

Technical Workshop on  
**Sustainable Fuels: Production and Combustion**  
**Tuesday, July 29, 2014**  
**Institute for Sustainable Energy**  
**College of Engineering, University of Alabama**

**South Engineering Research Center (SERC 1013 and 1059)**

*For [Free Registration and Additional Details](http://ise.eng.ua.edu), visit: <http://ise.eng.ua.edu>*

**8:00 am Registration and Networking Coffee with Continental Breakfast, SERC 1013**

**8:40 am Welcome Remarks, Dr. Joe Benson, Provost and Vice President for Academic Affairs**

**8:50 am Announcements and Overview of the Workshop, Prof. Ajay K Agrawal**

**9:05 am Next Generation Combustion Engines and Future Fuel Opportunities**



**Robert Wagner; Fuels, Engines and Emissions Research Center, Oak Ridge National Laboratory, Knoxville, TN**  
New technologies coupled with advances in sensors and onboard computers will enable real-world implementations of new combustion concepts as well as new fuel pathways that blend the best characteristics of spark-ignition and compression engines for maximum efficiency with lowest possible emissions. A detailed discussion of related research and relevant background on ORNL will be provided in this presentation.

**9:40 am 21<sup>st</sup> Century Energy Sources**



**Chad Hewitt; Fuel Services, Southern Company Generation, Birmingham, AL**

Coal has been the backbone of America's energy needs.  
Will natural gas become America's next base load fuel?  
What role does Nuclear, Biomass, Wind, and Solar play?

**10:15 am Challenges in Deploying a Biofuel Industry in the Southern U.S.**



**Steven E. Taylor; Professor and Head, Dept of Biosystems Engineering, Auburn University, AL**

The southern U.S. has the ability to produce more than half of the advanced biofuels needed by our nation. While there have been significant R&D investments in biofuels, challenges remain to deployment of a sustainable "drop-in" biofuels industry based on lignocellulosic biomass feedstocks. This presentation will discuss these challenges and selected efforts underway by Auburn University and its partners to address them.

**10:50 am Development of Sustainable Fuels and Efficient Combustion Technologies through Experiments, Modeling and Simulations**



**Ranjan S. Mehta; CFD Research Corporation, Huntsville, AL**

CFDRC is active in development of combustion models that can be applied to bio-derived fuels in a computationally efficient manner. This presentation will briefly describe these activities and also present our outlook on emerging technologies for sustainable fuels and combustion technology.

**11:25 am Industrial Combustion Applications with Different Fuels**



**Charles E. Baukal; John Zink Hamworthy Company, Tulsa, OK**

This presentation will be a survey of industrial combustion applications including metals (e.g., ferrous and non-ferrous), minerals (e.g., glass and cement), chemicals and petrochemicals (e.g., heaters and furnaces), and power generation (e.g., boilers). A wide range of gaseous fuels, oxidizers, burners, temperatures, and combustors will be discussed. The diversity of the applications shows the varied needs and requirements in different industries.

**12:00 am to 1:00 pm LUNCH**

**3<sup>rd</sup> Floor Terrace Facing Science and Engineering Quad, SERC**

1:00 pm – 2:00 pm

**Poster Session &  
Engine and Combustion Lab (ECL) Tours**

Small groups will rotate through poster session and lab tours

Please re-convene in **SERC 1059** for the afternoon presentations



**2:00 pm Biodiesel: Fuel Properties, Its “Design” and a Source of “Designer” Fuel**

**Gerhard Knothe; U.S. Department of Agriculture, Peoria, IL**

This presentation will give an overview of biodiesel fuel properties for different fatty acid alkyl esters and how they affect the biodiesel mixture as well as discuss components of biodiesel that lead to a fuel with improved properties, “designer” biodiesel. Optimized biodiesel could be based on enrichment in palmitoleic or decanoic acids. Although facing agronomic issues, a potential source of biodiesel enriched in decanoic acid is cuphea oil.



**2:35 pm Staged, Pressurized Oxy Combustion for Cost-Effective Carbon Capture**

**Richard L. Axelbaum; Washington University, St. Louis, MO**

This talk focuses on fossil fuel combustion to understand the formation of pollutants, such as soot, and then using this understanding to develop novel approaches to eliminating them. In particular, global concerns over carbon dioxide emissions are addressed by developing oxy combustion for cost effective carbon capture and storage (CCS).



**3:10 pm National Carbon Capture Center for Near Zero Emissions**

**John Socha; Project Manager, National Carbon Capture Center, Wilsonville, AL**

Offering a world class neutral test facility and a highly specialized staff, the National Carbon Capture Center accelerates the commercialization of advanced technologies to enable coal-based power plants to achieve near-zero emissions. Current projects involving chemical looping technology, Fischer-Tropsch coal to liquids catalyst, and Pressure Swing Adsorption unit will be discussed.



**3:45 pm Well-to-Wheel Analysis of Direct & Indirect use of Natural Gas in Passenger Vehicles**

**Scott Curran; Fuels, Engines and Emissions Research Center, Oak Ridge National Laboratory, Knoxville, TN**

This presentation discusses the well-to-wheels energy and emissions costs from different natural gas to transportation fuel pathways and compares the results to conventional gasoline vehicles and electric vehicles using the US electrical generation mix. Results show the dependency on the combustion efficiency of natural gas in stationary power can outweigh the inherent efficiency of electric vehicles.



**4:20 pm Practical Challenges for the Industrial Burner Industry**

**John Nowakowski; Fives North American Combustion, Cleveland, OH**

Industrial combustion applications often need to accommodate multiple fuels when there are by-products or co-products of processes elsewhere in the facility, such as when various gases are recovered during thermally enhanced oil recovery operations. This presentation shares such challenges and practical approaches for considering the tradeoffs.

4:55 pm **Vote of Thanks**

5:00 pm – 6:30 pm **Social Hour; Poster Session; Optional Lab Tours**