The development of a sustainable energy portfolio to mitigate climate change is one of the great challenges we are facing today. The United States has set goals to develop a bio-based industry for fuel, power, and other products. At the same time, we are seeing an increasing investment in renewable energies, like wind and solar. The development of new technologies leading to a clean energy economy will be critical to long-term economic competitiveness and the ability to win the future. This investment has to be coupled with next generation manufacturing technologies such as additive manufacturing.

These goals have engendered a growing interest in the production of biomass and its conversion to fuels and materials. Novel deconstruction methods focusing on enzymatic catalysis of biomass allowing targeted access to cheap sugars derived from cellulose and hemicellulose and will permit the exploration of other plant cell wall components such as lignin. Lignin, among other applications, is evaluated as precursor for carbon fiber production. Traditional carbon fiber, derived from fossil fuel precursors is currently used in many high-end applications such as lightweighting of high-end sports cars to increase performance. The production of carbon fiber at lower cost will allow the use in conventional vehicles leading to substantial weight saving. Weight reduction has a direct impact on fuel economy and is a targeted goal to achieve future fuel standards. Lignin carbon fiber researchers at ORNL developed a novel process for lignin carbon fiber spinning which reduces the carbon fiber cost significantly, opening the door for use in conventional vehicles. Combined with the use of alternative fuel sources and electrification, this can break petroleum's vise grip on transportation.

This presentation will give an overview of various research areas within ORNL focusing on the integration of technologies towards a sustainable community in the future.

**ABOUT THE SPEAKER**

**Martin Keller** was appointed to the role of Associate Laboratory Director at Oak Ridge National Laboratory (ORNL), on July 1, 2009. On November 1, 2010, a new directorate was formed, Energy and Environmental Sciences, and Dr. Keller was asked to lead this newly-established directorate. As Associate Laboratory Director of the Energy and Environmental Sciences Directorate, he is responsible for the energy, biological, and environmental research programs at ORNL supported by the U.S. Department of Energy (DOE), the Environmental Protection Agency, and the National Institutes of Health.