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Arab Urban Development Inst.

Sustainable Urban Mobility in Arab Cities

Innovative Practices and Solutions

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About the Arab Urban Development Institute (AUDI), a regional, non-governmental, and non-profit organization, established in 1980 by the Permanent Bureau of the Arab Towns Organization, with its headquarters in Riyadh, Saudi Arabia. AUDI is the first Arab institution specializing in urban development and municipal support. It has over 650 member cities across 22 countries and focuses on research and studies in urban policies, capacity development and training, and networking in the fields of urban development and municipal affairs.

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The project aims to enhance greening efforts and initiatives through experimentation and knowledge development related to participatory solutions and models in this field. This report is primarily based on projects published on the AUDI's Arab Urban Development Portal; a platform supported by the project to document and share data related to urban development in the Arab region. The report also reflects the Institute's commitment to employing evidence-based approaches to achieve sustainable urban development. It examines the contribution of mobility initiatives to promoting sustainable development by reviewing regional and international experiences. Furthermore, the report identifies their environmental, social, economic, and institutional impacts. Finally, it draws practical lessons and identifies key trends that encourage the development of more flexible, inclusive, and effective sustainable urban mobility strategies.

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AUDI'S MESSAGE

Dr. Anas Almughairy
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Urban mobility is a cornerstone of cities' capacity to achieve sustainable development. It extends beyond simply providing mobility, as it is closely connected to economic efficiency, environmental quality, and residents' access to employment, services, and activities. As cities and populations grow rapidly and dependence on private vehicles increases, Arab cities face mounting challenges, including congestion, pollution, declining public-space quality, limited accessibility, and insufficient integration between different modes of transport.

In line with the Arab Urban Development Institute's (AUDI) role in supporting Arab cities, this report examines ongoing transformations in the urban mobility sector and explores opportunities to develop systems that are more sustainable, resilient, and inclusive. It draws on a comparative analysis of leading international experiences and practices, complemented by a review of 60 urban mobility projects across Arab cities, to identify emerging trends, highlight existing gaps, and derive lessons adaptable to local contexts.

This report shows that Arab cities have made significant progress in increasing public transport networks, aligning mobility projects with national visions and strategies, and integrating environmental considerations into a series of initiatives. However, more efforts are necessary to create actual integrated urban mobility systems, particularly in the field of transport integration, active mobility, smart mobility, community participation, institutional coordination, and sustainable financing. The report also underscores the importance of moving beyond an infrastructure-focused strategy toward a more inclusive model of urban planning that places people and their needs at the heart of the planning process.

From this perspective, the report emphasizes that the future of urban mobility in Arab cities cannot be shaped by a single solution or mode of transport. Rather, it requires the development of integrated systems that combine public transport, active mobility, smart solutions, multimodal hubs, and shared mobility, while reflecting the climatic, cultural, and social characteristics of each city. The success of such systems also depends on more integrated governance, effective partnerships among government entities, the private sector, and the community, as well as more effective use of data and modern technologies in planning and decision-making.

The report offers framework based on three interrelated dimensions, which are governance, public participation, and inclusivity; environmental sustainability and resilience; and economic development. Together, these dimensions provide a balanced vision for urban mobility that advances equity and accessibility, minimizes environmental impacts, strengthens local economies, and opens new opportunities for development.

AUDI adhere to advancing knowledge and sharing expertise that enable Arab cities making use of best practices and develop solutions to the specific challenges related to city's context. Sustainable urban mobility is not merely an investment in transportation infrastructure; it is an investment in the future of cities and the quality of life. Through cooperation, Arab cities can move beyond simply addressing mobility challenges toward establishing new frameworks that facilitate accessibility, place residents at the heart of urban development, and create a more sustainable future.

Finally, AUDI extends its appreciation to the Arab Fund for Economic and Social Development for its invaluable support in producing this report, which forms part of a series of publications under the project (Supporting Green Activities in Selected Arab Cities), in addition to the team involved in preparing this report, experts, researchers, and organizations whose vital contribution enriched its content and contributed to the successful completion.

EXECUTIVE SUMMARY

Arab cities are undergoing rapid transformation driven by population growth, urban expansion, and increasing environmental pressures. Despite significant investments in transport infrastructure, urban mobility systems continue to face structural challenges that affect their efficiency and sustainability, including traffic congestion, deteriorating air quality, limited accessibility, and increasing social and economic costs of mobility.

This report examines innovative approaches in sustainable urban mobility through a comparative analysis of global best practices and a comprehensive assessment of 60 urban mobility projects implemented across Arab cities. The study applies a multidimensional analytical framework covering governance and public participation, environmental sustainability and resilience, economic development, social equity, and innovation. Global case studies are used as benchmarks to identify gaps, assess opportunities, and provide deeper insights into the factors shaping project success and long-term impact.

The analysis demonstrates that the main challenge facing Arab cities is not a lack of solutions or investments, but rather a gap in integration between different components of the urban mobility system. While major infrastructure projects continue to expand, their impact is often constrained by weak integration with other transport modes and fragmented governance structures. Investments remain largely concentrated in capital-intensive projects, while lower-cost solutions, such as active mobility, pedestrian accessibility, and last-mile connectivity, remain comparatively limited. Furthermore, social equity and economic inclusion are not yet systematically embedded within mobility planning, highlighting the need for more integrated approaches that connect policy, financing, and implementation.

The assessment shows that Arab cities are increasingly investing in large-scale public transport systems and developing strategic mobility frameworks aligned with national visions and development agendas. Environmental considerations, particularly energy efficiency and climate adaptation, are gaining greater attention, while social inclusion, affordability, and economic linkages between mobility and employment remain less consistently addressed. Governance frameworks are often fragmented, with varying levels of community participation and limited coordination between mobility policies and broader urban development objectives.

In response, the report proposes an integrated framework for advancing sustainable urban mobility in Arab cities based on three interconnected pillars:

(1) Integrated governance approaches that strengthen institutional coordination and stakeholder engagement;

(2) Human-, climate-, and context-sensitive mobility design that improves user experience and supports behavioral change; and

(3) Financing and implementation models that ensure the long-term economic and operational sustainability of mobility projects.

The report concludes with practical policy recommendations calling for a more balanced allocation of investments, stronger integration between mobility policies and infrastructure development, and the adoption of effective demand-management tools to support more efficient, resilient, inclusive, and equitable urban mobility systems across Arab cities.

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Introduction

Context and Rationale

Urban mobility is a fundamental component of green urbanism and sustainable urban development, shaping economic performance, social inclusion, and environmental outcomes. Throughout the 20th century, modernist planning models prioritized automobile-oriented infrastructure, enabling suburban expansion but reinforcing car dependency, spatial fragmentation, and environmental degradation. While public transport system, have historically provided efficient mass mobility, their effectiveness depends on context-specific integration rather than reliance on a single mode.

Arab cities largely reflect this global trajectory but remain dominated by car-centric mobility patterns. Historically walkable and mixed-use, many cities shifted toward wide road networks and dispersed urban forms following the introduction of the automobile. This transition has contributed to increased congestion, greenhouse gas emissions, air pollution, and declining public space quality. While several Arab cities have recently invested heavily in large-scale public transport systems, such as metros, tramways, monorails, and BRT, active and sustainable mobility infrastructure remains underdeveloped, and behavioral shifts away from private car use remain limited.

Urban mobility transitions in the Arab region are shaped by distinct climatic, cultural, and socio-economic factors. High temperatures reduce the attractiveness of walking and cycling, while car ownership is often associated with social status. As a result, mobility strategies frequently prioritize technological solutions, such as electric and autonomous vehicles, over demand management or lifestyle change. Despite these challenges, increasing regional investment and institutional reform signal a growing recognition of the need for more sustainable, resilient, and mobility systems.

This report contributes to this evolving discourse by examining sustainable mobility initiatives as a critical entry point for advancing sustainability, resilience, and social equity in Arab cities. It situates regional experiences within global mobility transitions and identifies transferable lessons that respond to local constraints.

Objectives and Scope

The main goal of this report is to examine how sustainable urban mobility initiatives in the Arab region shape urban form, governance practices, and social inclusion while responding to challenges such as climate conditions, car dominance, rapid urbanization, and equity. Through comparative analysis with global best practices, the report aims to identify trends, gaps, and opportunities for improving sustainable mobility.

Specifically, the report seeks to:

- Identify trends in sustainable mobility projects addressing sustainability and resilience;
- Analyze best practices from global and Arab cities;
- Examine governance structures and stakeholder collaboration;
- Assess social equity, accessibility, and inclusivity outcomes;
- Evaluate economic impacts, including job creation and local development;
- Investigate the role of smart governance and digital mobility tools; and
- Propose actionable guidance for future sustainable mobility initiatives.

The following discussion provides an overview of urban mobility initiatives within cities, examining their various typologies and characteristics. It explores how different forms of mobility contribute to environmental sustainability, social well-being, and economic development.

Typologies and Conceptual Framework

Urban mobility typologies encompass the systems and strategies cities use to meet transportation needs while balancing efficiency, accessibility, and sustainability. Historically, urban transport evolved from pedestrian movement and other types of mobility available in pre-industrial cities to railways, trams, and motorized vehicles during the Industrial Revolution, fundamentally reshaping urban form and connectivity (Divall & Bond, 2017). By the early 20th century, mass transit systems such as buses and metros supported urban expansion and reduced reliance on private travel. However, the automobile led many cities to prioritize car-centric infrastructure, often at the expense of public transport and active and sustainable mobility modes, with long-term social and spatial consequences (Cervero, 2013).

In recent decades, urban mobility has increasingly shifted towards sustainable, and inclusive approaches in response to congestion, environmental degradation, and social inequality. Cities worldwide are adopting solutions such as Bus Rapid Transit (BRT), cycling infrastructure, shared mobility, and electrified public transport, alongside smart technologies that enable real-time data use and multimodal integration (Newman, 2006). Contemporary mobility paradigms now emphasize reducing carbon emissions, improving equity and accessibility, and enhancing urban resilience, positioning sustainable mobility as a central component of future urban development.

Global Perspective of Urban Mobility

Urban mobility policies encompass diverse strategies aimed at regulating and transforming transport systems to support more

sustainable, and livable cities. These include congestion pricing, traffic calming, pedestrianization, and integrated transport master planning. London's congestion charge illustrates how such measures can reduce traffic and emissions while funding public transport, contributing to improved air quality and urban livability by discouraging car dependency (Banister, 2008).

Behavioral campaigns and awareness programs also play a key role in shaping mobility patterns. Initiatives such as Paris's Journée Sans Voiture promote walking and cycling while highlighting the environmental impacts of private car use, helping foster long-term cultural shifts toward green commuting and sustainable mobility (Banister, 2005).

Public transport systems; buses, metro, trams, and rail, remain the backbone of urban mobility, offering efficient and equitable alternatives to private vehicles. Bogotá's TransMilenio BRT system demonstrates how cost-effective, scalable public transit can reduce congestion, support compact urban development, improve accessibility, and lower greenhouse gas emissions (Cervero, 2013).

Smart and sustainable mobility integrates digital technologies such as real-time traffic management, shared mobility platforms, and electric vehicle infrastructure to optimize transport systems. Singapore's AI- and IoT-enabled traffic management illustrates how technology can enhance efficiency, user experience, and sustainability in urban mobility planning (Cohen & Kietzmann, 2014).

Cities with geographic constraints often adopt alternative mobility solutions, including aerial and water-based transport. Projects such as Medellín's Metrocable improve accessibility for underserved communities while minimizing environmental impact, while recreational mobility systems like Venice's vaporetto integrate daily transport with tourism and heritage preservation (Elrayies, 2017; Yang, 2006).

Shared mobility initiatives, including carpooling and car-sharing, reduce vehicle ownership and emissions while supporting flexible travel and first- and last-mile connectivity. Platforms such as Zipcar and Flinkster demonstrate how shared vehicles can complement public transit systems (Shaheen & Cohen, 2013). Multimodal hubs enable seamless transfers between transport modes and are critical for reducing private car reliance. Integrated hubs such as Hammarby Sjöstad in Stockholm illustrate how coordinated design and connectivity can improve efficiency and support sustainable and green commuting (Bertolini et al., 2005).

Finally, active and sustainable mobility projects prioritize walking and cycling through pedestrian-friendly design, cycling infrastructure, and bike-sharing systems. Copenhagen's extensive cycling network exemplifies how active transport can reduce carbon emissions while improving public health and safety (Gehl, 2010).

The categories presented in this report are derived from a synthesis of global sustainable urban mobility initiatives and relevant academic literature. Each category represents a distinct yet interconnected dimension of mobility, addressing functional and societal objectives such as efficiency, environmental sustainability, social inclusion, and economic development. This typology provides a structured framework for analyzing the objectives, features, and innovations of sustainable mobility projects worldwide. It also serves as a foundation for categorizing and assessing urban mobility initiatives in Arab cities, ensuring consistency and comparability across global and regional contexts while supporting the adaptation of international best practices to local urban conditions.

Urban Mobility in Arab Cities

Urban mobility projects in the Arab region are shaped by a distinct combination of environmental, social, and institutional factors that influence their design and performance. Rapid urbanization, population growth, and unplanned expansion have contributed to severe traffic congestion, deteriorating air quality, and fragmented public transport systems in many cities. In Cairo, for example, congestion-related losses are estimated at 3.6% of national GDP due to reduced productivity and increased fuel consumption (Nakat et al., 2014). In parallel, instability in parts of the region has constrained the capacity of local authorities to finance, implement, and manage effective mobility systems (El-Geneidy et al., 2013).

Climatic conditions further shape mobility patterns, particularly in desert environments where extreme heat and water scarcity influence infrastructure design and daily travel behavior (El-Husseiny et al., 2024). Persistently high temperatures discourage walking and cycling, reinforcing dependence on private vehicles and limiting the uptake of active and sustainable mobility. Addressing these constraints requires climate-responsive urban design measures, such as shaded pedestrian routes, vegetation corridors, and thermally comfortable public spaces, to support sustainable commuting and enhance urban resilience. Despite these challenges, several Arab cities have initiated large-scale mobility projects aligned with sustainable objectives. Initiatives such as the Riyadh Metro in Saudi Arabia and the Greater Amman Bus Rapid Transit (BRT) system in Jordan aim to reduce private car dependence, improve public transport accessibility, and enhance air quality. However, their overall contribution to sustainability remains uneven, as many projects are still in early stages of integrating environmental, social, and governance (ESG) considerations in a comprehensive manner (World Bank, 2012).

Recent international reports increasingly frame Arab cities as a shared analytical context shaped by common structural and developmental conditions rather than purely cultural characteristics. Publications such as The State of Arab Cities 2022 (UN-Habitat), Arab Cities Resilience Report 2018 (UNDP), and Local Climate Action in the Arab Region 2019 (UN-Habitat) emphasize governance constraints, infrastructural gaps, and environmental pressures as key determinants of urban mobility transitions. At the same time, cultural norms continue to influence travel behavior, including the association of car ownership with social status, limited social acceptance of walking and cycling for certain groups, and gendered perceptions of safety, all of which differentiate mobility transitions in Arab cities from other global contexts promoting sustainable transport.

In line with this literature, the report treats Arab cities as a dynamic urban laboratory in which diverse policies and practices respond to mobility and development challenges. This perspective supports comparative analysis across social, economic, and climatic contexts, enabling knowledge exchange and the identification of transferable lessons. By situating regional mobility initiatives within global trends, the report highlights both persistent gaps and emerging practices that can contribute to more sustainable, resilient, and inclusive urban mobility systems.

Methodology

Research Approach and Scope

The report adopts a comparative case study methodology to analyze sustainable urban mobility initiatives globally and across the Arab region. Rather than providing a descriptive overview, it identifies recurring patterns, enabling factors, and challenges influencing the success and impact of these initiatives.

Projects were selected to represent key mobility typologies across diverse geographic, economic, and climatic contexts, with emphasis on innovation, environmental sustainability, and urban impact. The selection also ensures analytical balance between the Global North and Global South, enabling meaningful comparisons across different development conditions.

The analysis draws on two main sources: AUDI's Arab Urban Development Portal and a systematic review of global sustainable mobility initiatives. For the Arab region, a sample of 60 sustainable urban mobility projects was selected from the portal based on data availability, geographic coverage, diversity of mobility types, relevance to regional challenges, and variation in country size, urban development activity, and demographic scale.

The sample is not intended to be statistically representative but to provide an analytical basis for identifying emerging trends, enabling conditions, and structural gaps in urban mobility systems.

Data Collection

This report draws on two primary data sources: the Arab Urban Development Portal, which documents sustainable mobility projects across the Arab region, and a desk-based review of global sustainable mobility initiatives. The Portal aggregates qualitative and quantitative information from project reports, government publications, policy documents, and media sources. Each entry provides standardized details on objectives, governance arrangements, funding mechanisms, implementation timelines, and community impacts, supported by referenced sources that ensure verification and traceability. This structured dataset offers a consistent, evidence-based foundation for analyzing regional sustainable mobility projects.

Figure 1.1: Methodological and analytical framework for urban mobility assessment.

Global data were collected through a systematic review of official project websites, municipal and national government reports, academic literature, and databases maintained by international organizations. This approach enabled the identification of widely cited best practices and innovative mobility solutions across diverse geographic and socio-economic contexts, ensuring balanced representation beyond a single regional focus.

To complement documentary sources, expert consultations were conducted with transport professionals and sustainability researchers. These discussions provided insights into emerging trends, implementation challenges, and the relative effectiveness of different approaches, strengthening the contextual interpretation of the collected data.

Data Analysis

The analysis followed a structured case study approach to ensure consistency across global and regional projects. Each case was examined using the sustainable urban mobility typology developed in this report, enabling systematic comparison across mobility types. Projects were assessed for their contributions to environmental sustainability and resilience, with attention to low-carbon technologies, multimodal integration, and measures enhancing urban livability, such as pedestrian-friendly and climate-adaptive infrastructure.

Governance dimensions were central to the analysis, focusing on institutional arrangements, stakeholder collaboration, policy frameworks, and public-private partnerships. Projects demonstrating participatory planning or innovative governance models were highlighted as illustrative practices. Economic impacts, including job creation, local business development, and contributions to urban tourism, were examined alongside social dimensions such as accessibility, affordability, and equity, particularly for underserved populations. Where available, reported outcomes, evaluations, and impact studies informed assessments of project effectiveness.

The analysis of sustainable mobility in the Arab region examined a sample of projects through both in-depth case review and transversal comparison across cities. In the first phase, initiatives were categorized by typology, scale, and key components to assess their geographic reach and functional diversity.

The second phase applied cross-cutting analytical lenses, including environmental performance, economic impact, technical and managerial solutions, and governance structures, derived from the literature and refined through project data analysis (see Table 1.1). This methodological approach enabled the identification of region-specific trends, common challenges, and transferable lessons for advancing sustainable and resilient urban mobility.

Projects were analyzed using a structured framework examining:

- Sustainability and resilience outcomes
- Governance and stakeholder engagement
- Economic impacts
- Social equity and accessibility
- Technological and managerial innovation

A transversal analysis across all projects identified patterns, challenges, and transferable lessons. While the study does not assess post-implementation performance, it provides a robust basis for recognizing trends and informing future sustainable mobility strategies.

Figure 1.2: Sustainable Urban Mobility Research Methodology

Limitations

Data gaps were noted in the Arab Urban Development Portal, with some projects missing critical information such as funding sources, economic development metrics, or community engagement feedback. These elements are essential for a comprehensive and transversal analysis, and their absence limits the depth of assessment, particularly as this study relies mainly on secondary data sources and expert consultations rather than direct fieldwork. Some projects also lack transparent documentation, which further constrains evaluation.

At the same time, the Portal provides a rich and systematic dataset on urban mobility initiatives across the region. While the level of detail varies between projects, reflecting differences in documentation practices, this diversity offers valuable insights into the approaches implemented. Urban mobility is a rapidly changing field, shaped by new technologies, policy shifts, and societal behaviors, and projects may undergo modifications not yet available in current records.

The study emphasizes projects recognized as best practices or representative cases of mobility typologies, highlighting innovative initiatives while acknowledging that some experimental solutions are still emerging and less widely documented. To ensure a balanced perspective, the analysis draws on expert consultations and applies a structured framework, enabling transversal reading of objectives, components, and implementation strategies.

It should be noted that this desktop research depends on secondary data and expert consultations rather than primary fieldwork. As a result, the study does not include performance assessments of the projects. Several limitations were encountered, particularly related to data availability, consistency, and potential bias. Nevertheless, the Portal's comprehensive coverage provides sufficient information for comparative analysis across diverse contexts.

The wide geographic scope and diversity of categories enrich the study, allowing lessons learned to be drawn from multiple contexts. Eight of the sixty urban mobility initiatives have been fully implemented, covering different types of mobility solutions examined in this report. The selected sample remains highly relevant, as the purpose of the study is not to assess project outcomes but to identify trends, highlight best practices,

Table 1.1: Main global typologies of urban mobility projects.

Types of urban mobility projects	Brief Description
Policies and Strategies	Regulatory and planning measures, such as congestion pricing, traffic calming, and pedestrian zoning, are designed to reduce car dependency, improve air quality, and enhance urban livability. London's congestion charge illustrates their effectiveness in reducing traffic and emissions while funding public transport improvements (Banister, 2008).
Campaigns and Initiatives	Awareness-raising and incentive-based programs that promote sustainable travel behaviors, including walking, cycling, and public transport use. Paris's annual Journée Sans Voiture demonstrates how public engagement can support long-term cultural shifts away from car dependency (Banister, 2005).
Public Transit Infrastructure	High-capacity systems such as buses, metros, trams, and BRT that provide efficient, affordable, and equitable urban mobility while reducing congestion and emissions. Bogotá's TransMilenio BRT exemplifies a cost-effective and scalable transit solution (Cervero, 2013).
Smart Mobility and High-Tech Solutions	Technology-driven systems, including real-time traffic management, mobility-as-a-service (MaaS), and electric vehicle infrastructure that improve efficiency, user experience, and environmental performance. Singapore's AI- and IoT-based traffic monitoring system illustrates this approach (Cohen & Kietzmann, 2014).
Waterfront and Aerial Mobility	Water-based and cable-supported transport modes that address geographic constraints while enhancing connectivity and social inclusion. Medellín's Metrocable connects hillside communities to the urban core and supports equitable access to opportunities (Elrayies, 2017; Yang, 2006).
Carpooling and Car Sharing	Shared vehicle services that reduce private car ownership, lower emissions, and complement public transport networks. Examples such as Zipcar and Germany's Flinkster demonstrate how shared mobility can fill first- and last-mile gaps (Shaheen & Cohen, 2013).
Multimodal Hubs and Interconnectivity	Integrated nodes that enable seamless transfers between transport modes, reducing travel time and reliance on private vehicles. Hammarby Sjöstad in Stockholm illustrates effective multimodal integration across urban, regional, and long-distance networks (Bertolini et al., 2005).
Active Mobility	Walking- and cycling-focused initiatives that improve public health, reduce carbon emissions, and enhance urban livability through pedestrian zones, cycling lanes, and bike-sharing schemes. Copenhagen's cycling system is a global benchmark for large-scale mode shift (Gehl, 2010; Weinreich, 2021).

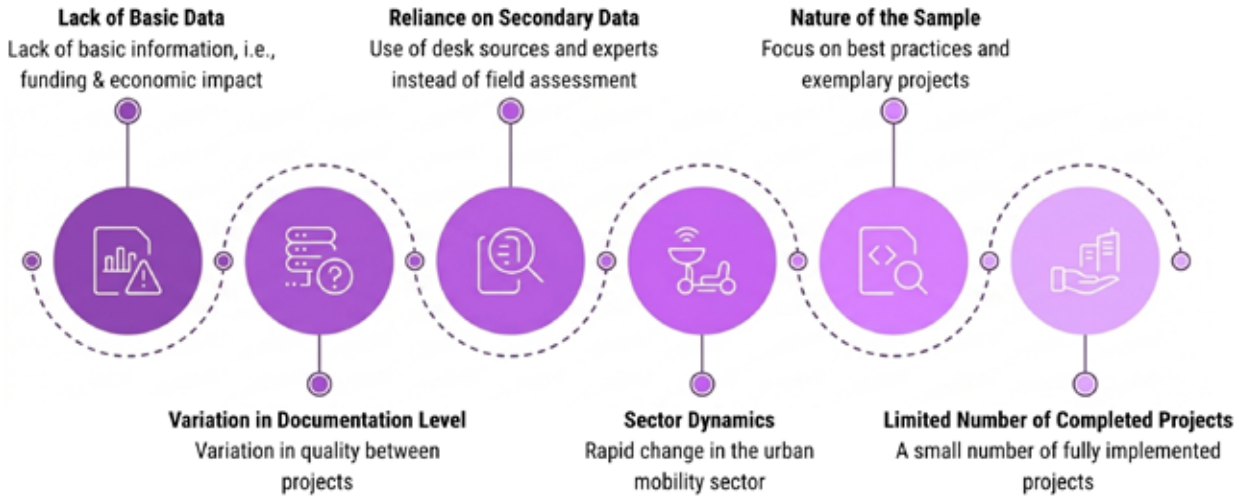


Figure 1.3: Methodological limitations in the Urban Mobility Report

and examine governance, environmental, and economic dimensions shaping urban mobility in the Arab region. Despite these limitations, the adopted analytical framework provides a coherent basis for understanding the dynamics of urban mobility projects by focusing on the structural and institutional factors that determine their effectiveness, rather than merely evaluating their visible outcomes.

Structure of the Report

The report is organized into five main sections, as follows:

- Introduction: Outlining the context, focus, and methodology of the study.
- Global trends in urban mobility: an examination of global trends in urban mobility and best innovative practices based on the categorization framework established in this report. This section also involves lessons learned from innovative approaches of global cases for local authorities, which can build insights for recommendations provided in this report.
- Transversal analysis: A detailed projects cross-examination, highlighting selected projects in the form of boxes to showcase different approaches to urban mobility and support the overall narrative. At the end of this chapter, a framework for integrated urban mobility initiatives is proposed.
- Projects' summaries: In this section, one-page cards systematically present information on each project, including its name, location, size, period of development and implementation, objectives, components, and key findings on the three dimensions of governance, public engagement and inclusivity, environmental sustainability and resilience, and economic development.
- Conclusions: Synthesizing the key findings on urban mobility initiatives globally and in the Arab world, highlighting distinctive trends and drawing recommendations on the institutional, strategic, and operational levels.

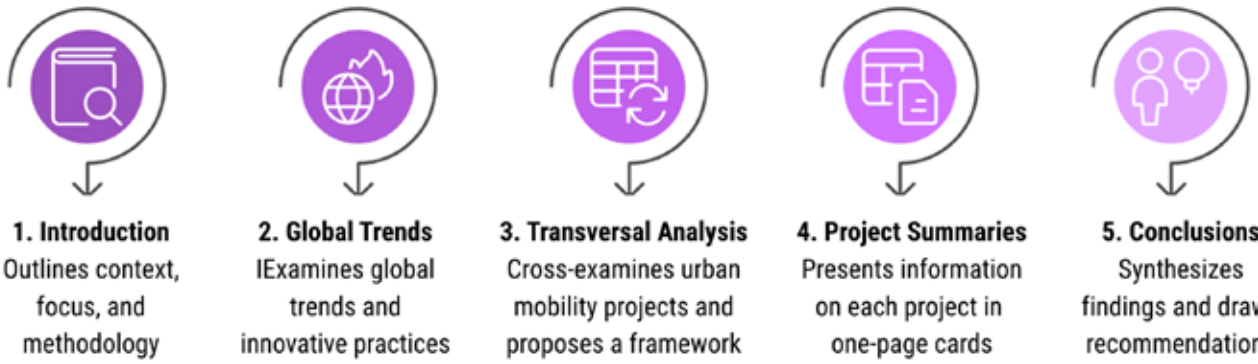


Figure 1.4: Diagram representing the structure of the report.

Global Trends in Sustainable and Resilient Urban Mobility

A. Introduction

Urban mobility is central to sustainable urban development, shaping how people move, access opportunities, and interact within cities. Globally, cities face increasing challenges related to congestion, pollution, social inequities in transport access, and the environmental impacts of car dependency, pressures that are intensifying with continued urban population growth. In response, cities are adopting innovative urban mobility approaches, ranging from policy and strategic interventions to active and low-carbon mobility initiatives, aimed at enhancing efficiency, accessibility, sustainability, and resilience.

This chapter examines global urban mobility trends through the analysis of projects that demonstrate forward-thinking solutions to these challenges, with a particular focus on their innovative contributions to sustainability and resilience. By identifying best practices from international case studies, the chapter extracts lessons that can inform mobility initiatives in the Arab region, supporting the adaptation of global experience to local environmental, social and institutional contexts and contributing to broader discussions on sustainable urban mobility.

B. Global Perspectives on Urban Mobility Best Practices

Urban mobility best practices contribute to improved governance, environmental sustainability, and economic performance by integrating innovative, inclusive, and resilient approaches. Strategic investments in sustainable transport systems, digital solutions, and participatory governance frameworks are central to addressing congestion, emissions, and unequal access to mobility.

1. Policies and Strategies

Policies and strategies represent regulatory and planning frameworks that guide transportation systems and mitigate congestion through measures such as congestion pricing, traffic signal optimization, and pedestrian-friendly zoning. These approaches support organized and efficient urban transport networks, improve air quality and public safety, and reduce reliance on fossil fuels by encouraging public transport and low-emission mobility. Inclusive policymaking, supported by stakeholder engagement, strengthens public trust and ensures that diverse community needs are addressed.

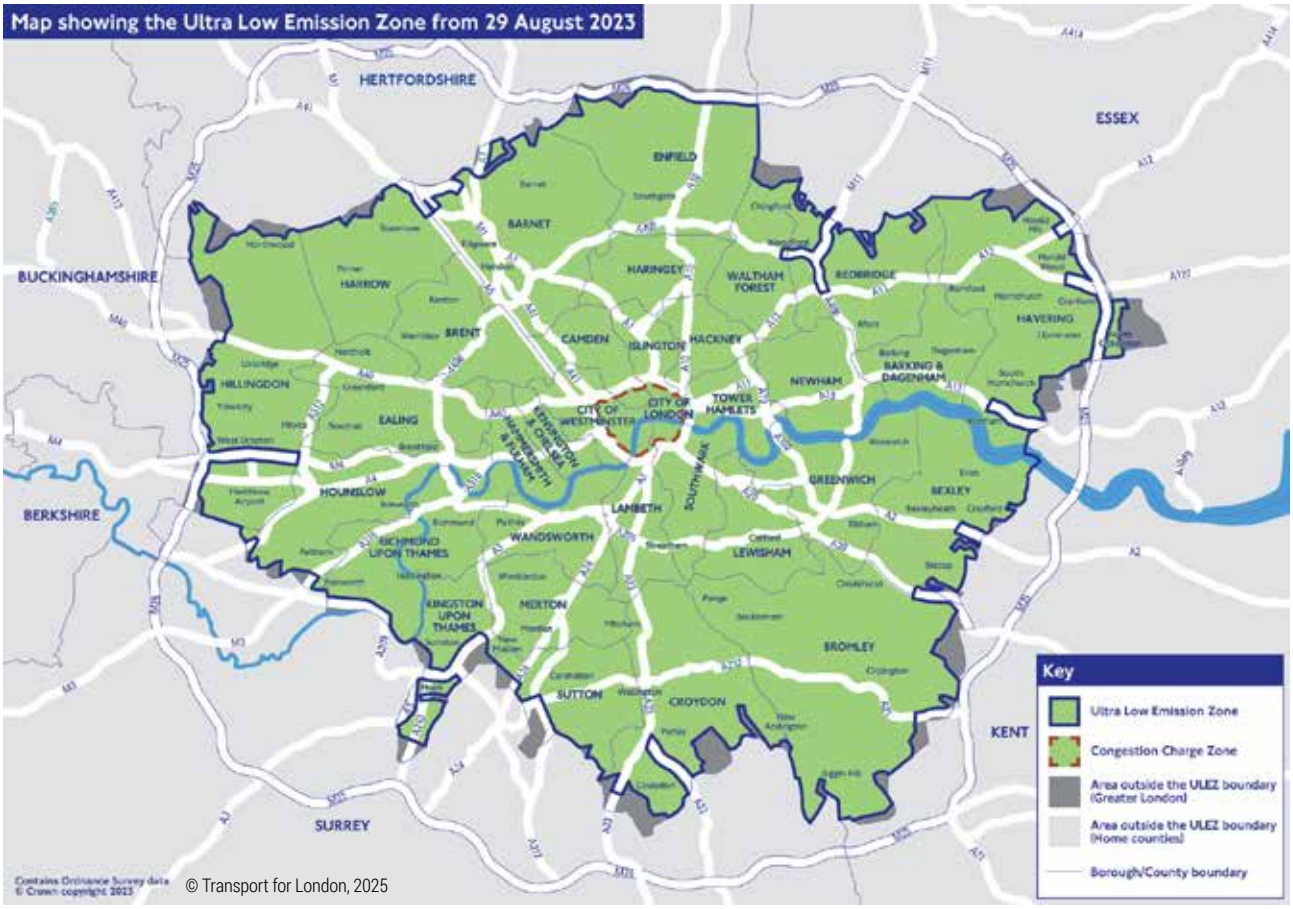


Figure 2.1: Annotated map of London's Ultra Low Emission Zone (ULEZ) and Congestion Charge Zone (CCZ) policies.

Congestion Pricing, London, UK

The London Congestion Charge Zone (CCZ), introduced in 2003, is a policy instrument designed to manage traffic congestion and reduce emissions in the city center by charging vehicles entering central London during peak hours, with exemptions for low-emission vehicles. Initially set at £5 per day within a limited area, the charge has increased to £15 per day, with evolving operational hours and exemptions. The system has been progressively digitalized using automatic number plate recognition (ANPR) technology to improve enforcement and efficiency.

In 2019, the Ultra-Low Emission Zone (ULEZ) was introduced, initially covering the same area as the CCZ and later expanding across Greater London. ULEZ operates 24/7 and targets high-emission vehicles through stricter European emissions standards.

These policies have led to significant reductions in vehicle emissions, improved air quality, and lower carbon footprints in central London. Traffic volumes decreased by approximately 15-20%, resulting in around 65,000 fewer daily car trips within the charging zone. Reductions in nitrogen dioxide (NO_2) and particulate matter (PM) levels have been recorded, alongside improvements in road safety and increased uptake of cycling and public transport.

Exemptions for zero-emission vehicles have further encouraged electric vehicle adoption (Beevers & Carslaw, 2005). Revenue generated, approximately £1 billion annually, has been reinvested in public transport, bus services, and cycling infrastructure, contributing to economic efficiency and more reliable journeys, with congestion charging estimated to generate £50 million annually in economic benefits (Leape, 2006; Givoni, 2012).

Despite these benefits, challenges remain. Some businesses within the charging zone have experienced reduced car-based access, and lower-income drivers without viable alternatives may be disproportionately affected despite exemptions. Additionally, congestion displacement to surrounding areas requires ongoing monitoring and complementary investment (Givoni, 2012).

2. Campaigns and Initiatives

Campaigns and initiatives play a critical role in raising awareness and encouraging public participation in sustainable transportation choices. By promoting walking, cycling, and car-free lifestyles, these initiatives foster community engagement, social inclusion, and behavioral change. They highlight the importance of coordinated, people-centered approaches to mobility that complement infrastructure investments, reduce emissions, and strengthen urban resilience. In addition to environmental benefits, such campaigns can alleviate congestion-related economic losses by encouraging alternative transport modes and improving overall urban productivity.

Car-Free Sundays, Bogotá, Colombia

Car-Free Sundays, locally known as Ciclovía, is a weekly initiative established in 1974 in Bogotá, where major streets are closed to motorized traffic to prioritize pedestrians and cyclists. The program has expanded to approximately 127 kilometers of roads every Sunday and public holiday, attracting more than 1.5 million participants each week (Rosas-Satizábal & Rodriguez-Valencia, 2019). Managed by the Bogotá Institute of Recreation and Sports (IDRD), Ciclovía promotes active mobility, reduces vehicle emissions, and provides inclusive public space for non-motorized transport.

Civil society organizations reinforce engagement through health promotion, cycling advocacy, and community events, particularly benefiting low-income populations reliant on walking and cycling (Sarmiento et al., 2017).

By encouraging regular cycling and walking, Ciclovía fosters long-term shifts toward sustainable travel behavior and strengthens urban resilience through low-carbon mobility alternatives. Environmental benefits include measurable reductions in air and noise pollution, with studies reporting a 13% decrease in air pollutants on Ciclovía days (Glazener et al., 2022).

The initiative also generates positive economic effects, supporting local businesses such as street vendors, bicycle services, and outdoor fitness providers, while contributing to public health cost savings through increased physical activity (Glazener et al., 2022).

One of the primary advantages of Bogotá's Car-Free Sundays (Ciclovía) is its role in democratizing urban space. By prioritizing non-motorized mobility, the initiative reclaims streets for people rather than cars, fostering social interaction, physical activity, and community ownership of public spaces.

Figure 2.2: Car-free Sunday campaign in the city of Bogotá.

Health studies indicate that participants burn an average of 400-800 calories per event, contributing to improved cardiovascular health and reduced obesity rates. The program also provides affordable recreation, particularly for residents with limited access to formal leisure or fitness facilities (Rosas-Satizábal & Rodriguez-Valencia, 2019; Glazener et al., 2022).

Despite these benefits, Ciclovía faces challenges, including periodic disruption to motorized traffic and high operational costs for traffic management, security, and maintenance. Access remains uneven, as residents living far from designated routes encounter barriers to participation, while expansion into underserved areas has been constrained by budgetary and planning limitations (Parra et al., 2020).

3. Public Transit Infrastructure

Developing public transit requires effective governance structures and public engagement to ensure the system meets community needs and is accessible to all citizens. Local authorities play a critical role in fostering inclusive transportation systems. Robust public transit systems reduce reliance on private vehicles, lowering emissions and enhancing urban resilience. Efficient public transit improves access to employment and services, stimulating economic activity and reducing transportation costs for individuals.

Largest Tram Network, Melbourne, Australia

Melbourne hosts the largest operational tram network in the world, with origins dating back to the late 19th century. Beginning with horse-drawn trams in 1884 and cable trams in 1885, the city transitioned to electric trams in 1906, enabling system expansion and improved efficiency. Unlike many cities that dismantled tramways during the automobile era, Melbourne preserved and modernized its network, which expanded significantly between the 1920s and 1950s and remains a defining feature of the city's transport system. Recent modernization efforts include fleet upgrades, accessibility improvements, and a commitment to power the entire tram network with renewable energy by 2025.

The network spans more than 250 kilometers of double track and includes over 1,700 tram stops, connecting the central business district (CBD) with inner and middle suburbs. Approximately 75% of the network operates in mixed traffic with other vehicles (Coles, 2020). To improve accessibility and reduce car dependency in the city center, the Victorian Government introduced the Free Tram Zone (FTZ) in 2015, building on the earlier City Circle Tram service. Managed by Yarra Trams under a franchise agreement with the Victorian Government, the system operates through a public-private partnership (PPP) model, combining public oversight with private-sector operational efficiency (Currie & Shalaby, 2007).

Melbourne's trams generate significantly lower emissions per passenger than private cars, supporting the city's climate objectives and encouraging a modal shift away from car use. The Free Tram Zone (FTZ) has improved accessibility for residents, commuters, and tourists within the CBD, but has also led to overcrowding, slower services, and increased short-distance trips that might otherwise be made on foot. Proposed FTZ expansions were deemed impractical due to anticipated overloading and cost concerns (Kolovos, 2025).

Operational challenges remain considerable. Melbourne's trams are among the slowest globally, averaging 16 km/h across the network and 11 km/h in the CBD. Around 17% of journey time is spent at red lights, well above international averages of 2-5%, a situation exacerbated by extensive road sharing, with 170 kilometers of shared lanes, more than any other city worldwide (Clure, 2017).

Despite these constraints, the tram network's wide coverage in high-density areas, frequent service, and integration with train and bus systems make it a preferred mode of transport for commuters and visitors. It supports Melbourne's economy by facilitating access to jobs, education, commercial centers, and tourism destinations, while its affordability enhances social and economic inclusivity.

4. Smart Mobility

Smart mobility solutions, such as integrated transportation platforms, real-time information systems, and data-driven services, enhance user experience, accessibility, and system efficiency. Inclusive governance is essential to ensure that technological innovations are accessible to all citizens and support informed policymaking. By optimizing routes, managing demand, and integrating transport modes, smart mobility contributes to emissions reduction and environmental sustainability while strengthening integrated and resilient transport systems. Investments in smart mobility technologies also stimulate economic growth by improving transport efficiency, creating new markets, and enabling mobility-related services that support emerging businesses.

Electronic Vehicle (EV) Infrastructure, Norway

Norway's nationwide EV infrastructure comprises an extensive network of charging stations, including fast chargers along major highways, urban charging hubs, and incentives for home charging. This system supports one of the highest EV adoption rates globally and underpins Norway's policy objective to phase out new petrol and diesel car sales by 2025 (Hannisdahl et al., 2013).

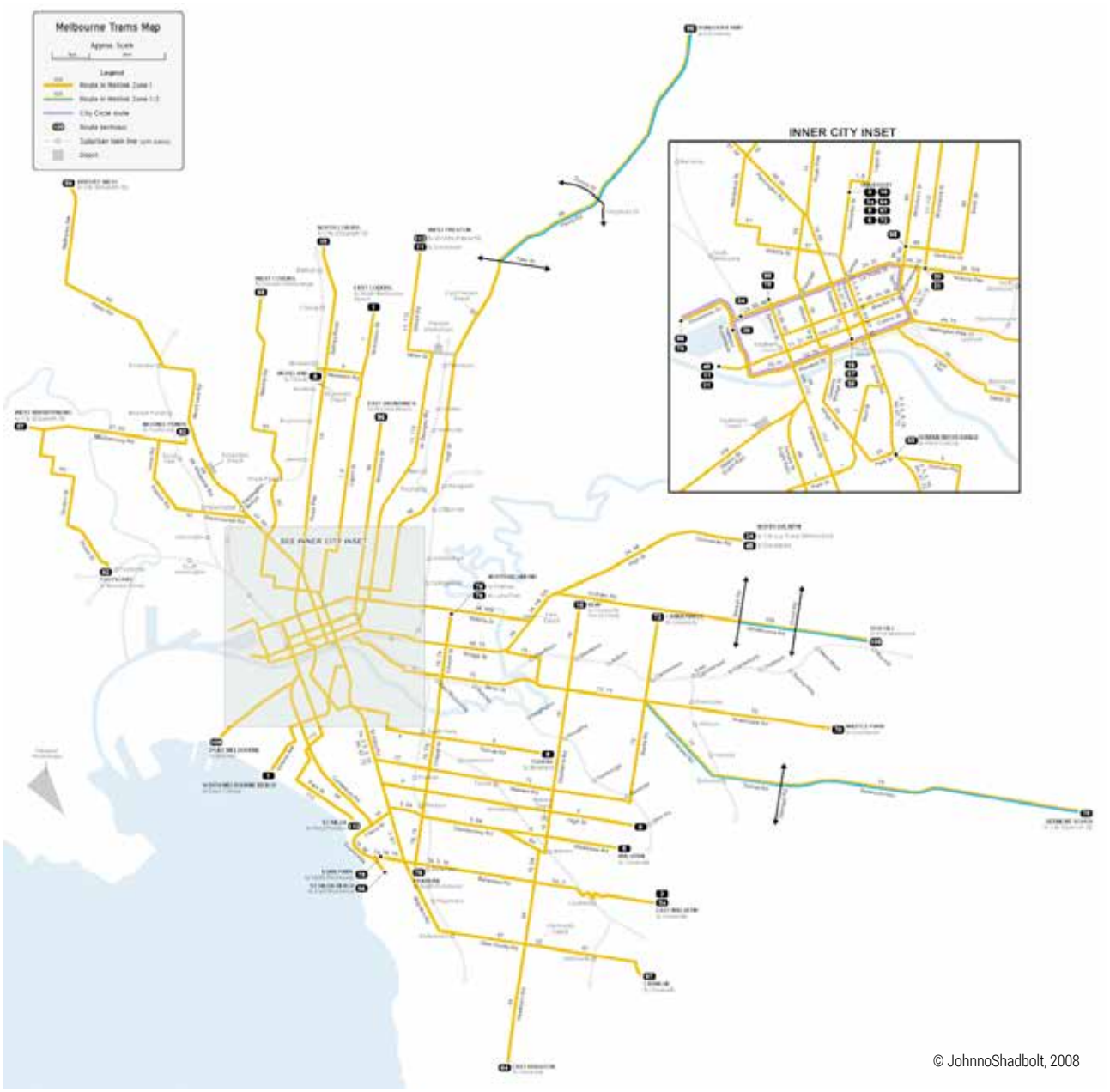


Figure 2.3: Tram Network in Melbourne.

The transition began in the 1990s through early incentives and accelerated in the 2000s with tax exemptions, toll waivers, free parking, and bus lane access for EVs. Public institutions, notably the Norwegian Public Roads Administration and Enova, played a central role in establishing and expanding the charging network. By 2024, fully electric vehicles accounted for 88.9% of new car sales, supported by more than 20,000 charging points nationwide, including high-speed chargers on all major corridors (Hannisdahl et al., 2013).

A defining feature of Norway's EV infrastructure is its integration with renewable energy. The charging network is powered almost entirely by hydroelectricity, reducing lifecycle emissions and aligning electric mobility with national climate goals (Hannisdahl et al., 2013).

Norway has also advanced sustainable battery management through second-life applications and recycling systems, with initiatives such as Hydrovolt, a joint venture between Hydro and Northvolt, supporting a circular economy for EV batteries.

Governance has been central to this transition. Strong policy incentives and regulatory frameworks actively shaped EV adoption, complemented by public-private partnerships that enabled rapid deployment of charging infrastructure across urban and rural areas. Public funding and incentives are paired with private-sector operation and maintenance, while integration into urban planning, through revised parking policies and building codes requiring charging points in new developments, ensures long-term system readiness.

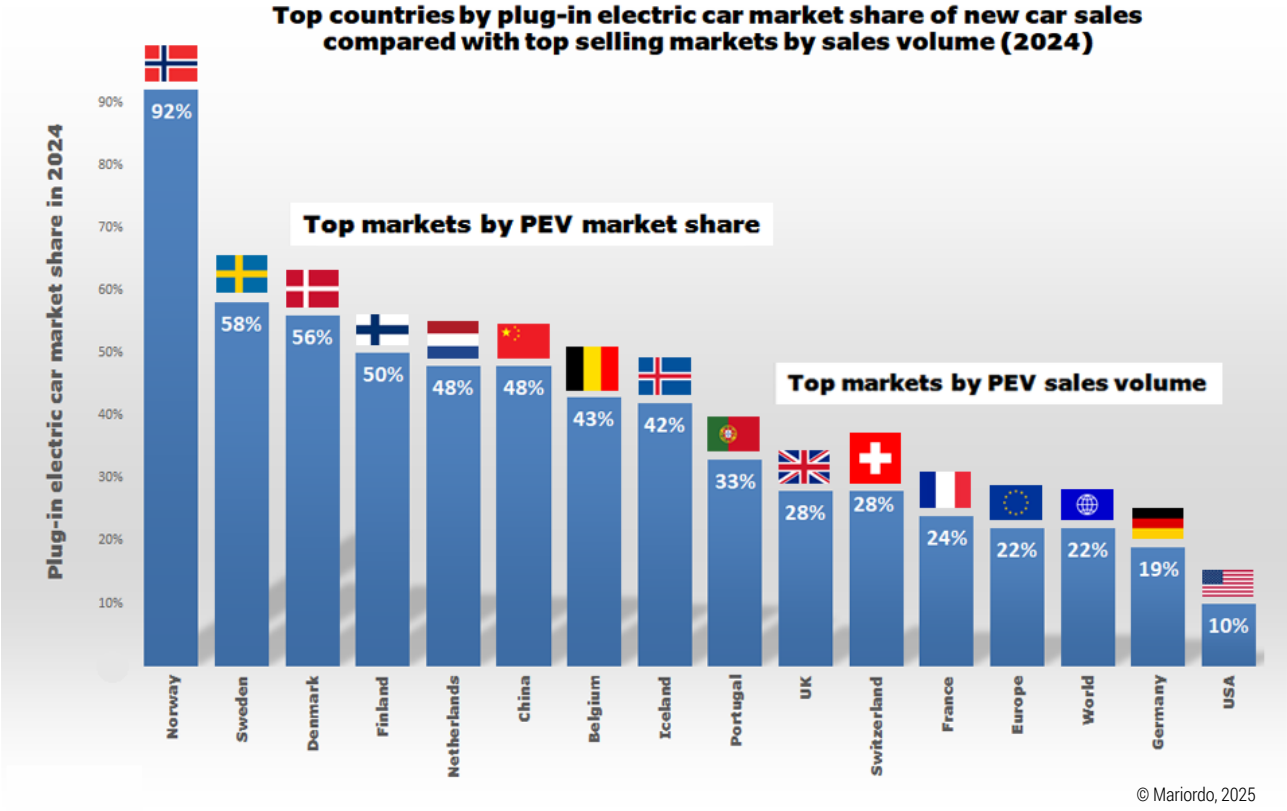


Figure 2.4: Norway stands out with dominant adoption rates compared to other countries with the world's highest plug-in electric car market shares.

Figure 2.5: EV charging station in Storgata, Norway.

Economically, Norway's EV transition has reduced dependence on imported fossil fuels, strengthening energy security and redirecting expenditure toward domestic economic activity. It has also supported the growth of new industries, including battery technology, charging systems, and smart charging software. Norwegian firms such as Zaptec and Easee have emerged as international leaders, contributing to employment creation and economic diversification. In parallel, smart grid integration and emerging vehicle-to-grid (V2G) technologies are being explored to enhance energy resilience and manage peak electricity demand more effectively (Sovacool et al., 2020).

Despite its success, challenges remain. The cost of maintaining and expanding charging infrastructure, particularly in rural areas, is significant, and congestion at charging stations has increased during peak periods. Concerns also persist regarding the environmental impacts of battery production and the need for continued innovation in recycling and lifecycle management (Aasness & Odeck, 2015).

5. Waterfront and Aerial Mobility

Waterfront and aerial mobility solutions require comprehensive planning and public consultation to ensure safety, accessibility, and social acceptance. By utilizing waterways and aerial routes, these systems can relieve road congestion, reduce emissions, and support environmental objectives.

In addition to their transport function, such modes often serve recreational and tourism purposes, generating economic activity in adjacent areas and supporting local businesses, including cultural venues, cafés, and leisure services.

Figure 2.6: Medellín Metro cable car (Line J) from San Javier Station for better hillside community connectivity.

Metrocable, Medellín, Colombia

The Medellín Metrocable is an aerial cable car system integrated into the city's public transport network and the first of its kind designed for mass urban transit rather than tourism. Operated by Metro de Medellín, it connects steep hillside neighborhoods, historically marked by limited accessibility and social exclusion, to metro, bus, and tram services, offering affordable and efficient mobility for low-income communities (Brand & Dávila, 2011).

Before its implementation, informal settlements in Medellín's hilly areas faced poor infrastructure, long travel times, and restricted access to public services, reinforcing inequality and insecurity. As part of a broader transport strategy, the first line (Line K) opened in 2004, linking Santo Domingo to the metro and significantly reducing travel times. Its success led to the development of additional lines to expand coverage (Galvin & Maassen, 2020).

The Metrocable is central to Medellín's social urbanism, integrating mobility infrastructure with public spaces, social programs, and participatory governance. By prioritizing transport equity, it has reduced spatial segregation, strengthened social integration, and revitalized marginalized neighborhoods through increased public presence, economic activity, and community pride (Brand & Dávila, 2011).

From an environmental perspective, the Metrocable provides a low-carbon mobility solution. Electrically powered cable cars emit less than buses and private vehicles, reducing air pollution and greenhouse gas emissions. Stations are integrated with green public spaces and reforestation initiatives, reinforcing sustainability (Perez-Lancellotti & Ziede, 2021).

Economically, improved connectivity has expanded access to jobs, education, and markets, supporting residents' integration into the formal economy. The system has also stimulated tourism, with destinations such as Comuna 13 and Parque Arví gaining prominence. Travel times have been cut from hours to minutes, offering a fast and direct route across difficult terrain where conventional road infrastructure would be costly or impractical (Bocarejo et al., 2014).

Despite these benefits, cable cars face limitations: restricted passenger capacity, long waits at peak hours, specialized maintenance needs, and sensitivity to weather conditions. While highly effective in mountainous terrain, they are less suitable in flatter cities, where bus rapid transit (BRT) or metro systems may be more cost-efficient (Heinrichs & Bernet, 2014).

6. Carpooling and Car Sharing

Carpooling and car-sharing programs require supportive policies and public participation to be effective. Inclusive programs ensure affordability and accessibility for diverse populations. These initiatives reduce the number of vehicles on the road, decreasing emissions and contributing to environmental sustainability. Car-sharing reduces individual transportation costs and can decrease the need for parking infrastructure, allowing urban spaces to be repurposed for economic activities.

ShareNow, Europe

ShareNow is a free-floating, app-based car-sharing service operating across multiple European cities, offering short-term vehicle access without fixed pick-up or return locations. The platform promotes a shift from private car ownership to shared, on-demand mobility, supporting more efficient use of urban transport resources (Shaheen & Cohen, 2013).

Formed in 2019 through the merger of Daimler's car2go (2008) and BMW's DriveNow (2011), ShareNow became part of a broader joint mobility venture to scale shared services across Europe. It operated in major cities such as Berlin, Paris, and Milan before its acquisition by Stellantis in 2022, reflecting consolidation trends in the sector.

The free-floating model allows users to locate, unlock, and drive vehicles instantly via a mobile app, improving accessibility and convenience while reducing reliance on private cars. Studies suggest one shared vehicle can replace eight to ten private cars, significantly lowering congestion and parking demand (Firnkorn & Müller, 2015; Shaheen & Cohen, 2020).

Governance relies on public-private partnerships with municipalities to coordinate parking policies, service zones, and integration with public transport. This collaboration supports a multimodal ecosystem in which car-sharing complements public transport, cycling, and walking.

Environmental benefits include reduced carbon emissions and lower fossil fuel dependence, particularly through the integration of electric vehicles (EVs). In cities such as Hamburg and Amsterdam, ShareNow operates fully electric fleets, aligning shared mobility with climate mitigation goals. The model also encourages behavioral change by promoting occasional, need-based car use instead of habitual car dependency.

ShareNow enhances urban resilience by offering flexible mobility during disruptions such as public transport strikes, system failures, or extreme weather events. Economically, it provides a cost-effective alternative to car ownership in dense urban areas, lowering expenses for parking, insurance, and maintenance, while generating employment in fleet management, digital mobility services, and EV infrastructure maintenance.

Figure 2.7: ShareNow cars as an alternative to owning or renting practices.

Challenges persist, though; free-floating car-sharing depends heavily on public parking availability, often creating conflicts with residents. Longer trips can be costlier, reducing competitiveness with traditional rentals, while high operational and maintenance expenses have led to service reductions in some markets, including ShareNow's withdrawal from North America in 2020 (Ortega et al., 2023).

7. Multimodal Hubs

Multimodal hubs integrate multiple transport modes, such as buses, trains, cycling, and shared mobility, into seamless transit points that enhance efficiency, accessibility, and user experience. Effective governance is essential to coordinate transport providers, enable unified ticketing systems, and ensure accessibility for diverse user groups, including people with disabilities and low-income communities.

By making public transport more attractive and efficient, multimodal hubs reduce car dependency, lower greenhouse gas emissions, and support environmental sustainability. When combined with green infrastructure and transit-oriented development (TOD), these hubs promote compact, walkable urban forms, improve labor market accessibility, and stimulate economic activity through increased real estate value and business development.

Hammarby Sjöstad, Stockholm, Sweden

Hammarby Sjöstad is a widely cited example of sustainable transit-oriented development integrating housing, public transport, and green infrastructure. Developed from a former industrial site beginning in the 1990s, the district was designed to accommodate approximately 25,000 residents and 10,000 workers while minimizing car dependency and promoting walking, cycling, and public transport use (Svane et al., 2011).

Figure 2.8: Integrated transit plan and diversity of functions.

Figure 2.9: Cycling as Stockholm's central urban life, linking vibrant public spaces with modern mobility.

The TOD model centers on strong multimodal connectivity, combining light rail (Tvärbanan), buses, ferries, and cycling infrastructure to ensure seamless access to central Stockholm. Streets prioritize pedestrians and cyclists, while limited parking discourages private car ownership. The development follows a closed-loop sustainability approach, integrating energy, water, and waste systems to reduce environmental impact (Pandis Iverot & Brandt, 2011).

The project was delivered through extensive collaboration between municipal authorities, private developers, and local communities, ensuring participatory planning and social inclusion. Affordable housing was incorporated to support socio-economic diversity, while energy-efficient buildings, renewable energy systems, green spaces, waterfront promenades, and stormwater management enhanced climate resilience and reduced emissions (Pandis Iverot & Brandt, 2011).

Economically, Hammarby Sjöstad has increased property values, attracted businesses, and reinforced Stockholm's position as a global reference for sustainable urban mobility and development. The district has inspired similar TOD initiatives internationally (Iveroth et al., 2013).

Despite its success, the project highlights several challenges. High upfront investment costs for integrated infrastructure and closed-loop systems can be prohibitive, particularly for cities with limited financial capacity (Loorbach & Shiroyama, 2016). Rising property values have also raised concerns about gentrification and reduced affordability, potentially limiting social diversity (Machline, 2020). The governance model relied on strong institutional coordination and regulatory capacity, conditions that may not be easily replicated elsewhere.

Behavioral change remains another challenge, as sustained investment and incentives are required to encourage long-term shifts away from private car use (Iveroth et al., 2013).

8. Active Mobility

Active mobility, walking, cycling, and other non-motorized modes play a central role in promoting public health, environmental sustainability, and urban resilience. Cities must prioritize pedestrian and cycling infrastructure through policies that ensure safe, continuous, and accessible pathways for all users.

Public engagement is essential to design walkable neighborhoods that respond to diverse needs, while Complete Streets approaches ensure that pedestrians and cyclists are systematically integrated into urban planning.

Active mobility reduces emissions and air pollution, supports urban cooling and biodiversity through green corridors, and enhances resilience by lowering dependence on motorized transport during disruptions. Economically, walkable and bike-friendly areas attract businesses, increase property values, and boost retail activity, while investment in cycling infrastructure generates employment across manufacturing, tourism, and urban services (Yang et al., 2023; El-Geneidy et al., 2013).

Copenhagen Bicycle Highways, Denmark

The Copenhagen Bicycle Highways (Cycle Superhighways) are a network of high-quality, long-distance cycling routes connecting Copenhagen with surrounding municipalities, offering fast, safe, and convenient commuting alternatives to car travel (Emanuel, 2019).

Developed in the early 2000s, the first route (Albertslund Route, C99) opened in 2012, spanning 17.5 km. The network has since expanded, with more than 60 routes planned across over 850 km, delivered through collaboration between Copenhagen and 30 neighboring municipalities, with funding from local and national governments (Greenovation, 2017).

Figure 2.10: Bikes outnumbering cars in Copenhagen

The bicycle highways integrate cycling into the metropolitan transport system through smart traffic signals and "green wave" technology that prioritizes cyclists at intersections, improving safety and travel efficiency by enabling continuous movement at approximately 20 km/h (Cabral Dias & Gomes Ribeiro, 2021). Designed for long-distance commuting, the routes include wide lanes, rest stops, air pumps, clear signage, and grade-separated crossings that reduce conflicts with motorized traffic. Integration with public transport, through bike parking hubs, bike-sharing facilities, and bike-friendly transit policies, supports multimodal commuting and further reduces car dependency (Cabral Dias & Gomes Ribeiro, 2021).

The network delivers significant economic and health benefits. Reduced congestion improves productivity and commuting efficiency, while increased physical activity lowers healthcare costs related to non-communicable diseases. Studies indicate that cycling generates substantial annual savings for Copenhagen through reduced healthcare expenditure and improved public health outcomes (Larsen, 2017).

Governance innovation is a defining feature of the project. Cross-municipal cooperation ensures consistent quality and connectivity across administrative boundaries, preventing fragmented infrastructure delivery (Henderson & Gulsrud, 2019). Participatory governance, engaging residents, cycling organizations, and businesses, has strengthened public support and policy legitimacy, encouraging widespread adoption of cycling as a daily transport mode (Henderson & Gulsrud, 2019).

Despite its success, challenges persist. High cycling volumes place pressure on infrastructure, requiring ongoing investment in maintenance and parking capacity. Long-term institutional and financial commitment remains essential, and extreme weather conditions can reduce cycling uptake despite winter maintenance measures (Hill, 2011; Gössling & Choi, 2015).

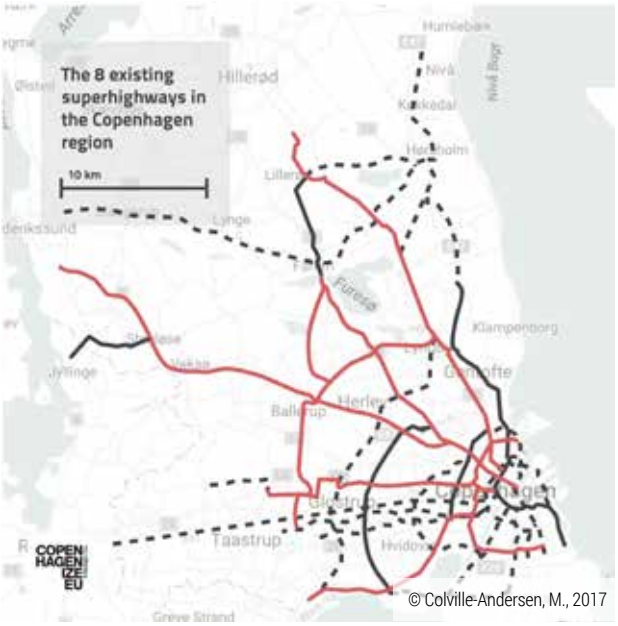


Figure 2.11: Bicycle superhighways in Copenhagen.

C. Cross-Cutting Lessons for Local Authorities and Stakeholders

Synthesized from International Urban Mobility Policies, Campaigns, Infrastructure, and Systems

Drawing on a diverse set of international urban mobility interventions, including congestion pricing in **London**, car-free initiatives in **Bogotá**, large-scale public transport in **Melbourne**, electric vehicle infrastructure in **Norway**, aerial mobility in **Medellín**, shared mobility services across **Europe**, transit-oriented development in **Hammarby Sjöstad**, and active mobility networks in **Copenhagen**, this section synthesizes a consolidated set of lessons relevant to local authorities and key stakeholders.

1. Strategic Governance and Long-Term Policy Commitment

Across all cases, sustained institutional commitment and institutional continuity emerge as foundational conditions for success. Whether implementing congestion pricing mechanisms, recurring car-free campaigns, public transport investments, or cycling networks, long-term strategies supported by stable governance structures are essential to achieve durable behavioral and environmental outcomes. Short-term or fragmented interventions risk undermining public confidence and limiting system-wide impact.

2. Early Engagement, Participation, and Public Acceptance

Early and continuous stakeholder engagement plays a decisive role in building legitimacy and public acceptance. Experiences from London, Bogotá, Medellín, and Stockholm demonstrate that transparent communication, participatory decision-making, and community involvement help mitigate resistance, particularly for interventions that alter mobility costs, access, or daily routines. Public trust is strengthened when communities perceive mobility projects as inclusive, responsive, and socially beneficial (Rosas-Satizábal & Rodriguez-Valencia, 2019).

3. Integrated Urban and Transport Planning

A consistent lesson across all cases is the importance of embedding mobility interventions within broader urban systems. Effective initiatives align transport policies with land use, housing, energy, public space, and social development objectives. Stand-alone solutions, whether pricing schemes, shared mobility platforms, or infrastructure investments, deliver limited benefits when not integrated into a cohesive urban framework. Transit-oriented development in Hammarby Sjöstad and multimodal integration in Melbourne exemplify the value of systems-based planning.

4. Equity, Accessibility, and Social Inclusion

Equity considerations must be incorporated from the outset. Targeted exemptions and discounts in pricing schemes, universal accessibility in public transport design, coverage of underserved neighborhoods in car-free initiatives, and safeguards against displacement in TOD projects are essential to ensure that mobility transitions do not disproportionately burden vulnerable populations. Inclusive design and affordability measures are central to maintaining social cohesion and broad public support.

5. Data-Driven Design, Monitoring, and Adaptability

Continuous monitoring and evaluation are critical for ensuring effectiveness, fairness, and adaptability. Data-driven approaches support the refinement of pricing structures, assessment of environmental and social impacts, and responsiveness to changing demand patterns. Cities such as London, Stockholm, and Norway demonstrate how adaptive management, supported by robust data systems, enables policies and infrastructure to evolve in line with user behavior, climate conditions, and technological change.

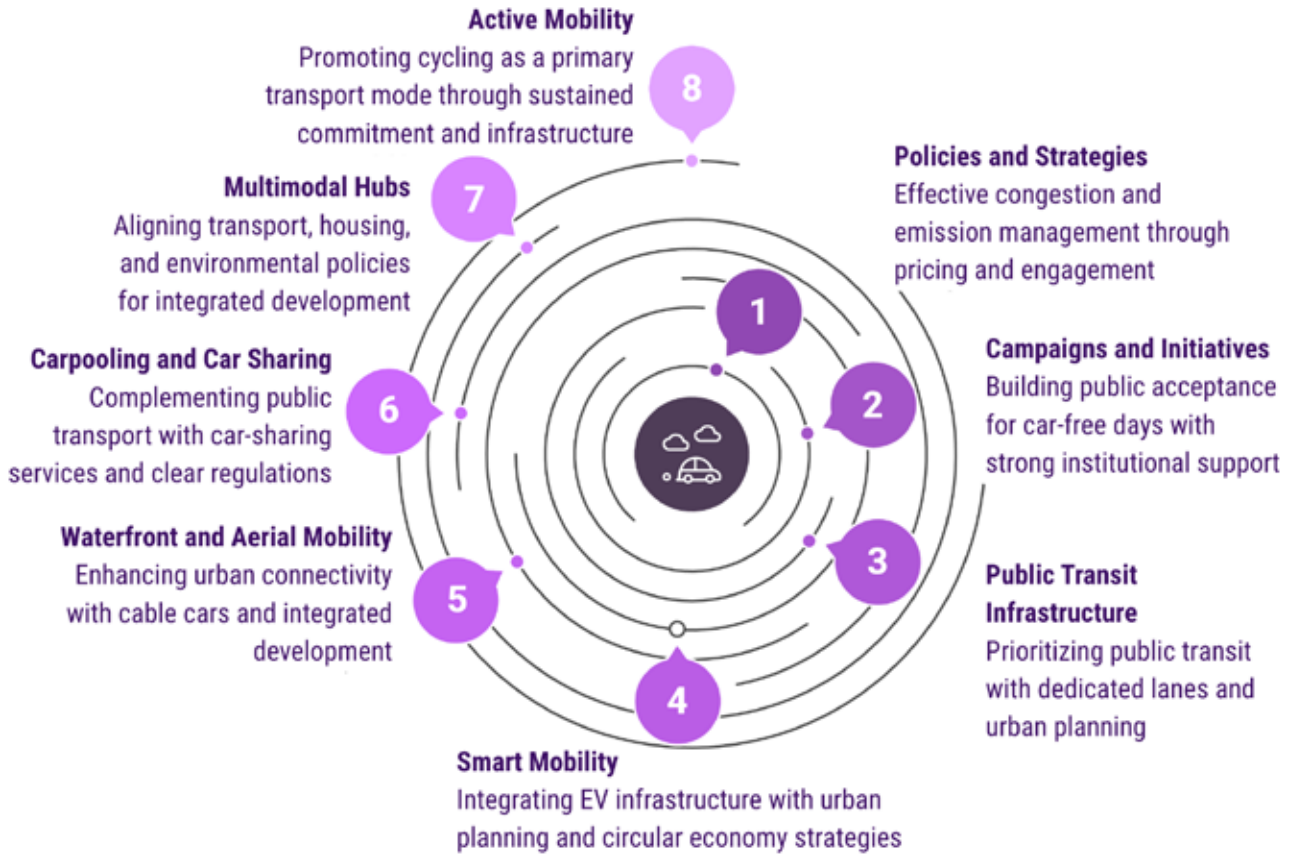


Figure 2.12: Lessons learned from urban mobility typologies relevant to local authorities and key stakeholders.

6. Public-Private Collaboration with Strong Public Oversight

Public-private partnerships have proven valuable in scaling infrastructure and services efficiently, particularly in public transport operations, EV charging networks, shared mobility services, and aerial mobility systems. However, these arrangements require strong public oversight to safeguard affordability, service quality, and public interest objectives. Clear regulatory frameworks and accountability mechanisms are essential to balance efficiency gains with social outcomes.

7. Financial Sustainability and Revenue Reinvestment

Long-term financial viability emerges as a cross-cutting concern. Successful cases demonstrate the importance of diversified funding models, cost-recovery mechanisms, and reinvestment of revenues into public transport, active mobility, and enabling infrastructure. Examples include reinvesting congestion pricing revenues in London and leveraging tourism-related income streams in Medellín to support system sustainability.

8. Behavioral Change Beyond Infrastructure Provision

Infrastructure alone is insufficient to shift mobility behavior. Sustained behavior change depends on complementary measures such as awareness campaigns, education programs, incentives, and cultural normalization. Car-free initiatives in Bogotá, shared mobility platforms in Europe, and cycling networks in Copenhagen illustrate how behavioral interventions amplify the impact of physical investments (Parra et al., 2020).

9. Climate Alignment and Low-Carbon Transition

All cases underscore the importance of aligning mobility systems with climate mitigation and resilience goals. Electrified public transport, EV infrastructure, renewable-powered aerial systems, and active mobility networks contribute to emissions reduction when integrated with local energy systems and climate-adaptive design. Norway's EV strategy and Copenhagen's cycling highways demonstrate how mobility transitions can support broader low-carbon urban agendas.

D. Innovative Trends in Global Sustainable Urban Mobility

Cities worldwide are reconfiguring their mobility systems, shifting from car-dependent models toward integrated, multimodal, and green transport solutions. This transition is driven by rapid urbanization, climate change imperatives, technological innovation, and evolving user preferences.

Across the examined case studies, ranging from policy instruments and public campaigns to shared and active mobility, urban mobility innovations reveal converging trends that emphasize integration, adaptability, and alignment with green and sustainable urban development objectives. Several recurring patterns emerge, highlighting the growing importance of coordinated transport systems that reduce car dependency, enhance accessibility, and improve environmental performance

1. The Rise of Multimodal and Integrated Transport Networks

A defining trend in global urban mobility is the shift from isolated transport solutions toward integrated systems that connect multiple modes. This is evident in cases such as the Metrocable in Medellín, which links hillside settlements to the metro network, significantly improving accessibility for marginalized communities. These integrated models reduce car dependency, congestion, and emissions while enhancing urban connectivity.

The effectiveness of multimodal systems depends on strong governance coordination to ensure efficiency, affordability, and accessibility. Cities offering diverse mobility options, such as aerial transit, buses, and rail, demonstrate greater resilience, as integrated systems can continue functioning during disruptions caused by extreme weather events or infrastructure failures.

2. Pedestrianization and the Reclaiming of Public Space

Pedestrian-oriented planning has emerged as a central pillar of sustainable urban mobility. Cities such as Copenhagen illustrate how prioritizing walking and cycling through projects like bicycle highways improves safety, public health, and urban vibrancy. Car-free and low-traffic environments encourage active mobility while enhancing the quality of public space.

Complementary initiatives, including bike-sharing and e-scooter programs, demonstrate how active mobility can be integrated into everyday urban life, reducing emissions, noise pollution, and congestion while revitalizing commercial districts. At the urban scale, the transit-oriented development (TOD) model of Hammarby Sjöstad highlights how integrating land use and public transport supports compact development, limits sprawl, and lowers transport emissions. However, such models require coherent governance to manage land values and mitigate gentrification risks.

3. Technology-Driven Mobility Solutions and Smart Governance

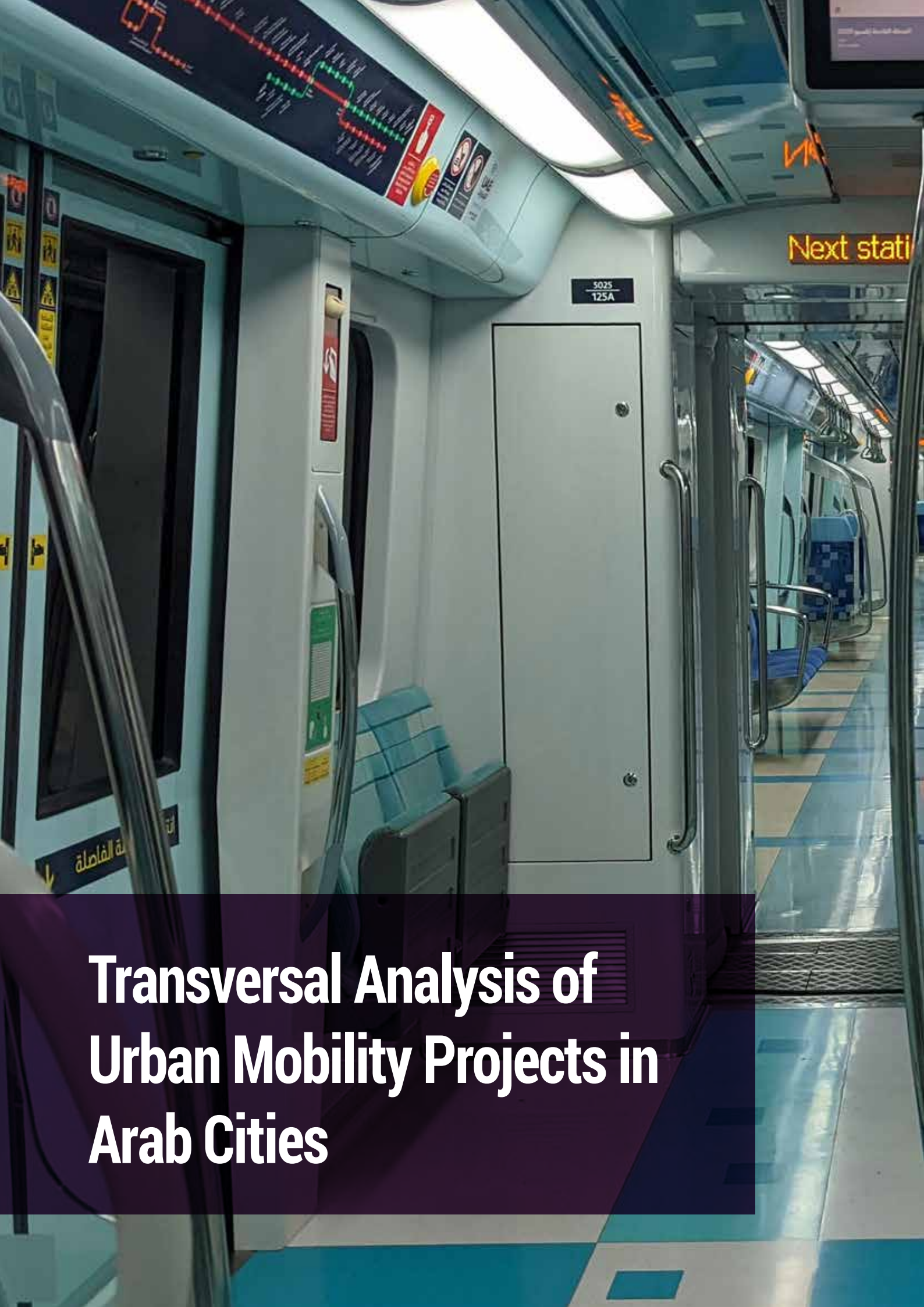
Digital technologies have transformed the management and operation of urban mobility systems. Innovations such as Mobility-as-a-Service (MaaS), smart mobility applications, and real-time data platforms optimize transport efficiency, improve user experience, and support demand-responsive services. These tools reduce unnecessary travel, manage congestion through dynamic pricing, and enhance system adaptability. At the same time, technology-driven mobility requires robust governance frameworks to ensure data protection, transparency, and equitable access. Smart governance is therefore a critical component in maximizing the benefits of digital mobility while addressing privacy and regulatory challenges.

4. Shared Mobility and the Shift Toward Transport as a Service (TaaS)

The expansion of shared mobility services reflects a broader transition from private car ownership toward transport-as-a-service models. Cities such as Amsterdam have embraced car-sharing, bike-sharing, and e-scooter systems to improve accessibility and reduce congestion. Digital platforms, including ShareNow, BlaBlaCar, and Zipcar, illustrate how shared mobility can complement public transport and improve first- and last-mile connectivity. These services contribute to sustainability by reducing emissions and improving space efficiency, but they also introduce governance challenges. Effective regulation is required to manage safety, curb disorder in public space, ensure data protection, and maintain equitable access.

E. Key Lessons for Mobility and Sustainable Development

1. **A Systems Approach is Necessary for Mobility Resilience:** Effective mobility solutions integrate multiple modes rather than relying on single-mode investments, creating adaptable and resilient transport networks.
2. **Public-Private Partnerships Drive Innovation and Efficiency:** Collaborations between governments and private operators have been central to scaling shared and smart mobility solutions while maintaining financial viability.
3. **Regulatory Frameworks Must Adapt to Emerging Mobility Trends:** Clear policies are needed to govern shared mobility, digital platforms, and smart services, balancing innovation with safety, equity, and public interest.
4. **Equity and Accessibility Should Be Central to Urban Mobility Planning:** Cases such as Medellín's Metrocable demonstrate the importance of prioritizing underserved communities and closing accessibility gaps through inclusive mobility planning.
5. **Cities Must Align Mobility Strategies with Climate Action Goals:** Reducing transport emissions requires sustained investment in active mobility, public transit electrification, and policies that promote walking, cycling, and shared transport as core components of urban climate strategies.



Transversal Analysis of Urban Mobility Projects in Arab Cities

A. Introduction

This chapter presents a transversal analysis of 60 urban mobility projects implemented across Arab cities, aiming to identify key patterns, relationships, and insights that characterize current mobility approaches in the region. The analysis examines how these projects address core dimensions of sustainable urban development and is structured around four components: project typology, project scale, project components, and visions and solutions. Visual materials, including maps, charts, and selected examples, support the analysis by illustrating trends and comparative findings across the dataset.

B. The Typology of the Selected Mobility Projects

1. Types of Projects

The typology derived from the literature provides a comprehensive classification framework, including strategy and policy initiatives, campaigns and initiatives, public transit infrastructure, multimodal hubs, smart mobility, aerial and waterfront mobility, carpooling, and active mobility. Many projects combine multiple mobility types to achieve broader environmental, social, and economic objectives, such as integrating walking, cycling, and public transport within multimodal hubs or combining recreational, ecological, and mobility functions in waterfront and active mobility projects.

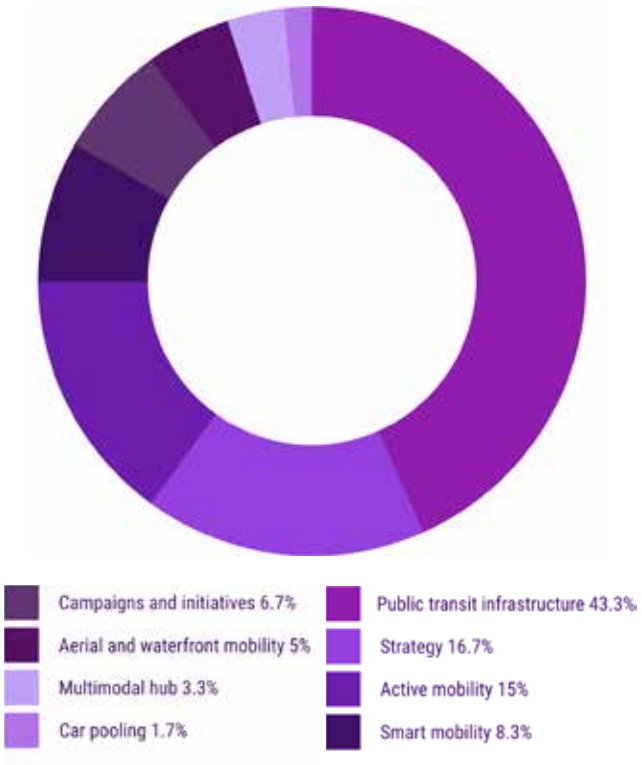


Figure 3.1: Types of urban mobility projects in the selected sample.

Public transit infrastructure represents the largest share of projects (43%), reflecting regional prioritization of mass transit investments, such as metro systems and bus networks, to address congestion and rising transport demand. Strategy and policy initiatives account for 17%, highlighting increasing emphasis on governance frameworks, regulatory reform, and long-term mobility planning. This trend signals recognition that infrastructure expansion alone is insufficient to achieve sustainable transport outcomes, particularly in the context of climate resilience and integrated urban development.

Active mobility projects constitute 15% of the sample, indicating growing awareness of walkability and non-motorized transport, though still constrained by structural and cultural reliance on private vehicles. Investments in pedestrianization and cycling have been driven by climate commitments, low-carbon urbanism agendas, and major international events that acted as catalysts for long-term urban transformation. Nevertheless, active mobility remains less prevalent than public transit, suggesting persistent barriers to wider adoption.

Carpooling (2%), multimodal hubs (3%), and aerial and waterfront mobility (5%) are the least represented categories, reflecting limited uptake of shared mobility, incomplete modal integration, and context-specific constraints related to cost and feasibility. Smart mobility solutions (8%) and campaigns and initiatives (7%) occupy an intermediate position, pointing to emerging interest in digital mobility tools and behavioral change, though not yet at scale.

2. Scales of Urban Mobility Projects

The scale of a project is often dictated by its type, coverage, and objectives, as shown in Figure 5.2. Urban mobility projects in the Arab region vary in scale, with initiatives ranging from neighborhood-level interventions to national-scale projects. The scale of a project determines its reach, impact, and governance complexity, influencing how it contributes to sustainable development goals (SDGs), particularly those related to urban sustainability (SDG 11), climate action (SDG 13), and economic growth (SDG 8). The projects in the sample are categorized into the following scales:

- **Neighborhood-scale projects** focus on localized interventions such as pedestrian streets, cycling infrastructure, traffic calming, and last-mile solutions, emphasizing human-centered design and community engagement.
- **Citywide projects**, the dominant scale in the sample, primarily involve public transit infrastructure and active mobility corridors that expand networks, enhance connectivity, and reduce congestion across urban areas.

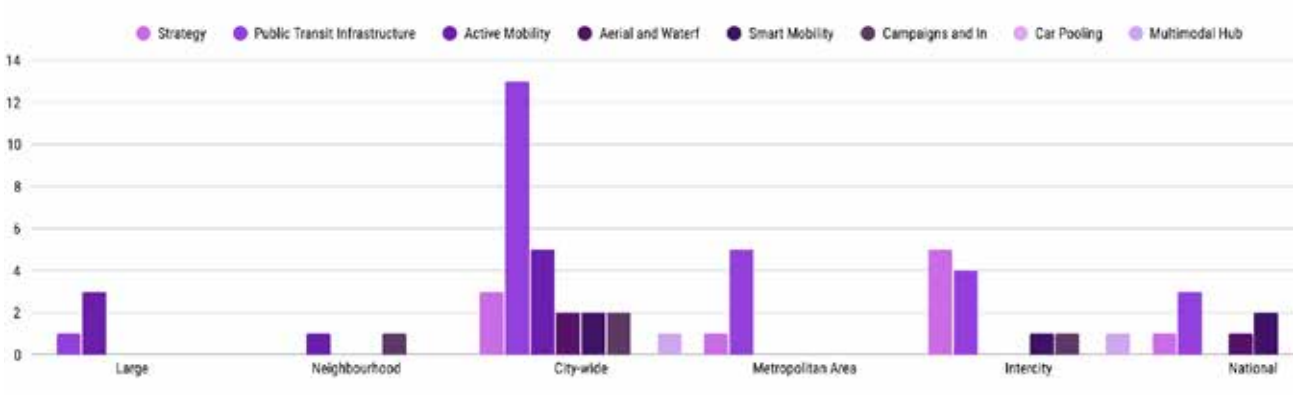


Figure 3.2: Scales and types of sustainable urban mobility projects in the sample.

- **Metropolitan-scale projects** serve commuter flows across urban regions, often through rail systems and major transport corridors responding to rapid urban expansion.
- **Intercity projects** connect multiple cities, typically through rail or intercity bus systems, supporting regional integration and long-distance mobility.
- **National-scale projects** include transport master plans, regulatory frameworks, EV charging networks, and high-speed rail, establishing long-term governance and investment direction.

Citywide projects dominate the sample, particularly in public transit and active mobility, reflecting urban priorities to reduce congestion, lower emissions, and improve accessibility. At the same time, the presence of intercity initiatives signals growing attention to regional integration and sustainable long-distance travel. While the selection is not statistically representative, given the absence of a comprehensive regional database, it captures a wide diversity of contexts and approaches, offering valuable insight into prevailing mobility trends across the Arab region. The geographic distribution of these initiatives, illustrated in Figure 3.3, broadly mirrors population patterns while also highlighting the dynamic investment of certain governments and cities in urban development, as well as the uneven availability of information.

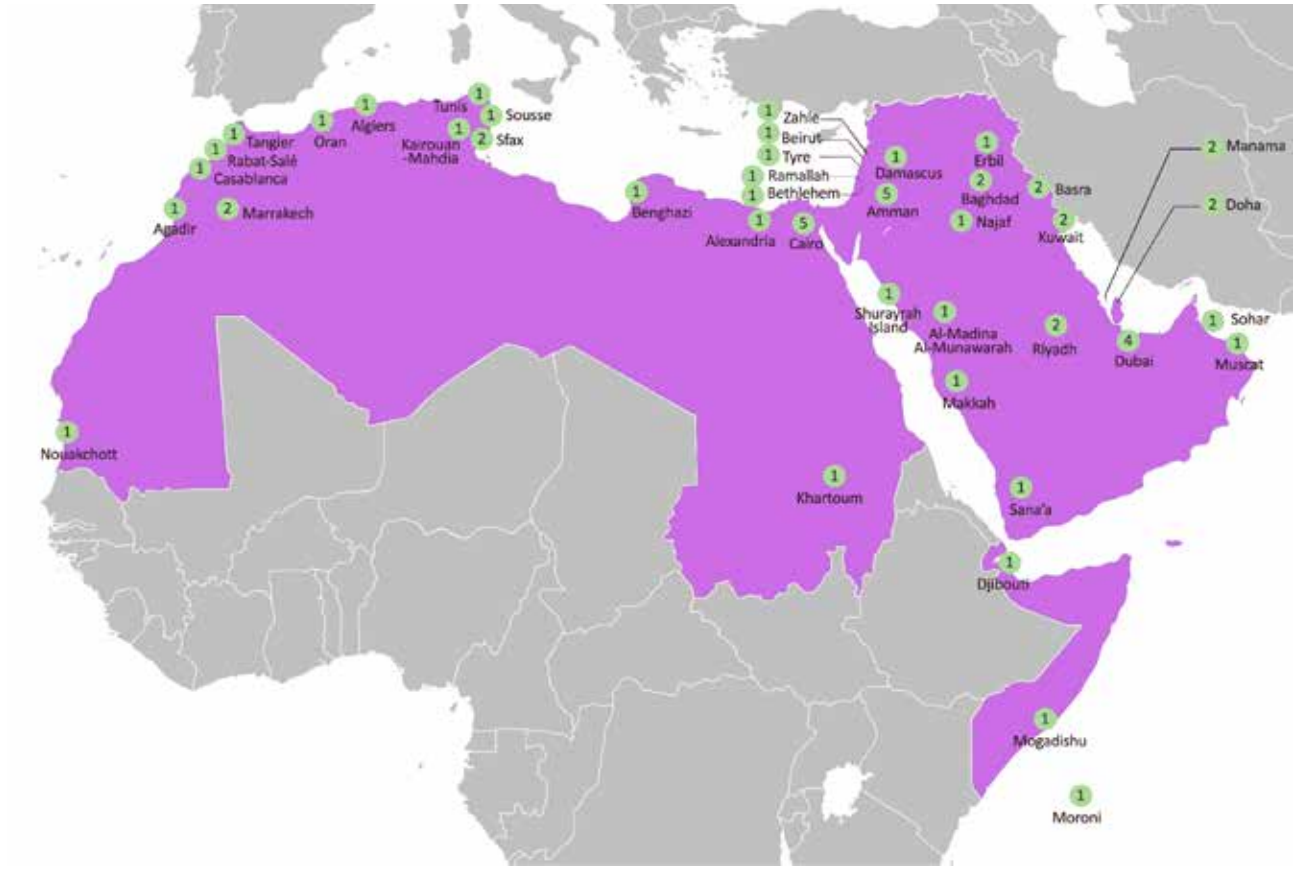


Figure 3.3: Geographical distribution of the 60 urban mobility projects.

Geographically, projects are concentrated in countries such as Morocco and Egypt (six projects each), followed by Tunisia, Jordan, Saudi Arabia, and Iraq (five each), reflecting both population distribution and levels of public investment. Cities such as Dubai and Cairo feature prominently, driven by distinct mobility challenges and ambitions ranging from smart mobility innovation to congestion mitigation. Overall, the distribution illustrates varied national and urban responses to shared sustainability and accessibility challenges.

C. Components and Design Priorities of Sustainable Urban Mobility Projects

1. Facilities of Urban Mobility Projects

Analyzed projects incorporate a broad range of facilities categorized as technical, interactive, commercial, leisure, greening, cultural, and special-use elements. These components vary by project type and scale, reflecting functional priorities and user needs.

Technical and interactive facilities, such as stations, surveillance systems, mobile applications, and real-time information, are widespread across all project types, indicating a strong emphasis on operational efficiency and user navigation. Commercial and leisure facilities are concentrated in multimodal hubs and active mobility projects, enhancing comfort and economic viability, while remaining limited in mass transit projects. Cultural elements appear primarily in campaigns and initiatives aimed at awareness and behavioral change.

Facilities addressing inclusivity, such as accessibility features for persons with disabilities, are present in a limited number of projects, highlighting a gap in inclusive mobility planning. Greening elements, including shaded walkways and green roofs, are prominent in active mobility and campaign-based projects but remain underrepresented in public transit infrastructure, suggesting that environmental integration is not yet central to mass transit design.

Urban mobility projects in the Arab region reveal distinct priorities depending on scale. Large-scale and neighborhood-level initiatives emphasize commercial, leisure, and cultural facilities, integrating mobility with daily life and fostering walkability, community engagement, and economic viability. City-wide projects are the most comprehensive, combining technical infrastructure with interactive features such as real-time tracking and passenger information systems to support mass transit efficiency. However, they place less emphasis on greening and cultural elements, reflecting a prioritization of operational performance over placemaking.

Metropolitan, intercity, and national-scale projects are predominantly technical and interactive, focusing on connectivity rather than local user experience. While accessibility features are occasionally integrated, commercial, leisure, and greening components remain limited, underscoring a transport-driven approach. This distribution highlights how project type and scale shape facility inclusion, aligning with broader urbanization trends and national development strategies such as Saudi Arabia's Vision 2030 and the UAE's Smart Mobility initiatives.

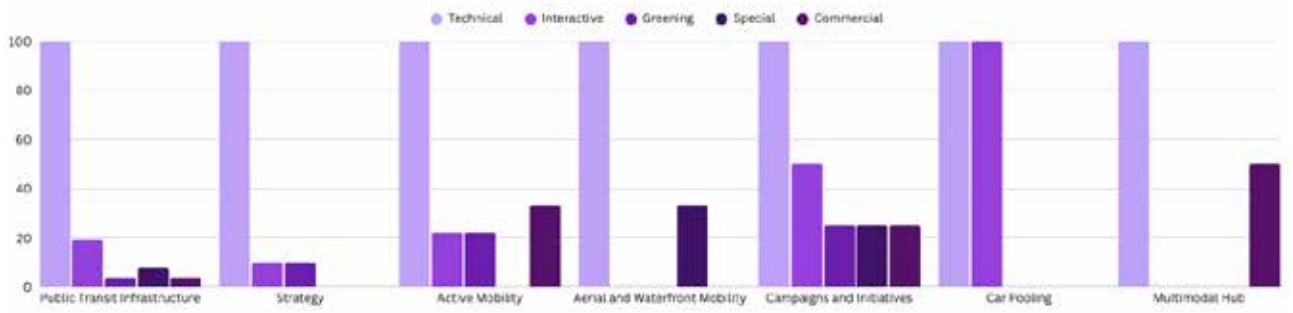


Figure 3.4: Percentages of facilities found in different types of sustainable urban mobility projects.

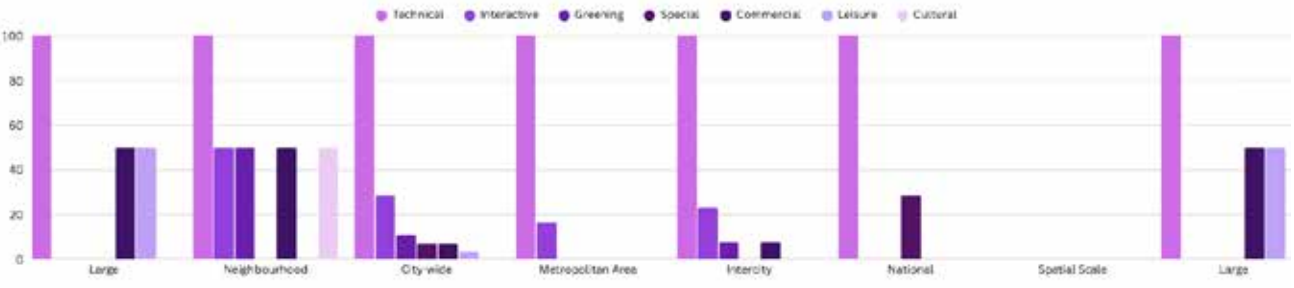


Figure 3.5: Facilities percentages categorized by project scale

The integration of commercial and leisure facilities within multimodal hubs reflects global transit-oriented development practices, yet the relatively limited presence of greening and cultural components suggests sustainability and placemaking remain secondary concerns. Overall, the region is transitioning toward more integrated and user-centric transport systems, though balancing infrastructure expansion with environmental and social sustainability continues to be a challenge.

2. Visions and Solutions

Strategic Frameworks and Policy Alignment

Out of 60 sustainable urban mobility projects in the Arab region, 50 align with master plans, national visions, or regulatory frameworks, reflecting strong governmental involvement in long-term development agendas. Eight projects explicitly comply with international standards in safety, design, and sustainability, mainly in public transit, waterfront mobility, aerial transport, and active mobility, facilitating funding access, interoperability, and technology transfer.

Innovative Visions and Policy Evolution

Beyond formal frameworks, 25 projects articulate independent visions with transformative objectives such as congestion reduction, smart mobility integration, pedestrian prioritization, and social inclusion. Ten projects contribute to policy evolution by advocating regulatory reform or strengthening institutional capacity. Examples include Amman's community-driven Khutoutna transport map, which functions as a policy advocacy tool influencing regulatory decisions.

Targeted Responses to Urban Challenges

Thirteen projects directly address pressing issues like climate change, traffic congestion, reliance on private cars, social exclusion, and post-crisis recovery. Lebanon's Zahle Eco-Friendly Hybrid Buses mitigate environmental degradation and high transport costs by offering inclusive fares, while YallaBus improves bus system efficiency through structured route information.

The Amman Cycling Map promotes safer biking infrastructure, and Libya's Benghazi Metro supports post-conflict reconstruction, economic diversification, and resilience following Storm Daniel (2023). Collectively, these projects highlight the dual role of mobility initiatives: improving transport systems while advancing environmental, social, and economic sustainability.

D. Thematic Analysis of the Selected Projects

This section provides a thematic exploration, examining governance structures, community participation strategies, sustainability and resilience efforts, and contributions to local and regional economic development. The analysis cross-examines projects' types, scales, objectives, components, and leading stakeholders to clarify how these factors shape project design and implementation across Arab cities.

1. Stakeholders' Involvement

In the sample, the following figures are noted:

10 projects involved public-private collaborations.

1 project is led solely by local organizations, and 5 projects were led by local authorities.

11 projects include collaborations with local organizations (3 projects) and local authorities (8 projects).

13 projects involve collaboration with international entities.

15 projects constituted direct community engagement in accordance with their core objectives.

4 projects have explicitly introduced social inclusivity and addressed it in their core objectives.

Stakeholders play a pivotal role in shaping sustainable urban mobility projects, influencing planning, implementation, and long-term sustainability. The diversity of leading actors, public administrations, private companies, and international collaborations reflects the complexity of governance in urban transport systems and the need to combine expertise, funding, and operational capacity.

Among the 60 projects, 26 are led by public administrations, primarily in public transit infrastructure and strategic planning at city-wide, metropolitan, intercity, and national scales, confirming governments' central role in policy-setting, financing, and regulatory oversight.

Twenty-four projects are driven through collaboration, including 10 public-private partnerships (PPPs), mainly in city-wide public transit infrastructure, indicating increasing reliance on private investment for implementation.

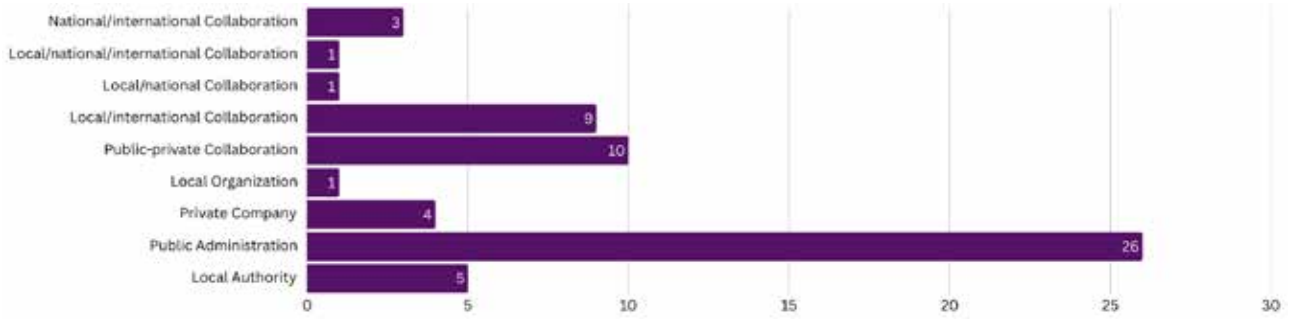


Figure 3.6: Types of stakeholders involved in leading the selected projects.

International involvement is significant: 13 projects involve collaborations with international entities, mostly at the city-wide scale, often providing technical expertise, funding, and exposure to best practices aligned with global frameworks such as the SDGs and the Paris Agreement. Nine projects involve local-international collaborations across public transit, campaigns and initiatives, and strategy development, while three are led by national-international collaborations (mostly in active mobility).

A smaller number involve multi-level local-national-international collaboration, particularly for metropolitan strategy-making. Private sector leadership remains limited but varied, with four projects led by private companies or developers across aerial mobility, smart mobility, active mobility, and carpooling. Five projects are spearheaded by local authorities, largely in public transit infrastructure and active mobility at large and city-wide scales.

The involvement of various stakeholders in sustainable urban mobility projects is shaped by the projects' type and scale as well as the broader governance context within each country. Stakeholder engagement varies significantly across countries, with some regions demonstrating a wider diversity of actors, while others remain more centralized with the dominant role of public administrations.

In city-wide mobility projects the significance of collaborative models is underscored, especially public-private partnerships and international collaborations in advancing smart mobility, sustainability-oriented projects, and infrastructure development across the Arab region.

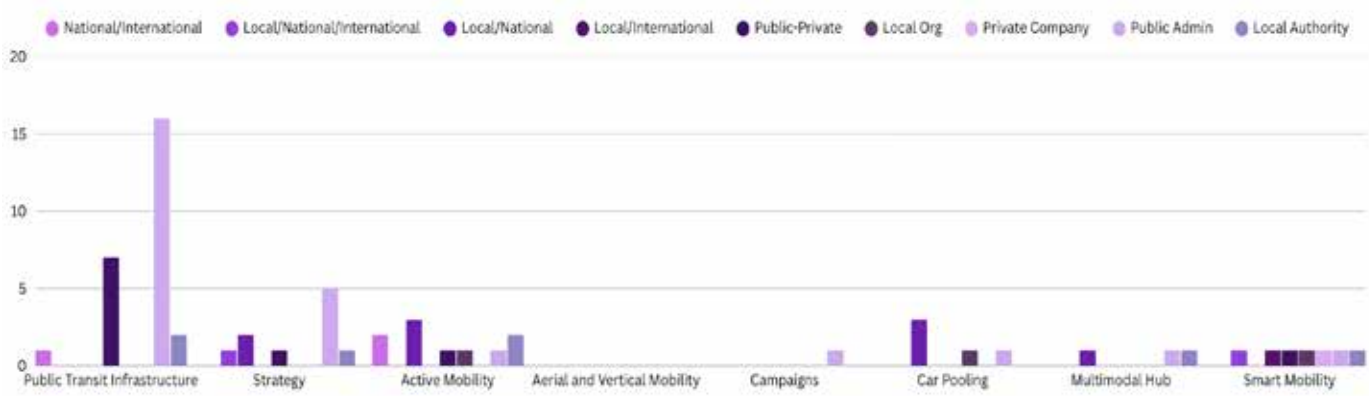


Figure 3.7: Types of projects and the leading stakeholders.

Collaborations Versus Solo Leadership

Complex projects, such as public transit infrastructure or multimodal hubs, often require collaborations between multiple stakeholders to pool financial, technical, and regulatory resources. In contrast, smaller or more localized projects, such as active mobility initiatives or smart mobility applications, may be led by a single entity, particularly local authorities, which oversee planning and implementation within their jurisdiction. The governance structure of each country, whether centralized or decentralized, also plays a crucial role in determining the level of stakeholder involvement and the extent to which private or international actors contribute to sustainable urban mobility development.

The transit-oriented neighborhood project in Amman, Jordan, a city-wide multimodal hub initiative, is developed through a collaboration between the Greater Amman Municipality and the World Bank. The project focuses on expanding the Bus Rapid Transit (BRT) system, improving pedestrian accessibility, and integrating green spaces into urban design. By leveraging public participation, the project ensures equitable, climate-resilient urban growth, reflecting the importance of cross-sectoral and international collaboration in large-scale mobility interventions. The partnership allows for access to international funding, expertise in transit-oriented development, and innovative technology, while the public sector ensures regulatory compliance and long-term operational management.

In contrast, the Shatt al-Arab Corniche Development Project in Basra, Iraq (large-scale) represents a locally led urban mobility and revitalization initiative. This transformative waterfront development project, initiated by the municipality of Shatt al-Arab and the Basrah Governorate, is fully funded by the Basrah Governorate with an estimated cost of $8.5 billion and implemented by Sahel al Iraq Company.

Shatt al-Arab Corniche Development Project, Iraq

The Shatt al-Arab Corniche Development Project in Basra is a locally led urban revitalization initiative by the municipality of Shatt al-Arab and Basrah Governorate, fully funded with $8.5 billion. Covering 8 km, it enhances waterfront accessibility, pedestrian mobility, and tourism, featuring a bridge walkway, cultural and commercial zones, recreational spaces, and improved connectivity to transform the riverfront into a dynamic urban and economic hub.

https://araburban.org/en/infohub/projects/?id=9477

Figure 3.8: Basra's riverfront promenade by Shatt Al Arab.

Amman Transit-Oriented Neighborhoods project, Jordan

The Transit-Oriented Neighborhoods project in Amman integrates urban planning and transportation to enhance mobility and sustainability. Collaboration is central, with the World Bank, Greater Amman Municipality, and Ecosistema Urbano co-developing solutions. Funded by the QII Partnership, the project prioritizes BRT expansion, pedestrian accessibility, and green spaces, leveraging spatial analysis and public participation to ensure equitable, climate-resilient urban growth.

https://araburban.org/en/infohub/projects/?id=9688

Figure 3.9: Intersection of Adan Street with the Hijaz Railway Path in Al Yarmook Street.

Spanning approximately 8 kilometers, the project seeks to enhance public spaces, pedestrian accessibility, and economic vitality along the Shatt al-Arab River, positioning the area as a prime cultural and touristic destination. It includes three distinct zones: a Heritage and Cultural Zone, a Wellness Zone, and a Commercial Zone, each integrating pedestrian pathways, recreational areas, and commercial facilities. Additionally, a 300-meter-long pedestrian bridge aims to reduce vehicular reliance and enhance connectivity between the river's northern and southern banks.

The variations in these two projects illustrate the broader governance dynamics influencing sustainable mobility projects across the Arab region, where some cities rely on international expertise and funding, while others pursue large-scale projects through localized institutional frameworks and municipal financing.

Direct Community Engagement in Sustainable Urban Mobility Projects

Community engagement strengthens inclusivity, legitimacy, and long-term project success, as public participation supports ownership and improves alignment with local needs (Innes & Booher, 2004). Participation ranges from informative to consultative and collaborative approaches, using methods such as forums, surveys, workshops, co-design, and digital platforms. Higher levels of engagement can involve empowered participation, where communities actively shape policies and projects (Carvalho et al., 2024).

In the sample, 15 projects involve direct community participation. Among these, six are strategy projects at city-wide and regional


© Alda, 2021

Figure 3.10: First bicycle parade in Kairouan.

AUTREMENT Project, Tunisia

The AUTREMENT project fosters sustainable urban mobility in Kairouan and Mahdia, Tunisia, through citizen engagement and collaborative urban planning. With Strasbourg's expertise, it focuses on active mobility, public space enhancement, and local governance training. Citizens, including youth and women, contribute to design studies and micro-projects, ensuring inclusive, bottom-up urban development. The project aims to improve residents' quality of life, promoting cycling and public participation in local affairs.

https://araburban.org/en/infohub/projects/?id=9467


© Ahmed, N. O., 2020.

Figure 3.11: Stations of the Cairo Bike Project.

Cairo Bike Project, Egypt

The Cairo Bike project is Egypt's first public bike-sharing system, launched in October 2022 to promote sustainable urban mobility. Covering Downtown Cairo and nearby areas, it provides affordable transport with solar-powered stations and a user-friendly app. Community engagement is central, with public participation in planning and expansion efforts. Supported by ITDP Africa, UN-Habitat, and the Swiss Drosos Foundation, the project fosters a cycling culture and inclusive mobility, particularly for women.

https://araburban.org/en/infohub/projects/?id=9494

scales, where public input is often integrated during assessment and planning phases. A key example is the Sustainable Urban Mobility Plan of Greater Sousse (SUMP), Tunisia, which included listening and reflection workshops with civil society and public actors, alongside strategic workshops supporting participatory decision-making. At the national scale, the Comoros Interisland Connectivity Project (PICMC) (waterfront mobility) uses Stakeholder Engagement Plans (SEP) to incorporate community perspectives.

Campaigns and initiatives include three projects with bottom-up engagement, such as the AUTREMENT Project in Tunisia (intercity), which used workshops and consultations to align interventions with residents' needs.

Two smart mobility projects use participatory data collection, where volunteers (students and commuters) interact with drivers and passengers to refine transport solutions and map design.

Three active mobility projects emphasize engagement to support implementation: in Jordan, the Amman Cycling Map is supported by community insights mobilized through the Zaatari Women's Biking organization; the Cairo Bike Project similarly relied on advocacy and community pressure to influence outcomes.

Two projects place participation at the core of their objectives: a city-wide multimodal hub in Amman designed through participatory planning for accessibility and user-friendly infrastructure, and a Tunisian intercity campaign/initiative emphasizing community engagement for awareness and sustainable mobility practices.

Social Inclusivity and better accessibility as Drivers of Urban Mobility Projects

Social inclusivity and enhanced accessibility appear as explicit priorities in a smaller subset of projects. Four projects explicitly prioritize social inclusivity, while seven include design features addressing the mobility needs of women and children. The Baghdad Metro, for example, introduces dedicated carriages for women and children and improves accessibility for passengers with reduced mobility. The Comoros Interisland Connectivity Project (PICMC) improves women's safety through lighting and open spaces and enhances accessibility for individuals with disabilities.

Inclusivity also appears through participatory and capacity-building approaches. The AUTREMENT project engages youth, women, and local stakeholders to shape planning outcomes. The Yalla Let's Bike project in Damascus promotes women's inclusion through cycling workshops, repair-skill training, and advocacy, linking mobility to empowerment and resilience.

Accessibility is a key driver in 20 projects, including seven in public transit infrastructure and three each in active and smart mobility. Five projects explicitly integrate accessibility for residents with special needs, such as the Makkah Public Transport Program in Saudi Arabia. Connectivity objectives are also prominent: 16 projects focus on linking city centers and suburbs to reduce congestion, five aim to ease daily commuting, and one focuses specifically on facilitating modal transitions to streamline networks and reduce congestion.

Comoros Interisland Connectivity Project (PICMC), Comoros

The Comoros Interisland Connectivity Project (PICMC) enhances maritime infrastructure, safety, and connectivity across the islands of Grande Comore, Moheli, and Anjouan. Community engagement is key, with a Stakeholder Engagement Plan (SEP) ensuring public participation. The project improves transport access, supports local businesses, and addresses vulnerable groups, including women and disabled individuals by upgrading ports and vessels and fostering inclusive infrastructure for safer, efficient, and sustainable mobility.

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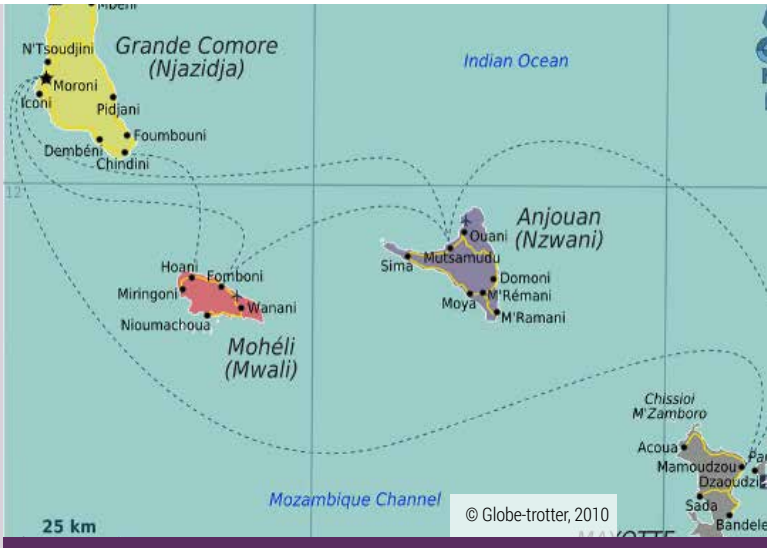


Figure 3.12: Transport network across the four Comoros islands.

© Bandakji, W., 2018

Figure 3.13: Yalla Let's Bike, the second bike ride for peace in Homs, Syria.

Yalla Let's Bike project, Syria

Yalla Let's Bike Syria promotes women's empowerment and social inclusivity through cycling, challenging gender norms and advocating for independent mobility. Since 2018, it has expanded across Syria, offering cycling workshops, bike repair training, and advocacy campaigns for safe, sustainable transport. With over 1,000 women involved, the initiative fosters climate resilience, accessibility, and grassroots urban mobility, proving cycling can be a tool for freedom and recovery.

https://araburban.org/en/infohub/projects/?id=9879

2. Environmental and Resilience Aspects of Sustainable Urban Mobility Initiatives

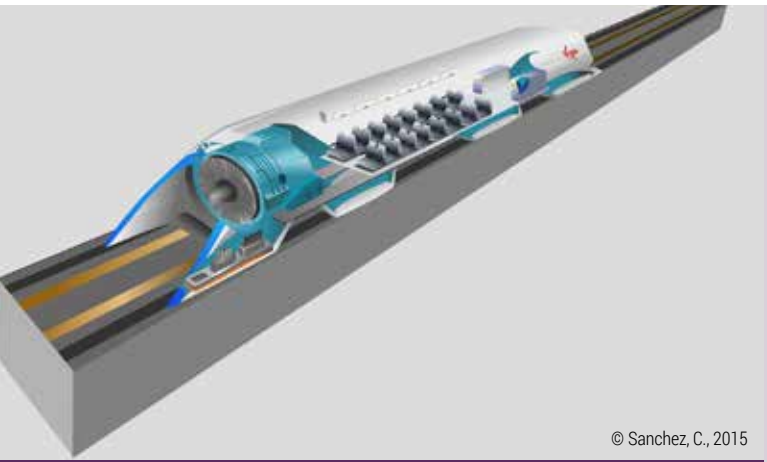
In the sample ,the following figures are noted:

- *7 projects involve high-tech transportation systems, and digital infrastructure is found in 6 projects.*
- *16 projects emphasize energy-efficient technologies as a key sustainability approach.*
- *12 projects incorporate renewable energy solutions.*
- *23 projects incorporate design adaptations to extreme environmental conditions.*
- *21 projects feature dedicated technical training, awareness campaigns and workshops.*
- *14 projects aim to improve residents 'quality of life ,with 5 projects promoting a healthy lifestyle as a core objective.*

High-Tech Urban Mobility Projects

High-tech integration reflects a growing emphasis on efficiency and sustainability. Five projects leverage AI-driven technologies for traffic management, problem detection, autonomous transport, and real-time optimization, spanning public transit infrastructure, aerial mobility, active mobility, and smart mobility. Seven projects integrate driverless, automated, or high-speed technologies, mainly in public transit. A notable example is the Dubai Hyperloop, combining AI-powered monitoring with autonomous operation and high-speed vacuum-tube transit.

Digital infrastructure appears in six projects, including digital maps, mobile apps, and electronic payment. The YallaBus Project uses an app with real-time schedules and GPS tracking to support navigation. Energy-efficiency measures are emphasized in 16 projects, mainly in public transit and active mobility, including climate-controlled pathways, low-floor designs, real-time passenger information, rainwater harvesting, and irrigation systems. Examples include the Oran Tramway (Algeria) with energy-efficient systems and the Redevelopment of Abou Nawas Corniche, integrating efficient irrigation, lighting, and green spaces.



© Sanchez, C., 2015

Figure 3.14: Detailed 3D cutaway concept of a Hyperloop capsule, revealing the inner workings.

The Hyperloop, UAE

Hyperloop UAE is a high-tech transportation project using vacuum tube technology and AI-driven autonomous operation to achieve near-supersonic speeds. Designed for passenger and freight transport, it integrates renewable energy, real-time monitoring, and aerodynamic pod design for efficiency. Overseen by the RTA and HyperloopTT, the system aims to reduce Dubai-Abu Dhabi travel to 12 minutes, advancing sustainable, smart mobility in the UAE.

https://araburban.org/en/infohub/projects/?id=9406

YallaBus, Lebanon

YallaBus is a technology-driven mapping app designed to organize Beirut's informal public transportation system. It provides real-time bus schedules, GPS tracking, and a digital route map, enhancing accessibility for commuters. Developed by students at the American University of Beirut, it integrates data collection, fleet GPS tracking, and user feedback to improve efficiency. The project won the "Reimagine Lebanon" competition, securing funding for development.

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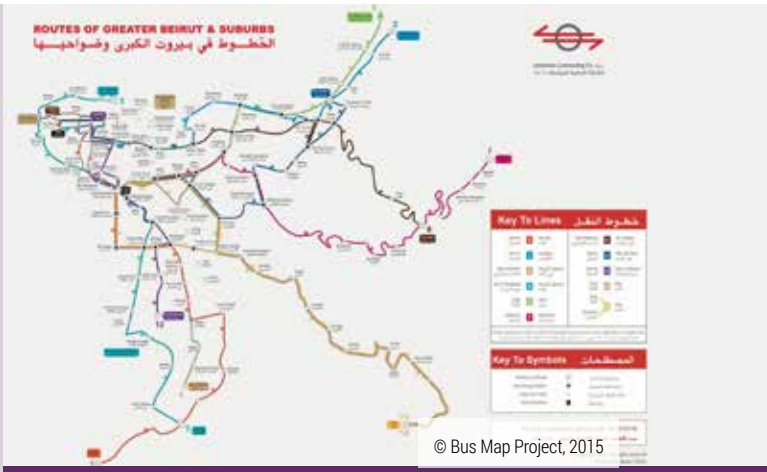

Figure 3.15: Greater Beirut informal transit network map.

Integration of Renewable Energy and Climate Adaptation

The integration of renewable energy in urban mobility projects enhances sustainability and resilience by reducing environmental impact and ensuring long-term efficiency. Among the analyzed projects, 12 incorporate renewable-energy solutions, including solar panels, rechargeable batteries, and energy-efficient infrastructure. These innovations contribute to decarbonizing transport systems, reducing reliance on fossil fuels, and improving adaptability to climate conditions.

For example, Bikesol in Iraq integrates solar panels generating 60 MW of renewable energy alongside protective barriers for safety and the planting of 160,000 trees, merging urban mobility with climate adaptation strategies. Similarly, the Taxi and Bus Stations Project in Sana'a emphasizes solar energy use and modernized infrastructure to create a sustainable, energy-efficient public transport system. Such initiatives demonstrate how renewable energy adoption in urban mobility not only reduces carbon emissions but also enhances environmental resilience, reinforcing sustainable urban development.

Bikesol, Iraq

BikeSol is a renewable-energy-integrated cycling infrastructure project in Erbil, Iraq. Spanning 40 km, it features solar panels generating 60 MW of clean energy to power the pathway and support the city's grid.

The project enhances eco-friendly transport, air quality, and safety with protective barriers and urban greening (160,000 trees). Funded by the Kurdistan Regional Government, it promotes sustainable mobility and active lifestyles.

https://araburban.org/en/infohub/projects/?id=9742

Figure 3.16: Screenshot from an Instagram animated reel "BikeSol-Erbil" by NOVA Studio Group (Adrián Berenguer).

Figure 3.17: The interior of King Abdullah Financial District (KAFD) metro station

Riyadh Metro, Saudi Arabia

The Riyadh Metro is a climate-resilient transit system designed to withstand extreme heat and desert conditions. Spanning 176 km with 6 lines, it features heat-resistant materials, AI-powered crowd management, and driverless trains reaching 90 km/h. Integrating traditional Najdi architecture with modern infrastructure, the metro reduces traffic congestion and carbon emissions, supporting Saudi Vision 2030 and enhancing Riyadh's sustainability and resilience.

https://araburban.org/en/infohub/projects/?id=9505

Resilience is explicitly stated as a core objective in six projects, particularly strategic mobility plans. The Active and Intelligent Mobility Project (MAIS) in Sfax, Tunisia promotes green and smart mobility to enhance quality of life and climate resilience. Climate-responsive design features appear in 23 projects, addressing hot climates, desert conditions, heat waves, and maritime and coastal conditions. Examples include the Riyadh Metro, engineered with heat-resistant materials, and the Najaf-Karbala Railway (Iraq), using an elevated design to enhance safety and resilience to ground-level disruptions.

Technical Training, Workshops, and Awareness Campaigns for Sustainability

Beyond infrastructure, 21 projects include awareness campaigns, technical workshops, and educational initiatives supporting safety, capacity building, smart mobility adoption, and sustainable transport behavior. The Oran Tramway (Algeria) supports technical workforce development through the establishment of a rail training institute in Algiers (2017). The MAIS project (Sfax) includes technical training, climate finance workshops, and community awareness sessions to strengthen institutional capacity and engagement.

Figure 3.18: Two tramway cars in Oran at the Ibn Badis Mosque station.

Oran Tramway, Algeria

The Oran Tramway Project promotes sustainable public transport through light-rail development in Oran, Algeria. Training programs and skills development were implemented, including the establishment of a rail training institute in Algiers in 2017. Public awareness campaigns and local employment initiatives support economic growth. The project aims to reduce travel time, enhance accessibility, and contribute to the city's sustainability by encouraging the use of clean, efficient transit.

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Bethlehem Mobility Strategy 2030 West bank, Palestine

The "Bethlehem Mobility 2030" strategy addresses transportation challenges by prioritizing affordable, inclusive, and sustainable mobility. It incorporates education, cultural initiatives, and public awareness campaigns to promote sustainable practices. The strategy includes 39 projects focused on improving infrastructure, public transport, and non-motorized transport, alongside capacity-building and stakeholder engagement. By promoting environmental sustainability, the plan aims to create an accessible, livable city for residents and visitors.

https://araburban.org/en/infohub/projects/?id=9442

Figure 3.19: Screenshot from a report for participatory and co-creative workshops of stakeholders.

Behavioral change efforts include the Medina Bus outreach through its website and app and the Amman Cycling Map through social media and community engagement. Inclusivity-oriented advocacy is illustrated by Yalla Let's Bike (Syria) and the Bethlehem Mobility Strategy 2030, which integrates cultural and educational initiatives to promote green mobility choices and support pedestrian and cycling infrastructure.

Better Quality of Life and Reducing Impact on the Environment

Sustainability is a core objective in 32 projects, with two explicitly aligning components with the SDGs. The Cable Car Transport System in Tangier reduces congestion and emissions while improving tourism accessibility. Yalla Let's Bike links sustainability with SDG 5 (gender equality) and SDG 13 (climate action) through women's cycling participation and emission reduction.

Tangier Cable Car Transport System, Morocco

The Tangier Cable Car Transport System is Morocco's first cable car initiative, integrating sustainable mobility within the Tangier City Port Redevelopment Project. Designed to reduce gas emissions, it aligns with sustainability goals by promoting eco-friendly transport, reducing congestion, and enhancing urban connectivity. The system, spanning two kilometers with four stations, will accommodate 32,000 travelers daily, offering efficient, low-impact mobility while supporting tourism and urban integration.

https://araburban.org/en/infohub/projects/?id=9458

Figure 3.20: Tangier Port seen from above by cable cars.

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Figure 3.21: One of Alexandria's Electric buses

Alexandria Green Transport Initiative, Egypt

The Alexandria Green Transport Initiative enhances quality of life by modernizing public transit with clean energy solutions. Launched in March 2023, it aligns with Egypt Vision 2030, reducing fossil fuel consumption and carbon emissions. The project introduced 15 electric buses, expanding to 40, each covering 250 km per charge. This initiative promotes sustainable urban mobility, ensuring eco-friendly and efficient transportation in Alexandria.

https://araburban.org/en/infohub/projects/?id=9500

Quality of life is emphasized in 14 projects, with five explicitly promoting healthy lifestyles. The Bike-Share Initiative in Tyre, Lebanon, encourages cycling to support air quality and reduce congestion and accidents. Environmental impact reduction is prioritized in 17 projects, targeting emissions reduction and decreased car dependency; the Alexandria Green Transport Initiative frames its strategy around improving quality of life through lower fossil fuel use, reduced emissions, and strengthened public transport.

Pedestrian and connectivity infrastructure is central in seven projects, including the Future Loop in Dubai, aligned with Dubai's Quality of Life Strategy 2033 and the "20-minute city" vision for 2040. The initiative includes a 2-km elevated walkway, 30,000 m² of air-conditioned outdoor spaces, green infrastructure, recreational areas, and links to metro stations and cycling routes, aiming for 80% of residents to access essential services within a short commute.

3. Economic Impact of Sustainable Urban Mobility Initiatives

In the sample, the following figures can be noted:

- **5 projects explicitly target job creation and business growth.**
- **13 projects mentioned touristic attraction for visitors in their core objectives**
- **9 projects targeting connectivity with key urban areas and key leisure and commercial facilities to boost economic activities and trade.**
- **6 projects explicitly emphasize the need for affordable access to mobility.**

Job Creation and Business Growth

Sustainable urban mobility projects contribute to economic resilience through improved accessibility, employment generation, and support to local economies. Three projects explicitly identify employment generation as a core objective: the Amman BRT, which improves connectivity between residential and employment zones and supports job creation through construction, operations, and maintenance; the Iraq Development Road, positioning Iraq as a transit hub between Asia and Europe and supporting employment in logistics and infrastructure while reducing reliance on hydrocarbons; and the Amman Cycling Map, which supports commuting, especially for foreign workers traveling to downtown areas, thereby strengthening job accessibility and reducing transport costs.

Two projects explicitly emphasize stimulating business activity: the Doha Metro, which supports economic productivity by reducing congestion and improving movement across the city, and the Downtown Cairo Passageways Redevelopment, which revitalizes public space and supports entrepreneurship by creating walkable zones that enhance business visibility and tourism.

Tourist Attraction in Sustainable Urban Mobility Projects

Tourism is explicitly referenced in the objectives of 13 sustainable urban mobility projects, highlighting the role of transport in enhancing visitor experience, sustainability, and economic growth. Public transit systems such as BRT Agadir modernize local networks, offering safe and frequent services that strengthen the city's economic and tourism appeal. Similarly, the Doha Metro provides fast, eco-friendly connections to souks, museums,

Iraq Development Road

The Iraq Development Road Project is a 1,200-kilometer transport corridor connecting Basra's Faw Port to Turkey's border, transforming Iraq into a regional trade hub. It integrates railways, highways, and logistics infrastructure, enhancing economic integration and mobility.

The project will generate over one million jobs upon completion, reducing hydrocarbon dependence and boosting employment for young job seekers, supporting sustainable economic growth and connectivity.

https://araburban.org/en/infohub/projects/?id=9838

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Figure 3.22: Map of the Iraqi development road project.

Downtown Cairo Passageways Redevelopment, Egypt

The Downtown Cairo Passageways Project revitalizes historic passageways into vibrant cultural and economic hubs, fostering business growth and urban regeneration. By transforming underutilized spaces into commercial hubs, co-working spaces, and artisan markets, it stimulates local entrepreneurship. Integrated with sustainable infrastructure and heritage preservation, the project supports urban revitalization while boosting economic activity, aligning with Egypt's broader regeneration strategies for a thriving downtown.

https://araburban.org/en/infohub/projects/?id=9491

© Nagati, O., 2016

Figure 3.23: KODAK green and public pathway.

cultural districts, and sports venues, supporting Qatar's ambition to become a leading global tourist destination while reducing congestion and emissions. Active mobility projects promote ecotourism and urban exploration by encouraging walkability and cycling. The Shura Pedestrian Bridge offers sustainable access to Shurayrah Island within The Red Sea Project, blending infrastructure with natural surroundings to support regenerative tourism.

The Amman Cycling Map Initiative enhances green tourism by providing designated cycling routes, positioning Amman as a bike-friendly city for visitors and foreign workers. Smart mobility solutions also contribute, such as Riyadh's EV Charging Stations Project, which facilitates low-carbon travel for tourists using electric vehicles and strengthens the city's sustainable tourism strategy.

By integrating public transit, active mobility, and smart mobility solutions, these projects make cities more attractive, accessible, and environmentally responsible. They not only improve visitor experiences but also preserve cultural and natural heritage, aligning tourism growth with sustainability and resilience goals.

Connectivity and Economic Development

Connectivity is a central driver of economic development, with 20 projects focusing on public transit infrastructure to support economic growth. Notable examples include the Riyadh Metro, aligned with Vision 2030 to reduce congestion and emissions, improve access to business districts, and support economic diversification. Similarly, the Benghazi Metro (Libya) enhances mobility, supports tourism, and encourages private investment

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Figure 3.24: An ALSA bus with passengers on board.

BRT Agadir, Morocco

The Agadir Bus Rapid Transit (BRT) system aims to modernize public transport, providing efficient, sustainable, and eco-friendly transit for residents and visitors. Spanning 15.5 km with 36 stations, Line 1 connects key areas, including the fishing port and commercial centers, enhancing Agadir's tourism appeal. The network's expansion with Lines 2 and 3 strengthens the city's economic and touristic attractiveness. Operational by 2025, it will serve 12 million passengers annually.

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Figure 3.25: Aerial view of the Shura bridge with lanes for pedestrians, bicycles, and smart cars.

Shura Pedestrian Bridge, Saudi Arabia

The Shura Pedestrian Bridge connects Saudi Arabia's mainland to Shurayrah Island, a luxury tourism hub within The Red Sea Project. Spanning 1.2 km, it enhances seamless visitor access while integrating sustainability and marine conservation. Designed for pedestrians, cyclists, and smart cars, it supports regenerative tourism by preserving ecosystems. Officially opened in October 2022, it strengthens the Red Sea's appeal as a premier destination.

https://araburban.org/en/infohub/projects/?id=9375

around stations. Six projects explicitly link transport infrastructure with investment opportunities and economic diversification. These include the Oman National Transport Strategy 2040, which strengthens connectivity between ports, airports, and free zones to improve logistics efficiency and attract investment, and Qatar's Al Khor Road, which connects economic sectors while upgrading enabling infrastructure to support real estate, tourism, and agricultural investment. Across the sample, nine projects strengthen connectivity with key urban areas and economic hubs. Overall, 34 projects prioritize integration with existing public transport networks and connections between urban areas and key facilities. Thirteen projects focus on improving users' connectivity within the city.

Affordability and Economic Accessibility

Affordability is explicitly emphasized in six projects, reflecting the recognition of mobility as a prerequisite for social and economic inclusion. The Kuwait City Metro is designed to provide affordable, fast, and accessible transit, including individuals with special needs, while supporting urban expansion. Similarly, SWVL (Egypt) offers an affordable alternative to private car ownership, helping reduce congestion in line with smart city strategies. Six projects improve access to economic activities, including the Shatt al-Arab Corniche Development Project, which strengthens pedestrian and transport connectivity to support tourism and waterfront economic growth. Four projects focus on improving access to city centers, such as the Tunis Rapid Railway Network (RFR) and the Khartoum Local Train Project, reducing car dependency and congestion. Five projects aim to improve commuting options. The Future Loop in Dubai seeks to enable 80% of residents to reach essential services within short commutes, while the EV Charging Stations initiative supports an accessible transition to electric mobility.

E. Proposed Framework: Towards Integrated Sustainable Urban Mobility Initiatives

The typology of sustainable urban mobility projects identified in the literature provides a comprehensive basis for understanding the diversity of mobility initiatives. This report aims to examine how these initiatives consider sustainability and resilience

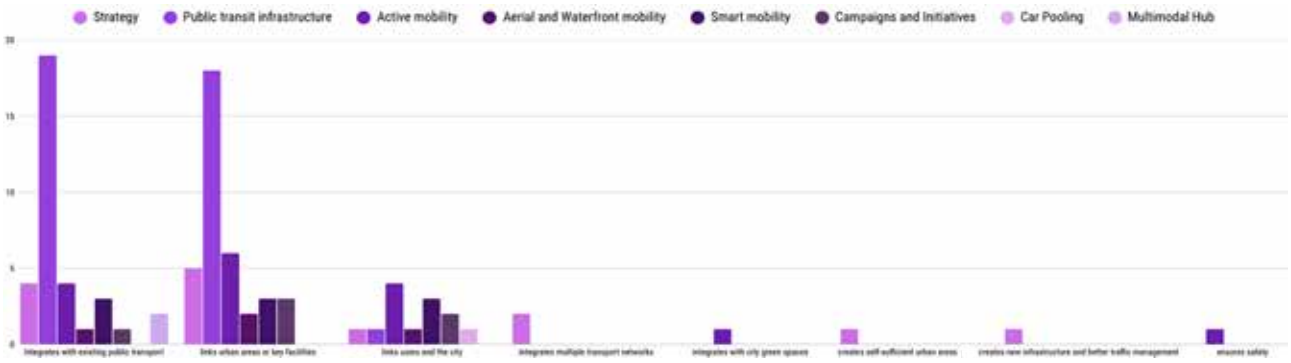

Figure 3.26: Connectivity in sustainable urban mobility projects.

through their objectives, components, and outcomes. To support this analytical goal, each project is investigated through three critical dimensions, recognized in the literature as major pillars of sustainability and resilience:

(1) Governance, Public Engagement, and Inclusivity;

(2) Environmental Sustainability and Resilience;

(3) Economic Development.

Governance, Public Engagement, and Inclusivity

Governance and public engagement are central to urban mobility success, as effective policies and planning mechanisms are needed to ensure sustainable outcomes (Banister, 2008). Multi-stakeholder governance structures, bringing together national and local governments, private sector actors, and civil society, can enable more integrated and sustainable mobility solutions (Marsden & Reardon, 2017).

Kuwait City Metro, Kuwait

The Kuwait Metro enhances affordability and better access by providing a fast, cost-effective transit system connecting outer urban areas to Kuwait City's center. Spanning 160 km with 68 stations, it integrates with other transport modes, improving mobility, particularly for individuals with special needs. By reducing congestion and emissions, it fosters economic growth and supports Kuwait's transformation into a financial hub.

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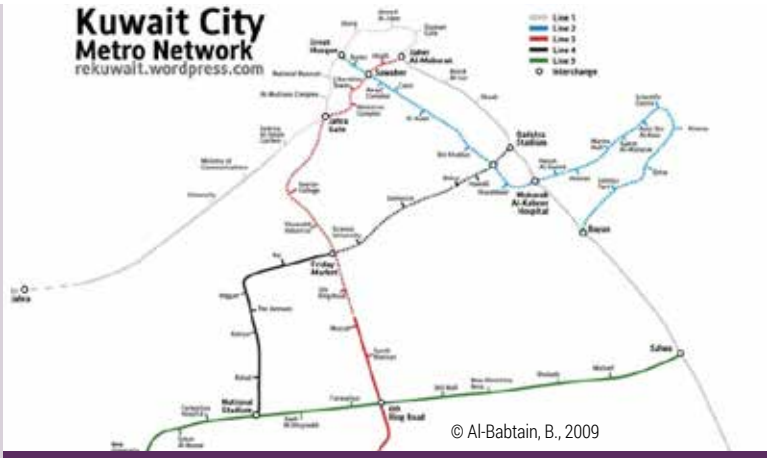

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Figure 3.27: Map of the Kuwait City Metro Network.

Tunis Rapid Railway Network (RFR), Tunisia

The Tunis Rapid Railway Network (RFR) enhances affordability and better access to the city center by providing a fast, cost-effective alternative to private cars. Designed to transport over 600,000 passengers daily, it connects key areas with five lines covering 85 km. The electric-powered system reduces CO_2 emissions by 50,000 tons annually, fostering sustainable urban mobility and economic accessibility.

https://araburban.org/en/infohub/projects/?id=7717

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Figure 3.28: Railway networks in Tunisia.

Public participation strengthens inclusivity and social acceptance by involving citizens in planning and decision-making (Lindenau & Böhler-Baedeker, 2014). Inclusive mobility also requires addressing accessibility needs of vulnerable groups, including people with disabilities, the elderly, and low-income communities (Lucas, 2012). Participatory approaches such as co-design with local communities have been shown to strengthen governance and long-term sustainability (Sheller, 2018).

Environmental Sustainability and Resilience

Urban mobility contributes significantly to greenhouse gas emissions, air pollution, and resource consumption (Newman & Kenworthy, 2015). Sustainable transport strategies prioritize minimizing environmental impact through active mobility, improved public transport efficiency, and the integration of electric or alternative-fuel vehicles (Geels, 2012).

Mobility resilience is increasingly necessary to adapt to climate change and disruptions such as natural disasters and pandemics (Ahern, 2011). Resilience-oriented planning includes diversified transport modes, climate-adaptive infrastructure, and smart technologies for real-time monitoring and management (Zeng et al., 2022). Many cities also apply green mobility policies such as low-emission zones and car-free initiatives to reduce environmental footprints (Hickman et al., 2013).

Economic Development

Urban mobility supports economic development by improving connectivity, reducing travel costs, and enabling business growth (Banister & Berechman, 2001). Efficient transport networks strengthen productivity by facilitating movement of goods and people, reducing congestion-related losses, and supporting tourism and local economies (Gössling, 2016). Public transport and active mobility investments are linked to job creation during construction and operation, and within emerging sectors such as EV manufacturing and smart mobility services (Mishra, 2019).

Figure 3.29: Three-dimensional analysis of sustainable urban mobility initiatives

Mobility strategies can also enhance economic inclusivity by ensuring affordable and accessible transport for all socio-economic groups, strengthening workforce participation and equity (Pojani & Stead, 2015).Transit-oriented development (TOD) approaches that integrate land use and transport planning are widely recognized for strengthening both economic vitality and sustainability (Curtis et al., 2009).

By applying these three dimensions, the report highlights best practices, identifies lessons learned, and clarifies how mobility initiatives contribute to sustainability and resilience. Building on global and regional case studies, the report proposes a framework to assess and guide mobility projects, particularly in the Arab region, through a sustainability and resilience lens. The framework functions as an analytical tool and a practical guideline for municipalities, policymakers, and stakeholders in designing, implementing, and managing sustainable and resilient mobility solutions.

The framework evaluates projects based on their contributions to:

- **Sustainability**, i.e., environmental impact, social inclusivity, and economic viability.
- **Resilience**, i.e., adaptability, risk management, and long-term durability.
- **Innovation**, i.e., technology use, governance models, and financing mechanisms.

This structure supports comparative analysis and generates actionable insights for decision-makers. Figure 3.30 below represents the structure of the framework, categorizing urban mobility initiatives under key dimensions and their associated sub-dimensions.

The "**Towards Integrated Sustainable Urban Mobility Initiatives**" framework aims to:

1. analyze projects based on sustainability and resilience strategies,
2. guide municipalities and policymakers in designing and managing adaptive and innovative transport systems,
3. facilitate learning from global best practices to inform context-specific solutions in the Arab region, and
4. promote multi-stakeholder collaboration by providing a structured decision-making tool for governments, private entities, and civil society.

This adaptable framework supports the development of urban mobility projects that contribute to sustainable, resilient, and economically viable future cities.

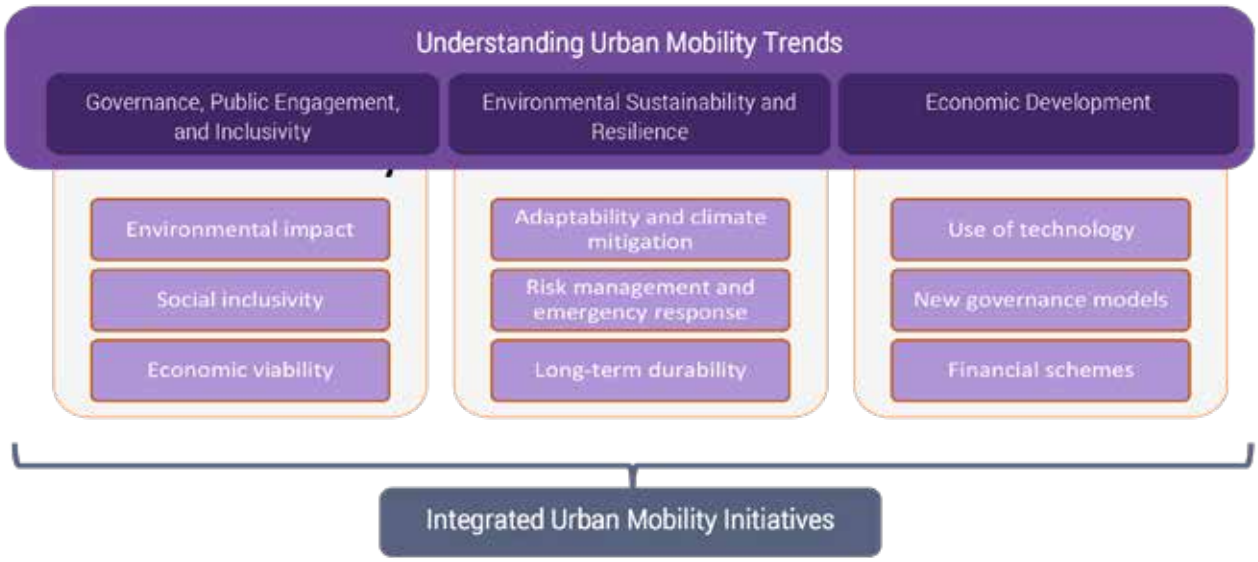
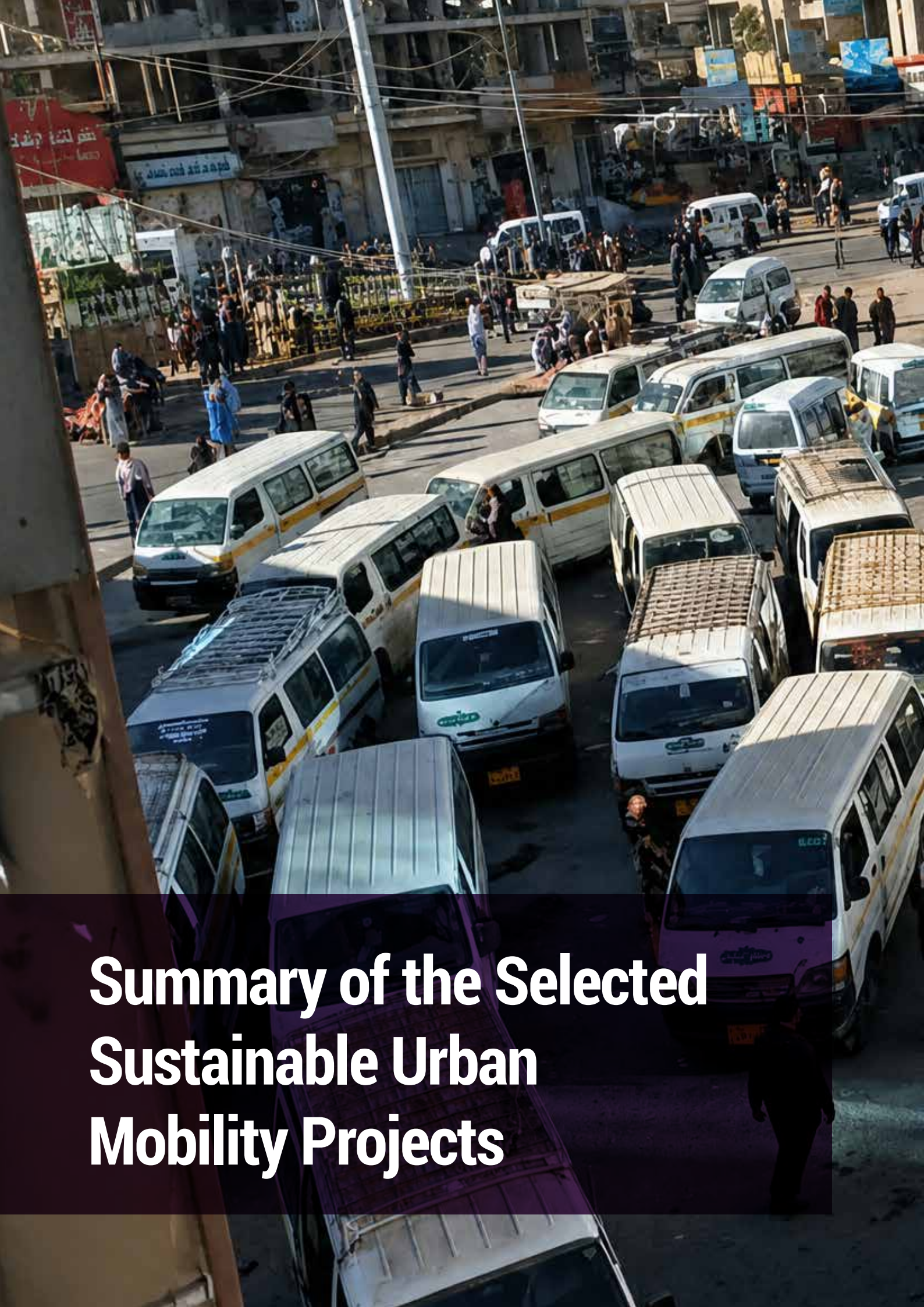


Figure 3.30: Proposed framework for integrated urban mobility initiatives.

Table 5.1: The proposed framework dimensions and sub-dimensions

Dimension	Sub-Entries	Relevance to Sustainability & Resilience
Governance, Public Engagement, and Inclusivity	Management of the project, partnerships, public engagement, community involvement in decision-making or in managing projects, social inclusivity for vulnerable communities, regulatory and policy support, gender-sensitive mobility, accessibility for persons with disabilities, and informal transport integration.	• Ensures inclusive decision-making and institutional adaptability. • Promotes inclusive urban mobility and enhances social resilience.
Environmental Sustainability and Resilience	Carbon footprint reduction; use of smart technologies; renewable resources and ecological design; connectivity and ease of access; multimodal integration and promoting active mobility; technical knowledge transfer and capacity development; withstanding extreme weather; risk management and emergency response; integration with existing transport; transit-oriented development (TOD) and compact city strategies.	• Enhances mobility efficiency, reduces car dependency. • Supports energy efficiency, enhances operational resilience. • Minimizes sprawl, optimizes space use for sustainability. • Enhances disaster preparedness, reduces environmental footprint. • Promotes a healthy and active life for users.
Economic Development	Job creation; business and investment support; improved connectivity; affordability and economic accessibility; recreation and tourism support; urban-suburban connectivity; and key facility linkages.	• Increases mobility for low-income groups, reduces economic disparities. • Stimulates economic diversification, supports urban economies



Summary of the Selected Sustainable Urban Mobility Projects

List of the Sustainable Urban Mobility Projects

The list of projects was grouped in the following eight categories, using the typology of urban mobility initiatives (see Table 5.1), which was developed based on an existing literature review.

A. Policies and Strategies

1. Djibouti Master Plan for the Integrated Urban Road Network
2. Kuwait Urban Public Transport Planning
3. Nouakchott Sustainable Urban Mobility Plan
4. Oman National Transport Strategy 2040
5. Bethlehem Mobility 2030
6. Public Transportation Master Plan for Ramallah-AlBireh Urban Area
7. The New Bajaj Rotation System
8. Active and Intelligent Mobility Project (MAIS)
9. Sustainable Urban Mobility Plan of Greater Sousse (SUMP)
10. Dubai Walk Masterplan, UAE

B. Campaigns and Initiatives

11. Alexandria Green Transport Initiative
12. Downtown Cairo Passageways Redevelopment
13. Yalla Let's Bike
14. AUTREMENT project

C. Public Transit Infrastructure

15. Algiers Metro
16. Oran Tramway
17. Bahrain Metro
18. Cairo Monorail
19. Iraq Development Road Project
20. Baghdad Metro
21. Najaf-Karbala Railway
22. Amman Bus Rapid Transit (BRT)
23. Amman-Zarqa Bus Rapid Transit
24. Kuwait City Metro
25. Zahle Eco-Friendly Hybrid Buses
26. The Benghazi Metro
27. Marrakesh Bus Rapid Transit (BRT)
28. CasaBusway
29. BRT Agadir
30. Rabat-Salé Tramway
31. Oman National Railway
32. Doha Metro
33. Al Khor Road
34. Al-Madina Al-Munawarah Bus project
35. The Makkah Public Transport Program
36. Riyadh metro
37. Khartoum Local Train Project
38. Tunis Rapid Railway Network (RFR)
39. Sfax Light Rail
40. Sana'a Taxi and Bus Stations Project

D. Smart Mobility

41. Manama Electric Vehicles (EVs) and Charging Infrastructure
42. Amman's Unofficial Transport Map (Khutoutna)
43. YallaBus
44. Riyadh Charging Stations for Electric Vehicles
45. Hyperloop

E. Waterfront and Aerial Mobility

46. Comoros Interisland Connectivity Project (PICMC)
47. Tangier Cable Car Transport System
48. SkyWay

F. Carpooling and Car Sharing

49. SWVL Egypt

G. Multimodal Hubs

50. Adly Mansour Transportation Hub
51. Amman Transit-Oriented Neighborhoods

H. Active Mobility

52. Cairo Bike Project
53. Bikesol
54. Abou Nawas Corniche Redevelopment Project
55. Shatt al-Arab Corniche Development Project
56. Amman Cycling Map
57. Tyre Bike-Share initiative
58. Marrakesh Medina Bike
59. Shura Pedestrian Bridge
60. The Future Loop

A. Policies and Strategies

1 Djibouti Master Plan for the Integrated Urban Road Network

Djibouti, Djibouti
[2024 - Ongoing]

Overview

The Master Plan for the Integrated Urban Road Network of Djibouti City is a strategic planning framework aimed at improving the efficiency and integration of the city's road infrastructure to support urban mobility and growth.

Figure 4.1: Map of Djibouti national highway networks

Scope and Scale

The Master Plan for the Integrated Urban Road Network is located in Djibouti City, the capital of Djibouti in the Horn of Africa. It covers the development and optimization of the city's transportation infrastructure, including a 6,500 km road network, pedestrian pathways, and transit systems. The plan spans multiple phases, aiming for full implementation by 2035, with a focus on districts such as Ras-Dika and Boulaos.

Objectives

- Optimize the existing road network
- Improve traffic flow
- Enhance mobility for Djibouti residents
- Enhance residents' quality of life
- Ensuring Djibouti's transport infrastructure withstands future urban challenges
- Improve congestion, accessibility and resilience

Components

- Roadway improvements
- Cycle-pedestrian pathways
- New parking facilities
- Bus stations
- Light rail transit systems
- Traffic simulation models
- Integrated drainage
- Public lighting systems

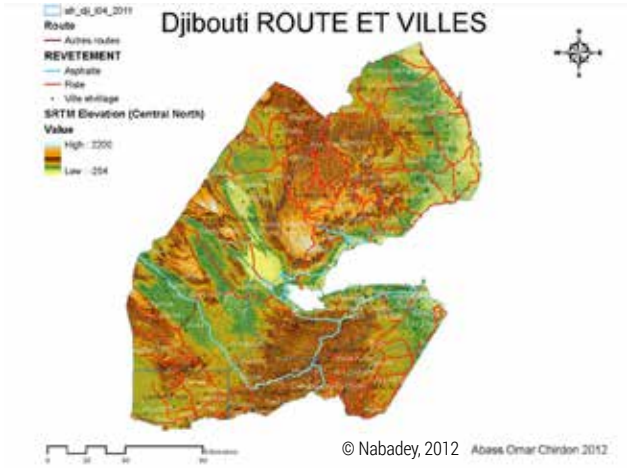


Figure 4.2: Road map of Djibouti showing major routes and transport connections within the country.

Main Stakeholders

Owner/Developer [Public]
Government of Djibouti
Djiboutian Roads Agency

Consultant/Designer
IDEA Consult International

Funder
African Development Fund
Urban and Municipal Development Fund
Global Centre for Adaptation

Contractor/ Implementer
Djiboutian Roads Agency

Optimizing Infrastructure for Resilience

The plan aims to create a resilient transportation system by improving roads, reducing congestion, and enhancing mobility. It prioritizes upgrades to roadway surfacing, drainage systems, and public lighting, with emphasis on future-proofing against urban challenges and climate impacts.

This ensures the network can withstand growth and environmental pressures, contributing to sustainable urban development goals.

Community-Centered and Inclusive Planning

Sustainability is integrated into the planning process, with community engagement central to Phase 1. Surveys and public consultations align improvements with residents' needs, while traffic analysis and simulation models address current conditions and future projections.

This participatory approach ensures adaptability to urban and population expansion, supporting long-term resilience.

Investment in Sustainable Transport Solutions

The plan introduces sustainable options, including repurposing the Djibouti-Addis Ababa railway into a cycle-pedestrian pathway and adding light rail transit.

These initiatives promote greener alternatives to car usage and reduce carbon emissions. New parking regulations and a bus station further enhance accessibility and efficiency, reducing congestion and supporting sustainble mobility.

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2 Kuwait Urban Public Transport Planning

Kuwait, Kuwait
[2012 - Ongoing]

Overview

Urban Public Transport Planning in Kuwait is a comprehensive initiative aimed at transforming the city's public transport system to be more sustainable and efficient. The vision is creating a sustainable, efficient, and low-carbon public transport system that enhances Kuwaitis' quality of life.

Figure 4.3: Map of Kuwait transport system in 2006

Scope and Scale

The Urban Public Transport Planning in Kuwait project is a citywide initiative aimed at transforming Kuwait's public transport system, with a primary focus on the Kuwait Urban Area and its connections to surrounding towns. The project involves a large-scale multi-modal transport network with implementation extending to 2030 to enhance mobility and reduce congestion.

Objectives

- Develop an efficient and sustainable public transport network
- Reduce carbon emissions and energy consumption
- Promote the use of public transport
- Integrate smart mobility solutions
- Decrease traffic congestion
- Provide a reliable alternative to private car usage

Components

- New public transport routes
- Upgraded infrastructure
- Bus rapid transit (BRT) routes
- Metro rail networks
- Express bus services
- Tram systems
- City distributors
- Interchange facilities

Figure 4.4: Urban road infrastructure and traffic management systems in Kuwait City.

Main Stakeholders

Owner/Developer [Public]
Kuwait Municipality

Consultant/Designer
Gulf Consult
Atkins

Funder
Ministry of Public Works
Ministry of State for Municipal Affairs

Contractor/ Implementer
Ministry of State for Municipal Affairs

Sustainable Mobility and Carbon Emission Reduction

The project prioritizes sustainability by developing an efficient and environmentally friendly public transport system. By expanding public transit options such as Bus Rapid Transit (BRT), metro rail, and tram networks, the initiative aims to reduce carbon emissions and energy consumption. Government subsidies and regulatory measures encourage the shift from private car usage to public transportation, contributing to a lower carbon footprint.

Resilience in Urban Transport Infrastructure

The plan integrates a Multi-Modal Transport Strategy to enhance the resilience of Kuwait's urban transport system. This includes express bus services, city distributor networks, and feeder buses, ensuring accessibility across all areas. By providing diverse mobility options and interchange facilities, the project strengthens Kuwait's ability to manage urban growth and traffic congestion while maintaining efficient transport services.

Smart and Integrated Public Transport Systems

The initiative incorporates smart mobility solutions, including digital ticketing and real-time tracking systems, improving passenger experience and operational efficiency. The integration of smart transport technologies enhances the system's adaptability, allowing for data-driven decision-making and optimized transit routes.

Governance and Institutional Framework

A key component of the project is the establishment of a Public Transport Authority to oversee the implementation and management of the urban transport system. This governance structure ensures the effective coordination of multiple stakeholders, including Kuwait Municipality, the Ministry of Public Works, and private sector partners.

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3 Nouakchott Sustainable Urban Mobility Plan

Nouakchott, Mauritania
[2024 - Ongoing]

Overview

The Nouakchott Sustainable Urban Mobility Plan is a new development initiative in Nouakchott, Mauritania, aimed at revolutionizing the city's transport system through sustainable and inclusive mobility solutions. This innovative project is unique in its commitment to improving accessibility for the poorest households while integrating modern technologies to foster resilience and efficiency in urban transport. Initiated in 2023, the plan is set to progressively transform Nouakchott's transport infrastructure over the coming years. The project envisions Nouakchott as a "model of sustainable, inclusive, and resilient urban mobility."

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Figure 4.5: Nouakchott Proposed Sustainable Urban Mobility Plan

Scope and Scale

The Nouakchott Sustainable Urban Mobility Plan is a citywide transportation initiative in Nouakchott, Mauritania, aimed at transforming the city's mobility infrastructure through sustainable and inclusive solutions. The project covers key transportation corridors, residential districts, and commercial hubs, with a focus on expanding public transport, improving pedestrian and cycling infrastructure, and integrating smart mobility technologies.

Objectives

- Enhance accessibility for marginalized communities
- Reduce environmental impacts
- Improve transport efficiency
- Contribute to a larger framework of resilient and equitable city planning

Components

- Dedicated bus lanes
- Improved public transport routes
- Pedestrian zones
- Cycle lanes
- Smart traffic management systems
- Energy-efficient street lighting
- Scсessible transit stops

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Figure 4.6: Aerial view of Nouakchott city showing urban density and cityscape context.

Main Stakeholders

Owner/Developer [Public]
Nouakchott Municipality
Transitec
Nouakchott SUMP

Owner/ Developer
Transitec
Nouakchott SUMP

Consultant/Designer
Japan International Cooperation Agency (JICA)

Funder
European Union

Sustainable Urban Transport Solutions

The Nouakchott Sustainable Urban Mobility Plan prioritizes environmentally friendly transport solutions to reduce congestion and emissions. The project includes a dedicated network of bus lanes and improved public transport routes to promote efficient commuting and decrease reliance on private vehicles. Additionally, it introduces modernized pedestrian zones and cycle paths, encouraging non-motorized transport and fostering a more walkable city. These initiatives contribute to lowering the city's carbon footprint while promoting cleaner mobility alternatives.

Integration of Smart and Energy-Efficient Technologies

The plan leverages innovative traffic management systems, integrating real-time monitoring and efficient routing technologies to optimize transport efficiency. Smart infrastructure, including energy-efficient street lighting and sustainable urban design, further reduces energy consumption and enhances urban resilience. By incorporating digital solutions, the project ensures long-term adaptability to emerging urban mobility challenges.

Equitable and Resilient Mobility Infrastructure

Ensuring inclusive access to transport services, the initiative emphasizes accessible transit stops and facilities tailored for disadvantaged and vulnerable groups. By improving connectivity in underserved areas, the plan enhances urban resilience, allowing marginalized communities to better integrate into economic and social life. These improvements also contribute to the city's ability to withstand future socio-economic and environmental disruptions.

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4 Oman National Transport Strategy 2040

Muscat, Oman
[Ongoing]

Overview

The Oman National Transport Strategy 2040 is a broad sustainable plan for an advanced transport system, part of the broader Oman Vision 2040. The Oman National Transport Strategy 2040 aims to transform the country's transportation landscape through integrated infrastructure and logistics development.

Figure 4.7: A newly constructed walkway, part of Oman Vision 2040's Infrastructure Enhancement and Development Projects

Scope and Scale

Implemented nationwide, the strategy integrates roads, railways, ports, and airports to strengthen connectivity and economic growth. It combines public and private investments to position Oman as a regional logistics and transport hub.

Objectives

- Enhance Oman's transport infrastructure with seamless integration among ports, airports, free zones, and economic areas.
- Maximize commercial and investment opportunities through improved connectivity.

Components

- Roads, railways, ports, airports
- Public transport and smart mobility solutions
- Logistics hubs and green transport initiatives

Figure 4.8: Muscat urban context, illustrates the metropolitan area for integrated transport, mobility, and planning.

Main Stakeholders

Owner/Developer [Public]
Ministry of Transport, Communications and Information Technology

Consultant/Designer
Aman Consultancy & Technology
Q5

Funder
Government of Oman
Oman Chamber of Commerce and Industry (OCCI)

Contractor/ Implementer
Ministry of Transport, Communications and Information Technology

Environmental Sustainability

The plan emphasizes eco-friendly transport solutions, reducing carbon emissions through green technologies and alternative energy. Policies encourage fuel efficiency, electric and hybrid vehicles, and sustainable urban mobility, aligning with Oman's vision for a greener economy.

Resilient Infrastructure Development

By expanding and modernizing infrastructure, the strategy enhances resilience against economic fluctuations and climate challenges. Durable construction, advanced engineering, and disaster-preparedness measures reinforce the long-term sustainability of transport networks.

Technology-Driven Sustainability

Smart systems, digital platforms, and data-driven logistics improve efficiency and environmental performance. Innovations such as predictive maintenance and real-time monitoring support energy-efficient, resilient mobility services.

Public-Private Collaboration for Sustainable Growth

The strategy fosters collaboration between public and private stakeholders, leveraging investments and international expertise to deliver environmentally responsible transport solutions. This diversified approach ensures financial sustainability and strengthens Oman's economic and environmental resilience.

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5 Bethlehem Mobility 2030

Bethlehem, Palestine
[2018 - Ongoing]

Overview

Bethlehem Mobility 2030 is a comprehensive transport and mobility strategy guiding development over the next decade. As the first initiative of its kind in the area, it spans Bethlehem, Beit Jala, Beit Sahour, the villages of Al Doha, Artas, and Al Khader, and three refugee camps. The plan envisions transforming the Bethlehem Conurbation into an accessible, livable, and attractive destination for residents, commuters, and visitors.

Figure 4.9: Screenshot from a report for participatory and co-creative workshops of stakeholders.

Scope and Scale

The strategy covers the Bethlehem Conurbation, three cities, three villages, and refugee camps, addressing current and future transport challenges over 2020 - 2030.

Objectives

- Address traffic challenges holistically while meeting transport needs for people and goods.
- Provide affordable, efficient, inclusive, and equitable access, prioritizing pedestrian-friendly spaces.
- Reduce air pollution, noise, waste, and land-use impacts.

Components

- Road network improvements
- Expanded public transport, parking management, pedestrian-friendly streets, city logistics, and tourism-oriented transport
- 99 mobility measures, with 39 projects at the pre-feasibility stage
- Sustainable transport, infrastructure upgrades, and governance

Figure 4.10: Manger Street in Bethlehem illustrates everyday urban mobility, pedestrian-oriented public accessibility, and transportation.

Main Stakeholders

Owner/Developer [Public]
Municipality of Bethlehem

Consultant/Designer
Community Development Group (CDG)
Move Mobility

Funder
Ville de Paris
French Development Agency (AFD)

Contractor/ Implementer
Municipality of Bethlehem

Sustainable Urban Mobility

The plan reduces reliance on private vehicles by expanding public transport, improving pedestrian infrastructure, and encouraging non-motorized mobility. Integrated transit and pedestrian-friendly spaces aim to ease congestion, enhance accessibility, and support sustainable urban mobility.

Environmental Resilience and Pollution Reduction

Measures such as road categorization, optimized transit routes, and new vehicle technologies reduce emissions, noise, and environmental degradation. Efficient land use helps limit sprawl and minimize infrastructure impacts.

Infrastructure and Climate Adaptation

Upgraded and restructured roads improve traffic flow and resilience to climate challenges, aligning new infrastructure with sustainable urban growth principles.

Stakeholder Engagement and Capacity Building

The strategy adopts a participatory approach, involving stakeholders throughout planning and implementation. Governance improvements and capacity-building initiatives strengthen long-term sustainability and foster awareness of sustainable mobility.

https://araburban.org/en/infohub/projects/?id=9442

6 Public Transportation Master Plan for Ramallah-AlBireh Urban Area

Ramallah, Palestine
[2019 - Ongoing]

Overview

This Master Plan is a public transportation strategy for the Ramallah-Al-Bireh Governorate in the West Bank, covering Ramallah, Al-Bireh, Betunia, and Surda Abu-Qush. Part of the Integrated Cities and Urban Development Project (ICUD), it responds to rapid socio-economic and urban growth since 1994, which has intensified traffic congestion due to rising vehicle ownership and expanding economic activity.

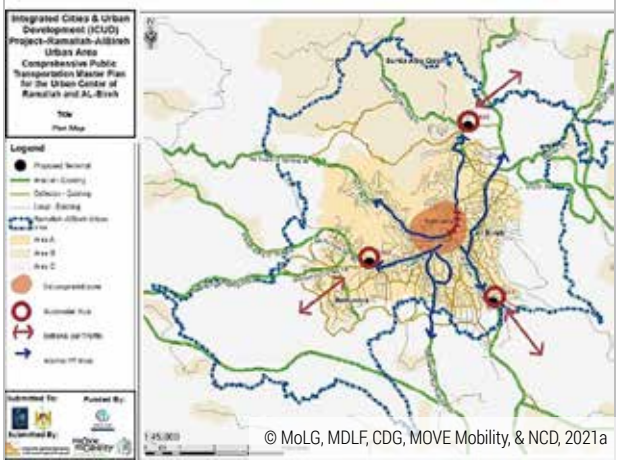

Figure 4.11: A master plan illustrating the main urban transport routes in Ramallah and Al-Bireh.

Scope and Scale

A regional-scale initiative in the central West Bank, the plan covers Ramallah, Al-Bireh, Betunia, and Surda Abu-Qush. It is part of Integrated Cities and Urban Development (ICUD), aimed at enhancing urban mobility and infrastructure for a rapidly growing population.

Objectives

- Improve quality of life
- Address growing population and private sector demands
- Focus on sustainable, efficient urban spaces and infrastructure

Components

- Parking facilities
- Park and Ride stations
- Pedestrian and cycling infrastructure
- Public transport terminals
- Bus stops

Figure 4.12: Public transport and shared taxi operations in Ramallah.

Main Stakeholders

Owner/Developer [Public]
Ministry of local government

Consultant/Designer
Move Mobility
Community Development Group (CDG)
National Center for Sustainable Development (NCD)

Funder
Municipal Development & Lending Fund (MDLF)

Contractor/ Implementer
Ministry of Local government

Sustainable Urban Mobility Strategy

The Comprehensive Public Transportation Master Plan for Ramallah and Al-Bireh focuses on enhancing sustainable urban mobility in a rapidly growing region. The plan aims to improve transportation infrastructure, addressing the rising demand for urban spaces while prioritizing sustainable transportation options. Through strategies like the development of pedestrian facilities and cycling routes, the project seeks to reduce reliance on private vehicles and encourage more sustainable modes of transport.

Reducing Traffic Congestion and Pollution

With increasing vehicle ownership and urban growth, traffic congestion and air pollution have become significant challenges in the Ramallah-AlBireh Governorate. The Master Plan proposes solutions such as the establishment of Park and Ride facilities, which will help reduce congestion in the urban center by providing alternative transportation options. This initiative is designed to promote more efficient public transport usage, alleviating the negative environmental impacts of excessive private car use.

Resilient Infrastructure and Operational Measures

The Master Plan includes various technical and operational measures to enhance the efficiency of public transport. These include improving bus stops, optimizing car circulation, and redefining the role of taxis as feeder services to public transport terminals. By strengthening the operational resilience of the transport system, the plan ensures long-term sustainability and adaptability to future urban growth and mobility needs.

https://araburban.org/en/infohub/projects/?id=9329

7 The New Bajaj Rotation System

Mogadishu, Somalia
[2023 - Ongoing]

Overview

The New Bajaj Rotation System is a regulatory policy governing the registration and operation of tuk-tuks (bajajs), Mogadishu's most common public transport mode. It introduces re-registration, labeling, and a rotational operation system to address rising urban mobility challenges caused by the growing number of bajajs, persistent roadblocks, and limited infrastructure. While bajajs have improved mobility, they have also been linked to criminal activities, prompting the need for stricter regulation.

Figure 4.13: Bajaj owners line up at a petrol station in Mogadishu.

Scope and Scale

Implemented in Mogadishu, the initiative re-registers and categorizes over 33,000 bajajs, enforcing a rotation system to limit daily operations. It extends to neighboring districts in Hirshabelle and Southwest States, including Balcad and Afgoye, ensuring regional coordination.

Objectives

- Reduce traffic congestion by limiting the daily number of bajajs in operation.
- Enhance security through comprehensive registration and monitoring of all vehicles.

Components

- The registration system
- Centralized database
- Color-coded labels for vehicles
- Enforcement mechanisms (fines, vehicle seizures)

Figure 4.14: A lady boards a Bajaj in Mogadishu.

Main Stakeholders

Owner/Developer [Public]
Council of Ministers of the Federal Government of Somalia (FGS)
Benadir Regional Administration (BRA)

Consultant/Designer
Benadir Regional Administration (BRA)

Funder
Benadir Regional Administration (BRA)

Contractor/ Implementer
Benadir Regional Administration (BRA)

Sustainable Urban Mobility

The New Bajaj Rotation System contributes to sustainable urban mobility by regulating the number of tuk-tuks (bajajs) operating in Mogadishu. By implementing a rotational system, the policy reduces congestion, improves road efficiency, and enhances the overall transportation experience for residents. The controlled operation of bajajs ensures a balanced distribution of public transport, preventing overcrowding on key routes and reducing fuel consumption associated with traffic delays.

Environmental Impact Reduction

The suspension of new bajaj imports plays a significant role in limiting the environmental impact of unregulated vehicle growth. By preventing the excessive influx of motorized three-wheelers, the policy helps curb emissions and air pollution. Additionally, with fewer bajajs operating on the streets each day, fuel consumption is minimized, contributing to the city's broader efforts toward environmental sustainability.

Enhanced Security and Urban Resilience

The regulation has strengthened urban resilience by addressing security threats associated with unregistered bajajs. By maintaining a comprehensive database of owners and drivers, the system improves law enforcement's ability to monitor, track, and respond to criminal activities involving bajajs. This security-focused approach enhances the safety of urban spaces, fostering a more stable and resilient city.

Institutional Capacity and Revenue Generation

The structured re-registration process has strengthened local governance by creating a formalized system for tracking vehicle ownership and generating revenue for the Benadir Regional Administration. The integration of bajaj registration fees into municipal revenue streams ensures financial sustainability while supporting broader urban development initiatives.

https://araburban.org/en/infohub/projects/?id=9472

8 Active and Intelligent Mobility Project (MAIS)

Sfax, Tunisia
2022 - Ongoing

Overview

The Active and Intelligent Mobility Project (MAIS) in Sfax is an urban mobility framework. The project aligns with national commitments to energy conservation and the promotion of renewable energies as outlined in the SDG 2030 Agenda.

© Medcities, 2023

Figure 4.15: Cycling activities in Chihia during the Sustainable Mobility Week, organized under the MAIS Project in partnership with MedCities and the City Council of Chihia.

Scope and Scale

The MAIS project spans four years (2022-2026) and is implemented in Sfax and Chihia. It combines infrastructure upgrades, policy planning, and community engagement to promote sustainable urban mobility at the metropolitan level.

Objectives

- Transition the city towards sustainable and resilient mobility in the face of climate change and improve citizens' quality of life by promoting sustainable and smart mobility initiatives.
- Enhance the capacity of city stakeholders to take sustainable mobility actions through multi-level partnerships, innovative financing schemes, and awareness-raising initiatives.

Components

- Photovoltaic power station
- Remotely managed traffic control center
- Dedicated bus lanes, pedestrian pathways
- Cycling lanes
- Electric municipal vehicles
- Electric bike rental system
- Geographic Information System (GIS)

@Municipality of Sfax / MAIS Project (Facebook), 2025

Figure 4.16: "Sfax Breathes," a community-based and car-free day initiative promoting active mobility and sustainable urban transport under MAIS.

Main Stakeholders

Owner/Developer [Public]
Municipality of Sfax
Municipality of Chihia

Consultant/Designer
MedCities
Municipality of Sfax
Municipality of Chihia

Funder
European Union
Catalan Agency for Development Cooperation
GIZ

Contractor/ Implementer
Municipality of Sfax
Municipality of Chihia
MedCities

Advancing Sustainable Urban Mobility

Strategic initiatives include traffic, pedestrian, and bicycle plans, supported by GIS-based management. The project also aims to establish a metropolitan mobility authority, reducing congestion, improving walkability, and fostering multimodal integration.

Infrastructure Upgrades for Sustainable Mobility

Key interventions include a photovoltaic power station, 7 km of pedestrian pathways, 45 km of cycling lanes, and the introduction of electric municipal vehicles and bike rentals. These measures reduce carbon emissions, enhance energy efficiency, and encourage active transport.

Technology-Driven Mobility Solutions

Smart solutions such as an advanced traffic control center and dedicated bus lanes optimize flows, encourage public transport use, and strengthen resilience against climate-related disruptions.

Capacity Building and Community Engagement

Training sessions, climate finance workshops, and awareness campaigns engage stakeholders and citizens, promoting a culture of sustainable mobility and long-term behavioral shifts toward greener choices.

https://araburban.org/en/infohub/projects/?id=7749

9 Sustainable Urban Mobility Plan of Greater Sousse (SUMP)

Sousse, Tunisia
[2021 - Ongoing]

Overview

The Sustainable Urban Mobility Plan (SUMP) is the strategic framework for transforming mobility in Greater Sousse. As a key pillar of the Integrated Urban Development Programme (IUDP), it is led by the State Secretariat for Economic Affairs (SECO) of the Swiss Confederation in collaboration with the municipality of Sousse. Rapid urban expansion on the city's outskirts, following a radio-concentric model, has increased reliance on motorized commuter flows. In response, SUMP envisions Sousse as a "Metropolis of Proximities" by 2030, shifting from hyper-mobility to hyper-proximity and from a laissez-faire approach to a structured, sustainable mobility strategy.

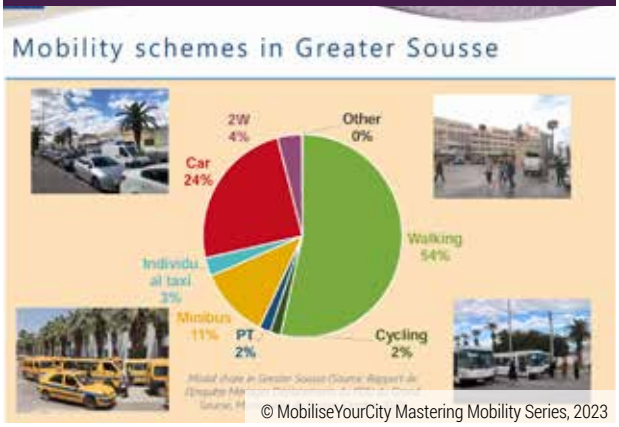

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Figure 4.17: Greater Sousse Sustainable Urban Mobility Plan, Greenhouse gas emissions impact assessment.

Scope and Scale

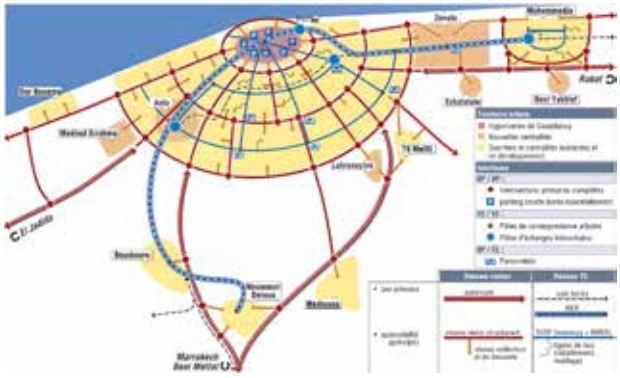
The Sustainable Urban Mobility Plan (SUMP) covers Greater Sousse, including urban and peri-urban areas, and aims to transform mobility across the metropolitan region. As part of the Integrated Urban Development Programme (IUDP), it addresses the needs of a rapidly expanding urban area, focusing on improved mobility and reduced car dependency by 2030.

Objectives

- Replace the core-periphery model with a polycentric urban structure.
- Reduce travel distances to ease congestion and commuting times.
- Decrease car dependency by strengthening active and public transport networks.

Components

- Multimodal mobility system
- Pedestrian-friendly pathways
- Enhanced public transport
- Cycling infrastructure
- Improved public spaces



© Ville de Sousse, Plan de Déplacements Urbains du Grand Sousse, 2021

Figure 4.18: Strategic mobility structure and proposed transport corridors in the Greater Sousse Urban Mobility Plan (PDU).

Main Stakeholders

Owner/Developer [Public]
Municipality of Sousse
Ministry of Local Affairs and Environment (MALE)

Consultant/Designer
TRANSITEC

Funder
State Secretariat for Economic Affairs of the Swiss Confederation (SECO)

Contractor/ Implementer
Municipality of Sousse

Promoting a Low-Carbon Mobility Model

Inspired by the "15-minute city" concept, the plan promotes active and public transport, ensuring essential services are within walking or cycling distance. This reduces carbon emissions, congestion, and sprawl, fostering a sustainable mobility system.

Enhancing Pedestrian and Cyclist Infrastructure

Safe, accessible pathways for pedestrians and cyclists are prioritized, with dedicated lanes and pedestrian-friendly streets. These improvements enhance air quality, reduce noise pollution, and promote public health, reinforcing urban resilience.

Developing a Resilient Multimodal Transport System

The plan emphasizes integration between buses, cycling lanes, and pedestrian corridors. Strengthened public transport networks reduce car dependency and improve adaptability to urban growth and climate challenges. A well-connected system also supports faster disaster response and mitigates disruptions.

Community Engagement for Sustainable Mobility

SUMP adopts a participatory approach, engaging civil society and public actors through workshops and consultations. This inclusive process ensures local knowledge and community priorities shape the transformation, fostering long-term adaptability and social resilience.

https://araburban.org/en/infohub/projects/?id=9747

10 Dubai Walk Masterplan

Dubai, UAE
[2025 - ongoing]

Overview

The Dubai Walk Masterplan is a visionary initiative to transform Dubai into a pedestrian-friendly city as part of the broader Dubai Urban Master Plan 2040. Supporting the Quality of Life Strategy 2033, it prioritizes safety, connectivity, and cultural integration while focusing on mobility, green infrastructure, sustainable urban planning, and expanded public spaces. The vision is to "create a healthy, happy, and sustainable urban environment that promotes active lifestyles and positions Dubai as one of the world's healthiest cities."

Figure 4.19: Pedestrian view from balcony at Fern Central Park, Dubai City Walk.

Scope and Scale

Implemented across Dubai as part of the Urban Master Plan 2040, the project spans 6,500 km of walkways and 110 pedestrian bridges, enhancing connectivity citywide. Full implementation is targeted for 2040.

Objectives

- Increase pedestrian mobility
- Promote sustainable urban development
- Build a network of continuous, accessible paths across 160 areas in the UAE
- Encourage walking

Components

- 6,500 km of walkways
- 110 pedestrian bridges and underpasses
- 112 km of waterfront paths
- 124 km of scenic green trails
- Air-conditioned walkways, green spaces, and commercial establishments

Figure 4.20: A 3D image illustrating the Dubai Walk Masterplan's objectives for walkable and climate-adapted public spaces.

Main Stakeholders

Owner/Developer [Public]
Government of Dubai

Consultant/Designer
Fortender

Funder
Government of Dubai

Promotion of Active Lifestyles and Sustainable Mobility

The Dubai Walk Masterplan aims to create a pedestrian-friendly environment by constructing 6,500 kilometers of walkways and 110 pedestrian bridges to enhance urban mobility. The plan promotes active lifestyles by increasing pedestrian connectivity and prioritizing the development of accessible walking paths. It aligns with Dubai's Quality of Life Strategy 2033, aiming to make the city one of the healthiest in the world by supporting walking, cycling, and reducing dependence on cars, thus enhancing both sustainability and urban resilience.

Green Infrastructure and Public Spaces

The project emphasizes the creation of green infrastructure through the expansion of public spaces like scenic green trails and waterfront paths. With 112 kilometers of waterfront paths and 124 kilometers of green trails, the plan integrates nature into urban environments, providing a more resilient city structure. Additionally, air-conditioned walkways and shaded areas are incorporated to mitigate the effects of extreme heat, fostering sustainable and inclusive urban spaces that prioritize environmental health and public well-being.

Support for Sustainable Urban Development

Aligned with Dubai's 20-minute city goal for 2040, the masterplan contributes to sustainable urban development by enhancing connectivity and ensuring that 80% of residents have access to essential services within a short commute. By integrating green spaces, shaded rest areas, and eco-friendly infrastructures, the Dubai Walk Masterplan supports sustainability and the resilience of urban environments against climate change, improving the overall quality of life for residents and visitors alike.

https://araburban.org/en/infohub/projects/?id=9407

B. Campaigns and Initiatives

11 Alexandria Green Transport Initiative

Alexandria, Egypt
[2018 - 2018]

Overview

The Alexandria Green Transport Initiative is part of Egypt's commitment to sustainable development, leveraging technology and clean energy to reduce carbon emissions and promote urban mobility. Officially launched in March 2023, it aligns with Egypt Vision 2030, focusing on safe fuels and clean energy to create greener, more efficient transport. Its vision is: "A model of sustainable urban development that enhances the quality of life for all citizens."


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Figure 4.21: Alexandria Electric buses

Scope and Scale

A citywide initiative modernizing Alexandria's public transport with electric buses, covering key routes. Implemented in three phases, it integrates clean energy into the network to reduce emissions and improve mobility.

Objectives

- Reduce fossil fuel consumption and carbon emissions.
- Improve urban mobility and public transport infrastructure.

Components

- Phase 1: 15 electric buses (operational), expanding to 40.
- Features: air conditioning, tracking systems, accessibility modifications.


© Hassan et al., 2026

Figure 4.22: The transportation system in Alexandria

Main Stakeholders

Owner/Developer [Public]
Ministry of Transport
Alexandria Governorate
Public Transport Authority

Consultant/Designer
BYD Company Ltd.

Funder
National Investment Bank

Contractor/ Implementer
BYD Company Ltd.

Reducing Carbon Emissions and Fossil Fuel Dependency

The Alexandria Green Transport Initiative significantly contributes to Egypt's environmental goals by reducing fossil fuel consumption and lowering carbon emissions.
The transition to a fleet of electric buses eliminates reliance on diesel, leading to cleaner air and reduced greenhouse gas emissions. With each bus capable of traveling up to 250 kilometers per charge, the initiative provides an energy-efficient alternative to traditional public transport.

Integration of Clean Energy Technologies

The project leverages advanced rechargeable battery technology, enabling electric buses to operate efficiently with a charging time of just three to four hours.
By integrating sustainable fuel technologies across Alexandria's transportation routes, the initiative ensures a long-term reduction in pollution and reliance on non-renewable energy sources. This shift aligns with Egypt's Vision 2030 sustainability goals and supports a broader national strategy for green urban development.

Resilient Public Transport Infrastructure

The initiative enhances Alexandria's resilience by modernizing its public transport network with a fleet of 40 electric buses. These buses are designed to improve commuter experience, featuring real-time tracking systems, air conditioning, and accessibility modifications for people with disabilities.
The initiative also strengthens public transport reliability and efficiency, ensuring long-term adaptability to growing urban mobility demands.

https://araburban.org/en/infohub/projects/?id=9500

12 Downtown Cairo Passageways Redevelopment

Cairo, Egypt
[2014 - 2015]

Overview

The Downtown Cairo Passageways Project was a redevelopment initiative aimed at revitalizing historic passageways in the city's core. By reimagining underutilized alleys, setbacks, and side streets, the project sought to enhance public spaces, foster social and cultural engagement, and stimulate local economic growth. With an overall goal to develop a downtown passageway network as a framework for urban regeneration through art and culture, a pilot project to design and implement two passages, Kodak and Phillips, was launched in April 2014 through a collaborative design workshop with architects, urban planners, and cultural experts. The vision was to create "a vibrant, inclusive, and sustainable urban hub that honors Cairo's historical legacy while paving the way for innovative cultural and economic activities."

© Nagati, O. and Stryker, B., 2016

Figure 4.23: An overall plan for Downtown Passageways as a framework for development

Scope and Scale

Located in Downtown Cairo's historic core, the broader Downtown passageways proposal covered over 2 square kilometers, transforming neglected or underutilized passageways into vibrant, pedestrian-friendly spaces through an innovative approach to architectural heritage downtown, addressing social space, not just physical structures.

Objectives

- Revive public spaces to foster local business growth and enhance pedestrian accessibility.
- Capitalize on the role of art, culture and creative initiatives downtown as an urban catalyst
- Contribute to broader frameworks for urban research and design intervention

Components

- Pedestrianized cultural spaces
- Commercial hubs with pop-up markets and artisan shops
- Green infrastructure
- Adaptive reuse of historic structures

© Nagati, O., 2016

Figure 4.24: KODAK green and public pathway in downtown Cairo

Main Stakeholders

Owner/Developer [Public]
Cairo Governorate

Owner/Developer
CLUSTER

Consultant/Designer
Danish Egyptian Dialogue Institute (DEDI), CKU

Funder
CLUSTER

Contractor/ Implementer
Neighboring businesses and community groups

Green and Sustainable Infrastructure

Environmentally friendly measures included energy-efficient lighting, improved water management, and eco-landscaping to reduce environmental impact and promote greener urban spaces. Kodak Passage remains a rare example of a small urban park in Cairo that is vibrant, inclusive and sustainable.

Pedestrian Accessibility and Urban Resilience

Revitalized alleys and courtyards reduced reliance on vehicles, mitigating air pollution and improving livability. Adaptive reuse of historic structures ensured functionality and relevance amid changing urban needs.

Climate-Responsive Design and Adaptation

Shaded walkways, green spaces, and passive cooling techniques reduced heat island effects and created more comfortable microclimates, aligning with broader sustainability goals.

Heritage Preservation and Sustainable Development

Rather than focusing on architectural restoration and considering contemporary uses as unnecessary enhancements, the project adopts an approach to downtown's heritage as fluid and dynamic that both maintains and celebrates mixed use and diverse social makeup while fostering sustainable tourism and economic revitalization. The transformation of passageways into cultural and commercial hubs balanced conservation with modern urban needs.

https://araburban.org/en/infohub/projects/?id=9491

13 Yalla Let's Bike

Damascus, Syria
[2018- Implemented/Ongoing]

Overview

"Yalla Let's Bike Syria" is a community initiative promoting women's empowerment and sustainable mobility through cycling in Damascus and other Syrian cities. Launched in 2018 amid Syria's ongoing conflict, the initiative challenges gender norms in a conservative society, envisioning "advocating for women's right to independent mobility" through cycling. With this vision, the project aligns with global sustainability and gender equality efforts, particularly the UN Sustainable Development Goals (SDGs) 5 (Gender Equality) and 13 (Climate Action).

Figure 4.25: Yalla Let's Bike, second bike ride for peace in Homs, Syria.

Scope and Scale

Yalla Let's Bike Syria began in Damascus and has expanded to other cities, including Latakia. The initiative has engaged over 1,000 women through cycling workshops, advocacy campaigns, and organized rides. Its growing impact includes the creation of cycling clubs and networks that promote sustainable mobility and gender-inclusive transport solutions across Syrian urban areas.

Objectives

- Promote cycling
- Tackle urban transportation challenges exacerbated by war
- Foster social inclusion
- Contribute to grassroots climate resilience efforts

Components

- Cycling workshops
- Bike repair training
- Community bike rides
- Female-only cycling events
- Safe cycling routes.

Figure 4.26: Cyclists during a community tour in Damascus.

Main Stakeholders

Owner/ Developer
community-led

Sustainable Urban Mobility

Yalla Let's Bike Syria promotes non-motorized transport as a sustainable mobility solution in conflict-affected cities. By encouraging cycling, the initiative reduces reliance on fossil fuels, helping mitigate air pollution and carbon emissions.

This aligns with global climate action efforts, particularly UN Sustainable Development Goal (SDG) 13 (Climate Action), by offering an eco-friendly alternative to motorized transport in Syrian cities struggling with fuel shortages and environmental degradation.

Climate Resilience and Local Adaptation

The initiative fosters grassroots climate resilience by promoting cycling as an adaptive response to Syria's urban transportation crisis, which has been exacerbated by war. By increasing access to affordable and sustainable transport, the project enhances community resilience to economic instability and infrastructure challenges.

The establishment of safe cycling routes and designated areas for women cyclists further supports local adaptation to urban mobility constraints.

Social Inclusion and Gender Equality in Mobility

By challenging societal norms that restrict women's mobility, Yalla Let's Bike Syria advances SDG 5 (Gender Equality) while also addressing sustainability goals. The initiative's cycling workshops and advocacy campaigns empower women by providing them with the skills and confidence to navigate cities independently.

Additionally, community-led bike rides foster social inclusion and strengthen women's participation in public spaces, reinforcing resilience through collective engagement.

https://araburban.org/en/infohub/projects/?id=9879

14 AUTREMENT Project

Kairouan, Tunisia
[2020 - 2023]

Overview

The AUTREMENT project (Urban and Territorial Planning to Reinvent Mobility and Engage Tunisian Citizens) was a collaborative initiative between Strasbourg (France) and the Tunisian cities of Kairouan and Mahdia. Kairouan, with a population of 570,000, is located in central Tunisia, while Mahdia lies 200 km south of Tunis. Spanning two and a half years, the project addressed sustainable urban mobility and planning challenges as part of the Strasbourg-Kairouan decentralized cooperation launched in 2016.

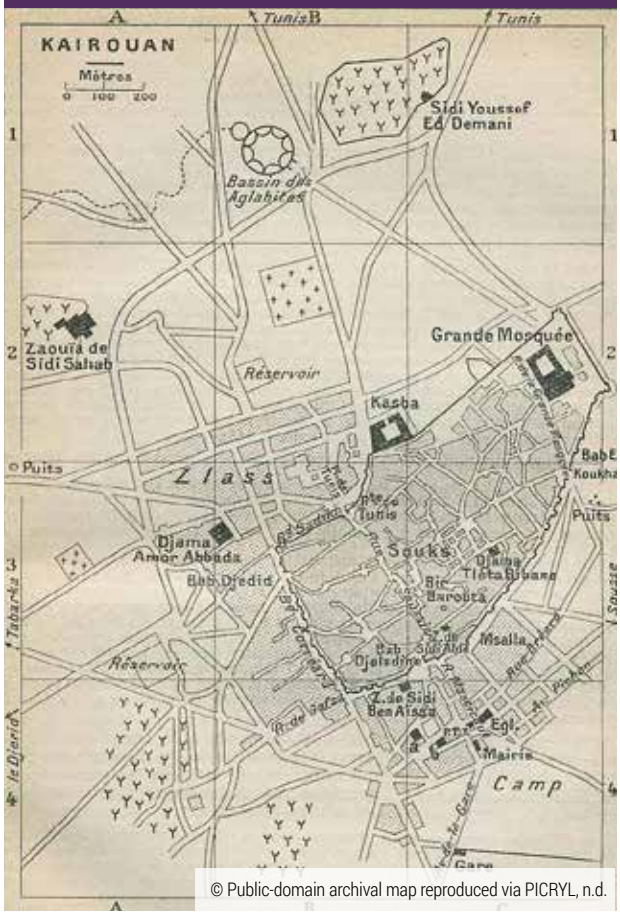

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Figure 4.27: Archival urban plan of Kairouan (1937).

Objectives

- Position Kairouan and Mahdia as pioneers in active mobility, citizen engagement, and local democracy.
- Promote walking and cycling.
- Improve urban mobility.
- Enhance quality of life, economic vitality, and tourist appeal.
- Leverage Strasbourg's expertise and leadership in sustainable transport planning.

Components

- Cycling infrastructure and bike houses
- Bike-related services, schools, and repair workshops
- Public space renovations
- Training programs, workshops, and citizen engagement platforms


© Alda, 2021

Figure 4.28: First bicycle parade in Kairouan.

Scope and Scale

Implemented in Kairouan and Mahdia, the regional project focused on mobility and planning challenges, combining infrastructure upgrades and citizen participation to foster sustainable urban development.

Main Stakeholders

Owner/Developer [Public]
Euro-metropole of Strasbourg
Municipality of Kairouan
Municipality of Mahdia

Owner/Developer
European Association for Local Democracy (ALDA)
Cooperation for the Development and Improvement of Urban and Peri-urban Transport (CODATU)
Centre for Studies and Expertise on Risks, Environment, Mobility and Planning (CEREMA) based in France

Consultant/Designer
European Association for Local Democracy (ALDA)
Cooperation for the Development and Improvement of Urban and Peri-urban Transport (CODATU)
Centre for Studies and Expertise on Risks, Environment, Mobility and Planning (CEREMA) based in France

Funder
European Union

Contractor/ Implementer
European Association for Local Democracy (ALDA)
Cooperation for the Development and Improvement of Urban and Peri-urban Transport (CODATU)
Centre for Studies and Expertise on Risks, Environment, Mobility and Planning (CEREMA) based in France

Promotion of Active Mobility

The project encouraged eco-friendly transport by building cycling infrastructure, bike houses, and services such as schools and repair workshops. These measures reduced reliance on motor vehicles, cutting emissions and strengthening environmental resilience.

Citizen Engagement and Local Governance

Workshops and consultations ensured inclusive participation, particularly of youth and women, in mobility planning and public space design. This participatory approach fostered ownership and long-term sustainability of introduced solutions.

Community Resilience through Urban Micro-Projects

Micro-projects revitalized public spaces and promoted sustainable development. Initiatives included a "bike house" in Kairouan and cycling parades to raise awareness. By integrating local initiatives and community involvement, the project strengthened social ties, enhanced infrastructure, and contributed to long-term resilience.

https://araburban.org/en/infohub/projects/?id=9467

C. Public Transit Infrastructure

15 Algiers Metro

Algiers, Algeria
2006 - Ongoing

Overview

The Algiers Metro is Algeria's first metro system and the second in Africa after Cairo. Serving three million inhabitants, it carries around 300,000 passengers daily, providing a modern and reliable public transport option.

Figure 4.29: Algiers public transport map with tramway network marked in red.

Scope and Scale

The metro spans 18.8 km with 14 stations across Algiers, serving approximately 200,000 passengers daily. Expansion plans are underway to extend coverage and capacity.

Objectives

- Strengthen Algiers' public transport network with efficient, accessible, and sustainable mobility solutions.

Components

- 18.8 km metro line (Line 1)
- 18 stations
- Fleet of 14 six-car trains
- Maintenance depot and control center

Figure 4.30: Passengers waiting for the metro line to board.

Main Stakeholders

Owner/Developer [Public]
Entreprise du Métro d'Alger (EMA)
Établissement public de Transport Urbain et Suburbain d'Alger

Owner/Developer
Siemens
Vinci Construction Grands Projets
RATP El Djazaïr

Consultant/Designer
Siemens

Funder
Entreprise du Métro d'Alger (EMA)

Contractor/ Implementer
Siemens
Vinci Construction Grands Projets
Construcciones y Auxiliar de Ferrocarriles S.A. (CAF)

Social Inclusivity and Accessibility

The metro prioritizes inclusivity with low-floor trams and fully accessible stations for passengers with disabilities. By improving access to employment centers and essential services, it promotes equitable mobility while reducing traffic congestion and enhancing daily commutes.

Environmental Benefits and Sustainable Transport Solutions

By reducing reliance on private vehicles, the metro alleviates congestion, lowers air pollution, and cuts carbon emissions. As an energy-efficient alternative to fossil fuel transport, it supports climate goals and contributes to cleaner urban air. Advanced technologies ensure safety, efficiency, and reliability.

Economic Impact and Urban Development

The metro has boosted Algiers' economy by improving connectivity, facilitating commuting, and supporting local businesses. Construction created jobs, while long-term operations enhance competitiveness, attract investment, and encourage tourism, positioning Algiers as a more dynamic urban hub.

https://araburban.org/en/infohub/projects/?id=7667

16 Oran Tramway

Oran, Algeria
2008 - 2013

Overview

The Oran Tramway Project is a light-rail project in Oran, the second-largest city in Algeria. The project is part of the Entreprise du Métro d'Alger's (EMA) 2006 plan to build light rails in Algerian cities.

© Meierberg, 2023

Figure 4.31: Map of the Oran tramway line.

Scope and Scale

The tramway spans 18.7 km across Oran, connecting key areas from Depot Sidi Maarouf to Depot Senia. It serves approximately 90,000 passengers daily.

Objectives

- Encourage public transit in Algeria's major cities (Algiers, Oran, Constantine, Sidi Bel Abbès, Sétif, and Ouargla).
- Provide comfortable, fast, clean, and wheelchair-accessible transit
- Support economic growth through improved mobility.

Components

- 18.7 km single tram line with 32 stations
- Fleet of 30 Alstom Citadis 302 trams with air conditioning, low-floor accessibility, video surveillance, and passenger information systems
- Maintenance and operational facilities

© Moussa Wahrani, 2013

Figure 4.32: Two tramway cars in Oran at the Ibn Badis Mosque station.

Main Stakeholders

Owner/Developer [Public]
Entreprise du Métro d'Alger (EMA)
Etablissement Public de Transport Urbain et Suburbain d'Alger (ETUSA)
SETRAM

Owner/Developer
RATP Dev

Consultant/Designer
SETRAM

Funder
Entreprise du Métro d'Alger (EMA)
SETRAM

Contractor/ Implementer
SETRAM
Etablissement Public de Transport Urbain et Suburbain d'Alger (ETUSA)

Improving Accessibility and Mobility

The Oran Tramway project has significantly enhanced social mobility by offering an efficient and accessible transport solution to approximately 90,000 passengers daily. The tram system is designed with air conditioning and low-floor features, ensuring that it is accessible to all, including people with disabilities. These inclusive design features make it easier for vulnerable groups, such as the elderly and those with mobility impairments, to use the system. The tramway not only improves daily commuting experiences but also ensures equal access to transportation for different segments of the population, contributing to greater social equity and inclusivity in Oran.

Boosting Local Employment and Urban Growth

The economic impact of the Oran Tramway extends beyond just improving transportation. The project has generated significant local employment opportunities, with 650 people employed in the operation and maintenance of the system. This provides a stable source of income for many residents and contributes to the local economy. Additionally, the creation of a rail training institute in Algiers in 2017 further strengthens the local workforce by providing specialized skills and promoting career development in the transport sector. The improved connectivity of the tramway also facilitates access to key services, businesses, and employment opportunities, thereby stimulating economic growth and supporting urban development in Oran.

Sustainable Transportation Solutions

By reducing reliance on private vehicles, the tramway alleviates congestion, lowers emissions, and improves air quality. It plays a key role in building resilience against pollution and climate impacts, aligning with broader efforts to create sustainable cities and reduce Oran's carbon footprint.

https://araburban.org/en/infohub/projects/?id=7711

17 Bahrain Metro

Manama, Bahrain
2018 - Ongoing

Overview

The Bahrain Metro is the Kingdom's first light rail transit system, developed under the Bahrain Economic Vision 2030. It is designed to provide modern, sustainable, and efficient public transport across the country.

Figure 4.33: 3D rendering of the proposed Bahrain metro project.

Scope and Scale

A nationwide initiative spanning 109 km, including 30 km of elevated track, the metro will connect major hubs such as Bahrain International Airport, Seef District, and Juffair, strengthening urban and suburban mobility.

Objectives

- Provide reliable connectivity to key residential, commercial, administrative, and leisure areas.
- Reduce traffic congestion and environmental impact through automated, self-driving electric trains.

Components

- 109 km light rail system with four lines (Red, Blue, Green, Yellow)
- Phase 1: 29 km of track, 20 stations, daily capacity of 43,000 passengers

Figure 4.34: A proposed plan for the first phase of the Bahrain Metro network..

Main Stakeholders

Owner/Developer [Public]
Ministry of Transportation and Telecommunication

Consultant/Designer
IDOM

Funder
Government of Bahrain
Delhi Metro Rail Corporation (DMRC)

Contractor/ Implementer
Delhi Metro Rail Corporation (DMRC)

Sustainability through Emission Reduction

The metro's electric, automated trains reduce reliance on cars, cutting congestion and carbon emissions. This aligns with Bahrain's commitment to environmental sustainability and improved urban quality of life.

Resilience through Efficient Connectivity

By linking key districts and hubs, the system enhances resilience, easing road network strain and ensuring seamless daily commuting. It supports economic and social integration across the country.

Boosting Growth and Business Opportunities

The project stimulates economic growth by improving access to business districts, creating jobs, and attracting investment. Metro stations are expected to foster new commercial opportunities and support productivity by enabling faster, more efficient travel.

Enhancing Connectivity and Quality of Life

The metro improves affordability and convenience for residents, reducing reliance on private vehicles and contributing to cleaner, safer urban environments. Its wide reach promotes social inclusion, ensuring access to services, leisure, and employment for all groups, including marginalized communities.

https://araburban.org/en/infohub/projects/?id=6861

18 Cairo Monorail

Cairo, Egypt
2015 - Ongoing

Overview

The Cairo Monorail is a two-line rapid transit system under construction, notable as Egypt's first driverless monorail and set to be the world's longest upon completion. It is a flagship project under Egypt's Vision 2030.

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Figure 4.35: Cairo Metro Map, LRT light rail lines, and monorail lines.

Scope and Scale

A large-scale project spanning 96 km across Cairo, connecting new urban developments with existing districts to improve mobility and accessibility citywide.

Objectives

- Strengthen connectivity between Cairo's urban communities.
- Facilitate citizen mobility across metropolitan and suburban areas.
- Reduce reliance on private vehicles.

Components

- Two monorail lines: the East Nile Line (54 km, New Administrative Capital to East Cairo) and the West Nile Line (42 km, 6th of October City to Giza).
- 34 stations with transfer options to Cairo Metro Line 3.
- Driverless trains and modern control systems.

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Figure 4.36: New Administrative Capital Monorail (East of the Nile).

Main Stakeholders

Owner/Developer [Public]
National Authority of Tunnels

Owner/Developer

Consultant/Designer
Bombardier Transportation (acquired by Alstom Group)
Orascom Construction
Arab Contractors

Funder
Egyptian Competition Authority

Contractor/ Implementer
Bombardier Transportation (acquired by Alstom Group)
Orascom Construction
Arab Contractors

Social Inclusivity and Mobility Access

The monorail provides affordable, reliable, and safe transport for underserved communities, particularly in peripheral areas. Integration with Cairo Metro and BRT ensures a cohesive transit network, improving accessibility for low-income populations and enhancing overall quality of life.

Economic Benefits and Urban Development

By reducing car dependency and congestion, the monorail supports productivity and economic growth. It connects key business, residential, and commercial hubs, stimulating investment, job creation, property development, and retail expansion, especially in previously underserved regions.

Environmental Sustainability and Resilience

As a clean, electric alternative to private vehicles, the monorail reduces carbon emissions and improves air quality. It diversifies Cairo's transport infrastructure, mitigating congestion and climate-related disruptions, and aligns with Egypt's broader sustainability goals by promoting energy-efficient public transit.

https://araburban.org/en/infohub/projects/?id=3963

19 Iraq Development Road Project

Baghdad, Iraq
[2023 - Ongoing]

Overview

The Iraq Development Road Project is a cross-border transportation and trade corridor connecting the southern port of Faw in Basra to the Faysh Khabur border crossing with Turkey. Spanning 1,200 km and passing through 10 major Iraqi cities, the initiative combines highway and railway infrastructure to position Iraq as a key transit hub between Asia and Europe.

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Figure 4.37: A map of the Development Road Project.

Scope and Scale

The corridor spans 1,200 km from Basra to Turkey, passing through Baghdad, Mosul, Najaf, and other key cities. It is designed as a regional-scale initiative to enhance connectivity and trade integration.

Objectives

- Transform Iraq into a commercial "transit hub" linking Asia and Europe via Turkey
- Generate financial returns and job opportunities
- Reduce reliance on hydrocarbons and public-sector employment
- Strengthen economic integration and trade with neighboring countries
- Improve efficiency in moving goods and people

Components

- Dual rail lines for cargo and passenger trains
- Motorway for cargo trucks
- 15 train stations
- Oil and gas pipelines


© Middle East Council on Global Affairs, 2024

Figure 4.38: Construction of Iraq's Development Road Project.

Main Stakeholders

Owner/Developer [Public]
Iraqi government

Consultant/Designer
PEG Infrastructure

Funder
Iraqi government

Contractor/ Implementer
Iraqi ministry of Transport
Alstom Company

Sustainable Transportation and Trade Connectivity

The Iraq Development Road Project is a strategic infrastructure initiative aimed at transforming Iraq into a key transit hub between Asia and Europe. By integrating a 1,200 km-long dual railway and motorway network, the project promotes sustainable mobility, offering a high-speed, energy-efficient transport alternative. The electric railway system reduces dependency on fossil fuels, cutting greenhouse gas emissions and supporting Iraq's transition toward greener infrastructure.

Economic Diversification and Job Creation

A major objective of the project is to reduce Iraq's economic dependence on hydrocarbons by fostering trade, logistics, and transit-related industries. By creating an estimated 100,000 jobs during the initial phase and over one million upon full completion, the initiative supports long-term employment opportunities across various sectors. The financial returns from improved trade efficiency and connectivity further strengthen Iraq's economic resilience.

Regional Integration and Connectivity

The project facilitates stronger economic ties between Iraq and its neighbors, particularly Turkey, through enhanced trade routes and logistical efficiency. The construction of 15 railway stations across major Iraqi cities enhances urban connectivity and accessibility for passengers and cargo alike. This regional integration promotes economic cooperation and positions Iraq as a vital corridor for global trade.

Infrastructure Resilience and Long-Term Viability

Planned in three phases (2028, 2033, and 2050), the project incorporates advanced engineering solutions to ensure durability and adaptability. International partners such as PEG Infrastructure and Alstom provide expertise to meet global standards in efficiency, safety, and sustainability.

https://araburban.org/en/infohub/projects/?id=9838

20 Baghdad Metro

Baghdad, Iraq
2017 - Ongoing

Overview

The Baghdad Metro, also known as the Baghdad Elevated Train (BET), is Iraq's first elevated and automated driverless metro system. Designed to serve a city of over 7 million people, the network will eventually cover more than 85% of Baghdad and its suburbs, with a capacity of nearly 5 million passengers daily. It will connect central Baghdad with new satellite cities, including Al-Jawahiri City (west), Ali Al-Wardi City (south), and New Al-Sadr City (east).

Figure 4.39: Map of the Al-Shula City Corridor Metro Line with bus stations.

Scope and Scale

The metro spans 148 km across seven lines, with 62 stations serving Baghdad and its expanding suburbs. It will connect major urban areas, including Baghdad International Airport and newly planned cities.

Objectives

- Address growing transportation needs
- Reduce traffic congestion in the capital
- Improve environmental quality
- Lower hydrocarbon emissions from car exhausts

Components

- Elevated and underground train stations
- Automated driverless metro systems
- Workshops, depots, control centers, and power facilities
- Specialized carriages: "gold class," women and children's sections, and accessible carriages for passengers with reduced mobility

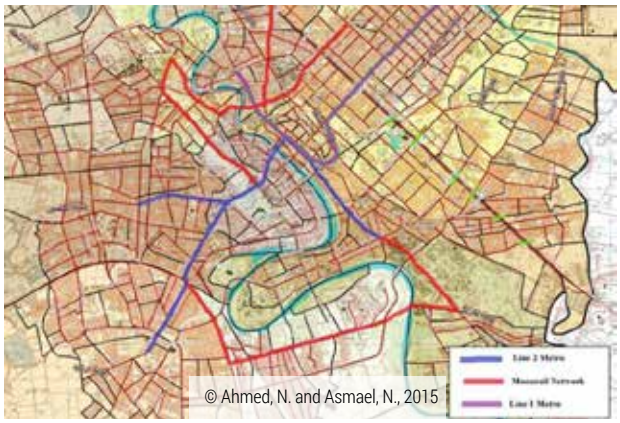

Figure 4.40: Map of Baghdad metro lines 1 and 2 and the monorail network.

Main Stakeholders

Owner/Developer [Public]
National Investment Commission
Mayoralty of Baghdad

Consultant/Designer
HSS Engineers Berhad
Consultant HSS

Funder
National Investment Commission
Mayoralty of Baghdad

Contractor/ Implementer
Mayoralty of Baghdad

Sustainable Urban Mobility

The driverless, electric-powered metro system is designed to reduce reliance on private vehicles, cutting congestion and emissions. With a daily capacity of nearly 5 million passengers, it represents a transformative step toward sustainable urban mobility.

Environmental Resilience

Electrified trains lower hydrocarbon emissions, while underground and elevated sections minimize land-use conflicts and disruptions to existing infrastructure. Tunnels up to 20 meters deep ensure resilience and integration with Baghdad's urban fabric.

Inclusive and Adaptive Infrastructure

The metro incorporates underground, surface, and elevated sections to adapt to diverse urban landscapes. Accessibility features, dedicated carriages for women and children, gold-class seating, and accommodations for passengers with reduced mobility ensure inclusivity. High-speed operations (80-140 km/h) enhance efficiency and appeal.

Economic and Institutional Viability

With a $2.5 billion investment under a DBOMFT (Design, Build, Operate, Maintain, Finance, Transfer) model, the project involves 26 multinational corporations. This financing approach reduces government burden while leveraging international expertise.

The metro is expected to generate jobs, stimulate urban development, and strengthen economic connectivity, particularly by linking Baghdad to emerging satellite cities.

https://araburban.org/en/infohub/projects/?id=7698

21 Najaf-Karbala Railway

Najaf, Iraq
[2024 - Ongoing]

Overview

The Najaf-Karbala Metro is a mass rapid transit system connecting the two religiously significant Iraqi cities. Initiated to meet the growing demand for large-scale transport, it serves millions of pilgrims year-round and weekly visitors. Designed to accommodate over 1 million passengers per day, the project provides a modern, electric alternative to road-based travel.

© Hadi, A., 2024

Figure 4.41: Iraqi map with the capital, Baghdad, in red, and the railway branches.

Scope and Scale

Spanning 90 km from Najaf Airport to Karbala city center, the metro is a regional-scale project designed to serve the continuous influx of pilgrims while strengthening urban mobility between the two cities.

Objectives

- Deliver safe, efficient, large-scale electric transport for pilgrims
- Reduce traffic congestion
- Improve environmental quality
- Replace fuel-based vehicles with clean energy systems

Components

- High-speed electric metro trains
- 90 km of elevated and ground-level tracks
- 4 main metro stations
- Parking facilities for 10,000 vehicles
- Elevators, escalators, ticketing areas, shops, cafeterias, restrooms, administrative and service rooms
- Comprehensive safety measures

© Government of Iraq/National Investment Commission, 2024

Figure 4.42: Proposed Najaf-Karbala Metro Phase 1 network map aligning main station locations between the two cities.

Main Stakeholders

Owner/Developer [Public]
Ministry of Transport
National Investment Commission

Consultant/Designer
Consultant HSS (CHSS)
HSS Engineers Berhad (HEB)

Funder
National Investment Commission

Contractor/ Implementer
National Investment Commission

Sustainable Transportation and Emission Reduction

Fully electric trains reduce carbon emissions and air pollution compared to conventional road traffic. Integration of clean energy sources ensures long-term sustainability, aligning with global climate goals.

Traffic Decongestion and Urban Mobility

By offering a reliable alternative to road transport, the metro alleviates congestion caused by millions of annual visitors. Reduced vehicle use also lowers road deterioration and maintenance costs.

Infrastructure Resilience and Safety

Elevated tracks minimize disruptions from congestion, flooding, and urban infrastructure challenges. Automated, driverless operations improve efficiency and safety, reducing risks of human error.

Inclusive and Accessible Design

The metro incorporates dedicated compartments for women and children, accessible seating for passengers with disabilities, and facilities for elderly travelers. Integration with bus and taxi networks ensures seamless, inclusive mobility.

Multi-Modal Connectivity and Service Efficiency

Stations are strategically linked to public transport networks, including buses, taxis, and large parking facilities. This multimodal approach encourages public transport use over private vehicles, supporting sustainability and resilience.

https://araburban.org/en/infohub/projects/?id=9857

22 Amman Bus Rapid Transit (BRT)

Amman, Jordan
2015 - Ongoing

Overview

The Amman BRT is a citywide network of large-capacity buses operating on dedicated lanes, designed to transport over 315,000 passengers daily. As part of Amman's vision for a modern, integrated public transport system, the BRT provides rapid, safe, and reliable service, playing a central role in the city's urban development and mobility strategy.

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Figure 4.43: Passenger service machine in Amman's Sport City for passenger use

Scope and Scale

The system spans 30 km across two main lines, connecting key urban areas such as Sports City, downtown Amman, and the University of Jordan.

Objectives

- Enhance mass public transportation to meet residents' and visitors' needs.
- Improve travel conditions and accessibility to employment areas.
- Support Amman's growth as an organized, modern, and viable urban center.

Components

- Dedicated bus lanes and stops
- Passenger information points and interchanges
- Terminal stations
- Planting of 4,000 indigenous trees along central islands


© Przechlewski, T., 2021

Figure 4.44: A bus in service through Amman streets.

Main Stakeholders

Owner/Developer [Public]
Greater Amman Municipality

Consultant/Designer
Greater Amman Municipality
Engicon company

Funder
AFD

Contractor/ Implementer
Haddadin Engineering and Contracting Company
Al-Masar
Ahmad Yousef Al-Tarawneh Consortium

Sustainable Urban Mobility

With frequent service and dedicated lanes, the BRT reduces congestion and travel times while offering a reliable alternative to private vehicles. Integration with feeder buses ensures last-mile connectivity, making public transport more accessible and reducing car dependency.

Environmental Sustainability

The project incorporates green infrastructure, planting 4,000 indigenous trees to improve air quality and urban greening. By shifting commuters from cars to buses, the system reduces carbon emissions, fuel consumption, and pollution from idling vehicles.

Resilient and Inclusive Public Transport

The BRT improves access to employment centers and urban nodes, ensuring inclusive mobility. Intermodal connectivity strengthens resilience, while frequent service every 3 minutes and high passenger capacity allow the system to adapt to future growth.

Economic and Institutional Resilience

Initially halted in 2011 due to financial constraints, the project was revived in 2015, reflecting strong governmental commitment. With a $250 million budget, two-thirds funded by AFD, it demonstrates successful public-private collaboration.

The involvement of multiple engineering and contracting firms enhances technical robustness and institutional resilience.

https://araburban.org/en/infohub/projects/?id=7674

23 Amman-Zarqa Bus Rapid Transit

Amman, Jordan
[2015 - Ongoing]

Overview

The Amman-Zarqa BRT is a regional-scale network of large-capacity buses operating on dedicated lanes, designed to serve over 10 million passengers annually. It is a cornerstone of Jordan's vision to modernize public transport by providing safe, efficient, and sustainable mobility between the two cities.

Figure 4.45: The express bus road between Amman and Zarqa.

Scope and Scale

Spanning 20 km, the BRT connects Amman and Zarqa through a dedicated corridor with major terminals and supporting infrastructure.

Objectives

- Deliver sustainable, safe, and effective mass transit services
- Connect Amman and Zarqa
- Enhance public transport facilities and services
- Reduce accidents, pollution, operational costs, and fuel consumption

Components

- 183 buses with capacity for 120+ passengers each
- 20 km of dedicated BRT lanes
- 2 terminal stations and 4 intermediate stations
- Pedestrian bridges, rainwater drainage, sewage systems, lighting, and traffic safety features

Figure 4.46: Figure 6.33: Amman-Zarqa Bus Rapid Transit corridor.

Main Stakeholders

Owner/Developer [Public]
Ministry of Transport

Consultant/Designer
Mostaqbal Engineering and Environmental Consultants

Funder
Ministry of Transport
Social Security Investment Fund
Kuwait Fund

Contractor/ Implementer
Ministry of Public Works and Housing
Greater Amman Municipality
Haddadinco

Environmental Benefits

By reducing reliance on private vehicles, the BRT lowers carbon emissions and fuel consumption, improving air quality along the Amman-Zarqa corridor. Dedicated lanes reduce congestion and idling, fostering a cleaner, more sustainable environment.

Energy Efficiency and Reduced Fuel Consumption

High-capacity buses and optimized routes minimize traffic-related fuel use. Real-time data systems improve efficiency, reducing the environmental footprint of transport in the region.

Improved Mobility and Resilience

Operating at speeds up to 80 km/h, the BRT cuts travel time between Amman and Zarqa from 40 minutes to 20-25 minutes. Dedicated lanes and enhanced facilities strengthen resilience by reducing congestion and ensuring reliable service.

Economic and Social Impact

The project supports economic sustainability by creating jobs and improving connectivity between the two cities. It serves university students and local residents, ensuring affordable, accessible transport that boosts social resilience and strengthens regional integration.

https://araburban.org/en/infohub/projects/?id=9847

24 Kuwait City Metro

Kuwait, Kuwait
[2008 - ongoing]

Overview

The Kuwait Metro is a large-scale greenfield initiative to develop an integrated rapid transit network, enhancing mobility between outer urban areas and Kuwait City's center. Envisioned as "transforming Kuwait City into a modern, connected, and accessible urban center," the project aligns with the national vision of positioning Kuwait as a commercial and financial hub.

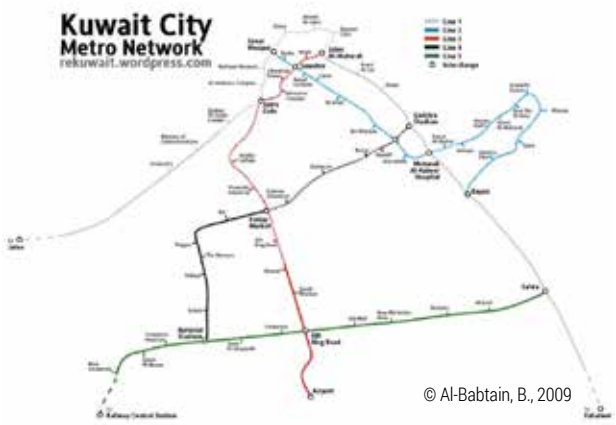

Figure 4.47: Map of the Kuwait City Metro Network.

Scope and Scale

The metro spans 160 km, covering Hawalli, Salmiya, Kheitan, Farwaniya, and Kuwait City's central business district.

Objectives

- Alleviate traffic congestion and promote economic growth
- Establish oversight authority
- Involve the private sector in development
- Enhance social connectivity with affordable, fast, and accessible transport, benefiting individuals with special needs.
- Reduce energy consumption and carbon emissions
- Support Sustainable Urban Mobility

Components

- 160 km metro network with 68 stations
- 44.8 km of underground track
- Integration with bus and tram networks
- Park-and-ride facilities

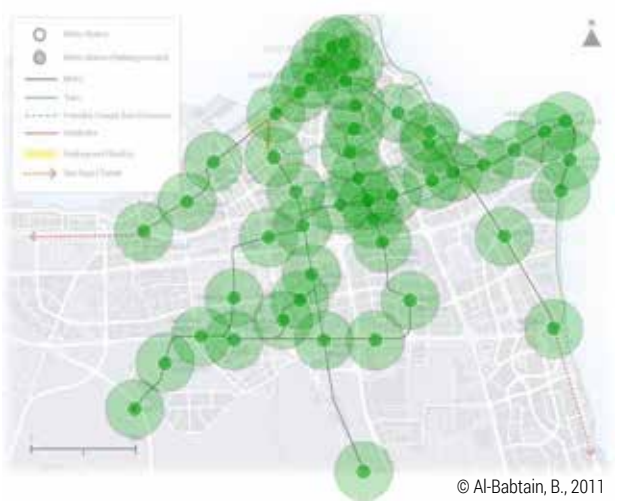

Figure 4.48: Map of the 5- to 15-minute walk radius from every metro station.

Main Stakeholders

Owner/Developer [Public]
Kuwait's Ministry of Communications
Partnerships Technical Bureau (PTB)

Owner/Developer
Kuwait Overland Transport Union (KOTU)

Consultant/Designer
Kuwait United Development
Ineco
Al Dashti Consortium

Sustainable Urban Mobility

By integrating metro, bus, and tram systems, the project reduces reliance on private cars, cutting emissions and energy use. It supports Kuwait's broader commercial and financial transformation goals while fostering eco-friendly urban development.

Resilience and Traffic Congestion Mitigation

The metro enhances connectivity between Kuwait City's core and surrounding areas, reducing travel times and congestion. Park-and-ride facilities, such as the Bayan station, strengthen capacity and encourage public transport use over private vehicles.

Inclusive and Accessible Public Transport

With 68 strategically located stations near universities, malls, and sports arenas, the metro ensures inclusive mobility. Affordable and accessible services particularly benefit individuals with special needs, reinforcing social resilience.

Governance and Public-Private Partnership (PPP)

Led by the Ministry of Communications, the project leverages PPP models with KOTU and PTB. This approach ensures structured implementation through feasibility studies, procurement strategies, and oversight, combining public accountability with private-sector expertise.

https://araburban.org/en/infohub/projects/?id=9381

25 Zahle Eco-Friendly Hybrid Buses

Zahle, Lebanon
[2019 - Ongoing]

Overview

The Zahle Eco-Friendly Hybrid Buses project is Lebanon's first sustainable hybrid bus initiative, launched in Zahle City in the Beqaa region. It is part of the Local Development Program along the Litani River Basin (LRB), funded by the European Union and implemented by the Economic and Social Fund for Development (ESFD). The program addresses the degradation of natural resources in the Litani River basin and the deterioration of living conditions in surrounding communities.

Figure 4.49: A newly introduced hybrid bus operating in Zahle's streets

Scope and Scale

A citywide initiative in the Zahle, Beqaa region, the project establishes a sustainable transport network across three main routes. It serves diverse neighborhoods and key destinations, aiming to reduce congestion, improve air quality, and provide affordable mobility.

Objectives

- Provide safe, efficient, and sustainable public transport
- Reduce traffic congestion and reliance on cars, vans, and tuk-tuks
- Lower air pollution levels in Zahle, which are significantly high.

Components

- Hybrid bus fleet (currently four buses)
- 3 planned lines and 43 stations
- Central bus station, bus rails, and designated bus stops

Figure 4.50: dedicated station in Zahle that is the hub for the city's new bus network for organized urban mobility.

Main Stakeholders

Owner/Developer [Public]
Zahle-Al-Muallaqa and Taanayel municipality

Consultant/Designer
Zahle-Al-Muallaqa and Taanayel municipality

Funder
European Union

Contractor/ Implementer
Zahle-Al-Muallaqa and Taanayel municipality
Economic and Social Fund for Development (ESFD)

Sustainability and Environmental Impact

The Zahle Eco Friendly Hybrid Buses project is Lebanon's first eco-friendly hybrid bus initiative, aimed at reducing the city's environmental footprint. By operating on a hybrid system combining electricity and AdBlue (a diesel exhaust fluid), the buses significantly lower nitrogen oxide (NOx) emissions, which is critical for improving air quality in a city facing high pollution levels. This sustainable transportation model not only mitigates the city's carbon emissions but also promotes cleaner air and healthier living conditions for residents.

Reduction of Traffic Congestion

The introduction of eco-friendly buses in Zahle is designed to address the city's growing traffic congestion problem. By offering a reliable and efficient public transportation service with four buses covering major city routes, the initiative reduces the reliance on private cars, vans, and tuk-tuks, which are key contributors to traffic jams.

This solution is not only a step towards improving urban mobility but also supports the city's goal of decreasing car dependency and enhancing overall urban livability.

Social and Economic Resilience

The project also integrates social equity into its design by offering free rides to senior citizens, individuals with special needs, and children under ten, while students receive a 50% discount on tickets.

This inclusivity ensures that the service remains affordable for a broad segment of the population, including marginalized and economically vulnerable groups. Furthermore, the project fosters economic resilience by providing a cost-effective alternative to expensive private transportation and improving access to key city areas, benefiting both local residents and businesses.

https://araburban.org/en/infohub/projects/?id=9276

26 The Benghazi Metro

Benghazi, Libya
[Ongoing]

Overview

Launched in May 2023, the Benghazi Metro is a landmark initiative to modernize the city's transport infrastructure and support post-conflict recovery. Developed under a partnership between the Libyan government and a multinational consortium, the project is part of Libya's broader strategy to revitalize the economy through large-scale investments in renewable energy, railways, and urban planning. It envisions Benghazi as a "sustainable, connected, and economically resilient hub" for eastern Libya and forms a key element of six major infrastructure projects planned for 2024, including a new airport, solar plants, and railway networks.

Figure 4.51: Public Transport Network map in Benghazi.

Scope and Scale

Covering approximately 64,000 hectares, the metro will connect Benghazi's city center, suburban areas, and the Green Mountains region. As part of Libya's post-conflict redevelopment strategy, it positions Benghazi as a resilient and sustainable transport hub in North Africa.

Objectives

- Drive economic diversification
- Reduce reliance on oil
- Lower carbon emissions through renewable energy-powered transport
- Improve urban mobility and connectivity across Benghazi

Components

- Three light metro lines
- New CBD transportation hub
- Regional railway integration
- Renewable energy-powered transport systems
- Advanced traffic modeling tools

Figure 4.52: Planned alignments and connections for the proposed metro and intercity rail network layout for Benghazi and Tripoli.

Main Stakeholders

Owner/Developer [Public]
Libyan Ministry of Transport

Consultant/Designer
Systematica

Contractor/ Implementer
Bfi-management
Siemens Mobility

Renewable Energy Integration

The metro will operate primarily on solar power, reducing fossil fuel reliance and carbon emissions. Energy-efficient infrastructure and electric buses further minimize environmental impact, leveraging Libya's abundant solar resources to support national renewable energy goals.

Sustainable Urban Mobility

Three light metro lines will ease congestion and reduce private vehicle dependency, improving air quality and livability. The system provides a reliable public transport alternative for Benghazi's growing population.

Climate Adaptation and Disaster Resilience

Infrastructure incorporates flood-resistant planning and climate-adaptive technologies, ensuring continuity of services during extreme weather events. This resilience is critical in a city recovering from conflict and disasters such as Storm Daniel (2023).

Economic and Social Resilience

The central business district (CBD)-centric design integrates transport hubs with economic activities, fostering job creation and local growth. By attracting international investment, the project diversifies Libya's economy beyond hydrocarbons and strengthens post-war recovery.

Smart and Inclusive Transport Planning

Advanced traffic modeling and urban planning balance modern infrastructure with cultural heritage preservation. Accessible public transport ensures inclusivity, benefiting diverse socioeconomic groups and enhancing urban equity.

https://araburban.org/en/infohub/projects/?id=9487

27 Marrakesh Bus Rapid Transit (BRT)

Marrakesh, Morocco
2017 - Ongoing

Overview

The Marrakesh BRT is a citywide public transport system using high-capacity electric buses on dedicated lanes. Announced during the COP22 summit in 2016, it is designed to transport over 45,000 passengers daily and provide a sustainable solution to the city's growing mobility needs.

Figure 4.53: A Hybrid Bus operating in Marrakesh.

Scope and Scale

Spanning 52.7 km across four transit lines, the BRT connects peripheral neighborhoods to central hubs, improving access to key destinations including the airport and industrial zones.

Objectives

- Improve quality of life
- Offer sustainable, reliable public transport
- Reduce congestion
- Enhance accessibility

Components

- Low-floor tram-style electric buses
- Two operational lines (T1, T2) with 70 stations and 47 km of tracks
- Planned extensions (T3, T4) adding 34 km

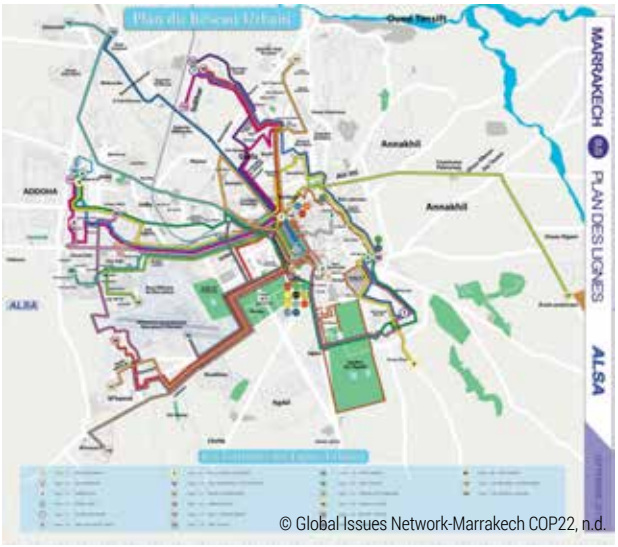

Figure 4.54: Alsa Bus network map for Marrakech, showing the layout of major bus routes and stops across the city.

Main Stakeholders

Owner/Developer [Public]
Municipality of Marrakesh
SDL Local Development Company

Consultant/Designer
Ingerop
Novec
Atelier 1

Funder
Global Environment Facility (GEF)

Contractor/ Implementer
Ingerop
Novec
Atelier 1

Governance, Collaboration, and Community Engagement

The project aligns with Morocco's sustainability agenda and involves multiple stakeholders in feasibility and implementation. It enhances inclusivity by connecting underserved neighborhoods to central hubs, addressing transport inequalities.

Sustainable Technologies and Climate Resilience

Powered by a 1 MW solar farm with High Concentration Photovoltaics (HCPV), the BRT reduces carbon emissions and fossil fuel reliance. Infrastructure upgrades, roadworks, signage, and electrical systems ensure efficient operations and long-term resilience.

Economic Growth, Tourism, and Capacity Building

By linking residential, commercial, and industrial areas, the BRT stimulates job creation and affordability. Improved accessibility supports tourism by connecting attractions efficiently. Training programs for operators and planners build local capacity, ensuring long-term success.§

https://araburban.org/en/infohub/projects/?id=6436

28 CasaBusway

Casablanca, Morocco
[2016 - Ongoing]

Overview

CasaBusway is a Bus Rapid Transit (BRT) system operating on dedicated lanes across Casablanca. Designed to carry over 300,000 passengers daily, it complements the city's existing transport network and forms part of the Casablanca Strategic Development Plan (PSDC) 2015-2025.

Figure 4.55: CasaBus passing through the city of Casablanca.

Scope and Scale

A citywide initiative spanning 24.5 km, CasaBusway connects major transit routes across Morocco's economic hub, offering efficient and sustainable transport for residents and visitors.

Objectives

- Improve and facilitate urban transport for residents and visitors.
- Ensure smooth integration with tramway routes
- Enhance commuter mobility

Components

- 24.5 km of dedicated BRT lanes
- 42 stations and 40 high-capacity buses
- Real-time monitoring tools and integrated ticketing
- Secure stations with turnstile access
- Facilities for passengers with reduced mobility

Figure 4.56: Map of Casabusway lines and stops.

Main Stakeholders

Owner/Developer [Public]
Casa Transport

Consultant/Designer
Casa Transport

Funder
Casablanca-Settat region
City council of Casablanca
CDG

Contractor/ Implementer
GTR
SGTM

Sustainable Urban Mobility

The CasaBusway project is designed to address urban mobility in Casablanca, focusing on sustainability by promoting a more eco-friendly and efficient public transportation system. With the capacity to transport over 300,000 passengers daily, the BRT system operates on dedicated lanes, reducing congestion and improving the flow of traffic throughout the city.

The use of buses powered by clean fuel and efficient engines helps reduce energy consumption and lower greenhouse gas emissions, supporting the city's sustainability goals.

Integration with Existing Infrastructure

The CasaBusway system is integrated with existing public transportation infrastructure, such as the tramway routes, enhancing overall mobility options. By connecting major transit routes across the city, the system provides a seamless connection for commuters, encouraging the use of public transport over private vehicles. This integration helps to reduce the reliance on cars, alleviating traffic congestion and supporting sustainable urban development.

Accessibility and Resilience

Designed to be inclusive, the CasaBusway features secure stations with turnstile access, facilities for people with reduced mobility, and an integrated ticketing system, ensuring accessibility for all residents and visitors.

Additionally, the BRT system is resilient, with advanced monitoring tools for real-time tracking of buses, ensuring high service quality and reliability. This resilience is vital for maintaining consistent operations, especially during peak hours, thus contributing to the long-term sustainability of urban mobility in Casablanca.

https://araburban.org/en/infohub/projects/?id=9693

29 BRT Agadir

Agadir, Morocco
[2020 - Ongoing]

Overview

The Agadir BRT is a public transport system operating on dedicated lanes with high-capacity buses. Part of the Urban Development Program for Agadir (PDU) 2020-2024, a royal initiative, the project aims to modernize the city's infrastructure, improve quality of life, and strengthen Agadir's role as an integrated economic hub in the Souss-Massa region.

Figure 4.57: The Oumlil Amalway Station in the Agadir city center.

Scope and Scale

A metropolitan-scale initiative serving over 1 million people in Agadir and the Souss-Massa region. Once completed, the system is expected to carry 12 million passengers annually on Line 1 alone.

Objectives

- Establish a sustainable, efficient, and environmentally friendly transit network.
- Provide reliable, frequent, and safe transport for residents and visitors.
- Enhance Agadir's economic and tourism attractiveness.

Components

- Dedicated BRT lanes
- 3 planned lines (L1 under construction; L2 & L3 under study)
- 30 articulated buses (Line 1)
- 36 stations
- Real-time passenger information system
- Modern ticketing system and surveillance cameras

Figure 4.58: An ALSA bus with passengers on board.

Main Stakeholders

Owner/Developer [Public]
Grand Agadir Local Development Company for Mobility and Urban Transport (GAMDU)
Souss-Massa Regional Council

Owner/Developer

Consultant/Designer
Urbanica
Artelia Maroc
Artelia France

Funder
Union for the Mediterranean
AFD
European Union

Contractor/ Implementer
SNTRO
SATIMED

Strengthening Urban Resilience through Enhanced Mobility

The BRT reduces pressure on road networks by connecting key hubs such as the fishing port, university district, and industrial zones. It improves adaptive capacity to demographic and economic shifts, reinforcing urban resilience.

Social Inclusivity and Improved Accessibility

Equipped with ramps, real-time information systems, and contactless ticketing, the BRT ensures accessibility for all, including individuals with reduced mobility. Affordable and inclusive design fosters social equality and broad usage across socio-economic groups.

Economic Development through Improved Mobility Infrastructure

By linking commercial, industrial, and tourist areas, the BRT facilitates the movement of people and goods, bolstering Agadir's position as a regional hub. Reliable, eco-friendly transport also boosts tourism and supports local businesses.

Technological Advancements for Operational Efficiency

Modern ticketing systems, contactless validation, and SAEIV (operational assistance and passenger information system) enable real-time route management. Surveillance cameras enhance safety, while advanced technologies reduce waiting times and improve service reliability.

https://araburban.org/en/infohub/projects/?id=9699

30 Rabat-Salé Tramway

Rabat, Morocco
[2007 - Ongoing]

Overview

The Rabat-Salé Tramway is a flagship public transport project within the Bouregreg Valley Development Project, designed to modernize mobility across the Rabat-Salé-Témara metropolitan area. By addressing road congestion and growing travel demand, the tramway supports Rabat's ambition to position itself among leading global metropolises through sustainable, mixed-use urban development.

Figure 4.59: The Rabat-Salé tramway network map including two main lines (Line 1 and Line 2) across Morocco's capital region.

Scope and Scale

Covering 20 km across the Rabat-Salé-Témara metropolitan area, the tramway connects key urban centers and serves a population of 400,000, with capacity for up to 170,000 passengers daily.

Objectives

- Improve traffic flow and accessibility between city centers and densely populated areas such as Temara and Sala al Jadida
- Establish a sustainable connection between Rabat and Salé
- Reduce greenhouse gas emissions
- Ensure safe, reliable, and environmentally friendly operations

Components

- Two tram lines spanning 20 km
- 31 stations with stops every 500 meters
- Integration with university towns, hospitals, government buildings, and bus/train stations

Figure 4.60: Rabat-Salé tramway in operation.

Main Stakeholders

Owner/Developer [Public]
The Bouregreg Valley Development Agency
The tramway company (STRS)

Consultant/Designer
The tramway company (STRS)

Funder
Rabat-Salé Tramway Company (STRS)
Bouregreg Valley Planning and Development Agency
European Investment Bank (EIB)

Contractor/ Implementer
Colas Rail

Sustainability and Environmental Impact

The Rabat-Salé tramway significantly contributes to sustainability by offering a greener alternative to traditional road transport. The project aims to reduce greenhouse gas emissions through the incorporation of eco-friendly and environmentally sustainable transportation methods, such as the use of electric-powered trams. By reducing road traffic congestion, the tramway helps to lower air pollution and promotes a cleaner urban environment, aligning with broader environmental goals of the Bouregreg Valley Development Project.

Urban Mobility and Accessibility

The tram system enhances urban mobility by providing a sustainable transportation option that connects key urban centers, including densely populated areas, university towns, and government buildings. With 31 stations across two lines, the tramway ensures efficient access to essential infrastructure and services for a population of 400,000, handling up to 170,000 passengers daily. The network also fosters resilience by improving connectivity between the two cities, facilitating smoother traffic flow, and addressing growing travel demands in Rabat-Salé.

Resilient Infrastructure and Expansion

The tramway's design and infrastructure are integral to the resilience of the Rabat-Salé agglomeration. Its continuous extension, such as the 2020 expansion and future plans for extending Line 2 to Témara and Sala El Jadida, demonstrates the project's capacity to adapt to the growing transportation needs of the region. By ensuring accessibility to key areas and promoting long-term urban development, the tramway serves as a critical component in enhancing the cities' resilience to future mobility and environmental challenges.

https://araburban.org/en/infohub/projects/?id=9218

31 Oman National Railway

Sohar, Oman
2014 - Ongoing

Overview

The Oman National Railway is a large-scale rail network designed for both passenger and freight transport. Initiated by the Oman Railway Company in 2014, the project aims to connect people, trade, and businesses within Oman and link the country to the wider Gulf Cooperation Council (GCC) regional network. It aligns with Oman's vision to "establish a solid and efficient rail system that bolsters the logistics industry's share of GDP and positions Oman as the leading regional logistics gateway."

Figure 4.61: Part of The UAE and Oman 303-kilometer rail network.

Scope and Scale

Spanning 2,224 km across Oman, the network will be developed in nine phases. It connects major cities, ports, and resource areas, with key segments linking Oman to the GCC regional rail system.

Objectives

The project aims to ensure a connected, prosperous and diversified economy, as well as promote sustainable urban expansion through:

- Connect major cities, ports, and natural resource areas through a reliable rail network
- Link Oman's infrastructure to GCC and international trade routes
- Provide advanced transport capabilities
- Support economic diversification and urban expansion

Components

- 2,224 km double-track railway network
- 46 stations, 8 marshalling yards, and 9 intermodal yards
- Connections to Muscat, Sohar, Duqm, and Salalah

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Figure 4.62: Proposed Oman national railway corridors linking key urban centers and ports.

Main Stakeholders

Owner/Developer [Public]
Ministry of Transport and Communications
Oman Rail

Consultant/Designer
ITALFERR

Funder
State of Oman
Oman Global Logistics Group (OGLG)
Asian Infrastructure Investment Bank (AIIB)

Environmental Sustainability and Eco-friendly Transport Solutions

Electric-powered trains reduce fossil fuel dependency, cut carbon emissions, and improve air quality. The network is designed as an energy-efficient, low-carbon system, supporting Oman's environmental goals and long-term ecological resilience.

Economic Resilience and Regional Connectivity

By strengthening Oman's logistics sector, the railway increases the role of rail transport in the national economy and enhances the country's position as a regional trade hub. Integration with the GCC rail network facilitates cross-border trade, lowers supply chain costs, and boosts competitiveness.

Social Equity and Improved Accessibility

Commuter stations in both urban and rural areas ensure inclusive access to transport services. The network reduces travel times, improves convenience for daily commuters, and provides a reliable alternative to road travel, enhancing social mobility and overall quality of life.

https://araburban.org/en/infohub/projects/?id=6461

32 Doha Metro

Doha, Qatar
2012 - Ongoing

Overview

The Doha Metro is an underground and elevated rail network designed to transform urban mobility in Qatar's capital. Featuring 75 trains across four lines, the system will span 300 km upon completion in 2026. It has already played a vital role in supporting Qatar's National Vision 2030 and served as a key transport solution during the 2022 FIFA World Cup.

Figure 4.63: Doha Metro Green Line at Mathaf Museum in the Fereej Al Zaeem district of Al Rayyan.

Scope and Scale

The metro spans 300 km across Doha and its suburbs, connecting key districts, economic centers, and transport hubs such as Al Wakra, Lusail, and Hamad International Airport.

Objectives

- Improve quality of life for residents and visitors.
- Promote national and urban economic growth.
- Enable faster, more affordable, and more efficient movement of goods and services.

Components

- 75 trains
- 4 metro lines (Red, Green, Gold, and upcoming Blue)
- 37 operational stations, with expansion to 70 additional stations
- 17.5 km Blue Line under development
- Multimodal connections to other transport infrastructure

Figure 4.64: Phase 1 of Doha Metro in Qatar showing its network connections

Main Stakeholders

Owner/Developer [Public]
Qatar Rail

Consultant/Designer
Qatar Rail

Funder
Qatar Development Bank (QDB)

Contractor/ Implementer
DB Engineering & Consulting
Webuild
QDVC

Governance and Collaborations

Led by Qatar Rail and funded by QDB, the project engages international contractors and operators to ensure world-class design, construction, and long-term efficiency.

Social Inclusivity and Urban Connectivity

The metro enhances accessibility by linking urban and suburban areas through three operational lines (76 km, 37 stations) and the upcoming Blue Line. Affordable and efficient service fosters social inclusion and economic integration across Doha.

Environmental Impact and Technological Advancements

As one of the fastest driverless metro systems globally, reaching speeds of 100 km/h, the Doha Metro reduces reliance on private vehicles, lowers emissions, and improves air quality. Integration with the Lusail Tram supports sustainable, transit-oriented urban development.

Economic and Regional Significance

The metro strengthens Qatar's economy by facilitating the movement of people, goods, and services. It was critical during the 2022 FIFA World Cup and continues to advance Qatar's National Vision 2030. By linking with the GCC rail network, the project enhances regional connectivity and positions Qatar as a key logistics and mobility hub.

https://araburban.org/en/infohub/projects/?id=3508

33 Al Khor Road

Doha, Qatar
2016 - 2021

Overview

Al Khor Road is a 33 km multimodal transportation and infrastructure project connecting Doha to northeast Qatar. Featuring highway lanes, a rail corridor, and cycling/pedestrian paths, the project supports Qatar National Vision 2030 by enhancing connectivity, promoting sustainable mobility, and enabling new urban development along the east coast.

Figure 4.65: Al Khor Coastal Road corridor and key interchange locations connecting Doha-Lusail-Al Khor, Qatar

Scope and Scale

Spanning 33 km from the Doha Gulf Club area to Al Khor and Ras Laffan, the project connects Doha to the east and north of Qatar. It serves as a major regional route, integrating multimodal transport options.

Objectives

- Encourage population movement outside Doha's historic center
- Create new urban areas and developments
- Attract investment in business, real estate, and agriculture
- Improved infrastructure
- Promote healthy mobility and sports through a safe, connected cycling and pedestrian network

Components

- Vehicle highway lanes
- Rail lanes
- Cycling and pedestrian paths

Figure 4.66: Al Khor Coastal Road in Al Heedan, Qatar.

Main Stakeholders

Owner/Developer [Public]
Public Works Authority 'Ashghal'

Consultant/Designer
Public Works Authority 'Ashghal'
KEO International Consultants

Funder
Public Works Authority 'Ashghal'

Contractor/ Implementer
Tekfen Construction

Social Inclusivity and Community Engagement

The project improves connectivity to over 20 residential neighborhoods and key facilities such as Lusail Stadium and Al Bayt Stadium. By including safe cycling and pedestrian paths, it promotes equitable mobility and healthier lifestyles for residents and visitors.

Environmental Impact and Sustainability

The Al Khor Road project includes significant environmental considerations, particularly through its focus on soft Dedicated cycling and pedestrian infrastructure, including an Olympic cycling track, underpasses, and tunnels, reduces reliance on vehicles while protecting ecosystems. Urban furniture such as benches, bicycle stands, and lighting enhances accessibility and supports environmentally friendly, active living.

Economic Impact

Al Khor Road drives economic growth by attracting investment along its corridor and enabling new urban developments. Improved infrastructure, including telecommunications, drainage, and sewage systems, supports diversification beyond Doha's historic center.

Enhanced connectivity reduces travel times, facilitates efficient transport of goods and services, and generates employment during construction and operations.

https://araburban.org/en/infohub/projects/?id=6486

34 Al-Madina Al-Munawarah Bus project

Al-Madina Al-Munawarah, Saudi Arabia
2022 - Ongoing

Overview

The Medina Bus Project is a citywide public transport initiative launched in Al-Madina Al-Munawarah as part of Saudi Arabia's Vision 2030. It introduces a modern bus network to reduce congestion, improve air quality, and create pedestrian-friendly areas near the Prophet's Mosque.

Figure 4.67: Madinah city bus network showing station locations and route connectivity across key urban nodes.

Scope and Scale

The network covers both urban and regional routes, connecting major hubs such as Al-Masjid an-Nabawi, Quba Mosque, Prince Mohammed Bin Abdulaziz International Airport, and Haramain Railway Station.

Objectives

- Enhance urban mobility by reducing traffic congestion and vehicular emissions.
- Provide sustainable, pedestrian-friendly transport options in key city areas.
- Support Vision 2030 goals for modern, inclusive, and environmentally conscious infrastructure.

Components

- Fleet of 27 buses (conventional and electric)
- 106 stations across 6 main routes
- Interactive facilities at bus stops
- Real-time tracking via mobile app and website

Figure 4.68: Bus at the Salam Road stop in Al-Madina, Saudi Arabia

Main Stakeholders

Owner/Developer [Public]
Al Madinah Region Development Authority

Funder
Al Madinah Region Development Authority

Contractor/ Implementer
Al Madinah Region Development Authority
SAPTCO

Enhancing Accessibility and Mobility

Operating 16 hours daily, seven days a week, the system improves connectivity through frequent stops and interconnecting routes. It provides a reliable alternative to private vehicles, easing congestion and serving residents, visitors, and pilgrims, especially during peak seasons like Ramadan.

Integration of Green Technologies

The project incorporates sustainability through electric buses and over 80 solar-powered stations. These reduce carbon emissions and reliance on nonrenewable energy. Interactive digital features at bus stops further enhance user experience and accessibility.

Social Inclusivity and User-Centered Design

Customized vehicles and accessible stops accommodate individuals with special needs. Affordable fares ensure equitable mobility for diverse socio-economic groups. Real-time passenger information via digital platforms improves convenience and reliability.

Resilience and Long-Term Urban Development

By linking transport to major city hubs, the project strengthens urban resilience and supports long-term development. The planned Bus Rapid Transit (BRT) system demonstrates Medina's commitment to sustainable, future-ready urban mobility solutions.

https://araburban.org/en/infohub/projects/?id=7525

35 The Makkah Public Transport Program

Makkah, Saudi Arabia
[2010 - Ongoing]

Overview

Launched in 2010, the Makkah Public Transport Program is a comprehensive initiative to modernize urban mobility in Makkah. It combines metro, Bus Rapid Transit (BRT), express bus, feeder bus services, and Intelligent Transport Systems (ITS). Unique in scope, the program addresses the dual needs of Makkah's residents and millions of visiting pilgrims, envisioning a "globally safe, reliable, and trusted transportation system to serve the residents and guests of the Holy Kaaba."

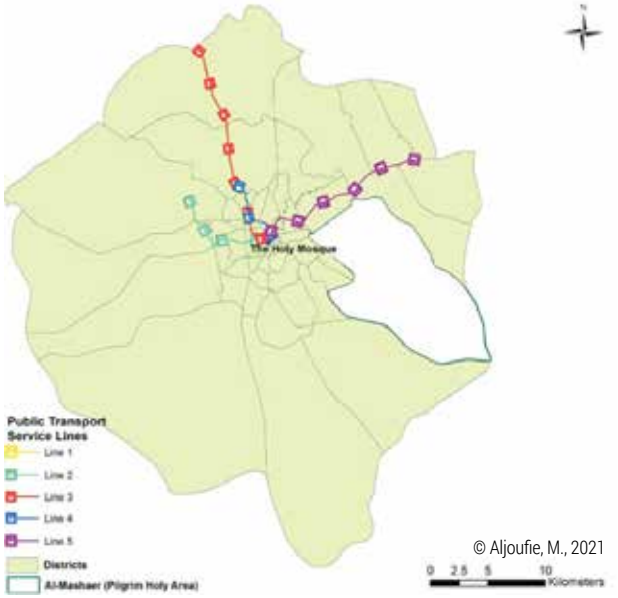

Figure 4.69: Public transport service lines in Makkah, Saudi Arabia.

Scope and Scale

A citywide initiative spanning 172 km with 342 bus stops, the program integrates metro and bus services to improve accessibility and reduce congestion across Makkah.

Objectives

- Reduce traffic congestion and improve air quality
- Enhance accessibility for mobility-impaired passengers
- Provide efficient, integrated transport solutions
- Align with Saudi Vision 2030 and the Pilgrim Experience Program

Components

- Metro system with four planned lines
- Bus Rapid Transit (BRT), express bus, and feeder bus services
- Intelligent Transport Systems (ITS) for real-time monitoring and route optimization

Figure 4.70: Public transport bus operating in Makkah supporting the Makkah Public Transport Program.

Main Stakeholders

Owner/Developer [Public]
Royal Commission for Makkah City and Holy Sites

Consultant/Designer
Systra
Japanese NEC Corporation

Contractor/ Implementer
Systra
Nesma
MBCO

Sustainable Urban Mobility and Emission Reduction

The Makkah Public Transport Program is designed to minimize traffic congestion and reduce air pollution by offering an integrated and efficient public transportation network. By incorporating low-emission Euro-4 buses, Bus Rapid Transit (BRT), and metro services, the program significantly lowers greenhouse gas emissions. The introduction of Wi-Fi-enabled, collision-avoidance-equipped buses also encourages a shift from private vehicle use to public transport, reducing overall carbon footprints.

Enhancing Accessibility and Social Inclusion

The project prioritizes accessibility by integrating hydraulic boarding systems for people with disabilities, making mobility easier for all residents and visiting pilgrims. The program ensures that both residents and pilgrims have reliable access to key religious and urban centers, enhancing social connectivity and inclusivity.

Resilient Infrastructure and Smart Technologies

The program leverages Intelligent Transport Systems (ITS) to optimize route efficiency and enhance the real-time monitoring of buses and metro operations. Managed by the NEC Corporation and SYSTRA, this technology-driven approach ensures that transport services remain adaptive to fluctuating passenger demand, particularly during peak pilgrimage seasons.

https://araburban.org/en/infohub/projects/?id=9495

36 Riyadh Metro

Riyadh, Saudi Arabia
[2014 - 2024]

Overview

The Riyadh Metro is a transformative urban mobility project designed to redefine transportation in Saudi Arabia's capital, one of the fastest-growing cities in the world. Featuring fully automated, driverless trains and architecturally striking stations inspired by local culture, the metro is a cornerstone of the Riyadh Public Transport Project (RPTP). Launched in 2014, it aligns with Saudi Vision 2030 and aims to create a sustainable, accessible, and world-class public transport network.

Figure 4.71: Map of Riyadh transportation lines network.

Scope and Scale

Spanning 176 km across Riyadh, the metro is designed to serve over 1.2 million daily passengers, easing congestion and advancing sustainable urban mobility.

Objectives

- Reduce traffic congestion and lower carbon emissions.
- Support economic diversification and urban growth.
- Revolutionize mobility for over 8 million residents.

Components

- 6 metro lines spanning 176 km
- 85 stations
- Park-and-ride facilities
- AI-powered crowd management and real-time monitoring systems

Figure 4.72: King Abdullah Financial District (KAFD) metro station.

Main Stakeholders

Owner/Developer [Public]
The Royal Commission for Riyadh City (RCRC)

Consultant/Designer
RMTC consortium Parsons
RMTC consortium Egis
RMTC consortium Systra

Funder
Public Investment Fund (PIF)

Contractor/ Implementer
BACS consortium led by Bechtel

Sustainable Urban Mobility

The metro aims to reduce car dependency by 30%, cutting greenhouse gas emissions and improving air quality. AI-powered crowd management optimizes passenger flow and energy efficiency, aligning with Vision 2030 sustainability goals.

Energy Efficiency and Low-Carbon Transit

Driverless trains operating at speeds up to 90 km/h use advanced signaling technologies to minimize energy waste. Electric-powered transport reduces fossil fuel consumption, while park-and-ride facilities encourage commuters to shift from cars to public transit.

Resilient Infrastructure and Climate Adaptation

Stations are designed to withstand extreme heat, incorporating climate-responsive architecture such as perforated façades for passive cooling. Platform screen doors and AI monitoring enhance safety and resilience. Accessibility features, including tactile pathways, elevators, and adaptive infrastructure, ensure inclusivity.

Long-Term Environmental and Social Benefits

Upon completion in 2025, the Riyadh Metro will serve as a global model for sustainable urban mobility. By blending cutting-edge technology with traditional Saudi architectural elements, it enhances connectivity, livability, and environmental resilience, showcasing how heritage and innovation can coexist in a modern city.

https://araburban.org/en/infohub/projects/?id=9505

37 Khartoum Local Train Project

Khartoum, Sudan
[2019 - Ongoing]

Overview

The Khartoum Local Train Project is a central component of Khartoum State's transportation master plan, which envisions metro systems, trams, roads, and bridges to build an integrated transit network. Designed to carry approximately 600 passengers per journey, the project responds to the city's growing public transport crisis, driven by rapid population growth, now around eight million, and deteriorating road infrastructure. It aims to establish a "modern, accessible, and sustainable public transportation system that enhances mobility, drives economic growth, and improves urban living."

Figure 4.73: Passengers arriving by buses at Khartoum train station.

Scope and Scale

The project currently operates two railway lines connecting Al-Shajara in the south and Al-Kadro in the north to Khartoum Central Station. Future extensions will expand coverage across the capital and suburban areas, strengthening national-scale mobility.

Objectives

- Alleviate traffic congestion
- Improve connectivity between central Khartoum and surrounding areas
- Enhance mobility as part of the state's broader transportation development strategy

Components

- 10 stations and 2 existing lines
- Trains with capacity for ~600 passengers per journey
- Planned network extensions and additional evening peak services

Figure 4.74: Location of Khartoum within Sudan, providing regional context for the Khartoum train network.

Main Stakeholders

Owner/Developer [Public]
Khartoum State
Ministry of Infrastructure and Transportation

Consultant/Designer
Ministry of Infrastructure and Transportation

Funder
Khartoum State

Contractor/ Implementer
Khartoum State
Ministry of Infrastructure and Transportation

Enhancing Sustainable Urban Mobility

By reducing reliance on private vehicles, the train system alleviates congestion and air pollution. It provides a reliable alternative to deteriorating road infrastructure, supporting a more environmentally sustainable urban mobility model.

Reduction of Carbon Emissions

Electrified rail services shift daily commutes away from minibuses and cars. Current operations meet 30-40% of regional transport demand, with planned expansions expected to reach 50%. This modal shift reduces fuel consumption and emissions, contributing to cleaner air and a healthier environment.

Resilience Through Infrastructure Expansion

Phased expansion strengthens transport resilience by improving connectivity between Khartoum's core and suburban areas. Integrating rail into the broader transport plan enhances the city's capacity to adapt to population growth and infrastructure challenges.

Public-Private Collaboration for Sustainable Transport

The project reflects collaboration between Khartoum State, the Ministry of Infrastructure and Transportation, and international partners. China's supply of six trains in 2018 highlights the role of global partnerships in advancing sustainable transit, securing investment, and ensuring long-term viability.

https://araburban.org/en/infohub/projects/?id=9422

38 Tunis Rapid Railway Network (RFR)

Tunis, Tunisia
2007 - Ongoing

Overview

The Tunis Rapid Railway Network (Réseau Ferré Rapide - RFR) is a major suburban rail transit system under development in Greater Tunis. Launched in 2007, it is one of Africa's largest infrastructure projects, designed to modernize urban mobility and reduce reliance on private vehicles.

Figure 4.75: A railway station in Tunis.

Scope and Scale

The RFR spans 85 km across Greater Tunis, consisting of five lines implemented in two phases. It is designed as a citywide system to connect metropolitan residents with central Tunis and key employment hubs.

Objectives

- Establish the primary collective transport system for Greater Tunis
- Carry over 600,000 passengers daily upon completion
- Improve access to the city center
- Reduce car dominance and its environmental and economic impacts

Components

- Fleet of 28 trains
- Command-and-control center
- Modern train traffic security systems
- Train maintenance facility
- Electrical substation
- New tunnel infrastructure

Figure 4.76: Railway networks in Tunisia.

Main Stakeholders

Owner/Developer [Public]
Ministry of Transport
Company of the Rapid Transit Railway Network of Tunis

Consultant/Designer
Company of the Rapid Transit Railway Network of Tunis

Funder
Tunisian Government
AFD
European Investment Bank (EIB)

Contractor/ Implementer
Company of the Rapid Transit Railway Network of Tunis
SYSTRA
Studi

Enhancing Sustainable Urban Mobility

The high-capacity network reduces car dependency, eases congestion, and supports urban densification around transit nodes. Faster train speeds improve mobility and foster a more sustainable urban environment.

Environmental Impact and Climate Resilience

Electrified rail powered by gas-generated electricity is expected to cut CO emissions by 50,000 tons annually. Modern traffic security systems and sustainable infrastructure enhance long-term resilience and environmental benefits.

Economic Development and Investment

With a $1.3 billion budget, 40% funded by the Tunisian government and the rest by international partners, the project strengthens competitiveness by improving access to employment centers, reducing travel times, and stimulating transit-oriented development.

Integration of Technology and Safety Standards

Advanced technologies, including a command-and-control center, modern signaling, and a new maintenance facility, ensure efficiency and reliability. Certification under international safety standards (CERTIFER) guarantees resilience and safety in operations.

https://araburban.org/en/infohub/projects/?id=7717

39 Sfax Light Rail

Sfax, Tunisia
[2011 - Ongoing]

Overview

The Sfax Light Rail is a metropolitan public transport initiative serving over 500,000 residents. Part of the Grand Sfax 2030 development strategy, the project integrates light rail and Bus Rapid Transit (BRT) to modernize mobility, reduce traffic congestion, and support sustainable urban growth.

Figure 4.77: 3D rendering of Sfax's light rail sustainable and regional urban mobility project.

Scope and Scale

The project spans approximately 60 km across the metropolitan region of Sfax, including a 22.8 km tram network and 47.1 km of BRT routes.

Objectives

- Enhance multimodal connectivity within the urban transport system
- Address evolving mobility needs
- Minimize road traffic impacts

Components

- 5 transit lines (2 Light Rail + 3 BRT)
- Multimodal hub
- 12 park-and-ride facilities (100-200 spaces each)

Figure 4.78: Map of the Sfax Light Rail system within the mobility strategy.

Main Stakeholders

Owner/Developer [Public]
SMLS - Société du Métro Léger de Sfax

Consultant/Designer
SYSTRA
STUDI International
Egis

Funder
Tunisian Government
European Investment Bank (EIB)

Enhancing Sustainable Urban Mobility

The Sfax Light Rail project contributes to a sustainable urban transport system by promoting multimodal connectivity and reducing dependence on private vehicles. By integrating light rail and Bus Rapid Transit (BRT) networks, the initiative enhances accessibility while decreasing traffic congestion and associated air pollution. The project's 22.8 km tram and 47.1 km BRT network serve key residential, commercial, and institutional hubs, ensuring a more efficient and environmentally responsible public transport system.

Reducing Carbon Emissions and Road Congestion

With a projected 500,000 residents benefiting from the improved transit infrastructure, the initiative is designed to minimize greenhouse gas emissions by reducing car usage. The introduction of electric-powered light rail and dedicated BRT lanes is expected to significantly lower the carbon footprint of urban mobility in Sfax. The implementation of a multimodal hub further promotes a shift toward low-emission transport options, reinforcing the city's commitment to sustainable mobility.

Resilient Infrastructure and Long-Term Adaptability

The phased implementation of the project, extending through 2030, ensures adaptive growth and resilience in response to urban expansion and changing mobility demands. The incorporation of 12 park-and-ride facilities facilitates a seamless transition from private to public transportation, supporting urban sustainability. Despite financial and technical challenges delaying implementation, the project remains a strategic investment in climate-resilient transport, supported by international funding and expertise.

https://araburban.org/en/infohub/projects/?id=9734

40 Sana'a Taxi and Bus Stations Project

Sana'a, Yemen
[2024 - Ongoing]

Overview

The Sana'a Taxi and Bus Stations Project is a citywide initiative to modernize the capital's chaotic transport network. Launched in 2022, it merges modern infrastructure with local architectural styles to reduce congestion and improve mobility. The project envisions transforming Sana'a into a "model city for organized and efficient public transport" and forms part of broader efforts to upgrade urban infrastructure amid rapid population growth and urbanization pressures.

Figure 4.79: Sana'a University transport hub, microbus station and roundabout bus Station at University Gate

Scope and Scale

Located in Sana'a, Yemen's capital, the project establishes taxi and bus terminals across the city to meet growing transport needs and improve urban mobility.

Objectives

- Establish centralized hubs for taxis and buses
- Regulate informal parking
- Enhance road safety
- Align with Yemen's National Urban Transport Strategy to support sustainable urban development

Components

- Six modern taxi stations with digital dispatch systems.
- Three main bus terminals with dedicated lanes and shaded waiting areas.
- Commercial spaces integrated into stations.

Figure 4.80: Main Station of Minibuses at Beit Bous Bridge in Yemen.

Main Stakeholders

Owner/Developer [Public]
Yemen's Ministry of Transport

Contractor/ Implementer
Yemen's Ministry of Transport

Integration of Modern Infrastructure with Local Context

The Taxi and Bus Stations Project in Sana'a combines modern transport infrastructure with local architectural styles, aiming to reduce congestion and improve urban mobility. The establishment of six modern taxi stations and three main bus terminals equipped with digital dispatch systems and dedicated lanes ensures efficient transportation. This modern approach balances functional transport solutions with cultural relevance, fostering community acceptance and long-term sustainability.

Promoting Sustainable Energy Solutions

As part of the project's expansion plans, the second phase (2024–Ongoing) includes the installation of solar energy systems. This initiative contributes to reducing the city's reliance on non-renewable energy, aligning with Yemen's broader goals for sustainability. The integration of solar power in public transportation infrastructure enhances energy efficiency and reduces the environmental footprint of the transport network, promoting resilience to energy disruptions.

Economic and Social Resilience through Local Development

The project's commercial spaces adjacent to stations, such as cafes and retail shops, serve to boost local commerce and create economic resilience for surrounding communities. This integration of commercial elements encourages job creation and local economic growth, contributing to a more resilient urban economy. Furthermore, it promotes social cohesion by fostering a sense of community around transportation hubs, ensuring the long-term sustainability of the area.

https://araburban.org/en/infohub/projects/?id=9490

D. Smart Mobility

41 Manama Electric Vehicles (EVs) and Charging Infrastructure

Manama, Bahrain
[2020 - ongoing]

Overview

The Electric Vehicles (EVs) and Charging Infrastructure project is a nationwide initiative to accelerate Bahrain's transition to sustainable mobility. Launched in 2020, it promotes clean technologies, efficient energy management, and sustainable infrastructure while raising public awareness to encourage EV adoption. The project aligns with Bahrain's Economic Vision 2030, the national goal of carbon neutrality by 2060, and broader climate change mitigation efforts.

Figure 4.81: Solar-powered EV charging station at ALBA Factory, Bahrain.

Scope and Scale

The project spans Bahrain's urban centers, highways, residential areas, and public spaces such as malls and parks. It aims to establish a nationwide EV charging network to support large-scale adoption of electric vehicles.

Objectives

- Transform Bahrain's transport sector
- Adopt widespread EV and robust charging infrastructure
- Enhance energy security
- Reduce carbon emissions by up to 22% in the short term
- Support innovation, inclusivity, and public education in sustainable mobility

Components

- EV charging stations in residential areas, shopping malls, and public spaces
- Highway and transit-route charging infrastructure
- EV maintenance and service centers
- High-capacity (360 kW) fast chargers

Figure 4.82: Indicative map of electric vehicle charging locations in Bahrain.

Main Stakeholders

Owner/Developer [Public]
Ministry of Transportation and Telecommunications
Ministry of Electricity and Water Affairs
Ministry of Industry and Commerce

Owner/ Developer
Ministry of Electricity and Water Affairs

Consultant/Designer
ABB Co.

Funder
Ministry of Electricity and Water Affairs
ABB Co.

Contractor/ Implementer
Bahrain National Insurance (BNI)
ABB Co.

Sustainability through Green Infrastructure

By integrating charging stations into key urban and transit locations, the project reduces emissions and supports Bahrain's carbon neutrality goals. It ensures widespread access to clean energy for transportation, contributing to long-term environmental sustainability.

Resilience through Energy Security and Innovation

The initiative reduces reliance on fossil fuels by promoting renewable energy-powered infrastructure. Financial incentives, subsidies, and tax benefits encourage EV adoption, while public-private partnerships leverage expertise and investment to build a resilient transport ecosystem.

Climate Adaptation and Environmental Impact

The project mitigates climate change by reducing vehicular emissions and urban air pollution. Expanding to electric scooters, bikes, and zero-emission delivery fleets strengthens Bahrain's leadership in sustainable transport. Reduced noise pollution and improved air quality enhance urban living conditions for residents and visitors.

https://araburban.org/en/infohub/projects/?id=9386

42 Amman's Unofficial Transport Map (Khutoutna)

Amman, Jordan
[2015 - 2017]

Overview

Khutoutna is an innovative mapping initiative designed to streamline Amman's formal and informal public transport system. As the first project of its kind in Jordan, it provides residents and visitors with a comprehensive visual tool that displays routes for large and small buses as well as service taxis across Amman and its suburbs.

© Sabbagh, A. & Syntax Design, 2016

Figure 4.83: Khutoutna Map.

Scope and Scale

Operating at a citywide scale, Khutoutna maps Amman's transport network to improve accessibility and efficiency for commuters, residents, and visitors.

Objectives

- Simplify travel planning by making public transport routes clear and accessible.
- Provide accurate information to residents, visitors, and authorities overseeing future transport development.

Components

- Interactive transport map (digital and print)
- Coverage of bus and service taxi routes
- Color-coded system for easy navigation

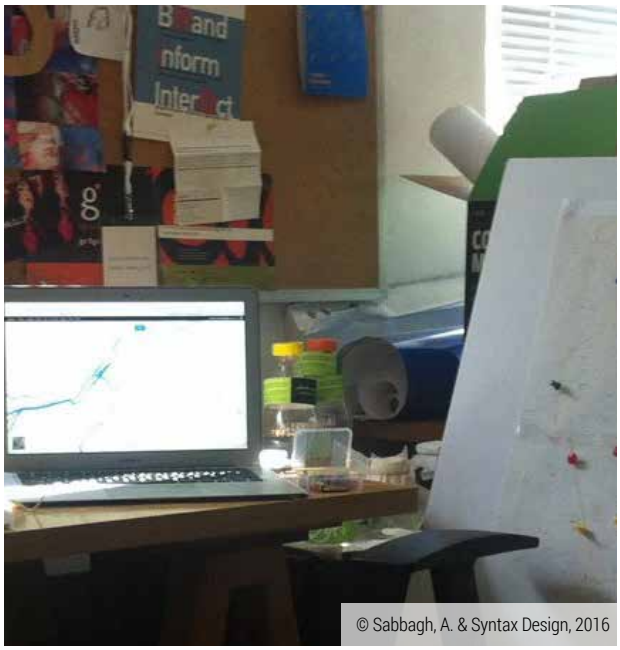
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Figure 4.84: Data Collection and Documentation Phase.

Main Stakeholders

Owner/ Developer
Maan Nasel

Consultant/Designer
SYNTAX

Funder
Maan Nasel

Contractor/ Implementer
Maan Nasel

Enhancing Public Transport Accessibility

By clarifying routes and reducing confusion, the project encourages greater reliance on buses and shared taxis, reducing congestion and emissions while supporting sustainable mobility.

Data-Driven Approach for System Optimization

Volunteers tracked 76 transport routes to ensure accurate documentation of formal and informal lines. This data-driven approach helps policymakers identify connectivity gaps and plan future expansions, strengthening system resilience.

Community Engagement and Participatory Resilience

The initiative relied on collaboration with volunteers, commuters, and bus drivers, integrating local knowledge into transport planning. This participatory model builds awareness of public transport challenges and fosters long-term community involvement in mobility solutions.

Integration of Digital and Physical Tools

Available as a mobile app, website, and printed map, Khutoutna ensures broad accessibility. Its multi-platform design allows real-time updates and adaptability, making it a dynamic tool that evolves with Amman's transportation needs.

https://araburban.org/en/infohub/projects/?id=9324

43 YallaBus

Beirut, Lebanon
[2017 - Ongoing]

Overview

YallaBus is a mobile app designed to organize Beirut's informal public transportation system. Initiated by students at the American University of Beirut and supported by grants, sponsorships, and the Ministry of Public Works and Transportation, the app provides real-time bus schedules and a comprehensive map of routes across the city. By addressing the lack of government oversight in Lebanon's bus system, YallaBus makes public transport more accessible and efficient for commuters.

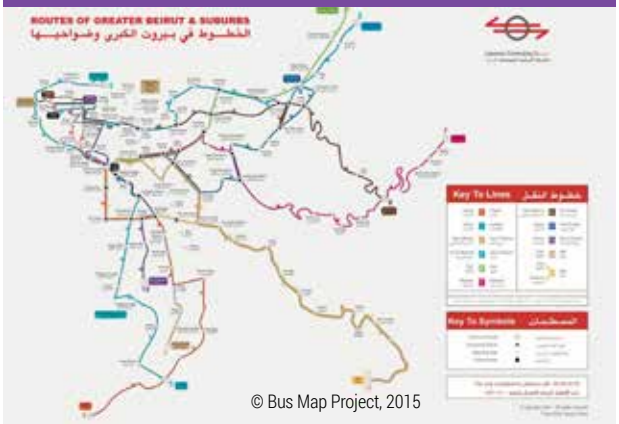

Figure 4.85: Greater Beirut informal transit network map.

across the informal transport system. It serves thousands of daily commuters, improving access to public transport and enhancing network efficiency.

Objectives

- Encourage public transport use
- Make schedules and routes easily accessible
- Improve the commuting experience for passengers and drivers
- Reduce traffic congestion, promote sustainability
- Provide an affordable alternative to taxis and private cars

Components

- YallaBus mobile app
- Real-time bus schedules
- GPS trackers on buses
- Printed maps distributed in public areas

Figure 4.86: Workshops and discussions for the interactive map of Lebanon's formal and informal public transport.

Main Stakeholders

Owner/Developer
Students at the American University of Beirut

Consultant/Designer
Students at the American University of Beirut

Funder
LiveLoveBeirut
CME Offshore
Berytech

Contractor/ Implementer
Students at the American University of Beirut

Sustainability of Public Transport System

YallaBus is an innovative mapping app designed to streamline Beirut's informal public transportation system, aiming to improve the sustainability of the city's transport infrastructure. By providing real-time bus schedules and mapping bus routes, the app enhances access to public transport, reducing reliance on private car ownership. The project seeks to alleviate traffic congestion and promote environmental sustainability by encouraging the use of buses as an alternative to taxis and cars. This initiative aligns with sustainable urban mobility goals by optimizing public transport accessibility for all residents, particularly those unable to afford private vehicles.

Resilience of Public Transport Networks

YallaBus contributes to the resilience of Beirut's public transport system by organizing and formalizing the informal bus network. The app's ability to track buses in real time and provide detailed route information improves the reliability of the transport system, offering commuters a more predictable and efficient travel experience. The app's integration of GPS trackers on buses enables better data collection and monitoring, allowing for timely adjustments and improvements to services. Furthermore, the feedback feature empowers passengers to report issues, promoting continuous service improvement and ensuring the system can adapt to challenges over time.

Social and Environmental Impact

The project also has significant social and environmental impacts. By enhancing the public transport system, YallaBus reduces carbon emissions and contributes to reducing traffic congestion, ultimately fostering a more sustainable urban environment. Additionally, it creates equitable access to transportation for all residents, improving mobility and connectivity within the city. With its user-friendly interface, the app improves the quality of life for Beirut's citizens by making public transport more accessible, affordable, and efficient.

https://araburban.org/en/infohub/projects/?id=9339

44 Riyadh Charging Stations for Electric Vehicles

Riyadh, Saudi Arabia
[2023 - Ongoing]

Overview

The Electric Vehicle Infrastructure Company (EVIQ), a joint venture between the Public Investment Fund (PIF) and the Saudi Electricity Company (SEC), is spearheading the development of a nationwide EV charging network. Launched in 2023, the initiative supports Saudi Vision 2030 by accelerating EV adoption, reducing carbon emissions, and positioning Riyadh as a sustainable urban hub.

Figure 4.87: EVIQ's first public DC fast-charging site in ROSHN, Riyadh.

Scope and Scale

The project is national in scope, with its first fast-charging hub opened in Riyadh. By 2030, the network will expand across Saudi Arabia, ensuring widespread access to EV infrastructure.

Objectives

- Provide advanced, sustainable transport infrastructure
- Enable transition to electric mobility
- Enhance the experience of residents and visitors
- Reinforce Riyadh's role as a modern, resilient city

Components

- 5,000 EV charging stations across 1,000 strategic locations by 2030
- High-power fast chargers exceeding 100 kW
- First fast-charging hub launched at ROSHN Front in Riyadh (2024)

Figure 4.88: Nationwide rollout of electric vehicle charging stations supporting the EVIQ programme in Saudi Arabia, with initial implementation in Riyadh.

Main Stakeholders

Owner/Developer [Public]
Electric Vehicle Infrastructure Company (EVIQ)

Consultant/Designer
Electric Vehicle Infrastructure Company (EVIQ)
Saudi Electricity Company (SEC)

Funder
Public Investment Fund (PIF)
Saudi Electricity Company (SEC)

Contractor/ Implementer
Electric Vehicle Infrastructure Company (EVIQ)

Promoting Sustainable Transportation Infrastructure

EVIQ plays a critical role in facilitating the transition to electric mobility by establishing a nationwide fast-charging network. By improving access to EV infrastructure, the project supports Saudi Arabia's sustainability goals and aligns with Vision 2030, which emphasizes reducing carbon emissions and promoting clean energy solutions. The expansion of charging accessibility encourages widespread EV adoption, reducing reliance on fossil fuels and contributing to a lower environmental footprint.

Enhancing Urban Resilience through Strategic Infrastructure

The installation of 5,000 EV charging stations across 1,000 strategic locations by 2030 strengthens Saudi Arabia's urban resilience. This network mitigates range anxiety among EV users, ensuring reliability and convenience. The launch of the first high-power charging facility at ROSHN Front in Riyadh, one of the city's most frequented destinations—demonstrates a well-planned approach to integrating sustainability into urban mobility. By addressing the current shortage of high-power EV chargers, EVIQ contributes to the resilience of Saudi Arabia's transportation system.

Strengthening Economic and Environmental Sustainability

EVIQ fosters economic sustainability by collaborating with local partners for installation and maintenance, creating new business opportunities and employment. The initiative also enhances Saudi Arabia's competitiveness in the EV sector, attracting investment and fostering technological innovation. By diversifying the economy and reducing dependency on conventional fuel-powered vehicles, EVIQ contributes to a more sustainable urban ecosystem while ensuring long-term energy efficiency.

Encouraging Behavioral Shifts toward Sustainable Mobility

Visible, accessible charging hubs normalize EV use and encourage individuals and businesses to transition to electric mobility. This shift reduces greenhouse gas emissions and sets a precedent for cleaner, more sustainable urban transport.

https://araburban.org/en/infohub/projects/?id=9719

45 Hyperloop

Dubai, UAE
[2015 - Ongoing]

Overview

Hyperloop UAE is an ambitious high-speed transit initiative designed to revolutionize intercity travel in the United Arab Emirates. Launched in 2015, the project envisions "transforming intercity travel by providing a high-speed, eco-friendly, and efficient transit system." It supports the UAE's vision for advanced, sustainable transport solutions by drastically reducing travel times and integrating cutting-edge technologies.

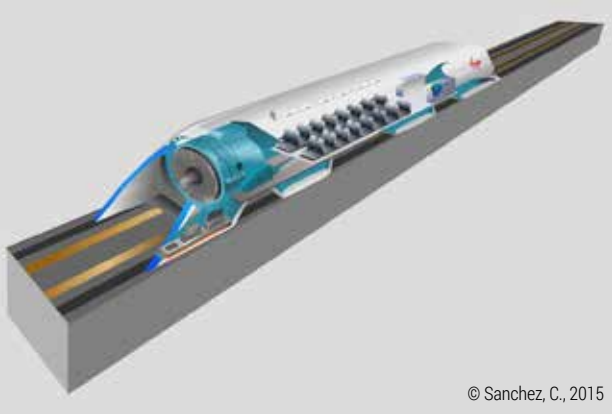

Figure 4.89: Detailed 3D cutaway concept of a Hyperloop capsule, revealing the inner workings

Scope and Scale

Hyperloop UAE is a regional-scale project linking Abu Dhabi and Dubai, with plans to expand across the UAE and potentially integrate into a broader regional and global network. A full-scale prototype track is under development.

Objectives

- Connect major urban centers such as Abu Dhabi and Dubai.
- Provide both passenger and freight transport capabilities.
- Support sustainable, future-ready mobility aligned with national development goals.

Components

- High-speed vacuum tube system
- Passenger and cargo pods
- AI-powered control systems
- Renewable energy integration

Figure 4.90: Structural design of the Hyperloop capsule, with contract development for the Dubai route

Main Stakeholders

Owner/Developer [Public]
Dubai Roads and Transport Authority (RTA)

Owner/Developer
Hyperloop Transportation Technologies (HyperloopTT)

Consultant/Designer
Bjarke Ingels Group (BIG)
Hyperloop Transportation Technologies (HyperloopTT)

Funder
DP World

Contractor/ Implementer
Hyperloop Transportation Technologies (HyperloopTT)
Dubai Roads and Transport Authority (RTA)

Energy Efficiency and Environmental Sustainability

Powered by renewable energy, the system minimizes reliance on fossil fuels and reduces carbon emissions. Vacuum tube technology eliminates air resistance, lowering energy consumption compared to rail or air travel. Elevated infrastructure preserves natural landscapes by requiring minimal land use.

Resilient and High-Speed Transportation

Designed for resilience, Hyperloop pods can reach near-supersonic speeds of up to 1,123 km/h, reducing Abu Dhabi-Dubai travel time to just 12 minutes. This efficiency supports urban mobility and ensures functionality under high-demand scenarios.

Advanced AI and Safety Mechanisms

AI-driven monitoring systems continuously track pod and infrastructure conditions, autonomously detecting and resolving issues. Malfunctioning pods can be rerouted to maintain uninterrupted service, enhancing safety and operational reliability.

Scalability and Economic Viability

The modular design allows phased expansion across the UAE and beyond. With construction costs estimated at $20-40 million per kilometer, Hyperloop UAE represents a long-term investment in sustainable mobility. By reducing congestion and strengthening economic linkages, it is poised to transform regional and global transport dynamics

https://araburban.org/en/infohub/projects/?id=9406

E. Waterfront and Aerial Mobility

46 Comoros Interisland Connectivity Project (PICMC)

Fomboni, Comoros
[2020 - ongoing]

Overview

The Comoros Interisland Connectivity Project (PICMC) is a national initiative to modernize maritime transport across the Comoros archipelago. Envisioned as a "safer, more efficient, and environmentally sustainable interisland transport system that promotes socioeconomic integration," the project combines infrastructure upgrades, vessel renewal, and institutional strengthening. It also ensures compliance with the World Bank's Environmental and Social Standards (ESSs) through frameworks such as the Environmental and Social Management Framework (ESMF) and Stakeholder Engagement Plan (SEP).

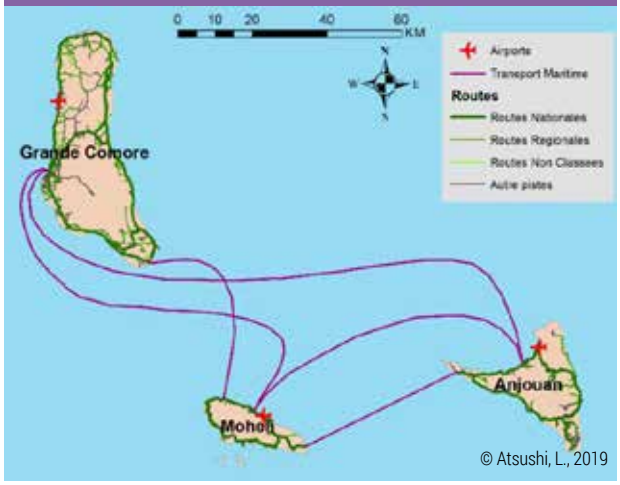

Figure 4.91: Transport network in Comoros.

Scope and Scale

Implemented across Grande Comore, Moheli, and Anjouan, PICMC is a national-scale project focused on upgrading port infrastructure, improving maritime safety, and enhancing interisland connectivity.

Objectives

- Enhance maritime infrastructure, connectivity, and mobility.
- Strengthen climate resilience and safety across Grande Comore, Moheli, and Anjouan.
- Support inclusive and sustainable transport solutions.

Components

- Upgraded ports (Fomboni, Boingoma, and secondary ports)
- Improved kwassa-kwassa landing sites
- Safer, eco-friendly vessels
- Navigation aids, lighting, and accessibility features

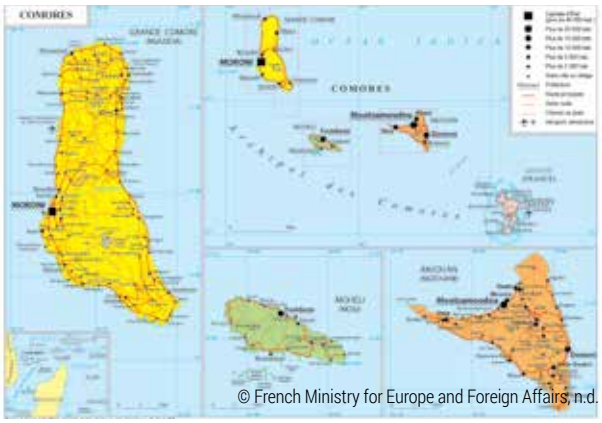

Figure 4.92: A regional map of the Comoros Islands, showing the main and secondary transport routes.

Main Stakeholders

Owner/Developer [Public]
Ministry of Maritime and Air Transport
Government of the Union of Comoros

Funder
World Bank (WB)
International Development Association (IDA)
French Agency for Development

Contractor/ Implementer
Ministry of Maritime and Air Transport
Société Comorienne des Ports

Enhancing Climate-Resilient Port Infrastructure

Port upgrades include a breakwater at Boingoma to protect against northern waves and expansion at Fomboni to accommodate larger vessels. These measures increase cargo capacity, reduce reliance on informal transport, and strengthen climate resilience.

Sustainable and Inclusive Transport Solutions

Old kwassa-kwassa vessels are being replaced with safer, fuel-efficient boats to reduce emissions and improve efficiency. Accessibility upgrades, such as ramps, signage, and lighting, enhance safety, particularly for women and individuals with disabilities.

Strengthening Maritime Safety and Emergency Preparedness

A formalized maritime safety program introduces subsidies for fleet renewal, regulatory reforms, and contingency mechanisms for emergency response. These measures mitigate risks from unregulated transport and improve resilience to climate hazards.

Capacity Building and Institutional Strengthening

The project invests in training maritime authorities, improving governance, and building local expertise in transport management. This strengthens regulatory oversight and ensures long-term sustainability of maritime operations.

https://araburban.org/en/infohub/projects/?id=9391

47 Tangier Cable Car Transport System

Tangier, Morocco
[2021 - Ongoing]

Overview

The Tangier Cable Car Transport System is one of Morocco's leading cable car initiatives. It was introduced as part of the Tangier City Port Redevelopment Project. Envisioned as a "symbolic and modern mobility solution," it provides an alternative mode of public transport while enhancing Tangier's role as a premier tourist destination and sustainable urban hub.

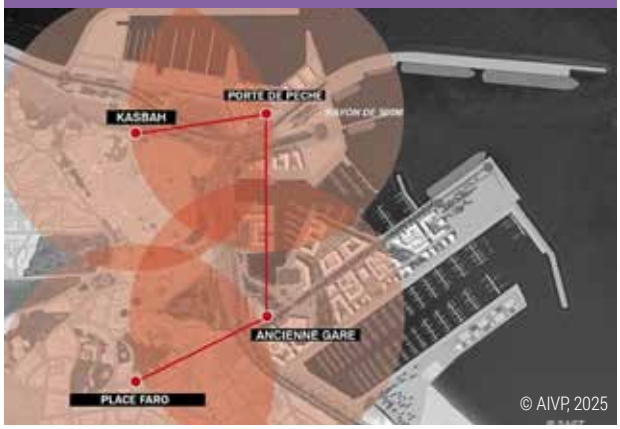

Figure 4.93: Master Plan of Tangier City Port Redevelopment with Cable Car System and Four Stations.

Scope and Scale

Spanning 2 km, the system connects Tangier's downtown, marinas, fishing port, and Kasbah. With a capacity of up to 32,000 passengers daily, the first phase is set to open in 2024.

Objectives

- Transform the port area into a dynamic, accessible hub
- Foster urban integration by connecting the city center with the port
- Promote eco-friendly mobility, reducing emissions
- Support sustainable development goals

Components

- 90 cabins (10-12 passengers each)
- 4 stations
- 17 towers (30-50 meters high)
- 2 km route with scenic viewpoints

Figure 4.94: 3D rendering for Tangier Cable Car Transport System connecting the port area with the city center.

Main Stakeholders

Owner/Developer [Public]
Development Company for the Conversion of the Port Zone of Tangier (SAPT)

Consultant/Designer
Carta - Reichen Et Robert Associés

Funder
Moroccan Government
Hassan II Fund for Economic and Social Development

Contractor/ Implementer
Development Company for the Conversion of the Port Zone of Tangier (SAPT)

Eco-Friendly Mobility Solution

By reducing reliance on gas-powered vehicles, the cable car system lowers emissions and supports Morocco's sustainability agenda. Elevated infrastructure offers a clean, efficient, and environmentally resilient transport option.

Enhanced Urban Integration and Accessibility

The system strengthens connectivity between key districts, improving mobility for residents and tourists alike. Seamless integration between commercial and cultural hubs supports economic resilience and urban cohesion.

Tourism and Economic Development

Beyond transport, the cable car serves as a tourist attraction, offering panoramic views of Tangier's landmarks, including the port and Medina. This dual role enhances Tangier's appeal, boosts tourism, and contributes to the city's broader economic development goals under the port redevelopment program.

https://araburban.org/en/infohub/projects/?id=9458

48 SkyWay

Dubai, UAE
[2015 - Ongoing]

Overview

SkyWay Dubai is an innovative initiative by SkyWay Technologies, specializing in string-rail transport systems. Envisioned as a "high-speed, eco-friendly, and efficient transit system," the project supports the UAE's vision for advanced, sustainable mobility while contributing to the national target of achieving 25% autonomous transport by 2030.

Figure 4.95: Construction of the container depot is completed in 2022.

Scope and Scale

Initial testing is underway at the Sharjah Research, Technology, and Innovation Park (SRTI Park) with a 2.8 km elevated string-rail system. Future expansions will connect major urban hubs, including Downtown Dubai and DIFC, for both passenger and freight transport.

Objectives

- Alleviate traffic congestion and reduce travel time.
- Support the UAE's autonomous transport goals.
- Serve commuters between key hubs such as Downtown Dubai and the Dubai International Financial Centre (DIFC).

Components

- 2.5 km suspended test track at SRTI Park
- Elevated string-rail transport system
- Driverless unicars
- 21 planned stops
- Freight transport infrastructure

Figure 4.96: Concept image of the SkyWay suspended transport system proposed for Dubai's high-density urban corridors.

Main Stakeholders

Owner/Developer [Public]
Dubai's Roads and Transport Authority (RTA)

Owner/Developer
SkyWay Technologies

Consultant/Designer
SkyWay Technologies

Funder
SkyWay Capital

Contractor/ Implementer
SkyWay Technologies
uSKY Transport
Al Serh Al Kabeer Construction (ASAK)

Sustainable and Energy-Efficient Transport

Driverless pods powered by battery and dynamo systems reduce carbon emissions and optimize energy use. The elevated design minimizes land consumption, preserving green spaces and limiting environmental disruption.

Innovative and Resilient Urban Mobility

The modular system allows scalable expansion to meet growing demand. AI-powered pods detect malfunctions, communicate with each other, and autonomously resolve disruptions, ensuring resilience and reliability.

Urban Integration and Reduced Congestion

By linking vital commercial and cultural hubs, SkyWay Dubai eases congestion and provides a fast, efficient alternative to traditional transport. Its minimal land footprint integrates seamlessly with existing infrastructure.

Smart Infrastructure and Technological Innovation

AI-enhanced safety systems, predictive maintenance, and automated crisis response ensure reliability. Lightweight materials and advanced construction techniques make the system cost-effective and durable. Aligning with Dubai's 2030 autonomous transport target, SkyWay Dubai represents a forward-looking model of sustainable, resilient urban mobility.

https://araburban.org/en/infohub/projects/?id=9457

F. Carpooling and Car Sharing

49 SWVL Egypt

Cairo, Egypt
[2017 - 2017]

Overview

SWVL Egypt is a tech-enabled mass transit initiative launched in 2017 to revolutionize urban mobility. Founded by Mostafa Kandil, Mahmoud Nouh, and Ahmed Sabbah with $30,000 in seed funding, the project leverages data analytics and artificial intelligence to optimize bus routes and enhance commuting efficiency. Its vision is to "redefine the future of transportation" by offering reliable, convenient, and affordable alternatives to private car ownership.

Figure 4.97: SWVL ride in Cairo, Egypt.

Scope and Scale

Initially operating in Cairo, Alexandria, and other Egyptian cities, SWVL quickly expanded regionally. Today, it serves 135 cities across 20 countries in Latin America, Europe, Africa, and Asia, representing a major shift toward sustainable, tech-driven urban mobility.

Objectives

- Address urban transportation challenges
- Reduce traffic congestion
- Provide a sustainable alternative to private vehicles
- Align with Egypt's smart city development and sustainable mobility strategies

Components

- Mobile app for booking and real-time tracking
- Fleet of modern buses with air conditioning and Wi-Fi
- Dynamic routing algorithms
- Cashless payment system
- Driver management platform

Morning Commutes				
From	To	Cost of SWVL ride in EGP	UBER Cost of UberX ride in EGP up to*	Careem Cost of GoValue ride in EGP up to*
5th Settlement	Smart Village	35	113	116
6th of October	Maadi	30	110	112
	Tahrir	20	83	86
Heliopolis	Smart Village	35	89	93
Heliopolis	5th Settlement	25	57	57
Heliopolis	Mohandessen	25	62	55
Maadi	5th Settlement	25	62	59
Mohanedeseen	Heliopolis	25	111	96
Nasr City	5th Settlement	20	41	46

Evening Commutes				
From	To	Cost of SWVL ride in EGP	UBER Cost of UberX ride in EGP up to*	Careem Cost of GoValue ride in EGP up to*
5th Settlement	Heliopolis	25	48	52
	Maadi	25	66	47
	Nasr City	20	34	36
	Mohandessen	30	66	67
Smart Village	5th Settlement	35	131	136
	Heliopolis	35	92	95
Maadi	6th of October	30	100	108
Mohanedeseen	5th Settlement	30	73	76
Tahrir	6th of October	20	79	82

*prices excluding surge/peak pricing

© Egyptian Streets, 2017

Figure 4.98: Comparative analysis of travel costs in Egyptian pounds between SWVL and other urban transportation options in Cairo.

Main Stakeholders

Owner/ Developer
Swvl Holdings Corp

Funder
BECO Capital
DiGAME Investment Company
Silicon Badia

Enhancing Sustainable Urban Mobility

By using AI-powered routing, SWVL reduces unnecessary vehicle miles, lowering fuel consumption and emissions. The initiative supports Egypt's smart city goals by encouraging shared mobility and reducing reliance on private cars.

Reducing Carbon Footprint Through Shared Mobility

SWVL's ride-sharing model decreases the number of cars on the road, improving air quality and reducing emissions. High-capacity vehicles maximize efficiency by transporting more passengers with fewer trips.

Building Resilient Transportation Networks

Real-time tracking and dynamic routing enhance system reliability, adapting to demand and traffic fluctuations. This resilience strengthens Egypt's transport infrastructure against economic and environmental pressures.

Improving Accessibility and Equity in Transportation

Affordable fares make SWVL accessible to students, low-income commuters, and those without private vehicles. By expanding mobility options, the project fosters social equity and inclusive urban development.

https://araburban.org/en/infohub/projects/?id=9493

G. Multimodal Hubs

50 Adly Mansour Transportation Hub

Cairo, Egypt
[2006 - 2022]

Overview

The Adly Mansour Transportation Hub is the largest multi-modal transit facility in the Middle East and Africa, serving as Cairo's central interchange for metro, bus, and rail networks. Construction began in 2018 after President Abdel Fattah El-Sisi laid the foundation stone, with the hub officially launched in July 2022. Envisioned as a "modern, integrated transportation gateway for Cairo and the region," the project aligns with Egypt's Vision 2030 and the National Strategy for Sustainable Transport.


© Abdul Mumin, 2019

Figure 4.99: Cairo Metro map, including the Adly Mansour station in line 3 (green).

Scope and Scale

Spanning 63,000 square meters, the hub connects metro, rail, and bus networks across Greater Cairo and the New Administrative Capital. It is designed as a regional-scale facility to streamline intermodal transfers and improve accessibility.

Objectives

- Enhance urban mobility and reduce traffic congestion.
- Support economic growth and regional connectivity.
- Strengthen links between Cairo's suburbs and the New Administrative Capital.

Components

- Metro station (Line 3 and future lines)
- Bus terminals and taxi stands
- Parking facilities
- Light Rail Transit (LRT) and Bus Rapid Transit (BRT) services
- Commercial spaces and pedestrian bridges
- Air-conditioned waiting halls


© Egyptian State Information Service, 2022

Figure 4.100: Adly Mansour Central Interchange Station, Cairo's primary multimodal transportation hub integrating metro, rail, and bus networks.

Main Stakeholders

Owner/Developer [Public]
Ministry of Transport

Consultant/Designer
Systra
The Consulting Bureau of Prof. Adel Gabr (CBAG)

Funder
The Sovereign Fund of Egypt (SFE)

Contractor/ Implementer
The Arab Contractors Company
Orascom Construction

Energy Efficiency and Renewable Integration

Solar panels generate clean energy, while rainwater harvesting systems enhance water conservation. These measures reduce reliance on fossil fuels and lower the hub's environmental footprint.

Multimodal Transit for Reduced Carbon Emissions

By integrating metro, LRT, BRT, and rail services, the hub encourages public transport use over private vehicles, easing congestion and reducing air pollution. Seamless intermodal transfers improve efficiency and accessibility.

Climate-Resilient Infrastructure

The modular design allows for future expansion and adaptation to climate challenges. Air-conditioned waiting areas and pedestrian bridges enhance commuter comfort and mitigate heat stress in Cairo's arid climate.

Smart Mobility and Digital Innovation

Real-time tracking systems and digital passenger information screens optimize commuter flow, reduce overcrowding, and strengthen resilience against operational disruptions.

Urban Connectivity and Sustainable Growth

By linking Cairo's suburbs with the New Administrative Capital, the hub supports equitable urban expansion and reduces dependence on central Cairo. Improved infrastructure fosters economic resilience by connecting emerging business districts with residential areas.

https://araburban.org/en/infohub/projects/?id=9781

51 Amman Transit-Oriented Neighborhoods

Amman, Jordan
[2024 - Ongoing]

Overview

The Transit-Oriented Neighborhoods (TOD) project is a strategic plan to advance sustainable urban development in Amman, a city of 4.3 million people, nearly half of Jordan's population. Responding to challenges such as traffic congestion, urban sprawl, climate vulnerabilities, and social inequities, the initiative integrates transportation and urban planning to create a more livable, connected, and resilient city. It envisions "transforming Amman's urban landscape."

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Figure 4.101: Intersection of Adan Street with the Hijaz Railway Path in Al Yarmook Street.

Scope and Scale

The TOD project is citywide, focusing on two priority areas: Sweileh District (around the Sweileh Terminal) and Al-Yarmouk Neighborhood. These locations address connectivity challenges and enhance accessibility for residents.

Objectives

- Expand the Bus Rapid Transit (BRT) system to improve public transport accessibility.
- Enhance pedestrian connectivity and public spaces to encourage walkability.
- Leverage mobility challenges as opportunities for innovative urban design and community engagement.

Components

- Expansion of the BRT system
- Pedestrian-friendly streets
- Green infrastructure
- Improved public spaces

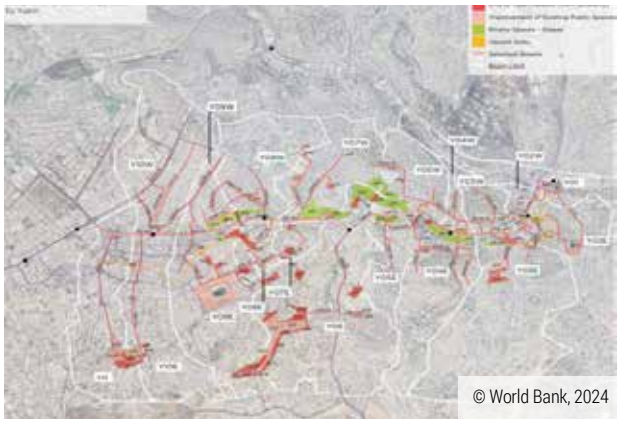
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Figure 4.102: The list of projects in Al-Yarmook Street on a map.

Main Stakeholders

Owner/Developer [Public]
Greater Amman Municipality (GAM)

Owner/Developer
World Bank

Consultant/Designer
Ecosistema Urbano

Funder
Quality Infrastructure Investment (QII)
Government of Japan

Contractor/ Implementer
Greater Amman Municipality (GAM)

Sustainable Urban Mobility

By expanding BRT and improving pedestrian infrastructure, the project reduces reliance on private cars, alleviates congestion, and promotes public transport use. This integrated approach fosters a more sustainable urban environment.

Green Infrastructure and Public Space

The plan emphasizes walkability and green infrastructure, creating accessible recreational areas and mitigating the urban heat island effect. These measures improve environmental quality, promote biodiversity, and strengthen climate adaptation.

Climate Resilience and Urban Equity

Targeting neighborhoods with unique challenges, such as hilly terrain and limited public spaces, the project enhances accessibility and equity. By ensuring all residents can access transit and green areas, it promotes inclusive urban development.

Community Engagement and Livability

The TOD project prioritizes participatory urban design, engaging communities to co-create solutions. By focusing on high-impact districts, it enhances public health, social equity, and livability, building a resilient urban fabric that adapts to future growth.

https://araburban.org/en/infohub/projects/?id=9688

H. Active Mobility

52 Cairo Bike Project

Cairo, Egypt
[2017 - Ongoing]

Overview

The Cairo Bike Project is Egypt's first public bike-sharing system, launched in October 2022 as part of Cairo's push toward sustainable urban mobility. Envisioned as "an eco-friendly and affordable transportation option for residents and visitors," the initiative integrates cycling into the city's transport network, supporting Egypt's national strategy for sustainable urban development and environmental conservation.

Figure 4.103: One Cairo Bike station with bicycles.

Scope and Scale

Covering over six square kilometers, the project serves Downtown Cairo, El-Sayeda Zainab, Garden City, and Al Attaba. Cycling infrastructure includes 2 km of completed protected bike lanes, with 17 km planned.

Objectives

- Reduce traffic congestion and improve air quality.
- Promote public health by encouraging physical activity.
- Enhance urban mobility and overall quality of life.
- Align with Egypt's broader sustainability and smart city goals.

Components

- 250 bicycles across 26 solar-powered stations (Phase 1)
- Expansion to 500 bicycles and 45 stations planned
- Surveillance cameras for safety
- Mobile app integration with credit and prepaid card payment options

Figure 4.104: Cairo Bike Project's Stations.

Main Stakeholders

Owner/Developer [Public]
Cairo Governorate

Owner/Developer
DROSOS FOUNDATION

Consultant/Designer
Institute for Transportation and Development Policy) ITDP(

Funder
DROSOS FOUNDATION

Sustainable Urban Mobility

By offering an affordable, eco-friendly alternative to motorized transport, Cairo Bike reduces reliance on private cars and supports a shift toward low-carbon mobility.

Environmental Impact and Air Quality Improvement

Cycling reduces greenhouse gas emissions and improves air quality. Solar-powered docking stations further minimize energy consumption, reinforcing sustainability goals.

Resilience through Infrastructure Development

Protected bike lanes enhance safety and encourage long-term adoption of non-motorized transport. Planned expansions strengthen resilience against fossil fuel dependency.

Social Inclusion and Sustainable Accessibility

Affordable rental fees (as low as 1 Egyptian pound per hour) make the system accessible to diverse social groups. Expansion plans emphasize inclusive mobility, particularly for women and underserved communities, fostering equitable and resilient urban transport.

https://araburban.org/en/infohub/projects/?id=9494

53 BikeSol

Erbil, Iraq
[2023 - Ongoing]

Overview

BikeSol is a landmark mobility infrastructure project in Erbil, designed to construct a covered bicycle pathway along the central median of Highway 120. Once completed, it will be the longest dedicated cycling lane in both the Kurdistan Region and Iraq. The initiative envisions "promoting eco-friendly transportation and integrating renewable energy to foster green, sustainable urban development."

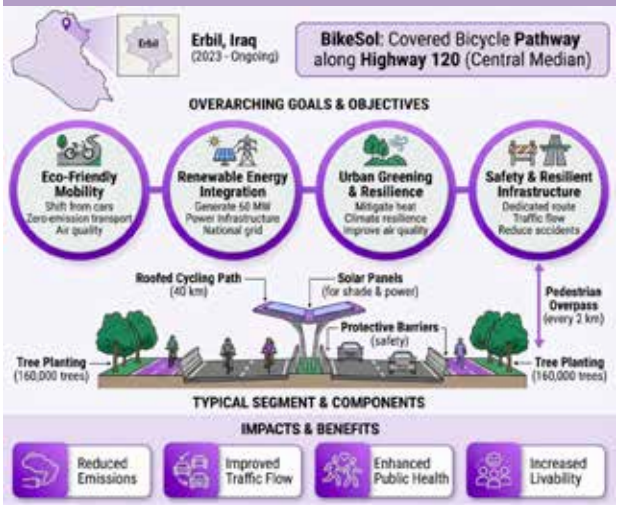

Figure 4.105: A representative diagram for the Bikesol project in Erbil.

Scope and Scale

Spanning 40 km along Highway 120 in Erbil, BikeSol will be Iraq's longest cycling lane. The project integrates renewable energy and large-scale urban greening to promote sustainable mobility and resilience.

Objectives

- Provide a safe, dedicated cycling route
- Enhance mobility
- Reduce vehicle emissions
- Mitigate climate change impacts
- Improve traffic flow and road safety
- Reduce congestion and accidents

Components

- 40 km roofed cycling path
- Pedestrian overpasses every 2 km
- Protective barriers for safety
- Solar panels for shade and power generation (60 MW capacity)
- 160,000 trees planted along the route

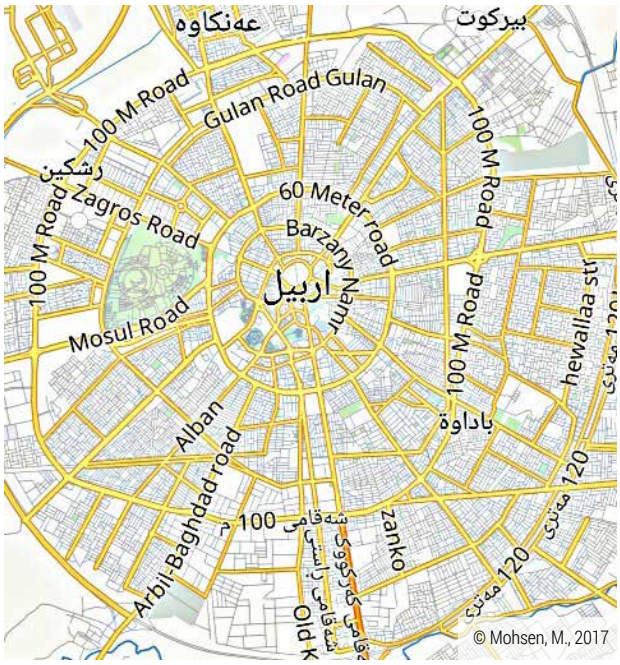

Figure 4.106: Location map of Erbil, Iraq, providing urban road context for transportation corridors.

Main Stakeholders

Owner/Developer [Public]
Kurdistan Regional Government (KRG)

Consultant/Designer
Nova Studio Group

Funder
Kurdistan Regional Government (KRG)

Contractor/ Implementer
Kurdistan Regional Government (KRG)

Sustainability through Eco-Friendly Mobility

By offering a safe, uninterrupted cycling route, BikeSol encourages a shift away from car dependency toward zero-emission transport. This reduces carbon emissions, mitigates air pollution, and supports Erbil's environmental goals.

Integration of Renewable Energy

Solar panels along the pathway will generate 60 MW of clean electricity, powering infrastructure, providing shade, and contributing to the national grid. This dual-purpose design strengthens Erbil's renewable energy transition.

Urban Greening and Environmental Resilience

The planting of 160,000 trees enhances air quality, mitigates the urban heat island effect, and provides natural cooling. This large-scale greening effort improves climate resilience and livability.

Safety and Resilient Infrastructure

Protective barriers and pedestrian overpasses every 2 km ensure uninterrupted, secure cycling. These features reduce accidents and conflicts with vehicles, promoting safer, more resilient transport alternatives.

Health and Livability Benefits

Beyond mobility, BikeSol promotes active lifestyles and recreational opportunities. By encouraging cycling as a healthy, accessible, and eco-friendly option, the project enhances urban well-being and contributes to a more livable city.

https://araburban.org/en/infohub/projects/?id=9742

54 Abou Nawas Corniche Redevelopment Project

Baghdad, Iraq
2023 - Ongoing

Overview

The Abou Nawas Corniche Redevelopment is a dual-faceted initiative along the Tigris River, combining the rehabilitation of the historic corniche (established in 1980) with the construction of a new 2.5 km extension. The old corniche spans 10 km from Sinak Bridge to Al-Ahrar Bridge, while the new section serves as a model waterfront project for Baghdad. Part of the "Baghdad Ajmal" campaign, the project aims to enhance public services, aesthetics, and urban livability.

Figure 4.107: Aerial view of Abu Nawas Corniche.

Scope and Scale

Spanning 12.5 km along the Tigris River, the project includes a 10 km rehabilitated corniche and a 2.5 km new extension. It is one of Baghdad's largest urban redevelopment initiatives, designed to revitalize the city's waterfront.

Objectives

- Transform the corniche into a recreational space for residents.
- Establish it as a tourist destination and cultural landmark.
- Promote sustainable, accessible, and inclusive urban development.

Components

- Waterfront parks and gardens
- Sports fields and courts
- Restaurants, cafes, and shopping areas
- Bicycle and jogging paths
- Recreational spaces and seating areas
- Bridges, entertainment zones, and green spaces

Figure 4.108: The opening ceremony of the second phase of abu Nawas Corniche.

Main Stakeholders

Owner/Developer [Public]
Mayoralty of Baghdad

Funder
Mayoralty of Baghdad

Contractor/ Implementer
Mayoralty of Baghdad

Sustainability through Green Infrastructure

A major aspect of the project is its focus on environmental sustainability. The rehabilitation involves increasing greenery by planting perennial trees and creating modern parks. These green spaces are supported by an irrigation system using renewable and energy-efficient water sources, ensuring the long-term sustainability of the landscape. The project also includes the cleaning of the Tigris River basin, removing obstacles and debris, which helps to restore the river's ecological health.

Resilience through Urban Design and Accessibility

The project contributes to urban resilience by incorporating features that enhance public accessibility and social inclusion. The corniche's design includes dedicated bicycle and jogging paths, creating multi-modal transportation options. Furthermore, the urban design adheres to universal building code requirements, ensuring that spaces are accessible to all, including those with disabilities. The project's recreational activities and public spaces cater to diverse groups, promoting social cohesion and well-being.

Economic and Social Impact

The project serves as a catalyst for the economic and social revitalization of Baghdad. By creating a vibrant public space with restaurants, cafes, and shopping areas, the corniche is designed to attract both local residents and tourists, fostering community engagement. Hosting sporting and cultural events, like the Baghdad Cycling Team marathon, further strengthens its role as a dynamic hub for leisure and cultural expression.

https://araburban.org/en/infohub/projects/?id=8578

55 Shatt al Arab Corniche Development Project

Al Basrah, Iraq
[2022 - Ongoing]

Overview

The Shatt al-Arab Corniche Development is a transformative urban revitalization initiative along the Shatt al-Arab River in Basra Governorate. Spanning 8 km, the project restores and modernizes the waterfront to create a dynamic public space that integrates cultural, recreational, and commercial elements. Envisioned as a "vibrant social hub and prime cultural and touristic destination," the project enhances accessibility, livability, and economic vitality while reflecting Basra's historical and cultural identity.

Figure 4.109: Night view of the Shatt al-Arab at the confluence of the Tigris and Euphrates in Al-Bayda Province

Scope and Scale

Located along the Shatt al-Arab River, the project spans 8 km and connects the northern and southern riverbanks. It is one of Basra's largest waterfront redevelopment initiatives, designed to integrate urban life with the riverfront.

Objectives

- Rehabilitate and modernize the corniche as a multifunctional public space.
- Improve pedestrian and transport connectivity with walkways, bike lanes, and a bridge linking riverbanks.
- Boost tourism and economic growth through heritage sites, entertainment venues, and hospitality facilities.

Components

- Heritage and commercial kiosks
- Event piazzas and open-air theater
- Sports fields, meditation spaces, family and reading areas
- Restaurants, cafes, and children's play zones
- Pedestrian and bike lanes
- 300-meter pedestrian bridge

Figure 4.110: Basra's riverfront promenade by the Shatt Al Arab

Main Stakeholders

Owner/Developer [Public]
Municipality of Shatt al Arab
al Basrah governorate

Funder
al Basrah governorate

Contractor/ Implementer
Sahel al Iraq company

Eco-Friendly Urban Revitalization

Green spaces, pedestrian pathways, and bike lanes reduce reliance on motorized transport, lowering emissions and improving air quality. The Corniche Promenade fosters a pedestrian-friendly environment that supports sustainable mobility.

Resilient Waterfront Infrastructure

Flood-resistant design elements, elevated walkways, and the pedestrian bridge strengthen resilience against climate risks while preserving the river's ecology.

Promoting Sustainable Mobility

Dedicated bike lanes and pedestrian pathways encourage walking and cycling, reducing congestion and carbon footprints. The 300-meter bridge provides a scenic and functional river crossing.

Green Public Spaces and Wellness Integration

Meditation areas, family zones, and sports fields foster healthier lifestyles. Expanded greenery mitigates heat island effects, enhances urban cooling, and provides shaded public spaces.

Cultural and Economic Sustainability

Heritage zones preserve Basra's identity, while commercial areas stimulate local business and tourism. Together, they foster long-term social and economic resilience, positioning the corniche as a cultural and economic landmark.

https://araburban.org/en/infohub/projects/?id=9477

56 Amman Cycling Map

Amman, Jordan
[2017 - Ongoing]

Overview

The Amman Cycling Map is a grassroots initiative that identifies the main routes frequently used by cyclists across the city. Developed in response to rising traffic accidents and the broader challenges faced by bikers in Jordan, the project highlights the need for safer cycling infrastructure in a city often considered unfriendly to cyclists. It represents a significant step in urging authorities to address road safety and mobility concerns.

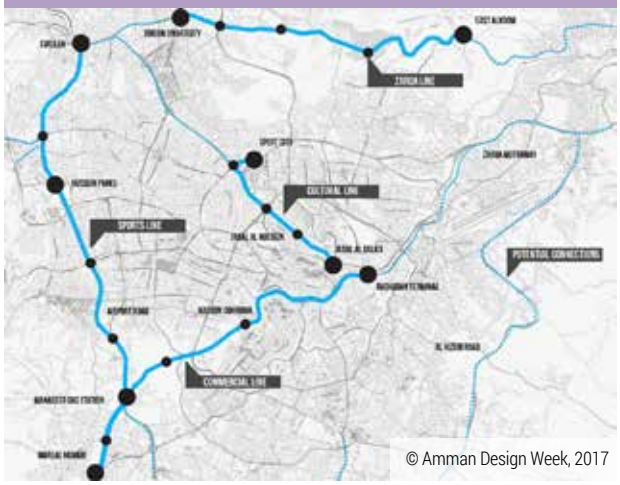

Figure 4.111: Map of cycling routes with potential connection nodes.

Scope and Scale

A citywide initiative in Amman, the project maps cycling routes while considering traffic patterns, inclines, and potential areas for bike lanes. Though small in scale, its implications for urban mobility and safety are significant.

Objectives

- Enhance road safety by identifying hazardous areas
- Advocate for improved cycling infrastructure
- Promote cycling as a viable mode of transport
- Document challenges
- Propose practical solutions

Components

- A citywide cycling map showing frequently used routes.
- Hazard identification along those routes.
- Recommendations for improvements, such as parallel roads or adapted cycling lanes.

Figure 4.112: Members of the Amman Cycling Club touring the city, engaging in sustainable cycling mobility. Image used for illustrative purposes.

Main Stakeholders

Owner/ Developer
Ahmad Asem Al-Hiari
Yassin Al-Tubor

Consultant/Designer
Ahmad Asem Al-Hiari
Yassin Al-Tubor
Center for the Study of the Built Environment

Funder
Ahmad Asem Al-Hiari
Yassin Al-Tubor

Contractor/ Implementer
Ahmad Asem Al-Hiari
Yassin Al-Tubor

Promoting Sustainable Urban Mobility

By documenting cycling routes and hazards, the project advocates for cycling as a sustainable alternative to motorized transport. It supports efforts to reduce car dependency, lower emissions, and improve air quality.

Enhancing Road Safety and Infrastructure Resilience

The initiative identifies critical risks and proposes solutions such as adapted lanes and parallel routes. These measures strengthen resilience by integrating cycling into urban transport planning and preventing accidents.

Community-Driven Urban Transformation

Rooted in grassroots advocacy, the project leverages social media and public outreach to raise awareness. It demonstrates how community engagement can influence policymakers to prioritize cycling-friendly infrastructure.

Data-Driven Urban Adaptation

The map is based on real-world data, including traffic flows, street inclines, and road space availability. This evidence-based approach ensures practical, adaptive solutions for Amman's challenging urban landscape, supporting sustainable mobility planning.

https://araburban.org/en/infohub/projects/?id=9739

57 Tyre Bike-Share initiative

Tyre, Lebanon
[2021 - Ongoing]

Overview

The Tyre Bike-Share Initiative is a soft mobility project launched by the Municipality of Tyre as part of a City-to-City partnership with Zurich, Switzerland. Designed to improve urban transport and address the needs of refugees hosted in the city, the initiative promotes sustainable commuting and strengthens municipal performance through knowledge exchange. Envisioned as a step toward "green, accessible, and resilient mobility," the project integrates cycling into Tyre's transport system while reducing congestion and pollution.

Figure 4.113: Bike station of 'Tour in Sour'

Scope and Scale

Located in Tyre, southern Lebanon, the initiative currently includes two public bike rental stations, with future plans for centralized parking and a Park-and-Ride system. It is part of a broader partnership to enhance soft mobility and reduce environmental pressures in the city.

Objectives

- Establish a foundation for future green transport alternatives
- Promote a culture of eco-friendly commuting
- Improve health, well-being, and air quality
- Alleviate traffic congestion, accidents, and pollution in Tyre

Components

- Public bike rental stations
- Flexible transport options
- Centralized "Park and Ride" facilities
- Low-cost bus shuttle services

Figure 4.114: Residents using bikes in old Tyre City

Main Stakeholders

Owner/Developer [Public]
Municipality of Tyre

Owner/Developer
UN-Habitat
Zurich Municipality

Consultant/Designer
UN-Habitat

Funder
Zurich Municipality

Contractor/ Implementer
Municipality of Tyre
UN-Habitat

Promoting Green Mobility

By encouraging cycling as a commuting option, the project reduces reliance on cars and motorcycles, lowering greenhouse gas emissions and fostering a cleaner urban environment.

Health and Well-Being Benefits

Cycling promotes cardiovascular health and fitness, contributing to healthier lifestyles. The initiative supports community resilience by addressing non-communicable diseases linked to sedentary urban living.

Improving Air Quality

As a zero-emission transport mode, bicycles help reduce pollution and improve air quality, an urgent priority given Lebanon's growing urban air challenges.

Enhancing Mobility and Accessibility

Bike routes improve access to key areas, including the old souk, alleyways, and the Corniche, where cars struggle to navigate. This inclusivity strengthens mobility for all community members, regardless of limitations, while enhancing Tyre's resilience.

https://araburban.org/en/infohub/projects/?id=9729

58 Marrakesh Medina Bike

Marrakesh, Morocco
[2016 - Ongoing]

Overview

Medina Bike is the first bike-sharing system in Marrakesh and the African continent's inaugural cycle-share scheme. Named after the city's historic center, the initiative complements Marrakesh's fleet of electric buses and reflects Morocco's commitment to sustainable development and green transport.

Figure 4.115: A street vendor in Marrakesh selling fruits using his bike.

Scope and Scale

Located in Marrakesh, Medina Bike is Africa's first bike-sharing system. Rental stations are strategically placed at major landmarks, including the Koutoubia Mosque and Majorelle Garden, ensuring accessibility for both residents and tourists.

Objectives

- Revive cycling culture in Marrakesh.
- Encourage residents to adopt non-motorized transport.
- Reduce urban congestion
- Mitigate climate change impacts through sustainable mobility.

Components

- 300 shared bicycles
- 10 automatic rental stations at key city locations

Figure 4.116: Figure 6.87: A bicycle in the narrow street of Marrakesh.

Main Stakeholders

Owner/Developer [Public]
The Ministry of Environment

Owner/Developer
United Nations Industrial Development Organization (UNIDO)
Global Environment Facility (GEF)

Consultant/Designer
Smoove

Funder
Global Environment Facility (GEF)

Contractor/ Implementer
Smoove
Estates Vision

Sustainability and Green Transport Integration

Medina Bike is Morocco's first bike-sharing system, launched in Marrakesh as part of the country's broader sustainable development goals. This initiative promotes non-motorized transportation to reduce urban congestion and combat the negative impacts of climate change. The system is aligned with Morocco's push for green transport, alongside the introduction of electric buses in the city, contributing to a more sustainable urban mobility model.

Technology and Innovation in Mobility

The bike-sharing system incorporates innovative technology, featuring bikes equipped with embedded communication systems and solar-powered, free-standing rental stations. This design eliminates the need for heavy civil engineering and infrastructure changes, making the system more adaptable and environmentally friendly. The stations are equipped with a feature that allows users to return bikes even if the station is full, enhancing the system's efficiency and usability.

Affordability and Social Equity

The initiative prioritizes affordability, aiming to make sustainable transportation accessible to lower-income residents. By offering a range of payment options, including cash, alongside traditional methods like credit cards and smartphone apps, the project ensures inclusivity for various socioeconomic groups in Marrakesh.

https://araburban.org/en/infohub/projects/?id=9713

59 Shura Pedestrian Bridge

Shurayrah, Saudi Arabia
[2020 - 2024]

Overview

The Shura Pedestrian Bridge, also known as the Shurayrah Bridge, is a landmark infrastructure project connecting the mainland to Shurayrah Island, the central hub of The Red Sea Project. Envisioned as "a seamless connection between the mainland and Shurayrah Island," the bridge supports Saudi Arabia's regenerative tourism objectives by facilitating sustainable access to luxury destinations in the Red Sea archipelago.

Figure 4.117: Aerial view of the Shura bridge with lanes for pedestrians, bicycles, and smart cars.

Scope and Scale

Located in the Red Sea, Saudi Arabia, the bridge spans 1.2 km and connects the mainland to Shurayrah Island, the centerpiece of The Red Sea Project.

Objectives

- Provide efficient, sustainable access to Shurayrah Island.
- Serve as a gateway to the Red Sea Project's luxury tourism developments.

Components

- 1.2 km bridge, 28 meters wide
- Lanes for pedestrians, bicycles, and smart vehicles
- Two 36-meter marine corridors for biodiversity protection

Figure 4.118: Construction works on the Shura and Shura Bridge project in Saudi Arabia.

Main Stakeholders

Owner/Developer [Public]
Saudi Government

Owner/Developer
The Red Sea Development Company (TRSDC)/Red Sea Global

Consultant/Designer
Foster + Partners
Buro Happold (KSA)

Funder
Public Investment Fund (PIF)

Contractor/ Implementer
ARCHIRODON N.V. (Greece)
Al Fouzan Trading & General Construction Company (KSA)
Webuild S.p.A. (Italy)
Al-Rashid Trading & Contracting Company (KSA)
Mofarreh Al-Harbi & Partners Company Ltd. (KSA)
POSCO Engineering & Construction (Korea)
Mammoet Limited Company (KSA)

Sustainable Construction Practices

On-site concrete batching plants and nearby precast yards reduce transport emissions. Sediment control measures and monitoring buoys protect marine ecosystems during construction.

Environmental Protection and Biodiversity Conservation

Two 36-meter-wide marine corridors allow safe passage for marine mammals, preserving ecological balance. Continuous monitoring by marine biologists ensures compliance with TRSDC's environmental standards.

Resilient Infrastructure for Regenerative Tourism

The bridge integrates lanes for pedestrians, bicycles, and smart vehicles, supporting low-carbon mobility and sustainable tourism in line with Vision 2030.

Innovative Engineering and Landmark Design

Built with sustainable materials and advanced engineering techniques, the bridge balances modern infrastructure with environmental responsibility. Collaboration with global firms and use of local materials highlight Saudi Arabia's commitment to resilient, sustainable development in the Red Sea region.

https://araburban.org/en/infohub/projects/?id=9375

60 The Future Loop

Dubai, UAE
[2024 - ongoing]

Overview

The Future Loop is a visionary mega project, a climate-controlled pedestrian and cycling superhighway forming part of the Dubai Walk Masterplan. Envisioned as a "connected, sustainable, and pedestrian-friendly environment," it enhances quality of life and positions Dubai as a global leader in sustainable urban development. The initiative supports Dubai's Quality of Life Strategy 2033 and the "20-minute city" goal for 2040.

Figure 4.119: The map of the Future Loop route.

Scope and Scale

Spanning 93 km, the Future Loop connects 10 major landmarks, including the Museum of the Future, Dubai World Trade Centre, Emirates Towers, and Downtown Dubai, while integrating with metro stations and cycling networks.

Objectives

- Redefine urban mobility by integrating climate-controlled pathways with public transport.
- Ensure 80% of residents can access essential amenities within a short commute.
- Promote healthier lifestyles while reducing carbon emissions.

Components

- 2 km elevated walkway
- 30,000 m² of air-conditioned outdoor spaces
- Bridges, tunnels, and green spaces
- Vertical farming and shaded rest areas
- Recreational areas, shops, and tourist attractions
- Links to metro stations and cycling pathways

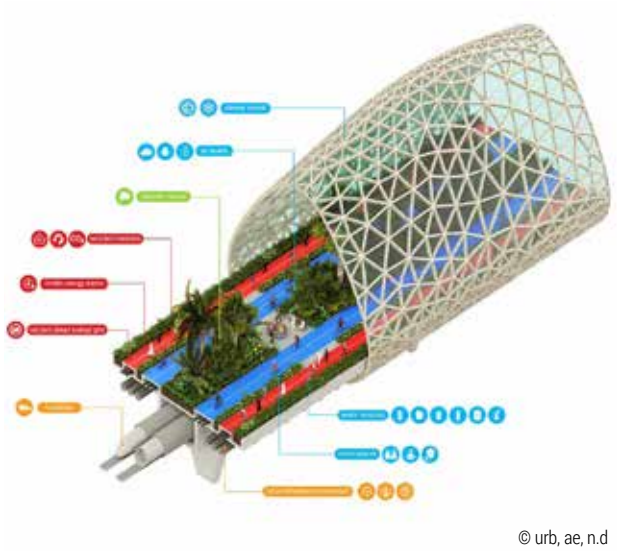

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Figure 4.120: Axonometric render of The Loop mixed-use spatial and built form, used material, and sustainable effects.

Main Stakeholders

Owner/Developer [Public]
Dubai Government

Owner/ Developer
URB

Consultant/Designer
URB

Carbon Emission Reduction and Sustainable Mobility

The Future Loop aligns with Dubai's Quality of Life Strategy 2033 and the 2040 "20-minute city" goal, enabling 80% of residents to access key amenities within a short commute. By prioritizing pedestrian and cycling infrastructure, the project aims to reduce car dependency, leading to lower carbon emissions and improved air quality. Additionally, the integration with public transportation further enhances sustainable urban mobility.

Climate-Controlled and Energy-Efficient Infrastructure

A core sustainability feature of the Future Loop is its climate-controlled pedestrian pathways, ensuring comfort even during Dubai's extreme summers. The 30,000 square meters of air-conditioned outdoor spaces utilize energy-efficient cooling technologies, reducing overall energy consumption. The enclosed walkways also incorporate vertical farming, green hotels, and shaded rest areas, promoting sustainable architecture and urban greenery.

Green Urban Spaces and Environmental Adaptation

The Future Loop enhances Dubai's resilience to climate change by integrating 6,200 meters of bridges and tunnels, improving road traffic flow by 30%. This reduces congestion and lowers fuel consumption from idling vehicles. The project also prioritizes green spaces and eco-friendly materials, fostering biodiversity while mitigating the urban heat island effect.

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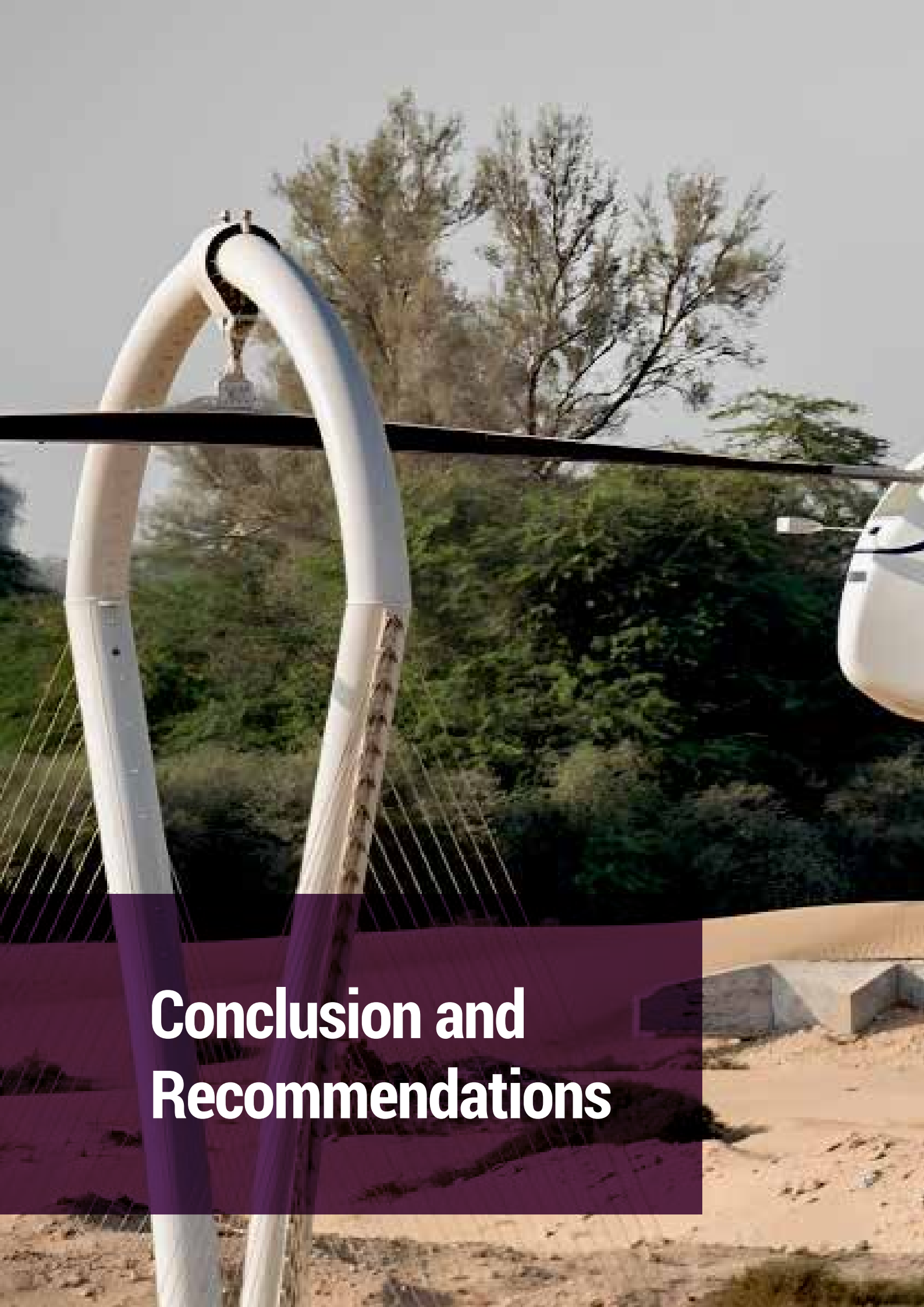

Conclusion and Recommendations

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Conclusion and Recommendations

This report examined a group of selected urban mobility projects across the Arab region, alongside selected global best practices, covering policy and strategy, public transit infrastructure, active mobility, campaigns and initiatives, carpooling, waterfront and aerial mobility, smart mobility, and multimodal hubs. The objective was to assess how these initiatives contribute to sustainability and resilience, identify key trends and gaps, and propose guidance for policymakers, municipalities, and stakeholders. By comparing Arab projects with leading global cases, the report highlights both progress and persistent challenges in achieving integrated, accessible, and environmentally sustainable mobility systems. Its primary outcome is a practical framework to guide the development of urban mobility initiatives in Arab cities while addressing governance, environmental, and economic constraints.

Key Findings and Regional Gaps

Governance and institutional frameworks

Governance structures play a decisive role in shaping urban mobility outcomes. Among the analyzed projects, 24 initiatives rely on collaborative models, including public-private partnerships, while 50 out of 60 projects are aligned with master plans, national visions, or regulatory frameworks. Examples include Saudi Arabia's Vision 2030, the UAE's Urban Mobility Strategy, the Kuwait Metro's dedicated oversight authority, and Tunisia's RFR project embedded in a national transport strategy. Despite these advances, gaps remain in regulatory enforcement, institutional coordination, and long-term funding mechanisms. Compared with global examples such as London's congestion pricing, where governance, enforcement, and financing are tightly integrated, many Arab initiatives still operate within fragmented institutional settings.

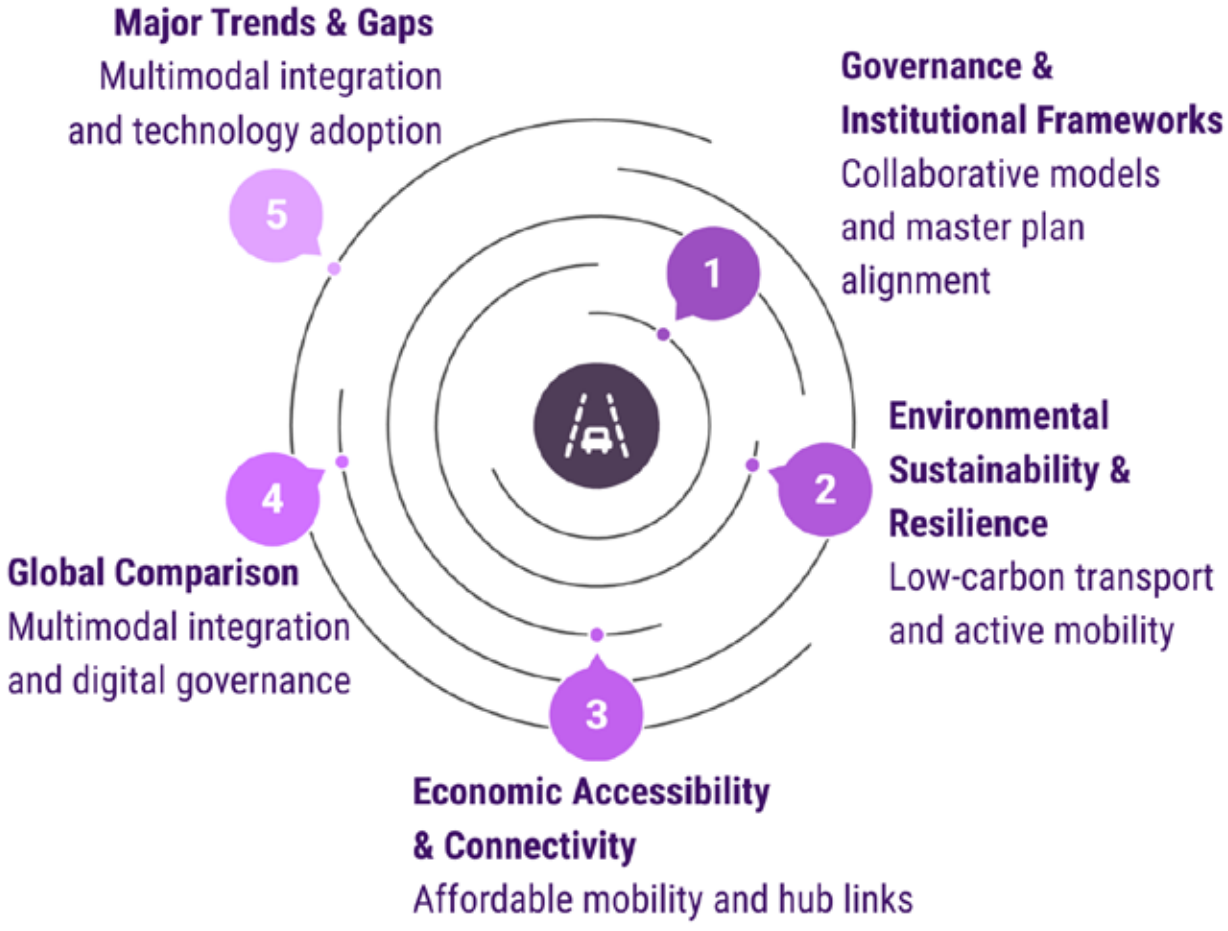

Figure 5.1: Urban mobility landscape in Arab cities.

Environmental sustainability and resilience

Environmental considerations are present but uneven. Fourteen projects explicitly prioritize sustainability through low-carbon transport, pedestrianization, or greening, such as BRT systems in Amman and Casablanca. Electric vehicle (EV) adoption and charging infrastructure, however, remain largely concentrated in Gulf countries, while active mobility infrastructure is still limited across much of the region. Although seven projects focus on improving pedestrian and cycling connectivity through walkways, bike lanes, and bridge walkways, these efforts are often localized and lack citywide continuity. In contrast, global examples such as Copenhagen's Bicycle Highways or Bogotá's Car-Free Sundays demonstrate how active mobility can be institutionalized as long-term urban policy. Waterfront and aerial mobility are emerging in specific contexts, including Comoros' interisland connectivity and Morocco's cable car initiatives.

Economic accessibility and connectivity

Economic considerations center on affordability, connectivity, and financing. Six projects explicitly emphasize affordable mobility, particularly in public transport, including the Doha Metro, Kuwait City Metro, and carpooling initiatives in Egypt. Connectivity is a strong theme, with nine projects targeting links to major urban, economic, and tourism hubs. However, financing remains heavily dependent on public funding: 43% of projects rely on government subsidies, while only 16.6% involve PPPs. Revenue-generating mechanisms such as congestion pricing, successfully applied in cities like London, are largely absent, partly due to fuel subsidies and car dependency. Shared mobility and mobility-as-a-service (MaaS) solutions remain at an early stage, despite examples such as SWVL in Egypt, and last-mile connectivity continues to be a major gap compared with cities like Melbourne, where tram and bus networks are fully integrated.

Global Comparison: Trends and Gaps

Global cases consistently emphasize multimodal integration, pedestrianization, shared mobility, and digital governance. Stockholm's TOD models, Copenhagen's cycling infrastructure, Norway's EV ecosystem, and Europe's ShareNow platform illustrate holistic, technology-enabled mobility systems. In contrast, Arab cities remain more focused on large-scale public transit infrastructure, with limited integration of smart technologies, active mobility, and shared services. While countries such as Kuwait, Tunisia and Egypt show promising directions, many projects still lack robust governance mechanisms, diversified financing, and comprehensive environmental strategies.

Major Trends and Gaps in Urban Mobility

- Multimodal integration is central to resilient mobility but remains underdeveloped in most Arab cities.
- Pedestrianization and public space reclamation are emerging but not yet institutionalized at scale.
- Technology-driven mobility and smart governance are advancing globally, while adoption in the Arab region remains limited and uneven.

Despite cultural preferences for car use, challenging climatic conditions, and rapid urban growth, the region is clearly transitioning toward more inclusive and sustainable mobility. This is reflected in growing attention to active mobility, high-tech infrastructure, accessibility for vulnerable groups, and climate adaptation. Nonetheless, gaps persist in sustainability integration, smart mobility deployment, active transport infrastructure, and institutional coordination.

Recommendations for Advancing Arab Urban Mobility

Based on global trends and identified gaps, the recommendations for advancing sustainable Arab Urban Mobility are proposed at the following levels:

Institutional and governance level:

- Establish integrated, multimodal transport authorities.
- Strengthen public-private partnerships to diversify funding and innovation.
- Adopt data-driven governance using digital platforms and real-time monitoring tools.

Environmental level:

- Prioritize low-carbon transport, including EVs, cycling, and pedestrian-friendly design.
- Integrate mobility projects with urban greening and climate-resilience strategies.
- Introduce demand-management measures to reduce car dependency, such as car-free zones and congestion pricing where feasible.

Economic level:

- Promote affordable mobility through subsidies and support for micro-mobility.
- Invest in last-mile connectivity between transport hubs and residential areas.
- Encourage the gradual transition toward Transport as a Service (TaaS) and shared mobility models.

By aligning governance, environmental, and economic strategies, urban mobility in the Arab region can progress toward a more sustainable, inclusive, and resilient future. Global best practices provide a valuable reference, but effective transformation will depend on adapting these lessons to local institutional, social, and climatic contexts.

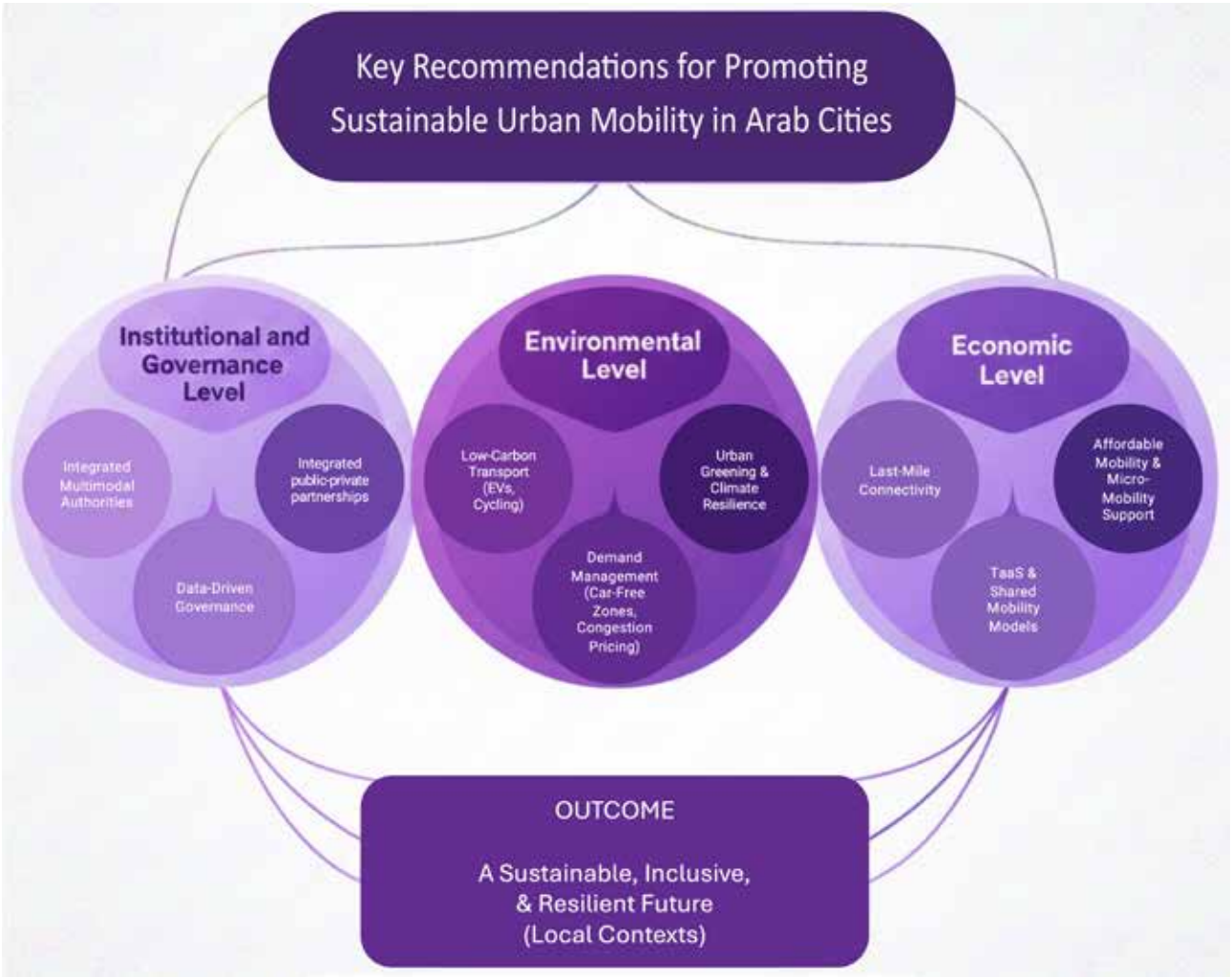

Figure 5.2: Urban mobility recommendations in Arab cities.

References

7beachbum. (2024). Street scene, Marrakesh bus [Photograph]. Openverse. Retrieved 12 January 2026, from https://openverse.org/image/75de6066-5170-4961-a8d7-a13093454def?q=Marrakesh+Bus&p=13

Aasness, M. A., & Odeck, J. (2015). The increase of electric vehicle usage in Norway, incentives and adverse effects. European Transport Research Review, 7, 1–8. https://doi.org/10.1007/s12544-015-0172-0

ABB. (2022). ABB EV chargers across 100 locations in Saudi Arabia [News release]. Retrieved 28 January 2026, from https://new.abb.com/news/detail/93862/abb-ev-chargers-across-100-locations-in-saudi-arabia

Abdeaitali (2019). Alsa bus Inezgane 2019. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Alsa_bus_Inezgane_2019.jpg

Abdelrahman1990 (2023). Electric bus, Alexandria Passenger Transportation Authority. Retrieved 12 January 2026, from: https://openverse.org/image/236a37c4-2ec0-4a3d-8b7f-4f421e6493df?q=Alexandria+electric+bus&p=1

Abdul Latif Yassin, F. (2024). The Iraqi Development Road Project: Legitimacy, Ambition, and the Constraints of Regional and International Geopolitical Competition. International Political Journal, Issue 60. Map of the Development Road Project, source: Anadolu Agency, https://www.aa.com.tr/en/world/road-project-means-connecting-east-to-europe-through-iraq-and-turkiye-premier-sudani/3236711, page 517. Retrieved 12 January 2026, from: https://ipj.uomustansiriyah.edu.iq/index.php/political/article/view/370/238

Abe, Y., Ogitsu, T., & Mizoguchi, H. (2016). Design and evaluation of parking position detection with human cooperation for automatic parking. Journal of the Institute of Industrial Applications Engineers, 4(2), 100–105. https://doi.org/10.12792/jiaie.4.100

Advani, M., & Tiwari, G. (2005). Evaluation of public transport systems: case study of Delhi Metro. Transportation Research & Injury Prevention Programme, 1.

Ahern, J. (2011). From failsafe to safetofail: Sustainability and resilience in the new urban world. Landscape and Urban Planning, 100(4), 341–343. https://doi.org/10.1016/j.landurbplan.2011.02.021

Ahmed, N. and Asmael, N. (2015). A GIS-ASSISTED OPTIMAL BAGHDAD METRO ROUTE SELECTION BASED ON MULTI CRITERIA DECISION MAKING, Journal of Engineering and Development, Vol.19, No. 06. Figure (1) Route Alternative 1, page 46. Retrieved 12 January 2026, from: https://jeasd.uomustansiriyah.edu.iq/index.php/jeasd/article/view/778/633

Ahmed, N. O. (2020). Towards an Evaluation of the Egyptian Experience in Bike-Sharing System. Proceedings of ICSUMP. Retrieved 13 January 2026, from: https://aastmtic3.aast.edu/icsump/papers_proceedings/Table%20V04_files/files/Towards%20an%20Evaluation%20of%20the%20Egyptian%20Experience%20in%20Bike-Sharing%20System.pdf

AInvest. (2026). Sfax's Light Rail Revival: A Strategic Bet on Urban Development and Regional Growth. Retrieved 13 January from: https://www.ainvest.com/news/sfax-light-rail-revival-strategic-bet-urban-development-regional-growth-2507/

AIVP. (2025). Tangiers, Morocco: From the port to the city by cable car. AIVP Good Practices. Retrieved January 15, 2026, from https://www.aivp.org/en/good-practices/tangiers-morocco-from-the-port-to-the-city-by-cable-car/

Al Arabiya. (2022). أيقونة معمارية جديدة: افتتاح أكبر جسر مائي في السعودية [Article]. Retrieved 28 January 2026, from https://www.alarabiya.net/aswaq/realestate/2022/10/14/أيقونة-معمارية-جديدة-افتتاح-أكبر-جسر-مائي-في-السعودية

AlBabtain, B. (2011). Kuwait Metro - New Map [Blog post]. ReKuwait. Published 21 February 2011. Retrieved 13 January 2026, from: https://rekuwait.wordpress.com/2011/02/21/kuwait-metro-new-map/

Alaghbari, W. (2026). [Image of Minibuses in Yemen]. Personal communication

Alda. (2021). Kairouan - first bicycle parade of the project AUTREMENT [Photograph]. Retrieved 12 January 2026, from:https://www.staging.alda-europe.eu/kairouan-first-bicycle-parade-of-the-project-autrement///

Aljoufie, M. (2021). Toward an effective analysis of public transportation demand factors in car-dependent cities: case of Makkah City, Saudi Arabia. Urban, Planning and Transport Research, 9(1), Figure 2. Public transport service lines in Makkah, page 262. Retrieved 12 January 2026, from: https://www.tandfonline.com/doi/full/10.1080/21650020.2021.1933581#abstract

Alkhalil, A. (2023). Metro Dubai [Photograph]. Pexels. Retrieved 14 January 2026, from: https://www.pexels.com/photo/metro-dubai-15995541/

Alsaideh14, L. (2025). Bus Rapid Transit route between Amman and Zarqa [Photograph]. Wikimedia Commons. Retrieved 12 January 2026, from https://commons.wikimedia.org/w/index.php?curid=160289941

Alsumaria News. (2023). Opening of the second part of Abu Nuwas Corniche in Baghdad (Photos). Local News. Retrieved 13 January 2026, from **https://www.alsumaria.tv/news/localnews/460158** افتتاح-الجزء-الثاني-من-كورنيش-ابو-نؤاس-في-بغداد-صور

AMISOM Public Information. (2021). A young lady boards a TukTuk (Bajaj) in Mogadishu, Somalia (Photo by Fardosa Hussein) [Photograph]. Wikimedia Commons. Retrieved 12 January 2026, from https://commons.wikimedia.org/wiki/File:Bajaj_in_Mogadishu_AMISOM_Progress_photos_Auto-Rickshaw.jpg

AMISOM Public Information. (2021). Bajaj owners line up at a petrol station in Mogadishu, Somalia (Photo by Fardosa Hussein) [Photograph]. Wikimedia Commons. Retrieved 12 January 2026, from https://commons.wikimedia.org/wiki/File:AMISOM_Progress_photos_-Mogadishu%2851638085922%29.jpg

Amman Design Week. (2017). Mapping urban experiences and design (by Lena Kassicieh). Amman Design Week. Retrieved 13 January 2026, from https://ammandesignweek.com/media/news/mapping-urban-experiences-and-design

Anadolu Agency. (2023). Sulaymaniyah hosts international cycling race. Anadolu Agency. Retrieved 15 January 2026, from: https://www.aa.com.tr/ks/pg/

Andraos, J., Awad, R., Geagea, T., Habib, C., Kobersi, L., Lahoud, J., Rabah, M., Reaidy, F., Eddine, N. S., & Masoumi, H. (2021). Urban travel behavior and socio-spatial issues in the MENA region: What do we know? Transport and Telecommunication Journal, 22(4), 425–443.

Atsushi, L. (2019). Hidden Treasures in the Comoros: The Impact of Inter-Island Connectivity Improvement on Agricultural Production. World Bank Policy Research Working Paper No. 8960, Figure 3: Transport network in Comoros, Page 4. Retrieved 12 January 2026, from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3433467

Axhausen, K. W., Chikaraishi, M., & Seya, H. (2015). Parking: Learning from Japan. Arbeitsberichte Verkehrs-und Raumplanung, 1095.

Bahnfrend (2019). Manger Street, Bethlehem, 2019 (02) [Photograph]. Wikimedia Commons. Retrieved 25 January 2026, from https://commons.wikimedia.org/wiki/File:Manger_Street,_Bethlehem,2019(02).jpg

Bailey, B., & Sereda, S. (2020). The sharing economy: Do escooters make the cut? MacEwan University Student eJournal, 4. https://doi.org/10.31542/muse.v4i1.1883

Bandakji, W. (2018). Women cycling in Damascus [Photograph]. In L. Goering, Defying war and catcalls, Syria's women hop on climatesmart bikes. Thomson Reuters Foundation, 12 December 2018. Retrieved 12 January 2026, from https://news.trust.org/item/20181212172519-axhrs/

Banister, D. (2005). Unsustainable transport: City transport in the new century. Routledge.

Banister, D. (2008). The sustainable mobility paradigm. Transport Policy, 15(2), 73–80. https://doi.org/10.1016/j.tranpol.2007.10.005

Banister, D., & Berechman, Y. (2001). Transport investment and the promotion of economic growth. Journal of Transport Geography, 9(3), 209–218. https://doi.org/10.1016/S0966-6923(01)00013-8

Bardaglio, I. (n.d.). Image of a man with a bike in Medina [Photograph]. Openverse. Retrieved 10 January 2026, from: https://openverse.org/image/8174327c-0e51-49e7-98bd-db2ac74cc6d0?q=medina+bike&p=11

BasilLeaf. (2022). Cairo Metro, LRT, and Monorail map [Map]. Wikimedia Commons. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Cairo_Rapid_Transit_map.png

Beevers, S. D., & Carslaw, D. C. (2005). The impact of congestion charging on vehicle emissions in London. Atmospheric Environment, 39(1), 1–5. https://doi.org/10.1016/j.atmosenv.2004.10.001

Bertolini, L., Le Clercq, F., & Kapoen, L. (2005). Sustainable accessibility: A conceptual framework to integrate transport and land use planmaking. Two testapplications in the Netherlands and a reflection on the way forward. Transport Policy, 12(3), 207–220. https://doi.org/10.1016/j.tranpol.2005.01.002

Bethlehem Municipality. (2021). Summary of the Sustainable Transport and Mobility Strategy for Bethlehem (English version). Retrieved 12 January 2026, from: **https://bethlehem-city.org/gallery/files/5744/**ملخص-إستراتيجية-النقل-والتنقل-المستدام-النسخة-الإنجليزية**-pdf-16770137574842959.pdf**

Blickstein, S. G., Brown, C., & Yang, S. (2019). Escooter programs: Current state of practice in US cities. Transportation Research Board Annual Meeting.

Bobbyqat. (2020). Al Khor Coastal Road in Al Heedan, northeast Qatar, near Bayt Stadium [Photograph]. Mapillary/Wikimedia Commons. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Al_Khor_Coastal_Road_in_Al_Heedan.jpg

Bocarejo, J. P., Portilla, I. J., Velásquez, J. M., Cruz, M. N., Peña, A., & Oviedo, D. R. (2014). An innovative transit system and its impact on lowincome users: The case of the Metrocable in Medellín. Journal of Transport Geography, 39, 49–61. https://doi.org/10.1016/j.jtrangeo.2014.06.018

Brand, P., & Dávila, J. D. (2011). Mobility innovation at the urban margins: Medellín's Metrocables. City, 15(6), 647–661. https://doi.org/10.1080/13604813.2011.609002

Brown, R. (2014). The train doesn't stop here anymore: An illustrated history of railway stations in Canada. Dundurn.

Bus Map Project. (2015). The Lebanese Commuting Company (LCC) Bus Map [Photograph]. Facebook. Retrieved 12 January 2026, from: https://www.facebook.com/BusMapProject/photos/pb.100065028660313.-2207520000/1464822640505328/?type=3

Bus Map Project. (2015). Youth engagement in Beirut exhibition: Beirut through the eyes of its youth launching event and discussion [Photograph]. Facebook. Retrieved 12 January 2026, from https://www.facebook.com/BusMapProject/photos/pb.100065028660313.-2207520000/1945169145804006/?type=3

Cabral Dias, G. J., & Gomes Ribeiro, P. J. (2021). Cycle highways: a new concept of infrastructure. European Planning Studies, 29(6), 1003-1020.

Carvalho, J., de Sousa, J. P., & Macário, R. (2024). Towards a more inclusive mobility: participatory mobility planning at a metropolitan scale. Transportation research procedia, 78, 222-229.

Casabu (2018). Map of line A of the Marrakech BRT, Morocco. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:MarrakechBHNS-LineA.png

Casabus (2021). Map of the tram network in the Rabat-Salé metropolitan area (Morocco). Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Rabat-Sal%C3%A9_tram_plan.png

Casabus (2023). Map of the Casabusway network in Casablanca, Morocco (July 2023). Retrieved 12 January 2026, from: https://openverse.org/image/8daafed8-fea7-4aaf-a943-ba7eec5c4cc2?q=Casablanca+Busway&p=4

Cellina, F., Derboni, M., Giuffrida, V., Tomic, U., & Hoerler, R. (2024). Trust me if you can: Practical challenges affecting the integration of carpooling in Mobility-as-a-Service platforms. Travel Behaviour and Society, 37, 100832.

Cervero, R. (2013). Bus Rapid Transit (BRT): An Efficient and Competitive Mode of Public Transport. University of California Transportation Center. Retrieved 7 April 2025, from: https://escholarship.org/uc/item/4sn2f5wc

Cervero, R. (2013). Transport infrastructure and the environment: Sustainable mobility and urbanism. IURD, Institute of Urban and Regional Development, University of California.

Chandra Kiran B. Krishnamurthy, Nicole S. Ngo, (2020). The effects of smart-parking on transit and traffic: Evidence from SFpark, Journal of Environmental Economics and Management, Volume 99, https://doi.org/10.1016/j.jeem.2019.102273.

Chaosone21 (2020). Picture of Medina Bus at Salam Road stop in the evening. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Medina_Buses_Salam_Road_Stop.jpg

Clements, R. (2020). Parking: an opportunity to deliver sustainable transport. In Handbook of sustainable transport (pp. 280-288). Edward Elgar Publishing.

Clure, E. (2017). Melbourne's trams among slowest in the world, NEWs, Forms of Government. Retrieved 7 April 2025, from: https://www.abc.net.au/news/2017-05-19/melbourne-trams-among-slowest-in-the-world/8541228

Cohen, B., & Kietzmann, J. (2014). Ride on! Mobility business models for the sharing economy. Organization & Environment, 27(3), 279 - 296. Retrieved 12 January 2026, from: https://doi.org/10.1177/1086026614546199

Coles, B. (2020). Innovation in the world's largest tram network, railexpress. light rail, Research & Development, Technology and IT. Retrieved 7 April 2025, from: https://www.railexpress.com.au/innovation-in-the-worlds-largest-tram-network/

Collins, R. (2002). Florida State Perspective, Session 14: Hurricane Partners, Avoiding the Perfect Storm. Presented at Institute of Transportation Engineers Spring Conference and Exhibit, Palm Harbor, Florida, March 2002.

Colville-Andersen, M. (2012). Bicycle Rush Hour Copenhagen - Summer (Nørrebrogade, world's busiest bicycle street). Retrieved 12 January 2026, from: https://www.flickr.com/photos/16nine/7023378645

Colville-Andersen, M. (2017). Copenhagen Capital Region Bicycle Superhighway Network (projected on London). Retrieved 12 January 2026, from: https://www.flickr.com/photos/16nine/35461794752/in/photostream/

Construction Review Online. (n.d.). Latest developments on the US$2bn Bahrain Metro project [Article]. Retrieved 27 January 2026, from https://constructionreviewonline.com/latest-developments-on-the-us-2bn-bahrain-metro-project-western-asia/

Cottrill, C. D. (2020). MaaS surveillance: Privacy considerations in mobility as a service. Transportation Research Part A: Policy and Practice, 131, 50-57.

Cullinane, S. (2002). The relationship between car ownership and public transport provision: a case study of Hong Kong. Transport policy, 9(1), 29-39.

Currie, G., & Shalaby, A. (2007). Success and Challenges in Modernizing Streetcar Systems: Experiences in Melbourne, Australia, and Toronto, Canada. Transportation Research Record, 2006(1), 31-39. https://doi.org/10.3141/2006-04

Curtis, C., Renne, J. L., & Bertolini, L. (Eds.). (2009). Transit oriented development: making it happen. Ashgate Publishing, Ltd..

Daniel Rosas-Satizábal, Alvaro Rodriguez-Valencia (2019). Factors and policies explaining the emergence of the bicycle commuter in Bogotá, Case Studies on Transport Policy, Volume 7, Issue 1, Pages 138-149, https://doi.org/10.1016/j.cstp.2018.12.007.

Dijk, M., & Parkhurst, G. (2014). Understanding the mobility-transformative qualities of urban park and ride polices in the UK and the Netherlands. International Journal of Automotive Technology and Management 21, 14(3-4), 246-270.

Divall, C., & Bond, W. (2017). Suburbanizing the masses: public transport and urban development in historical perspective. Routledge.

Dörrbecker, M. (Chumwa) (2020), Metro, suburban train and tramway map of Algiers [Map]. Own work, using OpenStreetMap data. Licensed under CCBYSA 2.0. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Metro,_suburban_train_and_tramway_map_of_Algiers.png

Egyptian Streets. (2017). Swvl: An Egyptian Startup Out to Reinvent Urban Mass Transit [Article]. Retrieved 28 January 2026, from https://egyptianstreets.com/2017/05/29/swvl-an-egyptian-startup-out-to-reinvent-urban-mass-transit/

El-Geneidy, A., Diab, E., Jacques, C., & Mathez, A. (2013). Sustainable urban mobility in the Middle East and North Africa. Global Report on Human Settlements, 3-6.

El-Husseiny, M., Mashaly, I., Azouz, N., Sakr, N., Seddik, K., & Atallah, S. (2024). Exploring sustainable urban mobility in Africa-and-MENA universities towards intersectional future research. Transportation Research Interdisciplinary Perspectives, 26, 101167.

Elrayies, Ghada. (2017). Aerial Ropeways as Catalysts for Sustainable Public Transit in Egypt. International Journal of Innovative Research in Science, Engineering and Technology. 6. 15542-15555. 10.15680/IJIRSET.2017.0608125.

Emadnadi. (2009). دوار الساعة - panoramio [Photograph]. Wikimedia Commons. Retrieved 26 January 2026, from https://commons.wikimedia.org/wiki/File:%D8%AF%D9%88%D8%A7%D8%B1_%D8%A7%D9%84%D8%B3%D8%A7%D8%B9%D8%A9_-_panoramio.jpg

Emanuel, M. (2019). Making a bicycle city: infrastructure and cycling in Copenhagen since 1880. Urban History, 46(3), 493-517.

EnGxBaDeR (2017). Speed Camera - Kuwait [Photograph]. Wikimedia Commons. Retrieved 25 January 2026, from https://commons.wikimedia.org/wiki/File:Speed_Camera_-_Kuwait.jpg

enimeuge. (n.d.). Current state of Electric vehicle charging in the island [Reddit post]. r/Bahrain (Reddit). Retrieved 28 January 2026, from https://www.reddit.com/r/Bahrain/comments/1mn6c4h/current_state_of_electric_vehicle_charging_in_the/

Er Kebabbaro. (2024). MAN Lion's City in Makkah [Photograph]. Wikimedia Commons. Retrieved 28 January 2026, from https://commons.wikimedia.org/wiki/File:MAN_Lion%27s_City_in_Makkah.jpg

Eskesen, S. D., Paulatto, E., & Stubbs, J. (2014). Construction challenges for urban tunnelling-The Copenhagen Metro Circle Line. Geomechanics and Tunnelling, 7(3), 223-229.

EVIQ. (2025). EVIQ launches first public electric vehicle DC fast charging site in Riyadh. EVIQ. Retrieved 14 January 2026, from https://eviq.sa/en/news/eviq-launches-first-public-electric-vehicle-dc-fast-charging-site-in-riyadh

Facebook. (n.d.). [Photograph post]. Retrieved 26 January 2026, from https://www.facebook.com/photo?fbid=875149808605843&set=pcb.875153258605498

Facebook. (n.d.). [Photograph post]. Retrieved 28 January 2026, from https://www.facebook.com/photo.php?fbid=580985797558076&set=pb.100069399812760.-2207520000&type=3

Facebook. (n.d.). [Photograph post]. Retrieved 28 January 2026, from https://www.facebook.com/photo/?fbid=886849212813343&set=a.422241092607493

Félix, R., Orozco-Fontalvo, M., & Moura, F. (2023). Socio-economic assessment of shared e-scooters: do the benefits overcome the externalities?. Transportation research part D: transport and environment, 118, 103714.

Filippo Tassinari (2024) Low emission zones and traffic congestion: Evidence from Madrid Central, Transportation Research Part A: Policy and Practice, Volume 185, https://doi.org/10.1016/j.tra.2024.104099.

Firnkorn, J., & Müller, M. (2015). Free-floating electric carsharing-fleets in smart cities: The dawning of a post-private car era in urban environments?. Environmental Science & Policy, 45, 30-40.

Fitzgerald, P. (2008). Sudan regions map [Map]. Wikimedia Commons. Retrieved 28 January 2026, from https://commons.wikimedia.org/wiki/File:Sudan_regions_map.png

Fmjwiki (2013). Tram Rabat-Salé at Rabat-Ville station. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Rabat-Sal%C3%A9_tram.JPG

Freudendal-Pedersen, M., Hartmann-Petersen, K., Friis, F., Rudolf Lindberg, M., & Grindsted, T. S. (2020). Sustainable mobility in the mobile risk society, Designing innovative mobility solutions in Copenhagen. Sustainability, 12(17), 7218.

Galvin, M., & Maassen, A. (2020). Connecting formal and informal spaces: a long-term and multi-level view of Medellín's Metrocable. Urban Transformations, 2(1), 4.

Ganesh, K., Thrivikraman, M., Kuri, J., Dagale, H., Sudhakar, G., & Sanyal, S. (2012). Implementation of a real time passenger information system. arXiv preprint arXiv:1206.0447.

Garric, A. (2024). Copenhagen's dream of becoming a low-carbon city. Lemonde, https://www.lemonde.fr/en/international/article/2024/09/07/copenhagen-s-dream-of-becoming-a-low-carbon-city_6725196_4.html#:~:text=Denmark's%20pioneering%20capital%20has%20set,sectors%20to%20make%20them%20greener.

Geels, F. W. (2012). A socio-technical analysis of low-carbon transitions: Introducing the multi-level perspective. Energy Research & Social Science, 1, 24-32.

Gehl, J. (2010). Cities for People. Island Press.

Ghadaliabata (2024). Amman-Zarqa Bus Rapid Transit: one of the buses [Photograph]. Taken 15 December 2024. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Amman-Zarqa_Bus_Rapid_Transit_%282%29.jpg

Givoni, M. (2012). Reassessing the results of the London congestion charging scheme. Urban Studies, 49(5), 1089–1105. https://doi.org/10.1177/0042098012446984

Glazener, Andrew & Wylie, James & Waas, Willem & Khreis, Haneen. (2022). The Impacts of Car-Free Days and Events on the Environment and Human Health. Current Environmental Health Reports. 9. 10.1007/s40572-022-00342-y.

Global Compact on Refugees (n.d.), City-to-city cooperation between Switzerland and Lebanon. UNHCR. Retrieved 10 January 2026, from: https://globalcompactrefugees.org/news-stories/city-city-cooperation-between-switzerland-and-lebanon

Globetrotter. (2010). Map of the Comoros [Map]. Own work, based on University of Texas Library - PerryCastañeda Map Collection (public domain). Wikimedia Commons. Retrieved 12 January 2026, from https://commons.wikimedia.org/wiki/File:Comoros_map.png

Gold Pillars. (n.d.). City Walk Crestlane Master Plan at Jumeirah, Dubai [Webpage]. Retrieved 26 January 2026, from https://www.goldpillars.ae/project/city-walk-crestlane-master-plan

Gössling, S. (2016). Urban transport justice. Journal of transport Geography, 54, 1-9.

Gössling, S. (2020). Integrating e-scooters in urban transportation: Problems, policies, and the prospect of system change. Transportation Research Part D: Transport and Environment, 79, 102230.

Gössling, S., & Choi, A. S. (2015). Transport transitions in Copenhagen: Comparing the cost of cars and bicycles. Ecological economics, 113, 106-113.

GoToVan (2019). Car2Go Car Sharing, Vancouver, Canada. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Car2Go_Car_Sharing_%2848118315597%29.jpg

Greenovation (2017). Copenhagen Bicycle Superhighways Network. Copenhagenize. https://www.greenovation.dk/english/copenhagen-bicycle-superhighway-network/

Gromov, D. (2020). A tram in the middle of the road near buildings [Photograph]. Pexels. Retrieved 14 January 2026, from: https://www.pexels.com/photo/a-tram-in-the-middle-of-the-road-near-buildings-4491945/

Guo, Y., & Zhang, Y. (2021). Understanding factors influencing shared e-scooter usage and its impact on auto mode substitution. Transportation research part D: transport and environment, 99, 102991.

Hadi, A. (2024). Study and Follow-up of the Iraqi Railway System utilize GIS. International Journal for Scientific Research, London. Vol (3), No (11). Figure (2), a map of Iraq and the capital, Baghdad, Showing the railway branches, page 153. Retrieved 12 January 2026, from: https://vsrp.co.uk/wp-content/uploads/7-IJSR-Vol.-3-No.-11-Nov-2024-Paper6-Dr.-Anaam.pdf

Hannisdahl, O. H., Malvik, H. V., & Wensaas, G. B. (2013). The future is electric! The EV revolution in Norway, Explanations and lessons learned. In 2013 world electric vehicle symposium and exhibition (EVS27) (pp. 1-13). IEEE.

Hassan et al. (2026). New mobility in Central Areas of Smart Cities, Alexandria as an applied example, Alexandria Engineering Journal, Volume 134, Fig. 3. Study Area in Alexandria City Centre, page 242. Retrieved 12 January 2026, from: https://www.sciencedirect.com/science/article/pii/S111001682501186X#fig0015

Hassoon, H. (2022). Khartoum train station and railway station, main station Jackson. Retrieved 12 January 2026, from: https://commons.wikimedia.org/w/index.php?curid=124516401

He, Sylvia & Tao, Sui & Hou, Yuting & Jiang, Wenhua. (2018). Mass Transit Railway, transit-oriented development and spatial justice: the competition for prime residential locations in Hong Kong since the 1980s. Town Planning Review. 89. 467-493. 10.3828/tpr.2018.31.

Heinrichs, D., & Bernet, J. S. (2014). Public transport and accessibility in informal settlements: aerial cable cars in Medellín, Colombia. Transportation research procedia, 4, 55-67.

Henderson, J., & Gulsrud, N. M. (2019). Street fights in Copenhagen: Bicycle and car politics in a green mobility city. Routledge.

Hickman, R., Hall, P., & Banister, D. (2013). Planning more for sustainable mobility. Journal of Transport Geography, 33, 210-219.

Hill, A. (2011). Copenhagen's novel problem: too many cyclists. The Guardian. https://www.theguardian.com/environment/bike-blog/2011/sep/09/copenhagen-cycling-congestion

Humpert, R. C. (2026). [Image of King Abdullah Financial District (KAFD)]. Personal communication.

I Love Qatar. (n.d.). New 5-lane road opens to reduce travel time from Doha to Al Khor [News post]. Retrieved 28 January 2026, from https://www.iloveqatar.net/news/general/new-5-lane-road-opens-to-reduce-travel-time-from-doha-to-al-khor

IDOM. (n.d.). Bahrain Metro. IDOM. Retrieved 14 January 2026, from https://www.idom.com/en/project/bahrain-metro/

Innes, J. E., & Booher, D. E. (2004). Reframing public participation: strategies for the 21st century. Planning theory & practice, 5(4), 419-436.

Iramezatil. (2024). View of a rental bicycle station and modern buildings in Cairo, Egypt [Photograph]. Pexels. Retrieved 14 January 2026, from: https://www.pexels.com/photo/view-of-a-rental-bicycle-station-and-modern-buildings-in-cairo-egypt-20634397/

Islamic Republic of Mauritania Ministry of Land Use, Urbanization and Habitation (MHUAT); Urban Community of Nouakchott (CUN); Japan International Cooperation Agency (JICA); RECS International Inc.; CTI Engineering International Co., Ltd.; PACET Corporation; PASCO Corporation (2018), Figure 5.1: Road Network of Nouakchott City (p. 173), in Nouakchott City Urban Master Plan Development Project in the Islamic Republic of Mauritania: Final Report. Retrieved 10 January 2026, from: https://openjicareport.jica.go.jp/pdf/12324737_01.pdf

Islamic Republic of Mauritania Ministry of Land Use, Urbanization and Habitation (MHUAT); Urban Community of Nouakchott (CUN); Japan International Cooperation Agency (JICA); RECS International Inc.; CTI Engineering International Co., Ltd.; PACET Corporation; PASCO Corporation (2018), Figure 5.86: Proposed Public Transport Network (p. 249), in Nouakchott City Urban Master Plan Development Project in the Islamic Republic of Mauritania: Final Report. Retrieved 10 January 2026, from: https://openjicareport.jica.go.jp/pdf/12324737_01.pdf

Iveroth, S. P., Vernay, A. L., Mulder, K. F., & Brandt, N. (2013). Implications of systems integration at the urban level: the case of Hammarby Sjöstad, Stockholm. Journal of Cleaner Production, 48, 220-231.

Izquierdo, R., García Dos Santos, S., Borge, R., de la Paz, D., Sarigiannis, D., Gotti, A., & Boldo, E. (2020). Health impact assessment by the implementation of Madrid City airquality plan in 2020. Environmental Research, 183, 109021. https://doi.org/10.1016/j.envres.2019.109021

Jagarlamudi, L. (2024). Examining the Effectiveness of Park-and-Ride Facilities in German Metropolitan Areas: Promoting Modal Shift and Mitigating Traffic Congestion (Master's thesis).

Jimenez, A. (2010). Tunis Railway Station, Flickr. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Tunis_Railway_Station.jpg

Johansson, R., & Svane, Ö. (2002). Environmental management in large-scale building projects, learning from Hammarby Sjöstad. Corporate Social Responsibility and Environmental Management, 9(4), 206-214.

JohnnoShadbolt (2008). Map of Melbourne's tram network, geographically accurate to approximate scale. Retrieved 10 January 2026, from: https://commons.wikimedia.org/w/index.php?curid=16839982

JohnnyDoobydoo (2025). Geographic and diagrammatic map of the Iraqi Republic Railways Network. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:IRR_Network_Map.svg

Jouni, H. (2025). [Image of Dubai metro]. Personal communication

Jouni, N. (2024). [Image of transportation and mobility roads in Amman]. Personal communication

Jouni, N. (2025). [Image of Bridge over Tigris River in Iraq]. Personal communication

Jouni, N. (2025). [Image of heavy traffic and cars stuck in Tunisia]. Personal communication

Juan Nicolas Gonzalez, Juan Gomez, Jose Manuel Vassallo (2023). Are low emission zones and on-street parking management effective in reducing parking demand for most polluting vehicles and promoting greener ones? Transportation Research Part A: Policy and Practice, Volume 176, https://doi.org/10.1016/j.tra.2023.103813.

Kent, J. L. (2014). Carsharing as active transport: What are the potential health benefits? Journal of Transport & Health, 1(1), 54-62.

Kforeman1 (2022). Passenger accepting Swvl ride in Cairo [Photograph]. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Swvl_ride_in_Cario_Eqypt.jpg

Khaleej Times. (n.d.). Skyway to transport passengers along Dubai's skyscrapers [Article]. Retrieved 28 January 2026, from https://www.khaleejtimes.com/uae/skyway-to-transport-passengers-along-dubais-skyscrapers

Klunke, M. (2009). Can Tunis station. In the center you can see the Renfe Integria workshops (1668 mm gauge), on the right the new workshops and some maintenance tracks for high-speed trains (1435 mm gauge). source: Ferropedia, https://ferrocarriles.fandom.com/wiki/P%C3%A1gina_principal?file=Ctdepositos.jpg. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Can_Tunis_dep%C3%B3sitos.png

km2bp @ Mapillary.com (2020). Doha Metro Green Line at Mathaf Museum, Al Rayyan [Photograph]. Published via Mapillary, licensed under CC BYSA 4.0. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Doha_Metro_Green_Line_at_Mathaf_Museum.jpg

Kolovos, B. (2025). A decade into Melbourne's free trams experiment, has it been worth it? The Guardian, Transport. Retrieved 7 April 2025, from: https://www.theguardian.com/australia-news/2025/jan/12/melbourne-free-trams-experiment-decade-critics

LA DOTD (Louisiana Department of Transportation and Development) (2005). "Prepare Ahead of Time," Coalition Urges. Baton Rouge, Louisiana, June 2005. Available online at: http://www.dotd.louisiana.gov/press/pressrelease.asp? nReleas e=489.

Laroche, F. (2022). The effect of COVID-19 on long-distance transport services in France. Regional Science Policy & Practice, 14(S1), 41-60. https://doi.org/10.1111/rsp3.12534

Larsen, J. (2017). The making of a pro-cycling city: Social practices and bicycle mobilities. Environment and planning A, 49(4), 876-892.

Lau, Y., Kanrak, M., Poo, M. C.-P., Yang, Z., & Yang, Z. (2024). Analysis of the Ferry Service Network in Hong Kong. Island Studies Journal, 19(2), 118-136. https://doi.org/10.24043/001c.125990

Leape, J. L. (2006). The London congestion charge. Journal of Economic Perspectives, 20(4), 157–176. Retrieved April 7, 2025. Retrieved 7 April 2025, from: https://econpapers.repec.org/article/aeajecper/v_3a20_3ay_3a2006_3ai_3a4_3ap_3a157-176.htm

Lebanon24 (2025). Zahle launches public transport in its streets - a pioneering experiment making it a model for other regions. Retrieved 12 January 2026, from: https://www.lebanon24.com/news/lebanon/1217889/ زحلة-تطلق-النقل-العام-في-شوارعها-تجربة-رائدة-تجعلها-نموذجا-لل

Lindenau, M., & Böhler-Baedeker, S. (2014). Citizen and stakeholder involvement: a precondition for sustainable urban mobility. Transportation Research Procedia, 4, 347-360.

Loorbach, D., & Shiroyama, H. (2016). The challenge of sustainable urban development and transforming cities. Governance of urban sustainability transitions: European and Asian experiences, 3-12.

Lucas, K. (2012). Transport and social exclusion: Where are we now? Transport Policy, 20, 105-113.

Machline, E., Pearlmutter, D., Schwartz, M., & Pech, P. (2020). Green neighbourhoods and eco-gentrification: a tale of two countries. Springer Nature.

Madinah Bus (MDA). (n.d.). جدول محطات حافلات المدينة واحداثياتها [PDF]. Retrieved 28 January 2026

Magharebia. (2011). The Algiers metro, which recently began operating, will transport thousands of passengers every hour, source: https://www.flickr.com/photos/magharebia/6358887069/. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Louverture_du_m%C3%A9tro_dAlger_suscite_lenthousiasme_%286358887069%29.jpg

Malkawi99. (2024). Vending and packing machine for Amman bus in Sport City [Photograph]. Retrieved 12 January 2026, from: https://commons.wikimedia.org/w/index.php?curid=149396961

Mariordo (Mario Roberto Durán Ortiz) (2025), Top EV market share by country, 2022 - 2024. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Top_EV_market_share_2022.png

Marsden, G., & Reardon, L. (2017). Governance of the smart mobility transition. Transportation Research Part A: Policy and Practice, 104, 14-25.

MatthieuCattin (2021). Bogotá Ciclovía - Every Sunday morning and public holidays certain streets of the city are closed to cars to allow bicycles to circulate [Photo]. This is the Ciclovia. Shutterstock. Retrieved 12 January 2026, from: https://www.shutterstock.com/image-photo/bogota-colombia-august-15-2021-every-2026569224

Mazini, S. (2024). Riyadh Metro Network Map [Map]. Wikimedia Commons. Retrieved January 12, 2026, from: https://commons.wikimedia.org/wiki/File:Riyadh_Metro_Network_Map.svg

Meagle Energy. (n.d.). Project 5. Meagle Energy. Retrieved 14 January 2026, from https://meagle-energy.com/projects/project-5

MedCities. (2023). MAIS project: Sustainable Mobility Week in Sfax. Environmental and Biodiversity. Retrieved 13 January 2026, from: https://medcities.org/mais-project-sustainable-mobility-week-in-sfax/

Meierberg (2023). A diagrammatic map of the Oran tram line. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Tramway_oran.svg

Middle East Council on Global Affairs. (n.d.). Iraq's Development Road Project: A Path to Prosperity or Instability? [Publication]. Retrieved 27 January 2026, from https://mecouncil.org/publication/iraqs-development-road-project-a-path-to-prosperity-or-instability/

MillardBall, A., Weinberger, R. R., & Hampshire, R. C. (2014). Is the curb 80% full or 20% empty? Assessing the impacts of San Francisco's parking pricing experiment. Transportation Research Part A: Policy and Practice, 63, 76–92. https://doi.org/10.1016/j.tra.2014.02.016

Mingardo, G. (2013). Transport and environmental effects of railbased park and ride: Evidence from the Netherlands. Journal of Transport Geography, 30, 7–16. https://doi.org/10.1016/j.jtrangeo.2013.03.004

Ministère de l'Europe et des Affaires étrangères (France). (2018). Comores [Map image]. Retrieved 28 January 2026, from https://www.diplomatie.gouv.fr/IMG/jpg/comores_cle061d37.jpg

Ministry of Local Government (MoLG) & Municipal Development and Lending Fund (MDLF). (2021). Integrated Cities and Urban Development Project (ICUD): Comprehensive Public Transportation Master Plan for the Urban Center of Ramallah and AlBireh, Phase 4 - Public Transportation Plan Formulation and Review, Volume 3: Public Transport Master Plan. (Figure 1, Page 7) Prepared by CDG, MOVE Mobility, & NCD. Funded by the World Bank. Retrieved 13 January 2026, from: https://molg.pna.ps/uploads/files/Public%20Transportation%20Plan%20Volume%203%20Master%20Plan_d793de9f30a94140957b02c8d79d9245.pdf

MobiliseYourCity. (2023). Greenhouse gas emissions impact assessment of an Urban Mobility Plan: Greater Sousse SUMP [Presentation]. MobiliseYourCity, Mastering Mobility Series. Retrieved January 13, 2026, from https://www.mobiliseyourcity.net/sites/default/files/2023-06/20230530_Emissions%20Calculator%20EUROMED%20Sousse_PPT.pdf

Mohareb, N., & Felix, M. (2017). Affordable and common modes of transportation in developing cities and their effect on the sustainability of streets. Procedia Environmental Sciences, 37, 319–329. https://doi.org/10.1016/j.proenv.2017.03.038

Mohsen, J.(2017). Arbil Map [Map]. Wikimedia Commons. Retrieved 28 January 2026, from https://commons.wikimedia.org/wiki/File:Arbil_Map.jpg

Moran, M. E. (2022). Treating COVID with bike lanes: Design, spatial, and network analysis of "popup" bike lanes in Paris. Findings. March. https://doi.org/10.32866/001c.33765

Mostafameraji (2017). Muttrah-Muscat passage (Oman Vision 2040 Infrastructure Project). Wikimedia Commons. Retrieved 10 January 2026, from: https://commons.wikimedia.org/wiki/File:Muttrah-Muscat_%D9%85%D8%B7%D8%B1%D8%AD%D8%8C_%D9%85%D8%B3%D9%82%D8%B7_20.jpg

Mostafameraji. (2017). Muscat, Oman 09 مسقط، عمان [Photograph]. Wikimedia Commons. Retrieved 25 January 2026, from https://commons.wikimedia.org/wiki/File:Muscat,_Oman_%D9%85%D8%B3%D9%82%D8%B7%D8%8C_%D8%B9%D9%85%D8%A7%D9%86_09.jpg

Mudununa (2024). Urban Mobility In Arab Cities, sixth issue, published by the Arab Urban Development Institute (AUDI).

Muhammad, A. (2025). Riyadh, Saudi Arabia: Riyadh Metro Blue Line at KAFD Metro Station with the KAFD skyline in the background, showing modern urban transit and architecture[Photograph]. Riyadh, Saudi Arabia. Editorial image. Shutterstock. Retrieved 18 June 2026, from: https://www.shutterstock.com/image-photo/24-november-2025-riyadh-saudi-arabia-2718176125

NAADAAN (2023). Photograph of the Oumlil Amalway Station in the Agadir city center. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Oumlil_Amalway_Station_-_BHNS_Agadir_01.jpg

Nabadey. (2012). Route de Djibouti [Map]. Wikimedia Commons. Retrieved 25 January 2026, from https://commons.wikimedia.org/wiki/File:Route_de_Djibouti.pdf

Nadhim, A. M. (2020). Shatt al-Arab, Basra. Wikimedia Commons. Retrieved 10 January 2026, from: https://commons.wikimedia.org/wiki/File:%D8%B4%D8%B7_%D8%A7%D9%84%D8%B9%D8%B1%D8%A8_%D8%A7%D9%84%D8%A8%D8%B5%D8%B1%D8%A9.jpg

Nagati, O. (2016). [Image of KODAK passage in downtown Cairo]. Personal communication.

Nagati, O. and Stryker, B. "Cairo Downtown Passageways: A Framework for Urban Regeneration." In Creative Cities: Reframing Downtown Cairo. Cairo: CLUSTER and the American University in Cairo, 2016. Pp. 178-189. Available at: https://clustercairo.org/2015/12/05/creative-cities-re-framing-downtown-publications/

Nakat, Z., Herrera, S., & Cherkaoui, Y. (2014). Cairo Traffic Congestion Study: Executive Note. The World Bank Group, 1-5.

Nathalie Ortar, David Sayagh, Adrien Poisson, Adrien Lammoglia, Benoît Feildel, Sandrine Depeau, Laurent Chapelon, Andoni Hentgen-izaguirre et Léa Barbé (2024). Comment les coronapistes ont influencé les pratiques cyclistes. Enquête en selle dans 5 métropoles françaises », L'Espace Politique, 47-48, 2022-2/3, https://doi.org/10.4000/espacepolitique.11218

National Investment Commission (Iraq). (2024). RFI English – Najaf–Karbala Metro (20.2.2024) [PDF]. Retrieved 27 January 2026, from https://investpromo.gov.iq/wp-content/uploads/2024/03/3.-RFI-English-Najaf-Karbala-metro-20.2.2024.pdf

Nelson, M., Ehrenfeucht, R., & Laska, S. (2007). Planning, plans, and people: Professional expertise, local knowledge, and governmental action in post-Hurricane Katrina New Orleans. Cityscape, 23-52.

Neuhausengroup (2014). Hyperloop capsule structural design. Retrieved 10 January 2026, from: https://commons.wikimedia.org/wiki/File:Hyperloop-Capsule.jpg

New Lines Magazine. (n.d.). Pedaling Through the Fault Lines of Postwar Damascus [Article]. Retrieved 27 January 2026, from https://newlinesmag.com/spotlight/pedaling-through-the-fault-lines-of-postwar-damascus/

Newman, P. (2006). Sustainable transport for sustainable cities. Issues, (76), 6-10.

Newman, P., & Kenworthy, J. (1999). Sustainability and Cities: Overcoming Automobile Dependence. Island Press.

Newman, P., & Kenworthy, J. (2015). The end of automobile dependence (pp. 105-140). Washington, DC, USA:: Island Press/Center for Resource Economics.

Novastudiogroup. (2023). BikeSol – Erbil: Bicycle pathway in Erbil 120m road, enhanced by solar panel roof for shading and generating energy. 3D modeling & animation by NOVA Studio (Adrián Berenguer, October). [Video]. Instagram. Retrieved January 15, 2026, from https://www.instagram.com/reel/CzRmTtzoSeS/

Olga L. Sarmiento, Adriana Díaz del Castillo, Camilo A. Triana, María José Acevedo, Silvia A. Gonzalez, Michael Pratt (2017). Reclaiming the streets for people: Insights from Ciclovías Recreativas in Latin America, Preventive Medicine, Volume 103, Pages S34-S40, https://doi.org/10.1016/j.ypmed.2016.07.028.

Oman Rail. (n.d.). Rail of Oman. Oman Rail. Retrieved 14 January 2026, from https://www.omanrail.om/rail-of-oman

Ortega, A., Haq, G., & Tsakalidis, A. (2023). Carsharing in Europe: a critical review of policy, research, innovation, and practice. Transportation Planning and Technology, 46(4), 381-406.

Osman, G., & Li, X. (2016). Sustainable Transportation in Arab Region. Management & Engineering, (24), 167.

Pandis Iverot, S., & Brandt, N. (2011). The development of a sustainable urban district in Hammarby Sjöstad, Stockholm, Sweden?. Environment, Development and Sustainability, 13, 1043-1064.

Parkhurst, G., & Meek, S. (2014). The effectiveness of park-and-ride as a policy measure for more sustainable mobility. In Parking issues and policies (pp. 185-211). Emerald Group Publishing Limited.

Parra, D. C., Adlakha, D., Pinzon, J. D., Van Zandt, A., Brownson, R. C., & Gomez, L. F. (2020). Geographic distribution of the Ciclovia and Recreovia programs by neighborhood SES in Bogotá: How unequal is the geographic access assessed via distancebased measures? Journal of Urban Health, 98(1), 101–110. https://doi.org/10.1007/s11524-020-00496-w

Pascoe, R. D., & Ghiggi, C. (2004). Lessons Learned So Far: The Copenhagen Metro. In Automated People Movers: Moving Through the Millennium (pp. 1-11).

Patel, C., Swami, M., Saxena, P., & Shah, S. (2015). Rotary automated car parking system. International Journal of Engineering Science and Innovative Technology (IJESIT), 4(2), 408-415.

Perez-Lancellotti, G., & Ziede, M. (2021). Sustainable Transitions of Urban Projects towards Mitigation and Adaptation Projects for Climate Change: The case of Medellin. In IOP Conference Series: Materials Science and Engineering (Vol. 1203, No. 3, p. 032011). IOP Publishing.

Picryl. (n.d.). Plan Kairouan 1937 [Image]. Retrieved 27 January 2026, from https://picryl.com/media/plan-kairouan-1937-50617c

Pojani, D., & Stead, D. (2015). Sustainable urban transport in the developing world: beyond megacities. Sustainability, 7(6), 7784-7805.

Popović A. (2023). Aerial view of Nouakchott, Mauritania cityscape [photograph]. Pexels. Available from: https://www.pexels.com/photo/aerial-view-of-nouakchott-mauritania-cityscape-33952949/

Propjunction. (n.d.). Fern Central Park. Retrieved January 13, 2026, from https://www.propjunction.ae/projects/fern-central-park

Przechelewski, T. (2021). Bus in Amman [Photograph]. Flickr. Retrieved January 12, 2026, from Openverse: https://openverse.org/image/1094d2b4-c305-42f8-8d97-75c7a52d0aa8

Qatar Rail (2018). Construction of the red line of the Doha Metro, source: https://retail.qr.com.qa/sites/QR/_layouts/15/QatarRail/photogallery.aspx. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Construction_of_the_red_line_of_the_Doha_Metro.jpg

Rachdi, K. (2023). Téléphérique de Tanger: le projet est sur de bons rails [Article]. le360.ma. Retrieved 28 January 2026, from https://fr.le360.ma/societe/telepherique-de-tanger-le-projet-est-sur-de-bons-rails_2DVHTGEVENAPVIPVWAPYDD4ASE/

Rérat, P., Haldimann, L., & Widmer, H. (2022). Cycling in the era of Covid-19: The effects of the pandemic and pop-up cycle lanes on cycling practices. Transportation Research Interdisciplinary Perspectives, 15, 100677. https://doi.org/10.1016/j.trip.2022.100677

ResearchGate. (n.d.). Shows the metro Train plan for Benghazi and Tripoli (Fig. 6) [Figure]. Retrieved 28 January 2026, from https://www.researchgate.net/figure/Shows-the-metro-Train-plan-for-Benghazi-and-Tripoli_fig6_388966300

Rock, M. Y. (2012). Splintering Beijing: Socio-spatial fragmentation, commodification and gentrification in the hutong neighborhoods of'old'Beijing. The Pennsylvania State University.

Rodrigue, J. (2020). The Geography of Transport Systems. Routledge.

Rolf_52 (2022). Stockholm, Sweden - October 30, 2022. Jan Inghes Square at Hammarby Sjöstad during an autumn sunset in Stockholm. This is a fashionable new residential area in Stockholm. [Editorial image]. Shutterstock. Retrieved 12 January 2026, from: https://www.shutterstock.com/image-photo/stockholm-sweden-october-30-2022-jan-2220539161

Rosa, L. (n.d.). Oman Rail [Slide deck]. SlideShare. Retrieved 28 January 2026, from https://www.slideshare.net/slideshow/oman-rail/63497794

Rotger, G. A. P., & Nielsen, T. A. S. (2015). Effects of job accessibility improved by public transport system: natural experimental evidence from the Copenhagen metro. European Journal of Transport and Infrastructure Research, 15(4), 419-441.

RSW. (2022). Unitsky String Technologies Inc.: The container depot construction work completed. RSW Systems. Retrieved 12 January 2026, from https://rsw-systems.com/news/depot-construction-completed

Russell, G. (2005). Nagin orders firstever mandatory evacuation of New Orleans. The TimesPicayune. Retrieved 11 January 2026, from http://www.nola.com/newslogs/breakingtp/index.ssf?/mtlogs/nola_Times-Picayune/archives/2005_08_28.html (nola.com in Bing)

Sabbagh, A. and Syntax Design (2016). Amman's Unofficial Transport Map, The first public transport map for Amman City, Behance, Retrieved 12 January 2026, from: https://www.behance.net/gallery/34988061/Ammans-Unofficial-Transport-Map

Sanchez, C. (2015). Hyperloop cutaway concept art. Retrieved 10 January 2026, from: https://commons.wikimedia.org/wiki/File:Hyperloop_all_cutaway.png

Sarsam, S. (2020). Implementation of Surveying Techniques in the Route Selection for Baghdad Metro Tube. 3rd International Conference on Architectural and Civil Engineering 2020. Fig. 11 Al-Shula City Corridor Metro Line Proposal, page 174. Retrieved 12 January 2026, from: https://eprints.cihanuniversity.edu.iq/id/eprint/3312/2/Conf_ICACE20_13-07-2021.pdf

Saudi Gazette. (2021). TRSDC appoints ARCHIRODON to build bridge to main hub island Shurayrah. Saudi Gazette. Retrieved 14 January 2026, from: https://saudigazette.com.sa/article/607587

Schiller, P. L., & Kenworthy, J. (2017). An introduction to sustainable transportation: Policy, planning and implementation. Routledge.

Schimkowsky, C. (2021). Managing passenger etiquette in Tokyo: between social control and customer service. Mobilities, 17(6), 932-950. https://doi.org/10.1080/17450101.2021.1929418

Schimkowsky, C. (2021). Manner Posters: A Genre Approach. Japanese Studies, 41(2), 139-160. https://doi.org/10.1080/10371397.2021.1925097

Schimkowsky, C. (2024). Visual communication and the management of passenger conduct: A visual analysis of transit etiquette posters by Japanese railway companies. Visual Communication, 23(4), 723-744. https://doi.org/10.1177/14703572221109889

Schmitz, S. (2023). View from San Javier Station to the cable car (Line J) of the Medellín Metro, Medellín, Colombia. Licensed under CC BY-SA 4.0. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Medell%C3%ADn,_San_Javier,_Estaci%C3%B3n,_2023-07_CN-01.jpg

Shaheen, S. A., & Cohen, A. P. (2013). Carsharing and personal vehicle services: worldwide market developments and emerging trends. International journal of sustainable transportation, 7(1), 5-34.

Shaheen, S., A. & Cohen, A. P. (2020). Mobility on demand (MOD) and mobility as a service (MaaS): Early understanding of shared mobility impacts and public transit partnerships. In Demand for emerging transportation systems (pp. 37-59). Elsevier.

Sharma, G. (2022), Delhi Metro Rail System and the Need for An Inclusive Last-mile Connectivity System. Discussion Paper, https://sprf.in/wp-content/uploads/2024/12/SPRF-2022_DP_Last-mile-delhi-metro.pdf

Sheller, M. (2018). Mobility justice: The politics of movement in an age of extremes. Verso Books.

Shoup, D. (2005). The High Cost of Free Parking. Routledge.

Skilla1st (2016). Djibouti National Highway. Retrieved 10 January 2026, from: https://commons.wikimedia.org/wiki/File:Djibouti_National_Highway.png

Snook, A. (2022). Toronto's Union Station Revitalization Project incorporates unique engineering. Renew Canada. https://www.renewcanada.net/5000090376-2/

SON, S. (2020). Policy Recommendations to Improve Integrated Transportation Service for Korean Smart Mobility: MaaS (Mobility as a Service) Platform Application Plan (Doctoral dissertation, KDI School of Public Policy and Management).

Sovacool, B. K., Kester, J., Noel, L., & de Rubens, G. Z. (2020). Actors, business models, and innovation activity systems for vehicle-to-grid (V2G) technology: A comprehensive review. Renewable and Sustainable Energy Reviews, 131, 109963.

Stanley, D. (2016). Basra Corniche. Wikimedia Commons. Retrieved 10 January 2026, from: https://commons.wikimedia.org/wiki/File:Basra_Corniche_(31103903525).jpg

State Information Service (Egypt). (n.d.). The inauguration of Adly Mansour Central Interchange Station [Webpage]. Retrieved 28 January 2026, from https://sis.gov.eg/en/projects-initiatives/projects/the-inauguration-of-adly-mansour-central-interchange-station/

Stopka, U., Pessier, R., & Günther, C. (2018). Mobility as a service (MaaS) based on intermodal electronic platforms in public transport. In Human-Computer Interaction. Interaction in Context: 20th International Conference, HCI International 2018, Las Vegas, NV, USA, July 15-20, 2018, Proceedings, Part II 20 (pp. 419-439). Springer International Publishing.

Surtiari, G. & Simarmata, H. (2019). Decision Making and Opportunities for Transformation in Jakarta, Indonesia.

Svane, Ö., Wangel, J., Engberg, L. A., & Palm, J. (2011). Compromise and learning when negotiating sustainabilities: The brownfield development of Hammarby Sjöstad, Stockholm. International Journal of Urban Sustainable Development, 3(2), 141-155.

Systematica (2021). Benghazi Mobility Master Plan, Public Transport Network. Retrieved 12 January 2026, from: https://www.systematica.net/project/benghazi-mobility-master-plan/

Tang, Siman & Lo, Hong. (2008). The impact of public transport policy on the viability and sustainability of mass railway transit - The Hong Kong experience. Transportation Research Part A: Policy and Practice. 42. 563-576. 10.1016/j.tra.2008.01.022.

Tao, S., & Duan, W. (2024). A Post-Evaluation Study on the Renewal of Public Space in Qianmen Street of Beijing's Central Axis Based on Grounded Theory. Buildings, 14(12), 3969. https://doi.org/10.3390/buildings14123969

Tarriño-Ortiz, J., Soria-Lara, J. A., Gómez, J., & Vassallo, J. M. (2021). Public Acceptability of Low Emission Zones: The Case of "Madrid Central". Sustainability, 13(6), 3251. https://doi.org/10.3390/su13063251

Taylor, K. (n.d.). Image of a bicycle scene in Medina. Openverse. Retrieved 10 January 2026, from: https://openverse.org/image/39e3d66b-f2b9-4117-bcc8-fdf33643b926?q=medina+bike&p=20.

Transitec Ingénieurs-Conseils SA. (n.d.). Nouakchott: A Sustainable Urban Mobility Plan to Improve Accessibility for the Poorest Households [Internet]. Available from: https://transitec.net/en/publication/11336-nouakchott-a-sustainable-urban-mobility-plan-to-improve-accessibility-for-the-poorest-households

Transport for London (2025), London's Ultra Low Emission Zone (ULEZ) and Congestion Charge Zone (CCZ) map. Wikimedia Commons. Retrieved 10 January 2026, from: https://commons.wikimedia.org/wiki/File:ULEZ-map.png

Turdyfirst. (2023). Busway de Casa. Retrieved 12 January 2026, from: https://openverse.org/image/e74bc5f3-0318-4a16-a506-0923e578b026?q=Casablanca+Busway&p=3

UITP (2024). Transforming Cities With Bus Rapid Transit (Brt). VREF, UITP AND BRT+ COE REPORT. https://cms.uitp.org/wp/wp-content/uploads/2020/07/BRT_ENG_Web.pdf

United Nations Lebanon (2024). UN initiative in Sour: introducing green means of transportation in Lebanon. Retrieved 10 January 2026, from: https://lebanon.un.org/en/241281-un-initiative-tour-sour-introducing-green-means-transportation-lebanon#:~:text=The%20bike%2Dshare%20initiative%20provides,for%20us%2C%E2%80%9D%20Khadeja%20says

URB. (n.d.). The Loop - 93 km sustainable urban highway in Dubai [Map/Project page]. URB. Accessed 13 January 2026, from: https://urb.ae/projects/theloop/

URB. (n.d.). THE LOOP | Dubai [Project webpage]. Retrieved 28 January 2026, from https://urb.ae/projects/theloop/

Ville de Sousse. (2021). Plan de Déplacements Urbains du Grand Sousse: Rapport technique – Mission 3 (Août 2021) [Report PDF]. Retrieved 26 January 2026, from https://plans-climat.aimf.asso.fr/wp-content/uploads/2024/05/TUN_Sousse_PDU-3.pdf

Wahrani, M. (2013). Two tramway cars in Oran at the Ibn Badis Mosque station. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Tramway_oran_18_cropped.jpg

Walid777999 (2025). New Administrative Capital Monorail (East of the Nile) trials [Photograph]. Wikimedia Commons. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:تجارب_مونوريل_العاصمة_الإدارية.jpg

Wang, H., Saito, M., Liu, J., & Shimamoto, S. (2024). Comprehensive Analysis of Traffic Operation for on-street Parking Based on the Urban Road Network. IEEE Access.

Wang, Z., Yu, J. G., Chen, A., & Fu, X. (2024). Subsidy policies towards zero-emission bus fleets: A systematic technical-economic analysis. Transport Policy, 150, 1-13.

Weinreich, M. (2021). Cycling Copenhagen: The Making of a Bike-Friendly City. Heinrich-Böll-Stiftung European Union. https://eu.boell.org/en/cycling-copenhagen-the-making-of-a-bike-friendly-city

Wirasinghe, S. C., Kattan, L., Rahman, M. M., Hubbell, J., Thilakaratne, R., & Anowar, S. (2013). Bus rapid transit-a review. International Journal of Urban Sciences, 17(1), 1-31.

Wolfmann (2017). Nissan LEAF and Volkswagen e-Golf at an electric vehicle charging station in Storgata, Tønsberg, Norway. Retrieved 12 January 2026, from: https://commons.wikimedia.org/wiki/File:Electric_vehicle_charging_station_Ladestasjon_for_elbil_Nissan_VW_e-golf_Storgaten_T%C3%B8nsberg_kommune_Norway_2017-09-20_01.jpg

Wong, C. (2025), Modern tram crossing a bridge over a canal in Stockholm, Sweden, with residential buildings and boats in the background. Retrieved 12 January 2026, from: https://www.istockphoto.com/photo/modern-tram-crossing-bridge-in-stockholm-sweden-with-scenic-canal-view-gm2224500287-640594978

World Bank (2012). Adaptation to a changing climate in the Arab countries: A case for adaptation governance and leadership in building climate resilience. Washington, DC: World Bank. Retrieved January 14, 2026, from https://documents1.worldbank.org/curated/en/740351468299700935/pdf/Adaptation-to-a-changing-climate-in-the-Arab-countries-a-case-for-adaptation-governance-and-leadership-in-building-climate-resilience.pdf

World Bank (2019). Jakarta Urgent Flood Mitigation Project, Report No: ICR00004907, Urban, Disaster Risk Management, Resilience and Land Global Practice East Asia And Pacific Region, https://documents1.worldbank.org/curated/pt/153081567169469254/pdf/Indonesia-Jakarta-Urgent-Flood-Mitigation-Project.pdf

World Bank (2024). TRANSIT-ORIENTED NEIGHBORHOODS IN AMMAN NEIGHBORHOOD SELECTION, ANALYSIS, AND URBAN DESIGN. LONG-LIST OF PROJECTS Al YARMOOK STREET, page 18. Retrieved 13 January 2026, from: https://documents1.worldbank.org/curated/en/099052024095197039/pdf/P177803194f53c0231b0541f824ebc2a4f8.pdf

World Bank (2024). TRANSIT-ORIENTED NEIGHBORHOODS IN AMMAN NEIGHBORHOOD SELECTION, ANALYSIS, AND URBAN DESIGN. Yarmouk Street Corridor, page 30. Retrieved 13 January 2026, from: https://documents1.worldbank.org/curated/en/099052024095197039/pdf/P177803194f53c0231b0541f824ebc2a4f8.pdf

Yang, D. (2006). Waterfronts: Spatial composition and cultural use. University of London, University College London (United Kingdom).

Zacharias, J. (2002). New central areas in Chinese cities. Urban Design International, 7, 3-17.

Zeng, X., Yu, Y., Yang, S., Lv, Y., & Sarker, M. N. I. (2022). Urban Resilience for Urban Sustainability: Concepts, Dimensions, and Perspectives. Sustainability, 14(5), 2481. https://doi.org/10.3390/su14052481

Zhang, Z., Lu, C., Zhao, H., Chen, Q., Wu, Q., & He, T. (2024). Construction of the Place Spirit of Qianmen Street in Beijing: Historical Performance and User Needs. In Design Studies and Intelligence Engineering (pp. 342-361). IOS Press.

Ziqi Yang, Xinghua Li, Yuntao Guo, Xinwu Qian (2023). Understanding active transportation accessibility's impacts on polycentric and monocentric cities' housing price, Research in Transportation Economics, Volume 98, https://doi.org/10.1016/j.retrec.2023.101282.

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