

# INTERNATIONAL CONGRESS ON ENERGY SUSTAINING SUPPLIES 2010

November 7-12, 2010 Salt Palace Convention Center Salt Lake City, UT

### **Letter from the Conference Organizers**

Dear Energy Professionals,

Welcome to the International Conference on Energy (http://energycongress.com) in Salt Lake City, Utah. "Sustaining Supplies," the theme of the conference, will focus on recent developments that will be instrumental to a better understanding of the technologies and the research and development that will stimulate innovative thinking to advance energy supply efforts.

The conference will address critical issues across three key areas:

- Bioenergy
- Fossil fuels with carbon capture and sequestration
- · Alternative energy and enabling technologies

The uniqueness of this conference is that it brings together experts from many fields of energy. Keynote speakers will include:

Solar Based Sustainable Energy Solutions Rakesh Agrawal, Purdue University

Transitioning to Low Carbon Power Generation by Integrating Renewables with Fossil Energy Michael Matuszewski, National Energy Technology Laboratory, DOE

Energy, Water: Sustainability for a Smarter Planet Josephine M. Cheng, IBM

Carbon Management Technologies and the Pace and Scale of Climate Change Mitigation Haroon S. Kheshqi, ExxonMobil Research and Engineering Company

Opportunities at the Energy-Water Nexus David Klanecky, Dow

We are very happy to see you at this important event, which is being brought to you by the Center for Energy Initiatives, a technological community of AIChE.

### T. Bond Calloway, Jr.

Chair, International Congress on Energy: Sustaining Supplies Manager, Alternative Energy Programs Savannah River National Laboratory

### Dale L. Keairns

Chair, Center for Energy Initiatives An AIChE Technological Community Executive Advisor Booz Allen Hamilton

The User's Guide Is Sponsored By



### **Acknowledgements**

The International Congress on Energy would like to recognize the many volunteers and energy professionals who have worked tirelessly to bring this fine program to you. The AIChE technical divisions, their chairs, and session chairs and the 250 experts in the energy areas covered by the ICE program.

We would like to acknowledge the following area chairs; and please excuse any omissions as they were unintentional.

- Fabio Ribeiro of Catalysis and Reaction Engineering
- Scott Keeler of Computing & Systems Technology
- David Silverstein of Education
- Ralph Pike Of Environmental
- Shang-Tian Yang Of Food, Pharmaceutical & Bioengineering
- Jeff Lindsay Of Forest Bioproducts
- Syamal Poddar of Fuels & Petrochemical
- Steve Sherman of Nuclear Engineering
- Raymond Rooks of Process Development
- D.B. Bhattacharyya of Separations
- Amy Miranda of Transport and Energy Processes
- Clare McCabe of Computational Molecular Science & Engineering
- Michael Wong of the Nanoscale Science & Engineering Forum
- Suzanne Kresta of the North American Mixing Forum
- Helen Lou of the Sustainable Engineering Forum
- Hugo Caram of the Particle Technology Forum
- Andre DaCosta of the Executive Board of National Program Committee
- Otis Shelton of the Government Relations Committee
- Deborah Grubbe of the Institute for Sustainability
- Greg Stephanopoulos of the Society for Biological Engineering
- Annette Johnson of the Research and New Technology Committee

### **Featured Speakers and Sessions include:**

### Sustainability Plenary

Monday, November 8, 8:30 - 11:00 am, Salt Palace 250 A Room Papers Include:

"Transitioning to Low Carbon Power Generation by Integrating Renewables with Fossil Energy" Michael Matuszewski, Robert Stevens, Systems Division, Office of Systems, Analyses and Planning

### "Solar Based Sustainable Energy Solutions"

Rakesh Agrawal, Purdue University

#### 2010 Danckwerts Lecture

Monday, November 8, 11:15 - 12:15 pm, Salt Palace Grand Ballroom A/C

"Chemical Engineering Outside the Pipe: Industrial Ecology and Sustainability"

Roland Clift, Center for Environmental Studies, University of Surrey

### **Energy and Water Sustainability for a Smart Planet Plenary**

Monday, November 8, 12:30 - 2:00 pm, Salt Palace Grand Ballroom A/C Papers Include:

"Energy, Water, Sustainability for a Smarter Planet"

Spike Narayan, IBM

"Water and Energy: Integrated Challenges, Integrated Solutions"

Jared Ciferno, U.S. Department of Energy, National Energy Technology Laboratory

"Opportunities at the Energy-Water Nexus: Leveraging Water Treatment Technologies for Efficiency, Economic Prosperity and Sustainability In the 21st Century"

David Klanecky, Dow Water & Process Solutions

### Sustainable Energy Plenary

Monday, November 8, 3:15 - 5:45 pm, Salt Palace 251 D Room Papers Include:

"Global Climate Change and Its Challenge to Long Term Sustainability"

Frank Princiotta, US EPA

"Carbon Management Technologies and the Pace and Scale of Climate Change Mitigation"

Haroon S. Kheshgi, ExxonMobil Research and Engineering Company

"Toward Energy Sustainability"

Costas Tsouris, Oak Ridge National Laboratory Doug S. Aaron, Georgia Institute of Technology Kent Williams, Oak Ridge National Laboratory

### International Forum on Clean and Renewable Energies Plenary

Tuesday, November 9, 8:30 - 11:00 am, Salt Palace 150 F Room Papers include:

"Multi-Scale Methodology for Process Engineering Innovations"

Jinghai Li, Institute of Processing Engineering, Chinese Academy of Sciences

"Conversion of CO<sub>2</sub> Into Chemicals or Fuels with Renewable Energy Inputs"

Rich Masel, Brian A. Rosen, Wei Zhu, Amin Salehi-Khojin, University of Illinois, Urbana - Champaign

"Recent Research Development in Biomass Conversion to Advanced Bio-Fuels"

Johnathan E. Holladay, Pacific Northwest National Lab

### **Upcoming Energy Conference**

### **Energy Measurement Project**

The project's objective is to identify gaps, barriers, and educational requirements that would enable an organization to report accurate, consistent, verifiable, timely, and transparent green house gas values. The team's intent is to learn from early adopters and determine where the greater engineering community can assist in these calculations. What issues need to be addressed such that the integrity of the legislation can be met and with resulting environmental improvement.

The project is a cooperative effort of AIChE, ASCE, ASME, IEEE and AIME.

### **Steering Committee members:**

Dr. Paul Chalmer, National Center for Manufacturing Sciences

Dr. Mary Ann Curran, EPA National Risk Management Research Laboratory

Dr. Subodh Das, Phinix, LLC

Dave Gustashaw, Gustashaw Consulting (facilitator)

Chuck Hookham, HDR

Dr. Beth Kujan, Adjunct, County College of Morris

Dr. Andy Miller, EPA National Risk Management Research Laboratory

Dr. Brajendra Mishra, Colorado School of Mines

Amy Mussen, P.E., Bentley Systems

Learn more at http:aiche.org/fscarbonmgmt/

### **Energy Events**

## AIChE's SEF and Energy Initiatives Board Announce Undergraduate Competition

The AIChE's Sustainable Engineering Forum and Energy Initiative Board announce a competition to promote energy education in K-12 schools for 2010. The program will pair teams of AIChE student chapters and an area K-12 school to work together to develop a hands-on learning activity that addresses curricular needs using energy concepts. \$2,500 prizes will be awarded. Application materials are due December 1, 2010 and can be found at

### http://www.aiche.org/Energy/Education/K12Initiatives.aspx

Each student group will develop a hands-on demonstration or experiment that illustrates an important concept in alternative energy, while also contributing to the K-12 curriculum learning objectives. The group, working in conjunction with an area school, must submit a proposal that describes the specific activity in enough detail so that it can be judged by a group of chemical engineering educators as to its effectiveness.

### AICHE Announces Formation of the Center for Energy Initiatives

**AIChE has formed the Center for Energy Initiatives.** Because of its importance to energy, the Technical Divisions of AIChE Forum are coming together to work on leveraging projects in energy. In announcing the formation of the CEI, AIChE President Henry "Hank" T. Kohlbrand said, "Our members are already working on energy-related issues from multiple perspectives. The new Center will help us network and 'cross-fertilize' and integrate ideas that can advance energy efforts across the board."

Divisions and Forums whose members also are in the CEI are the Catalysis and Reaction Engineering Division; the Computational Molecular Science and Engineering Forum; the Education Division; the Environmental Division; the Food, Pharmaceutical and Bioengineering Division; the Forest Bioproducts Division; the Fuels and Petrochemical Division; the Nanoscale Science and Engineering Forum; the North American Mixing Forum; the Nuclear Engineering Division; the Particle Technology Forum; the Process Development Division; the Separations Division; the Sustainable Engineering Forum; the Transport and Energy Processes Division. Other AIChE entities in CEI include the Institute for Sustainability, the Society for Biological Engineering, the Government Relations Committee, the Research and New Technology Committee, and the Executive Board of the National Program Committee.

CEI is intended to identify, launch, and incubate energy initiatives and new projects that cross the boundaries of existing AIChE entities working in the energy area. CEI serves as a means to leverage the breadth of work carried out and to enable integrated analysis of multi-disciplinary and multi-functional projects.

The CEI grew out of the work of AlChE's Energy Advisory Board, which was formed in 2005 and has already undertaken a number of energy related research and education projects. It has coordinated a project on carbon management for a group of leading engineering societies, made awards for K-12 energy education projects, and developed a "Speakers Academy" of energy experts. Work is currently underway on an inter-society, inter-disciplinary project to develop energy metrics that will allow for consistent comparison of diverse energy options.

**CEI is also developing energy education modules** for the undergraduate chemical engineering curriculum. Periodic CEI newsletters about energy issues will be e-mailed to the members of each entity starting in July. CEI also has a website that will provide more information about energy issues and important links: http://www.aiche.org/energy/.

**One of CEI's new functions** is to highlight and promote energy programming at AIChE meetings and to develop joint energy meetings with other organizations. These are areas where participation by Divisions and Forums is especially needed. To kick off this effort, CEI is conducting the First International Congress on Energy: Sustaining Supplies in conjunction with AIChE's Annual Meeting.

For more information and to subscribe to the energy newsletter, contact energy@aiche.org.

### What does a member of CEI get?

Members get a growing menu of benefits, including:

- A monthly e-newsletter updating energy-related developments and CEI initiatives
- Access to a broad network of professionals working on energy-related issues from multiple perspectives
- The opportunity to shape and participate in CEI sponsored-projects and undertakings that directly address specific energy-related issues important to working professionals
- Inolvement in energy-related primary, secondary and undergraduate education projects and competitions
- Greater recognition of, and appreciation for, chemical engineers' important contributions to our energy future

**To become a CEI member,** just join one of the above Divisions and Forums of AIChE. You will not only become a member of CEI, you will also enjoy the full benefits of the Division or Forum that you join. Join by contacting energy@aiche.org



Monday	Session #	Session Title	Room				
8:30am-11:00a	n 15	Catalytic Biofuels Refining	Marriott Grand Ballroom H		•	_	
	19	Electrocatalysis for PEM Fuel Cells I	Salt Palace 254 C			•	
	24	Heavy Oil and Other Challenging Resources I	Marriott Deer Valley I			•	
	25	Hydrogen Separation and Storage	Hilton, Seminar Theater			•	
	26	Hydrogen Storage System Engineering and Applications: Infrastructure	Marriott Alta Room			•	
		and Delivery Systems					
	44	Ned Division Student Award Competition	Marriott SnowBird Room				•
	50	Research Frontier of Water Sustainability	Salt Palace 150 F				•
	63	Sustainability Plenary	Salt Palace 250 A				•
	64	Sustainable Biomass Feedstock Production and Supply for the	Salt Palace 251 A		•		
		Emerging Biorefinery Industry					
11:15am-12:15p	m 73	2010 Danckwerts Lecture	Salt Palace Grand Ballroom A/C				4
12:30pm-3:00pi	n 81	Biobased Materials II	Salt Palace 150 C		•		
	82	Biomass Gasification	Marriott Grand Ballroom H		•		
	89	Developments in Biobased Alternative Fuels I	Salt Palace 251 A		•		4
	91	Electrocatalysis for PEM Fuel Cells II	Salt Palace 254 C			•	
	99	Heavy Oil and Other Challenging Resources II	Marriott Deer Valley I			•	
	100	Hydrogen Storage System Engineering and Applications: Materials and	Marriott Alta Room			•	
		Storage Risk Reduction					
	117	Plenary: Energy and Water Sustainability for a Smart Planet	Salt Palace Grand Ballroom A/C	•			4
	127	Unconventional Technologies for CO <sub>2</sub> Capture, Conversion and Utilization I	Salt Palace 151 F		•		
3:15pm-5:45pm	1 134	Biobased Materials III	Salt Palace 150 C		•		
	135	Biomass Pyrolysis	Marriott Grand Ballroom H		•		
	136	Catalytic Processing of Fossil and Biorenewable Feedstocks: Chemicals	Salt Palace 150 D/E		•		
	140	Conversion of Solid Wastes to Energy and/or Product	Salt Palace 150 F	•			
	142	Developments in Biobased Alternative Fuels II	Salt Palace 251 A				4
	149	Geothermal Engineering	Marriott Deer Valley I	•			
	151	Hydrogen Storage System Engineering and Applications: System Modeling	Marriott Alta Room			•	
	172	Reaction Engineering for Biomass Conversion	Salt Palace 150 G		•		
	176	Session in Honor of Professor Anthony Fane: Membrane Separations for	Marriott Grand Ballroom B/C				4
		Sustainable Water and the Environment					
	179	Sustainable Energy Plenary	Salt Palace 251 D				•
	181	Technologies for Reductions of Emissions From Stationary Combustion Sources	Marriott Grand Ballroom J		•		
	182	Unconventional Technologies for CO <sub>2</sub> Capture, Conversion and Utilization I	Salt Palace 151 F		•		
Tuesday	Session #	Session Title	Room				
8:30am-11:00a	n 200	Biological Conversions and Processes for Renewable Feedstocks	Salt Palace 254 A		•		
	206	Case Studies in Sustainability Science and Engineering	Salt Palace 251 D				•
	208	Catalytic Processing of Fossil and Biorenewable Feedstocks: Fuels I	Marriott Grand Ballroom F		•		
	218	Fundamentals of Hydrogen Production: Reactions, Separations and	Marriott Grand Ballroom J			•	
		Reactive Separations					
	221	Hydrogen Storage System Engineering and Applications: Applied Materials Development I	Marriott Alta Room			•	
	226	Integrated Processes for Biochemical Conversion of Renewable Feedstocks to Fuels and Chemicals I	Salt Palace 251 A				•
	228	International Forum On Clean and Renewable Energies (plenary)	Salt Palace 150 F	•			
	248	Sustainable Fuel From Renewable Resources	Salt Palace 251 E		•		



Tuesday	Session :	# Session Title	Room				
12:30pm-3:00p	m 265	Catalytic Processing of Fossil and Biorenewable Feedstocks: Fuels II	Marriott Grand Ballroom F	•			
•	270	Design for Sustainability	Salt Palace 251 D				•
	273	Electrocatalysis and Photoelectrocatalysis: Fundamentals and Applications I	Salt Palace 151 F			•	
	276	Forest Products Biorefinery Feedstock and Logistics	Salt Palace 150 C	•			
	278	Fundamentals of Environmental Sustainability	Marriott Grand Ballroom J				•
	280	Gasification Process Development	Marriott Grand Ballroom B/C	•			
	283	Hydrogen Storage System Engineeering and Applications:	Marriott Alta Room			•	
		Applied Materials Development II					
	285	Integrated Processes for Biochemical Conversion of Renewable Feedstocks	Salt Palace 150 G				•
		to Fuels and Chemicals II					
	286	Lithium Battery Technology and Materials	Marriott Grand Ballroom H			•	
	305	Sustainable Diesel Fuel From Renewable Resources	Salt Palace 251 E				•
3:15pm-5:45p	m 315	Biorefinery: Separation & Transport in Lignocellulosic Conversion Processes	Salt Palace 150 C	•			
	317	Catalytic Processing of Fossil and Biorenewable Feedstocks: Fuels III	Marriott Grand Ballroom F	•			
	319	Challenges in Small Scale Syngas Pilot Plants	Marriott Grand Ballroom G	•			
	325	Developments in the Pretreatment of Lignocellulosics for Bioconversion	Salt Palace 151 G	•			
	326	Electrocatalysis and Photoelectrocatalysis: Fundamentals and Applications II	Salt Palace 151 F			•	
	327	Energy Systems Design and Alternative Energy Sources	Salt Palace 250 E				•
	333	Green and Renewable Energy Aspects of Nanotechnology	Marriott Grand Ballroom A	•			
	336	Hydrogen Storage System Engineering and Applications:	Marriott Alta Room			•	
		Applied Materials Development III					
	341	Microbial Engineering of Microorganisms for Biofuels and Chemicals I	Salt Palace 251 A	•			•
	343	Modeling and Computation in Energy and the Environment	Salt Palace Grand Ballroom H				•
	357	Polymers for Energy Production and Storage	Salt Palace 252 A/B			•	
	361	Sustainable Electricity: Generation and Storage	Salt Palace 251 E	•			•
	364	Water-Energy-Climate Nexus in An Urban Environment	Salt Palace 251 D				•
6:00pm-8:00p	m 368	Hydrogen Storage System Engineering and Applications: Poster Session	Salt Palace Hall 1			•	
	374	Poster Session: Sustainability and Sustainable Biorefineries	Salt Palace Hall 1	•			•
Wednesday	Session :	# Session Title	Room				
8:30am-11:00a	m 376	Advanced Oxidation/Reduction Applications: Liquid/Gas Phase I	Marriott Grand Ballroom A	_		•	
	378	Advances in Fermentation and Biological Conversion	Salt Palace 255 A				
	380	Advances in Metabolic Engineering and Bioinformatics I - Biofuels	Salt Palace 255 F				
	387	Biorefinery - Biochemical Conversion and Biomass Recalcitrance	Salt Palace 150 C	•			
	389	Carbon Dioxide Injection in Underground Formations	Marriott Deer Valley I				
	393	Complexity, Networks, Dynamics, and Sustainability	Salt Palace 251 D				
	397	Design of Sustainable Processes	Salt Palace 250 E				•
	398	Energy Efficiency, Challenges and Solutions	Salt Palace 251 E		•		
	399	Environmental Biotechnology: Green Bioprocessing	Salt Palace 255 D	•			
	403	Hydrogen Storage System Engineering and Applications: Heat and	Marriott SnowBird Room			•	
		Mass Transfer Modeling					
	413	Nanomaterials for Photovoltaics I	Salt Palace 150 F				•
	417	Novel Battery Chemistry and Technology	Marriott Grand Ballroom H			•	
	418	Optimization and Control of Energy Systems I	Salt Palace 250 B				
	419	Oxycombustion of Coal - Need, Opportunities, and Challenges I	Marriott Park City Room			•	
	425	Reaction Engineering for Combustion and Pyrolysis I	Salt Palace 150 A/B	•			
	427	Renewable Hydrogen Production I	Marriott Alta Room			•	
	428	Separations for Renewable and Sustainable Energy Development I	Marriott Grand Ballroom F	•			
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ednesday S	Session	# Session Title	Room							
0am-11:00am	431	Sustainable Biorefineries Plenary Session (Invited Papers)	Salt Palace Grand Ballroom E		•				_	
30pm-3:00pm	443	Alternative Fuels and Enabling Technologies	Marriott Grand Ballroom H	•						
	449	Biobased Fuels and Chemicals I	Salt Palace 255 A		•					
	452	Biorefinery - Thermochemical Conversion of Biomass I	Salt Palace 150 C		•					
	455	Catalytic Hydrogen Generation for Fuel Cell Applications I	Salt Palace 151 F						•	
	461	Developments in the Pretreatment of Lignocellulosics for Bioconversion II	Salt Palace 251 A							
	467	Innovations in Bio-Refinery Processes	Marriott Grand Ballroom B/C		•					
	472	Materials for Alternative Energy: Solar Cells	Salt Palace 251 E							•
	474	Microbial Engineering of Microorganisms for Biofuels and Chemicals II	Salt Palace 251 D		•					
	479	Nanomaterials for Photovoltaics II	Salt Palace 150 F		_					
	486	Optimization and Control of Energy Systems II	Salt Palace 250 B							
	487	Oxycombustion of Coal - Need, Opportunities, and Challenges II	Marriott Park City Room							
	490	Reaction Engineering for Combustion and Pyrolysis II	Salt Palace 150 A/B							
	491	Renewable Hydrogen Production II	Marriott Alta Room							
	493	Separations for Renewable and Sustainable Energy Development II	Marriott Grand Ballroom F							
	494	Separations Needs for CO <sub>2</sub> Capture I	Marriott Grand Ballroom G							
	494	Solid/Liquid Separation Processes for Energy and Environmental Systems	Salt Palace 253 A							
nm Er4Enm			Marriott Alta Room							
pm-5:45pm	506	Advances in Thermochemical Hydrogen Production							•	
	508	Alternative Fuels and Enabling Technologies II	Marriott Grand Ballroom H		•					
	512	Biobased Fuels and Chemicals II	Salt Palace 255 A		•					
	517	Biorefinery - Thermochemical Conversion of Biomass II	Salt Palace 150 C		•					
	519	Catalytic Biomass Conversion to Chemicals	Marriott Cottonwood		•					
	520	Catalytic Hydrogen Generation for Fuel Cell Applications II	Salt Palace 151 F						•	
	525	Climate Change Legislation and Regulation	Marriott Grand Ballroom J						•	
	529	CO <sub>2</sub> Capture, Control and Sequestration	Salt Palace 251 E			•				
	532	Developments in the Pretreatment of Lignocellulosics for Bioconversion III	Salt Palace 251 D							
	552	Oxycombustion of Coal - Need, Opportunities, and Challenges III	Marriott Park City Room					•		
	555	Process and Product Development for Sustainability	Marriott Grand Ballroom B/C							
	557	Reactor Engineering for Biomass Feedstocks	Salt Palace 251 A		•					
	561	Separations Needs for CO <sub>2</sub> Capture II	Marriott Grand Ballroom G			•				
om-8:00pm	567	Poster Session: Bioengineering	Salt Palace Hall 1		•					
	Session	ı # Session Title	Room				J	Ļ		
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		Advances in Gasification Research I	Marriott Brighton Room		•					
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	574	Advances in Gasification Research I	Marriott Brighton Room	•	•					
	574 576	Advances in Gasification Research I Alternative Fuels	Marriott Brighton Room Salt Palace 150 A/B	•	•					
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m-11:00am	574 576 577 580 582 583 606 611 613 617 618	Advances in Gasification Research I  Alternative Fuels  Alternative Fuels and Enabling Technologies III  Biorefinery - Improved Utilization of Co-Products From Biorefinery  Catalytic Conversion of Renewable Resources to Synthesis Gases and Pyrolysis Oils  Catalytic Hydrogen Generation - General I  Nanomaterials for Energy Storage I  Novel Processes for Carbon Capture  Pilot Plants for Green and Sustainable Processes I  Reaction Kinetics and Transport Fundamentals for Biomass Conversion I  Reactions and Separations for Hydrogen Production	Marriott Brighton Room Salt Palace 150 A/B Marriott Grand Ballroom H Salt Palace 150 C Salt Palace 251 A  Salt Palace 251 D Salt Palace 150 F Salt Palace 251 E Marriott Grand Ballroom B/C Salt Palace 251 B Marriott Alta Room		•				•	
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opm-3:00pm	574 576 577 580 582 583 606 611 613 617 618	Advances in Gasification Research I  Alternative Fuels  Alternative Fuels and Enabling Technologies III  Biorefinery - Improved Utilization of Co-Products From Biorefinery  Catalytic Conversion of Renewable Resources to Synthesis Gases and Pyrolysis Oils  Catalytic Hydrogen Generation - General I  Nanomaterials for Energy Storage I  Novel Processes for Carbon Capture  Pilot Plants for Green and Sustainable Processes I  Reaction Kinetics and Transport Fundamentals for Biomass Conversion I  Reactions and Separations for Hydrogen Production	Marriott Brighton Room Salt Palace 150 A/B Marriott Grand Ballroom H Salt Palace 150 C Salt Palace 251 A  Salt Palace 251 D Salt Palace 150 F Salt Palace 251 E Marriott Grand Ballroom B/C Salt Palace 251 B Marriott Alta Room		•				•	



Thursday	Session	# Session Title	Room						
12:30pm-3:00pi	n 630	Catalytic Hydrogen Generation - General II	Salt Palace 251 D					•	
	631	Chemical and Catalytic Conversions and Processes for Renewable Feedstocks	Salt Palace 251 A		•				•
	632	Chemical Engineering Advances in Processing Radioactive Wastes and Nuclear Materials	Marriott SnowBird Room					•	
	638	Developments in Electrolytic Routes to Hydrogen I	Marriott Alta Room					•	
	640	Energy and Operations	Salt Palace 250 D						•
	641	Fuel Cell Technology	Marriott Grand Ballroom H					•	
	646	Innovative Carbon Capture and Storage Processes	Salt Palace 251 E						•
	647	Interfacial Phenomena in Energy Systems	Hilton, Canyon A					•	
	655	Nanomaterials for Energy Storage II	Salt Palace 150 F	•					
	663	Pilot Plants for Green and Sustainable Processes - II	Marriott Grand Ballroom B/C	•					•
	669	Reaction Kinetics and Transport Fundamentals for Biomass Conversion II	Salt Palace 251 B		•				•
	671	Syngas Production and Gas-to-Liquids Technology	Salt Palace 150 D/E		•				
3:15pm-5:45pn	674	Advances in Algal Biorefineries I	Salt Palace 251 A		•				•
	675	Advances in Biofuels: DOE Bioenergy Research Centers I	Salt Palace 251 B		•				•
	676	Advances in Numerical Simulations Bridging Chemical and Nuclear Engineering Phenomena or Processes	Marriott SnowBird Room					•	
	679	Biomass and Biorenewables Processing Under Pressure	Hilton, Alpine Ballroom East		•				
	683	Catalytic Hydrogen Generation - General III	Salt Palace 251 D					•	
	685	CO <sub>2</sub> Capture by Adsorption I	Salt Palace 250 A			•			
	687	Developments in Electrolytic Routes to Hydrogen II	Marriott Alta Room					•	
	690	Fuel Cell Technology II	Marriott Grand Ballroom H					•	
	696	Membranes for Hydrogen Purification	Marriott Grand Ballroom G					•	
	702	Nanomaterials for Hydrogen Production and Fuel Cells I	Salt Palace 150 F						
	705	Nanowires II: Energy Conversion and Storage Applications	Hilton, Seminar Theater					•	
	712	Solvent and Membrane Processes for Carbon Capture	Salt Palace 251 E						•
Friday	Session	# Session Title	Room						
8:30am-11:00ai	717	Adsorption Processes in Energy Applications	Salt Palace 254 C			•			
	718	Advances in Algal Biorefineries II	Salt Palace 250 E		•				•
	719	Advances in Biofuels: DOE Bioenergy Research Centers II	Salt Palace 251 B		•				•
	720	Carbon Dioxide/Hydrogen/Mercury Separation/Storage	Marriott Grand Ballroom I				•		
	731	Life Cycle Analysis of Renewable Feedstock-Based Processes and Products	Salt Palace 251 A		•				•
	732	Membranes for Advanced Fossil Energy Systems	Marriott Grand Ballroom G				•		
	737	Nanomaterials for Energy Production and Fuel Cells II	Salt Palace 150 F					•	
	747	Sorptive Processes for Use in Carbon Dioxide Capture	Salt Palace 251 E						•

### **AIChE Energy Advisory Board**

Chair: Dale Keairns, Science Applications International Corporation and Past President, AIChE

The following individuals played a vital role in the development and launch of the AlChE Energy Initiative. Thanks to:

Bond Calloway, Savannah River National Laboratory

**John Chen,** Lehigh University and Past President, AIChE

**H. Scott Fogler,** President, AIChE and University of Michigan

Dennis Griffith, Granherne

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Darlene Schuster, AIChE Institute for Sustainability

**Subhas Sikdar,** US EPA, Chair AIChE Institute for Sustainability

June Wispelwey, AIChE Executive Director

### **Acknowledgement**

Amos Avidan, VP, Bechtel Corporation

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**William Jacobi,** General Manager Nuclear Technology (retired), Westinghouse Electrical Corporation

**Dale Keairns,** Senior Advisory Engineer, Science Applications International Corporation (SAIC)

**Jeffrey Siirola,** Technology Fellow, Eastman Chemical Co., AIChE President '05

June C. Wispelwey, Executive Director, AIChE

### **Energy Initiative Sponsor**





### **Register Today**

### **International Congress on Sustainable Science & Engineering**

January 9-13, 2011 • Tucson, AZ J.W. Marriott Starr Pass Resort

The purpose of the Congress is to provide a common platform for practitioners of various physical and ecological sciences, engineering fields, economics, and social sciences to exchange emerging ideas about ways and means of protecting the environment and its resources so that humans can achieve sustained economic growth and societal benefits through generations. The focus of this Congress is managing natural resources sustainability from a systems perspective using scientific and engineering innovations.

### **Congress Chair**

**Subhas Sikdar,** US EPA, NREL Congress Vice Chair **Glenn Schrader,** University of Arizona

### **Steering Committee**

- Subhas Sikdar (US EPA)
- Glenn Schrader (University of Arizona)
- Elyn Beary (NIST)
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- Darlene Schuster (IFS-AIChE)
- Hamid Arastoopour (Wanger Institute for Sustainability, IIT)
- Hratch Semerjian (CCR)

### **Contact Information**

1 520-621-6569

### **Congress Topics:**

- Plenary session on industrial sustainability pathways and programs by invited industry leaders
- Sustainability practice in industry:
  - o Sustainable natural resource management
  - o Sustainable manufacturing
  - o Green chemistry and engineering for products and processes
  - o Sustainable materials and product design
  - o Product life cycle assessment
  - o Re-use, recycle, and re-manufacturing strategies
- Sustainable value/supply chains
- Sustainable built environments
- Infrastructure for energy and resource utilization efficiency
- · Technology for water sustainability and management
- Water sustainability and sustainable water management
- Sustainable energy
  - o Advances in alternative transportation energy and storage (e.g., biofuels, electric)
  - o Advances in non-fossil fuel power generation (e.g., solar, bio-mass)
- Metrics for sustainability
- Standards and protocols
- Educational opportunities and international collaboration

### Why you should attend

If you are engaged in scientific endeavors or engineering advancements that you believe can impact the state of sustainability implementation in providing the products and services required by society, you must plan to be part of this congress.

#### What over 200 attendees liked about ICOSSE09:

- "Excellent plenary presentations and a good mix of academic and business presenters"
- "Mixed representation from industry, service providers and academics"
- "The High quality talks by industry"
- "Large number of senior level EPA personnel in attendance"
- "International aspect & participation for great global viewpoints"
- "Linkages between the sustainability dimensions of energy, water and land"

For more congress information or to register go to www.icosse11.org



### Plan to attend the

33<sup>rd</sup> Symposium on Biotechnology for Fuels and Chemicals

May 2-5, 2011 Sheraton Seattle Seattle, WA



Photos courtesy of Seattle CVB

**Abstract site open:** September 2010

**Deadline for abstract submission:** December 10, 2010

Registration opens: January 7, 2011

### 2011 Chairs

Jim McMillan NREL jim.mcmillan@nrel.gov

NREL @nrel.gov bill.adney@nrel.gov

### 2011 Co-chairs

Thomas Klasson USDA-ARS-SRRC Jonathan Mielenz

Bill Adney

ORNL

tklasson@srrc.ars.usda.gov mielenezjr@ornl.gov

### **NOTES**

# National Sustainable Design Expo

featuring EPA's

people,
prosperity,
and the planet

Washington, DC • April 16-17, 2011 • www.epa.gov/P3



- Raise your company's brand awareness and profile as a sustainability leader
- Discuss your company's sustainable practices with representatives of federal agencies, industry, the public and Congress
- Meet over 400 P3 awarding-winning college students developing technologies in sustainability science and engineering
- Enjoy pre-Expo and on-site coverage in local and national media
- Expose thousands of people to your company (booth traffic estimated at 5,000 people)

The 7th Annual National Sustainable Design Expo featuring EPA's P3 Award will be held April 16 and 17, 2011, on the National Mall in Washington, D.C.

AIChE is co-sponsoring this event and has a limited number of exhibit spaces available to companies to promote and display their leadership in sustainability and environmental protection.

Sponsors are given a unique opportunity to showcase their contributions to advancing sustainability while discovering innovative, cutting-edge technologies and meeting over 400 university students in engineering, sciences, law, economics, architecture and other fields.

The Expo brings together a diverse group of scientists, engineers, and business leaders to discuss innovations designed to advance economic growth while reducing environmental impact and to showcase their approaches to sustainability to the interested public.

More information on the P3 competition is available at: http://www.epa.gov/p3

"The event gave us an opportunity to engage members of public, students and policy makers with the science behind our sustainability products."

- **Shawn Hunter**The Dow Chemical Company





"Advancing the Greener Supply Chain"

Call for Papers

March 16-18, 2011 Hyatt Regency Chicago

### Advancing the Greener Supply Chain

### Symposium Overview

This event is the primary forum for education and discussion of practical and technological advances related to sustainable packaging. The Sustainable Packaging Symposium is the first conference that brings together the entire packaging supply chain including scientists, engineers, academia, raw material manufactures, package convertors, suppliers, brand owners and retailers.

### **About Us**

The Sustainable Packaging Symposium (SPS) is a joint venture of Greener Package and the Institute for Sustainability, an AIChE Technology Community. This first-ever collaboration aims to further the scientific and technical foundations of sustainable packaging by bringing engineers and scientists with expertise in sustainability together with professionals who develop and/or specify packaging materials and technologies.

### Paper Criteria

Submitted papers should examine the pivotal role of packaging as a key enhancement to sustainability across a part of or the entire supply chain. Presentations should include the sound science and technical groundwork essential for successful outcomes. Papers of the highest quality will be selected for presentation and/or publication in the proceedings.

### Paper Topics to Include

- Sustainable Packaging Case Studies
- Life Cycle Assessments
- What is a Greener Package?
- Greener Feed-stocks
- Greener Processing
- Green Measurement
- Scorecards, Benchmarks, Metrics
- Opportunities to Improve Sustainability in the Package Supply Chain
- Prevention of Unintended Consequences
- Cost Assessment
- Business Propositions for Sustainable Packaging
- Least Cost Portfolios

Call for Papers Deadline: January 15, 2011

Paper submission and instructions visit http://aiche.confex.com/aiche/sps11/cfp.cgi

**Symposium Information:** 

http://www.sustainablepackagingsymposium.com/

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