



Student Involvement

Daniel Mueller, Ph.D. candidate in political science at WSU and research assistant on this project, will continue validation efforts for the CAAM and has finalized measurements for political capital and finished developing strategic applications of the CAAM. Future work includes further validation of the CAAM and testing the model through various collaborative research efforts.

Plans for Next Period

The final CAAM and strategic application will be validated in the Inland Northwest and BANR regions. This approach will include incorporating in multi-method decision-making tools, and appropriate weighting of the capitals based on their correlation.

Task 5- Refine and Deploy the Facility Siting Tools for Determining Regional Demand and Potential Conversion Sites to be Used in Regional Analyses

Washington State University

Objective(s)

Continuation from last year

Develop readiness level tools for regional projects.

Research Approach

The CAAM model, developed under the NARA project and refined for ASCENT applications, provides county-level data collected from national datasets to conduct a preliminary assessment of community characteristics for four (Cultural, Social, Human, Political) of the seven “Community Capitals” developed by Emery and Flora 2006.

To help improve facility siting tools, prior CAAM models (focusing on 3 assets: social, cultural, and human capital) were added to economic assets to assess the suitability of communities in the Pacific Northwest for bio-refineries. Expanding on these analyses, our CAAM measures have been added to a decision support tool (DST) to assess the repurpose potential of pulp mills in the Pacific Northwest for a biorefinery. An additional manuscript has been written on the effectiveness of this tool and will be submitted for review. These approaches have been utilized for cellulosic Alcohol-to-Jet supply chains in the Pacific Northwest, and we will work to demonstrate the tool for supply chain siting analyses for alternative jet fuel production using HEFA conversion technology and FOGs as feedstock in the Inland Northwest.

Milestone(s)

CAAM has been updated with four capitals, and readiness level tools for regional projects have been developed.

Major Accomplishments

During this reporting period, a manuscript combining CAAM with economic indicators to assess site-selection in the Cascades-to-Pacific region (western Oregon and western Washington) was developed and will be submitted. Supplementary data for strategic application has been added to strategic recommendations model which we plan to integrate with future DSTs.

Publications

Martinkus, Natalie, Greg Latta, Kristin Lynne Brandt, and Michael P. Wolcott. 2018. A Multi-Criteria Decision Analysis Approach to Facility Siting in a Wood-Based Depot-and-Biorefinery Supply Chain Model. *Frontiers in Energy Research*, 6:124. Doi: 10.3389/fenrg.2018.00124

Outreach Efforts

None

Awards

None

Student Involvement

Daniel Mueller, Ph.D. candidate in Political Science, now holds a funded Research Assistant appointment working on this project, and has been primarily responsible for acquisition of new primary data, and continuing validation of the model.

Plans for Next Period

In the next year, the latest iteration of the CAAM will be further validated and applied in the Inland Northwest and BANR regions, with expansion to at least one additional U.S. region (Inland Northwest and potentially Central Appalachian Region in cooperation with team members). This model is based upon the addition of measurements for political capital, development of more refined measurement of capital comparative ranking beyond dichotomous outperform/under-perform ratings using standard deviations to examine distance from regional average and impact on successful development and implementation of alternative measurements for cultural capital and slight changes in measurements for human and social capitals, additional supplementary demographic data to enhance the nuance of the model, and final validation, after statistical confirmation, using selected case studies to confirm the efficacy of the model.

The updated CAAM is available for use nationally, allowing comparison of counties against defined regional norms on cultural, social, human, and political capital scales that have been statistically tested and validated through triangulated testing with external data. The new version of the CAAM allows for further enhancing predictive capacity through the development of strategic applications of the model, including, for example, the level of political support for alternative jet fuels in any given community. Finalized codebooks for this model have been developed and made available and will continue to be refined as the model is further validated.

Task 6- Refinery-to-Wing Stakeholder

Washington State University

This is a shared task lead by Penn State University. The reporting is provided in Award No. 13-C-AJFE-PSU-002.

Objective(s)

Continuation from last year

Extend Stakeholder assessment to a limited sample of informed stakeholders in the remaining sections of the country to provide insight into market & industry dynamics which will help optimize successful outcomes.

Research Approach

The team will collect primary data via surveys to better understand the awareness, opinions, and perspectives of key aviation fuel supply chain stakeholders regarding to the potential impacts and key success factors for an economically viable biojet fuel production industry in the United States. These aviation fuel supply chain stakeholders include airport management, FBOs, other aviation fuel handlers, relevant airlines, and CAAFI personnel. Data collection to assess aviation fuel supply chain stakeholder opinions, awareness, and perceptions regarding factors impacting the adoption and diffusion of AJF in the Pacific Northwest region has been completed, and Midwest region analysis is continuing. A national survey of aviation management has been developed and has been distributed to several hundred stakeholders across the United States. This survey replaced efforts to conduct interviews due to low response rates and is currently ongoing. As respondents submit their answers, further outreach efforts will be conducted to improve the survey response rate, primarily by calling directly recipients of the survey who have not yet completed it.

Milestone(s)

Assessment in the Pacific Northwest region of stakeholder perceptions using interviews and a survey of airport management have been completed, resulting in one previously published paper and a second paper soon to be published in late 2018. Interview protocols have been completely converted into surveys, and a national survey has been distributed to stakeholders across every region of the country. Responses continue to be collected, and further outreach to enhance survey completion will start soon.

Major Accomplishments

The team has written a second manuscript describing airport management opinions on aviation alternative jet fuel in the Pacific Northwest. The paper has been accepted for publication in the International Journal of Aviation Management. Interview protocols have been converted into a national survey, which has been distributed to hundreds of aviation fuel stakeholders at airports across the country.



Publications

Mueller, D., Hoard, S., Smith, P. M., Sanders, C., & Gaffney, M. (2019). Airport Management Perspectives on Aviation Biofuels: Drivers, Barriers, and Policy Requirements in the U.S. Pacific Northwest. *International Journal of Aviation Management*. <https://doi.org/10.1504/IJAM.2019.098380>

Outreach Efforts

None

Awards

None

Student Involvement

Daniel Mueller, Ph.D. candidate in political science at WSU and research assistant on this project, has helped develop the national survey and is currently administrating this survey. He will also be assisting in outreach to survey recipients to improve response rates.

Plans for Next Period

The next year will see the completion of the national stakeholder assessment, with the team continuing to gather responses from across the country and analyzing the incoming data. When data gathering and analysis is complete, the team will begin drafting a manuscript reporting survey results.

Task 7- Supply Chain Analysis

Washington State University-Volpe

Objective(s)

Continuation from previous years

Oilseeds production and use for production of AJF using HEFA refining is one potential pathway to production of fuels in the Pacific and Inland Northwest. A logistical optimization routine is used to assess the most likely supply chain scenarios that may result in this region.

Research Approach

Oilseed production is estimated based upon previous USDA-funded research addressing sustainable agricultural practices in the dry-land farming area of the Inland Northwest. The yield and rotation information from this project, called REACCH (reacchpna.org), was used to assess 50% and 100% of maximum sustainable oilseed production in this region as a rotation crop to traditional wheat production. A variety of storage facility types (country, shuttle, and barge elevators) and transportation modes (road, rail, and barge) were assessed. Siting methods in this report were used to determine potential locations for oilseed crushing. Plant oil refining for biodiesel production at the REG facility in Grays Harbor, WA and coproduction of alternative jet fuel at an oil refinery near Anacortes, WA were considered for supplying diesel and jet fuel demands in the Greater Seattle and Portland markets. The location of crushing facilities and transportation modes/routes were determined using optimization routines that considered both plant oil and oilseed meal delivery. The oilseed meal was assumed to be used regionally as a protein source for cattle and dairy production.

Milestone(s)

Analysis is complete and an MS thesis is completed.

Major Accomplishments

WSU and the Volpe AFTOT analysis team has teamed with the NREL BSM team for a joint analysis of the ability to reach 1-billion gallon of AJF production in the US.

Publications

Camenzind, D. 2018. Supply Chain Analysis for the Production of Alternative Jet Fuel from Oilseeds produced within the U.S. Pacific Northwest. MS Thesis. Washington State University.



Outreach Efforts

None

Awards

None

Student Involvement

Dane Camenzind, MS Environmental Engineering, Washington State University

Plans for Next Period

Compare optimized supply chains to those assessed by Volpe using FTOT.

Utilize regional supply chain tools in assessing forest residuals to alternative jet fuels using pyrolysis methods in Task 8 below.

Task 8- Analytical Support for Regional CAAFI and USDA Jet Fuel Project

Washington State University

Objective(s)

Continuation from previous years

Develop a readiness level tool to assess the status of regional alternatives jet production projects. In addition, use the supply chain and standalone design cases to support the USDA BANR project in TEA and supply chain analysis. This regional CAP project focuses on the use of softwood forest salvage feedstock for fuels via a catalyzed pyrolysis conversion pathway.

Research Approach

We will develop readiness level tools for regional projects to assess their status of developing fuel project and assist in understanding critical missing components. This tool will take similar form and approaches to the CAAFI Feedstock and Fuel Readiness Levels and will be used to assist CAAFI in understanding the stage of development for projects of interest and assess critical gaps. In addition, we will assist the regional USDA BANR team in deploying TEA and Supply Chain analysis to their project. This effort is structured around using softwood forest salvage feedstock with a thermochemical conversion process to produce fuels and coproducts.

Milestone(s)

We are progressing on the use of the supply chain and standalone design cases to support the USDA BANR project in TEA and supply chain analysis. We have supported the BANR team in creating TEAs for the technologies under consideration.

Major Accomplishments

In collaboration with the USDA BANR project and attending their annual meeting to coordinate analysis. We currently await their completion of beetle-killed softwood estimates to complete the supply chain analysis.

Publications

None

Outreach Efforts

None

Awards

None

Student Involvement

Dane Carmenzind, MS Environmental Engineering, Washington State University

Lina Martinez, PhD Biosystems Engineering, Washington State University



Plans for Next Period

Analysis of the BANR Region is ongoing and will be complete within the project year.

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