



CEC- CRADA UPDATE AND OTHER DOE- ES DEMONSTRATION PROJECTS

• CRADA – kickoff meeting was held in Sept 2024, funding received in Oct 2024.

• **Tasks:**

1. Due diligence on energy storage technologies.

- Visited RICU (Rapid Integration and Commercialization Unit) at Marine Corps Air Station Miramar in San Diego. Eos, Invinity, Eaton Supercapacitor systems are on the test pad for evaluation. Conducting tests in collaboration with EPRI, Waiting to receive test data for SNL analysis and info.
- Site visit to SMD postponed.
- Visited Indian Energy installation at Viejas microgrid project with energy storage. Several Eos and Invinity batteries were installed but not hooked up yet during the visit time in Sept 2024. Now some of them are hooked up and Indian Energy is gathering system start up and performance info.

2. Analytics support.

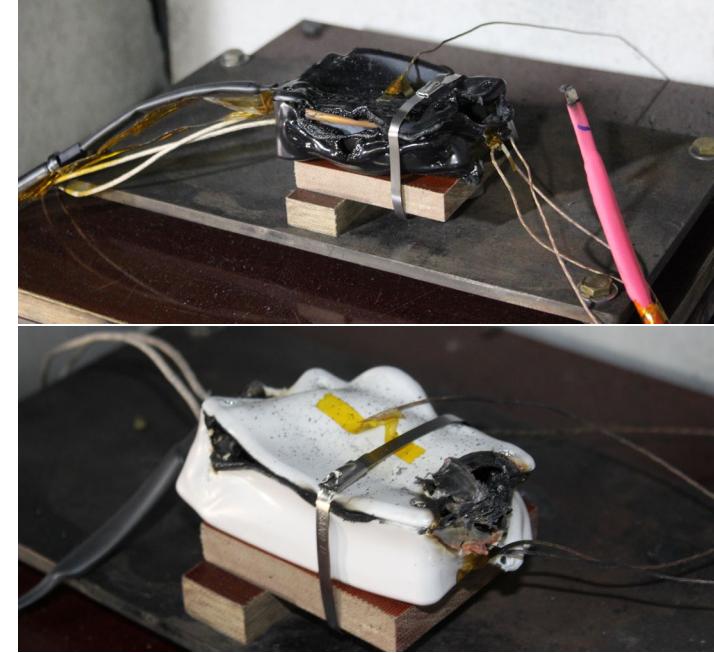
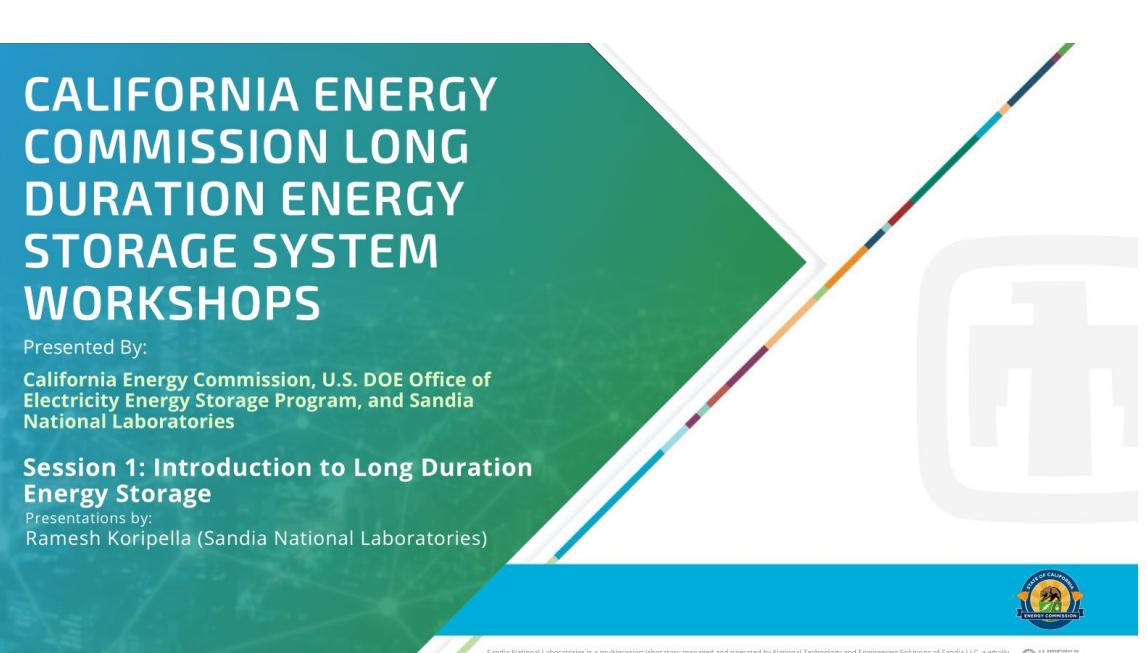
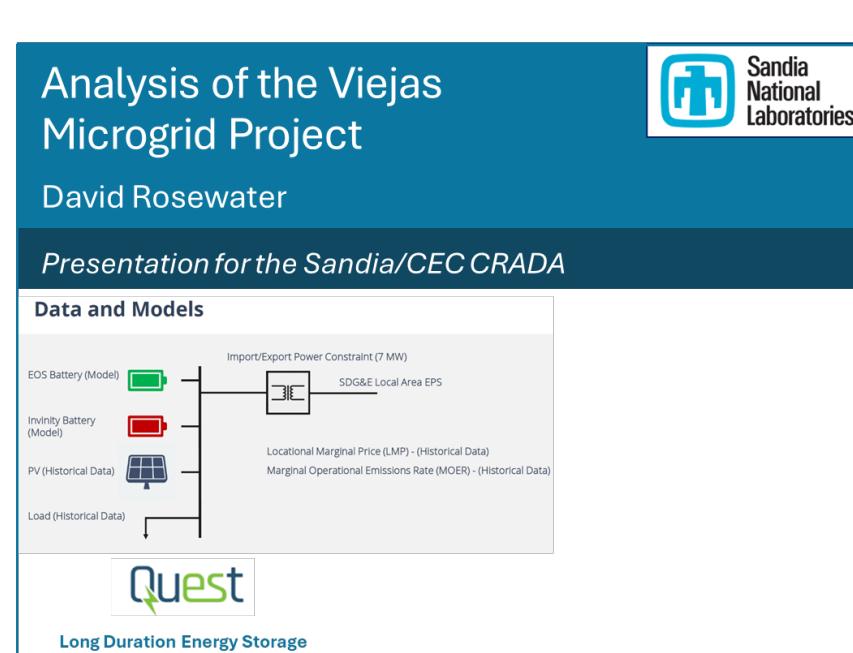
- Technoeconomic analysis support for the VCH (Valley Children's Hospital) project and Ontario Kaiser Hospital installation – Rodrigo Trevizan
- Quest module development and analysis Energy storage installation at Viejas. David Rosewater developed a software module in quEST., supporting CEC and CARB – see David Rosewater poster for details.

3. Energy storage safety.

- Attended CA governors round table on Li ion battery safety following the Moss Landing battery fire incident (Ray Byrne). Working to collaborate more with CEC energy storage safety group. – in progress
- Performing few studies on the impact of flame retardant coating on battery casing, supporting CEC and industrial partner – testing is in progress - see Loraine Torres poster.

4. Workforce development.

- Conducted educational webinars to CEC staff on Energy Storage covering various energy storage technologies, battery safety, energy and storage finance. – the series covering nearly 8 weeks period are well received by CEC staff - Will, Dylan, Ramesh
- Earlier plans to fund a graduate student at UC system did not materialize, continuing discussions.



Site visits to Viejas Microgrid and RICU



Eos, Zn-Br battery trailers



Invinity, V redox flow battery trailers, stacked double deck



Eaton Supercapacitors at RICU



ESS Fe flow battery trailer inside view

Energy Storage Demonstration Projects (DOE)

Supercapacitors for grid scale energy storage and for quick response grid applications.

Capybara Energy

- Demonstration project at Sandia National Labs.
- Aqueous supercapacitor for grid scale application.
- Proprietary electrolyte composition, low cost carbon electrodes, large foot print cells, simplified assembly process.
- Low Energy Density (100-125 Wh/L), but high RTE (~85%), 30+ yr life span, good cycle life.
- Cost competitive, safe.
- Evaluated a 50 Wh capacity (V: 0-50V and I: 0-10A current) 32 cell stack prototype demonstration system at Sandia.
- Targeting grid scale energy storage applications.
- see Capybara poster.



Capacitech Energy

- Demonstration project with the Orlando Utilities Commission's Grid Integration Laboratory at its Gardenia Innovations & Operations Center in Florida.
- Commercial organic supercapacitors are used to design a cable like, flexible form factor package called PowerLink™.
- Each Powerlink is ~4' long, 6"dia, rated 6.4 KW peak power and 8Wh capacity. Contains cell balancing and power management controls. Several of these standard PowerLink modules can be connected in series and/or parallel depending on the application.
- These are designed for short duration rapid response energy storage system applications such as microgrid black start and supply surge current to energize a transformer.
- A cost competitive hybrid power source application consisting of a battery, supercapacitor and a power source - see Capacitech poster.

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