

The Mobility Transition in the MENA Region

Comparative Policy Perspectives

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Regional Synopsis

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Ali has a degree in Environmental Science from the University of California Davis and has focused on urban and transport development in his professional career. Additionally, he currently hosts an Arabic podcast called Mad wa Jazer which covers various environmental issues from the Arab world.



Ronja Schiffer, Program Manager at FES

Ronja Schiffer is a program manager at the Regional Climate and Energy Project MENA at FES in Amman. Ronja covers the topics of mobility, sustainability, and social justice within the energy transition as well as in climate mitigation efforts. She is working closely with local civil society organizations and experts and links them to decision makers within the project, thanks to the support by Franziska Wehinger, head of the project. Through her work, she expanded her research on environmental-related challenges and disadvantages faced by politically disadvantaged groups, such as women, e.g. access to transportation and work, time poverty, lack of resources, and environmental stress.

Ronja has a degree in International Relations of the Middle East with Arabic from the University of Edinburgh and is focused on the Levant Region in particular. She has been working within the field for over two years.

Introduction

The MENA region (**Figure 1**) and in particular the Levant Region suffers from many issues, one of the main ones being insufficient, inaccessible, and unjust transportation systems which hamper overall mobility within those countries. Major consequences of this lack of mobility are high unemployment, especially for disadvantaged groups such as women and youth, decreased upward mobility as well as an increase of social, economic, and political injustice. The following synopsis summarizes and analyses four comparative case studies from the region on the status and prospects of a just and

sustainable mobility transition. Firstly, the region is presented with key data, followed by the format and key content of the case studies, then highlighting key findings and recommendations, and finally bringing it together to create a vision for the region by understanding commonalities and differences.

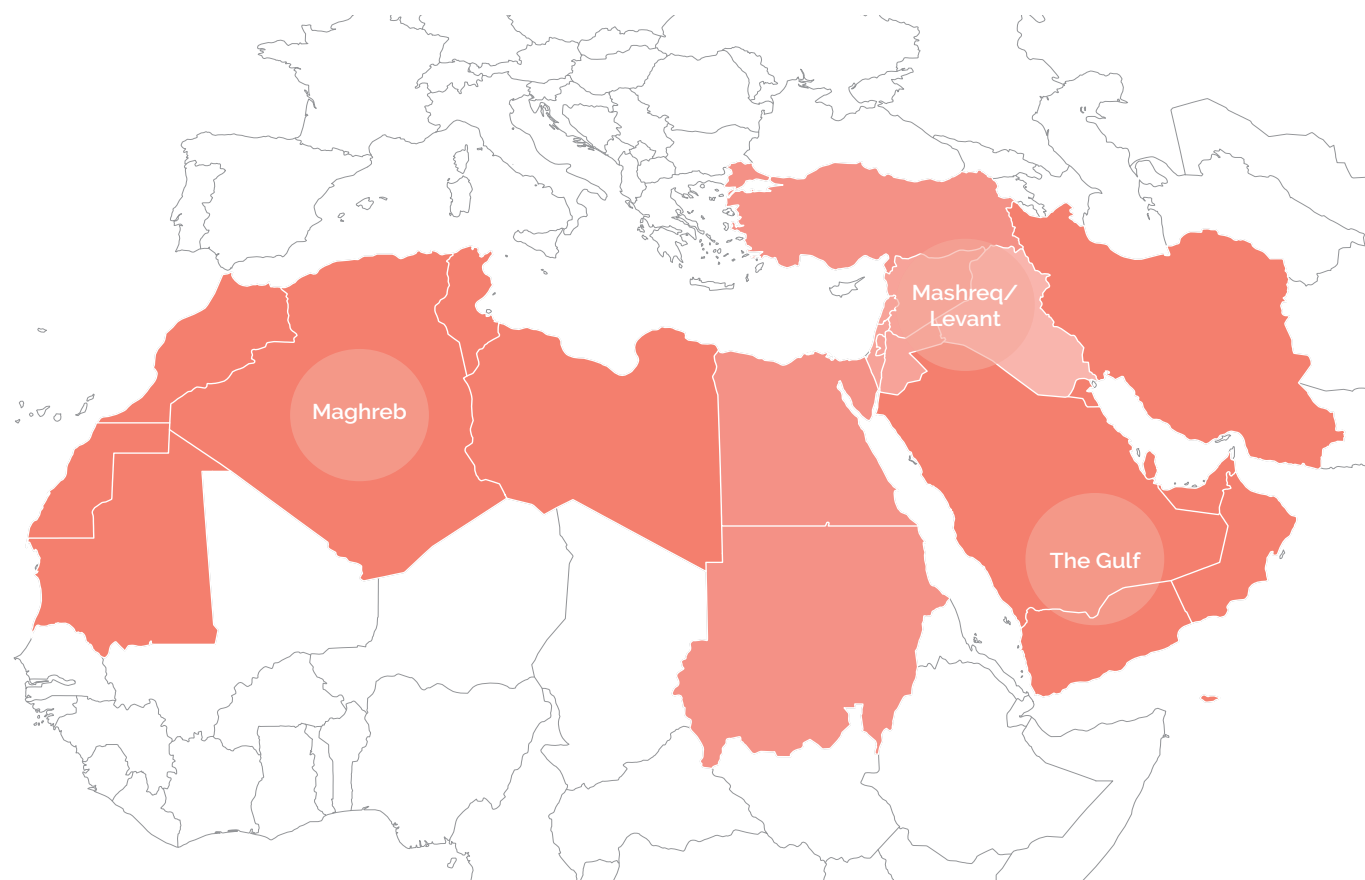


Figure 1: Countries in the MENA Region, Source: MENARA Project, September 2016

The MENA region (Figure 1) has a population of 569 million currently residing in it and it is expected to grow to over one billion by 2100, surpassing expectations for both Europe and China.¹ The GDP per capita is 7,857 USD, while taking into account the high regional variances due to the considerably wealthier Gulf states versus states such as Syria, Libya, Algeria.² Unemployment lies at ca 10.6 % for the region (2017) with variations from 1.2% (Bahrain) to 25.7% (Palestine).³ Youth unemployment lies at ca. 26.9% according to ILO estimates, with Libya highest with over 50% and Bahrain lowest with ca 4.6% (Worldbank 2020c).⁴ The female unemployment rate according to the ILO is around 18% in 2019 in the MENA region, with Bahrain being the lowest at 3% and Palestine being the highest at almost 41% (World Bank 2020d).⁵

¹ UNDESA/United Nations Department of Economic and Social Affairs (2017), World Population Prospects: The 2017 Revision, <https://esa.un.org/unpd/wpp>

² a. Worldbank (Data retrieved: June 21, 2020), GDP per capita (constant USD 2010) MENA, <https://data.worldbank.org/indicator/NY.GDP.PCAP.KD?locations=ZQ>

³ b. Worldbank (Data retrieved: June 21, 2020), Unemployment rate, Youth, MENA, ILO Estimate <https://data.worldbank.org/indicator/SL.UEM.1524.ZS?locations=ZQ>

⁴ c. Worldbank (Data retrieved: June 21, 2020), Unemployment rate, female as % of female labor force, MENA, ILO Estimate, <https://data.worldbank.org/indicator/SL.UEM.TOTL.FE.ZS>

⁵ d. Worldbank (Data retrieved: June 21, 2020), Unemployment rate, total, % of total labor force, MENA, National Estimate, <https://data.worldbank.org/indicator/SL.UEM.TOTL.NE.ZS>

This report consolidates the findings of four case studies from the region to create a synopsis and insights into the mobility transition that is needed and envisioned. The four countries are Egypt, Jordan, Lebanon, and Palestine. They can be found [here](#)(¹). The analysis tackles the following aspects:

- ***At a Glance:***

This section is meant to set the stage for each case study, providing general information about each country including basic demographic data and challenges. The information presented in this section should provide some context into why each case is unique, and why a one-size-fits-all approach cannot work in the complex world of transportation.

- ***Governance and Legislation***

This section covers the main factors in transportation planning on the national and local levels. In order to understand the challenges and opportunities present in each country, it is important to understand the roles and responsibilities of the governing institutions, and how they interact. Additionally, the main pieces of transport legislation are also mentioned in order to identify legislative and regulatory challenges and opportunities in the coming sections.

- ***Where Are We Now?***

The background information on each country and their transport governance systems are meant to provide enough context to explain some of the downfalls associated with the sector. This is where each case study starts to provide information about the current *modus operandi*, including transport-specific statistics, common transportation methods, major transportation challenges and their consequences.

- ***Where Do We Want to Be?***

How does each author envision the future of their country's transportation system? This section attempts to answer this question by looking into realistic scenarios that increase inclusion, address social justice issues, and meet the rising demand for transport through environmentally friendly alternatives.

- ***Short-Term Goals/Low Hanging Fruit***

What is easily achievable? Are there any low hanging fruits that can be addressed in the short term future? This section would provide the transitional period of moving towards cleaner mobility sources, with more priority being given to addressing the main challenges affecting the mobility sector (such as improving reliability, meeting demand, providing good coverage, etc...).

- ***Long-Term Goals***

This section would provide long-term recommendations which would require larger investments and time-consuming regulatory changes.

- ***Tying It All Together***

The EASI (Enable, Avoid, Shift, Improve) Framework

Enable (E) Strategies: Creating a sound enabling environment is essential and can be considered as the starting point to achieve changes in the transport sector. The enabling environment refers to the ability of establishing the right governance and regulatory structures that streamline the shift towards improved transportation systems. This includes developing and adopting a mobility transition plan with clear integrated responsibilities for stakeholders, proper capacity building, and public participation.

Avoid (A) Strategies: This strategy refers to the avoidance and reduction of the trips being made by users of the transportation system. In terms of overall strategy, this requires changes on several fronts in order to achieve a built environment where users do not need to make as many trips and can be realized through integrated land-use planning and transport demand management. The implementation of e-commerce and teleworking programs allow users to get more done without having to make a trip anywhere, and effective land use management allows users to get more done in a single trip, reducing the overall number of trips being made.

Shift (S) Strategies: Strategies where users shift from polluting alternatives, such as passenger cars, to more environmentally friendly and efficient alternatives, such as cycling, walking, or using public transport, which all lay under this category. Implementable actions falling under the S strategic direction can include introducing policy measures such as using pricing instruments to encourage shift to more efficient modes, as well as strengthening alternatives such as establishing cycling infrastructure, or reinforcing the public transport fleet by making it more appealing.

Improve (I) Strategies: This strategy mainly refers to the technological improvements that are applied to different modes of transport and transport management in order to reduce emissions. Shifting from an internal combustion engine car to a hybrid or electric vehicle is the perfect example of this, but this category also includes shifts from heavy gas guzzlers to smaller vehicles which emit far fewer emissions per kilometer. From another point of view, improvements to traffic management technology such as traffic signal timing and other methods of smart traffic management that adapt to peak demand are also under this umbrella of improving current technologies and systems.

It's important to distinguish between the different strategies of the EASI framework and establish priorities according to each country's needs. Through this paper, it is noticeable that each country has its own set of challenges and in reality, this will determine how and where they should choose to focus their resources.

This small comparative analysis sets a base for further research and policy planning. There is a lack of comprehensive data as well as conclusive and sustainable planning, which this analysis wants to highlight. The project is a collaborative project led by the Regional Climate and Energy Project MENA by the Friedrich-Ebert-Stiftung, based in Amman, in cooperation with five individual researchers/ think tanks with excellent expertise and local knowledge. For Jordan, Hazen Zureiqat, Engicon, has shared his long-standing expertise. For Egypt, Transport for Cairo and in particular Mohammed Hegazy included their knowledge and expertise. For Lebanon, Rami Semaan wrote throughout the horrific blast in the port of Beirut and added his insights. For Palestine, Dr. Sameer Abu Eisheh critically assessed the mobility challenges, present and in the future. For the synopsis, Ali Attari, Jordanian transport and environment consultant, and Ronja Schiffer, Program Manager at the Friedrich-Ebert-Stiftung, have brought the studies on point and authored this synopsis report.

Application and Findings

Tying the four comparative cases together, the analysis of the current situation, governance and strategic assessment highlight the lack of comprehensive, sustainable, and just mobility planning. Looking at where we are now, there are many issues in the current status of mobility. There is a heavy focus on private vehicles (e.g. Jordan), informal public transportation (e.g. Egypt and Lebanon) and taxis (e.g. Lebanon) as the main forms of transportation, and a lack of safe and accessible walking and cycling infrastructure (all four cases) reduce mobility for most of the citizens in the country, in particular vulnerable groups such as women and youth. Furthermore, current legislation and governance often has overlapping laws/government bodies, creating legal overlaps, conflict of parties involved and a lack of transparency and ineffective decision-making processes (e.g. Egypt, Lebanon, Jordan). In the case of Palestine, the fragmentation of land, the administrative division in the West bank and control of general movement by the Israeli government exacerbates their transport problems. Furthermore,

there is a lack of infrastructure and awareness for active modes of transportation such as walking and cycling - lack of sidewalks (e.g. Jordan), low air quality and high congestion (e.g. Egypt) and lack of safety (e.g. Lebanon). Even in states with higher modal shares on 'public transport' (e.g. Palestine and Egypt), oftentimes this includes taxis (e.g. Lebanon), and are mostly comprised of captive riders, having no alternative than to choose this particular mode of transport due to costs, accessibility, etc.

As the state of mobility is looking rather dim, envisioning a future in which the mobility transition enables safe, sustainable, and just mobility within the MENA region and beyond, it must include improving current policies and strategic plans. While there are country specific differences, key elements of the vision include a balanced and integrated multimodal mobility system, inclusion of active transportation modes, focusing on formalizing and extending safe and accessible public transportation, as well as decreasing the focus on private vehicles and participatory decision making processes. Mobility should become a basic right, such as education, which the state needs to provide. Different operational models need to be established in order to provide mobility as a service, as with a functioning transportation system, the economy is strengthened, and wealth can distribute itself to more parts of society.

Key Regional Recommendations for These Countries

Category	Short-Term	Long-Term
Infrastructure / Active Transport Modes	<ul style="list-style-type: none"> Support low cost facilities for active non-motorized transportation, giving more space and attention to pedestrians, such as providing proper sidewalks/crosswalks, bike facilities, and CBD auto free zones (e.g Jordan and Palestine).. 	<ul style="list-style-type: none"> Provide the hard infrastructure e.g. public transport systems, such as BRT and rail, pedestrian infrastructure, cycling lanes, electric vehicle charging stations, and so on (all). Support the construction of active transportation facilities for non-motorized transportation, such as pedestrians' bridges or underpasses, as well as more extensive bicycle facilities as appropriate (e.g. Palestine). Establish new public transportation terminals, especially in the outskirts of the major cities and operating mass public transportation (e.g. Egypt, Lebanon).
Public Transportation	<ul style="list-style-type: none"> Increase the attractiveness of the bus transportation through improvement of services and facilities, such as scheduling, activating new bus lines, upgrading bus fleet, installing bus stops, introducing smart technologies and transit priority system, improvement of the physical conditions of terminals (e.g. Palestine) Adopt comprehensive and sustainable urban planning policies that aim at reducing the need to travel, such as smart growth, transit-oriented development, higher densities, and mixed land use (all). 	<ul style="list-style-type: none"> Shift the operation of public transport services from the current, more commercial method of operation to one that is based on strictly enforced service standards. This will require adopting intelligent transport systems (ITS) solutions and revisiting the contractual frameworks that govern public transport operations (e.g. Jordan, Palestine) Conduct technical and financial feasibility studies for new mass transit options in urban areas and between cities (e.g. Egypt, Lebanon). Plan, design and operate BRT systems on the corridors of major transportation demand in the major urban areas (all).
Share of gross electricity consumption	<ul style="list-style-type: none"> Encourage the transitions towards the use of cleaner and environment friendly vehicles, including the public transportation vehicles. Special attention is needed to support changing the fleet towards EVs.(e.g. Jordan, Palestine). 	<ul style="list-style-type: none"> Focus automotive sector away from fuel combustion to electrification (all) or gas (e.g. Egypt). Encourage the shift towards highly efficient and effective technological and modal solutions including alternate fuels and establishment of the relevant supply chain systems.

Category	Short-Term	Long-Term
Regulatory/Legislative Frameworks and Strategic Planning	<ul style="list-style-type: none"> Update the regulatory and legislative framework to include regulations that facilitate the achievement of the clean and sustainable transportation system (all), this includes: <ol style="list-style-type: none"> Enforcing transparency. Involving all stakeholders through participatory processes. Implementing coherent and transparent procurement and funding procedures in place at the appropriate time. Develop/enhance a mobility transition plan with actions to improve mobility for all citizens, while managing traffic in a sustainable and climate-friendly way at the same time. Issues like social justice and accessibility of transportation systems for people with disabilities should form an integral part of the plan. Continuous awareness campaigns shall be part of the plan to facilitate citizens' acceptance (all). 	<ul style="list-style-type: none"> Find long-term, sustainable sources of funding for public transport and climate friendly mobility (all). Revisit the institutional framework governing transport and mobility, and an integrated coordination framework should be established among the different entities (all).

Table 1: Key Recommendations – Regional Level

Concluding it is left to encourage you to read the more in-depth case studies.

References

World bank (Data retrieved: June 21, 2020), GDP per capita (constant USD 2010) MENA.
<https://data.worldbank.org/indicator/NY.GDP.PCAP.KD?locations=ZQ>

World bank (Data retrieved: June 21, 2020), Unemployment rate, Youth, MENA, ILO Estimate.
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Mohamed Hegazy, Transport for Cairo

About Transport for Cairo

Transport for Cairo (TfC) LLC provides consultancy services, data, tech, and research to improve urban mobility in emerging cities. Established in Cairo, Egypt in 2015, we bring the best of the information, urban and transportation worlds together to provide disruptive transport consultancy services. To date, TfC successfully completed more than 20 projects in 5 countries in Africa.

Transport for Cairo produced this report and is referred to as the 'Consultant'.

Mohamed Hegazy, Founder and Director of Transport for Cairo

Founder and Director of Transport for Cairo (TfC) L.L.P. TfC provides consultancy services, data, tech, and research to improve urban mobility in emerging cities. With TfC, I successfully led the completion of more than 20 projects in 5 countries in Africa.

With 7 years of experience in management and project leadership within tech and tech enabled firms, I focus on data collection, data aggregation, data science & urban computing to transform ideas into practice. Academically trained in Economics, Sociology, and Public Policy design, I specialize in solving real world problems using data-driven methodologies.



Mohamed is an avid cyclist, rower, and reader. Born in Cairo, Egypt and have cum laude degrees in Economics from the American University in Cairo (2012), as well as Governing the Large Metropolis from Sciences Po, Paris (2018). In addition to having received training at the Center for Sustainable Urban Development, Columbia University, New York (2018). He is currently based in Cairo.

2.1 Transport in Egypt at a Glance

The levels of movement of people and goods across space in Egypt is high and will continue to rise. Transport demand is based on the population (which travels to satisfy needs), economic development (which determines the needs), and land-use (which determines the distances and trips travelled across space).⁶

Population: Egypt has 100 million inhabitants, growing at 2% annually and is projected to reach 160 million by 2050. It is noticeably young, with 50% of Egyptians at the age of 25 or younger.

Economy: Egypt is classified as a lower-middle-income country. The growing economy is expected to be the 7th fastest growing and the 18th largest economy in the world by 2050.

⁶ Ortúzar, J. de D. & Willumsen, L. G. *Modelling Transport*. (John Wiley & Sons, 2011).

Land-Use: The Greater Cairo Region (GCR, 24 million inhabitants) is the countries' economic, industrial, and cultural centre. Egypt's next three largest urban agglomerations are Alexandria, (6.5 million inhabitants) located at the western side of the Delta; Sohag (3.7 million inhabitants) located 470 km south of Cairo; and Al-Mansoura, (2 million inhabitants) located in the centre of the Delta.

Parameter	Values
Area	1,010,408 km²
Population	100,075,480
GDP per capita	3,047 USD
Registered Vehicles	9,890,062
Roads Length	~34,000 km

Table 2: General Data on Egypt



Figure 2: Egypt's Largest Urban Agglomerations

99% of Egyptians live on just 40,000 km2. The land area is equivalent to that of Switzerland, whose population is less than 10% of Egypt's. The arid climate and dependence on the Nile River for 97% of the water supply, drive a pattern of land use, leading to exceptionally high population densities. 45 of the 50 urban areas in Africa, with the highest population density, are in Egypt. Cairo's Urban Agglomeration network connects to 551 unique built-up regions within 120 km distance.⁷

Recent Developments: A political and an economic transition started with the 2011 uprising and the adoption of the constitution of 2014. Starting with 2016, the Government of Egypt (GoE) introduced transformative economic reforms accompanied by a three-year IMF Extended Fund Facility. Reforms included fiscal consolidation (e.g. the reduction of energy subsidies). Furthermore, the GoE adopted Sustainable Development Strategy, Egypt Vision 2030 (SDS), to guide sustainable national development.⁸ The SDS 2030 aims to attract foreign direct investment (FDI) and relies on multiple national megaprojects, such as the Suez-Canal Expansion, new city construction, and the National Road Project.

Egypt experienced a sharp depreciation of the local currency, a recovery in economic growth and job creation, a curb in inflation to single-digits, and management of high levels of public debt on a declining trajectory.^{9 10 11} Funds were allocated to helping the poor deal with the adjustment. Still,

7 SWAC & OECD. Africapolis - Densest Urban Areas. https://www.africapolis.org/research/densest_urban_areas (2018).

8 Ministry of Planning. Sustainable Development Plan - خطة التنمية المستدامة للعام المالي - 2016/2017. <http://mpmar.gov.eg/internal/internal/المالي%20للعام%20للتنمية%20المستدامة%202016> (2016).

9 IMF. Arab Republic of Egypt - Fifth Review Under the Extended Arrangement Under the Extended Fund Facility. (2019).

10 World Bank Group. Egypt : Enabling Private Investment and Commercial Financing in Infrastructure. <https://openknowledge.worldbank.org/handle/10986/31070> (2018).

11 World Bank. Egypt: Greater Cairo Air Pollution Management and Climate Change Project. World Bank. <https://projects.worldbank.org/en/projects-operations/project-detail/P172548> (2019).

the national poverty line increased by five percentage points to 32.5% for 2018.¹² Air, water, and land pressures are taking their toll on the local environment, affecting citizens living in poverty the most. The GCR ranked as the third most polluted megacity globally.¹³

2.2 Governance and Legislation

Transport related laws are proposed within the Transport Committee, one of 25 specialised committees within the Egyptian House of Representatives (HoR).¹⁴ Presidential decrees have the power of law. The Prime Minister, Ministers, and Governors have the power to issue decrees.¹⁵

Egypt is administratively divided into 27 Governorates, which are further divided into districts, followed by Shiyakhas. There are several public authorities, all of which fall under a governorate or ministry. All governorates (Govs) follow the Ministry of Local Development (MoLD).

Transport Strategy & Policies are made and monitored by the Ministry of Planning and Economic Development (MoPED). Present plans include the 'National Urban Development Framework' and 'Cairo 2052' for the GCR.

Transport-specific strategic plans are made and monitored by the Ministry of Transport (MoT). The MoT supervises several economic authorities. Operators include the ECM (Cairo Metro), ENR (Railways). Strategic Planning and Construction are distributed between the NAT (Metro and Tunnels), GARBLT (Roads), LTRA (Public Transport Operators), and ENIT (Planning and Training).

The Ministry of Housing (MoH) controls transport in the New Urban Communities (NUC) as it supervises NUCA (New Urban Communities) and the GOPP (Strategic Planning). NUCA recently started a new Transport Regulation Unit (TRU) to manage operations within the NUC's.

Some governorates each supervise Public Transport Operators: CTA (Cairo), ATA (Alexandria), and Monufia city. The CTA is responsible for the Greater Cairo Region metropolis. The Monufia operator exists but is inactive.

The Egypt Environmental Affairs Agency (EEAA)/Ministry of Environment (MoE) has part-financed the Sustainable Transport Project (STP) which focuses on public transport in Cairo and active mobility in secondary cities.

Roads are regulated through Law 84/1968 and Local Roads through Law 43/1979. Ride-hailing services are regulated through Law 87/2018. Road-based public transport service provision is limited to the state as per Law 124/1974, which can then give concessions to paratransit operators as per Law 55/1975.

¹² CAPMAS. *Egypt, Arab Rep. - Household Income, Expenditure, and Consumption Survey, HIECS 2018*. <https://www.capmas.gov.eg/Admin/Pages%20Files/2019123101612income1.pdf> (2019).

¹³ World Health Organisation. WHO Global Ambient Air Quality Database (update 2018). *WHO*. <http://www.who.int/airpollution/data/cities/en/> (2018).

¹⁴ Abdel Wahab, M. An Overview of the Egyptian Legal System and Legal Research - GlobalLex. *NYU Hauser Global Law School Program*. <https://www.nyulawglobal.org/globalex/Egypt1.html> (2019).

¹⁵ UN-Habitat. *Mapping the Legal Framework Governing Urban Development in Egypt*. (2015).

Component	Strategy & Policy	Planning	Regulation	Infrastructure	Operations & Maintenance	Financing
Public Transport	MoPED MoT	MoPED MoH/GOPP	MoT/LTRA	MoT, MoLD MoH/NUCA	Govs/CTA & ATA MoT/ENR & NAT Informal Sector	Public & private
Freight Trans (Land)	MoPED MoT	MoPED	MoT/LTRA	MoT	MoT Informal Sector	Public & private
Roads	MoPED MoT, MoH	MoH/GOPP MoT/GARBLT	MoT	MoT/GARBLT MoD, MoH, MoLD	MoT/GARBLT MoD, MoH, MoLD	Public
Traffic Management	Mol	-	HoR	Mol	MoLD/Govs	Public
Active Travel	-	MoLD/Govs	-	MoLD/Govs MoH/NUCA	MoLD/Govs MoH/NUCA	Public
Fuel/EV	MoERE/ MoPER	MoERE	MoTI MoE/EEAA	MoERE / MoPER	Public & Private	Public & private

Table 3: Matrix of Entities Involved in the Transport Sector

2.3 Where Are We Now?

A process of institutional reorganisation led to the creation of the Greater Cairo Transport Regulatory Authority (GCTRA) in 2012. Theoretically a progressive and a much-needed authority, it failed to develop in reality and was replaced through Law 93/2019 with the LTRA. The LTRA remains in a developing state and is yet to assume its responsibilities. Responsibilities overlap with existing operators (CTA, ATA), Governorates (which license informal paratransit services) and NUCA (which tenders out concessions for the NUCs).¹⁶ The gap in service provision led to the establishment of the Transport Regulation Unit (TRU) within NUCA, to regulate and contract hitherto non-existent formal services within the NUC's.¹⁷

Private motorisation is low by international standards (adjusting for GDP)¹⁸ and is increasing at ~7.5% annually: Private car registrations total around 4.7 million nationally¹⁹, with about half in the GCR. The motorisation rate is 1 in 10 households in Cairo. Private motorcycles and Tok-Toks are fast-growing.

Modal share figures are not collected regularly. The latest metropolitan figures for the GCR in 2010 were [26.5% Active Travel/23.6% Private Motorised/49.9% Public Transport].

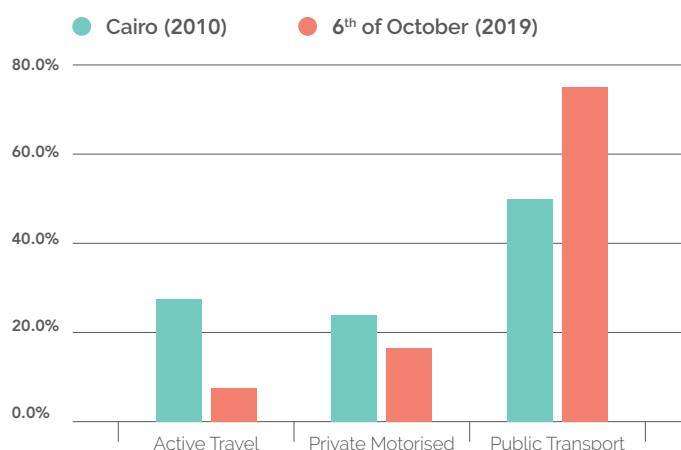


Figure 3: A Comparison of Transport Between Cairo & 6th of October

¹⁶ Hegazy, M. & Elnady, A. *Re-imagining our Streets: No new roads. Re-imagine existing Streets. Shift how we travel!* (Forthcoming).

¹⁷ Transport for Cairo. *Sustainable Urban Mobility Plan for 6th of October City Diagnostic, Scenarios and Vision* (Forthcoming). (2020).

¹⁸ Motor vehicles per 1000 inhabitants vs GDP per capita. *Our World in Data*. <https://ourworldindata.org/grapher/road-vehicles-per-1000-inhabitants-vs-gdp-per-capita> (2014)

¹⁹ CAPMAS. *Statistical Yearbook 2018*. https://www.capmas.gov.eg/Pages/Publications.aspx?page_id=5104&Year=23507 (2019)

Public Transport was split as [18.6% Metro & Rail/28% formal Bus/53.3% Paratransit].²⁰ More recent estimations for 6th of October show [6.5% Active Travel/16.1% Private Motorised/77.4% Public Transport], with Public Transport split as [4% formal Bus/96% Paratransit].²¹

The ENR provides rail service between cities, and transports significant numbers of passengers. Varying reliability, a relatively high number of highly mediated accidents and a stagnant development of network and capacity hampered development and led to decreasing modal share of inter-city travel. Law 20/2018 allows private sector participation in all aspects of railway service provision, and have been accompanied by substantial public investments to overhaul the network and modernise rolling stock.

Most other travel between cities is road-based and dominated by formal public bus operators, and concession-based informal paratransit microbus, as well as shared taxi services.

Public transport services within cities are dominated by informal operators. These lightly regulated 14-seater or 7-seater minibuses are driver-owned or organised by small single-digit fleets, and are called 'Paratransit'. 14-Seaters obtain route-based licences; 7-seaters qualify as private cars and operate semi-illegal but are often tolerated. Pick-up trucks provide services in industrial and rural areas. The GCR and Alexandria are the only two cities in Egypt with public bus operators, the CTA and ATA, respectively. The CTA licensed multiple private firms to provide services under concession.

Some policy interventions are significantly affecting mobility within and between cities:

- Significant fuel price hikes were implemented starting November 2016. At present, prices are regulated by a fuel pricing committee and adapted to international prices every three months.
- The currency devaluation of November 2016; which significantly increased vehicle prices in local currency.
- The removal of import-tariffs on European vehicle imports, which reduced vehicle prices in real terms.

New Transport projects affecting mobility within Cairo and Alexandria, and nationally:

- The ongoing overhaul of the ENR through new rolling stock, network and station upgrades.
- The ongoing Cairo Metro: Line 3 [13 stations operational/13 stations by 2022]; Line 4 planned.
- The planned Monorail: Western Line to 6th of October and Eastern Line to the Admin. Capital.
- The ongoing Light Rail Train (LRT) connecting northern Cairo with the Admin. Capital.
- The planned Bus-Rapid-Transit (BRT) connecting Giza with 6th of October.
- The planned Alexandria Metro project and ongoing Tram renovation project.
- The planned bike-sharing system in downtown Cairo and an ongoing limited pilot of bike lanes.
- The ongoing National Road projects, which includes 5000 km of new roads nationwide

New private sector entrants have expanded the (smart) mobility offering for citizens:

- Mwasalat Misr, offering high-quality bus services within Cairo, under concession from the CTA.
- Peak-only commuter services such as SWVL, Uber Bus providing app-based direct point-to-point services catering to a previously underserved upmarket clientele, within and between cities.
- Ride-hailing transport network companies (TNC) such as Uber, Careem and Halan (Tok-Toks).

Combined, these policy interventions, new public transport projects and expanded mobility offerings have significantly expanded options for commuters and travellers.

Electric Vehicles (EV) are an emerging national priority due to excess electricity supply, and Egypt's high renewable energy potential. Private sector companies are building an EV-Charging Station (EVCS) network nationwide, while public sector industrial organisations are discussing the possibility of locally producing EV's. A national strategy was recently commissioned but is still unpublished.

Natural Gas is a second national priority, due to an older successful scheme²² and the recent discovery

of vast reserves. The GoE recently announced a multi-year plan to replace private car and microbus engines powered by traditional fuels with dual-fuel engines.²³

Freight transport is prioritised in the planning and construction of new infrastructure: An ongoing restructuring of existing port management, construction of new dry-ports, freight-only rail lines, and terminals and maritime transport projects often intersect with other transport infrastructure, most notably in the overhaul of the ENR, and the National Roads Project (NRP).

Active Travel (Walking and Cycling) are deeply embedded in Egyptian culture, but are effectively disincentivised discouraged by public policies, and urban land use changes despite encouraging societal trends. The historically high-density of Egypt's cities make walking or cycling highly effective to travel, as shown by the high modal shares of Active travel in older districts of Cairo.

Public authorities are investing heavily in Car-Centric Streets within urban areas. Example: The recent construction of tens of flyovers in Eastern Cairo and increase of Level-of-Service of urban roads to become effectively urban highways, forming a safety hazard and disincentivizing Active Travel. Dedicated interventions promoting Active Travel are too little: The on-going construction of 1.5 km of dedicated bicycle lanes and a bike-share system in downtown Cairo are unlikely to change the trend away from Active Travel in light of the metropolitan level of weak enforcement of sidewalk standards and lack of sidewalk maintenance.

New Urban Communities increase distances travelled²⁴ and provide lower accessibility to jobs and services²⁵, diminishing the benefits of walking. Active travel levels in the NUC's are low²⁶, and difficult due to the Car-Centric Streets²⁷ which are dangerous-by-design for pedestrians and cyclists. Selected bike lane projects in the NUC's are failing to attract any ridership, as they do not provide adequate shading (a necessary component to travel long distances in arid desert climate), nor protection from nearby vehicles travelling at high speed.

During the COVID-19 pandemic and stay-at-home guidance, Active Travel increased significantly, as a physical activity, as well for commuting purposes. Bicycle demand increased and Car-Centric Streets were repurposed as public spaces²⁸. Lower air pollution and traffic levels invited citizens to Active Travel. A virtuous mobility cycle ensued. Egypt's young population and relatively moderate weather provide powerful prerequisites for high levels of Active Travel.

²⁰ El Araby, K. Urban Transport Issues in Egypt - JICA 2011 Update to CREATS. (2013).

²¹ Transport for Cairo. *Sustainable Urban Mobility Plan for 6th of October City Diagnostic, Scenarios and Vision (Forthcoming)*. (2020).

²² World Bank. Egypt: Scrapping and Recycling Old Vehicles to Lower Pollution and Improve Livelihoods. *World Bank*. <https://www.worldbank.org/en/news/feature/2018/10/25/egypt-scrapping-and-recycling-old-vehicles-to-lower-pollution-and-improve-livelihoods> (2018).

²³ Enterprise. How feasible is the plan to convert vehicles to natgas from gasoline on a national scale? *Enterprise*. <https://enterprise.press/stories/2020/07/22/how-feasible-is-the-plan-to-convert-vehicles-to-natgas-from-gasoline-on-a-national-scale-19437/> (2020).

²⁴ Hegazy, M., Kalila, A. & Klopp, J. M. *Towards Transit-Centric New Desert Communities in the Greater Cairo Region*. https://transportforcairo.com/wp-content/uploads/2019/07/EN_Transportation_Policy.pdf (2019).

²⁵ Hegazy, M., Kalila, A. & Mahfouz, H. *Multimodal network planning, identification of high capacity bus corridor and park and ride facilities*. (2019).

²⁶ Transport for Cairo. *Sustainable Urban Mobility Plan for 6th of October City Diagnostic, Scenarios and Vision (Forthcoming)*. (2020).

²⁷ Hegazy, M. & Elnady, A. Re-imagining our Streets: No new roads. Re-imagine existing Streets. Shift how we travel! (Forthcoming).

²⁸ UNDP. Egyptians return to cycling. UNDP <https://www.undp.org/content/undp/en/home/stories/egyptians-return-to-cycling.html> (2020).

Sector	Challenge	Evidence	Takeaway
Governance	Sector Organisation, or the governance framework organising the transport sector service provision, and future evolution	A multitude of public authorities organising transportation are siloed by mode, prohibiting true intermodal service travel. Metropolitan level public transport authorities failed (GCTRA) or are inactive (LTRA). No single authority plans strategically for urban transport, predicting capacity needs and desired modal share and pursuing them accordingly. ²⁹	Public Transport Authorities need to be activated at the metropolitan level. They should plan future capacity needs and take action to achieve desired modal shares.
Economic	Sector Employment, or the direct jobs and transport worker conditions within transport service provision	The public formal transit service provision by the ATA, CTA, ECM, ENR and other public operators are seen as overstaffed to the point of inefficiency. The primary dynamic driving informal paratransit service provision is employment generation under difficult working conditions. ^{30 31}	Meaningful and scalable mass transit solutions need to be designed around Egypt's high demand for new employment.
	Traffic Congestion, or the excess time spent to travel on roads compared to free-flow.	In the absence of right-of-way, congestion affects Active Travel: Public Transport Users and Motorists. Congestion increases air pollution, incurs economic costs, and lowers the quality of life. Congestion in Cairo alone in 2013 has been estimated to cost the Egyptian economy 8 billion USD annually. ³²	Road Congestion within cities is endemic, exacerbates accessibility issues and incurs high costs.
	Public Transport Capacity, or the congestion experienced during the use of Public Transport.	Cairo's Metro is the densest worldwide in terms of the ratio of passengers to the length of the network.	Lack of capacity in the public transport network affects everybody, as present users suffer and prospective users stay away.
Social	Gender Inequities, or the gender blind transport system design.	Fare structures, network design and personal safety systematically disadvantage women during Active Travel and Public Transport use.	(Hidden) mobility constraints affect women empowerment and equality.
	Road Fatalities, or death due to road accidents. Egypt has a high fatality rate due to road accidents.	Estimates for road accidents are 8000 – 27000 accidents per year. ³³ Deaths/million vehicles, which normalises road fatalities to the number of vehicles, would put Egypt in 9th place worldwide. ³⁴ The rate for Cairo is more than twice the national average and has recently surged due to new fly-over construction, and road widening projects. ³⁵	Low safety in travel hampers public transport use and active mobility, as travellers seek the door-to-door safety of private cars.
	Accessibility, or the ability to access work, educational and health opportunities within a reasonable commute time and cost.	The metropolitan Accessibility Index for the GCR is relatively low at 17.6%, and inequitable at a weighted GINI coefficient of 0.53%. Central Cairo & Giza (25%) provide much better accessibility than NUC's (0.2% - 5.7%). ³⁶ For comparison [Nairobi 28.5% - GINI 0.36%/ Cape Town 6.5% - GINI 0.63] ³⁷	Cairo's land use and public transit network does not connect its citizens well with job opportunities and is highly unequal, especially in the NUC's.

- ²⁹ Hegazy, M., Kalila, A. & Klopp, J. M. *Towards Transit-Centric New Desert Communities in the Greater Cairo Region*. https://transportforcairo.com/wp-content/uploads/2019/07/EN_Transportation_Policy.pdf (2019).
- ³⁰ Behrens, R., McCormick, D. & Mfinanga, D. An introduction to paratransit in Sub-Saharan African cities. *in Paratransit in African Cities* (2015). doi:10.4324/9781315849515-8.
- ³¹ Spooner, D. & Manga, E. *Nairobi Bus Rapid Transit Labour Impact Assessment Research Report*. (2019).
- ³² Spooner, D., Mwanika, J. & Manga, E. *Kampala Bus Rapid Transit: Understanding Kampala's Paratransit Market Structure*. (2020).
- ³³ Shawkat, Y. Cairo's New Roads: An Assault on Pedestrians and Mass Transit. *American University in Cairo - Alternative Policy Solutions Center*.
- ³⁴ BEO. Egypt Road Crash Deaths: The Basic Figures. *Built Environment Observatory BEO*. http://marsadomran.info/en/facts_budgets/2020/03/1929/ (2020).
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- ³⁶ Behrens, R., McCormick, D. & Mfinanga, D. An introduction to paratransit in Sub-Saharan African cities. *in Paratransit in African Cities* (2015). doi:10.4324/9781315849515-8.
- ³⁷ Spooner, D. & Manga, E. *Nairobi Bus Rapid Transit Labour Impact Assessment Research Report*. (2019).

Environmental	GHG Emissions, or gases that cause climate change	Egypt is the second-largest emitter of total Greenhouse gases (GHG) in Africa. Transportation contributes 48.3 Mt CO ₂ e or 15% and is the second-largest and fastest-growing emitter. ³⁸	Mitigating transport emissions provides the biggest cost-benefit to tackle climate change.
	Carbon Lock-in, or the long-term inertia of carbon emissions due to near-term investments in carbon-heavy infrastructure within the urban realm and the transport systems. ³⁹	The construction of NUCs is increasing distances travelled and permanently altering urban forms to more unsustainable patterns. The National Road Network projects and widening of streets within urban areas are increasing dependence on energy-intensive travel, which is at present entirely reliant on fossil fuels. ⁴⁰	Carbon intensive choices we take today make the transport transition tomorrow more difficult.
	Air Quality, or the effect of local air pollution on diseases and premature death. Egypt's air quality is the highest risk factor. ^{41 42}	Emissions from motor vehicles contribute about 26% of fine particulate matter (PM ₁₀) emissions, 90% of carbon monoxide (CO) and 50% of nitrogen oxides (NO _x) ⁴³ . Local diesel fuel is of low quality, causing excessive pollution. ⁴⁴	Low Air Quality disincentivizes Active Travel, and affects the poor disproportionately.

Table 4: Transport Challenges in Egypt

2.4 Where Do We Want To Be?

GoE Objectives: By 2030, the GoE envisions Egypt to have a “competitive, balanced, and diversified economy [...] based on justice, social integration, and participation [...] to achieve sustainable development and improve the quality of life for all.”⁴⁵ Egypt is internationally committed to progress towards the Sustainable Development Goals (SDG) and is a signatory to the COP 21 Paris Agreement.

Egypt's international commitments to tackle climate change⁴⁶ list as transport-sector targets:

- Passenger Transport: Increase modal share of the railways; increase the modal share of buses and paratransit, in addition to increasing the modal share of river travel.
- Freight Transport: Switch from road to rail and river transport.
- Roads: Improve road transport efficiency through reducing traffic congestion.

³⁸ Ortúzar, J. de D. & Willumsen, L. G. *Modelling Transport*. (John Wiley & Sons, 2011).

³⁹ Seto, K. C. et al. Carbon Lock-In: Types, Causes, and Policy Implications. *Annu. Rev. Environ. Resour.* 41, 425–452 (2016).

⁴⁰ Hegazy, M. & Elnady, A. *Re-imagining our Streets: No new roads. Re-imagine existing Streets. Shift how we travel!* (Forthcoming).

⁴¹ World Health Organisation. WHO Global Ambient Air Quality Database (update 2018). WHO. <http://www.who.int/airpollution/data/cities/en/> (2018).

⁴² Wang, H. et al. Age-specific and sex-specific mortality in 187 countries, 1970–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet Lond. Engl.* 380, 2071–2094 (2012).

⁴³ Heger, M., Wheeler, D. J. & Meisner, C. M. *Motor Vehicle Density and Air Pollution in Greater Cairo : Fuel Subsidy Removal and Metro Line Extension and their Effect on Congestion and Pollution?* 1–0 <http://documents.worldbank.org/curated/en/987971570048516056/Motor-Vehicle-Density-and-Air-Pollution-in-Greater-Cairo-Fuel-Subsidy-Removal-and-Metro-Line-Extension-and-their-Effect-on-Congestion-and-Pollution> (2019).

⁴⁴ CEDARE. *POLICY BRIEF: Cleaner Fuels for Cleaner Air: Towards cleaner, low-Sulphur Diesel Fuel*. (2019).

⁴⁵ Ministry of Planning. *Sustainable Development Plan - خطة التنمية المستدامة للعام المالي 2016/2017*. <http://mpmar.gov.eg/internal/internal/الخطة%20للتنمية%20المستدامة%20للعام%20المالي> (2016).

⁴⁶ The Arab Republic of Egypt. *Intended Nationally Determined Contributions of Egypt*. (2015).

Transport climate actions in the first assessment of current GHG emissions include:

- The Sustainable Transport Project (STP), implemented by UNDP and EEAA/MoE. It is estimated to save the equivalent of ~0.074 Mt CO₂ every year.
- The Cairo Metro expansions implemented by NAT/MoT. Line 2 and 3 are both estimated to save the equivalent of ~1.05 Mt CO₂ every year.

The ambitions of these climate actions are modest. They anticipate saving an estimated ~1.12 Mt CO₂ annually, which is less than the estimated annual growth of transport related GHG emissions. Total sector emissions will accordingly continue rising.

Total GHG emissions in passenger transport are a function of distance travelled, vehicle occupancy rate, vehicle energy efficiency and the fuel used. The choice of mode (Bicycle, Car or Bus) significantly affects these parameters.⁴⁷

The Paris Agreement requires net-zero global energy and land-use emissions by the second half of the century,⁴⁸ and its alignment with local development priorities. Three core strategies are proposed: Reduction of non-welfare enhancing demand for energy, improving energy efficiency, and decarbonising energy production.⁴⁹

The Deep Decarbonization Pathways (DDP) method proposes country-driven visions for sectoral transformation based on modelled backcasting from a net-zero emissions target to the present day.⁵⁰ Selecting short-term actions to pave the way for long-term technical, institutional, and behavioural changes is necessary, as the historical approach of making cheaper reductions first still leads to path dependencies and lock-in risks due to stranded assets.⁵¹

Information Box 1: Transport, GHG Emissions and Pathways to Achieving the Paris Agreement

Component	Present Assessment	Business-as-usual (BAU) Scenario	Future Vision
Distance Travelled	Urbanisation and population density in mixed-use historic cities and towns are high, leading to globally relatively short distances travelled.	NUC's massively increased distances travelled due to sprawling land-use, acting as commuter hubs to existing high-density employment districts and single-use zoning. ^{52,53}	NUC's effectively absorb new population; high-vacancy rates are massively reduced; behavioural changes towards local activities and tele-activities lead to a reduction in distances travelled.
Vehicle Occupancy Rate, Efficiency and Fuel. Modal Share	Egypt has developed an energy intensive ⁵⁴ and dirty ⁵⁵ transport sector (relative to its peers) due to decades of subsidised fuel.	The ongoing removal of fuel subsidies fixes market distortion. Increase in motorisation rates (Private cars, tricycles, motorcycles) lead to carbon-intensive suburban lifestyles.	Electrification inherently improves energy intensity and reaches mass adoption in the transit and private use sectors. Shift to Micro-Mobility vehicles for individualised passenger transport.
	Modal shares are heavily skewed towards collective transport and Active Travel in historic cities and towns. ⁵⁶	Modal shares in NUC's are highly reliant on motorised transport (incl. transit) with negligible levels of Active Travel ⁵⁷ . Private single-person cars are multiple the rate within historic cities.	Mode shift towards public transport and Active Travel. Smart technology improves service provision and load factors.

Table 5: Vision for a Deep Decarbonisation Pathway Compared to Business-as-Usual Scenario

Transport plays a significant role in achieving the SDG's and Egypt's international commitment to tackle climate change. To effectively do so, the sector should transition towards a socially inclusive, energy efficient and de-carbonised mobility system.

The Vision: Most trips are travelled on an electrified public transport system supported by high levels of Active Mobility. Private car usage would be reduced to a minimum and be part of a wider integrated multi-modal system. Private motorised transport would be electrified, and increasingly reliant on Micro-Mobility or travel using electric vehicles (E-Bikes, E-scooters, skateboards, etc.) that travel at speeds up to 25 km/h, and distances up to 10km.⁵⁸ A nationwide Electric Vehicle Charging Network would supply electricity generated from renewable sources.

The transition to the system would be mindful of the employment needs of present-day transport workers, which include hundreds of thousands of informal workers across multiple supply chains.^{59 60} It would manage the increasing capacity needs to cover new demand⁶¹ resulting from population growth, land-use changes and economic development, and unmet latent demand manifested through congestion. Citizens would be at the centre of the transition, which would aim to achieve zero-road fatalities and injuries, higher and more even accessibility scores across the metropolitan area and allow everybody to travel regardless of gender, age-group, income level or physical ability.

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- 47 Bataille, C. *et al.* Net-zero deep decarbonisation pathways in Latin America: Challenges and opportunities. *Energy Strategy Rev.* 30, 100510 (2020).
 - 48 IPCC *et al.* Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report. in (2018)..
 - 49 Bataille, C. *et al.* Net-zero deep decarbonisation pathways in Latin America: Challenges and opportunities. *Energy Strategy Rev.* 30, 100510 (2020).
 - 50 Bataille, C., Waisman, H., Colombier, M., Segafredo, L. & Williams, J. The Deep Decarbonization Pathways Project (DDPP): insights and emerging issues. *Clim. Policy* 16, S1–S6 (2016).
 - 51 Vogt-Schilb, A., Meunier, G. & Hallegatte, S. When starting with the most expensive option makes sense: Optimal timing, cost and sectoral allocation of abatement investment. *J. Environ. Econ. Manag.* 88, 210–233 (2018).
 - 52 Transport for Cairo. *Sustainable Urban Mobility Plan for 6th of October City Diagnostic, Scenarios and Vision (Forthcoming)*. (2020).
 - 53 Hegazy, M., Kalila, A. & Mahfouz, H. *Multimodal network planning, identification of high capacity bus corridor and park and ride facilities*. (2019).
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 - 56 El Araby, K. Urban Transport Issues in Egypt - JICA 2011 Update to CREATS. (2013).
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 - 59 Spooner, D., Mwanika, J. & Manga, E. *Kampala Bus Rapid Transit: Understanding Kampala's Paratransit Market Structure*. (2020).
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2.5 Short-Term Activities to Affect the Long-Term Impacts

The optimal short-term strategy to start a long-term emission-reduction process is to work on sectors with high investment needs, and where abatement capital is expensive.⁶² In Egypt, these would be the urban planning sector and NUC's, the Public Transport Sector, and the Car-Centric Streets. Priority should be given to sectors where a one-time investment leads to a persistent emission reduction over a long period, or in Egypt's case, stopping the rise in emissions at its present, still relatively low, level. Integrate sustainability into urban planning and NUC's: The land-use changes resulting from the shift to and design of new cities is increasing travel distances⁶³ and shifting travel to motorised modes⁶⁴, as well as increasing total energy demand. The Accessibility of captive riders is reduced,⁶⁵ and gender inequalities are embedded in the present-day informal network design.⁶⁶ *Priority should be given to limiting the overall land area of NUC's, to reducing rates of vacant housing increasing density rates and to ensuring behavioural changes towards local activities within the NUC's and tele-activities.*

Expand public transport capacity, improve quality, and shift travel: Formal high-quality modes of travel do not cover travel demand in the present, and current investments are not sufficient to cover future needs. The dominance of the informal paratransit sector, and reliance on the congested road network provides low quality service, which creates a powerful push to use private cars. *Priority should be given to increase investment in Public Transport to match demand, and in Active Travel infrastructure to cover the last mile. Technology and better management can improve the user experience (Passenger Information, Digital Ticketing), system efficiency (Multi-modal Integration, Network Optimisation, Schedule and Service Level Adherence), system equity (Targeted subsidies), and environmental impact (Clean fuels). Travel behaviour should be incentivised away from private cars towards transit and Active Travel.*

Transform Car-Centric Streets into Complete Streets: The current street-scape and current investments are incentivising private car usage and disincentivizing Active Travel, and by extension public transport use. This risks a long-term Carbon Lock-In as citizens invest in car-dependant lifestyles. *Priority should be given to re-appropriate urban street-space away from private cars into separated bus lanes and protected bike lanes, as well as re-designing streets for Active Travel safety and convenience. Micro-Mobility focused designs can help shift travel behaviour in the NUC's.*

2.6 Tying It All Together

Policy recommendations were chosen to cover all four components of the EASI-framework,⁶⁷ and all challenges mentioned in Table 2. Most policies focus on the Enable component, and involve closing knowledge gaps, investing in networks, and supporting stakeholders in launching new projects.

⁶² Vogt-Schilb, A., Meunier, G. & Hallegatte, S. When starting with the most expensive option makes sense: Optimal timing, cost and sectoral allocation of abatement investment. *J. Environ. Econ. Manag.* 88, 210–233 (2018).

⁶³ Transport for Cairo. *Sustainable Urban Mobility Plan for 6th of October City Diagnostic, Scenarios and Vision (Forthcoming)*. (2020).

⁶⁴ Seto, K. C. et al. Carbon Lock-In: Types, Causes, and Policy Implications. *Annu. Rev. Environ. Resour.* 41, 425–452 (2016).

⁶⁵ Hegazy, M., Kalila, A. & Mahfouz, H. *Multimodal network planning, identification of high capacity bus corridor and park and ride facilities*. (2019).

⁶⁶ Transport for Cairo. *Sustainable Urban Mobility Plan for 6th of October City Diagnostic, Scenarios and Vision (Forthcoming)*. (2020).

⁶⁷ Stucki, M. Policies for sustainable accessibility and mobility in urban areas of Africa. 1–140 <http://documents.worldbank.org/curated/en/467541468191641974/Policies-for-sustainable-accessibility-and-mobility-in-urban-areas-of-Africa> (2015).

#	E	A	S	I	Policy Recommendation	Challenges Targeted
1	Y				Support the creation of a nationwide urban transport strategy (distinct from national transport) and local sustainable urban mobility plans (SUMP) that commit to Deep-Decarbonization.	<ul style="list-style-type: none"> Sector Organisation
2	Y	Y		Y	<ol style="list-style-type: none"> Support the closure of the infrastructure gap through increasing public transport capacity and associated Active Travel infrastructure. Expand local understanding of different financing instruments,⁶⁸ through funding primary research on how such financing instruments can be applied locally. Target capacity building for practitioners on how to implement such mechanisms in ongoing or planned projects. 	<ul style="list-style-type: none"> Sector Organisation Sector Employment Traffic Congestion Public Transport Capacity Accessibility
3	Y		Y	Y	Support the identification of Intelligent Transport System (ITS) Interventions ⁶⁹ that can tackle local mobility problems and be realistically deployed, and increase public authorities' capacity to scope needs, budget for them, procure and manage them.	<ul style="list-style-type: none"> All
4	Y	Y	Y	Y	Involve local public and private actors in a collaborative process to discuss, design and encourage users' behavioural changes.	<ul style="list-style-type: none"> Gender Equities Road Fatalities
5		Y	Y	Y	Provide support for data collection and modelling, as well as policy design that can lead to specific bankable NAMA's.	<ul style="list-style-type: none"> GHG Emissions Carbon Lock-in Air Quality
6	Y				Provide support linked to the next NDC cycle (2025) aimed at including community developed NAMA's into the official NDC plan and coordinating with donors on accessing related green-financing.	<ul style="list-style-type: none"> GHG Emissions Carbon Lock-in Air Quality

Table 6: Selected Policy Recommendations for Egypt

⁶⁸ Ardila-Gomez, A. & Ortegon-Sanchez, A. *Sustainable Urban Transport Financing from the Sidewalk to the Subway: Capital, Operations, and Maintenance Financing*. (2016).

⁶⁹ Chen, Y., Ardila-Gomez, A. & Frame, G. Achieving energy savings by intelligent transportation systems investments in the context of smart cities. *Transp. Res. Part Transp. Environ.* 54, 381–396 (2017).

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Hazem Zureiqat, Director of Transportation at Engicon

Hazem Zureiqat is the Director of Transportation at Engicon, a regional multidisciplinary engineering consulting firm based in Amman. He is also a co-founder of Ma'an Nasel, a public transport advocacy group that recently launched Jordan's first public transport map and smartphone app. Hazem is active in the national transportation scene in Jordan. He has co-authored policy studies on the Kingdom's transport sector and writes regular columns in local media on matters related to public transportation.



Hazem holds a master's degree in transportation from the Massachusetts Institute of Technology (MIT). His areas of expertise lie in transportation engineering, planning, modeling, and economics. He has previously worked at the Greater Amman Municipality as the Head of the Transportation Economics and Modeling Division.

In addition to his work on transport, Hazem is the co-founder of Sowt, an Arabic-language podcasting platform, a member of the Executive Committee of the Taqaddam Platform, and a board advisor and former President of the MIT Arab Alumni Association.

3.1 Transport in Jordan at a Glance

Jordan consists of twelve governorates distributed among three regions; the northern, central and southern regions, with four governorates in each region. The capital city is Amman, which is located in the heart of the central region where the highest percentage (about 43%) of Jordan's population resides. The governorate of Irbid, located in the north, hosts the second highest percentage of population, and since its area is smaller than that of Amman, it has the highest population density in the Kingdom estimated at 1,130 capita/sq. km in 2015. The southern region has the lowest percentages of the population due in part to its arid nature.⁷⁰ Some general information about Jordan is also listed in Table 7.

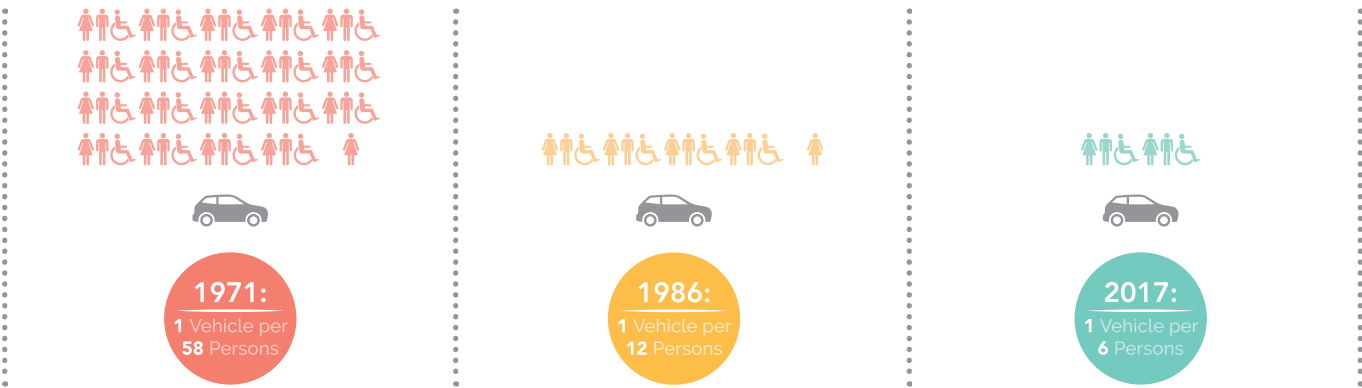


Figure 4: Persons per vehicle in Jordan

70 Jordanian Department of Statistics. Available: <https://www.dosweb.dos.gov.jo>

Classified as a middle-income country by the World Bank, Jordan faces challenges in many aspects. Given its location in a turbulent region, Jordan has been host to a large number of refugees from neighboring countries. This created significant pressure on the country's infrastructure and its economy in general. According to the World Bank, the Jordanian economy continued to experience sluggish economic growth in 2019, where the real GDP in three quarters of 2019 grew by 1.9% which is almost at the same level as in 2018. Unemployment rates continued to rise, reaching 19.1% in 2019 compared to 18.6% in 2018.⁷¹ Unemployment is especially high among youth and women. These economic challenges have had a ripple effect on many sectors in a country with limited resources.

Parameter	Value
Area ⁽¹⁾	89,341 km ²
Population ⁽²⁾	10,686,892
GDP per capita ⁽³⁾	4,130 USD
Registered Vehicles ⁽⁴⁾	1,583,458
Roads Length ⁽⁵⁾	9,810 km

Table 7: General Information about Jordan (Sources: (1) Royal Jordanian Geographic Center; (2) Jordanian Department of Statistics; (3) World Bank; (4) Drivers and Vehicles License Department, Jordan; (5) Ministry of Public Works and Housing, Jordan.)

Like other public services such as education and healthcare, transportation represents a key challenge to the growth of the Jordanian economy. The mobility system in the country is heavily dominated by private cars. This is due to several factors, among which is the lack of an efficient, reliable public transport system, as well as the lack of adequate infrastructure for greener modes of transport (such as walking and cycling). This long-established status quo has had detrimental effects across the board—from rising transportation costs for households to increasing economic, energy, and environmental costs at the national level.

3.2 Where Are We Now?

Car ownership rates in Jordan have increased almost ten times in less than four decades, reaching one vehicle per six persons in 2017 as shown in Table 2 and Figure 1. The increasing reliance on private cars has resulted in traffic congestion, especially in cities with the highest population densities, namely Amman, Irbid, and Zarqa. Some estimates put the public transport mode share at 33% nationally.⁷² In Amman, the most recent (although now outdated) household mobility survey in 2008 found that percentage to be 14% in the capital. The majority of public transport users are thought to be captive riders, having no other option for travel. The lack of a safe, efficient public transport system has also been cited as one of the main reasons behind the significantly low rate of female participation in the workforce, which stands at below 14%—among the lowest worldwide.⁷³ More than 47% of Jordanian women have declined a job offer due to the lack of safe, affordable and accessible public transportation availability. (SADAQA and FES, 2019, Gender and Public Transportation, available at <http://library.fes.de/pdf-files/bueros/amman/15221.pdf>)

Year	Registered Vehicles	Population (Millions)	Vehicles/100k Population	Vehicles Ownership Rate
1971	26,000	1.5	1,733	1 Vehicle/58 Persons
1986	232,361	2.796	8,310	1 Vehicle/12 Persons
2017	1,583,458	10.053	15,751	1 Vehicle/6 Persons

Table 8: Increase in Population and Number of Vehicles in Jordan with Time
Source: Annual Traffic Accidents Reports in Jordan, Public Security Department, 2017.

⁷¹ The World Bank, Jordan's profile. Available: <https://www.worldbank.org/en/country/jordan/overview>
⁷² Lina Shbeeb, "A Review of Public Transport Services in Jordan: Challenges and Opportunities", AL-Balqa for Research and Studies, Vol. 21 No. 1, Amman, 2018.
⁷³ The World Bank Data Bank. Available: <https://data.worldbank.org/country/JO>

There have been recent efforts to revamp public transport services in Jordan, especially in Amman. In 2019, GAM launched a new bus service called "Amman Bus" which, unlike other services that operate on a mostly commercial basis, runs on fixed schedules and according to specified service standards, it also caters to people with disabilities. Aside from a limited number of routes serving some public universities, the Amman Bus is considered the first standards-based, subsidized bus service in Jordan. A Bus Rapid Transit (BRT) system is also under construction. The system includes a 25km network within Amman and a 20km intercity corridor connecting Amman to neighboring Zarqa. Recent public statements have indicated that the BRT will begin operating in early 2022, ten years after the originally planned date of operation. Also, as part of a recent initiative funded by the World Bank, a Code of Conduct for public transport operators and users has been drafted and adopted by the Ministry of Transport.

Despite these efforts, many have called on the government to do more to enhance public transport services in the Kingdom. Recent studies have cited a lack of "political will", indicating that there needs to be change in the mindset across public agencies to transition towards a more balanced mobility system and to think of public transport as a public service. Another challenge often cited is the presence of multiple agencies (as indicated in the previous section), and perhaps more importantly, the lack of an integrated coordination framework among these agencies. (SADAQA and FES, 2019, Gender and Public Transportation, available at <http://library.fes.de/pdf-files/bueros/amman/15221.pdf>)

In addition to its impact on the economy and on household expenditures, the car-dominated mobility system has also negatively affected the environment, both in terms of air pollution at the local level, and GHG emissions at the global level. Locally, 50-90% of air pollution in Jordanian towns is caused by road traffic. Readings taken in 2007 by Jordanian researchers showed that levels of black carbon particles in the air were higher in urban areas (caused by vehicles and heating) than in industrial areas.⁷⁴ Air pollution in urban areas carries public health risks and also negatively affects people's ability to engage in more active mobility (such as walking and cycling).

As for the global environmental impact, according to Jordan's Third National Communication on Climate Change report submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in 2014, Jordan contributed about 28.72 Mt of CO₂ eq. of GHG to the atmosphere in the year 2006, where 72.9% of that amount were produced by the energy sector out of which 16.4% were produced by the transport sector. The report predicted the contribution of the transport sector to rise to 38% in 2020 and 43% in 2040. It should be noted here that Jordanian quality standards for fuel and exhaust emissions do exist, but there is limited monitoring and enforcement.

Jordan participated in the Paris Agreement in 2015, where the country committed to reducing emissions in 2030 by 14%, of which 12.5% is conditional on the support of donors and 1.5% can be achieved locally. These targets were reflected in Jordan's Nationally Determined Contributions (NDCs). Transport was identified as one of the key areas for intervention.

On that note, the adoption of hybrid and electric vehicles (EVs) has increased noticeably in Jordan. The value proposition for owning electric vehicles has become attractive for individuals, especially after tax and customs exemptions that the government granted for these vehicles. In 2018, the total number of registered electrical vehicles in Jordan was 16,000 according to a statement by the Minister of Transport at the time. Both the government and GAM have also replaced a portion of their own car fleets with electric vehicles.

Although promising, the EV sector in Jordan is facing several challenges. People are still reluctant to depend on EVs as their primary vehicles (many buy it as a second or third vehicle in a household). This is primarily due to what is known as "range anxiety", which is somewhat reinforced by the fact

⁷⁴ Jordan's Third National Communication on Climate Change report submitted to the United Nations Framework Convention on Climate Change (UNFCCC), 2014

that charging stations are not widely available. The lack of sufficient charging stations is partly due to existing regulations, which limit the margin private investors can make from these stations. The tariffs set by the government are just not considered viable for investors.

Furthermore, the lifespan of an EV in Jordan is limited by that of its battery, as replacing batteries is currently not an option in Jordan, given government restrictions on the import of batteries. There is anecdotal evidence of some local workshops offering battery replacement for EV owners, but those replacements have not been up to standard and have even caused safety hazards.

There are currently no electric buses or vehicles operating on Jordan's public transport fleet. With that being said, the Global Green Growth Institute (GGGI) recently carried out a study looking at the viability of using electric buses for the Amman BRT. GAM is also said to be considering using electric buses in the new fleet it plans to introduce to the "Amman Bus" service. It is still unclear how these efforts will materialize.

As for walking, Jordan generally has poor pedestrian infrastructure. Sidewalks in many cases are narrow or filled with obstacles like building materials, large trees, poles, or even tables in front of cafes and restaurants. In addition, there is a lack of safe pedestrian crosswalks in most areas. Although pedestrian bridges are sometimes provided, those are generally unattractive and viewed as being not safe. As a result of all this, pedestrians often have to walk on the streets and share the space with vehicular traffic, as well as crossing in a random and chaotic manner. With that being said, it should be noted that better pedestrian infrastructure can be found in some commercial areas or public parks. The latter, though, are not very prevalent, as they (specifically green areas) cover only 0.4%⁷⁴ of the area of the capital city of Amman, compared to the 10-20% recommended by the United Nations Environment Program (UNEP).

The challenges in pedestrian mobility stem from weak enforcement of sidewalk standards and lack of sidewalk maintenance (sidewalk construction and maintenance are the responsibility of private landowners). There is also weak enforcement of traffic laws, especially as they relate to pedestrian crossings.

Cycling, on the other hand, is not a common mode of transport in Jordan. It is largely viewed as a recreational activity. There is virtually no infrastructure for cyclists, and many see the hilly topography of cities such as Amman as a hindrance to adopting that mode on a wide scale. That perception may slowly be changing, especially with the rise of electric bikes, and the increased use of bicycles during the recent COVID-19 lockdown.

Sector	Challenge	Evidence	Takeaway
Governance	Sector Organisation, or the governance framework organising the transport sector service provision, and future evolution.	The presence of multiple entities involved in governing the transport sector with an evident lack of an integrated coordination framework among these entities.	The MoT should be empowered by the required tools in order to take the leading role and act as a lead agency to achieve an integrated coordination between the entities and set the standards towards achieving more sustainable mobility.
Economic	Traffic Congestion, or the excess time spent to travel on roads compared to free-flow.	With the continuous increase in the number of vehicles and the lack of a reliable public transport system, congestion in Jordanian cities, especially those with high population densities like Amman, Irbid and Zarqa, is increasing. This is resulting in higher costs, in terms of fuel and travel time costs. The economic cost of congestion in Amman was estimated to be around one billion JODs (\$1.4 billion) in 2015. ⁷⁵	Having a more balanced mobility system will have significant benefits not only in terms of travel, but also for the environment and the wider economy.
	Current Public Transport Modes are operated on a commercial basis.	Public transport vehicles often wait at their starting point until they fill up, rather than operating on a fixed schedule. There is a lack of incentives to operate on service standards, and the drive for operators is purely commercial.	A shift is needed towards contracts that rely on strict, measurable, and enforceable service standards.

	Lack of funds dedicated to improving public transport services.	Major improvements to public transport services are yet to be seen. As per the reports of MoT, plans aiming to shift towards a more reliable and green PT system do exist, but one of the main challenges is the lack of funds. ⁷⁶	Establishing a Passenger Transport Support Fund, as stipulated by law, is the first step towards achieving reliable and sustainable PT systems.
Social	Gender Inequities, or the gender-blind transport system design.	The absence of a safe and an efficient PT system has been cited as one of the main reasons behind the significantly low rate of female participation in the workforce which stands at below 14%. ⁷⁷	Gender issues need to be considered in all aspects of mobility planning and operations.
	Road Fatalities and Injuries due to road traffic crashes.	The year 2019 in Jordan recorded a total of 161,511 crashes, 643 fatalities, and 17,013 injuries. ⁷⁸	The absence of a reliable, affordable and safe PT system increases the exposure of Jordanians to private transit, and hence an increase in the risk of fatalities and injuries due to road traffic crashes.
	Accessibility, or the ability to access work, educational and health opportunities within a reasonable commute time and cost.	For many in Jordan, owning a car is the only way to reliably access work or educational opportunities (public transport lacks the necessary coverage and reliability). This is especially true for women. A recent study found that 47% of women surveyed turned down a job offer due to the lack of transportation options.	Mobility options should be provided in such a way that maximizes access to economic, social, and educational opportunities. This requires an integration of land use and transport planning across ministries and municipalities in Jordan.
Environmental	GHG Emissions, or gases that cause climate change.	Jordan contributed about 28.72 Mt of CO ₂ eq. of GHG to the atmosphere in the year 2006, where 72.9% of that amount was produced by the energy sector out of which 16.4% was produced by the transport sector. The contribution of the transport sector is predicted to rise to 38% in 2020, and 43% in 2040. ⁷⁹	Mitigating transport emissions through introducing green mobility would significantly reduce GHG emission in Jordan.
	Air Quality, or the effect of local air pollution on diseases and premature death.	The transport sector is the second largest contributor to emissions in Amman. ⁸⁰ 50-90% of air pollution in Jordanian towns is caused by road traffic. Readings taken in 2007 by Jordanian researchers showed that levels of black carbon particles in the air were higher in urban areas (caused by vehicles and heating) than in industrial areas. ⁸¹	Poor air quality has a detrimental effect on public health and also disincentivizes active travel or the use of greener transport modes.

Table 9: Transport Challenges in Jordan

- 74 A.Tomah, A. Abded and B. Saleh , "Assessment of the Geographic Distribution of Public Parks in the city of Amman", *European Journal of Scientific Research*, pp. 262 – 275, 2017.
- 75 The Jordan Times.
Available: <https://www.jordantimes.com/news/local/amman-gridlock-costs-motorists-jd1b-year-says-gam>
- 76 MoT Quarterly and Annual Reports.
- 77 The World Bank Data Bank.
Available: <https://data.worldbank.org/country/JO>
- 78 The Annual Road Traffic Accidents Report in Jordan 2019, Public Security Directorate.
- 79 Jordan's Third National Communication on Climate Change report submitted to the United Nations Framework Convention on Climate Change (UNFCCC), 2014
- 80 The Amman Climate Action Plan, A Vision for 2050 Amman, Greater Amman Municipality, 2019.
- 81 Atlas of Jordan, Air Pollution, Myriam Ababsa.
Available: <https://books.openedition.org/ifpo/5069?lang=en>

3.3 Governance and Legislation

The Ministry of Transport (MOT) is the entity responsible for setting the country's strategies in the transport sector. MOT's mandate covers various forms of transport infrastructure and services—land, air, and sea transport of both passengers and freight—with the notable exception of the national highway network, for which planning, construction, and maintenance fall under the Ministry of Public Works & Housing.

Planning and regulation of various passenger transport services, including public transport, is the responsibility of the Land Transport Regulatory Commission (LTRC), an independent government entity whose board is chaired by the Minister of Transport. For public transport and conventional taxis, LTRC plans and regulates all services in the Kingdom, with the exception of those that fall wholly within the Greater Amman Municipality and Aqaba Special Economic Zone regions.

Those services fall under the mandates of the Greater Amman Municipality (GAM) and the Aqaba Special Economic Zone Authority (ASEZA), respectively. Other passenger transport services, such as tourist transport and ride-hailing apps, are fully under LTRC, regardless of where they operate. Transport service provision is primarily carried out by the private sector—through companies or individual owner-operators.

The planning, construction, and maintenance of local roads are the responsibility of local municipalities. With the exception of GAM and ASEZA, municipalities are overseen by the Ministry of Local Administration, which also holds planning and regulatory functions.

Matters related to energy, fuel, and environmental standards in the transport sector fall under other entities within the government. These include the Ministry of Energy and Mineral Resources, the Energy and Minerals Regulatory Commission, and the Ministry of Environment.

Law enforcement on the Kingdom's roads is the responsibility of the Traffic Department. The department is part of the Public Security Directorate which, in turn, falls under the Ministry of Interior.

The entities listed above and the infrastructure and services that they oversee are governed by an extensive list of laws and regulations. The law regulating public transport is the Passenger Transport Law No. 19/2017.⁸² It identifies the responsibilities of the various entities involved in the sector and allows for the main regulatory entity (LTRC) to delegate some of its responsibilities to local authorities and municipalities, similar to what has been done in Amman and Aqaba. Details of service provision and operator and vehicle licensing requirements are regulated through bylaws and instructions issued in accordance with the law.

Table 10 summarizes the institutional framework governing the land transport sector in Jordan.

3.4 Where Do We Want To Be?

Jordanian cities should transition towards a more climate friendly, energy efficient, and socially inclusive mobility system. Public transport, walking, and potentially, cycling, should become viable options for travel, including for people who own cars. Reliance on private cars should be reduced, and a more

⁸² Land Transport Regulatory Commission.
Available: http://www.ltrc.gov.jo/sites/default/files/qnwn_tnzym_nql_lrkhb_lsn_2017_0.pdf

Component	Strategy & Policy	Planning	Regulation	Infrastructure	Operations & Maintenance	Financing
Public Transport	MoT	LTRC & GAM	LTRC & GAM	MoT, MPWH, LTRC, GAM, Mun.	Private	Private/Public
Freight Trans (Land)	MoT	LTRC	LTRC	MoT, MPWH & LTRC	Private	Private/Public
Roads	MPWH	MPWH & Mun.	MPWH & GAM	MPWH & Mun.	MPWH & Mun.	Public
Traffic Management	MPWH & GAM	MPWH & GAM	MPWH/GAM & MOI/PSD	MPWH & Mun.	MPWH & Mun.	Public
Active Travel	MPWH, MoLA & GAM	MPWH, MoLA & GAM	MPWH, MoLA & GAM	MPWH & Mun.	MPWH & Mun.	Public
Fuel/EV	MEMR	EMRC	EMRC	Private	Private	Private

MoT = Ministry of Transport; **LTRC** = Land Transport Regulatory Commission; **GAM** = Greater Amman Municipality; **Mun.** = Municipalities, including GAM; **MPWH** = Ministry of Public Works and Housing; **MoI** = Ministry of Interior; **PSD** = Public Security Directorate; **MoLA** = Ministry of Local Administration; **MEMR** = Ministry of Energy and Mineral Resources ; **EMRC** = Energy and Mineral Regulatory Commission.

Table 10: Summary of Entities Involved in the Jordanian Transport Sector

balanced and integrated multimodal mobility system should take place. Mobility should be treated as a basic right and should be made available to all segments of society, including women, people with disabilities, and others. As such, transport services should be affordable, and they should also be reliable. The lack of access to a private car should no longer hinder the ability of a Jordanian woman or man to get the education or employment she or he desires.

Vehicular transport modes—be they private or public—should shift to electric power using renewable sources. Electric charging infrastructure should be made widely available across the Kingdom.

The above vision is not inconsistent with what entities such as GAM have taken on in their long-term strategies. The Amman Climate Action Plan lays out an approach to creating a carbon neutral Amman while expanding services and meeting the needs of the rapidly growing city, as it sets an interim target of a 40% reduction of GHG emission in Amman by 2030 with the long-term goal being a carbon neutral Amman in 2050. One of the pillars of this action plan is enabling sustainable transport mobility and improving integrated planning for denser, transit-oriented development, and green infrastructure. What must be considered also, is behavioral change towards increased public transport use. The Amman Green City Action Plan also aims at raising the public transport modal share and shifting towards a sustainable and reliable public transport system.

3.5 Short-Term Goals/Low Hanging Fruit

Following are some measures that can be taken in the short-term to move closer towards the above vision for mobility and transport in Jordan:

- Utilize technology to improve the reliability of public transport services: Public transport services in Jordanian cities are fragmented, with over 80% of the fleet individually owned and operated. However, improving them is still manageable and easier compared to larger cities with complex, informal networks. Consolidating public transport operators has always been viewed as key to improving the service, and this is where technology can play an important role. Even with the current fleet, infrastructure, and modus operandi, low-cost technology solutions can help a great

deal in making public transport more reliable and therefore, more attractive. This can be done using simple tracking technologies and app-based platforms that allow users to have a better sense of departure/arrival times despite the lack of strictly enforced schedules. Electronic payments also allow for more transparent and more flexible fare structures.

- **Transition to electric vehicles for public transport:** With the BRT slated to begin operating in early 2022, and the new "Amman Bus" service expanding its scope, Jordan has a unique opportunity to introduce electric buses at a relatively wide scale. If this is not achievable in the short term due to issues related to charging infrastructure and financing, Jordan should consider utilizing smaller electric vehicles for local transport services, including those that may feed into the BRT.
- **Revisit the regulatory regime to encourage wider EV adoption:** Providing a tariff regime that encourages private investment in charging infrastructure will help a great deal in increasing EV adoption. Jordan should also look into solutions for battery replacement and also disposal including, potentially, establishing an EV battery recycling plant. Efforts could also be made to encourage adoption of other electrically powered vehicles, such as scooters.
- **Rehabilitate the Kingdom's sidewalks:** This is an ambitious action but one that can be easily implemented in the short term. What makes such an initiative especially timely is that it would (1) capitalize on the increased awareness on walking resulting from the COVID-19 lockdown, and (2) generate some economic activity for the construction sector (including architects and urban designers) in a time when the global pandemic has resulted in a slowdown. GAM and other municipalities should explore ways to accomplish this at a minimum cost and using locally sourced materials. Along with the rehabilitation, serious consideration should be given to sidewalk standards and how they are enforced and maintained in order to guarantee a safer pedestrian environment.

3.6 Long-Term Goals

Achieving the vision in the longer term will require efforts across multiple levels, namely:

Infrastructure: Provide the hard infrastructure needed to achieve the vision. This includes public transport systems, such as BRT and rail, pedestrian infrastructure, cycling lanes, electric vehicle charging stations, and so on.

Operations: Shift the operation of public transport services from the current, more commercial method of operation to one that is based on strictly enforced service standards. This will require adopting intelligent transport systems (ITS) solutions and revisiting the contractual frameworks that govern public transport operations. ITS, or technology-based solutions can vary from the simple vehicle tracking systems (mentioned above) to more sophisticated systems that allow for monitoring and enforcement of service standards.

Financing: Find (the Government of Jordan) long-term, sustainable sources of funding for public transport and climate friendly mobility. To that end, it is recommended that the government establish the Passenger Transport Support Fund, as stipulated in the Passenger Transport Law No. 19/2017. Such a fund could be financed through a gas tax, parking levies, and other sources. Furthermore, financing can be obtained as part of Jordan's efforts to reduce emissions in line with its NDCs. As mentioned earlier, 12.5 of the 14% reduction target Jordan set forth for 2030 is conditional on donor funding.

Governance: Revisit the institutional framework governing transport and mobility in Jordan, and an integrated coordination framework should be established among the different entities. Local

municipalities should play a larger role in implementing sustainable mobility solutions under a broader directive and set of standards from the MOT. The Ministry, in turn, should be empowered with the necessary tools to act as the lead agency for achieving the vision.

3.7 Tying It All Together

It is important to emphasize that achieving the mobility transition in Jordan will require simultaneous efforts on multiple tracks, as putting more emphasis on one track and disregarding others may produce unfavorable results. For example, shifting from conventional private vehicles to EVs may reduce emissions, but it would not, by itself, limit the increase in the number of cars and levels of traffic congestion.

As Jordan continues to improve conditions for expanding EV adoption (be they regulatory or other conditions), it must also work on building a more balanced mobility system, one in which public transport, walking, and, potentially, cycling become viable options for travel.

To that end, it is important to collectively consider national and municipal-level strategies related to transportation, urban planning, and energy when articulating the path forward for the transition and, as mentioned earlier, MOT can play a lead role in coordinating these efforts. The government and local municipalities should also think strategically and holistically in the actions it takes and in the projects it implements.

Tying together this holistic approach, as well as the long and short-term recommendations presented earlier, Table 11 presents a set of concrete policy recommendations, along with the objective of each recommendation in the context of the EASI framework.

#	Policy Recommendation	Objective
1	Create a national-level entity or committee under the Ministry of Transport to coordinate, drive, and empower the efforts of the various entities (national and local) involved in the mobility transition.	<ul style="list-style-type: none">• Enable guided local action
2	Establish clear national-level mobility transition strategy, as well as standards and specifications, codes of conduct, KPIs (e.g. walkability measures), and other relevant documents to ensure mobility transitions at the local level are consistent across municipalities.	<ul style="list-style-type: none">• Enable guided local action
3	Develop local urban mobility plans consistent with the national strategy, and ensure these plans are developed in a participatory manner, as well to be coupled with a detailed, implementable list of actions.	<ul style="list-style-type: none">• Enabling guided local action• Avoid carbon-lock in• Shift users' mode choices• Improve existing services
4	Establish the Passenger Transport Support Fund and utilize it to create an integrated, cross-modal subsidy mechanism to encourage the shift towards greener mobility choices.	<ul style="list-style-type: none">• Enabling guided local action• Avoid carbon-lock in• Shift users' mode choices
5	Build capacity and establish technical foundations for open data and open systems architecture; this involves creating an environment in which technology can be utilized to generate local solutions to mobility challenges, enhance the quality of (and thus encourage the transition to) greener mobility options, and ensure interoperability and integration among solutions.	<ul style="list-style-type: none">• Enabling guided local action• Avoid carbon-lock in• Shift users' mode choices• Improve existing services

Table 11: Selected Policy Recommendations for Jordan

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Acronym	Description
BMR	Beirut Metropolitan Region
BRT	Bus Rapid Transit
ESIA	Environmental and Social Impact Assessment
CDR	Council for Development and Reconstruction
CEDRE	Conférence économique pour le développement, par les réformes et avec les entreprises – Economic Conference for Development with Reforms and Enterprises
DGLMT	Directorate General of Land and Maritime Transport
DGRB	Directorate General of Roads and Buildings
DGU	Directorate General of Urbanism
GDP	Gross Domestic Product
GHG	Greenhouse Gas
MOF	Ministry of Finance
MOIM	Ministry of the Interior and Municipalities
MPWT	Ministry of Public Works and Transport
MUNI	Municipalities
OCFTC/RPTA	Office des Chemins de Fer et des Transports en Commun Railway and Public Transport Agency
TAVMA	Traffic and Vehicle Management Authority
USD	United States Dollar

4.1 Transport in Lebanon at a Glance

Lebanon is a small country with more than 1.5 million of its approx. 6-7 million inhabitants residing in Beirut, its capital and main city. The most densely populated city in the country, Beirut is also the hub for most economic, financial, administrative, educational and leisure activities. Presently, the whole country is suffering from worsening transport conditions, and is in vital need of solutions. In addition to the highly congested cities, other factors have exacerbated transportation problems in Lebanon, such as the high number of Syrian refugees amplifying existing problems in the system after 2011, the economic crisis that was slowly building up to reach its worst state yet this year with the collapsing currency, businesses shut down, prices for basic goods skyrocketing, as the threat of hunger is looming for the poorest people, and the escalating political tensions, mainly fed by the people's distrust of the government and their claims of its growing ineffectiveness as a primary reason for the economic crisis.

The urbanization rate in Lebanon is around 87%, with the economic and social weight mainly being in urban coastal agglomerations, such as Beirut, Tripoli, and Saida. Historically, urbanization in Lebanon was affected by the interplay of global and national factors that gave Lebanese cities (particularly Beirut) the economic and political prominence to become a population magnet. The central urban area around Beirut (BMR) concentrates more than 50% of the population, as it also represents a predominant share in the production of wealth. It also has a very high level of motorization, indicating a transport system quasi-monopolized by private cars.⁸³ The road infrastructure is increasingly reaching the limits of its capacity or even complete saturation in some areas, especially in the BMR. But this urbanization process was done with little to no consideration for probable environmental impacts, violations of the public maritime domain, and other criteria. This negligence left the Lebanese urbanization with challenges and hindrances requiring radical solutions and serious efforts from all parties involved, in order to improve the status quo.

Parameter		Value
Area ⁽¹⁾		10,452 km²
Population ⁽²⁾	Lebanese	4,680,212 (2019 est.)
	Syrian refugees	948,849 (2019 est.)
	Palestinian refugees	476,033 (2019 est.)
	Iraqi refugees	14,322 (2019 est.)
	Unregistered	736,584 (2019 est.)
	Total	6,856,000 (2019 est.)
GDP ⁽³⁾		54.96 billion USD (2018)
Registered Vehicles ⁽⁴⁾		2,001,200
Roads Length ⁽⁵⁾	Classified (under MPWT)	6,380 km
	Municipalities & Local Authorities	15,325 km

Table 12: General Information about Lebanon

4.2 Governance and Legislation

Several actors are supposedly involved in the land transport regulation and management. Laws and decrees determine the prerogatives of government bodies, not without contradictions and possible conflicts. These actors at national and urban levels are the Ministry of Interior, the Ministry of Public Works and Transport, the Municipalities, and the RPTA.

Government: As shown in the table below, responsibilities and prerogatives are quite disseminated among several authorities and agencies, lacking coordination and allowing for overlapping and conflicts.

83 Nahas, C., Semaan, R., Wehbe, R., & Wehbe, R. (2016). *Rapport Diagnostic sur la Mobilité au Liban*. Beirut.

Mode/Function Process	Policy & Regulation	Project Planning, Preparation & Implementation	Financing	Operation Management	Maintenance Management	User Information
Roads	DGRB	DGRB - CDR MUNI	MOF CDR		DGRB	
Traffic Management	TAVMA DGRB		MOF - CDR	Muni.	Muni.	MOIM TAVMA
Parking	DGU	TAVMA		MOIM TAVMA	MOIM TAVMA	MOIM TAVMA
PT	DGLMT	OCFTC	OCFTC MOF	OCFTC	OCFTC	
ParaTransit	DGLMT					
Urban Transport	DGLMT					
Vehicle Registration	MOIM TAVMA					MOIM TAVMA
Rail Transport	DGMLT OCFTC	OCFTC				

MOF = Ministry of Finance; MOIM = Ministry of Interior and Municipalities; DGRB = Directorate General of Roads and Buildings; DGLMT = Directorate General of Land and Maritime Transport; DGU = Directorate General of Urbanism; MUNI = Municipalities; CDR = Council for Development and Reconstruction; TAVMA = Railway and Public Transport Agency; OCFTC = Traffic and Vehicle Management Authority

Table 13: Summary of Entities Involved in the Lebanese Transport Sector

Non-Governmental Organizations (NGOs)

Efforts to implement new transport projects and organize the current mobility in Lebanon are not only made by the public sector and private companies, but also by non-governmental organizations seeking to share their expertise and knowledge to ensure the improvement of the transport sector. With the new investments planned for the revitalization of Lebanon's road networks (such as CEDRE), several initiatives were launched to gather expertise from different transport stakeholders and academics in order to promote a "sustainable transportation plan" to be presented to the government.⁸⁴ Nevertheless, in reality, NGOs' activities might succeed in blocking or cancelling some controversial projects but not in imposing a sustainable vision for the transport sector, which requires consistency, the ability to act, as well as determination from decision makers.

4.3 Where Are We Now?

Current Transportation Conditions

The general context was aggravated after the 15-year civil war in Lebanon (1975-1990), not only because of direct impacts (damages to the cities' infrastructures and networks; cessation of rail transport), but also due to the cumulative lack of investment and regulations in favor of alternative modes. Whereas, even during the hostilities (1975-1990), a railway service was still operating between Jbeil and Beirut, and a bus line linked Beirut Airport to some central districts, such as Barbir, Cola, and Hamra.

⁸⁴ Lewis, E. (2019, February 22). NGOs lobby the government on public transport. *The Daily Star*.

Continuous economic and political struggles prevented the implementation of a sustainable, efficient transport system and connected infrastructure. In fact, the whole transport system is problematic at its roots; since 1990, all major investments in infrastructure and services have been focused on roads, thus favoring private cars over urban space and public transportation / non-motorized forms of transportation. These policies, combined with users' complacent behavior, have led to unsustainable conditions in terms of accessibility, mobility, environmental effectiveness, and opportunities for multimodality in Lebanon. The current predominance of private cars (annual growth rate in car ownership) is due to several interrelated factors, which are the unreliable public transport system, the disorganized urbanism, and low constraints on individual motorized modes. It results in an ever-increasing level of congestion, and a mobility crisis that has turned into a daily ordeal for commuters, and a significant safety issue for pedestrians.

The modal share in passengers' mobility within the Greater Beirut area shows the current high part of private modes (around 80% of trips use private cars).

Furthermore, the current public transport's low revenues, along with the absence of organized and efficient management methods have led to a dangerous competition between the available public transport modes for economic survival. This impacts the level of service and lowers traffic safety (accidents, crashes, etc.), as it results in conflicts between drivers taking risks to get clients, which automatically jeopardizes other pedestrians, vehicles and passengers. One of the direct impacts of the growing urbanization is on the country's modal share. In Lebanon, transportation mainly relies on private passenger cars. The table below shows the number of vehicles by type and its evolution between 2008 and 2013.

2008		2010		2013		%
Vehicles by Type	Number	Vehicles by Type	Number	Vehicles by Type	Number	2008 - 2013
Private Cars	1,063,979	Private Cars	1,225,428	Private Cars	1,409,550	32.5% ↗
Public Cars (Taxis/Service)	13,211	Public Cars (Taxis/Service)	22,793	Public Cars (Taxis/Service)	24,027	81.9% ↗
Trucks	130,121	Trucks	196,865	Trucks	189,208	45.4% ↗
Buses	10,796	Buses	16,040	Buses	12,013	11.3% ↗
Motorcycles	197,454	Motorcycles	219,490	Motorcycles	360,396	82.5% ↗
Other	4,261	Other	7,092	Other	6,006	40.9% ↗
Total	1,419,822	Total	1,687,708	Total	2,001,200	41% ↗

Table 14: Vehicles by type and number (2008, 2010 and 2013)

The table shows a 41% increase in the number of registered vehicles within 5 years (2008 to 2013); which is considered extremely high in comparison to the global growth rate. This generated pressure on the physical networks and transport modes, increasing congestions, bottlenecks, and aggravating mobility and zones accessibility issues. It also further exacerbated congestion problems in most cities. It is, however, somehow expected given the unavailability of efficient alternate transport modes.

Taxis and shared-taxis, operating freely with no specified routes, are the dominant mode of public transport, even though taxis are 'normally' not considered public transportation. Due to the lack of large buses and operators, shared taxis, small busses and vans are considered public transportation in the Lebanese context, in addition to pseudo-organized small and medium buses/vans within some mini-networks or recurrent services/routes. The rapidly increasing urbanization allowed their number to grow substantially (by 81.9%), mostly because of public buses' inefficiency. While the cost of riding a freely-operated taxi-service (that has no specified routes) is relatively low, and the chances of finding one are high (especially in Beirut), this system is not flawless. The fierce competition among drivers leads to continuous and unpredictable stopping to pick up passengers, causing additional traffic congestion, the deterioration of road safety, and increased stress for other vehicles and non-motorized transportation modes.

The civil war that has marked Lebanon's recent history, combined with current internal tensions and regional conflicts are still affecting socio-political relationships and straining all levels of national life, including the country's mobility and transport systems. It also affects several international and national institutions, such as ministries, the parliament, embassies, and certain personalities' residences, whose security requires closing entire districts of several hectares to traffic.⁸⁵

Political tensions have hindered the implementation of many studies and transport plans, whether for financial, economic or other reasons. In addition, the economic and political crisis in Lebanon since October 2019 resulted in the delay of many projects' implementation. In theory, the government's core sectoral responsibility is the provision of transport facilities and infrastructure through the control of policies, strategies, and the implementation process.⁸⁶ The reality is unfortunately different.

Transport Emissions and Their Effect on the Environment

The transport sector has caused an increase in greenhouse gas emissions by a factor of 3.9, reaching 6.1 million tons of CO₂ eq. in 2013, which represents 23% of Lebanon's GHG emissions. This is mainly attributed to the ever-increasing number of registered vehicles in Lebanon (cars run with fuel 95/98 octane; and all small and large trucks with diesel). In addition, the transport sector also contributes to the greenhouse effect, by causing 61% of NOx emissions, 99% of CO emissions and 65% of NMVOCs. Moreover, fuel combustion for energy production is the main emitter of SO₂, with 94% of emissions, mainly caused by the Sulphur content in burnt fuel.⁸⁷ There are many effective and sustainable solutions that can decrease greenhouse emissions, and thus increase environmental benefits. Although Lebanon is highly dependent on petroleum-run private vehicles and taxi/services for transportation, some alternatives to decrease gas emissions could be:

1. Public transportation, which would not only save substantial amounts of money annually, but also provide significant environmental benefits. PT can be eco-friendly if it is sustainable, updated and well maintained, since old vehicles generally use more gas and therefore cause more emissions
2. Biking/walking (provided that pedestrian facilities are available) do not cause any gas emissions and would therefore be an eco-friendly solution.

⁸⁵ Nahas, C., Semaan, R., Wehbe, R., & Wehbe, R. (2016). *Rapport Diagnostic sur la Mobilité au Liban*. Beirut.

⁸⁶ United Nations Development Programme. (2018). Institutional Capacity Development of the Railway and Public Transportation Authority, Lebanon: United Nations Development Programme.
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⁸⁷ MoE. (2017). Greenhouse Gas Emissions.
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3. Carpooling would result in fewer numbers of vehicles on roads, less congestions, and decreasing emissions.
4. Electric vehicles (EVs) offer a low-carbon alternative to gasoline-powered vehicles.
5. Choosing the least-polluting, most efficient vehicles; for example, switching from a vehicle that makes 8.5-km/l to a vehicle that makes 10.5- km/l reduces greenhouse gas emissions by 1.7 tons annually.
6. The ESIA (adopted in 2012) assesses and predicts potential adverse social and environmental impacts, as it also develops suitable mitigation measures. The ESIA approach is now widely used as a tool in decision-making and mitigation of projects' impacts at a preventive stage.

Proposed Reforms

In order to improve the public transport supply in Lebanon, and encourage a shift from private cars to more sustainable transport modes, several projects or actions were suggested, but are still not implemented nor fully endorsed:

- Removal of fake public transport license plates, and prevention of illegal competition.
- A Bus Rapid Transit system between Beirut and Tabarja, BRT lines within Greater Beirut, and the construction of a bus network system with terminals in Greater Tripoli.
- A Mass Transit System Feasibility Study along the existing Rail Corridors for the Greater Beirut area.
- The Greater Beirut Urban Transport Project (BRT/Feeder Buses).
- A Bus Rapid Transit system between Beirut and Sidon and BRT lines within Greater Beirut.
- Restoration of the Railway services.

Moreover, several institutional reforms and programs were drafted by the Lebanese administration, with partial support from international agencies in some cases (Proposed Laws in 2002 and 2005). In reality, however, these efforts have gone in vain as no changes in the current land transport laws were ratified, and existing regulations that could be in favor of a more balanced transport system are not enhanced or enforced (i.e. land network hierarchy; verbalization of falsified license plates; implementation of urban strategic mobility plans, mainly in Beirut and Tripoli). The main reason for not implementing any changes is the conflict of interest between companies and politicians, resulting in the deviation of investments in the transport sector predominantly to roads, and neglect of the public transport sector. Furthermore, regulations on vehicle registration, taxation and fees for space use are still in favor of individual modes.

4.4 Where Do We Want To Be?

Clearly, transport conditions in Lebanon are in dire need of rehabilitation and improvement within a general vision aiming to increase the public transport share and the enhancement of non-motorized modes. Unfortunately, no noticeable change will be seen in the near future; but immediate steps towards that goal should be taken, with total transparency and commitment from all parties involved. Infrastructure acts as an inter-reliant support system for cities, and is vital to public and economic life. Infrastructure development is a prerequisite to economic growth and livelihood improvements for Lebanon's population.

The country would greatly benefit from a higher modal share for public transport, a progressive reduction in the number of new vehicle registrations, replaced with alternative transport methods, such as buses and the BRT. Supporting and improving mobility systems, such as the pedestrian environment, can pave the way for the success of the proposed projects.

4.5 Short-Term Goals/Low Hanging Fruit

The transportation system in Lebanon, with road congestions causing stress, pollution and wasted time and fuel, requires rehabilitation. As mentioned earlier, there are many studies and projects that could be implemented to ensure a more sustainable mobility. In order for these projects to work, and prior to any implementation, important steps should be taken:

- Enforce transparency from all concerned parties, since transportation projects' primary goal should be to improve people's lives.
- Involve all stakeholders.
- Include strong political control or sponsorship, clear objectives and leadership during implementation and operation.
- Support with clear guidance from the central government, including appropriate strategic interests and predictability.
- Implement coherent and transparent procurement and funding procedures at the appropriate time.
- Provide a strong financial structure.

4.6 Long-Term Goals

Lebanon has all the capabilities for adopting a variety of transport modes but, as mentioned earlier, its economic and political problems since the civil war, left it highly dependent on private cars. Many other modes could be implemented for a more balanced modal share, including:

Integrate non-motorized transportation into transport and urban design plans

Non-motorized: The advantages of integrating non-motorized transport modes:

1. Outdoor air pollution can be vastly reduced.
2. Non-motorized transport modes help reduce congestion. Bicycles take up less than a third of the space for a vehicle, and pedestrians take up around a sixth.
3. Health benefits from exercising (cycling for 30 minutes a day reduces the chances of cardiovascular diseases and diabetes by 50%).
4. Favoring social equality and addressing poverty through cheap, fast, and reliable transport opportunities; and public space development directed towards all segments of society.
5. Noise reduction.

Specific plans for major cities (Beirut, Tripoli, Saida, and Zahlé) were drafted and endorsed by related municipalities, and funding was prepared. However, implementation is not engaged yet but could be expected to start in 2021 within a whole national reform.

Railway: The advantages of rehabilitating the railway network:

1. Less congestion on the roads with people shifting from car/taxi to trains.
2. Employment: a new railway network would create significant direct and indirect jobs.
3. Railways are a very sustainable PT mode, implementing an efficient railway system would decrease toxic gas emissions and thereby positively affect the environment.
4. Favoring cross-cultural and economic exchange by relinking the French port of Marseille to the port of Beirut, thereby reconnecting the Levant region to Europe with a new railway open to Southern Europe and North Africa via the ports of Beirut and Tripoli (10).

Although there are plans to revive the rail transport sector in Lebanon, the build-up cost would be considerably high. Significant parts of the right-of-way are occupied by activities or roads, and therefore reclaiming them for railway service would require a reorganization plan and a related budget. Feasibility and detailed studies were performed, but required the government's final approval, as well as the preparation of land acquisition and resettlement plan. Also, the whole funding must be negotiated with international financial institutions.

Implement a Bus Rapid Transit (BRT) Project: The advantages of implementing a BRT network on the corridors:

1. Travel Time Savings; BRTs have dedicated bus lanes that separate them from mixed traffic, allowing them to travel more quickly.
2. Traffic Safety Improvements; implementing a BRT system reduces traffic crashes and fatalities by decreasing the number of drivers on the road, thus creating a safer transport environment for drivers, pedestrians, and cyclists alike; by limiting interaction between buses and other vehicles, thus minimizing the risk of traffic crashes, as it would also result in diminishing on-the-road competition with other vehicles.
3. Greenhouse Gas (GHG) Emissions Reduction; the BRT reduces the overall number of vehicle/kilometers traveled as commuters shift to high-capacity buses. Fewer vehicles transporting the same number of passengers would reduce traffic congestion, and provide the opportunity to replace older, more polluting vehicles.

Reorganize the current Bus System: The advantages of rehabilitating the current public transport system:

1. Less congestion: buses allow a higher density and increase the roads' passenger capacity while relieving vehicular congestion.
2. Promoting physical activity; walking to and from bus stops.
3. Cost effective; bus tickets are relatively cheap, and commuters would save money otherwise spent on parking and gas.

Rehabilitation of the currently unreliable public transport system (unorganized schedules for drivers and passengers, no maintenance or control) is an issue that must be addressed immediately, as sustainable transportation, including active mobility, public transportation and electric vehicles improve not just transport conditions but also air and space quality, the environment, as well as economic chances, etc. The implementation of a reliable and sustainable public transport system, along with efforts to make cities walkable, would significantly improve transport conditions, especially in Beirut and its suburbs.

4.7 Tying It All Together

#	Policy Recommendation	Objective
1	Implement immediate actions for short and long-term changes.	Reaching and implementing sustainable, effective solutions for the transport sector
2	Establish an efficient institutional framework.	Addressing the governance issues (legal level)
3	Direct public and private investments in a transparent and sustainable way (funding).	Limiting private cars' predominance and increasing the Public Transport System's share
4	Integrate alternative transport modes (non-motorized; mass transit means).	Improving the urban space quality (spatial level)
5	Increase political will (at local and national levels) and transparency in procedures and procurements.	Effectively planning the priorities; elaboration of indicators and monitoring system; preparation of adequate budgeting

Table 15: Selected Policy Recommendations for Lebanon

Despite both public and private awareness of the ever-worsening transportation conditions in Lebanon, no real comprehensive vision or strategy has yet been developed. The focus has only been so far on small scattered projects that lack interconnectivity or noticeable long-term effects. This is mainly due to government obstacles (whether political, economic, or topographical), and challenges in space management (with clusters of uncoordinated buildings, especially in the cities, hindering the reorganization of infrastructure). There is also a problem at the level of local authorities in their lack of efficient financial management and coordination between various government institutions.

Despite the numerous challenges and barriers facing the transport sector in Lebanon, immediate action should be taken for both short and long-term changes, because the 'do-nothing' option will most definitely lead to more problems. This country has the required knowledge and skills to slowly turn the circumstances around and, ultimately, reach and implement sustainable, effective solutions. The primary challenges for the coming period will be at four major levels:

Legal: Establishing an institutional framework to address governance issues.

Funding: Directing public and private investments towards limiting private cars' predominance and increasing the public transport system's share.

Spatial: Improving the urban space quality by implementing alternative modes (non-motorized and mass transit means).

Socio-economic: Affordability of services should be secured; all users categories should have adequate accessibility and mobility.

A general vision and proposed orientations were already drafted in previous studies that can readily be used for planning the much-needed changes. What is actually missing is the political will (at local and national levels), as well as more transparency in procedures and procurements.

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Sameer served as an Advisor in the Ministry of Planning since 1994, Prior to becoming the Minister of Planning in two governments. He also served as the Acting Minister of Finance, and Acting Minister of Education and Higher Education.

5.1 Transport in Palestine at a Glance

Mobility in Palestine, on the inter-region and inter-city levels, is restricted due to the constraints imposed by the Israeli authorities. Palestine comprises the two geographically separated regions of the West Bank and Gaza Strip as shown in Figure 6. After about 27 years of the Israeli occupation, the Palestinian National Authority (PNA) was established on parts of these two regions in 1994 as a result of Oslo Peace Accords of 1993. The Israeli army withdrew from the Gaza Strip in 1995, while still controlling most of the West Bank. The PNA became partially in charge of the civil matters, including roads, transportation and traffic affairs. General information on Palestine is listed in Table 16.

The Oslo Peace Accords divided the West Bank into three areas; Areas A, B, and C, where each was given a different administrative status. Area A is exclusively administered by the PNA; Area B is administered by both the PNA (for the civil matters) and Israel (for the security matters); and Area C, which contains limited Palestinian population, mostly Israeli settlements and the major national and regional



Figure 5: A map showing Palestine with the two regions of the West Bank and Gaza Strip and their internal transport routes

road corridors, is solely administered by Israel. Therefore, the Palestinians control the urban and most of the rural built-up areas (Areas A and B) comprising about 40% of the West Bank area, and the Israelis control most of the rural areas (Areas C) and East Jerusalem, comprising about 60% of the West Bank areas. They control planning, implementation, and monitoring of roads and transportation in these areas. Additional challenges include the separation wall extending for about 760km, surrounding and isolating many Palestinian communities, and severely restricting mobility as well as access to land and water resources.

Parameter	Value		
	West Bank	Gaza Strip	Total
Area ⁽¹⁾	5,660 km ²	365 km ²	6,025 km ²
Population ⁽²⁾	2,953,943	1,961,406	4,915,349
GDP per capita ⁽³⁾			3,177 USD
Registered Vehicles ⁽⁴⁾	254,497	74,253	328,750
Roads Length ⁽⁵⁾	3,400 km	297 km	3,697 km

Table 16: General Information about Palestine

Palestine is classified as an upper-middle income country by the World Bank. GDP growth rate was 0.9% in 2018 compared with 2017. The transportation sector contributed 1.8% only to the GDP, indicating economic distortion and the challenges facing the sector. About 77% of the Palestinians live in urban areas, 15% in rural areas and 8% in refugee camps. The major urban areas are East Jerusalem, Gaza City, Nablus, Ramallah/Al-Bireh, and Bethlehem.

Connection of the West Bank with Jordan is only through King Hussein Bridge on River Jordan. The besieged Gaza Strip's only connection is with Egypt through the Rafah border crossing, which remains closed for the most part. New transportation facilities were constructed to link Palestine with the outside, including Gaza International Airport, and Gaza Seaport. However, in 2001 the Israeli army destroyed the airport after three years of operation, while the site designated for the construction of the seaport was destroyed also in 2001 before construction, when the site was prepared for construction. The Israeli authorities still control the borders with the neighboring countries.

The split of management of the components of the transportation system between the Israeli authorities and the PNA reflects badly on the status of the system components, and results in the creation of a dual transportation system.

5.2 Governance and Legislation

There is a number of official PNA stakeholders in the transportation sector, which sometimes have overlapping roles and responsibilities. Table 17 shows the functional responsibilities per mode/sub-system. Ministry of Transportation (MoT) responsibilities include transportation planning, laying policies, drafting transportation and traffic legislations/regulations, setting safety guidelines and standards, issuing drivers' licenses, vehicles control, inspection and monitoring, issuing public transportation operation permits (inter-city or intra-city), and freight operation permits.

The Ministry of Public Works and Housing (MPWH) responsibilities include drafting roads legislations and regulations, setting road design and construction guidelines and standards, and managing road design, construction, and maintenance on the national level. On the other hand, the Ministry of Local Government (MoLG) responsibilities include following up roads networks inside the cities, towns, and villages through providing technical assistance and supporting them in planning, designing, and executing roads projects, in obtaining financial support for implementing their projects, and in following up and approving master plans. There is an overlap in its design standards responsibility with that of the Ministry of Public Works and Housing, where the former sets those on the local level, while the latter on the national level. After dissolving the Ministry of Planning and Administrative Development in 2015, the MoLG became in charge of national spatial planning.

The Higher Traffic Council is formed from the MoT, MPWH, and MoLG, in addition to the Ministry of Education, and Traffic Police, and is headed by the Minister of Transportation, with responsibilities including promoting traffic safety, relieving traffic congestion, and conducting activities to raise awareness of the citizens on traffic safety issues.

Mode/Function Process	National Roads	Urban Roads	Public Transportation	Urban Traffic Management	Vehicle Registration
Policy	MoT MPWH	MoT MoLG	MoT	MoT Municipalities	MoT
Regulations	MPWH	MoT MoLG	MoT	MoT MoLG	MoT
Guidelines & Standards	MPWH	MoLG	MoT	MoT MoLG	MoT
Planning	MPWH, Moh, MoLG	MoLG Municipalities	MoT	Municipalities	
Financing	MoFP	MoFP, MDLF, Municipalities		MoFP Municipalities	
Project Preparation & Implementation	MPWH	Municipalities		Municipalities	
Operation Management		Municipalities	MoT	Municipalities	
Maintenance Management	MPWH	Municipalities		Municipalities	

Table 17: Summary of Entities Involved in the Lebanese Transport Sector

The Ministry of Finance and Planning (MoFP) is responsible for coordination with the donors, public finances management, taxes, and customs. Under the ministry lies the Palestinian General Petroleum Corporation managing the supply of fuel for all the sectors, including the transportation sector. The Municipal Development and Lending Fund (MDLF) was created in 2005 as a semi-governmental institution as the main channel by the donors to support the development and reform of the municipalities. The Minister of Local Government heads MDLF Board. Most of the funded projects are in the transportation sector. The MDLF and the MoFP, both financing transportation projects, can be considered as financing institutions in their own way.

On the local level, the municipalities are fully responsible for transportation planning, road design and traffic management, as well as the construction, rehabilitation, and maintenance of roads inside the cities and towns, whereas inside the villages, it is a joint responsibility between the village councils and the MoLG.

As for legislations, the first Palestinian Legislative Council (PLC) was elected in 1996. The PLC passed Traffic Law No. 5 in 2000. The law has legislations concerning various relevant aspects such as vehicle registration and licensing, vehicle maintenance and safety, vehicle driving licenses, traffic rules and conduct, public transportation, licensing fees, and penalties. It opened the way for secondary bylaws, which were first adopted in 2004, and then later amended. Public transportation services have been regulated by the MoT, considering Traffic Law No. 5 and the bylaws. The MoT, through the Controller General of Traffic grants permits, sets the maximum number of public transportation vehicles to operate on a line, keeps records of public transportation routes and vehicles, sets fares, and monitors the provided services. PNA regulations exempt public transportation vehicles (shared taxis/taxis and buses) from sales taxes as a means of supporting public transportation. Some of the legislations that govern public transportation were inherited from those put in previous eras before the establishment of the PNA, that go as far as to the British Mandate. One of the major regulations in this regard is the bus company operational concession rights, which is still in effect.

5.3 Where Are We Now?

Road transportation dominates the transportation sector, whether for passengers or freight. Main roads connecting the major cities form 21% of total. Whereas regional roads, serving intra-regions form 30%, while local village access roads form 49%. In addition to the road lengths in Table 1, there is also 1,018 km of bypass roads serving the Israeli settlements.

Private cars form 83.1% of total licensed vehicles in the West Bank and dominate the mobility system. Taxis and shared taxis form 3.7%, public buses form 0.4%, commercial vehicles and trucks form 11.3%, and the rest of 1.5% are others. Figure 2 shows the distribution of the licensed vehicles in the West Bank by class. The annual growth rate in the number of licensed vehicles reached 11.5% in 2018. The number of private cars per 100 households reached 34 in 2018 for the West Bank. However, in the governorates with congested major urban areas, private car ownership rates are much higher. The rate in Ramallah/Al-Bireh Governorate reached 111 private cars per 100 households. This is reflected on the increase of car use and on mounting traffic congestion, where annual increase in traffic volumes are observed to reach 4%-5% in Nablus and Ramallah, respectively.⁸⁸

Means of the urban and intercity passenger transportation include a private car and public transportation (shared-taxi and bus). Public transportation is owned by individuals/firms, with limited government subsidy, and therefore, their service, especially for bus, is subject to profitable operations, resulting in low quality, unscheduled service. Passenger transportation was investigated in a recent study on Hebron City and four surrounding towns, and Nablus City and its surrounding villages, to assist in planning for sustainable urban growth as part of the Integrated Cities and Urban Development (ICUD) World Bank project. The share of passengers using public transportation between the studied communities reached 40%-45%, based on origin-destination studies, and where 35%-40% of public transportation users chose the bus.⁸⁹ Most public transport users are considered as captive riders, with no other travel options. There is a noticed less female use of the bus mode, due may be the perception of lack of safety or comfort.

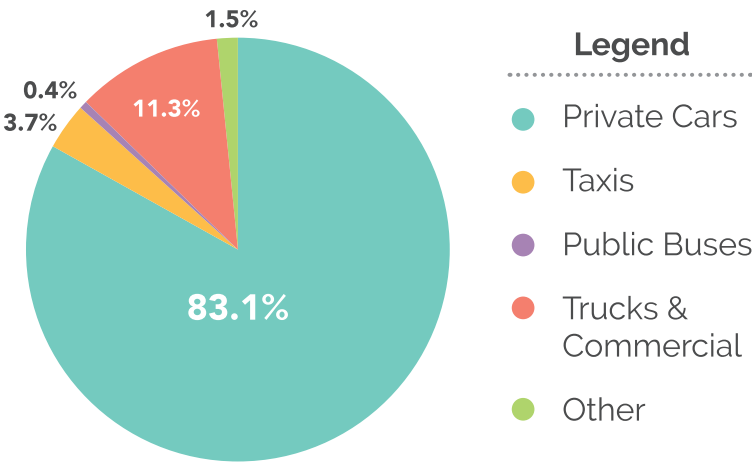


Figure 6: The distribution of the licensed vehicles in the West Bank by class, 2018

There is no comprehensive study on urban area mode choice. However, a mode choice study on An-Najah National University students in Nablus found that 7% of the students walk to the university, 16% use a private car (drive alone, share a ride, or carpool), 59% use shared taxi, 10% use bus, while those who prefer the taxis form 7%.⁹⁰

⁸⁸ MAS, 2019. Traffic Congestion in Palestinian Cities: Impact and Solutions, Background paper prepared by Abu-Eisheh, S., Palestine Economic Policy Research Institute, Ramallah, Palestine. <http://www.mas.ps/files/server/20190107164408-1.pdf>.

⁸⁹ Universal Group for Engineering and Consulting, 2019. Analysis of Transport Development in Hebron and Nablus Urban Areas, Final Report, Submitted to Municipal Development and Lending Fund, Al-Bireh, Palestine.

⁹⁰ Abdulhaq, D., 2016. Transportation Mode Choice Model for Palestinian Universities: A Case Study on An-Najah New Campus, M.Sc. Thesis, An-Najah National University, Nablus, Palestine.

Walking facilities can be found in most of the urban arterial and collector streets, but less on local streets. The widths of such facilities are generally limited and their quality is mostly poor. There are challenges in securing the widths free of obstacles, due to lack of enforcement. Some of the CBD crosswalks are equipped with ramps for the disabled.

Bicycles are rarely used, but these are being increasingly used in the level urban areas of Jericho, Qalqilya and Tulkarm in the West Bank as well as in Gaza Strip. There is no infrastructure for bicycles in general, even in the level urban areas. Recent projects involving adding bike lanes have been implemented in Jericho and Qalqilya. It has to be stated also that during the past two years, electric bikes have been introduced and are used even in the areas with mountainous terrain. In general, there is no preference by adults to use the bicycle due to limited social acceptance of riding the bicycle, especially for women.

The overall rise of the greenhouse gases (GHG) emissions in Palestine is mainly due to the increasing economic activities as well as vehicle ownership and the related increase in transportation needs causing increasing energy consumption. Transportation contributes with about 73% of all the GHG energy-related emissions. Transportation accounts for about 45% of the overall energy consumed in Palestine in 2017, responsible for the largest share of energy demand by any sector. The unit price of fuel is quite high compared with the respective prices worldwide. Transportation sector is the largest source of CO₂ emissions, resulting in annual emissions per capita of 1.014 tons of CO₂ Equivalent, which is relatively low compared with other countries, but it is expected to rapidly rise due to the high vehicular annual growth rate.⁹¹

The distribution of licensed vehicles by fuel type in the West Bank showed in 2016 that about 50% of the vehicles use diesel. However, the consumption of diesel is much higher than that of gasoline, as it is used by all public transportation and commercial vehicles. When this is combined with the presence of a high share of old/inefficient vehicles (42% of the vehicles are more than 10 years old), it indicates poor fuel efficiency and detrimental impacts on health and the environment due to emissions of a particulate matter and nitrogen oxides.

The PNA cabinet set and started implementing regulations in 2010 related to reductions in purchase tax for alternative fuel-powered vehicles, based on engine size and alternate fuel type (electric, hybrid vehicles, or Plug-in Hybrid Electric Vehicles [PHEV]). It was envisaged that this will result in an increase in the government's income, as eventually vehicle imports will increase as a result, reduce the number of illegal vehicles, modernize vehicle fleet, and improve traffic safety. Studies show that overall government income has not increased as expected, where the increase in the value added taxes due to the increase in the number of imported number of vehicles did not offset the decrease in the collected purchase taxes due to the reduction of taxes.⁹² Despite this, and after 10 years of implementation, the share of the unclassified vehicles (those not fueled by gasoline or diesel) was only slightly above 1%.

The Road and Transportation Master Plan prepared in 2016, funded by the European Investment Bank, included components to encourage public transportation, such as establishment of intra-city BRT services and inter-city railways for passenger transportation. The plan objective related to sustainability includes achieving a multimodal network through the potentials of public transportation and non-motorized modes. Despite that the plan has set some sustainability strategies, no integrated framework for achieving sustainable transportation was set.

⁹¹ Abu-Eisheh, S., Kuckshinrichs, W., and Dwaikat, A., 2020. "Strategic Planning for Sustainable Transportation in Developing Countries: The Role of Vehicles", forthcoming in *Transportation Research Procedia*, Elsevier.

⁹² MAS, 2013. *The Impacts of the Reduction on Purchase Tax on Private Cars*, prepared by Al Falah, B., Palestine Economic Policy Research Institute, Ramallah, Palestine.

There are limited ongoing major transportation projects on the national level or city-level. A number of large municipalities, such as those of Nablus, Ramallah/Al-Bireh, are proposing to build public transportation terminals and park-and-ride facilities at the cities' outskirts with the aim to improve traffic flows, reduce congestion, and improve the environment quality, as more than 50% of CBD traffic is generally composed of taxis/shared taxis. Other solutions to urban mobility challenges have been proposed considering public transportation alternatives, including Bus Rapid Transit (BRT) and tram/light rail services, in the major urban areas of Nablus, Ramallah/Al-Bireh, and Hebron.

The Palestinian government has recently formed a national team to study the potential for implementing smart transportation as well as Intelligent Transportation Systems (ITS) where the team is expected to come up with specific implementable recommendations.

5.4 Where Do We Want To Be?

The vision implying the future overall aim of Palestine's transportation system should include the desire of the stakeholders as well as citizens towards mobility transition from a traditional transportation system to a sustainable, clean, safe, smart, and multi-modal transportation system. This is envisaged to guarantee mobility for all, secure safe transportation systems, ensure accessibility, and reduce impacts on society, economy, and environment.

The current MoT's vision states "Apply the excellence standards in transportation to regulate, develop, and provide the services with high quality to contribute to the development and sustainability of the Palestinian economy". In consultation with MoT, vision was proposed to be reformulated to consider mobility transition stating "Apply the excellence standards to regulate, develop and provide an affordable, integrated, safe, smart, and sustainable multi-modal transportation system, that contributes to the development of Palestinian economy and well-being of the society".⁹³

The following illustrate the short term as well as long term recommendations towards achieving transition mobility, taking into consideration the proposed mitigation actions as stated in Palestine's Nationally Determined Contribution (NDC), identified after its accession to the United Nations Framework Convention on Climate Change (UNFCCC) in 2016, in which CO₂ emissions reduction for the transportation sector is highlighted.⁹⁴

5.5 Short-Term Recommendations

In the short term, a number of implementable actions could be considered for a proposed transitional period towards cleaner mobility. The focus would be to address mobility challenges that could be dealt with through limited financial resources. This facilitates achieving the vision through actions characterized as low-cost, quick-to-implement, and tangible, proposed to include:

- Adopt comprehensive and sustainable urban planning policies that aim at reducing the need to travel, such as smart growth, transit-oriented development, higher densities, and mixed land use.

⁹³ Dwaikat, A., 2018. Strategic Planning for Clean & Sustainable Transportation in Palestine: The Role of Vehicles, M.Sc. Thesis, An-Najah National University, Nablus, Palestine.

⁹⁴ State of Palestine, Nationally Determined Contributions, United Nations Framework Convention on Climate Change, Summary for Policy Makers.

- Support low cost facilities for active non-motorized transportation, giving more space and attention to pedestrians, such as providing proper sidewalks/crosswalks, bike facilities, and CBD auto free zones.
- Increase the attractiveness of the bus transportation through improvement of services and facilities, such as scheduling, activating new bus lines, upgrading bus fleet, installing bus stops, introducing smart technologies and transit priority systems, and improvement of the physical conditions of terminals.
- Encourage the transitions towards the use of cleaner and environment friendly vehicles, including for public transportation. Special attention is needed to support the changing of the fleet towards EVs.
- Update the regulatory and legislative framework to include regulations that facilitate the achievement of the clean and sustainable transportation system.
- Develop a mobility transition plan with actions to improve mobility for all citizens, while managing traffic in a sustainable and climate-friendly way at the same time. Issues like social justice and accessibility of transportation systems for people with disabilities should form an integral part of the plan. Continuous awareness campaigns shall be part of the plan to facilitate citizens' acceptance.

5.6 Long-Term Goals

In the long term, recommendations envisage the vision presented above through actions characterized to require more financial resources, where studies and plans need to be well prepared for the long term, which are proposed to include:

- Establish new public transportation terminals, especially at the outskirts of the major cities of Nablus and Ramallah/Al-Bireh, and operate mass public transportation connecting these with the CBDs, as many visitors from outside these cities commute daily using mainly shared taxis for work or higher education.
- Plan and implement BRT systems, indicated by Palestine NDC, on high demand transportation corridors in major urban areas such as Gaza, Hebron, Nablus and Ramallah/Al-Bireh where specific sections can be dedicated for buses with no need for fully separated system in order to enhance economic feasibility of establishing such systems.
- Encourage the shift towards highly efficient and effective vehicles, through updating the vehicle fleet, disposing of old vehicles, by promoting and encouraging the use of efficient vehicles, as indicated by Palestine NDC.

To achieve the future vision of the transportation system, goals should be reflected into policies and strategies, and these to be translated into implementable action plans. Therefore, relevant transportation system/organizational aspects, economic/financial aspects, user education/awareness/behavior aspects, and vehicle-oriented technological/ modal aspects, along with the governing regulatory aspects need to be considered. These are integrated within a framework approach adopted by GIZ to achieve sustainable transportation, requiring a holistic approach that categorizes the strategies into Avoid-Shift-Improve (ASI).⁹⁵ However, Enable (E) strategies are further integrated with these, thus the strategic framework will become EASI, with reflected strategies/actions that can be prioritized from easily attainable short term to long term. Table 18 shows a summary of selected policy recommendations and associated objectives.

5.7 Tying It All Together

#	Policy Recommendation	Objective
1	<ul style="list-style-type: none">• Develop a mobility transition plan to improve mobility for all citizens.• Conduct capacity building to the public and private sector.• Ensure participation of all including the civil society.• Update the regulations to achieve clean and sustainable transportation.	Enable and guiding for achieving better mobility
2	<ul style="list-style-type: none">• Support low carbon modes and increasing share of active transportation.• Encourage alternate work and activity models, such as telework, e-commerce, flexible work, and staggered work programs.• Establish incentive systems to support the use of sustainable modes of transportation such as carpools and vanpools.	Encourage actions that avoid causes of unsustainable transportation
3	<ul style="list-style-type: none">• Enhance efficiency of public transport and non-motorized facilities.• Introduce pricing instruments to shift to more efficient modes.• Support priority access to pedestrians, cyclists and public transportation vehicles.	Encourage shift towards clean and environment-friendly transportation
4	<ul style="list-style-type: none">• Promote and apply energy efficient technologies, vehicles operated with cleaner fuel alternatives, and relevant infrastructure.• Improve traffic management and control systems and adopt ITS.	Improve existing transportation modes and facilities

Table 18: Selected Policy Recommendations for Palestine

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About FES Regional Climate & Energy Project MENA

The Regional Climate and Energy Project MENA advocates for an energy transition into renewable energy and energy efficiency. It continues to search for solutions for a just transition in the energy sector ensuring both, the protection of the planet and the people.

As the MENA region is one of the most affected areas by climate change, we contribute to policy advising, research, and advocacy in the areas of climate change policy, energy transition, and urban sustainability, with the support of research institutions, civil society organizations, and other partners in the region and in Europe.



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