EESAT 2003 SESSIONS & TOPICS

OVERVIEW

Complimentary Roles State and Federal Agencies in Energy Development – Terry Surles: CEC

Applications and Markets for Electricity Storage in California – Joe Iannucci, Jim Eyer: DUA

A Systems Model for Sizing and Economic Analysis of Energy Storage Opportunities – Al Ingram: BPA

Life-Cycle Cost Analysis of Energy Storage Technologies for Long- and Short-Duration Applications – Susan Schoenung: Longitude 122 West, Inc.; William Hassenzahl: Advanced Energy Analysis

SYSTEM COMPARISONS

Application of Energy Storage Devices at AEP – David Nichols, Ali Nourai, Harry Vollkommer: AEP

Assessment of Alternatives to Lead-Acid Substation Batteries – Steve Eckroad: EPRI; Tom Key: EPRI/PEAC

A Fundamental Look at Energy Storage Focusing Primarily on Flywheels and Superconducting Energy Storage – Kent Davey, Robert Hebner: Univ. of Texas

Energy Storage Handbook for T&D Applications: A Standardized Approach – Steve Eckroad: EPRI; Imre Gyuk: DoE/ESS; Dan Mears: Technology Insights

ADVANCED FLYWHEELS

Successes and Opportunity in High Speed Flywheel Development – Donald Bender: AFS Trinity Power Corporation

Advanced NAS Battery System – Akiyasu Okuno, Makoto Kamibayashi, & Kouji Tanaka, Tokyo Electric Power Co.

Test, Analysis, and Scale-up of a 1-kWh Flywheel Rotor Design – A.C. Day, P.E. Johnson, M.D. Higgins, M. Strasik, J. Mittleider, J. Edwards, J.R. Schindler, K.E. McCrary, R.A. Hawkins: Boeing Phantom Works; C. Bakis, A. Sharma: Penn. State Univ.

3d CR KEMA Three Dimensional, Counter Rotation, Kinetic, Electro-Mechanical Accumulator – Mario Gottfried: Ermita Ixtapalapz 466

COMPRESSED AIR SYSTEMS

True Cost of Cycling Enhances the Value of Compressed Air Energy Storage Systems (CAES) – G. Paul Grimsrud, Steven A. Lefton , Philip M. Besuner: Aptech Engineering Services, Inc.

Compressed Air Energy Storage (CAES) Fits Today's Market Requirements – Rolf Althaus, Karl Wiederhold: ALSTOM Ltd.; Jean-Pierre Rickli: JPR Concepts & Innovation; Burkhard Roemhild: ALSTOM Power Inc.

Energy Storage Options for Central Illinois – Jason Makansi: ESC; Septimus van der Linden: Brulin Associates; Kent Schien: Innoventor Engineering Inc.

New Compressed Air Energy Storage Concept can Improve the Profitability of Existing Simple Cycle, Combined Cycle, Wind Energy, and Landfill Gas Combustion, Turbine-Based Power Plants – Michael Nakhamkin: ESPC, Inc.; Ronald H. Wolk: WITS; Sep van der Linden: BRULIN Associates, LLC; Ron Hall, Dale Bradshaw: TVA

Economic Value of Compressed Air Energy Storage in Conjunction with Large Scale Wind in McCamey – Nisha Desai, Dave Pemberton: Ridge Energy Storage

POWER ELECTRONICS

Efficient Utilization of Battery Energy Storage Utilizing a Multilevel Converter StatCom – Y. Cheng, C. Qian, M. L. Crow: Univ. of Missouri; Stan Atcitty: SNL

High Power Energy Storage System Application Using Emitter Turn-off (ETO) Thyristor – Alex Q. Huang: Virginia Poly Institute; Stanley Atcitty: SNL; Mike Ingram: TVA; Haresh Kamath: EPRI-PEAC; Patrick McGinnis: NSWCCD; Lesley Shimanek: ACI

Progress On An Optically Interconnected, Heat-Pipe Cooled, HVIGBT-Based, Mega-Watt Inverter, Building Block for DER Applications – Paul Grems Duncan, John A. Schroeder: Airak, Inc., Stanley Atcitty: SNL

High Power Energy Storage System Application Using an Emitter Turn-Off (ETO) Thyristor in a Transmission Ultracapacitor (TUCAP) – Alex Q. Huang, Bin Zhang, Yunfeng Liu, Siriroj Sirisukprasert, Josh Hawley, Xigen Zhou, Zhenxue Xu, and Hongfang Wang: Virginia Poly Institute; Stanley Atcitty: SNL; Dale Bradshaw, Mike Ingram: TVA

TECHNOLOGY ADVANCES

Nanomaterials-Based Electrodes for High Discharge and Charge Rate Energy Storage Devices – Amit Singhal, Ganesh Skandan, Mohit Jain, Krista Martin: NEI Corporation; Glenn Amatucci, Fatima Badway: Rutgers University

High Power, Bipolar, Nickel-Metal Hydride Battery for Utility Applications – Mike Eskra, Robert Plivelich: Electro Energy, Inc.

ALABC Progress Towards Improved VRLA Battery Performance – Pat Moseley: ILZRO

Thermal Energy Storage is Electric Energy Storage – Mark M. MacCracken: Calmac Mfg.Corp.

FLYWHEEL SYSTEMS

2 MW, 130 kWh Flywheel Energy Storage System – Matthew Caprio, John Herbst, Robert Thelen: Univ. of Texas

Kinetic Energy Storage: Solving Problems for Power Engineers Around the World – Colin Tarrant: Urenco Power Technologies Ltd.

Giga-Joule Class of Energy Storage by Large Flywheel, Motor-Generator System – Tatsuya Matsukawa: Nagoya University; Makoto Matsukawa, Shunzo Ohmori, Tsunehisa Terakado, Yoshikazu Ohmori, Jun Okano, Katsuhiro Shimada: Japan Atomic Energy Research Institute; Taku Takaku, Shunji Tsuji-Iio, Ryuichi Shimada: Tokyo Institute of Technology

LEAD ACID BATTERY LIFE PREDICTIONS

Modeling of Battery Life: I. The Equivalent Circuit Model (ECM) Approach – Bor Yann Liaw, Rudolph G. Jungst, Angel Urbina, Thomas L. Paez: SNL

Evolutionary and Adaptive Recurrent Neural Network Modeling for Prediction of Battery Life – C. Yap: ACTA Incorporated; Angel Urbina, Rudolph G. Jungst: SNL; Bor Yann Liaw: Hawaii Natural Energy Institute

Real Time Aging Effects on VRLA Batteries in a BESS Application – Robert J. Schmitt, George W. Hunt: GNB Industrial Power

CAPACITOR AND SUPER CAPACITOR DEVELOPMENT AND APPLICATIONS

Status Report 2003 on Capacitor Storage Systems - ECaSS® – Michio Okamura: Okamura Laboratory, Inc.

Test and Evaluation of an Asymmetrical Electrochemical Capacitor – Haresh Kamath, Thomas Key: EPRI PEAC

Enhancing the Transient Loadability of Distributed Generation Using an Electro-Chemical, Capacitor-Based Energy Storage System – Satish J. Ranade, Xin Jiang, LaxmiDeepa Terala: New Mexico State University; Nancy Clark, Stan Atcitty, John Boyes: SNL

Principle of a Hybrid Compressed Air and Supercapacitors Energy Storage System with Maximum Efficiency Point Tracking – Sylvain Lemofouet, A. Rufer, P. Barrade, F. Grasser: Swiss Federal Institute of Technology

LITHIUM BATTERIES

Development and Manufacturing of Two, 100 kW/1-Minute, Li-Ion Battery Systems for Energy Storage Applications – Dr. S. Oweis: Saft America Inc.; Leonard Lansing: SatCon Power Systems; Nancy H. Clark: SNL

Performance Characteristics of Phosphate Lithium-Ion Battery for Utility Backup Applications – Oliver Gross, John Nguyen: Valence Technology

Development of 24kWh Power Storage System Applying Li-Ion Batteries – H. Shibata1, K. Adachi: Kyushu Electric Power Co.; K. Hashizaki, H. Tajima , T. Hashimoto, T. Nishida, Y. Fujioka: Mitsubishi Heavy Industries Ltd.

FLYWHEELS FOR SHORT DURATION EVENTS

Flywheel-Based Recycling of Electrical Energy for Grid Frequency Regulation – Matthew L. Lazarewicz, Alex Rojas: Beacon Power Corp.

Dynastore - A Flywheel Energy Storage System for Power Quality Applications in the 10 kWh Class – H. Darrelmann: RWE-Piller GmbH; W.-R. Canders, F. Laube, S.O.Siems, G. Tareilus: Technical Univ., Braunschweig; D. Roestermundt: Depa Institute for Structural Mechanics DLR

Novel Control of Flywheel Generator for Power Fluctuations Compensation Taku Takaku, Yoshinobu Ashie, Reiji Onoe, Ryuta Hasegawa, Ryuichi Shimada1: Tokyo Institute of Technology

STORAGE WITH DISTRIBUTED GENERATION

HybSim 3.3 - Hybrid Generation Model Simulator – Lumas Kendrick, Jr., Josh Pihl, Irwin Weinstock, Srikesh Sridharan: SENTECH, Inc.; Dennis Meiners: Alaska Energy Authority; David Trujillo: SNL

Complimentary Battery Energy Storage in Inverter-Based Microturbines and Fuel Cell Systems – Abbas Akhil, Tom Byrd: SNL

Lessons Learned from the PV Hybrid Battery at Grasmere, Idaho – Tom Hund: SNL

Energy Analysis of Batteries in Photovoltaic Systems – Carl Johan Rydh: Univ. of Kalmar

Coordination of Conventional System, Wind Energy Storage System and Hybrid System for A 40-Megawatt Wind Farm for Operation with the Electrical Power Grid – Ben Enis, Paul Lieberman, Irving Rubin: EnisWindGen®

Wind Energy Storage with Uncooled Compressed Air – E. F. A. Mohamed1, H. P. Beck, E. A. Wehrmann, and H.-J. Barth: Technical Univ. of Clausthal

LARGE APPLICATIONS

Recent Progress in Vanadium Redox-Flow Battery – Katsuji Emura: Sumitomo Electric Industries, Ltd

Commercial Deployment of the NAS Battery in Japan – Hyogo Takami: TEPCO

Performance and Economic Analysis of the NAS Battery Demonstration at AEP (AEP) – Benjamin L. Norris: Gridwise Engineering Company; David K. Nichols: AEP; Jeffrey D. Newmiller: Endecon Engineering Company; Georgianne H. Peek: SNL

The Value of Large Scale Electricity Storage – Mark T. Kuntz, Toby Edmonds: Regenesys Technologies, Ltd.

World's Most Powerful BESS is Online and Working in Alaska – Tim De Vries: Golden Valley Electric Association

CLOSING SESSION

Life-Cycle Air Emissions From Utility-Scale Energy Storage Facilities: Comparative Analysis and Policy Implications – Paul Denholm, Gerald Kulcinski: Univ. of Wisconsin

Analysis of New Energy Storage Technologies for Power Quality Solutions in the Distribution Network – Ricardo Lopez, José P. Rasgado. Héctor G. Sarmiento: Instituto De Investigaciones Eléctricas

The Economic Value of Electricity Reliability and Power Quality – Joseph Eto: LLNL; William Brumsickle: Softswitching Technologies

Is the Cost There for The Economics? (Comparing Costs and Benefits for Energy Storage Systems) – John Boyes: SNL