



**TESTIMONY OF
THE DEPARTMENT OF THE ATTORNEY GENERAL
KA 'OIHANA O KA LOIO KUHINA
THIRTY-SECOND LEGISLATURE, 2023**

ON THE FOLLOWING MEASURE:

S.B. NO. 1002, RELATING TO AN ATMOSPHERIC CARBON CAPTURE PLANT.

BEFORE THE:

SENATE COMMITTEES ON ENERGY, ECONOMIC DEVELOPMENT, AND TOURISM
AND ON AGRICULTURE AND ENVIRONMENT

DATE: Wednesday, February 15, 2023 **TIME:** 1:00 p.m.

LOCATION: State Capitol, Room 224

TESTIFIER(S): Anne E. Lopez, Attorney General, or
John E. Cole or Bryan Yee, Deputy Attorneys General

Chairs DeCoite and Gabbard and Members of the Committees:

The Department of the Attorney General provides the following comments regarding this bill.

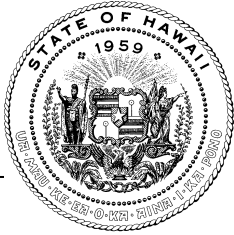
The bill requires the Hawaii State Energy Office, in conjunction with the Hawaii Natural Energy Institute, to develop a strategy for the construction of at least one atmospheric carbon capture plant in the State.

The Hawaii Natural Energy Institute is a research unit in the University of Hawaii at Manoa's School of Ocean and Earth Science and Technology. The current wording of the bill presents a state constitutional issue because it does not explicitly identify the matter that the bill is attempting to address (climate change) as one of "statewide concern" as is required by article X, section 6, of the State Constitution when enacting laws regarding the internal structure, management, and operation of the university.

To remedy the constitutional issue, we recommend adding the following (or similar) wording to the bill at the end of the paragraph on page 2, line 17:

The legislature further finds that the threat to the State posed by climate change and the utilization of carbon offsetting strategies and technologies to limit global warming are matters of statewide concern that fall under the legislature's purview pursuant to article X, section 6, of the Hawaii State Constitution.

Thank you for the opportunity to testify.



HAWAII STATE ENERGY OFFICE STATE OF HAWAII

JOSH GREEN, M.D.
GOVERNOR

MARK B. GLICK
CHIEF ENERGY OFFICER

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Testimony of
MARK B. GLICK, Chief Energy Officer

before the
**SENATE COMMITTEE ON ENERGY, ECONOMIC DEVELOPMENT, AND TOURISM
AND
SENATE COMMITTEE ON AGRICULTURE AND ENVIRONMENT**

Wednesday, February 15, 2023
1:00 PM
State Capitol, Conference Room 224 & Videoconference

Providing COMMENTS on
SB 1002

RELATING TO AN ATMOSPHERIC CARBON CAPTURE PLANT.

Chairs DeCoite and Gabbard, Vice Chairs Wakai and Richards, and Members of the Committees, the Hawai'i State Energy Office (HSEO) provides comments on SB1002, which directs HSEO, in conjunction with the Hawai'i Natural Energy Institute (HNEI), to develop and submit a strategy to the legislature by 2025 for the construction of at least one atmospheric carbon capture plant in the State by 2030.

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.

HSEO appreciates the opportunity to investigate and pursue the use of atmospheric carbon capture and sequestration technologies activities further. However, HSEO notes before the construction of any atmospheric carbon capture plant, the facility and technology chosen must undergo not only a thorough environmental review but should also undergo robust lifecycle emissions analysis to determine the efficacy of the plant itself due to the substantial energy requirements of atmospheric carbon capture, also known as direct air capture technology.

Per Act 238, Session Laws of Hawai'i 2022, HSEO has been working with the University of Hawai'i (UH) Climate Resilience Collaborative (CRC) on evaluating carbon sequestration and carbon utilization opportunities for the state of Hawai'i. As a part of this work HSEO and UH CRC have been collaborating on a white paper, which HSEO plans to publish and submit as an appendix to the Act 238 legislative report. As a part of the white paper, HSEO has evaluated the space and energy requirements of a facility similar to the Orca facility in Iceland. The facility in Iceland was chosen for comparison due to Hawai'i's similar basalt geology required for the sequestration of carbon dioxide (CO₂) after direct air capture.

As additional background information, HSEO notes that annual emissions from Hawai'i's energy sector (excluding international bunker fuels) were the equivalent of approximately 17,640,000 metric tons of carbon dioxide annually.¹ Comparatively, the annual amount of atmospheric carbon dioxide captured and sequestered in Iceland was 4,000 metric tons, less than one percent of Hawai'i's energy sector emissions.

The energy requirements for a direct air capture facility can generally be divided into two categories: 1) the energy required for mechanical components such as the fans to collect the CO₂ from the air and 2) the energy required to adequately heat the CO₂ collected and desorb it from the surface of the collection adsorbents (carbon filters).

Estimated energy requirements for CO₂ capture using the DAC technology used by the first net-negative facility Orca in Hellisheiði, are about 500 kilowatt-hours (kWh) per ton CO₂ for electricity, not including the electricity consumption for CO₂ compression, and 1,500 kWh per ton CO₂ for heat (for temperatures around 100 degrees Celsius).² This equates to approximately 2,000 megawatt-hours (MWh) per

1 ICF and University of Hawaii Economic Research Organization (UHERO). "Hawaii Greenhouse Gas Report for 2017 Report." Hawaii State Department of Health, April 2021. https://health.hawaii.gov/cab/files/2021/04/2017-Inventory_Final-Report_April-2021.pdf.

2 Terlouw, T., Treyer, K., Bauer, C., & Mazzotti, M. (2021). Life cycle assessment of direct air carbon capture and storage with low-carbon energy sources. *Environmental Science & Technology*, 55(16), 11397-11411

year of mechanical energy, excluding the energy used for compression, and approximately 6,000 MWh of energy annually for heating.

For perspective, solar energy facilities throughout Hawai'i generate a comparable amount of electricity annually. In 2020, Kalaeloa Renewable Energy Park (5 MW, approximately 20 acres) generated 7,812 MWh of electricity. The newly completed Mililani I solar project (39 MW plus 156 MWh storage, 150 acres) is estimated to generate 93,121 MWh of electricity per year,³ exceeding the energy requirements of a carbon capture system similar to Orca. Energy requirements also vary based on the configuration and energy sources for the DAC system. Depending on the configuration and the host island's grid portfolio, the energy production may provide more carbon benefits if the energy used goes directly to the grid and displaces carbon-intensive fossil fuel use. However, the lower the carbon intensity of the grid, the less of a concern this becomes, making the construction of a facility such as a carbon plant is more beneficial on islands where the grid has lower carbon intensity (or higher renewable penetration).

The draft whitepaper also explores the estimated space requirements, as well as the water-use and permit requirements for geological sequestration. Utilization opportunities after Direct Air Capture were also researched, these opportunities include the use of captured carbon in concrete and building materials, as well as the use of the carbon captured to produce alternative power-to-fuel technologies, also called e-fuels.

Various carbon dioxide removal technologies, such as direct air capture, are a critical component to achieving Hawai'i's net negative goals; however, they should not be construed as the fix-all solution. Carbon dioxide removal is not an alternative to reducing emissions through energy efficiency, renewable energy development, electric vehicle adoption, and alternative and active transportation mechanisms. Additionally, carbon removal technology is not an alternative to maintaining and increasing natural

³ Application of Hawaiian Electric Company for Approval of Power Purchase Agreement for Renewable Dispatchable Generation with Mililani I Solar, LLC. (2018, December 31) Docket 2018-0434.

sinks through measures such as reforestation and afforestation, and soil carbon sequestration or regenerative agriculture.

HSEO recommends that, while general research and attention to carbon capture continue, the specific tasks envisioned in this bill be delayed to a future time when Hawai'i's grids have an excess of zero-carbon energy available.

However, if the Committee does decide to proceed with this measure, HSEO requests the following revisions to clarify the intent of SB 1002.

- 1) Section 1, Section 2, and Section 3 of SB 1002 should clarify if the evaluated construction date of the plant should be 2028 or 2030. Sections 1 and 3 list the construction date as 2028, while Section 2 lists 2030. HSEO believes that 2030 is a more appropriate time frame, although the most appropriate construction date is determined by the overall carbon intensity of the grid, as described above.
- 2) Section 1 should clarify whether the Hawai'i State Energy Office will be evaluating a Direct Air Capture facility only, or if the strategy should also be inclusive of a facility that sequesters and/or geologically stores the carbon dioxide after it is captured. These facilities are often referred to as direct air capture with carbon storage facilities (DACCS). Storage and/or utilization after direct air capture are technologies separate from atmospheric carbon capture and the pathways for carbon dioxide utilization or storage after collection differ and require varying levels of analysis, environmental review, and permitting dependent upon the chosen pathway.

Thank you for the opportunity to testify.

SB-1002

Submitted on: 2/12/2023 7:47:17 PM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Will Caron	Individual	Support	Written Testimony Only

Comments:

Please support SB1002.

SB-1002

Submitted on: 2/13/2023 6:19:29 AM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Dwamato	Individual	Support	Written Testimony Only

Comments:

I support SB1002

SB-1002

Submitted on: 2/13/2023 1:01:15 PM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Dana Keawe	Individual	Support	Written Testimony Only

Comments:

support

SB-1002

Submitted on: 2/10/2023 7:04:44 PM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Douglas Perrine	Individual	Oppose	Written Testimony Only

Comments:

Atmospheric carbon capture is a technology that is in its infancy. It has not been advanced to the point where it can be economically and at a scale that makes it worth while. Most demonstration products require energy inputs that release more carbon than is captured. This is something that is not yet feasible, and may never be. Hawaii would be foolish to waste public funds on this before it is proven elsewhere. By contrast, we are ideally situated to conduct research on wave energy capture, ocean thermal conversion, and other promising technologies.

SB-1002

Submitted on: 2/10/2023 7:46:50 PM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Andrew Crossland	Individual	Oppose	Written Testimony Only

Comments:

I oppose this Bill.

SB-1002

Submitted on: 2/11/2023 10:10:32 AM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Regina Gregory	Individual	Oppose	Written Testimony Only

Comments:

This probably requires a large amount of energy as well as land for underground storage.

SB-1002

Submitted on: 2/13/2023 4:04:02 PM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Lisa Toriki	Individual	Oppose	Written Testimony Only

Comments:

Where would this "plant" be located? Where would we store the captured CO2?. There is a tremendous environmental and health risk in the storage and transportation of the CO2, which if it escapes into our waters or atmosphere would have devastating affects on our islands. Also, why bother to pass bills SB 1060 and 1004 if you are going to "capture" atmosheric carbon dioxide emission? These taxes are supposed to lower emissions right?? Also, I am not in favor of funding more unnecessary government agencies, union salaries and perks.

SB-1002

Submitted on: 2/13/2023 11:52:27 PM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Cara Soto	Individual	Oppose	Written Testimony Only

Comments:

The last thing we need politicians doing is attempting another building project. Whoever is making a career out of the rail needs to stay focused. Another costly building project seems like a detrimental distraction. I strongly oppose this bill.

SB-1002

Submitted on: 2/14/2023 10:00:28 AM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Donna Thompson	Individual	Oppose	Written Testimony Only

Comments:

I am opposed to this bill because it is based on a hoax of global warming which has been proven via NOAA data that there is actually a cooling trend over the last decade of 0.019C. Instead, there needs to be encouragement of innovation. Electric vehicles are not sustainable for a number of reasons and will make matters worse. There is plenty of patents that have been suppressed that could be brought forward. One examples is a transition phase using kits on current vehicles to move away from fossil fuels. This is very basic technology that is already being implemented in Pakistan. <https://patents.justia.com/inventor/stanley-meyer>

The United Nations and World Economic Forum that perpetuate these lies are run by oligarchs that seek to further enslave humanity. The following video provides testimony. <https://stopworldcontrol.com/unevent/>

SB-1002

Submitted on: 2/14/2023 10:27:15 AM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Mary Smart	Individual	Oppose	Written Testimony Only

Comments:

I am vehemently OPPOSED to SB1002. By now most people realize that the “climate crisis” is a hoax. The climate always changes. There have been colder and warmer periods of history and man and its use of carbon based products were not the cause of the cyclic changes.

The Department of Energy may have announced funding for carbon capture technologies, but that is not “free money” – that came from us, the Hawaii taxpayers as well as taxpayers from other states. Don’t waste federal money just because it appears to be “free”. If the Department of Energy has excess money to waste, their budget should be cut – not give out grants to study unneeded projects. Hawaii doesn’t need an atmospheric carbon capture plant and people’s time and energy should not be wasted on such a useless project. Hawaii has much more important and imminent problems. Focus on those and not the “pie in the sky” carbon capture objective.

Do not pass SB1002. Vote NO.

SB-1002

Submitted on: 2/14/2023 11:52:11 AM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Michdelle Melendez	Individual	Oppose	Written Testimony Only

Comments:

We are made of carbon. The plants need it to breath and we need them to stay alive! Plz DO NOT vote this through. These taxes will not help and there is more proof that the climate change is not what mainstream media is telling us. Please stop this. OPPOSE THIS BILL.

SB-1002

Submitted on: 2/14/2023 1:23:49 PM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Ben Robinson	Individual	Oppose	Written Testimony Only

Comments:

Aloha, while I am not opposed to the technology, I question whether Hawai'i is a great place for an installation of this.

SB-1002

Submitted on: 2/11/2023 6:51:39 AM

Testimony for EET on 2/15/2023 1:00:00 PM

Submitted By	Organization	Testifier Position	Testify
Noel Morin	Individual	Comments	Written Testimony Only

Comments:

Dear Chairs Gabbard and DeCoite, Vice Chairs Richards and Wakai, and Committee Members,

I want to offer comments regarding Carbon Capture. This measure highlights the importance and opportunities associated with the sequestration of legacy carbon dioxide. This is a critical climate action as the CO2 that has already been emitted into the atmosphere will have a persistent global warming impact. Efforts to halt emissions must be partnered with carbon drawdown to mitigate climate change.

Fortunately, there are several ways to accomplish this, and many groups are investigating and deploying solutions. These include **nature-based solutions**, e.g., reforestation and forest preservation, regenerative agriculture, and marine ecosystem restoration, and **technological solutions**, e.g., direct air capture (DAC), low or negative carbon concrete, and direct ocean capture.

Several, perhaps all, of these are needed, and some might be more relevant and a higher priority for Hawaii. We should call for a more thorough analysis of the various solutions that may apply to Hawaii and for developing a comprehensive Hawaii's Carbon Sequestration roadmap for Hawaii. This should consider the life-cycle impact of each solution. Some of these solutions, including DAC, require significant energy, and a systems view must be considered as we develop these solutions.

Thank you for the opportunity to comment.

Noel Morin - Hilo

Links for thought:

- Making carbon removal happen (WEF) - <https://www.weforum.org/agenda/2019/12/climate-change-carbon-removal-capture-conditions/>
- Oceanic carbon removal (ARPA-E) - <https://www.arpa-e.energy.gov/technologies/exploratory-topics/direct-ocean-capture>
- CO2 in our Oceans (WEF) - <https://www.arpa-e.energy.gov/technologies/exploratory-topics/direct-ocean-capture>
- DAC (IEA) - <https://www.iea.org/reports/direct-air-capture>

- Energy requirements of DAC (Nature) - <https://www.nature.com/articles/s41467-020-17203-7>
- Hawaii's Reforestation Opportunity (HFIA) - https://hawaiiforest.org/hawaiis_dryland_forests_can_they_be_restored/
- Carbon in soil (MIT) - <https://climate.mit.edu/explainers/soil-based-carbon-sequestration>