Sustainable Transport Magazine

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Better streets.
Better cities.
Better lives.

This issue highlights the vital role of well-funded and electric public transport for sustainable, equitable, and prosperous cities worldwide.

40 years ITDP
Institute for Transportation & Development Policy

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— Image Above (Guangzhou, China) and Cover (Jakarta, Indonesia): ITDP

Letter from Heather Thompson, CEO: As the World Changes, Our Commitment to Public Transport Remains Constant

This year, ITDP unveiled its 2030 Strategic Plan, a comprehensive roadmap that will guide our organization through the decisive years ahead. As we face rapid changes in the transport sector and beyond — including steep cuts to international aid and shifting government commitments — this new strategy positions us to remain steadfast in our work while offering the hope that equitable and sustainable cities are still within reach.

The launch of this Plan also aligns meaningfully with ITDP's 40th anniversary in 2025 — a significant milestone that celebrates our four decades of impact (see the adjacent graphic). This journey has been marked by many national mobility policy reforms, hundreds of billions of dollars directed towards transport projects, and improvements to urban infrastructure worldwide. From catalyzing the growth of bus rapid transit in Indonesia, to championing streets for walking and cycling across East Africa, to reshaping parking and housing regulations in Mexico, ITDP's deep experience has helped us build a foundation for continued success and progress alongside our partners.

This edition of *Sustainable Transport Magazine* reflects our ongoing efforts around the world to highlight the planning and implementation of better public transport with a focus on electric bus systems. Public buses remain the most widely used type of public transport worldwide, especially in the Global South, yet they do not get the attention they deserve. There is an urgent need to protect and boost ridership, build supportive infrastructure, and ensure long-term resilience. In this issue, you will read about how the transition to e-buses is helping make public transport a more attractive, reliable, and efficient option in many cities. Moving forward, it will continue to be a cornerstone of our work as we break down barriers to widespread adoption and investment at scale.

We know that real progress *is possible* because our teams are seeing it firsthand across the Global South, where bold policies and commitments are setting strong examples. We see it in the progress of national funding programs in India for the collective purchasing of e-buses across hundreds of cities. We see it in the deployment of new technologies and data tools to help streamline

Our Impact Since 1985

850
sustainable transport projects and policies

200
cities with a Bus Rapid Transit (BRT) system

3,000+
bikeshare systems established

120+
cities improved

5,800
kilometers covered

$200b
in financing secured for sustainable transport

24,000
government and institutional decision-makers reached

700,000
e-buses introduced in ITDP regions over eight years

transport operations across Brazil and Latin America. And we are seeing it in Ethiopia's landmark energy and transport regulations which are accelerating a transition to electric vehicles and away from fossil fuels.

Looking to 2030, the transport sector will continue to face pressing challenges but also significant new opportunities. Many cities are still dealing with considerable budget constraints, aging infrastructure, and deepening impacts from greenhouse gas emissions. This is worsened by global uncertainties in the energy sector, which continue to spike costs for governments that are overly reliant on fossil fuel imports. This also creates an imperative to invest wisely for the benefit of most people, leading us to prioritize public transport. To secure a brighter future for our economies, resources, and climate, we must reframe this moment as an opportunity — one to leverage more of the innovations, partnerships, and investments we need to expand electric mobility everywhere.

Achieving this will require governments and institutions to urgently work on narrowing the investment gap for public transport projects. According to the World Bank, low- and middle-income countries require approximately USD $417 billion annually through 2030 to implement truly resilient transport infrastructure. While this number is undoubtedly high, the Bank also found that such targeted investments can deliver much higher returns, with an estimated USD $4.2 trillion in net economic benefits — essentially yielding a $4 return for every $1 invested.

Redirecting just a portion of the world's car- and highway-centric spending would not only help close this gap for public transport, but also offer big economic benefits in the long run. In addition to cleaner air and fewer emissions, committing more investments to public transport would expand access to jobs and services, improve public health and safety, and spur growth in new industries. Stakeholders must embrace these opportunities for change to ensure prosperous cities can be built around more reliable, efficient public transport.

This is where ITDP is committed to moving the needle, helping orient more decision-makers towards policies and investments that put zero-emission, bus-led projects at the forefront. We centered our 2030 Strategic Plan on the urgent need to increase public transport ridership across our key regions, while also working to ensure these systems are electric, well-funded, and well-integrated with all other modes.

Now, as ITDP enters its fifth decade, we are grateful for the support of donors and partners like you as we deepen our technical capacities, scale our reach, and build relationships that will help us embrace every opportunity. The path to 2030 demands much more creativity, perseverance, and collaboration, and I have no doubt we will get there together.

Sincerely,
Heather Thompson

Unlocking Better Bus Service Starts with Electric Buses

By Jacob Mason and Beatriz Rodrigues, ITDP Global

— E-buses deployed at scale are key to transforming a city's mobility system. Image: ITDP

Buses are the backbone of public transport. Yet in many cities, especially in low- and middle-income countries (LMICs), bus services remain slow, unreliable, crowded, and poorly coordinated. Older, polluting vehicles further discourage ridership and worsen air quality. Electric buses offer a powerful opportunity to cut emissions while improving the quality, reliability, and integration of bus networks worldwide. But this transformation will not happen automatically. Here is why cities, governments, and communities everywhere should be excited about the large-scale shift to e-buses — and what different stakeholders must do to make it a success.

E-Buses Are Better Buses

Most buses still run on diesel engines, producing harmful emissions that worsen air quality, especially in LMICs. While cars emit the most overall, diesel buses also release high levels of nitrogen oxides (NOx), which contribute to respiratory illness and secondary pollution. E-buses, in contrast, use energy more efficiently and generate far fewer emissions, even when powered by fossil fuel-based electricity.

E-buses also deliver a smoother, quieter, and cooler ride, improving comfort for passengers and drivers alike. Most feature air conditioning and low-floor designs that make boarding easier for older adults and people with disabilities. Riders are often willing to wait longer or pay more just for the comfort and reliability of an e-bus. Cleaner operations also benefit residents living near bus depots, who have long endured the negative

— E-buses work best when well-integrated with a transport system built for walking, cycling, and transit. Image: ITDP

effects of air pollution. Equipped with modern technologies like automatic vehicle location (AVL) and digital payment systems, e-buses can make trips easier to plan and track in real time. Digital payments through smartcards or mobile apps reduce cash handling and improve safety, while helping operators manage routes and revenues more effectively.

E-Buses Support New Economic Models

A major reason why bus service is poor in so many places is related to the economics of public transport. The costs of operating a high-quality service are not well balanced by the revenues generated by that service, especially when trying to make it affordable for everyone. In most high-income countries, this problem is addressed by providing generous operating subsidies, which aim to keep fares low and service quality high.

Without subsidies, even where demand is high, profit margins are often small. To ensure profitability, many operators reduce their costs by delaying vehicle maintenance, hiring fewer or less experienced drivers, and only serving the most profitable routes. The operator's decisions, while logical from an economic perspective, lead to lower-quality service. In LMICs with limited government resources, even where rules exist to prevent this behavior, enforcing them can be challenging.

Electrification can change these economics. Per unit, the up-front cost of e-buses is still much greater than that of diesel buses given the high costs of batteries, which can be as expensive as a diesel bus. However, the dramatically lower costs of maintenance (fewer engine parts and thus less maintenance) and lower fuel costs (electricity is cheaper than diesel) mean that the total cost to operate e-buses (up-front costs, plus all operational costs, minus resale value) is about the same or lower than that of diesel. When many e-buses are procured together, per-unit costs can also go down, making the total costs slightly lower. Despite these benefits, a small operator with limited credit may still struggle to buy an e-bus.

Fortunately, the climate benefits of bus electrification are also now attracting climate investors to the public transport space. Unlike most small-scale transport operators, climate investors have access to substantial funds and can assume higher risks associated with purchasing an expensive e-bus. This has led to the formation of new companies that separate e-bus (and, in some cases, battery) ownership from operations. The use of electricity as an energy source has also attracted some utility companies to invest in e-buses to ensure steady, continued demand for electricity.

In East Africa, for example, the e-bus company BasiGo uses an asset leasing structure where the company buys, owns, and maintains e-buses, which it then rents to local operators who operate them on a 'pay-as-you-drive' model. By buying buses in bulk, BasiGo reduces the procurement costs. Because fuel, operations, and maintenance costs are lower, the cost of renting and operating an e-bus has become more attractive to local operators, who can then focus on what they do best: driving.

Furthermore, by using e-buses equipped with AVL and digital payment technology, BasiGo can operate them as planned and get first access to fare revenue to ensure that their rental payments are made, reducing economic risks. The operators can then retain the rest of the fares as profit. Because they must also cover the costs of any damages, operators now have a financial incentive to keep the buses in good working order.

— Modern technology on e-buses helps to streamline fare payment, tracking, scheduling, and more. Image: ITDP

The Critical Role of Governments

However, there are still issues to work out with this new type of ownership model. For one, operators may still be incentivized to run overcrowded buses on the most profitable routes. Many operators and asset leasing companies also struggle to procure e-buses and build out depots at scale. This is where government intervention and oversight are critical. Governments have a significant role to play in supporting the e-bus transition and in ensuring that the transition will lead to an integrated and well-managed transport network.

Luckily, the electrification of public transport aligns well with many high-level government priorities, including improved energy security (less need to import fuel), lower demand on foreign currency reserves (less foreign currency going to fuel imports), and improved air quality and health (lower emissions). Collectively, these are strong incentives for governments to support widespread bus electrification. Governments can start with targeted steps to help secure land for bus depots, provide the electricity and grid-safety to support them, and implement deals to lower energy prices. To ensure e-buses truly contribute to more integrated and well-managed public transport, governments need to leverage the many tools now available with these vehicles.

For example, operators can be required to share data from AVLs to enable proper fleet management, or leverage digital payment technology to shift to gross-cost contracts. This may allow governments to provide services on less profitable routes, set fares to facilitate easy and low-cost transfers, and plan routes that link together to form a better overall network. For the electric transition to happen smoothly, governments need to further develop rules and regulations to help scale e-bus procurement. This includes: removing existing barriers like tariffs; subsidizing e-bus, battery, and charger purchases; establishing standards for e-bus models to reduce manufacturing costs; making room for new investors to participate; and aggregating demand for e-bus procurement to drive down prices across cities.

In the long-term, governments can also signal their broader intentions to support the e-bus transition at scale. This might include actions like setting ten-year goals for deployment, which indicates to manufacturers, importers, and operators that they are a reliable and cost-effective investment. Even without government intervention, the private sector may still work to deploy e-buses, and they will undoubtedly offer very tangible benefits.

However, *with* direct government support and coordination, the transition can occur much more quickly and yield far greater benefits for people in the near- and long-terms. Improving the governance of transport systems through e-buses is not only an imperative for our climate, but it will also provide a myriad of benefits for overall urban mobility. A future of cities equipped with e-buses is, ultimately, one where everyone has more access to opportunities, more prosperous economies, and more livable communities.

How We Can Transform Urban Air Quality for the Better

By Dana Yanocha and Yutong Li, ITDP Global

— Poor air quality and smog in cities like São Paulo, Brazil, are a major public health concern. Image: ITDP Brazil

Step outside on a busy street in any major city, and the air tells a story. It carries the smell of engines, the haze of exhaust, and the invisible particles that enter our lungs with every breath. Urban passenger transport (cars, buses, motorcycles, and taxis) remains one of the most significant sources of harmful air pollutants worldwide. In dense cities, where millions live and work in close quarters, these pollutants do not just linger in the air; they enter our homes and workplaces, magnifying risks of respiratory and cardiovascular disease.

In fact, transport causes more than one-tenth of worldwide deaths from air pollution, with nearly 400,000 fatalities around the world in 2015 alone, according to the International Council on Clean Transportation. PM2.5, or fine particulate matter with a diameter of less than 2.5 micrometers, is one especially harmful type of vehicle pollutant that can cause diseases, strokes, cancers, asthma, and related illnesses. Other atmospheric pollutants from vehicles, like NOx (nitrogen oxides) and CO (carbon), further contribute to health issues. They are precursors to 'ground-level ozone' effects like thick smog, which aggravate breathing issues and reduce lung function.

Shifting to zero-emission mobility is not just a climate solution, it is a public health imperative.

The Polluting Impacts of Vehicles

Despite a trend of stricter emissions standards in many cities, the air quality crisis remains a significant challenge around the world. It can also disproportionately affect lower-income and Black and Brown communities everywhere. While stronger regulations and the electrification of transport are successful strategies for cutting tailpipe emissions, they cannot eliminate all forms of pollution.

As vehicles evolve to become cleaner and more efficient, the power to enhance air quality lies within the hands of cities. They can make a substantial impact by addressing non-tailpipe emissions — such as brake dust, tire wear, and road surface abrasion — which are emerging as significant contributors to pollution. Unfortunately, these sources are not regulated by most current vehicle emission standards. Unless cities focus on reducing the number of overall passenger vehicles on the road, they will continue to compromise air quality.

To truly address this challenge, cities must pair electrification with a substantial mode shift towards better, more reliable, and more efficient public transport and active mobility networks. This strategic shift can offer a beacon of hope for our air and our health, as it has the potential to significantly improve quality of life in every city.

Assessing Potential Emissions Scenarios

Recognizing the gap between existing policies and the scale of the air quality crisis, ITDP recently examined air pollutant emissions from urban passenger transport across six of the world's largest countries (the U.S., Brazil, Mexico, China, India, and Indonesia) and modeled future emissions under several scenarios: *current vehicle use, high use of sustainable transport, high vehicle electrification,* and *high sustainable transport with high vehicle electrification.*

In a projected *current vehicle use* scenario, per-kilometer tailpipe emissions of NOx and CO are actually estimated to decline worldwide by a factor of four by 2050, primarily due to stronger vehicle emissions standards. At the same time, however, total emissions do not decline as quickly as expected. Growing urban populations and increases in car use ultimately outweigh the incremental per-kilometer emissions improvements in several countries. By 2050, non-tailpipe emissions from vehicle brake and tire wear, road abrasion, and road dust will dominate. If the current demand for driving and vehicle use continues, three-quarters of PM2.5 emissions will still stem from non-tailpipe sources by 2050. Even in the *high electrification* scenarios, the share notably rises to over 90 percent.

Reducing vehicle use in general is the most effective way to tackle these PM2.5 emissions. Mode shift policies coupled with investments into walking, cycling, and public transport, when combined with compact urban planning, can significantly reduce the need for vehicles on the road and related emissions impacts. The effects of mode shift are especially pronounced in China, where bus electrification is more advanced compared to most other countries, with an estimated 69% of buses already fully electric and another 11% hybrid electric as of 2023. Shifting urban mobility away from private cars achieves larger PM2.5 reductions than electrification can alone. In the U.S., India, China, Brazil, and Mexico, mode shift reduces several times more PM2.5 than electrification would by itself.

Prioritizing More Compact, Electric Cities

Electrification is perhaps the most crucial strategy for reducing tailpipe emissions from transport, whether it be for passenger

— Investing in electric, sustainable transport in megacities like Tianjin, China, can significantly improve air quality. Image: ITDP China

or high-occupancy vehicles. In countries with a high share of motorcycles and motorized two- and three-wheelers, such as Indonesia and Mexico, electrification is critical. Although these smaller vehicles have lower emissions per-kilometer than cars, their sheer number and popularity mean they contribute to a considerable share of total urban air pollution. Replacing them with electric models would sharply reduce PM2.5, especially as their demand continues to surge.

Electrification is also the most powerful tool for reducing NOx and CO. Diesel buses are notable sources of NOx. While a shift towards sustainable transport modes alone has little impact on NOx emissions rates, electrification would help to nearly eliminate them by 2050. Thus, when electrification and mode shift policies are pursued together, the benefits for air quality are quite striking. By 2050, primary PM2.5 emissions from urban passenger transport could fall by up to 80 percent. NOx and CO would decline even further.

The Road to Change

Achieving such transformations for mobility and air quality requires decisive and coordinated action from policymakers. Widespread electrification of urban passenger transport depends on strong regulatory frameworks, financial incentives, and substantial infrastructure investments. Governments must set clear electrification targets, support large-scale bus electrification, expand charging infrastructure, and introduce low-emission zones that encourage cleaner mobility.

At the same time, reducing people's reliance on private cars is just as important. More compact land-use planning, better cycling and walking infrastructure, and high-quality public transport — especially bus systems — are key to lowering overall vehicle activity. Driving demand management measures such as parking reforms and congestion pricing can further reinforce this transition. The complete electrification of public transport sits at the intersection of both of these strategies. It simultaneously cuts emissions at their source while strengthening the sustainable mobility options that people need.

This future is within reach, but only if cities embrace both halves of the solution. Reducing our dependence on private cars with better policies and investments, and simultaneously electrifying all remaining vehicles, is the primary path to delivering cleaner air on a global scale. The stakes are as high as the air in our cities is thick. A transition to clean, electric transport is not merely a technological upgrade; it is an urgent need for our climate and our public health. The one truly sustainable strategy for better air lies in comprehensive transport reform: fewer, smaller, and cleaner vehicles serving cities designed for people.

— Dakar's e-BRT marks a milestone for transport access and sustainability across the region. Image: CETUD

What Cities Can Learn from the Africa Region's First Electric BRT System

By Dana Yanocha and Alphonse Tam, ITDP Global

To meet global climate goals, ITDP research shows that cities must both reduce vehicle trips and electrify the remaining vehicles. Electrification discussions often focus on private cars, which dominate trips in high-income countries. In low- and middle-income countries (LMICs), however, most trips occur on public transport and two-wheelers — segments that have received less attention. Electrifying public buses is a key strategy to decarbonize urban transport, reduce vehicle numbers, and improve efficiency. Yet high upfront costs and infrastructure challenges have continued to slow down adoption across LMICs.

Why Electrify?

Public transport electrification is a vital pathway for cities to meet urban development goals — from reducing emissions to improving air quality to driving economic growth. While private vehicles are the largest source of greenhouse gas (GHG) emissions, diesel buses also contribute significantly. Electric buses have already been shown to help cut GHG emissions by 48% in Shenzhen, China; 65% in Mexico; and up to 78% in Colombia.

Diesel buses are also major sources of local air pollutants like nitrogen oxides (NOx) and particulate matter (PM), which harm public health. E-buses nearly eliminate these emissions and further reduce noise pollution, another emerging concern for mental and physical well-being. E-buses also bring modern operational tools such as automatic vehicle location systems and digital fare payments, which help improve reliability, integration, and convenience. These technologies, along with new business models like asset leasing, can help attract more private investment into e-buses and share the upfront costs between the public and private sectors.

— Modern, accessible stations help make Dakar's e-BRT a reliable and convenient option for more people. Image: CETUD

At the national level, e-buses can reduce dependence on fossil fuel imports, ease pressure on foreign currency reserves, and improve economic stability, especially in countries that rely heavily on imported fuels. Electrification makes public transport more attractive and equitable by replacing aging fleets and formalizing informal systems with safer and more comfortable vehicles. Higher-quality service thus encourages more people to use bus networks, expanding access to jobs, schools, and essential services.

Surveys in cities such as Santiago, Chile, Bogotá, Colombia, and Pune, India, show higher passenger satisfaction with e-buses, while drivers report safer and more comfortable work shifts due to reduced exposure to exhaust and heat. The transition to e-buses represents the future of urban mobility — cleaner, quieter, and more equitable — and one city in Africa is already demonstrating their transformative potential to the world.

Dakar's e-BRT Lights the Way

In 2025, Dakar, Senegal, commenced full operations for the region's first all-electric bus rapid transit (BRT) corridor. The 18-kilometer, 23-station, center-running BRT operates along the city's north-south axis with over 120 e-buses. The project's inception to implementation and launch took more than 20 years, beginning in 2002 when the U.S. development agency USAID provided funding for sustainable transport projects in Senegal, Ghana, and South Africa.

The Dakar region's transport authority, CETUD, first proposed a BRT system, drawing inspiration from Bogotá, Colombia's Transmilenio BRT and a 'South-South exchange' visit between the former mayor of Bogotá and Dakar. The then-President of Senegal, Abdoulaye Wade, and local decision-makers displayed a strong interest in facilitating a mobility transformation in Dakar with a BRT that better serves the rapidly growing population.

Throughout the initial planning processes and evaluations, e-buses emerged as a viable option for the BRT to reduce fuel imports and, crucially, address mounting air quality concerns. One hundred percent of Dakar's population was found to be exposed to harmful PM levels in the air, which exceeded the national limit. Road traffic pollution also accounted for nearly 7% of deaths in Dakar, resulting in estimated costs of more than USD $687 million.

Dakar, Senegal, and its transport authority CETUD (Executive Council for Sustainable Urban Transport) debuted its all-electric bus rapid transit (e-BRT) system in 2024. For this achievement, Dakar was recognized with the 2025 Sustainable Transport Award (STA). Since its launch, the e-BRT has been:

► Providing access to 180,000 additional jobs in socio-economically disadvantaged areas of the city.
► Helping to catalyze a restructuring of Dakar's public transport to serve nearly 720,000 passengers daily.
► Cutting passenger travel time in half, from 90 minutes to 45 minutes, end-to-end.
► Projected to reduce CO2 emissions by 59,000 tons per year and 1.8 million tons over 30 years.
► Projected to reduce local air pollutants by 20 tons of PM2.5, 117 tons of NOx, and 24 tons of SO2 annually.

Dakar's urban transport sector previously relied primarily on loosely regulated paratransit service providers. CETUD emphasized the need to formally incorporate these operators into the BRT network as feeder lines and to integrate the BRT with the city's existing commuter rail to ensure a cohesive citywide transport network. In 2017, the e-BRT project secured financing, leveraging a new business model that balances financial and operational risk across the national government, public investors (development banks), and the private sector.

Low-interest concession loans from the World Bank's International Development Association (IDA) and European Investment Bank covered the infrastructure (lanes, stations, depots); e-buses were purchased and operated by Meridiam, a private sector investor; and the IDA and national government supported land acquisition. Crucially, the IDA provided viability gap funding to cover the difference in capital costs between diesel and e-buses, successfully reducing some financial risk for the private sector.

Learning from Dakar

Since debuting in 2024, Dakar's e-BRT system has become a model for global cities to learn from. Three key takeaways from Dakar and CETUD's experience can help others streamline decision-making and ensure new e-BRT projects are implemented in shorter timeframes.

First, it is crucial to ***make the case for e-BRT***. While these systems deliver critical decarbonization benefits, this may not be the best or only entry point to make the case. Governments are increasingly concerned with air pollution while also focusing on economic growth and energy security. Framing e-BRT as a strategy to also improve outcomes in these areas can widen the base of support. In Dakar, mounting public health costs related to air pollution was a major factor in the decision to use e-buses.

It is also essential to ***consolidate negotiating and decision-making*** processes. Governments interested in pursuing e-BRT must have a clear understanding of financing and contract negotiation, including risk allocation and procurement. Working within a public-private partnership structure is complex, requiring collaboration amongst different stakeholders and a clear decision-making authority. It is beneficial to consolidate some of this responsibility at the national level, where capacity and resources are likely to be more robust.

Leveraging new business models is essential as well. Electrification as a climate strategy is gaining attention from climate investors and financiers, especially as renewable energy reaches market maturity. This opens the door for governments to evaluate different business models to deliver e-BRT and other bus projects, leveraging private investment where it had not been available before. Private investor Meridiam recognized the revenue potential in purchasing e-buses and operating Dakar's BRT, leveraging digital tools that enable transparency and accuracy in revenue generation.

"[The e-BRT's] fully electric vehicles, solar-powered bus stations, and smart systems align with global sustainability trends, making Dakar a green leader and model for Africa," said former Director General of CETUD, Dr. Thierno Birahim AW, when accepting the 2025 STA this year. "All these advancements enable us to offer a high-quality, efficient public transport alternative to private cars for everyone."

In Celebration of ITDP's Cycling Cities Campaign

ITDP's Cycling Cities campaign began in 2021 to make cycling a permanent, reliable, healthy, and safe transport option in cities around the world. 2025 marks Cycling Cities' final year, and ITDP is amazed by the many achievements of the campaign's 34 cohort cities, 53 pledge cities, and dozens of partners. This collective effort has inspired more people to take up cycling and more decision-makers to recognize its economic, social, and environmental impacts. Since 2021, the Cycling Cities cohort alone has:

- ► Built **2,000 kilometers** of cycle lanes, including **917 kilometers** of protected lanes
- ► Held **3,886 events** that were car-free or open streets
- ► Organized **1,076 classes** for cycling training or learning-to-ride

These impressive transformations have led to:

- ► **1.46 billion kilometers** traveled by bicycle on new protected cycle lanes
- ► **877 million** fewer vehicle kilometers traveled because of new protected cycle lanes
- ► **4.6 million** more people living near safe cycle lanes

ITDP itself began as a cycling advocacy group 40 years ago and we know cycling is still a very critical piece of the urban ecosystem. Cycling has now become part of high-level global development conversations and strategic policies related to climate change, public health, and economic prosperity. The forthcoming *UN Decade of Action for Sustainable Transport (2026–2035)* will no doubt be an important forum for all our partners to continue elevating the work of every 'cycling city'.

— Images from Campaign cities, clockwise from left: Jakarta, Indonesia; Pimpri-Chinchwad, India; Mexico City, Mexico; Addis Ababa, Ethiopia

— ITDP previously collaborated with teams at USAID to build capacity for public transport systems in cities like Dar es Salaam, Tanzania. Image: ITDP

What the Solar Sector Taught Me About Scaling Bus Electrification

By Monica Bansal, One Earth Partners

— Monica Bansal

Monica is co-founder of One Earth Partners, where she is now leading an effort to assess the global impacts of USAID's withdrawal from climate and environment programming and to chart a potential path forward. She previously spent fifteen years at USAID, where she directed major climate portfolios and established the agency's Green Cities Division, launching urban programs focused on transport decarbonization, renewable energy, and climate resilience.

Around 2010, solar module prices dropped 80 percent. This was a game-changer for the sector. In many countries, it opened the doors to massive new solar investment. But in other places — primarily low and middle-income countries (LMICs) — the drop in prices was not enough. Even with cheaper technology, the concerns were substantial: perceived political risks, financing challenges, and questions about technical reliability.

Around this time, I began my long tenure at USAID and saw firsthand that the plummeting cost of solar did not automatically reach emerging markets. Ministers of renewable energy still told me that solar was too expensive. Utility executives were worried about reliability. Investors feared they would not get paid back. The list of fears went on and on, despite the desperate need for cheap and clean electricity everywhere.

Then, in 2014, I began working on our first solar auction — a competitive process where governments or utilities announce how much power (in megawatts) they want built, and private developers win the contract by bidding the lowest price to deliver it (similar to an eBay auction, but in reverse). We specifically provided support to utilities and governments to plan for, design, and run their auctions, evaluate bids, and close deals. We had clear signs that, even when the economics for a technology solution looked good on paper, hands-on support was still essential to make it work in practice.

In South Africa, with a diverse array of technical support, multiple rounds of renewable energy auctions were conducted, which propelled solar prices to fall 80% from where they started. Over time, more auction programs were launched in LMICs through steady and collaborative technical assistance. The result was fairer access to cheap renewables, which was good for people, utilities, and national budgets.

A Similar Pattern is Playing Out with Electric Buses

This experience illustrates something crucial: even when technology gets cheaper, that is only half the battle. The real work is in helping countries actually utilize and deploy it. By 2030, Bloomberg New Energy Finance estimates that 65% of

— Investing in sustainable transport and e-buses is not just about the technology, but also the people and institutions behind it. Image: ITDP Mexico

total bus sales will be electric. However, as with solar, we know that adoption will not happen equally across countries. Growth will be slowest in some of the places where urban populations are growing fastest — and where air pollution is deadliest. Nearly 95% of air pollution deaths occur in LMICs.

Growth is slow for predictable reasons. Transport planning may not be robust or long-term. Institutions may not be well-resourced. Officials may not have experience in negotiating successful public-private partnerships. The result is that governments often do not have enough policy drivers in place to enable technology investment. We know that the economics of e-buses depend on many factors: specific route planning, charging infrastructure, or the efficiency of the overall transit system of which they are a part. It also depends on many political processes: government budgets, regional coordination (e.g., *can enough transit agencies pool their resources and buy buses together at a volume discount?*), and the relationships across diffuse informal transport operators.

The point is that the specific tactics matter. We cannot afford to lose technological opportunities because of human and institutional barriers. The solar auction example demonstrates that these barriers *can* be moved with the proper support: hands-on expert technical assistance that is embedded and delivered over time, backed by funding that is patient, risk-tolerant, and flexible. This allows partners to build the specific skills they need to better govern the transport sector in the long-term.

The Funding Landscape Has Changed

There is one dynamic that dramatically changes the story for transportation as compared to solar, and that is where we are now in the global funding landscape. Official Development Assistance (ODA) — the foreign aid that wealthy countries provide to support development — has been the foundation for international development work for decades. It has

— Progress in the solar sector can also offer lessons for the e-bus industry. Image: ITDP

often provided exactly the kind of necessary technical assistance and expertise that underpins infrastructure investments. But since 2023, and with the loss of over 90% of USAID's programming as of January 2025, the aid from the top 17 donor countries has fallen 23 percent. Even further cuts are expected over time, according to social impact consultancy SEEK Development.

In sectors like transport and energy, this loss could mean significantly less technical support to institutions and organizations trying to deliver equitable, affordable, clean, and safe mobility systems. As we look ahead, it is still unclear how the priorities or strategies of other funders may change to adapt to this volatile landscape. What we *do* know is that the multi-billion-dollar gap left by this loss of global development aid will not be filled wholesale. We also do not know exactly *how* this will cascade and impact future progress in LMICs — such as the scaling of more e-bus fleets — but it may very well mean that collective infrastructure and technology investments will face greater barriers.

What We Are Leaving On the Table

In USAID's final years, we expanded our support for sustainable transport projects, largely in partnership with ITDP. Our work in Mexico, Tanzania, and Kenya focused specifically on making infrastructure and technological innovation work on-the-ground. To do this, we needed partners like ITDP with a long-standing international presence and deep technical expertise.

The goal was to work with local governments on practical challenges — bringing informal transport operators into a formal system that could work better for everyone; improving the financial viability of bus rapid transit by strengthening broader transport networks; and creating new contract structures to improve cost efficiency in the public sector.

We saw an opportunity in the transport sector to make relatively small investments that would have system-wide payoffs. These modest investments are often catalytic — they can be the key to whether much larger infrastructure investments succeed or fail. The opportunity then remains for others looking to make patient and strategic investments that can punch far above their weight.

The solar sector example shows us what is possible when we invest not just in the technology itself, but in the people and institutions that make the technology actually work. The transport sector could be next — if we invest where it truly matters. E-buses are an increasingly viable transport solution. The question is whether funders, and ultimately governments and decision-makers, will provide the type of real support that cities need so that public transport systems can effectively serve the millions who rely on them the most.

Electrifying Ethiopia's Transport: How Financing and Policy Can Lead to Scale

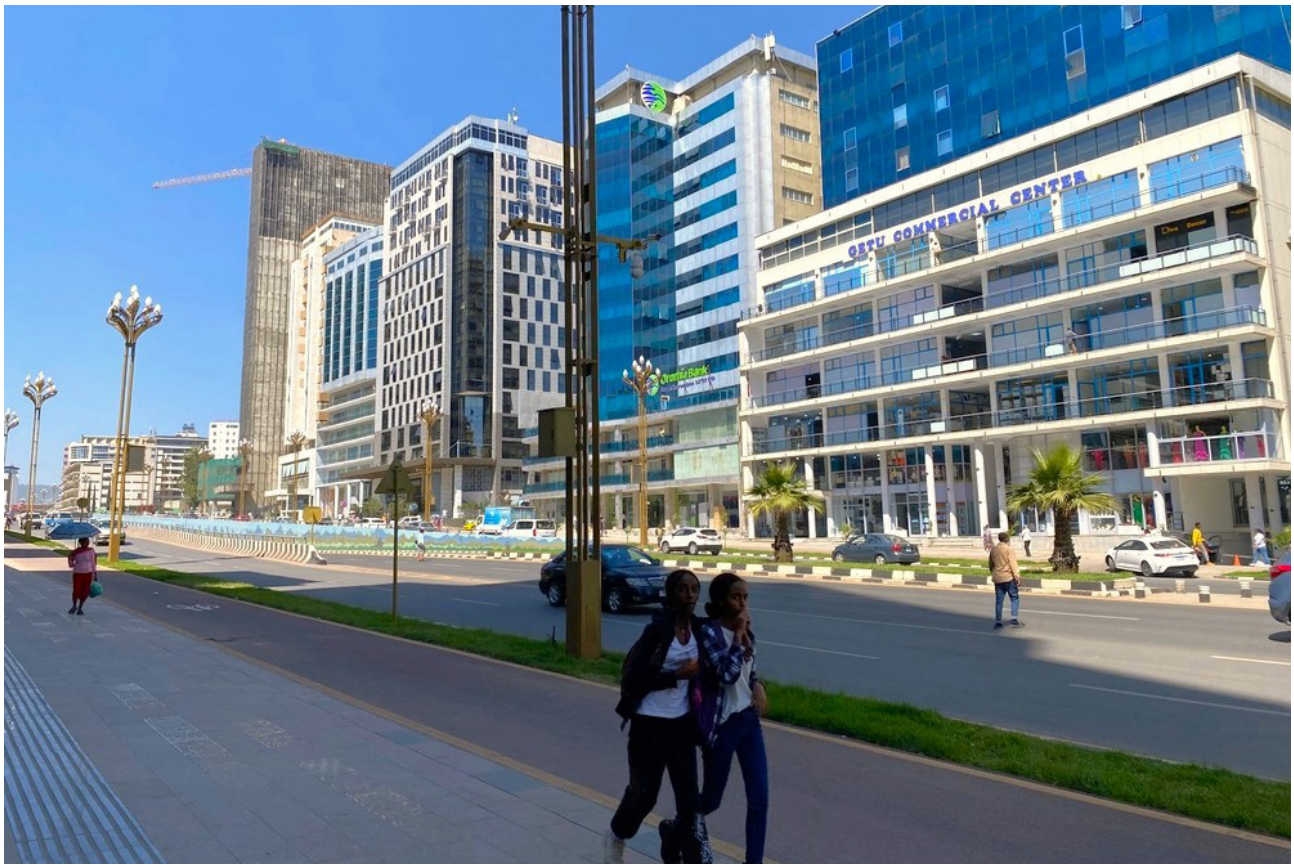
By Eng. Derrick Ogonji, ITDP Africa

— In Ethiopia's capital of Addis Ababa, e-buses are being piloted in the BRT system. Image: ITDP Africa

Ethiopia's streets tell a story of change. Rapid urbanization, rising motorization, and increasing congestion in cities have exacerbated air pollution, deepened dependence on fossil fuels, and restricted access to mobility. To better balance economic growth with environmental sustainability, the country's transport sector, as a major contributor to greenhouse gas emissions, needs urgent transformation. The electrification of public transport has become one of Ethiopia's most powerful strategies for achieving this.

By replacing diesel bus fleets with electric buses, the country can begin to reduce emissions, improve public health, cut costly fossil fuel imports, and strengthen economic resilience. Today, Addis Ababa operates Africa's largest e-bus fleet, positioning Ethiopia as a regional leader in the transition to clean mobility. The city's long-term strategy envisions the development of 15 bus rapid transit (BRT) corridors, complemented by electric feeder buses, to provide high-capacity and low-emission transport services across all major thoroughfares. This vision reflects deliberate national- and city-level actions bolstered by sustainable mobility policies, strong leadership, and strategic partnerships.

ITDP Africa continues to work closely with the national Ministry of Transport and Logistics (MoTL) and the Addis Ababa Transport Bureau (AATB) to design frameworks, business models, and operational strategies to sustain and scale electric public transport nationwide. These efforts align with ITDP's overall aim of increasing public transport ridership, fully electrifying systems, and securing financing at scale for such systems. Ethiopia's experience demonstrates how these strategies, when integrated into national mobility planning, can turn policy into real change.



— Fast-growing cities like Addis Ababa are in need of more infrastructure for walking, cycling, and transit. Image: ITDP Africa

A Milestone in Transport Policy

At the heart of Ethiopia's electrification progress lies one of the boldest national policies seen globally: a ban on importing internal combustion engine (ICE) vehicles. In January 2024, Ethiopia became the first country in the world to prohibit the importation of gasoline and diesel-powered cars. Initially applied to fully built ICE units, the ban was extended in 2025 to cover 'semi-knocked-down' and 'completely knocked-down' units (vehicles that are shipped in parts), helping close loopholes that allowed local assembly.

This moratorium on fossil-fueled vehicle imports was not just symbolic; it served to reorient the nation's transport sector entirely toward electric vehicles (EVs). The policy also aims to reduce foreign exchange pressure from costly fuel imports by harnessing Ethiopia's local energy sources. It further signals to manufacturers that the future lies in EVs and boosts long-term investor certainty that the policy environment will support clean mobility in the long run.

The results since 2024 have been dramatic. According to the Ministry of Transport and Logistics, national EV stocks tripled, rising from roughly 4,600 in early 2023 to over 14,000 by early 2025. In 2024, EVs accounted for more than 60% of new vehicle registrations, making Ethiopia one of the fastest-growing EV markets in the world. Updated forecasts by the Ministry now anticipate nearly 500,000 EVs on Ethiopia's roads by 2030.

Fiscal measures are further boosting this electric-forward approach. EVs are currently exempt from value-added tax, excise tax, and surtax, making them considerably more affordable to consumers. In addition, customs duties are structured to incentivize local assembly. Fully-built imported EVs are subject to a 15% customs duty, while 'semi-knocked down' units are taxed at 5% on average. Locally assembled EVs, on the other hand, are fully exempt from these duties, enabling job growth in the sector. Together, these measures have made electric mobility an increasingly attractive and viable choice for Ethiopian consumers and governments alike.

Investing in Electric Public Transport

Public transport, particularly e-buses, plays a pivotal role in Ethiopia's electrification journey. With over 110 e-buses in operation, Addis Ababa's public transport system is being significantly transformed. These e-buses serve key corridors, integrating seamlessly with a light rail system and conventional bus services. The growing electric fleet enhances the city's multimodal network, providing better access to dense neighborhoods and business districts. Commuters now experience shorter waiting times, quieter rides, and smoother

trips, while the reduction in emissions is a big step towards Ethiopia's climate targets. The development of bus charging depots, increasingly integrated with the country's renewable energy grid, demonstrates the feasibility of supporting clean buses with clean energy on a larger scale. These achievements thus far have positioned Ethiopia as a global model for e-bus deployment.

However, sustaining and scaling this transition will require more innovative financing mechanisms. So far, e-bus operations have been underpinned by government-led procurement, with the planned involvement of commercial banks and private investors. Yet, this design is not sustainable, given that e-buses cost three times more upfront than their diesel counterparts, and most vehicles and chargers are still imported, which leaves procurement vulnerable to market fluctuations. In addition, public transport fare revenue alone cannot cover operating costs and long-term debt obligations for operators.

ITDP Africa's research has helped underscore pathways for financing reform. For instance, leasing models that can enable financial institutions or asset companies to own e-buses and lease them to operators can spread the costs over time. Blended finance could combine concessional loans, climate finance, and commercial capital to reduce risks for local financiers. Public-private partnerships could unlock investment into charging depots, with utilities and private developers sharing costs and benefits. Instruments such as green bonds and climate funds are also tools to mobilize long-term capital while ensuring domestic ownership of the electric transition. If these models align with the government's ICE import policy and fiscal incentives, Ethiopia can shift towards a system where public funds help to further catalyze private capital.

In a bold move for sustainable mobility and energy security, Ethiopia became the first country to ban the import of gasoline and diesel-powered vehicles.

Recognizing the Barriers and Opportunities

Despite progress, several barriers remain. Procurement bottlenecks continue to hinder e-bus expansion, with lengthy contracting procedures and reliance on foreign suppliers causing delays. Operational challenges also persist. Local technicians lack training for advanced battery systems, spare parts remain scarce, and downtime risks affect reliability. Charging infrastructure is still limited, concentrated in a few depots.

Although Ethiopia's grid is predominantly renewable, constraints on reliability and distribution raise questions about future capacity. Financial risks compound these challenges — currency volatility inflates procurement costs, repayment streams remain uncertain, and Ethiopia lacks a dedicated national electric mobility fund. Institutional coordination between transport authorities, utilities, and financial institutions remains weak, slowing planning and investment. Addressing these gaps is crucial for scaling e-bus implementation beyond Addis Ababa.

Nonetheless, opportunities are also evident. In the short-term, Ethiopia can focus on mapping out fleet requirements in cities, streamlining procurement, developing charging hubs, and training more operators and technicians. In the medium-term, the priority will be to establish sustainable financing frameworks that attract the private capital needed to scale much larger e-bus fleets in Addis Ababa and secondary cities.

In the long-term, a sustainable urban future extends beyond buses. Ethiopia needs to focus on building out public transport that is also well-integrated with transit-oriented and non-motorized infrastructure and aligned with the commitments in the national *Climate Resilient Green Economy* strategy. The ICE import policy is a big first step for this strategy by making electrification a viable path forward.

Ethiopia's example demonstrates that policy, when combined with financing and innovation, can lead to real transformation. Addis Ababa's e-bus fleet shows us that African cities can lead the way in clean transport with the right mix of political will, institutional commitment, and resources. The ICE import policy has significantly reframed Ethiopia's trajectory, pushing both public and private stakeholders to commit to a more climate friendly and energy secure future.

Yet, policy alone cannot do all the work. Continued success will depend on more effective procurement reforms, layered financing models, and inclusive planning that strikes a balance between long-term affordability and sustainability for urban transport. If Ethiopia can maintain its trajectory, it will not only meet its climate and development goals, but also create a blueprint for cities across the continent.

— E-buses docked at a bus depot in Salvador, Brazil. Image: ITDP Brazil

The Moment to Electrify Brazil's Urban Buses is Now

By Clarisse Cunha Linke and Mariana Brito, ITDP Brazil

Transport electrification is no longer a distant vision around the world. It is the most mature technology available to replace polluting diesel vehicles, and electric buses are already transforming city streets in many countries. Latin America has a success story in Santiago, Chile, which today boasts the largest e-bus fleet in Latin America. Brazil cannot afford to fall behind. Buses remain the backbone of Brazil's urban mobility — and they are responsible for an alarming 69% of greenhouse gas (GHG) emissions in the transport sector.

— Passengers boarding an e-bus on the road in São Paolo, Brazil. Image: ITDP Brazil

With COP30 hosted by Brazil this year, decisive steps towards the electrification of public transport are needed to meet the country's climate and development goals. This is a defining moment for Brazil to make progress towards the targets it has set in the 2015 Paris Agreement to reduce national GHG emissions by up to 67% by 2035. With less than ten years until this deadline, policymakers must focus more closely on the importance of bus electrification.

A recent analysis by ITDP Brazil, conducted in partnership with the technology firm Scipopulis and supported by Brazil's Ministry of Cities, demonstrates that many cities across the country are primed to electrify thousands of public buses with minimal disruption. The study, *Accelerating the Transition: A Strategy to Electrify the Brazilian Bus Fleet by 2030,* was designed to guide the improvement of public policies for electrification across the country. It also serves as supporting evidence for Brazil's development and investment agencies, including the National Bank for Economic and Social Development (BNDES) and Caixa Econômica Federal (CEF).

The research revealed that more than 14,000 diesel buses across the country's 21 largest metropolitan regions could be replaced with electric models over the next five years. This means that bus electrification is not a long-term aspiration; it is a tangible goal that can be achieved in the near-term, offering substantial climate, economic, and social benefits for Brazil. The potential positive impacts are immense — from significant GHG reductions, to job creation in related industries, to improved public health.

The linkage between health and bus decarbonization is worth noting, as less polluted air in cities can reduce the risks of disease and death. According to the World Health Organization, air pollution was the leading cause of death in Brazil as recently as 2016. This pollution also disproportionately affects children, Black populations, and older people. For Brazil's cities, reducing pollution-related illnesses means lowering related health and environmental expenses. In fact, ITDP Brazil's research indicates possible savings of between R$54 million and R$62 million (USD $10-11 million) per year in the metropolitan regions studied.

The evidence is clear for both governments and individuals — bus electrification needs to be a priority. And it can, in fact, be implemented at scale in most of Brazil's large cities without increasing their fleet sizes, while also aligning the federal government with broader climate policies. Electrification can also benefit 41% of the population living in the regions analyzed by ITDP Brazil, while simultaneously upgrading half of the country's existing bus fleets. For these metropolitan areas, this also means reducing GHG emissions by an estimated 24.6% by 2030. The

— Cities like Rio de Janeiro have a large number of public buses ready to be transitioned to electric vehicles. Image: ITDP Brazil

large cities of São Paulo, Rio de Janeiro, and Belo Horizonte alone could deploy more than 5,000 e-buses over the next five years, setting the pace for transformation for the rest of the country.

The Ministry of Cities, recognizing this urgency and potential for electric mobility, first commissioned ITDP Brazil's analysis to determine how many buses could be feasibly transitioned in the short-term. The data from the findings will help guide transport and infrastructure investments under Brazil's major Growth Acceleration Program (PAC/REFROTA). This funding program, now offering more attractive interest rates and favorable repayment terms for cities to procure e-buses, demonstrates the government's commitment to sustainable, resilient transport systems. Brazilian cities themselves are further committing to financing e-buses in collaboration with their states and municipalities, preparing more financial mechanisms to support a rapid transition.

This is an opportune moment to transition away from the outdated, polluting, noisy, and uncomfortable bus fleets that millions of Brazilians rely on daily. E-buses will deliver quieter, cleaner, and more comfortable rides, improve commutes, and offer a mix of benefits that are urgent for a better quality of life. Beyond reducing GHG emissions, the adoption of e-buses can directly boost the economy, generate jobs in green industries, stimulate the electric vehicle market, and restore the prominence of Brazil's heavy vehicle manufacturing industry.

Strategically, bus electrification further strengthens the reliability of urban transport systems. Prioritizing e-buses on exclusive bus corridors maximizes their efficiency, ensures a longer lifespan, and magnifies the return on infrastructure investments. Congested, mixed-traffic operations squander the potential of clean fleets; dedicated lanes unlock it. With better service and more efficient operations, public transport will become increasingly attractive to a wider range of people that might otherwise opt for emission-heavy and costly vehicle trips.

Brazil is now in the position to become a leader in the electric revolution, particularly considering the high share of renewable resources and clean energy already in the national energy matrix. For e-buses, the technology is proven, the financial tools are growing, and the benefits to society and the economy are already clear. What is needed now is greater policy commitments and on-the-ground action on e-bus deployment across both the federal and local levels. This is a historic opportunity to transform the mobility, health, and climate outcomes for future generations of Brazilians.

Managing the Challenges of China's E-Bike Boom

By Qianqian Hu and Qiuyang Lu, ITDP China

— A renovated street in Guangzhou with dedicated lanes and storage for bikes and e-bikes. Image: ITDP China

In recent years, e-bikes have continued to experience explosive growth in cities across China, driven by the demand for affordable, sustainable, and flexible mobility. Yet this rapid rise has far outpaced the development of effective regulations or supporting infrastructure, leading to widespread challenges, especially in parking. Many municipal governments continue to grapple with how to confront these pressures with actionable policies. Against this backdrop, some major Chinese cities are beginning to take proactive steps. Lessons from Beijing and Guangzhou demonstrate how innovative and scalable strategies can be adopted to manage e-bike usage, particularly with storage, to complement public transport and sustainable mobility as a whole.

A New Parking Strategy for Beijing

Beijing, a city of over 20 million residents, is also home to more than 7 million e-bikes — and that number is growing by over a million every year. These e-bikes have become an essential mode of transport for daily commutes, connecting bus and metro routes, goods deliveries, and short-distance trips. However, their explosive growth has significantly outpaced the city's available parking infrastructure, particularly in areas around offices, transit stations, and shopping centers. This unique challenge has spurred the city to explore innovative solutions.

According to ITDP China's on-the-ground research, for example, a 200-meter road near a commercial transit hub in Beijing can have up to 400 two-wheeled vehicles parked. More than a third of them are e-bikes, and many others are just abandoned vehicles. Because of the lack of well-planned and clearly marked parking facilities, these vehicles are often left blocking sidewalks, cycling lanes, and other public areas, creating significant challenges for mobility and public spaces.

In response to the parking crisis, Beijing officials have implemented top-down solutions focused on maximizing existing spaces and creating new, dedicated storage facilities. These strategies are tailored to high-demand locations, aiming to strike a balance between efficiency and user convenience. For each area, officials conducted research into travel patterns and parking needs to identify the specific gap between supply and demand. This data-driven analysis was instrumental in informing a comprehensive e-bike action plan, which encompasses parking expansion, categorized parking guidance, and long-term management tools.

One of the strategies employed was the repurposing of existing urban spaces. Underutilized public areas — such as corner street plots, green spaces, car parking, and even spaces beneath overpasses — are now being converted into designated e-bike parking zones. To ensure these new facilities are used properly, directional signage to properly guide users is also being designed. Furthermore, during peak hours, residents and volunteers from community organizations provide on-site support to ensure orderly and safe use of these spaces.

At the same time, the city is also exploring technology-based solutions and opportunities for infrastructure improvements. Beijing's new approach to e-bike management can be seen in places like the Shahe Subway Station, which handles nearly 100,000 passenger trips daily. The city is not only repurposing unused space around the station for parking, but it is also testing geo-fencing technology for shared bikes and e-bikes to encourage riders to end their trips in designated parking areas. For personal e-bikes, facilities are further equipped with sheds, charging plugs, and fire protection.

In addition to managing almost 10,000 bikes and e-bikes parked at Shahe Station each day, a three-floor bike-specific parking garage is under construction. This facility will not only provide much needed storage but will also offer comprehensive services to riders, including stores, bike repair shops, and safe charging stations. The city is also developing a series of standards to define similar parking facility types with requirements for better planning, design, construction, fire protection, and maintenance. Beijing's strategies provide a broad framework for guiding the long-term management of e-bikes. It is also a testament to the city's commitment to improving oversight, charging infrastructure, and parking so that millions of residents can continue to ride safely and efficiently.

Better Parking and Charging Across Guangzhou

In 2024, citywide daily cycling trips in Guangzhou reached over 9 million — a nearly 9% year-on-year increase and the first time the figure has surpassed the local metro network's daily ridership. Citywide, registered e-bike ownership has exceeded 5.6 million, with the total vehicles in circulation estimated at over 6 million. This surge underscores two-wheelers' growing role for short trips and last-mile connections citywide.

The boom has, however, strained Guangzhou's street infrastructure. Metro stations, commercial centers, and office districts face chronic shortages of designated parking, resulting in sidewalk spillover, informal charging, and rising chaos in public spaces. In early 2025, the city prioritized e-bike governance with a three-pronged strategy to ensure riders have 'a path to *ride*, a place to *park*, and the power to *charge*'. Crucially, this strategy is complemented by a fast-growing non-motorized transport (NMT) street network that is also making curbside parking more feasible for e-bikes. Between 2022 and 2024, Guangzhou upgraded and connected cycling corridors to form 2,966 kilometers of NMT lanes, reaching an impressive 82% street coverage in six districts.

To understand how these spatial changes translate to day-to-day life, ITDP China carried out a multi-site field study focused on two high-demand typologies for e-bikes and NMT: metro station surroundings and central business districts. This exploration revealed interesting context-based approaches for managing Guangzhou's surge in e-bikes. One strategy focused on space reallocation and shared oversight around transit stations.

— Around Zhongda Station in Guangzhou, underutilized plazas were converted for e-bike storage. Image: ITDP China

At the busy Sanyuanli and Zhongda Stations, for instance, idle curbside and plaza pockets were converted into designated e-bike parking zones, integrated with the broader cycle lane network. These areas are supervised on-site by security or property staff for daily parking enforcement. In Zhujiang New Town, sidewalk extensions and pocket-park corners were adapted into linear parking bays with signage and soft separators, reducing conflicts with pedestrian routes.

The flexible use of 'gray space' was also innovative. At Chigang Station, previously unused under-bridge and underpass spaces were redesigned for e-bike parking. This relieves surface-level pressure and avoids e-bike clashes with pedestrians, particularly near hospitals and transit nodes. To better manage the parking order, paid pilots were also implemented. In especially dense areas like Xilang Station, the city is piloting fee-based, fenced parking in repurposed under-bridge spaces. Monitored by staff and priced modestly, these facilities deter long-term storage and reduce sidewalk overflow.

Guangzhou has also been focused on charging integration where possible. Select high-demand sites — such as a repurposed vehicle parking lot near Zhongda Station — include on-site charging points and cabinets that offer safe, dependable options to plug in. Citywide, however, the charging network remains in early development, with much charging still occurring informally or in residential compounds. These public pilots, however, offer a better path forward.

Together, these measures show Guangzhou's shift toward a contextual approach to e-bike management: rather than one uniform solution, each site is tailored to its own land use, demand profile, and street conditions. The city prioritizes on-site human supervision over technological controls, keeping operations cost-effective in a dense core. At the same time, expanded NMT lanes ensure riders can reach designated zones safely and quickly. These outcomes suggest that a megacity can effectively navigate e-bike growth by combining infrastructure provision with improved operations. This strategy — '*a path to ride, a place to park, and the power to charge*' — offers practical lessons for other cities.

Together, these parking-related e-bike challenges in Beijing and Guangzhou, along with their respective solutions, offer a roadmap for other areas also experiencing a surge in micromobility. Better oversight and regulations are crucial for harnessing the climate, economic, and social benefits of using e-bikes over private cars for urban trips. Both cities have moved beyond simple patchwork solutions by combining infrastructure demand with flexible, technology-informed strategies. Beijing's approach showcases top-down planning, while Guangzhou's highlights the value of localized interventions. They prove that effective, long-term e-bike management requires proactive and mindful planning to meet the diverse needs of all riders.

One Challenge, Five Startups, Better Public Transport for All

By Donita Jose, ITDP India

— Improving the public transport experience with technology was a primary goal of the T4A Challenge. Image: ITDP India

"Where is my bus?" Ask any Indian commuter and chances are they have asked this question before. The long waits and uncertainty often push people to simply give up and hail a rickshaw. Over time, what should be a city's most reliable service — public buses — can instead drive people towards private vehicles. This frustration is not unique to India, and innovation is needed to improve today's bus systems across the board.

History shows that significant challenges like this can often be solved by breaking them into more manageable parts. That is how 'hackathons' began in the 1990s — computer programmers fixing one glitch at a time until entire systems are improved. The lesson was simple: solve more minor problems first and the larger system benefits.

In April 2021, India embarked on a collaborative journey to solve issues with its urban bus systems. The Ministry of Housing and Urban Affairs (MoHUA) and the Smart Cities Mission launched the Transport4All (T4A) Challenge — India's first and largest digital transport challenge. Co-hosted by ITDP India, with support from the World Bank, Startup India, and CiX, the program ultimately brought together over 240,000 citizens, 130 cities, and 28 startups. This collective effort aimed to tackle a single mammoth problem, divided into seven clearly defined challenges. The outcome? Of the 10 pilot projects born from the Challenge, several are already helping to ease commuters' daily challenges through digital innovation.

The Concept and Challenge Design

The T4A Challenge used a dynamic, three-stage process to bring together cities, citizens, and startups to co-create solutions for public transport.

Stage 1: Identifying Problems

The first stage in 2021 involved a comprehensive assessment of the realities on-the-ground. Ninety-nine cities formed a T4A Task Force, a multi-stakeholder collective, to guide decision-making. This collective included city bus authorities, traffic police, metro rail operators, and non-government organizations (NGOs.) Since T4A was a digital innovation initiative driven by data at its core, a massive data collection exercise — the largest of its kind in India — was undertaken. Over 200 NGOs supported a city survey that involved more than 200,000 citizens, 17,000 bus drivers and conductors, and 25,000 informal public transport drivers. Their inputs helped shape eight core problem statements.

Stage 2: Solution Generation

With the problem statements defined, the Challenge shifted its focus to finding solutions by reaching out to startups in 2022. From over 160 applicants, 45 startups with 70 proposals were shortlisted to develop and refine digital solutions through mentoring and workshops. After another round of screening, the top ten winning startup solutions were selected. They each received a reward of up to ₹20 lakhs (around USD $22,000) per solution, along with the chance to proceed to the next stage of implementation.

Stage 3: Pilot Testing

This was where theory met practice. In 2023, the winning startups received pilot orders to engage with public bus operators for large-scale testing of their digital solutions. This stage was crucial for refining the solutions based on four mentorship rounds, in which the startups ironed out their selling points, business models, and prototypes. At the end of this stage, eventually, two problem statements were dropped due to a lack of robust solutions. Five startups ultimately took on the following six problem areas:

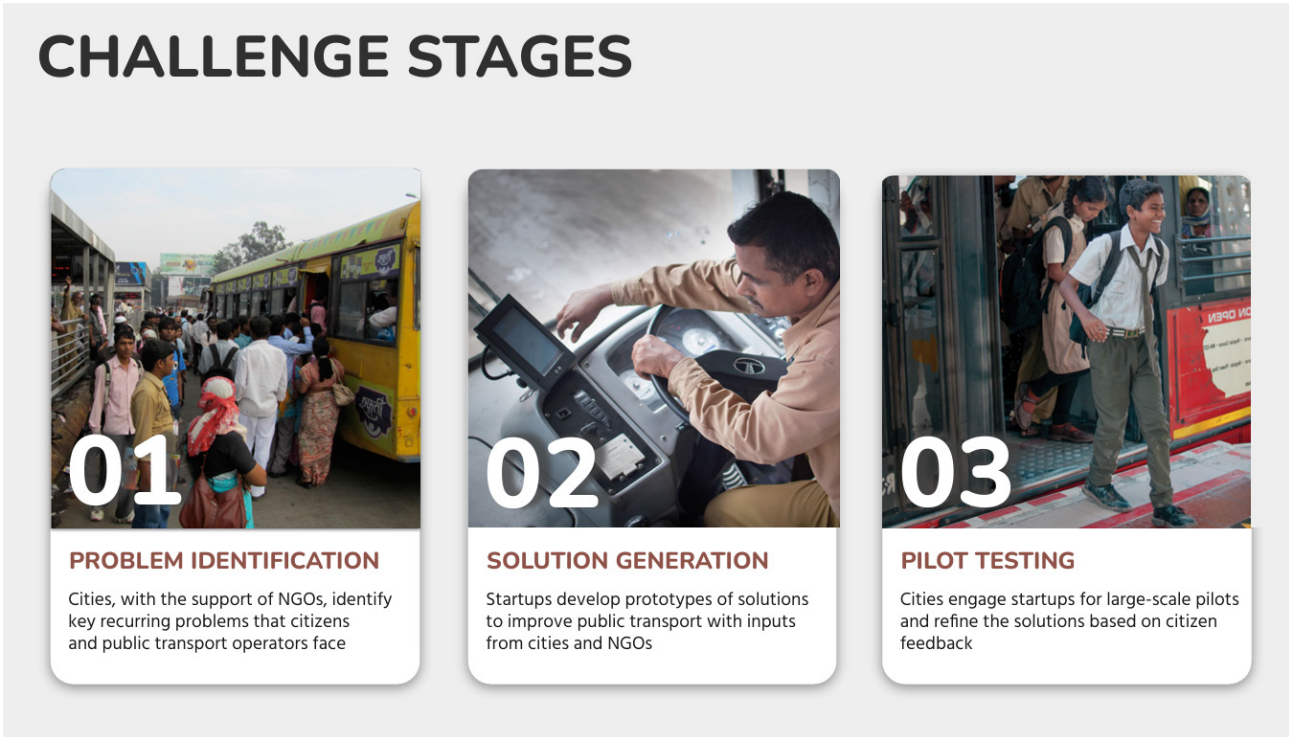
- ► Route Rationalization
- ► Network Digitalization
- ► Bus and Staff Scheduling
- ► Transit Performance Monitoring
- ► Passenger Information and Ticketing
- ► Bus Maintenance Scheduling

The Impacts and Innovations

Years of effort finally came to fruition when these five startups rolled out their ten pilot projects across six cities — Pune, Pimpri-Chinchwad, Mira Bhayandar, Belagavi, Kalyan-Dombivli, and Davanagere. Each pilot started with a simple question that needed to be answered.

Take bus route planning, for instance. In Pune and Pimpri-Chinchwad (two neighboring cities with one public bus operator) and Mira Bhayandar, bus operators asked: *"Why can't bus networks be viewed and planned digitally, instead of being scattered across paper files and Excel sheets?"* One startup, Anamar Technologies, digitized 1,100 routes in Pune and Pimpri-Chinchwad into General Transit Feed Specification (GTFS) formats, enabling multiple digital solutions for the bus operators at Pune Mahanagar Parivahan Mahamandal Limited (PMPML). Meanwhile, the startup Amiraj Wahan did the same in Mira Bhayandar for three routes. Now, staff can update routes in minutes, and passengers can see them directly on Google Maps.

There has also been an issue with planning staff and vehicle schedules dynamically based on passenger demand and traffic. Drivers and conductors have long asked: *"Why can't our shifts be planned reasonably and efficiently?"* In Belagavi, the startup Innoctive Technologies (CargoFL) introduced a scheduling tool



— The T4A Challenge followed a three-stage process for testing ideas. Image: ITDP India

that reduced scheduling time from 1,410 minutes to just 120 minutes. In addition to improving scheduling, it also saved up to ₹13 lakh (around USD $15,000) per depot annually, and increased vehicle utilization from 25 to 80 percent.

For many city bus operators, another frustration is: *"Why don't we have a dashboard to see how buses are performing?"* The startup, Vrishchik Technologies LLP, stated that in Davanagere, they created digital dashboards that can track operations with 95% accuracy and generate up to 30 actionable reports on various operational aspects.

Even bus maintenance was reimagined. Instead of waiting for breakdowns, bus operators asked: *"Why can't repairs be predicted and planned?"* QED Analyticals and ApnaWahan piloted predictive maintenance in Pune, using on-board devices and digital platforms. The result: repair turnaround times dropped by 50% from 3 hours to 1.5 hours, and overall costs fell by 16 percent.

And what about the passengers who often wonder: *"Why don't the buses go through the areas where people actually live and work?"* As cities grow, routes get outdated, which means some buses run nearly empty while others are overcrowded. The startup, Amiraj Wahan Pvt Ltd, helped three cities — Belagavi, Kalyan-Dombivli, and Mira Bhayandar — redesign their networks. In Kalyan-Dombivli alone, 84 routes were rationalized, expanding coverage from 280,000 to 720,000 people.

Lastly, one issue is persistent for many of India's modern bus users: *"Why can't bus information be at our fingertips, and why can't fares go cashless?"* In Pune and Mira Bhayandar, Anamar Technologies and Aloha Tech, respectively, launched mobile apps offering live arrival times, multimodal journey planning, and cashless ticketing.

Going Digital is Now Essential

T4A's four-year journey, culminating in these ten pilots across six cities, underscores the power of collective action. It shows what is possible when citizens ask the right questions, innovators create freely, mentors guide, and cities open their doors to change. Data and digital tools tied it all together. From dashboards that track fleet performance, to predictive systems that flag maintenance needs, to apps that display live bus information and tickets, these pilots have proven that technology and public transport can work together. They also sent a clear message to India's 100-plus bus operators: going digital is no longer optional, it is essential.

The next step is to ensure that these solutions do not remain short-lived pilots, but become part of daily operations. That means building the capacity within public bus operators and, just as importantly, investing in them for the long-term. Innovation needs funding to survive and scale. The T4A Challenge has shown us that it *is* attainable. Now it is about making it the norm so that bus riders across India will no longer need to ask themselves, *"Where is my bus?"*

— An e-bus on a BRT corridor in the city of Medan, Indonesia. Image: ITDP Indonesia

Turning Indonesia's Electric Bus Roadmap into Action

By Rifqi Khoirul Anam, ITDP Indonesia

Six years have passed since the Indonesian Government established a national commitment to promote battery electric vehicles (BEVs) through a Presidential Regulation. Since then, electric buses for public transport have been gradually adopted by cities across Indonesia. Starting with Jakarta in 2022, other cities such as Medan, Surabaya, and Pekanbaru have followed suit.

However, adoption remains limited: as of September 2025, only around 506 e-buses are in operation in urban fleets nationwide. While some progress has been made, the road toward large-scale, efficient, and sustainable bus electrification remains long. As one of the world's most populous countries, improving existing bus fleets with e-buses is essential for Indonesia's future economic, environmental, and urban development.

Jakarta, the pioneer in Indonesia's e-bus transition, has made many strides. Supported early on by ITDP Indonesia, e-bus trials began in 2019 and, by 2022, ITDP Indonesia was assisting the Transjakarta agency in monitoring and evaluating operations. That same year, the Jakarta Provincial Government committed to 100% electrification of its public transport fleet by 2030, as outlined in Governor Decree No. 1053/2022.

Early results of trials in Jakarta have been encouraging. By 2024, the operating costs per-kilometer for Transjakarta's e-buses were already 5% lower than those of conventional diesel fleets, confirming ITDP Indonesia's projections in 2022. Although the upfront investment is still higher, lower operating and maintenance costs make e-buses cheaper over time. With the same subsidy budget, Jakarta is now able to operate more e-buses while also extending services to many more users.

Building Out a National Roadmap

Leveraging Jakarta's momentum, ITDP Indonesia, with support from the regional climate foundation ViriyaENB, launched a multiyear project to assess urban bus electrification. The first year (2023–2024) focused on developing a national roadmap and incentive program. ITDP Indonesia analyzed 98 cities across the country, considering their readiness and urgency to have a properly electrified public transport system. Based on this analysis, 11 priority cities were identified as the most strategic places to advance electrification in the next few years.

The roadmap recommended that these 11 cities achieve 100% electrification of their public bus fleets by 2030. This would serve as a major stepping stone toward the broader national target of 90% urban transport electrification by 2030. The logic is straightforward: concentrating resources and policy support on priority cities first will create momentum, generate lessons, and lay the groundwork for wider replication. Bus electrification in these 11 cities can also effectively reduce greenhouse gas (GHG) emissions by 24% by 2030, equivalent to approximately 900,000 tons of CO_2, or the same as planting 3.6 million trees that grow for a decade.

The second year of the project investigated three other Indonesian cities: Surabaya, Pekanbaru, and Surakarta, testing ITDP Indonesia's roadmap at a local scale. Each city developed a more detailed electrification plan, assessing technical requirements, fiscal readiness, and policy gaps. The findings highlighted a stark contrast. Jakarta, supported by binding regulations, has a stronger legal foundation and a more explicit commitment to full electrification by 2030. Other cities, however, still face challenges like weak local regulations, limited fiscal capacity, and a lack of clarity regarding central government support. Considering these challenges, full electrification in places like Surabaya, Pekanbaru, and Surakarta may potentially be delayed over the next decade.

Barriers to Scaling E-Bus Progress

From these explorations, it is evident that what is holding

— Jakarta, the largest Indonesian city, is leading the way in e-bus deployment. Image: ITDP Indonesia

Indonesia back is not the absence of vision, but the lack of supporting structures for electrification. National targets remain voluntary and lack robust regulations. Local governments, meanwhile, struggle to find the fiscal capacity to purchase new fleets or invest in charging infrastructure. This gap in legal and financial certainty leaves many operators hesitant to transition.

Programs that were once intended to provide reliable central government support, such as operational funding for contracted bus services, have been reduced. This further leaves cities concerned about how to cover ongoing costs, even for traditional diesel buses. Above all, the challenge is one of coordination. The national government, local governments, and industry players are not yet moving in lockstep. Without more substantial alignment, cities are left to interpret and implement electrification on their own terms, which can slow down collective progress.

Action Items for 2030

The coming five years are decisive. To turn the electrification roadmap into reality, four broad areas of action will matter most:

Building a National Legal Backbone and Clear Targets: A clear and binding regulation is needed to provide industry players, cities, and operators with the confidence to establish electrification targets, define responsibilities, and ensure a smooth implementation process. These rules should be realistic, striking a balance between ambition and the varying levels of readiness across Indonesia's cities.

Creating Incentives and Support Mechanisms: Operators and cities will only act if the economics make sense. A structured mix of purchase support, concessional financing, and operational subsidies, adapted from the international practices, would create a stronger business case for adoption.

Strengthening Cities' Capacity and Ecosystem: Targets are not enough. Cities need training, technical tools, and regulatory templates to plan effectively. At the same time, a broader ecosystem must be built by linking operators, manufacturers, and regulators into a coherent framework.

Expanding Financing Options: Government subsidies will not be enough on their own. Over the next five years, Indonesia should explore green bonds, climate finance, and long-term contracts that give private operators the confidence to invest. Local government enterprises can also play a role in anchoring these new financial arrangements.

Indonesia is not starting from scratch. A national roadmap exists, lessons from local pilots are emerging, and awareness among cities is growing. What is missing is decisive national action to provide the legal foundation, incentives, and ecosystem support to match the country's ambition. The role of the Indonesian government is vital, as it involves setting consistent targets and providing fiscal and non-fiscal incentives for operators, manufacturers, and local officials so that e-buses are seen as viable long-term solutions. Without these actions, e-bus programs risk remaining expensive and unsustainable pilots, especially when most passengers simply want to prioritize reliable, high-quality service over vehicle technology.

The next five years will be a critical window. Four broad areas must be advanced in parallel: building a binding national regulation; creating substantial incentives for cities and operators; strengthening local capacity and planning; and expanding financing beyond subsidies. ITDP Indonesia's ongoing work will contribute to these priorities, as the focus moves to supporting the establishment of national legal anchors with the realistic targets needed for scale. If these elements are aligned, Indonesia can finally turn its scattered pilots into real action.

— Diego Monraz Villaseñor

In Conversation with Diego Monraz Villaseñor, Secretary of Transport for Jalisco, Mexico

By Bernardo Baranda, ITDP Mexico

— Station improvements have enhanced convenience, safety, and accessibility for more BRT users. Image: ITDP Mexico

In the metropolitan area of Guadalajara, *located in Mexico's State of Jalisco, the region's newest bus rapid transit (BRT) corridor, Mi Macro Periférico, officially launched in 2022. It has become one of the largest such systems in the country, providing more than 300,000 trips per day across 46 stations. ITDP Latin America Director Bernardo Baranda invited Diego Monraz Villaseñor, the state's Secretary of Transport, to discuss the decision to invest in BRT and what it can mean for other cities.*

Could you provide us with a general overview of the public transport situation in the State of Jalisco, specifically regarding urban buses and the number of people that use them?

In Jalisco, approximately 3.1 million trips are made daily on public transport, with nearly 1.8 million of these occurring in urban areas. Jalisco currently has the most modern bus fleet in the country, as just over 2,616 units were renewed at the end of the previous administration. This modernization process is ongoing during the current administration, with the first units delivered in the city of Lagos de Moreno and soon to be available in others like Ocotlán, Puerto Vallarta, and the Guadalajara metropolitan area. Thanks to this renewal, it was possible to reduce regional CO2 emissions by 20%, equivalent to 23,000 tons of CO2 emissions that will no longer be released into the air we breathe each year. Currently, in total, just over 5,000 public bus units are in operation every day throughout the state.

In Guadalajara, the Mi Macro system has been in operation for over 15 years and serves as a regional benchmark. Could you tell us more about the decision to expand it with additional lines?

The first corridor, Mi Macro Calzada, started in March 2009 as Jalisco's first BRT. It runs 16.6 kilometers along the major roads of Calzada Independencia and Gobernador Curiel Avenue, crossing the city from north to south and connecting the municipalities of Guadalajara and Tlaquepaque through 27 stations. It transports more than 150,000 passengers daily. In 2024, as part of a comprehensive renovation, 26 new bus units were added, increasing capacity by up to 18,000 additional users per day. The renovations also included upgrades to the stations, with new paint, signage, and automatic doors on the Mi Macro Calzada fleet.

Using the success of this system as a reference and addressing the need to modernize public transport along the city's major ring road, the Mi Macro Periférico system was inaugurated in 2022. It is the largest BRT currently in the country and, in its first three years of service, has provided just over 300 million trips, averaging 325,000 trips per day in the last year. It currently runs over 49 kilometers with 46 stations, connecting the municipalities of Guadalajara, Zapopan, Tlaquepaque, and Tonalá.

Both Mi Macro BRT corridors connect with Lines 1, 2, and 3 of the region's Mi Tren rail system. They will soon be directly linked to Line 4, giving residents of Tlajomulco a fast, sustainable, and affordable connection with the rest of the city. Its complementary and feeder lines, which cover dozens of neighborhoods, also allow residents of virtually the entire Guadalajara metropolitan area to transfer safely, quickly, and economically on

— Mi Macro is now one of the largest BRT systems in Latin America. Image: ITDP Mexico

public transport. This facilitates easier trips and reduces travel times by up to 20 percent. As an outstanding BRT project that guarantees better and more reliable service, while also generating economic benefits and positive environmental impacts, Mi Macro Periférico received a BRT Silver certification in 2024 awarded by the Technical and Institutional Committees of The BRT Standard.

What has been the impact of this expansion of Mi Macro in terms of access, equity, and the environment?

The impact is very tangible, as evident in the first 16 years of the whole system's service. We have facilitated over 507 million trips on Mi Macro Calzada and 300 million trips on Mi Macro Periférico, benefiting hundreds of thousands of people daily. In terms of equity, the Mi Macro systems allow all riders to get around, regardless of their condition or ability, as all stations in both systems have universally accessible designs and tactile guides, among other features. In the case of Mi Macro Periférico, 42 of the 46 stations have elevators and access ramps, while the remaining four also have access ramps at the street level.

Accessibility in the urban environment around Mi Macro Periférico stations has also been considered: bike lanes and side lanes (on the Periférico Ring Road) were built; safe crossings with inclusive bollards were implemented along dedicated sidewalk approaches; and medians and footpaths were re-landscaped. In addition, the new bus units circulating in the city comply with the Euro V standard for reducing air pollution, which means reducing CO2 emissions by up to 32% per year and eliminating other harmful polluting particles from the air we breathe.

Finally, in both Mi Macro systems, as in the rest of the Guadalajara area's public transport, it is possible to pay for tickets with the universal Mi Movilidad card that facilitates easy connectivity and transfers between the different systems. This makes Jalisco the only state in the country to have a unified fare payment method.

Why did you make decision to invest in BRT over other possibilities? What lessons could you share with other cities whose mobility departments are considering building BRT corridors?

BRT technologies and their derivatives have already proven to offer scalable, sustainable, flexible, fast, and safe mass transport solutions in Mexico and around the world. Additionally, their implementation costs are significantly lower than those of metro or train systems. While BRT systems are not infallible, they are a suitable alternative for large cities where demand supports their viability, minimizing the costs and infrastructure impact that constructing other transport systems would entail.

ITDP's Reading List

New resources, publications, and research from ITDP's teams around the world.

Scaling the Global Cycling Movement

This final campaign report shines a light on the achievements and progress of ITDP's Cycling Cities campaign and its global network of cities and institutional partners. Download at **ITDP.org/Publications**

From Challenges to Solutions: Building Inclusive Transport for People with Disabilities

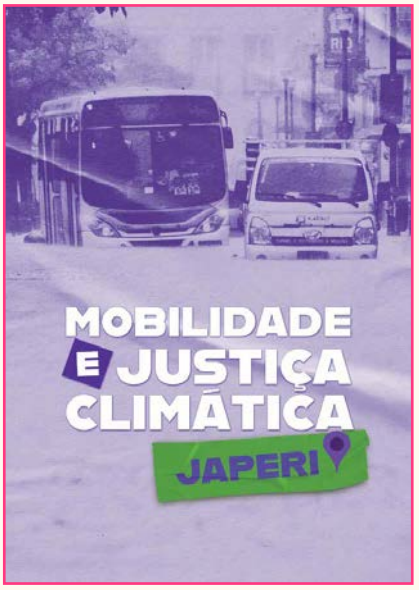
Developed with the Transforming Urban Mobility Initiative (TUMI), this paper discusses the comprehensive process of engaging the disability community to address barriers in urban transport. Download at **ITDP.org/Publications**

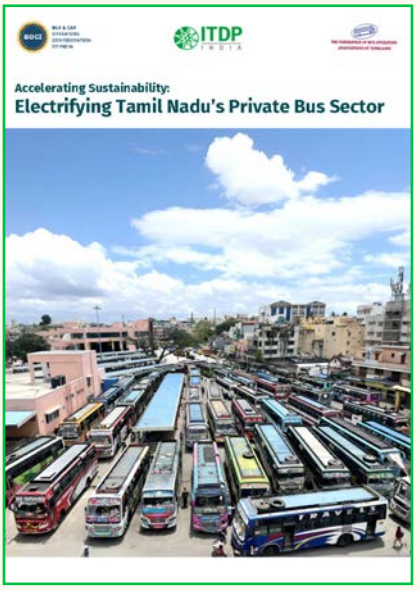
The Case for Cycling Infrastructure Investments

This joint release from ITDP and the World Bank introduces CyclingMAX, a cost-benefit analysis tool designed to help decision-makers evaluate investments in cycling infrastructure. Access at **ITDP.org/Publications**

Advancing E-Buses: A Guide to Batteries and Charging

This report provides an overview of e-bus technology options and key considerations for each, serving as a practical guide for governments and planners as e-bus deployment continues to grow. Access at **ITDP.org/Publications**





Addis Ababa Non-Motorized Transport (NMT) Implementation Plan 2024–2028

ITDP Africa is working with the Addis Ababa Transport Bureau on the final Implementation Plan of the city's broader 2019-2028 NMT Strategy for expanding walking, cycling, and public space infrastructure. Learn more at **Africa.ITDP.org**

Analysis for Improving Bicycle Lanes in Central Guangzhou

ITDP China conducted an in-depth analysis of cycling lanes in central districts of Guangzhou based on data collection and user feedback. The team's recommendations will help inform NMT guidelines for the city. Learn more at **ITDP.org**

Proposals for Mobility and Climate Justice in Rio de Janeiro

This series of reports from ITDP Brazil presents five proposals to improve urban mobility, address climate challenges, and promote climate justice in various neighborhoods across Rio de Janeiro. Read more **ITDPBrasil.org**

Reform Strategy Towards Public Transportation Electrification

ITDP Indonesia details roadmaps for electrification to guide the cities of Surabaya, Surakarta, and Pekanbaru as they seek to electrify their public bus fleets. Read the full report at **ITDP-Indonesia.org**

Accelerating Sustainability: Electrifying Tamil Nadu's Private Bus Sector

This ITDP India publication explores the electrification potential of the state of Tamil Nadu's private bus sector, which operates an estimated 8,500 buses across both urban and rural areas. Read the report at **ITDP.in**

The Use of Technology in Public Transport: Lessons and Opportunities in Mexico

This study from ITDP Mexico and the Inter-American Development Bank presents a detailed analysis of digitalization processes in four major Mexican cities, highlighting best practices and challenges. Access at **Mexico.ITDP.org**

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The Institute for Transportation and Development Policy (ITDP) is a global nonprofit at the forefront of transport innovation, providing technical expertise to accelerate the growth of sustainable mobility and urban development around the world. ITDP works to design and implement high-quality transport systems and policy solutions that make cities more livable, equitable, and sustainable for everyone. Through our projects, policy advocacy, and research publications, we aim to reduce carbon emissions, enhance social inclusion, and improve quality of life for people in cities.

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