

4th Annual Grid-Scale Storage Conference

Examining Increased Reliability, Sustainability and Performance of Large Scale Storage Facilities

June 6–7, 2018 • San Francisco, CA

Key Topics to be Covered Include

- Energy storage as a long term resource in commercial energy management plans, storage project models, and energy procurement plans to support and compete with conventional generation, transmission and distribution resources
- Integrating energy storage with renewable power and connecting to the grid to help operators and utilities turn intermittent unpredictable sources of energy into a more stable and dispatchable resource
- Energy storage solutions to catalyze growth in the market for renewable energy by enabling its use in greater volumes and in new applications; reducing costs so new technologies can compete on economic terms
- Developing standards for modelling and regulatory reform and financing grid-scale storage technology in an uncertain marketplace
- New business models to make, apply, and operate storage assets to allow the grid to work more reliably and cost-effectively while decreasing negative environmental impacts
- Lessons learned from energy storage pilots and initial commercial deployments; technological and financial case studies
- Grid-scale storage as a regulation service to provide fast and flexible response systems to deal with unmanaged variation due to power plant failures and transmission outages
- Frequency regulation and peak shaving with the use of big data analytics to provide fast-reacting power resources to manage grid stability as a primary economic driver for grid-scale storage
- Determining energy storage solutions while taking into consideration safe technologies, life cycles, cost effectiveness, maintenance requirements, size, efficiencies, discharge rate and depth of discharge

Sponsors Include



Media Partners Include



Sponsorship Opportunities:

With leading companies and organizations from the Grid-Scale Storage industry attending and speaking at our event, we have the perfect opportunity to provide outstanding exposure to a high-level, professional audience. There are varying sponsorship packages available, including sponsorship of a cocktail reception on the first evening of the event and sponsorship of a networking lunch.

For further details, please contact Angela Hamilton, Manager of Sponsorship Sales Milwaukee, at 414.221.1700 or ahamilton@acius.net.

“Annual investment in storage is currently about \$2.6 billion...that’s set to grow to \$9.2 billion in 2015 and then to \$25 billion by 2021. Energy storage (is expected) to generate \$500 million to \$1 billion in annual revenue by 2020.”

--Bloomberg News

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Content & Theme

The potential size of the grid-scale energy storage market segment is very large in the many hundreds of billions of dollars. The electric energy sector will increasingly add on energy storage to enhance its generating capacity with the addition of necessary storage capacity and when one considers the size of the potential global market it is easy to understand why so many venture capitalists and energy storage startups are hoping to get even a small piece of what promises to be a very large pie. Cost effective energy storage yields better asset utilization and well as the reduction of environmental damage from traditional energy generation, and now is becoming a reality due to economic and technological advances in bulk energy storage systems.

Attend ACI's **4th National Grid-Scale Energy Storage Conference**, June 6-7, 2018, San Francisco, CA to discover the significant market opportunities for energy storage, including government policy and regulatory initiatives, new requirements for transmission and distribution of power in electric markets, increased utilization of distributed energy systems and the integration of storage into smart grid platforms. This three-day conference will cover all aspects of the implementation of energy storage technologies as a key enabler of grid modernization, addressing the electric grid's most pressing needs by improving its stability and resiliency. Investment in energy storage is essential for keeping pace with the soaring demand for electricity.

Who Should Attend

Target Audience:

Energy industry executives, policymakers, energy consultants and engineers, legal and regulatory professionals, academics, non-profit and community leaders, consumer advocates and other interested stakeholders.

This conference is researched and designed for:

- Chief Utilities Officers and Executives
- Engineers and Operations Specialists
- Federal, Municipal, and Public Policy Government and Agencies
- Utility Industry Regulators

Including:

- Regulatory, Policy and Standards Administrators
- Academic and Research & Development Professionals
- Renewable Energy Project Developers
- Utilities and Power Generation Companies
- Grid Operators and Network Planners

Also:

- Equipment and Software Vendors:
 - Smart Grid/Soft Grid Developers
 - Energy storage equipment manufacturers and technology providers
 - Energy storage service providers and integrators
 - Transmission and distribution equipment suppliers
 - Battery manufacturers and component providers
 - Renewable energy developers and technology providers
- Industry Consultants, Solutions Providers, and System Integrators
- Investor Community and Industry Stakeholders

Confirmed Speakers

Ted Burhans, Director, Renewable Energy Resources

Tucson Electric Power

Jack Brouwer, Associate Professor - Mechanical and Aerospace Engineering
University of California Irvine

Tom Stepien, CEO and Co-Founder
Primus Power

Philippe Bouchard, SVP, Business Development & Marketing
Eos Energy Storage

Daniel L. Hamilton, Sustainability Manager
City of Oakland | Oakland Public Works

Ian McClenny, Research Analyst
Navigant

Rinaldo S. Brutoco, Founding President
World Business Academy

Jessica Tse, Distributed Energy Resources Coordinator
San Francisco Department of the Environment

Steve Hickey, Manager for Energy Management
Enel

Craig Wooster, Director
Wooster Energy Engineering Specialties

Michel Carreau, Director Hybrid Power, Associate
Hatch

Eric Daniel Fournier, Postdoctoral Researcher
UCLA Institute of the Environment & Sustainability

Rajit Gadh, Director - Smart Grid Energy Research Center
UCLA

Mike Jacobs, Senior Energy Analyst
Union of Concerned Scientists

Doug Karpa, Policy Director
Clean Coalition

Craig Lewis, Executive Director
Clean Coalition

Stephanie Pincetl, Director
California Center for Sustainable Communities

Michael Salomon, Director
Clean Horizon Consulting

Rolf Bienert, Technical Director
OpenADR Alliance

Chris Marnay, Guest Scientist
China Energy Group - Lawrence Berkeley National Laboratory

Dr. Jorge Elixondon
M.I.T.

Dr. Paul Breslow
EDF

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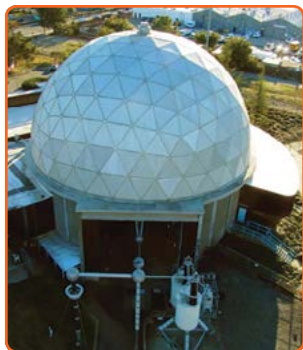
Exclusive Site Visits • June 5, 2018

SITE VISIT ONE: EOS ENERGY STORAGE

During the afternoon of Tuesday 5 June 2018 a limited number of conference attendees will have the opportunity to attend an exclusive site visit at PG&E's Smart Grid Lab, a unique smart grid testing lab provides prototyping and proof of concept for Pacific Gas and Electric deployments. The San Ramon, California, U.S., facility serves as home to more than 120 engineers, scientists and technicians committed to providing value for the utility's customers. They provide engineering and testing services for the utility's power generation, electric operations, gas operations and customer care lines of business, and serve as PG&E's one-stop engineering services shop for the more than 2,500 incident investigations, dam inspections, failure analyses and nondestructive equipment examinations that occur every year at PG&E. There is no extra charge to join the site visit, although places are limited and allocated to conference delegates on first come first served basis. Therefore, we would strongly suggest to book your place early to avoid disappointment.

SITE VISIT TWO: PRIMUS POWER

Primus Power is a provider of low-cost, long-life and long-duration energy storage systems. The Company's flow batteries are shipping to U.S. and international commercial/industrial, data center, microgrid, utility, and military customers. The Factory Tour will highlight Primus Power's technology, manufacturing and operation activities. It will feature EnergyPod 2 systems that are customer ready. It will also highlight Primus' internal microgrid.



Conference Day One • June 6, 2018

8:00 AM

REGISTRATION & COFFEE

9:00 AM

CHAIRPERSON'S OPENING REMARKS

9:15 AM

GLOBAL ENERGY STORAGE MARKET UPDATE: KEY TRENDS AND PROJECTIONS

- Overview of the global stationary energy storage industry, covering developments for each market segment (i.e. utility-scale, behind-the-meter, remote/off-grid) and technologies
- Understanding growth potential in storage markets – overview of Navigant's forecasting process
- Update on recent trends in major energy storage markets around the world, including new projects and regulations
- Global market projections: what are expected to be the largest and fastest growing country markets, technologies, and storage applications

Ian McClenny, Research Analyst, **Navigant**

10:00 AM

UTILIZING RENEWABLES+STORAGE TO OBTAIN NATURAL GAS PEAKER PLANTS

- Renewables+storage as an alternative to natural gas peaker plants
- Political push for storage as replacement for central power plants
- Promoting the opportunity to improve urban neighborhoods and reduce the construction of pipelines and transmission lines by developing storage in locations where old power plants operated

Doug Karpa, Policy Director, **Clean Coalition**

10:45 AM

MORNING REFRESHMENTS

Sponsored by **Gridscape Solutions**



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11:15 AM

DRIVERS SUPPORTING USE OF ENERGY STORAGE AS REPLACEMENT FOR CENTRAL POWER PLANTS, AT THE SITES OF OLD FOSSIL GENERATORS

- The technical aspect: Storage offers a range of grid support functions beyond making energy available at a different time
- The political aspect: Pushing the debate to improve the urban locations where old plants have operated to the detriment of the neighborhood

Mike Jacobs, Senior Energy Analyst, **Union of Concerned Scientists**

12:00 PM

BATTLING HIGH ENERGY STORAGE COSTS

- TEP has recently executed a sub- $\$0.03/\text{kWh}$ PPA for 100 MW of solar, with an additional 30 MW of battery storage
- Utilities with high renewable penetration should be actively looking at alternative solutions, such as storage, to help mitigate reliability risk
- TEP installed (2) 10 MW battery systems in 2017 to assist with frequency regulation and voltage support
- Battery systems can do a lot, but typically only one thing very well. Utilities must define use cases when justifying batteries, so that they are not just a “solution looking for a problem”

Ted Burhans, Director, Renewable Energy Resources, **Tucson Electric Power**

12:45 PM

LUNCH

1:45 PM

DURATION WITHOUT DEGRADATION: DELIVERING MULTI-HOURS OVER MULTI-DECADES

Primus Power’s long duration flow battery includes several technical innovations - a single flow loop and no ion exchange membrane – in order to deliver low cost over twenty years. This presentation will discuss the economics of a variety of storage applications in order to answer “where does long duration make sense?” question. Several real world examples will be described

Tom Stepien, CEO and Co-Founder, **Primus Power**

2:15 PM

SOLAR + STORAGE: FROM ECONOMIC MODELLING TO FIELD DEPLOYMENTS, HOW TO CAPITALIZE ON A MULTI-BILLION \$\$\$ MARKET OPPORTUNITY

- Summary of market analysis and research to structure a commercial offering around market need
- Review of economic modelling, specifically levelized cost of energy for storage in an AC-coupled and DC-coupled configuration
- Discussion of lessons learned from initial field deployments, avoid the pitfalls and steer your first projects towards commercial success

Philippe Bouchard SVP, Business Development & Marketing, **Eos Energy Storage**

3:00 PM

AFTERNOON REFRESHMENTS

Sponsored by Gridscale Solutions



3:30 PM

KEYNOTE PRESENTATION: THE RENEWABLE ENERGY ESCALATION

- Renewable role in demand growth
- Renewable market overview: Incentives vs Competitive mechanisms
- IPP Utility Scale Storage solutions, lesson learnt: Storage Catania 1 – Typical daily operation
- Rural electrification: Population without access to grid
- Solar/Wind/storage/Diesel off grid system: Ollagüe
- Peru off grid project: Main project features
- Case study – Mine Industry
- Retail applications: Energy Management System: Advanced system for an innovative energy experience
- Enel Green Power: A Global leader
- Worldwide RES trends: 2000-2030 Additional Capacity by Area
- IPP Utility Scale Storage solutions, lesson learnt: Storage Potenza Pietragalla (Wind)
- Microgrid for rural electrification: Kenya Project: Solution for access to electricity
- Solar/Wind/storage/Diesel off grid system: Ollagüe, day of operation
- Peru off grid project: Hybrid microgrid providing energy to offgrid small industry
- Retail applications: Enel Energy South Africa: Enjoy a reliable, uninterrupted supply of power, 24/7
- Enel Green Power Technologies
- Global Market is expected to rapidly grow for ESS
- Opportunity for ESS integration with RES
- Storage applications in EGP
- Microgrid Operation and Performance Analysis: Typical
- Hydrogen Storage for Diesel replacement: Cerro Pabellon Camp Pilot plant
- Technology Campus: Energy independent on-grid microgrid in California
- Enel and Formula E: Finally... still a microgrid!

Steve Hickey, Manager for Energy Management, **Enel**

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4:15 PM

POWERING DATA CENTERS WITH LOCAL RENEWABLES AND ENERGY STORAGE FOR DAILY OPERATIONS AND RESILIENCE

The Clean Coalition's mission is to accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise. This presentation will explore how local renewables can power critical facilities like data centers for the trifecta of economic, environmental, and resilience benefits. Typically, local renewables provide fixed-cost clean energy for decades and hedge against potentially volatile electricity pricing. In combination with energy storage, local renewables can do what neither remote generation nor local diesel generators can do: provide highly reliable indefinite power backup. While the economics might still be too tight for powering the entire needs of a data center, there is a strong case for increasing the use of local renewables and energy storage for data center power and resilience; and minimizing dependence on diesel generators that will never be clean nor independent of potentially tenuous refueling requirements.

Craig Lewis, Executive Director, **Clean Coalition**

5:00 PM

THE DER OPPORTUNITY: MANAGING ENERGY RESOURCES

One of the major challenges facing the energy industry today is the unexpected proliferation and diverse nature of Distributed Energy Resources (DER). Requirements for grid reliability and the diverse communication standards for DERs such as solar PV, battery storage, electric vehicles and demand side management resources present significant challenges for many electric utilities to coordinate and manage. Some utilities are exploring enhancing their legacy systems, innovative third party alternatives, and others are turning to cloud based distributed intelligence platforms to help manage the constantly changing collection of DER resources.

This presentation will help attendees gain a better understanding of the DR and DER landscape, requirements and communications standards support integrated DER management, and how they are addressing the challenges in working with customer owned assets and facilities to manage power flows and grid congestion using communications protocols such as OpenADR to provide customer communications for rates, load management, and price signals for dynamic asset management.

Rolf Bienert, Technical Director, **OpenADR Alliance**

5:45 PM

NETWORK RECEPTION
Sponsored by Kinectrics, Inc.



7:45 PM

CLOSE OF DAY ONE

Conference Day Two • June 7, 2018

8:30 AM

REGISTRATION AND COFFEE

9:00 AM

CHAIRPERSON'S OPENING REMARKS

9:15 AM

HOW HAVE CALIFORNIA AND INTERNATIONAL STORAGE MARKETS INFLUENCED EACH OTHER?

A view on import/export opportunities in and out of California.

- Australia update: the 4-hour opportunity
- German: the residential storage story
- Frequency regulation in Great Britain: what next?
- Beyond continental grids: island markets

Michael Salomon, Director, **Clean Horizon Consulting**

10:00 AM

CHALLENGES AND OPPORTUNITIES IN IMPLEMENTING HYBRID POWER PROJECT ON MICROGRID

Challenges and Opportunities in implementing Hybrid Power project on microgrid.

- Combining wind, solar, energy storage and controls
- Investment opportunities and risks
- Lesson learned from delivered projects

Michel Carreau, Director Hybrid Power, Associate, **Hatch**

10:45 AM

MORNING REFRESHMENTS

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11:15 AM

UNDERSTANDING THE NEW ENERGY PARADIGM: FROM WIRES TO ELECTRONS

- Setting out the vision: California Clean Energy Moonshot - 100% Green Energy, 10 years or less, no additional cost to ratepayers
- A View from Santa Barbara – What we learned from the Thomas Fires
- What we know vs. what we are willing to do
- Dynamic Energy Collection & Management System vs. Fossil Fuels as Storage (the Status Quo)
- Modifying substations for the future

Rinaldo S. Brutoco, Founding President, **World Business Academy**

12:00 PM

PANEL DISCUSSION: HYDROGEN STORAGE AT THE GRID EDGE

- Utilizing hydrogen as a source of electricity generation
- Creating lower cost, higher volume of electricity storage than would be possible with batteries
- Generating additional revenue streams with low carbon fuel credits for offset and the sale of excess hydrogen

Jack Brouwer, Associate Professor - Mechanical and Aerospace Engineering, **University of California Irvine**

Chris Marnay, Guest Scientist, **China Energy Group - Lawrence Berkeley National Laboratory**

Dr. Jorge Elizondo, M.I.T.

Dr. Paul Breslow, EDF

Craig Wooster, Director, **Wooster Energy Engineering Specialties**

1:30 PM

LUNCH

2:15 PM

ELECTRIC VEHICLES AND BATTERY ENERGY STORAGE FOR A CLEAN ENERGY GRID

The North American electric grid today is witnessing the fastest pace of change since its creation about one hundred years ago. States such as California have seen a substantial rise in the amount of energy generated from solar photovoltaics (PV) on rooftops. These renewable energy resources, being intermittent, can potentially destabilize the grid when scaled up to the level of the entire grid. Electric vehicles (EVs) are being added at a significant pace in California thereby increasing the load on the grid at various times of the day. While they may be considered as a load, their batteries may be exploited as battery energy storage system (BESS) devices thereby becoming an asset to compensate for the instability resulting from intermittency caused by renewables. The continuous decline in the cost of solar PV and lithium ion batteries for EVs is expected to further propel their growth resulting in further increase in complexity of balancing the demand and supply of electricity. Management and control of each of these distributed energy resources (DERs)— generation, storage and consumption – is a major area of research for the UCLA Smart Grid Energy Research Center (SMERC). The integration of advanced technologies, consumer preferences and innovative pricing models to address the above opportunities and challenges would achieve a modern grid that allows for higher penetration of renewables, increase in the number of electric vehicles, higher energy efficiency, improved grid security and resiliency, and, reduced outages.

In the context of the above issues, the talk will present two relevant research projects that UCLA's Smart Grid Energy Research Center (SMERC) has been involved with.

- SMERC has partnered with Los Angeles Department of Water and Power in the \$120M DOE-funded Smart Grid Demonstration Project or SGRDP. To achieve the SGRDP goals, UCLA has installed a test-bed consisting of over 100 electric vehicle charging stations in the UCLA campus, a 100KW BESS integrated into a building grid, Solar PV monitoring and integration with BESS, a Vehicle-to-grid or V2G system, a DC fast charger, 30 refrigerators within the campus housing, LED lighting controls and electric driers. These are networked, monitored and controlled via a variety of algorithms enabling a model for DER.
- SMERC is working on a California Energy Commission funded research project in the Southern California Edison territory in the City of Santa Monica to create a microgrid enabled with control system that integrates the following DERs: BESS, EV, V2G, Smart Charger, and, Solar PV. This system serves multiple simultaneous objectives including PV with BESS, local voltage regulation with BESS, Using V2G for fleet operations, controlling peak demand as a result of DC fast charging of EVs.

Rajit Gadh, Director - Smart Grid Energy Research Center, **UCLA**

3:00 PM

SAN FRANCISCO'S SOLAR+STORAGE FOR RESILIENCY PROJECT

- Expanding the solar market by serving as a national model for integrating solar and energy storage into the City's emergency response plans.
- Examining the feasibility of solar plus storage installations to support community facilities during an emergency while advancing both the city's energy and emergency preparedness goals.

Jessica Tse, Distributed Energy Resources Coordinator, **San Francisco Department of the Environment**

3:45 PM

PLANNING ENERGY STORAGE SOLUTIONS FOR DISADVANTAGED COMMUNITIES: CHALLENGES, OPPORTUNITIES, AND INSIGHTS

How are disadvantaged communities defined? What are their scale? And, why do they matter within the context of the ongoing renewable energy transition?

- When working within a disadvantaged community how should one address the question of whether to implement storage assets in front or behind the meter? What are the different potential value streams that can be leveraged in each case? How would each choice affect potential available financing strategies?
- Case Study Discussion: Planning for a net zero electricity community within the Los Angeles County Unincorporated Areas of Bassett and Avocado Heights

Eric Daniel Fournier, Postdoctoral Researcher, **UCLA Institute of the Environment & Sustainability**

Stephanie Pincetl, Director, **California Center for Sustainable Communities**

4:30 PM

CHAIRPERSON'S CLOSING REMARKS

4:45 PM

END OF CONFERENCE AND AFTERNOON REFRESHMENTS

About ACI:

Active Communications International (ACI) is a leader and innovator in strategic business conference planning and production. With offices in Chicago, London, Pune, Portland, Poznan and Milwaukee, we produce world-class events focusing on areas of most relevance to our served industry sectors. We are dedicated to deliver high-quality, informative and value added strategic business conferences where audience members, speakers, and sponsors can transform their business, develop key industry contacts and walk away with new resources.

Mission Statement:

ACI's mission is to unite key industry influencers and leaders to build strong relationships and enable our clients to achieve operational efficiencies, maintain competitive advantage in the marketplace, and increase their profitability.

Quality:

ACI invites senior-level executives and key industry leaders to share their insights and real-life working experiences with our audience. Our unique conference format offers an intimate and time-efficient educational development platform where our attendees can meet one-on-one with the people that can assist them in achieving their goals.

Research:

ACI offers cutting-edge conferences that are developed through extensive research and development with industry experts to bring you the latest trends, forecasts, and best practices.

Experience:

Our team of experienced conference producers and managers know you and your business demands. ACI has the resources, knowledge, and experience to create the events you need to remain on the forefront of your industry.

