JOSH GREEN M.D.
GOVERNOR

SYLVIA LUKE
LT. GOVERNOR

GARY S. SUGANUMA
DIRECTOR

KRISTEN M.R. SAKAMOTO
DEPUTY DIRECTOR

STATE OF HAWAIʻI
DEPARTMENT OF TAXATION
Ka ʻOihana ʻAuhau
P.O. BOX 259
HONOLULU, HAWAIʻI 96809
PHONE NO: (808) 587-1540
FAX NO: (808) 587-1560

TESTIMONY OF GARY S. SUGANUMA, DIRECTOR OF TAXATION

TESTIMONY ON THE FOLLOWING MEASURE:
S.B. No. 995, Relating to Renewable Fuel

BEFORE THE:
Senate Committees on Energy and Intergovernmental Affairs, and Agriculture and Environment

DATE: Wednesday, January 29, 2025
TIME: 1:00 p.m.
LOCATION: State Capitol, Room 224

Chairs Wakai and Gabbard, Vice-Chairs Chang and Richards, III, and Members of the Committees:

The Department of Taxation (DOTAX) offers the following comments regarding S.B. 995 for your consideration.

Section 2 of S.B. 995 establishes a sustainable aviation fuel import tax credit in chapter 235, Hawaii Revised States (HRS). The credit will be $1 per gallon of sustainable aviation fuel sold for distribution in the State. The credit is to be certified by the Hawaii State Energy Office (HSEO), which will also administer the aggregate annual cap on credit claims each year. The sustainable aviation fuel import tax credit is generally nonrefundable and may be carried forward. However, taxpayers may elect to reduce the eligible credit amount by 30 percent and if this reduced amount exceeds the amount of income tax payment due from the taxpayer, the credit converts to a refundable credit. The credit is also refundable for certain taxpayers with exempt pension/retirement income of less than $20,000 in adjusted gross income for the year ($40,000 for joint filers).

Section 3 of the bill amends the renewable fuels production tax credit in section 235-110.32, HRS, by 1) increasing the credit amount, 2) repealing the individual annual cap amount on the claimable renewable fuels production tax credit, 3) repealing the requirement that the credit be claimed for fuels with lifecycle emissions below fossil

fuels, and 4) repealing the prohibition on claiming other tax credits for the cost incurred to produce renewable fuels. The bill also adds an additional credit value amount of $1 per gallon for low lifecycle emissions renewable fuels and sustainable aviation fuel.

The bill further provides that taxpayers who previously claimed a tax credit under section 235-110.32, HRS, before the effective date of this act may claim another tax credit for taxable years beginning after December 31, 2024.

The bill also amends the aggregate credit cap on the renewable fuels production tax credit by increasing it from $20,000,000 to $40,000,000 for 2025, $50,000,000 for 2026, $60,000,000 for 2027, $70,000,000 for 2028, and $80,000,000 for 2029 and after.

This bill would be effective for all taxable years beginning after December 31, 2024, provided that section 2 of the bill, which creates the new sustainable aviation fuel import tax credit, shall be repealed on January 1, 2036. DOTAX anticipates that a new sustainable aviation fuel import tax credit will require new forms, instructions, and systems changes. To accommodate these changes, DOTAX requests that Section 2 of the bill become effective for taxable years beginning after 2025. DOTAX also recommends making the credit nonrefundable, as refundable credits are more susceptible to waste, fraud, and abuse.

Thank you for the opportunity to provide comments on this measure.

JOSH GREEN, M.D.
GOVERNOR
KE KIA'ĀINA

EDWIN H. SNIFFEN
DIRECTOR
KA LUNA HO'OKELE

Deputy Directors
Nā Hope Luna Ho'okele
DREANALEE K. KALILI
TAMMY L. LEE
CURT T. OTAGURO
ROBIN K. SHISHIDO

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF TRANSPORTATION | KA 'OIHANA ALAKAU
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

LATE

January 29, 2025
1:00 P.M.
State Capitol, Room 224

S.B. 995
RELATING TO THE RENEWABLE FUEL

Senate Committees on Energy and Intergovernmental Affairs & Agriculture and Environment

The Department of Transportation (DOT) **supports the intent of H.B. 976** to increase the use of renewable fuels statewide, and to establish tax credits to promote the expansion of local production of Sustainable Aviation Fuel for the local airline industry.

Sustainable Aviation Fuel (SAF) is an important solution for Hawaii to reduce Green House Gas (GHG) emissions in the aviation industry. SAF and renewable fuels can reduce lifecycle carbon emissions and are important strategies to accelerate the transition to lower emissions in the transportation sector.

DOT is currently developing a Greenhouse Gas Reduction Plan to provide DOT and the public with immediate actions we can take to reduce GHG emissions, a roadmap for Hawai'i to meet the State's net-zero emissions clean energy target no later than 2045, and a long-term plan to reach zero emissions in the transportation sector. Although the specific strategies and benchmarks of DOT's Greenhouse Gas Reduction Plan are still in development, we expect that increased Sustainable Aviation Fuel will be an important strategy of our Plan. From our initial calculations, it does not appear possible to reach the State's ambitious GHG reduction goals without a significant increase in Sustainable Aviation Fuel. The DOT encourages your committees to advance the development, adoption, and scaling of SAF and renewable fuels as part of our collective efforts to reduce GHG emissions statewide and promote energy security.

Thank you for the opportunity to provide testimony.

STATE OF HAWAI'I
OFFICE OF PLANNING
& SUSTAINABLE DEVELOPMENT

JOSH GREEN, M.D.
GOVERNOR

MARY ALICE EVANS
DIRECTOR

235 South Beretania Street, 6th Floor, Honolulu, Hawai'i 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawai'i 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: https://planning.hawaii.gov/

Statement of
MARY ALICE EVANS
Director, Office of Planning and Sustainable Development
before the
SENATE COMMITTES ON ENERGY AND INTERGOVERNMENTAL AFFAIRS AND AGRICULTURE AND ENVIRONMENT
Wednesday, January 29, 2025
1:00 PM
State Capitol, Conference Room 224

in consideration of
SB 995
RELATING TO RENEWABLE FUEL.

Chair Wakai, Chair Gabbard, Vice Chair Chang, Vice Chair Richards, and Members of the Senate Committee on Energy and Intergovernmental Affairs and Agriculture and Environment:

The Office of Planning and Sustainable Development (OPSD) **offers comments** on SB 995, which provides establishes the sustainable aviation fuel import tax credit and increases the renewable fuels production tax credit amount.

The proposed bill introduces tax credits for sustainable aviation fuel (SAF), aligning with the State of Hawai'i's clean energy and decarbonization laws by addressing aviation emissions—one of the largest contributors to greenhouse gases. SAF supports Hawai'i's carbon neutrality goals, diversifies the economy, and strengthens local energy independence.

Additionally, the Office of Planning and Sustainable Development's (OPSD) Carbon Offsetting Report[1] emphasizes the limitations and strongly dissuades the state's use or reliance on carbon offset programs. SAF, instead, represents a more impactful approach to reducing greenhouse gas emissions, and offering direct and measurable benefits that align with Hawai'i's clean energy and decarbonization goals. By incentivizing the use of SAF in our aviation industry, Hawai'i can take a significant step toward reducing its aviation-related emissions while supporting a more sustainable and resilient energy system.

OPSD defers to the Hawai'i State Energy Office and Department of Taxation on the implementation and management of this tax credit.

Thank you for the opportunity to testify on this measure.

---

[1] Office of Planning and Sustainable Development. (2019). *Feasibility and implications of establishing a carbon offset program for the State of Hawaii: Final report*. Office of Planning and Sustainable Development. Retrieved from https://files.hawaii.gov/dbedt/op/sustainability/feasibility_and_implications_of_establishing_a_carbon_offset_program_for_the_state_of_hawaii_finalweb.pdf

HAWAII STATE ENERGY OFFICE
STATE OF HAWAII

JOSH GREEN, M.D.
GOVERNOR

SYLVIA LUKE
LT. GOVERNOR

MARK B. GLICK
CHIEF ENERGY OFFICER

235 South Beretania Street, 5th Floor, Honolulu, Hawaii 96813 Telephone: (808) 451-6648
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Web: energy.hawaii.gov

Testimony of
MARK B. GLICK, Chief Energy Officer

before the
SENATE COMMITTEES ON
ENERGY AND INTERGOVERNMENTAL AFFAIRS
AND
AGRICULTURE AND ENVIRONMENT

Wednesday, January 29, 2025
1:00 PM
State Capitol, Conference Room 224 and Videoconference

Providing Comments on
SB 995

RELATING TO RENEWABLE FUEL.

Chairs Wakai and Gabbard, Vice Chairs Chang and Richards, and Members of the Committees, the Hawai‘i State Energy Office (HSEO) offers comments on SB 995, which establishes the sustainable aviation fuel import tax credit and increases the renewable fuels production tax credit amount while specifying thresholds and restructuring various provisions.

Research conducted by the Hawai‘i State Energy Office shows that our state needs more than just solar and wind energy. While these are valuable renewable sources, we must also invest in other clean energy technologies that produce low or zero carbon emissions to meet Hawai‘i’s complete energy needs.

The current bill proposes additional tax credits for sustainable aviation fuel (SAF) imports and production. The proposed inclusion of SAF is appropriate and would likely be economically sustainable if enacted at the current level of credits. HSEO notes that the proposed structure to increase the renewable fuels tax credit amounts and eliminate the cap could have a disproportionate impact on the state budget and might undermine support for the overall agenda for renewable energy tax credits. Additionally, consistent

methods for measuring energy production and emissions reductions across different fuel types are needed to manage and verify the credit program properly.

It would be inappropriate to remove or amend the requirement that the tax credit be claimed for fuels with lifecycle emissions below fossil fuels without a requirement for a renewable fuel to meet an established or diminishing lifecycle carbon intensity threshold or other safeguards identified in HSEO's 2023 Decarbonization Pathways Report.[1] Such safeguards are necessary to ensure a balanced approach to supporting renewable fuel development in Hawai‘i consistent with the renewable portfolio standard and decarbonization statutes.

Thank you for the opportunity to testify.

[1] Hawai‘i State Energy Office (2023). Hawai‘i Pathways to Decarbonization Report to the 2024 Hawai‘i State Legislature Act 238 (SLH 2022). Available at: https://energy.hawaii.gov/wp-content/uploads/2022/10/Act-238_HSEO_Decarbonization_FinalReport_2023.pdf page 12

EST. LIFE OF THE LAND 1970
P.O. Box 37158, Honolulu, Hawai`i 96837-0158
Phone: 927-0709 henry.lifeoftheland@gmail.com

COMMITTEE ON ENERGY AND INTERGOVERNMENTAL AFFAIRS
Senator Glenn Wakai, Chair
Senator Stanley Chang, Vice Chair

COMMITTEE ON AGRICULTURE AND ENVIRONMENT
Senator Mike Gabbard, Chair
Senator Herbert M. "Tim" Richards, III, Vice Chair

DATE: Wednesday, January 29, 2025
TIME: 1:00 PM
PLACE: Conference Room 224 & Videoconference

Re SB 995 Sustainable Aviation Fuels **Support with Amendment**

Aloha Chairs Wakai and Gabbard, Vice Chairs Chang and Richards, and Members of the Committees

Life of the Land is Hawai`i's own energy, environmental and community action group advocating for the people and `aina for 55 years. Our mission is to preserve and protect the life of the land through sound energy and land use policies and to promote open government through research, education, advocacy and, when necessary, litigation.

Life of the Land supports a low climate impact, renewable energy future that provides high reliability and resilience, while also increasing affordability and equity.

State agencies overlook the first part of HRS 225-P5 “as quickly as practicable, but no later than 2045.” This bill focuses on reaching the net-zero goal in 2045.

Proposed Amendment:

"`Lifecycle greenhouse gas emissions‘ means the aggregate attributional core lifecycle greenhouse gas emissions values utilizing one of the following:

(1) The most recent version of the United States Department of Energy's Argonne National Laboratory's greenhouse gases, regulated emissions, and energy use in technologies model, including agricultural practices and carbon capture and sequestration, or

(2) ~~Carbon offsetting and reduction scheme for international aviation~~; or

~~(3)~~ Another lifecycle methodology approved by the Hawaii state energy office.

In te short run, the carbon offset, and sequestration markets, are dubious.

Guardian Expose: “Revealed: more than 90% of rainforest carbon offsets by biggest certifier are worthless, analysis shows… Investigation into Verra carbon standard finds most are ‘phantom credits.’ ... The forest carbon offsets approved by the world’s leading certifier and used by Disney, Shell, Gucci and other big corporations are largely worthless and could make global heating worse, according to a new investigation.”[1]

“Following concerns that it is facilitating the sale of meaningless carbon credits to corporate clients, the **Nature Conservancy** says it’s conducting an internal review of its portfolio of carbon-offset projects. The nonprofit owns or has helped develop more than 20 such projects on forested lands mostly in the U.S., which generate credits that are purchased by such companies as JPMorgan Chase & Co., BlackRock Inc., and Walt Disney Co., which use them to claim large reductions in their own publicly reported emissions.

[1] https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe

"The self-examination follows a Bloomberg Green investigation last year that found the world's largest environmental group taking credit for preserving trees in no danger of destruction. The internal review is a sign that it's at least questioning some practices that have become widespread in the environmental world, and could carry implications for the broader market for carbon credits."[2]

"The **Massachusetts Audubon Society** has long managed its land in western Massachusetts as crucial wildlife habitat. But in 2015, the conservation nonprofit presented California's top climate regulator with a startling scenario: It could heavily log 9,700 acres of its preserved forests over the next few years.

"The group raised the possibility of chopping down hundreds of thousands of trees as part of its application to take part in California's forest offset program."

The California Air Resources Board "allows forest owners like Mass Audubon to earn so-called carbon credits for preserving trees. Each credit represents a ton of CO2. California polluters, such as oil companies, buy these credits so that they can emit more CO2 than they'd otherwise be allowed to under state law."

"The Air Resources Board accepted Mass Audubon's project into its program, requiring the nonprofit to preserve its forests over the next century instead of heavily logging them."[3]

Mahalo for considering this testimony

Henry Curtis
Executive Director

[2] https://www.worldoil.com/news/2021/4/5/nature-conservancy-investigating-its-own-sales-of-potentially-meaningless-carbon-credits

[3] https://www.propublica.org/article/a-nonprofit-promised-to-preserve-wildlife-then-it-made-millions-claiming-it-could-cut-down-trees

Hawai'i Renewable Fuels Coalition

January 29, 2025

TESTIMONY IN SUPPORT OF SB 995 RELATING TO RENEWABLE FUEL

Aloha Chair Glenn Wakai, Vice Chair Stanley Chang and Members of the Senate Committee on Energy & Intergovernmental Affairs and Chair Mike Gabbard and Vice Chair Herbert M. "TIm" Richards, III and Members of Senate Committee on Agriculture and Environment,

My name is Nahelani Parsons, and I am the Executive Director of the Hawai'i Renewable Fuels Coalition (HRFC). Mahalo for the opportunity to testify in **SUPPORT** of SB 995 with proposed amendments attached. This measure represents a critical step in advancing Hawai'i's clean energy and sustainability goals.

The HRFC is a diverse alliance of stakeholders working to achieve Hawai'i's renewable energy goals. Our founding members include:

- **Hawaiian/Alaska Airlines**: Leaders in adopting Sustainable Aviation Fuel (SAF) to decarbonize the aviation sector.
- **Pono Pacific**: Hawai'i's largest natural resource conservation company, advancing oil crop feedstock cultivation to support renewable fuel production.
- **Par Hawai'i**: The state's largest energy supplier, investing over $90 million in renewable fuel production technology to strengthen energy security and sustainability.

In addition to these partners, HRFC collaborates with:

Pacific Biodiesel, a local producer of biodiesel. The Hawai'i Farm Bureau, representing 1,800 farm families statewide, to support renewable feedstock cultivation and enhance food and energy security. Ranchers, dairy farmers, and conservationists, such as Meadow Gold and Haleakalā Ranch, contributing to Hawai'i's resilience and self-sufficiency. Airlines for America, which advocates for SAF adoption nationwide to reduce aviation emissions.

Hawai'i Renewable Fuels Coalition members in alphabetical order:

Airlines for America	Alaska Airlines	Haleakala Ranch
Hawaii Farm Bureau	Hawaii Fuelling Facilities Corp	Hawaiian Airlines
ITOCHU Corporation	Japan Airlines	Kuilima Farm
Meadow Gold Hawaii	Pacific Biodiesel	Par Hawaii
Pono Pacific	United Steelworkers	

The Importance of SB 995

Hawai‘i has made significant strides since the Hawai‘i Clean Energy Initiative launched in 2008, but key challenges remain—particularly in aviation, which accounts for nearly half of our transportation emissions due to our unique reliance on air travel. SB 995 addresses these challenges through:

- **Sustainable Aviation Fuel Tax Credit**: SAF is a proven solution to reduce lifecycle emissions by up to 80% compared to conventional jet fuel, supporting Hawai‘i’s clean energy leadership.
- **Renewable Fuels Production Tax Credit**: Incentivizing the production of renewable fuels like SAF, renewable diesel, biodiesel, and renewable naphtha, to decarbonize transportation and power generation.
- **Support for Local Agriculture**: By fostering renewable feedstocks such as camelina, this measure diversifies agriculture, strengthens food security, and creates green jobs.
- **Improved Credit Accessibility**: Modernizing the tax credit structure ensures broader and more equitable adoption of renewable fuel incentives.

Why This Bill Matters

Transitioning to renewable fuels is not just an environmental imperative but an economic and strategic necessity for Hawai‘i. Liquid renewable fuels complement intermittent renewable energy sources, enhancing grid reliability and diversifying our energy portfolio.

Significantly, SAF is a drop-in fuel compatible with existing aircraft and infrastructure, making it a viable near-term solution. As the U.S. airline industry works toward making 3 billion gallons of cost-competitive SAF available by 2030, Hawai‘i must provide competitive incentives to attract investment and scale production.

Highlights of the bill include:

- Tax credits for locally produced renewable fuels and imported SAF, with additional value for local feedstocks.
- Higher incentives for SAF to level the playing field with other renewable fuels.
- Removal of outdated restrictions, enabling more equitable access to credits and increasing the annual cap to $40 million for local production and $5 million for imports.

- Expanded eligibility to allow taxpayers who previously claimed credits to participate again starting in 2025.

These provisions address cost disparities—up to 2–5 times higher than conventional fuels—by bridging the gap until renewable fuels achieve maturity and scale.

Economic and Environmental Benefits

The HRFC and its partners are already driving progress:

- **Par Hawai'i**: Investing over $90 million to produce 60 million gallons of renewable fuel annually.
- **Pono Pacific**: Expanding oil crop cultivation for renewable fuel feedstocks.
- **Hawaiian/Alaska Airlines**: Integrating SAF into operations and investing in SAF technologies to reduce aviation emissions.
- **Pacific Biodiesel**: Producing 6 million gallons of biodiesel annually and expanding locally grown feedstock for biodiesel production.

By advancing this measure, Hawai'i will:

- Strengthen energy security and independence.
- Empower farmers and ranchers through new revenue streams.
- Support high-quality jobs in agriculture and biofuels.
- Take meaningful steps toward decarbonizing aviation, transportation and power generation sectors and achieving net-zero emissions by 2045.

Investing in renewable fuels is an investment in Hawai'i's future. This bill will ensure we lead the nation in clean energy innovation while fostering a sustainable, resilient economy.

Respectfully asking this committee to adopt the attached amendments which have been developed in collaboration with our stakeholders. Mahalo for your time, consideration, and support to secure a cleaner, more sustainable future for generations to come.

Nahelani Parsons
Executive Director
Hawai'i Renewable Fuels Coalition

Hawai‘i Renewable Fuels Coalition - Proposed amendments to SB 995

1. **Proposed amendment:** Page 10, delete subsection (j).

   Justification: This subsection was originally taken from the renewable fuels production tax credit language, but after further discussion with stakeholders, it was determined this subsection is not applicable for the SAF import tax credit.

Delete subsection (j) on page 10, lines 1 through 20, and page 11, lines 1 through 3:

~~(j) Notwithstanding subsection (i), an individual taxpayer may elect to have any excess of the credit over payments due refunded to the taxpayer, if:~~

~~(1) All of the taxpayer's income is exempt from taxation under section 235-7(a)(2) or (3); or~~

~~(2) The taxpayer's adjusted gross income is $20,000 or less or, if filing a tax return as married filing jointly, $40,000 or less;~~

~~provided that tax credits properly claimed by a taxpayer who has no income tax liability shall be paid to the taxpayer; provided further that no refund on account of the tax credit allowed by this section shall be made for amounts less than $1.~~

~~A married couple who does not file a joint tax return shall only be entitled to make this election to the extent that they would have been entitled to make the election had they filed a joint tax return.~~

~~The election required by this subsection shall be made in a manner prescribed by the director on the taxpayer's return for the taxable year in which the credit is claimed. An election once made is irrevocable.~~

~~The election required by this subsection shall be made in a manner prescribed by the director of taxation on the taxpayer's return for the taxable year in which the credit is claimed. An election once made is irrevocable.~~

~~No more than one taxpayer shall be allowed to claim a tax credit for the same purchase of eligible sustainable aviation fuel.~~

2. **Proposed amendment:** Page 14, lines 11-14 re-insert language that has been stricken.

   Justification: This sentence prevents double-claiming; after further discussion with stakeholders, it was determined that this sentence should remain.

Pg 14, lines 11 through 14 re-insert:

No other tax credit may be claimed under this chapter for the costs incurred to produce the renewable fuels that are used to properly claim a tax credit under this section for the taxable year.

3. **Proposed amendment:** Page 18, add language to establish a cap on the amount of the credit that can be allocated to sustainable aviation fuel stating that it cannot exceed 50% of the total credit amount for the year.

   Justification: add new sentence establishing a cap on the amount of the credit that can be allocated to the sustainable aviation fuel additional value. This new cap was inadvertently omitted from the bill.

Page 18, line 16, through page 19, line 3:

No taxpayer shall be eligible for more than seventy-five per cent of the total amount allowed in any year. **The aggregate eligible credit amount for the sustainable aviation fuel additional value shall not exceed fifty percent of the total credit amount allowed in any year.** To the extent that the limitations of this subsection reduce the amount of a taxpayer's credit, the amount of the reduction shall be available to the taxpayer to be used as a credit in the subsequent calendar year; provided that the credit shall not be carried over for any calendar year thereafter; provided further that the carryover credit shall be subject to the limitations of this subsection."

4. **Proposed amendment:** Pg 19, lines 6 through 10: add language to clarify that the credit period begins when the bill is enacted.

   Justification: change definition of the credit period to ensure that the reset of the eligibility for taxpayers who had previously claimed the credit is not impacted.

Pg 19, lines 6 through 10:

"Credit period" means a maximum period of ten consecutive years, beginning from ~~the first taxable year in which a taxpayer begins renewable fuels production at a level of at least two billion five hundred million British thermal units of renewable fuels per calendar year~~ **the effective date of this Act.**

P.O. Box 253, Kunia, Hawai'i 96759
Phone: (808) 848-2074; Fax: (808) 848-1921
e-mail info@hfbf.org; www.hfbf.org

January 28, 2025

HEARING BEFORE THE
SENATE COMMITTEE ON ENERGY AND INTERGOVERNMENTAL AFFAIRS
SENATE COMMITTEE ON AGRICULTURE AND ENVIRONMENT

TESTIMONY ON SB 995
RELATING TO RENEWABLE FUEL

Conference Room 325 & Videoconference
9:00 AM

Aloha Chairs Wakai and Gabbard, Vice-Chairs Chang and Richards, and Members of the Committees:

I am Brian Miyamoto, Executive Director of the Hawaiʻi Farm Bureau (HFB). Organized since 1948, the HFB is comprised of 1,800 farm family members statewide and serves as Hawaiʻi's voice of agriculture to protect, advocate, and advance the social, economic, and educational interests of our diverse agricultural community.

The Hawaiʻi Farm Bureau supports SB 995, which establishes a tax credit for the import of renewable fuel and updates the renewable fuels production tax credit.

Renewable energy production using biofuels can play a critical role in helping Hawaiʻi reach the goal of one hundred percent renewable energy by 2045, help to diversify Hawaiʻi's economy and agricultural sector, reduce greenhouse gas emissions, and reduce our dependence on imported oil.

HFB supports the production of dedicated energy crops, crop residues, and agricultural wastes into economically and environmentally sustainable biofuels and value-added by-products such as livestock feed.

Finding viable uses for agricultural lands that will encourage sustainability in our environment and that produce positive economic cash flow for Hawaii is a critical need. Locally grown biofuel feedstocks offer significant benefits for our farmers. These crops can thrive on marginal land, improving soil health and reducing erosion. They require less water and fertilizer than traditional row crops. By creating a demand for these crops, the renewable fuels industry can revitalize rural communities, create new jobs, and diversify farm income streams. Growing biofuel feedstocks locally helps to create new agricultural jobs, encourages food production, and does not compete with food crops when using oil seed cover crops. HFB believes these feedstocks will be able to provide a quality biofuel product and usable byproducts (such as animal feed) to help support Hawaii's sustainability goals and agricultural, ranching, and dairy sectors of the local economy.

Thank you for the opportunity to comment on this measure.

twelve

Legislative Testimony of S. Derek Phelps
Committee on Energy and Intergovernmental Affairs
Committee on Agriculture and Environment
January 29, 2025
S.B. No. 995 (RELATING TO RENEWABLE FUEL)

A BILL FOR AN ACT relating to a Sustainable Aviation Fuel Import Tax Credit and the Renewable Fuels Production Tax Credit.

Good morning, Chairs Wakai and Gabbard, Vice-Chairs Chang and Richards, and distinguished members of the Committees. My name is Derek Phelps. I am Head of Policy & Governmental Affairs for Twelve Benefit Corporation (Twelve). It is my pleasure to submit this written testimony to this committee in support of Senate Bill No. 9995 (as well as its House companion, HB976), introduced by you and several of your colleagues which, among other things, establishes a sustainable aviation fuel (SAF) import tax credit and increases the amount of the renewable fuels production tax credit.

Twelve, founded in 2015, is a high-tech start-up that has developed breakthrough technology that transforms CO2 into useful hydrocarbon products such as fuels, polymers, and ethylene, effectively turning what is typically considered a waste gas into a useful resource.

We are currently focused on the production of SAF. That is because the airline industry predicts it will need 30 billion liters of SAF per year by 2030.

Twelve has partnerships for the sale of its produced SAF with commercial air carriers, such as Alaska Airlines, and has completed demonstration projects

with the Department of Defense and NASA. I am pleased to report that last year we also announced a 14-year contract with International Airlines Group, the owner of five airlines including British Airways, through which they will purchase 785,000 tonnes of our SAF.

We are currently in the final stages of building our first plant, a demonstration project designed to prove the scalability of our technology, in Washington State, and we expect to begin producing SAF at that facility sometime this year.

On behalf of Twelve, I wish to convey our very strong, unambiguous support for this proposal which sends a clear signal that Hawaii wants to attract innovative clean energy and clean fuel projects and the jobs that these types of projects will bring with them, as well as associated investments in efforts to decarbonize aviation.

I also wish to underscore our strong support for the definition of "Sustainable Aviation Fuel," as appears in section 235-110.32 of the current bill, which makes clear that the definition includes fuels derived from "gaseous carbon oxides."

With that said, in the interest of ensuring a cohesive and coherent statutory construct, I would respectfully suggest and request that adding "gaseous carbon oxides" to the list of fuel sources that appears under the "Renewable Fuels" definition, also in the same section (i.e., 235-110.32).

Thank you again for the opportunity to speak in favor of this important legislation which promises to put Hawaii at the forefront of efforts to decarbonize aviation.

Comments before
January 29, 2025 Senate Joint Committee on Energy and Intergovernmental Affairs and Agriculture & Environment Hearing

OPPOSING
Senate Bill 995

Relating to Sustainable Aviation Fuels

Mike Ewall, Esq.
Founder & Director
Energy Justice Network
215-436-9511
mike@energyjustice.net
www.EnergyJustice.net

Aloha Honorable Committee members. Energy Justice Network is a national organization supporting grassroots groups working to transition their communities from polluting and harmful energy and waste management practices to clean energy and zero waste solutions. In Hawai'i, we've been working with residents who first sought our support in 2015. Since mid-2022, we have supported residents in forming the Hawai'i Clean Power Task Force and Kōkua nā 'Āina to address numerous energy and waste issues in the state.

We must stand in opposition to Senate Bill 995 because a transition to different burnable fuels in air travel is a false solution – one that, in many ways, is actually worse than the status quo.

While we'd prefer to see the bill indefinitely deferred, we offer the following amendments to make it somewhat less toxic and harmful, even though it would still amount to a massive $80 million per year subsidy to an oil refinery and airlines, with dubious climate benefits, if any.

AMENDMENTS:

1) Strike all of "(8) Municipal solid wastes [and]<u>,</u> industrial wastes[;]<u>, and construction and demolition wastes;</u>" so that construction and demolition wastes are not being added, and other wastes are removed as eligible feedstocks.

2) Replace "<u>(2) Is derived from biomass resources, waste streams, renewable or zero carbon energy sources, or gaseous carbon oxides.</u>" with "<u>(2) Is derived from biogas resources from sewage sludge or from the organic fraction of municipal solid waste that is digested prior to landfilling only after food scraps and yard waste are source separation for aerobic composting, zero carbon energy sources such as green hydrogen, or gaseous carbon oxides."</u>

3) Strike "<u>(2) Carbon offsetting and reduction scheme for international aviation;</u>"

The bill adds camelina, fats, tallows, construction and demolition (C&D) waste and "bio-intermediate ethanol produced from renewable feedstocks" to the list of "renewable feedstocks" – a list that already includes feedstocks as dirty as municipal solid wastes (household and commercial trash) and industrial wastes. **None of these are clean energy sources.**

The incentive is, in part, based on assessing the fuels for their "aggregate attributional core lifecycle greenhouse gas emissions." There are many flaws and biases in greenhouse gas (GHG) accounting that cause plant-based (biomass/biofuels) and waste-based feedstocks to be assumed to be "carbon neutral," even though there is a credible scientific debate over this controversy going for over two decades. Some of the science shows biofuels such as corn-based ethanol to consume more fossil fuels than they displace. The very existence of a debate over this shows that the "net energy" of biofuels are close enough to 1:1 that there can even be a scientific dispute over it. If biofuels require about as much fossil fuel (to grow, process, and transport) as they displace, there is no point subsidizing them and building new infrastructure to support a system that is not really an improvement.

Focusing solely on climate impacts (GHGs) in evaluating fuels is also short-sighted. We call it carbon fundamentalism. There are many other impacts that need to be evaluated, such as the use of genetically modified crops (usually accompanied by increased use of toxic herbicides), soil depletion, and excessive use of fresh water resources that Hawai'i cannot afford.

Waste-based fuels – trying to turn municipal solid waste (trash) or construction and demolition debris into burnable aviation fuels – are no better. There is an array of experimental incinerator-like technologies that aim to convert waste into fuels. These waste-to-fuels (WTF) technologies usually start with pyrolysis or gasification – technologies that, when the resulting gases are burned, are defined and regulated by EPA as municipal waste combustors (waste incinerators). Typically, these two-stage technologies will replace the second stage (burning the gases) with a liquefaction stage, to make liquid fuels to be burned elsewhere. This is known as Fischer-Tropsch gas-to-liquids technology, named after the two German scientists who developed the ability to make oil from coal by gasifying, then liquefying it. It was first used by Nazi Germany, then by South Africa's Apartheid regime.

These are toxic and dangerous technologies that are experimental and often fail both technically and economically. When fuels are burned off-site in land vehicles or for air travel, they are not subject to the sorts of air pollution controls that can be applied to a centralized facility with a single smokestack. Even when such a facility burns the gasified waste on-site with the full complement of air pollution control devices, waste incineration is still dirtier than burning coal for the climate as well as for most other air pollutants. This is even *with* all four air pollution control systems that waste incinerators should have (note that H-POWER's two older burners are missing half of these four control systems, though their third burner has all four).

Unlike coal, construction and demolition (C&D) waste is very heterogenous, which can be comprised of steel, concrete, brick, lumber, plaster, empty paint cans, asphalt, wire, shingles, and much more. Pyrolysis and gasification technologies do not work well on heterogenous fuels. They break down constantly and operate only in batches. These finicky technologies require very homogenous fuels. Even those trying to process scrap tires fail repeatedly, because tires are not homogenous enough for pyrolysis. Even the nation's top cheerleader for tire burning, a spokesperson for the Rubber Manufacturers Association, once stated that

"scores of start-ups have tried and failed to make money from tire pyrolysis. The road is littered with the carnage of people who were trying to make this technology viable."

These technologies also have been unable to operate at commercial scale, usually relegated to unregulated garage-scale pilot projects that go nowhere. This trend has led the nation's leading incinerator-promoting solid waste consulting outfit, GBB, to classify the technology as "high" risk – because, as they present to waste industry conferences, of "previous failures at scale, uncertain commercial potential; no operating experience with large-scale operations" (pyrolysis) and "limited operating experience at only small scale; subject to scale-up issues" (gasification).

Hawai'i has been targeted in recent years by quite a few fly-by-night companies aiming to cash in on state and federal subsidies to satisfy the desire for sustainable aviation fuels while making waste streams go "away." Companies like Aloha Carbon and Yummet prey upon uninformed public officials who don't have time to research the track record of this industry, the toxic hazards associated with it, or the better alternatives available.

As far as the toxic hazards go, please see this heavily-cited (92 footnotes) six-page overview I wrote on the toxic pollution issues associated with construction and demolition (C&D) waste incineration: https://www.energyjustice.net/incineration/cd.pdf While the paper focuses on direct incineration, many of the same principles apply, as the high temperature processes used in WTF technologies still release toxic metals while producing new toxic pollutants such as dioxins and furans, the most toxic chemicals known to science.

C&D waste contains many toxic ingredients. There are chlorine sources in wood treatment chemicals like pentachlorophenol, and in PVC plastics in C&D waste. Painted wood can contain lead and mercury, while treated wood can contain other toxic metals, namely arsenic, chromium, and copper. Testimony on the House companion bill from the Hawaii Natural Energy Institute (on page 41 of the testimony packet), affirms high levels of arsenic, chromium and lead in C&D waste, with arsenic concentrations 200 times higher than clean wood. Their research also shows high levels of hydrochloric acid, copper and zinc fron C&D waste, but doesn't point out a significant conclusion about this – that numerous published studies show that copper and zinc serve as catalysts for dioxin formation. Dioxins are the most toxic chemicals known to science and are formed in processes like those used to make these "sustainable" aviation fuels, where you have hydrocarbons, halogens like chlorine, and medium-high temperatures that are perfect for dioxin formation. These ultratoxic chemicals rapidly bioaccumulate and concentrate in meat and dairy products where 92% of human exposure comes from. Even if these emissions are blown out to sea, they concentrate and come back in the form of seafood.

Are Sustainable Aviation Fuels the Wrong Priority Right Now?

There are three concepts that should be applied here:

1) Similar to the Zero Waste Hierarchy where reduce and reuse come before recycling and composting, a *sustainable energy hierarchy* prioritizes conservation, then efficiency, before turning to fuels use.
2) Recognize that "transition fuels" aren't.
3) Prioritize the energy sectors we have clean alternatives for.

Prioritizing Conservation and Efficiency

Transportation fuels should first be tackled by prioritizing a reduction in the need for unnecessary travel, then more efficient transportation. After prioritizing these, electrifying transportation is the best solution so that combustible fuels can be avoided entirely. Any system that relies on extraction of resources, burning them up, polluting the air, and having to dispose of wastes is not sustainable. For long-distance flights where electrification may not become possible, perhaps hydrogen has a role, but not until the electric grid is cleaned up and we have extra wind and solar available for truly green hydrogen production.

Perhaps focusing on the back end is easier, politically, than touching the untouchable topic of reducing tourism. Nonetheless, if the legislature is sincere about reducing aviation fuel use, fewer flights is the place to start, not a topic to avoid.

No Such Thing as Transition Fuels

Burnable fuels are not a long-term option, as they are not clean or sustainable, no matter whether they're "biofuels" or waste-based. Any such move is in-between the present and the arrival of clean, non-burn options. Such fuels are often called "transition" fuels. However, the concept of a transition fuel is that we can go from A to B to C, as if B helps us get to C. However, transition fuels have different infrastructure and their own economic weight that causes them to stand in the way of a future transition to clean options.

By the time we finish transitioning the energy sectors that we have clean, non-burn solutions for, long-distance air travel will probably have viable solutions we can focus on to complete the job. However, investments in "differently bad" fuels are an economic investment dead-end, requiring another transition later, wasting time and money needed to do the proper transitions in other energy sectors. In fact, the notion of "transition" fuels is a false one, since it entails investing in infrastructure that could last for 30+ years. No company developing so-called "transition" infrastructure, and trying to amortize their investment, is going to step aside in 5-10 years when something cleaner comes along. They're going to fight to stop the transition to cleaner options to protect their investment. In this sense, it's dangerous to steer resources into false solutions such as waste-based burnable transportation fuels.

Prioritizing the Energy Sectors That Have Clean Alternatives

There are three sectors of energy consumption: electricity, transportation, and heating. Transportation can be broken down into land, sea, and air. Heating is broken down in federal energy reporting as industrial, residential, and commercial/institutional sectors of use.

Just as there are preferable non-burn solutions for every waste management need, there are clean non-burn solutions for nearly every energy sector, though long-distance commercial passenger aviation is not there yet.

Cleaning up these energy sectors should start with solutions we already have, without trying to solve the most unsolvable sector by replacing one type of burnable fuel (petroleum-based aviation fuel) with differently bad burnable fuels (crop-based biofuels) or even more hazardous types of burnable fuels (waste-based fuels).

Since the way to clean up the transportation and heating sectors is to electrify them so that they can run on wind and solar without burning anything, it's critical to clean up the electricity sector first, and faster, since electricity demand will grow as the other energy sectors are electrified. Electricity production is easiest to fully transition to non-burn technologies – mainly solar and wind with energy storage, which are becoming the cheapest options over time. The state's renewable portfolio standard (RPS) aims to transition the electricity sector to "renewable" sources by 2045, but still counts some combustion sources as renewable – the worst of them being solid fuel combustion (burning of trash and trees). SB 680 aims to clean up the RPS starting by removing solid fuel combustion sources, which will speed up the implementation of solar, wind, and energy storage.

The heating sector is dominated by industrial heating, which is increasingly possible to electrify, while residential and commercial space heating and cooking needs are easily electrified. Electric stoves and heat pumps for space heating can be incentivized if replacing a combustion system.

The transportation sector is easily electrified for land-based travel. International shipping is now possible with electric ships (see also here and here). The hardest sector to make non-burn is long-distance air travel, though inter-island air travel can now be electrified with sea gliders, as Hawaiian Airlines has been exploring.

While waiting for good non-burn solutions to powering long-distance air travel, let's focus where we have good alternatives:

1) end combustion in the electricity sector, which is mostly oil in Hawai'i, but also some burning of trash, trees, and biofuels; replace with conservation, efficiency, solar, wind, and energy storage.

2) electrify any heating needs... most use is industrial sector, but also help transition residential

or commercial sectors where cooking and space heating is done with combustible fuels (mainly gas made from oil).

3) end combustion use for land-based vehicles by reducing vehicle use, having better (and fare-free) electrified public transit, and electrifying other land vehicles.

4) replace inter-island air travel with electric sea gliders, and electrify shipping, which is now possible.

Mahalo nui loa for your willingness to refocus on the other bills that put scarce public resources into more strategic paths forward.

January 28, 2025

TESTIMONY IN SUPPORT OF SB 995
RELATING TO RENEWABLE FUEL

Senate Committee on Energy and Intergovernmental Affairs (EIG)
The Honorable Glenn Wakai, Chair
The Honorable Stanley Chang, Vice Chair

Senate Committee on Agriculture and Environment (AEN)
The Honorable Mike Gabbard, Chair
The Honorable Herbert M. "Tim" Richards, III, Vice Chair

January 29, 2025, 1:00pm
Senate Conference Room 224
State Capitol 415 South Beretania Street

Chairs Wakai and Gabbard and Vice Chairs Chang and Richards, and members of the Committees,

Thank you for the opportunity to provide testimony in STRONG SUPPORT of SB 995, Relating to Renewable Fuels. We believe that the proposed legislation presents a unique opportunity to make a positive impact on our state, our environment, and our agricultural sector.

Pono Pacific is Hawai'i's first and largest private natural resource conservation company providing land management, restoration services, sustainable agricultural development, renewable energy, and eco-asset development for large and small-scale projects throughout the state. Pono Pacific's expertise creates a more resilient future by promoting industries that activate working lands, increase food security and community engagement, and protect natural resources. Since 2023, Pono Pacific has partnered with Par Hawaii to develop a consistent supply of feedstocks for biofuel production across the state. Locally grown feedstocks will provide farmers with a viable economic commodity to supply the refinery and help stimulate growth in the agricultural economy. SB 995 includes a calculation for low-emission renewable fuels, which is intended to spur economic activity in the agricultural sector, while not excluding out-of-state companies from participating. This will help Hawaii farmers by providing an additional credit of $1 per gallon for low lifecycle

emissions renewable fuels, which can be produced from locally grown renewable feedstocks.

Over the past year and a half, Pono Pacific has partnered with two of Hawaii's largest food producers, Mahi Pono and Aloun Farms, as well as Meadow Gold Dairies Hawaii, to advance oil crop feedstock cultivation by growing *Camelina sativa* (Camelina) at sites on Hawaii Island, Maui, Oahu and Kauai. Additionally, Camelina variety trials have been conducted in partnership with the Hawaii Agricultural Research Center (HARC). Camelina is of specific interest due to environmental co-benefits identified in planting, and coproducts generated that stabilize local food systems (e.g. seed cake used for animal feed, and crop residue used for soil amendments). The results from these crop trials have been very encouraging, both in the yield per acre produced, as well as the enthusiastic reaction from farmers and ranchers.

Finding viable uses for agriculture lands that will encourage sustainability in our environment and that produce positive economic cash flow for Hawaii is a critical need. Locally grown biofuel feedstocks offer significant benefits for our farmers. These crops can thrive in rotation with food production or on marginal land, improving soil health and reducing erosion. They require less water and fertilizer than traditional row crops. By creating a demand for these crops, the renewable fuels industry can revitalize rural communities, create new jobs, and diversify farm income streams.

Par Hawaii has publicly committed to spending significant capital, approximately $100M, retrofitting its Kapolei refinery to produce liquid renewable fuels, including Sustainable Aviation Fuel (SAF). Transitioning to SAF, derived from renewable sources like energy crops, presents a crucial step towards decarbonizing air travel. SAF can bring meaningful reductions in aviation carbon emissions, with lifecycle emissions up to 50 to 80% lower than conventional jet fuel. Investing in local SAF production is not just economically sound, it's an environmental imperative.

Hawaii needs to be competitive with other states that have already adopted tax credits for liquid renewable fuels and provide local production and consumption with the necessary advantages to succeed, especially as the industry is just starting to get off the ground. Initially to be competitive, local SAF production will need government support.

Growing biofuel feedstocks locally helps to create new agricultural jobs, encourage food production through infrastructure synergies, and does not compete with food crops when

using oil seed cover crops. Pono Pacific believes these feedstocks will be able to provide a quality biofuel product and usable byproducts to help support Hawaii's sustainability goals, and agricultural, ranching and dairy sectors of the local economy.

The production and distribution of liquid renewable fuels, including SAF, is not just about farms; it is about building a robust green energy infrastructure within our state. From biofuel refineries to logistics companies, the entire chain creates high-paying jobs, attracts investment, and boosts Hawaii's overall economic output. Investing in local SAF production positions us as a leader in the growing clean aviation fuel market, attracting further investment and innovation.

Renewable fuels face a financial hurdle and cost more to produce than conventional alternatives. This bill proposes a strategic set of tax incentives tailored to incentivize local renewable fuel production and imports of renewable fuels into Hawaii. These incentives will empower us to cultivate energy independence, foster economic growth, and create a sustainable future for our islands. Incentives and credits, therefore, are not a perpetual need but a bridge to get biofuel production to maturity and scale when it can compete successfully against traditional petroleum-based fuels.

The proposed tax incentives for local renewable fuel production are not just an economic stimulus package; they represent a strategic investment in Hawaii's future. By supporting our farmers, fostering clean energy innovation, and building a more sustainable aviation industry, we can secure a brighter future for generations to come.

We urge you to pass this legislation and unlock the immense potential of locally produced liquid renewable fuel. Together, we can build a cleaner, more prosperous future for all. Thank you for your time and consideration.

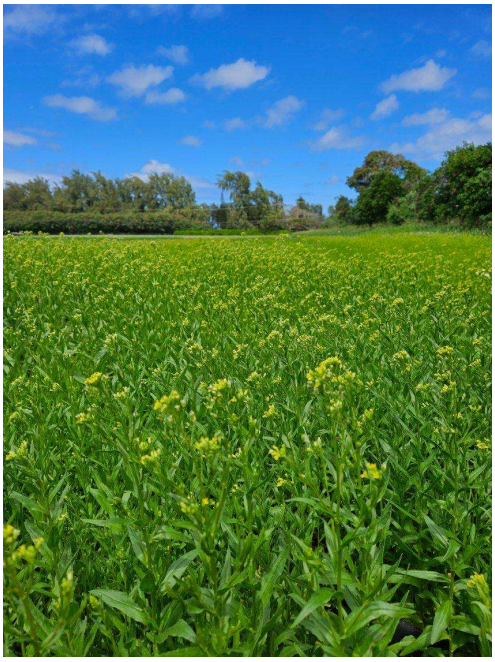
Mahalo,

Chris Bennett
Vice President of Sustainable Energy Solutions
Pono Pacific Land Management, LLC

(See photos on next page)

PONO PACIFIC

Camelina flowering on Oahu



Camelina seed pods on Maui

Camelina field on Kauai

Camelina field on Kauai

Airlines for America®

We Connect the World

LATE

January 28, 2025

Testimony on SB 995 Relating to Renewable Fuel

Committee on Energy and Intergovernmental Affairs
Senator Glenn Wakai, Chair
Senator Stanley Chang, Vice Chair

Committee on Agriculture and Environment
Senator Mike Gabbard, Chair
Senator Tim Richards, Vice Chair

Dear Chairs Wakai and Gabbard, Vice Chairs Chang and Richards and Members of the Committees:

Airlines for America (A4A), the principal trade and service organization of the U.S. airline industry, supports the vast majority of the provisions in SB 995. A4A and its members have a strong climate change record and are committed to working across the aviation industry and with government leaders in a positive partnership to achieve net-zero carbon emissions by 2050.

Achieving this rapid transition to sustainable aviation fuel (SAF) requires industry and government to work in partnership, at both the federal and state levels, to expand SAF production capacity across the country. A4A and our members strongly support efforts such as this which are needed to catalyze SAF production. The key provisions of SB 995 that we support include:

- **Sustainable Aviation Fuel Tax Credit**: SAF is a proven solution to reduce lifecycle emissions by up to 80 percent compared to conventional jet fuel, supporting Hawai'i's clean energy leadership.
- **Renewable Fuels Production Tax Credit**: Incentivizing the production of renewable fuels like SAF, renewable diesel, biodiesel, and renewable naphtha, to decarbonize transportation and power generation.
- **Support for Local Agriculture:** By fostering renewable feedstocks such as camelina, this measure diversifies agriculture, strengthens food security and creates green jobs.
- **Improved Credit Accessibility**: Modernizing the tax credit structure ensures broader and more equitable adoption of renewable fuel incentives.

Airlines, governments and other aviation stakeholders have recognized that achieving net-zero aviation emissions by 2050 will require a very rapid transition from conventional (fossil) jet fuel to SAF. As noted earlier, SAF can bring meaningful reductions in aviation carbon emissions, reducing lifecycle emissions intensity of fuel up to 80 percent compared to conventional jet fuel today, with future pathways having potential for 100 percent reductions. A4A and its members are feedstock and technology neutral for SAF production, and thus we firmly believe that any feedstock that can meet technical and environmental requirements should be eligible for this tax credit.

A4A greatly appreciates that the state of Hawaii is continuing to lean in on this issue with SB 995, we look forward to opportunities to work with the sponsors on the legislative text.

Please do not hesitate to reach out with any questions.

Sean Williams
Vice-President, State and Local Government Affairs
swilliams@airlines.org

LATE

SENATE COMMITTEES ON ENERGY AND INTERGOVERNMENTAL AFFAIRS and AGRICULTURE AND ENVIRONMENT

JANUARY 29TH, 2025

SB 995, RELATING TO RENEWABLE FUEL

POSITION: SUPPORT WITH AMENDMENTS

Coalition Earth **supports and suggests amendments** for SB 995, relating to renewable fuel, which establishes the sustainable aviation fuel import tax credit; increases the renewable fuels production tax credit amount; repeals the: (1) cap amount of claimable renewable fuels production tax credit; (2) requirement that the tax credit be claimed for fuels with lifecycle emissions below fossil fuels; and (3) prohibition on claiming other tax credits for the cost incurred to produce renewable fuels; specifies that the renewable fuels production tax credit can only be claimed for fuels that meet the certain thresholds; adds an additional tax credit value; clarifies that a taxpayer who previously claimed a renewable fuels production tax credit may claim another one for taxable years beginning after 12/31/2024; clarifies required information in the certified statement for the tax credit; and repeals the requirement that the Hawai'i State Energy Office provide the taxpayer with a determination of whether the lifecycle greenhouse gas emissions for each type of qualified fuel produced is lower than that of fossil fuels.

According to a report produced by the Hawai'i Climate Change Mitigation and Adaptation Commission, global sea levels could rise more than three feet by 2100, with more recent projections showing this occurring as early as 2060. In turn, over the next 30 to 70 years, approximately 6,500 structures and 19,800 people statewide will be exposed to chronic flooding. Additionally, an estimated $19 billion in economic loss would result from chronic flooding of land and structures located in exposure areas. Finally, approximately 38 miles of coastal roads and 550 cultural sites would be chronically flooded, on top of the 13 miles of beaches that have already been lost on Kaua'i, O'ahu, and Maui to erosion fronting shoreline armoring.

As we work to reduce carbon emissions and stave off the worst consequences of climate change, we must begin preparing for the adverse impact of sea level rise on our shores. We are

now quantifying the speed at which we must act. We cannot continue to develop the 25,800-acre statewide sea level rise exposure area–one-third of which is designated for urban use–without risking massive structural damage and, potentially, great loss of life.

Just two years ago, we witnessed the impact of the climate emergency on our shores. On August 8, 2023, wildfires swept across Maui and killed at least 100 people, making it one of the nation's deadliest natural disasters. The spread of the fires has been attributed to climate change conditions, such as unusually dry landscapes and the confluence of a strong high-pressure system to the north and Hurricane Dora to the south. The wildfires destroyed over 2,200 structures, including numerous residential buildings, historic landmarks, and school facilities. In September 2023, a report from the United States Department of Commerce estimated the total economic damage of the wildfires to be roughly $5.5 billion. Investing in renewable energy generation could not be more urgent, given the growing threat of climate catastrophes to our island home.

Therefore, **our state should take steps to accelerate our transition to a clean energy economy and continue our fight against climate change, including by incentivizing the use of sustainable aviation fuel.** This is especially important in light of the islands' carbon-intensive visitor industry. In 2019, for example, Civil Beat reported that flights to and from Hawai'i from all over the world produced approximately 6.3 million tons of carbon, which is the equivalent of the CO2 produced by generating electricity for almost 1.1 million homes in a year.

As an island state that is heavily reliant on air transportation and a robust tourist economy, we need to take action to ensure that air travel related to our state aligns with our goal of reducing our economy's carbon footprint. Jet fuel consumption for the islands is 17 million barrels–or 740 million gallons–per year between civilian and military consumption. To reduce our reliance on fossil fuels, we should seize the opportunity to invest in local sustainable fuel production, which can be derived from both plant and animal materials, ranging from cooking oil and plant oils to agricultural residues as well as municipal waste and waste gases.

That said, we urge your committee to amend this bill by including requirements for the use of sustainable aviation fuel for all intrastate flights, as outlined in HB 1459. Specifically, we would like to see the following language added to this bill: "Beginning January 1, 2030, any commercial airline operating intrastate airline flights in the State shall utilize at least ten per cent of sustainable aviation fuel in their intrastate airline flights operated in the State." While we recognize that the cost of producing sustainable aviation fuel is currently higher than the cost of conventional fuels, we believe that the long-term benefit of transitioning to a clean economy outweighs the price of continuing a carbon-intensive business model. Moreover, while we support industrial incentives that buttress positive environmental outcomes, we philosophically believe that such incentives should be coupled with mandates that ensure commercial entities will take actions that are attuned to our state's overall climate resilience goals.

Coalition Earth is a nongovernmental organization that works to preserve the well-being of people and our planet. We champion policies that advance climate resilience, clean energy, public health, and economic fairness for working families. Contact us at info@coalitionearth.org.

LEGISLATIVE TAX BILL SERVICE

TAX FOUNDATION OF HAWAII

735 Bishop Street, Suite 417 Honolulu, Hawaii 96813 Tel. 536-4587

SUBJECT: INCOME TAX; Sustainable Aviation Fuel Import Tax Credit; Renewable Fuels Production Tax Credit

BILL NUMBER: SB 995, HB 976

Commented [JM1]: Double check format

INTRODUCED BY: SB by WAKAI, CHANG, GABBARD, KANUHA, KEOHOKALOLE, MCKELVEY, Hashimoto; HB by LOWEN, EVSLIN, ICHIYAMA, KAHALOA, KEOHOKAPU-LEE LOY, KILA, KUSCH, LA CHICA, MARTEN, PERRUSO, POEPOE, QUINLAN, TARNAS, TODD

EXECUTIVE SUMMARY: Establishes the sustainable aviation fuel import tax credit. Increases the renewable fuels production tax credit amount. Repeals the: (1) cap amount of claimable renewable fuels production tax credit; (2) requirement that the tax credit be claimed for fuels with lifecycle emissions below fossil fuels; and (3) prohibition on claiming other tax credits for the cost incurred to produce renewable fuels. Specifies that the renewable fuels production tax credit can only be claimed for fuels that meet certain thresholds. Adds an additional tax credit value. Clarifies that a taxpayer who previously claimed a renewable fuels production tax credit may claim another one for taxable years beginning after 12/31/2024. Clarifies and expands required information in the certified statement for the tax credit. Repeals the requirement that the Hawai‘i State Energy Office provide the taxpayer with a determination of whether the lifecycle greenhouse gas emissions for each type of qualified fuel produced is lower than that of fossil fuels.

SYNOPSIS: Adds a new section to chapter 235, HRS, to provide for a sustainable aviation fuel import tax credit. The credit amount per taxpayer importing sustainable aviation fuel into the State is to be $1 per gallon importing for distribution in the State, provided that the fuel meets the lifecycle greenhouse gas emissions reduction threshold.

Specifies that the credit is determined at the entity level and may be allocated to partners, S corporation shareholders, or trust beneficiaries following section 704(b) of the Internal Revenue Code.

No later than 30 days following the close of the taxable year, a taxpayer intending to claim this credit is to submit relevant information to the Hawaii State Energy Office and obtain certification from that office. That certification is to be filed with the taxpayer's income tax return.

An aggregate cap is established for the credit as follows:

Calendar Year(s)	Aggregate Cap
2025	$5 million
2026	$10 million
2027	$20 million
2028	$30 million
2029 to 2036	$50 million

If the credit claims under this section exceed the total credits allowed for all eligible taxpayers in any given calendar year, the total credits allowed shall be allocated proportionally to each eligible taxpayer in proportion to the amount of such taxpayer's credits under this section for the calendar year.

To the extent that a taxpayer's credit claim is reduced because of the aggregate cap, the amount of the reduction shall be available to the taxpayer to be used as a credit in the next subsequent calendar year but shall not be carried over for any calendar year thereafter; provided that the carryover credit is subject to the aggregate cap for the year to which it is carried.

The taxpayer is to provide written notice of intention to begin import of renewable fuels to the Department of Taxation and the Energy Office prior to the start of importation.

The taxpayer is to provide another written notice to the Department of Taxation and the Energy Office within 30 days following the start of importation.

Information received by the Energy Office is to be made publicly available.

The credit is nonrefundable but may be carried forward until exhausted. A taxpayer is also given an election to make the credit refundable by giving up 30% of it. A taxpayer all of whose income is exempt under section 235-7(a)(2) or (3) (relating to pensions) or a taxpayer whose adjusted gross income is $20,000 or less ($40,000 if married filing jointly) may make the refundable election at no cost.

All tax credit claims shall be filed before the end of the 12th month following the close of the taxable year for which the credit may be claimed, upon pain of waiver of the right to claim the credit.

Amends section 235-110.32, HRS, regarding the fuel production credit. The amount of the credit is changed from 20 cents to 35 cents per 76,000 BTU of fuel imported, provided:

(1) The taxpayer's production of renewable fuels is not less than 2.5 billion BTU of renewable fuels per calendar year;

(2) The tax credit shall only be claimed for fuels that meet the lifecycle greenhouse gas emissions reduction threshold and product transportation emissions threshold;

(3) There shall be an additional credit value of $1 per diesel gallon equivalent for low lifecycle emissions renewable fuels; and

(4) There shall be an additional credit value equal to $1 per gallon if the renewable fuel is sustainable aviation fuel.

The $3.5 million per taxpayer limit on the credit is removed.

Although related taxpayers are not eligible for more than a single credit per credit period (10 years under prior law), taxpayers who previously claimed a fuel production tax credit under prior law may claim another tax credit for taxable years beginning after December 31, 2024, under the law as amended.

EFFECTIVE DATE: Taxable years beginning after December 31, 2024. Credit is repealed on January 1, 2036.

STAFF COMMENTS: Act 202, SLH 2016, enacted a renewable energy production credit with a five-year life. The credit sunset on December 31, 2021. The credit was revived by Act 16, SLH 2022 with an aggregate cap of $20 million.

While the idea of providing a tax credit to encourage such activities may have been acceptable a few years ago when the economy was on a roll and advocates could point to credits like those to encourage construction and renovation activities, what lawmakers and administrators have learned in these past few years is that unbridled tax incentives, where there is no accountability or limits on how much in credits can be claimed, are irresponsible as the cost of these credits goes far beyond what was ever intended. Instead, lawmakers should encourage alternative energy production through the appropriation of a specific number of taxpayer dollars. The State could directly purchase energy, or it could give a subsidy to developers. Then, lawmakers would have a better idea of what is being funded and hold the developers of these alternate forms of energy to a deliberate timetable or else lose the funds altogether. A direct appropriation would be preferable to the tax credit as it would: (1) provide some accountability for the taxpayers' funds being utilized to support this effort; and (2) not be a blank check.

We also have technical comments, as follows:

1. The bill requires that when the aggregate cap is exceeded, all tax credit claims are prorated so that the aggregate cap is met. This is perhaps fairer to the various participants, but may not be administrable because the certifying agency will not be able to certify any credits until ALL credit claims are in the door.
2. The bill specifies that a taxpayer can give up 30% of the credit to make it refundable, like the energy credit, but may make a free refundability election if the taxpayer is a low-income individual. We consider it unlikely that any low-income individual will be in a position to claim this credit, so that provision could be deleted.
3. The bill states that a taxpayer must apply to the HSEO for the credit within 30 days following the close of the calendar year. That means the taxpayer must fill in the form AND a third party needs to audit or otherwise verify the numbers within that 30 days. We wonder whether that time frame is achievable.

Digested: 1-26-25

SB-995
Submitted on: 1/27/2025 12:55:49 PM
Testimony for EIG on 1/29/2025 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Robert King	Testifying for Pacific Biodiesel Technologies	Support	Written Testimony Only

Comments:

This bill is very important for our company in order to survive the changes in Federal incentives for renewable energy. Mahalo

Testimony of
ALASKA AIRLINES and HAWAIIAN AIRLINES

Before the House Committees on
ENERGY AND INTERGOVERNMENTAL AFFAIRS
&
AGRICULTURE

Wednesday, January 29, 2025
1:00 P.M.
Hawai‘i State Capitol, Room 415

In consideration of
SENATE BILL 995
RELATING TO RENEWABLE FUELS

The Honorable Glenn Wakai, Chair
The Honorable Stanley Chang, Vice Chair
Members of the Committee on Energy and Intergovernmental Affairs

The Honorable Mike Gabbard Chair
The Honorable Herbert “Tim” Richards, Vice Chair
Members of the Committee on Agriculture

Re: **Testimony in Support of Senate Bill 995, Relating To Renewable Fuel**

Aloha Chair Wakai, Vice Chair Chang, Chair Gabbard, Vice Chair Richards, and members of the Committees on Energy and Intergovernmental Affairs & Agriculture,

Alaska x Hawaiian Airlines submits this testimony in **strong support** of SB 995, which establishes critical incentives to promote the production and importation of renewable fuels, including sustainable aviation fuel (SAF), in Hawai‘i. This legislation represents a necessary step in addressing the aviation industry’s carbon emissions while advancing Hawai‘i’s clean energy goals and reducing its reliance on imported fossil fuels.

Commitment to Sustainability

As an airline committed to achieving **net-zero carbon emissions by 2040**, Alaska x Hawaiian Airlines recognizes the transformative role that SAF will play in decarbonizing aviation. SAF provides the most immediate and scalable solution for reducing lifecycle greenhouse gas emissions by up to 80%, making it a cornerstone of our sustainability strategy. However, the current supply of SAF is insufficient to meet Hawai‘i’s needs, and targeted incentives are essential to building a robust market for renewable fuels.

Aviation’s Role in Hawai‘i’s Clean Energy Transition

Hawaiʻi's geographic isolation and reliance on aviation for tourism, commerce, and connectivity mean that decarbonizing aviation is critical to achieving the state's **net-zero carbon goals by 2045**. SAF is a proven, drop-in solution that can help Hawaiʻi meet these goals without requiring costly modifications to aircraft or infrastructure. By supporting both local SAF production and importation, SB 995 ensures that Hawaiʻi has the tools needed to significantly reduce aviation-related emissions while maintaining its vital role as a global hub.

Key Features of SB 995

This legislation establishes a forward-looking framework to support renewable fuels and SAF, including:

1. **Sustainable Aviation Fuel Import Tax Credit:**
    - Provides a $1 per gallon credit for SAF imported into Hawaiʻi, ensuring that imported fuels remain competitive.
    - Focuses on SAF that meets stringent lifecycle greenhouse gas emissions reduction thresholds, ensuring environmental integrity.

2. **Enhanced Renewable Fuels Production Tax Credit:**
    - Increases credit values and introduces additional incentives for low-emission renewable fuels, intended to spur economic activity in the agricultural sector, and SAF production.
    - Expands eligibility to allow taxpayers who previously claimed credits to participate again starting in 2025.

3. **Scalable Implementation:**
    - Gradually increases renewable fuels production tax credit funding caps from $40 million in 2025 to $80 million in 2029, and establishes gradually increasing sustainable aviation fuel import tax credit funding caps from $5 million in 2025 to $40 million in 2029, providing predictability and flexibility to support Hawaiʻi's growing SAF market.

4. **Accountability and Transparency:**
    - Requires detailed reporting on renewable fuels production, importation, and lifecycle emissions, ensuring robust oversight and stakeholder confidence.

Economic and Environmental Benefits

SB 995 will reduce aviation-related greenhouse gas emissions while enhancing Hawaiʻi's energy security by diversifying its fuel sources and reducing reliance on imported fossil fuels, as well as fostering economic growth in the agricultural and biofuels sectors. =

Hawaiʻi's Opportunity to Lead

As a state that has declared a climate emergency and set ambitious clean energy goals, Hawaiʻi has the opportunity to lead the aviation industry's transition to renewable fuels. By passing SB 995, Hawaiʻi can demonstrate how targeted incentives, such as the proposed enhancements to the renewable fuels production tax credit and the introduction of the SAF import credit, can support sustainability while addressing the unique challenges of an island state heavily reliant on aviation.

The Importance of the Import Credit

Hawai'i's aviation industry consumes over **600 million gallons of jet fuel annually**, making it a significant contributor to the state's overall carbon emissions. While local production of SAF by entities like Par Hawaii is a promising development, their planned capacity to produce **60 million gallons of renewable fuels annually,** of which up to 38 million could be SAF, falls far short of the demand. This highlights the critical need for SAF importation as part of the aviation decarbonization conversation.

The establishment of the **Sustainable Aviation Fuel Import Tax Credit** under SB 995 is essential to closing this gap. By providing a $1 per gallon credit for SAF imported into Hawai'i, the state can:

- **Encourage the flow of SAF into Hawai'i's fuel supply**, ensuring a reliable and scalable source of renewable fuels to complement local production.
- **Level the playing field** for SAF, which is significantly more expensive than conventional jet fuel, making it competitive and accessible for aviation stakeholders.
- **Position Hawai'i as a leader** in the national and global SAF market by demonstrating how policy incentives can drive sustainable aviation innovation.

Conclusion

SB 995 is a critical step forward in Hawai'i's clean energy transition. Alaska x Hawaiian Airlines strongly urges the committee to pass this legislation, which will help protect Hawai'i's environment, support its energy resilience, and inspire other states to follow its lead.

Mahalo for the opportunity to submit testimony in strong support of SB 995.

Par Hawaii

January 29, 2025

TESTIMONY IN SUPPORT OF SB 995
RELATING TO RENEWABLE FUEL

Senate Committee on Energy & Intergovernmental Affairs
The Honorable Glenn Wakai, Chair
The Honorable Stanley Chang, Vice Chair

Senate Committee on Agriculture & Environment
The Honorable Mike Gabbard, Chair
The Honorable Herbert M. "Tim" Richards III, Vice Chair

Wednesday, January 29, 2025 at 1:00 p.m.
State Capitol, Conference Room 224

Aloha Chairs Wakai and Gabbard, Vice Chairs Chang and Richards, and members of the committee,

Thank you for the opportunity to provide testimony in **SUPPORT** of SB 995, Relating to Renewable Fuel.

This bill essentially decreases the cost of low carbon fuels to Hawaiian Electric, Hawaii Gas and other utility and transportation customers including the State of Hawaii. It supports local production of renewable fuels, and provides incentives for local farmers to grow energy crops that complement food production and ranching.

Hawaii has made significant progress in decarbonizing our economy over the past 17 years since the Hawaii Clean Energy Initiative launched in 2008. Most of our focus as a state has been on reducing lifecycle Greenhouse Gas (GHG) emission for the utility sector. Yet, there is much work still to be done. Transportation emissions account for over 50% of Hawaii's GHG emissions.[1] Using "drop-in" renewable fuels that do not require retrofits to existing combustible energy engines for ground, marine and air transportation can accelerate decarbonization of multiple industry sectors and reduce independence on fossil fuels.

States on the US West Coast have introduced incentives for the use of low carbon fuels. In California, as reported by the California Air Resources Board, over 50% of diesel demand is now met by Renewable Diesel (RD). RD is a low-carbon fuel produced by processing used cooking oil, animal fats and vegetable oils. Similarly, there are small but growing volumes of renewable fuels for the aviation sector. This product is called Sustainable Aviation Fuel (SAF), and it is produced in a similar process and from the same feedstocks as RD.

[1] https://health.hawaii.gov/cab/files/2023/05/2005-2018-2019-Inventory_Final-Report_rev2.pdf (Pages 26-27 document Transportation sector emissions of 10.68 MT of CO2 equivalent in the most recent reporting period of 2019. Total net emissions were 19.42 MT CO2 equivalent.)

Par Hawaii

These liquid renewable fuels are critical to meeting Hawaii's clean energy goals. This was a key finding in the recent Act 238 Hawaii Decarbonization Pathway Study which calls for RD and SAF to be a significant part of Hawaii's fuel supply beginning later this decade. See the chart in Appendix A.

The good news is that Par Hawaii is already investing over $90M into its renewable fuel's infrastructure. In the later part of 2025, Par Hawaii will be able to produce 60,000,000 gallons of renewable fuels for our customers to reach their decarbonization goals. Hawaii companies are also stepping up to meet the need for these carbon reducing fuels. However, the cost to produce these fuels is significantly higher than the cost of imported crude oil, and financial incentives are required to initiate and sustain the production of these renewable fuels. These state tax incentives are essential to accelerating the transition for utilities, air, ground, and marine transportation into renewable industry development and market adoption.

Manufactures on the US West Coast have had success in bringing renewable fuels to the market, but it has required state-level financial subsidies of up to $1.00-2.00 per gallon. Without comparable incentives for renewable fuel production in Hawaii, these desirable renewable fuels will most likely be produced locally but delivered to other markets including the West Coast. However, with these incentives, we hope to bridge the gap with fossil fuels, while passing these savings on to our customers and creating a greater demand for these renewable fuels.

The need for incentives should decrease over time as demand increases and there is a greater economy of scale. We are collaborating with Alaska Airlines & Hawaiian Airlines, Pono Pacific Land Management, Hawaii's largest natural resource conservation company, as well as several of Par Hawaii's utility and transportation customers, and the Hawaii Renewable Fuels Coalition with its broad range of stakeholders.

Similar to goals and pathways that spurred the solar and film industries in Hawaii, we ask for similar consideration to advance renewable fuel production locally in Hawaii. Hawaii has steadily increased its renewable energy portfolio, and incentivizing the growth of local renewable fuel production is critical to accelerating our decarbonization goals. SB 995 is a deliberate strategy that aligns with the emission reduction targets set by the state.

Mahalo for allowing Par Hawaii to share our comments in support of SB 995.

Par Hawaii

Appendix A

Act 238 Hawaii Decarbonization Pathway Study

- December 2023 Act 238 Pathways to Decarbonization Study modeled 3 scenarios
- **Study finds that renewable liquid fuels are critical to Hawaii reaching it's decarbonization goals**
- Recommends an expansion of renewable fuels production tax credit

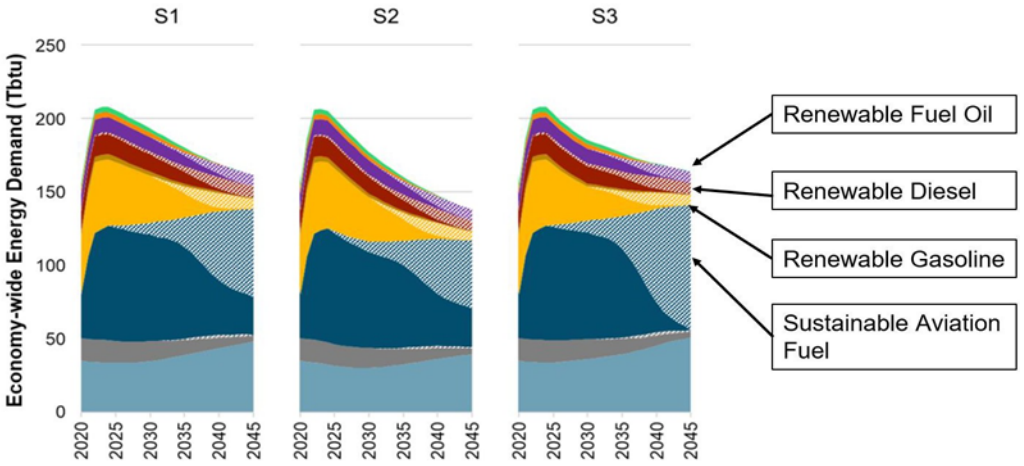


Figure 54 Economywide energy demand from 2020 through 2045 (excludes fuels combusted for electricity generation)

LATE

SB-995
Submitted on: 1/28/2025 1:03:39 PM
Testimony for EIG on 1/29/2025 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Gene Harrington	Testifying for Biotechnology Innovation Organization	Support	Written Testimony Only

Comments:

The Biotechnology Innovation Organization (BIO) is the world's largest trade association representing biotechnology companies, academic institutions, state biotechnology centers and related organizations across the United States and in more than 30 other nations. Our key areas of focus are health biotechnology, industrial and environmental biotechnology, and food and agriculture biotechnology. We support SB 995.

This bill is an important piece of renewable energy legislation that can help diversify Hawaii's economy, protect the environment, combat climate change, and strengthen Hawaii's position as a leader in a national transition to clean fuels. Mahalo for the opportunity to testify.

LATE

SB-995
Submitted on: 1/29/2025 8:38:52 AM
Testimony for EIG on 1/29/2025 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Raymond Kwok	Testifying for Meadow Gold Dairies Hawaii	Support	Written Testimony Only

Comments:

Meadow Gold Dairies Hawaii is in favor of SB995. We believe that having a source of locallly produced milk is of a huge importance for the State of Hawaii. SB995 would benefit crops such as Camelina as a feedstock for our dairy farm source on the Big Island. Camelina, a crop used in renewable fuel production, can also produce a high-quality byproduct for animal feed, providing ranchers and dairies with an affordable and sustainable feed option.

In addition these bills support Hawaii's 2045 renewable energy and net-zero carbon goals. Renewable fuels (such as Camelina) helps reduce emissions in critical sectors, including power generation, aviation, and transportation.

To the Honorable Chair and Members of the Committee:

My name is Tahan Bapna, and I am a sophomore in high school. I strongly support S.B. 995 because it represents a bold and innovative approach to tackling the dual challenges of reducing greenhouse gas emissions and achieving energy security for Hawaii. This bill provides much-needed incentives to promote the production and use of renewable fuels, especially sustainable aviation fuel, while aligning with Hawaii's ambitious clean energy goals.

Hawaii's reliance on imported fossil fuels leaves us vulnerable to price fluctuations and environmental risks. By incentivizing local production of renewable fuels and sustainable aviation fuel through tax credits, this bill helps reduce our dependence on imported petroleum, fosters local economic growth, and creates green jobs. It is critical for Hawaii to lead by example, particularly as we continue to face the pressing challenges of climate change.

One of the most impactful provisions of this bill is the establishment of the Sustainable Aviation Fuel Import Tax Credit. With Hawaii's unique reliance on air transportation for both residents and visitors, the airline industry is a major contributor to greenhouse gas emissions. By offering a $1-per-gallon tax credit for sustainable aviation fuel that meets lifecycle greenhouse gas reduction thresholds, this bill encourages airlines and fuel producers to prioritize cleaner, more sustainable fuel sources. This is a vital step toward decarbonizing Hawaii's aviation sector while meeting net-zero or net-negative emission targets by 2045.

Additionally, increasing the Renewable Fuels Production Tax Credit from $0.20 to $0.35 per 76,000 British thermal units and removing the cap on claimable amounts are smart moves to ensure that renewable fuel production becomes financially viable and scalable. These changes will attract more investment in renewable fuel infrastructure, ultimately benefiting the state by enhancing energy independence and reducing carbon emissions.

What I appreciate most about this bill is its commitment to equity and transparency. By requiring clear reporting from taxpayers claiming these credits and ensuring that lifecycle emissions reductions are verified, S.B. 995 establishes a system that is both fair and accountable. Furthermore, provisions that allow taxpayers to claim credits in subsequent years if funding limits are reached ensure that no one is left behind in this important transition.

Hawaii has already shown leadership by declaring a climate emergency and committing to a 100% renewable energy future. S.B. 995 builds on that leadership by addressing key sectors—such as aviation—that are difficult to decarbonize and often overlooked in climate policy. Supporting this bill is not just about advancing renewable energy; it’s about safeguarding Hawaii’s future and setting a global example for sustainability.

Thank you for the opportunity to testify in strong support of this bill. I urge you to pass S.B. 995 and help Hawaii remain a leader in the fight against climate change.

Sincerely,
Tahan Bapna

Hawai‘i Natural Energy Institute Research Highlights

Alternative Fuels

Sustainable Aviation Fuel Production

OBJECTIVE AND SIGNIFICANCE: In 2019, commercial aviation in Hawai‘i used nearly 700 million gallons of jet fuel, all of it is derived from petroleum. In 2023, as the state recovered from the combined effects of the pandemic and the Lāhainā wildfire, jet fuel consumption is approaching 2019 levels (Figures 1 and 2). The University of Hawai‘i (UH) is a member of the Federal Aviation Administration’s (FAA) Aviation Sustainability Center (ASCENT), a team of U.S. universities conducting research on production of sustainable aviation fuels (SAF). UH’s specific objective is to conduct research that supports developments and decisions related to supply chains for alternative, renewable, sustainable, jet fuel production in Hawai‘i. Results may inform similar efforts in other tropical regions.

BACKGROUND: This project was initiated in October 2015 and is now continuing into its 10th year. Activities undertaken in support of SAF supply chain analysis include:

- Conducting literature review of tropical biomass feedstocks and data relevant to their behavior in conversion systems for SAF production;
- Engaging stakeholders to identify and prioritize general SAF supply chain barriers (e.g. access to capital, land availability, etc.);
- Developing geographic information system (GIS) based technical production estimates of SAF in Hawai‘i;
- Developing fundamental property data on biomass resources; and
- Developing and evaluating regional supply chain scenarios for SAF production in Hawai‘i.

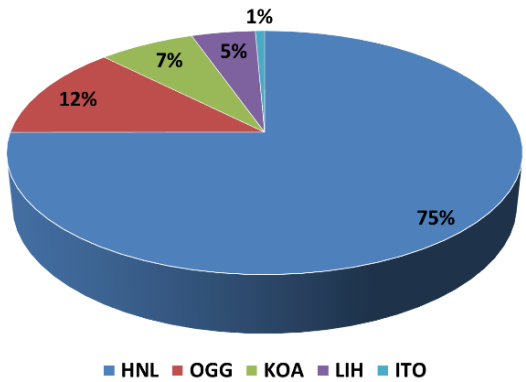


Figure 1. Commercial fuel use at Hawai‘i’s airports in 2023 totaled 638 million gallons (HNL, OGG, KOA, LIH, and ITO are Hawai‘i’s airports’ codes).

PROJECT STATUS/RESULTS: Literature reviews of both biomass feedstocks and their behavior in SAF conversion processes have been completed and published. Based on stakeholder input, barriers to SAF value chain development in Hawai‘i have been identified and reported. Technical estimates of land resources that can support agricultural and forestry-based production of SAF feedstocks have been completed using GIS analysis techniques. Samples from Honolulu’s urban waste streams and candidate agricultural and forestry feedstocks have been collected and subjected to physicochemical property analyses to inform technology selection and design of SAF production facilities.

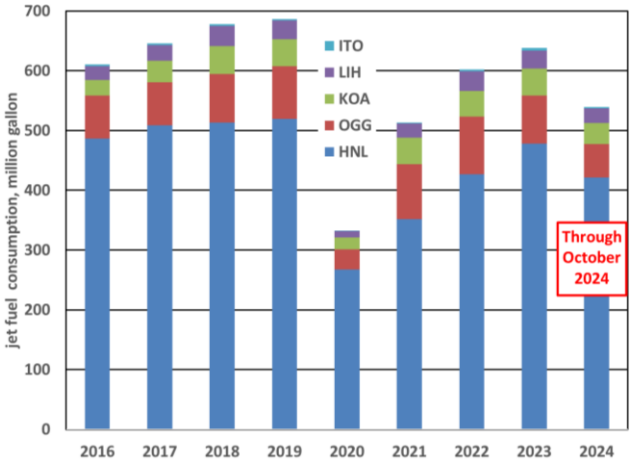


Figure 2. Commercial jet fuel consumption in Hawai‘i.

Urban Waste: Fuel Properties of O‘ahu’s Construction and Demolition Waste Streams

A sampling and analysis campaign was undertaken to characterize fuel properties of construction and demolition waste (CDW) streams on O‘ahu. Complete results were summarized and published in **Construction and Demolition Waste-Derived Feedstock: Fuel Characterization of a Potential Resource for Sustainable Aviation Fuels Production** in the *Frontiers in Energy Research* journal.

As shown in Figure 3, although the combustible fraction of the CDW samples have elevated ash levels compared to clean biomass materials, their heating values were comparable, indicating the presence of higher energy density materials. As with most refuse derived fuels, the amount of ash in the fuel and its composition is of particular importance – since ash

impacts energy facility operations, maintenance, and emissions.

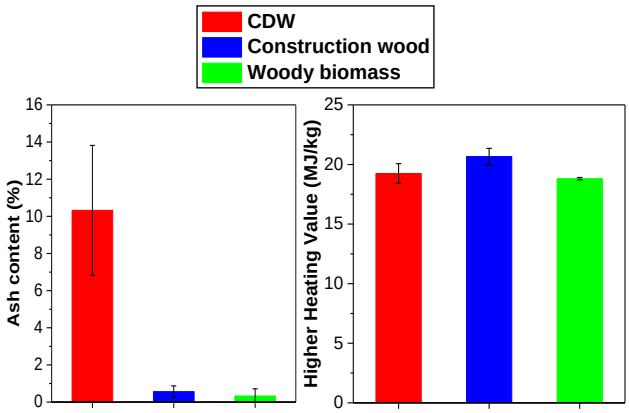


Figure 3. Ash content (left) and heating value (right) of the combustible fraction of CDW compared to construction wood and woody biomass.

Tests of clean wood fuel from the invasive species (Leuceana spp., common name koa haole) and synthetic CDW (sCDW) material were conducted at a commercial gasification technology provider facility to evaluate product composition and yields and identify contaminants (Figure 4). Test reports for koa haole ("*Gasification of Leucaena leucocephala stemwood*") and CDW ("*Gasification of synthetic CDW 1*"), respectively, are available on the HNEI website. The test results detail the reactor operating conditions, fuel characteristics, concentrations of major permanent gas species (H_2, CO, CH_4, CO_2), and concentrations of inorganic species present as contaminants in the product gas stream (H_2S, NH_3, HCl, As, Cd, Cr, Pb, Mg, P, K, Se, Na, Z, Hg). The increases of As, Pb, and Cr concentrations in the sCDW product gas compared to clean wood product gas were notable, in the case of arsenic increasing

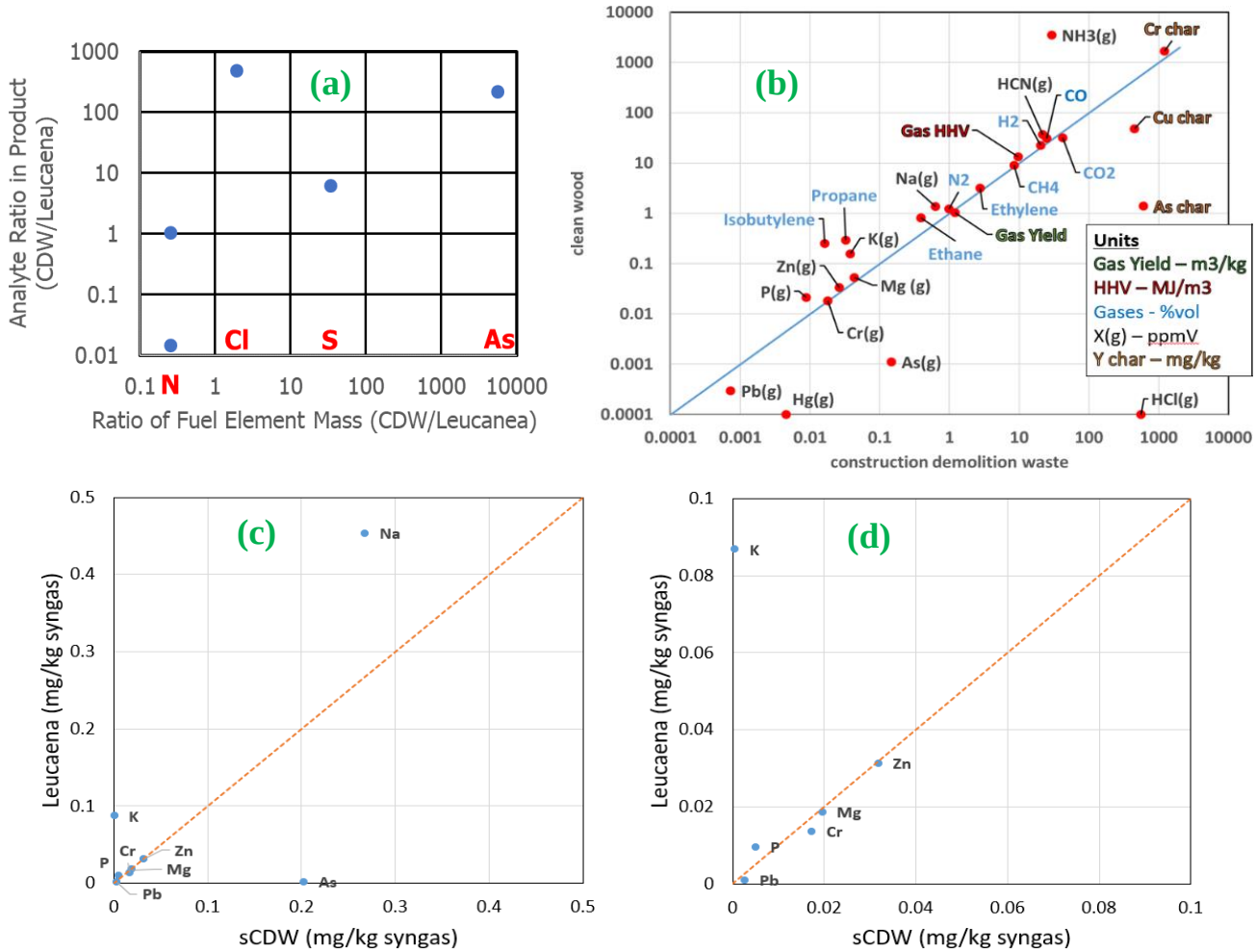


Figure 4. (a) Relative ratios of elements present in fuels to ratios in the product gas stream, (b) comparison of gasifier test measurements between clean fuel and CDW, (c) and (d).

from ~1 part per billion by volume (ppbv) to ~200 ppbv. Conversely, the clean wood fuel produces gas with elevated potassium (K) and sodium (Na) concentrations compared to the sCDW. The data indicate that managing the gas quality through feedstock treatment/blending or product gas cleanup will be required.

[1]. Waste amounts generated by counties over the past nine years are plotted in Figure 5. Waste amounts generally scale according to population, with Honolulu having the largest total despite the use of waste for fuel in the HPOWER power plant. Integrating solid waste management and SAF production with a view of treating the state as a single management unit rather than four individual county units could be a beneficial approach to meet waste management, energy resiliency, and greenhouse gas abatement goals and improve economies of scale.

Urban Waste: Resource Logistics

Utilizing urban waste resources as feedstock for SAF production has the advantages of both reducing amounts of material entering the limited landfill space and reducing dependence on imported energy. A 2022 statewide assessment of urban waste resources entering landfills is summarized in Table 1

One approach for integrated solid waste management for SAF production would transport waste resources from neighbor islands and consolidate them with waste from the City & County of Honolulu (C&C) to fuel a gasification and Fischer-Tropsch (FT) conversion facility located on O‘ahu. Figure 6 shows a schematic of this approach. Urban waste generated on O‘ahu are transported to the SAF conversion facility by trucks via transfer stations. Waste generated in other counties are transported to ports by truck, transloaded to ocean transport, shipped to O‘ahu, transloaded to trucks, and finally transported

Table 1. Summary of combustible waste materials currently entering landfills (tons per year)[1].

County	Maui	Kaua‘i	Hawai‘i	Honolulu	Total
Non-food biomass	111,151	43,279	120,346	22,207	296,983
Plastics and textiles	40,832	13,904	27,616	6,440	88,792
CDW	-	-	-	208,000	208,000
Urban Total	151,983	57,183	147,962	236,647	593,775

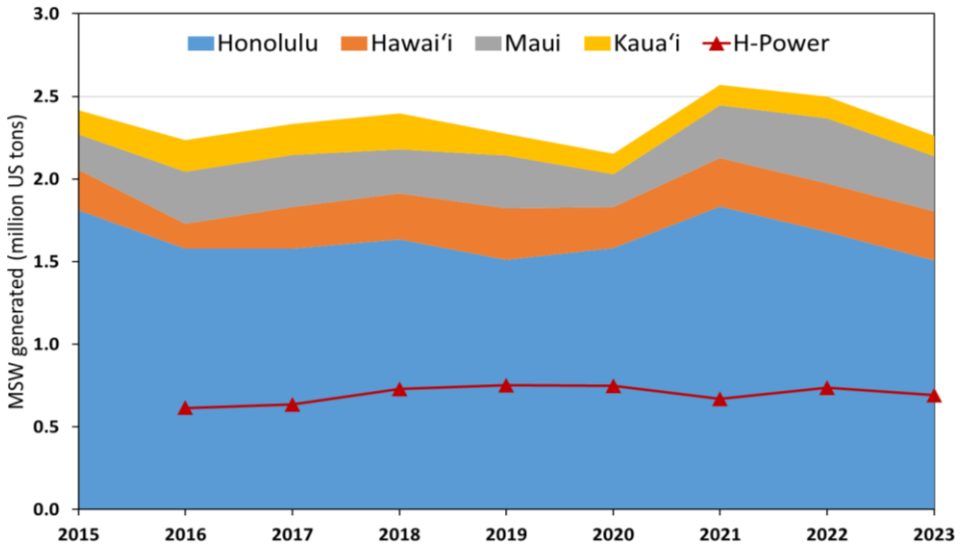


Figure 5. Annual MSW generation in Hawai‘i by county. Data include recyclable and non-combustible materials which may not be used for SAF production.

[1] Adapted from Turn, S.Q., R.B. Williams, and W.Y. Chan. 2022. Resources for renewable natural gas production: A Hawai‘i case study. *Environmental Progress & Sustainable Energy*. e14002. https://doi.org/10.1002/ep.14002.

to the SAF production facility. SAF is delivered by trucks to Daniel K. Inouye International Airport (HNL). Six different scenarios of non-recycled urban waste utilization for SAF production are listed in Table 2. Differences between them result from assumptions on the use of food waste and mixed plastics and the fraction of waste diverted to the HPOWER waste to energy plant currently operated in C&C. Food waste is typically a high moisture fraction of the waste stream and can be diverted for animal feed or as feedstock for anaerobic digestion. Plastics are typically the largest source of non-biogenic carbon present in waste. The remaining categories – paper, yard trimmings, combustible C&D material, mixed organics, and mixed MSW – are all included in each of the waste scenarios. All categories can be commonly identified from data included in integrated solid waste management plans prepared by individual counties.

Estimates of production potential from the six waste utilization scenarios are shown in Figure 7. Scenarios 1, 3, and 5 that don't include HPOWER operation yield the highest SAF production values ranging from 38 to 45 million gallons annually. Diverting food waste and plastics from the material fueling the SAF process accounts for the difference of 7 million gallons per year. Comparing SAF production potential under Scenarios 3 (44 million gal/yr) and 4 (21 million gal/yr) demonstrates the impact of operating HPOWER while diverting food waste but including plastic (non-biogenic carbon). Scenario 6 has the lowest SAF production potential, 18 million gal/yr, the result of diverting waste to HPOWER and excluding both food waste and plastics.

Figure 8 summarizes preliminary assessment of life cycle greenhouse gas emissions per MJ for each of the six scenarios. The results show that the estimated emissions range from 32-53 gCO_2e/MJ. As reference, petroleum jet fuel has a GHG intensity value of 90 g CO_2e/MJ. Continued operation of HPOWER reduces the amount of MSW available on O'ahu for SAF production, increasing the relative weight of MSW

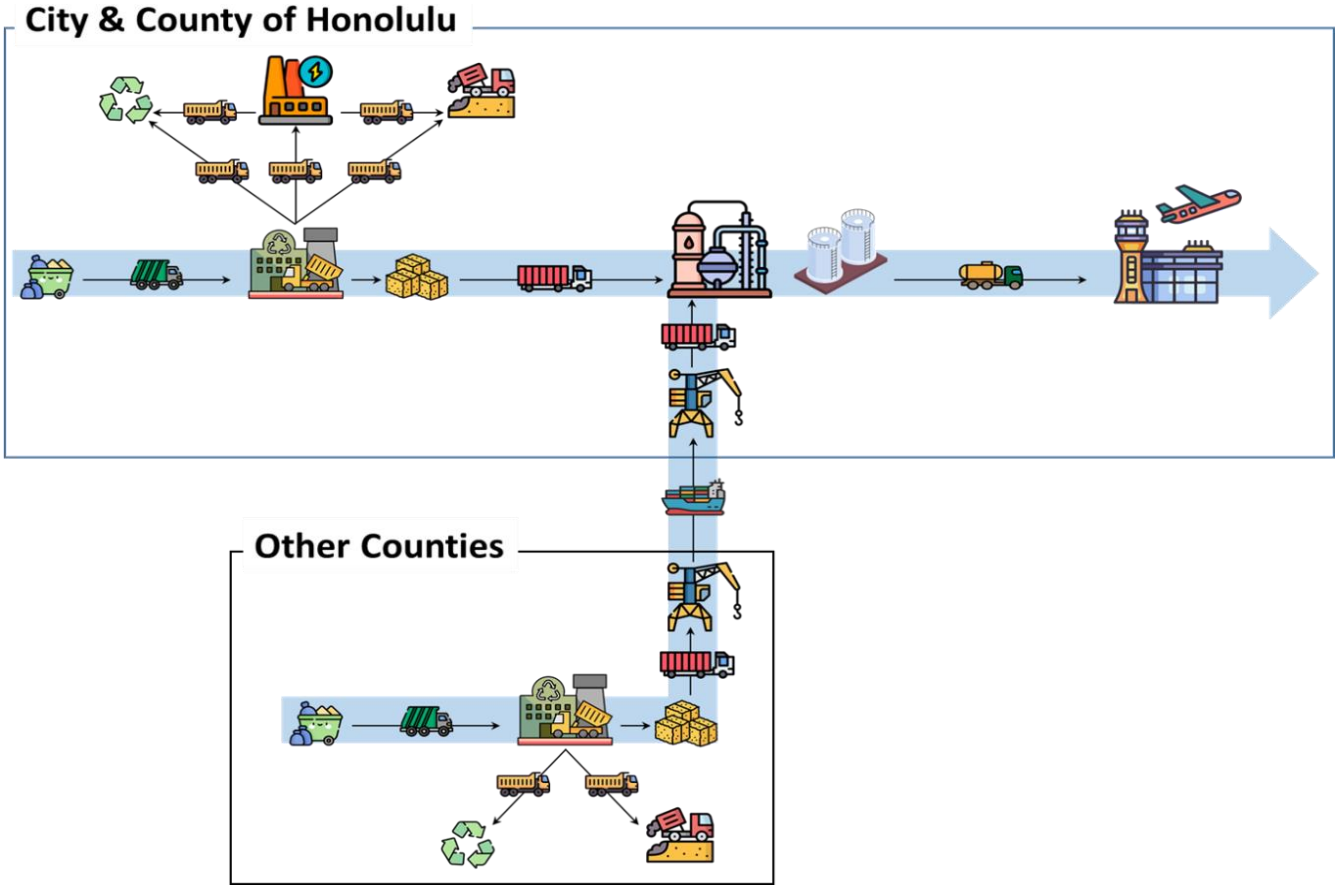


Figure 6. Schematic of waste management across the state in support of SAF production on O'ahu.

transported from outer islands and their associated GHG intensities (GHG_e per MJ) – compare Scenarios 1 and 2. Scenarios 3 and 4 consider the impact of removing food waste from the MSW feedstock coupled with HPOWER operations. Food waste is a high moisture component of MSW and may be diverted because it is a commonly used feedstock for anaerobic digestion applications and can also be used as animal feed. Food waste removal produces a small net increase in GHG emission intensity resulting from the higher percentage of non-biogenic material in the waste stream. Scenarios 5 and 6 consider removal of plastics from the feedstock stream. Although it reduces the SAF production volumes (as shown in Figure 7), it results in a much lower GHG value since plastics contain non-biogenic carbon.

Table 2. Solid waste utilization scenario assumptions for SAF production and HPOWER (Yes indicates that waste category is included or HPOWER is operated; No indicates that waste category is excluded or HPOWER is not operated.)

Scenario	1	2	3	4	5	6
HPOWER	No	Yes	No	Yes	No	Yes
Food Waste	Yes	Yes	No	No	No	No
Mixed Plastics	Yes	Yes	Yes	Yes	No	No
Combustible C&D Materials	Yes	Yes	Yes	Yes	Yes	Yes
Mixed Organics	Yes	Yes	Yes	Yes	Yes	Yes
Mixed MSW	Yes	Yes	Yes	Yes	Yes	Yes
Yard Trimmings	Yes	Yes	Yes	Yes	Yes	Yes
Paper	Yes	Yes	Yes	Yes	Yes	Yes

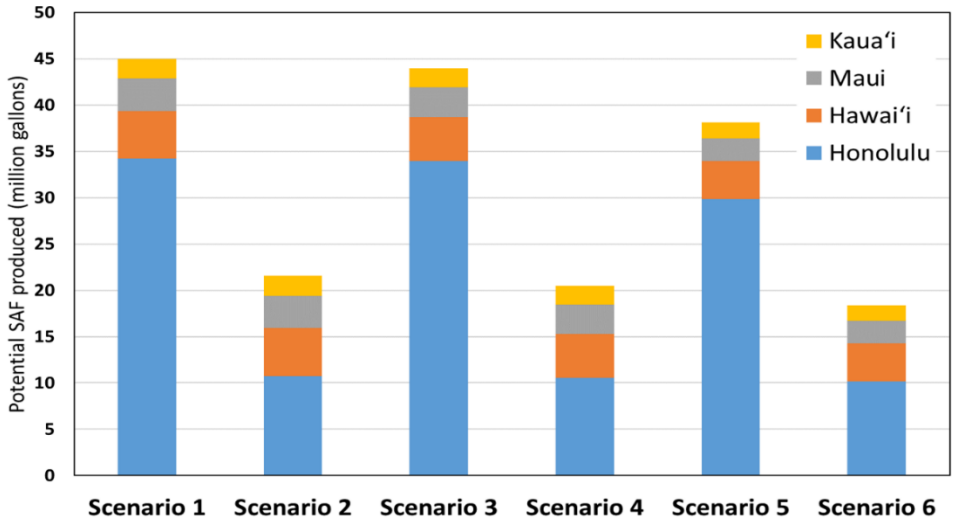


Figure 7. Technical SAF potential from combustible urban waste for six utilization scenarios.

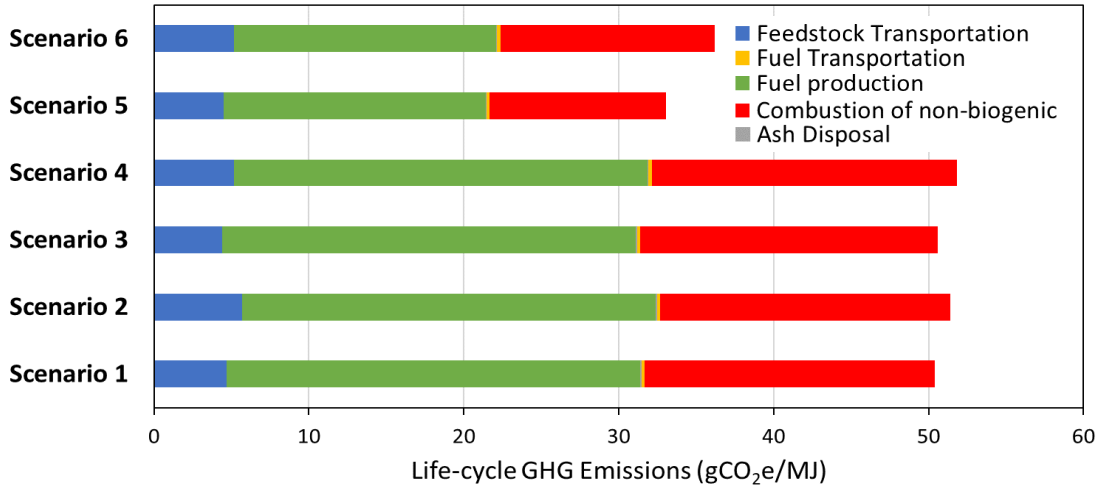


Figure 8. Estimation of GHG emissions from six waste utilization scenarios that include SAF production and combustion in HPOWER.

Biomass: Exploration of Hawai'i Feedstocks

Figure 9 compares land use in 1937, 1980, 2015, and 2020 for the nearly 2 million acres of agricultural lands in Hawai'i[2]. Bringing agricultural lands back into production can support diversification of the economy and support rural development. Biomass feedstocks for sustainable aviation fuel production are options that can contribute to this revitalization. This work was summarized and published in **Review of Biomass Resources and Conversion Technologies for Alternative Jet Fuel Production in Hawai'i and Tropical Regions** in the *Energy and Fuels* journal.

The EcoCrop model was used to complete an assessment of plant production requirements to agro-ecological attributes of agricultural lands in the State. Land use constraints included agricultural zoning, land capability classes (an indicator of soil quality), slope, service by irrigation systems, and current agricultural activities. The analysis focused on sites capable of rain-fed production to avoid using irrigated lands that could support food production. Oil seed crops, woody crops, and herbaceous crops were all considered; an example is shown for a eucalyptus species (Figure 10).

The EcoCrop model provides an estimate of each energy crops' productivity across the agricultural landscape. Aggregated yield of biobased feedstock and conversion efficiency from feedstock to final energy product were used as the basis for SAF technical potential estimates under four scenarios:

- Scenario 1 - agricultural zoning, slope less than 20%, land capability class 1 to 6
- Scenario 2 - agricultural zoning, slope less than 20%, land capability class 1 to 6, excluding land serviced by irrigation systems,
- Scenario 3 - agricultural zoning, slope less than 20%, land capability class 1 to 6, excluding land serviced by irrigation systems and land currently in agricultural use, and
- Scenario 4 - agricultural zoning, slope less than 20%, land capability class 1 to 6, excluding land serviced by irrigation systems and land currently in agricultural use other than pasture.

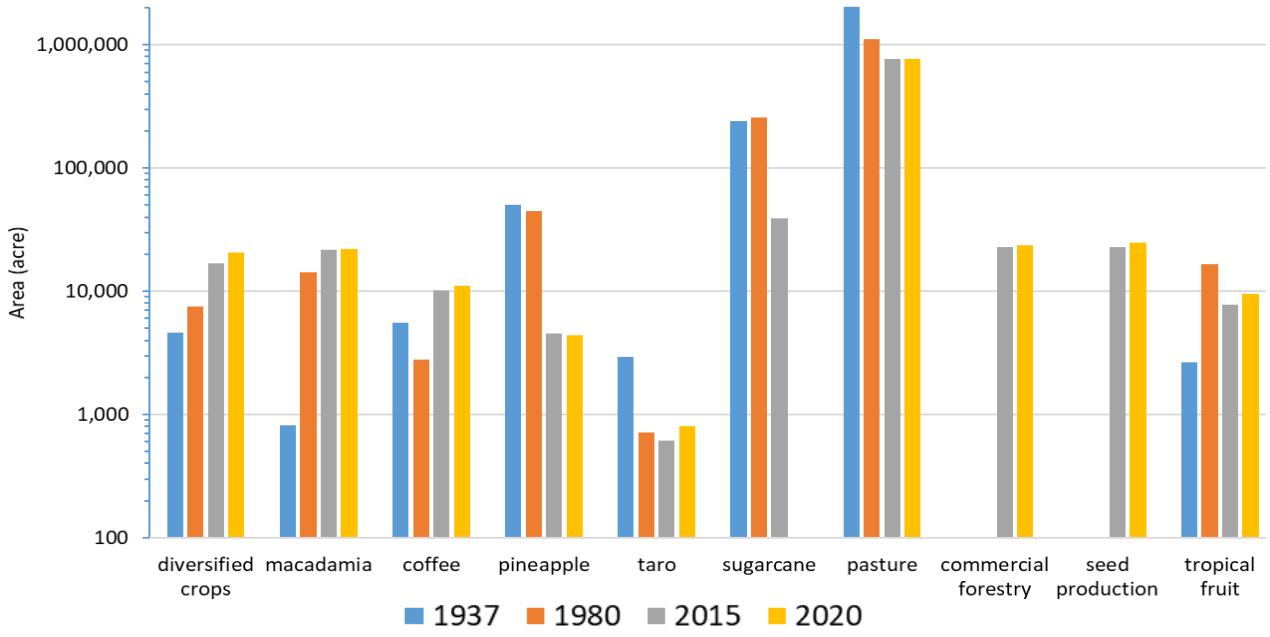


Figure 9. Hawai'i agricultural land use patterns, 1937 to 2020[2].

[2] Adapted from data in a) Melrose, J., R. Perroy, S. Cares. 2015. *Statewide agricultural land use baseline 2015*. University of Hawai'i at Hilo. Prepared for the Hawai'i Department of Agriculture. Honolulu, Hawai'i and b) Perroy, R. and E. Collier. 2024. *2020 Update to the Hawai'i statewide agricultural land use baseline*. University of Hawai'i at Hilo. Prepared for the Hawai'i Department of Agriculture. Honolulu, Hawai'i.

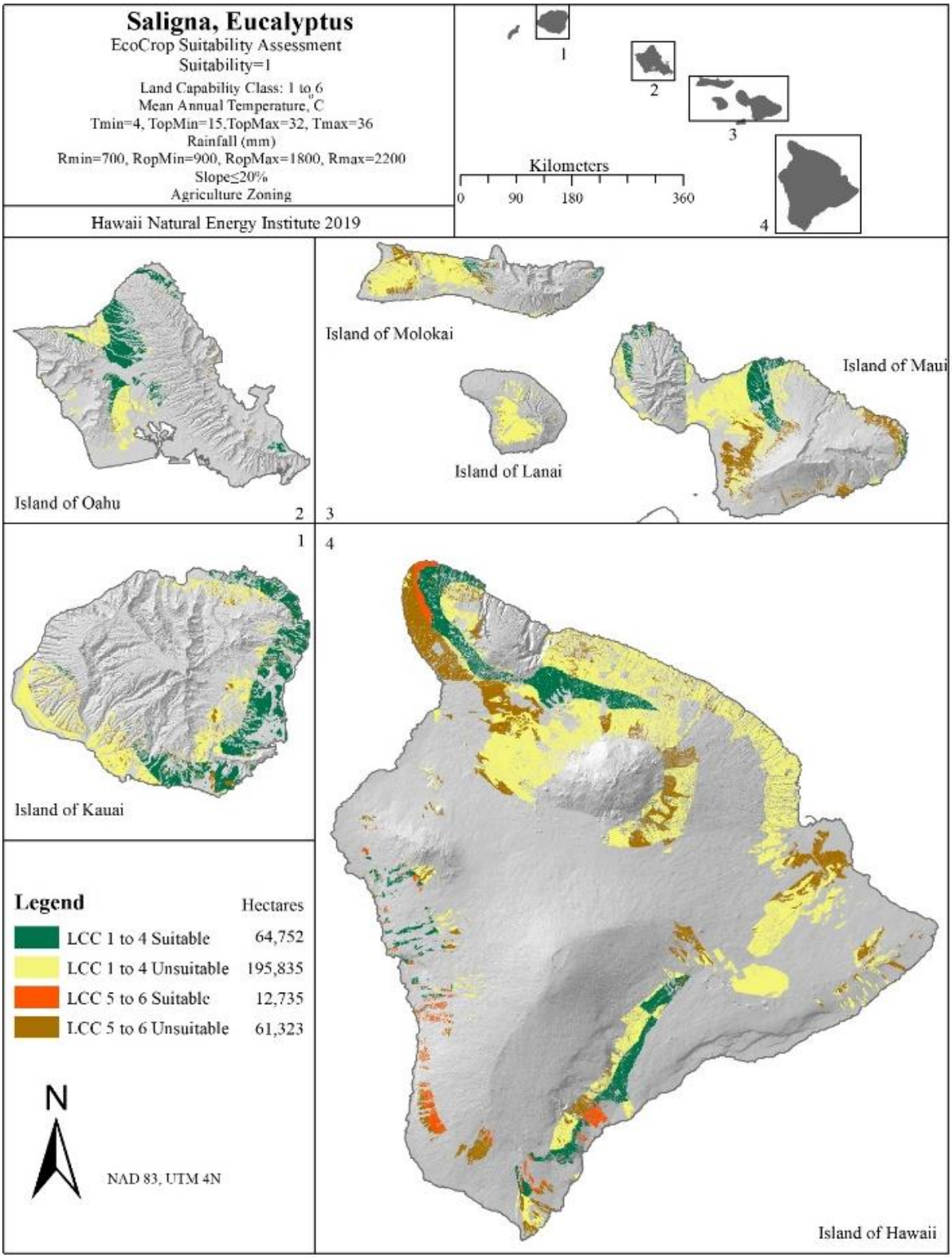


Figure 10. EcoCrop assessment of Saligna, Eucalyptus.

All scenarios assume a EcoCrop suitability index >0.5 on a scale of 0 to 1 using rainfed conditions. Results of the analyses are shown in Figure 11. Note that the results are not mutually exclusive, i.e. the same land area may be included in the estimates of multiple crops. Scenario 1 includes the greatest land area and this is reflected in highest annual SAF production potential estimates, of up to ~100 million gallons. Scenario 2 removes any land serviced by an irrigation system from the analyses, resulting in a reduction in potential to a ~80 million gallons.

Scenario 3 further restricts available lands by excluding those under production identified in a study conducted by the University of Hawai'i at Hilo (UH Hilo) for the Hawai'i Department of Agriculture[3], resulting in SAF production potential estimates <40 million gallons per year. Scenario 4 considers the dual use of land to support energy crops and pasture by including pasture lands identified in the UH Hilo Baseline report. This results in maximum estimates of ~70 million gallons per year. A report detailing these results is currently being drafted.

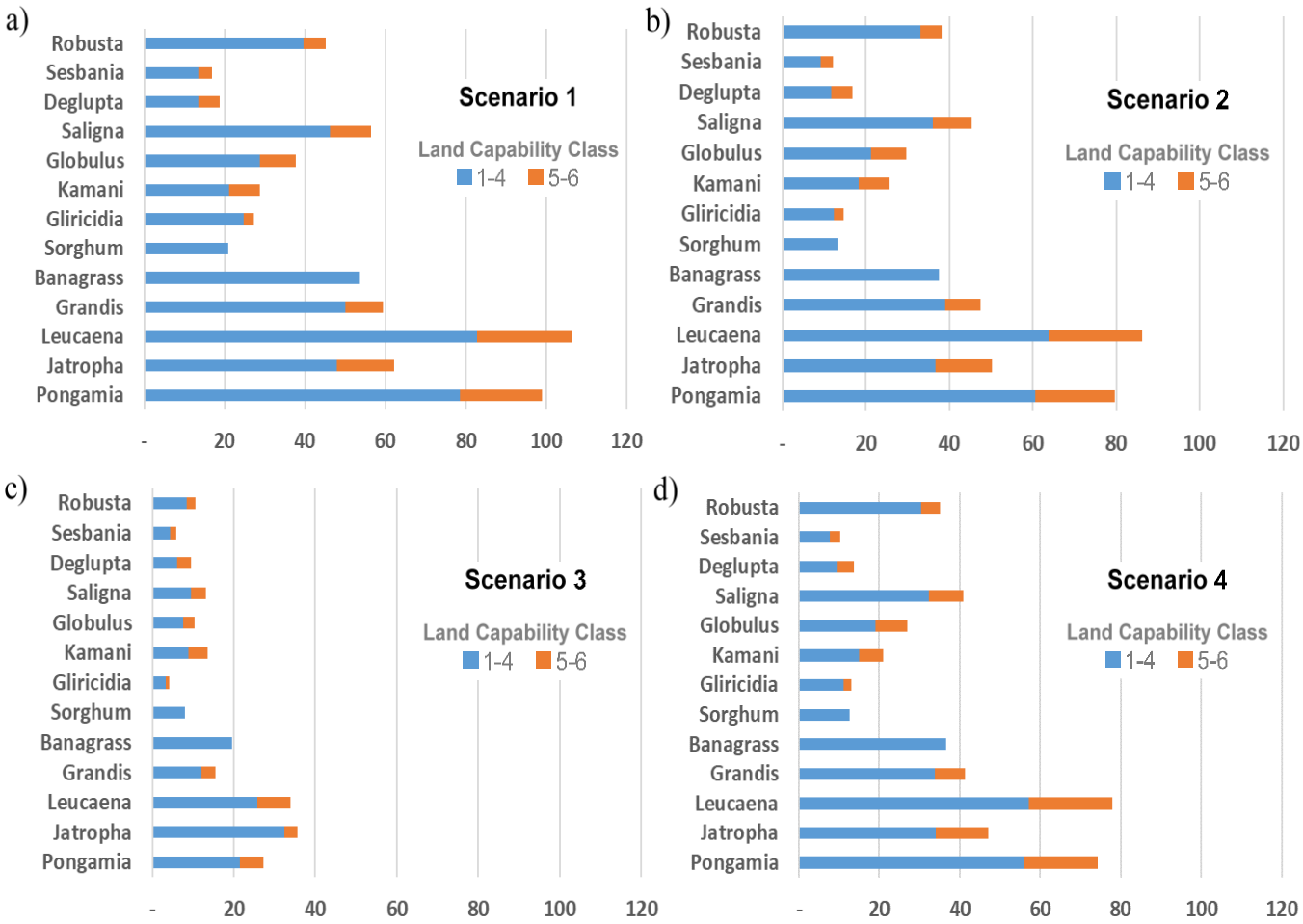


Figure 11. SAF potential (million gallons per year) for 13 energy crop feedstocks under four scenarios: (a) agricultural zoning, slope less than 20%, (b) agricultural zoning, slope less than 20%, excluding land serviced by irrigation systems, (c) agricultural zoning, slope less than 20%, exluding land serviced by irrigation systems and land currently in agricultural use, and (d) agricultural zoning, slope less than 20%, exluding land serviced by irrigation systems and land currently in agricultural use other than pasture. All scenarios assume a EcoCrop suitability index >0.5 on a scale of 0 to 1 using rainfed conditions.

[3] Melrose, J., R. Perroy, S. Cares. 2015. *Statewide agricultural land use baseline 2015*. Prepared for the Hawai'i Department of Agriculture. Honolulu, Hawai'i.

Biomass: Pongamia Logistics

EcoCrop energy crop modeling identified pongamia as having the greatest oil production potential based on suitable growing area and yield. The geographic distribution of suitable growing areas across the state provides an opportunity to select pongamia primary processing sites that minimize transportation costs. Seeds in their pods would be harvested and transported to a primary processing location where the seed and pod could be separated – oil could be extracted from the seed, and oil and de-oiled seed cake could be upgraded. Land zoned for industrial use (brownfield site) on each island was considered as potential primary processing sites. Greenfield sites were also considered – identified as land zoned for agriculture with slope less than 5%, and a minimum contigous area of 125 acres. This would accomodate space needed for processing, storage, and possible colocation of complementary industries utilizing the de-oiled seedcake and pod to develop coproducts. A tonne-kilometer value, Tkm_i, was calculated for all *i* candidate processing locations using Equation 1.

$$Tkm_i = \sum_{j=1}^{n} m_j \cdot d_j \qquad \text{(Eq. 1)}$$

Where m_j is the mass of seed pod harvested at a production location *j*, d_j is the distance traveled over the existing road network between production location *j* to the candidate processing site *i*, and *n* is the number of pongamia production locations. Production locations were based on analysis using a 1 km x 1 km grid. A relative index, C_{ik}, shown in Equation 2, was used to compare *Tkm* values across islands.

$$C_{ik} = \left(\frac{Tkm_i - Tkm_{min}}{Tkm_{max} - Tkm_{min}}\right)_k \qquad \text{(Eq. 2)}$$

Where Tkm_{min} and Tkm_{max} are the minimum and maximum *Tkm* values, respectively, for island *k*. Candidate sites for Scenario 1, ranked from lowest (C_{ik}=0) to highest (C_{ik}=1) value, are shown in Figures 12 and 13 for brownfield and greenfield locations, respectively.

Figure 14 identifies processing site locations that would minimize transportation requirements for harvested pongamia seed-in-pod from Scenario 4 under constraints of maximum transport distances: 77 km (brown and green), 90 km (pink and tan), and 110 km (blue). As the permissible transportation distance decreases, optimum locations shift from Waimea and Pahala (110 km) to Waimea and Nāʻālehu (90 km), to Kawaihae and Nāʻālehu (77 km). The total *Tkm* value for the two processing site locations are 38.6, 36.2, and 45.0 million ton·km for the 110, 90, and 77 km constraints, respectively, with a marginal concomitant reduction in total amounts of seed-in-pod transported, 1.5 million ton per year. Note that lines in Figure 14 indicate the association between production area (dot) and processing site (star), but the transport distances are based on road network values.

Figure 15 identifies processing sites selected using the same travel distance limits (77, 90, and 110 km) but with an added constraint limiting facility processing capacity to 750,000 tons per year at any given location. Decreasing travel distance limits shifts the locations of the sites that minimize transportation costs. This evaluation would be useful to repeat to site facilities with smaller processing capacities as the first orchards are planted and the total crop harvest is limited.

Greenfield site options are more numerous than brownfield locations and may afford reductions in transportation requirements as shown in the figures. Brownfield sites are anticipated to offer access to pre-existing utilies that could reduce costs of developing the processing facilities. The locations for minimum cost sites depend on the production scenarios for pongamia. Pongamia production system planning would require verification of industrial zoning, farmer acceptance of pongamia production, community acceptance, and economic viability of all value chain participants. Continued system evaluation is planned moving forward.

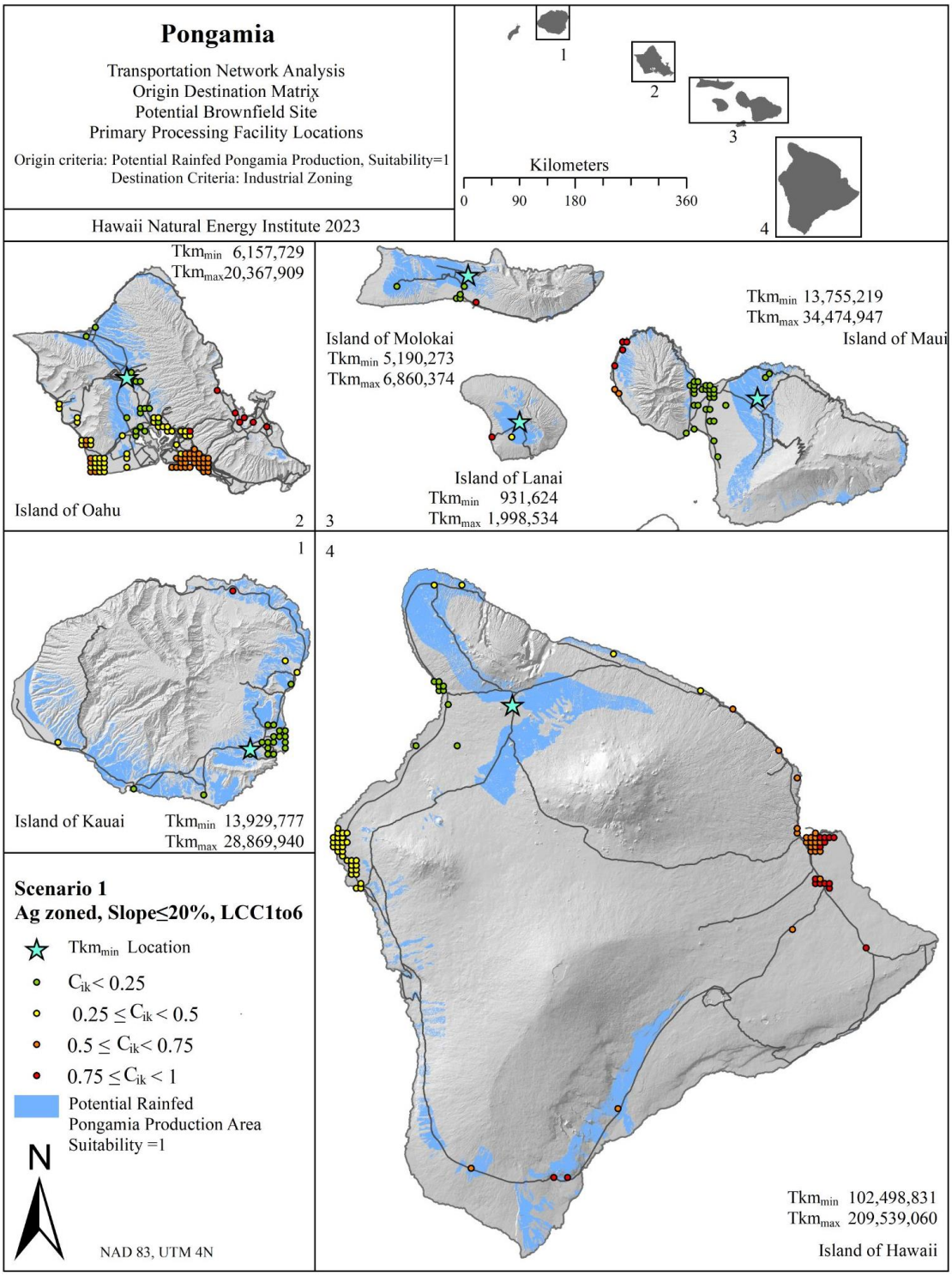


Figure 12. Results of analysis to identify locations to minimize transportation costs of harvested pongamia seed pods to a central brownfield processing site. Blue areas are zoned for agriculture, have slope less than 20%, have land capability class ratings of 1 through 6, and have EcoCrop suitability values of 1.0 for pongamia under rainfed conditions. Potential brownfield processing locations, shown as colored circles, are zoned for industrial use. The star on each island identifies the location of Tkm_{min} corresponding to $C_{ik} = 0$.

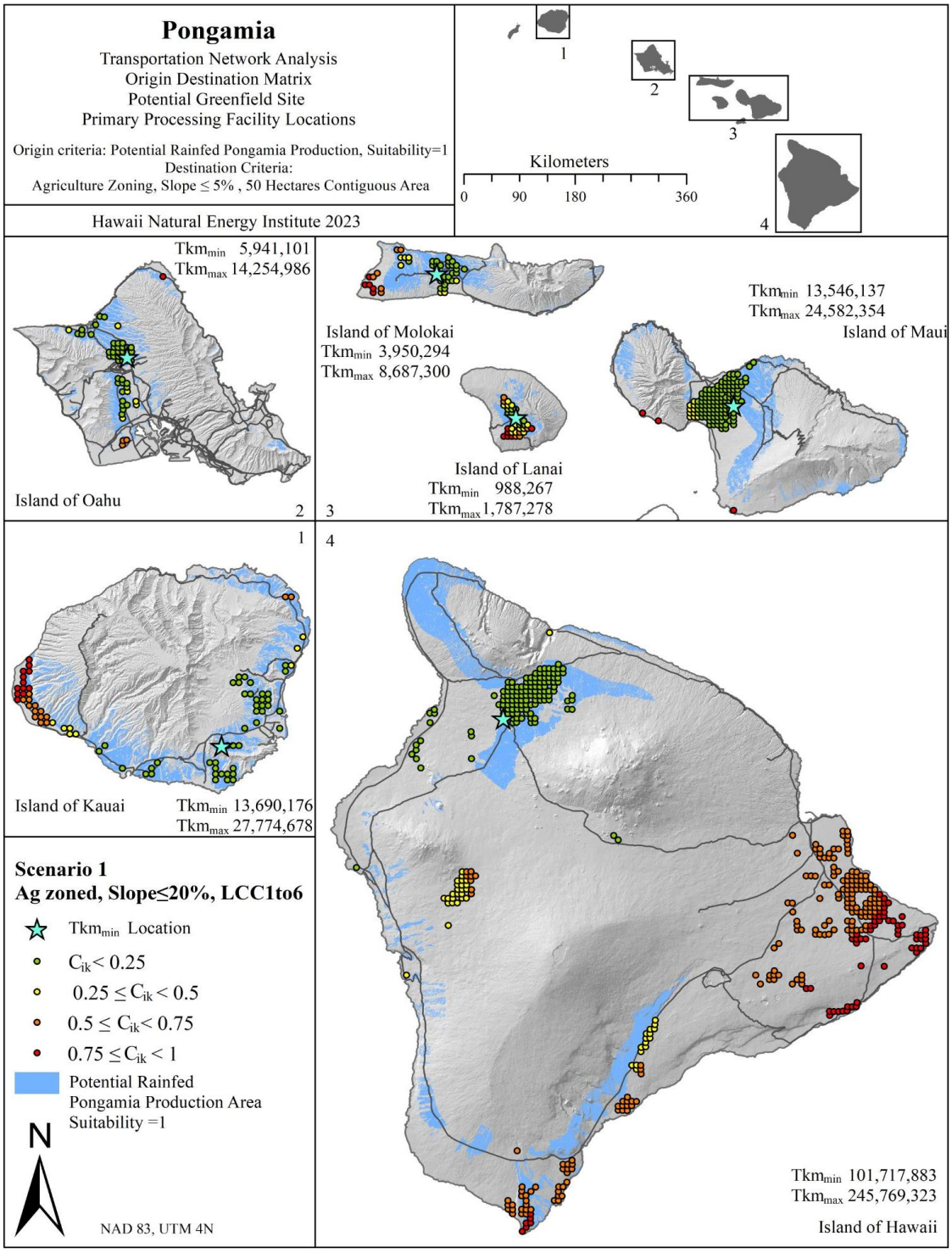


Figure 13. Results of analysis to identify locations to minimize transportation costs of harvested pongamia seed pods to a central greenfield processing site. Blue areas are zoned for agriculture, have slope less than 20%, have land capability class ratings of 1 through 6, and have EcoCrop suitability values of 1.0 for pongamia under rainfed conditions. Potential greenfield processing locations, shown as colored circles, are zoned for agriculture, have slopes ≤5%, and have 125 acres (50 hectares) of contiguous area. The star on each island identifies the location of Tkm_{min} corresponding to $C_{ik} = 0$.

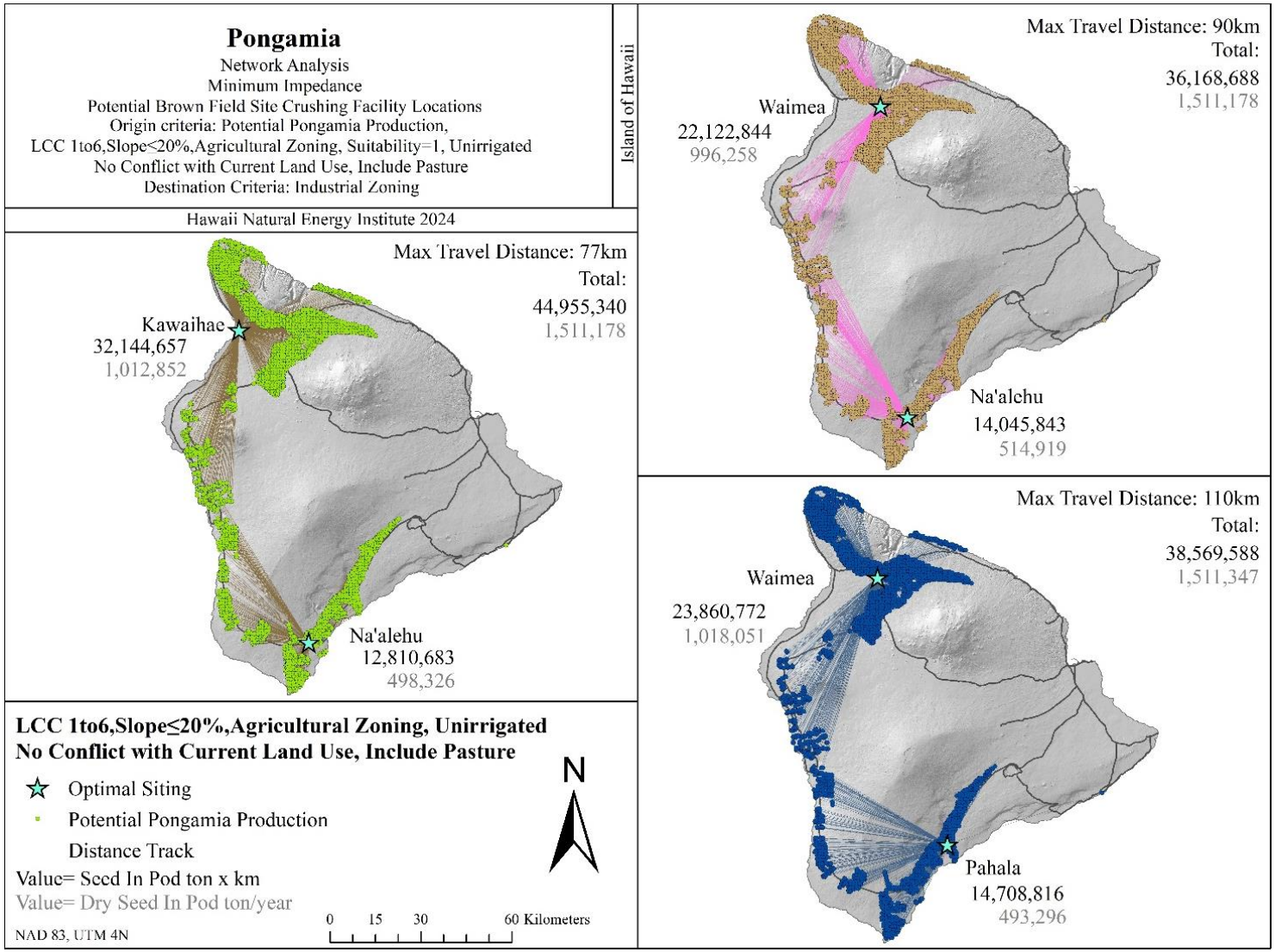


Figure 14. Brownfield processing site locations that would minimize transportation requirements for harvested pongamia seed-in-pod from Scenario 4 under constraints of maximum transport distances: 77 km (brown and green), 90 km (pink and tan), and 110 km (blue). Note that lines indicate the association between production area (dot) and processing site (star), but the transport distances are based on road network values.

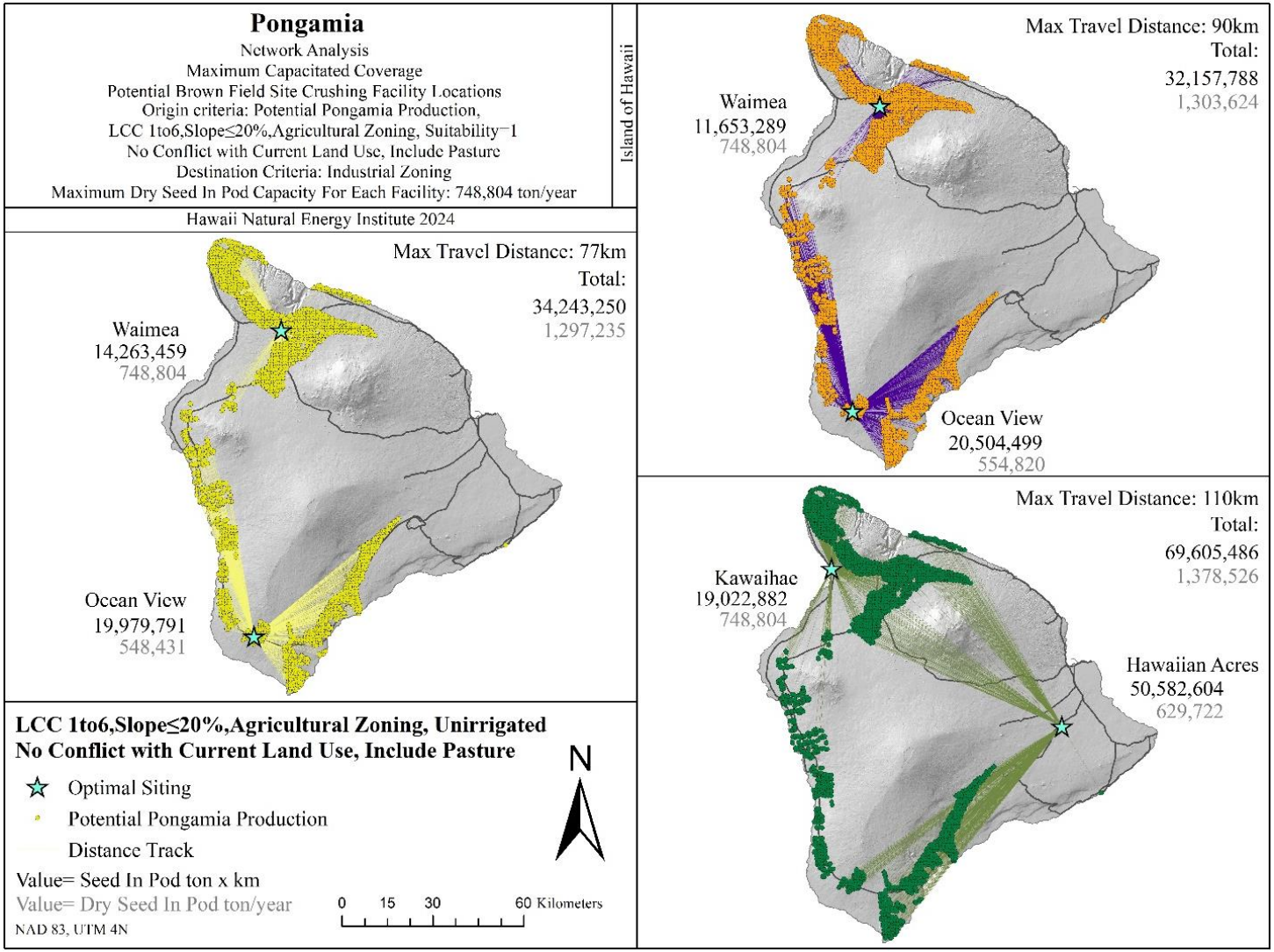


Figure 15. Brownfield processing site locations that would minimize transportation requirements for harvested pongamia seed-in-pod from Scenario 4 under constraints of processing facility capacity <750,000 tons per year and maximum transport distances: 77 km (yellow), 90 km (purple and orange), and 110 km (green). Note that lines indicate the association between production area (dot) and processing site (star), but the transport distances are based on road network values.

Biomass: Evaluation of Pongamia

Of the sustainable aviation fuels currently approved by ASTM and the FAA, those based on the use of oils derived from plants and animals have the highest SAF yield and the lowest production costs. Pongamia (*Millettia pinnata*) (Figure 16) is a tree, native to the tropics, that bears an oil seed and has plantings established on Oʻahu, Maui, and Hawaiʻi island. Pongamia is largely sourced from wild collection in many parts of the world. Pongamia production, processing, and use as an agricultural crop for SAF production would require a value chain (Figure 17). Several projects have been undertaken to provide information needed to develop this value chain. Results are summarized below.

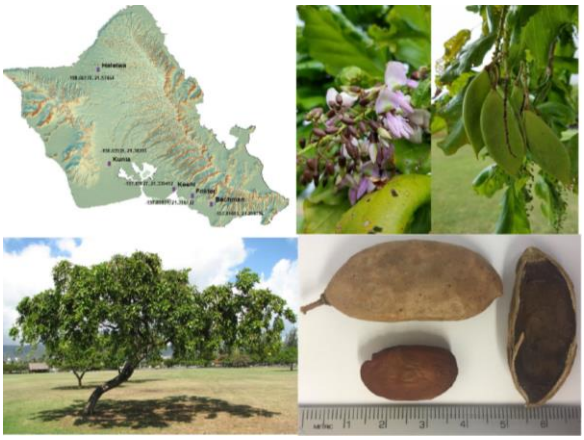


Figure 16. Locations and images of Pongamia.

Economics of Producing Pongamia in Hawai'i

Figure 18 proposes common agricultural activities for orchard production of pongamia and illustrates material and energy flows crossing the orchard boundary. Outputs from the orchard include harvested pongamia seed in pod, pongamia trees when the orchard is removed, and land, air, and water emissions. Figure 19 provides additional detail. Growing pongamia trees in Hawaiʻi will require extensive land preparation. In the case of land that has been out of production for several years, preparation may include removal of pre-existing trees, weeds, and debris. Once the soil is prepared, young trees will be purchased and planted. Additional costs may include royalties and grafting costs if specialized cultivars are used. Once the young trees are in the ground, they will need to be pruned, irrigated, and fertilized, and protected from insects and weeds. These cultural costs are higher initially and then decline as the trees mature. When the trees begin producing seed pods, the cost of harvesting will be incurred.

Production costs are evaluated over a 25-year time period. In the first year, the land is prepared at a cost of $265 per acre, then trees are planted at a cost of $3,848 per acre. The newly planted trees are irrigated, pruned, fertilized, and treated for weeds (through mowing and herbicide use) at an initial cost of $600 per acre per year in year 1, rising to $852 per acre in

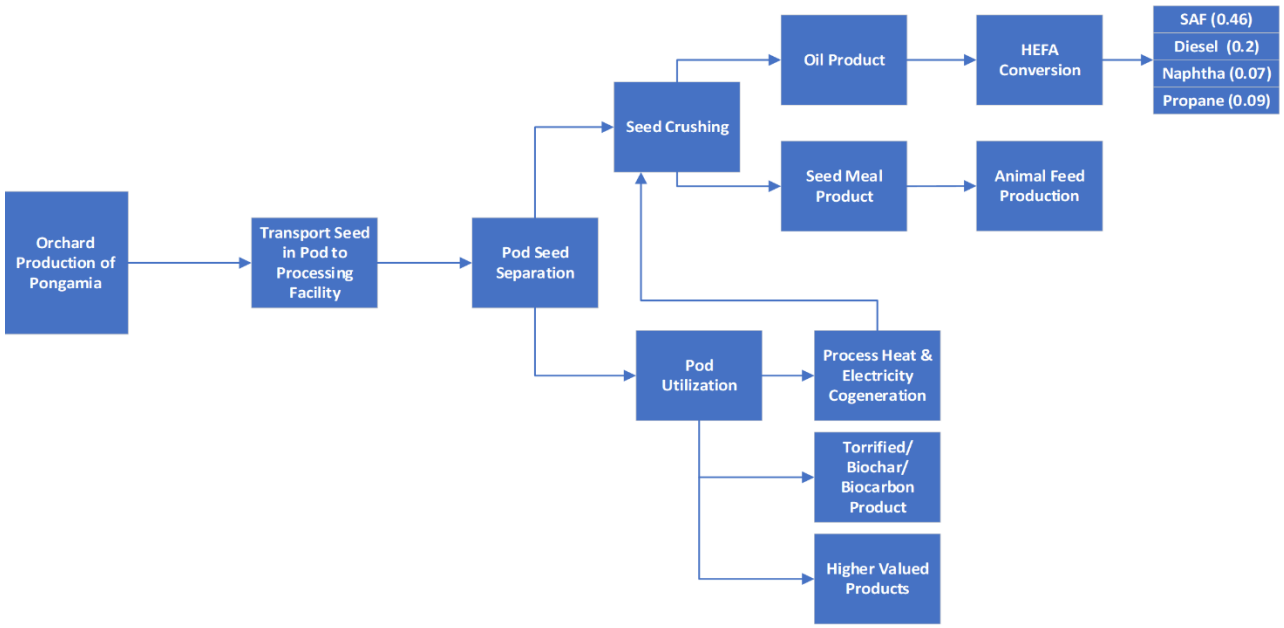


Figure 17. Pongamia value chain from orchard production, aggregation at a processing facility, oil separation, HEFA conversion, and upgrading of byproduct seed meal and fibrous pods.

year 2, $1,014 per acre in year 3, falling to $277 per acre in year 4 and continues to decline gradually reaching $249 by year 25. In year 3, the trees begin flowering and producing seedpods which will be harvested and sold. Initial yields are 0.36 Mg seed (hulled) per acre, peak yields are 3.64 Mg seed (hulled) per acre. Seed yield peaks in year 18 and declines annually through year 25. Baseline production assumptions are displayed in Table 3. Annual seed production is illustrated in Figure 20.

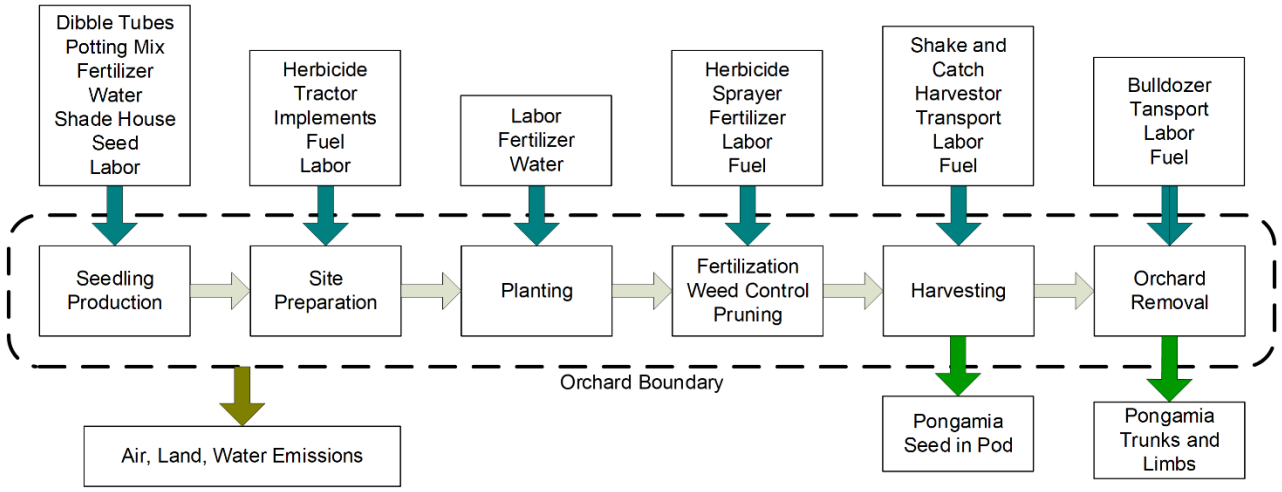


Figure 18. Common agricultural activities propsed for orchard production of pongamia and material and energy flows crossing the orchard boundary.

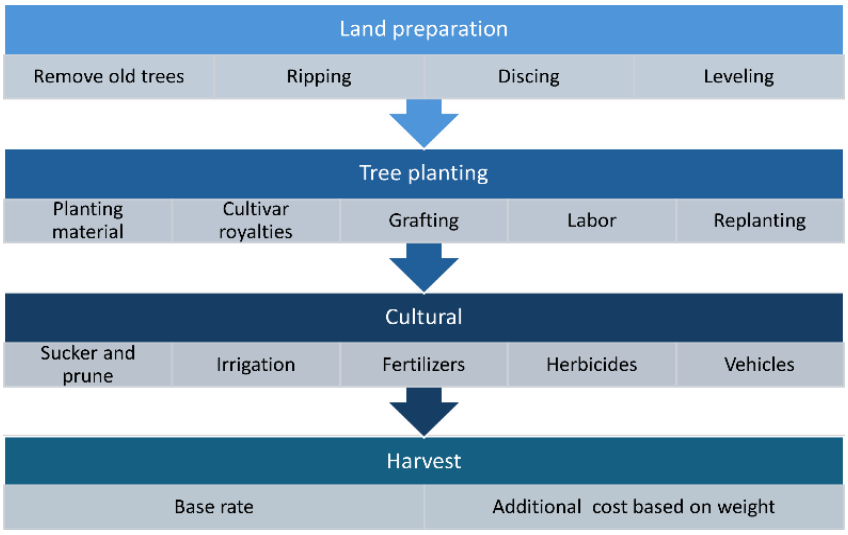


Figure 19. Factors of production proposed for pongamia production systems.

Table 3. Baseline cost assumptions.

Item	Year	Units	Baseline	
Land preparation cost	1	$ per ac	$265	
Tree planting cost	1	$ per ac	$3,848	
			Low	High
Cultural costs (range)	1 to 25	$ per ac	$249	$1,014
Harvest costs (range)	3 to 25	$ per ac	$162	$527
Yield range	3 to 25	Mg seed per ac	0.36	3.64

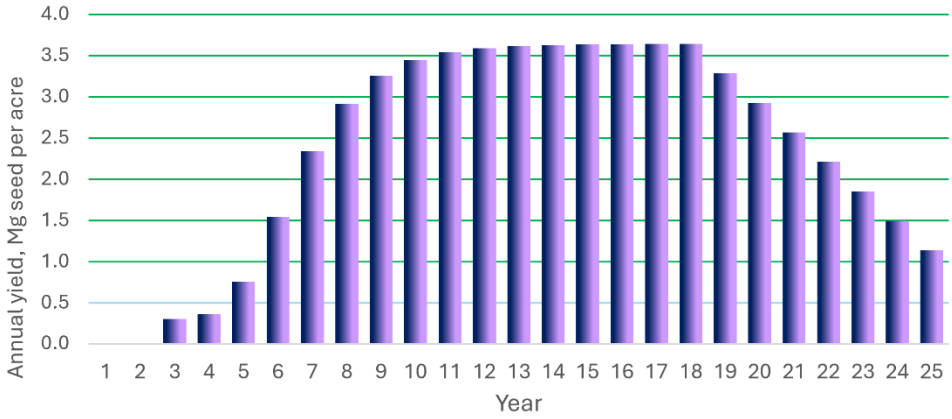


Figure 20. Pongamia seed yield over time in Mg hulled seed per acre per year.

For a one-acre plot of land, results indicate the net revenues will be negative for the first four years of production. In year 5, revenues from the sale of Pongamia seed pods will exceed culture and harvest costs and results in positive net revenues through year 25. With a seed price of $597 per Mg hulled seed, net revenues over 25 years will total $10,522 per acre, not discounted.

Biomass: Pongamia Fuel Properties

Pongamia is a potential resource for renewable fuels in general and sustainable aviation fuel in particular. The physicochemical properties of reproductive material (seeds and pods) from pongamia trees grown in different environments at five locations on O‘ahu were characterized (Figure 21). Proximate and ultimate analyses, heating value, and elemental composition of the seeds, pods, and de-oiled seed cake were determined. The oil content of the seeds and the properties of the oil were determined using American Society for Testing and Materials (ASTM) and American Oil Chemist’s Society (AOCS) methods. The seed oil content ranged from 19 to 33% wt. across the trees and locations. Oleic (C18:1) was the fatty acid present in greatest abundance (47 to 60% wt) and unsaturated fatty acids accounted for 77 to 83% wt of the oil. Pongamia oil was found to have similar characteristics as other plant seed oils (canola and jatropha) and would be expected to be well suited for hydro-processed production of sustainable aviation fuel. These results were published in **Fuel Properties of Pongamia (*Millettia pinnata*) Seeds and Pods Grown in Hawai‘i** in the *ACS Omega* journal.

Figure 21. Pathways from Pongamia seed pods to fuel.

Biomass: Pongamia Coproduct Development

Additional studies were devoted to developing coproducts from pongamia pods. Leaching and torrefaction experiments were performed to remove inorganic constituents and reduce the oxygen content of the pods (Figure 22). A 2^3 factorial design of the leaching treatment determined the impacts of process operating parameters (i.e. rinse water temperature, rinse duration, and particle size) on the composition and physicochemical properties of the pods and the water. The higher heating value of the pods was found to increase from 16 to 18-19 MJ/kg after leaching, while the ash content was reduced from 6.5% to as low as 2.8% wt, with significant removal of sulfur (S), chlorine (Cl), and potassium (K). The chemical oxygen demand, non-purgeable organic carbon, and total nitrogen of the post-experiment leachates were all found to increase with the rinse water temperature and rinse duration but decrease with the increase of particle size. Leached pods were further processed via torrefaction and the targeted mass and energy yields,

~70% and 85%, respectively, were reached at a process temperature of 270°C. The S, Cl, and K contents of the leached, torrefied pods were found to be lower than that of the raw pods. The reuse of leachate on successive batches of fresh pods showed that ash removal efficiency was reduced after three cycles, although some removal was possible through 15 cycles.

Pongamia pod leaching processes and pod torrefaction processes were summarized and published in **Water leaching for improving fuel properties of pongamia Pod: Informing process design** and **Upgraded pongamia pod via torrefaction for the production of bioenergy**, both in the journal *Fuel*, respectively.

Figure 22. Laboratory scale leaching and torrefaction test equipment.

Biomass: Pongamia Invasiveness Assessment

Pongamia (*Millettia pinnata*) is a tree, native to the tropics, which bears an oil seed and has plantings established on Oʻahu. Under this project, an observational field assessment of trees in seven locations on Oʻahu was conducted by Professor Curtis Daehler (UH Dept. of Botany) to look for direct evidence of pongamia escaping from plantings and becoming an invasive weed. Although some pongamia seedlings were found in the vicinity of some pongamia plantings, particularly in wetter, partly shaded environments, almost all observed seedlings were restricted to areas directly beneath the canopy of mother trees. This finding suggests a lack of effective seed dispersal away from pongamia plantings. Based on its current behavior in the field, pongamia is not invasive or established outside of cultivation on Oʻahu. Because of its limited seed dispersal and low rates of seedling establishment beyond the canopy, the risk of pongamia becoming invasive can be mitigated through monitoring and targeted control of any rare escapes in the vicinity of plantings. Seeds and seed pods are water dispersed, so future risks of pongamia escape and unwanted spread would be minimized by avoiding planting at sites near flowing water, near areas exposed to tides, or on or near steep slopes. Vegetative spread by root suckers was not observed around plantings on Oʻahu, but based on reports from elsewhere, monitoring for vegetative spread around plantations is recommended; unwanted vegetative spread might become a concern in the future that could be addressed with localized mechanical or chemical control. A detailed technical report titled "***Observational Field Assessment of Invasiveness of Pongamia (Millettia pinnata), A Candidate Biofuel Crop in Hawai'i***" summarized this work and is available on HNEI's website.

Biomass: Other Feedstocks

Other potential feedstocks for Hawaiʻi, kukui (*Aleurites moluccanus*) and kamani (*Calophyllum inophyllum*) nut oils, were also explored. The oil content of the kukui nuts is ~60% wt, which is ~20-30% wt higher than that of pongamia seeds and kamani nuts. The unsaturated fatty acids, however, accounted for ~90 % wt of the kukui nut oil, slightly higher than that of kamani nut (~75% wt) and pongamia seed oil. Kukui and kamani nut oil are different from the pongamia seed oil, in that the primary fatty acid is linoleic acid (C18:2). The results of the study conducted on kukui were published in **Comprehensive Characterization of Kukui Nuts as Feedstock for Energy Production in Hawai'i** in the *ACS Omega* journal.

Funding Source: Federal Aviation Administration; Energy Systems Development Special Fund

Contact: Scott Turn, sturn@hawaii.edu

Last Updated: November 2024

SB-995
Submitted on: 1/28/2025 12:16:43 PM
Testimony for EIG on 1/29/2025 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Emily Garland	Individual	Oppose	Written Testimony Only

Comments:

Aloha,

Please oppose this bill. Making fuel out of toxic construction and demolition waste is NOT sustainable. Liquefying our crops and trees isn't, either.

Mahalo,

Emily Garland

Hilo

THE SENATE
KA ʻAHA KENEKOA

THE THIRTY-THIRD LEGISLATURE
REGULAR SESSION OF 2025

COMMITTEE ON ENERGY AND INTERGOVERNMENTAL AFFAIRS
Senator Glenn Wakai, Chair
Senator Stanley Chang, Vice Chair

COMMITTEE ON AGRICULTURE AND ENVIRONMENT
Senator Mike Gabbard, Chair
Senator Herbert M. "Tim" Richards, III, Vice Chair

HEARING

DATE:	Wednesday, January 29, 2025
TIME:	1:00 PM
PLACE:	Conference Room 224 & Videoconference State Capitol 415 South Beretania Street

SB-995 (HB-976) Refundable Tax Credits for the Importation of Sustainable Aviation Fuel (SAF) and the In-State Production of SAF and Other Renewable Fuels

Establishes the sustainable aviation fuel import tax credit. (to maximum of $50 MM per year in 2029 through 2036)
Increases the renewable fuels production tax credit amount. (from $20 MM to a maximum of $80 MM in 2029 and thereafter)
Repeals the:

(1) cap amount of claimable renewable fuels production tax credit;
(2) requirement that the tax credit be claimed for fuels with lifecycle emissions below fossil fuels; and
(3) prohibition on claiming other tax credits for the cost incurred to produce renewable fuels.

Specifies that the renewable fuels production tax credit can only be claimed for fuels that meet certain thresholds. Adds an additional tax credit value.
Clarifies that a taxpayer who previously claimed a renewable fuels production tax credit may claim another one for taxable years beginning after December 31, 2024.
Clarifies and expands required information in the certified statement for the tax credit. Repeals the requirement that the Hawaii State Energy Office (HSEO) provides the taxpayer with a determination of whether the lifecycle greenhouse gas emissions for each type of qualified fuel produced is lower than that of fossil fuels.

Commenter's Position: Opposed

Questions about the decarbonization pathway and the end goal.

There is too much ambiguity about the scope of 2045 decarbonization effort to quantify the goal or the benefits that might be derived from the Renewable Fuel Tax Credit (RFTC). HRS 225P-5 has a goal of net zero carbon emissions "within the State as quickly as practicable, but no later than 2045."

And yet GHG inventories and decarbonization strategies are inconsistent between the State agencies. By some rationale interstate travel by air or sea is subject to the 2045 reduction target but GHG's generated during international travel is not subject to net reduction target. Neither type of transpacific flight is actually within the State. The are many federal facilities clearly within the State and yet DOD emissions have been characterized as *"external to Hawaii's economy"* and appears to be outside the reduction target, even though HRS 225P-5 does not actually provide for that exclusion. Understanding the end goal is important because, to a large degree, it dictates which reduction measures should be employed. The RFTC is most appropriate and necessary when fuel cannot be regulated or taxed such as fuel used in international travel or by the US government. SB995 specifically cites current jet fuel consumption of **740 MM** gallon per year from all civilian and military travel, however DOTAX has reported the taxable volume of aviation fuel as **310 MM** gallons per year over the past 2 years and even less in prior years. Based on the 2020/21 GHG inventory it seems that the Clean Air Branch much like DOTAX is excluding fuel consumed by DOD, and during international travel. The HRS do not clearly embrace these exclusions, which is why HSEO is hesitant as well. The State legislature should provide some better definitions, limitations and clarity on which categories of fuel use are or should be in the Statewide GHG inventory and more importantly which are subject to the 2045 net zero target.

SB-995 should be rejected for the following reasons

1. The renewable fuel tax credits will not lower the overall cost of renewable fuels. It will merely subsidize their importation and local production with public funds. There is no funding source specified for the refundable credits.

2. There is no supplemental tax credit for locally grown feedstocks, which is understandable, because supplemental tax credit for Hawaii sourced

feedstocks would have to be substantial to compete with renewable feedstocks imported through (FTZ), which provided certain tax and logistical advantages. Because of limited availability of land and water history has shown that even robust tax credits have not led to the production of more renewable fuels. The multimillion-dollar ethanol tax credit did not lead to the production of any ethanol in the State. To promote production in Hawaii, in 2022 the legislature raised the RFPTC raised from 3 million to 20 million principally support the expansion of Pacific Biodiesel Technologies (PBT). The amount of biodiesel produced by PBT has increased steadily, setting a record of over 6 MM gallons in 2023, however it was not locally sourced. On 7/8/24 HECO submitted a report to the PUC that showed over a recent 4-year period, 68% of the feedstocks used by Pacific Diesel were derived from used cooking oil that was imported from the West Coast (probably Oregon) to Hawaii.

3. Providing renewable fuel tax credit is not consistent and not as efficient as the imposition of a carbon tax as had been recommended by the State Energy Office and the 2021 Tax Review Commission. Alternatively, as several other bills have suggested, the use of SAF could be incentivized by raising the $1.05/bbl barrel tax to $42/bbl (or $1/gal) on traditional aviation fuel and other traditional fossil fuel as well, and the tax would be and revenue generator for the State rather than a drain on its resources.

4. Because so many of the caps and limits have been removed from RFPTC with this bill, the tax credit is no longer serving one of its primary functions to provide support for innovative start-ups, and as result the RFTC has morphed into a long term and potentially never-ending public subsidy for few select companies with handsome profit margins. <u>On January 28th DOTAX testified on HB-976, recommending the tax credit be revised to non-refundable to avoid waste and abuse.</u>

5. The tax credits, particularly for SAF are characterized as “essential” principally because the airlines are not willing to pay more for more for SAF than traditional jet fuel. The airlines give lip service to the goal of reducing GHG emissions, but they are not willing to commit to minimum purchases of SAF and/or pay the higher price associated with acquisition of SAF, presumably because of competitive pressures. And the State is barred from mandating the use of SAF on any transpacific flight.

6. Since SAF is considered a drop in fuel, and consistent with the explicit provision for HRS 225-P which target reductions of GHG within the State, instead tax credits, the State should consider a phased in mandated minimum for the use of SAF on interisland flights. The first phase could include all the approximate 36 MM gallons per year of SAF that is Par Hawaii is expected to produce, ensuring it would not be shipped out-of-state, which appears to be underlying urgency of this proposed legislation. There would be no necessity to subsidize the SAF consumed on interisland flights with tax credits, if the airlines were required to purchase SAF by State statute. Everyone recognized that when the State announced the goal of reaching net zero within the State it was going to cost more. Conceptually Par Hawaii could simply charge the airlines the same price for the SAF, as they would if the SAF was shipped out of State, which might be $1-2 more per gallon.

7. The renewable fuel import tax credit (RFITC) for imported SAF is projected to end in 2036 and yet there is no good basis or reason to think additional SAF will not be needed well beyond, particularly because the State is intent on reducing and offsetting GHG from transpacific flights. Alaska Airlines has a goal of net zero by 2040 but it proposes to reach that goal with SAF and offsets. In contrast the producer's credit for SAF (and other fuels) goes on indefinitely creating a virtually monopoly for PHR. There could be FTC considerations and challenges due to the lack of real competition caused by such a disparity in tax credits for producers vs importers.

8. Either the nominal credit for imported SAF of $1/gallon is too low or more likely, the RFPTC (2.56/gal) is too high to ensure competition between renewable fuel producers and importers. Abundant supply and (some minimal amount of) competition are the two key factors that will help keep prices for SAF and other renewable fuels in check for Hawaii residents and travelers. Par Hawaii will already be laying claim to a $1.75/gal federal credit for SAF and then as proposed by SB995/HB976 Par Hawaii Refining would get an additional credit of $2.56/gallon for SAF from the State of Hawaii, totaling $4.31per gallon. That means the total tax credit for SAF produced in Hawaii would equate to saving of about 2/3rd the cost of traditional jet fuel $6.44/gal according to GlobalAir creating an opportunity for windfall While Par Hawaii will incur an additional cost for producing the SAF from virgin soybean oil, importers like IES will have to pay a higher price to their suppliers for finished SAF produced by other manufacturers like NESTE and SkyNRG and importers will bear the cost of transporting it to Hawaii. Importers will find it difficult to deliver and compete when PHR has more

than a $3-gallon ($132/bbl) cost advantage over SAF importers. As inferred by the combined 67% combined credit basis above, the State tax credit for the Par Hawaii Refining for producing SAF is too high.

Higher tax credit valuation for in-state production of SAF cannot be justified on the hopes and promise of local feedstock supply because there is no mechanism or guarantee that a material portion of the $2.56/gal tax credit would go to local farmers and whether their share of the tax credit would provide an adequate incentive to place valuable pastures in to service.

Although estimates vary, Stillwater has estimated that the Low Carbon Fuel Standard in California provides about $1.05 per gallon in value. Consequently, it should not be necessary for the State to provide PHR with a state tax credit of more than $1.5 for SAF to ensure that they will not produce it in Hawaii and then ship it to California, with other renewables.

9. The RFTPC is too high in absolute terms and far too costly in terms of how much fuel would be covered by the tax credit. Par Hawaii has indicated that about 60% of the 60 MM gallons that it new renewable fuel production facility can/will be used to make SAF, that is equivalent to 36 MM gallons per year. Assuming that all the SAF manufactured by PHR meets all the critical lifecycle thresholds, the thirty 36 MM gallons of SAF would cost or have a value of $92.1 MM (36MM gals * $2.56/gal) in credit. Because the $/gallon credit value is so high, on just SAF, and in the first year of operation Par Hawaii could claim more than the maximum value of the production credit ($80 million) in a single year. That also means that were be 24 MM gallons of renewable diesel and naphtha for which there would be no available tax credit remaining, and according to PHR, it will be shipped to the West Coast where it commands a higher value. Then Par Hawaii will likely, once again ask the legislature for further expansion of the RFPTC, because the State will always be in competition with the West Coast for the supply of SAF.

10. In absolute terms, the refundable tax credit is huge. A single year of the tax credit for fuel producers ($80 million dollars) could have bought the entire Par Hawaii refinery in 2013, it would nearly pay off the new $90 million production facility in a single year and $ 80 million dollars represents about 1/3 of State's corporate income tax. All sorts of real-life comparisons can be made to credit/cash stream of $80MM per year. Just for producers over 20 years the public subsidy would equate to over $1.6 billion dollars.

11. While the public subsidy for the proposed tax credit is quite high, it provides relatively little assurance that SAF will be produced and remain in Hawaii, simply because the State's demand for jet fuel is so high. Working the math backwards, if for example that Par Hawaii was the sole benefactor of the production tax credit, only 31 MM gallons per year of SAF would be subsidized (and protected) by the State tax credit ($80 MM /($2.56/gal). By any measure 31 MM gallons is a small fraction of the total amount of jet fuel consumed by airplanes traveling within and from the State. The amount of tax-payer subsidized SAF would be just 4.2% of the 740 MM gallons of jet fuel cited in the bill, which accounts for all jet fuel consumed. Even relative to the roughly 310 MM gallons of taxable aviation fuel according to recent DOTAX reports, the 31 MM gallons would represent only about 10% of the taxable jet fuel more definitively targeted for displacement. In either case, 31 MM gals per year is a small fraction of the jet fuel demand particularly since SAF for transpacific flight is expected to continue until at least 2040. Will the State be expected to provide even more public subsidies to displace the remaining 90+ % of (taxable) fossil fuel if Par Hawaii makes additional modifications. It is simply inconceivable that Hawaii can fund tax credits that would have to be ten times higher or $800 MM/year to buy down the cost of all the SAF that could be needed for interisland and interstate travel.

12. There is no limitation on a single company claiming both the producer's tax credit and the importers' tax credit. Par Hawaii historically has been both a manufacturer and importer of jet fuel. The same could be true of SAF, particularly as disparities in the value and the availability of tax credits stifles competition from other importers of SAF.

13. There are no protections for the State interests or assurances that the robust (refundable) tax credits will be directed to companies which are in good standing with DOTAX.

The legislature should ensure there are common-sense financial safeguards much like those employed by the IRS on the $2.9 billion dollar federal tax credit for clean fuels under Section 45z, to ensure the tax credits are only issued to companies which are in good standing with the federal tax code.

Below is the brief but critical language which established prequalification criteria that has to be met in order for companies to receive generous federal tax credits for the production of renewable fuels (such as $1.75/gal for SAF).

"Requirements. The IRS will register an applicant .... **if** the IRS ... is satisfied with the filing, deposit, payment, reporting, and claim history for all federal taxes of the applicant and any related person (as defined in § 48.4101-1(b)(5)."

For reference the entire prequalification criteria (n-24-49) recently issued by the IRS in July of 2024 is hyper-linked below.

Notice 2024-49, Section 45Z Clean Fuel Production Credit; Registration

SB-995 should be amended to include a good-standing pre-qualification provision, so that refundable tax credits can only be granted with DOTAX's annual endorsement that a company is good standing with Hawaii's tax regulations and statutes.

SB-995 (and HB-976) proposed a dramatic increase in and de facto commitment to the State's Renewable Fuel Production Tax Credit (RFPTC) as currently set forth by HRS §235-110.32 from $20 million dollars per year to over $130 MM per year in aggregate by 2029. The bills also effectively did away with the individual taxpayer credit limit of $3.5 MM per year, replacing it with a proration scheme based on the amount of renewable fuel produced, so that a single person/taxpayer could claim $50 MM per year as an importer and $80 MM dollars as a producer in 2029 (less in earlier years). There is nothing that precludes a single company (specifically Par Hawaii Refining) from claiming both the importers credit and the production credit. Historically PHR has been both a producer and importer of traditional jet fuel.

The bill also embodied proposals to extend the duration of the just the production credit period past 2045, which is the year the State has established (through HRS §225P-5) as a target to reach atmospheric carbon (CO_2) emissions neutrality through reductions and offsets/sinks. Even though the TRC recommended a carbon tax, because Par Hawaii Refining is on track to start producing about 4,000 barrel per day of renewable fuels at its foreign trade zone (FTZ) refinery in the Campbell Industrial Park during the second quarter of 2025, at the bequest of its largest benefactors, new legislation (SB-995, HB-976 and others) has been introduced to extend and expand the State's RFPTC to accommodate PHR's renewable fuel production facility.

The renewable fuel facility which is located in foreign trade subzone 9A (FTZ 9A) has been in the planning stages ever since the Inflation Reduction Act of 2022 and the 45z tax clean fuel tax credit was authorized creating a strong economic incentive for the refinery to convert approximately 5% of its capacity to renewable fuels. On December 28, 2022 the FTZ Board published notice in the Federal Register of Par Hawaii's intent to expand its production authority to also allow the refining soybean oil into renewable diesel, naphtha and SAF.

Federal Register: Foreign-Trade Zone (FTZ) 9-Honolulu, Hawaii; Notification of Proposed Production Activity; Par Hawaii Refining, LLC (Renewable Fuels); Kapolei, Hawaii

In May of 2023 the governor issued a press release which announced that State of Hawaii and the FTZ Board had granted Par Hawaii Refining special authorization to import renewable feedstocks principally soybean oil into the FTZ refinery, from foreign countries like Brazil and Argentina allowing US duties and State taxes to be deferred until the resultant renewable fuels like SAF are sold within the State.

Governor Josh Green, M.D. | DBEDT NEWS RELEASE: PAR HAWAII RECEIVES FIRST FEDERAL APPROVAL TO PRODUCE RENEWABLE FUELS IN A FOREIGN-TRADE ZONE

While the local supply of renewable feedstock is possible, Hawaii-grown renewable feedstocks will be insignificant relative to the amount of renewable feedstock imported in bulk from foreign countries.

Even though the 45Z federal clean fuel production credit served as the primary impetus for converting a portions of the refinery to renewables Par Hawaii has and will continue to put tremendous pressure on the State legislature and State energy office (HSEO) to expand the RFPTC to ensure that the renewable fuels that it produces (within the Hawaii FTZ) remains within the State and more importantly ensures that Par Hawaii Refinery gets an additional robust state tax credit for making and keeping renewable fuel in State. Par Hawaii providing testimony last year and followed up with proposed legislation this year that requires RFPTC to be expanded to at least $ 80 million dollars per year. As documented in Appendix A of HSOE's recently released 2023 Pathway to Decarbonization Study, Par Hawaii Refining issued the following ultimatum.

> *"States on the US West Coast and elsewhere have incentives – ranging from approximately $1-2 per gallon – for low carbon fuels. Fuels will flow to where they can achieve the highest value for producers.*

Par Hawaii is proceeding with a $90 million project to convert a unit at the Kapolei refinery to the production of renewable diesel and sustainable aviation fuel. This unit will have a capacity of approximately 60 million gallons per year and will begin production of fuel in Q2 of 2025. As noted above, these fuels are expected to be ***exported to the US West Coast****, unless State policy includes financial incentives for those fuels to be consumed in Hawaii.* "

In addition to claiming the robust federal 45Z tax credit for production of clean/renewable fuels ($1.75/gal for SAF), Par Hawaii Refining expects and is demanding that the State provide enough State tax credits to offset and recover its one-time capital investment of $90 million dollar investment within the first full 3 years of operation. On top of the federal credit, Par Hawaii Refining would be the recipient and entitled to huge refundable State tax credit windfall, not for just the first year but for every year thereafter - until at least 2045, and probably much longer so long as Par Hawaii Refining continues to produce renewable fuel, while maintaining the very real threat of shipping it out-of-state to the West Coast (free of any State taxes). Particularly since renewable importers are considerably disadvantaged (by this bill), once the State becomes dependent on Par Hawaii for the supply of renewable fuels, Par Hawaii would have even greater leverage, to secure additional and larger tax credits in the future.

Before the State commits to providing huge public subsidy of over $ 130 million per year for renewable fuels (for the foreseeable future) worth well over **$1.5 billion** the State should take the same approach as the IRS and require that in order to qualify for the State's RFTC, that the taxpayer, is current and have no outstanding State tax liabilities as determined by DOTAX. There is good reason to add the prequalification standard because Par Hawaii Refining (without question the largest benefactor of the proposed renewable fuel tax credit) has been under investigation by the State's AG since 2021 for making false claims and deductions for the Foreign Trade Zone (FTZ) and institutionalizing measures to avoid State taxes and tax related expenses.

Hawaii Sues State's Largest Oil Refiner For Alleged Unpaid Taxes - Honolulu Civil Beat

Except for property tax and employee taxes, Par Hawaii Refining has historically asserted and may (in their legal defense) continue to assert that the Hawaii FTZ is

entirely outside that taxing jurisdiction of the State. The legislature should not give free license and advance new legislation which would reward bad actors with robust tax credits (just because they are making renewable fuel in the FTZ) particularly when the State's AG and DOTAX are attempting to collect taxes from Par Hawaii Refining and hold them accountable for aggressively misrepresenting the scope of the FTZ exemptions to the State and to the refinery's suppliers, service providers and contractors.

Just as Par Hawaii Refining is holding the State hostage, in a concerted effort to secure huge renewable fuel production tax credits from the State legislature, the State in turn should secure its interests and ensure that Par Hawaii has fully cooperated satisfying historic obligations and continues contributing its fair share to the public funds before an unknowing legislature allows and encourages Par Hawaii Refining to draw on those public funds.

Notably the proposed bill(s) retains the refundability element of the State RFPTC which currently includes a provision, (excerpted below) which allows the tax credit to be refunded, which means RFPTC is not merely the loss of business income tax revenues (from claimants) but would cause the State to actually payout and distribute the residual value of the tax credits, to renewable fuel producers, such as Pacific Biodiesel and Par Hawaii Refining.

HRS §235-110.32

(i) A taxpayer may elect to reduce the eligible credit amount by thirty per cent and if this reduced amount exceeds the amount of income tax payment due from the taxpayer, the excess of the credit amount over payments due shall be refunded to the taxpayer; provided that tax credit amounts properly claimed by a taxpayer who has no income tax liability shall be paid to the taxpayer; .."

The refundability of the RFPTC should be (returned to its original state and) revoked, because it will far exceed (dwarf) Par Hawaii's corporate state income tax liability in the first year of operation and could potentially eclipse all State income tax collected and paid by all corporations, not just those claiming the RFPTC. Although qualified and limited to 70%, the RFPTC is effectively a public subsidy, principally for oil companies because the amount renewable fuel that will be needed, far exceeds the income tax liability of those companies that will import or produce it. On January 28th DOTAX testified on HB-976, recommending the tax credit be revised to be made non-refundable but EEP rebuffed that change.

Neither Hawaii farmers nor the general public are likely to see much of a benefit from the State's on-going (and unfunded) subsidy for renewable biofuels, particularly SAF, because there are no assurances that the "savings" afforded by the tax credit will be passed on to either its local suppliers or its airline and utility customers. Hawaii Natural Energy Institute (HNEI) released a report that indicated, that at most 10% of the 700 MM gallons of required jet fuel could be produced from existing agricultural lands principally pastureland no currently for crops. However the amount of land required, even will using the highest yielding Pongamia Tree is enormous. Based on a published estimated of 300 gallons/acre from specialty developer Terviva (who is managing several trial plots on two islands) would still mean that about 50,000 acres of "new" land would have to be dedicated to energy crops in order to displace 2% of traditional jet fuel with SAF. There are only about 120,000 acres currently being used to grow crops in Hawaii, so the 50,000 acres is a very large commitment and that is just the land issue.

Sustainable Aviation Fuel Production

There are many reasons to reconsider the merits of the renewable fuel tax credit that have been proposed, but if SB-995 (or HB-976) is to be advanced (in spite of its shortcomings), the legislature should at least protect the State's interests and assure the integrity of the renewable fuel program by adding good-standing prequalification safeguards and/or by eliminating the refundability provision. The change recommended by DOTAX, would restore the credit to its original construction and would serve as a much needed upper bound on how much of the tax credit could be claimed by a single company and limit the State's financial exposure.

Ted Metrose