



JAMES A. BAKER III  
INSTITUTE FOR  
PUBLIC POLICY  
RICE UNIVERSITY

**energy**forum

James A. Baker III Institute for Public Policy • Rice University



RICE UNIVERSITY  
**Shell Center for  
Sustainability**

*Energy for Sustainable  
Development in Africa*

Wednesday, April 8, 2009

Room 131

M. D. Anderson Biological Laboratories  
Rice University

## About the Event

Africa is a major producer of oil, natural gas and coal. Yet, as little as 2 percent of some sub-Saharan African populations have access to electricity because of the expense and unreliable supply. Wood fuels burned in open fires and primitive cookstoves provide more than two-thirds of the total energy (nonhuman, nonanimal), and more than 85 percent of nonindustrial energy. Indoor air pollution from these primitive cookstoves is a leading cause of death, particularly for women and children. Africa's energy sector is characterized by insufficient investment, distorted markets and ineffective governance. More conventional approaches such as "appropriate technology" and "second generation biofuels" (jatropha, palm, etc.) have had little impact. This talk presents an overview of the energy sector in Africa, examining technologies that have had commercial impact with a focus on tools that hold particular promise for widespread dissemination. The technologies include improved biomass cookstoves, distributed electricity generation, microgrid technology, and biofuels from algae—a "third generation biofuel." There will also be a discussion of successful approaches which have been applied in other regions of the developing world.

The Energy Forum  
of the  
James A. Baker III Institute for Public Policy  
in conjunction with the  
Shell Center for Sustainability  
Rice University

Introduction

**Rebecca Richards-Kortum, Ph.D.**

Stanley C. Moore Professor of Bioengineering, Rice University

Presentation

***Energy for Sustainable  
Development in Africa***

with

**Bryan Willson, Ph.D.**

Director, Clean Energy Supercluster, and  
Professor in the Department of Mechanical Engineering, Colorado State University

Question and Answer Session

**Wednesday, April 8, 2009**  
6:00 pm

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**Rebecca Richards-Kortum, Ph.D.**, is the Stanley C. Moore Professor of Bioengineering at Rice University. Richards-Kortum's research group is developing miniature imaging systems to enable better screening tools for oral, esophageal and cervical cancer and their precursors at the point-of-care. In collaboration with faculty at the M. D. Anderson Cancer Center, her group has carried out clinical trials of this technique involving more than 2,000 patients in the United States, India and Nigeria. The group is developing contrast agents for in vivo molecular imaging of changes associated with precancer, including expression of epidermal growth factor receptors. More recently, she and her group have worked to integrate advances in nanotechnology and microfabrication to develop novel, low-cost sensors to detect infectious diseases—including cryptosporidium, malaria and tuberculosis. Richards-Kortum joined the Rice Department of Bioengineering in 2005 and served as chair of bioengineering from 2005 to 2008. Previously, she held the Cockrell Family Regents Chair in Engineering #10 and was a professor of biomedical engineering at The University of Texas at Austin, where she was also a distinguished teaching professor. After receiving a B.S. in physics and mathematics from the University of Nebraska-Lincoln, Richards-Kortum studied at the Massachusetts Institute of Technology, where she received an M.S. in physics and a Ph.D. in medical physics.

**Bryan Willson, Ph.D.**, is director of the Clean Energy Supercluster at Colorado State University (CSU), founder and director of CSU's Engines and Energy Conversion Laboratory, and a professor of mechanical engineering. He is also co-founder of Envirofit International, a nonprofit corporation that disseminates clean technology in the developing world through a market-based approach, and Solix Biofuels, a for-profit developer of algae-based biofuels. Willson has worked in more than 30 countries and has significant experience in Africa. With teaching experience in design, systems modeling, internal combustion engines, energy and sustainable development, Willson is the principal or co-principal investigator for more than \$30 million in funded research. He has raised more than \$50 million for venture and foundation funding for Envirofit and Solix; has funded more than 350 graduate and undergraduate students; and authored or co-authored more than 200 journal papers, conference proceedings or technical reports. Willson received his undergraduate degree from Texas A&M University and his doctorate from The University of Texas at Austin.

#### Related Web Sites:

[www.Energy.ColoState.edu](http://www.Energy.ColoState.edu)

[www.EECL.ColoState.edu](http://www.EECL.ColoState.edu)

[www.Envirofit.org](http://www.Envirofit.org)

[www.SolixBiofuels.com](http://www.SolixBiofuels.com)

## Baker Institute Energy Forum

Located in Houston, Texas, the energy capital of the world, the James A. Baker III Institute for Public Policy has created a multifaceted program designed to promote original, forward-looking discussion and research on the energy-related challenges facing our society in the 21st century. The mission of the Energy Forum is to shed light on important trends—both regional and global—that shape the nature of global energy markets and influence the quantity and security of vital supplies needed to fuel world economic growth and prosperity. The choice of the word “forum” is deliberate. It reflects the group’s goal to serve as a focal point for the exchange of ideas on how to improve understanding of the complex political, cultural, religious, economic and social forces that influence open access to energy resources and their equitable distribution.

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## Shell Center for Sustainability

The Shell Center for Sustainability (SCS) at Rice University is an on-campus research center that supports outreach, education and faculty research in sustainable development focusing on science, technology and human impact. Our research teams are multidisciplinary and invite collaboration with external partners while creating opportunities for student participation. SCS has been a part of Rice since 2003, when Shell Oil Company joined the university in supporting sustainable development. Our area of impact includes the Houston region, the state of Texas and coastal cities. The governing committees include representation from the Schools of Social Sciences, Earth Sciences, Engineering and Architecture, as well as representatives from Shell and Rice staff. Recently funded projects comprise research on a business model for solar energy production and use; sea-level rise and coastal planning; genetics and alternative energy generation; mercury chemistry in air quality; and solar refrigeration. Several past projects have grown beyond initial research objectives to become independent research centers or initiatives. SCS offers students internship opportunities, funds various course initiatives and sponsors events that bring together the community and experts in the most current science research supporting sustainable development.

## Rice 360°

Announced at the Clinton Global Initiative annual meeting in 2007, Rice 360° is Rice University's initiative to raise \$100 million to start a campus institute dedicated to global health technologies. Rice 360° works in partnership with communities around the world to design and implement novel, affordable technologies that prevent disease, improve health and reduce poverty. Integrating expertise in bioengineering, nanoscience, health and public policy, management, micro-entrepreneurship and education, Rice 360° brings together highly focused technical solutions; new, sustainable systems of implementation; and the creativity of students and faculty to improve the health of the world's poorest people.