

DAVID Y. IGE
GOVERNOR

JOSH GREEN M.D.
LT. GOVERNOR



ISAAC W. CHOY
DIRECTOR OF TAXATION

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

To: The Honorable Glenn Wakai, Chair;
The Honorable Bennette E. Misalucha, Vice Chair;
and Members of the Senate Committee on Energy, Economic Development, and
Tourism

From: Isaac W. Choy, Director
Department of Taxation

Date: Monday, January 31, 2022
Time: 3:00 P.M.
Place: Via Video Conference, State Capitol

Re: S.B. 2511, Relating to Taxation

The Department of Taxation (Department) appreciates the intent of S.B. 2511 and offers the following comments for the committee's consideration.

S.B. 2511 expands the Renewable Energy Technologies Income Tax credit (RETITC) under section 235-12.5, Hawaii Revised Statutes (HRS), by adding a new category of system that is eligible for the credit. For each "firm renewable energy system" installed and placed in service during a taxable year, the credit is equal to an unspecified percentage of actual costs or \$750,000, whichever is less, as long as the firm renewable energy system has a total output capacity of at least one thousand kilowatts per system of direct current. "Firm renewable energy system is defined as "a renewable energy technology system that is always available and continuously producing energy, twenty-four hours per day, three hundred sixty-five days per year, at its contracted capacity, subject only to routine maintenance and emergency repairs." The measure applies to taxable years beginning after December 31, 2021.

First, the Department notes that the definition of "firm renewable energy system" is quite broad and there is significant overlap between that definition and the RETITC's definitions of other types of renewable energy technology systems. The Department strongly suggests specifically defining the term so that there is no ambiguity regarding what qualifies for the credit.

Second, the calculation of the credit should be clarified. If the credit is to be calculated as a percentage of the actual cost capped with the per system cap limited to \$750,00 that should be specified. As currently written, the provision could also be read to limit the "actual cost" to \$750,000.

Finally, the Department respectfully requests that the date of applicability be postponed until taxable years beginning after December 31, 2022. This will give the Department sufficient time to make the necessary form and computer system changes.

Thank you for the opportunity to provide comments.

DAVID Y. IGE
GOVERNOR



CRAIG K. HIRAI
DIRECTOR

GLORIA CHANG
DEPUTY DIRECTOR

EMPLOYEES' RETIREMENT SYSTEM
HAWAII EMPLOYER-UNION HEALTH BENEFITS TRUST FUND
OFFICE OF THE PUBLIC DEFENDER

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
P.O. BOX 150
HONOLULU, HAWAII 96810-0150

ADMINISTRATIVE AND RESEARCH OFFICE
BUDGET, PROGRAM PLANNING AND
MANAGEMENT DIVISION
FINANCIAL ADMINISTRATION DIVISION
OFFICE OF FEDERAL AWARDS MANAGEMENT (OFAM)

WRITTEN ONLY
TESTIMONY BY CRAIG K. HIRAI
DIRECTOR, DEPARTMENT OF BUDGET AND FINANCE
TO THE SENATE COMMITTEE ON ENERGY, ECONOMIC DEVELOPMENT,
AND TOURISM
ON
SENATE BILL NO. 2511

January 31, 2022
3:00 p.m.
Room 224 & Videoconference

RELATING TO TAXATION

The Department of Budget and Finance (B&F) offers comments on this bill.

Senate Bill No. 2511 amends Section 235-12.5, HRS, by expanding the Renewable Energy Technologies Income Tax Credit to include firm renewable energy systems. The amount taxpayers may claim for firm renewable energy systems would be set at the lesser amount of either an unspecified percent of the system's total cost or \$750,000, provided that the system has a total output capacity of at least 1,000 kilowatts of direct current.

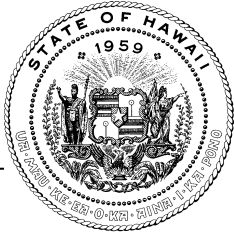
B&F notes that the federal American Rescue Plan (ARP) Act restricts states from using ARP Coronavirus State Fiscal Recovery Funds (CSFRF) to directly or indirectly offset a reduction in net tax revenue resulting from a change in law, regulation, or administrative interpretation beginning on March 3, 2021, through the last day of the fiscal year in which the CSFRF have been spent. If a state cuts taxes during this period, it must demonstrate how it paid for the tax cuts from sources other than the CSFRF, such as:

- By enacting policies to raise other sources of revenue;
- By cutting spending; or
- Through higher revenue due to economic growth.

If the CSFRF provided have been used to offset tax cuts, the amount used for this purpose must be repaid to the U.S. Treasury.

The U.S. Department of Treasury has issued rules governing how this restriction is to be administered. B&F will be working with the money committees of the Legislature to ensure that the State of Hawai'i complies with this ARP restriction.

Thank you for your consideration of our comments.



HAWAII STATE ENERGY OFFICE STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

SCOTT J. GLENN
CHIEF ENERGY OFFICER

235 South Beretania Street, 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone:
Web:

(808) 587-3807
energy.hawaii.gov

Testimony of
SCOTT J. GLENN, Chief Energy Officer

before the
SENATE Committee on ENERGY, ECONOMIC DEVELOPMENT, AND TOURISM

Monday, January 31, 2022
3:00 PM

State Capitol, Conference Room 224 & Videoconference

in consideration of
SB 2511
RELATING TO TAXATION.

Chair Wakai, Vice Chair Misalucha, and Members of the Committee, the Hawaii State Energy Office (HSEO) offers comments on Senate Bill 2511, which expands the renewable energy technologies income tax credit to include firm renewable energy systems and would provide a tax credit equal to a percentage (undefined at this time) of the cost of the system, up to a maximum of \$750,000.

HSEO's comments are guided by its mission to promote energy efficiency, renewable energy, and clean transportation to help achieve a resilient, clean energy, decarbonized economy.

To the extent that taxes and tax credits express the desire of the Legislature to encourage, discourage, or accelerate the accomplishment of state objectives, it is appropriate to adjust incentives for certain renewable energy capabilities such as a desired level of availability and dispatchability (e.g., "firm") in the Renewable Energy Technologies Income Tax Credit.

HSEO notes that the bill's definition of "firm renewable energy system" does not address the potential availability of renewable fuel to the facility as a condition of operation of the facility. Fuel supply availability is typically assumed in characterizing fossil fuel energy as firm. This is not an issue for renewable technologies such as

geothermal, ocean thermal energy conversion, or wave energy systems, which do not require fuel to operate.

HSEO also notes that many firm renewable energy systems produce alternating current rather than direct current. The effect of the minimum size threshold may have unknown impacts to Hawaii meeting its renewable energy goals.

HSEO defers to the appropriate agency for comment on implementation. HSEO supports the intent of this bill provided that its passage does not replace or adversely impact priorities indicated in the Executive Supplemental Budget.

Thank you for the opportunity to testify.



P.O. Box 37158, Honolulu, Hawai'i 96837-0158
Phone: 927-0709 henry.lifeoftheland@gmail.com

COMMITTEE ON ENERGY, ECONOMIC DEVELOPMENT, AND TOURISM
Senator Glenn Wakai, Chair
Senator Bennette E. Misalucha, Vice Chair

DATE: Monday, January 31, 2022
TIME: 3:00 pm
PLACE: Conference Room 224 & Videoconference

SB 2511 RELATING TO TAXATION.

OPPOSE

Aloha Chair Wakai, Vice Chair Misalucha, and Members of the Committee

Life of the Land is Hawai'i's own energy, environmental and community action group advocating for the people and `aina for 52 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.



Trees are the lungs of the planet. They are nature's way of fighting climate change.

Globally, we plant 5 billion trees per year, chop down 15 billion trees per year, for a net loss of 10 billion trees per year (1.1 million trees per hour).¹

This bill would give a tax credit to those who chop down forests.

Mahalo,
Henry Curtis, Executive Director

¹ <https://www.reuters.com/article/us-science-trees/earth-has-3-trillion-trees-but-theyre-falling-at-alarming-rate-idUSKCN0R21Z620150902>

SB-2511

Submitted on: 1/28/2022 1:41:00 PM

Testimony for EET on 1/31/2022 3:00:00 PM

Submitted By	Organization	Testifier Position	Remote Testimony Requested
Ted Bohlen	Testifying for Climate Protectors Hawai'i	Oppose	No

Comments:

To: The Honorable Glenn Wakai, Chair, the Honorable Bennette Misalucha, Vice Chair, and Energy, Economic Development and Tourism Committee members

From: Climate Protectors Hawai'i (by Ted Bohlen)

Re: Hearing SB2511– **RELATING TO TAXATION.**

Monday January 31, 2022, 3:00 p.m., by videoconference

Aloha Chair Wakai, Vice Chair Misalucha, and Energy, Economic Development and Tourism Committee members:

The Climate Protectors Hawai'i is a group focused on responding to the climate emergency. **The Climate Protectors Hawai'i appreciates the bill's intent to incentivize renewable energy sources, but OPPOSES SB2511 unless it is amended to exclude tax credits for renewables that exacerbate the climate emergency!**

The State and the world face a climate emergency. It is critical that we not incentivize renewable sources that exacerbate this climate emergency. Some renewable energy sources, specifically burning wood, are very harmful to the climate. Mature trees benefit the climate by sequestering carbon. Harvesting them and burning them to generate electricity is a "double whammy" on the climate because it both stops trees from sequestering and emits greenhouse gases in combustion. If Hawai'i is to reach its goal "to sequester more atmospheric carbon and greenhouse gases than emitted within the State as quickly as practicable, but no later than 2045," we must stop, not incentivize, the burning of wood.

This bill would allow a tax credit for renewable energy sources, including firm renewable energy systems, which appears (on page 4, lines 9-13), to include wood-burning.

Please amend this bill to clarify that it does not provide tax credits for wood-burning generators.

Mahalo!

Climate Protectors Hawai'i (by Ted Bohlen)



Testimony to the Committee on Energy, Economic Development, and Tourism

Monday, January 31, 2022

3:00 PM

VIA Video Conference

Conference Room 224, Hawaii State Capitol

SB 2511

Chair Wakai, Vice Chair Misalucha, and members of the committee,

Hawaii Clean Power Alliance (HCPA) **supports** SB 2511, which expands the renewable energy technologies income tax credit to include firm renewable energy systems.

Hawaii Clean Power Alliance is a nonprofit alliance organized to advance and sustain the development of clean energy in Hawaii. Our goal is to support the state's policy goal of 100 percent renewable energy by 2045. We advocate for utility-scale renewable energy, which is critical to meeting the state's clean energy and carbon reduction goals.

Tax credits have proven essential in building momentum and scale in the development and distribution of diverse renewable sources of energy, as demonstrated in the early days of solar and wind development. Similarly, the development of firm renewable energy systems such as hydroelectric, hydrogen and geothermal requires a significant outlay of investment and resources, bringing high-paying jobs and other benefits to the local communities. Hawaii needs to develop more renewable generation based on local resources to mitigate the risk of fossil fuel imports. The establishment of these tax credits provides incentive to create firm renewable based energy systems that can replace all of the fossil fuel generation on the electric grid while bringing greater stability and reliability.

New Year's Eve demonstrated in real time what happens when the grid is not receiving enough energy to sustain the demand. A confluence of rain, no wind, and multiple generation units going down left the grid without sufficient power, causing the electric utility to issue a notice of power conservation. We were fortunate that this event occurred during a low-demand period, thus there were little consequences. A similar situation during high demand times would likely be much more dire, similar to the recent tragic events both Texas and California experienced with multiple outages.



These credits, giving consideration to firm renewable power energy systems, create the runway for new firm renewable power plants with 24/7 availability, which will dramatically improve our energy diversity and ultimately, reliability.

We ask the committee to pass this bill.

Thank you for the opportunity to testify.

Sincerely,

A handwritten signature in black ink, appearing to read "Fred Redell", written in a cursive style.

Frederick Redell, PE

Executive Director

(949) 701-8249

www.hawaiicleanpoweralliance.org

TAX FOUNDATION OF HAWAII

126 Queen Street, Suite 305

Honolulu, Hawaii 96813 Tel. 536-4587

SUBJECT: INCOME, Tax Credit for Firm Renewable Energy Systems

BILL NUMBER: SB 2511

INTRODUCED BY: DELA CRUZ, CHANG, DECOITE, GABBARD, KEITH-AGARAN, KIDANI, MISALUCHA, WAKAI, Baker, Kanuha, Shimabukuro

EXECUTIVE SUMMARY: Expands the renewable energy technologies income tax credit to include firm renewable energy systems. We suggest direct appropriations or subsidies so that (1) we know what we are paying for, and (2) we know the price.

SYNOPSIS: Amends section 235-12.5, HRS, to allow a credit of ___% of the actual cost, up to \$750,000, for a firm renewable energy system.

Defines a “firm renewable energy system” as a renewable energy technology system that is always available and capable of continuously producing energy, twenty-four hours per day, three hundred sixty-five days per year, at its contracted capacity, subject only to routine maintenance and emergency repairs.

EFFECTIVE DATE: Applies to taxable years beginning after December 31, 2021.

STAFF COMMENTS: At present, the renewable energy technologies income tax credit provides incentives for construction and installation of solar and wind energy systems. These systems do not generate energy continuously, at least in theory, because the sun does set every day and the atmospheric wind conditions are variable. It is unclear what technologies are targeted by this proposed credit expansion – hydroelectric, ocean thermal, ocean wave, tidal, and geothermal come to mind – and it may be better to state the definition of a firm renewable energy system by more specifically describing the technologies intended so that disputes do not develop over whether a particular technology qualifies. It may be argued, for example, that garbage-to-energy technology such as H-POWER or burning of biomass qualifies, although the drafters might not have intended so because of secondary effects such as carbon dioxide emission.

It is also preferable to use direct appropriations or subsidies, rather than tax credits, to encourage development or use of these types of technologies because (1) we know what we are paying for, and (2) we know the price. A tax credit with an open-ended description of the creditable activity gives us neither.

Digested: 1/29/2022



To: The Senate Committee on Energy, Economic Development and Tourism
From: Sherry Pollack, Co-Founder, 350Hawaii.org
Date: Monday, January 31, 2022, 3pm

In strong opposition to SB2511

Aloha Chair Wakai, Vice Chair Misalucha, and Committee members,

I am Co-Founder of the Hawaii chapter of 350.org, the largest international organization dedicated to fighting climate change. 350Hawaii.org **strongly opposes SB2511** that would expand the renewable energy technologies income tax credit to include firm renewable energy systems.

350Hawaii supports and encourages the efforts of the legislature to incentivize our transition to truly clean, non-climate harming renewable energy. However, “firm” renewable energy as currently defined would include burning trees and other wood products. Incentivizing firm renewable energy systems that include burning trees and wood products would result in unintended negative consequences to our environment and climate.

Burning trees is more expensive than utility-scale wind and solar. Furthermore, burning wood for energy is disastrous for the climate. It destroys forests, and puts out more carbon dioxide into the air than coal. The period for regrowth and making up that carbon debt can take many decades or more, time that we no longer have the luxury of wasting. We are in a climate crisis and must make scientifically sound choices that will reduce greenhouse gas emissions as soon as possible if we are to stay below 1.5 degrees Celsius rise. Now is not the time to promote technologies that increase greenhouse gases simply because they are not derived from fossil fuels.

In short, pursuing expanding the renewable energy technologies income tax credit to firm renewable energy systems and thereby incentivizing burning wood products as an energy source will worsen the climate and negatively impact our economy. SB2511 as written would undermine our progress towards 100% truly clean, renewable energy and take us in the wrong direction.

Unless trees and other wood products are excluded from the definition of renewable energy, we urge you to **oppose** this ill-advised bill.

Mahalo for the opportunity to testify.

Sherry Pollack
Co-Founder, 350Hawaii.org



**Hawaiian
Electric**

**TESTIMONY BEFORE THE SENATE COMMITTEE
ON ENERGY, ECONOMIC DEVELOPMENT, AND
TOURISM**

SB 2511

Relating to Taxation

January 31, 2022

3:00 p.m., Agenda Item #4

Conference Room 224 & Videoconference

Rebecca Dayhuff Matsushima
Vice President, Resource Procurement
Hawaiian Electric Company, Inc.

Dear Chair Wakai, Vice Chair Misalucha, and Members of the Committee,

My name is Rebecca Dayhuff Matsushima and I am testifying on behalf of Hawaiian Electric Company, Inc. (“Hawaiian Electric” or the “Company”) in **support** of SB 2511, Relating to Taxation, **with suggested amendments** to subsections (a) and (h).

SB 2511 proposes to amend Section 235-12.5, by: (1) amending subsection (a) to include a tax credit for a firm renewable energy system of ___ percent of the actual cost or \$750,000, whichever is less, provided that the system has a total output capacity of at least one thousand kilowatts per system of direct current; (2) amending subsection (c) to include a definition of “firm renewable energy system;” (3) amending subsection (g), to now include firm renewable energy systems, which provides taxpayers the option to reduce the eligible credit amount by 30% 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 by the taxpayer; and (4) amending subsection (h), to now include firm renewable energy systems, which

provides taxpayers the option to have any excess of the credit over payments due refunded to the taxpayer if: (a) all of the taxpayer's income is exempt from taxation under section 235-7(a)(2) or (3), or (b) the taxpayer's adjusted gross income is \$20,000 or less (or \$40,000 or less if filing a tax return as married filing jointly).

Firm generation is imperative to operate the electric system and ensure reliability and resilience. Hawaiian Electric believes expanding the tax credit to cover firm renewable energy systems and setting the maximum credit at \$750,000 provides a strong incentive for an individual or organization to develop such a system. The Company, however, recommends an amendment to subsection (a) starting on page 3, lines 6-10, to read as follows:

“For each firm renewable energy system: _____ per cent of the actual cost or \$750,000, whichever is less; provided that the firm renewable energy system has a total output capacity of at least one thousand kilowatts per system of **direct alternating** current.”

This revision is being proposed as direct current is meant for PV or wind systems where they are measuring the panel output before it goes into the inverter and converted to AC power which is what the grid requires. For firm generation, it needs to be AC power to interconnect to the grid (i.e. there is no conversion through an inverter).

With the introduction of firm renewable energy systems into Section 235-12.5, Hawaiian Electric feels it would only be natural to allow taxpayers the option to claim a refundable tax credit if they elect to reduce their credit by 30% for firm renewable energy systems as it is consistent with what is currently allowed for solar energy systems.

Lastly, with regard to the insertion in subsection (h), the Company recommends

modifying the language on page 6 lines 3-4 as follows: "...for any renewable energy technology system ~~or~~ **including a** firm renewable energy system, an individual taxpayer..." We recommend this change as we believe a "firm renewable energy system" falls under the umbrella of a "renewable energy technology system." With or without this proposed modification, the Company supports this proposed language.

Thank you for this opportunity to testify on SB 2511.

SB-2511

Submitted on: 1/28/2022 9:40:00 AM

Testimony for EET on 1/31/2022 3:00:00 PM

Submitted By	Organization	Testifier Position	Remote Testimony Requested
Keith Neal	Individual	Support	No

Comments:

I support renewable (zero emissions) energy systems receiving tax credits

SB-2511

Submitted on: 1/28/2022 11:16:15 PM

Testimony for EET on 1/31/2022 3:00:00 PM

Submitted By	Organization	Testifier Position	Remote Testimony Requested
Dylan Ramos	Individual	Oppose	No

Comments:

Aloha Chair Wakai, Vice Chair Misalucha, and EET Committee members,

I oppose SB2511 so long as it incentivizes projects billed as "renewable energy" that actually contribute to the very issues of carbon emissions and climate change that they propose to combat. In particular, renewable energy cannot be based on wood-burning. Not only do such projects depend on deforestation -- even replanted forests take time to grow and sequester carbon -- but per equal amount of energy generated, wood-burning is worse for the climate than fossil fuels! Thank you for considering this testimony.

Mahalo,
Dylan Ramos

SENATE COMMITTEE ON ENERGY, ECONOMIC DEVELOPMENT, AND TOURISM
January 31, 2022, 3:00 PM
COMMENTS ON SB 2511

Chair Wakai, Vice Chair Misalucha, and Committee Members:

My name is Richard Wallsgrove and I am a professor of law at the William S. Richardson School of Law, University of Hawai'i at Mānoa, where I teach energy law and policy along with various other business law and environmental law courses. Prior to joining the law school, I was a frequent participant in regulatory proceedings before the Hawai'i Public Utilities Commission (PUC). This testimony is submitted in my personal capacity.¹ I thank the Committee for allowing me this opportunity to participate in its consideration of this bill.

I am writing to suggest revisions to a problematic proposed definition of “firm renewable energy system” utilized in SB 2511:

a renewable energy technology system that is always available and capable of continuously producing energy, twenty-four hours per day, three hundred sixty-five days per year, at its contracted capacity, subject only to routine maintenance and emergency repairs.

This definition incorporates the definition of “renewable energy technology system” currently codified at H.R.S. § 235-12.5(c):

“Renewable energy technology system” means a new system that captures and converts a renewable source of energy, such as solar or wind energy, into:

- (1) A usable source of thermal or mechanical energy;
- (2) Electricity; or
- (3) Fuel.

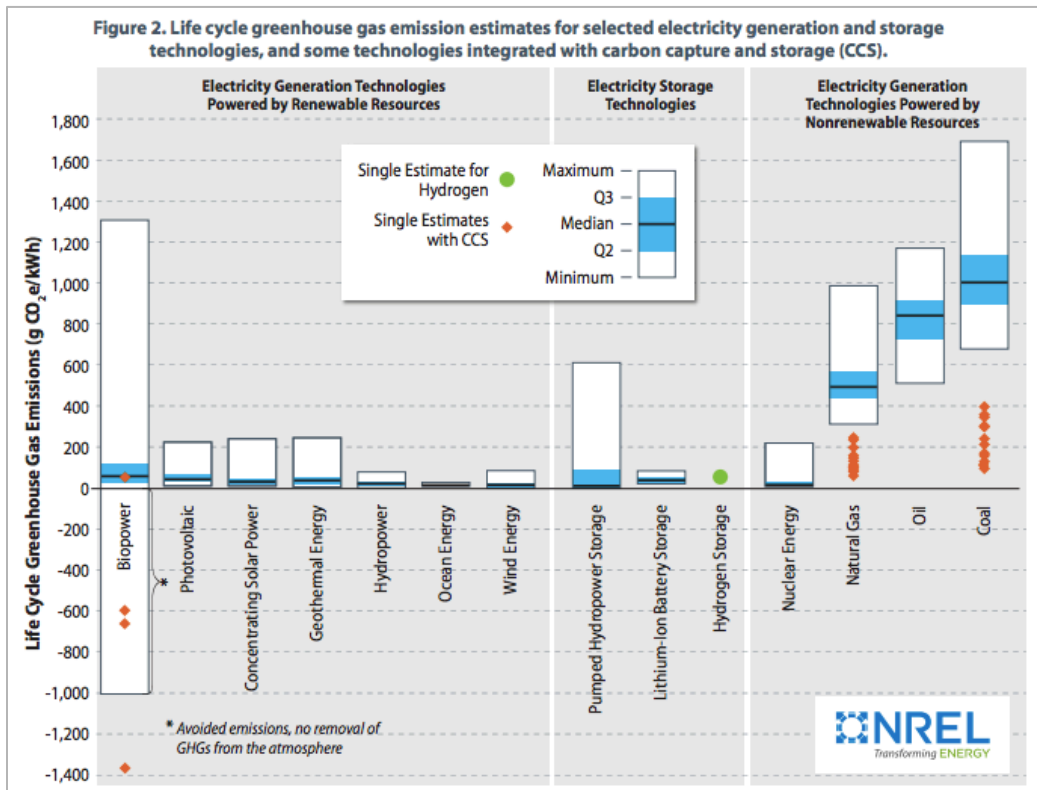
Taken together, these definitions leave **substantial uncertainty about what “renewable” means** in the context of “firm renewable” energy systems which may qualify for the tax credit. Such uncertainty will require clarification from tax regulators, and may result in inefficient litigation. To align with other aspects of Hawai'i's energy laws and policies, and to align with the reality of climate change, the definition of “firm renewable energy system” should be clarified to apply only to energy systems whose lifecycle emissions of dangerous carbon pollution are no higher than the examples identified in section 235-12.5, “solar or wind.”

Without this clarification, some taxpayers seeking the subsidy could attempt to describe an energy source as “renewable” even if the resulting emissions are no better than fossil fuels.

¹ This testimony is submitted solely on my own behalf and not on behalf of the University of Hawai'i nor any other entity.

According to the Intergovernmental Panel on Climate Change (IPCC)² it is incorrect to “automatically consider or assume biomass used for energy as ‘carbon neutral’, even in cases where the biomass is thought to be produced sustainably.”³ Instead, understanding the total lifecycle emissions of biomass energy requires additional analytical work to quantify things like emissions “associated with growing bioenergy crop, land-use change, fertilization, transportation, etc.”⁴

Depending on variables such as these, the National Renewable Energy Laboratory similarly found that **biopower can have a wide range of emissions--as high as coal, or lower than solar and wind.**⁵



Hawai'i policy should only support such energy sources on the condition that the party seeking a tax credit must show that the associated lifecycle emissions are no higher than those for energy sources such as wind and solar. If not, the resulting government subsidy will insert a false solution in place of real carbon reductions.

I suggest the following revisions to the definition of firm renewable energy system:

² The IPCC is comprised of scientists all around the world, convened by the United Nations and charged with providing climate science information to policy makers.

³ IPCC Task Force on Greenhouse Gas Inventories, Q2-10, <https://www.ipcc-nggip.iges.or.jp/faq/faq.html>.

⁴ *Id.*

⁵ NREL Fact Sheet, *Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update (2021)*, available at https://www.nrel.gov/docs/fy21_osti/80580.pdf.

“Firm renewable energy system” means a renewable energy technology system that is: (i) ~~always~~ typically available on the demand of the energy system’s operator and capable of continuously producing energy, twenty-four hours per day, three hundred sixty-five days per year, at its contracted capacity, subject only to routine maintenance and emergency repairs; and (ii) shown by the taxpayer to have actual associated lifecycle carbon emissions less than 50g CO_{2eq}/kWh, using a methodology approved or adopted by the National Renewable Energy Laboratory.⁶

The proposed revisions also address the concept that firm energy is best described as energy *upon demand*, rather than mandating a potentially less efficient “always on” energy system as described in the current definition. For example, hydrogen energy systems have been discussed as one potential approach for seasonal balancing of a renewable energy grid. These systems would typically produce hydrogen during sunnier months, and then use the stored hydrogen to make electricity during less-sunny months. Such a system could firmly serve an actual need on the system, and add resilience, and yet would not be captured by the current definition of “firm.”

Although I have not included suggested text here, the bill may also need revision to clarify that taxpayers may not claim multiple renewable energy tax credits for the same system (e.g. a system that qualifies for the solar tax credit, and which also and satisfies the definition of “firm”).

Thank you to the Committee for considering how to best promote Hawai‘i’s 21st century energy system. And thank you for allowing me this opportunity to submit testimony.

⁶ This note is intended to explain the selection of 50g CO_{2eq}/kWh as the comparable emissions associated with wind and solar systems. According to NREL, the median estimated emissions for solar, wind, geothermal, pumped hydro, and other renewable energy sources are each under 50g CO_{2eq}/kWh. *See id.* Data from the proposed battery-backed Paeahu Solar project on Maui indicates emissions of approximately 35g CO_{2eq}/kWh. *See Paeahu Solar GHG Analysis*, prep’d for Maui Electric Co. Ltd. (September 2019) (reporting 35,733 MT CO_{2eq} lifecycle emissions, and 1,031,075 MWh total generation).