

Community Charging Stations for Electric Vehicles (EVs) in Apartments

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Version	Authors	Date
1.0	Mr. Nagaraja Rao – President, BAF president@baf.org.in Mr. Vikram Rai – General Secretary, BAF secretary@baf.org.in Mr. Vishnu Gattupalli – Governing Council member, BAF vishnu080@gmail.com	23 rd May 2021

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Introduction

Energy is the primary and most universal measure of all kinds work by human beings and nature. Everything what happens the world is the expression of flow of energy in one of its forms. Energy is the major input to drive the life cycle and improve it. Energy consumption is closely related to the progress of the mankind. The development of infrastructure plays a significant role to sustain economic growth.

Most vehicles on Indian roads (and around the world) are run on fossil fuels (petrol & diesel). Petrol and diesel produce various emissions that are harmful to the environment and fossil fuels are a finite resource. The time has come to move into futurist mobility solutions of electric and hydrogen fuel cell vehicles. The electric vehicle industry is taking off in India with several new companies investing in electric vehicles and investment in EV charging infrastructure.

Karnataka electric Vehicles Energy Storage Policy -2017:

GoK & GoI have framed policy on adoption of Electric Vehicles (EV), the summary of which is as under:

Karnataka State has published a policy keeping in mind the estimated increase of 54% in the Global Energy by 2030 with a quarter of the projected increase from the Transportation sector. With the depletion of fossil fuels, the shift to electrical mobility has become necessary with the fall in oil source and the impact of transportation over the climate change. The electrical vehicles are becoming increasingly popular, because of the eco friendliness, cheaper fuel, lower maintenance expenses etc.,

With the result GOK published the policy called Karnataka Electric Vehicles Energy Storage Policy -2017, the stakeholders being Additional Chief Secretary-Department of Industries and Commerce, BBMP, BESCO, in addition to the multiple private vehicle owners. The policy entails in electric mobility Efforts, equipment manufacturing, battery technology, R&D, Design, charging infrastructure etc., Incentive mechanism for transporters & Consumers are envisaged to promote implementation.

Karnataka desires to be the first-mover State making Bangalore, the Electrical Vehicle Capital of India. Special initiatives for EV manufacturing, support for charging Infrastructure, R&D, skill development etc. are part of the policy. In addition, EV manufacturing-parks are being established. GoK has already ordered exemption of registration charges and stamp duty for EVs.

This follows the policy of GoI called Faster Adoption & Manufacturing of EVs (FAME) in India, establishing EV charging infrastructure in cities. Monitored by the Department of Heavy Industries, GoI envisages a budget of Rs.10,000 crores for the next three Years, involving capital grant to various organisations.



In the 21st century, EVs saw a resurgence due to technological developments, and an increased focus on renewable energy. A great deal of demand for EVs developed and a small core of do-it-yourself (DIY) engineers began sharing technical details for doing electric vehicle conversions. EVs, which are termed eco-friendly are expected to increase from 2% of global share in 2016 to 22% in 2030

EV growth: 69,012 units of electric vehicles sold in India during 2017-18, its numbers increased to 143,358 units in 2018-19 and again rising in 2019-20 to 167,041 units. The number included both two-wheelers, three wheelers and buses but two-wheeler sales have been upbeat.

Electric vehicles are saving the climate — and our lives. Here's how:

- Emissions from cars and trucks are not only bad for our planet, they're bad for our health. Air pollutants from gasoline- and diesel-powered vehicles cause asthma, bronchitis, cancer, and premature death.
- Electric vehicles have a smaller carbon footprint than gasoline-powered cars, no matter where your electricity comes from.

The electricity that charges and fuels the battery in the electric and plug-in hybrid vehicles comes from power grids, which rely on a range of sources. Energy grids can vary from one state to another, which means that the carbon footprint of driving an electric vehicle ranges depending on the source of its electricity. Some points on the charging efficiencies:

Types of chargers / Features	AC charger	DC charger
Charging speed	Slow	Fast
Load consumption	Less	More (consumes higher power in the same time)
Number of vehicles that can be charged	Less	More at the same time

BAF has been an active supporter in providing advice on various sources of energy and other resources to make the RWAs sustainable & operational. We have concentrated on making solar through promotion of Rooftop Solar power plant installations, implemented by many apartments. In addition to making the RWAs economical, this has added on to the green energy avoiding pollution. The next step in this direction would be the Electric Vehicles.

BAF with a citizen strength of over 1.5 Lakh households, each of whom will definitely be an owner of a



vehicle or two per household and many would be looking for a changeover to EV, for various reasons of pollution reduction, increased cost of the fuel etc. The Government has been promoting EVs on a big scale, even by waiving the registration charges. Keeping this in view, we may expect at least 5%-10% of the vehicles to be EVs soon. A preliminary survey conducted earlier revealed that there are a few apartment-communities who are having about 8-10 EVs, though the average per apartment may vary from one or two. We would be supporting the elements of vision of the Government to make the air less polluted.

One of the constraints at present for the EV is the lack of nearby Charging Stations. Apart from a few stations available in the city, some of the companies have also provided charging stations for the vehicles for the employees at the working place.

About seven companies dealing with EV charging stations were contacted for the details, based on the list of manufacturers communicated by BESCOM. Though they are based in Bangalore, they cater to the requirements of other states and other countries, and that too for large-scale charging stations, making the same commercially viable. On the other hand, the RWAs need charging stations of lower capacity, keeping the limited number of EVs in the apartments at present. But the growth potential is huge. Considering the enormous scope and anticipated changeover to EVs and the investments, discussions were held with a few companies.

Only two of them have responded to suggest models of Slow & Fast Charging Stations.

What is Electric Vehicle charging station?

An **electric vehicle charging station**, also called **EV charging station** or electronic **charging station (ECS)**, is an element in an infrastructure that supplies electric energy for the recharging of plug-in electric vehicles—including electric cars and electric two wheelers.

Why do we need electric vehicle supply unit (EVSE / EV chargers)?

The EVSE is just a device that safely allows electricity to flow. The EVSE enhances safety by enabling two-way communication between the charging station and the electric vehicle.

EVSE's have a safety lock-out feature that does not allow current to flow from the device until the plug is physically inserted into the vehicle. Automotive Research Association of India (ARAI) recommend using EVSE's to charge any EV safely as compared to using a simple 15A/240V socket, which is the normal practice in vogue at present, which fails to cover the aspect of safety.



So essentially an EVSE is a wall mounted box, or a small cement structure that supplies electric energy to the onboard charger for the recharging of electric vehicle batteries, with enough intelligence built-in. and charging the EV in a safe and smart manner.

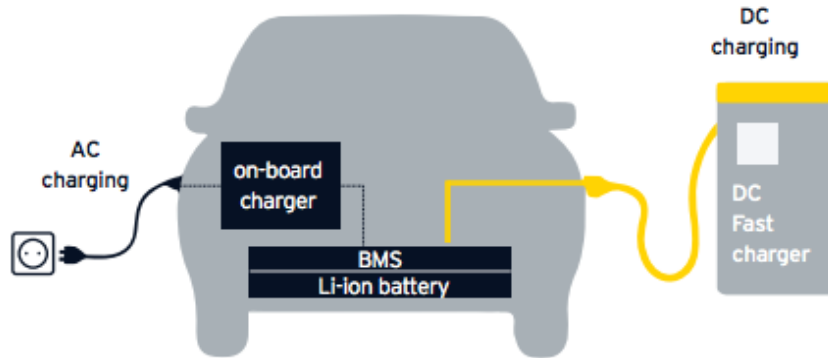


Figure: AC DC Charging scenario (EY Technical study of EV*)

BESCOM tariff structure for EV charging station

To promote a faster adaption of EVs in the state of Karnataka, KERC has provided a new introductory Tariff schedule for Electric vehicle charging station under LT-6 (C) category. Here are the tariff details for FY 20-21.

Electric Vehicle Charging Stations - LT-6 (c)		
Fixed charges	LT	HT
Fixed charges	Rs.100/KW/month	Rs.230/KVA/month
Energy charges	525 Ps/unit	

BAF had a meeting with the MD BESCOM, who has appreciated our efforts and has promised all support for the project.

Proposals for Apartments

At present, there are a few apartments resident users of Electric Two-Wheelers/cars are drawing power from the source of their flat for charging them. This is not safe at all and there would be a differential voltage which would affect the charger. Secondly, the charges would be an add-on to the Home meter in the higher tariff.

An EV vehicle AC charger typically requires up to 7.5 kW of power supply. They rarely have a higher



sanction load to accommodate a new power requirement to charge their vehicle.

Can an apartment association set up EV charging station within the apartment complex?

Yes, considering that there are many issues in allowing a separate charging point to each resident, an apartment association can set up a community charging station as a service to all their apartment/community residents in common parking areas.

Is it mandatory from the government to install EV charging infrastructure in an apartment complex?

As per the new notification from KERC, dated 22/10/19, any **new apartment** built after the date of notification is required to provide at least two charging stations if the requisitioned load is 250 KW or above or the built up area of the building is more than 5,000 sq.m. This is not applicable for the buildings built before 22/10/19.

Some of the policy level recommendations that BAF has taken up with BESCO/Govt of Karnataka for the faster adoption of EV in the state of Karnataka

1. **Reduction in Tariff:** As the intake of EVs is very less at this time in apartment complexes due to lack of infrastructure, we recommend the Govt. of Karnataka to reduce the tariff from Rs 5.25 /unit to average cost of supply of BESCO up to 5 years as a promotion for setting up commercial charging stations by RWAs.
2. **Relaxation of Fixed tariff:** BAF recommended to BESCO to remove the additional fixed/demand charges coming from EV charging station. This could be time bound for the first 5 years.
3. Sanction of additional power wherever needed.
4. Waiver of fixed charges for the additional load.
5. Subsidizing a part of the investment by the apartment in establishing the Charging Station and allied infrastructure.

Two types of charging stations models:

While the AC Charging unit with a limited investment would suffice for the present, keeping in view of the limited EV cars in the RWA, under the CAPEX model, the Fast Charging Units would be a future requirement with a heavy investment under the OPEX model.

CAPEX Model:

- The Investment is approximately Rs 2.0 Lakhs
- One Type2 AC and One AC 001 Model, based on the capacity of the vehicles.
- Requirement of power would be 20-30 KW

- Number of vehicles to be charged: 4 at a time
- Duration of charging: 6-8 hrs.
- Total per day: **7-12 vehicles**
- Includes installation, maintenance for one year by the Company



- RWA identified person to be trained for maintenance
- The cost per unit would be at a subsidised rate for a dedicated line

OPEX Model:

- The investment would be about approximately Rs 30-35Lakhs
- One 60 KW & one 15 KW charging stations
- Requirement of power would be 70 KW
- Also includes cost of transformer **if needed**
- Number of vehicles in a day: **28-30 cars**
- Duration of Charging: 45 mts.
- Full investment by the company
- Installation, Maintenance by the Company
- RWA to obtain power sanction
- Rs.14 per unit will be the charge
- RWA to sign 10 years lease.
- A subscription model is suggested by the Company
- Monthly payment of Rs 3,000 with free charging.
- An app will also be provided for free charging elsewhere.

FAQs

1. Q: What are the Pros and Cons of AC and DC charging?

Ans: Advantages of AC charging: Low cost and easy installation. AC chargers take lower power like 3.3 kW and 7.4 kW per charger. You can charge more vehicles with lesser sanctioned loads

Advantages of fast DC chargers: Speed of charging is almost 6-7 faster, Better suited for faster revenue generation and more cars can be charged with less charging points

Disadvantage of fast DC chargers: DC chargers take 15 KW and higher. An apartment needs to have much higher sanctioned load capacity to support more DC vehicle charging.

2. Q: Will the charging station need to be placed under a shade or inside a box, to protect against rains?

Ans: Most of the chargers are IP54 compliant and need a canopy over the charger and not necessarily a canopy for the vehicle itself as the plug points are IP65 compliant.

If you need canopy/roof for the whole vehicle, you need to invest for that.

3. Q: Do RWAs need to allow outsider/non-resident vehicles for charging?

Ans: Not necessarily. It's up to the association committee.

If you made an investment with fast DC charging and you want to recover expenses faster, then you can allow outsiders for charging their cars.



4. Q: If we need to shift the charging base from outdoor to indoor location (example - basement parking), can that be done by the vendor at no additional cost?
Ans: The wiring costs and labour costs will be extra. Instead you can simply add additional points in basement instead of adding. Wiring is a bit costlier.
5. Q: How does the payment option work for each person who uses the charging station?
Ans: There are different software apps for different vendors. The app will be integrated with charging station. People need to make payment on the app. The app gives complete details on power drawn, time slots, who has done etc. All reports can be generated. These payment and monitoring apps have subscription/usage costs.
- Example: If it's a fast DC charging people will be even to pay 15-20 rs per unit of charging because the car can be charged in 1 hour. Association can decide on the charges after calculating the ROI
6. Q: Can power from rooftop solar be used for the charging?
Ans: It can be achieved, but that would require a battery storage ,if vehicles need to be charged in the evening/night. Which will not work out commercially. One could also set up the solar charging directly to the charger as a captive consumption without any battery. The paybacks would be there only if the residents are charging the vehicles during sunny hours.
7. Q: What are the advantages of applying a net new LT6 connection(&meter) Vs using the exiting connection?
Ans: LT6 has subsidised tariff of 5.25 rs per unit. Fixed tariff charges also need to factor in If you use from your existing connection, then you end up paying 8-9 rs per unit. You need to check your apartment sanctioned load and see if that can support the charging stations. For an initial pilot setup, an apartment can go with existing connection as there are no additional charges to be borne by the association for LT-6 connection. Later on, they can invest on the new Lt-6 connection depending on the ROI on the project. Association can take call on this with the vendor.
8. Q: What should we do in case of fire or other emergencies?
Ans: You need to ensure there is proper earthing done and fire extinguisher is a must to be kept ready. The chargers are extremely well tested and are very less chances of catching fire.
9. Q: What are the safety hazards considering kids moving around in the apartments?
Ans: They are well protected. You need to scan QR code and give a command of charging it won't start charging.



10. Q: If an apartment is large enough what kind of recommended?

Ans: it's preferable to have a combination of both ac and dc chargers. It's not practical to install many DC charges in a resident complex with so many vehicles to be charged all the same time. Since most of the owners charge their vehicles overnight, they don't want to wait in line. An apartment can start with AC chargers initially and once the number of vehicles increase and if there are enough residents who prefer fast charging, then they can add DC chargers.

Association can go for fast DC chargers to allow outsiders for charging, it is a great way of generating revenue. Security can be trained to direct outsiders who are coming for charging and some space management needs to be taken care.

11. Q: Will BESCOM provide an overall meter for all chargers included or separately?

Yes. They will provide one meter for such installation. With the new LT6 connection.

12. Q: Should the chargers be OCPP (Open Charge Point Protocol) compliant?

Ans: Yes

13. Q: Can it be installed anywhere? outside or inside parking spaces? Any specific locational requirements?

Ans: Can be installed either in the Parking slot or anywhere else. You can choose the location in consultation with the Vendor you select.

14. Q: Do the chargers auto disconnect on full charge?

Ans: Yes. This is one of the built-in safety measures.

15. Q: What is the life of the chargers? what maintenance will it require post installation? Please provide details about warranty and maintenance requirements.

Ans: The warranty on chargers is usually 2 years but expected to work much longer time. There are two maintenance charges. 1. Software 2. Services. The software charges would be ~6K per charger and service charges could ~2K per charger that includes any onsite breakdown maintenance and tele support for any billing related issues.



BAF empaneled vendors

1. Magenta Group:

A. Rahul Gupta : 97116 83966 rahul.gupta@magentagroup.com

B. Reema Lewis: 99699 49424 reema.lewis@magentagroup.com

2. Delta Group:

Harsha Kuntur 95352 40349 harsha@ecosoch.com

3. EV Motors group:

A. Pritish Desai 99800 04491 prish.desai@ev-motors.com

B. Sandeep Mittal 93151 15771 sandeep.mittal@ev-motors.com

