EEi Newsletter

2017 – Q1

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The Energy and Environment Initiative (EEi) engages expertise from multiple research disciplines, along with industry leaders and government agencies, NGOs, and the public to develop and promote relevant and impactful activities and research at Rice that have a transformative effect towards Energy Sustainability. Our target audience is our students, faculty, staff, collaborators, and stakeholders in government, industry, and NGOs. For more information, please visit our website at eei.rice.edu.

In this edition we feature several of our initial activities for the year and set the stage for the next quarter of 2017. We publish a newsletter quarterly and hope you find the material informative and interesting.

RESEARCH ANNOUNCEMENTS

Seed Grants

The next round of grants submitted through the Provost's Creative Ventures Fund – Energy and Environment Awards and funded by EEi will take place this Spring. Stay tuned to the award page here, as it contains eligibility, selection criteria, deadlines, and application information. Cross disciplinary teams are not only encouraged but supported by the funding requirements and the Office of Research. The EEi team provides the assessments and analysis for research relevance and impact to the markets. The objective is to support research that will better our environment as well as our energy reliability, security, and affordability, not just in the United States but also in the global marketplace.

Subsea Systems Institute (SSI)

The SSI overview was included in last quarter's newsletter. In January we conducted two exchanges with our industry and marketplace advisory boards. Both our Board of Directors, as well as our technical advisory committee, exchanged research priority opportunities and set the framework for what we expect will be a second round of funding opportunity announcements this year. The prioritized research areas will be featured and funding will be driven by the next round of funding from the RESTORE ACT, the State of Texas, as well as funding made available to the SSI through a state educational solicitation. We expect these announcements will be made in the second quarter and the strategic course set for the balance of 2017. A full list of SSI industry and marketplace Board of Directors and technical committee members can be found here.

COLLABORATIVE AGREEMENTS

Energy & Environmental Research Center (EERC)

The EERC and Rice faculty conducted a technology exchange March 23-24, 2017 at Rice. Rice faculty presented the status and scope of research that could be of interest to the EERC for the purpose of commercial demonstration opportunities, as well as cooperative funding partnership on the individual research topics.
Topic areas and Rice lead faculty:
Chemical Engineering Department – Dr. Mike Wong
Sensors and telemetry – Dr. Aydin Babakhani
NEWT – Dr. Qilin Li
Biochemistry – Dr. Walter Chapman and team
Advanced materials and additive manufacturing – Dr. Zachary Cordero
Customized drill bits and advanced manufacturing – Dr. C. Fred Higgs

EEi Advisory Board

EEi Operations Committee

(cont'd)

The exchange created a number of follow up actions that include individual faculty meetings in May in Houston involving EERC clients, EERC identifying cooperative teaming proposals for clients and funding, and prioritizing the Rice faculty team to meet at the EEC center in Bismarck and the University of North Dakota in the fall of 2017 for further exchange. Our cooperative agreement establishes these two exchanges this year to ensure alignment and cooperative strategic plans.

EVENTS

CERAWeek 2017

For the first time in the 36-year history of CERAWeek, Rice University became an industry partner to this premier international gathering of energy industry stakeholders. With the effort led by EEi, Rice featured a number of researchers in plenary sessions and thought leader forums, as well as the Agora technology forums throughout the week. For a brief overview of CERAWeek, including the keynote dinner Thursday night for our alumni and friends of Rice, see this news release.

Several of the interviews and presentations that were a part of the event this year, including Rice participation, can be found on the CERAWeek website here.

EEi is already in talks to expand Rice's involvement next year, to include more opportunities for our researchers and leadership to be central voices heard on wide ranging topics impacting the energy marketplace today and in the future. We also anticipate involvement with city and community of Houston leaders, as well as our educational additions to the CERAWeek effort.


PetroChallenge North American Finals

Two winning teams from the PetroChallenge event held at Rice in October 2016 participated in the North American PetroChallenge Finals in January 2017. Hosted again by NeXT, a division of Schlumberger, the Rice teams competed against the winning teams from Penn State University and the University of Wyoming. Students receive a hands-on, team-oriented, educational experience that offers them the opportunity to gain insight into the decision-making steps involved in the exploration and production business process faced by oil and gas companies. We are proud to announce that the Rice team of "Two Guys and a Laptop" were the overall winners!

EDUCATION

Leadership and Decision Making in the Energy Industry

The inaugural symposium for this EEi-developed course was held in January with the associated faculty in a panel designed to inform and interact with approximately 50 students. The Rice Online team also conducted a focus group study to obtain student feedback on course design and content. The course will undergo some minor improvements and the focus for 2017 will be to once again provide the course to the general public much the same way as the first launch was designed but also to work with individual corporate clients and international business organizations to further executive education. These individual industry and graduate schools domestically and internationally have expressed the desire for customized offerings of the course aimed at special groups of client learners. Further developments will be updated in the next newsletter.

FEATURE FACULTY

Dr. C. Fred Higgs III Particle Flow and Tribology Lab (PFTL)

Dr. Higgs is a tribologist which means he is an expert in Tribology, the study of interacting surfaces and the associated friction, lubrication, and wear. He directs the Particle Flow & Tribology Laboratory, which is most interested in the problem of rubbing surfaces when there are particles and fluid between them. Especially in the oil and gas market.

When drilling for shale energy resources, the cutters on the drill bit cut rock formations as the drilling fluid, which not only cools and lubricates the drill bit, removes the loose rock cuttings from the interface so that a high rate of penetration (ROP) is maintained. Higgs' lab has an advanced computer model to predict ROP. ROP is the key performance parameter in drilling since fuel companies are often paying hundreds of thousands of dollars per day to lease drilling rigs. The bits also wear out frequently as they violently interact with the rock. Thus, instruments in Higgs' lab, such as a tribometers, help his team assess the tribological performance and lifetime of various materials used during drilling. His lab also works in additive manufacturing, where one of his most intriguing projects is one where they 3D print drill bits which have been designed and optimized for ROP by his aforementioned computer model. He has discussed elements of his overall work with drilling service providers such as Baker Hughes, Schlumberger, and Halliburton, in addition to the National Energy Technology Laboratory. His lab at Rice University features a lab-scale drilling rig, high-resolution surface measurement instruments, particle property measurement instruments, tribometers, mechanical property testers, and a state-of-art metal 3D printer which just arrived at his lab very recently. With this type of high-end 3D printer, he expects the distance between technology design and manufacturing to shorten to feet and hours.

As an expert in particle media, he also works in the algae renewable energy space, where he has invented a machine that extracts oil from algae in order to make biofuels. Consequently, Dr. Higgs along with his collaborator and former colleague at Carnegie Mellon University, Philip LeDuc, launched an algae extraction technology start-up company, InnovAlgae Inc., which is now funded by an NSF Small Business Innovative Research (SBIR) Phase I grant.

Abbreviated Biography

C. Fred Higgs, III is the John & Ann Doerr Professor of Mechanical Engineering at Rice University. He is also a Joint Professor within their Bioengineering Department, and the Faculty Director of the Rice Center for Engineering Leadership (RCEL), which focuses on developing tomorrow's leaders in technology. A Fellow of the American Society of Mechanical Engineers (ASME), he is the past recipient of an NSF CAREER award, the ASME Burt L. Newkirk award (for an individual under *age 40* who made notable Tribology R&D contributions), and the Benjamin Richard Teare Teaching Award (for the most outstanding engineering teacher (at Carnegie Mellon University). Dr. Higgs has published over 100 archival papers while serving as research advisor to over 100 undergraduate, 30 Masters, and 12 doctoral students. He is the co-founder and Chief Technology Officer of InnovAlgae, a technology start-up company that bio-manufactures algae-based consumer goods and products.

Upcoming Events

April 20-21, 2017
Earth Day Conference
Dallas, TX

April 28, 2017
EEi Quarterly Advisory Board meeting
Rice University

May 1 – 4, 2017
Offshore Technology Conference (OTC)
NRG Park
Houston, TX

May 3-4, 2017
R&D Showcase at OTC
NRG Park, 2nd floor
Houston, TX

May 3, 2017
International Energy Agency's Gas & Oil Technology Collaboration Program Executive Rountable
"Technology Pathways for the Oil and Gas Industry" – invitation only
Cohen House, Rice University

May 5, 2017
d5 – The Next Big Thing
Jones Graduate School of Business
Rice University

May 20, 2017
House Science and Technology Committee
"Commercializing Technology in Oil and Gas Through Industry and Universities"
Testimony by Charles McConnell

June 7-8, 2017
Energizing North Dakota's Future: Partnership Summit
Energy & Environmental Research Center (EERC)
University of North Dakota

June 29, 2017
Greater Houston Partnership (GHP) Advisory Board meeting
Houston, TX

Special thanks to our partners: