



UNIVERSITY OF HAWAII SYSTEM

Legislative Testimony

Written Testimony Presented Before the
House Committee on Finance
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by
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SB 1493 SD1 HD2 RELATING TO LIGHT POLLUTION

Chair Oshiro and members of the Committee. My name is Robert McLaren and I am here today to submit this testimony on behalf of the University of Hawai'i. The University of Hawai'i strongly supports this bill that will require full shielding of new and replacement bright lights in Hawai'i.

Mauna Kea on the island of Hawai'i, and Haleakala on the island of Maui, are two of the best astronomy sites in the world. Dark night skies are essential for these observatories to continue to operate. However, increasing urban lighting is threatening the dark night skies over these observatories. Light pollution extends well beyond county boundaries; lights from O'ahu have a major and growing impact on Haleakala, and also affect Mauna Kea. Statewide legislation is needed to protect the observatories.

Astronomy in Hawai'i has a major economic impact. The present economic impact of astronomy is estimated to be \$150 to \$200 million per year.

Full shielding of lights is one of the most important techniques for protecting astronomical observatories from light pollution. Light emitted from poorly shielded fixtures at small angles above the horizontal travels enormous distances through the atmosphere, and is a major contributor to light pollution — it increases sky glow at remote locations, making it difficult or impossible to see faint objects. Fully shielded light fixtures emit no light above the horizontal, and therefore have much less impact on remote locations.

Full shielding also reduces glare, which is a very important safety factor, particularly for older drivers, and greatly reduces the impact of nighttime lighting on species that are affected by light at night, including endangered birds and turtles. Fully shielded lights also deliver more light to the area being lit, producing higher average illuminance per Watt of energy used, and allowing the possible selection of lower Wattage fixtures for roadways, thereby reducing energy usage.

We believe that use of fully shielded lighting will result in only very minimal additional costs for the state for roadway lighting. The State Department of Transportation has recently installed fully shielded lighting in the new highway lighting on H-1 near the Pearl City exit, on H-1 at the new exit in Kapolei, and on Kalanianaʻole Highway near Olomana Golf Course. Fully shielded lights are also being used at other locations on highways and city roads, including numerous locations where it is intermixed with partially shielded lighting. The City and County of Honolulu now uses fully shielded lighting in all new street lighting.

Fully shielded lighting was adopted many years ago for lighting of highways in California, Arizona and Texas.

We have evaluated roadway lighting uniformity from fully shielded lights using the AGI32 roadway lighting software. For any new roadway lighting, we find that satisfactory uniformity of roadway lighting can be achieved using pole spacing that is typical of current installations, and slightly higher mounting height for the light. This means that use of fully shielded lights does not require additional light poles, and therefore the only additional cost would be for slightly taller light poles (which would increase cost by a fraction of a percent of the total cost of a new roadway). We also find that the fully shielded lights result in higher illuminance levels on the roadway for the same Wattage lamps. Fully shielded light fixtures are more efficient because the prismatic lenses in partially shielded fixtures absorb substantial amounts of light. The roadway lighting software shows that use of fully shielded lights in some cases can allow lower Wattage fixtures to be selected (for example 200 Watts instead of 250 Watts), reducing energy usage and therefore reducing operating costs.

House Draft 2 is considerably weaker than House Draft 1. We prefer the wording for the exemption for recreational lighting in House Draft 1. The recreational exemption in HD1 is consistent with the lighting now being used on Kauaʻi to minimize impact on birds, and the lighting being used in Pima County, Arizona, including Tucson and the University of Arizona. Tucson has several major observatories in its vicinity. The exemption related to uniformity and pole spacing that was inserted in HD2 is vague, and does not directly refer to roadways. Based upon reading the EEP committee report, it appears that the omission of roadway lighting in this exemption was unintentional. We recommend modifying the wording in the following manner:

Replacement lighting for roadways and highways shall be fully shielded unless a registered electrical engineer certifies that fully shielded lighting with the existing pole spacing cannot achieve the lighting uniformity levels recommended by the Illuminating Engineering Society of North America. Where fully shielded fixtures are not used, acceptable luminaires shall be partially shielded lights that emit no more than 5% of their light above the horizontal.