

UNIVERSITY OF HAWAI'I SYSTEM

ANNUAL REPORT

REPORT TO THE 2006 LEGISLATURE

Annual Report On
CENTER FOR SMART BUILDING AND COMMUNITY DESIGN
SCR 173/HCR 166

November 23, 2005

The Center for Smart Building and Community Design

Progress Report 2005

Energy Efficient Design and Performance Standards for New Construction, Renovation, and Retrofitting for Buildings throughout the University of Hawaii System

This progress report is submitted to the Hawaii State Legislature by the Center for Smart Building and Community Design in compliance with the provisions of Senate Concurrent Resolution 173 and House Concurrent Resolution 166.

Summary

The Center for Smart Building and Community Design (Center) was established in 2004 and is administered by the University of Hawaii (UH) Sea Grant College Program. It is an interdisciplinary center whose mission is to create and support economically viable, attractive communities that enhance their environment, economy, and culture. The Center was requested by the 2005 Hawaii State Legislature to develop energy efficient design and performance standards for new construction, renovation and retrofitting of buildings throughout the University of Hawaii system. The Center has established a project advisory committee and convened a meeting of the committee in early 2005 during which the Center received guidance on the project. The Center has generated a preliminary draft performance standards document which is currently under review, refinement, and augmentation by Center staff. Strategies for implementation of the final standards are under development. All deliverables are expected on time to the Legislature prior to the 2007 Regular Session.

Background

The Center's collaborative ethos is epitomized by its Director, Dr. Stephen Meder, Assistant Professor of Architecture, who holds a joint faculty appointment in the UH School of Architecture and the UH Sea Grant College Program. The Center effectively draws upon the expertise of its partners and facilitates the application of this expertise to enhance the state's communities.

Center partners include the UH Sea Grant College Program, UH School of Architecture, UH Department of Urban and Regional Planning, UH School of Travel Industry Management, UH School of Business, US Environmental Protection Agency, US Department of Energy, US National Oceanic and Atmospheric Administration and City and County of Honolulu.

Progress

The High Performance Building Standards will reduce operating costs, through decreased energy and water demand in new buildings as well as in existing buildings that are to be retrofitted. These performance standards will itemize quantitative goals and methods to achieve those goals in the areas of energy and water use and indoor air quality and are to be incorporated into the UH Request for Proposal Documents so that architects and engineers bidding on UH projects will have to design and build to those standards. Progress to date includes:

- The Center Director, Dr. Stephen Meder and UH Sea Grant College Program Director, Dr. E. Gordon Grau established a Performance Standards Advisory Committee in the first quarter of 2005 including UH system administrators (including community college chancellors), UH Manoa administrators, UH School Deans, UH faculty, industry (utility) representatives, the State Department of Business, Economic Development and Tourism, the UH Office of Sustainability, UH Department of Energy and a student representative (please see Appendix A.)
- The Performance Standards Advisory Committee met on February 1, 2005 and received a briefing on the project and related Center activities by Dr. Meder and key Center staff and provided discussion to enhance the utility and success of the new performance standards (please see Appendix B.)
- The contractual services of Olivier Pennetier were secured to conduct a preliminary investigation with recommendations on existing relevant campus building performance standards and/or programs and the identification of relevant codes, regulations and standards with recommendations relevant to compliance.
- Draft performance standards for existing buildings were delivered to the Center for Smart Building and Community Design at the end of 2004 for review and comment.
- The draft performance standards are currently being further refined and augmented by Center staff to include consistency with and in support of Act 77
- Strategies for implementation of the final standards are under development
- Analysis for establishing a University of Hawaii Energy Conservation Manager are ongoing

The Center wishes to acknowledge the commitment of the Hawaii State Legislature to conserve energy, reduce costs and improve the quality of life on University of Hawaii campuses statewide through the generation of high performance, energy efficiency design standards for University of Hawaii buildings.

Respectfully submitted,

Dr. Stephen Meder, Director
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University of Hawaii Sea Grant College Program
University of Hawaii School of Architecture

Appendix A

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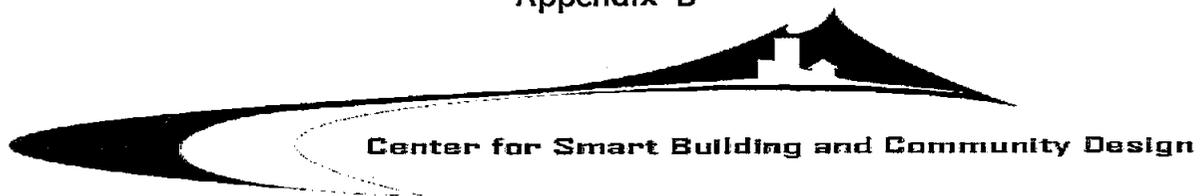
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1 February 2005

Performance Standards Advisory Committee Meeting – Minutes

Present:

Mr. Sam Callejo	Vice President for Administration, UH
Dr. Shirley Daniel	Henry A. Walter, Jr., Distinguished Professor of Business Enterprise Professor of Accountancy Director, Pacific Asian Management Institute, UH College of Business
Dr. Mary Donohue	Associate Director, UH Sea Grant College Program
Ms. Rachael Edinger	Project Coordinator, Energy Star Dormitory Project
Dr. Rockne Freitas	Chancellor, Hawaii Community College
Ms. Ruth Goldstein	Executive Planning Coordinator, UH Sea Grant College Program
Prof. E. Gordon Grau	Director, UH Sea Grant College Program
Mr. Maurice Kaya	Chief Technology Officer, DBEDT Strategic Industries Division
Mr. James Maskrey	Program Manager, HECO Inc.
Dr. Stephen Meder	Director, Center for Smart Building & Community Design
Dr. Bruce Miller	Director, UH Office of Sustainability
Mr. Frank Perkins	Assistant Vice Chancellor for Research
Mr. Peter Rappa	Coastal Communities and Economies Extension Agent, UH Sea Grant College Program
Mr. Victor Russell	President, ASHRAE Hawaii
Mr. Michael Unebasami	Associate VP for Administration and Community Colleges Operation, UH
Mr. David Waller	VP Customer Solutions, HECO Inc.
Ms. Sharon Ching Williams	Project Coordinator, UH Performance Standards

1. Gordon Grau explained the mission of Sea Grant College Program's Center for Smart Building and Community Design.
2. Stephen Meder explained the purpose of this meeting, the importance of gaining the institutional commitment of its attendees to achieve an energy efficient University of Hawaii, and the benefits to the UH for doing so. Dr. Meder acknowledged systemic constraints posed by the Life Cycle Cost Analysis process and the Legislative process. Support and funding from the Dept. of Energy, Rebuild America, Rebuild Hawaii Consortium, Dept. of Business, Economic Development and Tourism, the Federal Energy Management Program, the University of Hawaii, the UH Sea Grant College Program, Rodney Sakaguchi, and UHM Office of Sustainability has totaled approximately \$150,000.

Partnerships with HECO, the UHM and the UH Sea Grant College Program, and the Board of Water Supply have laid the foundation for the work that is to follow. HECO did an early energy assessment of the UH campus and supplied 32 meters to the UHM campus to more closely monitor energy use of the facilities. Sea Grant has supported a benchmarking study documenting energy use of campus buildings, the development of UH Performance Standards, and a study of campus water catchment potential. A Memorandum of Understanding between the Board of Water Supply and UHM has resulted in a UHM water audit and \$500,000 assessment for water savings on campus.

3. Dr. Meder described the projects currently under development.
 - a. UH Performance Standards provide specific guidelines for reducing energy and water consumption while improving indoor air quality in university offices, classrooms and laboratories. By highlighting energy efficient lighting, air conditioning, window and daylighting strategies, and water conservation, these standards will reduce the UH energy bill by millions of dollars a year, reduce green house gas emissions and on fossil fuels, extend the sustainable yield of Hawaii's aquifers and allow UH to demonstrate energy and resource conserving solutions to the state and region.

These performance standards will be completed in three different reports. Energy efficiency and better life cycle costs are more easily achieved in New Facilities as they don't come with the kind of obstacles present with Retrofit Work, and Laboratories present yet another set of requirements – on the UHM campuses. Laboratory buildings comprise just 25% of the overall UHM building square footage, but consume 50% of the total campus energy. As a resource, Sea Grant has recruited Phil Wirdzek, founder of the EPA/DOE Labs21 program, and Dale Sartor of the Lawrence Berkeley Laboratory onto their affiliate faculty.

Because they saw the importance and potential of these performance standards, The Federal Energy Management program (FEMP) provided an additional \$20,000 to fast track development of the Retrofit study; a copy of the draft by Bonneville Power and its review by Tom Van Liew were included as exhibits.

To focus on achievable goals for the UH, Dr. Meder noted that the performance standards will focus only on what he feels are the three most achievable and effective portions of LEED – energy, water conservation and indoor environmental quality (temperature, ventilation, and humidity). Three additional areas of LEED are not being addressed at this time (sustainable sites, materials and resources, and innovative design).

Example no. 1: Stanford University Sustainability Guidelines. Stanford University created a system to support their commitment to sustainability. Stanford established contractual procedures, administrative and facility department support, and by personnel hired to implement the standards.

Example no. 2: Cornell University Sustainable Campus. University Design and Construction Standards have provided guidance to engineers, architects, designers, and maintenance staff on how to minimize energy use for the past 15 years. Based on projects installed from 1980 to 2000, their Utilities Department has documented annual savings of \$7.6 million on energy expenditures.

However, guidelines are but a wish list and have no teeth without Institutional Commitment. The energy efficiency standards can develop specifications, but it will take an institutional commitment to advance this goal.

- b. Gas Technology Institute (GTI) Project is a feasibility study of potential for solar and distributed generation opportunities at the UH campus. Three buildings and one district cluster will be analyzed for energy savings opportunities. \$15,000 of the UH match on the performance standards grant is allocated to this study, which in turn is matched by \$85,000 from GTI, The Gas Company and the Dept. of Energy to total to a \$100,000 study for UHM.
 - c. Energy Star Dormitory Project. This project is a showcase dorm room at the UH campus employing Energy Star fixtures and appliances. Energy Star labeling is a system developed by the US EPA that indicates those appliances and products that meet set standards of energy efficiency. This project is funded by DBEDT and the Dept. of Energy, and is a partnership between UH and SEI (Strategic Energy Innovations), an energy consulting non-profit organization out of San Rafael, CA. Minimal support for paint and installation costs for one room will be required from the UH for implementation. This project is a first step in demonstrating large scale energy and water conservation in UH dorms. This project will provide a viable platform for improving energy use in dorms, educating students on energy conserving consumer choices and provide a positive exposure for the university approach to improving the quality of life and energy performance in the UH dormitories.
 - d. UHM Solar Assessment Project. This project identifies the amount of cooling energy is required as a result of black roofs and conversely, the opportunities for solar collection – chance to generate hot water or electricity.
4. The implementation and ultimate success of the proposed standards is predicated on institutional commitment by the UH to be energy efficient and to require that all future retrofit, new, and laboratory work be compliant with these new standards.

Institutional commitment improves the potential UH eligibility for additional DOE (Dept. of Energy) funding to support campus projects. We will be requesting an MOU (Memo of Understanding) between the UH and the DOE during the course of this project.

5. Discussion

- a. Gordon Grau: Cornell University is approximately the same size as the UH and has documented \$7.6 million in annual savings as a result of their energy efficiency programs. The UHM electricity bill is currently around \$15million; system wide exceeding \$20 million. Costs are going up.

- b. Jim Maskrey update: HECO is working w/ UH to assess what can be done. HECO has paid rebates for energy efficiency upgrades. 40 new meters have been installed throughout state to better understand how energy is used – to help determine what to do next.
- c. Mike Unebasami: R&M money has been applied to energy upgrades; they can't keep up with rising rates although consumption has gone down. Although they initially wanted performance based contracts, they went into projects that gave the best payback and applied 100% of their budget to lighting upgrades. Unions objected to UH installation without using outside contractors.
- d. Dave Waller – meters have been installed on a large number of buildings, but not on all buildings on the UHM campus (where there are about 100 meters).
- e. Gordon Grau described some of the opportunities at the UH campus for water source and ground source heat pumps. He noted the existence of an underground stream to absorb waste heat.
- f. Victor Russell – was asked about his impressions. He noted working at the Stan Sheriff center when all the lights and cooling were turned on for an area much larger than what was required for their meeting; about working on Kennedy Center with 30 year old equipment. He liked the idea of waste heat into the ground water source. He is exploring absorption chilling and combined power and heat.
- g. Sam Callejo – suggested that Hamilton Library be the first project to incorporate these standards; he will get the consultant together with Steve Meder and Gordon Grau.
- h. Maurice Kaya – Hamilton Library has big humidity problem and a lot of mold. He also added that Labs21 is developing a project on Coconut Island which is striving to incorporate the very same kind of energy efficient design standards that we're describing.
- i. Gordon Grau – GE is developing a complete package of renewable energy systems, distribution, storage, and demand side efficiency products that they would like to market as an integrated product and would like to get involved with Coconut Island as a demonstration project.
- j. Mike Unebasami – Maui CC looking at wind power. He would like to work with Steve Meder for recommendations on how to proceed.
- k. Maurice Kaya – reported on DBEDT's partnership with HNEI on developing hydrogen fuel cell applications. DBEDT is also working to advance integration of renewables and distributed energy at the National Energy Laboratories of Hawaii (NELHA). He noted that the Gateway Building is an example of an attempt to get platinum LEED certification. The West Hawaii campus is coming up – any ideas that this group might offer would be very welcome.
- l. Gordon Grau – cited Steve Meder's energy efficient high performance modular classroom design, and integrating NELHA and the West Hawaii campus.
- m. Peter Rappa would like to see the Energy house saved.
- n. Bruce Miller—would like to save the Energy house; it doesn't use A/C and is still very comfortable.
- o. HECO Training – 2/24 advanced daylighting with Victor Olgyay, and 4/6 – workshop by New Building Institute and Energy Center of Wisconsin called "Integrating High Performance Design".

- p. Sam Callejo questioned whether there was certification required before consultants did any of their work. For the past two years HECO has been putting on sustainable and energy design workshops to educate the local A/E community. He also stated that it would be important to have UH personnel; especially the Facilities Department attend these workshops.