Sandia FY17 Analysis and Controls Efforts

Acknowledgment: this work was supported by the DOE energy storage program under the guidance of Dr. Imre Gyuk.
Energy Storage Analytics

Equitable Regulatory Environment Thrust Area

- **Goals:** Lower barriers to widespread deployment of energy storage by identifying new and existing value streams, quantifying the impact of policy on deployment, and developing new control strategies

- **Objectives:**
  - Project case studies
  - Tools for storage valuation
  - Identify new value streams
  - Control strategies to maximize revenue/grid benefit
  - Assess policy impact on storage
  - Develop policy recommendations
  - Standards activities (PNNL/SNL Energy Storage Protocols)
Demonstration Project Support

- Electric Market Authority (EMA) of Singapore
  - Analysis of peak shaving sizing
- Sterling Municipal Light Department, MA
  - Analysis of ISO-NE revenue streams, 2017 IEEE PES GM paper, two webinars
- Cape & Vineyard, MA
  - Analysis of ISO-NE revenue streams
- Green Mountain Power, VT
  - Analysis of ISO-NE revenue streams
- Los Alamos, NM
  - Analysis of benefits with respect to PNM Tariff
- Taos, NM
  - Preliminary analysis of peak shaving benefits
- Joint Base Andrews
  - Analysis for WGL Energy proposal
- German Secondary Control Reserve (SCR) market analysis
  - Analysis of SCR benefit, paper accepted in 2018 IEEE T&D Conference
- Oahu Energy Storage Study
  - Paper submitted to Journal of Energy Storage
Storage Valuation R&D

- Analysis of MISO market
  - Results presented at the 2017 IEEE PES GM

- Behind the meter applications
  - Results presented at the 2017 EES North America and paper at 2017 IEEE North American Power Symposium (NAPS)

- Revenue optimization with nonlinear energy storage model
  - Poster at peer review

- Open source energy storage valuation, sizing, and placement tool
  - Limited functionality prototype – DOE demonstration later this month
Energy Storage Controls R&D

- BPA damping control project
  - Successful May/June 2017 testing at BPA
  - R&D 100 Award Finalist
  - 2017 Sandia Employee Recognition Award Winner (team category)

- Networked/distributed control of energy storage
  - Power system stability with time delays, presented at the 2017 IEEE North American Power Symposium (NAPS), paper submitted to the American Controls Conference
  - Control of distributed storage, 2017 EESAT paper
  - Optimal control of distributed energy resources (energy storage, PV, micro-turbines, CHP, etc.), stochastic optimization and forecasting

- Energy management systems
  - IEEE Access journal paper