Energy & Petroleum Regulatory Authority

ELECTRIC VEHICLE CHARGING AND BATTERY SWAPPING INFRASTRUCTURE GUIDELINES

CONTENTS

IN EXERCISE of the powers conferred by section 11(a)(c)(d), 121(1), 148(1), 151(2) and 163(4) (1) of the Energy Act, 2019, the Authority makes the following Guidelines:-

CITATION AND COMMENCEMENT

These Guidelines may be cited as the Electric Vehicle (EV) Charging and Battery Swapping Infrastructure Guidelines, 2023.

DEFINITION OF TERMS

"Battery Charging Station (BCS)" means a station where the discharged or partially discharged electric batteries for electric vehicles are electrically recharged.

"Battery Swapping Station (BSS)" means a station where any electric vehicle can get its discharged battery or partially charged battery replaced with a charged battery.

"Battery Management System (BMS)" means a system that monitors and manages a rechargeable battery (or group of batteries).

"Charging Bay" means a designated area or space where electric vehicles can be parked and connected to a charging point.

"Charging Point" – also known as an Electric Vehicle Supply Equipment (EVSE), means a component or device in Electric Vehicle Charging Infrastructure (EVCI) that supplies electrical energy for recharging the battery of electric vehicles. A charging point may have one or several connectors to accommodate different connector types.

"Charging Point Operator (CPO)" means an entity that installs and manages the operations of the charging infrastructure. A CPO may own the charging infrastructure or provide services on behalf of the charge station owner.

"Charging Station" means a site or location with one or more charging points that allows electric vehicles to charge.

"Connector" means a cable that connects an EV vehicle to an electric charging point.

"Electric Vehicle" means a vehicle that is capable of being propelled by electrical power derived from a storage battery.

"Electric Mobility Service Provider (e-MSP)" means an entity with which the EV driver contracts for all services related to electric charging. The e-MSP has various responsibilities; from providing charging passes/cards, applications to locate and navigate charging stations, billing and invoicing and customer management.

"Internet of Things (IoT)" means the network of physical objects/devices/equipment that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet.

"Public Charging Station (PCS)" means an EV charging station where any electric vehicle can get its battery recharged.

"Smart Charging" means a charging system where electric vehicles, charging stations and charging operators share data connections.

"Warranty" means a document of assurance or guarantee given to the purchaser or system owner by a manufacturer, vendor or installer, as the case may be, stating that a product or installation will perform as stated, is reliable and free from known defects and that the manufacturer, vendor or installer shall, without charge, repair or replace defective parts within a given time limit and under certain conditions.

LIST OF ACRONYMS

BCS	Battery Charging Station
BMS	Battery Management System
BSS	Battery Swapping Station
CPO	Charging Point Operator
E-MSP	Electric Mobility Service Provider
EPRA	Energy and Petroleum Regulatory Authority
EV	Electric Vehicle
EVCI	Electric Vehicle Charging Infrastructure
EVSE	Electric Vehicle Supply Equipment
FCB	Fluid Cooled Batteries
IoT	Internet of Things
KEBS	Kenya Bureau of Standards
OMCs	Oil Marketing Companies
PCS	Public Charging Station
RO	Retail Outlet

INTRODUCTION

The Government of Kenya has undertaken multiple initiatives to promote manufacturing and adoption of electric vehicles as the country endeavours to achieve its energy transition goals. The Kenya Kwanza administration's Bottom-Up Economic Transformation Plan 2022-2027 (also known as the Bottom-Up Economic Transformation Agenda (BETA), envisages that the Government will construct 1000 electric vehicle charging stations. It is envisaged that there will be 700 in urban areas and 300 along highways.

The importation of electric vehicles in the country began about ten years ago and has mainly been driven by the private sector. There has been a slow uptake of EVs partly due to the following:

i. Electric vehicles are being deemed expensive compared to internal combustion engine models.
ii. A lack of clarity on the availability of sustainable and affordable energy for electric vehicles.
iii. Accessibility issues are caused by inadequate charging infrastructure.

With Government support, electric vehicles have started to penetrate the Kenyan market. However, there is currently no framework that encourages uptake and penetration through an enabling framework. The Authority has therefore developed the Electric Vehicle (EV) Charging and Battery Swapping Infrastructure Guidelines, 2023. These Guidelines summarise key considerations when siting, designing, installing, and operating electric vehicle charging points and stations.

PURPOSE

The purpose of these Guidelines is:

i. To make electric vehicle charging infrastructure accessible to all users.
ii. To enable faster adoption of electric vehicles in Kenya by ensuring safe, reliable, accessible, and affordable charging infrastructure and eco-system.
iii. To promote affordable tariffs chargeable from Electric Vehicle (EV) owners and Charging Station Operators/ Owners.
iv. To generate employment/income opportunities for small entrepreneurs.
v. To proactively support the creation of EV Charging Infrastructure in the initial phase and eventually create a market for the EV Charging business.
vi. To encourage the preparedness of Electrical Distribution Systems to adopt EV Charging Infrastructure.
vii. To create uniformity and certainty towards accelerated adoption of EVs in the Country.

SCOPE

These Guidelines apply to individuals, firms, and institutions intending to install, operate and maintain a Public/Private Charging Station and Battery Swapping Stations. The Guidelines will also apply to users where applicable.

GUIDELINES

1. Public Charging Infrastructure Requirements

1.1 Any person intending to install a PCS shall be a required to apply to the Authority for an electricity retail supply license prior to such installation.

1.2 Any person seeking to set up a PCS may apply for connectivity on the specified area of supply and will be provided with connectivity on priority basis by the Electric Distribution Licensee. Any Charging Station/Chain of Charging Stations may also obtain electricity from any generation licensee through open access arrangement.

1.3 Every PCS shall have the following minimum infrastructure:

i. An exclusive transformer and/or electric supply line with all related supply equipment including safety appliances, as required by the Kenya Grid Code.

ii. Appropriate cabling and electrical works ensuring safety and stability of electricity grid.

iii. Appropriate civil works.

iv. Adequate space for charging and entry/exit of vehicles.

v. Appropriate fire protection equipment and facilities.

vi. Appropriate public amenities.

vii. Practice generally accepted international standards.

viii. The PCS shall have, one or more chargers or any combination of chargers from the table below:

Charger Type	Charger Connectors	Rated Output Voltage (V)	No. of Connector Guns (CG)	Charging Vehicle Type(W=wheeler)
Fast Charge (DC & AC)	Combined Charging System (CCS) (> 50 kW) - DC	200-750 or higher	1 CG	4W
	CHArgedeMOve (CHAdeMO) (> 50 kW) - DC	200-500 or higher	1 CG	4W
	Type-2 AC Three - Phase (> 22 kW)	380- 415	1 CG	4W, 3W, 2W
Moderate and Slow Charge (AC)	Type-2 AC (> 22 kW)	380- 415	1 CG	4W, 3W, 2W
	Type-2 AC >3.7kW and ≤ 22kW	380- 415	1 CG	4W, 3W, 2W

The CS may have options for installation of additional charging points if required.

ix. The CS for two/three wheelers shall be free to install any chargers other than those specified in the table above subject to compliance with technical and safety standards as laid down by the Kenya Bureau of Standards (KEBS) and EPRA.

x. The PCS/CPO shall tie up with at least one online e-MSP to enable advance remote/online booking of charging slots by EV owners. Such online information to EV owners should also include information regarding location, types, and numbers of chargers installed/available and so on.

xi. The PCS shall share charging station data with appropriate electric power distribution licensees and maintain appropriate protocols as prescribed by such companies for this purpose. The Authority shall have access to this data.

xii. Where a fast/rapid charging facility is also planned to be provided at the PCS, the following additional infrastructure shall be provided:

a) Appropriate Liquid Cooled cables if High-Speed Charging Facility for onboard charging of Fluid Cooled Batteries (FCBs) is also planned.

b) Appropriate Climate Control Equipment for Fast Charging of Batteries to be used for swapping.

1.4 A Charging Point Operator/owner shall ensure that the workforce installing, maintaining, and operating chargers have appropriate licenses, certifications, and training to ensure that the installation, operation, and maintenance of chargers are performed safely and meet public safety standards.

1.5 No PCS shall be operational without inspection, testing and issuance of a completion certificate issued by a licensed electrical contractor/inspector.

1.6 The Charging Points shall be certified and type-approved/tested by KEBS or any other accredited agency.

1.7 A CS may be installed in residential estates, malls, office complexes, restaurants, hotels, and other similar premises.

1.8 The PCS may have the option to add stand-alone battery swapping facilities provided space and/or other conditions permit.

2. Private Charging Infrastructure Requirements

2.1 Private charging at residences/offices shall be permitted.

2.2 The minimum public charging infrastructure requirements in Clause 1.3 do not apply to Private Charging Points meant for the self-use of individual EV owners (non-commercial basis).

2.3 Captive charging infrastructure for 100% internal use for a company's own/leased fleet for its own use will not be required to install chargers that have tie-ups with e-MSPs.

2.4 The fast/rapid Charging Stations which are meant only for 100% in-house/captive utilization, for instance, buses of a company, would be free to decide the charging specifications as per requirement for its in-house company.

2.5 Charging Points shall be certified and type-approved/tested by KEBS or any other accredited agency.

2.6 Private charging infrastructure shall be operational only after inspection, testing and issuance of a completion certificate issued by a licensed electrical contractor/inspector.

2.7 A separate metering arrangement shall be made for charging points so that consumption may be recorded and billed as per the applicable tariff for EV charging.

3. Battery Swapping Stations Requirements

3.1 The provision of adequate space for charging and swapping of batteries.

3.2 The batteries are required to be BMS-enabled for efficient battery monitoring, data analysis, and safety. The battery swapping provider shall ensure that appropriate BMS is in place to protect the battery from conditions such as thermal runaway.

3.3 To ensure battery safety and security of assets, swappable batteries will be equipped with advanced features like IoT-based battery monitoring systems, remote monitoring & immobilisation capabilities, and other required control features.

3.4 To implement unique traceability across the battery lifecycle, a UIN shall be assigned at the manufacturing stage for tracking and monitoring EV batteries. An appropriate system may be applied which is tamper-proof and allows centralised monitoring.

3.5 The standard or methodology and the detailed definition of the UIN system for EV batteries shall be as approved by the relevant authorities.

3.6 Battery swapping operators shall store the usage history and required performance data of the battery with UIN during EV application, and data must be maintained to facilitate the traceability of EV batteries during the entire lifecycle.

3.7 A UIN number shall also be assigned to each Battery Swapping Station.

3.8 Swappable batteries and charging infrastructure shall be tested and certified as per standards developed or approved by KEBS for safety.

3.9 Battery Swapping Station operators shall ensure that the workforce installing, operating and maintaining chargers has appropriate licenses, certifications, and training to ensure that the installation, operation and maintenance of chargers and swappable batteries are performed safely.

3.10 Every Battery Swapping station shall only be operational after inspection, testing and issuance of a completion certificate issued by a licensed electrical contractor/inspector.

4. Installation Documentation, Warranty, and Insurance

4.1 Installers of charging points and/or battery swapping stations shall upon completion of electrical installation work issue the system owner or operator with the following documentation:

i. A completion certificate including a declaration that the system owner/operator has been trained on the safe use and maintenance of the charging point(s) and tests results of commissioning tests,
ii. The “as built” system design and drawings,
iii. Warranties on the charging infrastructure and accessories issued by the manufacturer or vendor.
iv. A warranty for the installation workmanship of not less than one year from the date of commissioning, and
v. Appropriate operations and user manuals.

4.2 The person installing the charging points and/or battery swapping stations may need to take and maintain professional indemnity insurance during the installation process.

5. Location and Database of Public Charging Stations

5.1 In the case of Public Charging Stations, the following minimum requirements are laid down regarding density/distance between two charging points:

i. At least one Charging Station should be available in a grid of 3 Km X 3 Km. Additionally, one Charging Station shall be set up at every 25 Km on both sides of highways/roads.
ii. For long range EVs (like long range SUVs) and heavy duty EVs such as buses/trucks, there should be at least one Fast Charging Station with appropriate

charging infrastructure at every 100 Kms, one on each side of the highways/road located preferably within/ alongside the charging stations. Within cities, such charging facilities for heavy duty EVs shall be located within bus stops. The swapping facilities are also not mandatory within cities for buses/trucks.

5.2 Additional public charging stations shall be set up in any area only after meeting the above requirements.

5.3 The appropriate government(s) (both national and counties) may also give priority to existing Retail Outlets (ROs) of Oil Marketing Companies (OMCs) for installation of Public EV Charging Stations in compliance with the applicable safety requirements as laid above.

5.4 The Authority shall create and maintain a national online database of all the PCS through electricity distribution companies. Appropriate protocols shall be notified by distribution companies for this purpose which shall be mandatorily complied by the PCS and BSS.

6. Signage, Markings and Accessibility Considerations

6.1 When installing charging points, Charging Point Operators/Owners must install appropriate signage and pavement markings to guide motorists and ensure safety. The charging infrastructure shall be installed in a convenient location, well-lit and equipped with appropriate gadgets to prevent vandalism.

6.2 The charging station should be designed in such a manner that it is accessible, easy to use, and safe for all motorists including persons living with disabilities.

7. Tariff for Supply of Electricity to EV Public and Private Charging Stations/Points

7.1 The tariff for the supply of electricity to EV charging stations shall be as approved and gazetted by EPRA. This tariff shall be applicable for Battery Swapping Stations.

7.2 The tariff applicable for E-mobility shall also be applicable for domestic charging.

7.3 Separate metering arrangements shall be made for charging stations/points so that consumption may be recorded and billed as per the applicable tariff for EV charging.

8. PCS/BSS Charging Price and Payment Method

8.1 PCS/BSS charging of EVs is a commercial service.

8.2 Prices charged by PCS/BSS shall be just and reasonable, non-discriminatory and the tariff determination shall be transparent.

8.3 The Authority may cap the price to be charged by PCS/BSS to end users as electricity is being provided at concessional rates.

8.4 A Charging Point Operator shall clearly display the price and all its components at all publicly accessible charging stations to inform the end users before charging. At least the following price components, if applicable at the charging station, shall be clearly displayed:

i. price per kWh,
ii. price per minute,
iii. price per session.

Unless charging is permanently provided free of charge to customers, charging stations must provide secure payment methods, accessible to persons with disabilities, which at a minimum shall include a contactless payment method that accepts major debit and credit cards, and either an automated toll-free phone number or a short message/messaging system (SMS) that provides the EV charging customer with the option to initiate a charging session and submit payment.

9. Charge Point Measuring System

9.1 A public charge point shall be configured so that on each occasion it is used, it measures/calculates and records—

i. the electricity it has imported or exported.

ii. the amount of time for which it is importing or exporting electricity.

9.2 A public charge point shall be configured so that—

i. a figure measured or calculated in accordance with 9.1 is accurate to within 5% of the actual figure; and

ii. any inaccuracies are not systematic. For the purposes of these Guidelines, an inaccuracy is systematic if, as a consequence of the design or manufacture of the charge point, it is consistent or predictable.

10. Smart Functionality

10.1 Every public charge point shall have a smart functionality.

10.2 A public charge point has a smart functionality if:

i. It is able to send and receive information via a communication network;

ii. It can respond to signals or other information received by it by:

a) increasing or decreasing the rate of electricity flowing through the charge point.

b) changing the time at which electricity flows through the charge point.

iii. it is capable of using the functionality referred to in (i) and (ii) above to provide demand side response services.

iv. at least one user interface is incorporated in the charge point or otherwise made available to the owner.

11. EV Charging Infrastructure Communication

11.1 A charging point shall communicate with a charging network via a secure communication method.

11.2 Charging points shall remain functional if communication with the charging network is temporarily disrupted, such that they initiate and complete charging sessions.

11.3 Charging points and charging networks shall securely measure, communicate, store, and report energy and power dispensed, real-time charging-port status, real-time price to the customer, and historical charging-port uptime.

11.4 A charging network shall be capable of communicating with other charging networks to enable an EV driver to use a single method of identification to charge at charging stations that are a part of multiple charging networks.

11.5 Charging networks shall be capable of secure communication with electric utilities, other energy providers, or local energy management systems.

12. Customer Service, Data Privacy, Data Sharing and Security

12.1 PCS and BSS operators shall ensure that EV charging customers have mechanisms to report outages, malfunctions, and other issues with charging infrastructure.

12.2 PCS and BSS operators must collect, process, and retain only the personal information strictly necessary to provide the charging service to a consumer, including information to complete the charging transaction and to provide the location of charging stations to the consumer.

12.3 PCS and BSS operators shall ensure that the following data fields are made available, free of charge, to third-party software developers, through the application programming interface:

i. Unique charging station name or identifier
ii. Location of the charging station
iii. Charging station operator name
iv. Charging network provider name
v. Charging station status (under construction, operational, decommissioned)
vi. Charging station access information
vii. Number of charging ports
viii. Connector types available by port
ix. Charging level by port (DCFC, AC Level 2, etc.)
x. Real-time status by port
xi. Pricing and payment information.

12.4 PCS and BSS operators shall implement physical and cybersecurity strategies consistent with their respective EV infrastructure deployment plans to ensure charging station operations protect consumer data and protect against the risk of harm to, or disruption of, charging infrastructure and the electricity grid.

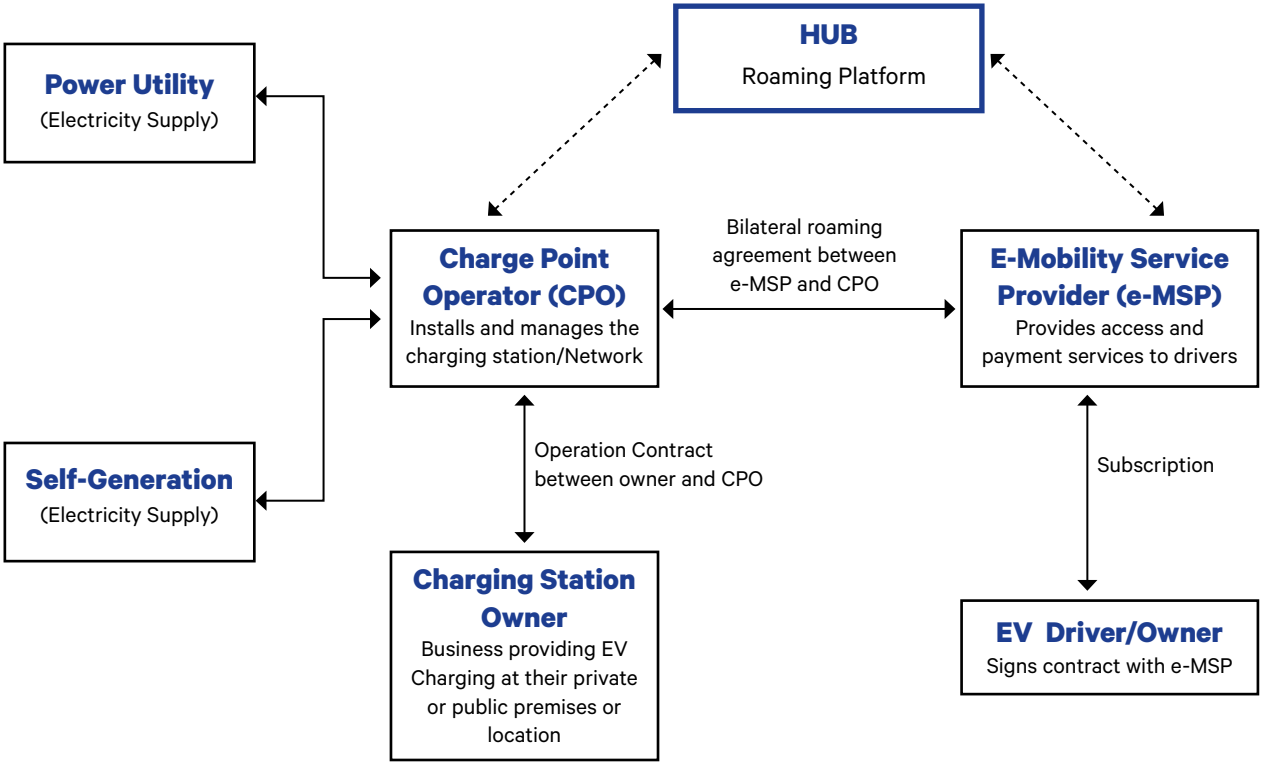
13. Complaints and Dispute Resolution

Any complaints involving or between; electric vehicle owners, charging station operators, battery swapping service providers, and other relevant entities may submit such complaints to the Authority. Complaints and dispute handling shall be in accordance with the Energy (Complaints and Disputes Resolution) Regulations 2012

EFFECTIVE DATE

The effective date of the guidelines shall be 1st September 2023.

APPENDIX I: ELECTRIC VEHICLES CHARGING ECOSYSTEM



CONTACT US

Head office
Energy and Petroleum Regulatory Authority
Eagle Africa Centre, Longonot Rd, Upperhill
P. O. Box 42681-00100 GPO, Nairobi
Telephone: +254 709 336 000
Email: info@epra.go.ke
Website: www.epra.go.ke

North Rift Region – Eldoret
7th Floor, Eldoret Daima Towers
P. O. Box 6950-30100
Eldoret
Tel: 020 7859465

Nyanza & Western Region - Kisumu
2nd floor, Lake Basin Mall
P. O. Box 7540-40100
Kisumu
Tel: 020 7859356

Central Region - Nyeri
4th Floor, KDS Centre, Kimathi Way
P. O. Box 1670-10100
Nyeri
TEL: 066 2321859

North Rift Region – Lodwar
Former WFP Office, Along Lodwar Airport Road,
P. O. Box 447 – 30500,
Lodwar
020 7859356

Coast Region - Mombasa
3rd floor, Kilindini Plaza Building, Moi Avenue
P. O. Box 83315-80100
Mombasa
Tel: 066 2322946

North Eastern Region – Isiolo
BarsalingaTowers, 2nd Floor Along Isiolo
Moyale Road.
P. O. Box 55 – 60300,
Isiolo
Tel: 020 7859356

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