Published on ***Hawaii Natural Energy Institute*** (http://www.hnei.hawaii.edu)

Evaluation of Energy Conversion and Utilization Processes

The Hawaii Natural Energy Institute (HNEI) evaluates energy conversion and utilization processes by performing diagnostic sampling of physical processes and using commercial software such as ASPEN? for process modeling. Sampling systems have been constructed for the evaluation of laboratory and demonstration-scale gasification systems and industrial combustion processes. ASPEN? models have been constructed for evaluation of biomass integrated gasifier combined cycle systems and for sugar factory based cogeneration systems.

Plant Wide Assessment Study

As a member of a team headed by Hawaiian Commercial & Sugar Company (HC&S), HNEI and colleagues from the UH Department of Molecular Biosciences and Bioengineering are participating in a study sponsored by the Department of Energy's Office of Industrial Technology. HC&S operates a vertically integrated sugar plantation including ~35,000 acres of sugar cane production, a sugar factory that manufactures raw and food grade sugars and molasses from sugar cane, and a power plant that uses biomass supplemented with coal to produce steam and electricity to satisfy internal needs and exports excess power to the Maui Electric Company utility grid. The plant wide assessment currently under way is evaluating the energy systems on the plantation with the goal of identifying methods to improve efficiency and reduce energy use. The UH team has conducted boiler efficiency measurements when the units are fueled with bagasse and coal as part of the steam generation evaluation. An integrated ASPEN? model of steam generation in the power plant coupled with steam utilization for electricity generation and mechanical power and thermal needs in the sugar factory is currently being developed. Construction of the ASPEN? model will provide a tool to evaluate the energy impacts of proposed process modifications and to reconfigure existing equipment to improve efficiency.

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Last Updated: Monday, March 11, 2013

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