Letter Report Describing the Analyses and Reports that were Forecast to be Completed Under Task 12

Prepared for the

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Hawai‘i Distributed Energy Resource Technologies for Energy Security

Subtask 12.2 Deliverable
Letter Report on Planned Analyses and Reports

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Letter Report on Analyses and Reports Planned for Task 12

This Task completed efforts begun under Task 9 in an earlier amendment to the Agreement. In addition to this letter report, the new and expanded Subtasks for Task 12 included bioenergy analyses, energy and economic development, production of a common CIS database focusing on environmental qualities of State lands, and lifecycle analyses of bioenergy production systems.

Specific work completed as part of the above Subtasks included the following:

- Roundtable on Sustainable Biofuels Certification Readiness Study: Hawai‘i Biofuel Projects – The Roundtable on Sustainable Biofuels (RSB) Principles and Criteria for Sustainable Biofuel Production and accompanying certification systems are fully developed to the point where organizations are currently certified or seeking certification with global recognition. The biofuel projects in Hawai‘i are maturing to the point where they could achieve certification to the RSB standards. It was concluded that there is a strong correlation between County, State and Federal Laws and Regulations and the Principles and Criteria of the RSB Standard. The RSB Standard, however, has requirements that are not supported by or achieved through simple compliance with laws and regulations and these relate to: 1) the need for a more comprehensive stakeholder engagement process, and 2) the requirement that a biofuel operator must develop an Environmental and Social Management Plan.

- Observational Field Assessment of Invasiveness for Candidate Biofuels in Hawai‘i – Five biofuel crops were observed from May-August 2012 for evidence of escape and invasiveness. Observations were made around field plantings of banagrass, Jatropha (*Jatropha curcas*), *Eucalyptus grandis*, African oil palm (*Elaeis guineensis*) and arboreal Leucaenas found on Oahu, Maui, Hawai‘i and Moloka‘i . Observations are reported on distance and degree of spread away from plantings. Risks are assessed and recommendations are made for each species, based on our current field experience and evidence of invasiveness in Hawai‘i. Behavior of these plants could change in the future. Growers should adopt standard mitigation practices in order to minimize invasion risks and impacts of biofuel crops.

- Economic and Environmental Analyses Related to the State of Hawai‘i Energy Future – This subtask resulted in two reports. The first report dealt with model refinement for economic assessments of Hawai‘i Clean Energy Policies. The plan was to assess the optimal energy technology selection to achieve 40% renewable energy for the State of Hawai‘i by the year 2030. This work will serve as a baseline by which to later address the Energy Efficiency Portfolio Standard. The Renewable Portfolio Standard (RPS) was to be modeled based on the constraints of the two regulated electric utilities in the state. The goal was to access macroeconomic impacts of an interisland cable system, as well as the renewable energies that it allows (i.e., greater wind penetration) within the model. The second report addressed a greenhouse gas emissions-weighted Clean Energy Standard (GGE-weighted CES) in comparison to an RPS. The GGE-weighted CES provides incentive to not only pursue renewable sources of electricity, but also promotes

fuel-switching among fossil fuels and improved generation efficiencies at fossil-fired units. GGE-weighted CES is found to be particularly cost-effective when projected fossil fuel prices are relatively low.

- Geographic Information System Resources to Support Biomass/Bioenergy/Biofuel Decision Making – The Hawaii Natural Energy Institute assessed potential biomass/ bioenergy/biofuel resources that can be produced in Hawaii including *Leucaena*, *Eucalyptus*, and banagrass for fiber, sugarcane for both sugar and fiber, and algae for oil or other intermediate products. The objective of this report is to provide computer-based, geographic information system tools on biomass/bioenergy/biofuel resources for use in improving the effectiveness of decision making. A total of 58 GIS layers were produced in total. Data sets include information on soil suitability, slope, sugar and fiber resources, and selected biofuel production resources. These data were provided to the Hawaii Statewide Geographic Information System Program for posting on their website.

- Lifecycle Analyses of Bioenergy Production Systems -- Stakeholder input from the Hawaii Bioenergy Master Plan targeted life cycle analysis as an important area where information is needed to support decisions of policy makers and decisions of those with commercial interests. Hydrogen is an increasingly important component of biofuel production since many of the feedstocks must be hydrotreated to obtain drop-in replacement fuels. Conversion pathways for biohydrogen production are a critical component of integrated biofuel and bioenergy production systems. This agreement seeks to compile information on life cycle analyses of biohydrogen and bio-energy production systems in increments that can be identified as well-defined, value-chain components.