

STORAGE WEEK

3 Connected Meetings Covering Opportunities in the Fundamental Reshaping of the Power Industry via Energy Storage

July 13-16, 2009

San Diego Marriott La Jolla, La Jolla, CA



National Alliance for
Advanced Transportation Batteries

Monday-Tuesday, July 13-14

STORAGE SUMMIT: POLICIES, MARKET DESIGN AND BUSINESS MODELS

Monday, July 13

8-8:15

Chairman's Introduction

Kenneth S. Culotta, Partner, KING & SPALDING LLP

8:15-8:45

Keynote Address

R. James Woolsey, Venture Partner and Senior Advisor, VANTAGEPOINT VENTURE PARTNERS; *Annenberg Distinguished Visiting Fellow*, HOOVER INSTITUTE AT STANFORD UNIVERSITY; *Senior Executive Advisor*, BOOZ ALLEN HAMILTON; *Former Director*, CENTRAL INTELLIGENCE AGENCY

Session I: Regulatory Initiatives and Market Design

8:45-10:00

Panel Discussion:

Bringing Energy Storage to the Power Grid

- The role of storage in helping to meet RPS goals, and status of the two federal RPS bills
- Storage vis-à-vis efficiency from a system-wide and timing perspective; can off-peak storage be monetized for system-wide efficiency benefits?
- Should storage be rate-based for its contributions to load-level, carbon reduction, demand response and grid reliability?
- The role of storage in Smart Grid deployment, islanding and microgrids (and vice-versa)
- Policies and incentives for bulk storage (CAES and pumped hydro) as distinct from distributed storage
- Storage conceptualized as generation rather than transmission

Moderator:

Dave Marchese, Vice President, HADDINGTON VENTURES, L.L.C.

Panelists:

Ed Czalet, *Vice President/CoFounder*, MEGAWATT STORAGE FARMS, INC.; *Founder*, APX, Inc.

Bob Lane, *Manager - Corporate Regulatory Policy*, SEMPRA ENERGY

Brad Roberts, *Executive Director*, ELECTRICITY STORAGE ASSOCIATION

10:00-10:30 *Networking Break*

10:30-11:30 *Panel Discussion:*

State Regulatory Policy

- Exploring the system-wide benefits of storage
- Enabling role for meeting renewables standards
- Should investments in storage by IOUs be rate-based?
- How can power markets be better structured to monetize storage services?

Moderator:

Michael Oldak, *Senior Director, State Competitive & Regulatory Policies*, EDISON ELECTRIC INSTITUTE

Panelists:

Brett A. Perlman, *Vice President, Strategy and Development*, ATREIDES CAPITAL LLC; *Former Commissioner*, PUBLIC UTILITY COMMISSION OF TEXAS

Andrew Campbell, *Advisor*, CALIFORNIA PUBLIC UTILITIES COMMISSION

David Lott Hardy, *Chairman*, INDIANA UTILITY REGULATORY COMMISSION

11:30-1:00 *GROUP LUNCHEON*

LUNCHEON ADDRESS:

Hermann Scheer, *Member*, GERMAN PARLIAMENT; *Chair*, THE INTERNATIONAL PARLIAMENTARY FORUM FOR RENEWABLE ENERGIES.

1:00-2:00 *Panel Discussion:*

Revising Regional Market Designs to Facilitate Storage: System Operators Views

- Benefits of storage for grid efficiency, reliability and security
- How storage is currently valued for different niches in the regional market
- How to quantify the value of improved transmission and generation efficiency derived from storage charging off-peak
- At what level does a storage facility warrant its own node?
- The inapplicability of traditional resource planning models to storage
- Impacts on operating priorities: what are we trying to optimize? Least cost or GHG reductions or reliability?

Moderator:

David G. Tewksbury, *Partner*, KING & SPALDING LLP

PANELISTS:

Todd Hillman, *Executive Director, Strategic Business Development*, MIDWEST ISO

Shaun Johnson, *Manager – Energy Market Products*, NEW YORK ISO

Don Tench, *Director, Market Evolution*, INDEPENDENT ELECTRICITY SYSTEM OPERATOR (IESO)

2:00-2:30 *Networking Break*

SESSION II: STORAGE USERS' AND VENDORS' PERSPECTIVES

2:30-3:30 *Panel Discussion:*

UTILITY PERSPECTIVES ON IMPLEMENTING ENERGY STORAGE

- Experience to date with storage pilot projects

- What utilities are looking for in storage performance, technology risk and price:
- For load-level applications
- For demand-response
- For ancillary services
- For substation asset deferral
- How important is the capitalization and likely longevity of storage suppliers?
- Will utilities sign PPA-equivalents from possible IPP/merchant storage developers? If so what might they look like?
- How does storage cost for renewables firming compare to the cost of spinning reserve?

Moderator:

Kenneth S. Culotta, *Partner*, KING & SPALDING LLP

Panelists:

Michael Matheson, *Senior Engineer, Generation Strategies*,
NEBRASKA PUBLIC POWER DISTRICT

Ali Nourai, *Distributed Energy Resources*, AMERICAN ELECTRIC POWER (AEP)

Anuja Ratnayake, *Manager, Strategic Initiatives*, DUKE ENERGY

Jeffrey Reed, *Director, Market Development & Emerging Technology*,
SAN DIEGO GAS & ELECTRIC

3:30-4:30

Panel Discussion:

Storage Suppliers Respond: What Policy and Market Change Are Needed to Stimulate a Robust Storage Market?

- How do vendors see the impact of the Stimulus bill and inclusion of storage in a Federal RPS?
- How do vendors see the overall market potential?
- What are the biggest obstacles they find in commercializing their solutions?
- Where do they see the price points to meet for various applications?
- What further market regulatory changes are wished for?

Moderator:

Peter Mostow, *Partner*, WILSON, SONSINI GOODRICH & ROSATI

Panelists:

Bill Capp, *Chief Executive Officer*, BEACON POWER

Terry Copeland, Ph.D., *President/Chief Executive Officer* ALTAIRNANO

Ric Fulop, *Founder and Vice President Marketing/Business Development*
A123 SYSTEMS

Chris Hickman, *Senior Vice President, Utility Solutions*, ICE ENERGY

Ben Rogers, *President and Chief Operating Officer*,
GRID STORAGE TECHNOLOGIES LLC

5:00-6:00

**Networking Reception Hosted By
Haddington Ventures, L.L.C.**



STORAGE SUMMIT, DAY TWO

TUESDAY, JULY 14

SESSION III: FINANCING STORAGE PROJECTS AND COMPANIES

8:00-8:30

Plenary Presentation:

The Federal Energy Storage Initiative and ARRA Stimulus Funding

A review of DOE Energy Storage work with utilities and state energy agencies:

- Future DOE research directions
- Prospects for Stimulus funding by the states
- Outline of ARRA funding for DOE Energy Storage demonstrations within the Smart Grid framework

Presenter:

DR. IMRE GYUK, *Program Manager, Energy Storage Research*,
U.S. DEPARTMENT OF ENERGY

8:30-9:00 *Plenary Presentation:*

Financing Storage Projects after the Stimulus

Renewable energy-related markets are heavily influenced by government policy, and even small changes in policy can make winners and losers. This presentation will address what sort of help the federal government is providing the energy storage business and how to tap into it, and what "pivot points" are possible in the foreseeable future in the market.

Presenter:

John J. Marciano III, *Associate*, CHADBOURNE & PARKE LLP

TRACK ONE:

GRID-SCALE STORAGE BUSINESS MODELS AND FINANCE (>20MW)

9:00-9:15 *Chairman's Introduction*

Kenneth S. Culotta, *Partner*, KING & SPALDING LLP

9:15-10:15 *Panel Discussion:*

Developing New Large Scale Storage: What Will It Take?

- How has the economic downturn and the credit crisis changed the likely sources of construction stage equity financing for new projects?
- Are the infrastructure funds interested and ready to provide capital to energy storage projects?
- Where can developers turn to find debt financing for their projects?
- What role can the capital markets play in the coming twelve months?
- Revisiting the natural gas storage analogy and economics of energy arbitrage, update on announced compressed air projects
- A new wave of pumped hydro?
- Lender views of technology risk for energy storage project development and valuation
- Impact of ARRA Stimulus money for large storage projects

Moderator:

Kenneth S. Culotta, *Partner*, KING & SPALDING LLP

Panelists:

Stephen Byrd, *Chief Executive Officer*, ENERGY STORAGE AND POWER, LLC

Peter Donalek, *Power System Studies – Manager*, MWH

Jim Heid, *Vice President Global Business Solutions*, DRESSER-RAND

Kim L. Johnson, *Executive Vice President, Commercial*,
SYMBIOTICS LLC

Dave Marchese, *Vice President*, HADDINGTON VENTURES, L.L.C.

10:15-10:45 *Presentation:*

The Comparative Value of Grid-scale Energy Storage Assets

The presentation will compare four popular grid-scale energy storage assets (flywheel, CAES, hydro and battery) based on the incremental contribution (measured in \$/MW equivalent) in the PJM market. The presentation tries to

answer the basic question of what grid-scale energy technology currently has the best marginal return and what are the main drivers of the comparative value.

Presenter:

Ruben Moreno, *Senior Director*, R.W. BECK, INC.

10:45-11:00 *Networking Break*

11:00-11:30 *Presentation:*

General Compression

The General Compression Advanced Energy Storage (GCAES) system is designed to make intermittent windfarms as reliable and dispatchable as conventional generators. The system features a modular 1.5 MW near-isothermal hydraulic compressor/expander enabling 20 to 1,000 MW, 8 to 300 hour, compressed air energy storage projects with no fuel requirement when generating power.

Presenter:

David Marcus, *Chairman and Founder*, GENERAL COMPRESSION

11:30-12:00 *Presentation:*

Valuation Drivers For Large Scale Energy Storage Projects

The value proposition for large scale energy storage is very much a function of the market and location where the facility is placed into service. Increases in wind generation resources, as an example, create integration issues in markets such as ERCOT, WECC and MISO that can be mitigated with large scale energy storage. The presentation will discuss key valuation drivers, and the interplay of these drivers associated with large scale energy storage including:

- Arbitrating energy prices
- Providing ancillary services
- Firming of capacity
- Optimization of infrastructure requirements

Presenter:

Mark Griffith, *Managing Director*, BLACK & VEATCH CORPORATION

12:00-1:30 *Group Luncheon*

1:30-2:30 *Panel Discussion:*

How Will Bulk Storage Projects Be Financed? Debt and Equity Perspectives

- How will the relative percentage of debt vs. equity, and terms, be affected by the DOE loan guarantees for large projects
- CAES versus pumped hydro: comparative costs and timing for ROI
- Can Investor-Owned Utilities access loan guarantees for large storage? Will they be interested in PPAs or build/transfer agreements?
- Locational trade-offs for bulk storage projects
- Perceptions of risk factors: technical, siting, permitting, operational

Moderator:

Chuck Zabriskie, *Principal*, ACQUEST ADVISORS LLC

Panelists:

Michael Casey, *Managing Director*, Power & Utilities and Alternative Energy, ROYAL BANK OF CANADA CAPITAL MARKETS

Jeremy Dockter, *President*, THE KINETIC GROUP

Scott Gardner, *Managing Director*, US RENEWABLES GROUP

Stuart J. Murray, *Director Infrastructure & Energy Finance*, CITIBANK

Raymond Wood, *Managing Director*, CREDIT SUISSE

- 2:30-3:00 *Presentation:*
An Introduction to Siting and Technical Factors in Compressed Air Energy Storage Projects
This presentation will offer a background on the different technical and geological considerations involved in creating underground compressed air projects, spanning four different types of reservoirs from recent consulting work: salt cavities, excavated mines (Norton Project), aquifer structures (Iowa Stored Energy Park), and depleted gas fields (Gaiaelectric). Mr. King will also explore how the different geological constraints translate into risk factors from an investment perspective, and mitigation strategies for such risks.
Presenter:
Michael King, *Principal*, THE HYDRODYNAMICS GROUP
- 3:00-3:30 *Networking Break*
- 3:30-4:00 **Linking Environmental Considerations into Energy Project Development: Save Years and Millions**
By considering environmental constraints in the earliest phases of project development, energy developers are streamlining their permitting requirements by years, saving millions of dollars. Even before the project concepts have been finalized, incorporating environmental considerations into project planning can streamline all phases of project development. Proactive permitting considerations to be discussed include:
- Describing and sequencing project development to streamline permitting
 - Anticipating and addressing critical path permits
 - Hot button environmental permitting issues affecting energy developers
 - Take the lead identifying your lead agency
- Presenter:*
Tisha Schuller, *Vice President*, TETRA TECH
- 4:00-5:00 *Presentations and Panel Discussion:*
Pumped Storage Today and Tomorrow
- Traditional model of long term demand side planning coincident with long term supply and transmission planning has been changed. The industry's 80-100 years of experience is less applicable going forward.
 - Individual state RPS policies, in the absence of a clear and consistent federal policy has yielded an energy only policy.
 - The emergence of variable generation technologies has evolved in the absence of transmission planning along with the absence of energy storage and capacity planning.
 - Compare Denmark's experience of significant wind penetration and strong interconnects with Norway and Germany with California experience – and what is their price for electricity to make that work?
- Panelists:*
Rick Miller, *Senior Vice President, Hydropower Services*, HDR|DTA
President, NATIONAL HYDROPOWER ASSOCIATION
Gil Tam, *Principal Consultant*, ELECTRIC POWER GROUP, LLC (Eagle Mountain Pumped Hydro)
David Kates, *Director*, THE NEVADA HYDRO COMPANY (LEAPS – LAKE ELSINORE PUMPED STORAGE)

TRACK TWO:

GRID-CONNECTED MARKETS AND SOLUTIONS (<20MW)

Track Chair:

Dan Rastler, *Program Manager*, ELECTRIC POWER RESEARCH INSTITUTE

9:00-9:15

Presentation:

17 Electric Utility-related Energy Storage Benefits

This presentation includes high level characterizations of potential benefits from energy storage used for electric utility-related applications. Also discussed is the concept of combining applications/benefits into value propositions including use of distributed and/or modular energy storage.

Presenter:

Jim Eyer, *Senior Analyst*, DISTRIBUTED UTILITY ASSOCIATES

9:15-9:30

Presentation:

"Free Storage" - Is Ice the Key to Exploiting Wind Power?

Many industry veterans miss the connection between wind power, thermal storage for air conditioning and demand response. This talk outlines the use of hot water and ice as the missing battery for intermittent renewable energy sources, such as wind power. Thermal storage systems are almost always "free," paying for themselves by reducing utility bills, while simultaneously enabling utilities to use wind power.

Presenter:

Elton Sherwin, *Senior Managing Director*, RIDGEWOOD CAPITAL

9:30-9:45

Case Study 1:

Lead Acid Storage Facility (1.2MW)

In 1996, GNB Industrial Power in collaboration with GE, DOE and Sandia, designed and installed a 1MW/1.4MWh Battery Energy Storage System at the Alaskan facilities of Metlakatla Power and Light. The purpose of this installation was to stabilize the island community's power grid, and to demonstrate the viability and economic justification for a lead acid battery in a large energy storage application. The operational history of the BESS installation over the past 12 years will be summarized.

Presenter:

Mike Berger, *Director of Engineering*, North American Industrial Product, EXIDE TECHNOLOGIES

10:00-10:30

Networking Break

10:30-11:00

Case Study 2

ALTAIR NANO'S 1MW FREQUENCY REGULATION COMMERCIAL DEPLOYMENT

In November of 2008 independent power producer AES launched its one megawatt (MW), 250 kilowatt-hour battery storage system, selling grid regulation services into the PJM market region. The installation used Altair Nano's Lithium-Titanate batteries to provide grid regulation services, and followed on the heels of an earlier one megawatt test project in Indiana. The unit is now available for commercial operation as a qualified market participant for regulation service by AES Energy Storage.

Presenter:

Chet Sandberg, *Chief Applications Engineer*, ALTAIR NANOTECHNOLOGIES

11:-00-11:30

Presentation:

Economic Valuation of Utility-scale Distributed Energy Storage

This presentation will address the economics of three storage applications with high value potential when the combined value elements can be accrued to the owner: T&D upgrade deferral, regulation control, wind generation and distribution. The presentation will summarize market and "SmartGrid" conditions

associated with these applications for a generic energy storage technology and describe a lifecycle cost analysis methodology to quantify costs and benefits. Results will be presented in terms of net present value (NPV) for representative case studies in each category.

Presenter: Dan Mears, President, TECHNOLOGY INSIGHTS

11:30-12:00 *Case Study 3:*

Assessing Storage Options for Tehachapi II Wind Farm

As far back as 1992 Mr. Romanowitz pioneered a 2.88MW, 17,280 KWH battery storage project integrated with wind to meet Firm Capacity PPAs. Mr. Romanowitz is currently managing the Tehachapi Wind Expansion and related transmission projects. In that capacity, he has been studying the different storage solutions currently available to determine the best fit. In this presentation Mr. Romanowitz will discuss the pros and cons of different storage products and methods, providing representative insight into the needs and concerns of large wind farm developers.

Presenter:

Hal Romanowitz, President & Chief Operating Officer,
OAK CREEK ENERGY SYSTEMS

12:00-1:30 *Group Luncheon*

1:30-2:30 *Panel Discussion:*

Renewable Energy Developer Perspectives on Energy Storage

Storage can help renewable energy resources overcome some current issues. First, island grids that do not have significant system inertia cannot accept high penetrations of wind without some type of balancing technology—storage can and has been proven to be useful here. Secondly, the economics of some renewable energy projects is sub-optimal due to transmission issues. Large scale energy storage technologies could provide some of these installations with flexibility to improve their project economics. Finally, energy storage will be useful to provide time-shifting of these resources.

- Experience to date with storage pilots
- What are wind and solar developers looking for in storage capability, technology risk and price?

Panelists:

Joe Borkowski, Development Manager, E.ON RENEWABLES

Michael King, Principal, THE HYDRODYNAMICS GROUP

Kim Smith, Vice President Construction and O&M Services,
ACCIONA ENERGY NORTH AMERICA

2:30-3:00 *Presentation:*

Critical Factors for Developing Economically Viable Electricity Storage Projects

This presentation will draw on insights from studies conducted over the past 5 years evaluating different electricity storage technologies in competitive markets. It will provide an overview of competitive electricity markets and recent policy changes implemented in various ISO/ RTO markets to remove barriers for electricity storage participation. The presentation will cover various factors that need to be considered by investors / project developers / technology providers to ensure the commercial viability of electricity storage projects. These factors include:

- Storage design, performance & capabilities
- Market design and rules
- Financing
- Other factors

The presentation will cover these factors independent of specific technologies, but will draw on examples of advanced batteries, flywheel and CAES to illustrate the importance of some of these factors.

Presenter:

Rahul Walawalkar, *Senior Energy Consultant*, CUSTOMIZED ENERGY SOLUTIONS (CES)

3:00-3:30 *Networking Break*

3:30-4:30 *Panel Discussion:*

INTEGRATING DISTRIBUTED RESOURCES: DEMAND RESPONSE, ELECTRIC AND THERMAL STORAGE, ELECTRIC VEHICLES

Currently ESCOs, demand response providers, and smart grid tech vendors are carving out “third party” spaces between the utility and the end energy customer. Vehicle and distributed storage (whether electric or thermal) further thickens the soup. This panel will provide a cross-section of R&D, smart grid and investor perspectives on the evolving business and technology environment into which storage will be incorporated.

Moderator:

Buz Barclay, *Partner*, DICKSTEIN SHAPIRO LLP

Panelists:

Elliot Boardman, *Executive Director*, PEAK LOAD MANAGEMENT ALLIANCE

Richard Drake, *Program Manager*, *Transportation & Power Systems R&D*, NYSERDA

John L. Petersen, *Partner*, FEFER PETERSEN & CIE

Jeff Tolnar, *Chief Technology Officer*, BPL GLOBAL

Bill Vogel, *Founder*, *Senior Vice President Strategic Development*, TRILLIANT INC.

4:30-5:00 **Compressed Air Energy Storage (“CAES”) and Its Roles in Distributed Generation and the Smart Grid**

Second generation compressed air energy storage (“CAES2”) provides load management and ancillary services for “smart grids” with unit capacities ranging from 2-3 MW to 15-20 MW. They provide ~70% of a unit’s capacity with practically instant load fluctuations and synchronous reserve functions. These units consist of standard components - combustion turbine, compressors and expanders with the compressed air storage in the piping/pressure vessels i.e. without any restrictions to unit locations.

Presenter:

Royal Daniel, *Chief Executive Officer*, ENERGY STORAGE AND POWER

5:00-6:00 **Networking Reception**
Hosted by A123 Systems



6:00PM Day Two Adjourns, Summit Ends

Day Three: Energy Storage Technology and Investment Outlook_

Welcome from the Chairman:

Brad Roberts, Executive Director, ELECTRICITY STORAGE ASSOCIATION (ESA)

Session I: DOE and ARRA Stimulus Funding

8-8:30

Presentation:

Progress in Energy Storage Applications and Technologies

- A review of energy storage technologies and application areas
- Progress in application of fast storage to frequency regulation
- Storage for peak shaving and reliability
- The growing argument for storage as a complement to renewables
- Renewed interest in CAES

Presenter:

Dr. Imre Gyuk, Program Manager, Energy Storage Research,
U.S. DEPT. OF ENERGY

8:30-8:45

Presentation:

A Call for 10MW of Storage from UC San Diego

One of the biggest and most advanced research universities in the U.S., UC San Diego is working toward a world-class sustainable energy infrastructure. The university aims to produce 7.4 MW in green energy from on-site photovoltaic, biogas fuel cells and wind energy procurement, as well as move toward hybrid and electric vehicles. Future projects include energy storage systems that adjust to the intermittency of renewable energy and provide permanent load-shifting. Mr. Washom will provide details on a forthcoming RFP for 10 megawatts of energy storage.

Presenter:

Byron Washom, Director, Strategic Energy Initiatives,
UNIVERSITY OF CALIFORNIA, SAN DIEGO

9:15-9:45

Presentation:

Overview of the Grid-scale Energy Storage Market

- Segments
- Dollar values
- Angles of attack (example companies targeting specific segments)

Presenter:

Dan Cline, Analyst, LUX RESEARCH

9:45-10:15

Networking Break

10:15-11:45

Panel Discussion:

Who's Doing What and Where the Money Is Going

The interest in energy storage tech continues to grow, and VCs are making their bets on companies and market opportunities. Figuring out who the winners are most likely to be requires knowledge and understanding of not only the technology but also the competitive environment now, the emerging smart grid environment, and where the power and transportation industries are headed. Opportunities exist not just in batteries per se, but in battery components, control systems and full customer solutions, including service, innovative third party business models and long-term deployment.

Moderator:

Richard Baxter, Principal, CRA INTERNATIONAL

Panelists:

Mark Townsend Cox, *Chief Executive Officer*, NEW ENERGY FUND LP
Keith Gillard, *Principal*, BASF VENTURE CAPITAL AMERICA INC.
John L. Petersen, *Partner*, FEFER PETERSEN & CIE
David H. Wells, *Partner*, KLEINER PERKINS CAULFIELD & BYER
Marianne Wu, *Partner*, MOHR DAVIDOW VENTURES

11:45-1:15 *Group Luncheon*

TRACK ONE:
STORAGE TECHNOLOGY SURVEYS

1:15-1:30 *Track Chair:*
Dan Rastler, *Program Manager*, ELECTRIC POWER RESEARCH INSTITUTE

1:30-2:00 *Presentation:*
Advances in Lead Acid Chemistries and Components
While Lithium Ion is the darling of venture capital investment at the moment, Lead Acid should not be counted out, as it is still much cheaper for many stationary and mobile applications. The batteries in power-assist hybrid electric vehicles (HEVs) are required to operate from a partial-state-of-charge baseline and to provide, and accept, charge, for short periods, at very high rates. Under this regime conventional lead-acid batteries accumulate lead sulfate on the negative plate and fail quickly. This failure mode can be effectively countered by the inclusion of certain forms of carbon at greater concentrations than have been used in lead-acid batteries in the past. So effective is this preventive measure that VRLA batteries benefiting from the inclusion of such carbon have been able to substitute for nickel metal hydride batteries in power-assist HEVs with no significant loss of performance.
Presenter:
Dr. Patrick T. Moseley, *President*, ADVANCED LEAD-ACID BATTERY CONSORTIUM;
Manager, Electrochemistry, INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION

2:00-2:30 *Presentation:*
Horizons in Lithium Ion Development
Transformational advances well beyond today's technologies are needed to satisfy the needs of high-mileage hybrid and all-electric vehicles as well as stationary storage applications. The near-term future in the transportation area will be dominated by Li-ion batteries. Fundamental and applied research is underway to develop more robust, safer, higher energy density, and more powerful Li-ion batteries, and to explore potential materials beyond lithium to enable revolutionary breakthroughs needed for a secure energy future. To respond to this challenge, new nanostructured and multifunctional materials will be developed to increase energy capacity and power densities and encompass basic materials research to prototype device development with the transfer of its intellectual property to industrial manufacturers at each step along the way.
Presenter:
Mark Peters, *Deputy Associate Laboratory Director*, ARGONNE NATIONAL LABORATORY

2:30-3:00 *Networking Break*

3:00-3:30 *Presentation:*
Scaling Lithium Battery Development from Cell to Pack

There are two complementary halves that define a good battery. The first is the fundamental materials and cell developments (as outlined in Dr. Peters talk) that define the battery capabilities and performance characteristics. The second aspect (the focus of this talk) extends the strong fundamental cell technology to build a battery suitable for the demands of automotive and stationary applications. This talk surveys the lessons, challenges and directions being undertaken for good cell packaging design, strategic manufacturing/shipping, control optimization, thermal control, battery module and battery pack design. These global developments focus on optimizing the battery pack for the rigors of variable environment, harsh performance and 10-year design life.

Presenter:

Sankar DasGupta, *Chief Executive Officer*, ELECTROVAYA

3:30-4:00

Presentation:

UltraCapacitors Review

Ultracapacitors have the ability to discharge very large quantities of power in short bursts. They are valuable both for certain kinds of short-duration ancillary services to the grid, as well as an augment for lead acid and lithium ion auto batteries. Much activity is taking place in ultracapacitor research, and this review will highlight technologies, components and chemistries that may have major market impacts within the next 2-3 years.

Presenter:

John Miller, *President*, JME INC.

4:00-4:30

Presentation:

MW-Scale Storage Solutions Deployed as kW-Scale Systems

RedFlow Technologies now has Zn-Br electricity storage systems installed in utility trials in rural locations in Australia. Positioned at the customer's meter, clusters of these units are successfully working together to manage peak loads on the network. This approach maximises the value of energy storage to utilities while minimising risk. Individual systems have capacities of up to 30 kWh, and are readily installed and integrated with solar PV. RedFlow is now preparing to expand its manufacturing plant for increased production in 2010 and utility trials in USA.

Presenter:

Chris Winter, *Chief Executive Officer*, REDFLOW TECHNOLOGIES LTD

TRACK TWO:

STORAGE PRODUCT PRESENTATIONS

1:15-1:45

A123 Systems

Presenter:

Ric Fulop, *Vice President, Marketing*, A123 SYSTEMS

1:45-2:05

Grid Storage Technologies (GST Zinc/Air Battery)

Presenter:

Michael Oster, *Chief Executive Officer*, GRID STORAGE TECHNOLOGIES

2:05-2:25

EnerSys

Presenter:

Steve Vechy, *Director of Marketing, UPS/Utility*, ENERSYS

2:30-2:55

Exide Technologies

Presenter:

Mike Berger, *Director of Engineering, North American Industrial Product,*
EXIDE TECHNOLOGIES

2:55-3:15 **Austin Energy: A Dispatchable Wind/Solar Power System
Using Dual-Mode Energy Storage**

Presenter:

Mark Kapner, *Senior Strategy Engineer, AUSTIN ENERGY*

3:15-3:35 **Prudent Energy**

Presenter:

Tim Hennessy, *President, PRUDENT ENERGY*

3:35-3:55 **ZBB Energy**

Presenter:

Christopher Kuhl, *Sales Applications Engineer, ZBB ENERGY*

3:55-4:15 **Adiabatic Small CAES (3 to 30 MW/hrs)**

Presenter:

Septimus van der Linden, *Principal, BRULIN ASSOCIATES*

4:15-4:35 **Expansion Energy LLC**

Presenter:

David Vandor, *Managing Director, EXPANSION ENERGY LLC*

5:00 Day Three Adjourns

DAY FOUR: STORAGE AT THE 'EDGE': OPPORTUNITIES ON THE CUSTOMER SIDE OF THE METER

9:00-9:15 **Chairman's Introductory Remarks**

Dan Rastler, *Program Manager, ELECTRIC POWER RESEARCH INSTITUTE (EPRI)*

9:15-10:00 *Presentation:*

Value Propositions of Customer-Sided Energy Storage

Advanced storage technologies are emerging into the marketplace just as the electricity industry is in the midst of major transitions into Smart Grids, electric vehicles, and increased Renewable Portfolio standards. Storage technologies have been proposed as an effective tool for the future utility grid. However, to date, the proposed applications have been targeted toward utility-scale applications. Advanced storage technologies have essentially the same characteristics at 20 KW that they have at 20 MW. Hence, this presentation will examine the value propositions and economics of smaller, customer-sided energy storage applications. This presentation will discuss new applications that are being proposed, such as "community storage," customer-sided storage as a component of smart grids, solar-storage applications and how electric vehicles may serve as a tool on the grid and not just an additional load.

Presenter:

Richard Fioravanti, *Director, Storage Applications and Support, KEMA, Inc.*

10:00-10:30 *Presentation:*

A Compelling Value Proposition for Distributed Grid-Connected Storage

- An overview of the distributed, grid-connected storage market, including its main drivers
- An understanding of the potential grid-scale impacts of distributed energy storage
- An understanding of the value proposition for customer sited storage, including tangible analyses of the value of storage as a stand-alone entity and as integrated with distributed renewable resources. The presentation will also address the key drivers that impact the value of storage, and will show the impact of many of these drivers including different tariff structures, different load shapes, and different incentives, including the ITC
- A high-level view of policy developments in CA and the need for and impact of appropriate state level and federal tax incentives and policy intervention going forward
- A clear understanding of what is required to accelerate the adoption of energy storage in CA and the US

Presenter:

Janice Lin, *Managing Partner*, STRATEGEN CONSULTING LLC;
Director, THE CALIFORNIA ENERGY STORAGE ALLIANCE

10:30-11:00 *Networking Break*

11:00-12:00 *Presentation:*

Integrating Storage into 'Edge' Services in the Home, Business and Community

- Benefit of on-site storage for local and system-wide efficiencies (i.e., generation, transmission, application)
- Need for open "end-to-end" standards: plugs, charging, communication
- Public charging services: value propositions, free versus pay
- Storage as the potential 'smart hub' of the Home Area Network
- Firming solar and wind micro-generation
- Differences in value proposition of on-site storage for the building owners versus the utility
- Role of third parties, such as ESCO, demand response, new aggregators, "sustainable energy utilities"
- Who has access to all the energy system data that will be generated?

Moderator:

Eric Hsieh, *Manager of Government Relations*,
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

Panelists:

Elliot Boardman, *Executive Director*, PEAK LOAD MANAGEMENT ALLIANCE

Todd A. Headlee, *Chief Executive Officer*, SILENT POWER, INCORPORATED

Ryan Wartena, *Chief Technology Officer*, ICEL SYSTEMS

12:00-1:30 *Group Luncheon*

1:30-2:30 *Panel Discussion:*

Storage in the 'Grid-to-Vehicle' and 'Vehicle-to-X' Business Models

Emerging consensus suggests "Vehicle 2 Grid" is a long way off. What may be more immediate is V2Business and V2Home:

- Update on smart grid infrastructure and design of the charging interface
- Will existing Smart Grid protocols or platforms be adapted for this purpose?
- Battery price point projections
- Battery re-use for stationary storage by utility substations
- Lead acid/carbon vs. Lithium Ion: the race is on

Moderator:

Sam Jaffe, *Senior Research Analyst*, ENERGY INSIGHTS

Panelists:

Collette Lamontagne, *Managing Consultant*, NAVIGANT CONSULTING

Mark Kapner, *Senior Strategy Engineer*, AUSTIN ENERGY

John Petersen, *Partner*, FEFER PETERSEN & CIE

Martin Schroeder, *Senior Program Manager, Rail & Energy Programs*,
AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

BILL VOGEL, *Founder, Senior Vice President Strategic Development*,
TRILLIANT, INC.

2:30-3:00

Presentation:

THERMAL STORAGE

Thermal storage via ice represents an immediate and extremely cheap way for customers to lower their bills while helping to shave peaks. Utilities have shown a strong interest, and the technique is rapidly scalable. This presentation will provide an overview of the value proposition and players in distributed thermal storage.

Presenter:

Frank Ramirez, *Chief Executive Officer*, ICE ENERGY

3:00-3:30

Networking Break

3:30-5:00

Panel Discussion:

Storage, Smart Grid, and Next: The Micro-Grid?

- Benefits of creating a microgrid for campus, neighborhood or block
- Contribution of storage to realizing those microgrid benefits, including additional
- revenue potential from arbitrage back to the main grid
- Utility /regulatory barriers to microgrids – “wires rule,” rate-decoupling
- Status of power controls and software
- Pilot microgrid sites

Moderator:

Clint Wheelock, *Managing Director*, Pike Research, Inc.

Panelists:

Tom Hall, *Director Facilities Planning and Development*,
LOS ANGELES COMMUNITY COLLEGE DISTRICT

Christopher Kuhl, *Sales Applications Engineer*, ZBB ENERGY

Alan McDonnell, *President*, NON-SYNCHRONOUS ENERGY ELECTRONICS, LLC

5:00

Day Four Adjourns, End of Storage Week