

2017 **ICEPAG** | **GRID EVOLUTION
GLOBAL SUMMIT**

PROGRAM



March 28 - 29, 2017

Advanced Power and Energy Program
Henry Samueli School of Engineering
UC Irvine

WITH APPRECIATION FOR OUR SPONSORS

PLATINUM SPONSOR



GOLD SPONSOR



SILVER SPONSOR



BRONZE SPONSORS



STONE EDGE FARM
MICROGRID PROJECT



SPONSORS



Welcome

ICEPAG 2017: GRID EVOLUTION GLOBAL SUMMIT: HYDROGEN

ICEPAG (the **I**nternational **C**olloquium on **E**nvironmentally **P**referred **A**dvanced **G**eneration) is presented annually by the Advanced Power and Energy Program (APEP) at UC Irvine as a "Global Summit Series," varying each year between **Grid Evolution** and **Microgrid Technologies**.

ICEPAG 2017 addresses **Grid Evolution** and brings together global experts from Industry, Government, and Academia to examine issues and share critical, cutting edge information on the role of **HYDROGEN** in the grid of the future, with a focus on:

- Hydrogen Generation
- Hydrogen Transport/Storage
- Hydrogen End Use

APEP continues to expand its cutting-edge research in advanced power generation and utilization, and in accelerating the integration of **HYDROGEN** into the U.S. and global economies. APEP's strategic alliances with industry and national and international agencies and laboratories, provide a critical bridge between our research and practical application.

In partnership with **Southern California Gas Company (SoCalGas)**, **Proton On-Site**, and the **National Renewable Energy Laboratory (NREL)**, APEP engineers have successfully implemented the first power-to-gas (P2G) hydrogen pipeline injection process in the United States. It successfully demonstrates the use of excess clean electricity that would otherwise go to waste by converting surplus sustainable energy from solar panels or wind farms into renewable-hydrogen. Once converted, it can then be blended with natural gas and utilized in home appliances and power plants, to supply hydrogen fuel cell electric vehicles, or it can be directly injected into the natural gas infrastructure to provide a massive energy storage buffer that can manage and better utilize high levels of renewable power.

In the promising area of advanced technologies for Integrated Gasification Combined Cycle (IGCC) plants, APEP is identifying and developing advanced technologies for coproduction of electricity and hydrogen. Utilized with carbon capture and storage (CCS), incremental analysis shows cofeeding and coproduction to be competitive with a cost of hydrogen lower than the U.S. Department of Energy's (DOE) goal for cost per kilogram.

APEP continues to collaborate with the **UCI Administration** in the evolution of the UCI Microgrid as a major field laboratory. The UCI Microgrid includes the most stellar energy efficiency initiatives in the country, the broadest array of advanced energy and transportation technologies, and the latest in diagnostics and computer simulation resources. Under funding from the **DOE**, APEP is collaborating with **Southern California Edison (SCE)**, **ETAP**, **California ISO (CAISO)**, the **Ports of Los Angeles** and **Long Beach**, the **Irvine Ranch Water District (IRWD)**, **MelRoK**, and the **UCI Medical Center**, in the development of a Generic Microgrid Controller (GMC).

The APEP Laboratory tours scheduled during the networking reception will feature visits to our new Connectivity Lab developed in collaboration with **Schweitzer Engineering Laboratories (SEL)**, our Fuel Cell Systems research, our Power-to-Gas research, and our research in combustion and alternative fuels. We hope that you will take advantage of the tour while at the networking reception.

In summary, we are indebted to our long-standing relationships that contribute in so many ways to the Summit, our research, our real world research and demonstration projects, and our students.

We thank you for attending, and for your support and contributions to the Summit and to APEP.

Scott Samuelsen, Program Chair

UC IRVINE | HENRY SAMUELI ENGINEERING COMPLEX



ICEPAG 2017 Wyndham Hotel Bus Schedule

Day	Departure Location	Departure Time	Arrival Time
March 28, Morning	Wyndham Hotel	7:15 am In Front of Hotel	7:30 am E. Peltason/Engineering Gateway Bus Cut Out
March 28, Evening	UCI	7:00 pm E. Peltason/Engineering Gateway Bus Cut Out	7:15 pm Wyndham Hotel
March 29, Morning	Wyndham Hote	7:15 am In Front of Hotel	7:30 am E. Peltason/Engineering Gateway Bus Cut Out
March 29, Evening	UCI	5:45 pm E. Peltason/Engineering Gateway Bus Cut Out	6:00 pm Wyndham Hotel

ICEPAG 2017

Grid Evolution

Hydrogen: Generation, Distribution, Utilization

PROGRAM: DAY 1 – TUESDAY, March 28, 2017

PLENARY and SIGNATURE PANEL SESSION

- 7:30 – 8:30 am **NETWORKING BREAKFAST**
- 8:30 – 9:00 am **Welcome**
- Professor Scott Samuelson, Director, UCI Advanced Power and Energy Program (APEP)
- 9:00 – 10:00 am **Keynote: “Environmental Goals”**
- Rich Corey, Executive Officer, California Air Resources Board
- 10:00 – 10:30 am **NETWORKING BREAK**
- 10:30 – 11:00 am **Keynote: “Manufacturing Goals”**
- Regis Conrad, Director, Division of Advanced Energy Systems, U.S. Department of Energy
- 11:00 – 12:00 pm **Signature Panel Session----“Hydrogen: Why Important?”**
- Moderator: Jack Brouwer, APEP
- Academic Perspective
Jack Brouwer
APEP
 - Industry Perspective
Ole Höefelmann, Air Liquide
 - ISO Perspective
Peter Klauer
California Independent System Operator
- 12:00 – 1:00 pm **LUNCH**

TECHNICAL SESSION

1:00 – 2:45 pm

Hydrogen Generation

Moderator
Jack Brouwer
UCI

Session G-I

Tri-Generation
Tony Leo
FuelCell Energy

Electrolysis (I/II)
Steve Szymanski
Proton OnSite

Electrolysis (II/II)
Rob DelCore
Hydrogenics

Power-to-Gas: Technology
Li Zhao
APEP

2:45 – 3:15 pm

NETWORKING BREAK

3:15 – 5:00 pm

Hydrogen Generation	
Moderator Jack Brouwer UCI	
Session G-II	
Power-to-Gas: Economics Lori Schell Empowered Energy	
Centralized Generation with CC: NGH₂T Ganesan Subbaraman GTI	
Centralized Generation with CC: IGFC and NGFC Ashok Rao APEP	
Electrochemical Conversion with CS Tianyu Cao Tsinghua University	

5:00 pm

DAY 1 PROGRAM CONCLUDES

5:00 – 7:00 pm

NETWORKING RECEPTION: APEP CENTER

7:00 pm

BUS DEPARTS FOR HOTEL

TECHNICAL SESSION

7:30 – 8:30 am

NETWORKING BREAKFAST

8:30 – 10:15 am

Hydrogen Distribution

Moderator

Mike Mac Kinnon
UCI

Session D-1

Distribution and Fueling Infrastructure

John Kato
California Energy Commission

Natural Gas Pipeline

Jeff Reed
Southern California Gas

Hydrogen Materials Interactions

Masanobu Kubota
Kyushu University
I²CNER

Distribution Environmental Impacts

Kersey Manlicic
APEP

10:15 – 10:45 am

NETWORKING BREAK

10:45 – 12:30 pm

Hydrogen Utilization: Electric Power

Moderator

Ashok Rao
UCI

Session U-I

Refueling 100MW Class Gas Turbines

John Marra
Siemens

Refueling 1MW Class Gas Turbines

Tony Lorentz
Capstone

Fuel Cells

Robert Flores
NFCRC

TIGER Stations

Laura Novoa
NFCRC

12:30 – 1:30 pm

LUNCH

TECHNICAL SESSION

1:30 – 3:15 pm

Hydrogen Utilization: Combustion End-Use

Moderator
Vince McDonell
UCI

Session U-II

Combustion Characteristics
Elliot Sullivan-Lewis
UCICL

Industrial Burners
Stephen McCollam
Zinc

Gas Turbines
Andrew Padilla
Solar Turbines

Environmental Impacts
Michael Mac Kinnon
APEP

3:15 – 3:45 pm

NETWORKING BREAK

3:45 – 5:30 pm

Hydrogen Utilization: Transportation

Moderator
Brendan Shaffer
UCI

Session T-1

Light Duty Vehicles
Steve Ellis
Honda

Trams and Medium Duty Vehicles
Nicolas Pocard
Ballard

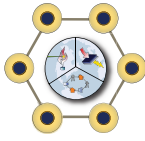
Heavy Duty Vehicles
James Kast
DOE-ORISE

Locomotives
Jack Brouwer
NFCRC

5:30 pm

COLLOQUIUM CONCLUDES
BUS DEPARTS FOR HOTEL

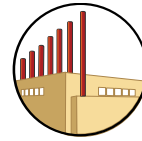
PARTNERS



ADVANCED POWER
AND ENERGY PROGRAM
UC IRVINE



NATIONAL FUEL CELL
RESEARCH CENTER
UC IRVINE



UNIVERSITY OF CALIFORNIA IRVINE
COMBUSTION LABORATORY
UC IRVINE



INTERNATIONAL INSTITUTE
FOR CARBON-NEUTRAL
ENERGY RESEARCH
KYUSHU UNIVERSITY



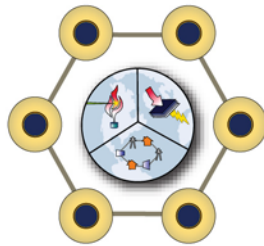
PACIFIC RIM CONSORTIUM ON
ENERGY, COMBUSTION,
AND THE ENVIRONMENT
UC IRVINE

MEDIA PARTNERS



YOUNG PROFESSIONALS IN ENERGY





ADVANCED POWER & ENERGY PROGRAM

UNIVERSITY of CALIFORNIA • IRVINE

<http://www.apep.uci.edu>

Engineering Laboratory Facility, Bldg 323

Irvine, California 92697-3550

Phone 949-824-7302

Fax 949-824-7423