Inaugural function of innovative projects of ANERT

Hon'ble Minister for Electricity Sri. K. Krishnan Kutty will be inaugurating following projects in ANERT HQ on 04/07/2025 at 2.30 pm.

1. Inauguration of Grid interactive solar powered battery storage system.
2. Inaugural function of demonstration project on Vehicle to Grid (V2G) Technology
3. Official launch of EZ4EV Mobile application for EV charging
4. Inaugural function of EV customer lounge

Grid Interactive Solar Powered Battery Energy Storage System

ANERT has completed the installation of Kerala's first Decentralized Solar Powered Grid Interactive Battery Energy Storage System at ANERT HQ, Thiruvananthapuram. The system can power up to loads of 100kW and is having a battery bank of 150 KWh, enabling continuous operation of 1.5 hours on full load in the absence of Solar or Grid power. The system has a provision to connect Solar of maximum up to a capacity of 100kWp through the 2 Nos of MPPT modules, out of which currently 30 kWp is being fed and the same can be enhanced as and when required. The battery bank of 150 kWh is provided by 2 sets of 75kWh units which is also upgradable based on the future demand.

The Energy Storage System installed is a containerized solution comprising of a prefabricated module structure system, power supply and distribution system, monitoring and control system, environmental control system, fire protection system, dedicated Battery Management System (BMS) and Energy Management System (EMS) etc. Also, it is designed in such a way that, in case of an emergency, the system can be disconnected from the building, can be transported out to repower any

other building or location. The operational advantages of this project is as follows:

- Meeting the 24 x 7 Requirements completely from Renewables and Storage
- Replacement of existing DG unit
- Export of Power during Peak Hours for better monetization value
- Using the BESS for exclusive EV Charging during peak hours
- Improving Power factor and reducing three-phase imbalance
- Reduce Voltage and Current harmonics

This grid interactive BESS can be operated on standalone mode, exporting power to the grid from solar, Exporting Power to Grid from Battery, Charging battery from Solar and from Grid during rainy seasons etc. Through the intelligent control of the static switching module, the working mode switching function can be done automatically as well as on Programmable mode, enabling ToD operation. The operation modes are as below:

- Under normal circumstances, the system is in the grid-connected discharge state, at this time the energy generated by the Solar is supplied to the load and the grid, if the load requirement is greater than the set output power of the GRESS, the excess power is provided by the grid. This mode will be beneficial during sun hours as the electricity tariff is very less compared to other time periods.
- During Power failures in the Grid, the Grid interactive BESS will switch to off-grid working mode, and the load will be supplied with energy by the Solar and Battery; when the power grid is back to normal, the system

switches back to the original working state. This allows the building to function seamlessly and ensures 24x7 power.

- During Peak hours, the building load will be minimal, and this can be completely met from the energy stored in the batteries and export energy at a fixed power to the KSEBL grid enabling receipt of higher monetization of energy as well as higher banking percentages, that can be claimed in other time periods.

With effective programming and optimized scheduling, the Grid interactive BESS will help in catering cheaper power throughout the day and help in attaining maximum revenue through the energy sale.

The Battery Management System (BMS) available within the system safeguard the battery against overcharge, over-discharge, and over-current, while balanced cell management ensures the safe, reliable, and efficient operation of the entire system. This helps in enhancing the life of the batteries, as it is having a 10-year warranty with an assured life cycle of 6000 cycles. The Grid interactive BESS is also employed with an Energy Management System (EMS) which manages the System operation and data monitoring, strategy management, historical data recording, and system status tracking etc. The overall system performance can be monitored remotely for effective monitoring and control. The installation for the 100kW/150kWh Grid interactive BESS at ANERT HQ was done by M/s POM Systems and Services Ltd for an amount of Rs. 1,20,00,000/-incl GST and all other expenses including 7-year warranty for the complete system and 10-year warranty for the Battery. This expenses can be met from the state plan of ANERT under head of account program on renewable energy during this year 2024-25.

Demonstration Project on Vehicle-to-Grid Technology

The Vehicle-to-Grid technology is a State-of-the-art game-changing innovation that turns electric vehicles (EVs) into mobile energy assets. Instead of just consuming electricity, V2G-enabled EVs can send power back to the grid, helping balance energy supply and demand. The EVs can be charged from the Solar hours at a cheaper tariff and during peak hours, the power may be exported back to the grid or used for powering standalone loads. This is made possible with use of a Bi-directional charger and Bi-directional modular power unit (BMPU). The bidirectional charger is an advanced EV charger capable of two-way energy transfer. BMPU operate much like an inverter, converting AC to DC during charging and the reverse during discharging. However, bidirectional chargers can only work with vehicles compatible with BMPU. Due to bidirectional chargers being far more sophisticated, they are also much more expensive than regular EV chargers since they incorporate advanced power conversion electronics to manage the energy flow to and from the vehicle.

The vehicles with V2G facility can be directly connected to the bidirectional charger for charging and discharging power to the grid. As on date, only a handful of EVs are having the facility, whereas it is seen that the same will be added as a feature on all the newer models of most of the OEMs like the Vehicle-to-Load option which they are providing now. But since, there are already quite a few EVs currently on the road, a demonstration on the retrofitting option is also being done by ANERT. One of the existing EVs of ANERT was used for the purpose by which the existing DC Fast charging option was disabled, and a Bidirectional Modular Power Unit (BMPU) was installed in the vehicle to enable the Bi-directional power conversion. BMPU is a device or system that enables bidirectional flow of power between electric vehicles (EVs).

The Demonstration project is being completed in association with the India Smart Grid Forum (ISGF) which has the technical assistance from the University of Delaware and under support from International Sustainable Energy Forum (ISEF). The BMPU is manufactured by M/s Watt and Well, the Bidirectional charger is manufactured by M/s Nuvve Holding Corporation and the EV technical support is being provided by M/s TATA Motors. The Vehicle Control Unit (VCU) enables the control of charging and discharging power at which the export of energy is done, which can be programmed between 2 kW to 9.9 kW. Accordingly, the EV is to be charged during sun hours, when the electricity is available at comparatively lower tariff and the energy is to be exported during peak hours (SoC up to 35%) enabling higher monetisation of the power. The model can be replicated at most of the government buildings as well as for the public.

EZ4EV Mobile application for EV charging

Presently various types of mobile applications are being used at public EV charging stations across Kerala. These applications are mostly managed by private agencies, which often charge huge service fees. Additionally, electric vehicle owners are required to deposit money into the wallet of each individual app they use, causing inconvenience.

As a solution to this issue, the state government, through ANERT, has developed a mobile application called EZ4EV for public EV charging stations. A trial run of this app is currently being demonstrated at 18 charging stations across Kerala.

The EZ4EV mobile application comes equipped with advanced features such as:

- Trip Planner
- Real-time chat support
- Alert notifications for customers
- Feedback option
- Auto charge
- Display of percentage of charge during charging
- Filter options
- Free charging facility for selected customers
- Different tariffs for AC and DC chargers during solar and non-solar hours

This initiative aims to provide a unified, efficient, and user-friendly solution for EV users in the state is now being officially launched. The EZ4EV application is offered completely free of cost to private agencies operating public EV charging stations. No payment gateway charges or service fees are collected for its usage. In addition, 24x7 customer care support in the local language will be available for both charging machines and the mobile application. Total expenditure for this project is Rs.11.5 lakhs and yearly expenditure is Rs.1.5lakhs to 2.00 lakhs. This expenses can be met from the profit of the existing public EV charging station of ANERT.

EV customer lounge

The charging time for DC fast charging stations for the electric cars are 30min to 1 hour. So the EV customers require air conditioned waiting area and washroom facility during the E car charging time.

For the complete requirement of EV customers, ANERT have provided following charging facilities for all type of EV customers

1. 60kW CCS type II chargers with 2 guns – 1 no

2. 30kW CCS type II charger – 1 no

3. 10kW AC charger with 3 guns – 1 no

(For the existing E-autos and E-scooters)

4. 3kW LECCS charger – 1 no

(For the fast charging of E-scooters like Ather)

For the waiting of EV customers, ANERT have provided one new air conditioned customer lounge with washroom facility at ground floor of ANERT HQ. Also provided television set, unlimited Wi Fi, Daily news papers and EV magazines. One vending machine is also provided inside the customer lounge for the light refreshment.