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**LATE**

Via E-mail

March 26, 2007

The Honorable Representative Marcus Oshiro, Chair and Members  
House Committee on Finance  
Hawaii State Capitol  
415 S. Beretania Street, Room 308  
Honolulu, HI 96813

**OPPOSITION TO SB 644 SD3, HD2 RELATING TO ENERGY RESOURCES  
(Mandatory Solar Energy Devices for new residential properties)**

Dear Chair Oshiro, and Members:

My name is Dave Arakawa, and I am the Executive Director of the Land Use Research Foundation of Hawaii (LURF), a private, non-profit research and trade association whose members include major Hawaii landowners, developers and a utility company. One of LURF's missions is to advocate for reasonable and rational land use planning, legislation and regulations affecting common problems in Hawaii.

While LURF and its members support and employ solar energy or comparable renewable energy devices and support the general intent of this bill, we must testify **in strong opposition to the current version of SB 644 SD3, HD2**, based on, among other things, the following grounds: "If it ain't broke, don't try to fix it." The present system of rebates and incentives are working, there is no need for any additional regulation or increased costs to new homeowners; Individual homeowner choices such as installing a costly solar energy device should be left to each individual homeowner, rather than mandated by the government; a very serious impact of this bill is that it would increase the sales price and up front costs of new housing for homebuyers; the higher sales prices will detrimentally affect the ability to qualify for a mortgage loan; it will also cause the loss of tax credits for homeowners; it will cause the loss of HECO rebates for homeowners; and the regulatory process established by this bill is subjective, confusing, unenforceable and of questionable legality.

Instead of mandatory legislation, the legislature should encourage making solar thermal energy devices or comparable renewable energy devices cost-neutral to new homebuyers and developers, by providing credits and incentives to developers to counteract the increased costs of such devices and the resulting increased prices of new homes.

**SB 644, SD3 HD2.** It is our understanding that this bill, which mandates the installation of solar thermal devices, substitute devices, or demand water heater devices, in detached single-family residential homes, has been revised twelve (12) times since it was introduced in 2007, to address the concerns which have been raised. The current HD2 revisions reduce the State tax credit incentives, and add the requirement of installation of a demand water heater device. The current HD2 version of the bill requires the following:

- That beginning with construction permits issued after January 1, 2010, solar thermal energy devices shall be installed in the construction of every new residential detached single-family residence;
- Exceptions include the following: (1) When the installation is impracticable due to poor solar resource; (2) When installation is cost-prohibitive; or (3) A substitute renewable energy device is installed; provided that if the substitute device is installed, the device shall be the most practical, energy-efficient device available, as determined by an architect or engineer licensed under Chapter 464, Hawaii Revised Statutes (“HRS”), and the architect or engineer attests in writing that a solar thermal device cannot be installed for the reasons stated in paragraphs (1) or (2), and submits the written attestation on behalf of the building permit holder to the county building code authority;
- **HD2 added another exception: The installation of a “demand water heater device,”** approved by Underwriters Laboratories, Inc. Such a device is defined as a tankless, instantaneous water heater that provides hot water only as it is needed through the use of a gas burner.
- Solar thermal devices shall be installed by a licensed installer in compliance with all manufacturer and industry standards. The licensed installer of the solar thermal device or substitute device, or the architect, or engineer licensed under Chapter 464, HRS, if the solar thermal device is specified through building plans, shall submit a written attestation to the county building code authority, stating that the installed solar thermal device, or substitute device, is suitably sized for the number of people expected to occupy the dwelling and meets the applicable county building code;
- The counties are not precluded from establishing procedures and standards required to implement this section;
- **HD2 eliminates current State tax credit of thirty five percent (35%) for residents who install solar or other eligible renewable energy technology system on to existing single family residential properties, as of January 1, 2010.**
- **HD2 reduces** the State tax credits for eligible renewable energy technology systems from the **current 35 percent (35%)** of the actual cost, or \$2,250, whichever is less for newly constructed residences, **to twenty percent (20%),** for newly constructed residences on or prior to January 1, 2010. (This proposed bill would not change the thirty-five percent (35%) tax credit for multi-family residential and commercial properties);
- **HD2 further reduces** the State tax credits for eligible renewable energy technology systems from the **current 35 percent (35%)** of the actual cost, or \$2,250, whichever is less for newly constructed residences, **to only fifteen percent (15%),** for newly constructed residences after January 1, 2010; provided that at the time the system is installed and placed in service, Hawaiian Electric Company’s solar water heater equipment, use, and installation standards

program, including its 100-point rating scale for solar water heating units and rebate applies to the system.

**LURF's Position.** While we agree that we, as a community, should work to conserve more energy, we believe that the choice of energy conservation devices should be governed by market forces and government incentives, rather than by government regulations. The grounds for our objections include, among other things, the following:

- “If it ain’t broke, don’t try to fix it (12 times!).” Representatives of Hawaii’s energy and solar industry have repeatedly testified that the present system of rebates and incentives are working, there is no need for any additional regulation or increased costs to new homeowners;
- We believe the choice to install a solar energy device should be left to each individual homeowner.
- This mandatory legislation will increase the sales prices of homes in Hawaii since the cost of the solar devices and installation will be “passed-on” to the new homebuyer.
- The increased sales prices caused by this bill will adversely impact the ability of new homebuyers to qualify for mortgage loans.
- We understand that this mandatory legislation **will also result in the elimination of HECO’s \$1,000 utility rebate for homeowners.** The HECO rebate is designed to encourage its customers to install solar water heating devices. However, if installation of such device becomes mandatory under this law, there is no reason for HECO to fund the rebate.
- The **reduction of tax credit incentives from 35% to 20% and 15%** will increase the net up-front costs to be paid by new homebuyers.
- The **elimination of the 35% tax credit for existing homeowners** is not consistent with the purposes of this bill.
- Philosophically, this is the classic “Carrot versus the Stick” approach to influence peoples’ behavior. We prefer the “carrot” approach and would recommend that incentives be increased for developers of new residential projects who install energy conservation devices, rather than require compliance through legislation. If the legislature grants sufficient incentives and tax credits to developers of new residential development projects, then the impact of this legislation could be cost-neutral for new homebuyers.
- The purported purpose of the bill is to significantly reduce the State’s dependence on imported oil over time, however, it is curious that this bill does not require solar energy devices to be installed on all state buildings, multi-family residential condominiums and townhouses, commercial, industrial, or resort properties. Instead, it only focuses on government requirements which would increase the costs and sales price of a new home. If the stated purpose of the bill is true, one wonders why government does not impose the same requirements upon itself.

**Regulatory Problems.** The regulatory process established by this bill remains subjective, confusing and unenforceable:

- **Broad exceptions are unenforceable.** The criteria for granting exceptions (“impracticable due to poor solar resource;” or “cost prohibitive”) are subjective, lack consistent application, and therefore, are unenforceable. There are no definitions or technical standards to define “impracticable” or “cost prohibitive,” thus each architect or engineer can create their own interpretations to justify exceptions.

- **Lack of government review and supervision.** Will any government agency review the attestations of architects or engineers that the solar thermal device cannot be installed because it is either impracticable or cost-prohibitive? What government agency will enforce any violations of this law?
- **If an architect or engineer attests that a solar thermal device cannot be installed because it is either impracticable or cost-prohibitive, is the home then required to be built including a “substitute renewable energy device” or a “demand water heater device?”** It is unclear whether proposed §196- \_\_\_ (3), will require a substitute renewable energy device or demand water heater device be installed, if the installation of a solar thermal device is impracticable due to poor solar resource, or is cost prohibitive. The language of this section could be interpreted to mean that if the installation of a solar thermal device is impracticable or cost-prohibitive, then the home is required to be built with a substitute renewable energy device.
- **What happens if an architect or engineer attests that a substitute renewable energy device or a demand water heater device is impracticable or cost-prohibitive?** It is unclear whether proposed §196- \_\_\_ (3) will allow an exception to the required installation of a substitute renewable energy device, or demand water heater device, if such devices are impracticable, or is cost prohibitive. The language of this section could be interpreted to mean that the exception is only available for solar thermal devices, and that there is no exception available for substitute devices.
- **Installation procedures cannot be implemented.** The bill, which goes into effect on January 1, 2010, refers to installation pursuant to HECO’s 100-point installation inspection procedures, however, HECO will not be operating this inspection program after January 2009. Pursuant to a Public Utilities Commission decision, the HECO inspection program will be transitioned to a non-utility administrator on or about January 2009.
- **The bill lacks any operable installation procedures, standards, specifications or a procedure to create an approved products list.** With the transition of HECO’s inspection program, this bill lacks operable installation procedures, standards or specifications, and lacks a process to create an approved products list.
- **What is the legal basis for this giving a preference and requiring approval from a private company - Underwriters Laboratories, Inc. ?** We question the legality of requiring every homeowner who installs a “demand water heater device,” to obtain the approval of a private company - Underwriters Laboratories, Inc.
- **Inconsistent terminology.** The terminology in Section 1 of the bill is inconsistent with the provisions in Section 2. Section 1 refers to “solar energy device,” “comparable renewable energy device,” and “demand gas water heaters;” however, Section 2 refers to “solar thermal device,” “substitute renewable energy device,” and “demand water heater device.”

Thank you for the opportunity to express our concerns on this matter.

COUNTY COUNCIL  
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March 26, 2008

The Honorable Marcus Oshiro, Chair  
 House Finance Committee  
 State Capitol, Room 308  
 Honolulu, HI 96813

**LATE**

RE: SB 644, SD3, HD2

Dear Chair Oshiro and Members of the Finance Committee:

**I am writing as an individual Kaua'i County Council member in strong support of the intention of the bill but in opposition to that portion of the bill that creates a loophole by allowing tankless water heating.**

The purpose of the bill, to help our families become independent of fossil fuels, has been compromised by allowing demand gas water heaters which are dependent on fossil fuels and produce carbon emissions that are more than three times that produced by solar water heating.

In the chart below, "Solar-electric" means a solar system with an electric back up, "Solar-gas" means a solar system with a gas back up (this generates the least carbon emissions) and the rest are self-explanatory. You can see that solar systems with electric or gas back-ups produce the least carbon emissions as a direct result of using less fossil fuels..

Carbon Emissions Generated by Water Heating System  
 Pounds of CO2

Number of Bedrooms	Requirement	Solar-electric	Solar-gas	Electric heat pump	Tankless gas	Tankless electric	Tank gas	Tank electric
<u>1-2</u> Bedrooms	714	649	309	3894	2184	6026	3090	6490
3-4 Bedrooms	1071	974	464	5841	3276	9039	4635	9735

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How committed are we to reducing our reliance on fossil fuels and our carbon footprint? If the Legislature is serious about reducing fossil fuel dependence and carbon emissions and protecting our families against rising oil costs, I would like to offer an approach that is embodied in the attached bill which I am planning to introduce on the floor of the Kaua`i County Council in two weeks, pending review by the County Attorney.

**The Kaua`i County draft bill would allow any technology for heating water on new single family and duplex construction that meets the best practice standard of a solar water heater, expressed in terms of carbon footprint and renewable energy efficiency.** The calculations are attached to the draft bill for anyone to examine and critique. The draft bill allows a variance for any situation where it can be shown that the life cycle cost of a solar water heating system exceeds the life cycle cost of any other water heating technology. To ensure quality solar water heating systems that meet energy saving projections, it requires the solar thermal system be sized to meet 90% of the annual hot water demand, and establishes minimum requirements for sizing and orientation to the sun. It is implemented by certification by a licensed architect, electrical or mechanical engineer or licensed solar water heating system contractor. Building permit fees for such systems are waived.

I urge you to amend SB 644, SD3, HD2 to incorporate the features of the Kaua`i County draft bill that base the requirements for residential water heating on objective standards directly related to the purposes of the bill—lessening dependence on fossil fuels, decreasing carbon emissions and lowering the life cycle cost of residential water heating systems, which will stimulate the economy by hopefully injecting the money saved into the local economy. Please also incorporate our quality control standards that will ensure that families are served by properly sized and installed solar water heaters or comparable technologies that achieve the projected energy savings and allow our utilities to do accurate projections.

**As a final request, especially if you choose not to remove tankless gas, please make it clear that SB 644 does not preempt counties from creating their own requirements for energy efficient, low carbon emitting solar water heating as long as we equal or exceed the energy savings and carbon reductions established by state law. Please do not preclude our county from passing a more effective law if we can get sufficient community support to pass it.**

Thank you for your consideration of this testimony. If I can answer any questions, please do not hesitate to call me at 808-652-3988.

Sincerely,

JoAnn A. Yukimura  
Councilmember  
Attachment

DRAFT 14  
MARCH 24, 2008

ORDINANCE NO. \_\_\_\_\_

BILL NO. \_\_\_\_\_

A BILL FOR AN ORDINANCE TO AMEND SECTION 12-2.2 (217) OF THE KAUAI COUNTY  
CODE 1987 ENTITLED "BUILDING CODE"

BE IT ORDAINED BY THE COUNCIL OF THE COUNTY OF KAUAI, STATE OF HAWAII:

SECTION 1. Findings and Purpose. The Council finds that independence from fossil fuels is critical for the security and wellbeing of Kaua'i's residents and for the sustainability and vitality of Kaua'i's economy. Rising oil costs and increased dependence on foreign oil continue to place Kaua'i's families in a vulnerable position. Increasing consumption of fossil fuel will also worsen global warming, which in turn could mean increasing frequency and intensity of storms and rising sea levels for Kaua'i. This will cause significant and costly impacts to our island community as well as the larger world.

The purpose of this Bill is to require the installation of a solar water heater or a comparable renewable energy device in all new residential single-family and duplex construction. This requirement is based on a fossil fuel efficiency standard based on solar water heating. Any water heating system that meets this standard will be allowed.

Installing a solar water heater can significantly reduce energy costs for homeowners. By relying on the sun to provide at least ninety (90) percent of the hot water demand in homes, residents will use less fossil fuel based electricity or gas. This will avoid a cost that will only grow as the price of oil rises – meaning savings for Kaua'i families, renters and owners.

The requirement of solar water heating will also lower each family's carbon footprint (defined as the "total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide) and reduce Kaua'i's contribution to global warming.

This bill establishes a specific follow-up action to Resolution 2005-53, which pledged the Kaua'i County Council's support of the County of Kaua'i's participation in the effort to live by the standards of the Kyoto Protocol and the U.S. Mayors Climate Protection Agreement to fight global warming, by which the Kaua'i County Council unanimously approved. Mayor Bryan J. Baptiste has also formally endorsed the County of Kaua'i's commitment.

This Bill is also consistent with the Hawai'i Energy Strategy (HES), updated in 2000, which recognizes that Hawai'i is the most oil-dependent of the fifty (50) States, relying on oil for 90% of its primary energy while having the highest prices for energy and fuel in the nation. The Bill meets all four (4) HES objectives: 1) Dependable, efficient, and economical Statewide energy systems capable of supporting the needs of people; 2) Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased; 3) Greater energy security in the face of threats to Hawai'i's energy supplies and systems; and 4) Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use.

The purpose of this Bill is to improve and protect the health, safety, and general welfare of the people of Kaua'i.

SECTION 2. The Kaua'i County Code (KCC) is hereby amended by amending Section 12-2.2 (217) as follows:

"Chapter 11 – ENERGY [EFFICIENC] EFFICIENCY

**N1101. General.** The energy efficiency related requirements for the design and construction of buildings related by this Code shall comply with Chapter 13 Solar Energy System, International Building Code and Article 6, Chapter 12, Building Code, Kaua'i County Code 1987 as amended.

**N1104. Service Water Heating.**

**N1104.1 Water heating appliance and equipment performance.** Performance of equipment listed in Table N1104.1 is covered by preemptive Federal law. Appliances and equipment not listed in Table N1104.1 shall meet the minimum efficiency requirements of Section 504.2 of the *International Energy Conservation Code*.

**N1104.2 Definitions.**

Unless otherwise expressly states, whenever used in this Article, the following terms shall have the following meanings:

**British thermal unit, BTU:** the amount of heat required to raise the temperature of one pound of water from 59°F to 60°F.

**building:** Defined as stated in Chapter Two (2) of the 2003 International Residential Code for One and Two-Family Dwellings.

**collector direction/orientation:** The compass direction the collector faces, expressed in true degrees.

**collector ratings:** BTU output per collector per day in Solar Rating & Certification Corporation protocol OG-100 format for Category C for cloudy day, mildly cloudy and clear day sky conditions, correlated to the State of Hawaii Department of Planning & Economic Development Sunshine Map of Kauai at 300, 400, and 500 calories per square centimeter per day and interpolated linearly at 350 and 450 and extrapolated to 550 calories per square centimeter per day.

**collector tilt:** the angle by which the collector plate is tilted, expressed in degrees.

**forced circulation system:** a solar heating system where water circulation through the collector is accomplished mechanically, e.g. with a powered pump.

**fossil fuel efficiency standard:** a standard expressed in BTUs for delivering a specific amount of water heating, using no more than a specified amount of fossil fuel.

**photovoltaic module:** in the context of solar water heating system, a device to convert sunlight to electricity, usually to power the pump in a forced circulation solar hot water heating system.

**solar electric water heating system:** a hot water heating system which obtains its energy to heat water primarily from sunshine, using electricity as a backup source.



**solar propane water heating system:** a hot water heating system which obtains its energy to heat water primarily from sunshine, using propane as backup fuel.

**solar fraction:** the contribution by the solar water heating system to the average daily water heating requirements. A function of the actual system hot water storage, design finish tank temperature, daily BTU requirement to achieve design finish tank temperature, and daily collector output as determined by collector tilt, orientation and sunshine zone.

**Thermo siphon system:** a solar water heating system where water circulation through the collector is accomplished using the heat difference between water in the storage tank and collector, as compared to a powered pump.

#### **N1104.3 Energy efficient water heating for new construction.**

(a) Except as otherwise specified in this section, no building shall be equipped with an electric resistance water heater, gas heater, or tankless, on-demand electric water heater, unless:

- (1) An electric resistance water heater, gas heater, or tankless, on-demand electric water heater is used in conjunction with a solar water heater;  
or
- (2) An electric resistance water heater, gas heater, or tankless on-demand electric water heater is used in conjunction with an alternative energy efficient water heating system that is certified by a licensed architect, electrical or mechanical engineer, or licensed solar water heating system contractor that when used together, meets the fossil fuel efficiency criteria as stated in Sec N1104.4.

(b) The solar or other energy efficient water heating system shall be sized to meet at least ninety (90) percent of the annual hot water demand for any building covered by this section. The plans and specifications shall show in sufficient detail all pertinent data and features of the building and the equipment and systems including; but not limited to: exterior envelope component materials, U-values of the respective elements including insulation, R-values of insulating materials, size and type of apparatus and equipment, equipment and system controls, and other pertinent data to indicate compliance with the requirements of this Section.

(c) The solar or other alternative energy efficient water heating system shall be in compliance with this section as certified by a licensed architect, electrical or mechanical engineer, licensed solar water heating system contractor, or licensed plumber and a permit shall be obtained prior to installation.

(d) Plan review fees and building permit fees shall not be required for the

installation of a solar water heating system.

(e) A variance may be granted if the Code Official finds that the estimated life cycle (15 years) cost of the solar water heating system exceeds the life cycle cost of any other water heating technology.

#### **N1104.4 Residential Water Heating Fossil Fuel Efficiency Standard**

**(a) Applicability**

The requirements of this section shall apply to new water heating systems and equipment installed in new residential buildings as defined in Section 1104.2.

**(b) Exemptions.**

(1) Hotels, motels, or any building intended primarily for manufacturing or for commercial or industrial processing shall be exempt from this section.

**(c) Efficiency.**

All residential buildings covered by this section shall meet the following fossil fuel efficiency standard as shown in Table N1104.2.

Table N1104.2 Required Efficiency Standard

<u>Number of Bedrooms</u>	<u>Daily Water Heating</u>	<u>Maximum Annual Carbon Footprint</u>	<u>Maximum Annual kWh consumption</u>	<u>Maximum Annual Propane consumption</u>
<u>1 - 2 bedrooms</u>	<u>36.652 BTUs</u>	<u>714 lbs CO<sup>2</sup></u>	<u>444 kWh</u>	<u>27 gallons</u>
<u>3 - 4 bedrooms</u>	<u>54.978 BTUs</u>	<u>1071 lbs CO<sup>2</sup></u>	<u>666 kWh</u>	<u>40 gallons</u>
<u>Add this amount for each additional bedroom</u>	<u>+9.163 BTUs</u>	<u>+179 lbs CO<sup>2</sup></u>	<u>+111 kWh</u>	<u>+15 gallons</u>

**Comment [w1]:** Doug will provide appropriate language to specify single family and multi-family residential, but to excluded hotels and commercial.

**(d) Compliance**

A water heating system shall meet this standard if it meets any of the following criteria:

(1) For water heating systems that use electricity as a backup heating source:

(A) A water heating system shall meet this standard if it is a solar electric hot water heating system that complies with all the specifications of Sec. N1104.4(e).

(B) An electric water heating system shall meet this standard if it is capable of delivering the specific amount of water heating required in Table N1104.2 using no more than the kWh shown.

(C) An electric water heating system shall meet this standard if it is capable of delivering 30,130 BTUs of water heating per kWh.

(2) For water heating systems that use LP gas as a backup heating source:

(A) A water heating system shall meet this standard if it is a solar propane water heating system that complies with all the requirements of Sec N1104.4(e)

(B) A propane water heating system shall meet this standard if it is capable of delivering the specific amount of daily water heating required in Table N1104.2 and using no more than the maximum annual propane consumption allowed.

(C) A propane water heating system shall meet this standard if it is capable of delivering 238,900 BTUs of water heating per gallon of propane.

**Comment [w2]:** Doug will provide language about the architect being responsible for insuring the design complies.

(3) A water heating system based on another type of fossil fuel shall meet this standard if it is capable of delivering the specific amount of daily water heating required in Table N1104.2 and produces only the maximum annual fossil fuel usage allowed.

(e) Solar Thermal Design Elements

(1) System Sizing. Systems shall be sized to yield an acceptable solar fraction as defined in Sec. N1104.2.

(A) Water Storage. The minimum water storage for the combined capacity of the solar hot water heating system shall be based on the number of bedrooms as shown in Table N1104.3

Table N1104.3

<u>Number of Bedrooms</u>	<u>Nominal Storage Capacity (in gallons)</u>
<u>1 – 2 bedrooms</u>	<u>80</u>
<u>3 – 4 bedrooms</u>	<u>120</u>
<u>Each additional bedroom</u>	<u>+20</u>

(B) Tank Temperature. Tank temperature rise for system sizing shall be 55°F to 120°F.

(C) Daily BTU Requirement. The daily BTU requirement shall be determined by multiplying the total actual system storage in gallons by 8.33 pounds per gallon and by 55 BTU per pound for a 55°F temperature rise. Table N1104.4 lists the daily BTU requirements for common nominal size residential storage tanks.

Table N1104.4

<u>Nominal Storage Capacity (in gallons)</u>	<u>Daily BTU Requirements</u>
<u>80</u>	<u>36,652</u>
<u>120</u>	<u>54,978</u>

(D) Solar Fraction. The system design solar fraction shall be not less than ninety (90%) percent of the total actual system storage BTU requirement.

(2) Collector Orientation & Size.

(A) Collector Tilt. Collectors shall be tilted not less than 14° or more than 60° from the horizontal. Forced circulation system collectors and thermo siphon systems mounted on roofs with a pitch less than 14° shall be tilted to a minimum of 20° and a maximum of 30°. Collectors mounted on roofs with a pitch above 35° shall have the rated output rating de-rated by the percentages listed in the Table N1104.5. Collector tilt factors shall be determined by rounding the collector tilt to the nearest 5°.

Table N1104.5

Tilt (in degrees)	Additional Collector BTU Required
14°	0
35°	0
40°	5%
45°	10%
50°	15%
55°	20%
60°	25%

(B) Collector Direction. Collectors shall be oriented between South of due East and South of due West. Collectors oriented east of 135° true or west of 225° true shall have the rated output de-rated by the percentages shown in Table N1104.6. This figure shows allowable collector orientations and orientation factors corrected for magnetic deviation.

Table N1104.6

Collector Direction (True)	Rating Adjustment
135° - 180° - 225°	Full Rating
225° - 235°	5%
235° - 245°	10%
245° - 255°	15%
255° - 270°	20%
270° - 0° - 90°	Not Allowed
90° - 105°	25%
105° - 115°	15%
115° - 125°	10%
125° - 135°	5%

(C) Collector Ratings. Collectors shall be rated by a recognized independent testing laboratory for domestic water heating applications. Ratings shall be expressed in BTU output per collector per day in Solar Rating & Certification Corporation protocol OG-100 format for Category C for cloudy day, mildly cloudy and clear day sky conditions and shall be correlated to the Department of Business, Economic Development, and Tourism Sunshine Map at 300, 400, and 500 calories per square centimeter per day and interpolated linearly at 350 and 450 and extrapolated to 550 calories per square centimeter per day.

(3) Controllers and Instrumentation.

(A) Controller. The controller shall automatically control the operation of the circulating pump so that optimum system performance is attained. The controller shall be compatible with the circulating pump or the pump power supply, or both. Controller sensors shall be thermistors that conform to the manufacturer's specifications for the controller.

(B) Photovoltaic Module. Photovoltaic modules used as circulating pump power supplies shall be compatible with the pump's performance rating and power requirements. Photovoltaic modules shall be installed with the same tilt and orientation as the system collectors.

(C) Time Switches. All systems shall have time switches, which control the operation of the auxiliary heating system so that the auxiliary heating system will normally be off during the solar day.

(D) Temperature Measuring Device. A temperature-measuring device shall be provided to measure the temperature of the storage tank, which directly supplies the hot water load. Acceptable temperature measuring devices are temperature gauges and electronic temperature devices. In forced circulation systems, the temperature-measuring device shall be installed at the hot water outlet port on the tank, which directly supplies the domestic hot water load. In thermo siphon systems, the temperature-measuring device shall be installed only on an accessible hot water supply after the storage tank and before any hot water fixture; the device shall not be required on inaccessible hot water supply lines.

(4) Plumbing.

(A) Piping. Solar supply and return pipe shall be sized to attain total collector design flow rate in conjunction with length of pipe run and pump size. The pipe size for forced circulation systems with not over 120 square feet of collector area and not over 120 feet total round trip distance shall be one half (1/2) inch minimum. The pipe size for forced circulation system with a collector area of over 120 square feet or over 120 feet round trip, or both distances shall be three quarter (3/4) inch minimum. The pipe size for thermo siphon systems for the interconnecting piping shall be three quarter (3/4) inch minimum.

(B) Piping Insulation. Piping insulation shall be flexible and elastometric with a minimum wall thickness of one half (1/2) inch and a minimum design temperature of 220°F. Insulation shall be installed on all hot water piping in the system, including solar supply and return lines and up to six (6) feet on accessible hot and cold water supply pipe leading to the system. Insulation is not required on the cold water supply line to thermo siphon systems. The tank temperature & pressure relief overflow line and collector pressure relief overflow line, where present, shall be insulated to within twelve (12) inches of the end of exposed pipe. Insulation butt joints shall be sealed in accordance with manufacturer's recommendations. Packing of insulation butt joints in attics and within walls, in lieu of sealing, is acceptable. Abutment of valves, unions and tees with pipe insulation is acceptable. Insulation shall not restrict the operation of any valve. Collector headers and interconnections shall be insulated. Collector headers' and interconnections' insulation may be slit and ny-tied without sealing. The entire circumference of roof top-exposed insulation shall be UV protected. Acceptable UV protection is latex based paint or other approved product. UV protection of insulation on exterior vertical piping is acceptable.

SECTION 3. If any provision of this Chapter is held invalid, such invalidity shall not affect other provisions or application of this Chapter which can be given effect without the invalid provision or application, and to this end, the provisions of this Chapter are declared to be severable.

SECTION 4. This ordinance shall take effect ninety (90) days after its approval. The requirements of this ordinance shall not affect any building permit application which has been approved by the Code Official prior to the effective date of this ordinance."

DISCLAIMER: The following shall not be included as part of the Bill, but is attached for information to show how the calculations in Table N1103.1 and N1104.4 were derived

## Appendix A – Reference Standard Solar Hot Water Electricity Consumption Calculations

The following calculation shows the fossil fuel consumption of a solar electric hot water heating system delivering 36,652 BTUs of water heating daily (a typical 1 – 2 bedroom home) and is based on the following assumptions, constants, and conversion factors.

- Solar-electric hot water heating systems, appropriately sized and designed to achieve solar fraction of at least 90%, that is to say 10% of the annual BTU requirement will come for the electric backup resistive heating element.
- 16,600 BTU of heating requires 4.9kWh of electricity
- The electric resistive heating element is 98% efficient, i.e. on 2% of the electricity is not converted to heat in the storage tank
- A base load heat rate for the electric utility of 10,000 BTU/kWh
- 161 lbs CO<sup>2</sup> / M BTU from combusting diesel

Calculation for this standard was performed as follows:

$$\text{AnnualHotwaterBTUfromElectricity} = \text{DailyHotwaterBTU} \times 365 \times (1 - \text{SolarFraction})$$

$$\text{AnnualKWH} = \frac{\text{AnnualHotwaterBTUfromElectricity}}{\text{ElectricBackupHeatingElementEfficiency}} \times \frac{4.9\text{KWH}}{16,600\text{BTU}}$$

$$\text{AnnualCO}_2 = (\text{AnnualKWH} \times \text{KIUCHeatRate} \times 0.000161) \times 110\%$$

The representative calculation for a 2 bedroom dwelling is as follows

$$\text{AnnualHotwaterBTUfromFossil} = 1337798 \text{ BTU} = 36,652 \times 365 \times (1 - .9)$$

$$\text{AnnualKWH} = 403\text{KWH} = \frac{1337798}{.98} \times \frac{4.9\text{KWH}}{16,600\text{BTU}}$$

$$\text{AnnualCO}_2 = 649\text{lbsCO}_2 = 403\text{KWH} \times 10000 \times 0.000161$$

Setting the solar fraction to zero, the same calculations show a typical electric water heater without solar water heating uses 4030 KWH of electricity annually and produces 6490 lbs of CO<sub>2</sub> annually.

## Appendix A2 – Reference Standard Solar Hot Water Propane Consumption Calculations

The following calculation shows the fossil fuel consumption of a solar electric hot water heating system delivering 36,652 BTUs of water heating daily (a typical 1 – 2 bedroom home) and is based on the following assumptions, constants, and conversion factors.

- Solar-electric hot water heating systems, appropriately sized and designed as specified in this document, will achieve solar fraction of at least 90%, that is to say 10% of the annual BTU requirement will come for the electric backup resistive heating element.
- Each gallon of propane contains 91,500 BTUs
- The propane tank water heater is 60% efficient. (Although propane is a more efficient fuel than electricity for heating, a great deal of the heat created by burning propane goes up the flu, leaving only this much to heat water in the storage tank.)
- 12.7 lbs CO<sup>2</sup> / gallon propane

Calculation for this standard was performed as follows:

$$\text{AnnualHotwaterBTUfromLP} = \text{DailyHotwaterBTU} \times 365 \times (1 - \text{SolarFraction})$$

$$\text{AnnualLP} = \frac{\text{AnnualHotwaterBTUfromLP}}{\text{LPBackupHeatingElementEfficiency}} \times \frac{1 \text{ gallon}}{91,500 \text{ BTU}}$$

$$\text{AnnualCO}_2 = (\text{AnnualKWH} \times \text{KIUCHeatRate} \times 0.000161) \times 110\%$$

The representative calculation for a 2 bedroom dwelling is as follows

$$\text{AnnualHotwaterBTUfromFossil} = 1337798 \text{ BTU} = 36,652 \times 365 \times (1 - .9)$$

$$\text{AnnualKWH} = 24.4 \text{ gallons} = \frac{1337798}{.6} \times \frac{1 \text{ gallon}}{91500 \text{ BTU}}$$

$$\text{AnnualCO}_2 = 309 \text{ lbs CO}_2 = 24.4 \text{ gallons} \times 12.7$$

Setting the solar fraction to zero, the same calculations show a typical propane water heater without solar water heating uses 244 gallons of LP annually and produces 3090 lbs of CO<sub>2</sub> annually.



**BIA-HAWAII**  
**BUILDING INDUSTRY ASSOCIATION**

March 26, 2008  
Committee on Finance  
11 a.m.  
Conference Room 308

**LATE**

The Honorable Marcus Oshiro, Chair and Member  
Committee on Finance  
State House of Representatives  
State Capitol, Room 308  
Honolulu, Hawaii 96813

Dear Chair Oshiro and Members:

**Subject: Senate Bill No. SB 644 SD 3, HD 2 Relating to Energy Resources**

I am Karen Nakamura, Chief Executive Officer of the Building Industry Association of Hawaii (BIA-Hawaii). Chartered in 1955, the Building Industry Association of Hawaii is a professional trade organization affiliated with the National Association of Home Builders, representing the building industry and its associates. BIA-Hawaii takes a leadership role in unifying and promoting the interests of the industry to enhance the quality of life for the people of Hawaii.

**BIA-Hawaii strongly opposes S.B. No. 644 SD 3, HD 2.**

The bill proposes to amend Chapter 196 HRS to allow the Department of Business, Economic Development and Tourism to require that as of January 1, 2010, all new single-family residential construction will be required to install a:

- **Solar thermal water heating device;**
- **Substitute renewable energy device; or**
- **Demand water heater device.**

**The solar thermal water heating device** must be installed by a licensed installer in compliance with all manufacturer and industry standards. The licensed installer of the device, or the architect or engineer licensed under chapter 464, shall submit a written attestation to the county building code authority stating that the installed device is suitably sized for the number of people expected to occupy the dwelling and meets the applicable county building code, unless the installation is:

- a) Impracticable due to poor solar resource; or
- b) Cost prohibitive.

If impracticable or cost prohibitive, **a substitute renewable energy device** that is the most practical, energy-efficient substitute device available shall be installed, as determined by an architect or engineer licensed under chapter 464, and the architect or engineer shall attest in writing that a solar thermal device cannot be installed for the reasons stated, and submits the written attestation on behalf of the building permit holder to the county building code authority;  
or,

**A demand water heater device** approved by Underwriters Laboratories Inc., is installed. For the purposes of this paragraph, "demand water heater" means a tank-less, instantaneous water heater that provides hot water only as it is needed through the use of a gas burner.

The bill also proposes to amend Section 235-12.5, HRS to allow for the:

1. Reducing of the Solar Thermal Energy System Tax Credit from 35% to 15% on single-family dwellings constructed after January 1, 2010, conditioned on continued applicability of Hawaiian Electric Company's solar water heater equipment, use, and installation standards program, including its 100-point rating scale for solar water heating units and rebate, to these solar thermal energy systems; and
2. Reducing the Solar Thermal Energy System Tax Credit from 35% to 20% on single-family dwellings constructed before January 1, 2010.

As proposed, the developer of one or more single family residential units will receive a tax credit of 15% of the cost of the system or \$2,250 whichever is less for a solar thermal water heater. On a \$5,000 system, this tax credit would amount to \$750. The remaining \$4,250 would be added to the price of the new unit. There is no information on an approximate cost of either a substitute renewable energy device, or a demand water heater device. These costs are in addition to existing government exactions for:

- Schools (DOE Fair Share Contribution);
- Roads (impact fees);
- Sewer (meter charges);
- Water (meter/development charges); and
- Parks.

This does not include other public facilities charges for police or fire stations that are associated with larger developments. In addition, there are inclusionary zoning requirements for affordable housing placed on rezoning at the county. For example, the City and County of Honolulu requires 30% of the total number of units in a development to be affordable: 10% priced at the 80% and below HUD median income limit and 20% priced at the 120% and below HUD median income limit.

For 2008, the HUD median income limit for a family of 4 in Honolulu is \$77,300. Assuming a 6%, 30 year fixed mortgage with \$10,000 down, the maximum price would be approximately \$275,000. The maximum prices for the 80% to 120% income limits would be between \$270,000 and \$328,000. These prices are inclusive of all the government exactions listed earlier, and the pro-rata share of the internal infrastructure costs required for the project.

This bill was submitted during the 2007 Legislative Session and has been revived based on crude oil prices exceeding \$100 per barrel. Based on this increase, the legislature initially believed that it is the appropriate time to shift the burden of the state's energy policy from state funded incentives to mandates on all new residential construction. However, the latest version of the bill (HD 2), the legislature is now proposing mandates with reduced incentives. While we agree that the rising price of fossil fuels will cause all of us to reconsider how we all use our limited resources, we question why government intervention is needed in this particular case. Mandating solar water heaters in all new construction seems to imply that new home buyers lack the ability to make this choice in light of the raising price of fossil fuels.

If the concern is truly to conserve energy and reduce our dependency on fossil fuels providing true transportation alternatives which currently uses 63% of our imported oil compared to 30% used for electricity may provide for more immediate and long-term benefits.

We believe that the choices, not mandates should be the role of government especially when the government intervention goes beyond its basic role of providing for our public health, safety or welfare. We do not support government interference in the free market system. The choice of a hot water heating system for a homeowner should be governed by market incentives rather than regulation. Compliance with these types of regulations will increase the cost of the homes in Hawaii, and impact the delivery of affordable housing units

Finally, the bill does not discuss how the State DBEDT will implement and more importantly enforce this mandate. Some consideration should be given the staffing and resources required to monitor and enforce this program, including some type of process to adjudicate situations where there is non-compliance.

Thank you for this opportunity to express our views.

*Karen I. Nakamura*

# **BIA-HAWAII**

**BUILDING INDUSTRY ASSOCIATION**

## **ADDENDUM TO BIA TESTIMONY OF KAREN NAKAMURA**

Committee on Finance Hearing

March 26, 2008

11 a.m.

Conference Room 308

### **RE: SB 644, SD3, HD2, "Relating to Energy Resources"**

Chair Oshiro, Vice Chair Lee and Members of the Committee on Finance:

I am Karen Nakamura, Chief Executive Officer of the Building Industry Association of Hawaii (BIA-Hawaii). I apologize that I could not be present this morning for the hearing.

BIA-Hawaii's testimony was submitted earlier; however, we have just received the following information from a few of our developer-builder members regarding their efforts to install solar water heating in their projects:

1. Gentry Homes has shared an aerial view of two of their projects that were built in 2005 and 2006 that show solar units on the roof. This photo (attached) was taken in early 2006. The majority of the lots adjacent to the golf course have been built since this photo was taken and the new homes all will have solar as a standard feature. The homes built by Gentry that have solar as a standard feature are as follows:

2005 – 207 units

2006 – 179 units

2007 - 160 units

2. Mark Development (Craig Watase)  
Solar is standard at their Ke Ola O Pokai Bay project ( 125 homes- 40 built)  
Solar was installed at all 70 units at Kapolei Ho'olimalima.
3. Castle & Cooke Homes is offering solar as an option at their Makakilo and Waikoloa projects. Solar is standard at their Nohona @ Kapolei (118 multi-family). Solar in single family homes are installed in the garage and are not enclosed.

Thank you for the opportunity to provide this additional information.

*Karen I. Nakamura*

# ***Gentry Solar Powered Homes***





**LATE**

HOUSE OF REPRESENTATIVES  
REGULAR SESSION OF 2008

**COMMITTEE ON FINANCE**

RE: SB644 SD3, HD2 RELATING TO ENERGY RESOURCES

ON BEHALF OF R&R SOLAR SUPPLY, I SUBMIT ATTACHED TESTIMONY FOR THE ABOVE REFERENCED BILL.

Chair OSHIRO, Vice Chair LEE, Committee Members,

My name is Rolf Christ.

Outside of the solar industry it is a little known secret that we have manufactured flat plate solar collectors here in Hawaii for over 25 years. Since our founding, this has amounted to over 30,000 solar collectors produced and all installed here in the State of Hawaii. Recent federal survey data shows that we manufactured 8% of the total collectors produced in the U.S. in year 2006 alone. In addition to those figures we have bought and sold thousands more solar collectors manufactured on the mainland. It is our goal and the goal of the solar industry in Hawaii to promote and increase the use of solar to heat water and maintain our high industry standards.

I'm testifying in opposition to HD 2 of this bill.

It is a poor attempt to address all concerns of the parties opposing the solar mandate for various reasons.

I have talked to most of the parties opposing the mandate and many parties favoring it. The main objective of the bill is to increase the use of solar hot water systems. This goal is currently achieved with various incentives and a high energy cost. Mandating solar for new construction only and reducing incentives could result in less installations than the current incentive system, which has given us the highest penetration per capita in the nation.

All parties opposed to HD2, that I talked to, have indicated that mandating a "solar ready" house is preferred to the current proposals in HD2.

It also is GUARANTEED to increase installations vs. the current incentives system alone.

**"Solar ready" is defined as follows**

**The builder shall provide a heater location that is a minimum of 6 foot tall and have a minimum floor space of 34"x34".**

**R&R Services, Inc.      922 Austin Lane Bldg D      Honolulu, HI 96817**  
**Phone: (808) 842-0011      Fax: (808) 847-4938**

**The builder shall provide 2ea 1/2" nominal copper lines, insulates with a minimum 1/2" wall pipe insulation, able to withstand 220 degrees F.**

**The pipe together with a minimum 18 gauge 2 conductor wire shall start at the heater location and terminate in a south facing attic space or penetrate a south facing roof, if no attic is available.**

**Third, the builder shall provide a 120 volt outlet in the heater area, in case the solar system utilizes an AC pump.**

This simple mandate would increase the cost of a new house by less than \$500.

It would also reduce the amount the state pays in tax credits, because the builder cannot claim a credit on the pre-piping, which reduces system cost later.

It still allows the homeowner to choose a system matching his needs and a system of his choice of quality, type and warranty.

Since the home owner has more motivation now to install solar in a "solar ready" house, but still is not forced to, rebates and tax credits can stay in place to help him reduce the cost of the system.

With rebates in place, those installations would have to follow all standards and specifications in effect at the time of installation.

The rest of my testimony addresses all the concerns with a system mandate, that would be eliminated with the "solar ready" approach.

Outside of the solar industry it is a little known secret that we have manufactured flat plate solar collectors here in Hawaii for over 25 years. Since our founding, this has amounted to over 30,000 solar collectors produced, all installed here in the State of Hawaii. Recent federal survey data shows that we manufactured 8% of the total collectors produced in the U.S. in year 2006 alone. In addition to those figures we have bought and sold thousands more solar collectors manufactured on the mainland.

Most of our product is sold to plumbing and solar contractors, who in turn offer our products to home owners. In most cases homeowners are offered products from 2 or more contractors with differing product quality, sizing, labor and product warranties. Competition is fierce and inferior products and "fly by night" contractors are singled out and do not prevail in the market place. Also, standards developed by Hawaiian Electric Company, with input from the plumbing and solar industries, have kept the quality of our solar systems above most of the rest of the nation. I brought with me examples of solar collectors from both ends of the cost spectrum. For a home owner with rebates and tax credits available, it is an easy decision to choose a longer lasting, more efficient product, even if it is more expensive. For a builder or developer who has no interest in the effectiveness or longevity of the product after the house is sold, it might be as easy

a choice to pick a cheaper product, that unfortunately produces less hot water, won't last as long or has a shorter warranty.

We also find it is difficult to properly size a system without knowing the needs of the family using it.

Right now, all utility rate payers and all taxpayers are financially supporting the purchase of solar hot water systems by paying for rebate and credits to distribute the impact of the purchase price. Rate payers benefit by deferring the construction of a power plant. The State of Hawaii and its residents benefit economically, their dollars staying and circulating within Hawaii instead of leaving the state for the purchase of oil. Because of this, systems are very affordable and market penetration in Hawaii is second to none in the nation.

Mandating systems will raise the net cost of a solar hot water system to the homeowner by eliminating various incentives available to the people of Hawaii, and inevitably adding a builders mark-up, an additional system cost avoided by direct sales between contractors and homeowners.

50 % of owner-occupied homes in Hawaii already have solar systems installed, a percentage that increases every year. High oil prices are incentive enough for citizens, and a major driver to increase market penetration without a mandate. Hawaii's solar market is already a showcase for the nation thanks to the foresight of the proactive legislative body here in our state. Please don't try to fix something that isn't broken.

ROLF CHRIST

A handwritten signature in black ink, appearing to read 'Rolf', with a long horizontal line extending to the right.

PRESIDENT



# HAWAII RENEWABLE ENERGY ALLIANCE

46-040 Konane Place #3816, Kaneohe, HI 96744 – Telephone/FAX: 247-7753 – Email: wsb@lava.net

## Officers

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Warren S. Bollmeier II

Vice-President  
John Crouch

Secretary/Treasurer  
Cully Judd

## Directors

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WSB-Hawaii

John Crouch  
PowerLight Corporation

Cully Judd  
Inter Island Solar Supply

Herbert M. (Monty) Richards  
Kahua Ranch Ltd.

## TESTIMONY OF WARREN BOLLMEIER ON BEHALF OF THE HAWAII RENEWABLE ENERGY ALLIANCE BEFORE THE HOUSE COMMITTEE ON FINANCE

### SB 644 SD3 HD2, RELATING TO ENERGY RESOURCES

March 26, 2008

Chair Oshiro, Vice-Chair Lee and members of the Committee, I Warren Bollmeier, testifying on behalf of the Hawaii Renewable Energy Alliance (HREA). HREA is a nonprofit corporation in Hawaii, established in 1995 by a group of individuals and organizations concerned about the energy future of Hawaii. HREA's 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 HREA's 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 purposes of SB 644 SD3 HD2 are to: (1) requires installation of solar thermal or demand water heaters in single-family residences constructed after 1/1/2010; (2) reduce to 20%, Renewable Energy Tax Credit for solar thermal systems in single-family residences constructed before 1/1/2010; and (3) extend the credit at 15%, on certain conditions, to residences constructed after 1/1/2010.

HREA **supports the intent of this bill**, which is to increase the number of solar thermal energy systems in Hawaii. However, we **cannot support** the bill as drafted, and offer the following comments for the committee's consideration:

- (1) Summary of our objections? If there is to be a mandate, it should be only for **solar thermal energy systems**, and **NOT** include **comparable renewable energy devices**. A mandate will work **ONLY** if quality solar systems are designed, installed and maintained. The **utility** is the caretaker now **for quality control**. It appears that the bill will make the **homebuilder** the new caretaker. This approach will be **problematic**. An entity is needed to be the **caretaker**.
- (2) Is there a HD3 that could resolve our concerns? That is the \$64 dollar question. Following the previous hearing, HREA has collaborated to draft a proposed HD3 with the Hawaii Solar Energy Association, Life of the Land and the Sierra Club for the committee's consideration. We **support the proposed HD3** as we believe it provides the best chance for achieving the goals of the bill and resolving our concerns. However, we believe we all most go into this new brave world with our **eyes wide open**. There are a number of assumptions, as described by HSEA in their testimony that are critical to the success of the proposed solar mandate. The most important of these assumptions we believe is the role of the Public Benefits Fund ("PBF") Administrator (to be established by the Public Utility Commission). The PBF Administrator has been alternately referred to as the third party utility and the energy efficiency utility. In any case, the Administrator or new utility will be providing services previously provided by HECO. We believe it is absolutely critical that **HECO's quality control approach and system** must be transferred intact to the Administrator and maintained and improved if possible.

**LATE**

Thank you for this opportunity to testify.

## FINTestimony

---

**From:** Windward Ahupua`a Alliance [info@waa-hawaii.org]  
**Sent:** Tuesday, March 25, 2008 11:06 PM  
**To:** FINTestimony  
**Subject:** SB 644 SD3, HD2

### SUBMITTED BY:

*Windward Ahupua`a Alliance*

P.O. Box 6366

Kane`ohe, HI 96744

Phone: 808/247-6366; Cellular: 808/223-4481 or 224-4496

E-Mail: info@waa-hawaii.org

Website: <http://www.waa-hawaii.org>

# LATE

**COMMITTEE ON FINANCE**  
**Rep. Marcus Oshiro, Chair**  
**Rep. Marilyn B. Lee, Vice Chair**

**PUBLIC HEARING**  
**11 am**  
**Wednesday, March 26, 2008**  
**Conference Room 308**

**SB 644 SD3, HD2**

**STRONGLY SUPPORT HD1 WITH ADDITIONAL AMENDMENT; DELETE HD2**

### TO THE COMMITTEE ON FINANCE:

My name is Shannon Wood, *Interim President* of the *Windward Ahupua`a Alliance*, a 501c3 non-profit organization. *WAA* considers local, national & international energy policies and their impacts upon climate change & sea level rise to be critically important in determining if humankind will be around seven generations - 150 years - from now.

Unfortunately, **SB 644 SD3, HD2** takes a **HUGE** step backwards by allowing "gas drive demand heating appliances" as an alternative to solar water heaters. Most gas comes from oil and that's exactly what we're trying to wean ourselves away from by mandating solar energy. Furthermore, it would have to be transported across the *Pacific Ocean* by ships using diesel fuel.

Yes, I know about methane and volcanic gases, but no one is seriously discussing these as a direct fuel resource here in Hawai`i -especially O`ahu.

There should be **NO** reduction in credits and the expiration date for construction of new housing should be extended to 2015 since it will take that long for many projects - especially those receiving some sort of public funding - to get started.

3/26/2008

We urge that you delete **HD2** and return to **SB 644 SD3 HD1** and amend the bill by extending the expiration date.

*Mahalo* for the opportunity to provide input on this critically important issue.

*The Windward Ahupua`a Alliance works to educate & inform residents, visitors, businesses, policymakers, and the media about using Smart Growth planning principles which promote sustainability. These include: Designing long-term waste management systems; improving illegal dumping/derelect vehicle legislation & enforcement; developing & implementing comprehensive curbside recycling programs; providing research & support on public access issues; establishing both state & county-level "legacy lands" funds to support affordable workforce housing initiatives and critical land purchases to protect against inappropriate development; creating alternative energy systems to reduce Hawai`i's dependency on fossil fuels & to mitigate the impacts of global warming; and, setting long-term watershed protection policies based upon ahupua`a concepts & principles.*

## FINTestimony

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**From:** val loh [vallohfoto@yahoo.com]  
**Sent:** Tuesday, March 25, 2008 7:12 PM  
**To:** FINTestimony  
**Cc:** hooser1 - Debra  
**Subject:** Please pass SB644 SD3 HD2

# LATE

Dear Senators and Everyone else concerned with the energy future of Hawai'i:

Please pass SB644 SD3 HD2. This bill will require solar water heaters (or on-demand gas water heaters) on new homes constructed after 2010.

Our family has installed and used solar for our water heaters for about 20 years and we can attest to the benefits of a cleaner, cheaper energy technology. While it is true that installing solar water heater systems are more expensive up-front, our monthly bills have been much less costly than if we had relied solely on electricity.

As you already know, the oil we use to generate electricity is getting more and more expensive. We would like to see Hawai'i become less dependent on foreign oil, and for us in the islands, all oil is foreign and must be shipped here.

Solar water heaters make sense, even if the sun doesn't shine every day because it keeps our costs down, as well as lessens our need for oil based energy.

It's obvious that no single technology will be the miracle solution to the world's energy needs, but solar is an important part of the many solutions we need to implement so that Hawai'i can eventually become energy independent.

Thanks very much for caring for and helping with Hawai'i's future!

Aloha nui,  
~Val Loh  
Honolulu, HI 96816

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## FINTestimony

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**From:** Laurel Brier [browerr001@hawaii.rr.com]  
**Sent:** Tuesday, March 25, 2008 6:39 PM  
**To:** FINTestimony  
**Subject:** Support Solar Water Heating *SP 644*

**LATE**

IT IS IMPERATIVE THAT WE TAKE MORE ACTION TOWARD SUSTAINABILITY AND ENERGY INDEPENDENCE. IT'S SO RIGHT. REQUIRE SOLAR WATER HEATERS ON NEW CONSTRUCTION. IT BENEFITS EVERYONE. AND PLEASE KEEP THE TAX CREDIT AT ITS CURRENT 35%.

MAHALO NUI LOA  
LAUREL BRIER & FAMILY  
ANAHOLA, KAUA'I

3/26/2008

Testimony: FINtestimony@Capitol.hawaii.gov

COMMITTEE ON FINANCE  
Rep. Marcus R. Oshiro, Chair  
Rep. Marilyn B. Lee, Vice Chair

**LATE**

Wednesday, March 26, 2008  
11:00 A.M.  
Conference Room 308

SB 644, SD3, HD2 Requires installation of solar thermal or demand water heaters in single-family residences constructed after 1/1/2010; Reduces to 20%, Renewable Energy Tax Credit for solar thermal systems in single-family residences constructed before 1/1/2010; Extends the credit at 15%, on certain conditions, to residences constructed after 1/1/2010.

Honorable Committee Members,

I work in solar industry and help in the design and implementation of solar thermal and photovoltaic systems.

I want solar water heating and solar photovoltaic on every roof that has adequate solar exposure, as soon as possible.

However, I believe that the current legislation to mandate solar water heating on residential new construction was poorly conceived without adequate consideration of the impact of reduced incentives or without a full understanding of how the current DSM program instituted by the HEI group of utilities evolved into the most effective and substantial deployment of well designed, sized, inspected and financed residential solar technology in the United States.

The SB 644, SD3, HD2 language on every draft to this point, has not addressed the mandates with adequate technical detail to prevent unintended reductions in the evolved benefits of the current incentives and quality control.

Ideally, in place of mandatory requirements of placing solar panels on the roofs of new construction, the legislature should first consider mandating solar ready new construction housing with IDEAL south facing roofs that can support either thermosyphon or active pump solar water heating without any shading.

All of the homes under this type of mandate would be pre-piped and insulated as well as pre-wired for active solar water heating. The housing should all be able to accommodate the prescribed storage tanks based on current HEI Utility Demand Side Management

(DSM) requirements. This alternative would NOT mandate the placement of the system components in the structures and therefore would not jeopardize the current incentives and would assure that the installed systems will perform up to current DSM standards.

Another more appropriate mandate would be for all existing homes to be required at time of sale to include a DSM compliant solar water heating system. This mandate would need to be crafted to assure that there would be NO impact to the current DSM program or Hawai'i state tax credits. Ideally this type of mandate would expand the Hawai'i solar water heating retrofit market without impacting any of the existing incentives or the existing quality control.

In order for mandatory installation of solar hot water systems on new construction housing to be effectively implemented, I believe that the existing utility rebate program including the current inspection and standardization of technology must be continued and funded. Additionally, the current Hawai'i state tax credits 35% percentage must be maintained OR INCREASED for all solar installations. Since natural gas is a fossil fuel, it would be regressive to mandate gas in place of solar.

Based on the current wording of the legislation which reduces incentives, does not define standards, eliminates DSM quality control, is silent on who will inspect systems and how the inspection process will be funded, allows natural gas to substitute for solar, I encourage your committee to hold this legislation.

If a draft of legislation, which is supported by the Hawaii Solar Energy Association (HSEA), emerges based on the stated concerns, I would also support that draft.

Thank you for your time,

By email (digital signature)

Alan Lennard

P.O. Box 818

Haleiwa, HI 96712

# LIFE OF THE LAND

*Ua Mau Ke Ea O Ka 'Aina I Ka Pono*

76 North King Street, Suite 203, Honolulu, Hawai'i 96817

Phone: (808) 533-3454 \* E-Mail: [henry.lifeoftheland@gmail.com](mailto:henry.lifeoftheland@gmail.com)

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## COMMITTEE ON FINANCE

Chair: Rep. Marcus R. Oshiro

Vice Chair: Rep. Marilyn B. Lee

DATE: Wednesday, March 26, 2008

TIME: 11:00 A.M.

PLACE: Conference Room 308

# LATE

Bill: SB 644 SD3 **PROPOSED HD3** Mandating Solar Water Heaters **STRONG SUPPORT**

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

Life of the Land is Hawai'i's own environmental and community action group advocating for the people and the 'aina since 1970. Our mission is to preserve and protect the life of the land through sustainable land use and energy policies and by promoting open government through research, education, advocacy, and litigation.

**Life of the Land has worked with the Hawaii Sierra Club, Hawaii Solar Energy Association and the Hawaii Renewable Energy Association to come up with a new draft version for SB 644.**

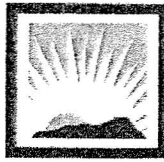
The proposed draft includes (1) a mandate; (2) tax credits; (3) establishes standards and specifications; (4) coordinates the program with the new energy efficiency utility which will be operational in 2009; and (5) establishes inspection and system verification protocol

Solar Water Heaters are the low hanging fruit. They are among the most cost effective way of reducing oil consumption. Please pass the bill.

Mahalo,

Henry Curtis  
Executive Director





Hawaii Solar Energy Association  
*Serving Hawaii Since 1977*

**LATE**

**BRIEF TESTIMONY OF THE HAWAII SOLAR ENERGY ASSOCIATION  
IN REGARD TO SB 644, SD 3, H.D. 2 RELATING TO ENERGY RESOURCES  
BEFORE THE  
HOUSE COMMITTEES ON FINANCE  
ON  
WEDNESDAY, MARCH 26, 2008**

Chair Oshiro, Vice-Chair Lee and members of the committee, my name is Richard Reed and I represent the Hawaii Solar Energy Assn. (HSEA). HSEA is a professional trade association established in 1977, and affiliated with the Solar Energy Industries Association (SEIA). HSEA represents manufacturers, distributors, contractors, financial entities and utility companies active in the solar energy industry.

**HSEA strongly opposes S.B 644, S.D. 3, H.D. 2 as drafted.** I have appended for your reference and the record our extended testimony in opposition, but wish instead to focus in this brief testimony on the HSEA's proposed H.D. 3, which is attached.

In general, mandates are the antithesis of choice, but they should, at a minimum, provide clarity: they tell you what to do. S.B 644, S.D. 3, H.D. 2 does NOT do that. The fifth draft of this measure now mandates not one, but three water heating options:

- 1) A solar water heating system, or
- 2) An undefined substitute renewable energy device, or
- 3) An instantaneous, tankless gas water heater

From our perspective mandating three separate choices is an oxymoron. H.D. 2 simply does not reflect the intent of the bill's most outspoken proponents, which is to mandate solar water heating systems on the vast majority of new single family detached homes constructed in Hawaii.

In order to bridge the gap that exists between the bills proponents and opponents, HSEA offers for the committee's consideration our proposed H.D. 3 as a reasonable attempt to reach a compromise. We believe that this draft provides much needed specificity and clarity. It eliminates the non-solar options, escape clauses, and many unintended consequences. Our proposed H.D. 3 has been reviewed by the Hawaii Renewable Energy Alliance, the Sierra Club, and the Life of the Land.

We respectfully urge this committee to either accept the core amendments as proposed in H.D. 3, or hold this measure. The time for punting this bill without a complete overhaul is behind us. HSEA thanks you for the opportunity to testify.

THE SENATE  
TWENTY-FOURTH LEGISLATURE, 2008  
STATE OF HAWAII

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# A BILL FOR AN ACT

RELATING TO ENERGY RESOURCES.

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

1           SECTION 1. The legislature finds that Hawaii's economic  
2           viability is dependent on the availability of affordable energy  
3           pricing. In early 2008, the price of crude oil surpassed the  
4           \$100 per barrel mark from the 2007 annual average of \$65 per  
5           barrel, burdening Hawaii's residents and businesses with  
6           increasingly high electricity and gasoline costs.

7           Recognizing the critical importance of energy to the State,  
8           the 1976 legislature enacted Act 189 establishing state income  
9           tax credits to encourage private investment in renewable energy  
10          systems among other measures, and these incentives have proven  
11          successful, beneficial, and cost effective. The original Act  
12          has been amended 11 times, varying credit rates, applicability,  
13          and duration, demonstrating that past progress and prior  
14          accomplishments in energy sustainability confer no license for  
15          complacency. The legislature finds, in fact, fossil fuel  
16          imports now account for a greater impact upon Hawaii's economy

1 than at any prior time in the past, substantially exceeding that  
2 of every other state despite the fact that we are blessed with  
3 the greatest number of renewable energy resources in the nation.

4 According to the January 2002 report of the energy  
5 efficiency policy task force, in 2001 when oil prices averaged  
6 \$23 per barrel, the State of Hawaii refunded an estimated  
7 \$2,765,000 to 2,500 solar thermal system purchasers. This  
8 spending was estimated to have led to the following economic  
9 outcomes :

- 10 (1) Support for 300 jobs each year that the energy  
11 conservation income tax credit remained at a 35 per  
12 cent level and creation of 64 new jobs for every 2,500  
13 new systems installed, a job impact that increased in  
14 relation to the number of systems continuously  
15 installed; and
- 16 (2) A return to the State of \$5,200,000 in tax revenues  
17 for every 2,500 systems installed over the 25-year  
18 life of these systems, a revenue impact that increased  
19 in relation to the number of systems continuously  
20 installed. For example, if the number of systems  
21 installed each year grows to 5,000, it was predicted

1           that \$10,400,000 in tax revenue would be generated  
2           over the life of these systems at current tax  
3           incentive levels.

4   The task force also found that the historical relationship  
5   between the effective tax credit and number of solar systems  
6   sold indicated that the estimated number of solar systems sold  
7   would decrease to 287 with the elimination of the tax credit,  
8   thereby resulting in loss of jobs and decrease in tax revenues.

9           However, the legislature finds that, with crude oil prices  
10   rising from \$65 to over \$100 per barrel in less than one year  
11   and with no relief under the State's direct control and  
12   jeopardizing the State's economic viability, the State must  
13   seriously consider requiring the installation of solar thermal  
14   systems to heat water in all new single-family dwellings  
15   constructed after December 31, 2009, to accelerate the  
16   installation of this type of energy saving device to benefit the  
17   owners and renters of newly constructed homes. A government  
18   mandate of this technology in new home construction effectively  
19   requires the private sector to jointly invest with the state so  
20   that the result will be greater benefit to the public at large

1 through the prudent investment in this type of renewable energy  
2 saving device.

3       The legislature finds that a conventional electric water  
4 tank accounts for 30 to 35 per cent of a home's electric bill.  
5 It is estimated that the savings from a home's electricity bill  
6 through the installation of a solar thermal water heater could  
7 result in the system being paid off in eight to ten years  
8 so less. Furthermore, if the expense of the installation of a  
9 solar thermal water heater is included in the mortgage of a new  
10 home, given the high and unpredictable cost of oil, the savings  
11 from the lowered electricity costs may exceed the additional  
12 monthly payments for the solar thermal system, which itself has  
13 the added benefit of being an allowable tax deductible expense  
14 that may also be eligible for a federal renewable energy tax  
15 credit. Therefore, the legislature finds that with a solar  
16 thermal water heater mandate, and with a properly sized and  
17 installed solar thermal system, a household can increase its  
18 disposable income through this type of prudent, energy saving  
19 investment.

20       The legislature further finds that the favorable impact of  
21 this policy on the environment is undeniable. In 2006, there

1 were 5,700 new residences constructed; assuming that the number  
2 of new single-homes constructed remains approximately the same,  
3 this would amount of over 10,260 tons of greenhouse gas  
4 emissions avoided per year.

5 Accordingly, the purpose of this Act is to increase the use  
6 of renewable energy to protect our environment, reduce  
7 pollution, make housing more affordable, and enhance Hawaii's  
8 local economy by:

- 9 (1) Requiring the installation of solar thermal energy  
10 systems in all new residential projects;
- 11 (2) Making the credit available to homes constructed after  
12 January 1, 2010, conditioned on the continued  
13 applicability of any electric utility's or public  
14 fund's solar water heater equipment, use, and  
15 installation standards program, including its 100-  
16 point rating scale for solar water heating units and  
17 rebate, to systems that qualify for this credit.

18 SECTION 2. Chapter 196, Hawaii Revised Statutes, is  
19 amended by adding a new section to be appropriately designated  
20 and to read as follows:

1       "§196-       Solar thermal energy system required for new  
2 single-family residential construction. (a) Beginning with  
3 construction for which building permits are issued after January  
4 1, 2010, a solar thermal energy system shall be installed as the  
5 primary water heating system in the construction of every new  
6 residential detached single-family residence.

7       (b) Solar thermal energy systems required under subsection  
8 (a) shall be installed by a State of Hawaii licensed contractor  
9 in compliance with the residential solar water heating system  
10 standards and specifications promulgated by any ratepayer  
11 financed energy efficiency rebate program, administered by an  
12 electric utility or public benefit fund administrator, in effect  
13 at the time for which construction permits are issued for the  
14 residence. In the event that compliance with these standards  
15 and specifications is technically impracticable, as determined  
16 solely by the administrator of the ratepayer financed energy  
17 efficiency rebate program, then the administrator is expressly  
18 authorized to grant a waiver that results in the greatest  
19 contribution by the solar thermal device to the residential  
20 water heating load.

21       SECTION 3. Section 269-121, Hawaii Revised Statutes, is

1 amended by amending subsection (b) to read as follows:

2 (b) If the public utilities commission establishes a  
3 public benefit fund, the surcharge shall be known as the public  
4 benefits fee. Moneys in the fund shall be ratepayer funds that  
5 shall be used to support energy-efficiency and demand-side  
6 management programs and services, and to support compliance  
7 verification of a solar thermal energy system installed in the  
8 construction of every new residential single-family residence,  
9 subject to the review and approval of the public utilities  
10 commission. These moneys shall not be available to meet any  
11 current or past general obligations of the state.

12 SECTION 4. Section 269-123, Hawaii Revised Statutes, is  
13 amended by adding a new subsection (c) to read as follows:

14 "(c) The fund administrator's duties and responsibilities  
15 shall include:

16 (1) Maintenance of, or improvement to, the current  
17 residential solar water heating system standards and  
18 specifications to the performance, prescriptive,  
19 durability, longevity and quality assurance standards  
20 and mechanisms first developed by the Hawaiian  
21 Electric Company that include:



1       (A) System design and sizing criteria that provide  
2       for a 90% annualized solar contribution, not to exceed  
3       110%. System design and sizing criteria shall ensure  
4       that each solar water heating installation yields  
5       significant demand-side management benefits;

6       (B) A system design life of no less than fifteen  
7       years;

8       (C) Prescriptive standards and specifications  
9       governing the required system components and the  
10       installation of the systems;

11       (D) An approved components and equipment list to  
12       ensure that installations utilize only high quality,  
13       durable and reliable components suitable for Hawaii's  
14       environment;

15       (E) A post-installation inspection regime that  
16       ensures each solar water heating system is installed  
17       in accordance with the performance guidelines,  
18       durability requirements, standards and specifications,  
19       and quality assurance mechanisms detailed in this  
20       subsection;

21       (2) Verification of compliance with the residential solar

1           water heating system standards and specifications for  
2           a solar thermal device installed in every new  
3           residential detached single-family residence."

4           (3) Any electric utility or public fund administrator  
5           shall convene a technical advisory committee of  
6           representatives from the solar and building  
7           industries, electric utilities, and other  
8           stakeholders, as deemed necessary by the  
9           administrator, to propose or to address any proposed  
10           changes to the residential solar water heating system  
11           standards and specifications.

12           SECTION 5. Statutory material to be repealed is bracketed  
13 and stricken. New statutory material is underscored.

14           SECTION 6. This Act shall take effect upon approval;  
15 provided that section 2 shall take effect on January 1, 2010.

**Report Title:**

Solar Energy Devices; Water Heating; Residential; Tax Credit

**Description:**

Requires installation of solar thermal water heaters in single-family residences constructed after 1/1/2010; Requires any public benefit fund to provide resources to the fund administrator to verify compliance of mandated systems; Requires the fund administrator verify compliance; and Expands the duties and responsibilities of the fund administrator.



**Hawaii Solar Energy Association**  
*Serving Hawaii Since 1977*

**EXTENDED TESTIMONY OF THE HAWAII SOLAR ENERGY ASSOCIATION  
IN REGARD TO SB 644, SD 3, H.D. 2 RELATING TO ENERGY RESOURCES  
BEFORE THE  
HOUSE COMMITTEE ON FINANCE  
ON  
WEDNESDAY, MARCH 26, 2008**

Chair Oshiro, Vice-Chair Lee and members of the committee, my name is Richard Reed and I represent the Hawaii Solar Energy Assn. (HSEA). HSEA is a professional trade association established in 1977, and affiliated with the Solar Energy Industries Association (SEIA). HSEA represents manufacturers, distributors, contractors, financial entities and utility companies active in the solar energy industry. HSEA strongly opposes S.B. 644, S.D. 3, H.D. 2 as drafted.

The intent of S.B. 644 was to mandate the installation of solar water heating systems on new residential construction. S.B. 644, S.D. 3, H.D. 2 neither guarantees that solar water heating systems will be installed in new homes, nor does it require – if solar is chosen from the current list of three mandate options – that design, performance and quality standards will continue to be enforced.

Over many years, our electric utility companies have developed thorough performance, quality and inspection standards for DSM solar water heating installations. These rigorous requirements are a kind of “quality mandate” that ensures each installation performs well and that the energy savings and capacity deferral benefits persist for no less than 15 years. The assurance of overall system quality allows the electric utilities to count the energy and capacity savings provided by each system against their Renewable Portfolio Standard requirements and DSM obligations. No guesswork is involved or required. S.B. 644, S.D. 3, H.D. 2 provides no such guarantee that significant DSM benefits will continue to accrue to ratepayers as a whole.

HSEA strongly supports the quality mandate now provided by rigorous third party standards, specifications, and inspections. This quality mandate ensures that each ratepayer participating in an electric utility DSM program receives a properly sized and designed system, that only durable materials and components are allowed, that the system is expertly installed by a participating contractor and that an experienced third-party will provide a 100 point post-installation inspection. S.B. 644, S.D. 3, H.D. 2 provides no such guarantees.

From the foregoing it is clear that HSEA supports a continuing **quality mandate** administered by a competent third-party. This bill is deficient to the extent that it provides for no such overall quality assurance, and that it now, effectively and literally, does not mandate solar water heating. S.B 644, SD 3, HD 2 is also moot or vague on all the key issues that will determine the real world impact and effectiveness of this bill.

The following is a brief summary of the bills remaining deficiencies:

1) There is no definition of what constitutes a solar water heating system. There is a reference to proper size and design in the purpose clause, but not in the bill language per se. What **exactly** is proper size and design? Who makes that determination? The bill only mentions “suitable” sizing as attested to by a licensed contractor? Builders will have many differing opinions regarding the definition of “suitable”. Suitable may easily mean the least common denominator. HSEA would much rather continue to have a qualified third party make this determination.

2) What is a substitute renewable energy device? This exemption is unacceptable. Either mandate solar or don't, but do not allow slippery exemptions. A builder bent on circumventing the intent of this bill will drive a MAC truck through this hole.

3) By virtue of offering builders one of three options, i.e. a solar water heating system, an undefined substitute renewable energy device or an instantaneous, tankless gas heater, the bill effectively mandates a choice. This is an oxymoron. In the most practical, real world sense, S.B. 644 now mandates the least expensive of these three options, regardless of the original intent of the bill's author or its proponents.

4) Solar water heating works everywhere in Hawaii. Compared to the rest of the world there is no “poor solar resource”. This language should be eliminated. The “cost prohibitive” exclusion is pointless. The entire thesis of this bill is that residential solar in new construction is cost effective. Furthermore, who is the referee that makes this call? Isn't it the builder that may not like construction mandates in the first place?

5) This bill shifts the entire cost of the system to the homebuilder. Consider carefully in advance that both the State tax credits and third-party DSM rebates are likely to be eliminated. The price to the builder on a \$5,000 DSM quality system will increase by approximately \$2,400. Builders presently are eligible to take both the State tax credit and DSM rebate. In the absence of any solid performance and prescriptive criteria, the builder temptation may be to install the least expensive system he can lay his hands on regardless of performance, quality, and durability.

6) There are no guidelines or quality standards for system components and materials. The quality, durability and reliability of system components in this very tough climate is an extremely important industry concern. S.B. 644 does nothing to assure us that material standards will be maintained and or enhanced. Who will ensure that builders adhere to the quality mandate that we are used to and strongly support?

7) A final note of context. Any way you slice it, the net cost of a residential solar water heating system in new construction is going up. Builders will consider this an additional business expense and add margin accordingly. Through the eventual elimination of the State of Hawaii tax credits and DSM rebates, this mandate will raise prices to consumers.

The future of solar water heating in Hawaii is in a state of flux. Countervailing forces are currently at work. The positive force remains the excellent incentive regime now in place that includes both State tax credits and utility company DSM rebates. These incentives

have motivated most builders to offer solar water heating systems as a standard feature or as an option. **The Department of Taxation recently clarified that homebuilders who offer solar as a standard feature may claim the renewable energy technologies tax credit.** HSEA believes this simple clarification will entice **all** production builders to offer solar as a standard feature in the near future.

The potentially negative forces at work are the impending transition of the electric utility DSM rebate programs to an as yet-to-be-selected non-utility administrator beginning in January, 2009. In addition, the federal residential tax credit is scheduled to expire at the end of this year. These forces are already creating uncertainty in the marketplace and remain of great concern to HSEA member companies.

Hawaii currently enjoys the most vibrant and successful solar water heating market in the nation. More solar water heaters are installed in Hawaii on a per capita basis than in any other state. Over 5,500 utility quality solar water heating systems were installed in Hawaii in 2007 alone, with 37% on new homes. In short, the current compact is working very well indeed. In your deliberations the HSEA urges this committee to carefully consider the unintended real world consequences of this vague and deficient bill.

Unless this committee is fully committed to redressing the problem areas still found in the fifth draft of this bill, HSEA respectfully requests that you hold S.B. 644, S.D. 3, H.D. 2.

Thank you for the opportunity to present this testimony.