

Compendium of Recommendations on Policy Interventions in EV Charging Infrastructure - Kerala RIGHT TO CHARGE

SOCIETY OF ENERGY ENGINEERS AND MANAGERS

ENERGY MANAGEMENT CENTRE

INTERNATIONAL COPPER ASSOCIATION INDIA

CONTENTS

ABBREVIATIONS	2
PRELUDE	5
EXECUTIVE SUMMARY	7
1. INTRODUCTION	
1.1. Objectives of RTC Project	
1.2. Project Milestones	
1.3. Summary of Existing Policies and Guidelines	
1.3.1. Policy Roadmap for EV Charging Infrastruc	cture in India13
1.3.2. State Specific Policies – Kerala	
2. EXISTING PROCESS FOR EV CHARGING STATI	ON INSTALLATION AND
ENERGIZATION	
2.1 HOME CHARGING	
2.1.1 STEPS FOR INSTALLING AN EV CHARC	GING STATION AT HOME42
2.2 PUBLIC CHARGING STATIONS	
2.2.1 INFRASTRUCTURAL REQUIREMENTS	FOR SETTING EV CHARGING STATION
45	
2.2.2 STEP-BY-STEP PROCESS FOR PUBIC CI	HARGING STATION INSTALLATION46
2.2.3 ANERT E MOBILITY SUBSIDY - SOLAR	CHARGING STATIONS FOR ELECTRIC
VEHICLES	65
2.3 CAPTIVE CHARGING STATION	
2.3.1 EXISTING PROCESS FOR CAPTIVE CHA	ARGING STATION INSTALLATION75
3. RECOMMENDATIONS	97
3.1 FEEDBACK FROM STAKEHOLDERS, RELI	EVANT POLICY GUIDELINES AND
RECOMMENDATIONS	97
3.2 SUMMARY OF RECOMMENDATIONS	
3.3 ACTION PLAN ON RECOMMENDATIONS.	
4. FREQUENTLY ASKED QUESTIONS	
5. GLOSSARY	





society of energy engineers and managers सीम्प्seem

ABBREVIATIONS

AC	:	Alternating Current	
AIS	:	Automotive Industry standards	
ANERT	:	Agency for New and Renewable Energy Research	
		and Technology	
ARAI	:	Automotive Research Association of India	
BCS	:	Battery Charging Station	
BEE	:	Bureau of Energy Efficiency	
BEV	:	Battery Electric Vehicle	
BHEL	:	Bharat Heavy Electricals Limited	
BMS	:	Battery Management system	
CCS	:	combined charging system	
CCS	:	Captive Charging Station	
CEA	:	Central Electricity Authority	
CHAdeMO	:	CHarge de Move	
СРО	:	Charge point operator	
DC	:	Direct Current	
DISCOM	:	Distribution Company	
DHI	:	Department of Heavy Industries	
EESL	:	Energy Efficiency Services Limited	







ELCB	:	Earth Leakage Circuit Breaker	
EV	:	Electric Vehicle	
EVSE	:	Electric Vehicle Supply Equipment	
FC	:	Fast Charging	
FCEV	:	Fuel Cell Electric Vehicle	
FCS	:	Fast Charging Station	
GO	:	Government Order	
G2V	:	Grid to Vehicle	
HEV	:	Hybrid Electric Vehicles	
HT	:	High Tension	
IBR	:	Indian Building Rule	
IEC	:	International Electrotechnical Commission	
KMBR	:	Kerala Municipal Building Rule	
KPBR	:	Kerala Panchayath Building Rule	
KSEBL	:	Kerala State Electricity Board Limited	
KSERC	:	Kerala State Electricity Regulatory Commission	
KSRTC	:	Kerala State Road Transport Cooperation	
Li-ion	:	Lithium-ion	
LT	:	Low Tension	
MBBL	:	Model Building Bye Laws	
MoHUA	:	Ministry of Housing and Urban Affairs	
MoP	:	Ministry of Power	







NEMMP	:	National Electric Mobility Mission Plan	
NH	:	National Highway	
NiMH	:	Nickel metal hydride	
NSP	:	Network Service Provider	
NTPC	:	National Thermal Power Corporation Limited	
OEM	:	Original equipment manufacturer	
PCS	:	Public Charging Stations	
PEVCS	:	Public Electric Vehicle Charging Station	
PHEV	:	Plugin Hybrid Electric Vehicle	
REIL	:	Rajasthan Electronics & Instruments Limited	
SC	:	Slow Charging	
URDPFI	:	Urban and Regional Development Plans	
		Formulation and Implementation	
V2G	:	Vehicle to Grid	





International Copper Association India Copper Alliance



PRELUDE

India has some of the most polluted cities in the world, with vehicular emissions being a major contributor. Shifting to electric mobility will help India save nearly one giga tonne of carbon dioxide emissions by 2030. Each electric vehicle on the road helps in reducing the harmful air pollution for the younger generations to come. The global market for electric vehicles is expected to grow from 8.1 million units to 39.21 million units by 2030.

The Indian government has also introduced various incentives and policies to promote the adoption of EVs, such as tax exemptions, subsidies, and the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme. These initiatives have encouraged the development and adoption of EVs in India, leading to a growing market for electric cars, two-wheelers, and buses.

With the increasing popularity of EVs, the demand for charging infrastructure has also grown, highlighting the need for the development of a robust network of charging stations across the country. But India may not have enough infrastructure to cater to the demand from the rising number of electric vehicles. As of January 23, 2023, India had 5,254 public electric vehicle (EV) charging stations, to cater to a total of 20.65 lakh EVs. This is according to the data revealed in Lok Sabha by Minister RK Singh and the Vahan dashboard. This means for every 393 electric vehicles in the country, there is one public charging station.

To address this issue, the "Right to Charge" campaign has emerged, advocating for the right of EV owners to access charging infrastructure easily and affordably. This campaign is crucial in promoting the transition to a cleaner and more sustainable transportation system in India. The Right to Charge (RTC) Campaign aims to develop a public-private partnership between state/local self-government bodies and private entities to set up charging infrastructure in public/private domain. International Copper Association India (ICAI) identified Charging infrastructure as one of the critical barriers to the mass adoption of EV's in India. The campaign seeks to involve policymakers that have already committed to the Government of India's Go Electric Campaign and state-based intended targets toward developing a low-carbon transportation network.







ICAI is committed to improving the quality of life through better electrical safety, energy efficiency, clean energy and sustainability. ICAI was set up in 1959 and has been working with the objective to grow the markets for copper based on its superior technical properties. ICAI is involved in developing a public-private partnership between state/local bodies and private entities within the country to facilitate the setting up of a sufficient number of charging stations in the public domain under governmental and non-governmental ownership.

ICAI deliberated to associate with appropriate agencies in Kerala to carry out this campaign. As a professional body, Society of Energy Engineers and Managers (SEEM) was identified as an organization with synergistic values aligning with the project objectives. SEEM is the national professional body of Certified Energy Managers, Auditors, and other energy professionals in the country established in 2005 and registered under the Charitable Societies Act 1955. With the outreach in various sectors of economy, SEEM is ideally placed to gather the concerns/suggestions regarding EV charging from various interest groups, analyze, suggest measures to strengthen the policies to accelerate the establishment of sufficient charging infrastructure in the state.

The Energy Management Centre (EMC), which is also one of the nodal agencies for e-mobility in the state, has extended their support for the program. ICAI and SEEM collaborated with Energy Management Centre on the project. Energy Management Centre is an autonomous organization under the Department of Power, Government of Kerala, and the State Designated Agency (SDA) of the Bureau of Energy Efficiency (BEE), Government of India. EMC, having been recognized as the best SDA many times, has evolved a novel and comprehensive energy management approach and institutional philosophy encompassing management of energy technology systems. Thus, EMC is ideally placed in Kerala to initiate policy changes required to support the project objectives.







EXECUTIVE SUMMARY

In the face of mounting global concerns over air pollution and climate change, the shift towards cleaner and more sustainable modes of transportation has become a pressing necessity. Our nation has proclaimed its commitment to go net zero by 2070, in the background of this world wide awakening towards this issue. Moreover Kerala Government has also declared to go carbon neutral by 2050.

India, and especially Kerala with its densely populated cities and high pollution levels, is at the forefront of this challenge. The need to curb vehicular emissions and reduce the carbon footprint has led to a growing emphasis on electric vehicles (EVs) as a viable solution. To address this concern, the "Right to Charge" campaign has emerged as a crucial movement aimed at promoting the adoption of electric vehicles and creating an enabling environment for their use through the development of a robust charging infrastructure.

Prelude: Urgency and Opportunity

India grapples with alarming pollution levels, a significant portion of which can be attributed to vehicular emissions. The adoption of electric mobility presents a unique opportunity to combat this crisis. By transitioning to electric vehicles, India has the potential to significantly reduce its carbon dioxide emissions and provide cleaner air for future generations. Furthermore, the global market for electric vehicles is on the cusp of exponential growth, with projections indicating a remarkable increase in unit sales by 2030. Recognizing the potential benefits, the Indian government has introduced various incentives and policies to foster the adoption of EVs, including tax exemptions, subsidies, and the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme.

Charging Infrastructure: A Vital Link

However, the adoption of electric vehicles faces a significant hurdle – the lack of a robust charging infrastructure. The availability and accessibility of charging stations are crucial for encouraging





individuals to transition to electric vehicles. As of the present, India falls short in terms of charging infrastructure. There are approximately 393 electric vehicles for every public charging station in the country, underscoring the need for a comprehensive strategy to address this imbalance. The "Right to Charge" campaign recognizes this deficiency and aims to establish a public-private partnership to develop charging infrastructure across the nation.

Campaign Objectives and Milestones

The core objective of the "Right to Charge" campaign is to expedite the adoption of electric vehicles in the state of Kerala by facilitating the rapid deployment of charging infrastructure. The campaign started with Secretary level discussions with the concerned Government departments who lent their endorsement and support. Various Government bodies extended their whole hearted support. This support enabled to organize the stakeholder meetings with active and widespread participation from all conceivable stakeholders. The campaign captured the apprehensions as well as the aspirations of the stakeholder groups comprehensively and are recorded in this report.

The campaign sought to achieve this by collaborating with state and local self-government bodies as well as private entities. The campaign's milestones include developing guidelines for EV charging in existing and new buildings, consulting with government departments and builders' associations, proposing business models for charging infrastructure, and conducting capacity-building workshops and public awareness programs.

Evolving Policies and Guidelines

The global electric vehicle market has witnessed substantial growth over the past decade. While India's as well as Kerala's progress has been noteworthy, there is still room for improvement. The government's efforts to promote electric vehicles through incentives and policies have laid the groundwork for adoption. Additionally, the state-specific policies in Kerala highlight the regional commitment to fostering electric mobility. This study and report examined the available policies, guidelines, approach papers and combines them into a compendium for easy comprehension for any







stakeholder. These were juxtaposed with available such policies elsewhere in the country. That exercise has thrown up opportunities for further strengthening the policy frame work to combine ease and safety for adoption of a user friendly charging infrastructure.

Enabling Home and Public Charging

Home charging serves as a convenient and cost-effective method for recharging electric vehicles. The process involves using Level 1 and Level 2 Electric Chargers, with Level 1 charging occurring overnight using AC chargers. Public charging stations are integral to making electric mobility a viable option for the masses. Setting up public charging stations is a de-licensed activity, provided they meet technical and safety standards. Different levels of charging stations are essential for accommodating various types of electric vehicles, from two-wheelers to four-wheelers. The report dwells into procedures, safeguards for establishing various categories of charging stations.

Solar-Powered Charging Stations: ANERT Initiative

The Kerala government has taken a proactive step by establishing solar-based public charging stations for electric vehicles. The Agency for New and Renewable Energy Research & Technology (ANERT) has issued guidelines for setting up these stations. The charging stations will be strategically located near highways and other high-traffic areas. Solar plants with capacities ranging from 5 kW to 50 kW will power these stations. ANERT's initiative also includes offering subsidies to support the establishment of solar-based charging infrastructure.

Action Plan on Recommendations

The campaign garnered concerns and challenges faced by different stakeholders through stakeholder meetings conducted at Trivandrum, Ernakulum and Calicut with wide and active participation. The feedback is compiled and chronicled to enable policy makers to get a view of how the stakeholders perceive the thrust given to electric vehicles adoption in the state.





The study conducted as part of the campaign has highlighted several areas for improvement to facilitate faster EV adoption. These recommendations span various governmental departments and agencies. They include the establishment of a call center for EV-related queries, the formation of norms for common charging connectors and protocols, the introduction of standardized EV charging logos, the implementation of tariff structures for load management, and the incorporation of EV charging stations in building regulations. The recommendations and action plans have been segregated according to different Government departments and policy bodies for ease of consumption.

Conclusion: A Cleaner, Greener Future, March towards net zero emission

The "Right to Charge" campaign stands as a beacon of hope in India's journey towards sustainable and eco-friendly transportation. By addressing the critical need for charging infrastructure, the campaign has the potential to accelerate the adoption of electric vehicles and reduce the country's carbon footprint. As the campaign partners with governmental bodies, private enterprises, and various stakeholders, it paves the way for a future where electric mobility is accessible, affordable, and environmentally responsible. The campaign aligns seamlessly with India's commitment to global climate goals and supports the state of Kerala in its endeavor to achieve net-zero emissions by 2050, and catalyze India's journey to net zero by 2070







1. INTRODUCTION

Mitigating global warming by bringing down the emission of greenhouse gases through clean energy initiatives is a major challenge taken up by the majority of countries from a global perspective. The decisions taken by many countries in the various Conferences of Parties (CoP) and the awareness created among people have strengthened the quest for green transition. On our part, our nation has made a major commitment of going carbon neutral by 2070. In tandem with this, our state of Kerala has followed up with the aspirational goal of going Net Zero by 2050. Early electric vehicle adoption can significantly contribute to these lofty goals. Needless to say, this will be supporting sustainability development goals (SDG) of Affordable and clean energy (SDG 7), Sustainable cities and communities (SDG 11), Climate action (SDG 13) and Life on Land (SDG 15).

Electric vehicles (EV) and their charging is gaining great impetus recently in the automobile sector globally. In India also the automobile industry is on the fast track of focusing on e-mobility development. But adoption at a faster pace can be achieved only if policies are formed so as to overcome technological and economical barriers. Although Central and State Governments are giving thrust for faster adoption of EVs, it is yet to gain traction to the desired level.

The "Right to Charge" campaign is an essential movement that is working towards ensuring the availability and accessibility of charging infrastructure for electric vehicles in India. By doing so, the campaign is promoting the adoption of EVs, reducing pollution, and contributing to the country's sustainable development goals. The campaign develops a public-private partnership between state/local self-government bodies and private entities to set up charging infrastructure in public/private domain.

1.1. Objectives of RTC Project

- Catalyse the EV adoption in Kerala state by faster deployment of charging infrastructure
- Develop guidelines for existing & new buildings and public parking spaces closely working with stakeholders in Kerala





- Consultation with the government departments/builders associations to understand the present issues in EV adoption
- Developing business model proposals for the implementation of charging infrastructure by local self-government
- Capacity building workshops and public awareness programs

1.2. Project Milestones

SEEM core team deliberated within SEEM and with ICAI and consulted experts in EMC and other organizations to arrive at a strategy. The method revolved around discussions with policy bodies, individual experts on a one-to-one basis and literature studies of related policies in Kerala and other states. This gave enough insight to design the stakeholder meetings including the format, participants, and tactics to ensure participation from varied and comprehensive interest groups. The governmental support from the Principal Secretary (Power) through EMC was instrumental in bringing together the right participants from government organizations like KSEBL, ANERT, Electrical Inspectorate, NATPAC, LSGD etc.

1.3. Summary of Existing Policies and Guidelines

The global market for electric vehicles has grown significantly over the past ten years. When it comes to electric vehicles, India has a poor acceptance rate. There is still a lot to be done in terms of model types, charging infrastructure, and financial incentives provided to EV manufactures. India is currently the biggest market for two and three wheelers and is among the top five countries for both passenger autos and commercial vehicles. Buses powered by electricity are becoming more popular in daily transportation. The Indian government reaffirmed its support for the EV sector in its budget for 2021–2022. The government proposed several reforms to increase the market penetration of EVs in India. To assist the acceptance of electric vehicles (EVs) in the





country, the central government has announced a number of promotional measures in the previous ten years, including tax incentives for electric vehicle owners, public EV charging infrastructure



development, and so on.

1.3.1. Policy Roadmap for EV Charging Infrastructure in India

Timeline for various initiatives taken by policymakers and regulators are shown below.

NEMMP 2013

In 2013, the Government of India launched NEMMP 2020, intending to reduce dependence on crude oil for transportation by promoting EVs in India. It is a National Mission document providing the vision and the roadmap for the faster adoption of EVs and their manufacturing in the country. The mission provided a roadmap for the faster adoption of electric vehicles in the nation and their manufacturing in the country to achieve national fuel security. The plan is projected to save 9500 million litres of crude oil which is equivalent to INR 62,000 crores. The NEMMP cages to invest

Image Credit: e amrit, Niti Ayog





around INR 14000 crores to foster R&D efforts and kick start nascent technologies, to accelerate the uptake of electric vehicles, and to develop necessary infrastructures through public-private coinvestments. The Ministry of Heavy Industry had first set the potential target and objectives of the NEMMP undertaking a thorough analysis of the possible interventions, by taking into consideration focus group discussions, expert opinions, existing literature, international studies, as well as primary research conducted through external consultants.

FAME I - 2015

As part of the NEMMP 2020, the Department of Heavy Industry (DHI) launched a Scheme called Faster Adoption and Manufacturing of (Hybrid & Electric Vehicles in India (FAME) Scheme for a period of 2 years commencing from 1st April 2015 by the Indian government to reduce the usage of petrol and diesel automobiles. This scheme was an essential part of electric mobility in India. The FAME India Scheme aims to incentivize all types of vehicles. The Scheme was implemented through four focus areas namely (i) Demand Creation, (ii) Technology Platform, (iii) Pilot Project and (iv) Charging Infrastructure. The scheme had an approved financial outlay of INR 7.95 billion for a period of two years out of which INR 0.3 Billion was earmarked for the installation of charging infrastructure (INR 0.1 Billion for FY 2015-16; INR 0.2 Billion for FY 2016-17).

NATIONAL E-MOBILITY PROGRAMME - 2018

Launched in 2018 for entire e-mobility ecosystem with focus on creating charging infrastructure and policy framework so that by 2030 more than 30% of vehicles are electric. In addition, the programme, envisaged that no licensing to setup charging infrastructure in India would be required and the tariff would be less than Rs 6.

FAME II - 2019

Based on the experience gained in the Phase-I of FAME India Scheme, it was observed that sufficient bandwidth of charging infrastructure is required to achieve expected outcome of the plan, which is being addressed presently in Phase-II of FAME Scheme notified on 8th March 2019. FAME-II is being implemented for a period of 3 years, effective from 1st April 2019 with a budget allocation of





10 Billion which includes a spill over from FAME-I of Rs 366 Cr. Under FAME II India Scheme INR 10 Billion (INR 3 Billion for FY 2019-20; INR 4 Billion for FY 2020-21; INR 3 Billion for FY 2021-22) has been allocated for the establishment of charging infrastructure. The Department of Heavy Industries has also sanctioned 2636 charging stations in 62 cities across 24 States/UTs under FAME India scheme phase II. 241 charging stations for electric buses were sanctioned under the scheme. The scheme proposes to offer the buyer one fast charger for every 10 electric buses and one slow charger per electric bus. Funding available for the establishment of charging infrastructure to the extent of 100% of cost involved. Six projects for setting up of EV charging infrastructure have been funded under this Scheme. These include four solar projects, with Bharat Heavy Electricals Limited (BHEL) and Rajasthan Electronics & Instruments, Jaipur (REIL) setting up two. Similarly, among conventional infrastructure Mahindra Reva Electric (now Mahindra

Electric Mobility) has received funding for its public fast charging infrastructure network in Bangalore, which it will set up in collaboration with Lithium Urban Technologies. FAME II funding will support 5,00,000 e-three-wheelers, 7,000 e-buses, 55,000 e-passenger vehicles, and a million e-two-wheelers. The aim was to drive greater adoption of EVs in India. The scheme was supposed to end in 2022. But now, In the budget for FY2022-23, the Government of India has decided to extend the FAME-II scheme till 31 March 2024.

1. MODEL BUILDING BYELAWS 2016 - AMENDMENTS IN 2019 FOR ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

To address the emissions from the transport sector powered by fossil fuels, electric vehicle is considered a viable option with adequate charging stations available. It is necessary to make provisions for establishing Public Charging Stations (PCS) in the local areas including urban areas for vehicle re-fuelling/recharging. Hence, amendments are required for addition of charging infrastructure provisions in the building premises and core urban areas of the cities. Based available charging technologies and their evolution, type of vehicles, the types of chargers, indicating number of charging points required for setting up adequate PCS within the local urban areas including the building premises of all building types and with the long term vision of implementing electric mobility during the next 30 years, amendments are made in the relevant sections (Chapter





10) of the Model Building Bye laws, 2016. In the Chapter 10, Sustainability and Green Provisions of the Amendments to Model Building Bye-Laws, 2016, after section 10.3 named Various Guidelines for Green Rating Systems, provision of "Electric Vehicle Charging Infrastructure" to be added at clause 10.4.

Based on the occupancy pattern and the total parking provisions in the premises of the various building types, charging infrastructures shall be provided only for EVs, which is currently assumed to be 20% of all vehicle holding capacity or parking capacity at the premise. Additionally, the building premise will have to have an additional power load, equivalent to the power required for all charging points (in a PCS) to be operated simultaneously.

The charging infrastructure installed by a home owner shall be considered as private meant for self-use (non-commercial basis). Any PCS installed at Public/Private areas or building premises of any category that caters to commercial mode of charging of EVs shall be deemed as a Public







Charging Station and shall have to install the minimum requirements of chargers. Open metering and on-spot payment options to be available for all users.



Town and Country Planning Organisation Ministry of Urban Development

2. URBAN AND REGIONAL DEVELOPMENT PLANS FORMULATION AND IMPLEMENTATION GUIDELINES (URDPFI - 2014) AND AMENDMENTS IN 2019 FOR ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

The Urban and Regional Development Plans Formulation and Implementation Guidelines (URDPFI) were conceptualized as the outcome of widespread consultations with the planning peers in the various Ministries, Experts, Professional and Academic Institutions and o ther stakeholders. To encourage Electric Vehicles as a viable option, adequate charging stations





for re-fuelling/recharging of vehicles are necessary. Hence, amendments are required for addition of norms for charging Infrastructure provisions in Development Control Regulations. Based on available charging technologies and their evolution, type of vehicles, the types of chargers indicating number of charging points required for setting up adequate PCS as regional facilities and with the long term vision of implementing electric mobility during the next 30 years, amendments are made on February 2019, Under Chapter 8: Infrastructure Planning, at section 8.4.7 "Distribution Services", Table 8.57 - "Norms for Distribution Services" of URDPFI Guidelines, 2014 (Volume I) at clause 3.

Electric Vehicle Supply Equipment is a wall mounted box that supplies electric energy for recharging of electric vehicle batteries. EVSEs can be customized with added features like, authentication, integrated payment gateways and software for remote monitoring. Charging batteries of privately owned electric vehicles through domestic charging points and the billing is part of domestic metering. For 3 wheelers, battery swapping is to be made available in PCS for faster recharge experience. For buses, captive fast charging infrastructure for 100% internal use for fleets may be adopted by privately owned Depots. Public Charging Station service providers shall be free to create charging hubs and to install additional number of chargers in addition to the minimum chargers prescribed. 20% of total parking capacity will be considered for EVs. At every 25 Kms on both sides of highways, at least 1PCS is to be set up. Similarly at every 100 Kms on

Amendments in Urban and Regional Development Plans ormulation and Implementation Guidelines URDPFI - 2014) Electric Vehicle Charging Infrastructure

y Planning Orga sing and Urban ment of India Affai

February, 2019





both sides of highways, at least 1 Fast Charging Station to be set up. Standalone Battery Swapping Stations may be added with the PCS. Land for at least 1PCS is to be reserved within a grid of 10 Km x 10 Km of the designated industrial area/park/estates.

3. CENTRAL ELECTRICITY AUTHORITY (TECHNICAL STANDARDS FOR DISTRIBUTED CONNECTIVITY OF THE **GENERATION RESOURCES**) AMENDMENT REGULATIONS, 2019 DATED AT 06-02-2019

To amend the Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013, the objections and suggestions received from the public were considered by the Central Electricity Authority. This regulation is called the Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Amendment Regulations, 2019.







THE GAZETTE OF INDIA : EXTRAORDINARY

[PART III—SEC. 4]

CENTRAL ELECTRICITY AUTHORITY

NOTIFICATION

New Delhi, the 6th February, 2019

No.12/X/STD(CONN)/GM/CEA/2018.—Whereas the draft regulation proposing to amend the Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013 was published in six newspaper dailies, as required by sub-section (3) of section 177 of the Electricity Act, 2003 (36 of 2003) read with sub-rule (2) of rule (3) of the Electricity (Procedure for previous Publication) Rules, 2005, inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of the period of thirty days, from the date on which the copies of the newspaper containing the said publications were made available to the public;

And whereas copies of the said newspapers containing the said regulations were made available to the public on the 02nd May, 2018;

And whereas the objections and suggestions received from the public on the said draft regulations were considered by the Central Electricity Authority;

Now, therefore, in exercise of the powers conferred by sub-section (1) of section 177 of the Electricity Act, 2003, the Central Electricity Authority hereby makes the following regulations to amend the Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013, namely: -

(1) These regulations may be called the Central Electricity Authority (Technical Standards for Connectivity
of the Distributed Generation Resources) Amendment Regulations, 2019.

(2) They shall come into force on the date of their publication in the Official Gazette.

- In the Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013 (hereinafter referred to as the said Regulations), in regulation 1, in subregulation (1), for the words "Connectivity of the Distributed Generation Resources", the words "Connectivity below 33 kilovolts" shall be substituted.
- In regulation 2 of the said regulations, in sub-regulation (1).
 - (i) for clause (b), the following clause shall be substituted, namely: -

'(b) "applicant" means a generating company, charging station, prosumer or a person seeking connectivity to the electricity system at voltage level below 33 kV;';

(ii) after clause (d), the following clauses shall be inserted, namely: -

These regulations shall apply to all generating companies or persons owning distributed generation resources, charging stations, prosumers or persons who are connected to or seeking connectivity with the electricity system below 33 kV voltage level. The applicant and the user shall comply with the cyber security guidelines issued by the Central Government from time to time. The applicant shall provide a reliable protection system to detect various faults and abnormal conditions and provide an appropriate means to isolate the faulty equipment or system automatically and ensure that fault of his equipment or system does not affect the grid adversely. The applicant seeking connectivity at 11 kV or above shall install power quality meters and share the recorded data with the distribution licensee. In addition to harmonics, periodic measurement of other power quality parameters such as voltage sag, swell, flicker, disruptions shall be done. It shall be the responsibility of concerned licensee to ensure





that before connectivity to the grid, all the provisions with regard to the connectivity stipulated in these regulations are done by the applicant.

4. CENTRAL ELECTRICITY AUTHORITY (MEASURES RELATING TO SAFETY AND ELECTRIC SUPPLY) (AMENDMENT) REGULATIONS, 2019 DATED 28-06-2019

The objections and suggestions received from the public on the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 were considered by the Central Electricity Authority and made Central Electricity Authority (Measures relating to Safety and Electric Supply) (Amendment) Regulations, 2019 and published in Official Gazette on June 28, 2019. The major safety requirements for electric vehicle charging stations are observed and described in the regulation. All electric vehicle charging stations shall be designed, installed, tested, certified, inspected and connected in accordance with the guidelines provided. And charging station shall be provided with overload protection, suitable lightning protection, fire detection, alarm and control system. Portable socket outlets, adaptor and cord extension set or secondary supply lead are not permitted to be used for electric vehicle charging. The DC electric vehicle charging point shall disconnect supply of electricity to prevent overvoltage at the battery, if output voltage exceeds maximum voltage limit set by the vehicle. All electric vehicle charging stations shall be provided with an earth continuity monitoring system that disconnects the supply in the event that the earthing connection to the vehicle becomes ineffective. Every charging station shall be tested and inspected by the owner or the Electrical Inspector or Chartered Electrical Safety Engineer before energisation of charging stations and the owner of the charging station shall establish and implement a safety assessment programme for regular periodic assessment of the electrical safety of charging station.





The safety provisions of all Alternating Current charging stations and Direct Current charging stations shall be in accordance with international standards.

CENTRAL ELECTRICITY AUTHORITY

NOTIFICATION

New Delhi, the 28th June, 2019

No. CEI/1/2/2018 .- Whereas the draft regulation further to amend the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010, was published in six newspaper dailies, as required by subsection (3) of section 177 of the Electricity Act, 2003 (36 of 2003) read with sub-rule (2) of rule 3 of the Electricity (Procedure for Previous Publication) Rules, 2005, inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of the period of thirty days, from the date on which the copies of the newspaper containing the said publications were made available to the public;

And whereas copies of the said newspapers containing the said regulations were made available to the public on the 02nd May, 2018;

And whereas the objections and suggestions received from the public on the said draft regulations were considered by the Central Electricity Authority;

THE GAZETTE OF INDIA : EXTRAORDINARY

[PART III-SEC. 4]

Now therefore, in exercise of the powers conferred by section 177 of the Electricity Act, 2003, the Central Electricity Authority hereby makes the following regulations further to amend the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010, namely: --

1. (1) These regulations may be called the Central Electricity Authority (Measures relating to Safety and Electric Supply) (Amendment) Regulations, 2019.

(2) They shall come into force on the date of their publication in the Official Gazette.

- 2. In the Central Electricity Authority (Measures relating to Safety and Electric Supply), Regulations 2010, (hereinafter refer to as the said regulations), in regulation 2, in sub-regulation (1),-
 - (i) after clause (fa), the following shall be inserted, namely:

'(fb) "charging point" has the meaning assigned to in clause (da) of sub-regulation (1) of regulation 2 of the Central Electricity Authority (Technical Standarad for Connectivity of the Distributed Generation Resources) Regulations, 2013;';

'(fc) "charging stations" has the meaning assigned to in clause (db) of sub-regulation (1) of regulation 2 of the Central Electricity Authority (Technical Standarad for Connectivity of the Distributed Generation Resources) Regulations, 2013;';

.



6



Association India



5. REVISED CONSOLIDATED GUIDELINES & STANDARDS FOR CHARGING INFRASTRUCTURE ISSUED BY MINISTRY OF POWER 2022 DATED AT 14-01-2022

The "Charging Infrastructure for Electric Vehicles - Guidelines and Standards" were issued by the Ministry of Power on 14.12.2018 which were subsequently revised on 01.10.2019 and an Amendment was issued on 08.06.2020. After considerations and suggestions received from various stakeholders, it has been decided to amend the guidelines to accelerate the E-Mobility transition in the country. And Ministry of Power issued the revised consolidated Guidelines & Standards for charging infrastructure on 14th January, 2022.

The objectives are accelerating faster adoption of electric vehicles in India by ensuring safe, reliable, accessible and affordable Charging Infrastructure and eco-system, provision of affordable tariff chargeable from Charging Station Operators/Owners and Electric Vehicle (EV) owners, generation of employment/income opportunities for small entrepreneurs and promoting energy security and reduction of emission intensity of the country by promotion of entire EV ecosystem.

The guideline states that, the owners may charge their Electric Vehicles at their residence/offices using their existing electricity connections and any individual/entity is free to set up public charging stations. The battery charging station (BCS) will be treated at par with the public charging station (PCS) and the applicable tariff for electricity supply will also be the same as for the PCS. To boost setting up of public EV charging stations in India, delicensing of EV public charging infrastructure allowed, that is companies setting up charging infrastructure for EVs do not require any separate license for electricity transmission, distribution, or trading. Connectivity for PCS will be provided by the Distribution Company licensee and any charging station can obtain electricity from any generation company through open access. Each PCS should have one or more or any combination of chargers – CCS/CHAdeMO/Type 2 AC for fast charging and Bharat DC-001/Bharat AC-001 for slow charging. Other requirements for PCS are civil, cabling, electrical works; 33/11 KV line/cables, transformer and adequate space for charging and entry/exit of vehicles. PCS for long-range EVs/heavy duty EVs (trucks, buses) need to have at least two chargers of minimum 100kW each of different specification and appropriate liquid cooled cables.





Tie up with at least one online network service provider (NSP) required for online booking of charging slots by EV owners. In addition, provision of at least one charging station within each 3km x 3km grid and at every 25 km on sides of highways is required. For long range EVs, the requirement is to have fast charging stations at every 100 km on sides of highways.

The tariff for supply of electricity to Public EV Charging Stations and Battery Charging Station (BCS) shall be a single part tariff and shall not exceed the "Average Cost of Supply" till 15 March, 2025. The tariff applicable for domestic consumption shall be applicable for domestic charging and a separate metering arrangement shall be made for PCS so that consumption may be recorded and billed as per applicable tariff for EV charging stations.



No.12/2/2018-EV (Comp No. 244347) Government of India Ministry of Power

> Shram Shakti Bhawan, Rafi Marg, New Delhi, the 14th January, 2022

To,

- 1. The Secretaries of all the Ministries/ Departments of Government of India
- 2. The Chief Secretaries of the States/UTs

Subject: Charging Infrastructure for Electric Vehicles (EV) – the revised consolidated Guidelines & Standards-reg

Sir/ Madam,

The "Charging Infrastructure for Electric Vehicles - Guidelines and Standards" were issued by the Ministry of Power on 14.12.2018 which were subsequently revised on 01.10.2019 and an Amendment thereof was issued on 08.06.2020. After careful consideration of progress made and suggestions received from various stakeholders, it has been decided to amend the guidelines to accelerate the E-Mobility transition in the country. In supersession of all previous guidelines in this regard, the revised consolidated guidelines are as follows:







1.3.2. State Specific Policies – Kerala

Timeline for various initiatives taken by Kerala State government is shown below.



1. KERALA EV POLICY 2019

The vehicular transport of the State predominantly depends on fossil fuels. The extensive use of fossil fuels leads to environmental pollution and health hazards, which necessitates the exploration of alternative energy. The over dependency of fossil fuels badly affects the balance of payment of the Country and the political instability of oil producing countries always remains as a threat to the economic stability of our nation. In this alarming circumstance, the State of Kerala, initiated framing a road map to Electric Vehicle Policy for the State. Transport department published a draft policy on Electric Vehicles in Kerala on 29-09-2018. After detailed discussion with the various stakeholders, the draft policy was modified and government approved the policy on 10-03-2019.





Vision is "To embrace electric mobility as a tool to promote shared mobility and clean transportation and ensure environmental sustainability, pollution reduction energy efficiency and conservation and to create an ecosystem for manufacturing EV components in Kerala".

Kerala needs to focus on growing internal manufacturing ecosystem and turn away from being an import dependent, consumption driven economy. To promote localised tech manufacturing facilities, the state government extended support and announced various incentives. KSEB is looking at EV adoption as an option for generating demand during off peak hours. It would mean cheap electricity for EVs and load balancing for the grid. KSRTC will change its entire fleet of 6000+ buses into EV by 2025. With appropriate sizing of the batteries, charging infrastructure and incentivized tariff, maintenance cost will be much lesser than current feet of diesel buses. Conversion of three wheelers

	e	e-91312/19.	
	Government of Kerala Abstract	state	
Transport Department – Policy – Orders Issued.	on Electric Vehicles for the S	tate of Kerala - approved	
	ransport(B) Department	2	
GO(Ms) No.24 /2019/Trans	Dated, Thiruvar	nanthapuram 10/03/2019	
Read : 1. GO(Rt) No.242/2017/ 2. GO(Ms) No.58/2018/	'E&ITD dated 10/10/2017 Trans. dated 29/09/2018		

Order

The vehicular transport of the State predominantly depend on fossil fuels. The extensive use of fossil fuels leads to environmental pollution and health hazards, which necessitates the exploration of alternative energy. The over dependancy on fossil fuels badly affects the balance of payment of the country and the political instability of oil producing countries always remains as a threat to the economic stability of our nation.

In this alarming circumstance, the State of Kerala, which is a forefront runner in many reforms and innovations, initiated early steps in the direction of framing a road map of Electric Vehicle Policy for the State. As per the GO read as 1st paper above, Government had appointed a Special Task Force under the chairmanship of Prof.Jhunjhunwala. Principal Advisor to the Minister for Power, Govt. Of India, for framing a draft EV Policy for the state. The committe had prepared a draft policy and submitted before the Government. In light of the proposal of the committee a draft Electric Vehicle policy for the State of Kerala had been published as per the GO read as 2nd paper above.

After detailed discussion with the various stakeholders, the draft policy was modified according to the prevailing circumstances of the State incorporating various changes, the Government are pleased to approve the Electric Vehicle Policy for the State of Kerala as appended herewith.

> By Order of the Governor K R JYOTHILAL



society of energy engineers and managers

1



and transport buses to electric would be the first priority for the state along with the conversion of two and four wheelers and electric boats using solar power for ferrying passengers.

The government shall consider fully exempting road tax on E Vehicles for the initial 3 years. The KSEBL, the state DISCOM shall be Nodal Agency for establishing charging infra structure. Balancing the demand during peak and off-peak hour can be achieved from the time of the day tariff for PCS and BCS and provision of incentives to charge 2 and 3 wheelers with swappable batteries at off peak hour. In major cities, at least one charging station should available in a grid of 3 km. And charging stations should set up every 25 km on sides of highways and major roads connecting major cities. However, the operators will have the option to meet their demand from renewable sources. KSEB will utilize and invest in its available space for setting up charging infrastructure on its own or through third party operators using PPP model and the government will provide incentives for setting up charging and swapping stations to support and encourage the investors. To create awareness on the e mobility aspects and usage among the public and to promote adoption, the state government will take the initiative for conducting electricity tariff. And also state government will establish centers for skilling programs, courses and curriculum update for EV.

2. KSEB APPROACH PAPER 2020

KSEB provides power for the EV as State DISCOM and establishing adequate charging infrastructure as State Nodal Agency. The critical requirement of accelerating EV adoption is the development of charging infrastructure. While charging infra structure is the precondition for increasing vehicle sales, companies are reluctant to invest without assured demand. So KSEB and Kerala Government together committed to take firm stand to promote both private and public investments in charging infrastructure.

The objective is "To ensure the state of Kerala to become the leader among Indian states in e mobility through creation of EV charging infrastructure that achieves state level coverage."

The adoption to the EV will gradually increase the power demand of the state and expected to have sight stresses in the grid. So KSEB initiated efforts to bring more power to





balance the grid for future demands by encouraging generation from nonconventional energy sources which increases the clean component of states energy. Balancing the demand during peak and off-peak hour can be achieved from the time of the day tariff for PCS and BCS, incentives to charge 2 and 3 wheelers with swappable batteries at off peak hour, destination charging at office and public places and home charging for auto rickshaws as well as private two and four wheelers.

During pilot stage, few charging stations are set up in the city. It will increase interest and curiosity and thus help gather public support for the idea of e mobility while supporting early adopters.

In the coverage stage, KSEB plans to establish a state-wide coverage for its charging station network by building mini charging stations and public charging stations. Two and three wheelers are using Mini charging stations with simple slow Bharat AC 001 chargers of 10 kW. Public charging station with DC fast chargers at every 25 km interval along the entire National Highway network enable users to quickly charge their vehicles. KSEB will take an active role in encouraging individuals and organizations to set up Mini Charging Stations across Kerala and larger investors who wish to set up a chain of charging points targeting to achieve 100% coverage of all Panchayats and Municipalities. And KSEB will work with Local Self Government Institutions to identify suitable locations for installation of charging kiosks including public places, parking spaces and auto-rickshaw stands in addition to shopping centres, malls and similar buildings.







In the scaling stage, when the target of e vehicle adoption has been reached, the government will withdraw its active promotional role. And the charging network operators have to monitor the waiting time and utilization of chargers and accordingly add charging points or increase the network density.

EV Charging Infrastructure for Kerala: Approach Paper

1. Background

Kerala aims to be one of the front-runners in the adoption of Electric Mobility and has been among the earliest States in India to adopt an approved Electric Vehicles Policy. The vision of the Policy is "to embrace electric mobility as a tool to promote shared mobility and clean transportation and ensure environmental sustainability, pollution reduction, energy efficiency and conservation, and to create an ecosystem for manufacturing EV components in Kerala." The Policy targets to have 1 million EVs on the road by 2022 including a Pilot Fleet of 200,000 two-wheelers, 50,000 three wheelers, 1,000 goods carriers, 3,000 buses and 100 ferry boats by 2020.

As part of the Policy, the Kerala State Electricity Board Ltd. (KSEB) has been appointed as the State Nodal Agency for establishing a charging infrastructure for electric vehicles (EVs).

As articulated in the Central and State policies, there is an urgent need to promote electric mobility although it may not have yet achieved cost parity with conventional vehicles, requiring various fiscal and non-fiscal promotional initiatives. A critical requirement for accelerating EV adoption is the development of an appropriate charging infrastructure for EVs. While such infrastructure is being cited as precondition for increasing vehicle sales, companies are reluctant to commit investments in infrastructure without assured demand. Given this scenario, KSEB with the support of the Government of Kerala, is committed to take a proactive stance in promoting both public and private investment in charging infrastructure in the State.

This document describes the approach which KSEB proposes to adopt to support the EV Policy both for providing power in its role as the state DISCOM as well as for establishing an adequate charging infrastructure as the State Nodal Agency.

Road Map

The Government of Kerala gearing up the adoption of EVs for its official vehicles. KSEB will work with the Government of Kerala to set up charging stations in all district collectorates as well as other large government offices with more than 20 government vehicles. Kerala State IT mission in coordination with the IT wing of KSEB will develop a mobile APP with added features like Authentication, Integrated payment gateways and Software for remote monitoring. KSEB will scrap the own old vehicles in the corporate offices and other field Offices and replace it with EVs. In future, petrol and diesel cars hired on contract for use of field officers will also be replaced with EVs, as far as possible. If required, the services of EESL/NTPC/Government/private agencies for possible leasing





of EVs will also be explored. KSEB is initiated to apply under FAME II for incentives to set up 25 charging stations having 6 chargers each under each city.

3. TRANSPORT DEPARTMENT – AMENDMENT 2021

As per notification issued on 23rd February, 2021 and published in the Kerala Gazette Extraordinary No.1081 dated 24th April, 2020, Government have given a reduction of 25% on the rate of tax to new electric vehicles other than electric three wheeled vehicles for private use, electric motor cycles, electric motor cars and electric private service vehicles for personal use with effect from the 1st day of April, 2020.



GOVERNMENT OF KERALA Transport (B) Department NOTIFICATION

G.O.(P)NO.12/2021/Trans

Dated, Thiruvananthapuram, 23rd February, 2021

S. R. O. No. 231/2021

In exercise of the powers conferred by section 22 of the Kerala Motor Vehicles Taxation Act, 1976 (19 of 1976) the Government of Kerala, being satisfied that it is necessary in the public interest so to do, hereby make the following further amendment to the notification issued under

And also fully exempted the tax levied on new electric auto rickshaws for a period of five years from the date of their registration. In para 352 of the Budget Speech for 2021-2022, it was declared that a reduction of 50% in motor vehicle tax will be given for newly registered electric vehicles for the next five years. For the purpose, Government have decided to make an amendment to the said notification.

4. GUIDELINES BY ELECTRICAL INSPECTORATE 2021

For the effective implementation of public EV Charging stations, Electrical Inspectorate published guidelines on 2021. All electric vehicle charging station shall be provided with overload protection,





energy engineers and managers



suitable lightning protection, fire detection, alarm and control system. Every Public Charging Station (PCS) will have transformer with all related substation equipment, 33/11 kV line/cables with associated equipment, Appropriate civil works, Adequate space for charging and entry/exit of vehicles, and one or more chargers or any combination of chargers. Charging station will have to tie up with at least one online Network Service Providers (NSPs) to enable online booking of charging slots by EV owners and also provide online information to EV owners include information regarding location, types and numbers of chargers installed/available, service charges for EV charging etc.

Charging station may also be installed by Housing societies, Malls, Office, complexes, Restaurants, Hotels, etc. with a provision to allow charging of visitor's vehicles which are permitted to come in its premises. Fast Charging Stations for long range EVs and heavy duty EVs (like trucks, buses etc.) will have at least two chargers of minimum 100 kW (200-750 V or higher) each of different specification with single connector gun each. Additional PCS/FCS can be installed even if there exists a PCS/FCS in the required grid or distance. Separate metering arrangement shall be made for PCS so that consumption may be recorded and billed as per applicable tariff for EV charging stations.

An emergency push button shall be provided at the power incomer side for disconnection of power supply to public EV charging station. Portable socket outlets, adaptor and cord extension set or secondary supply lead are not permitted to be used for electric vehicle charging. The DC electric vehicle charging point shall disconnect supply of electricity to prevent overvoltage at the battery, if output voltage exceeds maximum voltage limit set by the vehicle. All electric vehicle charging stations shall be provided with an earth continuity monitoring system that disconnects the supply in the event that the earthing connection to the vehicle becomes ineffective.







The owner of the charging station shall keep records in regard to design, construction and labelling, relevant test certificate. The owner of the charging station shall ensure that test and inspection of charging station is being carried out every year in the initial period of first three years after the energisation of charging station and in every four years thereafter. Every charging station shall be tested and inspected by the owner or the Electrical Inspector or Chartered Electrical Safety Engineer before energisation of charging stations.

Department of Electrical Inspectorate Office of the Chief Electrical Inspector Housing Board Buildings, Shanthi Nagar Thiruvananthapuram 695 001 Phone: 0471 2331104, 0471 2331159 email : ceikerala@gmail.com Web site: www. ceikerala.gov.in



An IS 15700 : 2005 Cortified Department

Thiruvananthapuram Date: 19/11/2021

No: B2- 17924/2020/CEI

CIRCULAR

Subject: - Installation of Public EV charging station -guidelines issued -regarding

Reference: - Nil

For the effective implementation of Public EV charging station, the following guidelines are issued.

Guidelines for scrutiny / inspection of Public EV Charging Station (PEVCS)

(a) Technical

- The minimum qualification for carrying out the installation work of a public EV charging system shall be a licensed B-Class Contractor issued by KSELB(Kerala State Electricity Licensing Board). Depending up on the capacity of the installation, eligible contractors can carry out the work.
- All electric vehicle charging stations shall be provided with protection against the overload of input supply and output supply fittings.
- The electric vehicle parking place shall be such that the connection on the vehicle when parked for charging shall be within five meters from the electric vehicle charging point/EVSE.

5. ELECTRICITY TARIFF FOR CHARGING STATIONS - KSEB 2021

As per the revised Guidelines for charging infrastructure of electric vehicles issued by Ministry of Power on October 1, 2019, private charging at residence and offices shall be permitted. Based on this KSEB published relevant Guidelines for electricity tariff for private charging stations at residences and offices on 2021.





Private charging at residences and offices shall be permitted and distribution Companies (DISCOMS) may facilitate the same. Setting up of Public Charging Stations is a de-licensed activity and any individual or entity is free to set up public charging stations. Charging stations can be installed at Housing societies, Malls, Offices complexes, Restaurants, Hotels etc. with a provision to allow charging of visitor's vehicle which are permitted to come in its premises. The tariff applicable for domestic consumption shall be applicable for domestic charging. A separate metering arrangement shall be made for public charging Stations so that the consumption may be recorded and billed.



KERALA STATE ELECTRICITY BOARD LIMITED

(Incorporated under the Companies Act, 1956), CIN:U40100KL2011SGC027424 Registered office: Vydhyuthi Bhavanam ,Pattom ,Thiruvananthapuram-695004 Phone (O) +91 471 2514617, 2514650E-mail: trac@kseb.in, web: www.kseb.in

ABSTRACT

Electricity tariff for Private charging stations at residences and offices - sanctioned–orders issued CORPORATE OFFICE (Planning)

B.O. (FTD) No.269/2021(KSEBL/TRAC/G/EV Stations /2020-21) dated, Tvpm 28.04.2021

- Read: 1. Letter No. GB/Vehicle charging /2020-21/1383 dtd 20.11.2020 of Deputy Chief Engineer, Electrical Circle, Shoranur
 - Letter No. No. VTLA/Trac/20-21/ dated 30.12.2020. of Assistant Engineer, Electrical Section, Vyttila
 - Note No KSEBL/TRAC/G/EV Stations /2020-21dated 22.04.2021 of the Deputy Chief Engineer (Commercial & Planning) with full powers of Chief Engineer to the Full Time Directors (Agenda No.63/4/21)

ORDER

The Deputy Chief Engineer, Electrical Circle, Shoranur and Assistant Engineer, Electrical Section, Vyttila as per letter read as 1^{st} and 2^{nd} paper above respectively has sought clarification as whether to release connection for EV charging station in residences for their own use under 'LT X – Electric Vehicle Charging Stations' tariff. Also, enquiries are being received from non-domestic consumers including EV boats. It may please be noted that the tariff assigned to KIOSKS for charging house boats is 'LT VII (A) Commercial', a tariff much higher than that of 'LT X tariff'.

As per tariff order effective from 08.07.2019, LT X tariff is applicable for Electric Vehicle Charging Stations (Fixed charge-75/kW & Energy Charge - 5.00/kWh) and that in high tension, it is HT VI- Electric vehicles charging stations (demand charge - Rs.250/kVA/month & Energy charge- Rs. 5.00/kWh). It is also specified in the Government's EV policy that a subsidized electricity with tariff between Rs.5 -5.5 per unit for EV charging stations.

Charging Infrastructure for Electric Vehicles defines two types of EV charging stations, that are Pubic charging station and captive charging station. Public Charging Station (PCS) shall mean an EV







charging station where any electric vehicle can get its battery recharged. And Captive Charging Station (CCS) shall mean an electric vehicle charging station exclusively for the electric vehicles owned or under the control of the owner of the charging station. For example, Government Departments, Corporate houses, Bus Depots, charging stations owned by the fleet owners etc. and shall not be used for commercial purpose. Private charging points meant for self-use at residence shall be permitted and the existing supply shall be utilized for electric vehicle charging and no separate electric connection is required in this case. For captive stations also, the existing supply shall be extended for electric vehicle charging infrastructure. The tariff of the CCS has not been specified in the revised guidelines issued by MoP, so they shall be assigned with the tariff of the office/corporate house/depots etc. PCS shall be given separate service connection and shall be billed at tariff approved by KSERC from time to time (presently LT X and HT VI).

6. KERALA STATE ELECTRICITY REGULATORY COMMISSION 2022

Kerala State Electricity Regulatory Commission released an order on 25/06/2022 detailing the schedule of tariff and terms and conditions for retail supply of electricity by KSEBL and all other licensees with effect from 26.06.2022 to 3.03.2023. This schedule shall be defined in the Electricity Act, 2003 or in the Regulations specified by the Kerala State Electricity Regulatory Commission. The tariff mentioned in this Schedule shall apply to consumers to whom the Kerala State Electricity Board Limited or other distribution licensee has undertaken to supply electricity.

'Low Tension Consumer' (LT) means a consumer who is supplied with electrical energy at low or medium voltage by the Kerala State Electricity Board Limited and other distribution licensees in the State. Tariff applicable to electric vehicle charging stations at LT is described below.

LT – X: Electric vehicle charging stations

(a) Fixed Charge (Rs per kW) is 90





(b) Energy Charge (Rs/ unit) is 5.50

The ceiling tariff that can be charged by EV charging stations / outlets from customers shall be Rs 8.00/unit.

High tension (HT) consumer means a consumer who is supplied with electrical energy at a voltage of 33,000 Volts, 22,000 Volts or 11,000 Volts under normal conditions. The tariff applicable to electric vehicle charging stations at HT is shown below.

HT- VI: Electric vehicles charging stations

Tariff applicable to charging stations of electric vehicles availing electricity at high tension.

- (a) Demand Charges (Rs/kVA of Billing Demand/Month) is 270
- (b) Energy Charge (Rs/k unit) is 6.00






The ceiling tariff that can be charged by EV charging stations / outlets from customers shall be Rs 8.00/unit.

7. KERALA MUNICIPAL BUILDING RULES, 2019 AND KERALA PANCHAYATH

യ കേരള സർക്കാർ Government of Kerala 2022



Regn.No. KERBIL/2012/45073 dated 05-09-2012 with RNI Reg No.KL/TV(N)/634/2021-2023



CONCUTATION CONCUTATICO CONCUT

ആധികാരികമായി പ്രസിദ്ധപ്പെടുത്തുന്നത് PUBLISHED BY AUTHORITY

തിരുവനന്തപുരം,

വാല്യം 11 Vol. XI ശനി Thiruvananthapuram, Saturday 2022 ສາຄານ 25 <u>25th June 2022</u> **1197 ຂຳໃນຈູຕຣ 11** <u>11th Mithunam 1197</u> **1944 ആഷാഡരം 4** 4th Ashadha 1944

ოისიზ 2115 No. 2115

KERALA STATE ELECTRICITY REGULATORY COMMISSION THIRUVANANTHAPURAM

No.297/D(T)/2022/KSERC.

Dated, Thiruvananthapuram, 25th June, 2022.

SCHEDULE OF TARIFF AND TERMS AND CONDITIONS FOR RETAIL SUPPLY OF ELECTRICITY BY KERALA STATE ELECTRICITY BOARD LIMITED AND ALL OTHER LICENSEES WITH EFFECT FROM 26-6-2022 TO 31-3-2023

(VIDE ORDER DATED 25-6-2022 IN OP NO. 11/2022)

Unless the context otherwise requires, the words and expressions used in this schedule shall be as defined in the Electricity Act, 2003 or in the Regulations specified by the Kerala State BUILDING RULES, 2019 DATED AT 08-11-2019

The Kerala Municipality Building Rules, 1999 was issued under G.O.(Ms)No.188/1999/LSGD dated 1st day of October, 1999 and published as S.R.O. No.777/1999 in the Kerala Gazette Extraordinary No.1786 dated 1st day of October, 1999. Now, the Government have decided to issue the Kerala Municipality Building Rules, 2019 superseding the Kerala Municipality Building Rules, 1999. Kerala Municipality Building Rules, 2019, shall apply to areas under all





Municipalities in the State and apply to any public or private building and all lands which are proposed to be developed or redeveloped for construction of buildings.

The Kerala Panchayat Building Rules, 2011 was issued under G.O. (Ms.) No. 41/2011/LSGD dated 14th day of February, 2011 and published as S.R.O No. 127/2011 in the Kerala Extraordinary No. 351 dated 14th day of February, 2011. Now the Government have decided to issue the Kerala Panchayat Building Rules, 2019 superseding the Kerala Panchayat Building Rules, 2011. This rule shall apply to area under all Village Panchayats in the State and apply to any public or private building and all lands which are proposed to be developed or redeveloped for construction of buildings.

Kerala Municipal Building Rules, 2019 and Kerala Panchayath Building Rules, 2019 does not address anything about EV Charging infrastructure. This has to be specifically addressed in the building rules.







കേരള സർക്കാർ Government of Kerala 2019



Regn.No. KERBIL/2012/45073 dated 05-09-2012 with RNI Reg No.KI/TV(N)/634/2018-20

കേരള ഗന്പ **KERALA GAZ**

അസാധാരണം EXTRAORDINARY

ആധികാരികമായി പ്രസിദ്ധപ്പെടുത്തുന്നത്

PUBLISHED BY AUTHORITY

വാല്യം 8 Vol. VIII

തിരുവനന്തപുരം, വെള്ളി

Thiruvananthapuram, Friday

2019 നവംബർ 08 08th November 2019 1195 തുലാം 22 22nd Thulam 1195 1941 കാർത്തികം 17 17th Karthika 1941

2691

നമ്പർ

No

GOVERNMENT OF KERALA Local Self Government (RD) Department

NOTIFICATION

G.O.(P)No. 77/2019/LSGD.

Dated, Thiruvananthapuram 2nd November, 2019 16th Thulam, 1195.

S. R. O. No. 828/2019

In exercise of the powers conferred by sections 381, 382, 387, 398, and 406 read with section 565 of the Kerala Municipality Act, 1994 (20 of 1994) and in super session of the Kerala Municipality Building Rules, 1999 issued under G.O. (Ms.) No188/99/LSG Dated 1st October, 1999 and published as S.R.O. No.





Association India



2. EXISTING PROCESS FOR EV CHARGING STATION INSTALLATION AND ENERGIZATION

Setting up of Home and Public Charging Stations is a de-licensed activity and any individual/ entity is free to set up public charging stations provided that, such stations meet technical, safety as well as performance standards and protocols as per the Revised guidelines issued by MoP dated 01.10.2019 as well as any further norms/ standards/specifications laid down by Ministry of Power and Central Electricity Authority from time to time.









ARAI develops standards for vehicles and its components. These standards are marked as AIS-XXX standards. AIS-138 Part 1 specifies the charging requirements for AC Charging and AIS-138 Part 2 specifies the charging requirements for DC Charging for all electric vehicles (2/3/4) wheelers with the exception of trolley buses, rail vehicles and off-road industrial vehicles. Selection of equipment is critical in setting-up of electric vehicle charging station. Technical specifications for electric vehicle chargers vary across Level 1, Level 2, and Level 3 charging stations. Table below showcases the mapping of different charger specification in India:

Charging	Voltage (V)	Power (Kw)	Type of	Type of Compatible
Station			Vehicle	Charger
Level 1	240	<=3.5 kW	4W, 3W, 2W	Type 1, Bharat AC-001
(AC)				
Level 1	>=48	<=15 kW	4W,3W,2W	Bharat DC-001
(DC)				
Level 2	380-400	<=22 kW	4W,3W,2W	Type 1, Type 2, GB/T,
(AC)				Bharat AC-001
Level 3	200 - 1000	22 to 4.3 kW	4W	Type 2
(AC)				
Level 3	200 - 1000	Up to 400 kW	4W	Type 2,
(DC)				CHAdeMO, CCS1, CCS2

2.1 HOME CHARGING

To recharge Electric Vehicle at home, setting up an EV charging station is must and it includes Level 1 and Level 2 Electric Chargers. EV charging is delivered over slow AC chargers and happen overnight. Consumers returning from their daily commute would plug in the car into an appropriate home socket or wall mounted equipment, and will accumulate enough charge overnight to fully replenish the battery for a few days' worth of use. With home EV charging there is no waiting around





a public charging point for hours. At home charging can help the EV user save money. These savings can even make it a residential EV charging station pays for itself over time.



LEVEL 1 CHARGING

- The level 1 electric charger comes with electric vehicle or cars are AC chargers and doesn't require an installation engineer but a specialised electrician.
- These are wall mounted, slow AC chargers.
- Level 1 charger with a 230V/15A single-phase plug that delivers up to 2.5 kW of output power.
- No extra costs associated with installation and you can setup an EV charging station system on your own.







- The time taken to charge depends on the rate of charging and the amount of charge required by the battery capacity.
- Level 1 home charger can charge electric scooters in 2 to 3 hours and electric cars in 6 to 7 hours approximately.
- Moreover, the amount of electricity consumed is added to home metering.

LEVEL 2 CHARGING

- Level 2 charging offers a fast charging solution to EV owners.
- This type of charger requires an expert engineer or specialised installation team to set up a charging station at home.
- The level 2 AC chargers which have both single-phase (7.4kW) and three-phase (22kW) variants.
- The charger is suited for charging vehicle at home.

2.1.1 STEPS FOR INSTALLING AN EV CHARGING STATION AT HOME

- 1. Hire a certified electrician to install Level 1 chargers and Level 2 charger requires expert engineer or specialised installation team to set up a charging station at home.
- 2. Permission is not required for the installation of wall mounted Level 1 EV charging points.
- 3. Many people will want to use Level 2 EV Charger due to the quicker charging times, but many older homes may not have sufficient electrical capacity. So, determination of home's electrical capacity is necessary.
- 4. If required, they must upgrade the service panel for the Level 2 charging.
- 5. Installation plans to be submitted as part of the permit applications for Level 2 Charger.





- 6. The EV owner can begin installation when the permit is issued. When the installation is completed, the owner should arrange for an inspection with the KSEB, and then make any required changes.
- 7. To ensure safety, the Bharat EV specifications suggested the installation of residual Current Circuit Breaker and IEC 60309 industrial connector.

PUBLIC CHARGING STATIONS 2.2

Setting up of Public Charging Stations is a de-licensed activity and any individual/ entity is free to set up public charging stations provided that, such stations meet technical, safety as well as performance standards and protocols as per the Revised guidelines issued by MoP dated 01.10.2019 as well as any further norms/ standards/specifications laid down by Ministry of Power and Central Electricity Authority from time to time. Level 2 and Level 3 Chargers are mainly used for Public Charging Stations for charging 2 wheelers, 3 wheelers and 4 wheelers and adequate parking space is mandatory.









LEVEL 2 CHARGING (STANDARD CHARGING)

- It provides an average charging time of 4 to 6 hours through a 240 volts (V) AC plug.
- It is compatible with all EVs including plug-in electric hybrid vehicles.
- The Charger is ideally suited for:
 - Hotels & Resorts to provide overnight charging facility for their in-house guests.
 - Multi-story Apartment Societies & Residential Communities to provide community charging.
 - Institutions & Campuses to provide shared charging to residents & guests.





• Workplaces: From small offices to large offices, business parks and complexes

LEVEL 3 CHARGING (RAPID CHARGING)

- Typically used for rapid charging, there are three types of DC car-side connectors.
- Most DC rapid charging stations will have cables with both a CHAdeMO and CCS connector attached so you will just have to choose which fits to your vehicle socket.
- It can charge a battery up to 80% in 20-30 minutes using 480 V, Direct Current (DC) plug.
- To protect the battery, rapid chargers do not consistently charge at their maximum power rating.
- However, it is not compatible with all the EVs.
- They can be installed only in public charging stations.

2.2.1 INFRASTRUCTURAL REQUIREMENTS FOR SETTING EV CHARGING STATION

As selection of equipment is critical in setting-up of electric vehicle charging station, mentioned below are the key requirements as per government as well as the AIS-Standard developed by ARAI.

- The charging station should have an exclusive transformer with all related substation equipment, including safety appliance.
- The charging station should include 33/11 kV lines/cables and associated equipment, including line termination etc.
- The charging station must have appropriate cabling and electrical work ensuring safety.
- Adequate space for charging and entry/ exit of vehicles is necessary.





- The charging station must tie-up with at least one online Network Service Provider (NSP) to enable advance remote/ online booking of charging slots.
- EVSE (electric vehicle supply equipment) shall be tested by a third-party lab accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL).

2.2.2 STEP-BY-STEP PROCESS FOR PUBIC CHARGING STATION INSTALLATION









- A government or private firm wishes to implement EV Charging station needs to register through the official site of KSEB. The details to be collected from the applicant through registration portal are:
 - Personal Details: Name, Address, Consumer Number, Phone Number, Email ID
 - Location Details: District, Place, Area, Latitude, Longitude
 - Purpose: Car, Scooter, Autorickshaw, All Electric Vehicles
 - And along with that, submit an online application through the official site of Kerala State Electricity Board for getting a Non-Domestic Connection. The following documents are mandatory for all applicants for new service connection
 - Proof of Identity of the Applicant Applicants shall submit any of the documents listed below as proof of Identity (Electoral Identity Card/Indian Passport/Driving Licence/Ration Card/Photo Identity Card issued by any Government Agency/PAN Card/AADHAR Card/Photo Identify Certificate from Village Panchayat or Municipality or Municipal Corporation).
 - Proof of ownership or occupancy of the premises Applicants shall furnish any of the documents listed below as proof of ownership (Ownership certificate of the building issued by Municipal Corporation or Municipality or Panchayat or Township / Ownership or Possession certificate of the land issued by competent Revenue authority / Certified copy of title deed or lease agreement / letter of allotment in the case of industrial estates or industrial parks or Special Economic Zones).
 - An applicant who is not an owner but an occupier of the premises/tenant, shall furnish a no objection certificate from the owner of the premises.
 - Non-domestic Kiosks NOC for kiosk from the Municipal corporation or Municipality or grama Panchayat or land development authority or land owning agency is also submitted along with the application form.
 - All Low Tension (LT) applicants can submit online application for new service connection by payment of Application Fees of Rs 50 /-







- LT Non-Domestic category applicants having connected load up to and including 10 kW and not requiring construction of OH line including phase addition, installation of support poles, pole insertion etc can opt for Package Connection (Service connection before field verification). Such applicants can remit online all the requisite fees for new service connection including Application fees, Security Deposit and entire expenditure for Service connection.
- For such applicants connection shall be arranged (possibly in two working days time) if there is no pending service connection application in that category. The inspecting personnel will verify the details.
- For applicants where overhead line extension or installation of poles (support, insertion etc) is required for effecting service connection, the cost can be ascertained only after field inspection. Such Applicants can submit their application online and pay the required Application Fee.
- The cost (Estimated cost for Service connection + Security Deposit) thus ascertained during field inspection will be intimated to the applicant through e-mail and sms after inspection and the applicant need to remit the amount subsequently.
- For HT Loads, applicant seeks approval from Electrical Inspectorate with an application and relevant documents.
- After submitting the application online, the applicant shall take a print out of the system generated form, and hand over to the KSEB Ltd personnel, after affixing signature & photograph along with other required documents, during site inspection / while effecting service connection. In the case of new Contract Demand Based billing connections, Service Connection Agreement in non-judicial stamp paper has to be executed.
- Post submission of completed application for Charging Station, the connection for Public Charging Station shall be provided within time period not exceeding seven days in metro cities, fifteen days in other municipal areas and thirty days in rural areas, within which the distribution licensees shall provide new connection or modify an existing connection.





society of energy engineers and managers







ANNEXURE Details to be collected from the applicate through registration potal:

Name Address

Consumer no. (Optimal) Phone No.

E-mail id

Location details:

District Place Area Latitude,longitude(Optional)

Purpose

Car Scooter Autorickshaw All

പേര് അഡ്രസ്റ്റ്

മാണ് പ്രിപ്പാനും (െറ്റം) ഫോൺ നമ്പർ ഇ-മെയിൽ അഡ്രസ്സ്

ലോക്കേഷന്റ വിശദവിവരങ്ങൾ:

<u>ജ</u>)ਜੋ സ്ഥ്ലം സ്ഥലത്തിന്റെ എകദേശ അളവ് അക്ഷാംശവും രേഖാംശവും (ഓപ്ഷണൽ)

ആവശ്യം കാർ സ്കൂട്ടർ ഓട്ടോറിക്ഷ

എല്ലാം

- A frie













24	Con No Connected load Purpose Tariff Date of Connection			1				EW	I.																
0.45				tio	•																				
Kerala State Elec (Registered Office: Vydystri Bhave Website: www.iset.in Application for I					ec r L tec	ctricity Board Limited aram, Patton, Thirusananthapuram - 695 004 CIN: U401808(2011)56C027424) Low Tension Connection ed Load based Billing)					Affix recent Passport size Photograph of applicant / authorised signatory														
	Name of ap	plicant (i	in Capi	tal Le	flers,)		Τ																	
1	If connection	on is	Nam	e of O	Inga	nisation		t																	
	required for Organisatio	e an n	Desig	matio	m of	í Applica	nt																		
			Ad	ldress (s of j conr	premises nection is	wł rec	her qui	e ele ired	ctri	sity				Pres	ent ad	ldre	286	(for	соп	mu	nia	atic	m)	
	Name of Bu	ilding																							
	Building Nu	umber																							
2	Lane / stree	t																							
	Place / Lan	1 mark							_	_										_		_	_	_	
	District / Pi	n Code														_									
	Village/Sur	vey No.										_	P	h	(L)	0			Ц					Į.	
	E mail				1								D.	•	(M)									
		Domestic If non-domestic, pr activity / manufac				ctur	nde d red pr	etaile rodu	at t		5		Cor	meets	ed 1	.ca	d								
	Purpose of	ercial										(kW)													
3	Supply (V)	Industr	rial										6				PA F	NI	No (Opt	iona	ŋ	1	_	-
		Agricu	Itural														No. Concert								
	Cipture of any	Others				Owner		Î		Davas	at 1		7	-		LAK.	rso F	(area					1 		
•	Status of ap	pucant	ontino	Var		UNDE :					ni:	N.		_	34/1				and a			Losse			+
8	need to be c	tossed o	wer	No	H.	obtained	1 in	u al	l cas	01194 615		N	lo lo		isc	carrie	d o	ut l	by p	rom	oter		1	No	
		If appli	icant de	esires	a p	articular	Dø	te i	of In	spe	tion	- 97	<u>seci</u>	ify	theI	Date*									
	Preferences	No of P	hases	Requi	ired.	(1 phase	1.5	ар 3-р	hase	8			1 Ph 3 Ph												
9	of applicant	Whethe	er come		- onl	to numb	ase		where	r fac	mor 6		A. 44		10000	d one	e i fi	ca F	ionì	•	<u> </u>	┥		din.	_
	(Optional)	onal) Whether applicant wishes to remit security deposit and expenses for								_ [┥			_											
	connection along with application (Only for WP service				e n	ot	requi	ring p	oles)		- 16	9			90									
1 ,	son/daughter of bereby declar					lare																			
that	that I have attained 18 years of age, that the information provided in this application is true to my knowledge, that the internal						mal																		
wiri Kon	wiring of the premise has been tested by																								
test	test cum completion certificate / Energisation Approval No						is																		
avai will	available with me. I further confirm that there are no orders of Court / Govt restricting electricity connection in the premises, that I will remit electricity dues during every billing cycle and also as and when demanded as my the antibable electricity twiff and						at I																		
othe	was remay executions during every builing cycle and also as and when demanded as per the applicable electricity fariff, and other charges, that I will own the responsibility of security and safety of the meter, cut-out and the installation thereafter. I will not							not																	
indi Tha	includge in any misuse of power and will take all necessary steps in the premises for the efficient use of power and to stop its wastage. I have read and understood the Kerala Electricity Supply Code, 2014 and aerose to abide by the conditions mentioned therein.																								
Dat	Date: Signature of the applicant / authorized signatory																								

F18CC:	riaber Pealitier							
Documents	Proof of Identity		Letter of Authorisation		Details of Property Crossing / Property Crossing Consents		Dimensioned sketch of the premise	
Presentick (*)	Proof of ownership		Consent from Owner		Test Certificate of metering equipment		Others involut	





Association India e



Model Agreement for	supply of energy (low tension)
(h	n stamp paper)
(See	Regulation 103(3))
AGREEMENT made this day of	
on behalf of the	
as the "Licensee") of the one part and Sri/Smt	of
	(hereinafter referred to as the "consumer")
of the other part, is as follows:	
1. The Licensee shall supply to the consumer and t	he consumer shall take from the Licensee the energy requir
the consumer for operating the consumer's equipment	nt and lighting his premises up to a total load of
The supply to the consumer shall be in the form Hertz per second and a nominal voltage of	ofphase alternating current at a nominal frequency of the second s
3. The consumer shall pay to the Licensee, on der	mand, for the energy so supplied, at the tariff rates and
provisions of the Kerala Electricity Supply Code, 2	014 in force from time to time and for all such other char
become due from time to time at rates prescribed in	the Kerala Electricity Supply Code, 2014.
4. The consumer shall deposit with the	the sum of Rs.
(Rupees)	as security for the purpose of payment or satisfaction of all r
which shall become due or owing by the consumer t	to the Licensee in respect of the supply of energy or providir
plant or line or otherwise under this agreement.	
5. The consumer has no right to terminate the agree	ment, having availed connection, before the expiry of 1/2/3
After the said period, the consumer may determine t	this agreement on giving thirty days' clear notice in writing
agreement authority of the Licensee.	
6. The consumer hereby declares that the premises to	which service connection is to be given as per his/her appli
is under his/her occupation as owner or lawful occup	pier.
7. a) All dues to the Licensee, including penalty, of	f the service connection effected to the premises of the con
will be the first charge on the assets of the consumer	and it should be realized as public revenue due on land.
b) Reconnection to the same premises after disconne	sction will be effected only on paying the entire arrears inc
interest, by the same consumer.	
8. In case, the electric line laid for giving service co	nnection to the premises mentioned in the schedule requires
deviated at a later stage, the same shall be done as	per the provisions in the Kerala Electricity Supply Code, 20
amended from time to time.	
9. All dues that may become payable by the consu	mer under or by virtue of this Agreement by reason of brea
otherwise are recoverable under the provisions of th	a Revenue Recovery Act, as if they are arrears of public re
due on land or in such other manner as the Licensee i	may deem fit.
10. The consumer hereby declares that the Kerala	Electricity Supply Code, 2014 has been carefully peruse
him/her read to him/her and he/she agrees to be box	and by the said Supply Code in force from time to time,
shall always form an integral part of this agreement.	
11. The consumer hereby agrees to indemnify the	Licensee for any loss, damage and cost of litigation whi

Acknowledgement

Ref No:	
Application of	(name of applicant), complete in
all respects, for a new Service Connection has	been received at this office on
(Date).	

The above reference number is to be used for all future correspondence.

Signature of representative /Seal of KSEB Ltd

Name and designation







Particulars of Consents / NOCs required / produced

applicant is lonant /	accupter *	I /We, the absolute owner / joint owner(s) bearing building no	of property comprise of	• Proof d in Sy No	of ownership to be produ being registered title of dy) do hereby give my t/ occupier of the abo e premises. I/We shall	aced separately holder(s) and Village, / our consent ve premise to inform KSEB			
200		Name & dtd signature of owner/ joint owner(s)	Name & dtd s first witness	ignature of N	ame & dtd signature of cond witness	f			
	(i)	No of properties to be crossed		(ii) No of consents obta	rined				
		1 / We hereby give consent for di electric connection to Sri / Smt Name & Address of property	rawing electric line t Village	hrough my / our proper Sy No	ty mentioned below Signature of	for giving f Property			
 Crossing to open individual 	Contents Received	Signature Name (Witness 1)		Signature Name (Witness 2)					
dava (No Name & address of	property owner	Vi	Bage	Sy No			
In case of Pr	Consents Not Becelved								
	Space for affixing Special Adhesive Stamp worth Rs 200/-								
D _i Ni	nted : une :	Signature & of Applicant							















Department of Electrical Inspectorate Office of the Chief Electrical Inspector Housing Board Buildings, Sharthi Nagar, Trinvensettapuaran 685-001 Phone: 0471 2331104-0471 2330558, Email - cel@celkenals.gov/n

Service Quality System Procedure

Checklist for EHT/HT/MV Electrical Installations

Genera	1	
1	Signing of the drawings by the Consumer & Contractor	
2	Conformity of the drawing to the standards prescribed. Size of the drawings A0, A1, A2, A3 or A4	
	Furnishing of master schematic drawing	
*	Physical layout with earthing drawing.	
5	Site Plan	
	Outdoor structure drawing (end view and elevation) with all electric	
7	Questionnaire of the installation	
	Affixing Court fee stamp	
9	Remittance of Scrutiny Fee	
10	Approval No & date of the latest approval received	

Master Schematic Drawing

1	HT metaring unit	
2	Primary side protection details with device No.	
3	HT cable size, laying details and fault level calculation	
4	Detail: of transformer secondary protection	
5	Specification of HV & MV CTs for metering and protection	
6	Relay details, device No: and release details.	
7	Details of breakers.	
8	Total connected load and M.D on various switch boards.	
9	Switch board rating and bus bar size of all switch boards.	
10	Whether bus duct / cable details of transformer secondary furnished (Bus duct design	
l her	calculation, spacing sectional drawings etc)	
11	Switch/ fuse rating of outgoing feeders.	
12	Cable size of outgoing feeders.	
13	Whether grading is observed between sections	
14	Whether Length of all cables furnished	
15	Whether Feeder-wise HIM is provided	
16	Whether Group correction or individual capacitors are provided	
17	Whether Generator protection details lumished	
18	Whether Detailed relay and control wiring diagram furnished	
19	Whether cable size of generator is furnished	
20	Whether downstream feeder rating is less than generator current rating	
21	Whether Generator room elevation drawing furnished	
22	Whether Motor rating, cable sizes and length are furnished	
23	Whether Type of starter, r.p.m of motors are furnished	
24	Whether size and length of cables of capacitors are furnished	
25	Whether D.Bs provided are as per standard	
- 200	With more than one earth source, whether standby H/F relay is suitable connected so as not	
-	to miss earth return	

Document No -CEUSQSP 1.0 , Page No - 9 of 15, Rev No - 80, Date - 31 /12/2015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector







Service Quality System Procedure

Checklist for EHT / HT / MV Electrical Installations

Physical layout and Earthing Drawing

1	The structure, L.A., and fencing earthing details	
2	Transformer/Generator body and neutral earthing details	
3	Transformer/Generator room clearances	
4	Transformer oil drainage facilities and foundations set up	
5	Transformer / Generator room elevation drawing	
6	Position of fuel tank of the generator	
7	Inter connection of earth pits.	
8	HT panel room clearances and earthing details	
9	MV Switch board room clearances and earthing details	
10	Physical location and earthing of all SSBs and DBs	
11	Earthing conductor size of all motors and capacitors	
12	OI resistivity value certified by the Electrical Inspector.	
13	Fault level calculation and earthing design	
14	Deviation, if any, from the cable sizes prescribed in the cable schedule published by the department.	
15	All additions and alteration in red colour	
16	All earth bus, earthing conductor, interconnections in green colour	
17	Locations and Numbering of earth electrodes, distance between earth electrodes	
18	Forwarding date of Advance copy	

Document No -CEVSQSP 13 , Page No - 10 of 15, Rev No - 00, Date -31 /122015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector









Covern ment of Kerala Department of Electrical Inspectorate Office of the Chief Electrical Inspector Houing Band Buildings, Sharihi Nagar, Trinvenantapusan 605-001 Phone : 0471 2331104-0471 2330558, Email : cei@ceikesals.gov.in

Service Quality System Procedure

Performa for Electrical Installations

	Particulars of Installation	
	Name of the consumer	
	Address to which communications are to be sent	
	Location of installation	
	Name of Street	
	Corporation / Town / Village	
	District	
	Pin	
	Address of the KSEB Major section	
	Power requirements	
	Nature of load	
	Name of the Contractor License No.	
	Name of the Supervisor Permit number	
Ì	lechnical	
	Details of the EHT / HT Installation	
	(To be furnished only when there is addition alteration on the HT side)	
	Sub - station	
	Transformer Capacity Voltage	
	Indoor / Out door	
	HV	
	Terminais	
	Tap changer Type of cooling	
	LV	
	HV On bushing / Cable end box	
	LV On bushing / Cable end box On load / Off load	
Ń	ole. If more transformers are to be provided, furnish the above information for all.	

H.T. Switch gear	
Туре	
Voltage	
Current	
Rupturing capacity	
Desta strategies de table : De la serve se la s	

Protection details Releases relay Note: If more H.T. Switch gear are to be provided, furnish the above information for all. Details of MV installations

Main L.T. Switch gear	Туре	
Voltage		
Current		
Rupturing capacity		
Protection details Releases / relay		
Kole: If more LT switch gear are to be provided, furnish the above infi	amation for all.	

Document No -CEVSQSP 1.8 , Page No - 11 of 15, Rev No - 00, Date -31 /122015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector









Service Quality System Procedure

Motor and other equipments	
Distribution mains	
Capacitors	

ils of Genera

Engine Capacity		
Generator Capacity		
Voltage		
RPM		
(Furnish all possible information in the drawing)		

Switch gear

Туре	
Voltage	
Current	
Rupturing capacity	
Protection details Releases / relay	

Equipments

Are all equipments constructed and erected in accordance with 151 specifications and code of practice	
Do all equipments satisfy the condition of the supplier?	
Are the equipments to be erected entirely within the property of the consumer	

Drawings to be sent

Site plan showing point of commencement of supply for New installation	
Physical layout HT equipment Panel Boards Equipments	
(Plan and elevation of the above equipments with their clearances should be furnished in	
the drawing)	
Trench Details	
Schematic layout of equipment	
Sectional elevation of switch gears with erection details	
Earthing arrangement	

Document No-CEISQSP 1.0 , Page No - 12 of 15, Rev No - 60, Date -31 /122015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspects





International Copper energy engineers and managers











Department of Electrical Inspectorate

Office of the Chief Electrical Inspector Housing Board Building, Sharth Nagar, Thiruwanarthagaranan 685-001 Phone: 0471 2331104.0471 2330538, Email : ceiğcekenia.govin

Service Quality System Procedure

Scrutiny Fee Details

Name of Treasury	
Chaian No	
Date	
Amount	

General

Other accompaniments Soil Resistivity as certified by Electrical Inspector (attach a copy) (Only for transformer' installations) Bus duct design Earthing calculation Protection scheme Any other details required for scrutiny

Whether advance copy of scheme is submitted to Chief Electrical Inspector (For drawing submitted at Electrical Inspector's office) Whether the contractor is authorized to observe the required formalities and Make modification in the schemes as recommended by Electrical Inspectorate.

Signature Owner

Consumer Contractor

Document No -CEISQSP 1.8 , Page No - 13 of 15, Rev No - 60, Date -31 /122015









Department of Electrical Inspectorate Office of the Chief Electrical Inspector g liced Buildings, Shanthi Nagar, Thirusananthapaanan 605-001 Housing D

Phone : 0471 2331104:0471 2330558. Email : calificationals.cov/in

Service Quality System Procedure

Form of Completion Certificate

I/We certify that the installation detailed below has been installed by me / us and tested and that to the best of my / our knowledge and belief, the installation complies with the provision of CEA regulations and also IS 3043, IS -732 and other relevant codes of practice for electrical installations

- 1. Name of installation
- 2. Voltage and system of supply
- 3. Particulars of work and test results
 - (a) Transformers (Give details of each transformer)
 - Rating
 - Voltage
 - Make •
 - Serial number
 - Year of manufacture
 - **Results of Insulation Tests**
 - Results of earth resistance and continuity tests
 - Results of other relevant tests depending on the voltage level and rating of the transformer.
 - (b) Generators (Give details of each Generators)
 - Rating
 - Voltage .
 - Maline
 - Serial number
 - Year of manufacture
 - **Results of Insulation Tests**
 - Results of earth resistance and continuity tests
 - Results of other relevant tests depending on the voltage level and rating of the Generator
 - (c) H.V motors
 - Number of motors.
 - Name plate details of each motor .
 - Result of insulation tests
 - Results of earth resistance and continuity tests
 - Results of other relevant tests depending on the voltage level and rating of the Motors. .

Document No -CEISQSP 1.8 , Page No - 14 of 15, Rev No - 60, Date -31 //22015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector















Department of Electrical Inspectorate

Office of the Chief Electrical Inspector g Bard Buildings, Sharthi Nigar, This search pagement 605-001 **Housing Board Buil** Phone: 0471 2331104.0471 2330558, Email: cal@calkarala.gov/n

Service Quality System Procedure

(d) M.V Motors

- Number of motors.
- Name plate details of each motor
- · Results of insulation tests
- · Results of earth resistance and continuity tests
- (e) EHV and HV cables (Give details of each cable)
 - Length of cable and number of terminations/joints

 - Results of Insulation Tests
 Result of H.V withstand test result
 - · Results of earth resistance and continuity tests
 - · Results of other relevant tests

(f) MLV cables

- Results of Insulation resistance tests
- Results of Earth resistance and continuity tests

(g) Relays

- · Results of Relay and control wiring tests
- · Results of tests of protection and measurements CTs
- · Results of tests of PTs

(b) Protective earthing

- · Earth resistivity at the site
- Earth resistance of individual earth electrodes
- Result of earth continuity test
- Combined earth resistance of the installation

(i) Special Equipments

- Name plate details of each equipment.
- Results of insulation tests
- Results of earth resistance and continuity tests
- Results of other relevant tests depending on the voltage and rating of the equipment.

Signature of the Supervisor

Signature of the owner

Signature of the Contractor

Name and address with permit number Of the Supervisor.

Name and address of the owner

Name and address with Contract License number of the Contractor.

Document No -CENSQSP 18 , Page No - 15 of 15, Rev No - 00, Date -31 /122015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector







2.2.3 ANERT E MOBILITY SUBSIDY - SOLAR CHARGING STATIONS FOR ELECTRIC VEHICLES

The Kerala government is set to establish solar-based public charging stations for charging electric vehicles in the state. The Agency for New and renewable Energy Research & Technology or ANERT, a Kerala government agency, has issued guidelines in this regard. The charging stations would be set up on the premises of hotels, shopping malls and hospitals situated along the national highway, MC Road and state highways. Permission would also be granted for setting up charging stations on premises having facilities like take away or refreshment joints, waiting rooms, washrooms.

Solar plants having a capacity of 5 to 50 kw have to be set up for charging stations. A place ideal for the plant should be minimum 500 sq feet and maximum 5000 sq ft. A solar plant with a capacity of 5







International Copper Association India

energy engineers and managers

सीम्seem

65

kw will cost between Rs 5 lakh to Rs 20 lakh. Equipment, transformer, panel board will cost between Rs 13 lakh to Rs 18 lakh. A maximum of Rs 10 lakh would be given as subsidy from ANERT.

EXISTING PROCESS FOR INSTALLING SOLAR CHARGING STATION FOR ELECTRIC VEHICLES

- Applications can be submitted directly at the ANERT district offices for charging stations.
- The following documents are mandatory for all applicants
 - Proof of Identity of the Applicant Copy of Aadhaar Card
 - ✤ Copy of the Registration Certificate, In case of Hotels, Malls & Hospitals
 - Copy of PAN Card of Beneficiary
 - ✤ Location details for EV Charger Route Map of the Site may be attached
 - Copy of KSEB Bill First Bill and Recent Bill
 - Available and Area to be provided for EVCI infrastructure (in Sqm) Sketch/ Civil drawing of Plot should be enclosed.
 - Ownership details of the land Copy of the recent Land tax receipt
 - Copy of the invoice Cost of Charging Machine
- The Charging Point Operator have to sign an agreement stating the guidelines published by ANERT.
- Subsequently ANERT district engineering will visit the site and inspect the facilities before granting permission.





Application form for subsidy of Public EV Charging Machines for Hotels, Malls & Shopping Complexes Near NH, MC Road and Other State Highways

1	District	
2	Name of the Beneficiary	2
э	Address of Beneficiary(Attach copy of Adhar Card)	4
4	Hotel/Mall/Shopping Complex/Hospitals/Restaurants	1
5	Contact Number	1
6	E-Mail ID	
7	Registration Certificate No.(In case of Hotels, Malls & Hospitals, Copy of the Registration certificate)	
8	Pan No.of Beneficiary (Attach a copy)	t)
9	Location Details for EV Charger. (Address, Village, Taluk, Name of local body, District) (Route Map of the site may Attached)	4
10	Whether separate Transformer in Installed for this Charging Station.	
π	Capacity of Transformer in kVA	







12	Copy of KSEB Bill (First bill and recent bill)	4
13	Electricity charge for last six months	T
14	Name and Contact No. of the KSEB section office	4
15	Available Land Area to be provided for EVCI infrastructure (in Sqm)(Sketch/Civil drawing of Plot should be enclosed)	Ť
6	Ownership Details of land (Survey No.) (Copy of the recent land tax receipt should be attached)	*
7	Own land/Rented Property	45
8	Facility for Refreshment	: Yes/No
9	Facility for waiting room	: Yes/No
20	Wash room facility	: Yes/No
21	Type of investor	: Single/ Partnership/Company













GB/T Gun	Nos	
CCS TYPE II Gun	Nos	
TYPE II AC Gun	Nos	
CHADEMO Gun	Nos	

(Subsidy is also eligible for CCS TYPE II Gun)

Note:

1. All the site should be provided the facilities like refreshment, washroom/waiting room (Preferably AC) for availing the subsidy.

Date:

Signature : Name: Address:







Existing Process for set up of Public Charging Stations (Commercial Basis)

Step 1	Application for Public Charging Station	 Charging Point Operator/Property Owner (Government or Private) wishes to implement EV Charging station needs to register through the official site of KSEB. The details to be collected from the applicant through registration portal are: I. Personal Details: Name, Address, Consumer Number, Phone Number, Email ID II. Location Details: District, Place, Area, Latitude, Longitude III. Purpose: Car, Scooter, Autorickshaw, All Electric Vehicles
		Along with that, submit an online application through the official site of KSEB for getting a Non-Domestic Connection. The following documents are mandatory for all applicants for new
Step 2	Application for Power Connection from KSEB	 service connection, 1. Proof of Identity of the Applicant - Electoral Identity Card/Passport/Driving Licence/Ration Card/Photo Identity Card issued by any Government Agency/PAN Card/AADHAR Card/Photo Identify Certificate from Village Panchayat or Municipality or Municipal Corporation. 2. Proof of ownership or occupancy of the premises - Ownership certificate of the building issued by Municipal Corporation or Municipality or Panchayat or Township / Ownership or Possession certificate of the land issued by




		competent Revenue authority / Certified copy of title deed
		or lease agreement.
		3. NOC from the owner of the premises - An applicant who is
		not an owner but an occupier of the premises/tenant, shall
		furnish a no objection certificate from the owner of the premises.
		4 NOC for Non Domestic kiosk from the Municipal
		corporation or Municipality or grama Panchayat or land
		development outbority on land owning occupy is also
		development authomy of fand owning agency is also
		submitted along with the application form
Step 3	Revenue Sharing	For government lands, KSEB will approach the relevant land
	Agreement	owning Government entity to sign a Revenue Sharing agreement
		All Low Tension (LT) applicants can submit online application for
		new service connection by payment of Application Fees.
		• LT Non-Domestic category (Connected load up to and
		including 10 Kw) and not requiring overhead line extension
		or installation of poles (support insertion etc) can opt for
		Backage Connection (Service connection before field
Store 1	Devenent of	Fackage Connection (Service connection before field
Step 4	Payment of	verification). Such applicants can remit online all the rees
	Application Fee	including Application fees, Security Deposit and entire
		expenditure for Service connection.
		• For applicants where overhead line extension or installation
		of poles (support, insertion etc) is required for effecting
		service connection, the cost (Estimated cost for Service





society of energy engineers and managers सीम्seem

		connection + Security Deposit) ascertained during field inspection will be intimated to the applicant through e-mail and SMS after inspection and the applicant need to remit the amount subsequently.
Step 5	Approval from Electrical Inspectorate for HT Loads	 For HT Loads, applicant seeks approval from Electrical Inspectorate with an application. The Application Form shall be submitted only through a competent Electrical Contractor licensed by the Kerala State Electricity Licensing Board, Department of Electrical Inspectorate. The relevant documents attached with application as follows: A covering letter, with court fee stamp worth Rs 1/-affixed Authorisation Letter from the client authorising the Electrical contractor to carry out the work Copy of the Electrical contractors Licence Electrical schematic consisting of distribution and detailed working drawing. The structural layout showing plan and elevations with sectional and safe clearances Earthing Layout Diagram Site Plan Certificate of soil resistivity Fault level calculation Bus Duct design Control Wiring Diagram chalan receipt enclosed along with the application







		On completion of Electrical Installation work, Electrical Inspectorate conducts an inspection and issues safety certificate and sanction for energization.
Step 6	Print out of Application Form	After submitting the application online, the applicant shall take a print out of the system generated form
Step 7	Inspection for Verification and Estimation	 Inspection of site for estimation of infrastructure needs & connection costs by KSEB. The applicant should hand over the print out of system generated form to the KSEB Ltd personnel, after affixing signature & photograph along with other required documents, during site inspection.
Step 8	Completion of Pubic Charging Station	Charging Point Operator completes the construction of Pubic Charging station by considering the inputs from KSEB
Step 9	Final Inspection By KSEB	After completing the setup of Pubic Charging Station, KSEB conducts an inspection for approval to check that such stations meet technical, safety as well as performance standards and protocols as per the guidelines issued by MoP.
Step 10	Energization	Energization of Public Charging Station by DISCOM and opening the station for Public.



Г



2.3 CAPTIVE CHARGING STATION

Captive Charging Station is an electric vehicle charging station exclusively for the electric vehicles owned or under the control of the owner of the charging station e.g. Government Departments, Corporate houses, Bus Depots, charging stations owned by the fleet owners etc. and shall not be used for commercial purpose.

2.3.1 EXISTING PROCESS FOR CAPTIVE CHARGING STATION **INSTALLATION**









- A government or private firm wishes to implement Captive Charging station needs to register through the official site of KSEB. The details to be collected from the applicant through registration portal are:
 - Personal Details: Name, Address, Consumer Number, Phone Number, Email ID
 - Location Details: District, Place, Area, Latitude, Longitude
 - Purpose: Car, Scooter, Autorickshaw, All Electric Vehicles





- And along with that, submit an online application through the official site of Kerala State Electricity Board for getting a Non-Domestic Connection or upgrade existing connection. The following documents are mandatory for all applicants for new service connection
 - Proof of Identity of the Applicant Applicants shall submit any of the documents listed below as proof of Identity (Electoral Identity Card/Indian Passport/Driving Licence/Ration Card/Photo Identity Card issued by any Government Agency/PAN Card/AADHAR Card/Photo Identify Certificate from Village Panchayat or Municipality or Municipal Corporation).
 - Proof of ownership or occupancy of the premises Applicants shall furnish any of the documents listed below as proof of ownership (Ownership certificate of the building issued by Municipal Corporation or Municipality or Panchayat or Township / Ownership or Possession certificate of the land issued by competent Revenue authority / Certified copy of title deed or lease agreement / letter of allotment in the case of industrial estates or industrial parks or Special Economic Zones).
 - An applicant who is not an owner but an occupier of the premises/tenant, shall furnish a no objection certificate from the owner of the premises.
 - Non-domestic Kiosks NOC for kiosk from the Municipal corporation or Municipality or grama Panchayat or land development authority or land owning agency is also submitted along with the application form.
- All Low Tension (LT) applicants can submit online application for new service connection by payment of Application Fees of Rs 50 /-
- LT Non-Domestic category applicants having connected load up to and including 10 kW and not requiring construction of OH line including phase addition, installation of support poles, pole insertion etc can opt for Package Connection (Service connection before field verification). Such applicants can remit online all the requisite fees for new service connection including Application fees, Security Deposit and entire expenditure for Service connection.







- For such applicants connection shall be arranged (possibly in two working days time) if there is no pending service connection application in that category. The inspecting personnel will verify the details.
- For applicants where overhead line extension or installation of poles (support, insertion etc) is required for effecting service connection, the cost can be ascertained only after field inspection. Such Applicants can submit their application online and pay the required Application Fee.
- The cost (Estimated cost for Service connection + Security Deposit) thus ascertained during field inspection will be intimated to the applicant through e-mail and sms after inspection and the applicant need to remit the amount subsequently.
- For HT Loads, applicant seeks approval from Electrical Inspectorate with an application and relevant documents.
- After submitting the application online, the applicant shall take a print out of the system generated form, and hand over to the KSEB Ltd personnel, after affixing signature & photograph along with other required documents, during site inspection / while effecting service connection. In the case of new Contract Demand Based billing connections, Service Connection Agreement in non-judicial stamp paper has to be executed.
- Post submission of completed application for Charging Station, the connection for Captive Charging Station shall be provided within time period not exceeding seven days in metro cities, fifteen days in other municipal areas and thirty days in rural areas, within which the distribution licensees shall provide new connection or modify an existing connection.





International Copper



Details to be collected from the applicate through registration postal:

Name Address

Consumer no. (Ophinal) Phone No.

E-mail id

Location details:

District Place Area Latitude,longitude(Optional)

Purpose

Car Scooter Autorickshaw All

പേര് അഡ്രസ്റ്റ്

ഇ-മെയിൽ അഡ്രസ്റ്റ്

ലോക്കേഷണ്റ വിശദവിവരങ്ങൾ: ജില്ല സ്ഥലം

സ്ഥലത്തിന്റെ എകദേശ അളവ് അക്ഷാംശവും രേഖാംശവും (ഓപ്ഷണൽ)

ആവശ്യം

കാർ സ്കൂട്ടർ ഓട്ടോറിക്ഷ എല്ലാം

- Aprile







20	Con No						G	onnecte	d loa	d				kW								
014	Purpose				Tariff		Date	of Con	octi	on												
KSEB (Registered Office: Vydyuthi Bhav Website: www.kerb.it Application for								Affix recent Passport si Photograph of applican authorised signatory r Low Tension Connection ted Load based Billing)							size int /	ſ						
	Name of ap	plicant (i	in Cap	ital Let	iters)																	-
1	If connection required for Organisation	on is er an n	Nam Desi	ue of O gnatio	rganisation n of Applica	nt															_	
			A	ddress 4	s of premises connection is	wh reg	ere ek prired	ectriciț			F	hese	nt ad	dre	-	(for	con	mu	nica	tior	1)	
	Name of Bu	ilding	ĺ																			
	Building Nu	imber								ļ												
2	Lane / stree	t	ļ																			
	Place / Lan	I mark				_											-		_		_	
	District / Pi	n Code									-		٦	г			_	_				
	Village/Sur	vey No.								P N	h.	(1)	0	-			-	_	⊢			
<u> </u>		Domesi	6		If non-domesti	c, pr	ovide d	letails of				(an)			_	_						-
		Comm	ercial		activity / man	utac	tured p	roduct		5		Com	(kW)	а I. 	Can							
3	Purpose of Supply (v) Agricul		rial						PAN				ND	No (Optional)			—					
			Itural						6				Γ									
		Others								_	A	ADH	AR N	So I	(iii.an	a di sh	le, pro	di eti kü	ontit	i isan	d req	e)
4	Status of ap	plicant			Owner			Tenant		1												
8	Whether off	er prop	erties	Yes	If YES, v	whe Lin	ther c	onseni	8	íes Nia		Whe	ather	int Los	err a t	nal e	listr	ibuti	on	Y	65	
	need to be t	If appli	icant d	lesires	a particular	Dat	e of Ir	specti	m, s	peci	ify (the D	ate"			<u> </u>		(Allea		1.0		۲
	Preferences	* (This r No of P	may at Thases	tract ad Requi	iditional exper ired (1 phase	(/ 3) phas	6)									1 P	h [Т	3 P	h	—
9	of applicant (Optional)	Whethe	er com	sumer	opt to purch	ase	meter	r (as pe	r CE	FA approved specification) Yes No						_						
	(educated)	Whethe	ther applicant wishes to remit security deposit and expenses for											. [┢	N		_				
—		connec	tion a	long w	rith applicati	on (Only f	or WP	ervi	ce n	ota	equiri	ng pe	des							-	-
I		1.40	~				m/dai	ighter e	F										ere	by d	lecla	ire
wiri	 nave attaine ng of the pren 	a 16 year tise has b	is of ag ison be	ge, mut sted by	me mormati	on p		ea in th	e ap	puic	a1000	n 18 Un	uid 60	цì	R	00%	nedg	pr, titta	at 11	er to . (ne		of
licer	used wiring co	ntractor)	who is	havin	g a valid Licer	ise Ì Lini	No														nd t	fher i
avai	test cum completion certificate / Energisation Approval No									, 18 at I												
will	remit electrici	ty dues d	luring	every b	billing cycle ar	nd a	lso as	and wh	en d	ema	nde	d as p	er th		ppl	kab	le el	ectric	ity:	tarii	ff, ar	nd
othe	r charges, that doe in any mis	I will ow	on the r	nespone discillat	sibility of secur also all percent	rity. ratei	and sa here in	fety of I the pre-	he m	eter; « for	, cui the	t-out a officia	ind th mb us	ne in avri	nista Error	allat	ion ti and	hernesa texastra	ifter mit	: I w	rill r orter	not:
The	ve read and ur	derstood	the Ke	erala El	lectricity Supp	ly C	ode, 2	014 and	agae	e bo	abic	te by	the ce	nd	itio	na n	nenti	oned	the	ngin		See.
Dat	e:						Si	gnatur	of	the	app	lican	tt/as	th	ori	zed	sigr	ator	y			
Plac	Place: Name:																					

F Laborer.					Pratine.					
Documents	Proof of Identity		Letter of Authorisation		Details of Property Crossing / Property Crossing Consents	Dimensioned sketch of the premise				
Presented (%)	Proof of ownership		Consent from Owner		Test Certificate of metering equipment		Others (even)			





Association India e



	Annexur
Model Agreement for supply of energy	gy (low tension)
(In stamp paper)	
(See Regulation 103	(3))
AGREEMENT made this	hYear between
as the "Licensee") of the one part and Sri/Smt	of
(hereinafter	referred to as the "consumer")
of the other part, is as follows:	,
1. The Licensee shall supply to the consumer and the consumer shall	I take from the Licensee the energy require
the consumer for operating the consumer's equipment and lighting hi	s premises up to a total load of
2. The supply to the consumer shall be in the form of	Iternating current at a nominal frequency of
Hertz per second and a nominal voltage ofvolts.	a restored as a second strength of the
3. The consumer shall pay to the Licensee, on demand, for the end	ergy so supplied, at the tariff rates and a
provisions of the Kerala Electricity Supply Code, 2014 in force fro	m time to time and for all such other char
become due from time to time at rates prescribed in the Kerala Electr	ricity Supply Code, 2014.
4. The consumer shall deposit with the	
(Rupees) as security for the	purpose of payment or satisfaction of all n
which shall become due or owing by the consumer to the Licensee in	respect of the supply of energy or providin
plant or line or otherwise under this agreement.	
5. The consumer has no right to terminate the agreement, having available	iled connection, before the expiry of 1/2/3
After the said period, the consumer may determine this agreement on	giving thirty days' clear notice in writing
agreement authority of the Licensee.	
6. The consumer hereby declares that the premises to which service or	onnection is to be given as per his/her applie
is under his/her occupation as owner or lawful occupier.	
7. a) All dues to the Licensee, including penalty, of the service conr	nection effected to the premises of the con-
will be the first charge on the assets of the consumer and it should be r	ealized as public revenue due on land.
b) Reconnection to the same premises after disconnection will be effort	ected only on paying the entire arrears incl
interest, by the same consumer.	
8. In case, the electric line laid for giving service connection to the pr	remises mentioned in the schedule requires
deviated at a later stage, the same shall be done as per the provision	s in the Kerala Electricity Supply Code, 20
amended from time to time.	
9. All dues that may become payable by the consumer under or by	virtue of this Agreement by reason of brea
otherwise are recoverable under the provisions of the Revenue Recov	very Act, as if they are arrears of public re
aue on iand or in such other manner as the Licensee may deem fit.	by Code 2014 has been carefully person
him/har read to him/har and ha/she arreas to he hound by the solid.	supply Code, 2014 has been carefully peruse
shall always form an integral part of this arrayment	suppry code in force from time to time,
11. The concurrent hereby agrees to indemnify the Licensee, for an	w loss damage and cost of litigation which
Licensee might incur on account of giving this connection	y ross, damage and cost of nugation white
Encensee might men of needan of giving ans connection.	

Acknow	ledgement	
--------	-----------	--

Ref No:

_

Application of(name of applicant), complete in

The above reference number is to be used for all future correspondence.

Signature of representative /Seal of KSEB Ltd Name and designation



Particulars of Consents / NOCs required / produced

applicant is tenant /	Froof of osenership to be produced separated I /We,									
1		Name & dtd signature of owner/joint owner(s)	Name & dtd s first witness	gnature of	Name & second v	t dtd signature of witness				
	(i)	No of properties to be crossed		(ii) No of conser	nts obtained					
		I / We hereby give consent for dr	awing electric line t	hrough my / our	property m	entioned below	for giving			
11		electric connection to Sri / Smt								
		Name & Address of property	Village	Sy No	0	Signature of	Property			
Crossing to open antimpind	Consents Received	Signature		Signature						
븉	_	Name (Witness 1)	property owner	Name (witness	Village		Se No			
In case of Pas-	Consents Not Received									
D	Space for affixing Special Adhesive Stamp worth Rs 200/-									
N	me	of Applicant								











International Copper Association India Copper Alliance





Department of Electrical Inspectorate Office of the Chief Electrical Inspector Housing Board Buildings, Sharthi Nagar, Trinvensettapuaran 685-001 Phone: 0471 2331104-0471 2330558, Email - cel@celkenals.gov/n

Service Quality System Procedure

Checklist for EHT/HT/MV Electrical Installations

Genera	1	
1	Signing of the drawings by the Consumer & Contractor	
2	Conformity of the drawing to the standards prescribed. Size of the drawings A0, A1, A2, A3 or A4	
3	Furnishing of master schematic drawing	
4	Physical layout with earthing drawing.	
5	Site Plan	
6	Outdoor structure drawing (end view and elevation) with all electric	
7	Questionnaire of the installation	
8	Affixing Court fee stamp	
9	Remittance of Scrutiny Fee	
10	Approval No & date of the latest approval received	

Master Schematic Drawing

1	HT metaring unit	
2	Primary side protection details with device No.	
3	HT cable size, laying details and fault level calculation	
4	Detail: of transformer secondary protection	
5	Specification of HV & MV CTs for metering and protection	
6	Relay details, device No: and release details.	
7	Details of breakers.	
8	Total connected load and M.D on various switch boards.	
9	Switch board rating and bus bar size of all switch boards.	
10	Whether bus duct / cable details of transformer secondary furnished (Bus duct design	
l her	calculation, spacing sectional drawings etc)	
11	Switch/ fuse rating of outgoing feeders.	
12	Cable size of outgoing feeders.	
13	Whether grading is observed between sections	
14	Whether Length of all cables furnished	
15	Whether Feeder-wise HIM is provided	
16	Whether Group correction or individual capacitors are provided	
17	Whether Generator protection details lumished	
18	Whether Detailed relay and control wiring diagram furnished	
19	Whether cable size of generator is furnished	
20	Whether downstream feeder rating is less than generator current rating	
21	Whether Generator room elevation drawing furnished	
22	Whether Motor rating, cable sizes and length are furnished	
23	Whether Type of starter, r.p.m of motors are furnished	
24	Whether size and length of cables of capacitors are furnished	
25	Whether D.Bs provided are as per standard	
- 200	With more than one earth source, whether standby H/F relay is suitable connected so as not	
200	to miss earth return	

Document No -CEUSQSP 1.0 , Page No - 9 of 15, Rev No - 80, Date - 31 /12/2015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector







Service Quality System Procedure

Checklist for EHT / HT / MV Electrical Installations

Physical layout and Earthing Drawing

1	The structure, L.A., and fencing earthing details	
2	Transformer/Generator body and neutral earthing details	
3	Transformer/Generator room clearances	
4	Transformer oil drainage facilities and foundations set up	
5	Transformer / Generator room elevation drawing	
6	Position of fuel tank of the generator	
7	Inter connection of earth pits.	
8	HT panel room clearances and earthing details	
9	MV Switch board room clearances and earthing details	
10	Physical location and earthing of all SSBs and DBs	
11	Earthing conductor size of all motors and capacitors	
12	OI resistivity value certified by the Electrical Inspector.	
13	Fault level calculation and earthing design	
14	Deviation, if any, from the cable sizes prescribed in the cable schedule published by the department.	
15	All additions and alteration in red colour	
16	All earth bus, earthing conductor, interconnections in green colour	
17	Locations and Numbering of earth electrodes, distance between earth electrodes	
18	Forwarding date of Advance copy	

Document No -CEVSQSP 13 , Page No - 10 of 15, Rev No - 00, Date -31 /122015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector









Covern ment of Kerala Department of Electrical Inspectorate Office of the Chief Electrical Inspector Houing Band Buildings, Sharihi Nagar, Thisvenantapusan 605-001 Phone : 0471 2331104-0471 2330556, Email : cei@ceikesals.gov.in

Service Quality System Procedure

Performa for Electrical Installations

	Particulars of Installation	
	Name of the consumer	
	Address to which communications are to be sent	
	Location of installation	
	Name of Street	
	Corporation / Town / Village	
	District	
	Pin	
	Address of the KSEB Major section	
	Power requirements	
	Nature of load	
	Name of the Contractor License No.	
	Name of the Supervisor Permit number	
Ì	lechnical	
	Details of the EHT / HT Installation	
	(To be furnished only when there is addition alteration on the HT side)	
	Sub - station	
	Transformer Capacity Voltage	
	Indoor / Out door	
	HV	
	Terminais	
	Tap changer Type of cooling	
	LV	
	HV On bushing / Cable end box	
	LV On bushing / Cable end box On load / Off load	
Ń	ole. If more transformers are to be provided, furnish the above information for all.	

H.T. Switch gear	
Туре	
Voltage	
Current	
Rupturing capacity	
Destination distribution Destination and and	

Protection details Releases relay Note: If more H.T. Switch gear are to be provided, furnish the above information for all. Details of MV installations

Main L.T. Switch gear	Туре	
Voltage		
Current		
Rupturing capacity		
Protection details Releases / relay		
Note: If more L.T switch gear are to be provided, furnish the above in	formation for all.	

Document No -CEVSQSP 1.8 , Page No - 11 of 15, Rev No - 00, Date -31 /122015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector









Service Quality System Procedure

Motor and other equipments	
Distribution mains	
Capacitors	

ils of Generate

Engine Capacity		
Generator Capacity		
Voltage		
RPM		
(Furnish all possible information in the drawing)		

Switch gear

Туре	
Voltage	
Current	
Rupturing capacity	
Protection details Releases / relay	

Equipments

Are all equipments constructed and erected in accordance with 151 specifications and code of practice	
Do all equipments satisfy the condition of the supplier?	
Are the equipments to be erected entirely within the property of the consumer	

Drawings to be sent

Site plan showing point of commencement of supply for New installation	
Physical layout HT equipment Panel Boards Equipments	
(Plan and elevation of the above equipments with their clearances should be furnished in	
the drawing)	
Trench Details	
Schematic layout of equipment	
Sectional elevation of switch gears with erection details	
Earthing arrangement	

Document No-CEISQSP 1.0 , Page No - 12 of 15, Rev No - 60, Date -31 /122015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspects











International Copper Association India Copper Alliance





Department of Electrical Inspectorate

Office of the Chief Electrical Inspector Housing Board Building, Sharth Nagar, Thiruwanarthappeoran 685-001 Phone: 0471 2331104.0471 2330538, Email : oxi@cekenia.govin

Service Quality System Procedure

Scrutiny Fee Details

Name of Treasury	
Chaian No	
Date	
Amount	

General

Other accompaniments Soil Resistivity as certified by Electrical Inspector (attach a copy) (Only for transformer' installations) Bus duct design Earthing calculation Protection scheme Any other details required for scrutiny

Whether advance copy of scheme is submitted to Chief Electrical Inspector (For drawing submitted at Electrical Inspector's office) Whether the contractor is authorized to observe the required formalities and Make modification in the schemes as recommended by Electrical Inspectorate.

Signature Owner

Consumer Contractor

Document No -CEISQSP 1.8 , Page No - 13 of 15, Rev No - 60, Date -31 /122015









Covern ment of Kentle Department of Electrical Inspectorate Office of the Chief Electrical Inspector Ford Rulding, Sherbi Naga, This anarthopage 055-001 Housing Board Buildings, Shanhi Nagar, Thiruwananthapuaram 655.00 Phone : 0471 2331104:0471 2330558, Email : caligorativasa govin

Service Quality System Procedure

Form of Completion Certificate

I/We certify that the installation detailed below has been installed by me / us and tested and that to the best of my / our knowledge and belief, the installation complies with the provision of CEA regulations and also IS 3043, IS -732 and other relevant codes of practice for electrical installations

- 1. Name of installation
- 2. Voltage and system of supply
- 3. Particulars of work and test results
 - (a) Transformers (Give details of each transformer)
 - Rating .
 - Voltage
 - Make
 - Serial number
 - Year of manufacture
 - **Results of Insulation Tests**
 - Results of earth resistance and continuity tests
 - Results of other relevant tests depending on the voltage level and rating of the transformer
 - (b) Generators (Give details of each Generators)
 - Rating
 - Voltage
 - Make .
 - Serial number
 - Year of manufacture
 - Results of Insulation Tests
 - Results of earth resistance and continuity tests
 - Results of other relevant tests depending on the voltage level and rating of the Generator

(c) H.V motors

- Number of motors
- Name plate details of each motor
- Result of insulation tests
- Results of earth resistance and continuity tests
- Results of other relevant tests depending on the voltage level and rating of the Motors. .

Document No -CEVSQSP 1.8 , Page No - 14 of 15, Rev No - 00, Date -31 //22015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector











International Copper Association India Copper Alliance





Department of Electrical Inspectorate

Office of the Chief Electrical Inspector gland Buildings, Sharthi Nagar, Triny anarthoparam 625-001 **Housing Board B**

Phone: 0471 2331104.0471 2330558, Email: cal@calkanala.gov.in

Service Quality System Procedure

(d) M.V Motors

- Number of motors.
- Name plate details of each motor
- · Results of insulation tests
- · Results of earth resistance and continuity tests
- (e) EHV and HV cables (Give details of each cable)
 - · Length of cable and number of terminations/joints
 - Results of Insulation Tests
 - Result of H V withstand test result
 - Results of earth resistance and continuity tests
 - Results of other relevant tests

(f) MLV cables

- Results of Insulation resistance tests
- Results of Earth resistance and continuity tests

(g) Relays

- · Results of Relay and control wiring tests
- · Results of tests of protection and measurements CTs
- · Results of tests of PTs

(b) Protective earthing

- · Earth resistivity at the site
- Earth resistance of individual earth electrodes
- Result of earth continuity test.
- Combined earth resistance of the installation

(i) Special Equipments

- Name plate details of each equipment.
- Results of insulation tests
- Results of earth resistance and continuity tests
- Results of other relevant tests depending on the voltage and rating of the equipment.

Signature of the Supervisor

Signature of the owner

Signature of the Contractor

Name and address with permit number Of the Supervisor.

Name and address of the owner

Name and address with Contract License number of the Contractor.

Document No -CEI/SQSP 18 , Page No - 15 of 15, Rev No - 00, Date -31 //22015

Prepared & Issued By: Nodal Officer

Approved By: Chief Electrical Inspector

Existing Process for set up of Captive Charging Station (Non-Commercial Basis)







Step 1	Application for Captive Charging Station	 Charging Point Operator/Property Owner (Government or Private) wishes to implement Captive Charging station needs to register through the official site of KSEB. The details to be collected from the applicant through registration portal are: I. Personal Details: Name, Address, Consumer Number, Phone Number, Email ID II. Location Details: District, Place, Area, Latitude, Longitude III. Purpose: Car, Scooter, Autorickshaw, All Electric Vehicles
Step 2	Application for Power Connection from KSEB	 Along with that, submit an online application through the official site of KSEB for getting a Non-Domestic Connection. The following documents are mandatory for all applicants for new service connection, I. Proof of Identity of the Applicant - Electoral Identity Card/Passport/Driving Licence/Ration Card/Photo Identity Card issued by any Government Agency/PAN Card/AADHAR Card/Photo Identify Certificate from Village Panchayat or Municipality or Municipal Corporation. II. Proof of ownership or occupancy of the premises - Ownership certificate of the building issued by Municipal Corporation or Municipality or Panchayat or Township / Ownership or Possession certificate of the land issued by competent Revenue authority / Certified copy of title deed or lease agreement





opper society of energy engineers and managers

सीम्seem



		III. NOC from the owner of the premises - An applicant who is
		not an owner but an occupier of the premises/tenant, shall
		furnish a no objection certificate from the owner of the
		premises.
		IV. NOC for Non-Domestic kiosk from the Municipal
		corporation or Municipality or grama Panchayat or land
		development authority or land owning agency is also
		submitted along with the application form
		V. For Charging Point Operator / Govt or Private Property
		Owner, willing to avail existing tariff and meter connection.
		an application needs to be made to KSEB and for new load
		addition/ load enhancement.
		All Low Tension (LT) applicants can submit online application for
		new service connection by payment of Application Fees.
		• LT Non-Domestic category (Connected load up to and
		including 10 Kw) and not requiring overhead line extension
		or installation of poles (support, insertion etc) can opt for
		Package Connection (Service connection before field
		verification). Such applicants can remit online all the fees
Step 3	Payment of	including Application fees, Security Deposit and entire
	Application Fee	expenditure for Service connection.
		• For applicants where overhead line extension or installation
		of poles (support, insertion etc) is required for effecting
		service connection, the cost (Estimated cost for Service
		connection + Security Deposit) ascertained during field
		inspection will be intimated to the applicant through e-mail





society of energy engineers and managers सीम्seem

		and SMS after inspection and the applicant need to remit the
		amount subsequently.
Step 4	Approval from Electrical Inspectorate for HT Loads	 For HT Loads, applicant seeks approval from Electrical Inspectorate with an application. The Application Form shall be submitted only through a competent Electrical Contractor licensed by the Kerala State Electricity Licensing Board, Department of Electrical Inspectorate. The relevant documents attached with application as follows: A covering letter, with court fee stamp worth Rs 1/-affixed Authorisation Letter from the client authorising the Electrical contractor to carry out the work Copy of the Electrical contractors Licence Electrical schematic consisting of distribution and detailed working drawing. The structural layout showing plan and elevations with sectional and safe clearances Earthing Layout Diagram Site Plan Certificate of soil resistivity Fault level calculation Bus Duct design Control Wiring Diagram chalan receipt enclosed along with the application







		On completion of Electrical Installation work, Electrical
		Inspectorate conducts an inspection and issues safety certificate and
		sanction for energization.
Step 5	Print out of Application Form	After submitting the application online, the applicant shall take a print out of the system generated form
Step 6	Inspection for Verification and Estimation	 Inspection of site for estimation of infrastructure needs & connection costs by KSEB. The applicant should hand over the print out of system generated form to the KSEB Ltd personnel, after affixing signature & photograph along with other required documents, during site inspection.
	Completion of	
Step 7	Captive Charging Station	Charging Point Operator completes the construction of Captive Charging station by considering the inputs from KSEB
Step 8	Final Inspection By KSEB	After completing the setup of Captive Charging Station, KSEB conducts an inspection for approval to check that such stations meet technical, safety as well as performance standards and protocols as per the guidelines issued by MoP.
Step 9	Energization	Energization of Captive Charging Station by DISCOM and opening the station.







3. RECOMMENDATIONS

FEEDBACK FROM STAKEHOLDERS, RELEVANT 3.1 POLICY GUIDELINES AND RECOMMENDATIONS

CONCERNS	ACTION REQUIRED
At present, charging at public stations can be done only through the mobile app. In case of mobile phones getting switched off or lost, it will be difficult to charge	A prepaid coupon that helps to charge without booking through the mobile app can be used for emergencies and alternate methods are in discussion.
Electric vehicles are new to town, and so many enthusiasts are looking forward to bringing them home. But still, there are confusions. Many of the queries from the public are unanswered.	If the energy sector and transport sector jointly establish call centres, then many apprehensions can be answered through this.
As electric vehicles are still in the development stage, different manufacturers use different standards for their chargers. When public infrastructure chargers are being used, this will be a major concern.	The charging protocols need to be made robust and universal and also standardized format for chargers is absolutely necessary.







At some pole mount charging stations provided by KSEB, unnecessary blocks are created by other vehicles (non-charging), especially near seashores.	 A separate queue for charging electric vehicles (cars & autos) is suggested. No Parking Board for noncharging vehicles
The kerb charging stations have to mind road safety and parking facilities.	Pole mounted charging stations to be located based on need and parking convenience.
No clear norms are available for fast charging and slow charging in Electric Vehicles.	The concerned manufacturers have to state clear guidelines for battery management systems in Electric Vehicles.
Charging beyond 90% causes problems in some cases like the vehicle gets stuck and software problems	Nodal Agencies to convene a meeting of EVC manufacturers, app developers and end-users to consolidate charging issues and solve the same.
The 2 and 3-wheelers are in huge numbers. So, the inadequate charging infrastructure causes rush and long waiting period for charging	 More mini charging stations are needed in public places. The space below flyovers can be used for mini charging stations.
Fast charging is recommended at highway roadsides but land unavailability will be an issue. In the case of roads having less width (especially NH with width about 45 m), space is limited for parking bay or charging bay	 To address this, even during the design stage of Highways, EV charging station locations are to be assigned or specifically mentioned with sufficient parking bay. The Highway design shall address cable cross ducts as well as charging bays near intersections below bridges. The space below flyovers can be used for charging stations.
The outdated Electrical Inspectorate guidelines are making confusions during the installation of Electric Vehicle Charger at housing societies for flat owners.	Inspectorate guidelines to be modified for smart charging as well as EVC at housing societies for flat owners.







Electric Vehicle Charging Stations are not included in the KMBR, KPBR and IBR.	Government should amend building rules by making necessary provisions to accommodate electric vehicle charging stations in buildings.
In case of flats, some of them have already an existing 11 kV supply. So difficult to set up EV station.	A separate connection for EV stations may be considered by KSEB
In apartments, so many people have electric vehicles. So, charging becomes difficult when all of them need the same place to charge.	Slot bookings for charging at apartments by smart setting will be useful to avoid clashes.
In the case of old flats, the insufficient transformer capacity becomes a problem when installing charging station.	Resident association to ensure that sufficient capacity is available in the transformer, before submitting for scheme approval to the electrical inspectorate for the installation of charging stations.
As a major issue encountered in the case of home charging is the inadequate capacity of the existing service wire.	A mechanism to be devised by KSEB to enhance the capacity of service wire (for eg:- from 10 sq. mm to 16 sq.mm) may be made with the necessary ELCB etc.
Some of the charging point operators need to install separate metering for charging stations. But it becomes difficult because the KSEB supply code doesn't mention this.	KSEB supply code to be amended to permit sub-metering for charging station and permit the same in HT connection.
Harmonics and phase imbalance observed especially in the case of domestic chargers.	Electrical Inspectorate and KSEB to look into this matter.
The absence of proper guidelines and regulations are a challenge. Unrestricted and unregulated	





al Copper society of India energy engineers and managers



charging facilities which are operated by small vendors like tyre repairing units and like-wise can lead to disasters.	 Guidelines are to be provided for charging station controls especially for ELCB, cable, and control gear for charging. Fire and safety regulations (as in buildings) are to be modified for charging stations. Necessary regulations to be made to permit electricity sale for EV charging and ensure safety. EV Charging logo can be displayed.
Different manufacturers use different standards for their batteries, connectors, plug location on the vehicle and plug type etc, because electric vehicles are still in the early stages of development. As of now, only proprietary swapping facility is available.	 Battery standardization will help easy swapping. Need for a high-level round table between charger manufacturers and vehicle manufacturers required to establish norms, common connectors, plug in location, plug type, standards, protocols, and interchangeable operations.
At present there is no provision for the government land to be leased by private parties to install a charging station near the roadside.	If such a provision is granted by the govt authorities (LSG authorities) preferably without a license fee, chances of more EV charging stations coming up can be encouraged. (For eg:- As is being provided by ANERT by charging a nominal amount per unit
Due to the underutilization of privately installed charging stations, the owner suffers a huge amount of loss.	Such situations can be avoided only if more EV vehicles come into the market.
The industrial subsidy for setting up 50 kW charging station is not being disbursed timely.	Government to look into this and speed up the release of subsidy.
Entrepreneurs are hesitant to enter EV industry because of the insufficient number of vehicles, high land cost, fear of returns, difficulty in official formalities, lack of awareness etc.	• Charging rate shall be incentivized with Govt support by supporting base infrastructure like land transformer etc. till the market becomes competitive.







	 Soft loan and incentives for new EVC Entrepreneurs for a limited period till infra is self-sustained. Uniform tariff to be fixed depending upon the type of charger used. Eg:- slow chargers, fast chargers likewise. Power should be made available to the entrepreneurs who come forward to set up EV stations without much hassles. • The official formalities for setting up the charging station to be made easy. Suitable uniform tariff to be allotted to charging stations. Government subsidy may be given to investors to support initial investment including fixed charges, transformer cost. If private entrepreneurs like hotels, hostels etc are given the provision to set off the unit generated from their PV plant, they can viably run green stations by installing PV plant also. Revenue sharing lease of government land for charging stations to be provided.
Technicians are lacking in EV technology as well as practical knowledge to attend to charger and vehicle problems.	Courses, Skilling Programs and Curriculum Update based on EV
Disposal of batteries can pose as a huge threat to the environment in the future.	 Any method for recycling of used batteries or usage of the secondary life of the battery will have to be devised. Government can provide grants to such research works.
Anti-propagandas on electrical vehicles (like fire, range anxiety etc.) cause apprehension in public.	Governments as well as manufacturers to take measures to create awareness on this.





society of energy engineers and managers सीम्**s**eem

Introduction of electric vehicles cause unbalance in the grid. Charging of EV at the peak hour will worsen the scenario. Load balancing is a primary goal of KSEB.	 A time-based charging and TOD tariff may be implemented for load management. Promoting destination charging is to be more effective from the point of view of load balancing. Charger manufacturing company may provide such facilities like smart meter or IOT control.
As a concern of auto drivers, it was pointed out that the subsidy from the government for purchasing EV autos has not been received even after a long time. This discourages the purchase of EV autos.	To encourage the purchase of e autos, the subsidy should be released on time.
The high cost of vehicles makes it not affordable to common people. This pose as a hindrance for common to purchase EV vehicles.	 Government to initiate suitable steps to encourage the use of electric vehicles. If the government issues a liberal quantum of subsidy, more EV vehicles can replace IC engines. The downtime period may be excluded from the warranty period (which is beyond the control of the owner).
The realistic range announced by ARAI as well as manufacturers of EVs differs too much from the actual. This causes range anxiety in EV purchasers.	EV manufacturers to see that their vehicle complies with the range specified by them.
In case of emergencies, the vehicle automatically locked down and a technician from the EV dealer is only able to access the onboard diagnosis. The unavailability and the waiting time for the	• Onboard diagnosis (OBD) spot and software for informing troubleshooting of the vehicle to the owner are suggested.







technicians will become major problems and	• Emergency road support system to be
discourage people from buying EV.	provided by EV dealers.
The non-availability of proper spare parts is another hurdle.	EV manufacturers to look into this.

3.2 SUMMARY OF RECOMMENDATIONS







1. KSEBL has taken the decision to install at least five pole-mounted charging stations in each assembly constituency. In the assembly constituency, which comes under corporation limits, the number of pole-mounted charging stations installed will be 15. Across the state, the KSEBL is setting up a network of 1165 pole-mounted charging stations. With the help of pole-mounted charging stations, owners would be able to charge their EVs while they were parked on the roadside. They can use either street lamp posts or dedicated charging posts to do so. Pole-mounted charging stations are 15-A standard AC charging stations for slow charging vehicles, especially e-autos, e-scooters, etc. Installation of 15 A standard AC charging stations is mentioned in Kerala EV Policy 2019, but nothing has been said about adequate parking facilities, road safety measures, etc. KSEBL needs to address these concerns and provide adequate guidelines for installing and maintaining pole-mounted charging stations.



Pole Mounted Charging Station at the Road Side









- Due to the high population density and lack of land availability, the roads in Kerala are very narrow. Also, there is a high vehicle density on Kerala's roads. This results in slow traffic on the already-narrow roads. When installing pole-mounted charging stations in poles without adequate parking space, this will cause congestion and the streets to become narrower due to vehicles parked at every street pole.
- At some pole-mounted charging stations provided by KSEBL, ANERT, or any agencies, the non-charging vehicles are parked in the space, which makes it difficult to charge EVs and creates unnecessary blocks and arguments.
- Though many are at intersections or near government offices, many are located in places that are mostly used by people to dump waste or park trucks overnight. These are underutilised.
- The KSEBL does not identify the location of charging stations based on need.
- The bidders choose to install Pole mounted Charging Stations at random places only to complete their tender.
- At some places, the condition of the poles is worse. The pole should not fall onto the vehicle.
- Vehicles parked on the roadside block the path of pedestrians and also block access to the shops behind them, which sometimes leads to accidents. So, charging stations have to consider road safety and parking facilities.
- The other cause for concern could be the lack of adequate safety measures in view of potential fire hazards.



Waste dump near Pole Mounted Charging Station of KSEBL



International Copper Association India nor Alliana





RECOMMENDATIONS

- Adequate parking space should be provided around the respective electric poles so that congestion is avoided in crowded areas. To implement this KSEBL can closely work with LSGD and the Transport Department.
- The Transport Department should provide a detailed guideline to establish road safety for the charging stations with parking facilities on the roadside.
- Parking charges can be baked into the charging fees, and the municipalities too could gain revenue if adequate parallel parking facilities only reserved for EVs are provided as part of their Green City initiative.
- To install pole-mounted charging stations, the KSEBL has to identify a space in the urban area where the vehicles can easily access the location from the main roads.
- The design should be done considering road safety and parking facilities.
- The bidders from KSEBL shall mark the area and construct a pole or install the unit in an existing pole for the charging station.
- To prevent traffic from entering the area, short posts called bollards must be provided.
- Vehicle stoppers, a printed sign board, lighting arrangements for electric vehicle charging, and no parking board for non-charging vehicles shall be provided.
- A logo with lighting for an electric vehicle charging station can be shown. Which helps to identify the station from a long distance and also at night.
- A surveillance camera shall be installed for security purposes and integrated with the nearest KSEBL control room.
- The operation of the station is proposed to be unmanned.
- Smart Payment facilities shall be provided in EVCS, and the amount shall be transferred to the KSEBL account specified.
- A separate queue for charging electric vehicles (cars and autos) is suggested.
- If the non-charging vehicles are parked on the premises of the charging station, KSEBL must impose a fine for the first time, and if it repeats, it leads to the suspension of a driver's licence.





2. Electric vehicle owners residing in high-rise apartments, societies, etc., are facing the biggest challenges when it comes to charging their EVs. One of the biggest obstacles is still getting the building associations, committees, and owners to agree. Establishing a charging station becomes difficult due to disagreements over opinions, concepts, and priorities. Some will have the foresight, while others will be stubbornly against it.



CONCERNS

- National level policies and state level policies do not mandate electric vehicle charging stations in newly constructed housing societies, malls, office complexes, restaurants, hotels, etc.
- The Electrical Inspectorate has not yet published complete guidelines for the installation of electric vehicle chargers at housing societies for flat owners.
- The absence of proper guidelines causes misunderstandings and complexity in official formalities when installing charging stations.




- Everyone would want to charge their EVs overnight. So even if 3–4 points are installed, it will become unsustainable soon.
- The common metre for society falls under a different category, and power is charged at a significantly higher cost per unit as opposed to individual home metres. So, a common point will incur higher charges for the owner.
- Charging becomes difficult when all of the EV users need the same place to charge.
- The costs of installing charging points at individual parking spots will be expensive, and this will require considerable collective contributions to be possible.
- In the case of apartments, some already have an 11 kV supply. So, it is difficult to set up a charging station.
- The insufficient transformer capacity becomes a problem when installing charging stations.
- Few people use electric vehicles in apartments. It leads to problems when using only one metre for both domestic and charging facilities.
- In apartment complexes, whether small or large, parking is already allotted, and getting properly covered parking for all residents and having adequate visitor parking itself is a challenge. So, dedicating additional space for EV charging is unlikely to be feasible in existing flats.

- Mandate electric vehicle charging stations in newly constructed housing societies, malls, office complexes, restaurants, hotels, etc.
- Apartments or buildings with connected loads greater than 100 kW get approval from the Electrical Inspectorate before installing a charging station.
- Inspectorate guidelines shall be modified for smart charging as well as electric vehicle charging at housing societies for flat owners.
- The preparation of drawings for charging stations as per standard specifications and design should be done considering safety and parking facilities.
- A separate connection for EV stations may be considered by KSEBL.







- Separate metering for EV charging facilities is recommended. KSEBL supply code is to be amended to permit sub-metering for charging stations and permit the same in HT connections.
- Resident association to ensure that sufficient capacity is available in the transformer before • submitting a scheme approval request to the electrical inspectorate for the installation of charging stations.
- Some tenants might leave their vehicles plugged in all night with a full battery. Applying a • fine or setting hourly fees could be an incentive for owners to connect the vehicles and move them after they are charged.
- Slot bookings for charging at apartments by smart setting will be useful to avoid clashes.
- One thing that builders should do for new properties is plan for enabling lines to individual parking slots so that those who want a charger set up can easily do it.
- The best approach would be points tied to the individual metre. It cannot be tied to a • common or commercial metre.
- 3. Kerala has a network of 11 national highways, 72 state highways, and many district roads. Roads in Kerala include 1,812 kilometres of national highway with a large number of flyovers. The space below flyovers is vacant and not being used for any purpose. In some areas, migrant workers and homeless people are staying there temporarily.





International Copper Association India





Image Credit: Kerala Kaumudi, Vacant Space below Vyttila Kundannur Flyover Kerala

Kerala has narrower national highways and state highways compared to other parts of India. So, installing charging stations along the roadside is always a challenge. But the establishment of adequate charging infrastructure is important in the journey to adapt electric vehicles.

RECOMMENDATIONS

- The space below flyovers can be used for mini-charging stations and public charging stations with parking facilities.
- The National Highway is under the jurisdiction of the central government. So, the state government has to forward the suggestion as a request to NHAI and the central government.
- To install charging stations in the space below flyovers, the KSEBL has to identify a space in the flyover where vehicles can easily enter and exit without making traffic congestion worse.
- The preparation of drawings for charging stations as per standard specifications and design should be done considering road safety and parking facilities.
- KSEBL shall get in contact with the regional body for approval with the necessary documentation and design.







- After getting approval from the local body, KSEBL should publish proper guidelines for establishing a charging station in the space below the flyover.
- KSEBL shall mark the area and construct a platform for the charging station. •
- To prevent traffic from entering the area, short posts called bollards must be provided. •
- Vehicle stoppers, a printed sign board, lighting arrangements for electric vehicle charging, • and no parking board for non-charging vehicles shall be provided.
- A surveillance camera shall be installed for security purposes and integrated with the . nearest KSEBL control room.
- The operation of the station is proposed to be unmanned. •
- Smart Payment facilities shall be provided in EVCS, and the amount shall be transferred to • the KSEBL account specified.
- If the non-charging vehicles are parked on the premises of the charging station, KSEBL • must impose a fine for the first time, and if it repeats, it leads to the suspension of a driver's licence.
- The state government has to forward a request, including the feasibility study and • guidelines published by KSEBL, to NHAI and the Central Government for approval of the charging stations in the space below flyovers.





International Copper Association India



4. The vendors who run the charging stations of the KSEBL use different softwares, forcing consumers to use different mobile applications to get their EVs charged in the state. For example, in Kerala, Genesis, a private agency, collaborates with the Charge Mode app to facilitate the charging ports. To charge the vehicle, an app must be installed on the mobile phones. The user should recharge a specific amount and connect the portable charger to the vehicle. Later open the application and scan the QR code to charge. After required charging is done, click stop charging in the app and disconnect the charger.



CONCERN

At present, charging at public stations can be done only through the mobile app. In the event that mobile phones get switched off or lost, it will be difficult to charge EVs.

RECOMMENDATION

- The introduction of prepaid coupons makes it possible to charge without booking through the mobile app and can be used for emergencies.
- A working group should be constituted from electric vehicle manufacturers, charger manufacturers, battery manufacturers, nodal agencies, stakeholder organisations,







government authorities, and software developers to conduct the feasibility study and further take up the matter.

5. While the number of public charging points is growing, fast charging stations for electric vehicles are a need to ensure range over long distances. This is why fast charging networks are mainly found on highways and major roads. The setup of "highway corridors" means that the EV user can plan a trip of several hundred kilometres with complete peace of mind. Fast charger supplies more power than a regular charger. As a result, battery is fully charged in a shorter amount of time.



CONCERN





International Copper Association India



- Kerala has narrower roads. In the case of roads with less width especially NH, with a width of about 45 m, space is limited for parking bays or charging bays.
- Due to high population density in Kerala, there is not enough land available to construct charging stations with parking facilities in the highway.
- High cost of land.

- To address this, even during the design stage of Highways, EV charging station locations are to be assigned or specifically mentioned with sufficient parking bay.
- The Highway design shall address cable cross ducts as well as charging bays near intersections below bridges.
- The space below flyovers can be used for charging stations.
- 6. The sale of electric vehicles (EV) is soaring up in Kerala. As per data, 39,540 EVs were registered across the state in 2022, while the numbers were only 8701 in 2021 and 1325 EVs in 2020. By two and a half months into 2023, sales have reached 13,389 units. Given the current fuel prices, purchasing an electric vehicle has become more profitable. In addition, the provision of subsidies has also raised the acceptability of EVs among people. The major part of EV vehicles in Kerala is 2 and 3 wheelers. However, the absence of enough charging points poses a major challenge for EV owners.

CONCERNS

• As EVs are a developing technology, people are hesitant to set up more charging stations, and the capital cost of installing charging stations became an issue.







- The accessibility to charging stations is a primary concern. So, preference is given to the roadside plots.
- But the high cost of land is another issue for entrepreneurs.

- When a user has to travel beyond the range offered by the vehicle battery, does not have access to home charging, or in case of exceptions like unplanned trips or forgetting to charge. Even in such cases, it is seen that slow AC charging is sufficient for most situations.
- One of the fastest growing segments in charging stations is expected to be the Mini charging stations with simple slow Bharat AC 001 chargers of 10 kW.
- Mini charging stations will reduce the block and the long waiting period to charge.
- The nodal agency, KSEB, and other stakeholder groups must address the concern and implement proper measures to install more mini charging stations at public places.
- 7. Electric vehicles are still in the early stages of development. The batteries are non-standardized for the purpose of maintaining the uniqueness of the EVs from the point of view of sales and competition among manufacturers. Manufacturers are also not following a standard for connectors, plug types, plug locations, etc.

CONCERNS

- Different manufacturers use different standards for their batteries, connectors, plug location on the vehicle, plug type, etc
- Only proprietary swapping facilities are available due to the different battery standards of different manufacturers.

RECOMMENDATIONS

• Battery standardisation will facilitate easy swapping.





- There is a need for a high-level round table between charger manufacturers and vehicle manufacturers to establish norms, common connectors, plug-in location, plug type, standards, protocols, and interchangeable operations.
- 8. Disposing of batteries creates another set of environmental problem. Researchers in the United Kingdom found that in 2017, the number of electric vehicles sold would produce 250,000 metric tons of battery waste. The dangerous business of processing this waste is complicated by the fact that different manufacturers use different battery chemistries and their packs come in a range of different shapes and sizes.

- The government can offer grants to promote research works to develop standard batteries in the domestic sector and handle and recycle used batteries.
- Standardization of battery is an effective solution.
 - If there was less variation in the size and shape, then the removal of the packs would be cheaper and less dangerous.
 - Standards for batteries could pave the way for more automation in the disposal process.
 - Standardization allows the batteries to be more easily recycled or repurposed, which can produce financial benefits for both manufacturers and consumers.
- **9.** Various departments of state government and central government are published policies and guidelines related to Electric Vehicle and charging infrastructure. As the electric vehicle is a new technology, there are changes every day. Many government departments do not publish clear guidelines, which poses a major problem.

CONCERNS







- The concerned departments have not issued clear guidelines regarding the construction and operation of charging stations.
- The absence of proper guidelines and regulations is a challenge.
- Unrestricted and unregulated charging facilities, which are operated by small vendors like tyre repair units, can similarly lead to disasters.
- No clear norms are available for fast charging and slow charging stations.

- Guidelines are to be provided for charging station controls, especially for the ELCB, cable, and control gear for charging.
- Although there are about 30 points in the checklist of KMBR, KPBR & IBR (Kerala municipal building rules and Indian building rules), nothing is mentioned about EV charging stations. This has to be specifically addressed in the building rules.
- The transport department should publish road safety guidelines for the charging stations.
- Fire and safety regulations (as in buildings) are to be modified for charging stations.
- Necessary regulations to be made to permit the sale of electricity for EV charging and ensure safety.
- Inspectorate guidelines to be modified for smart charging as well as EVC at housing societies for flat owners.
- LSGD should amend building rules by making necessary provisions to accommodate charging stations in flats, malls, etc.
- The EV Charging logo can be displayed in every charging station.
- Government to initiate suitable steps to encourage the use of electric vehicles.
- Customer to be educated on DOs and DONTS. Manufacturer guidelines to be made available.
- The concerned manufacturers have to state clear guidelines for battery management systems in Electric Vehicles.
- 10. The introduction of electric vehicles causes unbalance in the grid. Charging of EVs at the peak hour will worsen the scenario. KSEBL needs to balance the demand during peak and off-peak





hours. Uncontrolled nature of charging facilities in a plug-in-mode could increase peak load and network congestion.

RECOMMENDATION

- Depending upon the type of charger used, an incentivized differential tariff like time of day is to be provided so that the tariff during nonpeak hours will be less than that during peak hours.
- Charging at destination stations as well as private places to be more or less evenly poised. Promoting destination charging was suggested to be more effective from the point of view of load balancing.
- A charger manufacturing company may provide such facilities as smart metres or IOT control.
- Two and three wheelers can be charged at charging stations during off peak hours will have preferential treatment in the matter of State incentives and for permits.
- 11. All EV models come with a standard portable cord-set that lets user to charge using any standard household outlet. This is called Level 1 charging and is the slowest speed of charging. Home charging meant for self-use at residence and the existing supply shall be utilized for electric vehicle charging. No separate electric connection is required in this case.

CONCERNS

- In some cases, the inadequate capacity of the existing service wire is a challenge.
- Harmonics and phase imbalance observed in the case of domestic chargers

RECOMMENDATION

- A mechanism to be devised by KSEBL to enhance the capacity of service wire (for eg:- from 10mm. sq to 16 mm.sq) may be made with necessary ELCB etc.
- Electrical Inspectorate and KSEBL to look into the observed harmonics and phase imbalance.
- 12. Entrepreneurs are hesitant to enter EV industry because of the insufficient number of vehicles, high land cost, fear of returns, difficulty in official formalities, high cost of installation, communication





between the grid and charge station companies, and the compatibility of chargers, and lack of awareness etc.

- Due to the underutilization of privately installed charging stations, the owner suffers a huge amount of loss.
- The industrial subsidy for setting up charging station is not being disbursed timely.
- At present there is no provision for the government land to be leased by private parties to install a charging station near the roadside.

RECOMMENDATIONS

- Government subsidy may be given to investors to support initial investment including fixed charges, transformer cost etc.
- Charging rate shall be incentivised with government support by supporting base infrastructure like land transformer etc till the market becomes competitive.
- Soft loan and incentives for new EVC Entrepreneurs for a limited period till infrastructure is self-sustained.
- Power should be made available to the entrepreneurs who come forward to set up EV stations without much hassles.
- The official formalities for setting up the charging station to be made easy.
- If there is spare capacity in the transformer, then that transformer should be allowed to be used for installing public charging station.
- Suitable uniform tariff to be allotted to charging stations.
- If private entrepreneurs like hotels, restaurants and hostels etc are given the provision to set off the unit generated from their PV plant, they can viably run green stations by installing PV plants.
- The industrial subsidy for setting up 50 kW Solar charging station should be disbursed timely by ANERT.
- If the government land is granted by the govt authorities (LSG authorities) for installing charging stations, preferably without a license fee, chances of more EV charging stations coming up can be encouraged. (For eg:- As is being provided by ANERT by charging a nominal amount per unit.)



- Underutilized charging stations can be avoided only if more EV vehicles come into the market.
- 13. In Kerala, the electric vehicle charging is done through mobile applications. Currently, the vendors who run the charging stations of the KSEBL use different softwares, forcing consumers to use different mobile applications to get their EVs charged in the state. The EV users are facing a major problem of having to deal with more mobile applications for charging at KSEBL stations alone.



CONCERNS

- EV users are forced to install different applications and load cash in all of them to access different charging stations.
- Different agencies use different apps for charger information systems.
- In some charging apps, the amount paid to the wallet gets exhausted if not used within a specified period.

RECOMMENDATION

If a standard charger infrastructure information system is available on a common platform, it would be very much beneficial to EV users to get real-time status on location, availability of free slots and all other allied information for any type of chargers.





Hence a standard super App that covers all charging stations in the country or at least in the state is to be developed, but all brands would need to come together to achieve this.

14. The world is on the cusp of EV revolution. According to experts, it is expected that electric vehicles proportion of the worldwide market will rise from 3 percent in 2015 to 23 percent in 2025. However, there will be huge challenges that could derail the hopeful future of electric automobiles. The state and central government should work together and also plans should be made to attract more people to electric vehicle.

CONCERNS

- The high cost of vehicles, the nonavailability of proper spare parts of EVs cause confusion among EV purchasers.
- The realistic range announced by ARAI as well as manufacturers of EVs differs too much from the actual. This causes range anxiety in EV purchasers.
- Electric vehicles are new to town, and so many enthusiasts are looking forward to bringing them home. But still, there are confusions. Many of the queries from the public are unanswered.
- Charging of EVs above 90% capacity creates critical errors in the system of EVs resulting in the operation of EVs getting blocked.
- The high cost of vehicles makes it not affordable to common people. This pose as a hindrance for common people to purchase EV vehicles.
- In case of emergencies, the vehicle automatically locked down and a technician from the EV dealer is only able to access the onboard diagnosis. The unavailability and the waiting time for the technicians will become major problems and discourage people from buying EV.
- Anti-propagandas on electrical vehicles (like fire, range anxiety etc) cause apprehension in public.





- A competent labour force is also in high demand as the electric vehicle industry continues to grow. Technicians are lacking knowledge in EV technology as well as practical knowledge to attend to charger and vehicle problems.
- As a concern of auto drivers, it was pointed that the subsidy from the government for purchasing EV autos has not been received even after a long time. This discourages the purchase of EV autos.

- Government to initiate suitable steps to encourage the use of electric vehicles.
- Concerned governments and manufacturers must launch suitable awareness campaigns and guidelines for comprehending the relevance of EVs, charging infrastructure, software to ensure the safety and convenience of users.
- Downtime period may be excluded from the warranty period (which is beyond the control of the owner).
- Emergency road support system to be provided by EV dealers.
- EV manufacturers to see that their vehicle complies with the range specified by them.
- On-board diagnosis (OBD), software for informing troubleshooting of the vehicle, and smart meter or IOT control are to be provided by EV and charger manufacturers.
- EV manufacturers can provide a facility for charging from PV panels during day time and discharge during the night either to the microgrid or to the home circuit of the owner. This will enable the owner to use his vehicle battery as a charging unit or a storage unit for its power usage at night and it should be compatible to all other inverters available in the market.
- Differential tariff like time of the day to be provided so that tariff during non-peak hour charging will be less than peak hour charging tariff
- EV manufacturers should find a suitable solution for the critical errors occurred by the overcharging.
- If the government issues a liberal quantum of subsidy, more EV vehicles can replace IC engines.





- If the energy sector and transport sector jointly establish call centres, then many apprehensions can be answered through this.
- Convene a meeting of EVC manufacturer, app developer and end-user to consolidate charging issues and solve the same.
- There is a need for more people with expertise in electric vehicle engineering, manufacturing, and repair to attend to Charger and vehicle problems. Engineers must be flexible in the face of industry shifts; thus, they require a comprehensive education. For that government should provide courses, skilling programmes and curriculum update based on electric vehicle technology.





International Copper Association India



ACTION PLAN ON RECOMMENDATIONS 3.3

The study identified some areas for improvement to facilitate faster adoption of EVs. The areas where further action is required are listed below tagging the responsible section.

1. Energy Management Centre

- 1.1 A call centre shall be established to address the questions and doubts about e-mobility, Electric Vehicles and charging infrastructure. This may be jointly organized by Power Department and the Transport Department.
- 1.2 A high-level round table meeting has to be initiated by EMC/BEE between EV charger manufacturers, EV manufacturers and EV users to establish norms for common charging connectors, Battery Management Systems (BMS), plug-in location on vehicle, plug type, standards & protocols, and options for interchangeability and trouble free charging / road support system.
- 1.3 Public institutions including Government / Government aided / Quasi-Government educational and other organizations may also be permitted to adopt the PPP model of leasing land for setting up EV charging stations by private entrepreneurs.
- 1.4 Government to initiate steps to address provision for EV charging as well as utility crossing in highways at the design stage itself in consultation with NHAI so as to utilise space beneath flyovers and avoid issues arising from the subsequent requirement in road crossing.
- 1.5 A standardised EV Charging logo shall be displayed in public charging stations for awareness
- 1.6 To attract more private investment to support EV policy, a concession in power charges for a specific initial period shall be considered in case of charging stations set up in remote areas
- 1.7 Human resource capacity building programs to be deployed for special skill development in EVs & their charging infrastructure.
- 1.8 Government shall provide grants to research works on EV batteries especially for utilizing the secondary life of batteries as well as their disposal.
- 1.9 Government to initiate suitable steps & encourage purchase of EVs by advising banks to provide loans at low interest.







- 1.10Awareness programs on EVs, battery management and safe charging practices to be organized for charging station entrepreneurs as well as EV users and general public. Such programs will help to address concerns on range / safety anxiety etc.
- 1.11Guidelines may be issued to EV manufacturers for specifying only realistic range in their communications. They shall also offer an extended warranty against extended downtime resulting from major issues due to manufacturing defects, non-availability of spares & service etc. which are beyond the control of the owner.

2. Kerala State Electricity Board Limited

- 2.1 KSEB supply code to be amended to permit exclusive connection for charging station and permit the same in HT/LT connections.
- 2.2 A prepaid coupon that helps to charge without prior booking through the mobile app may be established and made available for emergency usage when mobile connectivity is hindered.
- 2.3 Procedure for locating Pole mounted charging stations to be reviewed incorporating parking convenience and feedback on requirement.
- 2.4 "**QUEUE for Exclusive EV Charging**" Board to be provided near pole charging stations for reserving parking space for EV.
- 2.5 To attract more private investment to support EV policy, a concession in fixed charge for a specific initial period shall be considered in case of charging stations set up in remote areas.
- 2.6 A TOD tariff may be implemented for load management in EV charging.

3. Electrical Inspectorate

- 3.1 Electrical Inspectorate guidelines to be reviewed periodically for smart charging / EV Charging at housing societies/ apartments.
- 3.2 Electrical Inspectorate jointly with KSEB may initiate a detailed study to look into power quality and harmonics issues through competent agencies and come up with necessary recommendations.





3.3 Guidelines shall be formulated for micro charging stations attached to small vendors catering to 2/3 wheelers.

4. ANERT

- 4.1 A scheme to be brought jointly with KSEB to allow the setting up of pole-mounted mini charging stations to make available charging infra for the masses.
- 4.2 Government may look into the matter of industrial subsidy for setting up charging station and expedite the timely release of subsidies to facilitate further private investment in charging infrastructure.
- 4.3 To encourage the purchase of E-autos, expedite the timely subsidy release

5. Transport Department

- 5.1 A call centre shall be established to address the queries and doubts about e-mobility, Electric Vehicles and charging infrastructure. This may be jointly organized by Power Department and the Transport Department.
- 5.2 EV policy to be reviewed periodically (at least once in 2 years) to match EV population.

6. LSGD

- 6.1 Government may amend building rules (KMBR/KPBR) by making necessary provisions to accommodate electric vehicle charging stations in buildings.
- 6.2 Provisions may be granted by the LSGD and other Govt: entities to lease available space to prospective private entrepreneurs to set up EV charging stations, preferably with a nominal license fee and on a revenue-sharing basis (PPP Model).

7. PWD

- 7.1 During the design stage of public roads / state highways, EV charging station locations shall be identified.
- 7.2 The space below flyovers can be used for EV charging stations







8. MVD

8.1 Being envisaged in the EV policy, E Autos help to reduce carbon footprint. Recurring road taxes may be reduced to promote their adoption.

9. Industries Department

- 9.1 Power should be made available to the entrepreneurs who come forward to set up EV stations on a priority basis and necessary redressal mechanism.
- 9.2 Soft loan and incentives for new EV Charging Entrepreneurs shall be made available for a limited period till infrastructure is sufficiently developed.
- 9.3 Government may devise suitable subsidy scheme to encourage prospective EV manufacturing units to be set up within the state.

10.Fire & Rescue Department

10.1Fire and safety regulations (as in buildings) may be modified to cover charging stations also.





International Copper Association India



4. FREQUENTLY ASKED QUESTIONS

1. What is the process for setting up of Public Charging stations in public/ government land?

Setting up of Public Charging Stations is a de-licensed activity and any individual/ entity is free to set up public charging stations provided that, such stations meet technical, safety as well as performance standards and protocols as per the Revised guidelines issued by MoP dated 01.10.2019 as well as any further norms/ standards/specifications laid down by Ministry of Power and Central Electricity Authority from time to time.

A government or private firm wishes to implement EV Charging station needs to register through the official site of KSEB. The details to be collected from the applicant through registration portal are:

Personal Details:

Name, Address, Consumer Number, Phone Number, Email ID

Location Details:

District, Place, Area, Latitude, Longitude

Purpose: Car, Scooter, Autorickshaw, All Electric Vehicles

- Post submission of completed application, the connection for Public Charging Station shall be provided within time period not exceeding seven days in metro cities, fifteen days in other municipal areas and thirty days in rural areas, within which the distribution licensees shall provide new connection or modify an existing connection.
- When supply requires extension of distribution mains, or commissioning of new sub-stations, the distribution licensee shall supply the electricity. Any Public Charging Station/ Chain of Charging Stations may obtain electricity from any generation company through open access.







- All electrification works and civil works in connection with this and quality assurance of the equipment will be undertaken by KSEBL. The transformers, power extensions, canopy cover as desired by consumer including solar rooftop will be planned and executed by KSEBL.
- The Kerala government is set to establish solar-based public charging stations for charging electric vehicles in the state.

The Agency for New and renewable Energy Research & Technology or ANERT, a Kerala government agency, has issued guidelines in this regard. A maximum of Rs 10 lakh would be given as subsidy from ANERT.

- Applications can be submitted directly at the ANERT district offices for charging stations.
- Subsequently ANERT district engineering will visit the site and inspect the facilities before granting permission.
- A government/private entity keen to set up a Public Charging Station (PCS) in public / government land needs to submit an application form with relevant documents.
- Land Owning Agency will then enter into a Model Revenue Sharing Agreement with Charger Point Operator.
- The Charger point operator will apply for the approval for EV Meter and New/additional load from DISCOM, Kerala State Electricity Board.
- After getting the approval from KSEB, the energization process will start and then open for charging facilities.

2. What kind of metering and tariff options can be availed for different types of charging stations?

Private charging points meant for self-use at residence shall be permitted and the existing supply shall be utilized for electric vehicle charging and no separate electric connection is required in this case. For captive stations also, the existing supply shall be extended for electric vehicle charging infrastructure. The tariff of the CCS has not been specified in the revised guidelines issued by MoP, so they shall be





assigned with the tariff of the office/corporate house/depots etc. Pubic charging stations shall be given separate service connection and shall be billed at tariff approved by KSERC from time to time (presently LT X and HT VI).

Kerala State Electricity Regulatory Commission released an order on 25/06/2022 detailing the schedule of tariff and terms and conditions for retail supply of electricity by KSEBL and all other licensees with effect from 26.06.2022 to 3.03.2023. The tariff mentioned in this Schedule shall apply to consumers to whom the Kerala State Electricity Board Limited or other distribution licensee has undertaken to supply electricity.

'Low Tension Consumer' (LT) means a consumer who is supplied with electrical energy at low or medium voltage by the Kerala State Electricity Board Limited and other distribution licensees in the State. Tariff applicable to electric vehicle charging stations at LT is described below.

LT – X: Electric vehicle charging stations

- (a) Fixed Charge (Rs per kW) is 90
- (b) Energy Charge (Rs/ unit) is 5.50

The ceiling tariff that can be charged by EV charging stations / outlets from customers shall be Rs 8.00/unit.

High tension (HT) consumer means a consumer who is supplied with electrical energy at a voltage of 33,000 Volts, 22,000 Volts or 11,000 Volts under normal conditions. The tariff applicable to electric vehicle charging stations at HT is shown below.

HT- VI: Electric vehicles charging stations

Tariff applicable to charging stations of electric vehicles availing electricity at high tension.

- (a) Demand Charges (Rs/kVA of Billing Demand/Month) is 270
- (b) Energy Charge (Rs/k unit) is 6.00

The ceiling tariff that can be charged by EV charging stations / outlets from customers shall be Rs 8.00/unit.





3. Do Home Charging need permits/ approvals from the state nodal agency, Kerala State Electricity Board (KSEB)?

Home charging meant for self-use at residence shall be permitted and the existing supply shall be utilized for electric vehicle charging. No separate electric connection is required in this case.

4. What are the charging infrastructure requirements for Residential Buildings and all other buildings?

From the 2019 Amendments to Model Building Bye-Laws, 2016, the charging infrastructure installed by a home owner shall be considered as a Private meant for self-use (non-commercial basis).

Ownership	Private (Residential)
Connection and Metering	Domestic Meter
Type of Charger	Slow chargers as per owner's requirements
Modes of Charging	AC (Single Charging Gun)
Norms of Provisions	Min. 1 SC and additional provisions as per the owner individual.

Any PCS installed at Public/Private areas or building premises of any category that caters to commercial mode of charging of EVs shall be deemed as a Public Charging Station and shall have to install the minimum requirements of chargers as specified in the Guidelines of Ministry of Power.





Charging bays shall be planned currently at 20% capacity of all vehicles including 2Ws and PVs(cars). Open metering and on-spot payment options to be available for all users. Provision of FCB CS and BS shall not be mandatory, and will be at the discretion of the service provider.

Ownership of the	Service Provider			
Station				
Connection and	Commercial Metering and Payment			
Metering				
Type of Chargers	As per requirements specified in MoP Guidelines 2022, Annexure II			
Additional Chargers	PCS service providers shall install additional number of kiosk/chargers			
	beyond the minimum specified requirements to meet the ratio of charging			
	points as prescribed below (by the type of vehicles)			
Norms of Provisions for	4 Wheelers	3 Wheelers	2 Wheelers	PV(Buses)
Charging Points	1 SC – each 3 EVs	1 SC – each 2	1 SC – each 2	1 FC – each 10
	1 FC – each 10 EVs	EVs	EVs	EVs

5. For private entities interested to set up Public Charging Stations in government land/ property, are there any permissions needed from state government and relevant Municipal Authorities?

The land available with the government/Pubic entities shall be provided for installation of Pubic charging stations to a government/public entity on a revenue sharing basis for installation of pubic charging station at a fixed rate of 1 Rs/kWh (used for charging) to be paid to the Land-Owning Agency from such PCS business payable on quarterly basis. A Revenue sharing agreement may be initially entered by parties for a period of 10 years. The Revenue Sharing Model (Annexure IV, MoP 2022) may also be adopted by the public Land-owning agency for providing the land to a private entity for installation of Public Charging Stations on bidding basis with floor price of ₹1/kWh.





6. What is a Smart EV charger?

Non-smart EV chargers deliver the rated power of the device until the EV battery is fully charged. Smart EV chargers, feature advanced communication and control protocols that provide flexibility and reliability during the charging process. Smart EV charging technology defines charging parameters by featuring constant communication between the EV, charging operators, and the utility.

7. What is the difference between smart charging and bidirectional charging?

Smart charging electric vehicles and bidirectional charging are different concepts, however, they can be integrated within a single EV charger model. Smart charging includes energy management features that improve financial savings, ensure proper energy usage optimization, enhance user experience, and allow operation with limited electrical infrastructure. On the other hand, bidirectional charging is a feature that allows the extraction of power from the battery of an EV to inject it back into the grid or to power a load, delivering flexibility to the grid.

8. What is the difference between smart charging and fast charging?

Smart charging and fast charging are also entirely different terms, but they can be integrated within a single EV charger model. Fast charging is referred to the speed at which an EV gets charged (Fast charging uses DC power to charge EVs from 50 kW up to 350 kW), meanwhile smart charging is the set of protocols and management strategies used to optimize charging and deliver additional features at the charging station. An EV charging station can have smart DC fast chargers installed.

9. How long do batteries last in electric cars?

Most manufacturers have a five to eight-year warranty on their battery. However, the current prediction is that an electric car battery will last from 10-20 years before they need to be replaced.

10. What are EV batteries made of?





An EV battery is typically made up of thousands of rechargeable lithium-ion cells connected together to form the battery pack. Lithium-ion cells are the most popular because of their cost efficiency, offering the most optimal trade-off between energy storage capacity and price.

11. What kind of an engine does an electric vehicle have?

Unlike internal combustion engine (ICE) vehicles which have fuel-fed engines, electric vehicles (EVs) have electrical motors which turn the car's wheels. Depending on the type of vehicle, the electric motors may contain gears for additional efficiency.

12. Does an EV have a battery?

Yes, electric vehicles usually contain a battery assembly, either fixed onto the chassis or removable. Leads from these batteries provide the EVs motors with the energy they require to run, as long as the batteries hold a charge.

13. What are the types of batteries available?

This depends on the type of vehicle and the manufacturer. But the primary electric vehicle battery types are:

Lead-acid: This is one of the oldest technologies being used in electric vehicles. These kinds of batteries contain a mild sulfuric acid solution in a container, while being easy to produce and charge, these batteries slowly release noxious gasses and are therefore not placed within the passenger compartment.

Nickel metal hydride (NiMH): This battery technology too has been around for two decades. NiMH batteries do not contain toxic metals so they're better for the environment and can be safely recycled. These batteries also provide a high energy density and have been successfully used by many large EV manufacturers.

Lithium-ion (Li-ion): This technology is far younger, at just a decade old. Li-ion batteries tend to hold their charge longer when not being used. They are also capable of holding a high charge and so make a great fit for electric vehicle use. The consumer durables and electronics industries have relied on these benefits and the fact that these batteries are fairly lightweight, the very requirements for EVs as well.





14. What are the best features of an EV?

One of the most evident features of an electric vehicle is space. Without the need to accommodate an engine and large fuel tank, electric vehicles tend to have more passenger and storage space. Besides this, being all-electric, most EVs come with state-of-the-art technologies like cruise control, lane-assist driving, blind spot warnings and other driver-enablement features. The newer models across manufacturers also support rapid charging.

15. Since EVs are considered green, can batteries be recycled?

Presently, since most electric vehicles haven't aged much, the estimated rate of recycling is pegged at ~50%. However, the EV battery recycling market is envisioned to see a massive surge in coming years, and it is estimated that ~90% of EV batteries will be recycled. This will continuously help mitigate environmental damage from waste.

16. Do EVs have enough power as compared to ICE vehicles?

Electric vehicles actually deliver more on this front. ICE vehicles need to build up speed to deliver torque and power. EVs on the other hand don't need to get up to any speed to deliver torque and power, their motors deliver all their torque from zero rpm, as soon as the motors receive energy. ICE engines generate their torque based on the unit's displacement and the vehicle's speed, and it's unusual to get both high torque and high power together. As a result, electric vehicles have acceleration advantages over their ICE counterparts, with some EVs even attaining 0 to 96 kmh in two seconds.

17. How does one charge an electric vehicle and how long does it take?

If you decide on an EV, you'll need to have a home charger and knowledge of where commercial or public charging points are available in your city. Charging an EV requires plugging the vehicle into a charging unit, via a compatible charging plug or connector. Various chargers (levels 1 to 3) have different charging voltages, loads and times. Normally a Level 1 charger is suitable for homes and provides steady charging over a longer period (eg. Overnight, at a rate of about 8 km drive time per hour of charging).





Level 2 chargers, usually provided at public charging and parking, have a shorter duration for charging at a higher voltage (eg. Parking over a few hours, at a rate of about 30 km drive time per hour of charging). Then there are Level 3 (usually called 'fast chargers') which are normally installed at commercial charging stations which deliver rapid charging (eg. Over half an hour, with a battery being charged up to 80%). The time to charge is dictated by the charging unit type, the battery type and the battery capacity.

18. Will EV batteries run out in a few years like other electronics?

Today's electric vehicles are very well-engineered, and their batteries utilize well-tested technologies. Many vehicle manufacturers indicate ten-year battery life or a distance-based running life. As technologies improve, this duration (and distance covered by a battery pack) is only slated to increase.

19. What is Hybrid Electric Vehicles?

HEVs have an internal combustion engine (that runs on petrol or diesel), along with the electric motor. A suitable alternative to both conventional fuel vehicles and battery electric vehicles, HEVs provide fuel economy without sacrificing performance. The Toyota Camry is a well-received hybrid car in India, along with manufacturers such as Maruti offering Smart Hybrid varieties of popular models like the Brezza and Baleno.

20. What are the advantages of hybrid vehicle?

- High fuel economy with alternative power options.
- Eco-friendly, with significantly lower emissions.
- Specialised regenerative braking systems.
- Micro hybrids offer the simple "start-stop system" of regenerative breaking.





society of energy engineers and managers

21. What is a Battery Electric Vehicle?

BEVs are essentially all-electric vehicles that make use of stored electricity from a battery to get their power. There is an electric motor (one or more) that converts power to turn the vehicle's wheels. Some BEVs can be recharged by plugging in directly to grid electricity (internal converters) while others require dedicated charging units meant for the vehicle. Advanced BEVs also come with highly efficient fast charging options.

22. What are the types of electric vehicles?

There are four types of electric vehicles available:

Battery Electric Vehicle (BEV): Fully powered by electricity. These are more efficient compared to hybrid and plug-in hybrids. BEVs are also known as All-Electric Vehicles (AEV). Electric Vehicles using BEV technology run entirely on a battery-powered electric drivetrain. The electricity used to drive the vehicle is stored in a large battery pack which can be charged by plugging into the electricity grid. The charged battery pack then provides power to one or more electric motors to run the electric car.







International Copper Association India Conner Alliance



Hybrid Electric Vehicle (HEV): The vehicle uses both the internal combustion (usually petrol) engine and the battery-powered motor powertrain. The petrol engine is used both to drive and charge when the battery is empty. The engine gets energy from fuel, and the motor gets electricity from batteries. HEVs are also known as series hybrid or parallel hybrid. The transmission is rotated simultaneously by both engine and electric motor. This then drives the wheels. These vehicles are not as efficient as fully electric or plug-in hybrid vehicles.



Plug-in Hybrid Electric Vehicle (PHEV): The PHEVs are also known as series hybrids. Uses both an internal combustion engine and a battery charged from an external socket (they have a



plug). This means the vehicle's battery can be charged with electricity rather than the engine. PHEVs are more efficient than HEVs but less efficient than BEVs.

Fuel Cell Electric Vehicle (FCEV): FCEVs are also known as Zero-Emission Vehicles. They employ 'fuel cell technology' to generate the electricity required to run the vehicle. The chemical energy of the fuel is converted directly into electric energy. For example, a hydrogen FCEV.



23. What are the incentives offered by Central government?

The government offers different types of financial incentives to make electric vehicles more affordable. The key mechanisms for getting incentives are:

- Purchase Incentives: Direct discount provided to the user on the cost of the electric vehicle
- Coupons: Financial incentive where the amount is reimbursed later
- Interest Subventions: Discount offered on the interest rate while availing loan
- Road tax exemption: Road tax at the time of purchase is waived off
- Registration fee exemption: One-time registration fee applicable on new vehicle purchase is waived off





- Income tax benefit: Provided as a deduction on the tax amount payable by an individual to the government
- Scrapping incentives: Provided upon de-registering old Petrol and Diesel Vehicles
- Others: Incentives such as interest-free loans, top-up subsidies, special incentives on electric three-wheelers, etc. can also be availed

National Incentives:

FAME, is currently India's flagship scheme for promoting electric mobility. Currently in its 2nd phase of implementation, FAME-II is being implemented for a period of 3 years with a budget allocation of 10,000 Cr. The incentives offered in the scheme are:

Approximate Incentives	Approximate Battery Capacity
Two wheelers: Rs 15000/- per kWh upto 40% of the cost of Vehicles	Two wheelers: 2 kWh
Three wheelers: Rs 10000/- per kWh	Three wheelers: 5 kWh
Four wheelers: Rs 10000/- per kWh	Four wheelers: 15 kWh
E Buses: Rs 20000/- per kWh	E Buses: 250 kWh
E Trucks: Rs 20000/- per kWh	

24. What is Captive Charging Station?

It is an electric vehicle charging station exclusively for the electric vehicles owned or under the control of the owner of the charging station. For example, Government Departments, Corporate houses, Bus Depots, charging stations owned by the fleet owners etc. and shall not be used for commercial purpose.

25. What are the different types of EV charging connectors in India?





Electric vehicles are recharged by electricity. The electric battery can be charged, by connecting to an external plug. EV Charging Connectors are the end-point connectors that are fixed on the charging cable and get attached to the electric vehicle and facilitate charging.

EV connectors at the vehicle side

EV connectors at the vehicle side will directly connect to the vehicle. There are mainly two types of connectors, AC (slow charging) and DC (fast charging) type. The charging station sends electrical energy to the battery pack through a charging port.

- ✤ AC Connectors:
 - 1) Type 1
 - 2) Type 2

- DC Connectors:
 - 1) GB/T
 - 2) CHAdeMO
 - 3) CCS2



AC or slow charging connectors

They are usually slow charging. A regular three-pin outlet with an EVSE cable or a wall-mounted home charging point can be used to charge an electric automobile at home, work and destinations. Drivers of electric vehicles pick a home charging station to take advantage of faster charging and built-in safety features.





AC Connector	Typical Power Ratings	Features
Туре		
Type 1	3.3 kW 7 kW	 Single Phase only 3 Pins No locking mechanism IEC 60309 230V, 50Hz
Type 2	3.3 kW 7 kW 22 kW	 7 Pins Inbuilt locking mechanism single-phase or three-phase input power systems, depending on the charger rating IEC62196 415V, 50Hz

DC or fast charging connectors

The DC-EV Connectors provide direct DC power to the EV's battery pack. A Rapid-DC charging system can charge at 50kW, whereas an Ultra-Rapid charging system can charge at 100kW to 150kW. Rapid chargers do not charge at their full power rating all of the time to safeguard the battery.

DC chargers perform the conversion from AC power to DC power at the charging station itself. There are mainly three types of DC charging connectors:





DC Connector	Typical Power Ratings	Features
Туре		
CHAdeMO	50 kW	Rapid DC charging
	100 kW	
Combined	50 kW	High capacity charging
Charging System	150 kW	• 200 – 1000 V DC
(CCS)	350 kW	
GB/T	10-15 kW	DC fast charging
		• For lower power EVs
		• Bharat DC 001

26. What is AC charging for electric vehicles?

It's called the "onboard charger" though it really is a converter. It converts power from AC to DC and then feeds it into the car's battery. This is the most common charging method for electric vehicles today and most chargers use AC power. The slow chargers use household sockets to charge and, come in the form of 3-pin plug EV chargers. Slow chargers take between 4 and 5 hours to charge a 2W or 3W battery fully. EV manufacturers claim that slow charging is good for the life of battery.

27. What is DC Charging for electric vehicles?

DC charging is used for fast charging. A fast charging station is the way to recharge when in need of a quick charging solution. DC charger has the converter inside the charger itself. That means it can feed power directly to the car's battery and doesn't need the onboard charger to convert it. DC chargers are bigger, faster, and an exciting breakthrough when it comes to EVs.








28. What is a battery swapping station?

A battery swapping station (BSS) is where battery packs are housed and charged fully to be replaced with discharged battery packs from EVs. An owner can visit a battery swapping station and replace their low state of charge battery pack for a fully charged battery pack for a fee.

29. What is difference between AC and DC?

Electric current flows in two ways as an alternating current (AC) or direct current (DC). The main difference between AC and DC lies in the direction in which the electrons flow. In DC, the electrons flow steadily in a single direction, while electrons keep switching directions, going forward and then backwards in AC.

30. What is a Smart EV charger?

Smart EV chargers, feature advanced communication and control protocols that provide flexibility and reliability during the charging process. Smart EV charging technology defines charging parameters by featuring constant communication between the EV, charging operators, and the utility.

31. What is Vehicle to Grid?





Vehicle to Grid is bi-directional charging, enabling energy flow in both directions, from supplier to user and vice versa. It is a system that lets electric vehicles (EVs) communicate with the public power grid and even provide electricity back to the grid to meet energy demand. EVs spend much of their time plugged in, either at the owner's home or in a parking lot. V2G would also allow consumers to provide electricity to their homes from their EVs' batteries during a power outage. Vehicle owners could even leverage their vehicles' considerable battery capacity to sell electricity back to the grid during peak load.

32. What is Grid to Vehicle (G2V)?

Electric Vehicle (EV) batteries can be utilized as potential energy storage devices in micro-grids. They can help in micro-grid energy management by storing energy when there is surplus. Except for periods of peak use, the power system could generate and deliver a substantial amount of energy needed to fuel the nation's vehicles at only the marginal cost of fuel.

33. What are the benefits of Electric Vehicles

- The running cost of an electric vehicle is much lower than an equivalent petrol or diesel vehicle. Electric vehicles use electricity to charge their batteries instead of using fossil fuels like petrol or diesel. Electric vehicles are more efficient, and that combined with the electricity cost means that charging an electric vehicle is cheaper than filling petrol or diesel for travel requirements. Using renewable energy sources can make the use of electric vehicles more eco-friendly.
- Electric vehicles have very low maintenance costs because they don't have as many moving parts as an internal combustion vehicle. The servicing requirements for electric vehicles are lesser than the conventional petrol or diesel vehicles. Therefore, the yearly cost of running an electric vehicle is significantly low.
- Driving an electric vehicle can help the user to reduce carbon footprint because there will be zero tailpipe emissions. The EV user can reduce the environmental impact of charging vehicle further by choosing renewable energy options for home electricity.
- The availability of fossil fuels is limited, and their use is destroying our planet. Toxic emissions from petrol and diesel vehicles lead to long-term, adverse effects on public health. The emissions impact of electric vehicles is much lower than petrol or diesel vehicles.





- Registration fees and road tax on purchasing electric vehicles are exempted in Kerala. ٠
- Electric vehicles don't have gears and are very convenient to drive. There are no complicated ٠ controls, just accelerate, brake, and steer. When the user wants to charge vehicle, just plug it in to a home or public charger. Electric vehicles are also quiet, so they reduce noise pollution that traditional vehicles contribute to.
- The electric vehicles can charge at home charger for 4-5 hours before the trip. •
- Electric vehicles have the silent functioning capability as there is no engine. No engine means • no noise. The electric motor functions silently, so the user need to peek into your instrument panel to check if it is ON. Electric vehicles are so silent that manufacturers have to add false sounds in order to make them safe for pedestrians.





International Copper Association India



5. GLOSSARY

Battery Electric Vehicle: BEVs are essentially all-electric vehicles that make use of stored electricity from a battery to get their power. There is an electric motor (one or more) that converts power to turn the vehicle's wheels. Some BEVs can be recharged by plugging in directly to grid electricity (internal converters) while others require dedicated charging units meant for the vehicle. Advanced BEVs also come with highly efficient fast charging options.

Battery Management system: It is an electronic system installed inside vehicles to manage and protect the battery.

Battery Swapping: Electric vehicle can get its discharged battery or partially charged battery replaced by a charged battery. The biggest drawback of EVs is the short range and high recharge time of currently available batteries. Many companies in the country are working on swappable batteries as a solution to this problem. These are expected to be suitable for two and three wheelers, although some leading companies are also working on swapping for cars and buses too.

Captive Charging Station: It is an electric vehicle charging station exclusively for the electric vehicles owned or under the control of the owner of the charging station. For example, Government Departments, Corporate houses, Bus Depots, charging stations owned by the fleet owners etc. and shall not be used for commercial purpose.

CCS (combined charging system): It charges EVs using standard AC and DC vehicle connectors and can be charged via vehicle inlet. It is a European standard connector used globally.





CHAdeMO: The full form of CHAdeMO is CHarge de MOve. It is a fast DC charging standard charger for EVs. It is a standard set by five major Japanese automakers; now, it is used globally.

Charging Point: It is a point or outlet which supplies electrical power for charging EVs.

Charge point operator (CPO): 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 point owner.

DC fast charging: This type of charging is primarily available at public charging stations and offers an accelerated charging facility. The high power transfer charges EV faster.

Electric Vehicle (EV): Electric Vehicles (EVs) are run by electric motors which are powered by energy stored in batteries. EVs have an electric motor instead of an Internal Combustion Engine (ICE). As an EV runs on electricity, the vehicle emits no exhaust from a tailpipe i.e. it has zero tail pipe emission and does not contain components, such as a fuel pump, fuel line, or fuel tank.

Electric Vehicle Supply Equipment (EVSE): An EVSE supplies electrical energy to charge EVs. The EVSE system includes electrical conductors, related equipment, software, and communications protocols that deliver energy efficiently to electric vehicle. As per Ministry of Power guidelines, Electric Vehicle Supply Equipment (EVSE) shall mean an element in electric vehicle (EV) charging infrastructure that supplies electric energy for recharging the battery of electric vehicles.

Grid to Vehicle (G2V): Electric Vehicle (EV) batteries can be utilized as potential energy storage devices in micro-grids. They can help in micro-grid energy management by storing energy when there is surplus. Except for periods of peak use, the power system could generate and deliver a substantial amount of energy needed to fuel the nation's vehicles at only the marginal cost of fuel.

Home Charging: This is delivered over slow AC chargers and happen overnight. Consumers returning from their daily commute would plug in the car into an appropriate home socket or wall mounted equipment, and will accumulate enough charge overnight to fully replenish the battery for a few days' worth of use.





Hybrid Electric Vehicles: HEVs have an internal combustion engine (that runs on petrol or diesel), along with the electric motor. A suitable alternative to both conventional fuel vehicles and battery electric vehicles, HEVs provide fuel economy without sacrificing performance.

Lead-acid: This is one of the oldest technologies being used in electric vehicles. These kinds of batteries contain a mild sulfuric acid solution in a container, while being easy to produce and charge, these batteries slowly release noxious gasses and are therefore not placed within the passenger compartment.

Level 1 Charging: It is the slowest type of charging equipment. L1 chargers plug directly into a standard 120 Volt AC outlet supplying an average power output of 1.3 kW to 2.4 kW. Level 1 home charger can charge electric scooters in 2 to 3 hours and electric cars in 6 to 7 hours approximately. This type of charging occurs primarily in residential settings.

Level 2 charging: It refers to using a charging station that is either placed on a wall, pole, or stands on the ground to charge your EV. Given their price point and charging speed, Level 2 chargers are commonly found at residential and commercial locations. It provides an average charging time of 4 to 6 hours through a 240 volts AC plug. Charging for an hour with a 7.4 kW charger delivers about 25 miles of range, an 11 kW charger about 37 miles of range, and a 22 kW charger around 75 miles of range.

Level 3 Charging: Direct-current (DC) fast charging equipment (typically a three-phase AC input) enables rapid charging along heavy traffic corridors at installed stations. Level 3 charging stations able to deliver between 50 kW and 350 kW of power. An hour of charging at a 350 kW Level 3 charging station you can expect up to 298 miles of range, and at 50 kW you can expect up to 173 miles of range.

Lithium-ion (**Li-ion**): This technology is far younger, at just a decade old. Li-ion batteries tend to hold their charge longer when not being used. They are also capable of holding a high charge and so make a great fit for electric vehicle use. The consumer durables and electronics industries have relied on these benefits and the fact that these batteries are fairly lightweight, the very requirements for EVs as well.

Mini Charging Stations: Dependence on interim charging arises when a user has to travel beyond the range offered by the vehicle battery, does not have access to home charging, or in case of exceptions





society of energy engineers and managers सीमseem like unplanned trips or forgetting to charge. In such cases, it is seen that slow AC charging is sufficient for most situations. One of the fastest growing segments in charging stations is expected to be the Mini charging stations with simple slow Bharat AC 001 chargers of 10 kW.

Nickel metal hydride (NiMH): This battery technology too has been around for two decades. NiMH batteries do not contain toxic metals so they're better for the environment and can be safely recycled. These batteries also provide a high energy density and have been successfully used by many large EV manufacturers.

OEM (Original equipment manufacturer): It is a manufacturer of vehicles, vehicle parts and related services. Thus the term is used as EV manufacturers.

Off-peak charging: It is a method of charging an electric vehicle at a low cost during off-peak hours (usually at night).

Public Charging Stations: Public DC fast chargers enable users to quickly charge their vehicle and resume their journey. These are required on the side of highways where people stop for quickly recharging their battery. Establishments like government offices, malls, hotels etc also install fast chargers for the convenience of visitors or to attract customers. KSEB will partner with the Government of Kerala, PSUs and other private investors to create an adequate network of fast charging stations in Kerala, in the following categories.

Category A: At public places for commercial purpose. Available to any individual without any restrictions (EV Charging station at Municipal Parking Lots, Petrol Stations, Streets, Malls, and Market Complexes etc.)

Category B: Within the premises of a state or central government office complex, Government Hospitals/clinics/Dispensaries, Government educational Institutions or any other public office for non-commercial use.

Category C: Within the semi-restricted premises for commercial or non-commercial purpose. Available to any individual for charging of EVs without any restrictions. (e.g., EV Charging for Taxi Aggregators for charging of Taxies, Co-operative housing societies)







Smart EV charger: Smart EV chargers, feature advanced communication and control protocols that provide flexibility and reliability during the charging process. Smart EV charging technology defines charging parameters by featuring constant communication between the EV, charging operators, and the utility.

Smart charging: A wi-fi-connected charge point gives users a smart charging option and can perform energy monitoring, load balancing, and charging management.

V2G (vehicle to grid): It is a system that allows electric vehicles to communicate with the power grid and manage electricity flow in a set direction. It introduces a new scope of EV charging energy management. However, it is not very popular, and a small number of EV manufacturers use it.

Zero-emission: Zero-emission vehicles emit no tailpipe pollutants from the onboard source of energy. Harmful particulates like hydrocarbons, carbon monoxide, ozone, lead, and various oxides of nitrogen are emitted by conventional fuel vehicles. The electric vehicle emits zero pollutants and makes the environment pollution free. EVs emit no greenhouse gases.





International Copper Association India

