DOE Peer Review – Energy Storage

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The Need

National Drivers

- Telecom & Electric Utilities have been identified as critical infrastructure
- This infrastructure is vulnerable to natural and / or man-made disasters
- National Security & Electronic Banking are dependent upon telecom

Industry Drivers

- Growing wireless dependence - “No Landline” Homes, Mobile Workforce
- Most telecom sites depend solely upon a constrained number of lead acid batteries for backup power which can experience performance issues that compromise reliability
- Industry spends $650M annually for battery replacement

Corporate Drivers

- Customer expects & market demands uninterrupted telecom service
- Sprint is known for its “walkie-talkie” service (widely used by emergency first responders), Internet backbone, and as a provider of corporate networks
- Sprint is committed to a high standard of environmental performance in all decisions (sponsor of DOE Solar Decathlon)
- Total life cycle costs drive technology deployment decisions which impact shareholders

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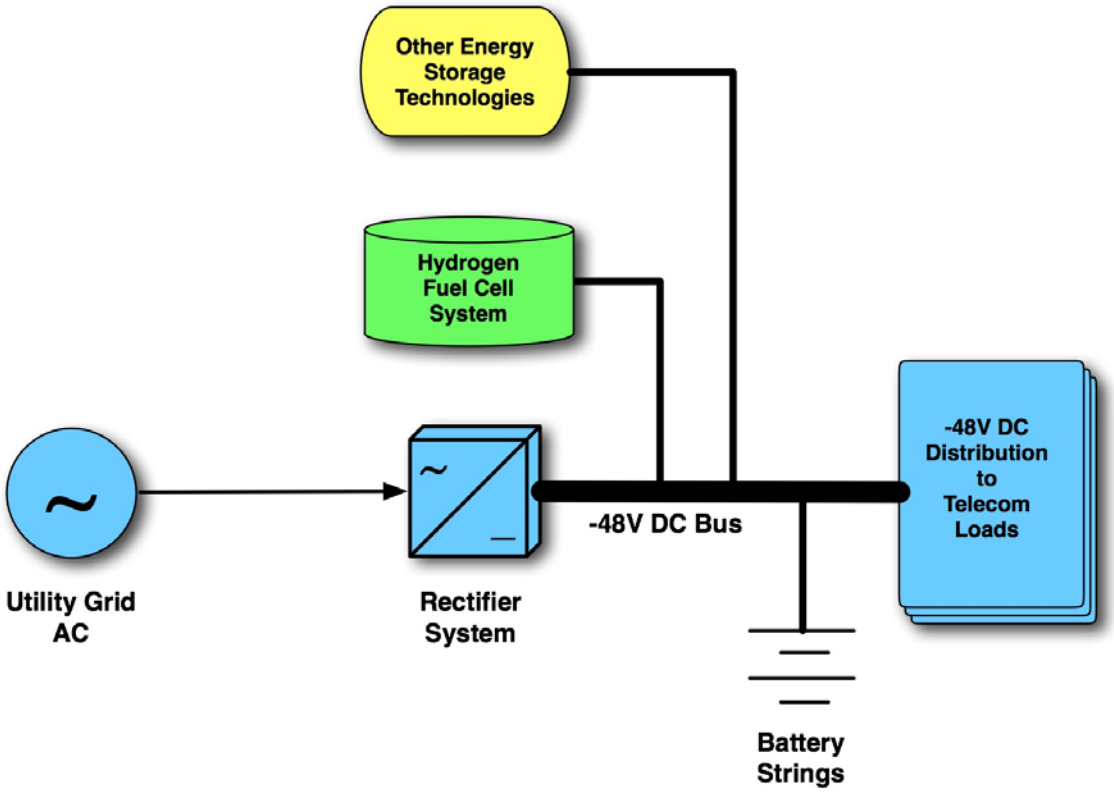
Typical -48vDC Telecom Schematic



Sprint

Together with NEXTEL

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The Requirements

Technical
- > Most applications are -48vDC, 24vDC; some AC applications
- > Focus on wireless cell site DC loads ranging from 3KW to 30KW
- > Also evaluating solutions for 200KW (POPs) and MW (Switch site) loads

Operational
- > Sites designated as “Critical” may require days of unattended operation
- > Some applications have size, weight and / or temperature constraints

Financial
- > Sprint has thousands of sites where new energy storage solutions could be applicable
- > While initial costs are a factor, total life cycle costs are most important

Environmental
- > Sprint is a big proponent of recycling and environmental performance, so improvements in this area are important

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The Project

Goal

- Determine which energy storage technologies offer the greatest match to the technical, operational, financial and environmental requirements

Time Line

- Conclusions to be reached by August 2008

Next Steps

- Identify potential technology solutions (see next slide)
- Create test plan for each
- Collect and evaluate lab test data against requirements
- Downselect from list, field test and evaluate field data against requirements

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Technologies Being Evaluated (Preliminary)

Batteries

- Valve Regulated Lead Acid (VRLA)
- Lithium Metal Polymer (LMP)
- Lithium Ion
- Nickel Cadmium (NiCad)
- Vanadium Redux

Fuel Cells

- Hydrogen Proton Exchange Membrane (PEM)
- Zinc Bromide
- Fuel Cells in Conjunction with Hydrogen Reformers
  - Various Fuel Types
  - Various Fuel Mixtures

Super / Ultra Capacitors

Flywheel

Other Technologies, As Yet Undefined