

# APPLYING A VARIETY OF BATTERY CHEMISTRIES FOR ENERGY STORAGE

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More battery chemistries are now being used for energy storage in utility applications. This presentation will cover a variety of applications, including the Department of Energy (DOE) and Public Service of New Mexico (PNM) project that deployed a 1-MW storage system using advanced lead acid and ultra batteries as a storage management system (SMS) for a variety of grid support purposes. These purposes include:

- (1) To mitigate substation overloads and defer major capital expenditures through peak shaving, making an emergency condition manageable within normal procurement and construction time frames;
- (2) For general grid support functions (amps, volts, volt amperes reactive [VARs]);
- (3) To improve customer reliability by serving distribution feeder loads (if a permanent fault “islands” a problematic feeder where the battery has been applied; and
- (4) To study the storage of and ability to dispatch energy collected from intermittent sources (wind, solar, etc.).

This paper will focus on the PNM installation using the ultra battery, but will also cover additional grid scale (>1 MW) storage projects that are being installed using lithium-ion, sodium-nickel, and sodium-sulfur batteries.

## BIOGRAPHICAL NOTE



**Conference presenter:** Bradford P. (Brad) Roberts, S&C Electric Company, Power Quality Systems Division Director.

Brad Roberts is the Power Quality Systems Director for the Power Quality Products Division of S&C Electric Company, which specializes in low- and medium-voltage power protection systems.

Mr. Roberts has over 35 years experience in the design and operation of critical power systems, ranging from single-phase uninterruptible power supply (UPS) systems to medium-voltage applications. He began his engineering work as a systems reliability engineer in the Apollo Lunar Module Program at Cape Kennedy. He held senior management positions in two of the major UPS manufacturers during his career. He is a senior member of the Institute of Electrical and Electronics Engineers (IEEE) and has published over 40 technical papers and journal articles on critical power system design and energy storage technology.

Mr. Roberts is a registered professional engineer and has a B.S. in Electrical Engineering from the University of Florida. He is past chairman of the IEEE Power Engineering Society’s Emerging Technologies Committee and Executive Director of the Electricity Storage Association (ESA) and past chairman of the board. He has been a member of the ESA Board for 10 years. Mr. Roberts is a member of the U.S. Department of Energy Electricity Advisory Committee and Chairman of the Energy Storage Subcommittee.

Mr. Roberts is the 2004 recipient of the John Mungenast International Power Quality Award.

Troy Miller is a Business Development Manager in the Power Quality Products Division at S&C Electric Company. He has over 21 years of experience in the power engineering industry, including at Magnetek, Jefferson Electric, and ABB Inc.. Mr. Miller has a vast history in the application and implementation of all aspects of power electronics and power quality. Mr. Miller is a speaker at industry events for new product introductions and economic benefit analysis. He is currently responsible for power quality activities for S&C Electric, including Energy Storage, VAR compensation, and Uninterruptible Power Systems.

Mr. Miller received his B.S. in Electrical Engineering from the Milwaukee School of Engineering in 1993.

