Current Projects and Accomplishments:

A promising route to the production of biofuels being pursued by a group of researchers in the Sustainable Energy Research Center (SERC) is the conversion of trees to a substance commonly referred to as bio-oil. A process called fast pyrolysis is applied to thermally decompose wood or other biomass in the absence of air at 500°C. Rapid condensation of the vapor produced then yields a dark brown fluid known as pyrolysis oil, or more frequently as bio-oil. This product has been used in the past for such applications as liquid smoke for barbecue flavoring.

Raw bio-oil has some negative properties such as high acidity, thickening over time and low heating value when compared to petroleum oil. SERC has made major breakthroughs resolving these issues by developing an upgrading technology to produce liquid hydrocarbons from the raw bio-oil. This upgraded biofuel can be blended with gasoline and diesel fuels or transported to a petroleum refinery to be turned into green gasoline or diesel fuel. Researchers are powering a diesel generator and mowing grass with a riding mower fueled by a 5% blend of upgraded bio-oil and diesel or gasoline, respectively. The percentage of upgraded bio-oil allowable in both gasoline and diesel blends is expected to increase as research proceeds.

Our concept is to utilize portable pyrolysis reactors, which can be taken to the biomass sources to produce the bio-oil on site. This high-value product can then be transported to a central upgrading facility to be transformed into hydrocarbon rich crude for direct input into current petroleum refineries. The production of bio-oil will help generate new companies in rural areas in the Southeast and create new markets for pulpwood and wood waste products.

Future Projects:

SERC plans to develop a marketable transportation fuel from blends of upgraded bio-oil and petroleum fuels. In addition, research will be performed to determine the best technology by which to input the upgraded bio-oil into the total petroleum refinery process for the production of green fuels.