UCLG ASPAC

United Cities and Local Governments
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Regional
Learning Note

# #3

# Sustainable Urban Mobility

Pathways toward Low-Carbon, Inclusive, and Resilient Cities in Asia and the Pacific.


Urban-Act
Integrated Urban Climate Action
for Low-Carbon & Resilient Cities


# Sustainable Urban Mobility

Pathways toward Low-Carbon, Inclusive, and Resilient Cities in Asia and the Pacific.

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# FOREWORD

Across Asia and the Pacific, cities are entering a decisive period in transforming urban mobility. Rapid urbanisation, climate change, population growth, and rising demand for access are reshaping how people move and how cities plan for the future. Mobility is no longer only about transport infrastructure; it is also about equity, resilience, public health, economic opportunity, and climate responsibility.

This Learning Note captures insights from the Learning and Pairing Session on Urban Mobility, held under the Urban-Act Project during the Tenth United Cities and Local Governments Asia-Pacific Congress in Goyang, Republic of Korea. Through peer learning and city-to-city exchange, local governments shared experiences on complete streets, electric bus systems, walkable districts, digital transit governance, and low-carbon mobility planning.

The cases documented here show that sustainable mobility requires more than technology. Electric vehicles, smart systems, and transport infrastructure must be supported by integrated planning, reliable public transport, inclusive street design, financing mechanisms, and public trust. The real transformation lies in building systems that allow people to move safely, affordably, and with dignity.

United Cities and Local Governments Asia-Pacific remains committed to supporting cities in this transition through knowledge exchange, decentralised cooperation, and capacity strengthening. As we move forward, the future of urban mobility must place people at the centre, creating cities that are cleaner, safer, more inclusive, and more liveable for generations to come.

**Dr Bernadia Irawati Tjandradewi**
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# INTRODUCTION

Cities across Asia and the Pacific are facing growing pressure to transform urban mobility. Rapid urbanisation, population growth, rising private vehicle ownership, and increasing climate risks are creating persistent challenges, particularly in intermediary cities where public transport systems often remain limited, fragmented, or poorly integrated. As a result, congestion, air pollution, greenhouse gas emissions, unequal access to services, and dependence on private vehicles continue to shape everyday mobility.

The Learning and Pairing Session on Urban Mobility was convened under the Urban-Act Project in the context of the Tenth United Cities and Local Governments Asia-Pacific Congress in Goyang, Republic of Korea. The session brought together local governments, technical experts, development partners, and peer cities to discuss how sustainable transport can support low-carbon, inclusive, and climate-resilient urban development. Discussions emphasised that mobility should not be treated only as a transport issue, but as part of city planning, climate action, public health, and social equity.



Learning Note #3

# BACKGROUND

## Urban Mobility for Low-Carbon and Inclusive Cities: Global Trends and Policy Context

Urban mobility is becoming one of the defining challenges of sustainable urban development. As cities expand, the movement of people and goods increasingly shapes whether urban growth becomes inclusive, productive, and low-carbon, or congested, unequal, and environmentally damaging. Urban areas already host more than half of the world's population, with this share projected to reach around 55 per cent by 2050. [1]Much of this growth will occur in developing regions, where intermediary cities, regional urban centres, and metropolitan areas are expanding faster than infrastructure, planning systems, and public transport networks can respond.

Although major metropolitan areas often dominate transport investment debates, rapidly growing cities outside megacity

[1]United Nations Human Settlements Programme. (2022). *World Cities Report 2022: Envisaging the Future of Cities.* United Nations Human Settlements Programme. Available at: *https://unhabitat.org/wcr/2022*

cores are becoming important mobility frontiers. Many serve as regional hubs connecting rural settlements, peri-urban areas, tourism destinations, industrial zones, and larger metropolitan regions. Yet they often grow with limited public transport coverage, fragmented land-use planning, and rising dependence on private vehicles, motorcycles, informal transport, and ride-hailing services. Without early intervention, these patterns can lock cities into congestion, high emissions, unsafe streets, and costly infrastructure retrofitting.

Transport is also central to the global climate agenda. According to the International Energy Agency, carbon dioxide emissions from cars and vans reached 3.8 gigatonnes in 2023, accounting for more than 60 per cent of road transport sector emissions[2]. This increase was partly driven by population growth and rising incomes in China, India, and Southeast Asia. These figures show that mobility systems are not only urban service systems, but also major determinants of climate outcomes.

## Environmental, Health, and Equity Implications

Unsustainable mobility systems carry serious environmental and social costs. Heavy reliance on private vehicles increases greenhouse gas emissions, worsens air pollution, consumes urban land, and deepens fossil fuel dependence. When urban growth is poorly coordinated with transport planning, it often creates long commutes, dispersed development, and higher travel demand, making it harder for residents to access jobs, schools, health facilities, markets, and public spaces.

[2] International Energy Agency. (2024). *Cars and Vans*. International Energy Agency. Available at: *https://www.iea.org/energy-system/transport/cars-and-vans*





Road safety is also a major concern. The World Health Organization reports that road traffic deaths remain at approximately 1.19 million per year, while road traffic injuries are the leading cause of death for children and young people aged 5 to 29 years[3] More than half of road traffic deaths involve pedestrians, cyclists, and motorcyclists, showing that unsafe mobility disproportionately affects vulnerable road users, especially in intermediary cities where these modes remain central to daily mobility.

Mobility inequality reflects broader urban inequality. When public transport is unreliable, unaffordable, unsafe, or inaccessible, low-income residents, women, older persons, persons with disabilities, children, and peripheral communities are most affected. Limited transport access restricts access to employment, education, health care, and civic life. Urban mobility is therefore not only about movement, but about the distribution of opportunity.

## Sustainable Urban Mobility as a Development Strategy

Sustainable urban mobility is a critical strategy for building low-carbon, inclusive, and resilient cities. It requires shifting from vehicle-centred planning to people-centred systems that prioritise access, safety, affordability, and environmental performance. This includes strengthening public transport, improving walking and cycling infrastructure, integrating land-use and transport planning, electrifying vehicle fleets where appropriate, and using digital systems to improve service quality.

For intermediary and rapidly growing cities, timing is crucial.

[3] World Health Organization. (2023). *Global Status Report on Road Safety 2023*. World Health Organization. Available at: *https://www.who.int/publications/i/item/9789240086456*

Many still have the chance to shape development before car dependence becomes deeply embedded. The Learning and Pairing Session emphasised that cities should plan growth around public transport, walking, and cycling before correction becomes costly and politically difficult. Reliable buses, safe pedestrian routes, cycling networks, feeder services, and first- and last-mile connections can deliver major improvements when adapted to local conditions.

Larger knowledge cities offer useful lessons on electrification, digital governance, fleet management, route optimisation, charging infrastructure, and carbon neutrality planning. However, these lessons must be adapted rather than copied. Electrification is increasingly important, especially for buses, taxis, and public fleets, but it must be supported by route design, service reliability, charging infrastructure, institutional capacity, financing, and integration with walking, cycling, and land-use planning.

## International Policy Frameworks

Sustainable mobility is strongly embedded in international development frameworks. The 2030 Agenda for Sustainable Development includes a specific transport target under Goal 11, calling for safe, affordable, accessible, and sustainable transport systems for all, improved road safety, and expanded public transport, particularly for people in vulnerable situations, women, children, persons with disabilities, and older persons. According to United Nations reporting on Goal 11, only 51.6 per cent of the world's urban population had convenient access to public transport, based on 2022 data from 1,507 cities in 126 countries[4].

[4] United Nations Department of Economic and Social Affairs. (2024). *Sustainable Development Goal 11: Make Cities and Human Settlements Inclusive, Safe, Resilient and Sustainable.* United Nations. Available at: *https://sdgs.un.org/goals/goal11*





The city practices documented in this Learning Note show how SDG 11 can be translated into concrete mobility actions. Walkable districts, shaded pedestrian routes, complete streets, feeder services, electric buses, and improved public transport routes all contribute to safer, more accessible, and more sustainable urban transport. Local governments enhance mobility and implement global goals at the city level through practical actions.

The Paris Agreement and the New Urban Agenda further reinforce the importance of transport transformation. Many national climate commitments now include electric mobility, public transport, fuel efficiency, and urban transport planning, while the New Urban Agenda promotes integrated planning, compact urban form, sustainable transport, and equitable access to services. For local governments, this means shifting from reactive transport management toward integrated mobility planning that links public transport, active mobility, land use, digital systems, and climate finance.

# CASE STUDY

## Greening first- and last-mile mobility towards an inclusive low-carbon city

**Antipolo City, Philippines**



### OVERVIEW

Antipolo City, located east of Metro Manila, is a rapidly growing urban centre that faces increasing pressure from urban expansion, transport demand, and environmental stress. Its position as a gateway city within the metropolitan region creates both opportunities and challenges: while it benefits from economic and population growth, it also experiences congestion, rising emissions, and pressure on public spaces. In response, the city has developed a project concept focused on greening first- and last-mile mobility as part of a broader





transition toward an inclusive low-carbon city.

The initiative aims to transform Antipolo's city centre into a more walkable, accessible, and environmentally responsive urban space. Rather than treating mobility only as a transport issue, the project links movement, public space, climate mitigation, and urban greening. It promotes active transport infrastructure, linear parks, greenways, and better integration of public transport routes to reduce dependence on private vehicles and improve the quality of everyday mobility.

A central component of the project is the development of a green and low-carbon mobility network. This includes the expansion of greenways through green-grey infrastructure, the preparation of a transport management plan, the identification of interconnected public transport green routes, and the establishment of electric vehicle charging stations for public transport. These interventions are intended to support cleaner mobility while also improving urban liveability, pedestrian comfort, and environmental quality.

The project also reflects Antipolo's ambition to create a replicable model for low-carbon urban development. The proposed funding requirement is estimated at around Philippine Peso 995 million, with counterpart funding identified at approximately Philippine Peso 495 million. Beyond infrastructure delivery, the project requires technical assistance, financing, institutional coordination, and behavioural change to ensure that sustainable mobility becomes embedded in city planning and transport practice.

## CHALLENGES

Antipolo City faces several challenges in implementing its low-carbon mobility agenda. Technical assistance is still needed to design active transport facilities and urban development guidelines for low-carbon centres. Financing also remains a major constraint, particularly for developing green mobility infrastructure at scale. In addition, the city must address institutional and behavioural barriers, including the need to mainstream sustainable transport practices and secure public acceptance of new mobility patterns.

## STRATEGIES

To address these challenges, the city has adopted several strategic approaches:

- Development of a linear park network to connect urban spaces and support walking, cycling, and access to green public areas.
- Expansion of greenways through green-grey infrastructure, combining ecological functions with urban mobility improvements.
- Preparation of a transport management plan to identify interlinked public transport routes and improve mobility integration.
- Establishment of electric vehicle charging stations to support cleaner public transport and low-emission mobility transition.





## LESSONS

Antipolo City's experience offers several lessons for cities seeking to integrate sustainable mobility with climate-responsive urban development:

- First- and last-mile mobility can become a strategic entry point for low-carbon transformation when linked with public transport and active mobility.
- Green-grey infrastructure strengthens both environmental performance and mobility quality, supporting cooling, accessibility, and urban liveability.
- Sustainable mobility requires more than infrastructure, including technical guidance, financing mechanisms, and supportive planning frameworks.
- Replication depends on institutional readiness, including stronger coordination among city departments, clear implementation roles, and engagement with transport operators, communities, and private-sector partners.
- Public acceptance is also critical, especially when mobility reforms require people to shift away from private vehicle dependence.

# Green walks and complete streets for safer and accessible mobility

**Baguio City, Philippines**

Baguio City, a compact mountain city in the northern Philippines, faces mobility challenges shaped by steep terrain, dense urban activity, tourism pressure, and increasing vehicle use. With a land area of 57.49 square kilometres and a population of 366,358 as of 2020, the city must manage growing transport demand within a limited and topographically constrained urban space. As of 2024, Baguio had 59,552 registered vehicles, adding pressure to roads, sidewalks, and public spaces already affected by congestion and competing mobility needs.





To address these challenges, the city introduced its Green Walks and Complete Streets initiative, which reimagines roads and sidewalks by prioritising people over vehicles. The initiative promotes safer, more accessible, and more inclusive mobility by improving pedestrian infrastructure, integrating bicycle lanes, and introducing planting strips and nature-based street design. Rather than treating streets as corridors for vehicles alone, Baguio's approach positions them as shared public spaces that support movement, health, culture, and environmental quality.

The Complete Streets design includes sidewalks, dedicated bicycle lanes, planters and planting strips, perforated concrete blocks, and bio-retention fixtures. These features encourage cycling as a low-carbon transport option, promote healthier lifestyles, and improve air quality. At the same time, planting strips function as natural buffers from pollution, while perforated concrete blocks and bio-retention fixtures support groundwater recharge and help preserve the city's water table.

Since 2022, seven major thoroughfares have been redesigned under the Complete Streets approach, with a total cost of approximately Philippine Peso 72,578,355.84, or around United States Dollar 1.2 million. The city also integrates creative place-making through street murals that transform ordinary walkways and waiting areas into expressions of culture and community pride. Future plans include the development of the Baguio City Integrated Terminal, expansion of complete street principles to barangays, commercial centres, and tourism corridors, and adoption of a mobility fee to discourage excessive private vehicle use in high-traffic areas.

## CHALLENGES

Despite progress, Baguio City continues to face structural challenges in transforming its mobility system. The city's mountainous terrain limits road expansion and complicates infrastructure planning. Tourism and population growth increase pressure on narrow roads and pedestrian spaces, while private vehicle use continues to contribute to congestion and air pollution. The city must also ensure that walking, cycling, and public transport improvements remain accessible, safe, and attractive enough to shift behaviour away from car dependence.

## STRATEGIES

To address these challenges, the city has adopted several strategic approaches:

- Implementation of Complete Streets principles to prioritise pedestrians, cyclists, and public transport users over private vehicles.
- Integration of green street features, including planting strips, planters, perforated concrete blocks, and bio-retention fixtures, to improve environmental performance and pedestrian comfort.
- Expansion of redesigned corridors, with seven major thoroughfares improved since 2022, supported by creative place-making such as murals and cultural street designs.





- Development of future mobility measures, including an integrated terminal, wider Green Walks expansion, and a mobility fee policy.

## LESSONS

Baguio City's experience offers several lessons for cities seeking to improve mobility in constrained urban environments:

- Complete Streets can transform roads into inclusive public spaces, improving safety, accessibility, and quality of life.
- Green street design strengthens both mobility and environmental performance, supporting cleaner air, groundwater recharge, and urban cooling.
- Low-carbon mobility requires behavioural and spatial change, not only new transport infrastructure.
- Place-making can improve public acceptance of street transformation, turning mobility corridors into spaces of cultural identity and community value.
- Demand management tools such as mobility fees can support the shift away from excessive private vehicle use when paired with better public transport and active mobility options.

# Clean mobility transformation through an electric bus and feeder system

**Chiang Mai, Thailand**

Chiang Mai, a major urban and cultural centre in northern Thailand, faces increasing mobility pressures linked to rapid urban expansion, limited formal public transport, congestion, air pollution, and rising greenhouse gas emissions. Despite its role as a regional hub, the city's mobility system has long depended on fragmented and informal transport modes, including songthaews, private vehicles, and motorcycles. This has contributed to inefficient movement, unequal access, and growing environmental concerns, particularly as the city also faces climate-related risks such as flooding and extreme heat.





To respond to these challenges, Chiang Mai is developing the Clean Mobility Transformation initiative through a pre-feasibility study for an electric bus network integrated with electric songthaew feeder services. The project aims to support the transition toward a low-carbon and climate-resilient transport system by combining formal electric bus services with existing local mobility patterns. Rather than replacing the city's transport ecosystem entirely, the approach seeks to modernise and integrate it, using electric buses for main corridors and electric feeder services to improve connectivity.

The initiative is aligned with the Office of Transport and Traffic Policy and Planning's 16-route network master plan for Chiang Mai, Thailand's national climate commitments, and broader sustainable development objectives. Chiang Mai Provincial Administrative Organisation has already allocated its own budget to commission Chiang Mai University to conduct a feasibility study for three electric bus routes, with one route already included in the provincial budget.

The project's scope includes route prioritisation, infrastructure assessment, service design, ridership and investment estimation, financial modelling, and stakeholder engagement. Key expected outcomes include reduced greenhouse gas and fine particulate matter emissions, improved access for vulnerable groups, stronger resilience to extreme weather, and enhanced local capacity to manage clean mobility. Long-term financing may involve loans from the Local Administrative Organisation Promotion Fund, while short-term operations may require subsidy support until ridership and service quality improve.

## CHALLENGES

Chiang Mai faces several challenges in advancing its clean mobility transformation. The existing transport system is fragmented, with informal and inefficient services that are difficult to integrate into a formal network. Infrastructure needs, including depots, parking facilities, charging stations, and feeder connections, require significant investment. The project must also address institutional capacity, financing constraints, and the challenge of increasing ridership to ensure long-term operational sustainability.

## STRATEGIES

To address these challenges, the city has adopted several strategic approaches:

- Conducting a pre-feasibility and feasibility study to assess priority routes, infrastructure needs, service models, and investment requirements.
- Integrating electric buses with electric songthaew feeder services to combine clean mobility with existing local transport practices.
- Aligning local planning with the 16-route network master plan, national climate commitments, and sustainable development goals.
- Developing financial models and subsidy mechanisms to support short-term operations and long-term service sustainability.





- Engaging stakeholders, including agencies, operators, communities, and academic institutions, to strengthen technical planning and institutional readiness.

## LESSONS

Chiang Mai's experience offers several lessons for cities seeking to modernise fragmented public transport systems:

- Clean mobility transformation should build on existing transport realities, rather than assuming that informal systems can be replaced immediately.
- Electric bus systems require integrated planning, including routes, depots, charging infrastructure, feeder services, and financial models.
- Local government commitment is critical, particularly when feasibility studies and early implementation are supported by local budgets.
- Operational sustainability depends on service quality and ridership growth, not only on vehicle electrification.
- Partnerships with academic institutions can strengthen technical planning, helping cities move from ambition to evidence-based implementation.

# Carbon neutrality and next-generation mobility for a low-carbon urban future

**Hamamatsu City, Japan**

Hamamatsu City, located in Shizuoka Prefecture, Japan, is advancing a long-term transition toward carbon neutrality by 2050. The city's approach reflects Japan's broader commitment to decarbonisation and recognises that urban mobility, energy systems, land use, and public behaviour must be addressed together to achieve meaningful emission reductions. Hamamatsu declared itself a Zero Carbon City in March 2020 and has since promoted public-private collaboration to support the realisation of a carbon-neutral society by 2050.





Within this wider climate agenda, mobility reform plays an important role. Hamamatsu has identified the weakness of its public transport system, the decline of bus services, and excessive dependence on private cars as major urban challenges. Public transport mode share has been reported as low, and the city has recognised that car-centred mobility can restrict access for residents who cannot drive, while also contributing to congestion, emissions, and uneven mobility access across districts.

The city's long-term vision promotes a next-generation transport system that aims to create a society where residents can move without relying excessively on private cars. Proposed measures include the introduction of a new light rail transit-based core transport system, regeneration of bus services, integration with mobility-as-a-service approaches, and development of more compact urban patterns around transport corridors. The vision includes targets for light rail transit route development, public transport ridership, and improvement of public transport mode share.

Hamamatsu also emphasises the reallocation of urban road space toward more people-centred mobility. In the central city area, the transport priority is being reframed from car dominance toward pedestrians, bicycles, public transport, and then automobiles. This includes widening sidewalks, developing bicycle lanes, improving cycling infrastructure, and creating safer and more comfortable urban spaces. The city's experience demonstrates how carbon neutrality can be connected not only with vehicle technology, but also with compact urban development, modal shift, and the redesign of public space.

## CHALLENGES

Hamamatsu faces several challenges in aligning mobility reform with carbon neutrality. The city has historically depended heavily on private cars, while bus services have experienced declining ridership, route reductions, and financial pressure. Transport inequality is also a concern, particularly for residents without access to private vehicles. Achieving carbon neutrality therefore requires not only technological change, but also public transport regeneration, behavioural change, and long-term investment in compact, transit-oriented urban development.

## STRATEGIES

To address these challenges, the city has adopted several strategic approaches:

- Advancing a 2050 carbon neutrality agenda through public-private collaboration and citywide decarbonisation policies.
- Promoting next-generation public transport, including a light rail transit-based core system and regeneration of bus services.
- Reallocating road space toward pedestrians, cyclists, and public transport users to create safer and more liveable urban areas.
- Supporting compact urban development around transport corridors to reduce car dependence and strengthen public transport viability.





- Encouraging electrification and energy transition, including the electrification of municipal vehicles where feasible.

## LESSONS

Hamamatsu City's experience offers several lessons for cities pursuing carbon-neutral mobility pathways:

- Carbon neutrality requires mobility reform, not only energy transition, particularly in cities with high dependence on private vehicles.
- Public transport regeneration is essential to ensure that decarbonisation does not deepen mobility inequality.
- People-centred road space design can support modal shift, improving safety, accessibility, and urban liveability.
- Long-term mobility planning must be linked with compact urban development, so that transport investment shapes land use rather than merely responding to it.
- Knowledge cities can provide transferable lessons, but their approaches must be adapted carefully to the institutional, fiscal, and spatial conditions of other cities.

# Shenzhen Bus Group (SBG): Urban Mobility Solutions – Bus System Assessment & Optimization in Padang and Medan

**Padang and Medan, Indonesia**

Padang and Medan are two Indonesian cities seeking to strengthen public transport performance while preparing for a transition toward low-carbon urban mobility. The two cities are at different stages of this transition: Padang continues to rely largely on conventional diesel buses, while Medan has already piloted battery-electric buses. These different starting points make the assessment valuable, as it allows practical comparison between existing bus operations and emerging electrification efforts within Indonesian urban contexts.

Under the Urban-Act Project, a consulting initiative was developed





to assess and optimise the bus systems in Padang and Medan by drawing lessons from Shenzhen's experience in large-scale bus electrification and digital transit governance. Shenzhen serves as a reference case because of its extensive public transport system, including large bus and taxi fleets, thousands of charging terminals, and advanced digital systems. The purpose of the exercise is not to replicate Shenzhen directly, but to identify lessons that can be adapted to the institutional, financial, and operational conditions of Padang and Medan.

The assessment focuses on diagnosing current public bus operations, reviewing legal and policy frameworks, and identifying barriers to low-carbon transition. It also benchmarks Shenzhen and other international practices to generate recommendations on technical, financial, and policy measures. The expected output is a phased action plan that can help both cities improve efficiency, strengthen passenger services, and prepare for future electrification.

The methodology includes field visits, focus group discussions with local authorities, operators, and stakeholders, online surveys, case study benchmarking, data analysis, and literature review. Based on these inputs, the recommendations focus on demand-based route design, fleet and infrastructure electrification, digital governance, passenger service innovation, institutional and technical capacity-building, and safety and risk management. The case therefore represents an assessment-oriented approach: building evidence and institutional readiness before large-scale investment.

## CHALLENGES

Padang and Medan face several challenges in improving their bus systems and preparing for low-carbon transition. Existing public transport operations need stronger route planning, service reliability, fleet management, and passenger-oriented design. Electrification also requires charging infrastructure, technical capacity, financing, and operational readiness. Institutional coordination among local governments, operators, and relevant agencies remains critical, particularly because bus system reform requires alignment between policy, finance, technology, and daily operations.

## STRATEGIES

To address these challenges, the project has adopted several strategic approaches:

- Assessing bus operations, policy frameworks, institutional barriers, and readiness for low-carbon transition.
- Using Shenzhen as a benchmark for bus electrification, charging infrastructure, fleet management, and digital governance.
- Engaging local authorities, operators, and stakeholders through field visits, FGDs, and online surveys.





- Developing phased roadmaps for route optimisation, electrification, service improvement, institutional strengthening, safety management, and pilot implementation.

## LESSONS

The experience of Padang and Medan offers several lessons for cities seeking to improve bus systems and prepare for low-carbon public transport:

- Low-carbon bus transition must begin with system assessment, not only vehicle procurement or electrification targets.
- International benchmarking is valuable when adapted to local realities, particularly in cities with different fiscal capacity, governance structures, and passenger demand.
- Digital governance can improve efficiency and accountability, but requires reliable data, trained personnel, and clear operational procedures.
- Electrification must be integrated with route design, infrastructure planning, financing, and institutional capacity-building.
- Pilot projects can serve as practical learning platforms, helping cities move from diagnosis to implementation while reducing technical and financial risks.

# Active transport and walkable heritage district for low-carbon mobility

**Tagbilaran City, Philippines**

Tagbilaran City, the capital of Bohol Province in the Philippines, is advancing a sustainable mobility initiative that links climate action, public health, and heritage revitalisation. The city faces increasing heat stress and transport-related emissions, making low-carbon mobility a practical and urgent development priority. Historical data show an average baseline temperature of 32 degrees Celsius, while a recorded peak in March 2023 reached 49 degrees Celsius. Climate projections indicate that the city may continue to experience high heat index levels, creating risks for public health, livelihoods, and urban resilience.

Transport is also one of the city's major sources of greenhouse gas emissions. Based on the city's greenhouse gas inventory, electricity accounts for 48,728.71 tonnes of carbon dioxide equivalent, while road transport contributes 40,304.96 tonnes of carbon dioxide equivalent. Because large-scale solar farms are not feasible due to limited land availability, the city has identified active transport—particularly walking and cycling—as one of the most practical and immediate strategies for reducing emissions and improving urban liveability.

The initiative focuses on transforming the city's heritage district into a safer, more walkable, and low-emission urban zone. Phase One prioritises active transportation in the heritage district, including the area from J. S. Torralba Street down to T. Butalid Drive and Franklin Street, up to J. A. Clarin and Carlos P. Garcia Avenue around the city's main plaza. The project aims to establish a car-free and walkable zone supported by shaded pathways and covered walkways to ensure pedestrian comfort in high-temperature conditions.

Phase Two envisions a regulated transit-connected downtown, where vehicle operations are more strictly managed, fossil-fuelled vehicles are controlled, and walking is supported by shaded routes and an efficient mass transport system. The expected outputs include lowering greenhouse gas emissions by 5 per cent in four years, increasing annual income by Philippine Peso 60 million, improving public health, strengthening climate resilience, and revitalising the heritage district as a more attractive destination for residents and visitors.

## CHALLENGES

Tagbilaran City faces several challenges in implementing its active transport and heritage district transformation. Residents remain strongly dependent on tricycles for short-distance mobility, while the heritage zone has narrow and congested streets that limit pedestrian comfort and safety. High temperatures also discourage walking, making shaded and climate-responsive street design essential. In addition, budgetary constraints present a significant challenge, with estimated costs ranging from Philippine Peso 80–120 million for Phase One and Philippine Peso 130–175 million for Phase Two.

## STRATEGIES

To address these challenges, the city has adopted several strategic approaches:

- Transforming the heritage district into a car-free and walkable zone to prioritise pedestrians and reduce fossil-fuelled vehicle activity.
- Developing shaded and covered walkways to improve walking comfort under extreme heat conditions.
- Regulating vehicle operations in the downtown area, especially near the heritage zone where walkability is prioritised and connecting active transport with future mass transport systems to reduce dependence on tricycles and private vehicles.





- Aligning local emissions reduction efforts with national climate commitments, including the city's target to reduce greenhouse gas emissions by 5 per cent.

## LESSONS

Tagbilaran City's experience offers several lessons for cities seeking to link sustainable mobility with climate resilience and heritage revitalisation:

- Active transport can become a practical emissions reduction strategy, particularly in cities where large-scale renewable energy options are constrained by land availability.
- Walkability must be designed for local climate conditions, especially where heat stress can discourage pedestrian movement.
- Heritage districts can serve as strategic entry points for low-carbon urban transformation, combining mobility reform, tourism development, and public space improvement.
- Regulating fossil-fuelled vehicles requires complementary alternatives, including shaded walking routes and integrated mass transport.
- Sustainable mobility can generate economic as well as environmental benefits, particularly when linked with tourism, public health, and urban revitalisation.

# Bacolod City Urban Greenway Network

**Bacolod City, Philippines**

Bacolod City, with a population of around 600,000 inhabitant and covering 169 sq. km, is proposing an **Urban Greenway Network** as a climate-resilient pathway for sustainable development and improving its GHG inventory as part of the Philippines' NDC commitments. At the learning and Pairing Event, Bacolod City presented the results of their discussions and expressed strong interest in learning from their Knowledge City in China Shenzhen City regarding **sustainable transport systems**.





**Key components:**

- Expansion of greenways and urban vegetation to enhance carbon sequestration
- Integration with the national public transport modernization program
- Introduction of electric buses (supported by Shenzhen partners)
- Benchmarking with cities already operating e-buses
- Infrastructure for cycling and walking to promote active mobility

**The Learning priorities include:**

- Operational strategies and systems planning for mass transport
- Public buy-in approaches
- Fleet management by government or service providers

## CHALLENGES

- Rapid urbanisation and population growth have increased pressure on transport infrastructure, public spaces, and the urban environment.
- Traffic congestion and dependence on motorized transport reduce mobility efficiency and contribute to emissions.
- Climate change impacts, including flood risks and environmental degradation along waterways.
- Limited connectivity of existing green spaces despite the presence of parks with high ecological value.
- Declining environmental quality and increasing carbon emissions associated with urban growth.
- Need to improve public health and quality of life.
- Economic competitiveness requires attractive urban environments
- Fragmented transport systems and limited multimodal integration.
- Limited financial resources for large-scale urban transformation.
- Complex implementation involving multiple stakeholders.





## STRATEGIES

- Develop a connected Urban Greenway Network linking key parts of the city through green corridors, pedestrian paths, and bicycle infrastructure.
- Establish dedicated bike lanes, pedestrian walkways, and a “15-Minute City” network to encourage active mobility and reduce reliance on private vehicles
- Rehabilitate the Catmon and Lupit Rivers through riverbank restoration, linear parks, flood-resilient landscaping, bioswales, and permeable pavements (“blue-green infrastructure”).
- Connect existing parks (e.g., Capitol Park and Lagoon, Panaad Park) with new green corridors and develop additional pocket parks and community spaces.
- Expand tree planting, eco-parks, streetscape improvements, and green corridors to increase carbon sequestration and improve air quality.
- Create safe, attractive public spaces for walking, jogging, cycling, recreation, and community interaction.
- Integrate greenways with commercial and mixed-use districts, transit hubs, tourism areas, and urban renewal initiatives.

- Link greenways with existing and future public transport systems through Transit-Oriented Development (TOD) and proposed multimodal transport hubs.
- Mobilize public-private partnerships (PPP), national government grants, and international development financing.
- Establish strong governance led by the City Planning and Development Office (CPDO), implement the project in phases, and develop long-term maintenance partnerships.

**LESSONS**

- Urban mobility planning should integrate transport, green infrastructure, and land use planning rather than treating them as separate sectors.
- Investing in active mobility improves accessibility, reduces congestion, and contributes to climate mitigation and healthier lifestyles.
- Nature-based solutions (NbS) provide multiple co-benefits by combining flood management, biodiversity conservation, urban cooling, and recreational spaces.





- A network of connected green spaces delivers greater environmental and social benefits than isolated parks.
- Urban green infrastructure should be recognized as an important component of climate mitigation and resilience planning.
- Greenways serve not only transport functions but also improve public health, social cohesion, and community well-being.
- Climate-resilient urban investments can also stimulate economic development, tourism, property value appreciation, and job creation.
- Sustainable mobility requires integration between walking, cycling, and public transport, rather than stand-alone transport projects.
- Successful climate infrastructure requires diversified financing mechanisms rather than reliance on municipal budgets alone.
- Long-term success depends on multi-stakeholder governance, phased implementation, and sustainable maintenance arrangements.

# KEY LESSONS

Across the city experiences, sustainable urban mobility is most effective when treated as part of urban planning, climate action, public service delivery, and social inclusion. The cases show that mobility transformation depends on combining public transport, active mobility, low-carbon technology, financing, institutional coordination, and behavioural change.

### Streets should be designed for people, not only vehicles

Complete streets, shaded walkways, bicycle lanes, pedestrian zones, and safer crossings can improve access, safety, public health, and urban liveability. Cities should therefore move beyond road expansion and prioritise pedestrians, cyclists, public transport users, older persons, children, persons with disabilities, and other vulnerable groups.

### Public transport, active mobility, and land use must be integrated

Reliable buses, feeder services, walkable districts, cycling networks, and first- and last-mile connections deliver stronger results when linked with land-use planning and urban development. Intermediary cities should plan mobility early so that growth is shaped around access, rather than corrected later after congestion and car dependence become entrenched.





### Electrification requires system readiness

Electric buses, taxis, and public fleets can reduce emissions, but electrification alone is not enough. Cities need route planning, charging infrastructure, depots, maintenance systems, fleet management, financing models, service reliability, and institutional capacity to make electric mobility operationally and financially sustainable.

### Data and digital governance improve mobility performance

Passenger surveys, route assessment, fleet monitoring, traffic management, and public transport management systems can help cities diagnose problems and design services based on actual demand. However, digital tools only work when cities have trained personnel, reliable data systems, clear institutional responsibilities, and the capacity to use data for decision-making.

### Financing, public acceptance, and peer learning determine scale

Sustainable mobility projects require investment-ready plans, including clear project scope, cost estimates, financing options, implementation roles, and maintenance arrangements. Public acceptance is equally important, as residents will only shift to walking, cycling, public transport, or regulated mobility systems when these options are safe, affordable, reliable, and convenient. Peer learning helps cities adapt tested approaches to their own fiscal, institutional, and spatial contexts rather than copying models directly.

# THE WAY AHEAD

The next chapter of sustainable urban mobility in Asia and the Pacific will not be defined by vehicle technology alone, nor by isolated investments in buses, terminals, charging stations, or digital systems. It will depend on how cities organise movement, access, space, and responsibility. Mobility is no longer only about reducing congestion or improving transport operations; it is about reshaping the relationship between people, streets, public services, and the urban environment. The future calls for mobility systems that are cleaner, safer, more inclusive, and more responsive to the everyday needs of communities.

Cities will increasingly need to move beyond fragmented transport interventions and design integrated mobility ecosystems. Public transport, walking, cycling, feeder services, electric mobility, smart traffic management, and public space improvements should operate as connected parts of a wider low-carbon urban development strategy. This requires planners to move away from vehicle-centred logic and adopt people-centred mobility frameworks that prioritise access, safety, affordability, and liveability. In this model, mobility success is measured not only by speed or ridership, but by how effectively it connects residents to jobs, education, health care, cultural spaces, and social life.

As climate pressures intensify, low-carbon mobility will become a central pillar of urban climate action. Electrification will remain important, particularly for buses, public fleets, taxis, and feeder systems. However, it cannot substitute for comprehensive transport reform. Cities must ensure that electric mobility is supported by reliable routes, charging infrastructure, maintenance capacity, operational





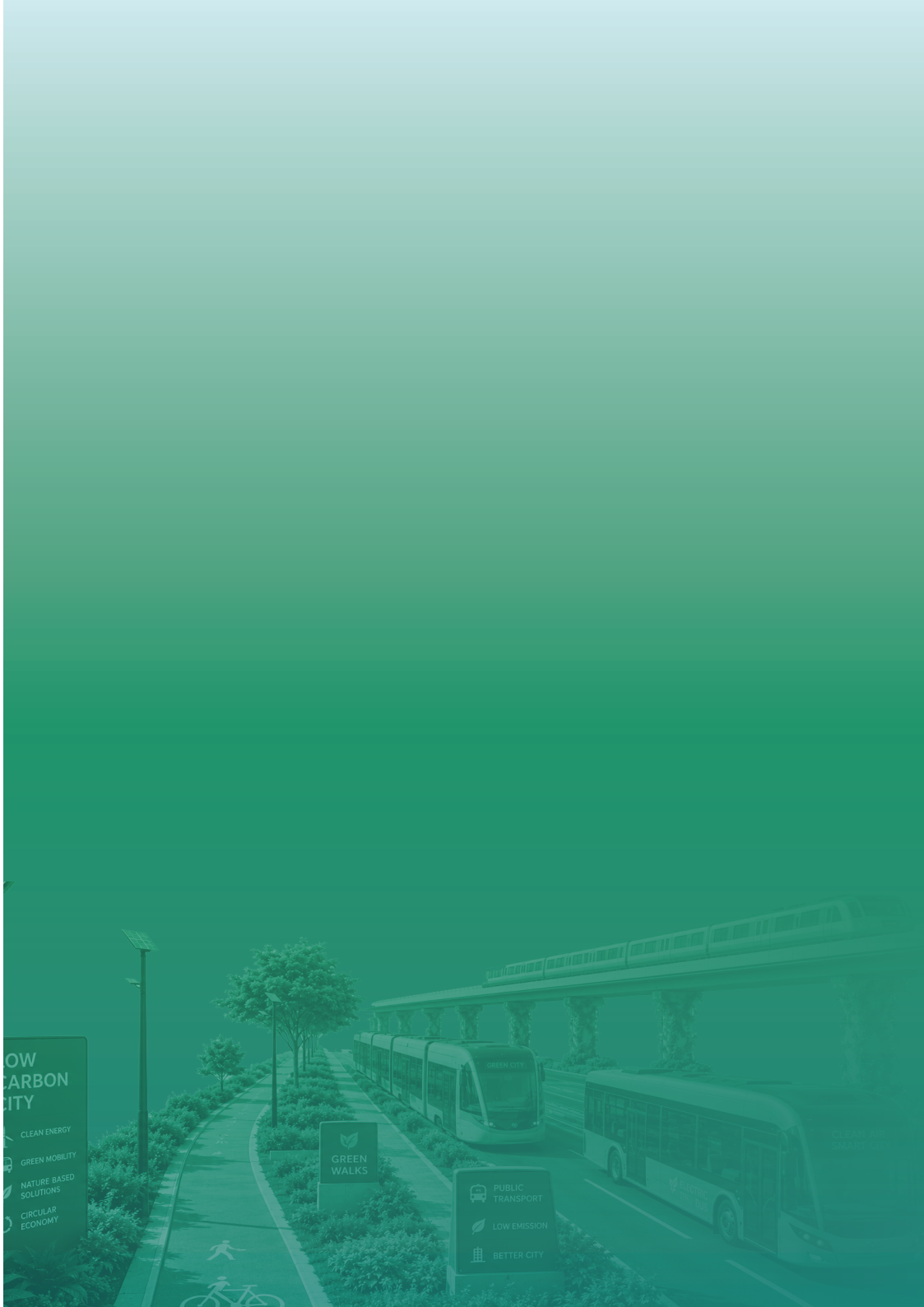
financing, and sufficient passenger demand. Active mobility must also be recognised as essential infrastructure. Walking and cycling networks, shaded pathways, complete streets, safe crossings, and pedestrian-priority zones can reduce emissions, improve public health, support local economies, and restore streets as shared urban spaces.

Financing will become decisive in determining whether sustainable mobility ambitions can move from concept to implementation. Many cities already have promising project ideas, but not all have investment-ready plans. An investment-ready mobility plan should include a clear project scope, priority corridors or service areas, demand estimates, preliminary technical design, cost projections, financing options, institutional responsibilities, risk assessment, and expected social, environmental, and economic benefits. It should also show how the intervention will be operated and maintained over time. This level of preparation helps financiers and partners assess whether a mobility proposal is feasible, bankable, and aligned with wider urban development priorities.

The human dimension must remain at the centre of mobility transformation. A technically advanced transport system that excludes vulnerable groups or fails to respond to everyday travel behaviour cannot be considered sustainable. Women, children, older persons, persons with disabilities, low-income communities, pedestrians, cyclists, and informal transport users must be recognised as central stakeholders in mobility planning. Public acceptance will depend on whether reforms improve comfort, safety, affordability, and reliability. Behavioural change cannot be expected from residents without providing better alternatives.

Knowledge and cooperation will also shape the pace of transition. Peer learning, city pairing, and technical exchange allow cities to learn from tested practices while avoiding costly mistakes. Larger knowledge cities can offer useful lessons on electrification, digital transit governance, route optimisation, and carbon neutrality, but these lessons must be adapted to local realities. Replication without contextualisation is unlikely to succeed. The stronger approach is adaptive learning: identifying what works, understanding why it works, and reshaping it to fit local geography, fiscal capacity, institutions, and mobility culture.

Ultimately, the way ahead is about designing mobility systems that serve people before vehicles. The sustainable city of the future will not be the one with the most advanced transport technology, but the one that can organise movement in ways that are equitable, low-carbon, financially viable, and socially trusted. For intermediary and rapidly growing cities, the opportunity is still open. By planning early, prioritising public transport and active mobility, preparing investment-ready mobility plans, and placing people at the centre of mobility reform, cities across Asia and the Pacific can avoid the lock-in of car dependency and build urban futures that are cleaner, safer, more inclusive, and more resilient.



Regional Learning Note

#3

# Sustainable Urban Mobility

Pathways toward Low-Carbon, Inclusive, and Resilient Cities in Asia and the Pacific.

Urban-Act
Integrated Urban Climate Action for Low-Carbon & Resilient Cities

UCLG ASPAC
United Cities and Local Governments Asia-Pacific

Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety
IKI International Climate Initiative
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
ESCAP
UCLG ASPAC United Cities and Local Governments Asia-Pacific
tu dortmund university
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