



Executive Summary

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Key messages, Mobility is transforming



A fundamental, irreversible paradigm shift in transportation is underway. In the next decades, the dominant trend in this transformation is electric mobility (e-mobility) – the accelerating growth of electric cars, vans, buses, scooters, trains and eventually ships and aircraft.

Electric car sales reached 2.3 million in 2020 globally, a 40 per cent increase from 2019, four times the number sold in 2015. Passenger electric vehicle sales are on track to rise to at least 14 million in 2025 by one estimate. Some projections suggest the shares of EVs in some larger markets are likely to reach around 90 per cent by the year 2040.

The rise of e-mobility is not limited to cars – other kinds of battery electric vehicles (BEVs) are also rising in overall use and popularity. Approximately 25 per cent of two-wheel vehicles on the road today are electric, a number projected to rise steadily over the next decade. The global fleet of electric two- and three-wheelers already numbers nearly 300,000,000. In the public transit sector, new electric buses registered around the world in 2020 were up 10 per cent from the two years prior. Today the global fleet of e-buses is nearly 700,000 – and 12 per cent of all e-buses operating today were sold in 2021 alone.

Changes to the global mobility paradigm cannot be understood without recognizing how climate change is a driving force. Transportation and mobility made up 23 per cent of all energy-related carbon dioxide emissions globally in 2019. And the advancement of e-mobility is spurred not only by the pressure to reduce greenhouse gas emissions, but also by a variety of health, social and political pressures around the world, including traffic congestion in major city centres, escalating pollution rates and efforts to make more forms of transit more accessible and safer for a variety of disadvantaged segments of populations.

Governments are recognizing the urgency of addressing, through a variety of policy measures, the ways in which ICE-powered mobility around the world has long lasting and significant impacts on global carbon emissions and climate change. These include targets for reducing emissions from transport, bans on ICE vehicles, incentives for EV adoption and many others. The automotive sector and other private sector interests are also recognizing the urgency, as well as the opportunity that the urgency portends. Investments in developing e-mobility vehicles and related technologies (especially batteries) are soaring,

projected by one analysis at \$515 billion over the next ten years.

Given its diversity, the Arab region has the potential to pursue a variety of paths and approaches to e-mobility. Countries throughout the region have made significant leaps and pledges in their commitment to adoption of EVs and development of e-mobility industrial capability. In this report we explore three different potential pathways that e-mobility could take in the Arab region over the next two decades and beyond.

Because it is the dimension of e-mobility with the greatest opportunity for transformative impact in the Arab region, this report focuses predominantly on electric vehicles (EVs) and transport systems that move people and goods on streets, roads, highways and rail. There are also emerging e-mobility developments in maritime transport, the aviation sector and heavy road vehicles.

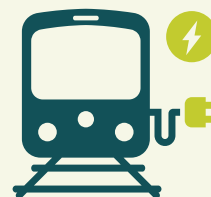
Electric propulsion of vehicles in those sectors is beginning to take hold, for reasons that mirror the rise of e-mobility in cars, buses and trains. First and foremost, it is in response to the imperative to reduce carbon emissions. Electrification in these three sectors offers significant benefits but with a shared set of challenges. Most significant is the difficulty that larger, heavier, longer-distance ships, planes and cargo trucks face in going electric due to the limited ability of current battery technology to support those distances and cargo sizes. Regulatory difficulties for electric-powered aviation also appear considerable, not only for passenger electric aircraft but also for electric-powered drones for delivery of small packages as part of the e-mobility future, particularly in urban environments.

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Key messages, Vector 1: Intentional complementary development of electrified public transportation, micro-mobility and mobility-as-a-service (MaaS)

The transition to an electric car future is incontestably gaining momentum. At the same time, but with much less recognition, adoption of other types of EVs is also increasing, and at significantly greater rates of growth – chiefly, e-scooters and other electric two- and three-wheelers and electric buses and other electric-powered public transportation vehicles. In parallel is the growing trend of “mobility-as-a-service” or MaaS, which integrates a variety of modes of transport (e-scooters, e-bikes, e-cars, car-sharing and ride-hailing) and transport-related services into a single, comprehensive, on-demand experience for users and aims to connect these individual mobility modes to public transit. Growth of interest in and development of electric-powered public transportation, electric-powered micro-mobility and MaaS all are already happening in the Arab region.

The focus of this “vector” is that electric public transit, e-micro-mobility and MaaS can have symbiotic impacts through deliberate co-development. The additive and mutually reinforcing impact of each is projected to increase in a future in which the “big end” (public transit) and “small end” (micro and MaaS) of the e-mobility spectrum are developed in tandem as a



deliberate objective. Electric micro-mobility and MaaS have the potential to help make transit-oriented urban development more effective and solve many of the transport-related problems that cities in the Arab region face. More reliable and flexible scooter, bike, ride-sharing and other e-mobility options and availability have their own impact on displacing car trips and can also facilitate the use of public transportation in place of driving personal cars. As micro-mobility and MaaS spreads in the region, alongside public transport systems modernizing with EVs, proactive design of these interconnections has the potential to increase the benefits of investment in all the modes beyond the benefits they could provide individually.

Intentional complementary “big end, small end” e-mobility development also can create a virtuous circle of social good. Intentional integrated development of these two ends of the e-mobility spectrum can be expected to additively increase each side’s benefits for Arab populations, in the form of greater economic opportunity, equity and inclusiveness and public health. It will help increase employment in the region, boost women’s participation in the Arab region’s labour force, substantially reduce economic costs stemming from traffic congestion and resultant air pollution from ICE cars and could reduce early deaths by 80 per cent in the grouped Middle East, Africa and smaller Asian-Pacific markets by 2030.

Nine recommendations at the conclusion of Section 3 would accelerate the intentional complementary development of electrified public transportation, micro-mobility and MaaS in the Arab region.

3 Key messages, Vector 2: A growing presence in the global e-mobility supply chain, as a strategic element of economic diversification



E-mobility can play an important role in diversification of Arab region economies. The urgency of effective Arab region economic diversification is increasing, as climate change and other forces drive a global shift toward sustainability with accelerating downward effects on the oil, gas and mineral-dominated economies of the region. One key to diversifying is for countries to promote the development of sectors that produce goods with more complex forms of production, more private sector innovation and growth, higher value-added exports and better integration with global value chains. The automotive industry, as it transforms into an electric-powered, digitalized global mobility industry, can be strategic in the Arab region’s development of such manufacturing and production capabilities.

Increased roles in the supply chain of these vehicles would not be a “silver bullet” for any Arab country’s economic diversification but could be a valuable element in larger strategies to create new “green economies” rooted in the transition to renewable energy. Taking this path would also help accelerate and scale the region’s own adoption of EVs.

The region’s role in the automotive and mobility industry is not only an aspirational future. There is already a significant and technologically strong foundation, particularly in Egypt

and Morocco. Automotive industry development is also emerging in more Arab countries including Lebanon, Oman, Saudi Arabia, Tunisia, and others. The United Arab Emirates is making investments to compete in the global e-mobility sector. In addition to car manufacturing, the number of electric micro-mobility and MaaS start-ups in the region is increasing rapidly, boosted by local and foreign venture investment.

The global supply chains of the automotive and mobility industry ecosystem are being transformed by the exponential growth of highly digitalized and connected EVs, and this is creating opportunity for the Arab region. New emerging original equipment manufacturers (OEMs) are anticipated to operate differently than traditional ones. This could create opportunities for Arab region-based companies to emerge as Tier 1, Tier 2 and Tier 3 suppliers and factor into new OEMs' decisions on situating manufacturing and assembly plants in the region.

Components associated with electric cars are the only sub-sector of automotive components anticipated to grow between now and 2030, and all of these supply chain niches represent opportunities for Arab countries. Battery-related technologies and services and charging infrastructure could be particularly beneficial priorities in an e-mobility component of Arab region economic diversification strategies, with the potential to create the greatest number of jobs of any Arab region investments in the e-mobility industrial ecosystem.

With the increasing digitalization of electric cars and other e-vehicles, mobility sector skills increasingly are digital skills. Developing and expanding automotive and mobility-related industrial capability in the region can also be investment in the development of digital skills of the populations of Arab countries (especially young people).

Seven recommendations at the conclusion of Section 4 would accelerate the development of a growing Arab presence in the global e-mobility supply chain, as a strategic element of economic diversification by the countries of the region.

4 Key messages, Vector 3: E-mobility as a catalyst and enabler in modernizing regional electrification and the transition to renewable energy

The advancement of e-mobility, the transition to renewable energy and electric grid modernization in the Arab region are inextricably linked from a practical standpoint, but not yet in policy or implementation. Scaling the number of EVs of all types in the region will require significant increases in electricity generation capacity and improvements in the reliable, dynamic distribution of electric power. And the desired impact of a large-scale shift to e-mobility on carbon emissions, other climate change impacts and public health will not be achievable unless the majority (and over time all) of the electricity powering EVs is from clean renewable sources.

Because electric vehicle batteries are a means of storage for variable renewable energy, mass



electrification of mobility could become an important element of the solution for improving flexibility and reliability in the electricity grids of Arab countries. In doing so, it could also help make possible the integration of high levels of renewable energy into the energy mix in the region, unlocking the immense potential of solar power in particular to transform Arab economies and mitigate climate change.

Smart charging, and especially bidirectional charging infrastructure widely described as “vehicle-to-grid” (V2G) technology, is the key to e-mobility facilitating the energy transition in the Arab region (and globally). V2G allows vehicle batteries (cars, buses and other types of EVs) to send electricity back to the power grid when it is needed to meet peak demand. Batteries become not only the source of power for EVs, but also backup storage cells for the grid, able to power houses, buildings and anything else connected to the power grid. In a region where electricity reliability is a critical vulnerability, enabling individual and fleet EV owners to play this role could have significant social and economic benefits once V2G is able to scale.

Arab region power markets must adapt to enable V2G and a renewable energy transition. The current power market structure is slowing progress on the transition to renewable energy, and will also slow the advancement of e-mobility in the region. A path toward an e-mobility future that incorporates V2G when it is available at scale is even more challenging under current power market structures. Even unidirectional V1G smart charging needs an attractive energy trading policy between EV owners and the power utility.

Seven recommendations at the conclusion of Section 5 would accelerate a deliberately integrated pursuit of e-mobility adoption, transition to renewable energy and electric grid modernization in the Arab region, with e-mobility as a catalyst and enabler in modern-izing regional electrification and the renewable energy transition.