The Center for BioEnergy Sustainability (CBES)
At Oak Ridge National Laboratory (ORNL)
is pleased to announce that we are holding our next Forum on January 16th, 2014
in the Ocoee Room (Room 189) in Building 1505 at 3:30pm

The forum will be followed by a casual gathering at Virginia Dale's home where light refreshments will be enjoyed as the discussions continue.

This month's forum topic is:

"Methods of reducing transportation energy and petroleum consumption and environmental impacts"

A discussion of internal combustion engines fundamentals, efficiency source, and fuel-related powertrain opportunities.

Guest Speaker:

Derek Splitter
Fuels, Engines, and Emissions Research Center
Oak Ridge National Laboratory

Overview:

This presentation provides a fundamental based discussion of internal combustion engine operation and methods of reducing engine petroleum consumption. A thermodynamic approach of basic engine operation is used which tracks where fuel energy is expended and addresses practical methods to increasing engine efficiency through new fuels and combustion concepts.

Abstract:

As an energy conversion device, the internal combustion engine (ICE) has become invaluable to society. The ability of the ICE to provide economically viable and reliable power for both stationary and mobile applications has resulted in mass production of the ICE in a variety of displacement and design platforms. Primarily, engines have been operated with non-renewable petroleum-based fuel sources. The depletion of these fuel stocks has raised both historical and recent concerns over improving engine fuel efficiency and fuel type. Secondly, because of the widespread engine usage, emission production has been and continues to be a major area of both concern and improvement.

Regardless of the engine design or the type of hydrocarbon-based fuel feedstock, the engine is an energy conversion device that converts chemical potential into useful work through combustion. Ideally, the products of hydrocarbon combustion with air would be carbon dioxide (CO2) water (H2O) and nitrogen (N2). Unfortunately, this is almost never the case. Typical engine operation produces incomplete combustion products that results in inefficiency and anthropogenic-derived atmospheric pollution. Government mandated regulation of pollutants such as carbon monoxide (CO), unburned hydrocarbon (HC), oxides of nitrogen (NOX), and particulate matter (PM) have been aggressively increased since their implementation. More recently, the U.S. has passed additional mandates on reducing carbon dioxide CO_2 in heavy and light duty vehicles. To combat these emissions and fuel consumption issues, bio-fuel and new combustion strategies have been investigated. This presentation discusses the fundamentals driving these areas of research, and what some of the preliminary results have demonstrated.

Bio:

Derek Splitter received a PhD in Mechanical Engineering from the University of Wisconsin Engine Research Center in 2012. He has authored or coauthored over 30 publications. He holds two US, Canadian, World, and EU patents on engine combustion technologies. He has been active in the development of advanced combustion processes including RCCI. His work has been distinguished with the SAE Horning Memorial Award, for the best paper relating to the better mutual adaptation of fuels and internal combustion engines in 2010. He is currently a Post-Doc at Oak Ridge National Laboratory where he works to better the understanding of bio-fuel and in-cylinder reforming effects in SI and advanced combustion concepts, and is the principal investigator on new a DOE Office of Vehicle Technologies funded project on Low-Speed Pre-Ignition in SI engines.

Please mark your calendar for every third Thursday for 2014 so that you can join in the collaboration and camaraderie that is being built by your participation in the CBES forums.