

Overview

Background

The Green Energy Hub (GEH) testbed is intended demonstrate the future of hardware integration from the Enabling Technology and Fundamental Science research planes in the FREEDM Systems Center.

The purpose of this Y9 project is to develop a LV SST demonstration comprised of FREEDM components such as:

- LV SST
- DESD
- DRER

Figure 1 shows a system level overview of the AC/DC household.

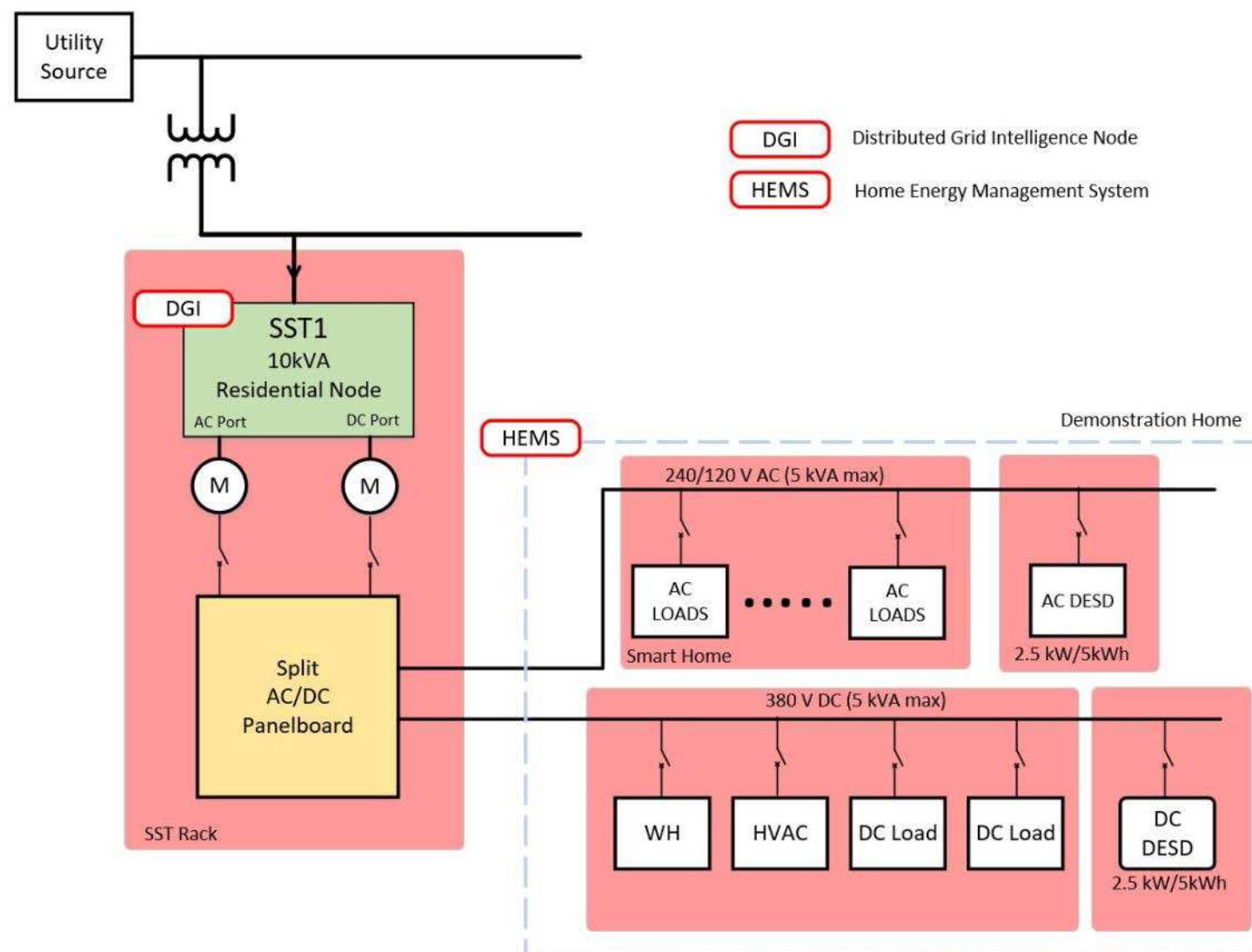


Figure 1: System Overview of Single LV SST Demonstration

Project Goals

- Integrate FREEDM GEH Components to represent a single residential home
- Create SCADA system provide visual representation of operation

Method

Hardware Implementation

The LV SST Residential Demonstration is comprised of several different types of hardware:

- FREEDM Components
 - LV SST & DESDs
- Smart Home Loads
- Other AC/DC Loads.

In order to integrate all of the hardware, a panelboard was design to interconnect the LV SST to the DESD and loads. The main features of the panelboard are:

- Ability to interconnect with both AC and DC sources and loads
- Provide adequate protection for LV SST and AC/DC Loads
- Measure voltage, current , and power of each load to provide feedback for HEM

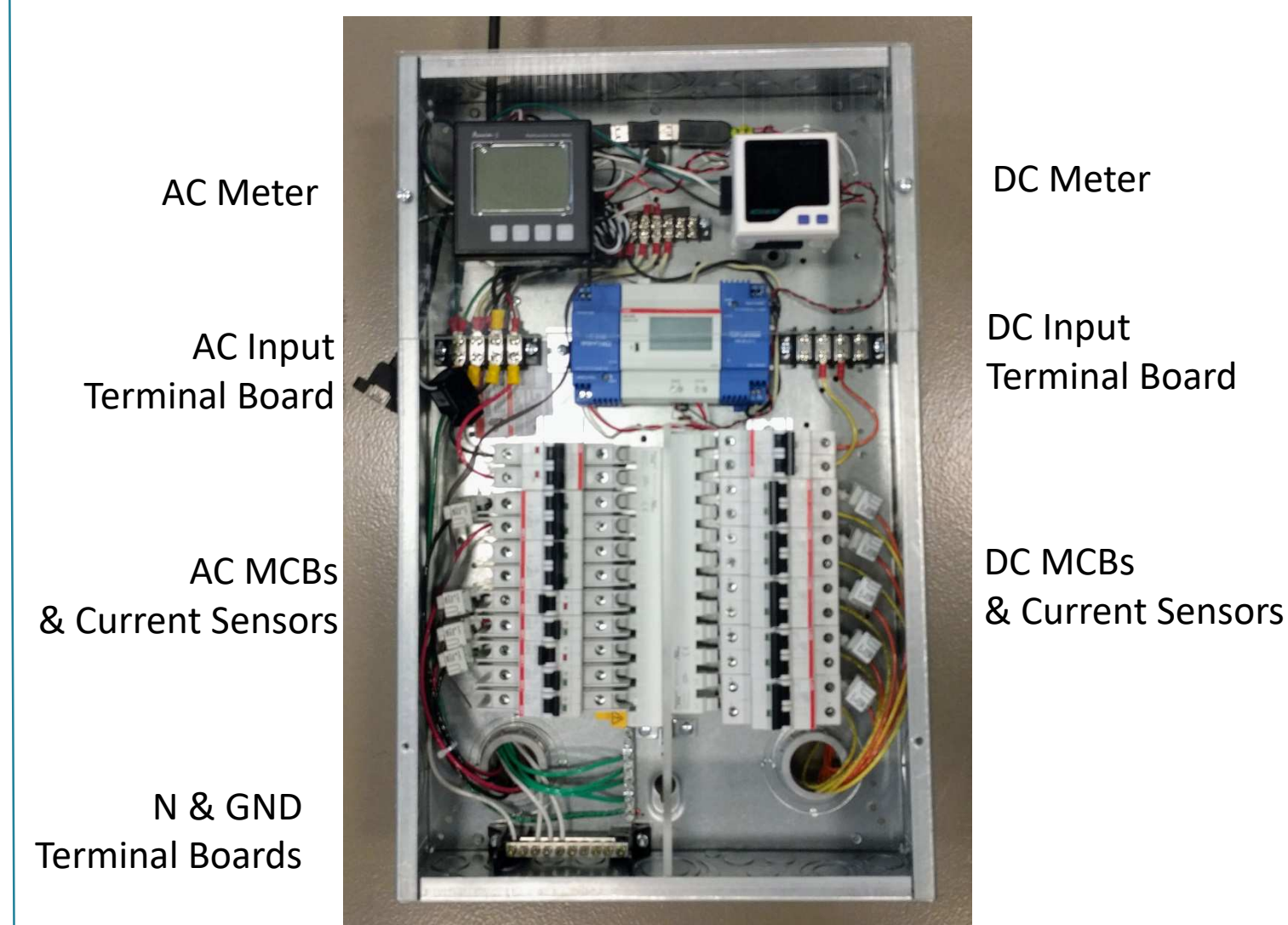


Figure 2: Layout of AC/DC Panelboard

Results

Software Implementation

A LabVIEW interface was created to observe the integration and operation of the LV SST Residential Demonstration.

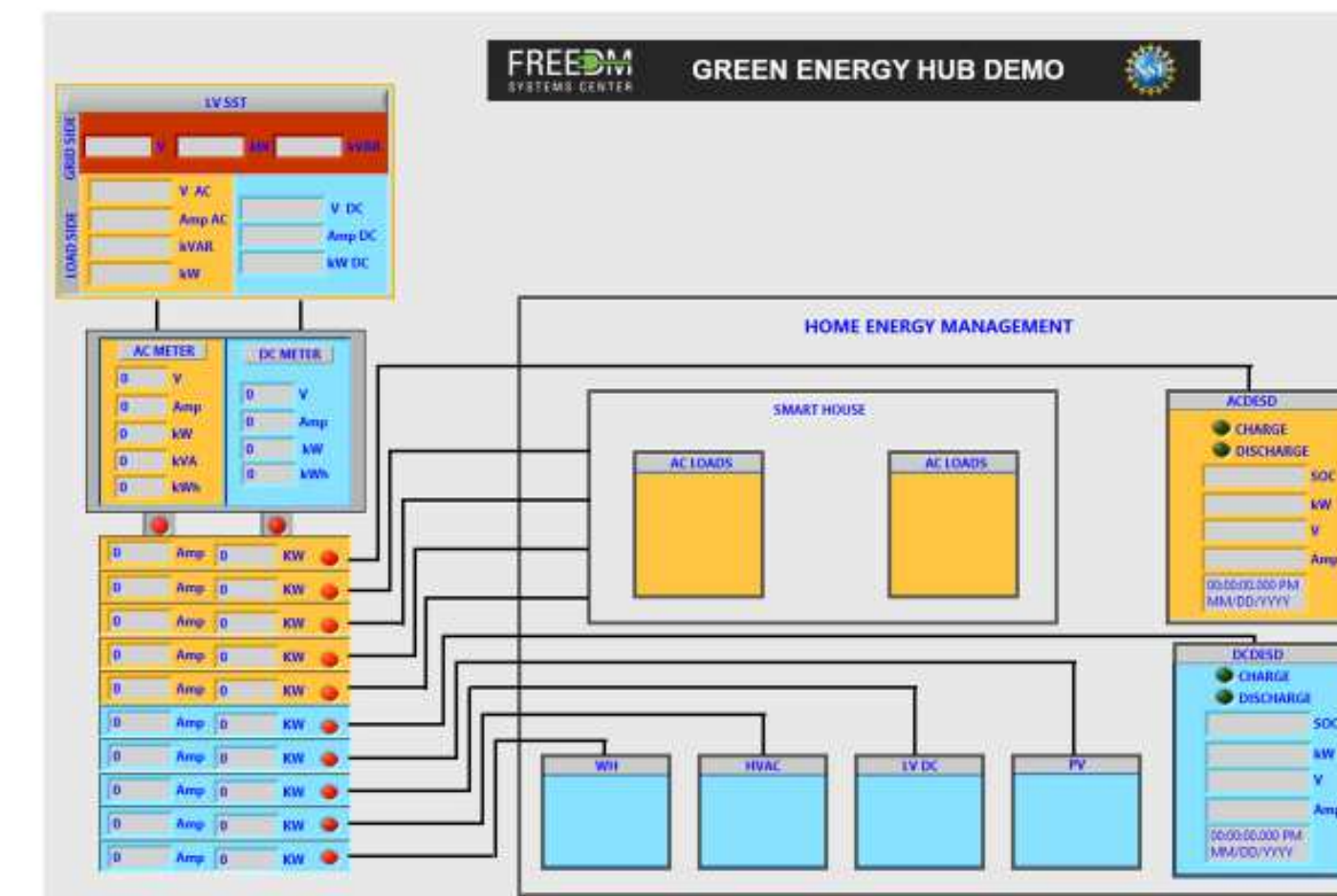


Figure 3: Single LV SST LabVIEW Interface

Conclusion

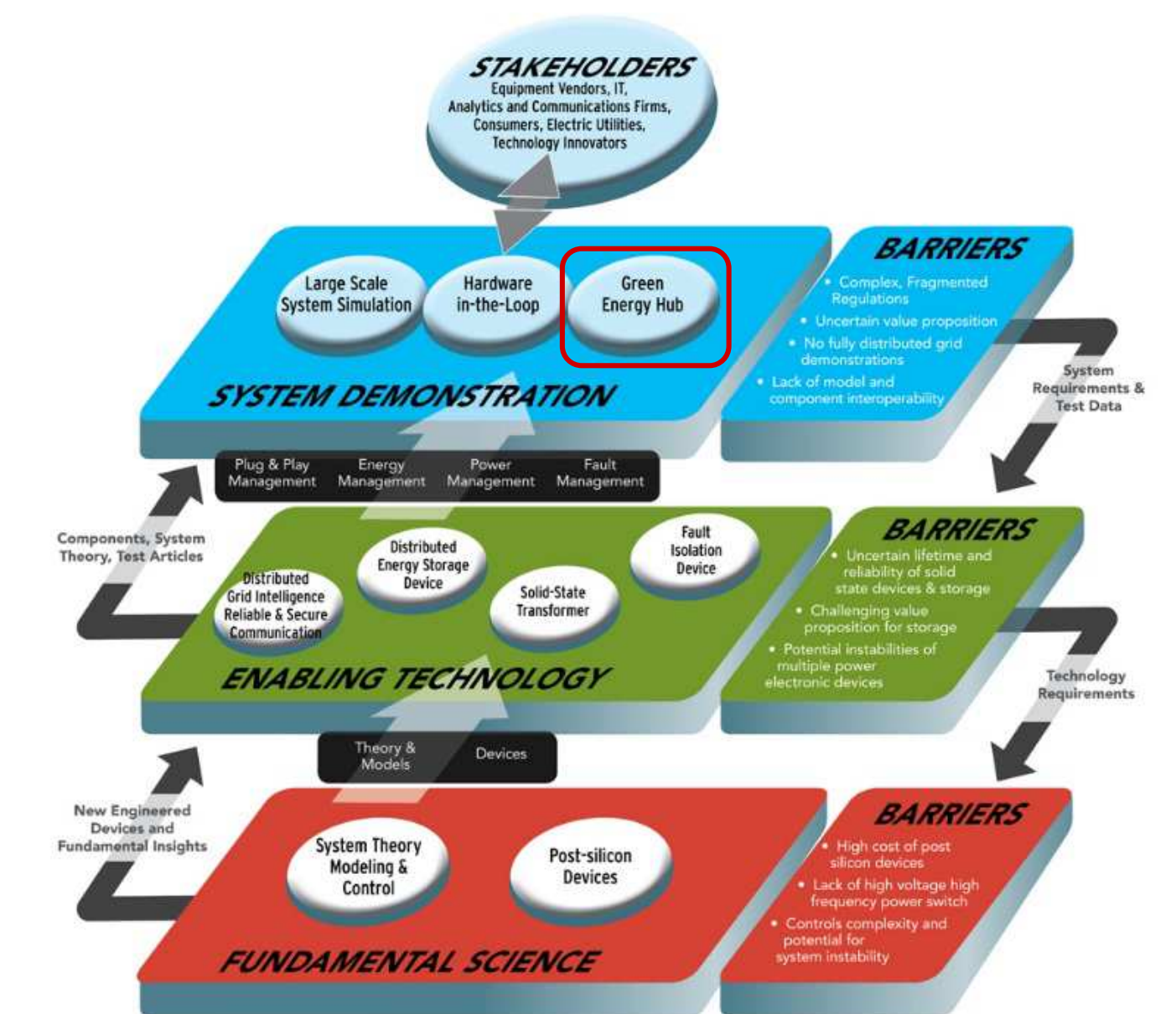
In this demonstration, the functionality of the LV SST and DESDs are displayed. In addition to the hardware, the FREEDM HEM System [1] was used to simulate a residential household load profile.

Future Work

- Testing LV SST disconnected from the grid (“islanding” mode)
- Implementation of AC DESD
- Testing in-rush current capability of LV SST
- Power flow from AC to DC or DC to AC LV SST Ports

References

1. Yan, J., Zhu, X., & Lu, N. (2015, July). Smart hybrid house test systems in a solid-state transformer supplied microgrid. In *2015 IEEE Power & Energy Society General Meeting* (pp. 1-5). IEEE.



Partners

