



**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

NEIL ABERCROMBIE
GOVERNOR

RICHARD C. LIM
DIRECTOR

MARY ALICE EVANS
DEPUTY DIRECTOR

No. 1 Capitol District Building, 250 South Hotel Street, 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804
Web site: www.hawaii.gov/dbedt

Telephone: (808) 586-2355
Fax: (808) 586-2377

Statement of
Richard C. Lim
Director

Department of Business, Economic Development, and Tourism
before the
House Committee on Energy and Environmental Protection
Tuesday, February 5, 2013
8:30 AM
State Capitol, Conference Room 325

in consideration of

HB 1107 RELATING TO RENEWABLE PORTFOLIO STANDARDS.

Chair Lee, Vice Chair Thielen, and Members of the Committee.

The Department of Business, Economic Development, and Tourism (DBEDT) opposes HB 1107, which would replace the current Renewable Portfolio Standard (RPS) for 2020 and 2030 with yet to be determined values based on a “clean energy standard”.

Despite good intentions, we oppose HB 1107 for the following reasons:

- Opening RPS to a “clean energy standard” would create market uncertainty in the pursuit of the State’s internationally regarded Hawaii Clean Energy Initiative (HCEI) and could potentially alter or even weaken it. HCEI has a proven record of success placing Hawaii at the top of a number of clean energy categories (e.g. 1st in the nation for Energy Savings Performance Contracting per capita, 1st place in the “Race to the Top” competition for

Energy Savings Performance Contracting, 3rd in the nation for clean energy job growth). RPS and Energy Efficiency Portfolio Standard (EEPS) are the statutory core of the HCEI agenda, and should not be subjected to any modification without substantial cause, and before extensive discussion and review by a multi-disciplinary stakeholder working group.

- Although greenhouse gas (GHG) reduction is an important and laudable objective, strict adherence to Hawaii's RPS achieves the State's primary objectives of clean energy economic growth and greater food & energy security, while contributing to significant GHG reductions.
- This measure erodes the Public Utility Commission's (PUC) authority established under Hawaii Revised Statutes (HRS) 269-95 Sections (4) and (5) to periodically review RPS to determine if the standards established by section 269-92 remain effective and achievable and to make necessary RPS modifications.

Thank you for the opportunity to offer these comments in opposition of HB 1107.



NEIL ABERCROMBIE
GOVERNOR

SHAN S. TSUTSUI
LT. GOVERNOR

STATE OF HAWAII
OFFICE OF THE DIRECTOR
DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS

335 MERCHANT STREET, ROOM 310

P.O. Box 541

HONOLULU, HAWAII 96809

Phone Number: 586-2850

Fax Number: 586-2856

www.hawaii.gov/dcca

KEALI' I S. LOPEZ
DIRECTOR

JO ANN UCHIDA TAKEUCHI
DEPUTY DIRECTOR

TO THE HOUSE COMMITTEE ON
ENERGY AND ENVIRONMENTAL PROTECTION

THE TWENTY-SEVENTH LEGISLATURE
REGULAR SESSION OF 2013

TUESDAY, FEBRUARY 5, 2013
8:30 A.M.

TESTIMONY OF JEFFREY T. ONO, EXECUTIVE DIRECTOR, DIVISION OF
CONSUMER ADVOCACY, DEPARTMENT OF COMMERCE AND CONSUMER
AFFAIRS, TO THE HONORABLE CHRIS LEE, CHAIR,
AND MEMBERS OF THE COMMITTEE

HOUSE BILL NO. 1107 - RELATING TO CLEAN ENERGY STANDARDS

DESCRIPTION:

This measure proposes to amend Hawaii's renewable portfolio standard by changing the renewable energy portfolio standard to a clean energy standard to enable Hawaii to achieve greater reductions in its electricity sector greenhouse gas emissions at a lower cost. This "standard" would be reflected in the establishment of renewable energy credits based upon lifecycle greenhouse gas emissions.

POSITION:

The Division of Consumer Advocacy supports the intent of this measure, however, there is concern that the specifics of this legislative measure should be further analyzed to determine actual costs and impacts and may be premature.

COMMENTS:

The merits and purposes of a clean energy standard (“CES”) are not fully understood and related cost benefit analyses have not been conducted. Through the implementation of the renewable portfolio standards, Hawaii sought to reduce its independence on fossil fuels. Greenhouse gas emission credits, solely based upon a determination of carbon dioxide (CO₂) emission, may reduce a focus on this initial goal and does not seek to address other regulated pollutants that have adverse health and environmental effects. In addition, the Public Utilities Commission is tasked to evaluate the current renewable portfolio standards, reflected in Chapter 269, Hawaii Revised Statutes, and will be providing its initial report to the Legislature prior to the convening of the 2014 regular session. A review of the merits a CES could be incorporated in that review process.

The Division of Consumer Advocacy offers that a legislative mandate at this time is premature and that the Committee could consider issuing a resolution identifying the critical RPS concerns the Legislature would like evaluated with respect to comparing a CES with the established Renewable Portfolio Standards.

Thank you for this opportunity to testify.

TESTIMONY OF HERMINA MORITA
CHAIR, PUBLIC UTILITIES COMMISSION
DEPARTMENT OF BUDGET AND FINANCE
STATE OF HAWAII
TO THE
HOUSE COMMITTEE ON ENERGY & ENVIRONMENTAL PROTECTION

FEBRUARY 5, 2013
8:30 a.m.

MEASURE: H.B. No. 1107
TITLE: Relating to Clean Energy Standards

Chair Lee and Members of the Committee:

DESCRIPTION:

H.B. No. 1107 would create “clean energy standards” (“CES”) to be used in place of the State’s current Renewable Portfolio Standards (“RPS”) beginning at the start of 2020. CES is defined in the bill to mean “an energy credit scale that provides renewable energy credits based upon lifecycle greenhouse gas emissions for each type of energy source including non-renewable energy where the energy source emitting the most greenhouse gases is set at zero.” CES target levels, if established, are deleted in this bill, as well as the percentage of RPS energy that must be met by renewable energy sources prior to the start of 2015. Finally, this measure requires electric utilities to meet Hawaii portfolio standards, including CES, in each of the utilities’ integrated resource planning.

POSITION:

The Commission supports the intent of this measure to review and strengthen, as needed, Hawaii’s RPS mandates, but feels adoption of this measure would be premature, lacking any type of supporting policy and technical analysis. The Commission would also like to offer the following comments.

COMMENTS:

Section 269-95, Hawaii Revised Statutes (“HRS”), explicitly requires the Commission to “[e]valuate the renewable portfolio standards every five years, beginning in 2013, and may revise the standards based on the best information available at the time to determine if the standards established by section 269-92 remain effective and achievable.” The Commission is also required under HRS § 269-95 to report its RPS-related findings and recommendations to the Legislature prior to the convening of the regular session of 2014 and every five years following that initial report. In accordance with HRS § 269-95, the Commission will commence its evaluation this calendar year. Although a CES program is worthy of consideration, H.B. No. 1107 would amend the RPS before the Commission can complete its legislatively-mandated study without any technical and policy analysis.

A resolution adopted by the Legislature may be a more appropriate vehicle to direct the Commission to study the merits of a CES program in lieu of RPS in its mandated, comprehensive review of RPS.

Thank you for the opportunity to testify on this measure.



76 North King Street, Suite 203
Honolulu, Hawai`i 96817
Phone: 533-3454; E: henry.lifeoftheland@gmail.com

COMMITTEE ON ENERGY & ENVIRONMENTAL PROTECTION
Rep. Chris Lee, Chair
Rep. Cynthia Thielen, Vice Chair

DATE: Tuesday, February 05, 2013
TIME: 8:30 AM
PLACE: Conference Room 325

HB 810 Clean Energy Standard

Grave Concerns

Aloha Chair Lee, Vice Chair Thielen and Members of the Committee

My name is Henry Curtis and I am the Executive Director of Life of the Land, Hawai`i's own energy, environmental and community action group advocating for the people and `aina for over four decades. 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 believes that climate change is real and poses a serious threat to the planet. Also very important are community values, the aloha spirit, laulima, `ohana, democracy, equality, free and prior informed consent (FPIC) of native peoples and free speech.

Fear of climate change should not trump other issues. Ranking renewables solely on life cycle greenhouse gas impacts has dangerous implications. In its extreme it means that the powerful should ensure their own survival by appropriating the resources of others.



Directors

Jody Allione
AES-Solar

Joe Boivin
The Gas Company

Kelly King
Pacific Biodiesel

Warren S. Bollmeier II
WSB-Hawaii

TESTIMONY OF WARREN BOLLMEIER ON BEHALF OF THE
HAWAII RENEWABLE ENERGY ALLIANCE BEFORE THE
HOUSE COMMITTEE ON ENERGY AND ENVIRONMENTAL PROTECTION

HB 1107, RELATING TO CLEAN ENERGY STANDARDS

February 5, 2013

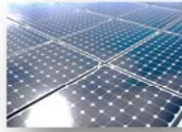
Chair Lee, Vice-Chair Thielen, and members of the Committee, I am Warren Bollmeier, testifying on behalf of the Hawaii Renewable Energy Alliance (HREA). HREA is an industry-based, nonprofit corporation in Hawaii established in 1995. Our mission is to support, through education and advocacy, the use of renewables for a sustainable, energy-efficient, environmentally-friendly, economically- sound future for Hawaii. One of our goals is to support appropriate policy changes in state and local government, the Public Utilities Commission and the electric utilities to encourage increased use of renewables in Hawaii.

The purpose of HB 1107 is to amend Hawaii's renewable portfolio standard by changing the renewable energy portfolio standard to a clean energy standard to enable Hawaii to achieve greater reductions in its electricity sector greenhouse gas emissions at a lower cost.

HREA takes no position on this measure at this time and offers the following comments:

- 1) Measure Objective. What is the objective of this measure?
 - a) On the surface, the objective looks pretty clear, modify the RPS by adding a "clean energy standard," definition that will help prioritize the way we acquire renewables to meet our RPS. Thus, it is more like a "criteria", in our opinion, than a "standard" as is the RPS. If so, should this "criteria" be also applied to the EEPS?
 - b) Underneath the surface, we believe this proposal will add confusion to what we now understand to be our "Clean Energy Goals," i.e., 40% RPS and 30% EEPS by 2030. Looking back, we understand that the option of establishing a Clean Energy Standard was discussed during the initial design phase of the HCEI. However, a decision to go with the RPS and EEPS was made, and we believe the RPS and EEPS construct is sound. Thus, we wouldn't want to change that now, unless there was a really good reason
- 2) Other Options. Perhaps we are missing something here, but as written, this does not make sense to us. Perhaps the Committee could consider re-naming the measure to "Relating to RPS and EEPS" or "Relating to Clean Energy Goals, and change the "clean energy standard" to "clean energy criteria" or "GHG criteria"?

Mahalo for this opportunity to testify.



HOUSE COMMITTEE ON ENERGY & ENVIRONMENTAL PROTECTION

February 5, 2013, 8:30 A.M.

Room 325

(Testimony is 2 pages long)

TESTIMONY SUPPORTING THE INTENT OF HB 1107

Chair Lee and members of the Energy & Environmental Protection Committee:

The Blue Planet Foundation supports the intent of HB 1107, establishing a clean energy standard (“CES”) for Hawaii. However, we caution that the CES standards to be adopted in 2020 should not be used to weaken Hawai‘i’s clean energy policy. Thus, we request one amendment, described below.

CES is an emerging, innovative approach to clean energy. It is similar to our existing Renewable Portfolio Standard (“RPS”), which mandates the amount of energy that must be obtained from renewable sources of energy. CES improves upon this method, by acknowledging that some sources of clean energy are more effective than others. Thus, the CES proposed by HB 1107 will the energy that can be provided from a diverse range of resource, in accordance with relative lifecycle emissions from those sources. Dirtier sources will receive less credit toward the CES, and clean sources will receive more credit toward the CES.

A study by the University of Hawai‘i Economic Resource Organization has analyzed the effectiveness of this approach, concluding that “[c]ompared to an RPS, the CES is more cost-effective because it prioritizes investments into relatively “clean” technologies.”¹

One benefit of the CES approach is its focus on lifecycle emissions. This will help to ensure that energy resources imported to Hawai‘i are not providing an illusion of clean energy, while actually damaging our atmosphere. For example, the myth that LNG is a “clean energy” resource has been scientifically debunked. LNG is comprised primarily of methane (CH₄). Methane is a greenhouse gas. According to the U.S. EPA, “[**d**]irect methane emissions released to the atmosphere (without burning) are about 21 times more powerful than

¹ See Coffman, An Assessment of Greenhouse Gas Emissions-Weighted Clean Energy Standards An Application of the Hawai‘i Electricity Model(May 2012), *available at* http://www.uhero.hawaii.edu/assets/20120413_CESRPSBrief_Coffman.pdf.

CO₂ in terms of their warming effect on the atmosphere.² On January 3, 2013 the highly respected scientific journal Nature reported on findings presented by NOAA scientists who measured methane leakage rates from LNG wells. The title of that report is “**Methane leaks erode green credentials of natural gas.**”³ Among other things, the report notes that the NOAA scientists measured methane leakage from LNG wells in Utah equating to 9% of well production. This is approximately three times higher than “the 3.2% threshold beyond which gas becomes **worse for the climate than coal.**”⁴ Studies of other well fields and natural gas systems have similarly reported methane leakage exceeding the 3.2% threshold.⁵

These important findings are the perfect example of why the lifecycle emissions approach created by HB 1107’s CES is smart energy policy for Hawai‘i. For these reasons, Blue Planet supports the CES approach.

However, we caution that some parties may attempt to use the establishment of 2020 CES standards to weaken Hawaii’s clean energy policy. Thus we request the following amendment:

(b)

...

(5) The commission shall ensure, after public notice and input in accordance with commission rules, that the clean energy standards adopted by the commission will result in lifecycle emissions greater than those resulting from the prior renewable portfolio standards.

Thank you for this opportunity to testify.

² See <http://www.epa.gov/cleanenergy/energy-resources/refs.html>

³ See Tollefson, *Methane Leaks Erode Green Credentials of Natural Gas*, NATURE (January 3, 2013) (reporting “alarmingly high” leaks of 9% of well production).

⁴ See Alvarez et al., *Greater focus needed on methane leakage from natural gas infrastructure*, PROC. NAT’L ACAD. SCI. (April 24, 2012).

⁵ See, e.g., Pétron et al., *Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study*, J. GEOPHYS. RES. 117 (2012); Howarth et al., *Methane Emissions from Natural Gas Systems*, Background Paper Prepared for the National Climate Assessment, Ref. no. 2011-0003, available at <http://www.eeb.cornell.edu/howarth/Howarth%20et%20al.%20--%20National%20Climate%20Assessment.pdf>



2/5/2013

House Committee on Energy and Environmental
Protection

EEP

8:30 a.m.

HB 1107

TESTIMONY IN SUPPORT

Aloha Chairs Lee, Vice Chair Thielen and Members of the Committee:

The Hawaii PV Coalition opposes this measure, which would weaken Hawaii's commitment to renewable energy and undermine ongoing plans and policies designed to end Hawaii's reliance on imported fossil fuels. Hawaii's clean energy mandate has set a national standard, which is rightly justified based on our position of extreme reliance on fossil fuels and extreme vulnerability to disruptions in their supply.

Note that even under the current renewable portfolio standard the state will still rely on fossil fuels for 60 percent of its energy generation in 2030. To the extent that this 60 percent can be derived from cheaper cleaner burning fuels such as gas rather than oil-based fuels, Hawaii will be better off than under our current energy generation regime. However, gas and other cleaner fossil fuels are not a substitute for renewable energy that comes from sources indigenous to our state. These sources, including wind, solar, and geothermal, are fuel-less. As such, they eliminate the state's exposure to the fuel cost increases and fuel supply fluctuations that are the ultimate source of many of the energy problems faced by Hawaii's homeowners and businesses.

In summary, no state has a greater incentive than Hawaii to convert to renewable energy and no state has made a greater commitment to do so. Backing off on this commitment now is wholly inappropriate and increases our vulnerability to factors outside of our control. This is the precise opposite of the policy direction an island economy should be taking in the face of global macroeconomic and geopolitical events.

Thank you for the opportunity to share these comments.

Mark Duda
President, Hawaii PV Coalition

The Hawaii PV Coalition was formed in 2005 to support the greater use and more rapid diffusion of solar electric applications across the state. Working with business owners, homeowners and local and national stakeholders in the PV industry, the Coalition has been active during the state legislative sessions supporting pro-PV and renewable energy bills and helping inform elected representatives about the benefits of Hawaii-based solar electric applications.

thielen3 - Charles

From: mailinglist@capitol.hawaii.gov
Sent: Saturday, February 02, 2013 12:22 PM
To: EEPtestimony
Cc: mendezj@hawaii.edu
Subject: *Submitted testimony for HB1107 on Feb 5, 2013 08:30AM*

HB1107

Submitted on: 2/2/2013

Testimony for EEP on Feb 5, 2013 08:30AM in Conference Room 325

Submitted By	Organization	Testifier Position	Present at Hearing
Javier Mendez-Alvarez	Individual	Support	No

Comments:

Please note that testimony submitted less than 24 hours prior to the hearing, improperly identified, or directed to the incorrect office, may not be posted online or distributed to the committee prior to the convening of the public hearing.

Do not reply to this email. This inbox is not monitored. For assistance please email webmaster@capitol.hawaii.gov

February 3, 2013

Makena Coffman
630 Auwai Street
Kailua, HI 96734

Paul Bernstein
5265 Lawelawe Place
Honolulu, HI 96821

Re: HB 1107

To whom it may concern,

We are writing in support of HB1107 bill, which seeks to amend the current Renewable Portfolio Standard (RPS) to a Clean Energy Standard (CES). We are researchers and faculty with the University of Hawaii and, though we write here as private citizens, have studied Hawaii's electricity system extensively in our professional capacity. We have studied the topic of a CES and, in particular, why it is a more cost-effective policy mechanism to move Hawaii toward its clean energy goals than the current RPS.

We support this legislation for four primary reasons. First, it distinguishes between types of renewable energy based on lifecycle greenhouse gas emissions and thus does not give them equal credit to the set goal. Second, it similarly distinguishes among fossil-based energy sources and thus does not treat them as identical. Third, providing (partial) credit to fossil-based sources provides incentive to pursue generation-level efficiencies (which are currently overlooked within State policy towards electricity generation, namely the RPS). Lastly, because it provides a prioritization of fuel types/technologies for electricity generation, it offers a much more cost-effective means to pursue low-carbon energy.

Below we have crafted several illustrative examples of why the proposed CES provides a more tailored policy to help Hawaii achieve its clean energy goals (*i.e.*, reducing its greenhouse gas emissions).

Table 1 provides a "reference" scenario – an illustration of the generation mix that could occur under the current RPS policy in the year 2020, where 25% of electricity sales are required to be met through renewable sources. Though the scenario is here provided for illustration only, the figures are based on reasonable representations of Hawaii's electricity system and potential least-cost means of utility compliance with the RPS.

Table 1. Reference case: No gas-fired units, biofuels assumed to have an emissions factor of 25% of oil

	Hawaii Generation	Heat Rate	RPS Credit	Emissions Factor	Emissions
	TWh	MMBtu/MWh		Metric Ton/MMBtu	Million Metric Tons (MM MT)
	[1]	[2]	[3]	[4]	[5] = [1]*[2]*[4]
Zero emitting	2.3		1		
Biofuel	1	10.5	1	0.0245	0.3
Oil-Avg. HR	8.5	10.5	0	0.0979	8.7
Oil-Low HR		8.5	0	0.0979	0.0
Coal	1.3	10.1	0	0.114	1.5
Gas-CT		10	0	0.0741	0.0
Gas-CC		7.5	0	0.0741	0.0
Total	13.1				10.5
Emissions Rate (MT/MWh) 0.80					
RPS 25%					

The reference scenario provides a baseline against which to compare the impacts of a CES. It shows a total of 10.5 million metric tons of carbon dioxide emissions from the electric sector, where the 25% RPS law is met.

An example of fossil-fuel switching to natural gas is provided in Table 2. We assume that natural gas is sourced as such that it provides a 20% improvement over the lifecycle greenhouse gas emissions of oil.

Table 2. Case 2: Gas-fired CC replaces 4 TWh of Oil

	Hawaii Generation	Heat Rate	RPS Credit	Emissions Factor	Emissions
	TWh	MMBtu/MWh		Metric Ton/MMBtu	Million Metric Tons (MM MT)
	[1]	[2]	[3]	[4]	[5] = [1]*[2]*[4]
Zero emitting	2.3		1		
Biofuel	1	10.5	1	0.0245	0.3
Oil-Avg. HR	4.5	10.5	0	0.0979	4.6
Oil-Low HR		8.5	0	0.0979	0.0
Coal	1.3	10.1	0	0.114	1.5
Gas-CT		10	0	0.0741	0.0
Gas-CC	4	7.5	0	0.0741	2.2
Total	13.1				8.6
Emissions Rate (MT/MWh) 0.66					
RPS 25%					
Emissions Relative to Ref (MM MT) -1.9					

Table 2 shows that, while the RPS law is met, the electric sector emits 1.9 million fewer metric tons of carbon dioxide than in the reference case. This is achieved through both fuel-switching and the building of more efficient CC units.

Similarly, Table 3 shows a case where a more efficient oil unit replaces a less efficient oil unit. There is a reduction of 0.8 million metric tons of carbon dioxide.

Table 3. Case 3: Low heatrate (more efficient) oil unit replaces 4 TWh of average efficiency oil units

	Hawaii Generation	Heat Rate	RPS Credit	Emissions Factor	Emissions
	TWh	MMBtu/MWh		Metric Ton/MMBtu	Million Metric Tons (MM MT)
	[1]	[2]	[3]	[4]	[5] = [1]*[2]*[4]
Zero emitting	2.3		1		
Biofuel	1	10.5	1	0.0245	0.3
Oil-Avg. HR	4.5	10.5	0	0.0979	4.6
Oil-Low HR	4	8.5	0	0.0979	3.3
Coal	1.3	10.1	0	0.114	1.5
Gas-CT		10	0	0.0741	0.0
Gas-CC	0	7.5	0	0.0741	0.0
Total	13.1				9.7
Emissions Rate (MT/MWh)	0.74				
RPS	25%				
Emissions Relative to Ref (MM MT)	-0.8				

The cases of fossil-fuel switching (Table 2) and generation-level efficiencies (Table 3) are currently not incentivized by the RPS. By governing fossil fuels (as well as renewable sources), the CES policy can provide incentives to move to cleaner technologies.

Tables 4 and 5 focus on the importance of distinguishing between types of renewable energy as well. For example, Table 4 shows the case where the RPS is met by a biofuel that provides a 50% reduction in greenhouse gas emissions, rather than the 75% improvement assumed within the reference case.

Table 4. Case 4: Biofuel only receives 50% reduction from oil

	Hawaii Generation	Heat Rate	RPS Credit	Emissions Factor	Emissions
	TWh	MMBtu/MWh		Metric Ton/MMBtu	Million Metric Tons (MM MT)
	[1]	[2]	[3]	[4]	[5] = [1]*[2]*[4]
Zero emitting	2.3		1	0	
Biofuel	1.0	10.5	1	0.049	0.5
Oil-Avg. HR	8.5	10.5	0	0.098	8.7
Oil-Low HR	0	8.5	0	0.098	0.0
Coal	1.3	10.1	0	0.114	1.5
Gas-CT		10.0	0	0.074	0.0
Gas-CC	0	7.5	0	0.074	0.0
Total	13.1				10.7
Emissions Rate (MT/MWh)	0.82				
RPS	25%				
Emissions Relative to Ref (MM MT)	0.3				

In this instance, the RPS is met identically to the reference case, yet electric sector emissions have risen. This case illustrates the importance of biofuels receiving credit based on their relative lifecycle greenhouse gas emissions, rather than treated wholesale as a purely renewable energy.

The next case further illustrates the importance of differentiating among renewable sourced generation to incentivize greenhouse gas emission reductions. Table 5 shows a case where there is no biofuel-based generation in the RPS target, but rather only zero-emitting (life-cycle based) technologies (such as wind, solar, and geothermal). Emissions decline by 0.3 million metric tons of carbon dioxide relative to the reference case and by 0.6 million metric tons relative to case 4, which has higher emitting biofuels.

Table 5. Case 5: Biofuel generation substituted with zero emitting technology

	Hawaii Generation	Heat Rate	RPS Credit	Emissions Factor	Emissions
	TWh	MMBtu/MWh		Metric Ton/MMBtu	Million Metric Tons (MM MT)
	[1]	[2]	[3]	[4]	[5] = [1]*[2]*[4]
Zero emitting	3.3		1		
Biofuel	0	10.5	1	0.0490	0.0
Oil-Avg. HR	8.5	10.5	0	0.0979	8.7
Oil-Low HR	0	8.5	0	0.0979	0.0
Coal	1.3	10.1	0	0.114	1.5
Gas-CT		10	0	0.0741	0.0
Gas-CC	0	7.5	0	0.0741	0.0
Total	13.1				10.2
Emissions Rate (MT/MWh)		0.78			
RPS		25%			
Emissions Relative to Ref (MM MT)		-0.3			

In Sum

The RPS is met in all five of these examples. Yet, the greenhouse gas emissions profiles among the cases differ substantially, and their cost impacts as well (although for brevity this is not shown here). Ultimately, however, the underlying logic of the lifecycle greenhouse gas emissions-based CES is quite simple. By prioritizing technologies and fuel types through the entire spectrum of electricity generation, it is possible to achieve more penetration of relatively less greenhouse gas intense fuels/technologies at lower cost to the consumer. By our estimates, this can be up to a 200% cost improvement.

We believe the CES provides greater guidance in policy-making in regards to how fuels/technologies should be prioritized for electricity generation. There is currently no distinction between types of renewable energy and types of fossil fuels, as well as no guidance on generation level efficiencies.

Therefore, compared to the current RPS policy, the CES is a much more cost-effective means of achieving emissions reductions; and because the CES more directly addresses greenhouse gas emissions, it could be harmonized with State of

Hawaii Department of Health Rulemaking on meeting ACT 234, which commits Hawaii to achieve 1990 levels of greenhouse gas emissions by 2020.

Please contact Makena Coffman at makena.coffman@gmail.com or (808) 779-6727 and Paul Bernstein at paulbernstein2004@yahoo.com or (808) 373-7161 if you should have further questions.

Sincerely,

Makena Coffman
PhD, Economics
Associate Professor of Urban and Regional Planning
Research Fellow
University of Hawaii Economic Research Organization

Paul Bernstein
PhD, Operations Research
Principal, NERA Consulting