BRIEFING

APRIL 2022

Zero-emission vehicle deployment: Africa

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OVERVIEW

Africa accounted for only 3% of the global new vehicle market in 2020, but imports of used vehicles and a growing vehicle fleet are fueling increases in climate emissions and air quality impacts in the region. According to the report "Used Vehicles and the Environment,"[1] about 1.5 million used vehicles are imported into Africa every year. Transport sector demand for fossil fuels grew by almost 50% between 2010 and 2020.[2] As Figure 1 shows, under currently adopted policies (Baseline scenario), well-to-wheel CO_2 emissions from vehicles (excluding 2&3-wheelers) will reach 909 million tonnes in 2050, 2.3 times the 2020 level. An accelerated transition to zero-emission vehicles (ZEVs[3]) in the region could instead reduce CO_2 emissions to 53% below the 2020 level by 2050 (Ambitious scenario).

Figure 1. Estimated well-to-wheel CO_2 emissions from cars, vans, buses, and trucks in Africa (million tonnes CO_2 per year)

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1 United Nations Environment Program, *Used Vehicles and the Environment – A Global Overview of Used Light Duty Vehicles: Flow, Scale and Regulation*, 2020, https://www.unep.org/resources/report/global-trade-used-vehicles-report.

2 *Africa Energy Outlook 2019*, World Energy Outlook Special Report, (IEA: Paris, 2019).

3 Zero emission vehicle (ZEV) technology includes battery electric vehicles and fuel cell electric vehicles.

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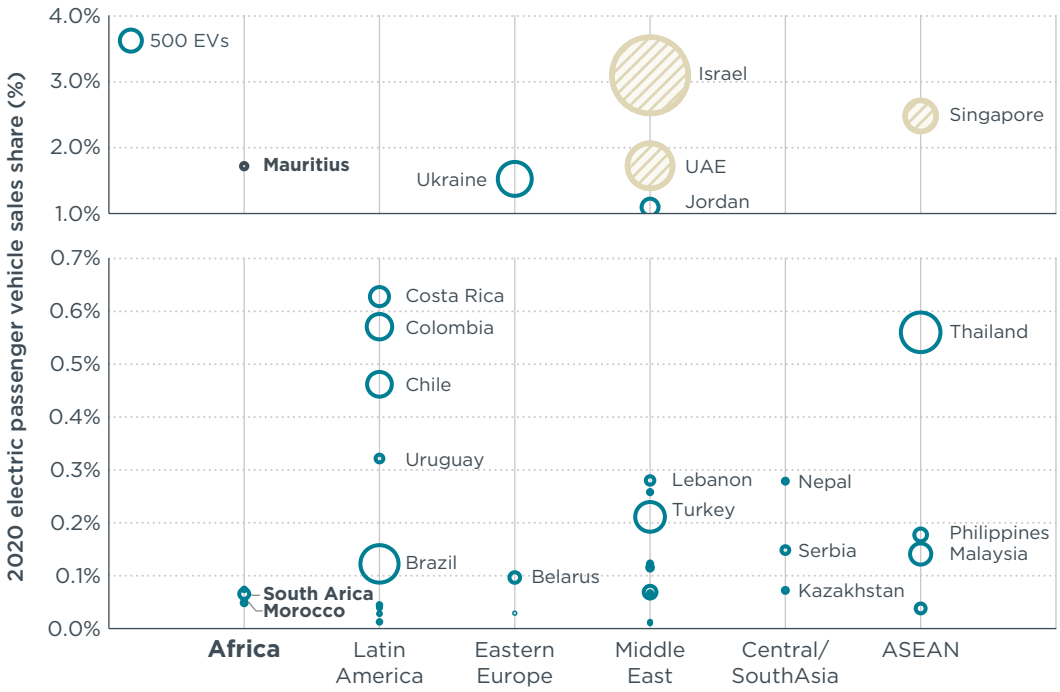
ZEV fleets will help to reduce traffic-related air pollution and associated health effects, especially if the region also decarbonizes its electricity grid. The CO_2 mitigation potential is amplified by the fact that many African countries already have green power grids with high shares of low-carbon electricity generated from hydropower, geothermal, solar, and wind energy.[4]

This briefing gives an overview of the status of ZEV development in the emerging economies of Africa. A full version of the work and a complete list of references are available in the ICCT white paper, "A critical review of ZEV deployment in emerging markets." Sister briefings focused on the emerging markets of Eurasia and Latin America, and on the ASEAN economies, can be found at theicct.org.

ZEV TRANSITION STATUS

In Africa, few countries have scaled electric vehicle (EV)[5] sales for passenger vehicles. The EV market shares in South Africa, Morocco, and Tunisia were below 0.1% (Figure 2). Mauritius's relatively high EV share of about 1.7% is a function of low overall new vehicle sales.



Note: Israel, UAE, and Singapore are high-income countries

Figure 2. EV sales share (%) of passenger vehicles in non-ZEV Transition Council (ZEVTC[6]) countries, by key region, based on available data for 2020.

Data source: EV Volumes[7]; OICA[8]; ICCT roadmap model.

These sales shares are generally lower than those in many non-ZEV Transition Council (ZEVTC) countries in other regions. The EV shares are even lower if imported used

4 Africa Energy Outlook 2019, IEA 2019.

5 Electric vehicles (EVs) include battery electric vehicles, plug-in hybrid vehicles, and fuel-cell electric vehicles.

6 ZEVTC, The Zero Emission Vehicle Transition Council, is made up of Ministers and representatives from some of the world's largest and most progressive car markets and ZEV-leading countries.

7 EV VOLUMES.COM The Electric Vehicle World Sales Database (2020), https://www.evvolumes.com/.

8 OICA International Organization of Motor Vehicle Manufacturers (2020), https://www.oica.net/production-statistics/.

vehicles are taken into account, since about 1.5 million used vehicles are imported into Africa every year.[9]

While Egypt, Morocco, South Africa, Uganda, and Tunisia have some electric bus stock, electric buses accounted for less than 0.01% of the region's bus fleet in 2020. African cities such as Accra (Ghana), Dakar (Senegal), Dar es Salaam (Tanzania), Johannesburg (South Africa), Kigali (Rwanda), Lagos (Nigeria), Nairobi (Kenya), and Victoria (Seychelles) are considering the large-scale introduction of electric buses. Meanwhile, a ZEV market in Africa is emerging for 2&3-wheelers, a popular transport mode in Africa. E-mobility based businesses and startups offer electric 2&3-wheelers as public and private transport options in Kenya, Liberia, Rwanda, Togo, Zimbabwe, Uganda, Ghana, and South Africa.

ZEV POLICY STATUS

A few African countries, including Cape Verde, Kenya, and Morocco, have announced non-legally binding EV targets. For example, Cape Verde has set 100% EV targets for new sales of passenger cars by 2035 and urban buses by 2040, as well as interim electrification objectives for fleet segments—including passenger cars, urban buses, and government vehicles—and for the nation's charging infrastructure.

Table 1 categorizes existing EV policies for African countries active in electrification. The five broad policy categories are those that have proven effective in leading ZEV countries. The "Others" category summarizes actions that are especially beneficial to emerging markets.

Table 1. Existing EV policies for select African countries

Country	Phase-out target	Regulations		Incentives		Infrastructure	Demand		Industrial development		Others		
		CO_2 standard	ZEV regulation	Subsidy/tax	In-use	Strategy/ Support	Special fleet	Shared mobility	Manufacturing	Assembly	R&D and capacity building	Business model	International support
South Africa						●	●	●	●	●	●	●	●
Kenya				●		●					●		●
Morocco				●		●	●	●	●	●	●		
Cape Verde	●			●	●	●	●			●			●
Mauritius				●		●		●					●
Zimbabwe						●	●	●		●		●	●

● indicates that a given country has at least some policy actions for the given policy category

Interventions by countries listed in Table 1 consist primarily of developing charging infrastructure; providing incentives that make EVs cost-competitive with ICE vehicles; establishing EV and battery manufacturing capacity; electrifying public transportation, especially electric 2&3-wheelers; and making use of international support.

9 Used Vehicles and the Environment – A Global Overview of Used Light Duty Vehicles: Flow, Scale and Regulation, UNEP 2020.

OPPORTUNITIES AND SUCCESS STORIES

a) ***Electric shared mobility:*** Due to low levels of individual car ownership,[10] shared mobility such as buses and taxis are common in Africa. These modes could potentially accelerate the transition to ZEV through fleet-by-fleet, rather than car-by-car, conversions. **South Africa** has introduced electric buses, 3-wheeler taxis, and taxi services for ride hailing. **Ghana** aims for a significant transition to electric buses by 2050. Ghana also has solar powered taxi service, used for ride hailing. In Nairobi, **Kenya**, a ride hailing company is operating 30 electric Nissan Leafs. Several mobility service providers are using electric motorcycles as part of their motorcycle taxi fleets.

b) ***Electrification of 2&3-wheelers:*** Annual imports of 2&3-wheelers into Africa are estimated to be around 3 to 4 million units, with a current fleet of around 15 to 20 million vehicles.[11] Electric 2&3-wheelers offer a great opportunity for low-cost e-mobility in Africa. **Uganda** is manufacturing new electric motorcycles, retrofitting existing ICE motorcycles, and assembling electric motorcycles and battery packs. **Rwanda** is retrofitting ICE motorcycles to become electric. **South Africa** has a startup company that manufactures and operates electric 3-wheeler taxis. **Ghana** is assembling electric 2&3-wheelers. **Kenya** is assembling and manufacturing electric 2&3-wheelers and multiple companies are currently investing in charging infrastructure for electric 2&3-wheeler charging. A battery swapping system has been tested in Kisii county in Kenya. Forty-nine electric motorcycles are currently being demonstrated in 4 fleets as part of an initiative supported by an international development organization.

c) ***Business:*** E-mobility creates opportunities for startup companies and businesses. **Zimbabwean** firms offer leasing for electric 3-wheelers and scooters, electric vans for delivery service, and dealerships that provide beneficial loan and insurance options for imported used EVs. **Ugandan** companies lease electric motorcycles and rent batteries. **Ghana** has solar-powered 2&3-wheeler taxis for leasing. **South Africa** has app-based electric 3-wheeler taxis that are cheaper than ICE taxi service.

d) ***Manufacturing:*** African countries have the potential to become future EV and battery exporters as some countries are rich in raw materials important for EVs (e.g., lithium in **Zimbabwe**, manganese and platinum in **South Africa**, copper and cobalt in the **Democratic Republic of Congo**). **Morocco** is working with three major international automakers to build ZEV manufacturing plants, and aims to build ZEV production capacity of 1 million vehicles by 2025. **South Africa** has a lithium-ion battery precursor pilot plant. **Rwanda** is incentivizing ZEV production. **Tunisia** is building capacity for manufacturing ZEV components.

e) ***Incentives:*** Incentives can be offered to improve EV cost-competitiveness. **Cape Verde** has exempted customs duty and VAT for imported EVs and has an internationally supported rebate program for covering the incremental purchase cost of EVs compared to ICE vehicles. **Kenya**, the **Seychelles**, **Mauritius**, **Rwanda**, and **Zambia** waived or reduced various taxes or duties for EVs. Other types of incentives include tax exemptions for imported EV components, batteries, and charging equipment; waived parking fees; and significantly lower electricity tariffs.

f) ***R&D:*** **South Africa**'s national uYilo e-mobility program has advanced R&D activities including national accredited battery and material testing, battery manufacturing, recycling, second-life usage, and vehicle-to-grid technology.

10 Ariadne Baskin, *Africa Used Vehicle Report*, UN Environment Program (2018), https://wedocs.unep.org/bitstream/handle/20.500.11822/25233/AfricaUsedVehicleReport.pdf?sequence=1&isAllowed=y.

11 UNEP estimates.

g) ***Charging infrastructure:*** A region-wide network of robust and reliable charging infrastructure builds consumer confidence in ZEVs. **Cape Verde** has set a target of establishing a nationwide network of charging infrastructure by 2030 and is installing private and commercial charging stations under the internationally funded 5-year NAMA support project for facilitating EV deployment and infrastructure development. In **Ghana**, solar EV recharging hubs have been developed in four key cities. The country has also engaged in public-private partnerships to install 200 chargers across southern Ghana. In **Morocco**, a public-private partnership project is facilitating construction of 37-station charging network in the service areas of an 800-km long motorway integrated with solar parking shading structures, which will enable renewable energy to power charging stations.

TOP BARRIERS AND CHALLENGES

Africa faces a number of challenges in accelerating a ZEV transition. These include:

- Absence of regulations and policies pertaining to ZEV-related manufacturing, import, deployment, technical standards, and charging infrastructure development
- Import of used ICE vehicles, which widens the price gap between ICE vehicles and ZEVs
- Lack of adequate finance to offer fiscal incentives and develop charging infrastructure to support the transition to ZEVs
- Lack of technical expertise needed for local assembling and manufacturing, and ensuring minimum quality standard product, repairing and recharging
- Low level of public awareness of ZEV benefits and operation/usage in the region, and
- Unreliable power supply and off-grid rural communities, which adds obstacles to providing the infrastructure needed for ZEV transition

POLICY IDEAS FOR COUNTRY COLLABORATION

a) ***Incentivize ZEV manufacturers and importers to improve ZEV access.*** Incentivize local manufacturing and assembly through collaboration with international ZEV manufacturers; focus manufacturing and assembly for electric buses and 2&3-wheelers; promote import and distribution of ZEVs, ZEV components, and batteries.

b) ***Facilitate ZEV production, imports, and fleet purchase.*** Set standards and certification procedures for imported and locally manufactured/assembled ZEVs; create mandates for ZEV purchase, ICE retrofitting, and gradual replacement of government fleet, bus, taxis, and 2&3-wheelers with ZEVs, where feasible; implement a regionally coordinated effort to regulate import of ICE vehicles, both new and used.

c) ***Reduce ZEV cost through trade agreement and international financing.*** Form trade agreements with countries to lower or waive import duties on ZEVs. Introduce international financing to reduce ZEV purchase and usage cost through rebate, reduced loan interest, or other type of collaboration.

d) ***Integrate infrastructure development with renewable energy and off-grid solutions.*** Provide region-wide charging infrastructure supported by uniform technical standards and powered by reliable and low carbon energy. Implement off-grid solutions such as solar carports to ensure a full ZEV transition.

e) ***Enable innovative e-mobility business and financing models in shared mobility and public transportation***. Encourage introduction of ZEV-based businesses and cooperative finance models, with a focus on catering to electric buses, taxis, and 2&3-wheelers for ride hailing, delivery services, leasing, battery renting, and/or swapping.

f) ***Demonstrate ZEV technology through exhibition, experience center, and pilot projects to raise public awareness.*** Collaborate with private sector and international entities on promotion events and demonstrations of ZEVs and charging method to increase public awareness and familiarity with ZEV technology.

INTERNATIONAL SUPPORT FOR ZEV TRANSITION

African countries are receiving financial and technical support for a ZEV transition from a wide range of international agencies and philanthropic institutions, from the United Nations and the European Union to the Hewlett Foundation. At least 12 countries have received USD $16 million for the ZEV transition in the last five years[12] for R&D, shared mobility, business models/startups, and multiple policy intervention and demonstration projects. Funding amounts on a per-country basis range from $28,500 to $8.4 million.

A programmatic approach is needed that executes country- and city-level ZEV projects and stimulates regional support through the creation of communities of practice and ZEV marketplaces. Global advocacy through global working groups is necessary to ensure that funding needed to support African countries shifting to zero-emission mobility can be raised.

Current international support is far from what is needed to facilitate ZEV leapfrogging in the region. A five-year goal to bring cumulative ZEV sales to 10% of 2020 sales of passenger vehicles, bus, and 2&3-wheelers, assuming funding at a rate of $30 per kWh of battery capacity, would require a funding level of approximately $500 million for all vehicle segments. This is a rough estimate, but it reveals the gap between existing and needed international support. The funding could be used for various purposes including, but not exclusive to, technical support, policy interventions, R&D, and bankable ZEV projects and loan service that advance ZEV leapfrogging in African countries.

12 Statistics based on available public information. It is expected that some activities are not captured by this analysis.