International Transport Forum

The Future of Public Transport Funding

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Research Report

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The International Transport Forum

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At the ITF, Rex Deighton-Smith acted as principal author of the report, with assistance from Corinne Mulley (University of Sydney) and Josephine Macharia and substantial guidance from the co-chairs. Jagoda Egeland and Stephen Perkins provided quality control. David Prater copyedited the report and co-ordinated the publication process.

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The Working Group brought together 40 experts from 19 ITF member countries, the World Bank and the European Union. For a list of Working Group participants and their affiliations, see the Annex.

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Foreword

Public transport has always played a crucial role providing mobility for communities, economies and wider society, serving local, regional and national objectives. This role is now central to the global mission to decarbonise mobility.

The transport sector currently accounts for 23% of emissions globally and these emissions are yet to start falling in the face of rising demand for mobility and the difficulty of decarbonising all modes of transport at the pace required. Electrifying the private vehicle fleet will contribute to the decarbonisation effort, but deployment cannot happen fast enough, and it still leaves the issue of severe congestion in our cities. Electrification could exacerbate inequality and there are still significant embedded emissions in their global supply chain.

Modal shift from the car to public transport must therefore be at the heart of decarbonisation strategies, particularly for journeys linking cities and peri-urban areas. Achieving this shift requires fresh strategies aiming for substantial increases in efficient and user-facing public transport offers, deployed in parallel with constraints on car use, either through journey times or costs.

The challenge facing this mission is one of funding and financing, particularly at the pace required. Modelling by numerous institutions suggests a global funding need of well over USD 2 trillion per year between now and 2050, with close to two-thirds of that funding needed in emerging economies. The recent COVID-19 pandemic and price inflation have led to an increased cost of borrowing for governments, the private sector and households, making this challenge even greater.

This report was drawn up by a group of more than 40 experts from 19 countries, who worked for 18 months on possible funding mechanisms for public transport. The report distinguishes between new investments and the operation of public transport services, without sidestepping the crucial challenges of their efficiency and user considerations.

In our deliberations we found numerous practical and well documented funding options and models, with a rich availability of good and bad use case studies. The report attempts to summarise these findings, providing steers towards some generally applicable policy recommendations, focused on aiding the rapid delivery required.

The size of the public transport funding challenge requires policy makers and funders to be ambitious, to be spatially and strategically focused, and to provide ongoing commitments to a clear set of solid objectives. This will lay the critical groundwork for a successful funding model: driving confidence to fund providers, public or private; enabling long-term and transparent fare strategies to create a balance between generating sustainable revenue streams and a clear user focus, including targeted concessions supporting equity in mobility; and ensuring upfront investment financing is not the only consideration, implying a long-term vision for construction through to operating and maintenance.

We also found that numerous efficiencies still go unrealised across many programmes, which suggests the need for national and international benchmarking and a focus on evaluation, essential to capitalise on best practices and free up vital funds.

Strengthening resilience in the event of a crisis in the financing of decarbonised, democratic mobility is essential for our societies, as mobility is at the heart of people's lives. This should be one of the objectives of any financing strategy. Decarbonising mobility will be no mean feat, and will require action on both transport demand, notably in urban planning via transit-oriented development, and major investment in decarbonised mobility services.

The aim is to guarantee low-carbon accessibility to the city for all, with acceptable journey times and costs, and minimise the impact on public space for more pleasant cities. It is not out of reach, but it requires new strategies for funding and financing our mobility, for the common good.

Jean Coldefy and Jonathan Saks, Working Group Co-Chairs

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Invest more

Greenhouse gas emissions from transport must decline rapidly to meet the Paris Agreement goals. As well as renewing vehicle fleets with electric vehicles, this requires modal shift towards public transport and active mobility. Public transport investments must increase significantly to enable the required modal shift.

Focus on efficiency

More efficient infrastructure and service provision will contain the funding requirement. This requires co-ordinated institutional management arrangements, a strong focus on competition, a well-functioning multimodal mobility system, public investment decisions determined with efficiency in mind, and efficient financing choices.

Fund from all sources

Sustainable public transport requires funding from three sources: users, through fares; governments, through general budgets and earmarked taxes; and taxes on indirect beneficiaries, including owners of land that increases in value when its accessibility improves.

Main findings

Governments must address future public transport funding in the context of the urgency of the climate crisis. Meeting the goals of the Paris Agreement requires rapid decarbonisation of all sectors of the economy, including transport, which is one of the largest emitters. Decarbonising transport requires a rapid shift to electric vehicles powered by green electricity. However, this alone will not be sufficient, given the long lifespan of the vehicle fleet and the time needed to move to low-carbon electricity sources.

Significant shifts away from car-dependency will need to occur. Public transport must at least retain its modal share in city centres. Much of the change must occur in peri-urban areas and between these areas and city centres. Here, less-dense demand patterns imply that only a multi-modal transport system will achieve the required shift. Such a system centres on public transport with efficient links to shared and micromobility systems. An increased share of active mobility is essential.

Governments are increasingly adopting sustainable urban mobility plans, which emphasise shifting towards public, shared and active transport. As well as helping achieve decarbonisation, such shifts provide more equitable access to transport by replanning cities to improve accessibility for those without access to private vehicles. They also aim to enhance urban environments by reducing congestion, noise and air pollution, reallocating urban road space to public transport, active mobility and alternative uses.

These objectives have fundamental implications for the future funding of public transport. Large, sustained increases in investment are required to fund the needed increases in the public transport task. However, recent events, including the Covid-19 pandemic, have strained public transport authority finances and the ability of governments to commit additional funds. In the longer term, pressure on public budgets will increase with demands for health care from ageing populations. These factors highlight the importance of providing public transport services efficiently to minimise the overall funding requirement.

Strategic funding policy must optimise revenues from all sources, including the fares paid by direct beneficiaries (i.e. transport users) and taxes levied on indirect beneficiaries (e.g. adjacent landholders). Funding via general taxation should reflect payment for the broader social benefits of public transport projects, including contributions to economic development and social equity goals. Governments should base funding policies on clearly identified principles developed in consultation with all stakeholders. This requires explicit, formal processes using the best available data and detailed, expert analysis.

Fare policies and fare-setting processes are crucial areas for reform. In most countries, fare revenue has declined as a proportion of operating costs for several decades. Growing private motorisation and urban sprawl have reduced load factors on public transport, while fare increases are politically unpopular. Setting and maintaining fares at efficient levels optimises user contributions and makes expanded services easier to fund. Free public transport initiatives do little to divert demand from less sustainable modes and risk undermining the sustainability of public transport.

There is increasing interest in taxing the indirect gains public transport investments provide to adjacent landowners and businesses. Various land value-capture mechanisms could contribute substantially to funding larger transport infrastructure projects, particularly those that create links to major, existing networks. Examples include contributions from property development through planning systems, local tax increments and integrated "rail plus property" development models.

Given the limited use of taxes on indirect beneficiaries, general government revenue usually funds most of the difference between costs and fare revenues. This situation creates funding uncertainty, as public transport must compete with other government priorities, such as health and education. Such uncertainty can impede investment and service planning. Earmarked taxes are relatively little used but can potentially create a more predictable funding base. Some cities earmark revenues from congestion charges and other imposts on private vehicles to fund public transport improvements.

Public transport authorities have long raised revenue from advertising, sponsorship and related activities. However, despite a few examples of significant increases in revenue in recent years, they make only modest contributions to overall funding, which rarely exceed 2% of revenue and are unlikely to become substantial future funding sources.

The size of the investments needed may strain the ability of some governments to finance the initial capital expenditures required. This may encourage greater use of private finance initiatives, remunerated with future payments from public budgets. A focus on financial efficiency is essential in contracting such liabilities. Decisions to use private finance or other innovative financing methods should be based on the need to achieve a clearly stated objective and accompanied by a transparently communicated analysis, by the public authority, of the public funding implications over the life of the investment. Project finance should add value beyond circumventing rules that limit apparent liabilities on public balance sheets.

Top recommendations

Fund public transport as a crucial part of a sustainable, decarbonised and accessible transport system

The core policy priorities of decarbonisation, sustainability and equitable accessibility require a significant reorientation of transport policy, entailing a more prominent role for public transport. Policy makers should consider this broader policy perspective when planning and allocating funding for public transport.

Formulate integrated funding strategies for future public transport services

Governments should develop explicit funding strategies for public transport consistent with its crucial role in a sustainable transport system. Such strategies should set out the contributions of each significant funding source, based on stated principles and policies. Funding should be diversified to include contributions from fare revenues, general taxation and specific local taxes on the indirect beneficiaries of public transport investments, which may involve changes to legislation in some contexts.

Ensure effective co-ordination between levels of government when funding public transport investments

The trend towards decentralised public transport planning powers and the limited tax-raising capacities of state and local governments make effective funding co-ordination essential. Planning for significant transport infrastructure projects should include allocating funding responsibilities. Governments should consider using explicit framework agreements to ensure co-ordination of funding flows and maintain accountability for their use.

Improve the efficiency of public transport infrastructure investments and service provision

Efficient infrastructure and services reduce demand for public subsidies. Efficiency is even more crucial given the more prominent role of public transport in a decarbonised and sustainable transport future. Pro-competitive reforms of infrastructure development and service provision are essential to improving efficiency. Systematic approaches to measuring efficiency performance, using structured benchmarking tools, can provide the insights needed to best direct efforts to make further gains.

Adopt explicit fare policies and implement them via formal processes

Explicit fare-setting policies, implemented via formal processes, can make user funding from fares less vulnerable to political pressure and more efficient over time. Incorporating extensive stakeholder consultation in fare policy development, especially with users, will enhance acceptability. Governments should also consider incorporating independent, expert advice into fare-setting processes.

Use structured fare policies for more equitable accessibility

Unlike blanket low fares, well-targeted concessionary fares can improve accessibility without compromising overall fare revenue. Eligibility for concession fares should be based primarily on need (i.e. income levels) rather than membership of particular social groups. This applies to middle-income countries as much as high-income countries, as the example of Bogotá demonstrates.

1. The role of public transport funding in a decarbonised future

The role of public transport within the broader transport system is undergoing major change, which will accelerate in the coming decades. A clear understanding of public transport's future role, including its relationship with other modes, is essential to developing an efficient, equitable and sustainable long-term funding model. Changes in of the ways public transport services are provided also have important implications for future funding requirements.

Decarbonisation requires a shift to sustainable modes

The climate crisis presents governments worldwide with a significant challenge in addressing future public transport funding. Meeting the Paris Agreement goal of limiting global warming to "well below" 2 degrees Celsius above pre-industrial levels requires the rapid decarbonisation of all sectors of the economy (UN, 2015). The transport sector accounts for 23% of emissions globally and 30% in developed countries, and total transport emissions have not yet begun to fall (UN, 2021).

Decarbonising transport requires a rapid shift to electric vehicles (EVs) fuelled by green electricity. However, this alone will not be sufficient, given the long lifespan of the vehicle fleet and the time required to build a green electricity grid. Therefore, significant shifts to more sustainable modes, including public transport, are also needed.

Since public transport already has high modal shares in many city centres, much of the required change must occur in peri-urban areas and between these areas and city centres. However, demand patterns in non-urban areas are less dense. For this reason, only a multimodal transport system, with public transport at its core and efficient links to shared mobility and micromobility systems, can achieve the required shift. More people need to use active transport modes as well. Continued improvements in vehicle energy efficiency across all transport modes and action to reduce travel demand are also essential (ITF, 2023b).

This context has fundamental implications for the future funding of public transport. Substantial expected growth in overall transport activity in the coming decades significantly increases the decarbonisation challenge. The *ITF Transport Outlook 2023* predicts that, on current trends, passenger and freight transport activity will double between 2019 and 2050 (see Box 1).

Dramatic increases in transport activity mean that current transport decarbonisation commitments are insufficient to put transport on a sustainable path. ITF modelling shows that, even if governments fully implement these commitments, transport's total carbon dioxide (CO_2) emissions would still increase by 14% by 2050 (ITF, 2023b). Therefore, significant additional policy change, as modelled in the *ITF Transport Outlook 2023* under the High Ambition scenario, is needed.

Box 1. The ITF Transport Outlook 2023

The *ITF Transport Outlook 2023* focuses on how the global transport sector can reduce carbon dioxide emissions in line with the Paris Agreement goals between now and 2050. Using the ITF's in-house global transport models, it projects the potential effects of two policy scenarios: a Current Ambition scenario and a High Ambition scenario.

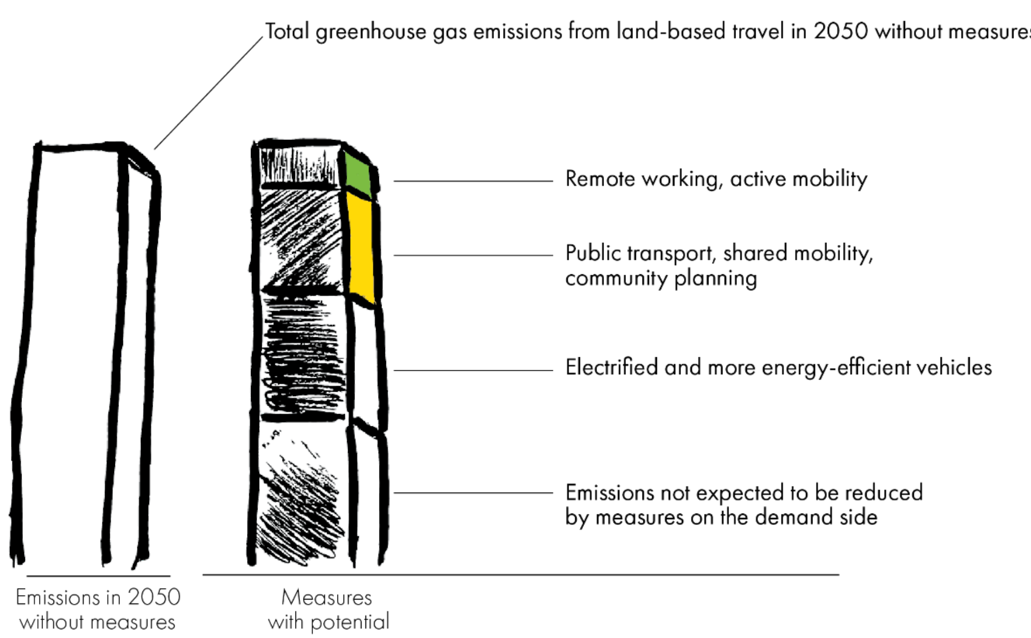
The Current Ambition scenario provides insights into how transport demand and emissions could evolve over the coming decades if transport policy continues along its current path. It reflects a general recognition that the transport sector needs to decarbonise and considers existing and forthcoming policy commitments in national and regional governance directives, government strategies and laws.

The High Ambition scenario, by contrast, looks at the impact of adopting more ambitious policies to decarbonise the transport sector. It takes the Current Ambition policies and imagines a policy trajectory with accelerated implementation timelines and bolder policies to encourage more sustainable developments and travel behaviour.

Source: ITF (2023b).

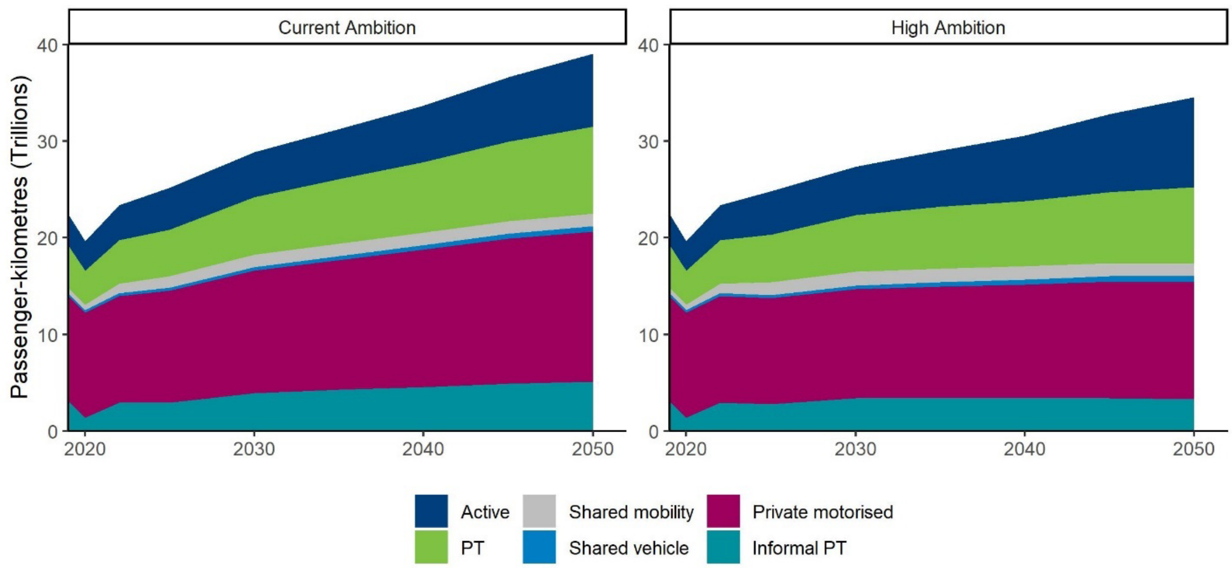
The Avoid-Shift-Improve (ASI) framework is the most widely applied approach to decarbonisation. This paradigm prescribes avoiding unnecessary trips, shifting to less energy-intensive modes, and improving vehicle efficiency (see e.g. TUMI, 2019). Figure 1 conceptualises the potential contribution of key policy and behavioural changes to reducing carbon emissions from transport.

Figure 1. Potential measures to reduce carbon dioxide emissions from transport



Source: K2 (2022).

Figure 2. Changes in urban passenger transport mode share by scenario



Note: Figure depicts ITF modelled estimates. Active mobility and micromobility include walking, biking, and scooter and bike sharing. Public transport includes rail, metro, bus, light rail transit and bus rapid transit. Informal PT includes informal buses and three-wheeled public transport. Shared vehicle includes motorcycle and carsharing. Private vehicles include motorcycles and cars. Shared mobility includes taxis, ridesharing and taxi buses.
Source: ITF (2023b).

ITF modelling shows ambitious decarbonisation policies could reduce transport CO_2 emissions by 80% by 2050, compared to 2019. However, achieving this goal requires a multi-faceted approach. Figure 2 compares the evolution of urban passenger transport modal shares under the ITF's two scenarios. It shows that while public transport's mode share increases in both scenarios, the increase is smaller in the High Ambition scenario, mainly due to higher assumed growth in active and shared mobility and micromobility.

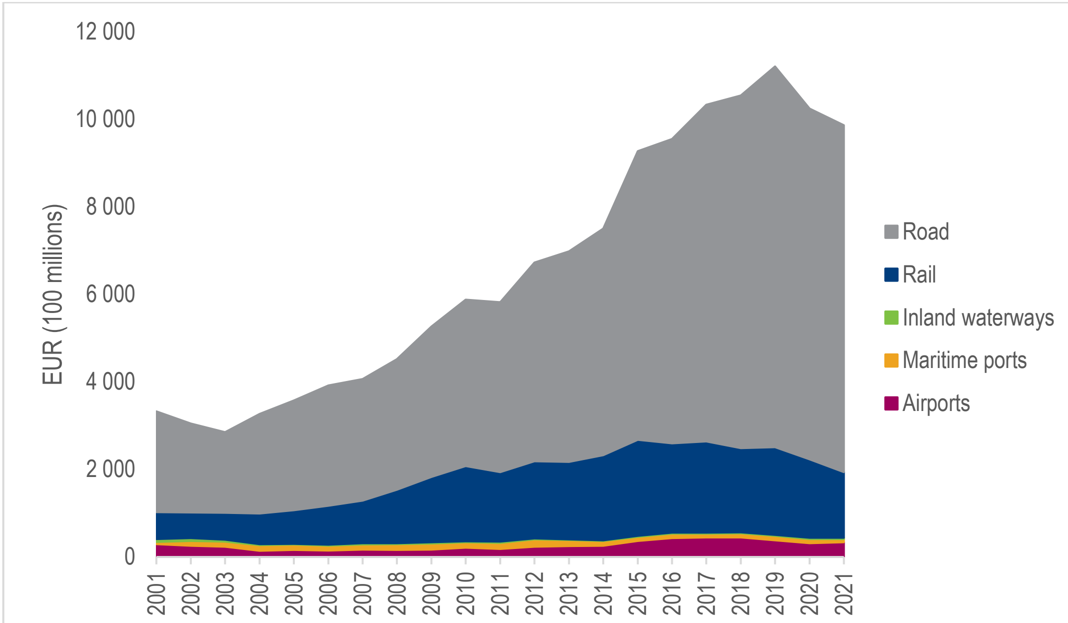
At the same time, given the significant expected increase in total demand, public transport demand would more than double in the High Ambition scenario. Public transport would also play a crucial role as the centrepiece of a multi-modal sustainable mobility model, combining with active, shared and micromobility to make complex trips feasible and efficient.

Achieving modal shift requires more investment in public transport

Substantial investments are needed to decarbonise transport. As SLOCAT (2021) states: "Globally, investments of USD 2.7 trillion per year from 2016 to 2030 (or USD 40.5 trillion in total) will be needed to achieve low carbon transport pathways, with 60-70% of these investments in emerging economies." Similarly, the ITF estimates that realising the High Ambition scenario would require investing 1.5% of global gross domestic product (GDP) between 2019 and 2050, or around USD 2.4 trillion annually (ITF, 2023b).

The enhanced role of public transport has significant implications for investment allocation. Investment spending and operational subsidies for public transport must rise significantly from current levels, implying a reversal of long-term trends, and more coherence in transport policies to make investment as efficient as possible. Between 2010 and 2018 alone, road transport infrastructure investment in OECD countries increased by 91% (SLOCAT, 2021). Figure 3 shows that roads dominate total transport infrastructure investment in a majority of ITF countries (where data are available).

Figure 3. Transport infrastructure investments in ITF countries, 2001-21



Source: ITF (2023).

The modal shift from private vehicle use under decarbonised transport scenarios implies reductions in required road investments. However, additional spending will be needed to enable this shift, including road-space reallocation to create new bus priority lanes, cycling and micromobility lanes, and footpaths.

The ITF (2023b) estimates that the road spending required under its High Ambition scenario would be about 6.5% less than under the Current Ambition scenario. Expected reductions in private vehicle ownership partly drive this result, as average distances travelled fall. At the same time, the use of shared vehicles rises, and private transport spending moves towards buying services rather than assets.

In the medium term, reduced road spending should offset public and active transport investment increases. However, the long time horizons of major infrastructure investments may create shorter-term challenges due to the costs and difficulties involved in revisiting already committed expenditures.

Moving to sustainable transport could reduce total investment needs in the long term. The ITF estimates overall transport investment needs would fall 5% from current levels under the High Ambition scenario (ITF, 2023b). Other researchers reach similar conclusions. For example, Fisch-Romito and Guivarch (2020) conclude that “the expenditure needed for transportation infrastructure is lower in low-carbon pathways than in baseline scenarios. This result holds true at both the global and regional scales and is robust to the uncertainties considered”.

Expected reductions in fossil-fuel subsidies should expand the fiscal space to fund necessary investments. For example, the Group of 20 (G20) countries have pledged to end such support. However, by 2020, G20 fossil-fuel subsidies had only fallen by 9% from peak levels and continued to amount to almost over USD 5 trillion globally. This situation highlights the potential gains from more meaningful reform (SLOCAT, 2021).

In summary, moving towards sustainable transport should not increase total transport investment needs. It will require a significant funding shift between modes and supporting policies within the “Avoid, Shift, Improve” framework. Governments must prioritise strategic planning, data collection and analysis, and forecasting, to provide sound evidence for decision-making and thus achieve this shift promptly and efficiently.

Redirecting transport spending will be particularly challenging in the short- to medium-term, as many large-scale investments have extended lead times and significant expenditures are already committed. However, the urgent need to move to sustainable transport implies governments should carefully review investment commitments currently directed to less sustainable modes.

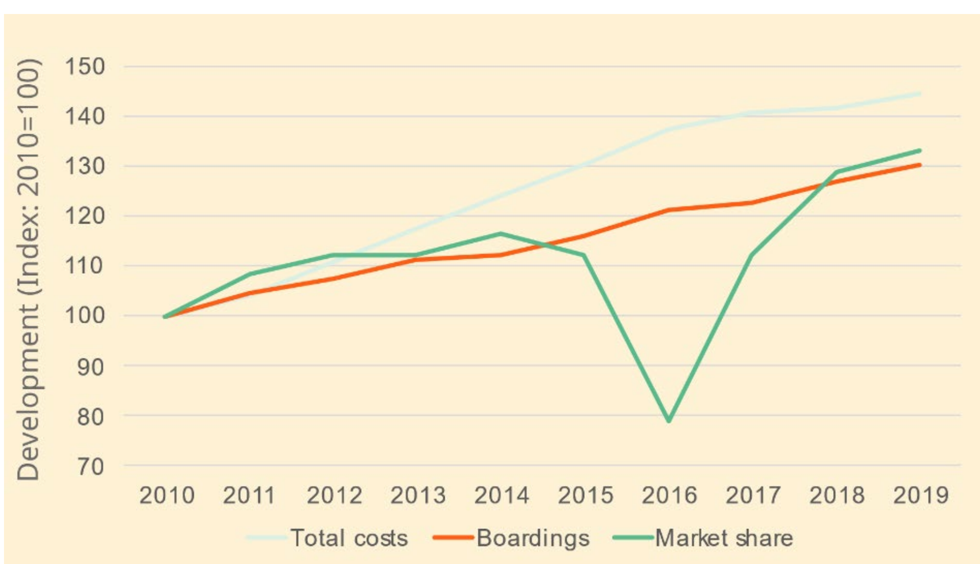
Effective strategies are needed to achieve sustainability goals

Some OECD countries have already set ambitious targets for increased public transport mode shares and significantly changed investment allocations. France's public transport investment tripled from EUR 2.3 billion in 2010 to EUR 6.9 billion in 2019. More than one-third of the 2019 total was devoted to the Grand Paris Express, a project intended to transform mobility in the greater Paris region.

The European Union's 2021 Sustainable and Smart Mobility Strategy sets several specific modal shift objectives. These include doubling high-speed rail traffic by 2030 (and tripling it by 2050) and completing the Trans-European Transport Network (TEN-T) as a comprehensive, sustainable multi-modal network (EC, 2020). The newly elected German government also established targets related to modal shift in its 2021 coalition agreement, committing to "strive to invest considerably more in the railways than in the roads" (Clinnick, 2021; Ibold and Bongardt, 2021).

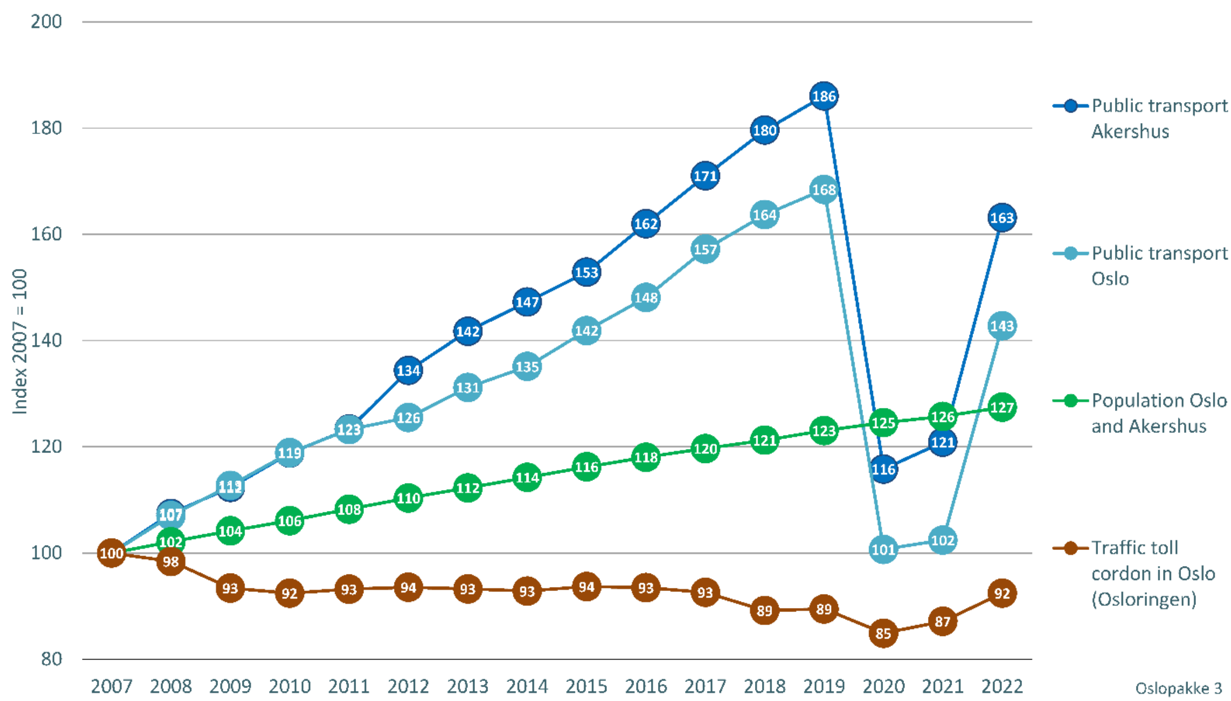
While increases in public transport investments have not always produced the desired modal shifts, some countries have achieved encouraging results. Sweden set a target of doubling public transport's modal share, from 18% of motorised travel in 2006 to 36% by 2030. Public transport's share had reached 32% by 2019 (see Figure 4). This result was enabled by a 60% increase in public funding for public transport (from SEK 17 billion to SEK 27 billion) and new legislation, adopted in 2012, shifting the main source of public transport funding from the local to the regional level of government (Hultén, 2023).

Figure 4. Public transport's share of motorised transport in Sweden, 2010-19



Note: The market share results for 2016 exclude Stockholm due to unavailability of data.
Source: Hultén (2023), data from Kollektivtrafikbarometern (2020).

Figure 5. Modal shift in Oslo and Akershus, 2007-22



Source: Norheim (2023).

A similar shift towards public transport modes has occurred in Norway. Public transport ridership increased by 68% in Oslo and 86% in Akershus between 2007 and 2022, while road traffic within the Oslo toll cordon area fell (see Figure 5) over the same period. The Norwegian government's decision to use urban toll revenues to fund increased public transport investment and improved services significantly contributed to this shift (Norheim, 2023).

In Canada's Ontario Province, the City of Brampton has significantly increased public transport's modal share through local rather than national government initiatives. Between 2009 and 2019, public transport ridership grew by 160% while the population grew by 27% (City of Brampton, 2021). This result is notable because development patterns remain largely low-density, single-use and suburban. Over half of the private dwellings in the city are detached houses (City of Brampton, 2019). This form of spatial development is not typically associated with high public transport performance.

However, the city invested heavily in improved services, adopting a network with high-frequency trunk lines, many with limited stops or operating in priority corridors (Marshall, 2018). Before Covid-19 the city had the fastest-growing ridership in Canada, and ridership in the first five months of 2023 was up 25% on the same period in 2019 (City of Brampton, 2023). The city has also adopted specific targets (e.g. 71 public transport rides per capita by 2041) in its sustainable development strategy. Gupta (2023) also cites high and rising car ownership costs as a factor in this modal shift.

Sustainable mobility and public transport are interconnected

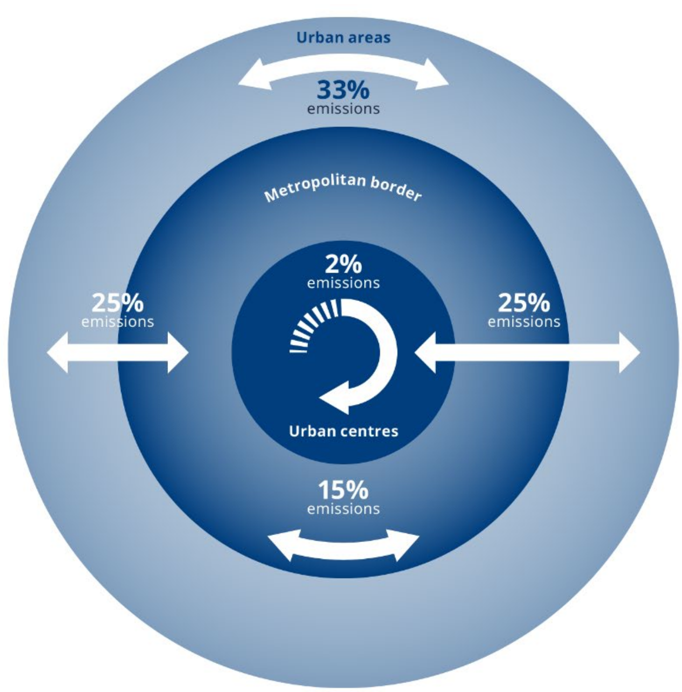
Many governments are adopting sustainable urban mobility plans (SUMPs) in the broader planning context. SUMPs play a significant role in decarbonisation and seek to ensure equitable access to transport for those without access to private vehicles. SUMPs also focus on improving urban environments by reducing congestion, noise and air pollution. Specific actions include reallocating urban road space to public transport, active mobility and alternative uses (see e.g. Eltis, 2021).

Hultén (2023) describes this as adopting a changed social contract, with the objective of "enabling everyone to get all around cities, as well as to important places outside cities, at a reasonable time and a reasonable cost, without having to own a vehicle". Hultén argues that this objective implies reorienting transport resources from private to shared modes, and moving from investing in products to paying for services.

Achieving sustainable urban mobility also implies implementing strategies to reduce transport demand. Integrating land-use and transport planning, including adopting the "15-minute neighbourhood" concept through mixed-use zoning, can reduce travel distances. Working with other government service providers (e.g. health and social services) to modify service planning and delivery models can also reduce travel distances and increase accessibility (Jones and Blackadder, 2022). Maximising virtual accessibility can reduce travel needs while maintaining or improving accessibility.

Equity is also a central issue. Researchers have long highlighted (see e.g. ITF, 2020b) that people without access to private cars often face "transport poverty", leading to social exclusion and the need for equitable accessibility policies. Increased road-user taxes and other policies designed to restrict private vehicle use will deepen this inequity by reducing the affordability of private vehicles. This inequity underlines the need to improve other transport options.

Figure 6. The distribution of vehicle emissions across urban areas



Source: Based on Coldefy and Gendre (2020).

Reduced private car use is implicit in sustainable mobility. Figure 6 shows that car use needs to decline in peri-urban areas. While 80% of vehicle emissions occur in urban areas, the high modal share of public transport in city centres means that only 2% of emissions relate to trips within these areas. The major targets for emissions reductions must be journeys within outer urban areas (33% of emissions), between outer urban areas and suburban zones (25%) and between suburban areas and centres (25%).

The methods used to shift to sustainable modes will vary by context. For example, rapid bus services require limited infrastructure investments and can quickly expand service offers. A recent study (Coldefy and Gendre, 2020) found that express coach services with few stops can provide similar journey times to private cars in most cases, while dedicated bus lanes can bring significant time savings.

User costs for express bus passengers are also 85% lower than for drivers, with savings of EUR 200 per month for a 30-kilometre daily commute. Furthermore, the costs of CO_2 emission avoidance are low or even negative (after accounting for the service's other benefits). Public transport operators can maximise the benefits of the shift to express coaches and other modes if they integrate services. Effective integration could involve providing freeway-adjacent park-and-ride facilities in suburban areas, or bus terminals co-located with metro and tram services in city centres (Coldefy and Gendre, 2020).

Maintaining accessibility across urban, peri-urban and extra-urban environments entails developing and integrating all alternative modes, including public, shared and active transport. Governments must increase both capital investments in public transport infrastructure and operating subsidies. They should also invest in efficient, multi-modal transport systems based on the Mobility as a Service (MaaS) concept, with public transport at their centres (see e.g. ITF, 2021d, 2021e).

Despite much experimentation, no commercially self-sustaining, mass-market MaaS offer has yet emerged. The long-term viability of MaaS business models thus remains unproven. Hultén (2022) suggests governments could lead and subsidise the initial development and delivery of MaaS systems. Non-government entities that have engaged in MaaS lack the resources to support its timely development and are not well-placed to take a strategic view of the broader role of MaaS in transport policy.

A government-led MaaS model would also overcome many public transport authorities' reluctance to engage with commercial MaaS providers (due to concerns that they could profit unreasonably from reselling a subsidised service). However, should governments adopt this approach, maintaining the medium-term contestability of the market by enabling entry by competing providers is essential to ensure the sector's dynamic efficiency.

The current and future funding environment

This report focuses primarily on funding public transport. However, because major public transport investments require substantial capital spending to develop essential infrastructure, it is important to distinguish between funding and financing (see Box 2). Many cities currently experience long-term public transport investment backlogs. Public transport networks often failed to keep pace with urban growth during the decades in which car ownership and private vehicles' mode share ballooned. Despite more recent moves to promote public transport use, particularly in major cities, much of this backlog remains.

Public transport authorities also faced significant financial pressures during the Covid-19 pandemic; many are financially fragile. Almost all saw major downturns in ridership and revenue, initially due to lockdowns and subsequently to consumer reluctance to use public transport. Government-provided emergency funding rarely fully offsets revenue losses. Patronage levels and revenues have yet to recover in many towns and cities. The recent re-emergence of inflation has also raised pressure on public transport budgets, increasing operating and investment costs.

The combined impact of these factors means many public transport authorities face budgetary stress. In the longer term, ageing populations will further pressure public budgets. In this context, identifying sustainable, efficient and equitable long-term funding models for public transport becomes an urgent task. Any model must meet two broad requirements. First, it must minimise costs by ensuring investment and service provision efficiency (see Chapter 2). Second, it must optimise the contributions of all funding sources.

Box 2. Funding and financing

To enable major infrastructure investments, it is crucial to determine who will ultimately pay for the service, in what proportions and over what periods; and who will mobilise the resources to implement it. The first aspect, funding, has to do with the project's ability to generate a sufficient revenue stream over its lifetime, not only to cover the required capital investments, but also operating and maintenance costs. The second, infrastructure financing, refers to the capacity to mobilise the investment and resources needed to meet the project's initial requirements (Vassallo and Garrido, 2023).

Two conditions determine whether a project is fundable. First, it must generate benefits at least equal in value to its total cost. Second, it must be possible to capture a sufficient proportion of these benefits to meet these costs.

Over a project's lifetime, the funding requirement comprises all capital and operating costs, plus the required rate of return on investment. The latter is equal to the opportunity cost of the capital employed, and includes the relevant discount rate, as most capital costs arise before the project begins to provide services, while repayments of these costs occur progressively over the project's lifespan. The funding requirement can be represented as follows:

Funding requirement = capital investment + return on capital + operating costs + maintenance costs

The time difference between the large initial expenditure and the flow of benefits creates the distinction between funding and financing. A project may produce enough funding (revenue to cover costs) over its lifespan but have problems obtaining finance at the outset when the capital investment is needed.

If project proponents cannot mobilise adequate resources, there is no way to develop the project and enjoy its benefits. In developed countries with efficient capital markets, problems when financing potentially fundable projects usually result from difficulties in capturing the project benefits. These may be political or technological, or some combination of the two.

Furthermore, the near universality of operating-cost deficits means major transport infrastructure projects impose large, ongoing funding requirements. However, many innovative funding sources used to fund projects' capital costs projects are ill-suited to providing ongoing funding. Even those potentially usable in this way (e.g. various property taxes) may be difficult to apply to generate operating subsidies if significant ongoing charges have already been levied to contribute to capital funding.

This highlights the need for project budgeting to focus systematically on the long-term fundability of the project rather than simply the capital costs. This means including estimates of the likely ongoing operational subsidies required to maintain services on new infrastructure in project appraisals.

For a more in-depth discussion of public transport financing see Chapter 8 of this report.

Vassallo and Garrido (2023) identify three general sources of public transport funding: public transport users, indirect beneficiaries of public transport services and infrastructure, and taxpayers (discussed in Chapters 3-5, respectively). Other sources such as advertising and sponsorship provide a smaller share of revenue (see Chapter 7). A recent systematic review identifies and evaluates 19 specific funding options (see Table 1), concluding that "no new options . . . are particularly cost-effective and easy to implement; each has disadvantages and constraints. As a result . . . various funding options should be used to help finance the local share of transportation improvements to ensure stability and distribute costs broadly" (Litman, 2022).

Table 1. A taxonomy of public transport funding sources

Funding source	Specific funding options
Public transport users	Fare increases Discounted access passes (to increase user numbers)
Indirect beneficiaries of public transport services and infrastructure	Property taxes Land-value capture Development or transport-impact fees Station rents Sale of air rights Employee levies (i.e. payroll tax surcharges) Regional sales taxes
Taxpayers	Vehicle levies (registration surcharges) Fuel taxes Vehicle distance charging Selective road tolling Congestion charges Parking pricing Parking levies Parking taxes Utility levies (paid by electricity users) Income taxes

Source: Based on Litman (2022).

In summary, the complexities of the current funding environment imply that governments should consider all of the following strategies:

- increasing user contributions (i.e. fare revenue) by adopting well-designed fare policies and fare-setting processes
- increasing contributions from the indirect beneficiaries of public transport, especially by more systematically applying land-value capture (LVC) mechanisms
- reorienting transport infrastructure investments away from the road sector and towards public, shared and active modes
- using earmarked taxes, where appropriate, as a medium-term initiative to encourage and enable timely moves to sustainable transport
- ensuring adequate financing capacity is available, potentially by calling on private financing options or other innovative financing tools (see Chapter 8 of this report).

2. Improving the efficiency of public transport

Significant expenditure increases are needed to establish and operate sustainable transport systems. Spending these funds effectively will minimise funding requirements, maximise value to consumers and yield sustainable modal shift. Achieving efficiency gains remains a serious challenge for public transport operators and funders. However, the objective to improve efficiency should not come at the cost of other service planning and delivery objectives, such as accessibility for all, and modal shift. Public transport authorities should equally consider the trade-offs between improving efficiency and meeting other objectives or priorities.

New public transport services generate capital costs and ongoing operational costs. Efficiency gains are needed in both areas to maximise the size and competitiveness of the public transport service offer. In this respect, increased efficiency can be regarded as equivalent to a fourth source of funding for public transport that can greatly assist in closing current and future funding gaps.

Improving the operational efficiency of public transport reduces the need for subsidies. For example, benchmarking work (Condry, 2023) shows that costs per train-capacity-kilometre vary more than threefold across the International Suburban Rail Benchmarking Group (ISBeRG), suggesting the scope for efficiency gains (although operating environments and remits vary). However, very few public transport operators and funders have introduced benchmarking or performance indicators that would enable them to measure and understand service efficiency.

This chapter explores three factors that improving efficiency depends on: the institutional organisation of service planning and delivery; the role of competition in promoting and maintaining efficiency; and the management of supply issues, including effective service planning and modal integration. It then moves to a discussion of the importance of benchmarking.

Co-ordination between institutions is crucial

The ITF has previously documented key trends in institutional approaches to public transport service planning and procurement (ITF, 2020a). Planning functions in many ITF countries have tended to move from national to regional and local government levels. This reflects broader trends towards decentralisation to address local needs and preferences and improve value for money.

However, because transport patterns do not necessarily reflect local government boundaries, many countries have found it necessary to create co-ordination mechanisms that cover the entire functional transport area of a city or region (i.e. the areas between people’s homes, workplaces and other vital destinations). Examples include creating metropolitan transport authorities (MTAs), pooling funding and regulatory authorities, and negotiating agreements between local and regional governments.

Coldefy (2023c) identifies three ways to ensure co-ordinated planning across functional areas:

1. extend the boundaries of metropolitan areas, or their transport authorities, across the whole transport area

2. empower metropolitan public transport authorities to implement public transport planning for inbound passengers beyond their jurisdictional boundaries
3. encourage co-operation between metropolitan and regional public transport authorities.

France's 2019 *Loi d'Orientations des Mobilités* [Mobility Orientation Law, LOM] takes the third approach (Republic of France, 2019). Coldefy argues that the results are poor, with few regions making co-operative agreements with neighbouring metropolises, as the LOM envisages. The resulting risk is that metropolises manage their transport and land-use policies without weighing their impacts on neighbouring regions, which frequently house many metropolitan area workers. Demographic changes increase the costs of poor co-ordination when a higher proportion of the population lives outside metropolitan areas (often due to metropolitan house price inflation) and commutes to city jobs. That is, jobs are more concentrated in the metropolis, while housing has become more dispersed.

Similar dynamics exist in many places. In Canada's Greater Toronto and Hamilton Area (GTHA), changing trip generators and increasing housing costs have resulted in more complex travel patterns, especially for commuters. For example, the GTHA's second-largest employment cluster, the Pearson Airport Employment Zone in Mississauga, is adjacent to two other municipalities, each with public transport networks. Intercity buses operated by GTHA's regional transport authority, Metrolinx, also serve the employment zone. The result is a complex network of bus services operating outside their municipal borders, limited service integration and connectivity gaps.

Legislative constraints on cross-boundary operations result in service duplication and higher operating costs and fares. Addressing these issues requires co-ordination between service providers, including aligning operational practices and integrating ticketing. This co-ordination currently occurs via separate inter-municipality agreements. However, following several pilot projects, provincial authorities have begun reforming legislation limiting cross-boundary service integration (Province of Ontario, 2022).

By contrast, in the Metro Vancouver area of British Columbia, the MTA, TransLink, has jurisdiction over all public transport services. Service and infrastructure improvements are planned and implemented by a single authority in co-operation with the metropolitan area's municipalities, and services and fares are fully integrated. TransLink has sole authority to establish and operate services but can also approve independent services (Province of British Columbia, 2023). The cities of Barcelona, London and Paris offer further contrasting examples of integrated regional MTAs (see ITF, 2018a).

Effective competition can increase efficiency gains

There has been a clear trend away from public monopoly provision of public transport services, with hybrid models of regulated competition now widespread. This reflects a broader trend towards ensuring more efficient delivery of public services. However, while this trend is well-established, good competitive processes are often absent. Transport authorities should ensure well-designed competitive processes, which are critical to establishing and maintaining workable competition.

A fundamental lesson for urban transport is that competition *for* the market is preferable to competition *in* the market (ITF, 2020a). Operators competing for passengers on identical or similar bus routes (as occurred, for example, during a reform process in Santiago, Chile) creates safety issues and congestion and pollution concerns. Crucially, it also reduces load factors, endangering the services' fundability.

Conversely, allocating concessions to operate route networks via periodically repeated competitive tender processes improves service quality and lowers costs (Hurtubia and Leonhardt, 2021). Barcelona's experience of a mixed (i.e. public and private) service provision model highlights the potential efficiency gains. Services contracted via competitive tendering showed significantly lower average costs per bus-kilometre than those provided under public monopoly conditions (EUR 3.50-5.50 versus EUR 6.70). Passenger satisfaction scores were higher for tendered services, and average public subsidies were around one-third lower (EUR 1.35 per passenger versus EUR 1.98). These differences led to a progressive move towards more competitive tendering (ITF, 2020a).

Following the reports from the French Court of Auditors, as well as the French National Transport Authority, Coldefy (2023b) argues the monopoly status of France's national state-owned railway company, SNCF, is a core reason for observed differences in productivity and costs between it and other countries such as Germany and Sweden. He notes the SNCF has 1.73 employees per kilometre of line, among the highest in Europe and almost twice that of Deutsche Bahn. French regional train drivers drive for around 400-600 hours per year, compared with about 1 000 in Germany.

A well-designed tendering process is essential to achieving the potential efficiency gains from competition in practice. A primary goal is to establish and maintain workably competitive markets by reducing barriers to entry. Achieving this goal requires maximising the number of qualified bidders, by:

- setting the size and length of concessions appropriately
- separating service provision from asset ownership (e.g. depots, buses)
- providing adequate information to tenderers
- ensuring contracts include adequate incentive mechanisms and performance standards that address all significant service quality requirements (ITF, 2020a).

Making better modal choices also improves efficiency

Efficient public transport supply also requires the scope of services to be appropriate and sound modal choices to address different circumstances. Coldefy (2023a) describes the evolution of the public transport offer in France in recent decades, highlighting the need to match demand conditions and modal choices. For example, the regional rail network (TER) has an average load factor of only 26%; many lines with low traffic levels continue to be served by rail rather than coaches. Coldefy points out that coach services would often be cheaper and yield lower emissions per passenger (when replacing diesel trains). Conversely, the potential diversion of demand to private vehicles (or discouraged travel) due to shifts to bus services, generally less preferred by consumers, must also be considered.

France's urban public transport services have expanded into many relatively low-density areas, mainly via major expansions in bus routes. Public transport accessibility has also increased, but high costs and low load factors imply large operational subsidies. For example, while the operating cost of a bus is around EUR 7 per vehicle kilometre, average loads on many services are below five passengers. The high subsidy cost implies low service frequencies, reducing the prospect of increasing patronage due to low perceived service quality.

Service planning must address this trade-off between efficiency and accessibility within a strategic framework (Coldefy, 2023a). For example, an alternative approach could potentially provide more frequent services and increase patronage. This would involve developing a multi-modal model that integrates public transport with other modes, including active and shared transport. Buses or trams would provide trunk services, fed by other modes. Such a model requires investment in quality walking and cycling infrastructure (ITF, 2024). It also requires enabling regulatory environments for shared and micromobility. Minimising the time and monetary costs of multimodality is at the heart of the MaaS concept. An enabling regulatory environment makes sustainable MaaS models more likely to emerge, encouraging multimodality.

Measuring performance is a prerequisite to increased efficiency

Effective performance measurement is essential to maintaining and improving efficiency. Both cross-sectional (static) and time-series (dynamic) data can be used. A static measure, comparing efficiency metrics against similar service providers can assess efficiency relative to current benchmarks. Dynamic measures track changes in efficiency performance and help assess reform progress. Comparative time-series assessments enable measuring an operator's efficiency improvement rate against relevant benchmarks.

Efficiency measures are most helpful if they measure performance against comparable service providers. Many public transport authorities conduct little comparative assessment. However, a large body of knowledge has emerged from the benchmarking work undertaken in recent decades, particularly by Imperial College London's Transport Strategy Centre (see Box 3). This work identifies and specifies indicators covering numerous performance dimensions.

Benchmarking includes broader performance measurement

Benchmarking goes beyond efficiency, addressing all objectives pursued by public transport services, including safety, service quality, accessibility, and sustainability. Table 2 provides an example, showing key success dimensions for public transport operators and KPIs for each dimension (with multiple KPIs in each area). The "internal processes" and "financial success" dimensions relate most directly to efficiency. The "growth and learning", "customer" and "safety" dimensions relate to other vital outputs (which typically involve trade-offs against efficiency).

Box 3. Benchmarking in practice: Imperial College London's Transport Strategy Centre

The Transport Strategy Centre (TSC) at Imperial College London has been benchmarking public transport for over 25 years. The TSC includes over 120 member groups covering metro, rail, light rail, buses and airports. Rail benchmarking groups covering mainline and suburban rail operations have operated since 2010 and 2016, respectively. The TSC also convenes a Railway Infrastructure Asset Management Group.

The benchmarking groups work on an annual cycle combining measurement and analysis of key performance indicators (KPIs), in-depth research, and information sharing. A core insight is that efficiency measurement is a complex and multi-dimensional task, requiring a detailed understanding of the specific characteristics of each operator and their operational context, and consistent and comparable data.

Source: www.imperial.ac.uk/transport-engineering/transport-strategy-centre.

Table 2. Success dimensions and key performance indicators

Success dimension	Areas covered by key performance indicators*
Background and context	Network, services and passengers
Growth and learning	Change in demand and service Staff training
Customer	Capacity provision and utilisation Trains: Service delivery and punctuality Train delays (e.g. delay minutes) Passenger punctuality and delays
Safety	Passenger safety Staff safety Signals passed at danger (SPADs)
Internal processes	Fleet availability and utilisation Reliability (delay incidents by cause) Staff productivity Staff absenteeism rate Energy consumption
Financial	Operating cost/efficiency (by category) Labour cost/efficiency (by category) Revenue (fares and subsidy) Fare evasion

Note: *Multiple key performance indicators can exist within each of these areas.
Source: Condry (2023).

Some of these success dimensions conflict, at least partly. Good benchmarking practice involves developing metrics for each dimension and determining how to combine them to obtain the richest insights into current performance, performance trends and their determinants. This method provides essential management information to support performance improvement.

Given the trade-offs between performance objectives, it is essential to understand how individual transport networks or operators perform from an overall perspective when comparing efficiency. For example, if a high level of quality is required (e.g. high punctuality standards) or services operate in low-density areas, lower performance on some efficiency metrics is likely. For example, staff productivity may appear to decrease if operators provide additional staff to ensure on-time departures.

Combining efficiency metrics for better insights

Condry (2023) highlights a basic distinction between technical efficiency (maximising outputs from a given set of inputs) and allocative efficiency (minimising the inputs needed to achieve a given output). He notes successful railways typically use both measures. The operating environment significantly affects potential efficiency, complicating comparisons. For example, widely differing demand densities mean railways with similar costs per train-kilometre can exhibit considerable differences in cost per passenger-kilometre.

Combining efficiency metrics helps address comparability issues and improve understanding of different aspects of system performance. It is important to distinguish between efficiency-related factors that are at least partly within the operator’s control and exogenous factors. Understanding the tools available to affect performance against each metric is also essential.

Table 3. Efficiency dimensions and metrics

Efficiency dimension	Key measures
Efficiency of rolling stock utilisation	Proportion of fleet available for peak service Distance travelled per annum (km/car) Passenger-kilometre/car Passenger-kilometre/car-kilometre Cost/car (by category) Cost/car-kilometre (by category)
Efficiency of labour utilisation	Passenger-kilometre/labour hour Train-kilometre/labour hour
Cost performance	Operating cost/hour, per passenger-kilometre, per car Labour cost/train hour, passenger-kilometre, or station Energy cost/ passenger-kilometre (or capacity-kilometre) Annual investment rate
Revenue performance	Cost recovery (fare and non-fare revenue)/operating expenditure (OPEX) Fare and non-fare revenue/passenger-kilometre, or per passenger journey Fare evasion rate

Source: Based on Condry (2023).

Condry (2023) identifies four broad perspectives on efficiency and highlights their relationships with elements of the rail operating environment. In general, rail operators expend resources to provide a service that meets passenger demand. The resources required include infrastructure, stations, rolling stock, staff, maintenance facilities and energy. The service consists of timetables, routes, operating hours, distances travelled, capacity, speeds and service types. Demand refers to passenger journeys and distances travelled, network usage, travel times, the purpose of journeys, and a passenger's willingness to pay.

A first efficiency perspective considers the relationship between resources and service: in other words, the extent to which resources are used efficiently to deliver the train service. A second, connected perspective reflects the relationship between service and demand: in other words, the extent to which an efficient train service is delivered that meets (and grows) demand. Both perspectives relate largely to establishing a sustainable future funding base for public transport.

A third perspective considers the relationship between resources and demand: in other words, the extent to which resources are used efficiently to meet (and grow) demand. A fourth, connected perspective considers the link between financial efficiency and profitability: in other words, between costs and revenues. Both perspectives focus on growing demand through efficient resource use and service provision.

All four perspective are vital in ensuring public transport plays its part in a sustainable transport system. Simply minimising costs risks entering a vicious circle of declining service levels and quality, reduced demand, and lower revenue. By contrast, maximising financial sustainability requires focus on both costs (resource) and revenues (demand).

In summary, focusing on efficiency helps minimise the size of the funding challenge, and benchmarking plays an important role in enabling efficiency gains. The following chapters turn to the three main sources of public transport funding, and to the challenge of optimising contributions from these sources.

3. User funding: Creating fairer, more efficient fare systems

Public transport users are a primary funding source for public transport services and infrastructure. This chapter discusses recent trends in fare revenues and factors affecting future revenues. It also discusses fare policies and fare-setting processes, focusing on the challenge of optimising user contributions.

User funding is in long-term decline

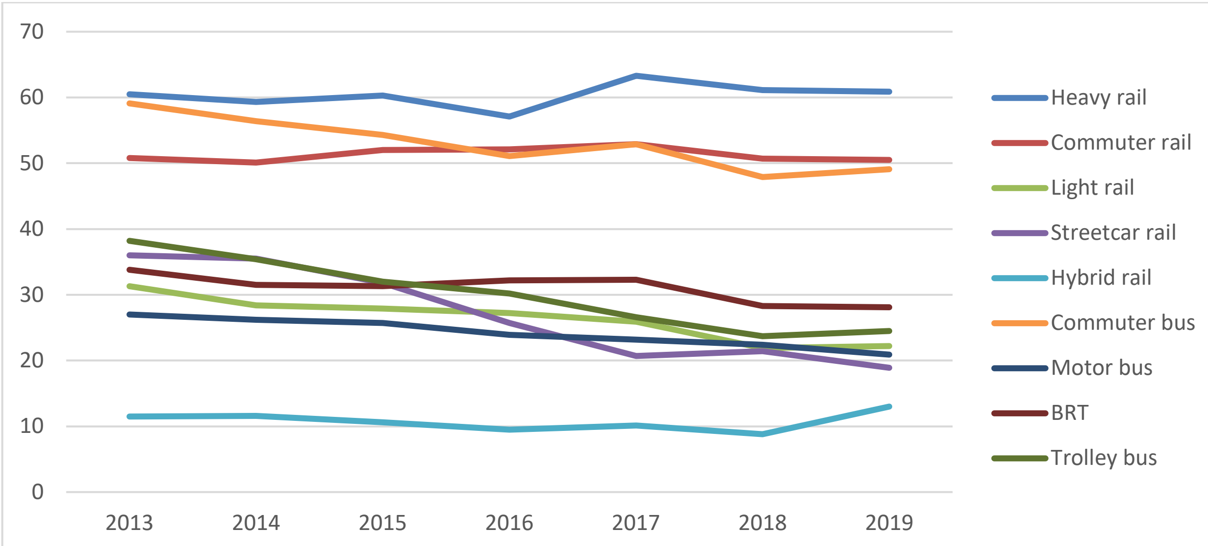
Before the 1960s, many operators' fare revenues covered all operating costs, while fare revenues were sufficient to fully fund some services. However, rapidly rising incomes led to significant increases in car ownership, a trend facilitated by increased government spending on road infrastructure. This trend progressively reduced public transport load factors and encouraged low-density settlement patterns and urban sprawl. Public transport networks typically did not expand in line with rapidly increasing urban footprints. This resulted in a dramatic deterioration in their competitiveness and financial performance, particularly in developed countries (ITF, 2020a).

In the 1980s and 1990s, many governments sought to reverse this shift towards private transport. They responded to increasing concerns about congestion, pollution and safety issues as well as the need to address the rapidly increasing budgetary costs of public transport subsidies (ITF, 2020a). Policies at the time focused on improving efficiency and service quality and discouraging private vehicle use in inner cities.

However, the ratio of fare revenue to operating costs in many countries has either continued to decline or, at best, stabilised. Figure 7, for example, shows generally static or declining trends across various public transport modes in the United States before the Covid-19 pandemic.

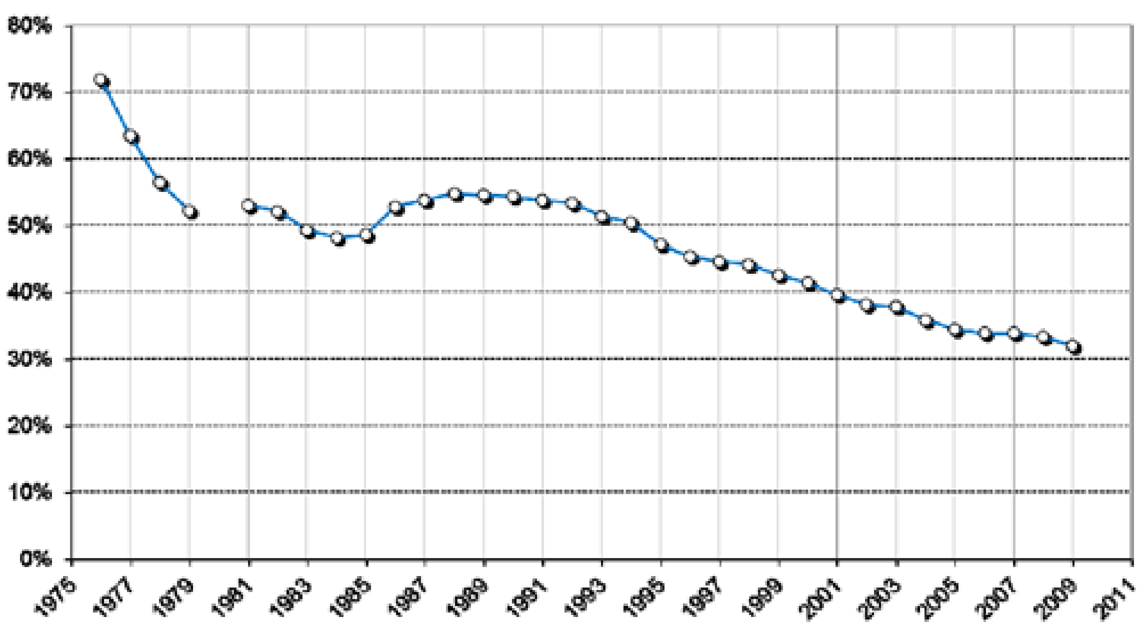
Figure 8, meanwhile, illustrates the long-term decline in France's revenue/operating cost ratio, from 70% in the mid-1970s to 50% in 1994 and 30% in 2009. The rate of decline subsequently moderated, but the pre-pandemic level was only 27% (Coldefy, 2022). However, city-to-city variation is high, with current ratios of up to 60% (e.g. in Lyon).

Figure 7. Revenue/operating cost ratio trends, United States, 2013-19



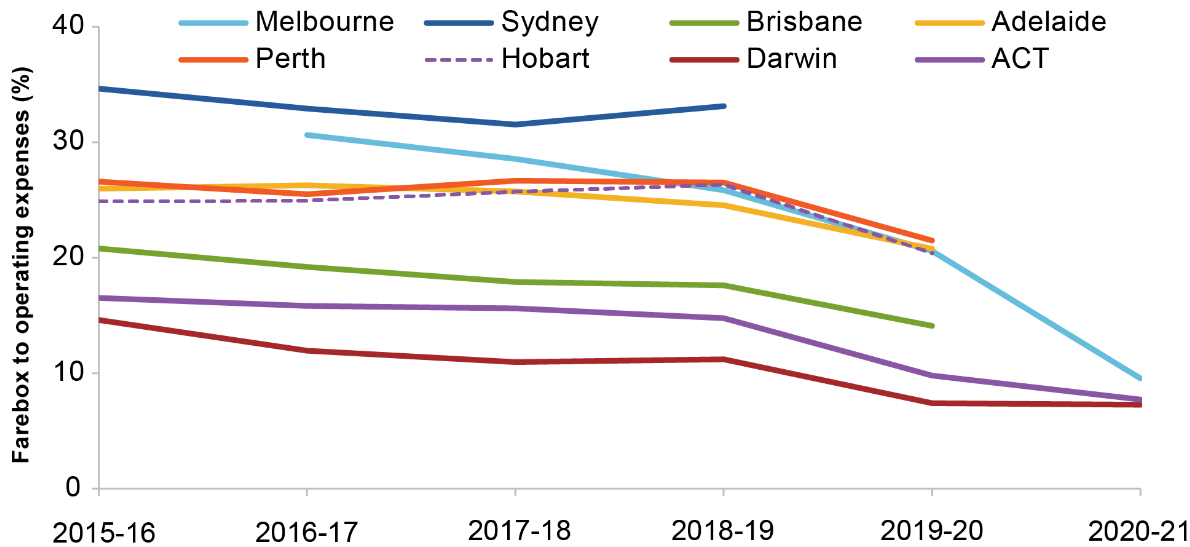
Source: Federal Transit Administration (2022).

Figure 8. Average revenue/operating cost ratios in French cities, 1975-2009



Notes: Figure includes data for French cities with populations greater than 100 000.
Source: Coldefy (2022).

Figure 9. Revenue/operating cost ratios, Australian capital cities, 2015-21



Source: Productivity Commission (2021).

The decline is also evident in other countries. Hebel et al. (2019) observe a declining trend in the same ratio for selected Polish cities: average revenue fell from over 60% to around 35% of operating costs between 2000 and 2016. In Australia, revenue/operating cost ratios in capital cities have generally declined in recent years, varying between 10% and 35%. Only Sydney achieves a ratio above 30% (see Figure 9).

There is wide variation within and between countries. Fares typically recover a higher proportion of operating costs in large, dense cities (e.g. London, New York) and very low proportions in small towns and rural areas. However, even in large cities, fare revenues typically cover only 30-40% of costs. Responses to a Working Group questionnaire show average pre-pandemic fare/operating cost ratios of 30% in Italy, 27% in France, and 34-43% in major Finnish cities. In Germany and Sweden, fare revenues cover 50% of operating costs on average, but with wide regional variations. In summary, the proportion of operating costs recovered from fare-box revenue has continued its long-term decline in most countries. Its inverse is steadily increasing public subsidies per passenger journey. For example, in France, they rose from EUR 0.80 to EUR 1.90 between 1999 and 2017 (Coldefy, 2023c).

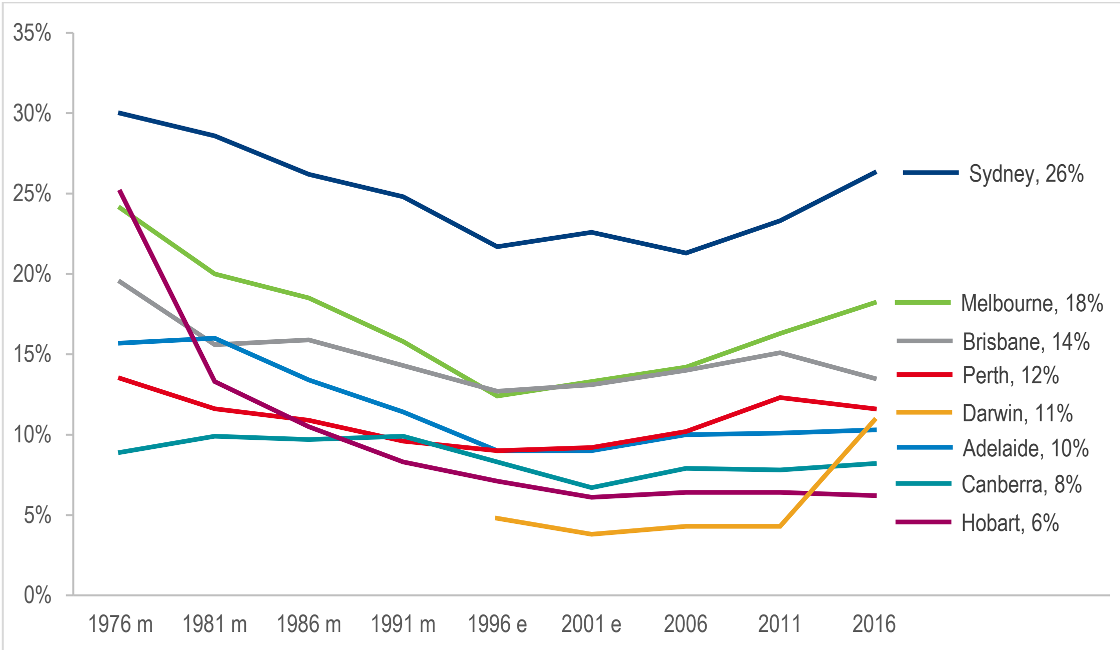
More passengers and better fare policy can increase user funding

Despite these long-term trends, there is potential to increase the funding contribution of fare revenue by increasing patronage and improving fare-setting policies and processes.

Public transport's modal share has begun to increase

Policies aiming to increase public transport use in major cities have largely halted, and in some cases begun to reverse, the long-term decline in public transport's modal share. For example, most Australian cities reached their minimum public transport modal share for commuter journeys in the late 1990s, with significant increases seen since then (see Figure 10).

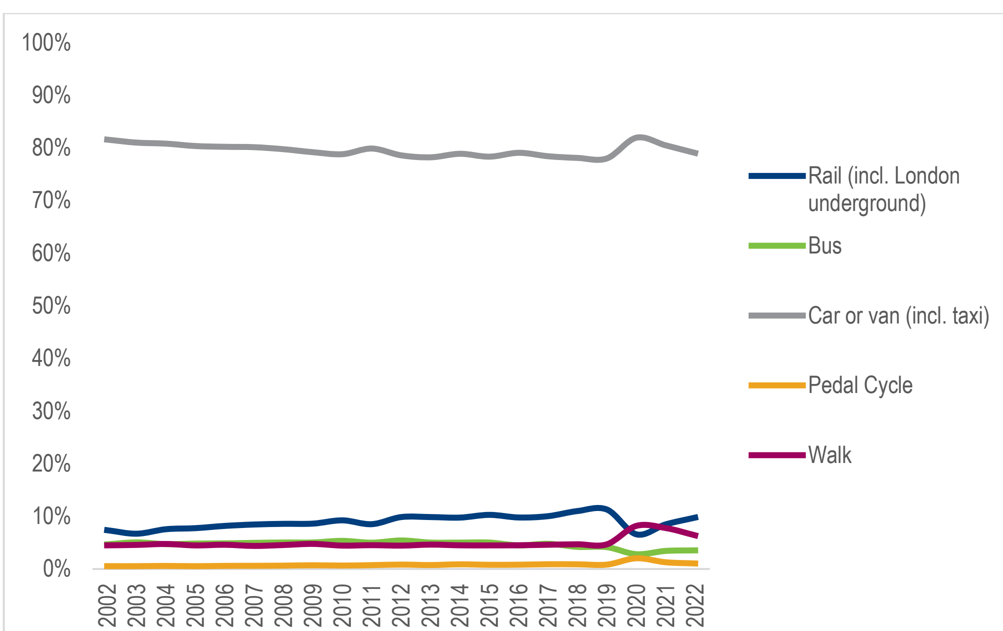
Figure 10. Modal share of public transport for commuter trips in Australian cities, 1976-2016



Notes: Data for years labelled "m" are missing estimated portions of aggregate categories (slight underestimates). Data for years labelled "e" include estimated portions of aggregated categories.
Source: Loader (2017).

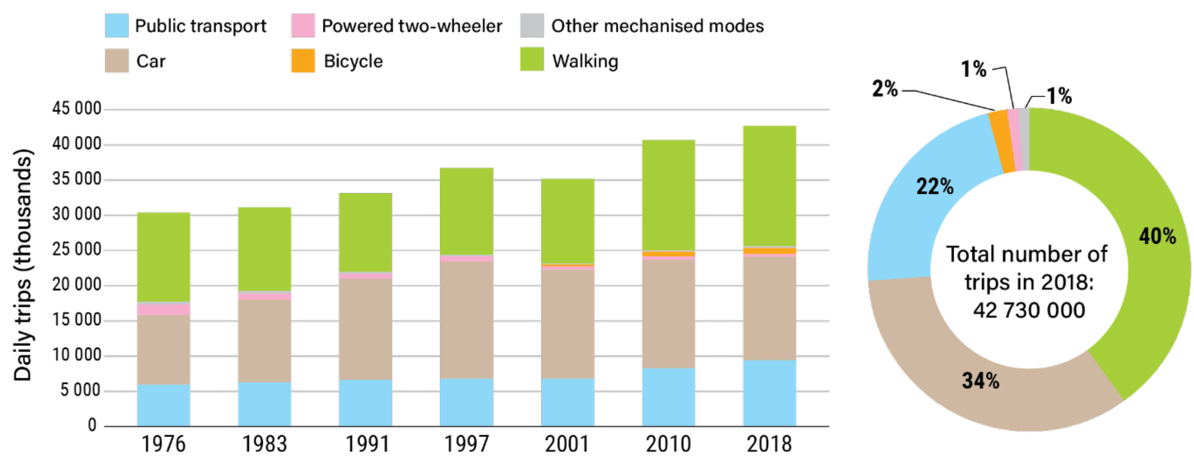
Similarly, in the United Kingdom, the modal share of private cars, vans, and taxis plateaued in the 2000s, gradually declining by 3 percentage points (except for 2020, due to Covid-19). Rail's modal share has also risen, from around 7% to 10%, despite a slight dip in 2020 due to the pandemic (see Figure 11).

Figure 11. Evolution of transport modal shares in the United Kingdom, 2002-22



Source: UK DfT (2023).

Figure 12. Change in modal shares in Île-de-France, 1976-2018



Source: Based on APUR (2021).

Meanwhile, Figure 12 shows the change in modal shares within the greater Paris region (i.e. Île-de-France), where the number of journeys by car fell 25% between 2001 and 2018, reflecting a broader trend away from motorisation, visible in a 25% reduction in the number of vehicles per household, from 0.52 in 1990 to 0.39 in 2017 (APUR, 2021).

Two factors suggest that patronage levels will increase in most countries. First, climate change and sustainability policies target further modal shifts towards public, active and shared transport. These include reforming vehicle taxes, improving public transport's quality and accessibility, and integrating public transport into a multimodal MaaS system.

Second, urbanisation and the densification of cities are expected to continue. The United Nations predicts the global urban population will increase by 2.3 billion, or more than 50%, by 2050, while rural populations decline (UNDESA, 2019). This trend will further pressure policy makers to meet travel demands sustainably and integrate transport and development planning (ITF, 2023b). Larger, denser cities typically achieve higher load factors and higher cost contributions from fare revenues.

Post-Covid changes in travel patterns, if durable, may have some lasting negative impact on public transport demand. For example, widespread regular teleworking may have a long-term negative impact on commuter travel demand. However, recent research finds that increased teleworking is not associated with reduced physical travel by households, as increased non-work-related travel offsets reduced commuting. Longer-term research also suggests that increased digitisation is unlikely to reduce travel. Thus, changing travel patterns may have a limited impact on load factors. However, a challenge will be to ensure public and multimodal transport options can accommodate more diverse non-work-related travel (ITF, 2023a).

Average public transport fares are too low

Fares are often set well below optimal levels. This reflects the political sensitivity of fare-setting and the almost universal use of ad hoc fare-setting policies and processes. Adopting explicit fare policies and formal fare-setting processes could help systematically to increase farebox contributions to operating costs. The successful adoption of such reforms in a few cities (e.g. Sydney) attests to their feasibility.

A second explanation for low fare levels is that they are often adopted as a "second best" strategy in the absence of road pricing. That is, the political difficulty of adopting road pricing leads policy makers to seek to reduce the external costs of urban road transport by encouraging mode shift towards public transport through artificially low fares. However, such "second-best" pricing strategies are relatively inefficient because the "diversion ratio" – the proportion of additional public transport users diverted from car use – is low (typically 15-35%). Thus, the cost of reduced fares is typically higher than the benefits of the lower external costs of car use (Proost, 2023).

The urgent need to reform vehicle and road-user taxation suggests this dynamic may soon change, particularly given the strongly negative impact of vehicle electrification on fuel tax revenue. A recent ITF report notes that many experts are now advocating distance-based charges, supplemented by more widespread congestion charging (ITF, 2023c). Such initiatives would ensure EV drivers contribute to infrastructure costs. They would also avoid incentives for more intensive vehicle use (due to the lower variable costs of EVs) and reap efficiency benefits by better internalising the external costs of vehicle use. Distance-based charges would also contribute to modal shift by increasing the costs of private vehicle use. Adopting them would also enable higher fares to be set without harming public transport's attractiveness relative to private cars.

Proost (2018, 2023) shows that, where such reforms are adopted, there are welfare benefits from increasing public transport fares and differentiating peak and off-peak fares. He notes that, in many inner-metropolitan areas, public transport already has a larger modal share than private transport. This high modal share is associated with heavily congested peak-period services. These characteristics mean there are considerable potential benefits from reforming public transport pricing and service provision in conjunction with vehicle and road-use taxes.

Modelling based on Stockholm, which has a closely monitored urban tolling system, demonstrates the potential benefits of a joint optimisation approach to transport pricing. Table 4 shows that restructuring bus fares, with a higher peak fare and a zero off-peak fare, yields welfare gains of around EUR 12 580 per day. Joint optimization through increased urban tolls and restructured bus fares triples these welfare gains (to EUR 36 970 per day). In this scenario, optimal bus frequency increases from 67 to 84 services per hour in peak periods and decreases from 48 to 20 services per hour in off-peak periods. Meanwhile, the current operating cost deficit for the bus service is eliminated.

In summary, continued urbanisation and densification plus vehicle and road-user taxation reforms should provide opportunities to increase farebox revenues. Still, these gains are unlikely to be fully realised unless governments reform fare-setting policies and processes.

Table 4. Potential benefits of optimisation of public and private transport pricing in Stockholm

Scenario	Road toll (peak) €/trip	Road toll (off-peak) €/trip	Bus fare (peak) €/trip	Bus fare (off-peak) €/trip	Frequency of peak buses/hour	Frequency of off-peak buses/hour	Deficit (€/day)	Welfare gain (€/day)
Reference	1.80	1.00	2.18	2.18	67	48	25 860	
Optimal bus fare	1.80	1.00	4.50	0.00	67	48	26 540	12 580
Only change frequency	1.80	1.00	2.18	2.18	92	13	15 380	22 200
Optimal toll, bus and frequency	4.31	3.32	4.90	0.97	84	20	-2 950	36 970
Zero car toll and optimal bus fare	0	0	4.10	0.00	67	48	30 190	14 120

Source: Börjesson, Fung and Proost (2017). Reproduced in Proost (2023).

Current fare-setting policies are deficient

Responses to the Working Group's survey suggest few countries have explicitly identified a comprehensive set of fare-policy principles or objectives. Formal, detailed fare-setting policies and processes are also rare. Some responses identified one or more principles guiding fare-setting but the extent to which they are respected in practice differs.

Several countries set targets for revenue/operating cost ratios, which could be viewed as a central fare-setting principle. For example, in Italy, a 1997 legislative decree (Parlamento Italiano, 1997) requires fare revenue to recover at least 35% of operating costs. The average ratio achieved is reported to be around 30%. Iceland recently set a 40% target for the Reykjavik region. In Japan, private rail operators must generally recover 100% of their operating costs from fare revenue, with subsidies provided in less-populated areas.

A second principle that appears widely adopted, at least informally, is maintaining fare stability (see Box 4). Questionnaire responses from France, Spain and Sweden highlighted the political sensitivity of fare-setting and the view that high or increased fares reduce patronage. Australian data provides quantitative evidence of the political sensitivity of fare-setting. It shows that, on average, the real value of fares remains constant in the year before an election, declines during an election year, and rises in the early years of the political cycle (Productivity Commission, 2021).

Box 4. Political pressures on fare levels

Political dynamics can erode fare revenues. Politicians sometimes initiate fare freezes that can last several years. For example, Transport for London (TfL) froze fares from 2016 to 2020 due to a pledge made during the mayoral election campaign (Topham, 2016). Madrid's fare freeze, which began in 2013, was also attributed to political factors and was followed in early 2023 by large fare reductions (MetroMadrid, 2023). Vienna reduced the cost of an annual public transport pass to EUR 365 in 2012, which has remained unchanged.

Moves towards providing free public transport services are also common. Free travel has been available in Luxembourg since 2020, and in Malta since 2022 (subject to a EUR 15 registration charge). Individual cities (e.g. Talinn in Estonia and Calais, Dunkirk and Montpelier in France) have also adopted free travel policies. Parts of Finland, Iceland, Italy, Spain and the United Kingdom provide free travel to specific groups, such as children, low-income students, and seniors. Public discussions in several other countries about the merits of extending free public transport more widely are underway.

Free public transport can expand public transport patronage but risks undermining its financial sustainability. Where patronage increases occur, they frequently divert demand from active transport, thus failing to contribute to sustainability. The ITF has previously argued service quality is a more significant determinant of patronage than fare levels (ITF, 2020c).

A related trend is to offer heavily subsidised periodical tickets. For example, Berlin adopted a EUR 29 monthly ticket for all urban public transport in October 2022. It was superseded in April 2023 by a EUR 49 monthly ticket providing unlimited travel on most regional and metropolitan services throughout Germany, at an estimated budgetary cost of EUR 3-5 billion annually. Austria's *KlimaTicket* [Climate Ticket] provides unlimited travel nationally for EUR 1 095 annually. Both schemes are promoted partly as helping achieve national emission-reduction commitments, but critics argue the costs outweigh the environmental benefits. The German initiative has also been partly justified as a response to rapid inflation, having been introduced alongside fuel excise reductions for motorists (Deutche Welle, 2023).

This political sensitivity likely explains the widespread use of regular inflation-based adjustments to maintain real fare levels. Frequent, small adjustments seem more politically palatable than larger, infrequent changes. Countries adopting this approach include Iceland, Sweden, the United Kingdom and the United States. A recent review of fare-setting in Australia found that "most jurisdictions rely on simplistic annual reviews that tend not to assess the fundamental fare structures where reforms are most needed" (Productivity Commission, 2021). Moreover, "policy inertia has been widely observed in recent years, with the exception of ad hoc changes stemming from electoral commitments that frequently move further away from efficient pricing".

A few jurisdictions have achieved significant revenue increases by modifying the inflation-based approach. For example, by regularly increasing fares by slightly more than inflation, Lyon (France) has doubled its fare ratio, from 30% in 2000 to 60% at present, with minimal opposition. This ratio is more than twice France's (pre-Covid) average of 27%.

Fare-setting policies should reflect efficiency and equity principles

Fare-setting policies should systematically focus on setting prices in line with economic efficiency principles – for example, adopting marginal cost-based pricing and addressing relevant incentive effects. Fare-setting policies should also ensure equity by providing concessional fares to maintain accessibility.

The role of marginal cost-based pricing

Australia's Productivity Commission (2021) notes: "Taxpayer-funded subsidies are generally the most efficient way of recovering the large, fixed costs of public transport networks, as the pricing options available for most other large networks like electricity and water are not feasible." It argues for a combination of fares and subsidies to cover operating costs. Determining the proportionate contributions of these two sources should depend on the outcome of short-run marginal cost-based pricing, modified by applying an appropriate concessional fare policy.

The recommended application of this "social marginal costs" pricing model involves setting prices to:

- the operating costs of running a service, for example, the fuel and driver costs of a bus for a given trip or kilometre of travel
- *less* the incremental benefits of reducing road congestion, recognising that an increase in fares can make some people drive, which at the margin, decreases traffic flows and increases trip duration for all motorists
- *less* the gains from more frequent services, recognising that cheaper fares encourage more patronage, which allows more buses or trains on a route, thereby increasing service frequency to the benefit of all customers
- *plus* the costs of overcrowding on public transport, recognising that people do not like standing or being jostled on public transport so that prices should be higher at times where this occurs, typically peak travel
- *plus* the efficiency losses from the taxes used to fund the subsidies to public transport – the 'marginal excess burden' of taxation, which recognises that taxes distort consumption, investment and labour supply and demand (Productivity Commission, 2021: 49).

Policy makers must balance three specific considerations in applying these general principles in practice. First, the potential efficiency gains from greater fare differentiation (particularly peak, modal and distance pricing). Second, the benefits of simplicity and ease of implementation in terms of administrative cost reduction and avoidance of consumer confusion. Third, the need to ensure adequate accessibility for all (i.e. equity).

Although widely accepted by researchers, these principles are not commonly applied in practice. This likely results from the political sensitivity of fare-setting, the need for specialist expertise to apply the principles in practice, and the lack of detailed, formal fare-setting processes.

Applying these principles systematically would be an important step towards optimising the contribution of fare revenues to public transport funding. However, it is more likely to occur if governments adopt long-term fare-setting strategies that explain the objectives and principles guiding fare-setting and their expected results. Engaging with stakeholders when developing a strategy could help generate broader support. Ideally, a fare policy integrated into overall transport policy would feature clear links between the policy and public transport's strategic role.

Fare structures should provide efficient incentives

Fare policies should also address fare structures and the incentives they create. Issues regarding fare structures include the relative prices charged to subscribers (i.e. periodic ticket holders) and casual users; the incentive effects of providing travel at zero marginal user cost to subscribers; and price relativities between pricing of peak and non-peak travel and between different modes.

Subscription pricing needs reform

Coldefy (2022) identifies two core weaknesses of most public transport fare systems. First, regular users' periodic passes effectively provide them with additional trips at zero marginal user cost. Second, occasional users face higher prices for individual trips, making public transport uncompetitive with private car use. He notes that, in France, regular users – who buy periodic passes for their significant price discounts – also take the most journeys. While the average cost per journey is EUR 0.05/km for subscribers, it is EUR 0.25/km for occasional users – similar to the cost of car use. Such differences suggest revisiting the relative pricing of periodic and single-use fares on equity grounds.

Zero marginal user-cost travel for periodic ticketholders also imposes efficiency costs by promoting over-consumption. Evidence suggests this over-consumption is significant. For example, in Bordeaux and Lyon, 25% of metro or tram journeys are of one to two stations, with little journey time saving over walking. These short journeys contribute to overcrowding, discouraging system use by those who could substitute public transport for private cars for longer journeys.

Pricing structures that avoid incentivising over-consumption could, therefore, contribute to a further shift to public transport. For example, the city of Nancy's pricing structure combines fixed and variable cost elements. Users pay a monthly network access charge plus a price per journey, which varies between peak and off-peak times. Different fixed and variable fare combinations exist for regular and occasional users (see Table 5).

As Coldefy (2022) notes, this fare structure resembles that widely used for utility tariffs. Recent technological advances give policy makers other options with appropriate incentives. For example, account-based fare systems allow more sophisticated pricing structures (Productivity Commission, 2021).

Table 5. Alternative fare structures in Nancy, France

	Network access (month)	Journey (peak)	Journey (off-peak)
Regular user	EUR 5 (Zero if unused)	EUR 0.98	EUR 0.65
Occasional user	EUR 1 (Zero if unused)	EUR 1.00	EUR 0.90

Source: Coldefy (2022).

Peak-period pricing can produce efficiency and equity gains

Differentiating between peak and off-peak fares has potential efficiency and equity benefits. In capacity-constrained systems, efficiency gains arise from smoothing demand patterns. Higher peak prices can shift demand from peak to non-peak times, reducing investments required to cope with peak demands (or delaying the need for new investments as demand increases).

Reducing non-peak fares also leads to equity gains, given that a significantly higher proportion of non-peak users belong to low-income groups (Productivity Commission, 2021; Pucher and Renne, 2003). However, care is needed to ensure fare rebalancing does not result in lower total fare revenue. The size of the impact of peak pricing on demand patterns is uncertain and varies with several factors. Table 6 summarises evidence on this issue from several published studies.

More recently, Japan Rail East adopted a peak pricing initiative combining a 10% price reduction for off-peak commuter passes with a small (1.4%) increase in the price of peak passes. Their modelling suggests around 5% of pass-holders will shift to off-peak travel (JR East, 2022). The apparent price elasticity of demand (around 0.4 for pass-holders) is higher than found in some of the earlier studies cited in Table 6. More flexible post-Covid-19 working arrangements may have increased commuters' demand elasticities, increasing the scope for peak/off-peak price differentiation to yield efficiency gains.

Table 6. Demand impact of peak pricing

Study	Location	Form of peak pricing	Demand impact
Anupriya et al (2020), Halvorson et al (2019, 2016).	Hong Kong	25% discount on weekday trips terminating by 8.15am	3% decrease in morning peak-time trips
Zou et al (2019)	Beijing	50% discount on morning pre-peak trips	5% reduction in peak-period ridership over six months
Peer et al (2016)	The Netherlands	Travel distance-based monetary rewards of EUR 1.5-4.5	22% fall in relative share of peak trips during the reward period, falling to 10% by the end of the period
Pluntke & Prabhakar (2013)	Singapore	Travel distance-based reward with credits for peak travel or triple credits if used off-peak	7.5% reduction in overall percentage of peak trips
Currie (2010)	Melbourne	Free trips if completed before 7am	1.2-1.5% reduction in peak demand
McCollom & Pratt (2004)	Denver and Trenton (United States)	Free non-peak trips in central business districts and universities	20% fall in peak ridership in Denver (from 50% to 30%), 13% in Trenton

Source: Productivity Commission (2021).

Differentiating fares can facilitate multimodality

Some fare policy reviews recommend modally differentiating fares to reflect the different demand conditions for different modes and differences in user characteristics. Such proposals usually involve bus fares set lower than train, metro or tram fares. This differentiation reflects the significant excess capacity on many bus routes, the low infrastructure costs of increasing bus system capacity, and lower-income groups' more intensive use of buses. Bus demand is also more strongly driven by shopping and recreational travel, whereas train demand focuses on commuting. As a result, bus demand is more elastic.

Infrastructure Victoria (2020) argues:

> While flat fares have the appeal of simplicity, our research shows that pricing all modes of public transport travel with a single fare contributes to the imbalance in the public transport system, increases road and public transport congestion and reduces equity. This is because each mode is unique – not just in the service it provides, but also in trip purpose, level of crowding, income levels of users and the benefits from reduced road congestion, pollution and increased active transport. Our analysis shows that the costs on society from increased bus use are much lower than for train use, with trams sitting in the middle.

It notes that modally differentiated fares are widely used, for example in Hong Kong, London and Sydney. The report also recommends that fare structures avoid providing access to public transport at zero marginal user cost to avoid incentivising over-consumption.

Modally differentiated fares can coexist with integrated ticketing. It remains possible to attain the benefits of integrated ticketing in encouraging patronage by providing simple, readily understood ticketing and fares. Smart ticketing systems can automatically calculate the best available fare combinations, and online portals can provide fare information. These mechanisms will become increasingly important as public transport is increasingly integrated into MaaS systems featuring service offers from multiple providers.

Concessionary fare policies should be targeted for cost-effectiveness

If reforms lead to higher overall fare levels, using concessionary fare policies to maintain high levels of accessibility for all will be increasingly important. Most current concession policies provide a fixed discount on standard fares (commonly 50%) to several broadly defined groups. Most systems offer concessions to a similar range of groups, yet the proportion of users benefiting from concessional fares varies widely. For example, the share of journeys taken using concessional fares varies between 49% and 80% across the Australian States (Productivity Commission, 2021).

This variation highlights the importance of effectively targeting eligibility to contain revenue impacts while ensuring accessibility for all. Better-targeted concessionary fare policies might link eligibility directly to income rather than membership of a particular group (e.g. students or older people). This avoids giving concessions to those who do not need them, or excluding low-income individuals who are not members of a targeted group. Another option is to vary the size of the concessionary discount by income level (Productivity Commission, 2021).

Both approaches are now widely used in France. Most French cities have adopted *tarification solidaire* [solidarity pricing]. These schemes usually assess family income via the *quotient familial* [family quotient] used for tax and benefit eligibility purposes. Taxable income is divided by the number of household members, with each adult counting as 1 unit, each of the first two children as 0.5 units and the third and each subsequent child counting as 1 unit (Government of France, 2023). Different fare discounts are applied accordingly. For example, Bordeaux provides discounts of 30, 50 and 100% (Transports Bordeaux

Métropole, n.d.). Grenoble has four levels of concession fare. Monthly fares range from EUR 2.50 to EUR 19.70 (a standard fare is EUR 63.70). Notably, while the discount can be more than 95%, no one is eligible for free travel (M TAG, n.d.).

Bogotá in Colombia introduced its Pro Poor tariff in 2014, to prevent low-income populations from being priced off the Transmilenio bus and BRT network by the national legal requirement that fares cover the costs of operation, maintenance and replacement. The subsidy targets the poorest users through an electronic payment card that stores information from the national System of Identification of Social Program Beneficiaries (SISBEN). This system determines eligibility for free health and other social services in Colombia. It uses metrics related to health, education, housing and vulnerability to calculate an aggregate “score” and determine eligibility for social programmes. Bogotá’s public transport operator has adopted it as the basis for its concessionary fare policy. Members of households scoring 40% or less on the scale pay 50% of the normal fare and 40% of peak fares (Peralta-Quiros and Hernandez, 2016; ITF, 2017).

Changes to fare structures could also make fares more progressive. Because low-income groups are most likely to travel at off-peak times and to use buses, adopting peak/off-peak fare differentiation and modally differentiated pricing would improve progressivity. For example, modelling of a broadly revenue-neutral fare reform incorporating these two changes found the lowest-income groups would pay 26% less than under current fare settings (Infrastructure Victoria, 2020). While the modellers intended the scenario to be revenue-neutral, results showed an estimated 11% revenue reduction. However, the average 26% reduction in fares paid by the lowest income quintile significantly exceeded this reduction, demonstrating a clear improvement in progressivity.

Improving fare-setting processes

Detailed, formalised fare-setting processes are rare. Stakeholder consultation is often required, but only a few cities (e.g. Slovenia and New York City) regularly include the public in this process. Responsibility for approving fare changes lies with various parties, including the public transport authority’s board (New York City), the Ministry of Transport (Japan), the mayor (London) and the rail service contracting authority (UK Department for Transport).

Two recent reviews published in Australia recommend adopting explicit fare-setting policies identifying relevant principles and objectives, complemented by transparent, formal fare-setting processes (Productivity Commission, 2021; Infrastructure Victoria, 2020). The Productivity Commission review identifies fare-setting practices in the Australian state of New South Wales (NSW) as broadly consistent with its recommendations. Both recommend a central role for independent, expert advisory bodies.

Adopt explicit fare-setting policies

The absence of explicit principles reduces the likelihood a strategic approach to fare-setting will be taken, particularly given the political sensitivities involved. Thus, adopting a formal policy or, at least, comprehensive fare-setting principles would constitute a significant improvement. Governments should publish, periodically review and revise these policies or principles.

Adopting clear principles comes with several advantages. They make fare-setting decisions more consistent by providing decision makers with explicit guidance. Furthermore, they have more ability to withstand short-term political pressures on fares. They also create stakeholder support for fare policies due to a greater understanding of their rationale and objectives. Finally, they encourage better policy development by enabling informed and effective stakeholder engagement.

Infrastructure Victoria (2020), an independent infrastructure advisor to the Victorian state government, recommends a best practice approach should have three elements:

1. Establishing explicit fare-setting objectives
2. Setting fares transparently, using clearly defined objectives
3. Appointing an independent body to advise on and monitor transport prices.

It also proposes three specific fare-setting objectives:

1. Make the best use of the public transport system
2. Take equity into account
3. Ensure people can make informed travel choices.

Establish independent, expert advisory bodies

Formal processes that incorporate expert, external advice via transparent mechanisms can help insulate decision-making processes from short-term political pressures, ensuring decisions are guided by sound analysis using rigorous methods. The ITF has previously recommended governments consider establishing independent infrastructure advisory bodies to provide transparent, expert advice on strategic infrastructure planning (ITF, 2021b). Such bodies are an effective, low-cost means of improving processes, providing frank and expert advice, and increasing credibility. This recommendation responded to the need for consistent, long-term decision-making, which avoids the risk of being distorted by short-term political pressures. It applies directly to major infrastructure decisions, such as public transport investments, and is highly relevant to the fare-setting context.

Australia's Productivity Commission (2021) has similarly argued that "independent fare regulators may help to overcome many of the issues inherent in other institutional approaches to fare-setting". Specifically, "social marginal cost modelling or cost-benefit analysis by an independent agency could help overcome structural policy inertia and fare stagnation".

Independent bodies are responsible for fare setting in Singapore (the Public Transport Council), New York City (the Metropolitan Transit Authority), and the Australian state of NSW. The Productivity Commission (2021) argues that NSW's model, incorporating independent advice from the Independent Pricing and Regulatory Tribunal (IPART), can be regarded as an "exemplar" internationally.

In the NSW model, the government sets pricing policy, while IPART, a multi-sectoral economic regulator, recommends price changes and improved fare structures, and publishes information on fare decisions. In practice, the Minister asks IPART to determine the maximum rate of fare increase (set as a weighted-average fare cap). The Minister makes the final decision, maintaining political accountability, but IPART's independent advice is fully transparent.

The relevant legislation, the *Passenger Transport Act 2014* sets out the matters that IPART must consider in making its recommendation:

(a) the cost of providing the services

(b) the need for greater efficiency in the supply of services to reduce costs, for the benefit of consumers and taxpayers

(c) the protection of consumers from abuses of monopoly power in terms of prices, pricing policies, and standards of service

(d) the social impact of the determination or recommendation

(e) the impact of the determination or recommendation on the use of the public passenger transport network and the need to increase the proportion of travel undertaken by sustainable modes

(f) standards of quality, reliability, and safety of the service

(g) the effect of the determination or recommendation on the level of Government funding . . .

(State of New South Wales, 2014: s. 124)

The Productivity Commission argues that "this model reduces short-run pressures on governments and improves transparency and accountability. Other jurisdictions, particularly those with cities experiencing crowding and congestion, could benefit from this approach" (Productivity Commission, 2021).

In carrying out its role, IPART conducts modelling of both service provision costs and public transport's external costs and benefits. It models the impact of fare proposals on future cost recovery and conducts public consultation. It is the only government body in Australia that explicitly adopts the social marginal cost framework when setting fares. In practice, fare increases are often smaller than the maximum recommended by IPART. Noting this, the Productivity Commission argues that requiring IPART to recommend both maximum and minimum fare increases would improve the model.

Consider other process improvements

While independent expert advisory bodies offer advantages, they are less suitable in some institutional and legal contexts. The resources and expertise required may also be scarce in smaller jurisdictions. However, other reforms could also help to make the fare-setting process more strategic, systematic and transparent.

While many current processes include stakeholder consultation, adopting formal process standards and systematically ensuring public engagement can significantly increase the benefits they deliver. Publishing background data ahead of consultations increases transparency. The same benefit arises from publishing the text of decisions (and the reasoning underpinning them) and modelling the expected impacts of fare reforms, including distributional effects.

Furthermore, a regular adjustment process that increases fares annually or biennially, based on a relevant price index, can help maintain their real value. This reduces the need for politically challenging major fare changes. Linking fare resets to changes in the cost of providing public transport services could be preferable to using a broader consumer price index, as it ensures a stable revenue/cost ratio. It also creates pressure to control the service provision costs, as frequent large fare rises are necessarily unpopular. However, at a minimum, using a consumer price index ensures the real value of fare revenue is maintained.

In summary, fare-setting policies, implemented via formal processes, can make user funding from fares less vulnerable to political pressure and more efficient over time. Incorporating extensive stakeholder consultation in fare policy development, especially with users, will enhance acceptability. Governments should also consider incorporating independent, expert advice into fare-setting processes.

Furthermore, governments should consider introducing structured fare policies for more equitable accessibility. Unlike blanket low fares, well-targeted concessionary fares can improve accessibility without compromising overall fare revenue. Eligibility for concession fares should be based primarily on need (i.e. income levels) rather than membership of particular social groups.

4. Ensuring indirect beneficiaries contribute to public transport funding

Public transport investments improve the accessibility of land, providing indirect benefits to landowners and users. Housing demand increases because residents can reach a broader range of destinations in less time. Business benefits from access to larger pools of potential customers and workers. Most governments have made limited efforts to tax these indirect benefits of their transport investments, which accrue as windfall gains to landowners and users. More systematic action in this sphere is a potentially significant additional public transport funding source.

This chapter considers land-value capture (LVC) as an indirect source of funding for public transport. It includes sections outlining the factors influencing land-value uplift (LVU), a taxonomy of LVC instruments, LVC practices worldwide and recommendations for using LVC effectively in the public transport context.

What is land-value capture?

The OECD defines land-value capture (LVC) as a set of policy instruments that allow governments to capture the increase in land values – so-called land-value uplift (LVU) – generated by public interventions such as infrastructure investments or administrative action (OECD, 2022). The OECD also describes the rationale for LVC policies as follows: "Traditional fiscal policies largely ignore the fact that the cost of providing urban infrastructure is public, but some of the economic benefits, notably those that materialise in higher prices of land are private, meaning that landowners typically reap unearned wealth."

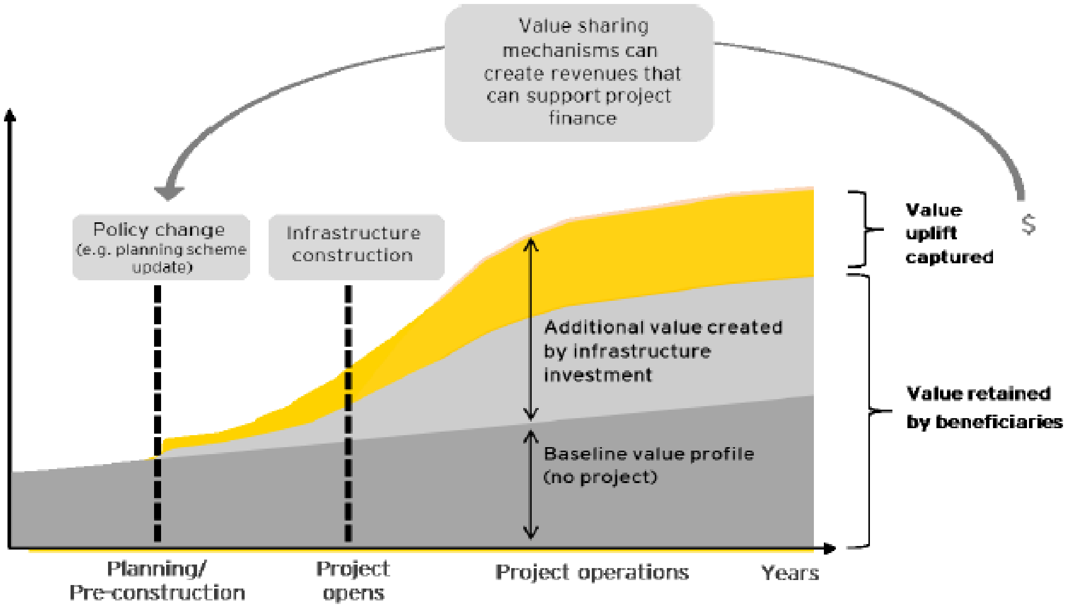
The foundations of LVU lie in the "land rent" theory developed by Alonso (1964) and Muth (1969), which analyses the relationship between accessibility and land value. The theory outlines how land rents (annualised capital values) increase as accessibility improves. Accessibility in this context measures how easily individuals reach activities or destinations.

Building new transport infrastructure increases the accessibility of neighbouring properties because people can get to activities or destinations more quickly or cheaply. This increases rental and land values, creating LVU. Land's zoning status (a regulatory constraint on its theoretical "best-use" value) also influences rental values. A change in zoning creates LVU and yields windfall gains to owners. LVC captures some of these gains.

The OECD also argues for the efficiency benefits of LVC: "By tapping into the windfall profits public investment and urban planning generates in land ownership, it may also avoid the distortions that taxation imposes on economic incentives. In this way, it may help direct efforts away from rent-seeking behaviour, such as acquiring land simply to realise value gains, towards gainful economic activity" (OECD, 2022).

Figure 13 shows that LVU can commence when a project is announced, effectively capitalising on expected future benefits in current land values. LVU will likely increase during construction and rise further after new infrastructure becomes operational. However, the timing of LVU varies widely between projects, complicating the implementation of LVC policies.

Figure 13. Conceptualising land-value uplift and land-value capture



Source: Mulley (2023).

Multiple factors can influence land-value uplift

Assessing LVU is more complex than the theory suggests. Published evidence reports widely differing results, calculated using various methods, each with its strengths and limitations. These include comparative methods, which look at before and after prices using average changes in market prices; hedonic modelling, which values the components making up house prices individually; spatial modelling; geographically weighted regression; and difference in difference methods. The relative merits of each of these methods are discussed more fully in Mulley (2023).

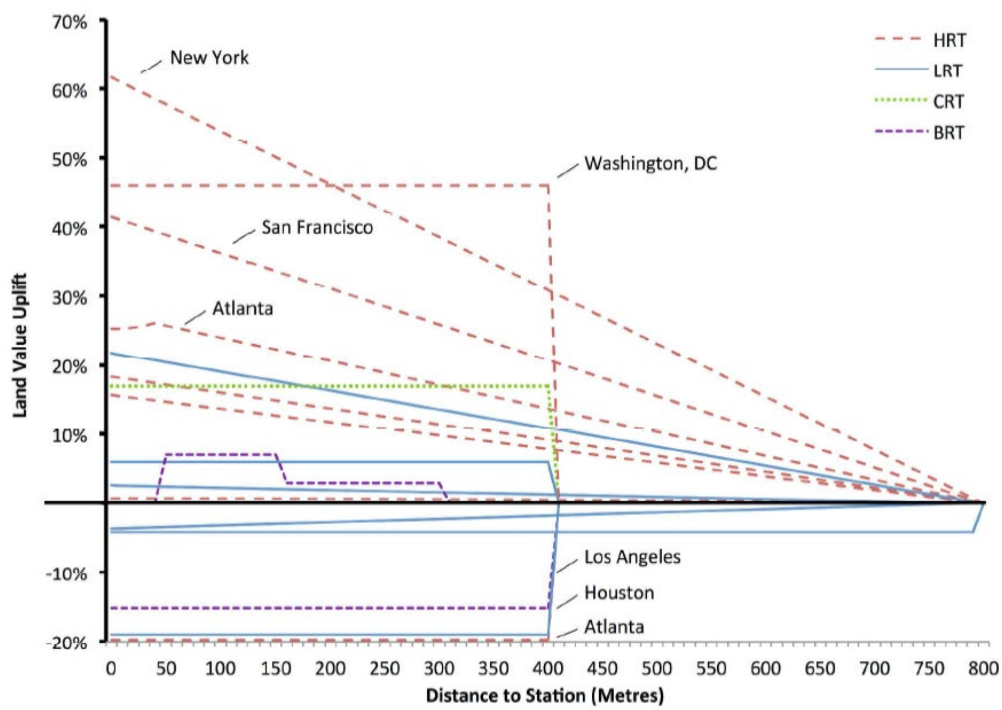
Despite the range of methods used, some general conclusions can be drawn regarding the nature and extent of LVU. First, the extent of LVU depends on context. Factors influencing the reported results include:

- whether the uplift accrues to existing residential or commercial properties or new developments
- the mode of the public transport investment
- the nature of the affected neighbourhoods (density, land use mix, socio-demographics)
- the quality of the investment (is there dedicated road space or mixed traffic?)
- whether LVU is due to the expansion of an existing network or the provision of a new link.

There are also wide differences in the geographical distribution of the uplift and its timing.

Notwithstanding these caveats, evidence from empirical studies in the United States suggests rail-based investments, particularly heavy rail, yield the highest LVU (Figure 14). Light-rail LVU varies, being lower where the systems operate in mixed traffic, likely because of lower travel-time benefits. Bus-based interventions, such as bus rapid transit (BRT), yield lower, and sometimes negative, LVU – perhaps because they are seen as less permanent, even when there is dedicated infrastructure. Figure 14 also shows how uplift declines as the distance from a station to affected land increases.

Figure 14. Land-value uplift due to access to a rapid transit service in the United States



Notes: HRT: Heavy rail transit. LRT: Light rail transit. CRT: Commuter rail transit; BRT; Bus rapid transit.
Source: Higgins and Kanaroglou (2016).

Table 7 summarises the results of a range of empirical studies and shows that while LVU averages around 10% the range of reported values varies widely. In contrast to Figure 14, in this dataset heavy rail has the lowest mean uplift and the broadest range of observed uplift levels. This may suggest heavy rail has the greatest uplift potential, but that it is often not realised in practice.

Moreover, heavy rail is the most capital-intensive mode. If uplift per unit of capital spent were assessed, light rail and BRT would likely both yield superior results. The wide variations in uplift percentages for all modes suggest policy makers would be unwise to plan for the average uplift without understanding the key determinants of realised levels.

Table 7. Average value uplift by public transport mode

Mode	Average land-value uplift (%)	Range (%)	Number of observations
Heavy rail	6.9	-42 to +40	18
Light rail	9.5	-19 to +30	32
Bus rapid transit	9.7	-5 to +32	14

Source: BITRE (2015), based on papers by Smith et al. (2015) and Ozdilek (2011) and metastudies by Mohammad et al. (2014), McIntosh et al. (2014) and Stokenberga (2015).

Table 8. Summary of estimated value uplift for different property types

Property type	Range of property value (HIGH)	Range of property value (LOW)
Single-family residential	+32% within 40m of a station	+ 2% within 70m
Apartment	+45% within 410m	+4% within 810m
Office	+120% within 410m	+9% within 1000m
Retail	+167 within 70m	+1% within 160m

Source: CTOD (2008), cited by SGS Economics and Planning (2015).

Interventions that provide multi-connected new links to the existing public transport network generate greater LVU than new links in a suburban area with less obvious network accessibility gains. Context is important: developing countries show higher LVU from bus-based infrastructure than developed countries, possibly due to the limited availability of rail options. Cities in Australia and North America typically have more prominent central activities districts than European cities. Improved links to these areas tend to lead to more significant changes in accessibility gradients than in the mixed-used environments more common in European cities. Commercial properties tend to have higher LVU than residential properties (see Table 8).

Spatially disaggregated models reveal significant spatial variation in LVU. While the results vary widely, common conclusions are that:

- significant improvements in travel times are needed to achieve observable LVU – an unsurprising result as travel time savings are the core accessibility metric
- higher-quality investments, such as light rail in dedicated pathways, yield higher LVU
- LVU is greater where density is higher and where there are more amenities
- Development or improving a network provides higher LVU due to more widespread accessibility gains
- interventions in declining areas yield less LVU.

Longitudinal studies show wide variation in the timing of LVU. In some cases (e.g. the metros in Chicago and Washington, DC), LVU was anticipated. It was observed at the project announcement or during the building phase before accessibility increased. However, in these cases, additional gains accrued after service commencement. In others, there was no observed LVU until after service commencement. In still others (e.g. Portland), LVU was anticipated before the project commenced but subsequently diminished. There appears to be no consistency in the timing of LVU, but ignoring timing can bias the estimation of its size.

Overall, *ex-post* measures of LVU do not provide a firm basis for linking LVU to LVC for existing properties. This observation creates problems in developing an evidence-based policy. LVC opportunities seem highly context-specific, but LVU is typically modest. Timing is variable, and potential LVU is greatest when the intervention links users to an extensive, efficient network. However, despite these implementation issues, LVC has provided significant funding for public transport worldwide.

Land-value capture instruments

The OECD Compendium (2022) provides a taxonomy of LVC instruments, offering several definitions. It addresses LVC use in various public infrastructure contexts but does not present evidence relating to transport separately. This section uses the Compendium definitions as a starting point for discussing LVC and transport investments.

Infrastructure levies

Infrastructure levies are taxes or fees levied on landowners owning or using land where LVU has occurred due to government-initiated infrastructure development (OECD, 2022). Transport LVC is well-suited to infrastructure levies because defining the catchment area (and hence who should pay) is relatively easy. However, over 50% of the infrastructure levies identified in the OECD Compendium were based on project cost and only 23% on the size of the LVU.

This creates problems since LVU may not be proportional to project cost and, if there is wide spatial variation in its extent, cost-based LVC implies inequity between taxpayers. Transport infrastructure levies are sometimes called tax-increment financing (TIF). For example, the Randolph/Washington station construction in Chicago benefited from USD 13.5 million in TIF from local LVU for existing properties and new development (Iacono et al., 2009).

Special assessments

A special assessment is usually imposed as a one-off tax on affected properties and typically varies with their distance from the new infrastructure. Authorities generally administer this tax through a “public transport benefit district”. The rationale for creating these districts is that properties within it benefit disproportionally from LVU due to the project, and owners should contribute to the investment cost that created this uplift. A special assessment provides a one-off capital source rather than contributing to operating costs.

Transport levies

A transport levy usually refers to an ongoing charge on property owners, collected with other land taxes, such as property rates. These funds help accelerate improvements to public transport. Transport levies are not related to specific LVU estimates for a given cohort of properties, as with a public transport benefit district. Instead, they reflect the idea that LVU generally accrues when accessibility improves. A general transport levy can support multiple projects and provide ongoing revenue support.

Sometimes, all or part of the levy is linked to a specific project. There are several examples in Australia. For instance, ratepayers in Gold Coast, Queensland, pay an annual transport levy, which was increased by AUD 123 per year to help finance the new Gold Coast Light Rail project (Prosper Australia, 2013). A similar levy was imposed on the Sunshine Coast, also in Queensland, to part-fund the Sunshine Coast Mass Transit Project (SGS Economics and Planning, 2015).

Business rate supplements

A business rate supplement (BRS) is a more specific levy targeting larger non-domestic properties benefiting from the transport investment. Its scope may be restricted in this way because LVU is typically greater for commercial and retail properties. A BRS funded 25-30% of the Crossrail project in London (SGS Economics and Planning, 2015). The limiting factors for infrastructure levies are the size of the expected

LVU and acceptance by potential taxpayers that the LVU exists and is of the size claimed. The government and businesses agreed to the BRS for Crossrail following lobbying by the London Chamber of Commerce to relieve congestion for commuters on the London Underground or face businesses moving out of the city.

Crossrail first appeared in strategic plans for developing London's public transport system in 1943, but successive governments could not finance it. This background illustrates the potential importance of a BRS to a project's fundability. Agreement on the BRS broke the logjam: 2009 legislation allowed local government to levy taxes on non-domestic properties to fund infrastructure.

In agreement with the UK government and the Chamber of Commerce, the Mayor of London introduced an annual BRS in April 2010. The intention was to finance GBP 4.1 billion of the Greater London Authority (GLA) contribution to Crossrail, which was estimated to cost GBP 15.9 billion. The BRS was implemented as a 2% levy on the rateable value (i.e. estimated annual rental value) of non-domestic properties in London with rateable values above a threshold level (currently GBP 70 000). The BRS provides an ongoing contribution and will likely run for 24-30 years or until the GLA repays its borrowing.

In April 2012, the Mayor introduced an additional Community Infrastructure Levy (CIL) on new property developments. This levy aimed to raise GBP 300 million for Crossrail; other developer obligations raised a further GBP 300 million. The Mayoral CIL is calculated based on net additional floorspace. Rates vary by borough and distance from the city centre (GLA, 2016) and rose in 2019.

Developer obligations

Developer obligations are cash or in-kind contributions to the costs of additional infrastructure or services required due to private development (OECD, 2022). They usually apply to land developments and are a condition of gaining approval. They reflect the need to provide a range of infrastructure services to the newly developed land rather than being tied explicitly to specific infrastructure requirements. However, governments could plausibly earmark revenues to specific infrastructure providers. A rule-based approach typically determines the amount of tax paid. Negotiated approaches are much less common.

Developer obligations are common in public transport infrastructure. Examples include London's Crossrail and the Grand Paris Express. They are not always used to finance new infrastructure. For example, they can include negotiated in-kind contributions to other public infrastructure, such as new local roads or green spaces. London continues to add to its developer obligations, most recently introducing voluntary contributions to fund enhancements to public transport.

TfL's Public Transport Access Level (PTAL) indicator measures connectivity and forms a central part of the Transport Assessment for major developments. Separate models assess site accessibility by public and active transport. PTALs can identify whether the connectivity of a proposed development is lower than desirable for the planned density level (TfL, 2010). They can, therefore, help assess accessibility improvements required and quantify the developer's contribution towards those improvements.

The GLA now uses this method to enable developers to voluntarily propose contributions sufficient to raise PTAL scores to levels that permit project authorisation. This was the case for the GBP 9 billion Nine Elms redevelopment of the Battersea Power Station site. A loan from the UK government of GBP 998.9 million was made available to the Greater London Council, to be repaid through incremental business rates levied on the enterprise zone and developer contributions, to construct two metro stations and extend the Underground's Northern Line to serve the development.

Land-value capture in action

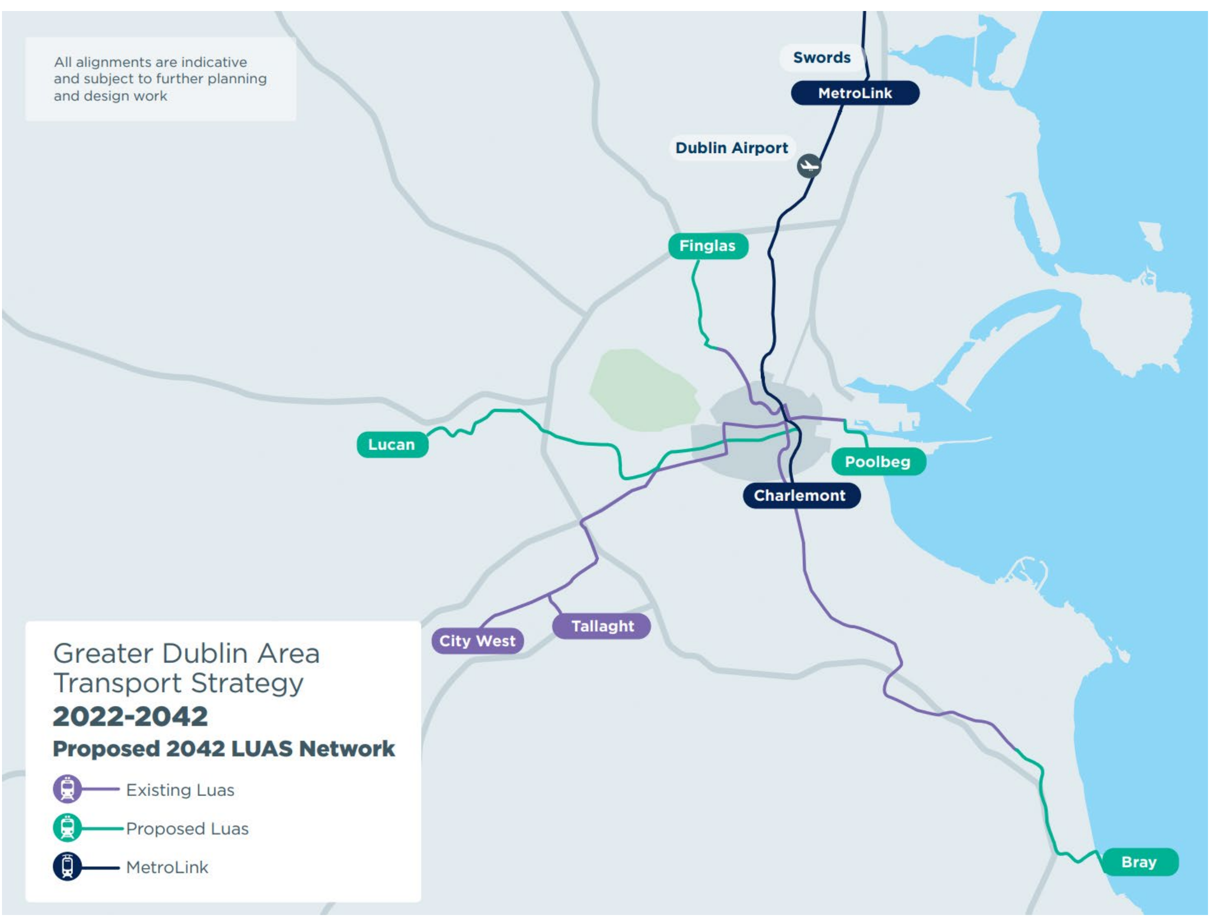
Experience with LVC varies widely between countries. The OECD Compendium found that all surveyed countries, except Uganda, used LVC at least occasionally, although this use does not necessarily relate to public transport. Low- and lower-middle-income countries typically use LVC less than developed countries. This may partly reflect resource requirements: effectively implementing LVC requires significant government capacities, including laws and supporting governance frameworks.

Governments and transport authorities can use LVC instruments in various ways. For example, the city of Dublin has used developer contributions to help fund its light-rail network. Its plans to develop several further expansions to the network pose new LVC implementation challenges. In other jurisdictions, including Japan and Hong Kong, the transport entity becomes involved in property development, creating demand for the new transport infrastructure and extracting LVU from the land development.

Developer contributions to Dublin's Luas light-rail system

Dublin's Luas light rail system (see Figure 14) began operation in 2004. On opening, it was impossible to interchange directly between the two lines, which were 1.5km apart at their closest point (NTA, 2022). The system has been expanded progressively, with several LVC mechanisms contributing funding.

Figure 14. Proposed light-rail network for Dublin, 2042



Source: National Transport Authority (2022).

A 2010 Green Line extension incorporated different LVC approaches for directly affected landholders and those in a broader catchment area. Authorities concluded commercial agreements with adjacent landowners, who provided land at reduced prices and capital contributions towards construction costs in recognition that LVU would occur. Specific levies also apply across the catchment area: EUR 2 000 for new residential units, EUR 38/m^2 for commercial properties, and EUR 43/m^2 for retail properties, paid over 30 years with biannual rate reviews.

A Red Line spur opened in 2011. A consortium of three private developers provided land for the line and constructed the civil elements. The consortium recognised the LVU of the light rail (and the associated land rezoning) for their holdings and the opportunity to expedite its delivery by contributing funding.

In 2013, authorities levied development contributions on a third extension (which had opened in 2009). The levies also applied to land one kilometre on either side of the line and were set at the same rates as for the Green Line extension, with a duration of 25 years. Authorities took a similar approach for the 2017 Cross City extension, which enabled passengers to transfer between services in the city centre. A related levy should yield EUR 27 million (23% of the estimated LVU accruing to new developments in the catchment area or 7% of the project's capital cost).

The most recent extension takes a different approach. Developers make supplementary contributions of EUR 250 000/hectare for residential developments and EUR 570 000/hectare for commercial developments. This extension covers lands on the urban periphery, whereas previous extensions served the city centre. In addition, a different municipal authority was responsible for setting the rates.

The Greater Dublin Area Transport Strategy 2022-2042 (NTA, 2022) proposes four additional Luas extensions and a light-rail line. Authorities have not decided which form of LVC to use. Several planned sustainable transport projects feature overlapping catchment areas, particularly near the city centre. In this context, a project-by-project approach to LVC could create equity concerns and negatively affect the ability to capture LVU on later projects. In sum, the principle of a development contribution is well developed, but the detail of its future application is yet to be determined.

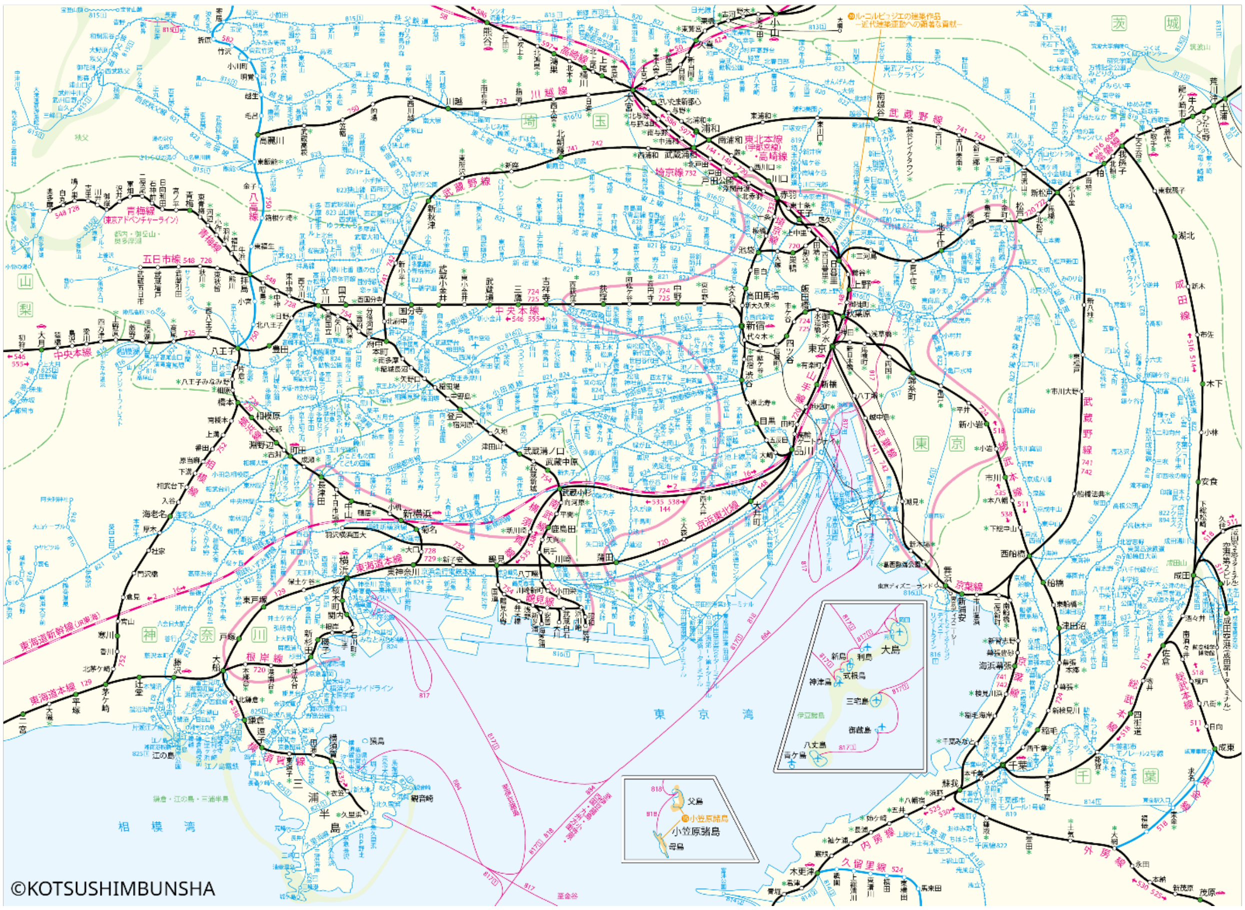
Integrated development in Japan: The KOBAYASHI-Ichizo Model

The KOBAYASHI-Ichizo Model followed by Japan's private railways since the 1910s is perhaps the most comprehensive "integrated development" model of land-value capture. Under this model, private railway companies purchased land on and around proposed government rail routes and built rail lines. They then developed the adjacent land and a range of facilities and businesses within new suburbs. Figure 15 shows how private rail investments have underpinned urban development in the hinterland of the main Japan Rail lines.

The model provided initial funding for infrastructure and ongoing funds for revenue support. Kurosaki (2023) argues this model's success relied on three operating environment features: rapid population growth, rapid urbanisation, and poor road transport infrastructure. This combination led to rapidly rising land prices, particularly for land served by rail transport, and meant developing land and businesses to serve the new suburbs was highly profitable.

However, the changing environment, including slowing population growth in the 1970s and rapidly increasing motorisation, meant the risks to private rail companies of continuing with the Kobayashi model became prohibitive. In response, the Japanese government passed a law allowing regional governments to lead the development of land and rail transport. The Integrated Development Law involves public authorities purchasing land parcels before rezoning, with a land readjustment plan subsequently adopted. The resale of some land parcels helps fund the development of public facilities.

Figure 15. Private rail infrastructure development under Japan's KOBAYASHI-Ichizo Model

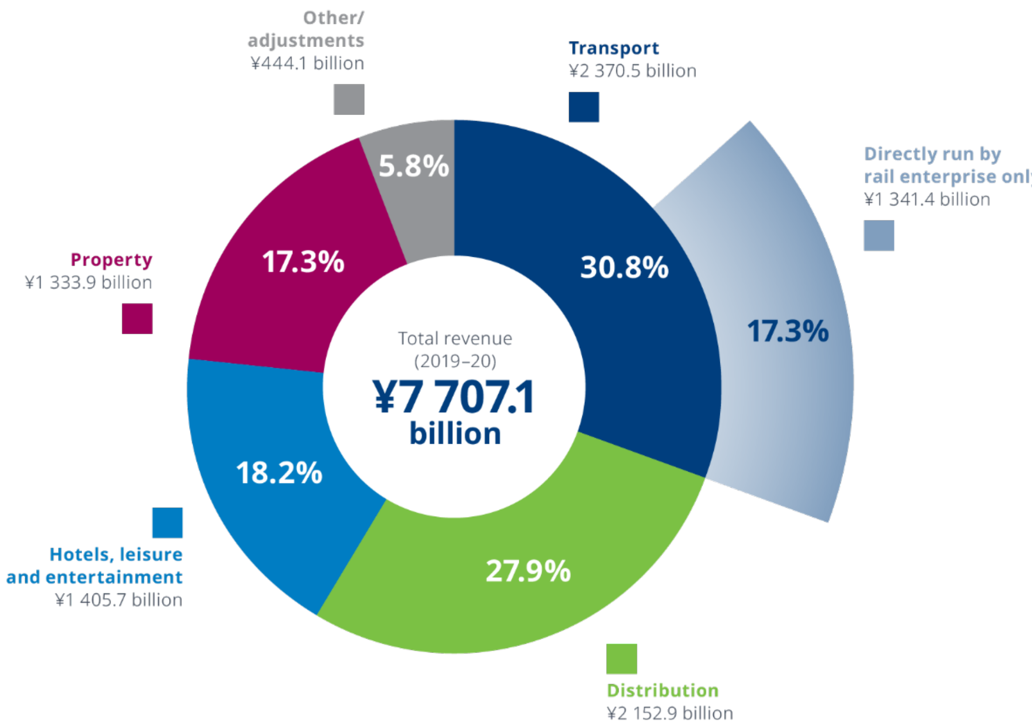


Note: Blue lines in the figure indicate private rail investments, while black lines indicate Japan Rail lines.
Source: Cited in Kurosaki (2023).

This model has successfully underpinned the construction of the Tsukuba Line northeast of Tokyo. The relevant municipal governments are shareholders in the rail entity and lead land development and rail projects. They receive ongoing income from rail entity dividends and land-tax increases. The latter can be regarded as a form of LVC (Kurosaki, 2023).

Figure 16 highlights Japan's private rail companies' reliance on non-rail investments. It shows that, despite the Integrated Development Law superseding the KOBAYASHI-Ichizo Model, non-transport sources continue to account for almost 70% of private rail sector revenues.

Figure 16. Revenue sources for Japanese private rail operators, 2019-20



Note: Data are for the financial year ending 31 March 2020.
Source: Minami (2023), drawing on financial results and explanatory documents for each company.

Hong Kong's "rail plus property development" model

Hong Kong also takes an integrated development approach. Under its "rail plus property development" model, the government and the metro authority (MTR Corporation, MTRC) jointly identify development sites around future stations when developing master plans for new metro extensions. MTR obtains from the government a 50-year lease for the development rights for land adjacent to stations, plus air rights over stations.

The lease value reflects the "pre-development" value of the land. MTRC then tenders these rights to private developers using agreements containing profit-sharing formulae. The private developers pay all development costs, including the land premium, and bear the construction and commercialisation risks and costs. This model underpins several proposed new transport infrastructure projects.

In theory, the model allows the capture of all the LVU, although private developers share the LVU and development profits. It also provides funding for maintenance and infrastructure improvements, as continuing revenue flows form part of the model. Some analysts view the model as a benchmark for LVC. For example, Aveline-Dubach and Blandeau (2019) refer to the "outstanding efficiency of the R + P [Rail plus Property] model".

However, Aveline-Dubach and Blandeau attribute the model's success to Hong Kong's "unique conditions". The city has a significant public transport ridership due to its high population density and policies restricting development to major railway transport corridors. A regime of public ownership allows MTRC to purchase large amounts of land at below-market prices. The model also benefits from rapid increases in real estate values. Finally, MTRC has considerable experience in urban planning and integrated railway-property development.

The authors note several recent developments which have changed how Hong Kong's model operates. These include the conversion of MRTC to a listed company, with associated transparency and accountability obligations, and political and economic changes following the reversion of Hong Kong to Chinese control. Aveline-Dubach and Blandeau characterise the current model as "management-based", with MTRC focusing on managing existing property assets rather than new developments.

Moreover, while some cite Hong Kong and Japan as exemplars of successful LVC, the premia accrued under these models do not solely represent conventional LVU. Rather, part of the value uplift comes from land development alone. The Hong Kong government monopolises land ownership and severely restricts development. Selling land to MRTC below market price and then allowing it to develop that land effectively creates a value increase. Removing a regulatory restriction on the land's use enables the transport authority to capture that increase.

The LVU comes from some combination of removing the regulatory restriction, developing the land, and the accessibility increase due to the transport investment. This is apparent in the research of Verougstraete and Zeng (2014) on the size of LVU in Hong Kong – measured traditionally as the "value premium [that] result from public investments". This work reports similar results to the international average cited above, with housing price premiums of 5-17% reported for units near railways.

No research is available on the relative importance of the three factors cited above in explaining total LVU. However, it is important to note that the "observed" LVU in these contexts is not entirely – or perhaps even primarily – a product of accessibility improvements due to the transport investment. The multiple sources of LVU involved in this context make it unsurprising that the reported levels of LVC are sometimes high. However, maintaining tight monopoly control over land use is not an efficient means of generating public revenue, given the opportunity costs involved.

Transit-oriented development

Transit-oriented development (TOD) integrates transport and land-use planning to develop major transit infrastructure. However, it does not necessarily involve the transit authority undertaking the development. The OECD (2022) argues flexible regulatory approaches near transit stations give developers greater opportunity to adopt more complex and integrated approaches, highlighting the potential of mixed-use developments. By contrast, TOD implies greater densification, with increased floor-area ratios encouraged in station precincts. This, in turn, increases LVU.

Densification also contributes to more sustainable development patterns, as ensuring development is clustered around public transport hubs maximises modal shift potential. It can thus increase revenues for transit authorities by attracting more users and increasing user fees. The OECD recommends governments enable intensive TOD around stations (OECD, 2022; see also Box 5). However, a key factor is ensuring an adequate portion of the LVU created is directed to public use through effective LVC strategies.

Cervero and Murakami (2009) highlight the potential for a TOD approach to increase LVU. The authors' study of standard "rail plus property" developments in Hong Kong found that LVU did not exceed 17%. However, as they note: "If the R+P projects had a distinctively transit-oriented design, reflected by nearby retail shops, high-quality pedestrian corridors and open space, the premiums exceeded 30 per cent." In other words, adopting TOD features could double LVU. The authors cite factors implying a more sophisticated integration of transport and land-use planning, focused on the liveability of urban spaces.

Box 5. Transit-oriented development: Serving multiple policy ends

Public transport authorities may develop retail property as part of LVC strategies for new public transport developments. A separate, although conceptually related, issue is the potential to increase revenues by developing existing stations and surrounding land. Such initiatives can vary widely in scale, from renovating and making available space in existing station buildings for commercial purposes to major station redevelopments.

Several major redevelopments are underway in large US cities. The West Falls Church Station project in Washington, DC, involves redeveloping the current metro station, including surrounding car parking, as a 100 000m^2 mixed-use development. This would raise revenue for the metro operator through 99-year ground leases and increased metro ridership. In Atlanta, Georgia, the Metropolitan Atlanta Rapid Transit Authority (MARTA) has taken a systematic approach, establishing a dedicated transit-oriented development (TOD) office in 2013. This has signed 17 ground leases to date, typically covering former surface parking lots adjacent to rail stations. These yield USD 6 million in annual rent, while the office costs USD 2 million annually (Bergal, 2021).

In addition to generating revenue, these initiatives serve other policy ends, including encouraging TOD and providing affordable housing (e.g. the MARTA leases require 20% of housing units to be leased to low-income workers). Conversely, some argue that TOD on brownfield sites may encourage gentrification, with the resulting displacement effects potentially overwhelming the benefits of affordable housing initiatives. A recent systematic review finds some support for this hypothesis but concludes the substantial variability in the results suggests other pre-existing local dynamics, built environmental attributes, and accompanying policies are more important drivers of gentrification (Padeiro et al., 2019).

Implementing land-value capture poses equity challenges

LVC's efficiency and sustainability are critical concerns but so is its fairness. Equity can be considered from a horizontal or vertical viewpoint. Horizontal equity occurs if each taxpayer pays an equal dollar amount of tax. However, in this case, the tax regime fails the vertical equity test (i.e. it is regressive) because the tax paid by lower-income groups represents a higher proportion of their income than that paid by higher-income groups. In contrast, a tax based on the ability to pay will be progressive, as higher-income taxpayers contribute more than lower-income taxpayers.

In the LVC context, there is likely to be little or no correlation between the size of the capital gains accrued and income levels. Taxing each landowner the same percentage of the capital gain, perhaps as a rates surcharge, may best meet the equity criterion. While any levy can create problems for asset-rich but cash-poor landowners, staged or deferred payment arrangements can address this issue. Importantly, any levy that recovers less than 100% of the LVU still leaves the landowner with a windfall gain. Perhaps for this reason, the New South Wales state government now refers to "value sharing" rather than LVC.

Infrastructure levies (including TIF, special assessments, and transport levies) tend to be applied uniformly across taxpayers within a beneficiary group. They thus achieve horizontal equity but are arguably regressive. Other LVC instruments (developer obligations, charges for development rights, land readjustment, and strategic land management) are more likely to be progressive since the market determines their incidence. Commercial entities tend to have higher incomes and higher ability to pay.

Other equity issues arise because LVU does not accrue uniformly across areas. Lower-income neighbourhoods yield lower percentage gains than higher-income areas. Increasingly, social justice and fairness considerations influence decisions on the location and provision of transport infrastructure. However, governments pursuing "levelling up" policies will likely face a trade-off between policy objectives due to lower average LVU in low-income areas. That is, the equity gain comes with an efficiency cost.

Spatial equity is another consideration in implementing LVC. Most or all the instruments described above require the identification of specific boundaries for applying LVC. Property owners outside these boundaries will still benefit from the public transport improvement (albeit to a lesser extent) but pay no cost, unlike those inside the boundary. Conversely, where multiple LVC schemes are adopted, taxpayers located in an area where LVC districts overlap may pay more than one tax.

Practical challenges involved in applying land-value capture

The OECD Compendium nominates limited government capacities as a critical barrier to the successful implementation of LVC. Identifying taxpayers (e.g. landowners) is particularly challenging for middle- and low-income countries. It requires good land registry information and quality cadastres that accurately (and without corruption) record quantity, value and ownership characteristics. The OECD identifies owners' resistance as a major related challenge. A lack of political will can also be a significant constraint, even if the idea that beneficiaries should pay is uncontroversial.

LVU levels vary by mode and across space, while *ex ante* prediction of LVU is problematic. These factors may explain why LVC schemes in transport are more likely to be based on project cost rather than potential LVU. The OECD suggests that, in high-income countries, imposing too high a tax can reduce LVC's acceptability and hence the ability to use it more widely.

While LVC is widely used to help finance infrastructure projects, its use to provide ongoing revenue for public transport operations is far less common. Of the instruments discussed here, a transport levy or a dedicated rates surcharge (where rates are usually levied on the property's value, constituting an ad valorem tax) are likely to be the only mechanisms suitable for providing ongoing revenue support.

Lessons from land-value capture for public transport

Public transport is vital to cities' sustainability, but providing new links is expensive, and governments increasingly find funding investments and subsidising operating costs challenging. The OECD Compendium (2022) notes increased interest in how to capture LVU to help fund new infrastructure. LVC is a potentially important funding source.

Despite the practical difficulties, LVC has contributed substantially to funding some major projects. For example, LVC funded around 30% of the cost of Crossrail, while a prospective analysis suggests using similar instruments could contribute 43% of Crossrail 2 funding (PwC, 2014). However, its potential contribution varies widely between projects and is usually lower. Even where significant LVU exists there may be limited potential to capture it.

Levying more than one type of LVC charge is likely to improve effectiveness. For example, Crossrail received funding from five LVC-related sources, including a business rate supplement, a smaller community tax, and the sale of surplus land (SGS Economics and Planning, 2015). Adopting multiple charges can better match benefits received and contributions made across groups, facilitating the capture of more LVU. Nonetheless, significant challenges remain. Indeed, Buck (2017) concluded that the government captured only around 10% of Crossrail's estimated LVU, with 90% retained by landowners as windfall gains.

Seeking LVC through business rate supplements is usually more politically acceptable than levying residential rate surcharges. Where there is business resistance to business rate supplements or other obligatory contributions, using voluntary developer contributions, mediated using accessibility measures such as PTAL, can be another option.

Even if explicit LVC charges are not adopted, some LVU is inevitably captured over time if land-based taxes reflect property prices. This "LVC by stealth" can be significant but may not help fund new infrastructure projects, as the level of government receiving the land-based tax revenues may not be the one developing the project. Japan's KOBAYASHI-Ichizo Model model avoided this, since the development and the transport project were integrated, with uplift necessarily flowing to the infrastructure developer.

The opportunities for implementing one or more forms of LVC are considerable, particularly where government capacities are in place, along with supportive legislative frameworks. The most notable examples of successful LVC are in countries with solid control over land-use planning. LVU – and hence potential LVC – are particularly high where land supply is tightly constrained, as in the case of Hong Kong. However, strong constraints on land supply imply high welfare costs to the broader society.

Thus, a modest contribution to project funding from LVC is not necessarily an indication of failure but a valuable addition to the funding envelope for major transport projects. Finally, as shown in the Dublin light rail example, successfully using LVC to contribute to funding new infrastructure implies capturing LVU accruing to existing properties and new developments within a project's catchment.

5. Improving the government funding base: The role of earmarked taxes

Government subsidies are a vital funding element for almost all public transport systems. However, the type of subsidy provided affects the stability and predictability of operators' revenues. This is a critical issue where large, long-running capital projects are needed to provide new or substantially upgraded services. Direct grants are a relatively unstable form of subsidy because their discretionary nature makes them vulnerable to political and policy changes, and subject to competing claims from other policy areas. Dedicated taxes and cross-subsidies, established legislatively, can provide greater funding stability. This may increase efficiency by facilitating the optimal scheduling of capital expenditures and avoiding delays in opening new services (Xuto et al. 2022).

There are two main rationales for earmarked taxes. The first, "beneficiary pays", is based on the view that some of the benefits of high-quality public transport go to groups other than the direct users. Chapter 4 addressed the application of such a beneficiary-pays logic to landowners and users. LVC can thus be seen as a specific form of earmarked tax. Payroll taxes, such as France's *versement mobilité,* also adopt this logic. Such taxes are based on the view that improving transport connections effectively increases the size, and thus the efficiency, of the labour market, providing efficiency gains for affected businesses.

The second rationale for earmarked taxes is the need to move towards a sustainable transport system, both as part of the response to the climate crisis and to achieve more equitable access to transport. This rationale implies increasing taxes on private vehicle use to levels that fully recover the external costs imposed by their use, particularly in urban areas. It also implies diverting revenue from these taxes to improving public transport to maintain accessibility levels for those priced out of private vehicle use. This chapter outlines the various kinds of earmarked tax that apply to transport.

Congestion charges and urban tolls

Despite the clear economic rationale for congestion charges, relatively few cities apply them. This reflects the political challenges of implementing them. However, there is continued interest in their potential benefits, and New York City is likely to become the first US city to adopt a congestion charge during 2024 (ITF, 2023c).

Proost (2022) identifies eight cities in five countries with congestion charges or urban tolls (see Table 9). An important distinction is between those that impose a high charge within a narrow perimeter (e.g. London) and those that apply a low charge across a larger perimeter. The latter group is larger and includes all Scandinavian cities applying congestion charges.

The revenue from almost all congestion charges is earmarked for transport-related uses. This could possibly be a response to the political challenges in adopting them. Both roads and public transport are generally eligible for funding, although the extent of the funding provided to these modes differs widely. Cycling and walking projects are eligible for funding in at least three cases.

Table 9. Congestion charges: Stated objectives and use of revenues

Urban area (year of introduction)	Stated objective	Use of revenues	Size of charge (2023)
Singapore (1975, 1998)	Congestion		Variable (target speed basis)
Bergen (1986)	Financial, environmental	Initially only for financing road projects, then 45% for road construction and 55% for improving environmental quality and road safety	NOK 6-64 (EUR 0.56-5.83) Varies with vehicle type, peak versus off-peak
Oslo (1990)	Financial	Investments in road capacity and public transportation projects	NOK 5-24 (inner ring) NOK 6-31 (outer ring)
Trondheim (1991)	Financial and congestion	Road infrastructure (road capacity, with some earmarking to public transportation and to cycling and walking)	NOK 13-37 (EUR 1.18-3.37) Monthly ceiling of NOK 110 (EUR 10)
London (2003)	Congestion	Public transport (80%), road safety (11%), cycling and walking (9%)	GBP 15 (EUR 17) ULEZ charge for non-compliant vehicles: GBP 12.5 (EUR 14.2) EUR 4 for petrol cars and EUR 6 for diesel cars
Stockholm (2006, 2007)	Congestion	Road infrastructure and public transport	SEK 11-45 (EUR 1-4.1) Daily maximum: SEK 135 (peak), SEK 105 (off-peak) (EUR 12.3/9.5)
Milan (2008, 2010)	Environmental, then congestion	Public transport, cycling and walking	EUR 0-5
Gothenburg (2013)	Congestion, environmental, financial	Road infrastructure and public transport	SEK 9-22 (EUR 0.81-2) Daily maximum: SEK 60 (EUR 5.43)

Source: Proost (2022), www.urbanaccessregulations.eu.

London earmarks the highest proportion of its road-user charging revenue to public transport, with 80% of the net revenue from its congestion charge and Low/Ultra-Low Emissions Zone charges used for this purpose. A further 9% funds active transport initiatives. In 2021-22, road-user charging revenue totalled GBP 423.3 million, or 9.8% of TfL's gross income (TfL, 2022a). Milan is the only other city currently spending most or all of its congestion charging revenue on public and active transport. The remaining cities spend substantial amounts on road-based projects.

The revenue from New York City's proposed congestion charge will also be earmarked for public transport. The Metropolitan Transit Authority (MTA) would use the expected annual revenue of USD 1 billion to fund repayments on a USD 15 billion loan, which would finance 30% of its multi-year capital works plan (Kaske, 2022). This is in addition to the toll revenue from the nine crossings into Manhattan operated by the MTA's Bridges and Tunnels Authority, which raised USD 2.2 billion, or 22% of the MTA's total revenue in 2021.

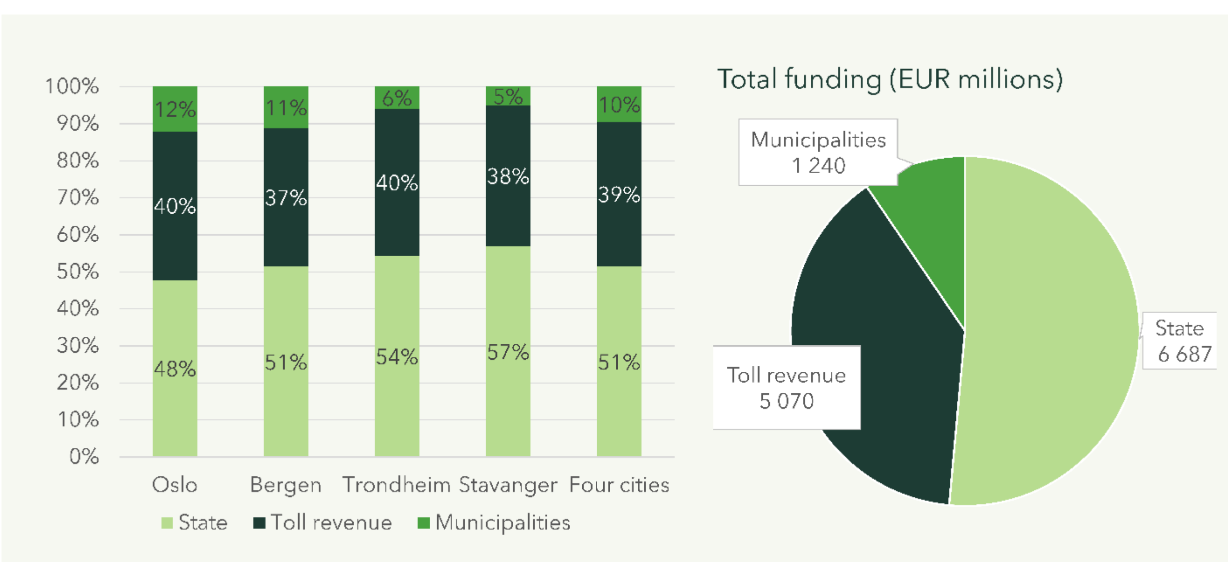
The ITF has previously highlighted the benefits of earmarking congestion charging revenue to fund public transport (ITF, 2021c). Support for congestion charging increases when affected road users have good transport options. Improving public transport makes it a feasible alternative to private car use for a larger proportion of journeys to and within congestion charging areas. The report also recommended introducing congestion charges as part of a broader SUMP (see Chapter 1). Because SUMPs aim to achieve a shift towards public and active transport, congestion charging revenues should be used to improve access to these target modes.

Urban tolls are a significant source of revenue for transport investment in Norway. They should contribute around 9% of the resources allocated under the 2022-32 National Transport Plan (Norwegian Ministry of Transport, 2022). Since 2009, a small proportion of tolling revenue has helped fund public transport operational costs. Norway's use of urban tolling provides an example of its incorporation into a broader policy context, explicitly linking tolls to achieving a long-term shift in urban mobility.

In Norway, the national government and regional and local authorities also adopt urban environment agreements (UEAs). These provide transport funding additional to that allocated under the National Transport Plan and via local authority budgets. UEAs were first used in the 2014 National Transport Plan. Since 2016, they have incorporated a "zero-growth" objective for private car traffic. UEAs provide a benchmark of 50% national government financing for major infrastructure projects, with the remaining funds derived mainly from urban tolling revenue, supplemented by some municipal funding. The national contribution can be increased to 66% if specific public transport service provision benchmarks are met.

Figure 17 shows the funding breakdowns of UEAs in four Norwegian cities. Urban toll revenues account for 37-40% of capital financing for new infrastructure projects financed under the UEAs. UEAs are therefore a significant source of project financing, with the total (national plus toll revenue) funding provided under them estimated at between EUR 427 (Oslo) and EUR 1 089 (Stavanger) per person annually between 2019 and 2029.

Figure 17. Total funding for transport growth agreements in Norway, 2019-29



Source: Norheim (2023).

Adopting the zero-car-growth objective followed modelling of the cost of meeting expected growth in transport demand. If current trends persisted, this cost would amount to almost EUR 30 billion over 20 years. An “environmental scenario” was estimated to halve the cost, saving EUR 15 billion.

Public acceptance of urban tolls has gradually increased over the past decade. Support in Oslo grew from 46% in 2013 to 55% in 2022, with 41% opposed. A similar percentage agree that the urban toll ring system reduces the extent of their car use (Norheim, 2023). EVs were initially exempt from the tolling system but now pay urban tolls with a minimum 50% discount. This policy has strong public support as part of a broader move to revise and reduce EV subsidies following their large-scale adoption in Norway.

Despite the successes of the UEA system, meeting the increased public transport funding needs arising from the zero-car-growth objective remains challenging. While urban tolling provides considerable revenue, it is significantly less than the additional public transport investments (and operating subsidies) needed. The government is taking various initiatives to address this challenge, including:

- reforming fare structures, incorporating differentiated fares and peak/off-peak pricing
- implementing network efficiency measures, including establishing trunk lines and giving traffic priority to public transport services
- adopting output-based public subsidies (i.e. a subsidy per passenger journey benchmark)
- establishing an integrated policy framework for public transport use and the adoption of restrictions on private car use
- including new mobility services in UEAs.

Iceland’s Reykjavik region is taking a broadly similar approach. The 2019 Capital Transport Pact responds to urban sprawl, reduced population density and increased intensity of car use by establishing a new BRT scheme. The BRT system will integrate with the existing bus network and form the backbone of an enhanced public transport system. As in Norway, the pact features new co-operation and co-ordination arrangements between the national government and the six affected municipal governments. A new sustainable mobility charge (or urban toll) could provide up to 50% of the BRT system’s funding. The remainder will be funded by the national (25%) and municipal governments (12.5%), supplemented by an LVC element (12.5%) in the form of revenue from land sales (Hermannsson, 2023).

Other road-user charges

Efficient taxes to internalise the external costs of motor vehicle use as fully as possible can help shift transport demand towards sustainable modes by increasing the relative price of private vehicle use. A central element is ensuring ICE-vehicle users face an effective carbon price. Proost (2022) argues current European fuel taxes imply an effective carbon price of around EUR 300 per tonne, while fuel taxes are also a potentially efficient means of internalising air and noise pollution costs.

A carbon tax of EUR 300 is broadly equal to the “target consistent” CO_2 shadow price recently adopted by the UK government for appraisal purposes. However, much lower fuel taxes apply in most non-European countries, suggesting the need for significant increases to embed an efficient carbon price. Moreover, the expected trajectory of shadow carbon prices in the years to 2050 is strongly positive, implying a need for further tax increases over time (ITF, 2022).

Using revenue from these road user taxes to improve public and active transport would reinforce their impact. Fuel tax accounted for 4.4% of all taxation revenue in Europe in 2020 (ITF, 2023c). Given the importance of this revenue source, there is a case for earmarking at least some of it for public transport. Several countries have already taken this step. For example, the Île-de-France region uses a small proportion of fuel-tax revenue to fund public transport. A current proposal would see it extended throughout the country.

In the United States, the federal Highway Trust Fund has traditionally funded highway investments using federal taxes on road fuels and trucks. However, the 2008 *Fixing America's Surface Transportation Act* authorised spending part of the Highway Trust Fund on public transport. The fund now comprises a Highway Account and a Mass Transit Account. In 2019, 12% of tax revenues accrued to the Mass Transit Account and 19% (USD 10.5 billion) of outlays were attributable to transit (Kirk and Mallet, 2020). Feigenbaum and Hillman (2020) find that 20 US states divert some fuel tax revenues to non-road related uses, mainly funding public transport. Six states spend over 20% of fuel tax revenue on public transport.

In New Zealand, 20% of funding under the National Land Transport Programme 2021-24, funded by vehicle and road user taxes, was spent on public transport (New Zealand Transport Agency, 2023). In Canada, the city of Vancouver applies a fuel tax of CAD 0.18 per litre to fund its metro system (Canadian Taxpayers Federation, 2022). The province of Ontario allocates CAD 0.02 per litre of its fuel tax to municipalities with public transport services (Ontario, 2023).

Urban parking taxes are also a potentially important source of tax revenue from road users. Because excessive parking supply has many negative impacts, these taxes can encourage behavioural changes and offer a fair way to finance local transport services. Litman (2013) identifies several parking tax and levy options, some used in Australian and US cities since the late 1990s. In Australia, Melbourne expects to generate AUD 108 million (EUR 70 million) from parking levies in 2022-23, having quadrupled the rate applied in the central area since its adoption in 2006 (State of Victoria, 2022).

Urban parking taxes and levies usually apply to commercial parking. Where used, a complementary strategy should ensure the efficient pricing of on-street parking so that pricing reflects the value of the road space used for this purpose. This approach yields additional revenue and ensures a consistent approach to parking pricing (ITF, 2021a). Dynamic on-street parking charges have been introduced in some cities, varying during the day in response to demand, as part of congestion management. Revenues from these systems tend to be earmarked for mobility improvements.

Franco (2020) summarises the potential impact of well-designed parking policy reforms based primarily on an analysis of Los Angeles' recent reform experience:

> Policies determining parking supply and pricing influence developers' decisions on how much land to provide for parking, and individual choices of how many cars to own and which travel mode to take to cover daily travel needs. Those choices have key implications for land use, urban form, congestion and air pollution. Therefore, parking policies can be key to achieve more environmentally sustainable urban mobility and development patterns.

Parking taxes can also help achieve planning objectives, encouraging more compact development and increased use of alternative transport modes. Beuhler et al. (2016) conclude that parking management and a metro expansion led to the modal share of private cars in Vienna falling from 40% to 27% in the two decades to 2014.

The *versement mobilité* in France

The French government adopted the *versement transport* [transport payment, VT] in 1971 as a payroll tax to provide a reliable funding source for major expansions of the public transport network. The VT underwent progressive expansion in terms of coverage until its replacement in 2019 by the *versement mobilité* [mobility payment, VM].

The VT was initially restricted to the Paris region (Île de France) but now applies throughout France. The size of the municipalities affected has also changed: the VT initially applied to those with populations over 300 000, but since 2020 the VM applies to municipalities with populations over 10 000. Private and public sector organisations employing 11 or more people pay the VM.

The VM is easily the most significant tax earmarked for funding public transport in France. Revenue has grown strongly recently, from EUR 7.7 billion in 2013 to EUR 9.3 billion by 2019 (Desclos and Minster, 2020). Local transport authorities set the tax rate, subject to legislated maxima. These vary according to the size of the municipality, whether there is an inter-municipal transport co-operation agreement in place, whether a transport mode with "right of way" (i.e. train, tram or BRT) exists, and whether the municipality benefits from the "tourism bonus" rate.

The maximum rates applicable as of 2021 vary from 0.55% to 2.95%, with higher maxima applying to larger municipalities. Around 90% of municipalities with populations over 400 000 charge the maximum rate, but a lower proportion of smaller municipalities do so. The maximum rates have increased progressively: for example, the top rate within Île de France before mid-1975 was 1.7% but since 2018 it has been 2.95%.

The VM has contributed substantially to the large-scale expansion of mass transit in France. Since 2019, VM revenues can also fund other mobility services (e.g. active and shared mobility). The fact that local authorities decide the tax rate, collect it, and use it locally makes its rationale and merits more transparent.

Conversely, the French employers' association (MEDEF), argues that the high VM rate, which accounts for as much as 7% of gross earnings in Paris and Lyon, harms competitiveness (Coldefy, 2023a). An additional requirement for employers to pay half the cost of employees' public transport travel passes underlines this issue. Moreover, the tax is paid for all employees, regardless of whether they commute by public transport or the workplace is accessible by public transport. This is a particular issue outside metropolitan areas. While 43% of workers commute by public transport in the Paris region, only 8% do so in the rest of France (Desclos and Minster, 2020). It is also possible that increased teleworking may reduce the VM's acceptability.

A more fundamental concern is that the VM has effectively become a substitute for fare revenues. While initially intended to fund major infrastructure, it has increasingly funded operational costs. In 2018, it funded 43% of public transport operating costs in Île-de-France and 48.2% elsewhere (Duron et al., 2021). Meanwhile, the contribution of fare revenue has declined particularly sharply in France, from 70% of operating costs when the VT was introduced to only 28% by 2015.

The French National Audit Office argued in 2015 that transport authorities' ability to rely on revenue from the VM had led to a failure to maintain the real value of fares, raising questions regarding fair cost sharing between users and taxpayers. It also argued the VM is at its maximum feasible level and that addressing future public transport needs will require alternative revenue sources (Desclos and Minster, 2020). Enabling VM revenues to fund other mobility services sharpens this imperative.

The political difficulty of increasing fares suggests that a reliable alternative revenue source such as the VM will increasingly risk diversion towards funding operational expenses. The absence of clear rules requiring it to be used to fund infrastructure expansion, as initially intended, has enabled this shift.

However, this risks undermining support for the VM and compromises its ability to contribute to network development. The need to invest heavily in sustainable transport underlines this point.

Establishing formal fare-setting policies and processes could help address this problem. Notably, Duron (2021) recommended prohibiting local transport authorities that benefit from VM revenue from offering fare-free travel. A more direct approach could be legislating restrictions on VM revenue use, requiring a minimum percentage to fund capital works.

Despite the VM’s long history and important benefits, no other country has adopted a similar model (Desclos and Minster, 2020). New York City’s Payroll Mobility Tax, which applies at rates ranging from 0.11% to 0.34%, represents a modest exception to this conclusion. Desclos and Minster note that effective implementation of the model requires an efficient administration to levy and collect the tax and an effective legal system to settle disputes. This suggests it is a tax best suited to relatively developed countries. Conversely, its ability to provide a stable revenue source for public transport will be particularly attractive in developing countries facing challenges in subsidising public transport due to budget constraints.

Other earmarked tax revenues

New York City’s MTA takes a highly diversified approach to using earmarked taxes. It receives funding from several taxes, including a local payroll tax, similar to France’s VM, two property taxes (targeting property transfers and mortgage registrations), a local sales tax of 0.375%, a USD 2.75/trip surcharge on taxis and ridesourcing vehicles, and vehicle-related taxes (a fuel excise plus registration and driver licence fees).

The MTA justifies the tax on ridesourcing and taxis as a congestion surcharge based on evidence that these vehicles contribute disproportionately to congestion in areas with high traffic densities (MTA, 2023). Earmarked property taxes are usually justified based on the increased land value from accessibility gains due to improved public transport. However, the mortgage-based charge used in New York City is less equitable and efficient than a rate surcharge. Similarly, a tax on property transfers is less efficient than an annual tax on property owners based on a percentage of the underlying property value.

Criticisms of earmarking

A major risk of earmarking taxes to fund public transport is that these funds become substitutes for action to maintain adequate user contributions (i.e. fare revenue). Similarly, when earmarked taxes generate substantial revenue, the risk is that reduced allocations from general government revenue will offset it. More significantly, substantial earmarked revenue may reduce spending discipline because there is less competition for available funds.

Certainty in funding allocations enhances transport authorities’ ability to commit to and schedule major investments. However, there can be offsetting costs if less rigour applies to spending choices. The issue arises because the pool of competing projects is much smaller. Whereas the Treasury oversees the allocation of general tax revenue between all current and proposed government programmes, funds raised by an earmarked tax are only usable for a much narrower range of purposes.

The existence of a dedicated funding source can reduce the rigour of project appraisal and the review and challenge functions of the appraisal process, compromising value for money disciplines. Hence, many

Finance ministries, including the UK Treasury, argue for maintaining competition for budget funding on efficiency grounds.

Mitha (2018) argues that earmarking can constrain funding for essential but less prominent government programmes, especially if adopted widely. Similarly, Sweden's Ministry of Finance argues that earmarking disadvantages "worthy but unpopular" expenditures by reducing the pool of uncommitted funds available to be allocated in the budget context. Moreover:

> [Earmarking] can lead to substantial revenues being directed to specific uses that, over the longer term, prove to be inefficient or ill-adapted to emerging priorities. In such cases, the ability to redirect revenues to better uses can be constrained, even in the medium term, by the public commitments that have been made to use revenue for particular purposes (ITF, 2021c).

The tax revenue raised by an earmarked tax will also likely become less predictable over time. The revenue raised by most taxes varies with economic circumstances (pro- or counter-cyclically) and is vulnerable to long-term shifts in demand. For example, were a significant proportion of fuel-tax revenue earmarked for public transport investment, the revenue raised would fall rapidly as the take-up of EVs increased.

Addressing the criticisms

Governments wishing to earmark tax revenues to fund public transport should ensure that the system design addresses these concerns as far as possible. In some cases, rules addressing the spending of the revenue raised may be appropriate. The example of the VM shows how incentives to spend the revenues on operational costs undermined the original objective of mobilising funds to finance major system expansions. Rules requiring authorities to spend all, or some minimum proportion, of revenues on capital projects could address this issue.

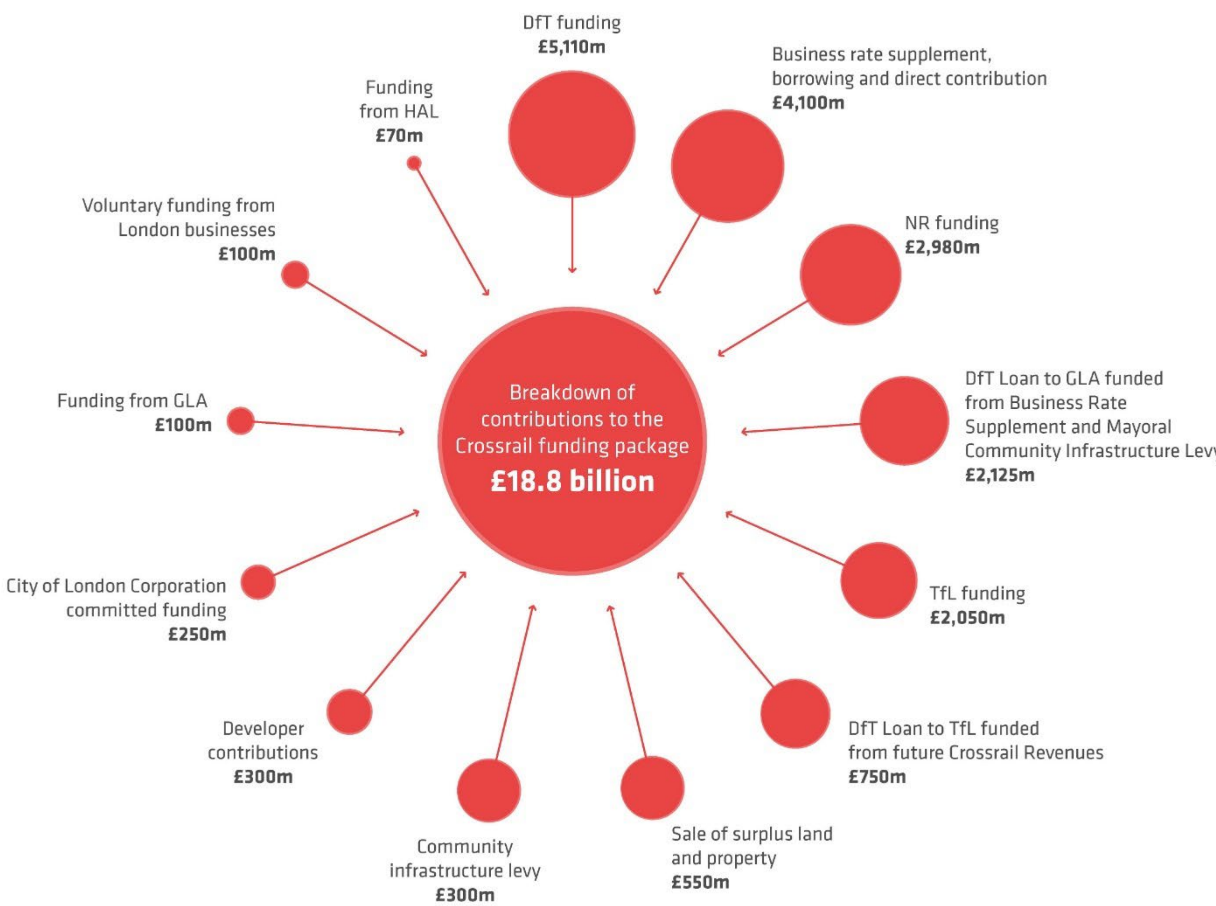
However, unduly restrictive rules have longer-term efficiency costs. Governments and transport operators may need to be able to shift funds from less successful initiatives to new priorities. Such flexibility suggests a flexible approach to earmarking that allows modifications as priorities evolve (ITF, 2021c). While a fixed proportion of tax revenues could be reserved for infrastructure spending, they should not necessarily be permanently allocated to specific projects.

Another approach could be to fund specific functions through general government revenue and others through earmarked taxes. This may be more readily accepted if earmarking is seen as a medium-term tool, explicitly linked to the large investment demands created by the need for a timely move to a sustainable transport system.

6. Combining funding sources

This report discusses the merits and potential contributions of a range of individual funding sources. However, a key characteristic of the funding of many recent major public transport projects is a strategy of drawing on a wide range of funding sources. For example, Crossrail drew on 17 different funding sources, including five separate LVC-related charges, as shown in Figure 18. Similarly, Litman (2022) argues for using a variety of funding options, to ensure funding stability and distribute costs broadly.

Figure 18. Crossrail funding and financing sources, 2021



Notes: GLA: Greater London Authority. DfT: Department for Transport. TfL: Transport for London. NR: Network Rail. HAL: Heathrow Airport Ltd. Precise levels of funding from some sources, such as sale of surplus land and property, may be subject to change.
Source: Crossrail (2021).

For Crossrail, the largest LVC-related source was a generally applied business rates supplement, expected to support borrowing of GBP 4.1 billion via annual revenues of GBP 225 million. Two major developers were key project beneficiaries and made significant contributions. One, Canary Wharf Group, was an early project proponent and agreed to build a station and contribute GBP 150 million to project funding. A second, Berkeley Group, also contributed to the collaborative development of a station on its land.

Two regulated entities made contributions which their users would ultimately fund, after the inclusion of these amounts in their regulatory asset bases. Network Rail financed GBP 2.3 billion of track works. Including this amount in its asset base meant the contribution would ultimately be funded by rail operators, who would pay track access charges to Network Rail. Heathrow Airport Holdings contributed GBP 70 million after securing agreement from its regulator to include this amount in its regulatory asset base, enabling its recovery from airport users benefiting from the accessibility improvement provided by the project.

The Corporation of London contributed GBP 250 million in recognition of the importance of the line for those who live, work in and visit the City and the wider capital. The Mayor's Community Infrastructure Levy applied a per-square-metre charge to newly constructed floor space, administered through the planning process. This contributed GBP 300 million, while obligatory development contributions provided a further GBP 300 million (Buck, 2017).

Another example of a major project marshalling a wide range of funding sources is the recently completed Transbay Transit Center (TTC) project in San Francisco. The USD 2.2 billion cost of this multimodal transit interchange is funded through a combination of LVC, local, regional, state and federal funding sources, and naming rights sponsorship (Hafen, 2020).

A key rationale for multiple-source funding models appears to be to limit funding risks for central government budgets. The approaches taken also suggest a focus on reducing risks and delivering certainty to relevant parties to underpin their participation. For example, Buck (2017) notes the UK government initially favoured a private concession model to fund Crossrail. When this proved unachievable, it set an initial "cap" on the contribution from the national budget of around one-third of the funding requirement. The project sponsors (the UK Department for Transport and Transport for London) then worked with the business and development sectors to develop a funding package. This approach, notably the explicit limit on the role of general budget funding, is consistent with the observations of Xuto et al. (2022) regarding the vulnerability of public transport systems and projects that are primarily budget-funded to instability in funding flows.

The fact that both Crossrail and the TTC employed several LVC-related funding mechanisms also reflects the observations made in Chapter 4 regarding the practical difficulties of capturing LVU. A differentiated approach allows better targeting of different beneficiary groups, improving LVC's efficiency and equity while avoiding imposing large, individual charges that will more likely prove politically contentious.

The OECD has also argued that diversifying revenue streams by using a range of LVC mechanisms reduces funding risk exposure for public authorities. However, it cautions that adopting this approach increases the risks of double taxation. To minimise this risk, legal frameworks governing LVC should include exemptions and offsets against other contributions (OECD, 2022).

7. Other revenue sources

In addition to specifically addressing fare revenue, LVC, and earmarked taxes, the Working Group questionnaire sought information on other public transport funding sources. Many responses identified advertising and sponsorship as revenue sources. Most identified advertising as the largest single revenue source among this group.

Advertising is a small but growing revenue source

Some questionnaire responses described advertising as a small but important revenue source, while others stated it played a minimal role. Quantitative estimates ranged from 0.3% of revenue in Madrid to 3.4% in London. The potential of this revenue source is indicated by TfL's estimate that it hosts 20% of all outdoor advertising space in the United Kingdom and 40% within the London area (TfL, 2019). Litman (2022) notes: "Most transit agencies collect revenues from transit vehicle, stop and station advertising".

Published data suggests many transport authorities have substantially increased advertising revenues over the past two decades. For example:

- Transport for London (TfL) advertising revenues grew almost tenfold in six years, from GBP 8.5 million in 2002-03 to GBP 82.7 million in 2008-09. The next six years saw a further doubling, revenues reaching GBP 169.5 million by 2014-15, or 3.4% of revenue (TfL, n.d.).
- Toronto reported CAD 28.4 million in advertising revenue in 2019, or 2.25% of operating revenue, compared with 1.5% in 2011 (Toronto Transit Commission, n.d.).
- Sydney signed a new 10-year advertising contract for its metropolitan railway stations in 2021 for AUD 500 million, more than triple the revenue earned under the previous contract (Ward, 2021).

Increases of this size seem to result from transport authorities adopting more strategic approaches to exploiting revenue potential. Recent increases in patronage in many large cities may also contribute.

Advertising has virtually always been a feature of public transport systems, with the first concession let on the London Underground in 1863. However, the extent to which this revenue source has been exploited has varied widely – perhaps reflecting the fortunes of public transport itself. For example, in 1948 the net advertising revenue from London Transport was GBP 1.3 million, equivalent to around GBP 29.9 million in 2003 values. More than half a century later, in 2002-03, actual TfL advertising revenues were less than one-third of this, at GBP 8.5 million (Horne, 2003). Thus, the solid recent revenue growth followed a long period of decline.

Cities with substantially increased advertising revenue generally engage commercial advertising companies to manage and develop this function. This presumably reflects recognition of the need to draw on specialist expertise to maximise revenue. Even TfL has adopted this approach since 1994, despite previously having a large specialist advertising division (Horne, 2003). It currently grants concessions to commercial partners, leasing certain advertising assets to them (TfL, 2021a). In New York City, Outfront Media has exclusive responsibility for managing MTA advertising.

Transit authorities also undertake facilitative roles for advertising clients. TfL analyses and provides de-identified Wi-Fi data to advertisers (TfL, 2021b). Several authorities, including the MTA, enable audio advertising on vehicles and in stations. Another common approach to transit advertising has historically been industry-led. Advertising agency JC Decaux pioneered the free provision and maintenance of bus shelters in Lyon in 1964, in exchange for the right to sell advertising on them.

TfL also identifies corporate "partnerships" as a distinct activity. These accounted for 10% of total advertising income in 2021/22 (TfL, 2022b) and typically involve an element of co-branding. For example, recent campaigns included use of TfL's roundel to promote the sponsor's products.

Despite significant recent increases in advertising revenue, some evidence suggests that it has reached its upper limit. For example, after a nearly 20-fold increase in little more than a decade, TfL advertising revenues plateaued and then declined in proportionate terms in the next several years, from 3.4% of total income in 2014-15 to 2.8% in the last pre-pandemic year, 2018-19 (TfL, n.d.). Data for New York City's MTA also suggest broadly static revenues in recent years.

Policy challenges

Cities that have sought to maximise advertising revenues often encounter policy challenges. One is that advertising can be visually intrusive and detract from customer experience, for example where vehicles (usually buses or trams) are "wrapped" in advertising or audio advertising is adopted.

TfL's experience also suggests that, as advertising becomes more widespread, pressure grows to ensure its alignment with other policy goals or to use it to promote them. This may impose constraints on the ability to maximise advertising revenues. For example, TfL's Annual Advertising Report for 2020-21 (TfL, 2021b) states that it declined 38 campaigns due to a recently adopted policy restricting advertising of foods with high fat, sugar or salt content. A "Diversity in Advertising" competition also provides substantial free advertising space to prize-winners. A Mayor's Advertising Steering Group was established in 2016 to "guide and inform the development of the TfL Advertising Policy" (Macleod, 2020).

Sponsorship models vary in terms of risk and success

Sponsorship differs from advertising because payments are linked to a particular transit authority asset. A common form involves selling naming rights to transit stations. The Chicago Transit Authority offers naming rights sponsorship (CTA, 2021), as does the Greater Toronto Area's Metrolinx (2022) and Kuala Lumpur's MTR (n.d.). However, research suggests this practice remains little-used overall: Fraszczyk et al. (2020) reviewed 31 mega-cities and identified only three selling station naming rights: Cairo, Delhi and New York City.

Reported sponsorship revenue varies widely. For example, in 2009, Barclay's Bank purchased naming rights sponsorship of the Atlantic Street Station in Brooklyn. The bank agreed to pay the NYC MTA USD 200 000 annually over 20 years (Grynbaum, 2009). The following year, the Southeastern Pennsylvania Transportation Authority (SEPTA) leased naming rights for the Pattison Station to AT&T for five years at an annual price of USD 1 million (US FHWA, 2023). San Francisco's Transbay Transit Center was named the Salesforce Transit Center in 2018 via a USD 110 million, 25-year contract – equivalent to 5% of the USD 2.2 billion project cost (Grabar, 2018).

The relatively small revenue achieved by NYC's MTA is perhaps surprising given its systematic approach to managing sponsorship arrangements via a published policy used in assessing requests for naming right sponsorship (MTA, 2013). However, the above examples suggest the commercial value of naming rights sponsorship is increasing as it becomes more widely used.

Another type of sponsorship involves the sponsor taking primary funding responsibility for a new service integrated into the existing network. A recent example is the former Emirates Air Line, a cable-car service that commenced operation in London’s inner-east in 2012. The naming rights sponsorship provided GBP 36 million of the estimated GBP 65 million total service cost over 10 years. The service was co-branded with TfL and Emirates logos and included on London network maps.

A critical risk with this model is its dependence on the success of the sponsored service. The London cable-car service had limited success, with passenger numbers well below expected levels. Presumably reflecting this, Emirates did not renew its sponsorship, and TfL found a replacement sponsor on far less favourable terms (BBC News, 2022; Mellor, 2022).

SEPTA’s agreement with a local utility company to sponsor its electric bus fleet provides another example of this risk. While the deal was intended to be a multi-year arrangement, initially valued at USD 650 000 over two years, SEPTA had to withdraw the entire fleet from service after less than six months due to mechanical problems. It remained out of service for over 18 months, leading to the termination of the sponsorship (WHYY, 2021).

8. Transport infrastructure financing

This report focuses primarily on funding public transport. However, because most major public transport investments require substantial capital spending to develop essential infrastructure, this chapter discusses issues specifically related to transport infrastructure financing.

Financing is the ability to raise resources to meet the project's initial capital cost. The time difference between the large initial expenditure and the flow of benefits creates the distinction between funding and financing. A project may produce enough funding (revenue allocated to cover its costs) over its lifespan but may have problems obtaining finance at the outset when the capital investment is needed.

If project proponents cannot mobilise adequate resources, there is no way to develop the project and enjoy its benefits. In developed countries with efficient capital markets, problems when financing potentially fundable projects usually result from difficulties in capturing the project benefits. These may be political or technological, or some combination of the two. Table 10 identifies benefits associated with major public transport investments and the problems that can arise in capturing them to fund the project.

Table 10. Project benefits and challenges in capturing them

	Direct benefits	Indirect benefits	Societal benefits
Examples	Travel-time savings Improved trip comfort Travel-time reliability	Accessibility gains, giving rise to: • land-value uplift (LVU) • increased business value • more efficient labour markets	Reduced climate costs Reduced urban pollution (e.g. air, noise) Reduced congestion and accident costs
Potential value capture mechanisms	Fare revenues	Land-value capture (LVC) through various taxes/charges Business rate surcharges "Rail plus property" fees Transit-oriented development (TOD)	Budget funding Increased road-user taxes (potentially earmarked)
Impediments to value capture	Political difficulty of increasing fares Incentive effects on ridership Difficulty capturing value of network benefits (e.g. reduced overcrowding) from users	Uncertainty about timing/extent of LVU Legitimacy concerns about LVC mechanisms Development risks associated with TOD	Political difficulty of increasing road user taxes, equity concerns Competing budget priorities

Sources: Vassallo and Garrido (2023).

The opposite problem can also arise. That is, financing can be made available to enable the construction of the project infrastructure, but service levels may subsequently be constrained due to limited ability to finance ongoing operating costs. For example, while construction of the Grand Paris Express project is well advanced, finance sources for the estimated EUR 700 million annual operating deficit have yet to be fully identified (Coldefy, 2023a).

Table 11 shows the range of financing options typically adopted by governments, and the links between financing options and the funding sources typically used for different project types. Government financing may come from the public budget, or via state-owned enterprises (SOEs) with responsibility for the sector (or for specific projects). Governments may also seek private finance. Both private finance and that provided via SOEs usually comprise a mix of equity and debt. SOE contributions may also include direct subsidies from the public budget.

The distribution of costs between the different funding sources varies widely within and between infrastructure types. Most roads are entirely funded from general taxation, but major urban and rural highways may be user-funded via a concession model or tax-funded through shadow tolls or availability payments. Infrastructure such as bridges and tunnels may be funded via a mix of these sources. Most public transport services are funded by a combination of user and general tax funding.

An urban rail or light rail project is most likely to be financed via the budget of a state-owned public transport authority, also using some combination of debt and equity, and to be funded via a combination of user and taxpayer contributions. Where these are major expansions to existing networks, the user contribution is increasingly likely to include sums mobilized from indirect beneficiaries via LVC.

Importantly, maximising efficiency in project financing will minimise funding requirements. Efficiency in financing has two elements. First, the cost-efficiency of the construction process (i.e. how well construction costs are managed) and second, the efficiency of the financing per se, involving the cost of capital and the amortisation rate. Desire to reduce initial capital costs is often given as a reason to use private organisations to design, build, finance (and sometimes operate) infrastructure. Conversely, private financing is criticised as entailing a higher cost of capital than traditional government financing.

Table 11. Initial financing and ultimate funding sources

Initial financing	Ultimate funding source		
	Taxpayers	Users and taxpayers	Users
Public budget	Urban and rural roads		
State-owned enterprises (Equity, debt, subsidies)		Urban toll bridges/tunnels Urban rail and light rail High-speed rail	Ports, airports
Private corporation (equity, debt)	Shadow toll, availability payment	Urban route buses	Toll concessions (highways) Ports, airports

Source: Adapted from Vassallo and Garrido (2023).

Addressing financing issues

The major reorientation of transport investment needed to achieve a timely move to a sustainable transport system will be a substantial, medium-term task. It is likely to create frictions and delays that stress governments' ability to finance the required spending. This may create pressure to increase the scope and scale of private financing, particularly to enable timely delivery.

The extent and scope of private involvement in infrastructure investment and associated service provision has varied widely, over time and between countries. However, the period from the 1980s to the 2000s saw a major expansion in its use, from which lessons can be drawn.

Governments seeking to expand private-sector involvement in infrastructure provision generally advance two rationales. One is that drawing on private capital can expedite investment plans, allowing new services to be delivered sooner. This rationale is based on an argument that public debt/GDP ratios must be kept below certain levels to avoid economic stability risks, due to perceived impacts on governments' creditworthiness. This may be accompanied by the adoption of self-imposed debt "ceilings", sometimes at very conservative levels. For example, the UK government adopted a public debt/GDP ceiling of 40% in the late 1990s and subsequently pursued an extensive private financing programme.

According to this rationale, private-sector financing, provided in return for user charges or "availability payments" made by government, can be used without adding to public debt, because the debt acquired by the private entity to finance the project is not generally accounted for as public debt. However, there are clear arguments that contractual obligations to make "availability payments" throughout the life of the project are equivalent to loan repayment obligations and should therefore be recognised as public debt. The fact that liability for refinancing failing projects typically falls to the public sector underlines this point.

Furthermore, non-recognition of such obligations as part of public debt represents a failure of public accounting standards. Past, unsuccessful proposals to reform international accounting standards in this regard can be seen as evidence for this view (ITF, 2021b). Reforms in some countries have addressed this issue in recent years. For example, current EU accounting rules require public-private partnership (PPP) liabilities to be listed on balance sheet unless the private partner is primarily responsible for construction, demand and availability risks (EC, EIB and Eurostat, 2016).

The second rationale for private involvement in infrastructure or service provision is that it can yield efficiency gains not readily achievable via public provision, lowering overall funding requirements. Potential sources of such efficiencies include:

- identification of more efficient or less costly design solutions
- better on-time and on-budget project delivery due to greater expertise and sharper performance incentives
- more efficient labour practices, due to less restrictive union or workplace agreements
- improved incentives to minimise lifecycle asset costs by optimising maintenance schedules
- A more proactive approach to risk management.

The incentive for lifecycle optimisation generally results in infrastructure being maintained consistently to a higher standard. Evidence suggests that efficiencies due to the other factors have been realised in practice in some cases, but often fail to materialise. This may be because designed standards are specified in contracts, preventing innovation, although where innovation is actively sought savings can be large. It can also result from failures in the performance of private companies, including in areas such as coordination of contractors (ITF, 2018b).

Evidence also highlights several limits, problems, and risks that must be addressed if private involvement in public infrastructure and services is to yield net public benefits.

Regulatory issues

Private infrastructure managers are generally subjected to price regulation, as their operations have substantial natural monopoly characteristics. Regulatory regimes should incentivise managers to seek efficiency gains, thus providing similar disciplines to a competitive environment. Price-cap regulation was widely adopted in the 1980s and 1990s: The regulator set a maximum rate of price increase (RPI) for the privately provided infrastructure services.

This "RPI – X" formula allows prices to rise by a rate equal to a general price index, less an expected annual productivity improvement. The latter was often set at 1%, but theoretically should equal average productivity growth in either the sector or the broader economy. These "efficiency targets" were typically reset at five-year intervals ("the price control period"). During this time, the asset manager retained the proceeds from above-target efficiency gains as excess profits. Failing to achieve the efficiency target led to lower-than-expected profits.

Experience quickly showed this mechanism could discourage investment: Infrastructure upgrades create fixed costs, given the need to earn a rate of return on the capital invested. However, as creating new or upgraded infrastructure is a one-off event, not an ongoing activity, achieving subsequent efficiencies is impossible – that is, the investment is sunk. Therefore, applying a price cap based on expected future productivity gains arbitrarily reduces the value of past investment.

This issue was addressed by "ring-fencing" such investments via a regulated asset base (RAB). This involves infrastructure managers and regulators agreeing, at the beginning of each regulatory period, on the efficient level of investment for the forthcoming period and guarantees a rate of return on that level of investment. In the United Kingdom, this model of price-cap regulation and RAB has been adopted in sectors including water, electricity, gas, railway and fixed telecommunication lines, as well as Heathrow Airport, and has mobilised large quantities of private capital.

However, this mechanism can create its own difficulties. If investments included in the RAB are large enough, applying the agreed rate of return may increase user prices, offsetting the effect of the efficiency target applied to ongoing operations. Creating a guaranteed rate of return on investment may also bias infrastructure managers toward capital investment, rather than operational solutions. Regulators' approach to the weighted average cost of capital (WACC) arguably also favours replacing equity with debt. That is, if the cost of debt is lower than the WACC, the regulated entity can increase their return on equity by increasing the proportion of debt funding. This can risk compromising the financial stability of the infrastructure entity. This regulatory approach also incentivises risk aversion, as losses cannot be recovered through the regulatory structure. It may thereby discourage innovation (Campbell, 2023).

Comparative cost of capital

PPPs are often criticised because the WACC approved under contracts or regulatory arrangements have consistently and often substantially exceeded the government's cost of capital (i.e. the bond rate). This suggests additional financing costs could fully offset efficiency gains achieved in other areas. However, the WACC for a specific project is not directly comparable to the bond rate: The WACC includes project risks, where the government bond rate does not, effectively reflecting only sovereign risk. Thus, actual differences in financing cost between the two mechanisms are significantly lower than is often presented (Campbell, 2023).

Nonetheless, private infrastructure managers often refinance projects after successfully completing the asset construction phase, when the risk profile effectively moves from reflecting construction risks to operational risks. This was observed in many of the first PPPs awarded In the United Kingdom, with refinancing generally occurring at significantly lower rates. It led to government incorporating a mechanism for sharing these additional profits in future PPP contracts (Hare, 2013).

Contractual difficulties

A basic problem with private provision of long-term infrastructure is the need to develop highly complex contracts to cover all relevant service and pricing issues, and other foreseeable sources of dispute, over periods of 25 years or longer. Specifying service requirements over such long periods introduces much uncertainty, as the procuring authority must anticipate relevant economic, social, and technological changes, as well as usage levels. Delays in project inception, while contractual issues are addressed, frequently result. For example, in the United Kingdom, housing private finance initiatives (PFI) negotiated before the 2008 global financial crisis took an average of 77 months from inception to final contract award (Hodgkinson, 2010).

Despite the uncertainties involved, most PFI contracts demonstrate minimal flexibility. While this is typically due to concerns about protecting governments from foreseeable risks, it also reduces the public authority’s ability to respond to unanticipated changes.

Risk transfer

The ability to transfer project risks to the private sector is often promoted as a critical benefit of PFIs. However, numerous insolvencies among major providers – including Metronet (2007) and Carillion (2018) in the United Kingdom – suggest this risk transfer can prove illusory. If governments are not prepared to see the closure of public services, they have little choice but to take over the insolvent entity, at least initially. This potentially yields greater risk exposure than would have been involved in initially taking responsibility for the project. Moreover, private investors price risk into contracts, at high premiums.

Issues with the use of private financing

The potential risks associated with using PPPs should be addressed systematically to ensure value for money is achieved for the public sector. Campbell (2023) proposes the following:

1. Approaches to drawing in private finance should be tailored to industry characteristics. For example, the UK government has used various approaches for different parts of the national rail system, such as RAB for the infrastructure manager, PFI for rolling stock procurement, and funding support for innovations with unproven current commercial performance (e.g., battery powered trains).
2. Government should clearly specify their policy objectives in each sector (or each project) and assess the case for PPP use in light of these. Where government is simply seeking cost efficiencies, alternatives such as different procurement strategies may entail lower risks and uncertainties.
3. Governments should carefully assess proposed risk allocations and incentive structures. Complexity and uncertainty imply some investments are best left to Government. Attempts to transfer these to the private sector can yield very high costs (i.e., risk premia) and significant risks of a government bailout. Moreover, the long-lived nature of infrastructure assets implies objectives, or at least relative priorities, may change during their lifespan. Governments can often

respond more nimbly and at lower cost where they own and operate the assets, while PPPs require lengthy, complex contract renegotiations.

4. Successfully using PPPs requires government to maintain significant commercial and legal expertise within the public sector, to undertake project specification and contract negotiation, execution, and management. Failure to do so risks poor value for money outcomes.

The UK government concluded in 2008 that PPPs should only be used for infrastructure investment where a clear advantage over public funding is identified. Few cases have since been identified in the transport sector. Such advantages are most likely to arise where governments have a poor asset maintenance record and PPP contract ties asset maintenance to the right to levy charges, and in sectors with strong potential revenue streams (e.g. toll roads in congested areas) in countries where governments face severe fiscal constraints (e.g. rapidly developing middle-income countries).

Intergovernmental financing issues

A key trend identified in previous ITF research (see e.g. ITF 2020a) is devolution of planning and delivery responsibility for public transport from national to regional and local levels. This seeks to create services that respond to local demands and preferences, yielding quality and efficiency benefits. However, regional and local governments generally lack the ability to fund major public transport services, making them dependent on co-funding from national governments. In this context, stable and predictable funding formulae are essential, with appropriate performance incentives for all parties.

Some countries have relatively standardised, formal co-funding agreements to address these issues. For example, the Norwegian government's UEAs set out the relative roles of national government, urban tolling and local government in financing public transport upgrades and expansions. Formalised agreements can help ensure the necessary funding to support the rapid development of sustainable transport systems is mobilised. Framework agreements can avoid or minimise project-by-project disputes regarding funding and help ensure efficient delivery through better funding co-ordination.

Conclusions and recommendations

A timely move to sustainable transport systems is an essential element in responding to the climate crisis. Public transport will play a major role but it will differ from its current role by being integrated into a larger, multi-modal transport ecosystem. While research indicates total investment requirements in a sustainable transport system could ultimately be smaller than at present, a major reorientation of investments is needed. Meeting the sustainable transport challenge requires a highly strategic, whole of government response. The task of funding public transport must be seen within this context.

A major shift from private road transport to rail, tram and bus is essential. However, critical road-based investments are also needed to enhance bus system capacities and upgrade facilities for active transport and micromobility, mainly by reallocating roadspace.

The size of the future funding requirement for public transport means the contributions of all revenue sources must be optimised. A focus on ensuring the efficient provision of public transport services, thus minimising the costs to be funded, is also essential.

Several factors should enable a reversal of the long-term decline in the funding contribution of passenger fares. Increased urbanisation and densification will enable significantly higher load factors, and policies to rationalise private vehicle use will also support this change. Maximising modal-shift opportunities also requires governments to integrate transport and land use policies, ensuring development is concentrated near public transport and urban sprawl is avoided.

Better fare-setting policies and processes can contribute substantially to higher user contributions. Fares must be set at efficient levels and maintained at those levels over time. Fare levels often fall below efficient levels because of the political sensitivity of fare-setting. To address this, governments should develop and communicate detailed fare policies, based on clearly stated principles. These should be implemented through formal fare-setting processes, using relevant economic and other policy expertise. Fare reforms must also include generous, but sophisticated and well-targeted, concessionary fares policies. Achieving high levels of sustainable accessibility for all must be a core objective.

Many ITF countries are increasingly using LVC or actively considering this option. LVC can contribute significantly to funding major transport projects, particularly those connected to major, pre-existing networks and those undertaken in large, densely populated cities. Transit oriented development, which integrates transport and land-use planning, will likely provide the greatest opportunities for LVC to contribute to funding public transport. Wide variations in the timing, size, and distribution of gains from transit investments in different circumstances mean the best approaches to LVC will vary. Combining multiple LVC tools will often yield better outcomes. Equity objectives will also affect choices, while public acceptability is always a key consideration. Clear LVC policies and processes are needed to address these issues and meet efficiency and equity objectives.

The heavy reliance on public transport subsidies funded from general budget allocations in most countries gives rise to funding uncertainty and variability and can significantly compromise project planning and delivery. Using earmarked taxes and charges can help address this issue by providing a predictable and stable funding source. However, the choice of revenue sources to be earmarked is critical. Given the need to move to a sustainable transport system, there is a clear logic in earmarking revenues from vehicle and road-user taxes to aid the development of public and active transport. Earmarking revenue from congestion charges or urban tolls to fund local public transport improvements can also increase support for such charges. This can facilitate their adoption, allowing the efficiency benefits they bring to be captured. Conversely, earmarking taxes to fund public transport may be a “zero-sum” game if this revenue effectively substitutes for user contributions. Clear rules on the use of these revenues are needed, within a broader revenue strategy for public transport. Where new taxes are under consideration, they must be assessed according to standard taxation criteria, notwithstanding the expected benefits of earmarked funding. This implies avoiding taxes that raise significant efficiency or equity concerns.

Many public transport authorities have also sought to exploit the revenue potential of advertising, sponsorship, and other related activities more systematically. However, while some have achieved relatively large increases in revenue from these sources, the evidence suggests that they are unlikely to be able to contribute more than a small percentage of public transport revenues.

In sum, governments must adopt an integrated revenue strategy based on clearly stated principles, policies, and processes to ensure an adequate, stable funding base for public transport in the context of the move to sustainable transport. The objective should be to achieve and maintain an appropriate balance between the funding sources identified in this report, including user contributions, earmarked taxes, land value capture, general budget allocations and ancillary sources such as advertising and sponsorship.

Recommendations

Fund public transport as a crucial part of a sustainable, decarbonised and accessible transport system

The core policy priorities of decarbonisation, sustainability and equitable accessibility require a significant reorientation of transport policy. This reorientation implies a more prominent role for public transport. Policy makers should consider this broader policy perspective when planning and allocating funding for public transport.

Redirect road infrastructure investment to meet decarbonisation and sustainability commitments

Governments must identify the extent and nature of the shifts in investment priorities needed to meet their commitments. They should recalculate road investment expenditures based on realistic, target-consistent traffic forecasts. This task should go hand-in-hand with identifying investment and service provision needs to support the necessary shifts towards public, shared and active transport.

Formulate integrated funding strategies for future public transport services

Governments should develop explicit funding strategies for public transport consistent with its role in a sustainable transport system. Such strategies should set out the roles and contributions of each significant funding source based on stated principles and policies. Government strategies should also use demand forecasting to inform future funding needs.

Ensure transport infrastructure appraisals and investment decisions account for operational costs and initial capital expenditures

Most public transport services incur large and sustained operating deficits. Governments’ ability to maintain new services depends on their capacity to meet initial financing needs and fund long-term operational costs. When initial project appraisals include assessments of ongoing funding needs, governments can give these needs sufficient weight in their decision-making processes. More realistic appraisals can help ensure the long-term fundability of public transport projects.

Plan for effective co-ordination between levels of government when funding public transport investments

With the trend towards decentralised public transport planning powers and the limited tax-raising capacities of state and local governments, funding co-ordination is increasingly essential. Planning processes for significant transport infrastructure projects should include allocating funding responsibilities. Governments should consider using explicit framework agreements to ensure effective co-ordination of funding flows and maintain accountability for their use.

Improve the efficiency of public transport infrastructure investments and service provision

Efficient infrastructure and services reduce demand for public subsidies. Efficiency is even more crucial given the more prominent role of public transport in a decarbonised and sustainable transport future. Pro-competitive reforms of infrastructure development and service provision are essential to improving efficiency. Systematic approaches to measuring efficiency performance, considering the potential impacts on other objectives, using structured benchmarking tools, can provide the insights needed to best direct efforts to make further gains.

Adopt explicit fare policies and implement them via formal processes

Explicit fare-setting policies and formal processes can make user funding from fares less vulnerable to political pressure and more efficient over time. Incorporating extensive stakeholder consultation in fare policy development, especially with users, will enhance acceptability. Governments should also consider incorporating independent, expert advice into fare-setting processes.

Use structured fare policies for more equitable accessibility

Unlike blanket low fares, well-targeted concessionary fares can improve accessibility without compromising overall fare revenue. Eligibility for concession fares should be based primarily on need (i.e. income levels) rather than membership of particular social groups. This applies to middle-income countries as much as high-income countries, as the example of Bogotá demonstrates.

Encourage Mobility as a Service (MaaS) to help create transport systems centred on public transport

Well-integrated, multimodal services incorporating shared and active transport also improve efficiency. MaaS systems can make multi-modal journeys more attractive by minimising the time and cost associated with modal shifts. However, the long- term sustainability of MaaS business models remains unproven. Governments could provide initial funding and strategic direction for MaaS applications to encourage their further development.

Complement public transport fare reforms with reforms to vehicle and road-user taxation

New and increased taxes (including distance-based charges, congestion charges and fuel taxes) can help ensure the efficient pricing of road transport. . Such tax changes will increase the relative price of private transportation. They can also enable higher public transport user contributions without reducing the attractiveness of public transport compared to personal car use.

Earmark vehicle and road-user taxes to enable a timely move to sustainable transport systems

Earmarked vehicle and road-user taxes can provide a significant additional funding source for public transport, at least during the transition to more sustainable transport systems. However, governments should avoid the risk of substituting earmarked taxes for adequate fare revenues. Reforming fare policies and using a proportion of earmarked tax revenues for capital expenditure can reduce this risk.

Increase contributions from indirect beneficiaries of public transport through land-value capture

The use of land-value capture mechanisms to fund public transport is currently limited. But, given the significant increase in land value created by transport infrastructure projects, land-value capture could provide an efficient and equitable funding source. When indirect beneficiaries of public transport infrastructure projects contribute to investment costs, this can also make such projects more fundable. However, wide variations in the timing, size and distribution of land-value increases from transit investments mean that approaches to land capture will necessarily vary.

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The Future of Public Transport Funding

Well-funded public transport services can play a crucial role in decarbonising the transport sector. This report aims to help governments meet the challenge of funding public transport sustainably and equitably. It recommends revisiting investment allocations, moving away from a road focus, and ensuring the efficiency of public transport services. Governments must also optimise the contributions of users, indirect beneficiaries of public transport (including landowners and businesses) and the public sector.

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