HAWAII STATE ENERGY OFFICE
STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

SCOTT J. GLENN
CHIEF ENERGY OFFICER

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Testimony of
SCOTT J. GLENN, Chief Energy Officer

before the
SENATE COMMITTEE ON WAYS AND MEANS

Friday, February 18, 2022
10:10 AM
State Capitol, Conference Room 211 & Videoconference

COMMENTS
SB 2283, SD1
RELATING TO THE HAWAII HYDROGEN STRATEGIC PLAN.

Chair Dela Cruz, Vice Chair Keith-Agaran, and Members of the Committee, the Hawai'i State Energy Office (HSEO) offer comments on SB 2283, SD1, which requires the Hawaii Natural Energy Institute (HNEI) to conduct a study to examine the State's ability to advance hydrogen production from local renewable energy resources and develop the Hawaii Hydrogen Strategic Plan utilizing the results of its study, which shall be reviewed and updated every four years, and requires reports to the Legislature.

HSEO appreciates that SD 1 of the bill was revised to specify that the long-term hydrogen plan developed by this measure should align with the State's existing energy planning goals and directs HNEI to consult with relevant entities, including HSEO.

HSEO agrees that hydrogen has the potential to be an increasingly important component of Hawai'i's energy system and that it is appropriate for HNEI "to conduct a study to evaluate the technical feasibility to produce and use hydrogen locally." The hydrogen study is the first step in creating a hydrogen deployment strategy as part of HSEO's overall energy planning mandate to decarbonize the economy. In 2019, Act 122 established the Hawaii State Energy Office "with a clear mission... to assist both the public and private sectors in achieving the State's energy goals" and "achieving a clean energy economy," and mandated Hawaii's Chief Energy Officer to "Identify market gaps and innovation opportunities, collaborate with stakeholders, and facilitate public-

private partnerships […] that will support the State's energy and decarbonization goals." The Hawaii State Planning Act, HRS Section 226-55(a), also affirms HSEO's overall energy planning mandate: "The state agency head [i.e., the Chief Energy Officer] primarily responsible for a given functional area shall prepare and periodically update the functional plan for the area." HSEO looks forward to collaborating with HNEI on the study of hydrogen production in Hawai‘i and continuing the collaboration to incorporate the results of the study with the creation of a Hydrogen Strategic Plan as part of HSEO's overall planning for the decarbonization of Hawaii's economy.

HSEO defers to the appropriate agencies for comment on the fiscal, administrative, and regulatory impacts of this proposal.

HSEO supports this bill provided that its passage does not replace or adversely impact priorities indicated in the Executive Supplemental Budget.

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.

Thank you for the opportunity to testify.

UNIVERSITY OF HAWAIʻI SYSTEM
Legislative Testimony

Testimony Presented Before the
Senate Committee on Ways and Means
Friday, February 18, 2022 at 10:10 a.m.
By
Richard Rocheleau, Director
Hawaiʻi Natural Energy Institute
And
Michael Bruno, PhD
Provost
University of Hawaiʻi at Mānoa

SB 2283 SD1 – RELATING TO THE HAWAII HYDROGEN STRATEGIC PLAN

Chair Dela Cruz, Vice Chair Keith Agaran, and members of the committee:

SB 2283 SD1 requires the Hawaiʻi Natural Energy Institute (HNEI) to conduct a study to examine the State's ability to advance hydrogen production from local renewable energy resources and develop the Hawaiʻi Hydrogen Strategic Plan utilizing the results of its study. The bill requires a preliminary report prior to the 2023 legislative session with a full report prior to the 2024 legislative session and an update every 4 years after beginning in 2028.

HNEI supports SB 2283 SD1.

For clarity we respectfully suggest that Section 2a(4) be modified to read “Propose policies to encourage production and usage of hydrogen utilizing economic incentives, tax credits, tariffs, or other methods to grow the supply of available hydrogen *consistent with the strategic plan developed under Section 2a(1).*

Thank you for the opportunity to provide this testimony on SB 2283 SD1.

SERVCO

SERVCO PACIFIC INC.
2850 PUKOLOA ST. STE. 300
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Senator Donovan Dela Cruz, Chair
Senator Gilbert Keith-Agaran, Vice Chair
Committee on Ways & Means

RE: **SB 2283 SD1 - Relating to the Hawaii Hydrogen Strategic Plan – In Support**
February 18, 2022; 10:10 A.M.

Aloha Chair Dela Cruz, Vice Chair Keith-Agaran and members of the committee:

Servco is in support of SB 2283 SD1, which requires the Hawaii Natural Energy Institute to conduct a study to examine the State's ability to advance hydrogen production from local renewable energy resources and develop the Hawaii Hydrogen Strategic Plan utilizing the results of its study, which shall be reviewed and updated every four years.

The demand for energy is growing and the benefits of producing hydrogen locally can play a key role in realizing a sustainable energy economy. Hydrogen is part of the portfolio of clean energy technologies to reduce Hawaii's dependency on imported fossil fuels. Servco has invested millions of dollars into hydrogen production facilities and will continue to invest as we believe in its future. We are pleased that the study includes an economic impact as an export commodity. The long-term export potential of hydrogen across the globe is not only a revenue generating opportunity but also yields environmental benefits.

Thank you for the opportunity to provide comments in support.

Peter Dames
Executive Vice President

Environmental Caucus of The Democratic Party of Hawai‘i

Energy & Climate Action Committee

Friday, February 18, 2022, 10:00 am

Senate Committees on Health, Human Services, and Homelessness and on Energy and Environmental Protection

SENATE BILL 2283 – RELATING TO THE HAWAII HYDROGEN STRATEGIC PLAN

Position: Support

Me ke Aloha, Chairs Yamane and Lowen, Vice-Chairs Tam and Marten, and Members of the Committees on Health, Human Services, and Homelessness and on Energy and Environmental Protection:

The Energy and Climate Action Committee finds that a study to examine the State's ability to advance hydrogen production from local renewable energy sources is a little problematic, in that the production of hydrogen fuels typically uses fossil fuels, none of which are available locally, nor are they renewable. Recent market studies show that this is a technology whose time has come and gone, surpassed by the potential and marketability of battery electric power.

Other renewable sources, such as solar and wind may not have the energy intensity (potency) or efficiency, are more likely to be a strategic part of the portfolio for more immediate use in an electricity grid. A similar situation may be true for hydropower, which is less available. Geothermal energy may be a good candidate, so the next focus would be the source of hydrogen. It is abundant in the ocean, and we will be most interested to learn whether technologies have advanced to take advantage of this abundant resource.

A major concern of our committee is that biomass not be used for this production, as biomass burning is a throwback to a time before coal and then oil. The world cannot live with such a backward step, as the emissions caused are an existential threat to our existence. Elsewhere it has been explained that consideration of biomass as a "renewable" source is an anachronism we cannot afford.

Our Committee supports this examination to determine a possible future for this technology.

Mahalo for the opportunity to address this matter.

Charley Ice & Ted Bohlen, Co-Chairs, Energy and Climate Action Committee
Environmental Caucus of the Democratic Party

Email: communications@ulupono.com

SENATE COMMITTEE ON WAYS & MEANS
Friday, February 18, 2022 — 10:10 a.m.

Ulupono Initiative supports SB 2283 SD 1, Relating to the Hawai'i Hydrogen Strategic Plan

Dear Chair Dela Cruz and Members of the Committee:

My name is Micah Munekata, and I am the Director of Government Affairs at Ulupono Initiative. We are a Hawai'i-focused impact investment firm that strives to improve the quality of life throughout the islands by helping our communities become more resilient and self-sufficient through locally produced food; renewable energy and clean transportation; and better management of freshwater and waste.

Ulupono supports SB 2283 SD 1, which requires the Hawai'i Natural Energy Institute (HNEI) to conduct a study to examine the State's ability to advance hydrogen production from local renewable energy resources and develop the Hawai'i Hydrogen Strategic Plan utilizing the results of its study, which shall be reviewed and updated every four years.

Ulupono supports the approach of this bill to perform a study and develop a strategic plan on the technical and economic feasibility of hydrogen production from renewable energy resources. The study will help to guide the development of the Hawai'i Hydrogen Strategic Plan to provide a road map of how hydrogen can play a role in our state meeting its renewable energy goals. Establishing the study and strategic plan are important first steps in determining hydrogen's role in meeting the State's 2045 100% renewable portfolio standard goal.

As Hawai'i's energy issues become increasingly complex and challenging, we appreciate this committee's efforts to look at policies that support the continued implementation of renewable energy resources throughout the islands.

Thank you for this opportunity to testify.

Respectfully,

Micah Munekata
Director of Government Affairs

TESTIMONY BEFORE THE SENATE COMMITTEE ON WAYS AND MEANS

SB 2283 SD1

Relating to the Hawaii Hydrogen Strategic Plan

Friday, February 18, 2022
10:10 AM
State Capitol, Conference Room 211 & Videoconference

Darren Ishimura, P.E.
Director, Grid Technologies
Hawaiian Electric Company, Inc.

Chair Dela Cruz, Vice Chair Keith-Agaran, and Members of the Committee:

My name is Darren Ishimura and I am testifying on behalf of Hawaiian Electric Company, Inc. ("Hawaiian Electric") in support of SB 2283 SD1.

Hawaiian Electric has committed to reduce carbon emissions from power generation in 2030 by as much as 70% below 2005 levels and have net zero carbon emissions by 2045. In concert with these commitments, Hawaiian Electric continues to modernize its grids and integrate more renewable energy to achieve the State's 100% renewable energy goal by 2045 while providing safe, reliable, and resilient power to its customers.

One action under Hawaiian Electric's Climate Change Action Plan is to pursue cost-effective, low-emission or zero-emission fuels, such as green hydrogen, and other emerging technologies. As such, Hawaiian Electric strongly supports the development of a comprehensive Hydrogen Strategic Plan for Hawai'i that aligns with long-term energy plans and considers land and land-use impacts, utilization of green hydrogen to achieve decarbonization and renewable energy goals, and the potential for hydrogen to provide resilience benefits.

Accordingly, Hawaiian Electric supports SB 2283 SD1. Thank you for the opportunity to testify.

To: The Senate Committee on The Senate Committee on Ways and Means
From: Sherry Pollack, 350Hawaii.org
Date: Friday, February 18, 2022, 10:10am

Comments for SB2283 SD1

Aloha Chair Dela Cruz, Vice Chair Keith-Agaran, and members of the Committee on Ways and Means,

I am Co-Founder of the Hawaii chapter of 350.org, the largest international organization dedicated to fighting climate change. 350Hawaii.org offers the following comments on this bill and suggested amendments.

SB2283 SD1 requires the Hawaii Natural Energy Institute to conduct a study to examine the State's ability to advance hydrogen production from local renewable energy resources and develop the Hawaii Hydrogen Strategic Plan utilizing the results of its study. However, it must be made clear that Hydrogen can be produced both clean or dirty. It is a climate-friendly clean renewable source of energy **only** if it is made from clean renewable energy such as wind or solar.

PROPOSED AMENDMENTS:

1. Exclude hydrogen derived from fossil fuels.
2. Replace “hydrogen” with “green hydrogen” throughout the bill.
3. Add a definition: “Green hydrogen” means hydrogen generated from solar and wind energy.
4. Add: A Greenhouse Gas Life Cycle Analysis shall be performed for the production of Hydrogen utilizing each renewable energy resource being considered.

Mahalo for the opportunity to testify on this matter.

Sherry Pollack
Co-Founder, 350Hawaii.org

HAWAII CLEAN POWER ALLIANCE

Testimony to the Committee on Ways and Means

Friday, February 18, 2022
10:10 AM
VIA Video Conference
Conference Room 211, Hawaii State Capitol
SB 2283 SD1

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

Hawaii Clean Power Alliance (HCPA) **supports** SB 2283 SD1, which requires the Hawaii Natural Energy Institute to conduct a study to examine the State's ability to advance hydrogen production from local renewable energy resources and develop the Hawaii Hydrogen Strategic Plan utilizing the results of its study, which shall be reviewed and updated every four years and requires a report to the Legislature. Appropriates funds.

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.

Hydrogen is widely considered one of the most promising zero-emissions fuel sources in the clean energy arena, so much so that the national infrastructure bill allocates billions for clean fuel R&D, with a special emphasis on hydrogen hubs and a hydrogen plan. Hydrogen is especially valuable due to its versatility in both grid power and vehicle power. While still in its early stages, research to date demonstrates that hydrogen is likely to play a major role in the nation's move to clean energy, thus making it a central figure in our clean energy work nationally and here in Hawaii. Hawaii will be at the forefront of renewable energy once again by creating a hydrogen strategic plan.

We ask the committee to pass this bill.

Thank you for the opportunity to testify.

SanHi
GOVERNMENT STRATEGIES
A LIMITED LIABILITY LAW PARTNERSHIP

DATE: February 17, 2022

TO: Senator Donovan Dela Cruz
Chair, Committee on Ways and Means

FROM: Tiffany Yajima

RE: **S.B. 2283, S.D.1 – Relating to the Hawaii Hydrogen Strategic Plan**
Hearing Date: Friday, February 18, 2022 at 10:10 a.m.
Conference Room: 211

Dear Chair Dela Cruz, Vice Chair Keith-Agaran and Members of Committee on Ways and Means:

On behalf of the Alliance for Automotive Innovation ("Auto Innovators") we submit these comments in **support** of S.B. 2283, SD1. This measure requires the Hawaii Natural Energy Institute to examine the State's ability to produce hydrogen from local renewable energy resources and develop a strategic plan to advance this fuel for Hawaii.

The Alliance for Automotive Innovation is the singular, authoritative and respected voice of the automotive industry. Focused on creating a safe and transformative path for sustainable industry growth, the Alliance for Automotive Innovation represents the manufacturers producing nearly 99 percent of cars and light trucks sold in the U.S. Members include motor vehicle manufacturers, original equipment suppliers, technology, and other automotive-related companies and trade associations.

Auto Innovators are supportive of the state's pursuit of hydrogen as a feasible alternative fuel for Hawaii and are interested in the development of a strategic plan to implement hydrogen as a transportation fuel. The automotive industry has made and continues to make a significant investment in hydrogen as a feasible fuel for motor vehicles and recognizes the importance of government support for infrastructure projects like hydrogen fueling stations.

Thank you for the opportunity to submit testimony in support of this measure.

First Hawaiian Center T 808-539-0400
999 Bishop Street, Suite 1400 F 808-533-4945
Honolulu, HI 96813 governmentaffairs@awlaw.com

HAWAIʻI GAS
THE CLEAN ENERGY COMPANY

Testimony to
The Committee on Ways and Means

Friday, February 18, 2022
10:10 AM
VIA Video Conference
Conference Room 211, Hawaii State Capitol

SB 2283 SD1

Chair Dela Cruz, Vice Chair Keith-Agaran, and members of the committee,

Hawaii Gas **supports** **SB 2283 SD1,** relating to the Hawaii Hydrogen Strategic Plan.

Hydrogen has established itself on the forefront of promising zero-emissions fuel sources. In the gas industry specifically, global research and development is yielding significant progress in understanding hydrogen's compatibility with gas grids and establishing it as a clean and reliable fuel source for typical household and commercial uses.

As we move towards our 2045 decarbonization goals, Hawaii Gas believes that our collective focus on innovation to accelerate multiple paths forward to achieve our state's goals is essential to meet our deadlines. The national infrastructure bill reflects this approach, allocating billions of dollars in funding **for clean energy demonstrations and research** focused on next generation technologies needed to achieve the nation's goal of net-zero by 2050, including funding for national hydrogen hubs and allocating resources for a national hydrogen plan.

We ask the committee to pass the bill.

Thank you for the opportunity to testify.

Sustainable Energy Hawai‘i
1143 Kukuau St., Hilo, HI 96720
sustainableenergyhawaii.org

February 17, 2022

SUPPORT for **SB2283 SD1** RELATING TO THE HAWAII HYDROGEN STRATEGIC PLAN

Dear Chair Dela Cruz, Vice-Chair Keith-Agaran, and members of the Ways and Means Committee,

I am Richard Ha, Chair of Sustainable Energy Hawai‘i, a coalition of concerned citizens dedicated to improving the quality of life of Hawaii residents through affordable renewable energy.

Sustainable Energy Hawai‘i is in support of SB2283 SD1. We support the intention of this measure to enable proper studies of hydrogen production but request amendments to expand the focus and importance of green hydrogen and other technologies such as geothermal that reduce our reliance on imported fossil fuels.

We appreciate the passage of SB2283 HD1 with amendments and the opportunity to testify.

Thank you,

Richard Ha
Chair
Sustainable Energy Hawai‘i

Sustainable Energy Hawaii is an all-volunteer, 501(c)3 dedicated to furthering energy self-sufficiency for Hawaii Island. For more information, visit sustainableenergyhawaii.org.

SB-2283-SD-1
Submitted on: 2/17/2022 9:17:29 AM
Testimony for WAM on 2/18/2022 10:10:00 AM

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

Comments:

To: The Honorable Donovan Dela Cruz, Chair, The Honorable Gilbert Keith-Agaran, Vice Chair, and Members of the Senate Committee on Ways and Means

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

Re: Hearing: SB2283 SD1 **RELATING TO THE HAWAII HYDROGEN STRATEGIC PLAN.**

Hearing: Friday, February 18 2022, 10:10 a.m., Rm. 211 and by videoconference

Aloha Chair Dela Cruz, Vice Chair Keith-Agaran, and members of the Senate Committee on Ways and Means:

The Climate Protectors Hawai‘i is a group focused on reversing the climate crisis and encouraging Hawai‘i to lead the world towards a safe and sustainable climate and future. **The Climate Protectors Hawai‘i appreciates the intent of this bill, but offers comments and proposes one amendment.**

The bill's intent is to have the Hawai‘i Natural Energy Institute conduct a study of the potential for the production and use of renewable hydrogen in the State and the potential role of renewable hydrogen in achieving a local, affordable, reliable and decarbonized energy system and economy. The results of the study shall be used to inform energy planning, which may include a Hawai‘i Hydrogen Strategic Plan, decarbonization efforts, and other ongoing work being undertaken by the Hawai‘i State Energy Office.

Comments and proposed amendment:

Studying hydrogen is not a bad idea, and the Climate Protectors Hawai‘i do not oppose the bill. Such study should be undertaken with a healthy skepticism, however. Almost all hydrogen is currently produced from climate-killing methane, a potent greenhouse gas, or coal, and therefore is quite harmful for the climate when the extraction and production parts of the lifecycle are considered, as they properly should be. The Hawai‘i Supreme Court has clarified that qualifying for the State definition of Renewable Energy and greenhouse gas

neutrality does not satisfy the statutory need for Greenhouse Gas Analysis in the form of GHG Life Cycle Analysis.

The Climate Protectors Hawai‘i propose an amendment to Section 1 of Bill SB2283 as follows:

Section 1. "The study shall consider: ... and (9) A Greenhouse Gas Life Cycle Analysis shall be performed for the production of hydrogen utilizing each renewable energy resource being considered."

Even if hydrogen is produced from clean renewable power that does not exacerbate climate warming, it does not appear to be viable for ground transportation, as the following recent Clean Technica article about a study by Dr. Patrick Plötz of the Fraunhofer Institute for Systems and Innovation Research in Germany makes clear. Dr. Plötz concludes:

"The use case for hydrogen is in industry — making steel and cement and fertilizers, for example. Researching ways to make that happen is well worth the investment in time and money, as those industries pump enormous amounts of carbon dioxide into the atmosphere every year. By all means, let’s find ways to make those industries carbon neutral or even zero carbon."

Here is the article:

"Hydrogen For Cars & Trucks Is An Idea Whose Time Has Come — And Gone

The window for hydrogen-powered motor vehicles is closing fast, says a new report from Fraunhofer ISI.

By

Steve Hanley

Published

1 day ago

- 151 Comments

Dr. Patrick Plötz of the Fraunhofer Institute for Systems and Innovation Research in Germany has published a new study at *Nature Electronics* (paywall) in which he says fuel cell cars and trucks have little chance of becoming commercially viable and that the urgency of the climate

crisis demands decision makers focus on battery-electric vehicles instead. The gist of the study is available on *Charged EVs*.

It's not that hydrogen will not play a role in reducing carbon emissions, he writes. "Hydrogen will play a vital role in industry, shipping and synthetic aviation fuels. But for road transport, we cannot wait for hydrogen technology to catch up, and our focus now should be on battery-electric vehicles in both passenger and freight transport. The window of opportunity to establish a relevant market share for hydrogen cars is as good as closed."

At the beginning of 2021, there were about 25,000 hydrogen fuel cell powered cars on the road, two FCEV models available — the Toyota Mirai and Hyundai Nexo — and about 540 hydrogen filling stations around the world. "In contrast, by the beginning of 2022, there are likely to be about 15 million battery-electric and plug-in hybrid vehicles on the road across the world. Almost all manufacturers now sell such vehicles, with more than 350 models available globally."

Recent technological developments have eliminated the main arguments in favor of FCEVs, namely longer range and shorter refueling times. "When battery-electric vehicles had limited ranges of under 150 km, and charging took a few hours, there was an important and large market segment for fuel cell vehicles — long distance travel. But battery electric vehicles now offer about 400 kilometers of real world range and the newest generation use 800 V batteries, which can be charged for a range of 200 kilometers in about 15 minutes."

Even in the trucking sector, batteries have left fuel cells behind. Plötz says there are currently some 30,000 battery-electric trucks in operation, mostly in China. More than 150 medium and heavy duty battery-electric truck models have been announced. "Fuel cell electric trucks, on the other hand, have only been operated in test trials (from two manufacturers) to date and are not yet commercially available."

"The current challenge for battery electric vehicles is long haul logistic operation (with an average of 100,000 km per year) and transport of very heavy goods (which implies high energy consumption per kilometer)," Plötz writes. "This is the use case often discussed for hydrogen trucks. Several truck manufacturers, as well as fuel cell and infrastructure providers, have joined forces and announced a target of 100,000 fuel cell trucks on European roads by 2030.

"But this seems very unlikely when contrasted with announcements from the companies about the earliest start date for the production of commercial series fuel cell electric trucks being in 2027. By that time, the second generation battery electric vehicles will already be commercially available and in operation."

Plötz admits long haul trucking of more than 500 kilometers per day "poses a challenge" for battery-electric trucks, but European regulations require truck drivers to stop for a 45-minute break after every 4.5 hours of driving. "Within 4.5 hours, a heavy truck could travel up to around 400 km, and thus practical [battery] ranges of about 450 km would suffice if high-power fast charging for battery-electric trucks was widely available."

He notes that specifications for the new megawatt charging system (MCS) standard, which could enable charging levels as high as 3.75 MW, are expected to be announced by the end of 2022, and a final standard is expected in 2023. According to *Green Car Reports*, the MCS could swing the advantage back to electric trucks, but it is not yet clear whether it will be less expensive than hydrogen. The total cost of ownership will ultimately be the determining factor in whether fuel cells or batteries dominate in trucking.

"Policymakers and industry need to decide quickly whether the fuel cell electric truck niche is large enough to sustain further hydrogen technology development, or whether it is time to cut their losses and to focus efforts elsewhere," the study concludes.

The Hydrogen Dream

Oil and gas companies continue to greenwash their public communications with articles about the wonders of hydrogen. When it gets used to power a fuel cell (Toyota even has an internal combustion engine that burns hydrogen), the waste products are nothing more than water vapor and heat. What could possibly be "greener" than that?

The problem, as anyone who reads *CleanTechnica* knows all too well, is that most hydrogen available today is derived from climate-killing methane (incorrectly known as "natural gas") or coal. While it is possible to make it by splitting water into its component atoms, that takes a lot of electrical energy. Hydrogen advocates blithely say we can simply use excess renewable energy to do it, but that assumes wind and solar farms will be able to supply all the world's needs with plenty left over to run electrolyzers. We are nowhere near close to that point today and won't be for a decade or more.

Hydrogen is also much more expensive than renewable energy, so the economic advantage it enjoys as a fuel will be far less than it is for battery-electric vehicles, although *Bloomberg* does suggest that "green" hydrogen could be cheaper than "blue" hydrogen by 2030. That still is no guarantee it will be cheaper than electrons from renewable energy sources, at least when calculating the cost of powering a motor vehicle from Point A to Point B. The dream of hydrogen-powered motor vehicles is dead. Time to move on.

The use case for hydrogen is in industry — making steel and cement and fertilizers, for example. Researching ways to make that happen is well worth the investment in time and money, as those industries pump enormous amounts of carbon dioxide into the atmosphere every year. By all means, let's find ways to make those industries carbon neutral or even zero carbon.

The planet could use a rest from all the crud that gets pumped into the environment every hour of every day with the excuse that people need jobs and jobs depend on fossil fuels. They don't. In the long term, they will depend on abundant, zero emissions energy, or else all the workers will be dead, along with virtually all human beings on Earth — a point the free market economists and capitalism advocates conveniently fail to include in their calculations.

It’s like saying humans need to breathe in oxygen to survive — which is true — while neglecting to point out they also need to exhale — which is equally true. An economy that is not sustainable is a lie told for private profit. Pursuing that lie will be the death of us all."

Please amend the bill as requested and as otherwise appropriate in light of the concerns expressed by Dr. Patrick Plötz.

Climate Protectors Hawai‘i (by Ted Bohlen)

LATE

SB-2283-SD-1
Submitted on: 2/17/2022 12:15:15 PM
Testimony for WAM on 2/18/2022 10:10:00 AM

Submitted By	Organization	Testifier Position	Remote Testimony Requested
Sonja Kass	Testifying for KauaiEV	Comments	No

Comments:

Dear Chair Chair Donovan M. Dela Cruz, Vice Chair Gilbert S.C. Keith-Agaran, and Committee on Ways and Means members,

I am writing on behalf of KauaiEV, a grassroots organization with over 100 members on Kauai. Our members are electric vehicle drivers and we believe that battery electric EVs are the personal transportation of the future.

In a recent analysis, the German Fraunhofer ISI (one of the leading European innovation research institutes) confirmed again that fuel cells will remain a niche application for ground transportation, even in heavy-duty applications and the in the commercial vehicle sector. They found that the decisive factor for the switch to battery-electric vehicles is the energy cost advantage compared to hydrogen and diesel.

https://traton.com/en/newsroom/press_releases/fraunhofer-analysis-battery-electric-trucks-advantage-over-hydrogen-trucks.html

Hydrogen - especially green hydrogen - is expensive to manufacture. H2 is a small molecule and leaks easily, makes metal brittle and acts as a greenhouse gas. The hydrogen fueling station are extremely expensive and not very safe. Battery electric vehicles are about twice as efficient, because the hydrogen conversion process - electricity to hydrogen and back - is inefficient. Finally, fuel cell vehicles are expensive, and so is their maintenance and most manufacturers (most recently Honda) stopped producing them.

We know green hydrogen is useful in the manufacturing of steel and for grid storage and probably as fuel for aviation and maybe in marine transportation. We applaud studying its use for these aplications, but would like to make it known we believe it has no use in ground transportation.

Mahalo

Sonja Kass, President KauaiEV

LATE

February 17, 2022

From: Hawaii Hydrogen Alliance

Re: SB2283

Relating to The Hawaii Hydrogen Strategic Plan

To the Committee on Ways and Means (WAM):

Chair Dela Cruz, Vice-Chair Keith-Agaran and Members of the Committee,

The State of Hawai'i does not have a holistic strategy to reduce energy and transportation emissions to zero. The current renewable portfolio standard lacks accountability and favors lowest-cost resources - intermittent renewable electricity. The result is lower resiliency across the islands, longer delays for project approval, and an unrealistic and myopic vision of an 'all-electric' grid.

This bill would examine the ability for hydrogen to serve as a low-cost, resilient, zero-emissions energy resource for both the electricity and transportation sectors here. It would also look at the potential for Hawai'i to export green hydrogen to places like Asia and North America.

Including stakeholder participation (specifically, NGO's) is an important part of this strategy, and we support this bill. Hawaii Natural Energy Institute has produced thoughtful documents related to hydrogen development in Hawai'i, and so they seem a good fit to take on this research-and-reporting based endeavor.

The Hawaii Hydrogen Alliance (Maui, Hawaii) is focused on increasing awareness for 'green hydrogen' production and use in Hawaii and across the Pacific. HHA represents companies and other stakeholders involved in the green hydrogen industry.

We look forward to participating in the discussion regarding the Hawai'i Hydrogen Strategic Plan.

Mahalo,

Chuck Collins

Board Member

admin@hawaiihydrogenalliance.com

SB-2283-SD-1
Submitted on: 2/16/2022 10:13:40 PM
Testimony for WAM on 2/18/2022 10:10:00 AM

Submitted By	Organization	Testifier Position	Remote Testimony Requested
Tawn Keeney	Individual	Oppose	No

Comments:

Members of the Ways and Means Committee,

Testimony: SB2283 Relating to the Hawaii Hydrogen Strategic Plan

This testimony concludes with proposal for amendment to this bill SB2283 which adds one further 'consideration' to the eight elements of the proposed study in the Hawaii Hydrogen Strategic Plan.

Section 1 (9) A Greenhouse Gas Life Cycle Analysis shall be performed for the production of Hydrogen utilizing each renewable energy resource being considered.

Though we must admire the author's intent to promote the use of Hydrogen as fuel source for Transportation or as grid level resource, we must place this proposal in context. The use of the phrase 'renewable energy resources' brings up a range of issues which should be considered.

Let's recall recent developments in the Saga of Hu Honua, the ill fated proposed wood burning power facility on the Big Island. In 2015 the definition of Renewable Energy fuels in HRS 269-91 was amended to add biomass (wood burning) as a renewable fuel and as carbon neutral. Therefore Hu Honua proposed its bioenergy produced to be 'carbon neutral' and 'renewable energy'. This was the case even though the Greenhouse Gas Analysis submitted by Hu Honua in 2019 to the Public Utilities Commission specified that per Kilowatt Hour of Electricity it produced, the Greenhouse Gas emissions were over twice those of the power generating facilities which it would replace.
https://drive.google.com/file/d/1tLYoCgzly5y7e_TrYpxqtC6cAnrJ8Y80/view?usp=sharing
It is well known that burning wood (chipped green trees from Hu Honua's clear cut harvest plan) releases 1.5x more GHG emissions than coal and 2.2x more GHG than oil per unit of electricity produced. The re-sequestration of CO2 by regrowth of the forest is a process known to take multiple decades to well over a century.

The Hawaii Supreme Court in 2020 decided that Hu Honua had failed to consider its Greenhouse Gas emissions as required by Hawaii statute in its presentation before the PUC in spite of its contention of GHG neutrality as above. The case was remanded to the PUC for presentation of Greenhouse Gas life cycle analysis of its process of bioenergy generation.

Blue Planet Research on the Big Island has signed a letter of intent (or interest) to purchase electricity from Hu Honua for Hydrogen production should the Hu Honua facility 'come online'. This commercial Hydrogen production will come under the same purview of the PUC and GHG analysis will be required.

It is the reasoning behind the use of Hydrogen that it will lower the GHG emissions from transportation and energy production. So if Life Cycle Analysis shows that it will in fact increase emissions beyond simply using fossil fuels for transportation and energy production then the Hydrogen proposal should be abandoned. We know in the case of burning wood to supply electricity to create hydrogen as fuel, the life cycle emissions will be far worse than simply using the fossil fuels (gasoline, oil or coal) as is currently done. We know that the same is true for the burning of industrial and municipal waste.

It is therefore important that the study which is being proposed in section 1 of this Bill have added to its 8 'considerations' a 9th consideration which would constitute a Green House Gas Life Cycle Analysis for the production of quantities of Hydrogen from each each of the renewable energy resources considered. The Supreme Court has clarified that qualifying for the State definition of Renewable Energy and greenhouse gas neutrality does not satisfy the statutory need for Greenhouse Gas Analysis in the form of GHG Life Cycle Analysis.

Thus, the amendment to Section 1 of Bill SB2283 is proposed as follows:

Section 1.

(13) A Greenhouse Gas Life Cycle Analysis shall be performed for the production of Hydrogen utilizing each renewable energy resource being considered.

Mahalo for your
consideration, Tawn Keeney MD

SB-2283-SD-1
Submitted on: 2/17/2022 7:03:42 AM
Testimony for WAM on 2/18/2022 10:10:00 AM

Submitted By	Organization	Testifier Position	Remote Testimony Requested
Noel Morin	Individual	Support	No

Comments:

Dear Chair Dela Cruz, Vice-Chair Keith-Agaran, and members of the Ways and Means Committee,

I support **SB2283 SD1 but would like to** recommend an amendment to ensure that the resulting study is focused on research and strategies that maximize the impact on emissions reductions, social equity, environmental justice, and economics. I recommend that we amend the measure to make even more explicit the focus on green hydrogen and production strategies that don't involve fossil fuels or processes that contribute to emissions. (While 'Hydrogen' is listed 23 times in SB2283 SD1, 'green hydrogen' has one mention.) By explicitly calling attention to the focus to be on **green hydrogen produced only using non-emitting renewable energy**, we avoid the risk of creating a new dependence on fossil fuel and exacerbating the climate crisis.

I appreciate the intention of this measure to enable a proper study of hydrogen production and utilization. This, admittedly, is a challenging goal since electricity is scarce and expensive in our state. We have opportunities to expand geothermal energy production to arrive at abundant, affordable renewable electricity, but it will require more research and development.

Thus, there will be pressure to generate the gas from fossil fuel feedstock (gas and coal), much like how close to 100% of the global hydrogen supplies are produced. This runs counter to our efforts to decarbonize and must be prevented. There may also be interest in using emitting processes, e.g., burning biomass, to create the energy required to generate the gas.

I am a supporter of hydrogen. It offers utility in the energy, transportation, agriculture, and industrial sectors. It offers Hawaii the opportunity to achieve energy independence from fossil fuel and other carbon-intensive products, enables energy system resilience, and supports external zero-carbon fuel demand. Achieving all of these is a tall order as it demands abundant, zero-emission renewables, without which we risk maintaining a dependency on fossil fuels and failing to address the high cost of living and the inequities that plague our state.

I humbly recommend that we make it unambiguous that our study will be focused on green hydrogen.

Thank you for this opportunity.

Noel Morin

Community Leader

Disclosure: I am affiliated with Hawaii EV, Big Island EV, Think BIG, and Sustainable Energy Hawaii.

Notes:

- Global hydrogen demand - https://www.iea.org/data-and-statistics/charts/global-hydrogen-demand-by-sector-in-the-sustainable-development-scenario-2019-2070
- Global green hydrogen demand - https://www.strategyand.pwc.com/m1/en/reports/2020/the-dawn-of-green-hydrogen/the-dawn-of-green-hydrogen.pdf#
- Types of Hydrogen - Green, Blue, Grey, Pink - https://www.weforum.org/agenda/2021/12/what-is-green-hydrogen-expert-explains-benefits/
- Applications of Hydrogen - role in our energy transition - https://blog.ucsusa.org/julie-mcnamara/whats-the-role-of-hydrogen-in-the-clean-energy-transition/
- Hydrogen combustion and NOx - https://insideepa.com/share/227828
- Save green hydrogen for grid storage, marine, aviation, and industry (Hawaii EV) - https://hawaiiev.org/blog/hydrogen-in-transportation
- H2 bus TCO is too high - https://cleantechnica.com/2022/01/11/french-city-cancels-hydrogen-bus-contract-opts-for-electric-buses/
- Hydrogen for Grid Storage - https://solarhydrogen.net/battery-storage-vs-hydrogen-storage/
- Hydrogen for High Heat Industrials (steel, cement, glass, basalt material) - https://cleantechnica.com/2021/08/23/hydrogen-for-cars-no-for-steel-yes/
- Hydrogen for liquid fuels - https://hawaii.federated.industries/feather
- Efficiency and decarbonization (support for battery electric vs. fuel cell) https://www.civilbeat.org/2021/12/waste-not-want-not-maximizing-efficiency-is-key-to-decarbonization/
- Modern Energy 101 (Sustainable Energy Produced video on our global energy reality) - https://youtu.be/vqI5VMs3_-U