

**At the Heart of Microgrids: A High Quality  
Embedded System**





When it comes to energy utilities, a properly functioning microgrid control system is important for ensuring all processes work correctly and that energy is always being distributed in an efficient manner. The “Grid” helps connect homes and buildings to central power sources, which allows for the use of appliances, HVAC and electronics. Generally, when one part of the connected grid needs repair, the rest is affected due to its interconnectedness. Microgrids operate in conjunction with the grid but also can operate separately using its own local energy during power outages. It becomes highly beneficial when considering applications that must remain functioning at all times or when considering power outages due to weather conditions like holiday snow storms. In recent years, microgrids have become more and more popular as various entities including businesses, institutions and even small cities have started to utilize the systems to optimize power consumption and even regulate how renewable energy is used.

## **How it works:**

A microgrid connects to the grid and maintains stable voltage as the main grid. It can be connected to a switch that can manually or automatically separate the microgrid from the main grid. As a power backup source, many institutions are utilizing the systems to ensure uninterrupted operations when power outages occur. Microgrid systems generally integrate a switch, an embedded system in conjunction with a battery and/or solar panel working to regulate and optimize energy flow.

## The Embedded Controllers in a Microgrid System

When one of the world's leading power and automation engineering companies started searching for an embedded computer to be integrated in their microgrid power station control room, they were looking at Axiomtek's eBOX670-883-FL-DC. Their requirements included:

- Low maintenance, fanless system
- Needed 24V supply
- Will be used in Powerstores (battery banks)
- Store historical data of a Microgrid control system
- System security is very important
- Provide webserver service to access and to configure Microgrid control system

The challenges included:

- The system needed to provide third party interface (Modbus RTU/Modbus TCP) to Microgrid control system
- It also must act as a gateway to the control system (SSH and VPN access)
- It must be a high performance and cost-effective solution
- Capabilities for the future is to provide calculating power for optimization calculations. Energy consumption and production optimization

They selected the eBOX670-883-FL-DC because of its ability to meet all of the current and future requirements. The embedded system offers the following features:

| Model             | Description  |
|-------------------|--|
| eBOX670-883-FL-DC | Fanless Embedded System with i7/ i5/ i3/Celeron® processors, GbE LAN*4, USB3.0*6, COM*6, HDMI*2, DP*1, VGA*1, 32 channel DIO and 9~36VDC |
| CPU               | Intel® Core i5-4570TE 2.7GHZ 4M  |
| RAM               | DDR3-1600 8GB 204P   |
| HDD               | WD 2.5" 500GB 54R 8M   |
| CFast Card        | WT CFAST SATA3 16GB  |
| MOUNT BKT KIT     | EBOX670 WALL MOUNT BKT KIT   |

Axiomtek was also able to provide the company with a reliable solution that could permit third party interfacing, allow a gateway (SSH and VPN access) to be used, and provide calculating power they need.

Axiomtek's eBOX products are developed with an emphasis on high performance/low power consumption CPUs, rich I/O options for expandability, wide voltage range for hazardous environments, and more which are well suited to work in the power and energy industry.