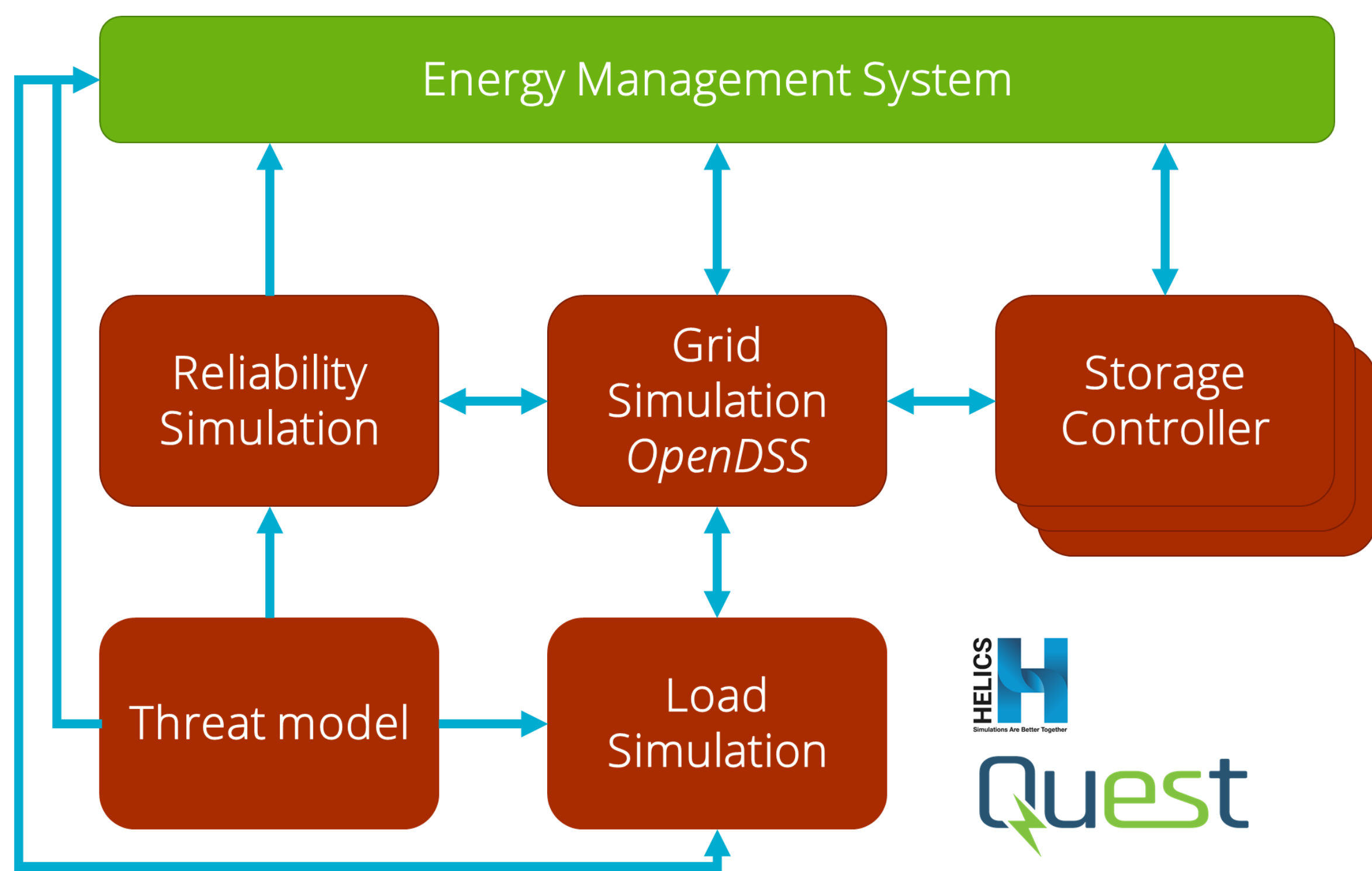# Storage Sizing and Placement Tool in Distribution Grids

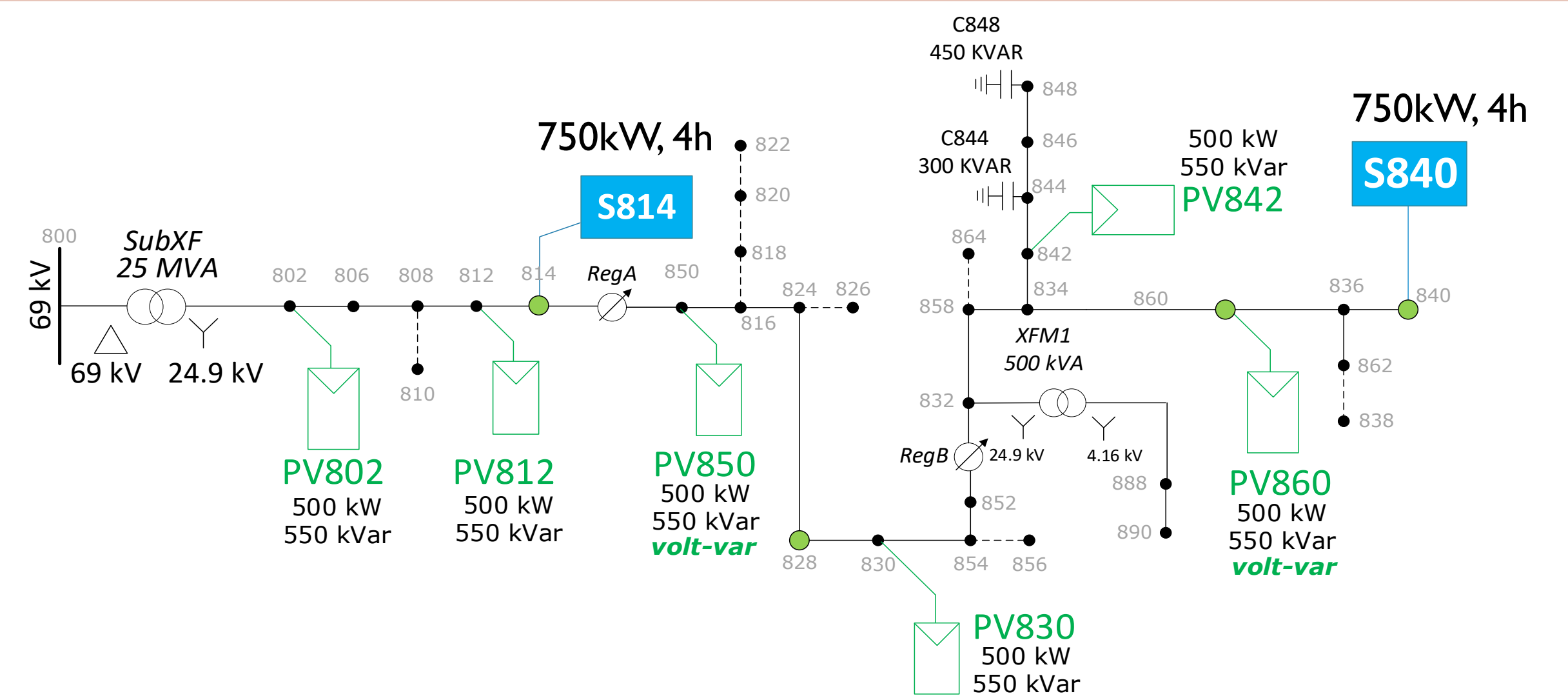## Will Vining, Ujjwol Tamrakar, John Eddy

Overview

- Identify optimal sizing and placement of Energy Storage assets on a distribution grid, incorporating considerations of:
  - Grid physics
  - Grid reliability
  - Disruptions caused by extreme events
- A HELICS-based co-simulation couples:
  - OpenDSS grid simulation
  - Grid reliability simulation
  - Energy management system simulation
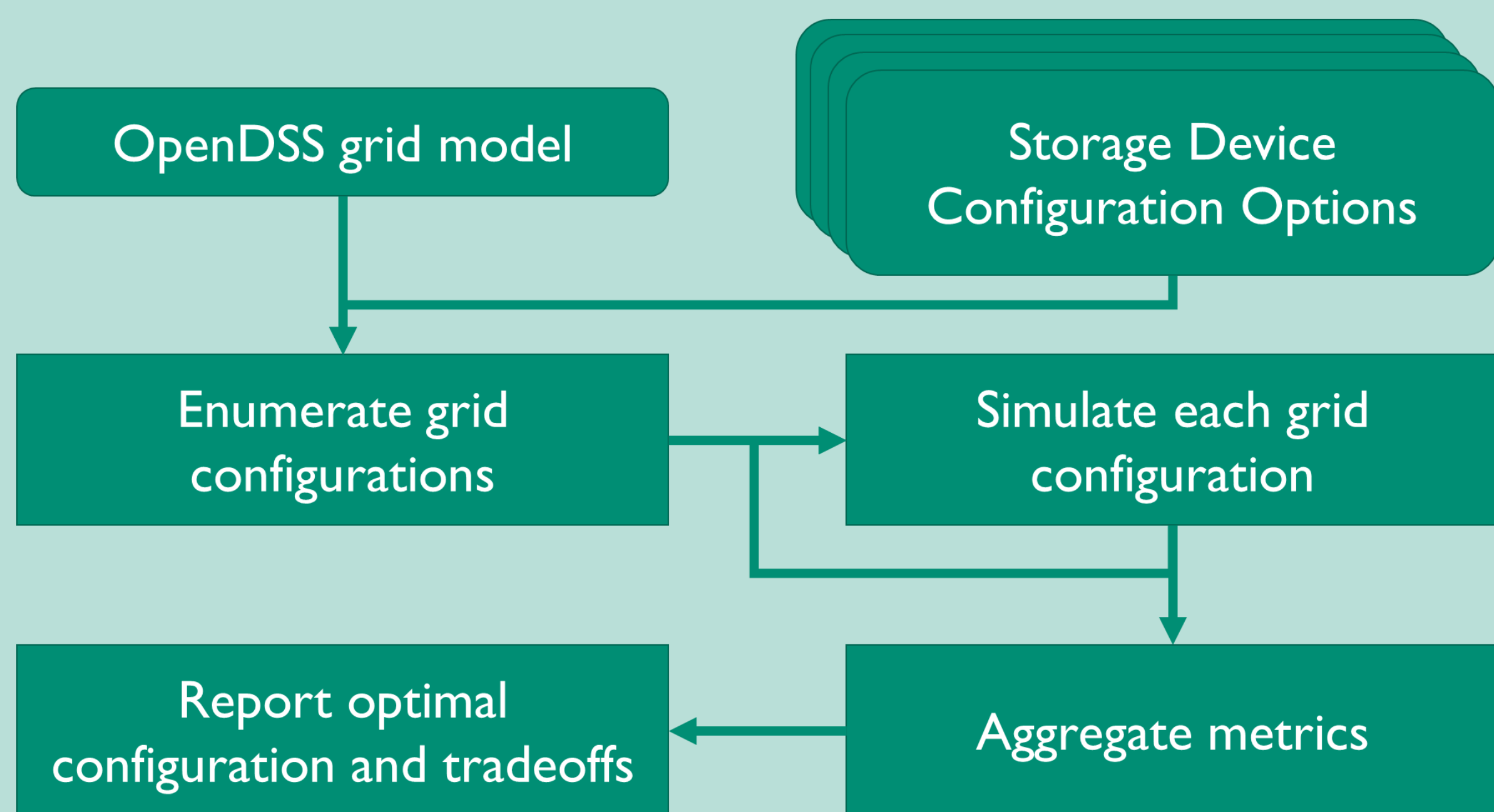 - Storage controller simulations

Storage Sizing and Placement Tool

- Metrics are captured and aggregated across the grid to quantify the impact of each storage configuration
- Metrics are normalized in such a way that different quantities of interest can be compared directly.

UI Development

1. **Landing Page** — Main page with all menus
2. **Grid Selection** — Open desired OpenDSS Model
3. **Storage Selection** — Place storage at desired locations
4. **Storage Controller** — Define storage control mode
5. **Define Metrics** — Define metrics for evaluation
6. **Analysis** — Results and Visualization

Case Study
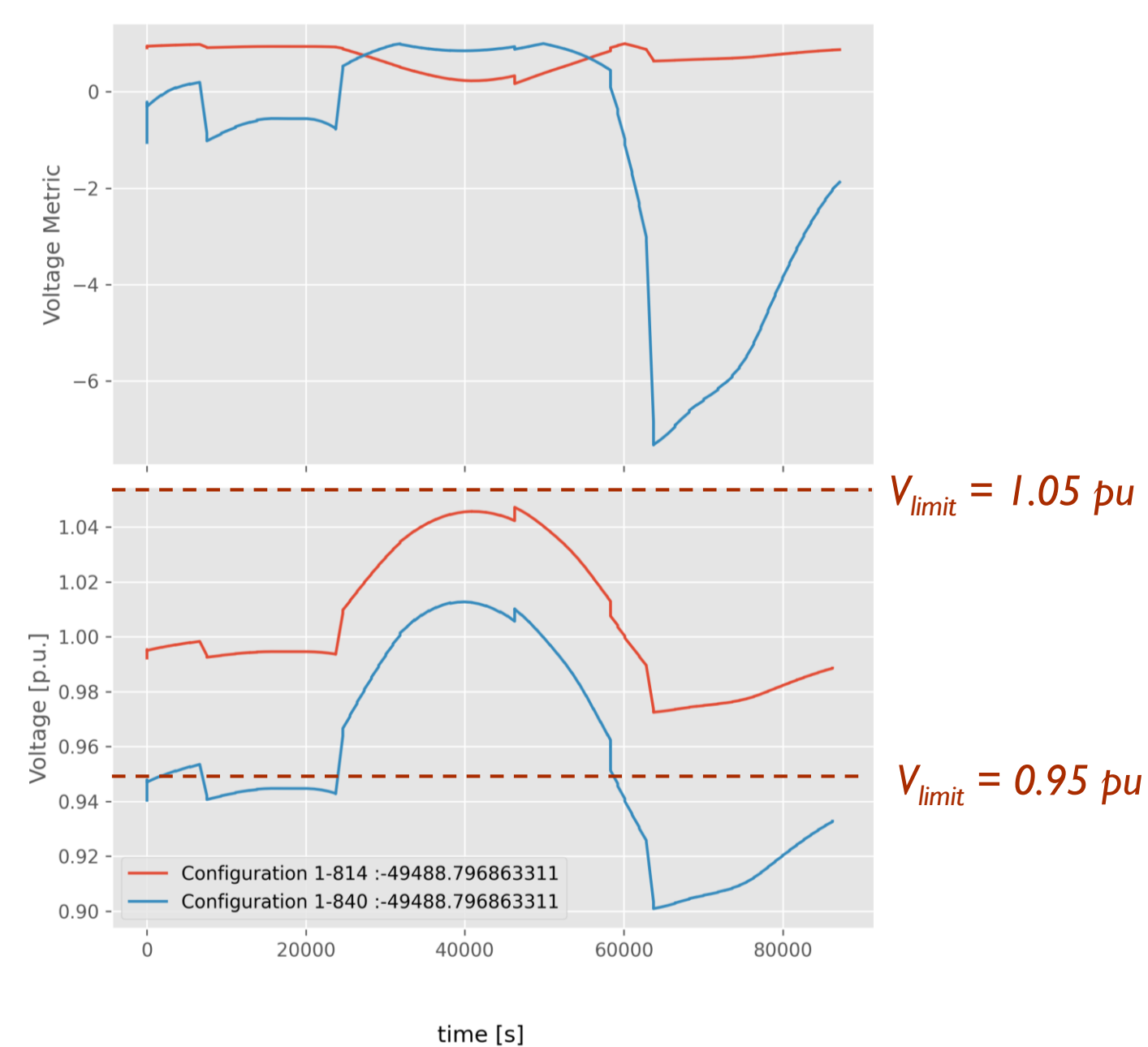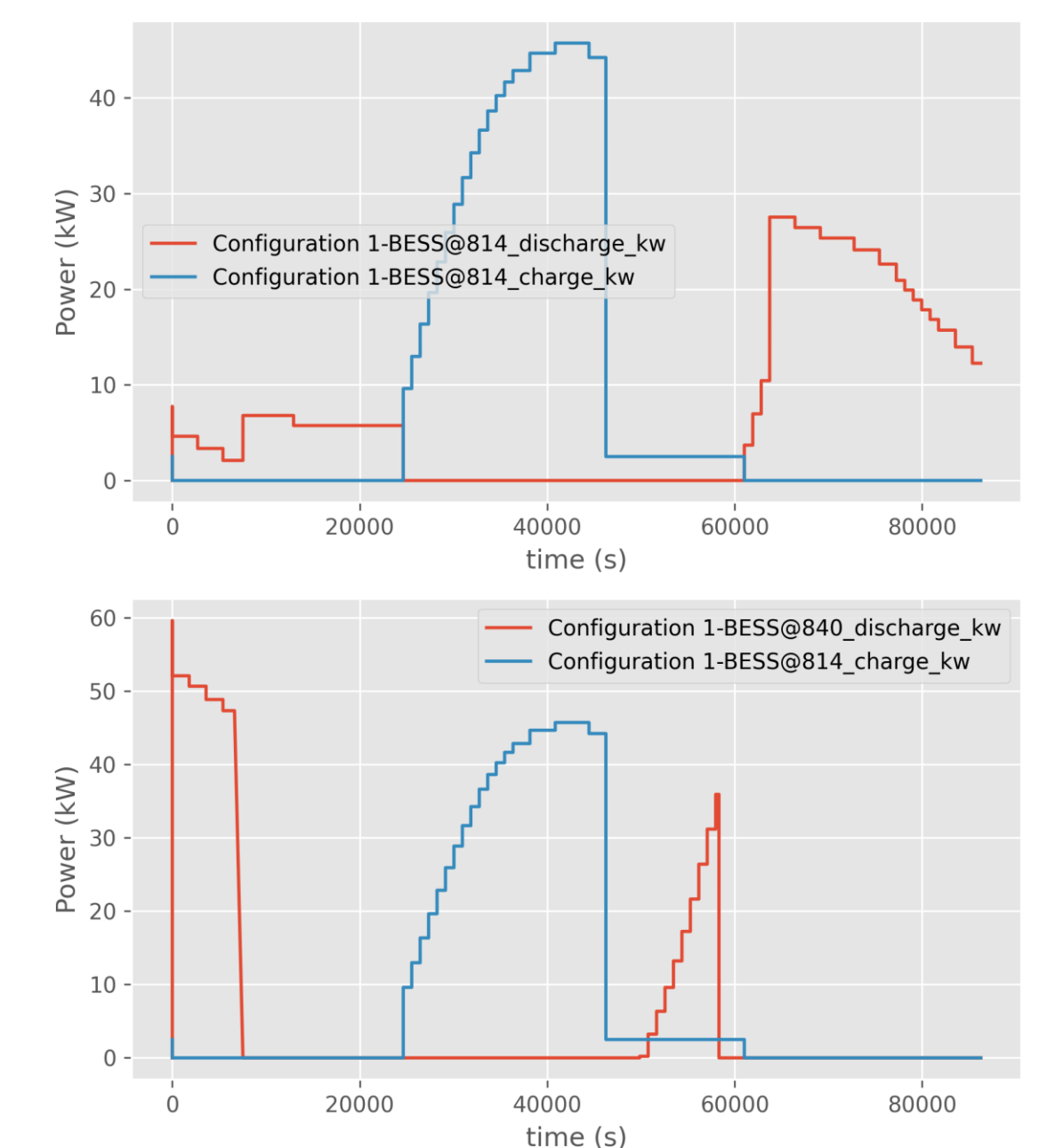
| Voltage Metrics | Charge/Discharge Profile |

Metric for voltage quality at busses 814 and 840 in the feeder above. The metric values become increasingly negative as the limits on voltage are exceeded.

Future Work

- The simulator will be distributed as an open source component of Sandia's QuESt tool.
  - Simulate threats to the grid such as extreme weather.
  - Develop capability to add PV assets from within the simulator.
    - Model different energy storage technologies.