



# AIChE Sustainable Engineering Forum Newsletter

Vol. 2 No. 2

June 2008

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**SEF Website:**  
<http://aiche.org/sef/>



## MESSAGE FROM CHAIR

Over the past three months, the entire Sustainable Engineering Forum leadership team has been hard at work, initiating new programs and improving upon existing initiatives.

A key accomplishment since the last publication is in the initiation of the SEF award programs. Thanks to the tireless efforts of our Awards Committee Chair, Thomas Marrero, we have successfully launched two new award programs – a Research Excellence Award and a Student Paper Award. The awards will be presented during the AIChE Annual Meeting in Philadelphia in November. Other areas of growth for the SEF include initiating the process for the development of sustainability related educational modules for use in undergraduate and graduate courses; this effort is led by Robert Hesketh. Additionally, the SEF will be co-sponsoring the First International Congress on Sustainability Science and Engineering, which will be held in mid to late August 2009 in Cincinnati, OH. Furthermore, we have many interesting sessions scheduled for the upcoming annual meeting in Philadelphia. Each of these activities is discussed in further detail later in the newsletter.

The executive committee also recently voted for the SEF to participate in the AIChE initiative which provides free membership into various AIChE Divisions and Forums for students. Our expectation through participation in this program is to broaden our membership base and impress the value of sustainability focused education and research in the chemical engineering and related fields. In addition, as always, a great deal of gratitude and appreciation must also be given to Earl Beaver for his tireless efforts in organizing virtual meetings, which cover a broad spectrum of sustainability topics. Please check the newsletter for a complete list of upcoming virtual meetings, we hope you find the topics interesting and that you participate in them.

Due to our committed leadership team and the continued support from the Institute for Sustainability (IfS), the SEF has been able to achieve many accomplishments; however, there is still a great deal of work to be done. Please enjoy the information provided in this newsletter and thank you for your continued support of our efforts, as our membership is a pivotal component to the success of the Forum.

Yinlun Huang  
Chair, Sustainable Engineering Forum

## ANNOUNCEMENTS

### AIChE 2008 Annual Meeting – SEF Programming

The AIChE 2008 Annual Meeting is quickly approaching, to be held November 16-21, 2008 in Philadelphia, PA. The SEF will sponsor three topical sessions, a Sustainability Topical (Topical E), which contains 8 oral sessions, a Sustainable Biorefineries Topical (Topical 4), which includes 11 oral sessions and 1 poster session, and a Green Engineering and Sustainability in the Pharmaceutical Industry Topical (Topical 5). The SEF will sponsor this Topical in conjunction with the Pharmaceutical Division, which will include 8 oral sessions and a speaker luncheon. The full listing of SEF programming is provided in the tables below:

For more detailed information regarding all programming at the Annual meeting, please visit: <http://aiche.confex.com/aiche/2008/cfp.cgi>

### AIChE 2008 Annual Meeting – Green Engineering and Sustainability Engineering Luncheon

The SEF will co-sponsor a luncheon, together with the Pharmaceutical Division, during the AIChE Annual Meeting in Philadelphia. The event is organized and arranged as part of the SEF Topical 5: Green Engineering and Sustainability in the Pharmaceutical Industry.

The luncheon speaker will be Dr. Karen Klimas, Vice-President of Global Safety and the Environment with Merck & Co., Inc. Her talk will discuss “The Road to a Sustainable Future for the Pharmaceutical Industry.” Advanced registration is required.

Date: Wednesday, November 19<sup>th</sup>, 2008

Time: 11:15 a.m. - 12:15 p.m.

Location: Philadelphia Marriott/Pennsylvania Convention Center, Room: TBD

Cost: \$15/person

#### Topical E: Sustainability

Session	Chairs	Chairs E-Mail
Design for Sustainability	M. El-Halwagi	el-halwagi@tamu.edu
	U. Diwekar	urmila@vri-custom.org
Practical Approaches to Sustainability and Business Success	S. Veith	susanne.r.veith@usa.dupont.com
	J. Xiao	jiexiao@wayne.edu
Sustainability Plenary	S. Sikdar	sikdar.subhas@epa.gov
	Y. Huang	yhuang@wayne.edu
Sustainable Fuels	R. Pike	pike@lsu.edu
	T. Yonemoto	toshiy@rpel.che.tohoku.ac.jp
Systems Analysis of Sustainability	A. Karunanithi	karunanithi.arunprakash@epamail.epa.gov
	K. Mochidzuki	mochi@iis.u-tokyo.ac.jp
Sustainable Energy	W. Barrett	barrett.williamm@epa.gov
	K. Liu	liuk@research.ge.com
Sustainability Education	R. Hesketh	hesketh@rowan.edu
	M. Eden	edenmar@auburn.edu
Prediction of Sustainability Performance by Computation	P. Blowers	blowers@engr.arizona.edu
	M. Goto	mgoto@kumamoto-u.ac.jp

#### Topical 4: Sustainable Biorefineries

Session	Chairs	Chairs E-Mail
Sustainable Biorefineries Plenary Session	B. Dien	dienb@ncaur.usda.gov
	D. Thompson	david.thompson@inl.gov
Sustainable Biomass Feedstock Production and Supply for the Emerging Biorefinery Industry	J. Hess	JRichard.Hess@inl.gov
	T. Richard	trichard@psu.edu
Catalytic Conversion of Renewable Resources to Synthesis Gases and Pyrolysis Oils	T. Foust	thomas_foust@nrel.gov
	J. Cobb Jr.	cobb@engr.pitt.edu

**Topical 4: Sustainable Biorefineries (cont'd)**

Session	Chairs	Chairs E-Mail
Pretreatment of Lignocellulosic Biomass and Interactions with Other Processing Steps I and II	R. Elander	richard_elande@nrel.gov
	T. Kim	thkim@iastate.edu
Reactor Engineering for Biomass Feedstocks	M. Antal Jr.	mantal@hawaii.edu
	Y. Matsumura	mat@hiroshima-u.ac.jp
	K. Mochizuki	mochi@iis.u-tokyo.ac.jp
Chemical and Catalytic Conversions and Processes for Renewable Feedstocks I and II	D. Miller	millerd@egr.msu.edu
	S. Staggs-Williams	smwilliams@ku.edu
Integrated Processes for Biochemical Conversion of Renewable Feedstocks to Fuels and Chemicals	N. Mosier	mosiern@purdue.edu
	K. Taconi	taconik@email.uah.edu
Developments in Biobased Alternative Fuels	B. Duff	bduff@bbbiofuels.com
	M. Rajchel	Marcus.Rajchel@forerunnercorp.com
Life Cycle Analysis of Renewable Feedstock-Based Processes and Products	D. Shonnard	drshonna@mtu.edu
	C. Alles	carina.alles@usa.dupont.com
Poster Session: Sustainability and Sustainable Biorefineries	C. Perkins	Christopher.Perkins@colorado.edu
	D. Thompson	david.thompson@inl.gov

**Topical 5: Green Engineering and Sustainability in the Pharmaceutical Industry**

Session	Chairs	Chairs E-Mail
Green Engineering and Sustainability in the Pharmaceutical Industry	R. Hesketh	hesketh@rowan.edu
	M. Savelski	savelski@rowan.edu
	C. Slater	slater@rowan.edu
Benign/Safer Solvents in Pharmaceutical Processing	D. Constable	David.c.constable@gsk.com
	A. Lee-Jeffs	aleej@corus.jnj.com
Pharmaceutical Environmental Metrics - LCA	C. Jimenez-Gonzalez	conchita.j.gonzalez@gsk.com
	C. Slater	Slater@rowan.edu
Green Reactions in the Pharmaceutical Industry	S. Katti	sanjeev.katti@genzyme.com
	A. Mehrotra	amit.q.mehrotra@gsk.com
The Business Case for Sustainability in the Pharmaceutical Industry	A. Lee-Jeffs	aleej@corus.jnj.com
	J. Leazer	john_leazer@merck.com
Government Programs and Partnerships	N. Nguyen	nguyen.nhan@epa.gov
	R. Engler	engler.richard@epa.gov
	S. Austin	austin.sharon@epa.gov
Batch to Continuous Pharmaceutical Processing Challenges	D. Pilipauskas	daniel.pilipauskas@pfizer.com
	F. Muzzio	muzzio@soemail.rutgers.edu
Green Separations in the Pharmaceutical Industry	A. Marchut	alexander.marchut@bms.com
	M. El-Halwagi	el-halwagi@tamu.edu
Green Engineering and Sustainability Engineering Luncheon	R. Hesketh	hesketh@rowan.edu
	M. Savelski	savelski@rowan.edu
	C. Slater	slater@rowan.edu
	J. Leazer	john_leazer@merck.com

## SEF Announces Award Programs

The AIChE Sustainable Engineering Forum has initiated two new award programs – a Research Excellence Award and a Student Paper Award. The deadline for all applications/nominations is August 1, 2008. The awards will be presented during the AIChE Annual Meeting in Philadelphia, November 16-21, 2008.

For more information regarding how to apply, along with the official award announcements, please visit the “Awards” section of the SEF website (<http://www.aiche.org/sef>).

## SEF Virtual Meetings--Topics and Dates for 2nd half of 2008

The virtual meeting topics and dates have been set for July 2008 through January 2009. After experimenting with various days and times, it has been decided that this next set of virtual meetings will be held on the 3<sup>rd</sup> Tuesday of each month at 2 pm ET.



The web cast trial is still underway, however based on initial participant feedback, the majority of the next 6 virtual meetings will be held by teleconference with all PowerPoint and supplemental materials to be posted on the SEF website ahead of time. The standing call in number, regardless if by web cast or teleconference, is (303) 928-2693, meeting number 3329706.

- Tuesday July 15<sup>th</sup>, 2008, 2 pm ET: Sustainability: Ethics and Engineering Practice
- Tuesday August 19<sup>th</sup>, 2008, 2 pm ET: AIChE Sustainability Index (sm) Benchmark for Industry
- Tuesday September 16<sup>th</sup>, 2008, 2 pm ET: Coal Liquids
- Tuesday October 21<sup>st</sup>, 2008, 2 pm ET: Center for Sustainable Technology Practices Sustainability Guide for Industry

- Tuesday November 18<sup>th</sup>, 2008, 2 pm ET: “Sustainability Actions an Individual Can Take.” Hosted by Robert Sylvester of DuPont during the AIChE Annual Meeting in Philadelphia.
- Tuesday December 16<sup>th</sup>, 2008, 2 pm ET: Sustainability and the Packaging Industry
- Tuesday January 19<sup>th</sup>, 2009, 2 pm ET: Sustainability and the Olympics.

Anyone with discussion contributions, ideas for future topics, or to volunteer as a speaker, is encouraged to contact Earl Beaver at [Erbeav@aol.com](mailto:Erbeav@aol.com). For more information regarding each virtual meeting or to register, contact [ifs@aiche.org](mailto:ifs@aiche.org).

## Past SEF Virtual Meetings

Information regarding past and upcoming virtual meetings is available on the SEF website ([http://webpages.eng.wayne.edu/~as8971/AIChE\\_SEF/workshops.htm](http://webpages.eng.wayne.edu/~as8971/AIChE_SEF/workshops.htm)). Please contact Earl Beaver if you are interested in a detailed summary of the main discussion points from these previous virtual meetings or for suggestions for future virtual meeting topics.

## Laboratories for the 21st Century (Labs21®) 2008 Annual Conference and Call for Presenters

The Laboratories for the 21<sup>st</sup> Century (Labs21®) 2008 Annual Conference will take place from September 16–18, 2008, at the San Jose McEnergy Convention Center in San Jose, CA.

Labs21, co-sponsored by the International Institute for Sustainable Laboratories (I<sup>2</sup>SL), the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Energy (DOE), provides a unique forum for industry leaders and professionals to discuss the challenges and opportunities facing sustainable laboratory design, construction, and operation worldwide.

For more information please visit the Labs21 website at [www.labs21century.gov/conf](http://www.labs21century.gov/conf) or contact Mr. Phil Wirdzek by phone, (703) 841-5484, or e-mail, [labs21@i2sl.org](mailto:labs21@i2sl.org).

## SEF ACTIVITIES

### **First International Congress on Sustainability Science and Engineering: Where Science and Engineered Technologies Meet the Needs of Society**

The SEF, together with the U.S. Environmental Protection Agency (EPA), American Society of Mechanical Engineering (ASME), Institute for Sustainability (AIChE), and National Institute of Standards and Technology, is co-sponsoring the First International Congress on Sustainability Science and Engineering. The symposium will be held in mid to late August 2009 in Cincinnati, OH.

The focus of the symposium is to provide a common platform to practitioners of various physical and ecological sciences, engineering fields, economics, and social sciences for exchanging emerging ideas about ways and means of protecting the environment and its resource depletion so that humans can achieve sustained economic growth and societal benefits through generations. Products, processes and systems for sustainability are among the major focus of this conference.

Additional details and information regarding this symposium will be published in future issues of the SEF newsletter.

### **SEF Announces new energy competition**

The Sustainable Engineering Forum announces a competition to promote energy education in K-12 schools. The program will pair teams, composed of AIChE student chapters and an area K-12 school, which will work together to develop a hands-on learning activity that addresses curricular needs through the use of energy concepts. The program was recently funded by the AIChE Foundation, allowing the SEF to offer awards of \$2,500 to each of four student chapters.



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 groups will develop their concept prior to November 1, 2008 and submit a proposal that describes the specific activity in enough detail so that it can be judged for effectiveness by a group of chemical engineering educators. An assessment component is a required element of the project.

Awards of \$2,500 will be provided no later than November 15, 2008 for those projects selected as most likely to succeed, to allow the group to purchase materials needed for the demonstration. The project shall be completed in the school no later than May 1, 2009. The student group shall make a report of the project, including instructions on how to construct the demonstration/experiment, the curricular goals and outcomes, and a report of the success of the first implementation of the project. The report will be included on a web page for public access and dissemination to a broader audience. An oral presentation of the outcomes of each project may be requested as a part of the AIChE Annual Meeting.

Program details and guidelines will be announced shortly so that interested AIChE student chapters can begin recruiting partner schools at the beginning of the fall term. Students or groups wanting more information can contact Martin Abraham at [martin.abraham@ysu.edu](mailto:martin.abraham@ysu.edu).

## EDUCATION COLUMN

### **The Experience of Learning Design for Sustainability in a Graduate Course**

Lou, Helen H.

Department of Chemical Engineering, Lamar University, Beaumont, TX, USA

A graduate course entitled

“Fundamentals of Sustainability,” with an element of design for sustainability, was



recently developed in the Department of Chemical Engineering at Lamar University. This course explains the fundamentals of sustainability, as it is a major issue in the development of human society. The major topics discussed in the course include:

1. Fundamentals of sustainability
2. A chemical engineers guide to environmental issues and regulations
3. The effects waste effluent from a plant have on the consumer, wildlife, communities, etc.
4. Emerging issues on sustainable engineering and science.

The course also includes the usage of software packages such as Green chemistry, EPI suite, etc., which help students understand the application of various software introduced by the EPA.



During the second half of the semester, the students are assigned a project that deals with real time sustainability issues faced by major industries and the steps they have taken toward creating an improved sustainable society. The class is divided into groups, where each group will work on a particular sustainability issue and come up with an idea to solve those issues.

An example of a successful course project was one that reviewed and discussed the sustainability efforts taken by Wal-Mart by considering the issue of EEE (environment, economy, and energy). The students' idea was to find a way to recycle both the plastic and vegetable waste generated at Wal-Mart stores. They considered using the vegetable waste as the vegetation layer on a green roof and also converting the waste into vermicompost, which can be used as the soil in the green roof. Additional considerations were to utilize the waste from the store to manufacture a root supporting guard. The students also conducted cost estimations, set future goals, and conceived the steps necessary to further develop the ideas.

By taking this course, the students gain a great deal of knowledge on emerging sustainability issues and the latest technology development. Students are also encouraged to think out-of-the box to solve real-world issues, all traits that will help the students in their future careers.

**Contact information:** Helen H. Lou, Phone: 409-880-8207; E-mail: [helen.lou@lamar.edu](mailto:helen.lou@lamar.edu)

## MEMBER COMMUNICATIONS

### 2008 AIChE Spring Meeting Recap

The 2008 Spring Meeting in New Orleans, LA was extremely successful and full of informative discussions and presentations. The SEF sponsored a topical session, Topical 9: Sustainability: Lessons, Actions and Outlook (Co-sponsored by ACS). The SEF and ACS also co-sponsored additional programming throughout the week. Please visit the following websites for full programming activity listings.

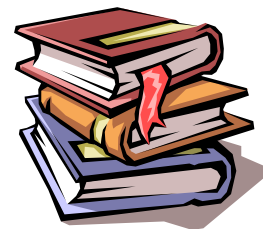
- **AIChE Technical Program**  
<http://aiche.confex.com/aiche/s08/techprogram/MEETING.HTM>
- **ACS Technical Program**  
<http://oasys2.confex.com/acs/235nm/techprogram/>

## Sustainability Barriers Workshop at New Orleans Meeting

AIChE IfS, CSTP, and SEF co-hosted, along with the ACS, the Workshop on Barriers to Implementation of Sustainability in the Chemical Industry at the Joint AIChE/ACS New Orleans meeting in April. Look for an upcoming article in CEP, which will provide an overview of the workshop and next steps in this important discussion. The workshop featured industry representatives from the Center for Sustainable Technology Practices, leaders in the chemical professional societies, academia, and government sectors. Lead by past SEF Chair Martin Abraham, the workshop is anticipated to be the first step in addressing barriers to implementation to sustainability in the chemical industry.

## Sustainability Readings

Lists of valuable sustainability related reading materials, as assembled by Earl Beaver, are available on the SEF website. Anyone interested in learning more regarding the areas of sustainability, global climate change, and how sustainable companies make decisions, please visit the "Readings" section of the SEF website (<http://www.aiche.org/sef>).



## IFS UPDATES

### Energy Metrics Project Initiated

AIChE has established a task team to develop a set of metrics, which will provide technical, sustainability, and societal perspectives on energy system choices. The product of this work would allow for the comparison of diverse energy systems, provide a common basis for evaluation, and would inform technology development and public policy. Currently, as a result of using different baselines, data, and problem boundaries, different parties often compare technologies and come to different conclusions. The development of a reference set of metrics would eliminate this problem.



The size and complexity of the challenge requires that a staged approach be taken to develop energy system metrics. The initial goal is to provide a

common framework for making well-founded decisions and to develop a disciplined process for updating the framework. The approach selected was to focus on a specific energy system, for which the energy system of biomass to energy has been chosen. Many different views (including technical and policy) are expressed with regard to this much-debated energy system. Thus, it provides a constructive reference case to consider the boundaries that need to be considered when evaluating an energy system, material and energy balance flows, the selection of important assumptions (e.g. today's performance vs. future potential capability), and evaluating constraints and trade-offs.

The initial tasks for the project were to develop a list of possible metrics to consider, and for the AIChE Government Relations Committee to focus on an assessment of the metrics of an energy metrics project by the US Congress and Federal Agencies. Clearly, the Federal Government sees a need for metrics work in biofuels systems, as evidenced by the creation of a Federal Interagency Task Force on Biofuels Metrics, which was mandated in the Energy Independence and Security Act recently signed into law by President Bush. The Biofuels Metrics task force is led by the EPA, with discussions currently underway for the appropriate engagement of the AIChE Energy Metrics expertise with this developing federal agency initiative.

Additionally, AIChE President Dale Keairns is leading a trans-disciplinary group of experts from ASME, AIME, IEEE, and ASCE on developing the appropriate metrics and boundaries for the Electric Power and Transportation Sectors, as part of a Founders Societies Project on Technologies for Carbon Management. The project was featured at a recent Engineers Forum on Sustainability meeting at the National Academies in Washington DC (<http://www.aiche.org/IFS>). To learn more and/or offer your expertise to become involved in these important metrics projects, email [ifs@aiiche.org](mailto:ifs@aiiche.org).

### Center for Sustainable Technology Practices (CSTP)

The Center for Sustainable Technology Practices Guide to Industrial Sustainability is expected to be published and available to the public in December 2008. In order to learn more about the Sustainability Guide for Industry, please participate in the October 21<sup>st</sup> SEF Virtual meeting.



CSTP member companies will be holding a task force meeting in New Jersey on Wednesday July 23<sup>rd</sup> to discuss the outcomes of their assessment of available tools to measure sustainability in industrial practices. The task force will also discuss the availability and potential need for 3<sup>rd</sup> party guidelines in "sustainable technologies" and the possible certification of greening the supply chain. Companies interested in exploring the benefits of CSTP membership can contact [ifs@aiiche.org](mailto:ifs@aiiche.org).

### AIChE Sustainability Index (sm)

The AIChE Sustainability Index (sm) plans to hold its inaugural Sustainability Index Roundtable during the Annual Meeting in Philadelphia on Wednesday, November 19<sup>th</sup>. The goal of the event is to help member companies improve their understanding of sustainability measurement and to evolve the index to best meet industries' benchmarking needs. To learn more about the index, see:

<http://www.aiche.org/IFS/Products/Publications.asp>

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### Youth Council on Sustainable Science and Technology (YCOSST) Presents 3rd Annual Award to EPA P3 Student Design Contest

The University of Idaho Interdisciplinary Design and Creation of Carbon-Neutral Idaho Environmental Learning Center was recently selected as the 2008 YCOSST P3 (People, Planet and Prosperity) Award winner. The criteria for the award included consideration regarding development, deployment to regions with limited resources, materials, and youth involvement. The judges also considered the amount of interdisciplinary collaboration; use of novel and innovative technologies to facilitate distance communication during research, and integral involvement of youth in implementation. The project, described at <http://www.caa.uidaho.edu/McCallDesignBuild>, entailed the planning, design, and construction of a carbon-neutral environmental learning center which takes into account the use of space, waste treatment, storm water management, site design, energy efficiency, and sustainable building materials. The award will be presented at the AIChE Annual Meeting in Philadelphia.

YCOSST is chaired by Katelyn Keefe and Ellyn Beary. Additional information on the EPA National Sustainable Design Expo and the P3 student design competition for sustainability can be found at [www.epa.gov/P3](http://www.epa.gov/P3).

## SEF LEADERSHIP (2008-2009)

<b>Chair</b>	Yinlun Huang, Professor Dept. of Chem. Eng. & Mat. Sci. Wayne State University Detroit, MI 48202 E-mail: yhuang@wayne.edu
<b>Vice Chair</b>	Helen Lou, Associate Professor Dept. of Chem. Eng. Lamar University Beaumont, TX 77710 E-mail: Helen.Lou@lamar.edu
<b>Treasurer</b>	Robert Hesketh, Professor and Chair Dept. of Chem. Eng. Rowan University Glassboro, NJ 08028 E-mail: hesketh@rowan.edu
<b>Secretary</b>	Nada Marie Assaf-Anid, Professor and Graduate Program Director Dept. of Chem. Eng. Manhattan College Riverdale, NY 10471 E-mail: nada.assaf- anid@manhattan.edu
<b>Programming Committee Chair</b>	Benson Pair, Chief Technology Engineer KBR Houston, TX 77002 E-mail: Benson.Pair@kbr.com
<b>Education Committee Chair</b>	Ralph Pike, Professor Dept. of Chem. Eng. Louisiana State University Baton Rouge, LA 70803 E-mail: pike@lsu.edu
<b>Membership Committee Chair</b>	Raymond Smith National Risk Management Research Lab/USEPA Cincinnati, OH 45268 E-mail: Smith.Raymond@epamail.epa.gov
<b>Awards Committee Chair</b>	Thomas Marrero, Professor Dept. of Chem. Eng. University of Missouri-Columbia Columbia, MO 65211 E-mail: MarreroT@missouri.edu

**Technical Advisory  
Committee Chair** Mahmoud El-Halwagi,  
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### Past Chair:

**2006-2007** Martin Abraham, Dean  
College of Sci., Tech., Eng., and  
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### Area Chairs:

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