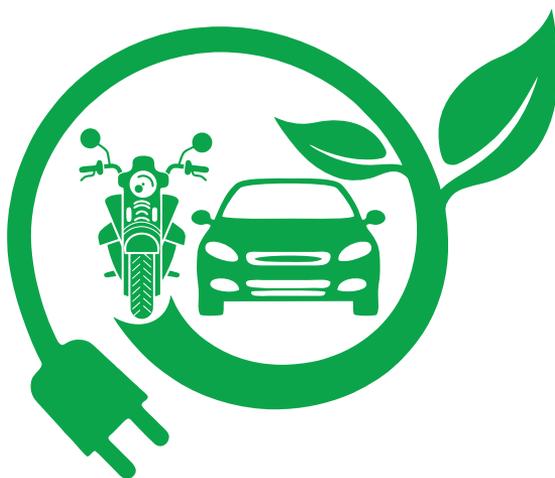




Kenya Power

E-MOBILITY CONFERENCE REPORT

7th - 8th February 2023



Powering E-Mobility in Kenya



PARTICIPATING STAKEHOLDERS

MAIN SPONSOR

Deutsche Gesellschaft für
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1. Ministry of Roads and Transport
2. Ministry of Energy and Petroleum
3. Ministry of Trade, Investments and Industry
4. Nairobi County Government
5. Petroleum Institute of East Africa
6. Development partners such as GIZ (main event sponsor), World Bank, UNEP, British High Commission, Swedish Embassy, German Embassy and World Resource Institute
7. Financiers
8. Battery and Charging Technology Manufacturers
9. Local and foreign electric vehicle assemblers and sellers
10. Transport sector associations
11. Academia



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1. Ampersand
2. Auto-Truck
3. BasiGo
4. Biliti electric
5. East Africa Limited
6. eBee
7. EcoBodaa Kenya
8. EVChaja
9. JAC Motors
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17. Utu



BASI



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AUTO TRUCK
GROUP™



eBee



M-KOPA



BILITI
ELECTRIC



E-MOBILITY CONFERENCE

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MINISTRY OF ENERGY
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(Ag.)-KENYA POWER

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MESSAGE FROM THE CABINET SECRETARY, MINISTRY OF ENERGY AND PETROLEUM



Energy plays a central and strategic role in Kenya's aspirations of attaining a middle-income economy status by the year 2030. Therefore, a rational, aligned, balanced, and sustainable energy ecosystem must be in place to achieve the Government's quest to provide universal electricity access, in order to spur economic growth.

The ministry is undertaking reforms within the electricity value chain that are meant to enhance its ability to adequately serve the economy and safeguard the country's position as the region's economic hub through the provision of affordable and reliable electricity supply. Provision of reliable and affordable electricity, a role played by Kenya Power, is fundamental in the development of the

E-Mobility ecosystem in the country.

The Ministry of Energy and Petroleum will work together with other relevant ministries to facilitate the implementation of a policy framework that will support the growth of the E-Mobility industry in Kenya.

This will involve consideration to provide tax incentives for electric vehicles, investment in the charging infrastructure, and supporting research and development in this field.

There is an ongoing consultative process to review the retail electricity tariff to improve the competitiveness of the electricity sub-sector. Among the proposals is a special E-Mobility tariff for charging electric vehicles. This will promote better utilisation of the installed generation

capacity especially if charging is done during off-peak hours.

By investing in E-Mobility, the country will significantly reduce dependence on fossil fuels to the benefit of our environment and the health and well-being of the citizens of Kenya. Additionally, E-Mobility will open up job opportunities as demand for electric vehicles and charging infrastructure increases.

The Government is committed to support the E-Mobility industry as the future of our transport system to attain a greener and more prosperous future for our country.

DAVIS CHIRCHIR,
CABINET SECRETARY -
MINISTRY OF ENERGY AND
PETROLEUM
7TH FEBRUARY, 2023



**Grid length
300,000km**



**Serving 9.1m
customers**



**Electricity access
to over 75% of
Kenyan population**



**Installed capacity
of 3,321MW
and peak demand
of 2,149MW**



**Over 90% electricity
dispatched to the
grid comprises of
clean energy**



**Over 1,350
electric-powered
vehicles on
Kenyan roads as
at February 2023**

MESSAGE FROM THE CHAIRMAN, BOARD OF DIRECTORS-KENYA POWER



In the last two years, the country has witnessed increased interest from local and international stakeholders keen on investing in, and developing Kenya's E-Mobility sector. If properly harnessed, this will lead to the enhancement of a formidable E-Mobility economy. Kenya can have a quantum leap ahead of other markets to become the continent's leader in research, innovation and E-Mobility access, with high quality and cost-effective products.

Kenya has increased electricity generation, mainly from renewable sources, and has also invested in transmission and distribution networks across the country, with

The growth of E-Mobility in the country and the region will play an impactful role in our economy, reducing the cost of transportation for the Kenyan masses.

forays into the Eastern Africa region leading to over 75% electricity access across the country.

For the last 100 years of existence, Kenya Power's primary purpose has been to provide clean, affordable and reliable power to support the

country's aspirations. The Company has done this cognizant of the need to take care of the environment.

The growth of E-Mobility in the country and the region will play an impactful role in our economy, reducing the cost of transportation for the Kenyan masses. The reduction of Green House Gas emissions will help the environment, with Kenya doing her part in saving our planet and mitigating the effects of climate change.

We are cognizant of the need to support E-Mobility and drive the development of adequate infrastructure to support the growth around this sub-sector.

Part of our mission as an organisation is to strive to provide world-class products and services to transform lives, as we ensure viability of our business. To this end, we are continuously streamlining our operations, to ensure our power distribution network is robust and able to anticipate our customer base's growth and future needs.

Being well aware that the E-Mobility ecosystem heavily relies on our organisation to thrive, an E-Mobility Steering Committee within the Company has been set up.

The Committee is working on various strategies that will guide the organisation towards full success of this nascent industry. We are collaborating with the various stakeholders in the E-Mobility ecosystem, and offering support in setting up a vast charging station network.

In our quest to build capacity, our Institute of Energy Studies and Research (IESR) is poised to become the premier training and research centre on E-Mobility. We welcome investors and partners interested in research and development to

collaborate with us towards the realisation of this vision.

As we embark on the next century of serving the Nation, E-Mobility is most definitely one of the emerging and exciting opportunities to grow our business.

Our Company will continue to respond to market dynamics as we seek to identify potential opportunities. We must be agile and proactive in modelling our business on a path of transformation to become a utility company that is futureproof.

JOY BRENDA MASINDE

- CHAIRMAN, KENYA POWER BOARD OF DIRECTORS

7TH FEBRUARY, 2023



The Kenya Power Board Chairman, Joy Brenda Masinde and MD (Ag.) Eng. Geoffrey Muli

MESSAGE FROM THE MANAGING DIRECTOR (Ag.)-KENYA POWER



As the country's off-taker and distributor of electric power, with a national footprint through its network, Kenya Power is taking a leading role in securing the environment through the adoption of clean energy.

Since 2004, we have consistently invested heavily towards the expansion of our grid's capacity and its automation to accommodate the exponential growth in our customer numbers, and to improve the flexibility of the grid and, in turn, the quality of power supply.

Today, we boast of an

extensive grid totaling about 300,000 kilometers in circuit length of the high, medium, and low voltage networks, which serve over 9.1 million customers, giving access to over 75% of the country's population in all 47 counties.

Presently, the country has an installed capacity of 3,321MW against a peak demand of 2,149MW. During off-peak, which happens late in the night, the demand drops to about 1,100MW.

The E-Mobility space in Kenya is growing steadily, with over 1,350 electric-powered vehicles currently on the country's roads, ranging from two,

three and four-wheelers (NTSA). With increased awareness of the benefits of E-Mobility, the demand for electric vehicles is expected to accelerate in the coming years.

Kenya Power is aligned to support this anticipated increase in demand through the provision of adequate and reliable electricity supply. To map out the needs of the E-Mobility sector and define a framework to provide excellent service to all players involved, the Company has been actively engaged in E-Mobility projects and initiatives with local and international partners.

The University of

Massachusetts and the World Resource Institute recently carried out a study to evaluate the readiness of Nairobi's power grid to handle EV charging demand. The study found that Nairobi's current power infrastructure is strong enough to support the switch to electric of 100% of two-wheeler vehicles in the city. Further, the power infrastructure can fully support a similar switch of 10% of Nairobi's other vehicles, including private and commercial fleets, which are presently at approximately one million.

In addition, the research suggests that electrification of transport in Nairobi will be beneficial for the overall technical performance of the grid system as it would translate to a better utilisation of the system especially during off-peak hours. Charging electric vehicles especially at night would, therefore, help bridge the gap between off-peak load and available generation capacity as well as raise the average demand to above 1,500MW.

Over the last three years, approximately 90% of the electricity dispatched to the grid comprises of clean energy generated through renewable sources such as hydro, geothermal, solar, and

wind. This rises to 100% during most of the night off-peak time which makes the E-Mobility more environmentally friendly end to end. As the demand for EVs continues to grow, Kenya Power will continue to prioritise generation from renewable energy sources such as solar, hydro, wind, biomass, and geothermal resources as guided by the Least Cost Power Development Plan.

Kenya Power is engaged in various undertakings to enable the growth of E-Mobility in the country, in addition to providing access to clean reliable, and quality supply, as detailed below:

1. In 2019, the Company partnered with the United Nations Environment Programme (UNEP) to lead the implementation of the Electric Mobility Programme in Kenya by piloting electric motorbikes attached to meter readers in several parts of the country.
2. We have since established a liaison office which acts as our one-stop shop to champion the Company's E-Mobility business. Through this office, we are working with investors and stakeholders

to support the development of the E-Mobility ecosystem. This entails identification of sites for potential charging stations and developing requisite geo-mapping software to enable users to locate the nearest charging station.

3. Further, we intend to gradually phase out fossil fuel-powered vehicles numbering approximately 2,000 from our fleet within the next 4 years. This will entail the purchase of new electric vehicles and motorbikes.

We understand that the transition to electric vehicles will not happen overnight and it will require a collaborative effort from all stakeholders. At Kenya Power, we are committed to working with the private sector and our customers to make this transition as smooth as possible.

Based on the foregoing, the Company organized the inaugural E-Mobility conference to bring together all stakeholders to chart the way forward on this exciting journey.

ENG. GEOFFREY MULI-
MANAGING DIRECTOR (Ag.)
7TH FEBRUARY, 2023



From left: Kenya Power's General Manager in charge of Commercial Services and Sales, Eng. Rosemary Oduor, General Manager for Regional Coordination, Eng Peter Njenga, Nairobi Deputy Governor, James Muchiri, and Stima Boda's Operations Manager, Ahmed Ali during the e-mobility conference.



EXECUTIVE SUMMARY

This report is a synopsis of the E-Mobility Stakeholders' Conference held on 7th and 8th February 2023 at Safari Park Hotel Nairobi. It commences with an introduction that provides a background of E-Mobility. This is followed by a justification of E-Mobility and the reasons for holding the conference. Conference details and key issues raised are outlined and this is followed by the conference impact and coverage. The risk analysis during the E-Mobility

transition is analysed and presented. Finally, the conclusions and recommendations from the E-Mobility Conference are outlined. Some of the key recommendations were: Engagement of relevant stakeholders and government agencies in E-Mobility policy formulation; Providing incentives and concessions by the government; Need for integrated Urban development plan; Need for capacity building on E-Mobility and conducting further research on areas that are not yet clear.



INTRODUCTION

E-Mobility is the collective term for vehicles, boats and aircraft that are partially or fully powered by electricity. They get their energy from the electricity grid and store it 'on board', in most cases in a lithium-ion battery. From electric trucks, e-bikes and e-scooters to drones: E-Mobility is so much more than just electric passenger vehicles. E-Mobility is not a distant dream anymore, but a transition that is already fully under way in a wide range of vehicles by land, air and sea.

The main reason for the growing popularity of E-Mobility is that electric vehicles reduce CO² emission thereby meeting the low-emission standards that are becoming increasingly important in protecting our climate. In addition, EVs also have other advantages: they are quiet and energy-efficient. Electric vehicles reduce transport costs for users. They may be more expensive to buy, but they are much cheaper to run than conventional fuel vehicles. (<https://www.bebat.be/en/blog/What-is-E-Mobility>).

According to BloombergEF Electric Vehicle Outlook 2022, about 74% of global transport is by road and it emits 24% of the total Carbon dioxide (CO²) emissions. This underlines the importance of deliberate transition to E-Mobility to bring down the increasing levels of the harmful emission before further damage is done to the environment. (<https://about.bnef.com/electric-vehicle-outlook/>)

Kenya intends to increase electric mobility adoption and has set a target of 2025 as the year by which 5% of all newly registered vehicles will be electric. According to the National Transport and Safety Authority (NTSA), it is estimated that there are 1,350 electric vehicles (EVs) registered in Kenya as of February 2023. Motorcycles take up almost half the share at 844, three-wheelers stand at 153, and motor vehicles (Saloons-5, Station Wagons-167, double cabins-3, vans-5, buses-3, lorries-3) at 186. The remaining classified as "other" vehicle categories are 150. As at May 2021, there were at least 18 E-Mobility companies with new start-ups being

established faster than ever before. Majority of businesses in the Kenyan E-Mobility space fall under the two and three wheeler segments. 86% of the surveyed companies have been in operation for less than three years indicating that most companies are in their early stages (Market survey report, 2021- Association for Electric Mobility and Development in Africa (AEMDA)).

The key success factors for smooth and faster adoption of E-Mobility are:

1. Collaborations by stakeholders in the areas of policies, strategies, tariffs, standards, and regulations are key.
2. Strong grid infrastructure and optimal placement of chargers
3. Capacity building for Electric Vehicles (EV) drivers and technicians
4. Academia involvement in areas of research and development
5. Incentives and concessions for electric vehicles
6. Financial models that help reduce the burden of the higher initial capital cost of electric vehicles

A CASE FOR E-MOBILITY IN KENYA

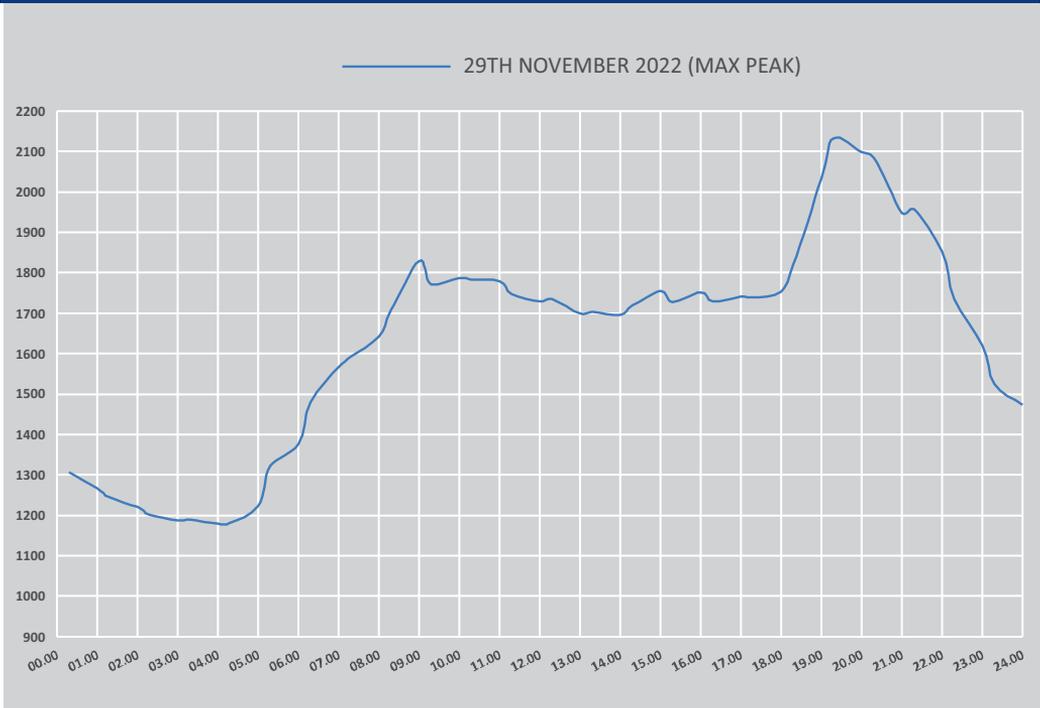
Presently, the country has an installed capacity of 3,321MW against a peak demand of 2,149MW. The available capacity is generally close in value to the effective capacity with variations happening from day to day depending on breakdowns, maintenance and generation resource availability. During off-peak, which happens late in the night, the demand

drops to about 1,000MW. The average load varies from about 1,100MW to 1,500MW. Charging electric vehicles especially at night can help bridge the gap between off-peak load available generation capacity as well as raise the average demand to above 1,500MW.

The average passenger electric car has a 40kWh battery. On a full charge, the range is between 250km to 300km per full

charge. Normal charging will take 3 to 5 hours. This, if charged daily, presents about 40 units of energy. For electric buses, the battery size is generally above 100kWh. For example, a BYD k6 bus has a battery size of 110kWh with a range of 250km per full charge. Charging the electric bus takes 2 to 3 hours using a 60kW charger. This presents a significant energy consumption.

Demand Curve



(Source Kenya Power)

RATIONALE FOR THE E-MOBILITY STAKEHOLDERS' FORUM

To give the E-Mobility agenda further impetus, Kenya Power held an E-Mobility Stakeholders' Conference on the 7th and 8th February 2023 at Safari Park Hotel in Nairobi. The conference themed 'Powering E-Mobility in Kenya', focused on the development of bespoke, world-class charging infrastructure, technologies and attendant ancillary services to power the uptake of E-Mobility in Kenya, and position the country as a regional leader.

The two day conference was organised to bring together the sector

stakeholders to help understand the current sector status, help the Company adopt E-Mobility as a key driver of growth and develop strategies for creating an enabling environment for the E-Mobility sector.

Participants had an opportunity to: apprise themselves of available E-Mobility charging infrastructure, technologies and ancillary services; explore ways of improving the existing charging infrastructure ecosystem; engage in discussions on policies and regulations supporting the development of the charging value chain; and benchmark against regional and global

leaders among other pertinent issues.

The two-day event's programme featured panel discussions that mainly centered around:

- Best in class, bespoke EV charging technology and infrastructure
- Policies to support the growth of the E-Mobility sector in Kenya
- Stakeholder experience
- Providing an enabling environment to increase available charging stations
- The current and future E-Mobility business opportunities in East Africa
- Research and technology in local and regional e-vehicles space among others.





E-MOBILITY CONFERENCE

CONFERENCE HALL



SPEAKERS



Ayiera Misiko - Research Engineer, e-Guide Initiative



H.E Sebastian Groth, Ambassador, Federal Republic of Germany



Chaitanya Kanuri - Senior Programmes Manager - Electric Mobility, World Resource Institute, India



Wycliffe Ogallo - Administration Secretary, Energy - Ministry of Energy



Gillian Pais - Partner, McKinsey & Company



Eng. James N. Mwangi - Director, Energy & Extractives, Kenya Private Sector Alliance (KEPSA)



H.E Caroline Vicini - Swedish Ambassador to Kenya



James Njoroge Muchiri - Deputy Governor, Nairobi County

PARTICIPANTS



E-MOBILITY SOLUTIONS ON DISPLAY



KEY ISSUES DELIBERATED AT THE FORUM

The two day event featured panel discussions on:

Panel 1: The size of E-Mobility business in Kenya: Opportunities, challenges, and quick wins

Key points:

- E-Mobility presents a vast opportunity for innovators who will offer solutions tailored for local needs and context.
- Strong grid infrastructure and optimal placement of chargers is necessary for mass transition into E-Mobility. Capacity building for EV drivers and technicians need to be prioritised to complete the value chain for E-Mobility.
- Academia involvement in areas of research and development will also be necessary during the transitioning into E-Mobility

Panel 2: Policies and Regulations powering the growth of E-Mobility

Key points:

- For smooth transition to electric vehicles (EVs), collaborations by stakeholders in the areas of policies, strategies, tariffs, standard, and regulations are key.
- To create cost parity between EVs and Internal Combustion Engine (ICE) vehicles and in order to encourage faster uptake of EVs, the government ought to consider incentives such as lowering taxes, excise duty, and levies for EVs; but increase the same for ICE vehicles to maintain its revenue targets.

Panel 3: Regional & International Benchmarking

Key points:

- EVs prices are dropping and therefore there is an accelerating adoption that will make EVs reach a price parity with ICE vehicles before 2025. 30% of global passenger vehicle sales will be fully electric by 2030.
- EV sales increased 108% in 2021 that translated to 8.3% of new sales market share and with big projections ahead.
- Kenya has an opportunity to benchmark with various countries like Rwanda, India, Germany, Sweden, among others while rolling out full adoption of EVs.

Panel 4: Opportunities for integration of EVs in Kenyan cities

Key points:

- Electric mobility means digital integration of four ecosystems: grid, buildings, homes, and drivers. Buildings will need more electricity and energy management. Consumers will charge when they stop as opposed to stopping to charge.
- 95% of EVs will charge at home, work or destination; only 5% will charge on transit. Electric vehicles will account for up to 40% of residential building electricity consumption. Convenience is a key driver for consumers to prefer charging at home. For example, in Europe, a third of EV drivers charge at home exclusively, while 80% of homes have access to EV charging.

- There is 20% - 50% saving to charge at a building as compared to charging in-transit depending on time of use (TOU) charges, solar generation and demand charges.
- 98% of EV chargers will be installed in buildings & homes. Building owners need to prepare the infrastructure for an increase of up to 45% electricity consumption. There is need for urban mobility plan upgrade to accommodate E-Mobility. Design a plan where EVs can be shared among various routes.
- Nairobi County government is looking for parking space where EVs can be left to charge as owners go about their businesses in the city.
- The county government will negotiate with land owners to free up some space for EV chargers installation. The government will also urge the land owners to change the intended use of land to make it available for charging while parking.
- There is consideration to also leverage on use of streetlights poles to support chargers.
- As part of supporting Kenya in the process of transitioning into E-Mobility without fully relying on external funding, some banks have developed strategies to finance investors through affordable plans. For example, NCBA bank has provisioned a KShs. 2 billion fund that can be used to finance up to 80% of the cost of electric vehicles.

Panel 6: Research and Innovation in spurring E-Mobility growth

Key points:

- Some of the key drivers for EV adoption are policy support, enhancements in battery technology, more charging infrastructure and greater consumer choice.
- Other key concerns are charging speed, affordability, variance and accessibility.
- Strategies for overcoming bottlenecks include negotiations and agreements, supporting low cost public charging points in public spaces, leveraging street infrastructure for charging and implementing public charging in urban planning.
- Capacity building through training to spur local assembly and manufacturing of EVs, charging infrastructure and ancillary services.
- Data on EVs is key to accelerating uptake, as better decisions can be made based on the available research. The data can help provide insights into infrastructure and policy questions.

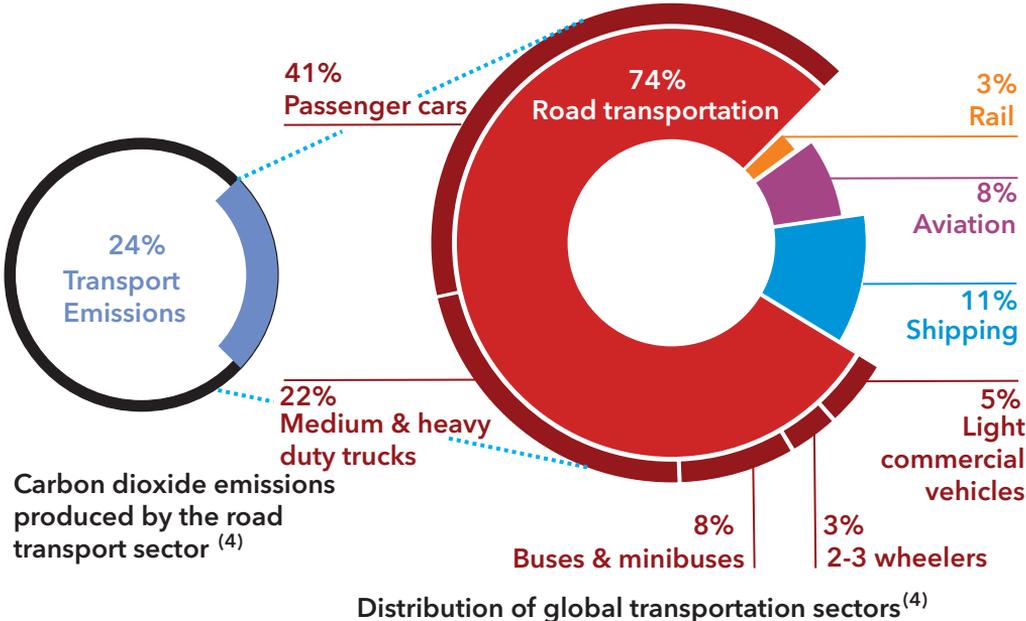
Notable presentations during the conference are as follows:

Panel 5: Role of private sector, financing in spurring growth of E-Mobility

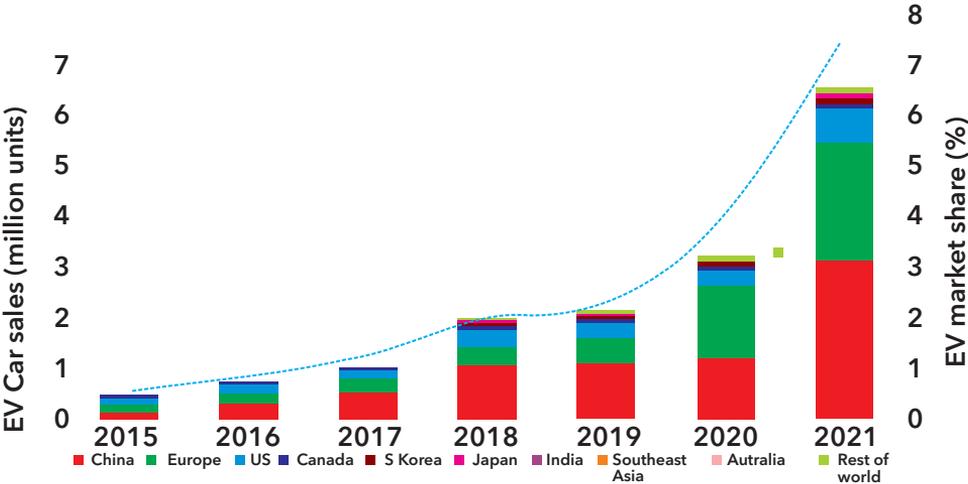
Key points:

- There are numerous business opportunities for oil marketing companies in E-Mobility. Partnerships between existing petrol stations and EV chargers will lead to smooth transition through making use of the existing facilities owned/leased by the petrol stations thereby lowering the initial capital cost of establishing the premises.

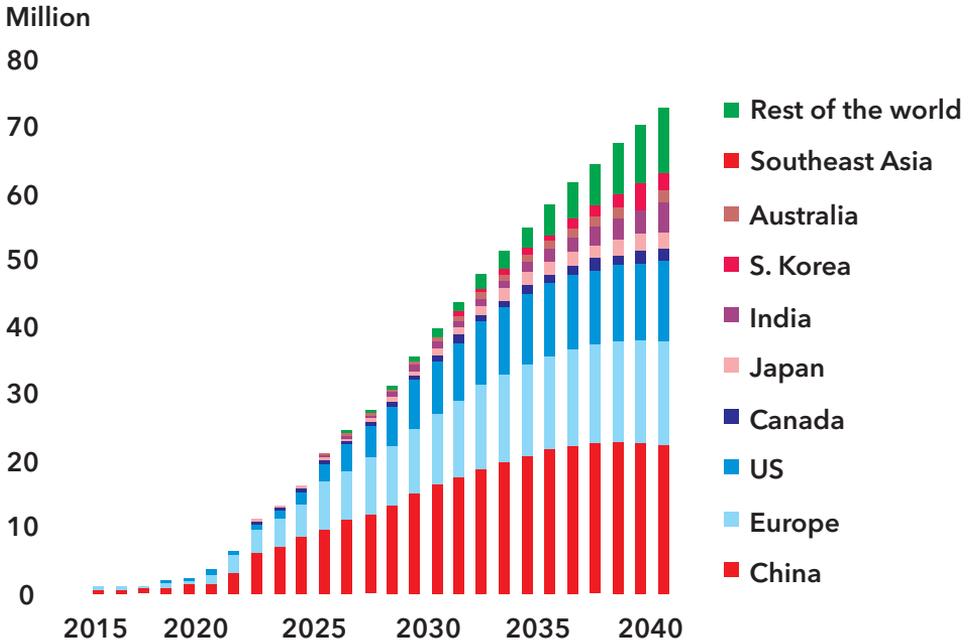
Contribution of emissions from transport sector and their distribution



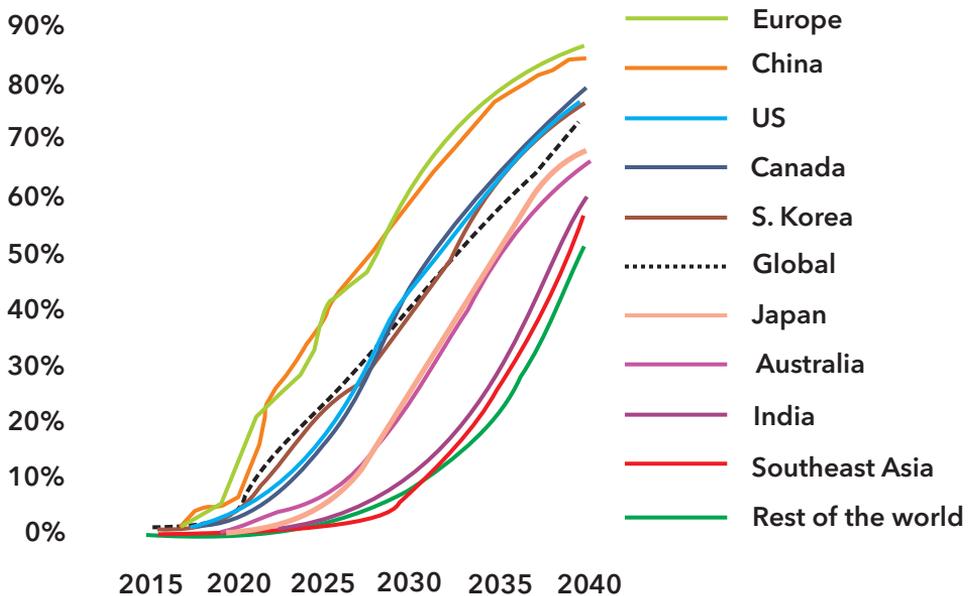
Global passenger EV sales and market share



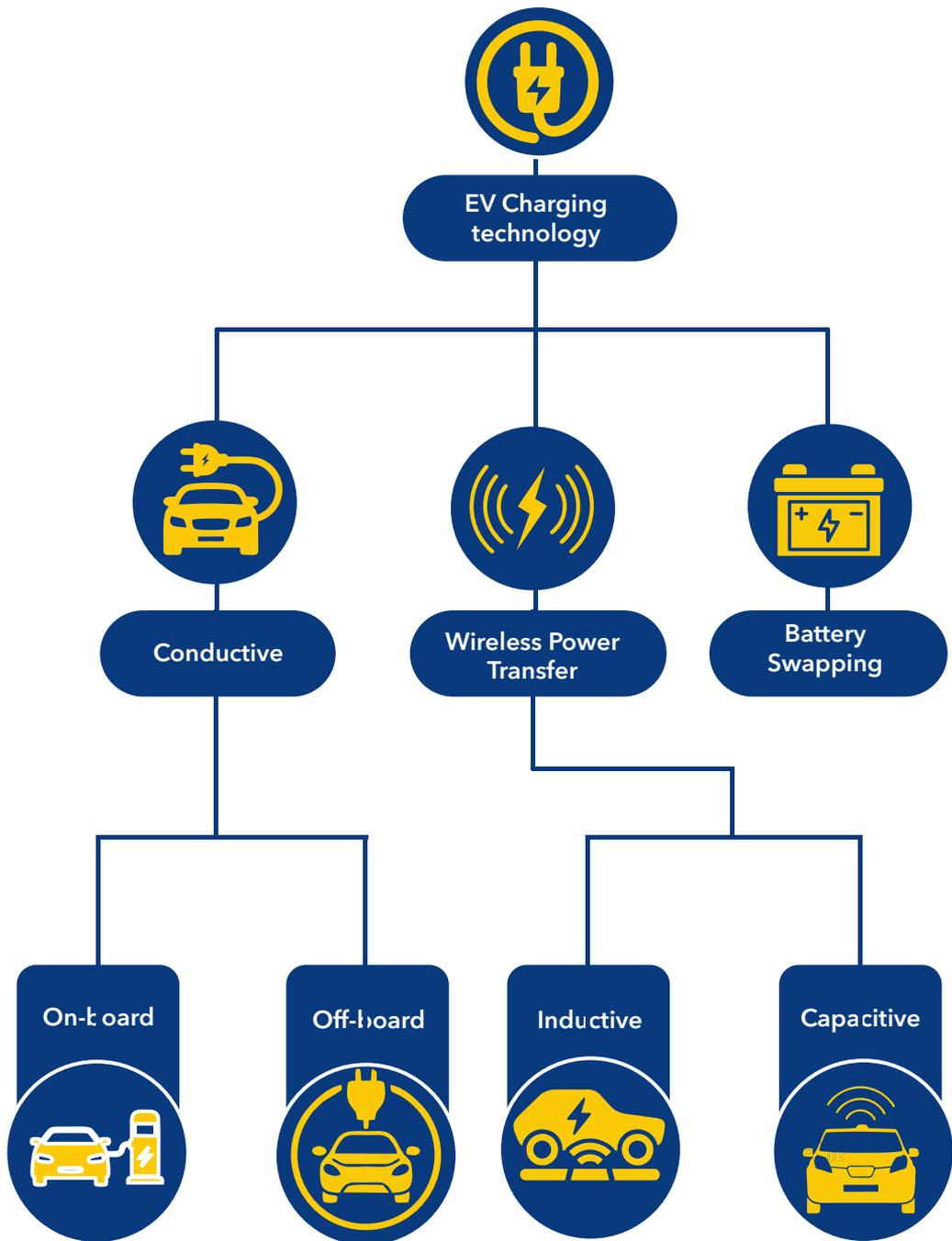
Global long-term passenger EV sales by market (1)



Global long-term EV sales share of passenger vehicle sales by market (1)



Classification of charging infrastructure



Descriptors of electric vehicle supply equipment

Classification in use	Level (SAE 01772)	Modes (ITC 61851-1)	Current	Power	Type per geographical area				Location within the city
					China	Europe	Japan	North America	
N/A	Level 1	Mode 1 and Mode 2	AC	≤3.7 kw	Devices installed in private household, the primary purpose of which is not recharging electric vehicles				Private homes and workplaces
Slow chargers	Level 2	Mode 3	AC	>3.7 kw and ≤22 kw	GB/T 20234 AC	IEC 62196- "Type 2"	SAE J1772- "Type 1"	SAE J1772- "Type 1"	Private homes, workplaces, public charging
			AC	≤22 kw	Telsa connector				
Fast charges	Level 3	Mode 4	AC Triphase	>22 kw and ≤43.5 kw	N/A	IEC 62196- "Type 2"	N/A	SAE J3068	Public charging and highways corridors
			DC	Currently <200 kw	GB/T 20234 DC	CCS Combo 2 Connector	CHAdeMo	CCS Combo 1 Connector	
			DC	Currently <150 kw	Telsa and CHAdeMo connectors				

As at March 2022, we had 27 EVCS in Kenya, 82% in Nairobi predominantly in shopping malls. The prevalent type of connector used is type 2 charger in most of these stations. (Source: University of Southampton)

In general, the TCO for Evs is better than for ICE vehicles

Example of Kenya 2W TCO, Q2 2021

Total Cost of Ownership (TCO) over 5 years (validated through pilot in Kenya in Q4 2021)

	Locally assembled ICE, \$	Locally assembled E2W, \$
Motorbike & accessories ¹	1,250	1,780
Maintenance ²	780	520
Fuel / charging ³	4,440	2,270
Residual value ⁴	-370	0
TCO	6,100	4,570

TCO of EVs vs ICE Vehicles (Courtesy of McKinsey & Company).

CONFERENCE MEDIA COVERAGE

The event themed “Powering E-Mobility in Kenya” attracted over 540 participants. Additionally, 16 organisations showcased their bespoke

technology and products in the local E-Mobility ecosystem. The conference attracted media coverage as shown below:



STAR
TRANSPORT
Kenya Power pushes on with e-mobility drive
Currently, the grid serves about 300,000 households at a cross-section of the high, medium, and low voltage networks

In Summary

Kenya power aims to deploy 15 e-motorcycle charging and swapping points at existing petrol stations in Nairobi with the possibility of extending the same to Kiambu.

Over the last three years, approximately 30 percent of the electricity dispatched to the grid comprises of clean energy generated through renewable sources



Business Sh24bn
Kenya Power stations can charge up to 500,000 EVs



Firm to tap idle power with e-cars
During off-peak hours late at night, demand drops to 1,300MW leaving bulk of power idle

allAfrica.com on MSN.com
Kenya Power Assures EV Investors On Power Demand Ability

Kenya Power has assured electric vehicle (EV) investors that it has enough energy capacity to meet demand from clean cars. It...



Forum discusses e-mobility sector

President Association for Electric Mobility & Development in Africa vice-president Warren Ombare, Kenya Power general manager commercial services and Innovation Officer, World Resource Institute India senior program manager on electric mobility Chaitanya Karanin, in a panel discussion during the inaugural e-mobility conference at the Safari Park Hotel, Nairobi yesterday. The conference brought together over 500 participants.

BUSINESS INSIDER AFRICA

Local Markets

Kenya is making huge strides in switching to electric vehicles

CHINEDU OKAFOR | February 7, 2023 4:40 PM

Kenya Power says has capacity to charge 100,000 electric cars






Inaugural e-mobility conference sets the stage for clean cars

From left: Kenya Power board chair Jay Banda Masinde and acting managing director Geoffrey Mutu, with BASIGO co-founder JJ Mututhuraya during the inaugural e-mobility conference at the Safari Park Hotel in Nairobi yesterday. (Our related story on page 6) [Nairobi Kenya](#)

E-MOBILITY STAKEHOLDERS CONFERENCE

7th & 8th FEB 2023



Kenya Power to convert its 2,000 vehicles to electric over 4 years



KENYA POWER'S MILESTONES IN DRIVING E-MOBILITY

2008 - First LPG forklifts

Kenya Power has been engaging in various initiatives geared towards E-Mobility. In 2008, KPLC brought in the first LPG forklifts primarily to address pollution in enclosed working spaces like stores and go-downs.

2016 - Electric forklifts

Later in 2016, KPLC added electric forklifts to the fleet. Having gone through the piloting and the findings found to be favorable for both forklifts and two-wheelers, all new forklifts and two-wheelers will be electric. Some of the ongoing and completed electric mobility projects in the company are as listed.

2021 - ENERGICA Project

The energy access and green transition collaboratively demonstrated in urban and rural areas in Africa (ENERGICA) is a European Union project where Kenya Power (through IESR) and other twenty-seven (27) project collaboration partners are scheduled to deploy about 15 e-motorcycle charging and swapping points at existing petrol

stations in Nairobi, with the possibility of replication in Kisumu. The project kicked off in 2021 and is to be implemented over a period of 4 years. The deployment of the pilot charging/swapping stations within fifteen Total petrol stations in Nairobi are planned to begin this year. Besides, the project will also focus on the modeling of grid network to analyze the impact of charging infrastructure on the national grid and develop strategies for demand side management.

2021 - UNEP electric bikes piloting and testing

In 2021, Kenya Power acquired sample (13) e-bikes from the United Nations Environmental

Program (UNEP) to test their performance and suitability for Kenya Power operations. This was within the precincts of a UNEP project that was aimed at promoting global transition to no and low emissions mobility for improved air quality and climate change mitigation. The project supported the demonstration pilots of electric 2&3 wheelers as well as the development of sustainable mobility policies in several countries including Kenya, Ethiopia, Uganda, Philippines, Thailand & Vietnam in order to foster the transition to electric mobility.



UNEP Pilot electric motorcycles (Courtesy - Xinhua News).

2022 - Launch of BasiGo electric passenger buses

Kenya Power being a strategic partner with BasiGo, joined in the flagging off of the first electric buses for passenger use in Nairobi. The electric buses are operated by Citi Hoppa and East Shuttle and ply various routes within the city. Kenya Power is expected to timely supply BasiGo's charging stations with the 3-phase power required for the passenger buses. BasiGo aims to deliver locally assembled electric buses in Kenya beginning in 2023, with over 1,000 electric buses set to be deployed by the end of 2025 in collaboration with BYD Bus Company.



Launch of electric buses

was to bring together sector stakeholders in order to understand the current sector status and help the company to coin its niche and develop strategies for creating an enabling environment for the E-Mobility sector.

ICT and Internet of Things (IoT) infrastructure requirement for E-Mobility

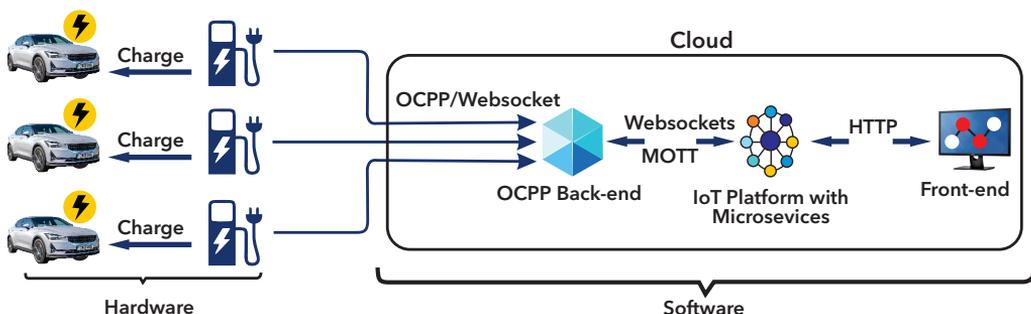
Internet of Things (IoT) and ICT enabled real-time status of an electric vehicle charging station can provide drivers with valuable information such as availability, reservations, and the

time to arrive at a specific station. It also allows collection, storage, and analysis of data from EV infrastructure. Since drivers typically charge their cars via Internet-connected applications, EV charging stations must be online at all times. However, as soon as a charging station goes offline, the central management system must be notified because understanding the real-time status of EV charging stations can provide valuable information. The diagram in the figure below depicts the hardware and software interactions in E-Mobility.

2023 - E-Mobility conference

To help accelerate the E-Mobility transition, Kenya Power organized an E-Mobility conference that took place on 7th and 8th of February 2023. The goal of the conference

Electric mobility system architecture





From left: Herman Kwoba (GIZ), Martin Eshiwani (Ministry of Transport), Gideon Oele (Ministry of Industrialization, Trade and Industry Development), Eng Robert Njoroge (KEBS) and Dr. Eng. Fenwicks Musonye (EPRA) during a panel discussion.



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KENYA POWER E-MOBILITY INITIATIVES

Governments all over the world are attempting to support the transition to e-mobility. The adoption of electric vehicles is a complex and unpredictable process that is unlikely to occur on its own. Some of the strategies adopted by Kenya Power to fast track adoption of E-Mobility in Kenya revolve around the following:

Grid Preparedness

As a Company whose main duty is to distribute electricity, we are aware that a reliable grid is critical in the adoption and growth of E-Mobility in the country. The Company has invested heavily in ensuring a stable and dependable grid, as well as automation to accommodate the exponential growth in our customer numbers, and to improve the flexibility of the grid and, in turn, the quality of power supply.

Today, we boast of an extensive grid totaling about 300,000 kilometers in circuit length of the high, medium, and low voltage networks, which serve over 9.1 million

customers, giving access to over 75% of the country's population in all 47 counties.

The county also prides itself in having over 90% of its energy being generated from clean/green sources. Presently, the country has an installed capacity of 3,321MW against a peak demand of 2,149MW. During off-peak, which happens late in the night, the demand drops to about 1,100MW. This means electric vehicles can charge at night.

The University of Massachusetts and the World Resource Institute recently carried out a study to evaluate the readiness of Nairobi's power grid to handle EV charging demand. The study found that Nairobi's current power infrastructure is strong enough to support the switch to electric of 100% of two-wheeler vehicles in the city. Further, the power infrastructure can fully support a similar switch of 10% of Nairobi's other vehicles, including private and commercial fleets, which are presently at approximately one million.

In addition, the research suggests that electrification of transport in Nairobi will be beneficial for the overall technical performance of the grid system as it would translate to a better utilisation of the system especially during off-peak hours.

Partnerships

To further support the adoption of EV in the county, Kenya Power has collaborated with several investors in the E-Mobility space. These include UNEP, whom the Company partnered to pilot e-bikes, electric bus investors like BasiGo and Roam whom we support in setting up charging stations, international partners like GIZ who funded our e-mobility conference, researchers and academicians whom we share knowledge in the e-mobility space, among others. The Company continues to embrace more partnerships so as to drive the uptake of the EVs in Kenya. Kenya Power has also established a liaison office which acts as our one-stop shop to champion the Company's

E-Mobility business. Through this office, Kenya Power is working with investors and stakeholders to support the development of the E-Mobility ecosystem. The Company is seeking further collaborations in areas of capacity building, charging infrastructure development, among others.

Converting ICE fleet to EVs

In order to take a lead role in the E-Mobility space, the Company plans to phase out Internal Combustion Engines (ICE) vehicles numbering approximately 2,000

from its fleet within the next four years. This will entail the purchase of new electric vehicles and motorbikes.

Supporting formulation of pro-E-Mobility policies

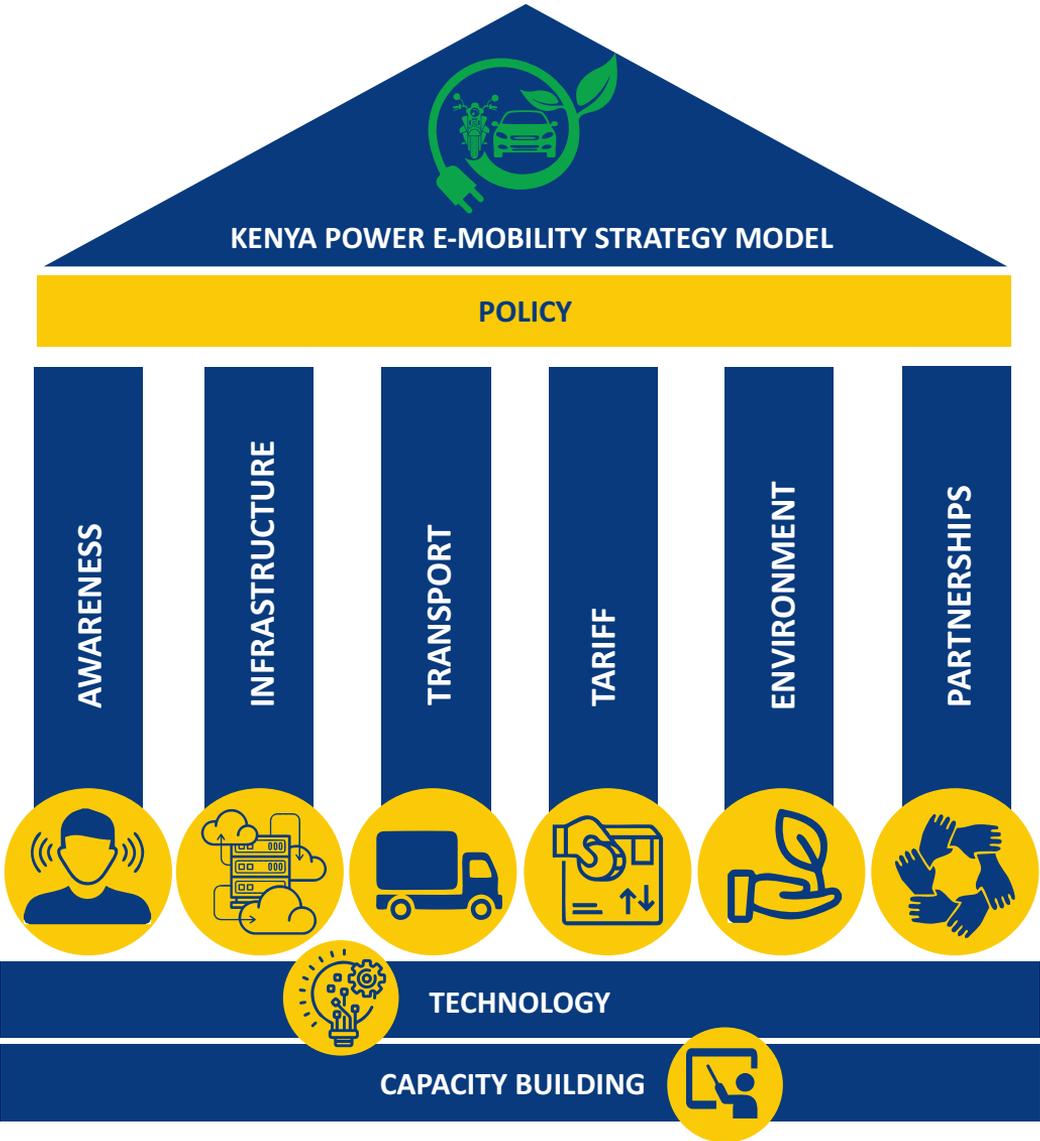
Kenya Power is working with stakeholders to develop an affordable and sustainable tariff for e-mobility. The time of use tariff will encourage uptake of e-mobility and charging at night when load demand is low. The Company remains committed in supporting any other policies or regulations that would encourage the uptake of EV in the country.

Awareness

In order to help demystify E-Mobility, the Company remains committed in raising awareness through various fora including local and international conferences, establishment of exhibitions and demonstration zones especially for e-bikes and home chargers in our banking halls in partnership with willing stakeholders, youth education and professional development, awards and recognition among others.



KENYA POWER E-MOBILITY STRATEGIC PILLARS



KEY OBSERVATIONS BY CONFERENCE STAKEHOLDERS

- 1** Incentives and concessions- lowering duties and exemption of VAT to make the vehicles affordable. This will also encourage investment by E-Mobility manufacturers, dealers and sellers. To enable local manufacturing and assembly, the duties/taxes and other levies for the raw materials or knocked-down kits could be reduced thereby also creating job opportunities. The Government should also be more involved in E-Mobility milestones setting and regulations to create an enabling environment for the growth of the sector in the country.
- 2** Capacity building in E-Mobility will improve the skillsets in the sector that will enable better production, deployment and adoption of new technologies.
- 3** All stakeholders including the relevant ministries (trade, energy, Transport) should engage more to achieve the necessary synergies for the growth of the sector. At the same time, increased collaborations with existing oil marketing companies and petrol stations (about 4200 in Kenya) should be encouraged for provision of space for charging stations.
- 4** Development of technology integration in E-Mobility with payment systems, mobile payments, VISA/Master Card and charger locator apps should be enhanced. Through technology integration, more data can be made available for better analytics especially if a central repository or portal for data storage is included in the deployment. Also, development of open standards e.g. Open Charger Protocol standard should be prioritised
- 5** More research on the following: battery life, secondary usage, effects of temperature on battery performance, effects of chargers on the power system, potential vandalism on chargers and batteries, lithium cell technology, effect topography on EV performance. More research on the best financial models for accelerating E-Mobility adoption.
- 6** Need for integrated Urban development plan- e.g. by NAMATA to help in optimal charger placement. There is also need for urban mobility plan upgrade to accommodate E-Mobility.
- 7** Establish a focal point for questions or information on E-Mobility e.g. Huduma Center model.
- 8** Suggestion to public transport owners to use bigger capacity buses that can carry more passengers. This will reduce congestion and make traffic flow smoother.
- 9** Utilities to consider using existing infrastructure such as streetlights poles to support electric charger deployment.

VOTE OF THANKS

On behalf of the Kenya Power's E-Mobility committee, I would like to express our appreciation to the following:

- The main sponsors, GIZ, without whose financial, technical and material support this event would not have been possible
- Ministry of Energy and Petroleum for their commitment to providing an enabling environment for eMobility within the country
- Board of Directors of Kenya Power for fully embracing eMobility and making it a key strategic initiative within Kenya Power
- Management of Kenya Power for their cross functional collaboration to ensure that the conference is a success
- VIPs including senior government officials, ambassadors, governors, directors and CEOs for gracing the event
- All speakers and presenters for sharing lots of useful insights and recommendations in various aspects of E-Mobility
- All moderators for expertly guiding the panel discussions and bringing out the key points in each area of interest
- All the participants who attended the event and listened patiently through all the presentations, and engaged the speakers with questions and comments
- All exhibitors for showcasing their products and services in a very practical way thus enabling participants to directly see, touch and feel E-Mobility
- Safari Park Hotel for their conference facilities and services
- The event organising committee led by Kevin Sang, Communications Manager Kenya Power
- All event service providers led by IMG Events & PR
- All media houses, journalists and bloggers who attended the event and gave it great coverage on their various platforms
- My fellow E-Mobility Committee members for their dedication to making Kenya Power and Kenya a center of excellence for E-Mobility
- The Almighty God for enabling us to have a safe, secure and successfully event

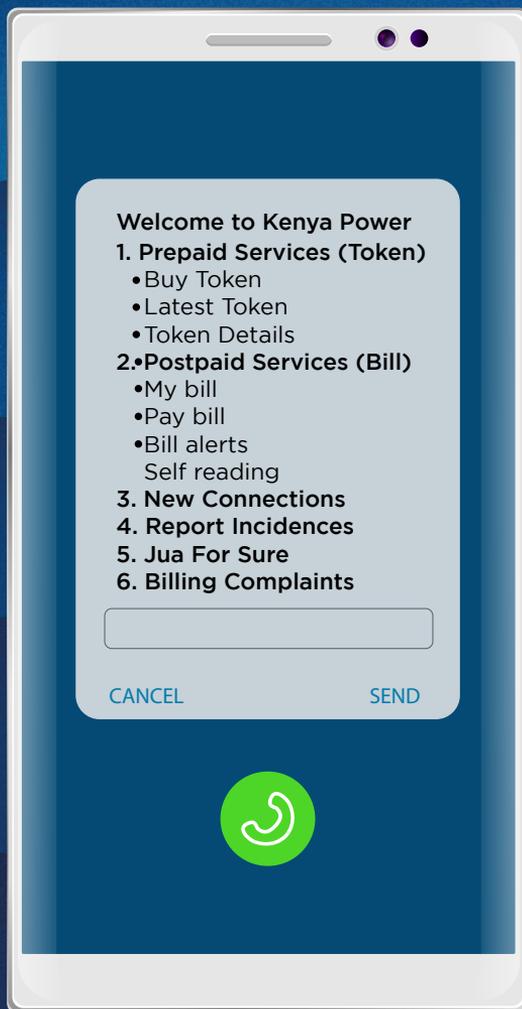
This will be an annual event and we look forward to seeing you at the next event to be held on 6th - 7th February 2024.

Regards,

Robert Mugo,
Chair, Kenya Power E-Mobility
Committee

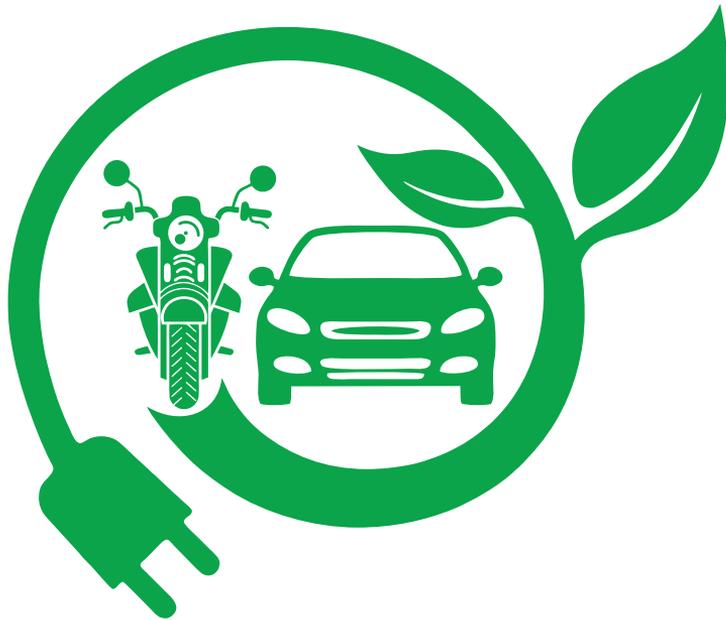
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