



# Project 001(B) Alternative Jet Fuel Supply Chain Analysis

## University of Hawaii

### Project Lead Investigator

#### University of Hawaii Lead:

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### University Participants

#### University of Hawaii

- P.I.(s): Scott Q. Turn, Researcher
- FAA Award Number: 13-C-AJFE-UH, Amendment 005
- Period of Performance: 10/1/15 to 9/30/18
- Task(s):
  1. Informing Regional Supply Chains
  2. Identification of Supply Chain Barriers in the Hawaiian Islands

#### University of Hawaii

- P.I.(s): Scott Q. Turn, Researcher
- FAA Award Number: 13-C-AJFE-UH, Amendment 007
- Period of Performance: 10/1/16 to 9/30/18
- Task(s):
  1. Informing Regional Supply Chains
  2. Support of Indonesian Alternative Jet Fuel Supply Initiatives

#### University of Hawaii

- P.I.(s): Scott Q. Turn, Researcher
- FAA Award Number: 13-C-AJFE-UH, Amendment 008
- Period of Performance: 8/1/17 to 9/30/18
- Task(s):
  1. National lipid supply availability analysis
  2. Hawaii regional project

### Project Funding Level

Under **FAA Award Number 13-C-AJFE-UH, Amendment 005**, the Alternative Jet Fuel Supply Chain Analysis-Tropical Region Analysis project received \$75,000 in funding from the FAA and cost share funding of \$75,000 from the State of Hawaii.

Under **FAA Award Number 13-C-AJFE-UH, Amendment 007**, the Alternative Jet Fuel Supply Chain Analysis-Tropical Region Analysis project received \$100,000 in funding from the FAA and cost share funding of \$75,000 from the State of Hawaii and \$25,000 of in-kind cost match in the form of salary support for Scott Turn from the University of Hawaii.

Under **FAA Award Number 13-C-AJFE-UH, Amendment 008**, the Alternative Jet Fuel Supply Chain Analysis-Tropical Region Analysis project received \$125,000 in funding from the FAA and cost share funding of \$125,000 from the State of Hawaii.



## Investigation Team

### Lead

Scott Turn – University of Hawaii

### Other Lead Personnel

Tim Rials and Burt English (UT Co-PIs)

Manuel Garcia-Perez (WSU Co-PI)

Kristin Lewis (Volpe PI)

Michael Wolcott (WSU PI)

### UH Investigation Team

Under **FAA Award Number 13-C-AJFE-UH, Amendment 005**, Task 1 and Task 2 includes

Dr. Scott Turn, Researcher, Hawaii Natural Energy Institute, UH

Dr. Trevor Morgan, Assistant Researcher, Hawaii Natural Energy Institute, UH

Dr. Richard Ogoshi, Assistant Researcher, Department of Tropical Plant and Soil Sciences, UH

Dr. Adel H. Youkhana, Junior Researcher, Department of Tropical Plant and Soil Sciences, UH

Under **FAA Award Number 13-C-AJFE-UH, Amendment 007**, Task 1 and Task 2 includes

Dr. Scott Turn, Researcher, Hawaii Natural Energy Institute, UH

Dr. Trevor Morgan, Assistant Researcher, Hawaii Natural Energy Institute, UH

Dr. Richard Ogoshi, Assistant Researcher, Department of Tropical Plant and Soil Sciences, UH

Dr. Adel H. Youkhana, Junior Researcher, Department of Tropical Plant and Soil Sciences, UH

Ms. Sharon Chan, Junior Researcher, Hawaii Natural Energy Institute, UH

Under **FAA Award Number 13-C-AJFE-UH, Amendment 008**, Task 1 and Task 2 includes

Dr. Scott Turn, Researcher, Hawaii Natural Energy Institute, UH

Dr. Trevor Morgan, Assistant Researcher, Hawaii Natural Energy Institute, UH

## Project Overview

Under **FAA Award Number 13-C-AJFE-UH, Amendment 005**, the research effort has two objectives. The first objective is to develop information on regional supply chains for use in creating scenarios of future alternative jet fuel production in tropical regions. Outputs from this project may be used as inputs to regional supply chain analyses being developed by the FAA and Volpe Center. The second objective is to identify the key barriers in regional supply chains that must be overcome to produce significant quantities of alternative jet fuel in the Hawaiian Islands and similar tropical regions.

The **FAA Award Number 13-C-AJFE-UH, Amendment 005** project goals are to:

- Review and summarize:
  - the available literature on biomass feedstocks for the tropics,
  - the available literature on pretreatment and conversion technologies for tropical biomass feedstocks,
  - the available literature on geographic information systems data sets available for assessment of alternative jet fuel production systems in the tropics.
- Identify alternative jet fuel supply chain barriers in the Hawaiian islands

Under **FAA Award Number 13-C-AJFE-UH, Amendment 007**, the research effort has two objectives. The first objective is to develop information on regional supply chains for use in creating scenarios of future alternative jet fuel production in tropical regions. Outputs from this project may be used as inputs to regional supply chain analyses being developed by the FAA and Volpe Center. Included in this objective is the development of fundamental property data for tropical biomass resources to support supply chain analysis. The second objective is to support the Memorandum of Understanding between the Federal Aviation Administration (FAA) and Indonesian Directorate General of Civil Aviation (DGCA) to promote developing and using sustainable, alternative aviation fuels.

The **FAA Award Number 13-C-AJFE-UH, Amendment 007** project goals are to:



- Support the Volpe Center and Commercial Aviation Alternative Fuels Initiative (CAAFI) Farm to Fly 2.0 supply chain analysis.
- Use GIS-based estimates of fiber crop production potential to develop preliminary technical production estimates of jet fuel in Hawaii.
- Develop fundamental property data for tropical biomass resources.
- Transmit data and analysis results to other ASCENT Project 1 researchers to support improvement of existing tools and best practices.
- Support Indonesian alternative jet fuel supply initiatives

Under **FAA Award Number 13-C-AJFE-UH, Amendment 008**, the research effort has two objectives. The first objective is to support a national lipid supply availability analysis that will inform industry development and guide policy. The second objective is to conduct a targeted supply chain analysis for alternative jet fuel production facility based on a Hawaii regional project

The **FAA Award Number 13-C-AJFE-UH, Amendment 008** project goals are to:

- Support ASCENT partners conducting the national lipid supply availability analysis by contributing information on tropical oilseed availability.
- Evaluate supply chains for targeted waste streams and purpose grown crops in Hawaii to a location in the principal industrial park on the island of Oahu.

## Task #0.1: Informing Regional Supply Chains

University of Hawaii

### Objective(s)

This task included two activities, (1) a review of the archival literature on existing tropical crops and potential new crops that could provide feedstocks for AJF production and (2) a review of relevant pretreatment and conversion technology options and experience with feedstocks identified in (1).

### Research Approach

Activity 1. The archival literature will be reviewed to construct an updated database of relevant citations for the tropical crops identified in section 8; new potential energy crops will be identified and added to the database. Available information on agronomic practices, crop rotations, and harvest techniques will be included. The database will be shared with and serve as a resource for the Project 1 team and Volpe Center analyses of regional supply chains.

Activity 2. A database of relevant pretreatment and conversion technology options and experience with potential tropical feedstock materials will be assembled from the archival literature and from existing Project 1 team shared resources. Of particular interest are inventories of material and energy flows associated with the pretreatment and conversion unit operations, fundamental to the design of sustainable systems and the underlying analysis. Pairings of pretreatment and conversion technology options provide the starting point for evaluation of tropical biorefineries that can be integrated into ASCENT Project 1 team and Volpe Center activities.

### Milestone(s)

Task 1, Activity 1: Identify target list of databases to search for relevant literature.

Task 1, Activity 1: Interim report summarizing progress on literature search.

Task 1, Activity 2: Identify target list of databases to search for relevant literature.

Task 1, Activity 2: Interim report summarizing progress on literature search.

Task 1, Activity 3: Identify target list of databases to search for relevant literature.

Task 1, Activity 3: Interim report summarizing progress on literature search.

### Major Accomplishments

This work is largely completed. A report was produced for each of the two activities. The two reports were combined to form a manuscript that is currently under review by co-author Prof. Manuel Garcia-Perez (WSU). The manuscript will be submitted to the *Journal of Renewable and Sustainable Energy Reviews* when review by FAA program managers is completed.



## Publications

None

## Outreach Efforts

None

## Awards

None

## Student Involvement

None

## Plans for Next Period

During the next period, the manuscript will be submitted to the *Journal of Renewable and Sustainable Energy Reviews* when review by FAA program managers is completed.

## **Task #0.2: Identification of Supply Chain Barriers in the Hawaiian Islands**

University of Hawaii

### Objective(s)

Identify the key barriers in regional supply chains that must be overcome to produce significant quantities of alternative jet fuel in the Hawaiian Islands and similar tropical regions.

### Research Approach

UH developed the Hawaii Bioenergy Master Plan for the State of Hawaii [1]. Completed in 2009, UH was tasked with determining whether Hawaii had the capability to produce 20% of land transportation fuels and 20% of electricity from biomass resources. Toward this end, the plan included assessments of (1) land and water resources that could support biomass feedstock production, (2) potential biomass resources and their availabilities, (3) technology requirements, (4) infrastructure requirements to support logistics, (5) economic impacts, (6) environmental impacts, (7) availability of human capital, (8) permitting requirements, and (9) limitations to developing complete value chains for biomass based energy systems. In keeping with the stakeholder driven development of the Hawaii Bioenergy Master Plan, barriers to development of regional supply chains for ASCENT will be identified by interacting with key stakeholder groups. Green Initiative for Fuels Transition Pacific (GIFTPAC) meetings are held quarterly and are attended by biofuel development interests in Hawaii including representatives of large landowners, producers of first generation biofuels, petroleum refiners, electric utilities, the State Energy Office, U.S. Pacific Command, biofuel entrepreneurs, county government officials, and the University of Hawaii. Additional stakeholders are invited as necessary to fill information and value chain gaps. These meetings are excellent opportunities to receive stakeholder input, identify barriers to supply chain development, and organize data collection efforts that span supply chain participants.

### Milestone(s)

Include a description of any and all milestones reached in this research according to previously indicated timelines.

Task 2: Introduce activities at next regularly scheduled GIFTPAC meeting after contract executed.

Task 2: Interim report outlining two tropical supply chain scenarios developed in consultation with Project 1 team, and with input from GIFTPAC participants.

### Major Accomplishments

This task is largely completed. A stakeholder meeting was held and documented in a report. The stakeholders identified barriers to alternative jet fuel production in Hawaii and ranked the barriers in order of importance as indicated below:

Economic constraints [e.g., high costs of entry for production factors such as land] throughout the whole production chain

- Issues associated with access to capital including high initial risks and uncertain return on investment



- Insufficient government support in the form of incentives and favorable policies to encourage long-term private investment
- Cost, availability and competition for water
- Alternative jet fuel production technologies are emerging but have not yet demonstrated full commercial viability
- Insufficient or inadequate infrastructure [harbors, roads, fuel distribution infrastructure, irrigation systems] to support the whole production chain

Several of the barriers are held in common with other locations in the continental U.S. but those related to water and infrastructure bear unique characteristics of an island state.

### **Publications**

None

### **Outreach Efforts**

This activity engaged stakeholders to identify barriers to alternative jet fuel production in Hawaii. Preparation included reviewing stakeholder lists from previous activities. Facilitators appropriate to the stakeholder group were retained. The stakeholder meeting included a presentation about the larger ASCENT program's scope and goals and the other aspects of the UH ASCENT project.

### **Awards**

None

### **Student Involvement**

None

### **Plans for Next Period**

This task is complete but stakeholder outreach activities will continue under other tasks outlined below.

## **Task #0.3: Informing Regional Supply Chains**

University of Hawaii

### **Objective(s)**

Building on FY16 activities, additional supporting analysis will be conducted for proposed supply chains in Hawaii, including:

- 0.3.1 Support Volpe Center and Commercial Aviation Alternative Fuels Initiative (CAAFI) Farm to Fly 2.0 supply chain analysis.
- 0.3.2 Use GIS-based estimates of fiber crop production potential to develop preliminary technical production estimates of jet fuel in Hawaii.
- 0.3.3 Develop fundamental property data for tropical biomass resources.
- 0.3.4 Transmit data and analysis results to support improvement of existing tools (e.g. POLYSIS).

### **Research Approach**

Activity 0.3.2 has been conducted using geographic information system (GIS) data to identify areas suitable for purpose grown crop production of feedstocks for AJF production in Hawaii. The approach has been to use GIS layers for land capability class (LCC), slope, and zoning as preliminary screens for suitability. Lands are classified by NRCS with ratings from 1 to 6. LCC's from 1 to 3 are generally suitable for agricultural production and LCC of 4 can be productive with proper management. The slopes of terrains impact aspects of production including mechanization and erodibility. An elevation GIS layer was used to derive a slope layer. Zoning layers were acquired from State and County GIS offices. Only agricultural zoning was deemed suitable for this analysis. The EcoCrop model was used to develop yield models for the crops selected in Task 0.1 based on the annual rainfall and mean minimum monthly temperature data. EcoCrop includes



model parameters on sugarcane, banagrass, five species of eucalyptus, leucaena, pongamia, jatropha, and sorghum. The parameters for sugarcane will be used to provide a base case assessment for comparison with historical sugar cane acreage and yield. Using sensitivity analysis, the model can be tuned to account for the differences between parameters developed from global sugar production and a century of production experience in Hawaii that was refined through plant breeding to adapt sugarcane varieties to a wide variety of agro-ecosystems. Model results across all of the potential feedstocks will be used to identify land use patterns that would match plants with environmental conditions toward maximizing productivity in support of AJF production.

Pongamia will be the initial focus of Activity 0.3.3. Pongamia is an oil seed bearing, leguminous tree that has production potential in Hawaii and Florida. The tree produces pods containing oil bearing seeds. Pods, oil seed cake, and oil will be evaluated from a number of trees growing on the island of Oahu. Fundamental measurements of chemical composition will be conducted and reported. Development of coproducts from the pods and oil seed cake will be explored.

### **Milestone(s)**

Identify target opportunities to augment POLYSYS, AFTOT, and conversion modules  
Review previously developed GIS information layers for tropical fiber crops and identify updating requirements  
Preliminary estimates of AJF technical potential in Hawaii based on previously developed GIS information layers

### **Major Accomplishments**

The GIS based analysis of AJF production potential is ongoing. The assessment of potential lands meeting requirements for land capability class, slope, and land use zoning was completed. The EcoCrop model is being implemented to predict yield as a function of the minimum average monthly temperature and the annual rainfall. This will allow prescription of potential AJF feedstock crops on land areas capable of supporting their production under both rain-fed and irrigated conditions. This analysis will provide information necessary in determining cropping patterns and assessing transport costs to processing facility locations. The EcoCrop model's prediction of sugarcane potential was determined and the results were compared with historic sugarcane acreage, both rainfed and irrigated. EcoCrop upper and lower values for temperature and rainfall that support optimal sugarcane production were varied to calibrate the prediction against historic acreage. The difference between the EcoCrop values and those representative of Hawaii conditions can be attributed to improvements due to plant breeding and unique combinations of environmental conditions. An example of the latter is the relatively young volcanic soils present in high rainfall areas on the island of Hawaii that allow for high drainage rates and accommodate sugar production. Similar analysis has begun with for *Eucalyptus grandis* and *Eucalyptus saligna*, the former suited for planting at lower, warmer, wetter locations and the latter better suited for cooler, drying sites.

Additional seeds and pods were collected from the pongamia tree on the University of Hawaii campus and the Ke`ehi Lagoon Beach Park. Two oil seed presses were acquired and safety documents were developed. Soxhlet extraction methods were reviewed and apparatus assembled.

### **Publications**

None

### **Outreach Efforts**

Outreach in this task has focused on interactions with Terviva, a startup company that has identified pongamia germplasm production and marketing as the central focus of their business plan.

### **Awards**

None

### **Student Involvement**

None

### **Plans for Next Period**

The GIS analysis of AJF production will continue to include the remaining AJF crops and provide State-wide working maps for each of the species.





The pongamia oil seeds and husks will be analyzed to determine oil content and potential for coproduct development. Differences between pongamia tree germplasms located on the island of Oahu will be determined to compare oil component profiles and coproduct potential.

## **Task #0.4: Support of Indonesian alternative jet fuel supply initiatives**

University of Hawaii

### **Objective(s)**

This task supports the Memorandum of Understanding between the Federal Aviation Administration (FAA) and Indonesian Directorate General of Civil Aviation (DGCA) to promote development and use of sustainable, alternative aviation fuels. Under the coordination of the FAA, efforts to establish points of contact and coordinate with Indonesian counterparts are ongoing.

### **Research Approach**

This task will support the Memorandum of Understanding between the Federal Aviation Administration (FAA) and Indonesian Directorate General of Civil Aviation (DGCA) to promote development and use of sustainable, alternative aviation fuels. This will begin with working with the FAA to establish points of contact to coordinate efforts with Indonesian counterparts. The Indonesian Aviation Biofuels and Renewable Energy Task Force (ABRETF) membership includes Universitas Indonesia, Institut Teknologi Bandung, and Universitas Padjadjaran. A prioritized list of tasks will be developed in consultation with Indonesian counterparts and data required to inform sustainability and supply analyses and potential sources of information will be identified. This could include data collection on Indonesian jet fuel use and resources for alternative jet fuel production, airport locations and annual and monthly jet fuel consumption patterns. Characterization of sustainable biomass resources with potential for use in producing alternative jet fuel supplies could include developing preliminary GIS mapping information of their locations and distributions and preliminary estimates of their technical potentials.

### **Milestone(s)**

Identify points of contact at Indonesian universities participating in ABRETF; identify research needs and develop project plan. Develop data on potential project.

### **Major Accomplishments**

The PI travelled to Jakarta in the first week of August, 2017, and met with Cesar Velarde Catolfi-Salvoni (ICAO), Wendy Aritenang (ICAO), Dr. Ridwan Rachmat (Head of Research Collaboration, Indonesian Agency for Agricultural Research and Development), Sylvia Ayu Bethari (Head of Aviation Fuel Physical & Chemical Laboratory, Research and Development Centre for Oil and Gas Technology), Dr. Ina Winarni (Forest Product Research and Development Center, Ministry of Environment and Forestry), and Dr. SD Sumbogo Murti (Center of Technology Energy Resources and Chemical Industry, Agency for the Assessment and Application of Technology). The activities of the tropical supply chain analysis effort were presented to the group followed by a general discussion. The conclusion from this introductory meeting was that the Indonesian counterparts would seek agreement on how to move forward with future cooperation.

### **Publications**

None

### **Outreach Efforts**

The PI travelled to Jakarta in the first week of August, 2017, and met with Cesar Velarde Catolfi-Salvoni (ICAO), Wendy Aritenang (ICAO), Dr. Ridwan Rachmat (Head of Research Collaboration, Indonesian Agency for Agricultural Research and Development), Sylvia Ayu Bethari (Head of Aviation Fuel Physical & Chemical Laboratory, Research and Development Centre for Oil and Gas Technology), Dr. Ina Winarni (Forest Product Research and Development Center, Ministry of Environment and Forestry), and Dr. SD Sumbogo Murti (Center of Technology Energy Resources and Chemical Industry, Agency for the Assessment and Application of Technology). The activities of the tropical supply chain analysis effort were presented to the group followed by a general discussion. The conclusion from this introductory meeting was that the Indonesian counterparts would seek agreement on how to move forward with future cooperation.



### **Awards**

None

### **Student Involvement**

None

### **Plans for Next Period**

The PI will continue to develop the cooperative research agenda between UH and Indonesian universities through continued dialog with FAA, ICAO, and the Indonesian Directorate General of Civil Aviation.

## **Task #2.2: National lipid supply availability analysis**

University of Hawaii

### **Objective(s)**

Activities under this task will support ASCENT partners working on a national lipid supply availability analysis by sharing data on tropical oilseed availability developed under previous year's activities.

### **Research Approach**

Activities under this task will support ASCENT partners working on a national lipid supply availability analysis by sharing data on tropical oilseed availability developed under previous year's activities. This support will include estimates of pongamia production capability in the State in addition to assessments of waste cooking oil and tallow.

### **Milestone(s)**

Milestones will coincide with lead institution, WSU, schedule for the national lipid supply analysis.

### **Major Accomplishments**

None - Task in progress

### **Publications**

None

### **Outreach Efforts**

None

### **Awards**

None

### **Student Involvement**

None

### **Plans for Next Period**

Efforts in the next period will include conducting production estimates of oil seed crops in Hawaii and assessing waste oil supplies. Information will be provided to the lead institution, WSU.





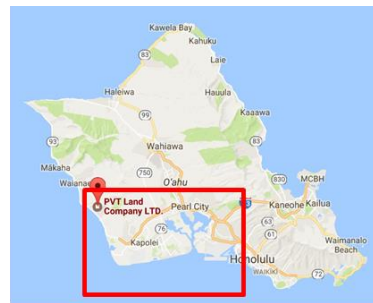
## Task #3.2: Hawaii Regional Project

University of Hawaii

### Objective(s)

A supply chain based on fiber feedstocks transported to a conversion facility located at Campbell Industrial Park (CIP) on Oahu will be evaluated (Figure 1). CIP is the current site of two oil refineries. Construction and demolition (C&D) wood waste from PVT Landfill could be primary source of feedstock. Other sources will be evaluated from elsewhere on Oahu and from outer islands, including MSW stream from outer islands and mining of current stocks of waste in place. Waste streams and purpose grown crops form the basis for a hub and spoke supply system with the hub located on Oahu. Pipelines for jet fuel transport are in place from CIP to Daniel K. Inouye International Airport and adjacent Joint Base Pearl Harbor/Hickam. Other coproduct off-takers for alternative diesel fuel (ADF) include Hawaiian Electric Co. and several military bases (Schofield Barracks (~50 MW alternative fuel-capable power plant under development), Kaneohe Marine Corp Base, etc.). Hawaii Gas (local gas utility) is also seeking alternative sources of methane if methane or feedstock suitable for methane production is available as a coproduct. Hawaii Gas currently off takes feedstock (naphtha) from refinery.

## Possible Locations of Value Chain Participants



### PVT Land Company



Figure 1. Possible locations of value chain participants for fiber based AJF production facility located at Campbell Industrial Park, Oahu.



## **Research Approach**

Task 3.2.G1. Analysis of feedstock-conversion pathway efficiency, product slate (including co-products), maturation Building on activities from previous years, additional supporting analysis will be conducted for proposed supply chains in Hawaii, including:

- 3.2.G1.1 Assess feedstock suitability for conversion processes (characterization, conversion efficiencies, contaminants, etc.) [UH and WSU (Manuel Garcia-Perez)]
- 3.2.G1.2 Acquire data re. feedstock size reduction, particle size of materials, bulk densities [UH, WSU (Manuel Garcia-Perez)]
- 3.2.G1.3 Evaluate coproducts at every step of the supply chain. [A01 team]

### **Task 3.2.G2. Scoping of techno-economic analysis (TEA) issues**

This task will determine the current TEA status of targeted AJF production technologies that use fiber feedstocks as production inputs. [UH, WSU (Manuel Garcia-Perez), Purdue (Wally Tyner)]

### **Task 3.2.G3. Screening level greenhouse gas (GHG) life cycle assessment (LCA)**

This task will conduct screening level GHG LCA on the proposed target supply chains and AJF conversion technologies.

Sub-tasks:

- 3.2.G3.1 Assess MIT waste based GHG LCA tools in context of Hawaii application. [MIT (Mark Staples)]
- 3.2.G3.2 Assess requirements to link previously completed eucalyptus energy and GHG analysis to the edge of the plantation with available GHG LCA info for conversion technology options. [MIT (Mark Staples), UH]
- 3.2.G3.3 Identify and fill information/data gaps

### **Task 3.2.G4. Identification of supply chain participants/partners**

Sub-tasks:

- 3.2.G4.1 Define C&D landfill case
- 3.2.G4.2 Identify eucalyptus in existing plantations – landowners, leaseholder/feedstock producer, harvesting contractor, trucking, etc. [UH]
- 3.2.G4.3 Define other feedstock systems as identified. [A01 Team]

### **Task 3.2.G5. Develop appropriate stakeholder engagement plan**

Sub-tasks:

- 3.2.G5.1 Review stakeholder engagement methods and plans from past work to establish baseline methods [UH, WSU (Season Hoard)].
- 3.2.G5.2 Identify and update engagement strategies based on updated CAAM/Outreach support tool [UH, WSU (Season Hoard)]

### **Task 3.2.G6. Identify and engage stakeholders**

Sub-tasks:

- 3.2.G6.1 Identify stakeholders along the value chain and create database based on value chain location. [UH]
- 3.2.G6.2 Conduct stakeholder meeting using instruments developed in Task 3.2.G5. [UH, WSU (Season Hoard)]
- 3.2.G6.3 Analyze stakeholder response and feedback to process. [UH, WSU (Season Hoard)]

### **Task 3.2.G7. Acquire transportation network and other regional data needed for FTOT and other modeling efforts**

Sub-tasks:

- 3.2.G7.1 Acquire necessary data to evaluate harbor capacities and current usage. [UH, Volpe (Kristin Lewis), WSU (Mike Wolcott)]
- 3.2.G7.2 Acquire data on interisland transport practices. [UH, Volpe (Kristin Lewis), WSU (Mike Wolcott)]

### **Task 3.2.G8. Evaluate infrastructure availability**



Sub-tasks:

- 3.2.G8.1 Evaluate interisland shipping options and applicable regulation. [UH, Volpe (Kristin Lewis), WSU (Mike Wolcott)]
- 3.2.G8.2 Evaluate transport or conveyance options from conversion location to end user and applicable regulation. [UH, Volpe (Kristin Lewis), WSU (Mike Wolcott)]

**Task 3.2.G9. Evaluate feedstock availability**

Sub-tasks:

- 3.2.G9.1 Refine/groundtruth prior evaluations of options for purpose grown feedstock supply [UH]
- 3.2.G9.2 Conduct projections of C&D waste supply moving forward and mining of waste in place on Oahu, MSW and mining of waste in place on other islands [UH]

**Task 3.2.G10. Develop regional proposal**

This task will use the information collected in Tasks 3.2.G1 through 3.2.G9 to develop a regional project proposal.

**Milestone(s)**

One milestones is associated with each of the subtask activities identified in the research approach section above.

**Major Accomplishments**

None, project is being initiated.

**Publications**

None

**Outreach Efforts**

None

**Awards**

None

**Student Involvement**

None

**Plans for Next Period**

During the next period, activities will begin toward completing subtasks identified in the research approach section above.