mass-transit?language=en_US

Notes

1. 'Additional' in reference to business as usual; figures are cumulative, considering replacements of vehicles.
2. African Development Bank (AfDB), Asian Development Bank (ADB), Asian Infrastructure Investment Bank (AIIB), European Bank for Reconstruction and Development (EBRD), European Investment Bank (EIB), Inter-American Development Bank Group (IDBG), Islamic Development Bank (IsDB), The World Bank Group (WBG)

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PUTTING PUBLIC TRANSPORT POLICY INTO ACTION

This section summarizes 34 action recommendations for the development and up-scaling of public transport systems. These are intended to guide four key actors: national and local governments, private transport operators, and the international development finance and technical assistance community. The recommendations can also serve civil society organizations to inform their courses of action.

The overview links each action recommendation to three of the six strategic areas. It factors their cross-cutting character and allows the reader to go back to the respective areas of action in the preceding section for contextual information.

While collaboration across all actors is cardinal to successfully develop public transport, the overview points to the different roles of actors: ‘lead’ (L), ‘engage’ (E), ‘support’ (S). ‘Lead’ implies that the actor’s proactive leadership and decision-making power are required. ‘Engage’ indicates that the actor is critical to be on board and that the actor contributes to informing, preparing, and implementing the action. ‘Support’ refers to an actor’s ability to provide financial or technical support, or to shape frameworks so that other actors are empowered to fulfill the role.

Finally, the matrix showcases examples from across the globe, and how policy can be translated into action (matrix III.1).

MATRIX III.1. AREAS FOR PUBLIC TRANSPORT ACTION

LINKS PRIMARILY TO	LINKS ALSO TO	NO	ACTION RECOMMENDATION	NATIONAL GOVERNMENTS	LOCAL GOVERNMENTS	PRIVATE TRANSPORT OPERATORS	INTERNATIONAL DEVELOPMENT FINANCE AND TECHNICAL ASSISTANCE	EXAMPLES
1	5 6	1	Integrate public transport development with national and local Climate and Sustainable Development Strategies.	L	L	E	S	Argentina, in its Voluntary National Review of the SDGs 2020, formulates the goal to increase universal access to public transport from 82% in 2010 to 91% in 2030. Source: SLOCAT 2020

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1	3	2	Set clear and ambitious targets for public transport development.	L	L	E	S	Istanbul, in its Sustainable Urban Mobility Plan 2040, set the target to have a share of 70% of daily trips made by public transportation and walking, to save riders 30% of travel time, and to expand its tram and metro lines to a total length of 776 km, which would, after New York, be the world's second largest network. Source: Eltis 2022
	4							
1	4	3	Focus on medium and long-term socio-economic benefits, not on short term profits	L	L	E	S	Auckland's Regional Land Transport Plan is a 10-year investment programme for public transport, cycling and walking. Beyond delivering infrastructure and services, the programme has set a focus on socio-economic aspects, such as the prevention of road death and fatalities, better use of urban space, better access and mobility choices for citizens, and reducing time spent in transport. The plan shall serve as a basis for a 30-year long-term vision for Auckland's Transport System Source: Auckland Transport 2021
	5							
2	1	4	Back up targets for public transport development with aligning multi-year budgets for investments and operations.	L	L	E	S	
	4							
2	3	5	Update multi-year budgets to accommodate for new needs of the climate future - electrification and adaption - and for digitization.	L	L	E	S	
	6							
2	4	6	Integrate training and upskilling of transport authorities and the transport workforce in planning and budgeting.	S	L	L	S	In 2015, the City of Cape town implemented a capacity building programme for paratransit operators to help the industry improve their business practice. 223 candidates were part of the training programme over 3 years learning about law and corporate governance, transportation management financial administration, HR etc. Source: Jennings & Behrens 2017
	5							

LINKS PRIMARILY TO	LINKS ALSO TO	NO	ACTION RECOMMENDATION	NATIONAL GOVERNMENTS	LOCAL GOVERNMENTS	PRIVATE TRANSPORT OPERATORS	INTERNATIONAL DEVELOPMENT FINANCE AND TECHNICAL ASSISTANCE	EXAMPLES
2	4	7	Implement national support programmes to complement local resources for investment and operation.	L	L	E	S	Germany, in summer 2022, rolled out a country-wide subsidized public transport ticket at 9 EUR per month to cushion the energy crisis' impact on households. After the initial phase of three months, the government is working on a follow-up reduced public transport ticket to be implemented on a permanent basis. Source: BMDV 2022
	6							
2	4	8	Secure funding for public transport operations from multiple sources.	L	L	E	S	The city of Bogota is planning to use Pico y Placa and the pay-out program as well as on-street parking monetization surplus to pay for TransMilenio's operating subsidies. Source: World Bank 2022
	6							
2	1	9	Strengthen access for public transport to development and climate finance	L	E	E	L	
	6							
2	4	10	Form fair public private partnerships to operate public transport	S	L	L	S	
	5							
3	1	11	Design compact neighborhoods and cities with short distances to jobs, education, social services, and public transport stations	S	L	E	S	In 2018, the Minister of Planning launched the 20-minute neighborhood pilot program to study the feasibility of implementing the 20-minute city in multiple locations in Melbourne. The idea is for most of the daily needs of residents to be met by a short walk, bike ride or public transport. Source: International Transport Forum 2021
	5							
3	1	12	Link transport, urban planning, and housing policies for inclusive and transit oriented development	L	L	E	S	Barcelona's superblock model, joining several housing blocks on a grid-like pattern together as one larger area, was implemented as a traffic calming measure that removed or slowed down car traffic considerably to improve urban air quality and public health, and to provide neighbourhoods with more space for social activities. It was started in low-income and social housing areas; bus services and stations were adjusted to better serve the area. Source: ICLEI n.d.
	5							

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3	1	13	Integrate public transport networks and connect them to networks for walking and cycling.	L	L	E	S	<p><i>Jakarta designed its public transport infrastructure to provide quicker and easier connections between public transport modes. The Cakra Selaras Wahana transit hub now connects different modes of transport, and provides smoother connections from Transjakarta Corridors to the Mass Rapid Transit system. The city improved 87 kilometers of sidewalks, including 41 kilometers within 400 meters of Transjakarta stations. The first 11 km of its planned 500 km cycle network connects nine BRT stations, six MRT stations, the LRT network.</i></p> <p>Source: ITDP 2021a</p>																																										
	5								3	2	14	Combine public transport with public and private shared and flexible mobility services for improved first- and last-mile connectivity	S	L	L	S	<p><i>Berlin Public Transport Operator BVG has collaborated, since 2019 with private operators (bike and scooter sharing, car and ride sharing, taxi) through a single platform for multimodal trip-planning and ticket purchasing to increase first and last mile connectivity.</i></p>	4	3	2	15	Adopt digital technologies for greater public transport efficiency and access	S	L	L	S	<p><i>Sierra Leone has used a complementary digital tools and sets of data to identify transport routes of the paratransit network, to improve access and to inform adaptation planning of the transport network</i></p> <p>Source: Arroyo-Arroyo, F. n.d.</p>	5	3	4	16	Inform urban transport planning by data	S	L	E	S		5	3	2	17	Give public transport dedicated space and way of right	S	L	E	S	<p><i>Mexico City has built seven BRT bus priority corridors over the last 15 years. The network has a total length of 140 km counts and serves nearly 1.3 million riders every day.</i></p> <p>Source: Global BRT Data n.d.</p>	4	3	1
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3	2	19	Support the shift to public transport through parking management, road user pricing, and access regulations.	S	L	E	S	<p>Since 2014, Paris has eliminated 15,000 parking spaces, expanded its bike network from 700 km to 1000 km, and converted riverbank expressways to public space; the modal share for cars drop by 45% since 1990, cycling increasing tenfold, and public transport use increasing by 30%.</p> <p>Source: International Transport Forum 2021</p>
	4							<p>In London, the congestion charge generated GBP 1.7 billion of revenue over 14 years; GBP 1.3 billion were used to improving the bus network. From 2002 to 2018, the percentage of trips made by private car in the city shrunk from 46% to 36%, while public transport grew from 29% to 37%.</p> <p>Source: TfL 2017</p>
4	1	20	Make public transport a cross-sectoral development effort by associating actors from housing, social development, energy, and public health	L	L	E	S	
	5							
4	1	21	Embed public transport in national urban mobility policies and programs	L	L	E	S	<p>India's National Urban Transport Policy (2014) promotes improvements in public transport services and infrastructure to ensure accessibility and sustainability in urban areas. It has a budget of over USD 20 billion to fund 35% to 90% of all types of urban infrastructure and rolling stock projects in large cities and cities with specific importance provided they are part of the city's mobility plan.</p> <p>Source: IUT India 2014</p>
	2							
4	1	22	Build integrated metropolitan Transport Authorities with the power to implement urban mobility policies across communal and modal jurisdictions	S	L	E	S	<p>Transport for London (TfL) was formed in 2000 by combing nearly all agencies responsible for transport – primary roads, streetscapes, rail, bus, cycling and taxi provision. The new organization model has implemented coordinated changes to bring about fundamental transformation.</p> <p>Source: WRI 2022</p>
	5							

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4	1	23	Establish spaces for exchange and coordination of public and private operators, formal and informal workers, and local communities.	S	L	E	S	<p><i>The Austin Project Connect is a voter-approved comprehensive multi-modal public transport plan. To embed equity, sustainability and transparency in the project, a community advisory committee was created to collect community input and consult with the city and transport operators.</i></p> <p>Source: Austin Transit Partnership 2020</p>																																										
	5								4	3	24	Implement capacity development programmes for transport authorities, operators and formal and informal transport workers.	S	L	L	S	<p><i>Indonesia's Government, with the support of international donors and agencies of technical assistance, rolled out a capacity development programme for urban transport. The programme included trainings at the ministerial level as well as for local governments, their transport authorities and transport planners. The training is a vital element of its comprehensive Sustainable Urban Transport Programme.</i></p> <p>Source: GLZ & MoT Indonesia 2014</p>	5	5	1	25	Plan and operate public transport for increased access of all groups of society: women, poor, children, old and disabled people	S	L	L	S	<p><i>Sao Paolo connected its low-income neighbourhood with direct services to the wealthier areas, allowing the low-income communities to get to their jobs faster and with greater convenience</i></p> <p>Source: WRI 2020</p>	3	5	1	26	Make public transport an attractive employer for women.	S	L	L	S	<p><i>Dublin Bus, Ireland, has changed its recruiting policy to attract more women as drivers: holding a bus driving licence as a precondition for employment was eliminated and driving license training is provided by the company.</i></p> <p>Source: ITDP 2021</p>	3	5	3	27	Support worker-led formalization of para-transit operators.	S	L	L	S	<p><i>In Cebu City, Philippines, jeepney drivers organised themselves into worker cooperatives which are now winning contracts to operate public transport services from the local authority.</i></p> <p>Source: ITF 2022</p>	4	5	1
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6	1	29	Start electrification of fleets with a pilot, learn and scale	S	L	L	S	Belo Horizonte, Brazil, has prepared a comprehensive testing plan for a pilot fleet of 25 buses, and based on a stakeholder consultation process involving the transport authority, bus operators, vehicles manufacturer, and utility companies. Source: WRI 2019b
	4							
6	1	30	Set time-bound and incremental targets for the deployment of zero-emission vehicles in public transport	L	L	E	S	Copenhagen, with its 2019 budget agreement, is committed to accelerating the implementation of zero emission buses. By the end of 2025, all buses that are wholly or partly financed by the city will be zero emission. Source: C40 2022
	2							
6	2	31	Adopt new business models for electric bus fleets to share costs, savings, and responsibilities across multiple actors, also from the energy sector.	S	L	L	S	Santiago, has adopted a new business model for financing and funding electric bus operations that involve bus manufacturers, utility company, bus operators, local authorities, a bank consortium and national government support. The scheme splits the upfront cost across several entities and brings benefits to all parties. Source: ITDP 2021
	4							
6	2	32	Use the additional electricity demand from public transport electrification as a business case for investments in electricity network and renewable capacities	L	L	E	S	In Izmir, Türkiye, the local bus operator installed a solar power plant near one of its depots to generate electricity specifically for charging the e-buses. This helps reduce the emissions generated by electric buses and mitigate the generally high carbon intensity of the Turkish national grid. Source: WRI 2019b
	4							
6	2	33	Identify climate risks and public transport's vulnerability to them	L	L	E	S	Transport Canada through their Transportation Asset Risk Assessment initiative, conducted advanced risk assessment to inform adaptation planning, and, at the same time, developed regional offices' capacities in risk assessment. Source: ITF 2022
	4							
6	2	34	Plan and implement adaptation measures early on and in line with defined priorities	L	L	E	S	Kenya's National Adaptation Plan, published in 2016, includes long-term endeavours to adapt transport and infrastructure. Among other interventions, the plan aims to improve infrastructure development using climate smart design on a county level. The plan includes Monitoring and Evaluation (M&E) from national to county level for interventions planned until 2030 to ensure successful resilience building. Source: ITF 2022
	4							



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