Conference Program

Clean Generation and Clean Utilization

April 1-3, 2014

Radisson Hotel Newport Beach, California
SPONSORS

TOYOTA  U.S. DEPARTMENT OF ENERGY  ADVANCED POWER & ENERGY PROGRAM

MelRok  UCIrvine  Office of Research

SMUD  South Coast AQMD  FuelCell Energy

HORIBA  Smart Grid Observer  Sempra Energy Utility

Collaborators

UCIrvine  Office of Research  U.S. Department of Energy

Advanced Power & Energy Program  University of California - Irvine

NPCRC

National Fuel Cell Research Center  UCIrvine  University of California
WELCOME

Thank you for joining us at ICEPAG 2014, our 14th annual Colloquium! We believe that you will find the caliber of speakers and presenters to be enlightening and inspiring and we thank you for joining us. ICEPAG began from a series of biannual meetings of the Pacific Rim Consortium on Energy, Combustion, and the Environment (PARCON). Established in 1992 at Seoul University, with representation by two industries and two universities from countries flanking the Pacific Ocean, PARCON has sought to promote advanced power generation for high efficiency and low criteria pollutant impact, promote communication and dialog not only within the Pacific Rim – but worldwide - and thereby accelerate the development and deployment of advanced technology from distributed generation to central generation.

ICEPAG was conceived by PARCON to:

- Facilitate on an annual basis a shared understanding of the various advanced energy technologies under development
- Promote strategic alliances to enhance collaboration among the world’s communities
- Inspire students to embrace the challenges and opportunities associated with advanced power generation and environmental quality

ICEPAG is structured on the premise that power generation, distribution, and utilization is comprised of many interconnected and interacting, existing and emerging components that require an understanding in the context of a **system**. Therefore, while ICEPAG includes sessions on component technologies, the overlying theme of ICEPAG is the perspective of the **system** as a whole. However the **system** considered is not limited to power, but also embraces:

- Water resources and water quality
- Agriculture
- Economics
- Socio-political considerations and policy

We trust that you will find the conference enlightening and inspiring, and that the contacts you make during ICEPAG 2014 will further advance the goal toward a more sustainable energy future for the world’s community.
Wednesday, April 2\textsuperscript{nd} at 4:45pm: Bus loads here for the networking reception

Thursday, April 3\textsuperscript{rd} at 12:15 pm: Bus loads here for the Orange County Sanitation District tour
TUESDAY, APRIL 1 | DAY 1

7:00 a.m. **REGISTRATION AND A HEARTY CONTINENTAL BREAKFAST**

**Keynote, Plenary, and Signature Panel Session**

8:30 a.m. **Welcome**
Scott Samuelsen, Colloquium Program Chair
Director, National Fuel Cell Research Center and Advanced Power and Energy Program
University of California, Irvine

8:35 a.m. **Keynote**
The Future of Fossil Fuel Powered Advanced Power Systems
Regis Conrad
Director, Advanced Energy Systems
Office of Fossil Energy
U.S. Department of Energy

9:15 a.m. **Signature Panel:**
Exporting Clean Tech: Federal Sources for Funding and Success
Organized by the U.S. Trade and Development Agency

10:15 a.m. **MORNING BREAK**

10:45 a.m. **Plenary Lecture**
Natural Gas Can Support Future Advanced Electric Generation, Combustion, and Transportation
Patrick Lee
Senior Vice President
Customer Service, Innovation, Business Strategy and Chief Environmental Compliance Officer
Southern California Gas Company

11:30 a.m. **LUNCH**
TUESDAY, APRIL 1 | DAY 1

Technical Sessions

1:00 p.m.  **Afternoon Parallel Sessions**

**TRACK 1**

**Clean Generation**

**SESSION 1-1**
DG: Fuel Cell Systems

Co-Chairs:
Shailsh Vora, NETL
Jack Brouwer, UCI

1:00 p.m.
Solid State Energy Conversion Alliance: Program Overview and Status
Shailesh Vora
NETL

2:00 p.m.
Fuel Cell Markets in Telecommunications
Dave Anderson
ClearEdge Power

**TRACK 2**

**Clean Utilization**

**SESSION 2-1**
Smart Energy, Power: Electric Vehicle Fueling

Chair:
Brendan Shaffer, UCI

1:30 p.m.
Fuel Cell Markets in California and Korea
Tony Leo
FuelCell Energy

2:30 p.m.
Afternoon Break

1:00 p.m.
Hydrogen Infrastructure: Planning
Kersey Manlicic
APEP

1:30 p.m.
Hydrogen Infrastructure: Deployment
Tim Brown
FirstElement Fuel

2:00 p.m.
Hydrogen Infrastructure: Generation
Pete Willette
APEP
**TUESDAY, APRIL 1 | DAY 1**

**TRACK 1**

**Clean Generation**

**SESSION 1-1**

**Fuel Cell Systems**

*Co-Chairs: Shailesh Vora, NETL*  
*Jack Brouwer, UCI*

- 3:00 p.m.  
  Fuel Cell Systems Fed by Biogenous Fuels  
  Massimo Santarelli  
  Polytechnical University of Torino

- 3:30 p.m.  
  Solid Oxide Fuel Cell Gas Turbine Hybrid Power Plant  
  Moritz Henke  
  German Aerospace Center (DLR)

- 4:00 p.m.  
  Experimental Investigation of Anode/Cathode Pressure Differences for a Solid Oxide Fuel Cell Gas Turbine Hybrid Power Plant  
  Mike Steilen  
  German Aerospace Center (DLR)

**TRACK 2**

**Clean Utilization**

**SESSION 2-1**

**Smart Energy, Power: Electric Vehicle Fueling**

*Chair: Brendan Shaffer, UCI*

- 3:00 p.m.  
  Electric Charging: Planning  
  Li Zhang  
  APEP

- 3:30 p.m.  
  Electric Charging: Protocol  
  Logan Grizzel  
  Toyota

- 4:00 p.m.  
  Electric Charging: Impact on Secondary Circuits  
  Renee Cinar  
  APEP

4:30 p.m. **DAY 1 TECHNICAL PROGRAM CONCLUDES**

**DINNER ON YOUR OWN**
International Colloquium on Environmentally Preferred Advanced Power Generation

**WEDNESDAY, APRIL 2 | DAY 2**

7:00 a.m. **HEARTY CONTINENTAL BREAKFAST**

**TRACK 1**

*Clean Generation*

**SESSION 1-2**

**DG: Gas Turbine Systems**

**Co-Chairs:**
Dave Teraji, Solar Turbines
Vince McDonell, UCI

<table>
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<tr>
<th>Time</th>
<th>Session Topic</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>8:00 a.m.</td>
<td>Low Swirl Burner for Fuel Flexibility for Gas Turbines</td>
<td>Robert Cheng LBNL</td>
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<tr>
<td>8:30 a.m.</td>
<td>The Development of a Next Generation High Performance Micro Turbine Power Generation System</td>
<td>Robert McKeirnan Capstone Turbine Corp</td>
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<td>9:00 a.m.</td>
<td>Gas Turbine SCR Optimization and Management</td>
<td>Brent Spang Fossil Energy Research Corp</td>
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**TRACK 2**

*Clean Utilization*

**SESSION 2-2**

**Smart Energy, Power: Utility Grid Technologies**

**Co-Chairs:**
Russ Neal, Power Innovation Consultants
Brendan Shaffer, UCI

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<td>Utility Grid Simulation and Control</td>
<td>Tanuj Khandelwal ETAP</td>
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<td>8:30 a.m.</td>
<td>Combination of Compressed Air Energy Storage Systems with NGCC</td>
<td>T.S. Kim Inha University J. L. Sohn Korea Institute of Machinery &amp; Materials</td>
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<td>9:00 a.m.</td>
<td>Regenerative Air Energy Storage System (RAES)</td>
<td>Amir Pourmousa LightSail Energy</td>
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9:30 a.m. **MORNING BREAK**
WEDNESDAY, APRIL 2 | DAY 2

TRACK 1

**Clean Generation**

**SESSION 1-2**

**DG: Gas Turbine Systems**

Co-Chairs:

Dave Teraji, Solar Turbines  
Vince McDonell, UCI

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10:00 a.m.

**Economic Evaluation of Using Biogas in Gas Turbine CHP Systems**

T.S. Kim  
Inha University

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10:30 a.m.

**Fine PM Emission Factors and Gas Turbine Engines**

Glenn England  
ENVIRON

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11:00 a.m.

**Concentrated Solar Power Hybrid Gas Turbine Demonstration Test Results**

David Teraji  
Solar Turbines, Inc.

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11:30 a.m. **LUNCH**

TRACK 2

**Clean Utilization**

**SESSION 2-2**

**Smart Energy, Power: Utility Grid Technologies**

Co-Chairs:

Russ Neal, Power Innovation Consultants  
Brendan Shaffer, UCI

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10:00 a.m.

**Electricity Market Valuation for Fuel Cells and Electrolyzers**

Josh Eichman  
NREL

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10:30 a.m.

**Irvine Smart Grid Demonstration Project**

Ed Kamiab  
Southern California Edison

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11:00 a.m.

**Holistic Sustainability Analyses: Evaluating Pathways to Meet California’s 2050 Greenhouse Gas Reduction and Water Supply Security Goals**

Brian Tarroja  
APEP
**WEDNESDAY, APRIL 2 | DAY 2**

1:00 p.m. **AFTERNOON PARALLEL SESSIONS**

**TRACK 1**

**Clean Generation**

**SESSION 1-3**

**DG: Applications and Systems Integration**

Chair:
Rich Hack UCI

**TRACK 2**

**Clean Utilization**

**SESSION 2-3**

**Smart Energy, Power: Microgrid Technologies**

Co-Chairs:
Michel Kamel, MelRok
Brendan Shaffer, UCI

1:00 p.m.  
Laboratory CHP Study/Large Scale DG/CHP for Shanghai Tourist Destination

Lucas Hyman  
Goss Engineering

UCI Microgrid: Capabilities and Performance

Matt Gudorf  
UCI Facilities

1:30 p.m.  
John Wayne Airport, Orange County Central Plant; Operational Experience in the South Coast Air Basin

Larry Serafini  
John Wayne/Orange County Airport

UCI Microgrid: Dynamic Control and Modeling

Fei Gu  
APEP

2:00 p.m.  
TIGER Stations  
Transmission Integrated Grid Energy Resource

Brendan Shaffer  
APEP

UCI Microgrid: Next Generation Grid Monitoring

Nicholas Halecky  
MelRok

2:30 p.m. **AFTERNOON BREAK**
Wednesday, April 2 | Day 2

Track 1

Clean Generation

Session 1-3
DG: Applications and Systems Integration

Chair:
Rich Hack UCI

3:00 p.m.

Pere Margalef
FuelCell Energy

Advancement of a Distributed Adaptive Mobile Ocean Energy Recovery System
3:30 p.m.

Andrew Gizara
Integrated Power Technology Corporation

Opportunities of Biomass to Power in the SMUD Region
4:00 p.m.

Valentino M. Tiangco
Sacramento Municipal Utilities District

Track 2

Clean Utilization

Session 2-3
Smart Energy, Power: Microgrid Technologies

Co-Chairs:
Michel Kamel, MelRok
Brendan Shaffer, UCI

Developing a Renewable Energy Portfolio Comprised of Solar, Wind, and a Biogas Fuel Cell as a Public Agency
3:00 p.m.

Jesse Pompa
Inland Empire Utilities Agency

Electric Infrastructure Capabilities Required for Next-Generation Microgrids
3:30 p.m.

James Lee
Scheinder Electric

Data Center Design for Best Use of Fuel Cell Combined Heat and Power
4:00 p.m.

Sean James
Microsoft

Day 2 Technical Program Concludes

Reception: Environmental Nature Center, Newport Beach

4:45 p.m.  Buses Depart Hotel
5:00 p.m.  Buses Arrive Reception
7:30 p.m.  Bus #1 Departs Reception
7:45 p.m.  Bus #1 Arrives Hotel
8:00 p.m.  Bus #2 Departs Reception
8:15 p.m.  Bus #2 Arrives Hotel
THURSDAY, APRIL 3 | DAY 3

7:00 a.m.  HEARTY CONTINENTAL BREAKFAST

TRACK 1

Clean Generation

SESSION 1-4
CP: Natural Gas, Coal, Biomass – Brayton, Rankine, and Fuel Cell Cycles
Co-Chairs:
Robin Ames, DOE
Ashok Rao, UCI

Turbine and System Developments on GE Power & Water’s DOE Advanced Syngas/Hydrogen Gas Turbine Technology Program
Roger Schonewald
GE Power & Water

8:00 a.m.

An Overview, Assessment, and Thermodynamic Analysis of Indirect (closed) Supercritical CO2 (SCO2) Power Cycle Configurations
Wally Shelton
NETL

8:30 a.m.

Identifying Pathways for Efficient Generation of Low Carbon Power from Fossil Fuels
Michael Matuszewski
NETL

9:00 a.m.

TRACK 2

Clean Utilization

SESSION 2-4
Smart Energy, Power: Nanogrid Technologies
Co-Chairs:
Jim Meacham, Altura Associates
Brendan Shaffer, UCI

Building Operation Optimization (I/III): The Designer
Jim Meacham
Altura Associates

Building Operation Optimization (II/III): The Implementer
Scot Duncan
Enerliance

Building Operation Optimization (III/III): Distributed Generation
Robert Flores
APEP

9:30 a.m.  MORNING BREAK
THURSDAY, APRIL 3 | DAY 3

TRACK 1

**Clean Generation**

**SESSION 1-4**

CP: Natural Gas, Coal, Biomass – Brayton, Rankine, and Fuel Cell Cycles

Co-Chairs:
Robin Ames, DOE
Ashok Rao, UCI

Cost and Performance of Retrofitting Natural Gas Combined Cycle (NGCC) Power Plants with a Post-Combustion Solvent Process

Wally Shelton
NETL

Highly Efficient Pre-Combustion Sorbent Based Carbon Capture System

Ambal Jayaraman
TDA

Solid Sorbent Based Post-Combustion CO2 Capture in Coal-Fired Power Plant

Qin Chen
APEP

10:00 a.m.

10:30 a.m.

11:00 a.m.

11:30 a.m.  Lunch

12:15 p.m.  Bus Departs for Orange Coast Sanitation District (OCSD) Tri-Generation Plant Tour

2:15 p.m.   Bus Returns From OCSD Tour

TRACK 2

**Clean Utilization**

**SESSION 2-4**

Smart Energy, Power: Nanogrid Technologies

Co-Chairs:
Jim Meacham, Altura Associates
Brendan Shaffer, UCI

Dynamics of Data Center Distributed Generation

Li Zhao
APEP

A Risk-based Data Driven Approach for Modeling Industrial Load Dynamics

Mohsen Jafari
Rutgers University

Next-Generation Building Energy Control

Jack Brouwer
APEP