



Pimpri Chinchwad Education Trust's  
**Pimpri Chinchwad College of Engineering**  
Sector No. 26, Pradhikaran,  
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## Battery and Solar Testing Laboratory at Pimpri Chinchwad College of Engineering

### About Battery Testing Laboratory

Electrical energy storage is one of the largest industries in the world and is used for solar power, electric vehicles and many other applications globally. In this context, a Battery and associated systems testing, research and development laboratory has been set up by Customized Energy Solutions (CES) Pvt. Ltd. CES is a reputed technology transfer company at Pune with Head quarter in USA and works as a major consultant to all large battery, solar and electric vehicle companies globally. PCCoE is one among the premier technical institutes in Maharashtra, established by the Pimpri Chinchwad Education Trust, Pune, since 1999. PCCOE & CES have started industry funded R&D on high performance charging systems and storage for Electric Vehicles.

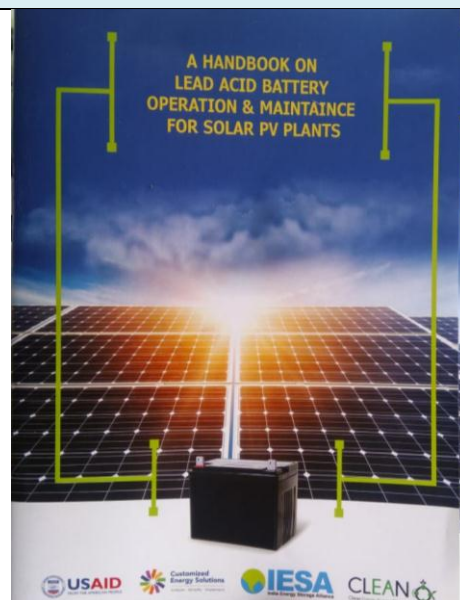
### Projects Handled

#### 1. Development of Operation and Maintenance(O&M) Manual for Off-grid Solar power plants

India and many other countries across the world are deploying many thousands of off-grid solar power system and mini-grids with lead acid batteries. As most of these sites are deployed for remote locations; installation, commissioning and O&M procedures of these plants are often sub-standard. During the last two years, the team involved in writing of the manual has studied performance of over fifty off-grid plants across India. During the visits, a lot of common issues with the performance of the solar PV plants especially the battery bank was witnessed.

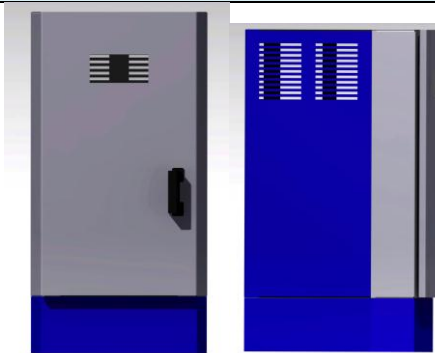
The aim of this project was to develop a comprehensive O&M manual for Solar PV battery power plants. This manual addresses the issues like battery bank selection, identification of failure modes in the mini grids, charging and discharging rates and relevant cut-off voltages etc.. The manual is a ready reckoner for Micro/mini grid operators for improving the life of the batteries in their plants. The manual gives comprehensive guidelines around equalization charge process and annual maintenance procedures for lead acid batteries

[https://www.thecleannetwork.org/wp-content/uploads/2018/10/Manual\\_0410.pdf](https://www.thecleannetwork.org/wp-content/uploads/2018/10/Manual_0410.pdf)



## 2. Development of High performance Fast Charger for Electric Rickshaw application

Through this project, a Fast Charger for E Rickshaw charging station equipped with 48V100Ah-C20 batteries (tubular & Flat plate) has been designed. The charger recharges the battery from 20% to 80% SOC within 3.5 Hours/ 210 minutes which allows E Rickshaw to run for 50-60 Kilometers on single charge. It has a mode for Intermediate or Opportunity Charge mode during lunch hour. Injects 35% or 35AH into a 48V100Ah-C20 battery within 1 Hr. 5 minutes/ 65 Minutes, which allows 30 Km. extra run after mid-day/ evening battery discharge. The product is under commercialization



## 3. Development of state of charge of lead-acid battery used for E Rickshaw application

In all battery systems it is necessary to monitor the battery state of charge (SOC). An SOC meter is being designed to give a 5% accurate estimate of the SOC of the battery in about 3 minutes time. It is designed for estimation of SOC of stationary E Rickshaw batteries in open circuit condition. The meter will be able to measure the SOC of both old and new batteries. The older version of the SOC meter (shown in figure) was developed quick determination of SOC for 12V 100 AH E Rickshaw batteries. An improved version of the same is under research and development.



## 4. Development of Battery Fuel Gauge for E-Rickshaw

This project aims at providing a reasonably accurate battery fuel gauge at low cost, which, in a running vehicle, shall continuously indicate the state of charge in the battery and the balance range or run time left in the battery. This instrument shall also provide advance warning/annunciation before the battery is deep discharged, so that the vehicle driver can take the vehicle to charging point. Audio and video signals will be used. An additional functionality of indication of over charge can also be provided. Thus the battery life can be prolonged to about 18 months from the current 8 months. The project is under research and development.



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