THE SENATE
TWENTY-EIGHTH LEGISLATURE, 2016
STATE OF HAWAII

S.B. NO. 2739

JAN 27 2016

A BILL FOR AN ACT

RELATING TO GRID-CONNECTED ENERGY STORAGE SYSTEMS.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. The legislature finds and declares the following:

(1) The legislature in Act 97, Session Laws of Hawaii 2015, has accelerated Hawaii's goals for the percentage of electricity to be supplied by renewables, with an overall goal of reaching one hundred per cent renewable energy, as mandated by section 269-92, Hawaii Revised Statutes;

(2) Hawaii's dependence on imported fuels drains the State's economy of billions of dollars each year. A stronger local economy depends upon a transition away from imported fuels and towards renewable local resources that provide a secure source of affordable energy;

(3) As the use of solar photovoltaic panels has grown, on some islands there is already more electricity being generated during the middle of the day than can be

immediately used, resulting in this renewable energy being unused during these times, and yet there is still unacceptably low use of renewable energy at other times. With the transition to one hundred per cent renewables, this problem of overgeneration in the middle of the day will increase substantially;

(4) Hawaii is in a period of energy transition from imported fuels toward local sources of renewable energy. In order to reach one hundred per cent renewables, it is important that future grid investments enable productive use of all potential renewable energy generation, including the productive use of overgeneration and the avoidance of curtailing renewables;

(5) Long duration storage of six hours or more would enable capturing excess electricity mid-day and using it productively at other times, both from current solar panels and wind, and from future solar and wind installations. Without long duration energy storage, this excess production in the middle of the day would be lost. Furthermore, without long duration energy

storage, adding additional solar photovoltaic panels will increase the overproduction mid-day, with most of the energy from these new solar panels being unused and lost. With deployment of more solar photovoltaic panels, many islands not currently experiencing overproduction will have sizable overproduction. As a result, without long duration energy storage, new solar panels will not materially boost Hawaii's overall renewables energy use. The lack of long duration energy storage is blocking Hawaii's renewables goals from being achieved;

(6) Achievement of the one hundred per cent renewables goal and a reliable grid, when a large percentage of the renewables are from intermittent sources like wind and solar, will require the use of long duration energy storage to make this intermittent renewable energy both dispatchable and dependable;

(7) The use of grid-connected long duration energy storage systems enables an increase in the interconnection of residential, commercial, and utility solar systems because peak daytime generation can shift to meet

evening peak demand. Increasing the use of solar energy helps Hawaii meet its renewables targets;

(8) When long duration energy storage is distributed throughout the grid, whether at many or all substations, the result is a grid that is more resilient and is better able to withstand natural disasters or hostile acts than a grid without such long duration energy storage. Grid-connected long duration energy storage systems can improve and maintain the reliability of the electrical grid;

(9) Having long duration storage as a shared grid resource would be more cost effective for ratepayers, homeowners, and businesses than mandating that storage be added to every renewables project;

(10) Grid-connected long duration energy storage systems lower ratepayer costs by deferring network distribution and transmission upgrades and by mitigating the need for new fossil fuel generation or burning expensive fossil fuels in existing plants;

(11) Grid-connected energy storage provides greater flexibility and optionality over many other types of

fixed assets because storage can be deployed where needed, when needed, sized to the number of megawatt-hours needed, and, for some storage technologies, can be relocated if and when needs change. Given the uncertainties associated with high levels of renewables, changes in sea levels due to global warming, and changes in demographics, such flexibility would be valuable;

(12) Long duration storage is available that can provide the same functions that are provided by short duration storage. If short duration storage is deployed before long duration storage, the short duration functions that could have been handled by new long duration storage are already being serviced by the previously installed short duration storage. This reduces the value of the long duration storage, which still must be deployed to reach higher renewables usage. The duplication of short duration functions would be short-sighted, wasteful, and costly to ratepayers. Accordingly, deployment of long duration storage must take priority over deployment of short duration

storage until such time as there is sufficient long duration storage deployed to meet all foreseeable long duration needs, or unless, in special circumstances, the short duration storage provides a unique and essential grid function that is not available from long duration storage. The legislature does not intend these findings or this Act to restrict electricity users from installing short or long duration storage of any type, at their expense, behind their meters;

(13) Procurements should be made of services and assets that are capable of being used productively at one hundred per cent renewables penetration so that all procurements are compatible with Hawaii's renewables goals. Assets that are not capable of productive use at one hundred per cent renewables penetration should be avoided, so as to minimize the burden on ratepayers of stranded assets as renewables usage rises, and so as to avoid procuring assets that might block more rapid achievement of Hawaii's renewables targets than the legislated requirements. For these reasons,

renewables and long duration storage should be explicitly considered as an alternative, with the same degree of care and investigation, as other assets and services, in any utility, electricity cooperative, or public utilities commission grid planning, or in any procurement by a utility or electricity cooperative, or any procurement overseen by the public utilities commission, of generation, transmission, or distribution of assets or services. In any procurement by a utility or electricity cooperative, or procurement overseen by the public utilities commission, energy efficiency, renewables, and long duration energy storage should be given higher priority over building more transmission or distribution lines, and all of the foregoing should be given priority over investments in, or service contracts for, fossil generation;

(14) There are barriers to the deployment of grid-connected energy storage systems, which mandated storage targets will help solve;

(15) One set of barriers to storage is that under existing procurement rules, assets on the grid are characterized as generators, transmission and distribution, or loads (including demand response), and are typically evaluated and procured under one of these categories. However, storage has characteristics of all three categories. It behaves like a generator when providing power to the grid, performs like a load when charging from the grid, and can be an alternative to transmission and distribution when used to supplement the power to a community when transmission line loading is at maximum. Storage deployment needs to be evaluated against generation, transmission, distribution and load (demand response) alternatives, and the value of storage should be assessed by viewing its collective benefits across all of these categories;

(16) Just as Hawaii set specific renewables goals to bypass barriers to renewables deployment, setting specific long duration storage deployment targets is necessary

to meet Hawaii's renewable energy and grid reliability objectives;

(17) Given that Hawaii will have significant dependence upon storage to support Hawaii's renewables targets, it is essential for reliability, resiliency, the environment, and the economy that Hawaii use commercially proven storage systems. To minimize the risk to ratepayers, commercially proven storage systems shall be used to meet the long duration storage targets set under this Act;

(18) Storage systems that are electricity-in and electricity-out provide maximum value to the grid and the storage targets set in this Act are intended only to cover systems that have these outcomes as their primary purpose. For clarity, the mechanism used internally within the storage system for storing the electricity may be of any form, including chemical means, mechanical means, or thermal means. For further clarity, dispatchable loads, such as hot water heaters or ice energy systems, whose primary purpose is not delivering electricity out, are not to be

deemed as storage under this Act. Those systems would typically be considered to be, and have value as, demand response assets;

(19) The path to a one hundred per cent renewable-powered Hawaii is only possible with a large amount of grid-connected rooftop solar panels. It is unnecessary to cover the remaining land in Hawaii with massive solar farms when residences and businesses already have roofs that can hold solar panels. There are reports that rooftop solar panels in many areas of the State produce more than two hundred fifty per cent of the electric power necessary to run those areas; and

(20) Solar energy's greatest challenge is the lack of a way to store power. The solution to this challenge is grid-scale energy storage. If the electric utility is able to effectively store all the power that is generated from rooftop solar panels, there would be little or no need to consume fossil fuels in order to create power at night.

The purpose of this Act is to create an energy storage compliance mandate expressed in terms of megawatt-hours.

SECTION 2. Chapter 269, Hawaii Revised Statutes, is amended by adding a new part to be appropriately designated and to read as follows:

"**PART . GRID-CONNECTED ENERGY STORAGE SYSTEMS**

§269-A Definitions. As used in this part:

"Commercially viable storage" means storage that, at the time of procurement, is determined by the public utilities commission to have a very high probability of meeting the lifetime, function, performance, and other commitments of the suppliers of the storage asset or storage service.

"Long duration energy storage" means:

(1) Storage that is capable of discharging its rated energy storage capacity at a relatively constant megawatt rate for six hours; and

(2) Storage that is capable of being recharged at approximately the same energy transfer rate as the discharge specified in paragraph (1).

"Megawatt-hour rating" means the energy delivered by the means described in paragraph (1) of the definition of "long duration energy storage" in this section.

"Storage" means a system that uses any means internal to the system to store electrical energy, including chemical, mechanical, and thermal means, and:

(1) Its primary functions are:

(A) Absorbing electricity from an external electrical grid or source;

(B) Storing that electrical energy for a period of time; and

(C) Returning electricity to an external electrical grid or load;

(2) Its features are:

(A) Being directly dispatchable by the utility or electricity cooperative; or

(B) Being indirectly dispatchable by being responsive to dynamic retail tariffs or other indirect dynamic signal issued by the utility or electricity cooperative;

(3) Its purposes are:

(A) Aiding Hawaii in reaching the renewables goals of section 269-92;

(B) Reducing emissions of greenhouse gases;

(C) Deferring or substituting for an investment in generation, transmission, or distribution; or

(D) Improving the reliable operation of the electrical grid; and

(4) Its characteristics may include being:

(A) Either centralized or distributed; or

(B) Owned by an investor-owned utility, an electricity cooperative, a customer of an investor-owned utility or electricity cooperative, or a third party, or being jointly owned by two or more of them.

The term does not exclude a device with energy dissipation in the form of heat or other efficiency losses; provided that the device's primary purpose is energy transfer with the external world in the form of electricity, for both incoming and outgoing energy. Specifically, "storage" excludes a device such as a hot water heater, whose primary purpose is delivering energy as heated water, or a chilling unit whose primary purpose is to provide chilled gas, liquid or solid, even if the device also incidentally has the capability of delivering a small amount of energy as electrical energy.

"Storage service" means a service provided to a utility or to an electricity cooperative in which:

(1) A third party owns the storage; and

(2) The utility or electricity cooperative has the right to use that storage for:

(A) Aiding Hawaii in reaching the renewables goals of section 269-92;

(B) Reducing emissions of greenhouse gases;

(C) Deferring or substituting for an investment in generation, transmission, or distribution; or

(D) Improving the reliable operation of the electrical grid; and

(3) The utility or electricity cooperative has the ability to control the storage in a manner that the storage is:

(A) Directly dispatchable by the utility or electricity cooperative; or

(B) Indirectly dispatchable by being responsive to dynamic retail tariffs or other indirect dynamic signal issued by the utility or electricity cooperative.

§269-B Priority preferences. Any utility or electricity cooperative that plans to change its generation, transmission, or distribution system, in deciding between alternatives, shall give:

(1) First priority preference to energy efficiency, renewables, and long duration energy storage, each of equal preference value;

(2) Second priority preference to construction or upgrading of transmission or distribution, each of equal preference value;

(3) Third priority preference to fossil-based generation; and

(4) Notwithstanding the above, fourth priority preference to assets or services that would not be productively used in a one hundred per cent renewables grid.

§269-C Contract approval. The public utilities commission shall not approve any contract for, or authorize any procurement of assets or services for, or any construction of, any generation, any transmission, or any distribution unless:

(1) Long duration energy storage has been considered as an explicit alternative with at least the same degree of careful consideration as the other alternatives; and

(2) In deciding between alternatives, the decision process assigned priority preferences in accordance with section 269-B.

§269-D **Reporting requirements.** By June 1 of each year all public utilities shall submit to the public utilities commission a forecast of generation sources on their grid, by year for the upcoming five calendar years, in addition to a forecast for each of those years of the amount of overgeneration had there not been long duration energy storage on the grid, and a plan for deployment of sufficient megawatt-hour rating of long duration energy storage for each year, to avoid at least sixty per cent of the forecast overgeneration during each year.

§269-E **Approved deployment plans.** By November 1 of each year, the public utilities commission shall review and approve, or revise, each plan for deployment of the means for generation, transmission, or distribution under this part, including the long duration energy storage procurement requirements in the form of the target megawatt-hour rating of long duration energy storage to be deployed and made operational for each utility and electricity cooperative, in each of the upcoming five calendar years. The public utilities commission shall make these approved deployment plans publicly available through the commission's website.

§269-F **Operational long duration energy storage.** Upon approval by the public utilities commission, utilities and electricity cooperatives shall implement their approved deployment plans and shall do so by procuring, deploying, and making operational long duration energy storage assets that are commercially viable storage or by entering into and making operational storage service contracts where the storage services use only long duration energy storage that is commercially viable storage.

§269-G **Commercially viable storage; burden of proof.** A utility or electricity cooperative shall have the burden of demonstrating to the public utilities commission that the storage asset being procured, or storage used in a storage service being procured, is commercially viable storage. Notwithstanding the public utilities commission's oversight or approval of procurements of storage or storage services, the financial risk of storage or storage services failing to meet the lifetime, function, performance, or other commitments shall be assumed by the procuring utility or electricity cooperative. The public utilities commission shall only approve procurements of storage assets or storage services that are commercially viable storage. In making its decision, the public utilities commission shall consider the following factors in evaluating whether storage is commercially viable storage:

(1) The number and megawatt-hour size of other projects deployed anywhere in the world using that storage;

(2) The demonstrated lifetime of the storage as evidenced by the number of years of operation for other projects anywhere in the world using that storage;

(3) The extent to which other projects anywhere in the world using that storage provided grid functions similar to the grid functions for the present procurement; and

(4) Whether the financial strength of the storage vendors is sufficient to ensure they can meet their commitments, including service contracts, warranties, and performance guarantees under the procurement, in

the event of difficulties, setbacks, or unexpectedly high costs.

§269-H **Reports.** By March 1 of each year, each utility and electricity cooperative shall submit to the public utilities commission a report documenting whether the utility or electricity cooperative has complied with the approved deployment plan for the previous calendar year. The public utilities commission shall make the report publicly available through the commission's website.

§269-I **Access to storage system.** Electrical energy necessary for safe operation of any storage system, including systems involving pumps, motors, heating, cooling, lighting, communications, control, and monitoring shall be provided on the same economic basis as the energy used for charging the storage and may, at any time, be drawn directly from the grid or may be provided from energy stored by any storage system located at the same physical site.

§269-J **Storage behind meters not restricted.** This part shall not restrict electricity users from installing, at their own expense, storage of any type behind their meters, including short or long duration storage."

SECTION 3. In codifying the new sections added by section 2 of this Act, the revisor of statutes shall substitute appropriate section numbers for the letters used in designating the new sections in this Act.

SECTION 4. This Act shall take effect upon its approval.

INTRODUCED BY:

S.B. NO. 2739

Report Title:
Electric Utilities; Electricity Cooperatives; Grid-connected Energy Storage; Long Duration Energy Storage

Description:
Requires electric utilities and electricity cooperatives to comply with certain priority preferences in planning energy storage system changes and to submit deployment plans to the PUC for approval.