

**University of Hawai'i  
Code Request Form**

**I. REQUESTOR CONTACT INFORMATION**

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Title: Institutional Researcher

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Campus/Office/Department/Address: MauiCC, Pilina 201

Action Requested:

NEW Program code (*new major/concentration, etc*)

NEW Subject Code

Change of existing code

Type (*subject, program, etc*):

Old:

New:

Other:

**II. CODE REQUEST** Academic program code preferences for consideration:

**NEW Program Code** Effective Term (*semester/year*): Fall 2011

Major: SSM Major Description: Sustainable Science Management

Is Major financial aid eligible?  Yes  No

Is major code being used the same way at other UH campuses?  Yes  No Comment: No other UH colleges have this program

Does same or similar major code exist in Banner?  Yes  No If yes, list code:

Concentration (*if applicable*): Concentration description:

Is concentration code being used the same way at other UH campuses?  Yes  No

Does the same or similar concentration code exist in Banner?  Yes  No If yes, list code:

Attach concentration to program code?  Yes  No

Level:  Undergraduate  Graduate  First-Professional  Other:

Degree/Certificate: BAS (Bachelor of Applied Science)

College: Instructional Department: SSM

If requesting a program name change, will current students be grandfathered in under the old program name?  Yes  No

If requesting a program name change, will the old code be available for:

Recruitment  Yes  No List the end term of old code:

Admissions  Yes  No List the end term of old code:

General Student  Yes  No List the end term of old code:

Academic History  Yes  No List the end term of old code:

**NEW Subject/Alpha Code** Effective Term (*effective semester/year*):

Code: SSM Description: Sustainable Science Management

College: UH Maui College Department: SSM

Does the same or similar subject code exist in Banner?  Yes  No If yes, please list code:

Is the subject code being used the same way at other UH campuses?  Yes  No

**University of Hawai`i  
Code Request Form**

**Other:**

Briefly describe your request and explain why you are requesting the codes:

**III. SUPPORTING DOCUMENTATION**

Attach required supporting documentation. See *Guide to Academic Program Actions & Approval* at [http://www.Hawaii.edu/vpaa.cms/quide\\_to\\_academic\\_prog\\_121006.pdf](http://www.Hawaii.edu/vpaa.cms/quide_to_academic_prog_121006.pdf)

- BOR minutes, with supporting documentation provided to BOR, from meeting date: April 21, 2011
- Memo from campus Chancellor.
- Signed memo from UH President.
- None required, according to the *Guide for Academic Program Actions & Approval*, seen at [http://www.hawaii.edu/vpaa/cms/guide\\_to\\_acad\\_prog\\_121006.pdf](http://www.hawaii.edu/vpaa/cms/guide_to_acad_prog_121006.pdf)

**IV. CAMPUS VERIFICATION**

The appropriate parties (faculty, administrators, registrar) have been consulted.

Jean A. Pezzoli

April 21, 2011

*Name of requestor (print or type)*

*Signature*

*Date*

Send completed form with supporting documentation to:

Institutional Research Office (Attn: Lynn Inoshita or Christine Shaw) • 1633 Bachman Place • Sinclair Annex 2, Room 4 • Honolulu, HI 86822  
Fax: 808-956-9870 Phone: 808-956-7532

For Internal use only

Appropriate documentation received:  Yes  No

Approval Status:

Notes:

Major code:  Yes  No

Concentr. code:  Yes  No

Program code:  Yes  No

Subject code:  Yes  No

Entered into SMAPRLE/SOACURR: \_\_\_\_\_

Code processing completion date: \_\_\_\_\_

Entered into STVMAJR: \_\_\_\_\_

Copies sent to: \_\_\_\_\_

Entered into STVSUBJ: \_\_\_\_\_



RECEIVED  
UNIVERSITY OF HAWAII  
**MAUI COLLEGE**  
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Office of the Chancellor

APPROVED AT 4/21/11 BOR mtg  
ec: J.Itano

UNIVERSITY OF HAWAII  
BOARD OF REGENTS  
D. Wongold  
P. Imada Iboshi

March 24, 2011  
UNIVERSITY OF HAWAII  
PRESIDENT'S OFFICE

11 APR 11 P5:04

MEMORANDIUM

TO: Howard H. Karr  
Chairperson, University of Hawai'i Board of Regents

VIA: MRC Greenwood *MRC Greenwood*  
President, University of Hawai'i

VIA: John Morton *John Morton*  
Vice President for Community Colleges

FROM: Clyde Sakamoto *Clyde Sakamoto*  
Chancellor, University of Hawai'i Maui College

SUBJECT: Approval of a new Bachelor of Applied Science in Sustainable Science Management at University of Hawai'i Maui College (UH Maui College)

SPECIFIC ACTION REQUESTED:

We request that the University of Hawai'i Board of Regents approve the program proposal as submitted and grant Provisional Status for the Bachelor of Applied Science in Sustainable Science Management to be offered by UH Maui College.

EFFECTIVE DATE RECOMMENDED:

We recommend that Provisional Status be made effective upon approval by the University of Hawai'i Board of Regents.

BACKGROUND:

Pursuant to Board of Regents Policy 5-1, the Board of Regents may approve new degree programs upon the recommendation of the President.

UH Maui College proposes a Bachelor of Applied Science (BAS) degree in Sustainable Science Management. The degree program objectives are appropriate functions of UH Maui College and the University of Hawai'i, as they are consistent with the vision, mission, and Strategic Plan



2008  
Bellwether  
Award  
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2009  
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MEMO TO: Howard H. Karr,  
Chairperson, University of Hawai'i Board of Regents

DATE: March 24, 2011

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objectives of the University of Hawai'i System, UH Community Colleges, and UH Maui College to diversify the economic base and provide a skilled workforce for the state and county. The BAS in Sustainable Science Management program has been designed in close collaboration with industry advisors and University researchers to ensure that the curriculum provides students with an educational path to careers in businesses or industries seeking to become more sustainable economically, environmentally, and socially. As an inter-disciplinary program, the BAS in Sustainable Science Management integrates topics in energy, ecology, business and management, water and wastewater, agriculture, waste management, economics, policy, the built environment, and social science with a strong liberal arts curriculum to provide students with the depth and breadth expected from a baccalaureate degree.

The BAS in Sustainable Science Management program provides a special focus on renewable energy, energy efficiency, and conservation that will equip students with the technical and communications skills needed to leverage these disciplines and optimize sustainable operations for businesses, organizations, residences, and communities. A student graduating with a BAS in Sustainable Science Management will access current and emerging career options in local, state, and federal agencies; utility companies; energy efficiency firms; non-profit organizations; hospitality and tourism operations; transportation companies; international environmental consulting and auditing firms; "green" contractors; and schools, museums, and parks.

The BAS in Sustainable Science Management degree has been designed and reviewed in accordance with all existing University of Hawai'i System and UH Maui College policies and procedures. The program proposal has been reviewed, and is supported by, the UH Maui College Science, Technology, Engineering, and Math (STEM) department, the UH Maui College Curriculum Committee, Academic Senate, UH Maui College administration, and the University of Hawai'i Council of Chief Academic Officers.

Approval of the program proposal will permit UH Maui College to submit a Substantive Change request to the WASC Accrediting Commission for Senior Colleges and Universities. Upon approval by the Commission, implementation of the program is scheduled for Fall 2011.

A complete Program Proposal for the BAS in Sustainable Science Management degree accompanies this action memorandum for review and consideration.

**ACTION RECOMMENDED:**

We recommend that the University of Hawai'i Board of Regents approve the program proposal as submitted and grant Provisional Status for the Bachelor of Applied Science in Sustainable Science Management to be offered by UH Maui College.

Attachment: New Program Proposal

c: Secretary to the Board of Regents



UNIVERSITY *of* HAWAII®

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**MAUI COLLEGE**

**Program Proposal**

**Bachelor of Applied Science in Sustainable Science Management**

**Date of Proposal: June 25, 2010**

**Proposed Date of Program Implementation: January 2011**

**Proposal – BAS in Sustainable Science Management**

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## **Program Objectives**

The University of Hawai'i Maui College proposes to offer a Bachelor of Applied Science degree in Sustainable Science Management. This program will provide students with an educational path to careers in virtually any business or industry that seeks to identify, implement, and design methods of becoming more sustainable economically, environmentally, and socially.

The recommendations of the working groups of the Maui County Energy Alliance (MCEA – Appendix A) support Maui County Mayor Tavares' goal of meeting 95% of all energy needs in Maui Nui sustainably and achieving a carbon-neutral footprint by the year 2020. Achieving this goal will require a strong network of committed partners, both within and outside of the renewable energy industry, including state and federal agencies, utility companies, the private business sector, educational institutions, and non-governmental organizations, in order to inspire the policies that will change the attitudes and behavior related to energy use in this state. In keeping with the purpose of the Hawai'i Clean Energy Initiative, the recommendations of the working groups promote an equitable distribution of benefit and opportunity to all sectors of the economy and all Maui County residents. The outcome is envisioned as an information platform that will serve as a model for other institutions, island, and isolated communities throughout the United States and the world (Appendix B, Articles 1 and 2).

Recent articles in the national news describe an increasing demand for a workforce with knowledge and expertise in sustainability. In addition, student interest in sustainability is driving colleges to create programs that offer training in this field. Nationwide in 2009, more than 100 majors, minors or certificates were created in energy- and sustainability-focused programs at colleges big and small – up from just three programs in 2005 (Appendix B, Articles 3 and 4). Closer to home, Maui County is preparing to issue its first Green Book Directory to highlight “businesses on Maui, Molokai and Lanai that provide sustainable, and, or, environmentally friendly products or services” (Appendix B, Article 5). The increases in workforce demand and student interest, coupled with Maui's ambitious energy goals and growing awareness present favorable conditions and unique opportunities for a BAS degree program in Sustainable Science Management at UH Maui College.

The main objective of the BAS in Sustainable Science Management is to provide students with the opportunity to expand and broaden their education to qualify for the growing number of jobs related to sustainability. The BAS will provide workforce training for the emerging green industry in Maui County, the State of Hawai'i, and throughout the nation.

The Sustainable Science Management program aspires to showcase Maui County not only as an example to island nations and isolated communities but also to the rest of the nation and the world in the responsible way that we use and conserve our natural resources. To accomplish this objective the program will promote “The Business of Energy and Sustainability,” by educating students in the various ways that we can preserve and protect our natural systems without sacrificing the health and growth of our local economy. To make a career in sustainability accessible to the greatest number of students, we have established a stepping-stone to the BAS by having created a new Business Careers Option AAS. The proposed Business Careers Option IV prepares students for business careers with an emphasis on energy, sustainability, environment, and related scientific disciplines (see Curriculum section page 8 of this proposal for a detailed description). For students planning on continuing on to the BAS in Sustainable Science Management, Business Careers Option IV requires three classes in Sustainability and two classes in Energy, with no electives.

Solutions to real world problems related to making our communities more sustainable are often extremely complex and require multi- and inter-disciplinary approaches. According to a December 2009 article in GreenBiz.com, interviews with sustainability professionals showed the importance of being able to find and manage information, and make a business case for sustainable strategies (Appendix B, Article 6). Sound decision-making requires more than a superficial understanding of the scientific, economic, social, and regulatory environments in which our society operates. We have designed the BAS in Sustainable Science Management at UH Maui College to assure that students understand the conflicts that can occur between the three points of the Sustainability Triangle, as shown in Figure 1. The three points of the triangle - Equity, Economic Growth and Efficiency, and Environmental Protection - are also commonly

represented by the Three P's: People (Equity), Profit (Economic Growth and Efficiency) and Planet (Environmental Protection). Whatever terms are used, a truly sustainable society must be socially, economically and environmentally sustainable.

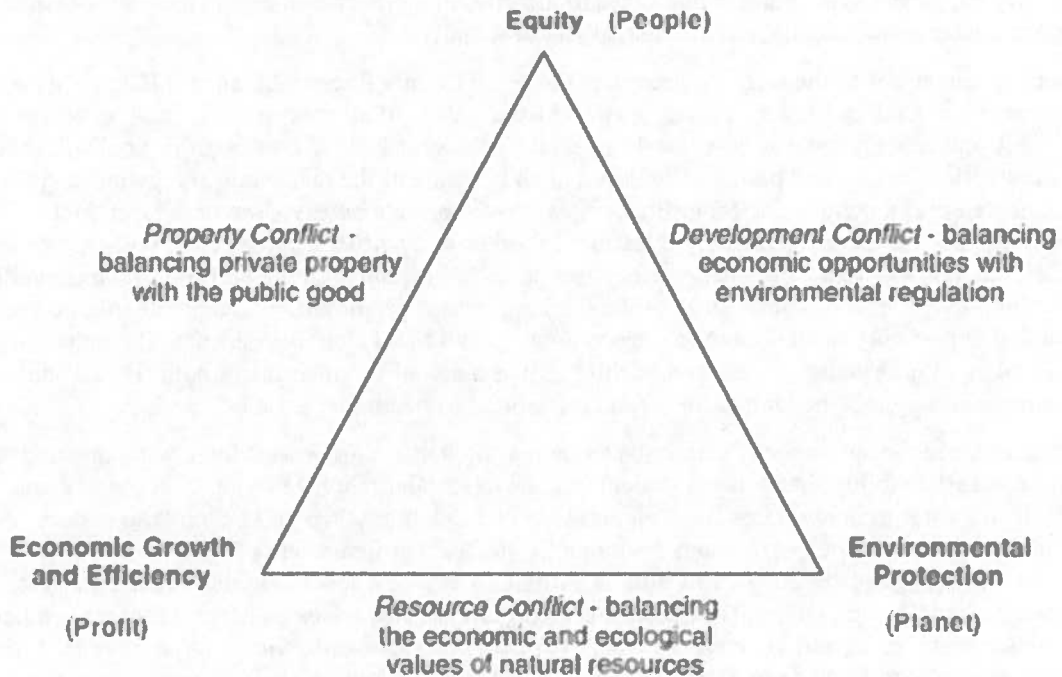


Figure 1 – Inherent conflicts in the sustainability triangle

As an inter-disciplinary field, a program in sustainability involves topics in energy, ecology, business and management, water and wastewater, agriculture, waste-management, economics, policy, the built environment, and social science. We have designed the BAS in Sustainable Science Management program to equip students with the technical and communications skills needed to bridge the disciplines and to produce sustainable operations for organizations and communities. A student graduating with a BAS in Sustainable Science Management will have career options in local, state, and federal agencies; utility companies; energy efficiency consulting; non-profit organizations; hospitality and tourism; transportation; wildlife and conservation agencies; international environmental consulting and auditing; "green" contracting and construction management; and educational work in schools, museums, and parks.



## **Relationship of the Program Objectives to the Functions of the College and University**

The mission of the BAS in Sustainable Science Management program is to produce graduates who will maximize the benefits of sustainable practices across multiple disciplines by being aware of the interconnectedness of natural systems, understanding the role and function of technology development and implementation, possessing the ability to establish new partnerships, and by using resources creatively, wisely and responsibly. This mission is in alignment with UH Maui College's Mission and Vision:

### **UH Maui College Mission**

*UH Maui College is a learning-centered institution that provides affordable, high quality credit and non-credit educational opportunities to a diverse community of lifelong learners.*

### **UH Maui College Vision**

*We envision a world-class college that meets current and emerging Maui County education and training needs through innovative, high quality programs offered in stimulating learning environments. The College mission, goals, and actions will be guided by the Native Hawaiian reverence for the ahupua'a, a practice of sustaining and sharing diverse but finite resources for the benefit of all.*

The BAS in Sustainable Science Management exemplifies the vision of Maui County, particularly the practice of sustaining and sharing diverse but finite resources to benefit future generations.

The BAS in Sustainable Science Management is also aligned with the **UH Maui College Strategic Plan**, specifically, **Goal 2, Objective 1**:

*Support the county and state economy, workforce development, and improved access to lifetime education for all by building partnerships within the UH system and with other public and private educational, governmental, and business institutions.*

The development of the BAS in Sustainable Science Management incorporates the following Action Strategies identified to achieve this objective:

- Expand training and workforce development programs in coordination with county, state, and industry economic initiatives.
- Develop apprenticeships with high schools to prepare for entry into the program
- Outreach or recruitment to Maui and Hawai'i high schools
- Support the collaboration of credit-non-credit offerings through coordination of resources and other strategies.
- Determine the need for emerging specializations in the workplace; create partnerships between college and community representatives to address new program initiatives.
- Seek external funding sources, e.g. National Science Foundation, to develop programs that promote economic diversification and high-end technology.
- Partner with the community to identify educational and training needs and to determine how the College can best meet those needs.
- Partner with community and industry to establish internships and cooperative employment for students to increase opportunities for placement in the workplace upon graduation.

## Needs Assessment

The threat of climate change and the impact of depleting fossil fuel reserves have created critical economic and ecological conditions around the globe. This section presents some of the recent initiatives by international, national, state, and local government and administrative agencies to create a workforce trained and dedicated to the sustainability of human society.

An important concept related to the creation of the BAS in Sustainable Science Management, is what is meant by a “green” job. The United Nations Environment Program (UNEP) defines green jobs as “work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute(s) substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution.” Throughout this document, whenever there is a reference to “green jobs,” this will be the underlying definition.

The United Nations Development Program (UNDP) Annual Report for 2009 lists resolutions for climate change as a top priority and has set aside \$404 million for programs and workforce development related to the environment and sustainable development in their 2008-2011 strategic plan. UNDP stresses the need for a new paradigm that mainstreams climate change into development planning at all levels including education, and is developing new partnerships and policies that create markets and employment within the field (Appendix C, Figure 1).

The United Nations Environment Program (UNEP) Green Jobs report (2008) assesses the numbers of green jobs that have already been created and are likely to be created in coming years, in six economic sectors: alternative (renewable) energy; the building sector (including appliances and office equipment); transportation; basic industry and materials recycling; food and agriculture; and forestry. According to this report, the estimated employment in the renewable energy sector alone in the year 2006 was 2.3 million worldwide with 404,000 jobs in the US. The UNEP makes global employment projections of 2.1 million jobs in solar PV and 6.3 million for wind energy by the year 2030. Other UNEP employment growth rate predictions for the US include over 180,000 jobs in solar PV, 200,000 in biofuels, and 120,000 in energy efficiency upgrades for buildings by the year 2025. It should be noted that the minimum educational requirement for sustainability-related employment with the UN, even at the internship level, is a baccalaureate degree in sustainability or a related field (Appendix D).

Because of the compelling need to reduce our resource consumption and our carbon footprint, green building is expected to grow across all market sectors, including education, government, industrial, office, healthcare, hotel, and retail, driven by an unprecedented level of government initiatives and heightened residential demand for green construction. McGraw Hill’s Green Outlook 2009 states that the overall green building market (both non-residential and residential) is likely to more than double from today’s \$36-49 billion to \$96-140 billion by 2013, with an associated increase in jobs.

The clean energy labor coalition, Apollo Alliance, projects that over 825,000 jobs will be created with an investment of \$89.9 billion in financing for green buildings (including energy efficiency upgrades), providing tax incentives, investing in research and development, and promoting new building codes and standards (Appendix C, Figure 2). Because these new jobs are performed at the local level and are often done by small enterprises, energy-efficiency programs are especially important for underdeveloped regions and areas of high unemployment rates.

To build support for an emerging green workforce in the US, the Green Jobs Act (GJA) of 2007 was developed to provide \$125 million per year to create an Energy Efficiency (EE) and Renewable Energy (RE) Worker Training Program because these industries are experiencing a shortage of skilled people required to do the work. There have been many attempts to address this shortage through alliances such as Green For All, Blue Green Alliance, etc. However, the need for a well trained, educated renewable energy workforce remains.

### *State and County Workforce Needs*

Local efforts include the Hawai'i Clean Energy Initiative (HCEI), a collaboration between the U.S. Department of Energy and the State of Hawai'i. The HCEI addresses issues related to the high cost of energy, ecological degradation, and lack of skilled workforce available for the emerging green industry. Energy efficiency statewide and in Maui County is particularly of critical concern. Currently, 90% of the energy produced in Hawai'i comes from imported petroleum-based fossil fuels, leaving Hawai'i with the highest national electricity rates. The HCEI gained support from the Hawai'i Department of Economic Development and Tourism, the Public Utility Commission, and the Governor who signed a voluntary agreement on October 20<sup>th</sup>, 2008 to accomplish the HCEI goal of moving towards energy independence by having 70% of the State's energy needs met by renewable energy technologies by the year 2030. This ambitious goal underscores the need for sustainability education and training to educate the workers who are going to make it a reality throughout the state and in Maui County.

A large part of the American Recovery and Reinvestment Act (ARRA) is dedicated to green workforce development and education. As of November 2010, Hawai'i's share of ARRA funds amounted to over \$1.6 billion. Among other things, ARRA funds will be used to deploy renewable energy technologies in state buildings, enhance energy efficiency in the buildings sector, and weatherize more than 650 homes across the state over the next three years. ARRA funding for renewable energy technologies includes installing photovoltaic solar energy systems on state office buildings in downtown Honolulu. According to the Hawai'i Green Report, A specific goal is to bring the state's existing building portfolio up to ENERGY STAR® standards. Other green related programs on the receiving end of ARRA fund are the Clean Water State Revolving Fund (\$30m) and the Drinking Water State Revolving Fund (\$20m). The development, implementation, evaluation and administration of all these programs will demand multiple levels of green workforce training, from technical certificates, through degree-granting programs. In mid-September 2009, the Council for Economic Development estimated that 4,200 jobs had been created in Hawai'i so far by ARRA funds (Appendix C, Figure 3).

According to a recent analysis by the American Council for an Energy Efficient Economy (ACEEE), energy efficiency provisions in the American Clean Energy and Security Act (ACES – H.R. 2454) could create 2,100 new jobs in the State of Hawai'i in the next 10 years, and more than 569,000 new jobs nationwide (Appendix E). "The energy efficiency programs in these proposals would create jobs because energy efficiency improvements are labor intensive and net job creators. These programs would produce more construction and service-sector jobs than those energy sector jobs lost from reduced energy consumption," said Steven Nadel, ACEEE Executive Director. "In addition, these programs would continue creating small numbers of jobs even after the stimulus period is over, because energy bill savings enable consumers and businesses to spend that money elsewhere in the economy."

A review of SOC codes for the State of Hawai'i and County of Maui using the EMSI System showed state- and county-wide workforce needs for a variety of careers requiring a bachelor's degree related to sustainability including: environmental scientists and specialists; urban and regional planners; environmental science and protection technicians; natural sciences managers; conservation scientists; agricultural and food science technicians; and water and wastewater treatment plant and system operators. A graduate of this program will be able to perform the duties and skilled required for these positions.

The Sustainability Community Forum, held at UHMC on October 29, 2009, revealed additional employment opportunities in jobs that are not clearly distinguishable as sustainability-related under the SOC classification system. For example, the results of a questionnaire distributed to forum participants showed that sustainability functions, including energy efficiency, green purchasing and supply chain management, and waste and water use reduction, are currently being performed by personnel classified as facilities managers, purchasing managers, administrators, project managers, and operations managers. It is therefore difficult to estimate the number occupations in the State and County that could be filled by someone with a BAS in Sustainable Science Management. As a point of reference, according to U.S. Metro Economies, there were slightly more than 2,000 "green" jobs in Honolulu in 2006, and that number is projected to grow by 691 percent to reach almost 16,000 in the year 2030 (Appendix C, Figure 4). The

results of the TurningPoint Technologies clicker survey from the October 29 Community Forum are provided in Appendix F.

Water resources management and water recycling are serious issues on Maui. Steve Parabolicoli, the water recycling program coordinator for the County of Maui, expressed industry needs on Maui for trained individuals, "The industry in Hawaii will be critically short of qualified personnel within the next 3-5 years as many current certified employees retire. It takes years to obtain higher levels of certification. We need to recruit and train the next generation of operators or this shortage will become a reality and negative impact to our community." Several of the courses proposed in this program will provide training to students for the fundamentals of water recycling.

A key component of sustainability is effective management of our waste streams. The County of Maui has diverted around 30 percent of its waste to recycling, composting and other beneficial uses for the past few years. The majority of the County's waste goes to the Central Maui Landfill, which is projected to reach capacity in 2026. The County of Maui's Integrated Solid Waste Management Plan calls for diverting 60 percent of Maui's waste from disposal, improving infrastructure to accomplish this increased level of diversion, and exploring modern technologies to reduce the County of Maui's dependence on landfills. Achieving and exceeding these goals will require a workforce that is knowledgeable about materials management strategies and technologies and understands the significance of viewing waste management as resource conservation. This is another area that does not have an obvious employment classification in the SOC code list.

Appendix G provides information about a few selected SOC codes relevant to sustainability positions in Maui County. Additional information in Appendix G shows current relevant position openings with the County of Maui and Maui Electric Company (MECO), as well as a list of other potential employers who have historically hired graduates from UH Maui College.

### ***Internal Factors***

As the 2008 recipient of the prestigious Bellwether Award in the category of Workforce Development, UH Maui College was recognized for its groundbreaking practices in sustainability and in meeting present and future workforce and institutional development needs. There are many other indicators that UH Maui College is distinguishing itself as a leader in sustainability. As a member of the Maui County Energy Alliance, UH Maui College's role is to educate and train the "green" workforce, support the growth and advancement of the "Business of Energy," and also pursue opportunities to demonstrate the feasibility and efficacy of renewable energy and the implementation of "smart grid" technology on campus. The College has also identified community partners in and outside of the renewable energy industry to assist with curricular development, internships, cooperative applied research initiatives, and other possibilities.

Other important advances in sustainability by UH Maui College include a partnership agreement with Maui Electric Company in April 2008, a gift of more than \$300,000 from the Case and Cole Family Foundations to establish the Sustainable Living Institute of Maui, a portion of the next \$3.2 million Rural Development Project to be devoted to developing and supporting sustainability, and finally, County resources are expected that will be dedicated to specific initiatives identified by Maui County's Energy Commissioner.

The UH Maui College Campus Sustainability Committee (Appendix H) has just become a full member of The Association for the Advancement of Sustainability in Higher Education (AASHE), which provides an abundance of resources to promote campus sustainability, including a self-assessment tool, in which sustainability across the curriculum comprises 30% of the total score. By offering a BAS degree in Sustainable Science management, UH Maui College clearly has an opportunity to improve its overall sustainability profile and further develop its role as a leader in sustainability for the county, state and nation.

During the Fall 2009 semester, we conducted an informal survey of students enrolled in POLS 120, Intro to World Politics, and found that there was a high level of interest for career opportunities related to sustainability (such as sustainability coordinators, energy efficiency analysts, and renewable energy technology specialists). The students in this particular class had recently been studying climate change,

and therefore had some exposure to sustainability-related topics. Students also expressed interest in graduate education in related fields, as well as the desire to become educators themselves. A BAS in Sustainable Science management will allow current and prospective students the opportunity to realize these goals. The program would also articulate well and complement current programs. For example, the Sustainable Construction Technology program is undertaking projects to install solar PV on campus with the potential for students and faculty to include K-12 outreach. Courses developed for the BAS in Sustainable Science management program have the potential to expand the reach of such existing projects by adding a research component that would give students the means to sharpen their skills at inquiry and gain experience at data collection, analysis and reporting – crucial skills for future sustainability professionals. A new topics course in sustainability was offered in Spring 2010, enrolling approximately 48 students who have also mentioned interest in the BAS degree program. A formal survey of using of the students in this class was also taken. The results of this survey are discussed in the enrollment projections found on page 15.

## **Curriculum**

The BAS in Sustainable Science management comprises: 1) a core curriculum emphasizing basic and applied science related to energy and sustainability, as well as communications and business fundamentals; 2) upper division courses that explore specific sustainability topics in depth and recognize the inter-relatedness of the three foundations of a sustainable society – economic growth, social progress, and environmental stewardship; 3) electives drawn from business, English, humanities, management, and marketing; 4) guest lectures by professionals active in renewable energy, green building, water resources management, waste management, transportation, urban planning, and policy; and 5) a strong experiential learning component based on internships, student applied research, service learning, and participation in the ongoing transformation of the college into an environmentally sustainable campus. Examples of current and relevant applied research opportunities include software applications related to distributed electricity generation, characteristics and uses of green materials, biofuels applications, storage applications for renewable energy, display units for renewable energy technology metrics, and behavioral aspects of energy efficiency measures.

The curriculum has been aligned to the needs of employers in Maui County through a community forum, ongoing interviews, and surveys of local business and county representatives to solicit input and feedback for curriculum design, development and implementation, as well as suggestions for internships, cooperative applied research initiatives, and other partnering options. This collaboration is instrumental in aligning the curriculum with the job market. We are working closely with industry partners and recognize that maintaining these types of relationships are key for the vitality of our graduates in the emerging field of sustainability. UH Maui College is in the process of contracting with an Energy Services Company (ESCO), who will be proposing a number of energy efficiency improvement measures for the campus. The contract will also include an educational component, and we anticipate that our relationship with the ESCO will provide many opportunities to supplement the Sustainable Science management curriculum.

The program includes general and specific competencies identified by faculty, professional staff, administrators, industry and community partners, and state agency representatives. The program is also designed to achieve the educational objectives required by the Western Association of Schools and Colleges (WASC). An application for substantive change will be submitted to WASC.

The four-year undergraduate degree with an emphasis in sustainability is relatively new. In developing the curriculum, research was conducted on other institutions offering a similar degree in order to develop course selection and content that would best serve the requirements for the degree. Through the curriculum development process, we have designed program learning outcomes (PLOs) and individual courses that support the concept of the triple bottom line, with equal attention given to economic growth, social equity and environmental protection. For this reason, the proposed degree bears the name “Sustainable Science management,” rather than “Sustainable Science,” which implies greater emphasis on

the environmental sciences, or “Sustainability Management,” which implies greater emphasis on economic issues.

The following PLOs illustrate the triple bottom line scope of this degree program:

- Give examples of ways in which the features and functions of multiple systems are interconnected, and explain how one system can be optimized without degrading other systems or depleting natural resources.
- Investigate, discover and summarize federal, state, local and industry codes, standards, laws, regulations, and guidelines.
- Assess the feasibility of investing in sustainability measures using simple payback, return on investment, and life cycle costing techniques.
- Describe the unique sustainability challenges faced by island communities.
- Identify, outline and illustrate the fundamentals of existing and emerging technologies in energy production, distribution and management; water supply; wastewater treatment; and waste management; their applications, processes and requirements.
- Appraise, evaluate, summarize, and explain the economic, social, cultural, political, and scientific features that make a system, process, practice, or business sustainable and consolidate that information into a sustainability profile.
- Propose and justify creative solutions to sustainability challenges that are scientifically sound.
- Demonstrate skills related to managing sustainability projects including defining scope, selecting achievable goals, evaluating ethical implications, working with diverse teams, making presentations, and preparing reports.

Appendix I provides information comparing the proposed curriculum with courses offered at selected benchmark institutions. In Appendix I, and in the following tables in this section of the proposal, the BAS in Sustainable Science Management courses are designated with the approved alpha, SOS. Appendix I also includes a table listing several sustainability career options suggested by the benchmark institutions.

To be admitted to the BAS in Sustainable Science Management program in a classified status, students are required to have completed the UH Maui College Option IV – AAS Business Careers/Sustainability, or have equivalent transferable coursework, with a minimum GPA of 2.5. Students will be admitted on provisional status if they have completed a minimum of 50 credits of transferable college coursework from an accredited institution with a cumulative GPA of 2.5 or higher in all courses attempted. Classified status will be assigned with completion of all lower division course requirements for Option IV – AAS Business Careers/Sustainability.

The program includes a required sustainability-themed internship, which will provide valuable work experience to assist graduates in securing permanent employment. Who have shown industry support and interest in the program (Appendix J). Results from the October 2009 community forum indicate internship opportunities exist with Grand Wailea, ProVision Solar, and Sopogy, Inc. to name a few (Appendix J). For those employers who would like to provide an internship experience, but do not have the funds to also provide a stipend, supplemental funds have been identified and are available in FY 2010 – 2011 from the Rural Development Project. Maui Electric Company has provided internships for several students from the Sustainable Construction Technology and Electronic and Computer Engineering Technology programs, and is committed to continuing these opportunities for students from the BAS in Sustainable Science Management program. Reports of student internships with MECO are provided in Appendix J. Additional preliminary partnerships have also been established with Goodfellow Bros. Inc., HNu Energy, and Boeing, who have all expressed interest in internship participation.

The program requirements are listed in the following tables. Table 1 presents the requirements for the first two years, which may also lead to the Option IV – AAS Business Careers/Sustainability. Table 2 presents

the curriculum for the junior and senior years, leading to the BAS in Sustainable Science Management. Descriptions of Sustainable Science Management (SOS) courses are provided in Appendix K.

**Table 1: Lower division requirements - Option IV – AAS Business Careers/BAS Sustainable Science Management (67 credits)**

Students planning on continuing with the BAS in Sustainable Science Management should take the following courses. Sustainable Science Management majors are required to earn letter grades (e.g., A, B, C, etc.) in all courses required for the Sustainable Science Management program.

Full-time students would take courses in this sequence:			
First Semester (Fall)	Credits	Second Semester (Spring)	Credits
BUS 120 Introduction to Business	3	ECON 131 Principles of Economics: Macroeconomics	3
BUSN 150 Introduction to Business Computing, or ICS 101 Digital Tools for the Information Age	3	PSY 100 Survey of Psychology, or SOC 100 Survey of General Sociology	3
IS 106 College Orientation I	2	HWST 107 Hawai'i: Center of the Pacific, or HIST 284 History of Hawai'i	3
BUS/COM 130 Business Communication – Oral, or COM 145 Interpersonal Communication I, or COM 210 Intercultural Communication I, or SP 151 Personal & Public Speech, or SP 251 Principles of Effective Public Speaking	3	MATH 115 Statistics	3
ENG 100 Composition I	3	ENRG 101 Introduction to Sustainable Technology	3
SOS 101 Intro to Sustainability	3	ENRG 103 Energy Production Systems	3
	17		18
Third Semester (Fall)	Credits	Fourth Semester (Spring)	Credits
ACC 201 Financial Accounting*	3	ACC 202 Managerial Accounting	3
ECON 130 Principles of Economics: Microeconomics	3	BIOL 124 Environment & Ecology	3
BLAW 200 Legal Environment of Business	3	BIOL 124L Environment & Ecology Laboratory	1
CHEM 151 Elementary Survey of Chemistry	4	ENG 209 Business and Managerial Writing	3
SOS 201 Sustainable Building Design, Construction and Operations	3	MATH 135 Pre-Calculus: Elementary Functions	3
		SOS 202 Sustainable Island Communities	3
	16		16
* ACC 124 and 125 are acceptable in place of ACC 201.			



**Table 2: Upper division requirements – BAS in Sustainable Science Management (60 credits)**

Communication 459(3); English 316(3); Humanities 400 or Contemporary Issues 390v or Advanced Contemporary Issues 490v in Humanities or English (3)\*; Management 310(3), 322(3); Philosophy 323(3); Psychology/Communication 353(3); Sustainable Science Management 301 (3), 302(3), 303(3), 401(3), 402(3), 403(3), 475(6).

Any four upper division electives (3,3,3,3): Advanced Contemporary Issues 490v; Business 318, 320; Contemporary Issues 390v; Management 400; Marketing 300; SOS 393v

Full-time students would take courses in this sequence:

Junior Year (Fall)		Credits	Junior Year (Spring)		Credits
PSY 353 Conflict Management and Resolution	3		MGT 322 Organizational Leadership and Management of Change		3
MGT 310 Principles of Management	3		ENG 316 Advanced Research Writing		3
SOS 301 Sustainable Organizations	3		SOS 303 Sustainable Science Processes		3
SOS 302 Environmental Health	3		SOS 401 Environmental Law, Policy and Justice		3
MATH 203 Calculus for Business and Social Sciences	3		Upper Division Elective		3
15			15		
Senior Year (Fall)		Credits	Senior Year (Spring)		Credits
HUM 400 Changes and Choices	3		SOS 403 Renewable Energy Integration		3
SOS 393V Internship	3		SOS 475 Senior Capstone Project		6
SOS 402 Water Resources Management	3		PHIL 323 Professional Ethics		3
Upper Division Elective	3		COM 459 Intercultural Communication II		3
Upper Division Elective	3				
15			15		

The following figures are provided to add a visual illustration the curriculum. Figure 2 shows how the coursework for the Junior and Senior years of the BAS in Sustainable Science Management is divided among Management, Sustainability, General Education, and Electives.

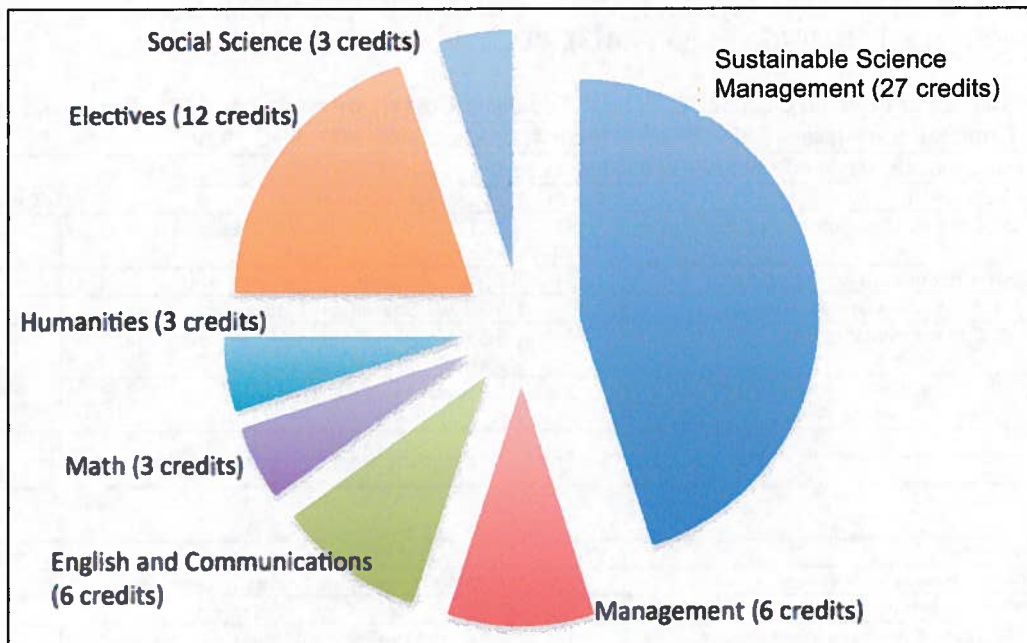
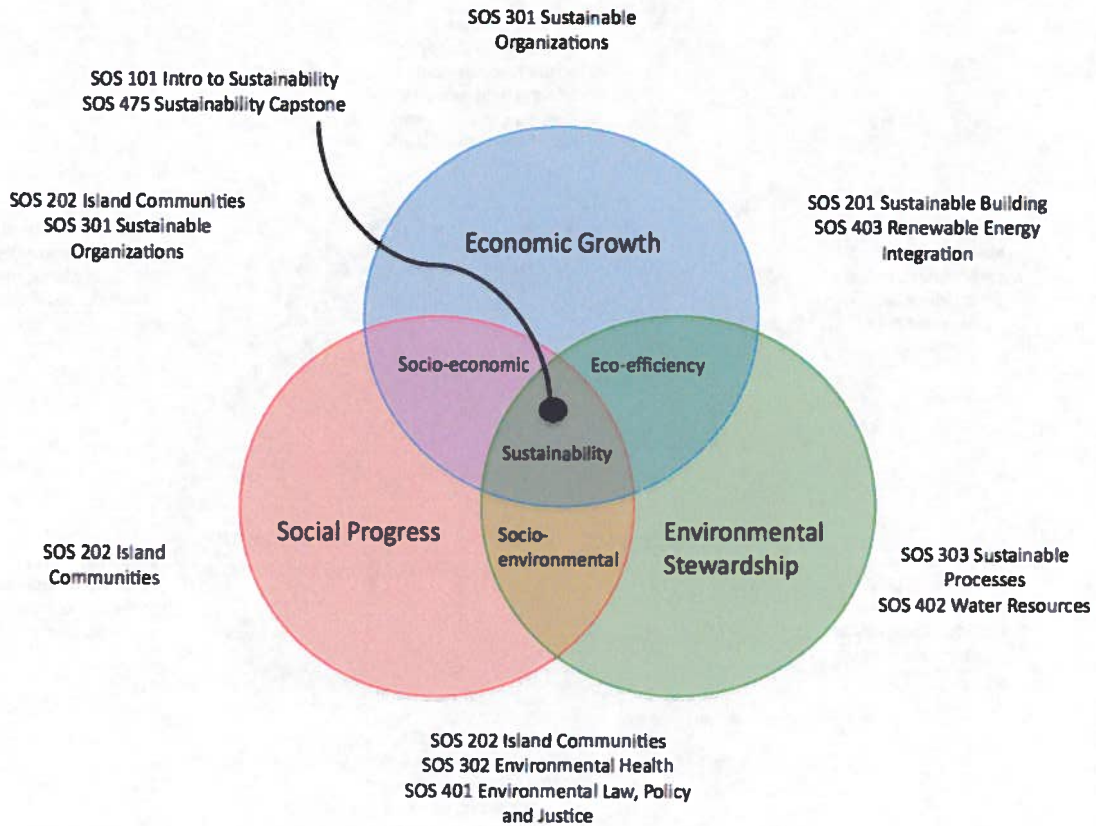


Figure 2 – Sustainable Science Management Curriculum by Category for the Junior and Senior Years

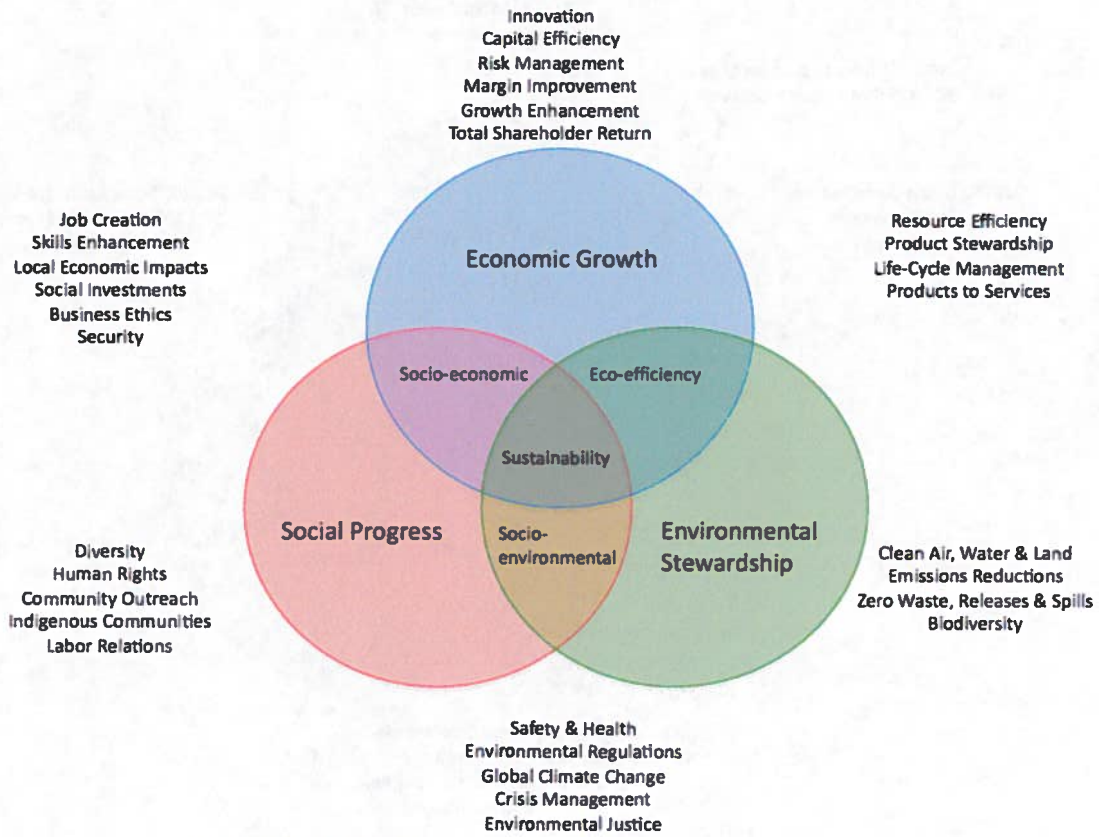
Figure 3 shows the overlap of the proposed Sustainable Science Management curriculum (SOS courses only) with the topical areas of the sustainability diagram shown in Figure 4. Note that some courses appear more than once – this is due to the multiple topics covered in those courses. The use of this diagram during curriculum planning also helped to ensure that courses were integrated and inter-related.



Source: Green City Blue Lake, <http://www.gcbi.org/economy>

Figure 3 – Sustainability Courses Mapped on the Sustainability Diagram

Figure 4 provides an alternate illustration of the three points of the sustainability triangle, along with where specific topics are addressed, both at the three points as well as at the areas of intersection.



Source: Green City Blue Lake, <http://www.gcbi.org/economy>

Figure 4 – Topical Areas in Sustainability

## Enrollment Projections

We estimate 12 students enrolling in the first year based on the profile of students who enrolled in the Spring 2010 topics course, SCI 190V Intro to the Science of Sustainability. Of the 48 students enrolled, 25 were Liberal Arts or Business majors. These students would be most prepared and most likely to choose to enter the BAS in Sustainable Science Management program the first year. Of these 25, it was further estimated that about 50% would actually enter the program. This estimate was verified by a class survey that asked students to indicate whether they would be interested in either choosing to major in Sustainable Science Management, or taking additional courses in Sustainable Science Management. Of the 25 students who completed the survey, 15 indicated high to very high interest in the major, and 21 indicated high to very high interest in additional classes (Appendix L). Again, it was assumed that of those expressing interest, we could be confident that approximately 12 of the 15 students who expressed interest would enter the program during the first year. As the program continues over time we anticipate an increase in student enrollment, which is reflected in the five-year plan.

## Resources Required

- a. **Faculty (existing and new FTEs):** The department added two new PhD faculty in Fall 2009 with responsibility for program planning and development. Two FTE faculty are required to implement the program. The anticipated workload for these two faculty is 9-12 credits per semester of teaching plus three workload units of applied research. Innovative teaching approaches will be explored including: integrating current events into the classroom, using current technologies such as podcasts and video, presenting case studies for review and analysis, providing opportunities for students to participate in national events and competitions (such as the solar decathlon, and EPA's annual P3 student design competition for sustainability) and recruiting experts from local industry, agencies and non-profits to teach course "modules."
- b. **Library resources:** Because much of the information related to sustainability involves rapidly changing events and technologies, a great deal of material is available on-line and will be shared in class and via faculty websites. The library will be enhanced with resources for the Sustainable Science Management curriculum through funding from the Rural Development Project. Possible funding sources include federal grants for curriculum development (e.g., NSF's Course, Curriculum and Laboratory Improvement (CCLI) grants for STEM education) and Rural Development Project grants.
- c. **Physical resources:** All courses (with the exception of the internship experience) are planned to be lecture format, requiring classroom with instructor computer, projector and video capability. It is anticipated that courses will also be offered by distance education and require the use of a distance media classroom and technical support.
- d. **Other resources:** Other resources include lecture costs for specific topics and courses, contributions toward shared departmental clerical staff, lab technicians, and library resource personnel, an internship coordinator and a dedicated counselor.

## Revenue Template Overview

Revenue expenses in the first year are high because of the low number of projected enrolled students. When student enrollment grows we will require less funding since expenses will largely be covered from baccalaureate tuition. Two FTE faculty currently in place are supported from general funds. Funding for other personnel includes a counselor to be shared with Applied Engineering Technology and will be provided by the Rural Development Project.

**Cost Revenue Template (Supporting templates with signature in Appendices M and N)**

### **Measures of Program Efficiency**

Program health will be examined as part of the program review process. UH Maui College's program review process involves continuous and systematic evaluation of all programs and serves to support and guide programs in the process of continuous improvement. Program efficiency will be measured by the program health indicators, including: (a) number of majors; (b) course fill rate (how many students registered in courses compared to number of seats available); (c) the number of courses taught per year; (d) the number of graduates; and (e) student to faculty ratio.

### **Measures of Program Effectiveness**

The effectiveness of the BAS in Sustainable Science Management program will be documented through the program review process and assessment of course and program learning outcomes (PLOs). Program effectiveness will be measured by (a) demonstrated achievement of the course and program learning outcomes as measured by appropriate assessment measures (i.e., examples of student work on assignments, tests and projects); (b) student retention; (c) degrees earned in relationship to the number of majors; and (d) placement of graduates into jobs related to the degree. In addition, the PLOs will be reviewed and validated by the program advisory council on an annual basis to ensure that the outcomes remain relevant to the current workforce skill requirements. The PLOs and assessment grid for proposed Sustainable Science Management courses are included in Appendix O. The grid indicates where each PLO is Introduced (I), Reinforced (R), and Evaluated (E) in the SOS courses.

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## Appendix A

### Maui County Energy Alliance

#### Overview

Mayor Charmaine Tavares established the Maui County Energy Alliance in 2008 to address the formulation of policies and actions to break the cycle of fossil fuel dependence. Maui's abundant natural resources, which include the sun, wind, ocean, fertile arable land, and geothermal potential, offer the real possibility of a broad portfolio of renewable energy sources. These will be harnessed to meet the Mayor's goals for 2020 of meeting 95% of all energy needs in the County of Maui sustainably and achieving a carbon-neutral footprint.

These efforts are not being undertaken in isolation. On a parallel and complementary track, the State has developed the Hawaii Clean Energy Initiative (HCEI) in concert with the Department of Energy. The goal of the HCEI is for efficiencies and renewable resources to meet 70% of the State's energy requirements by 2030.

#### Working Groups

With the establishment of the Maui County Energy Alliance, five working groups composed of volunteer experts were formed to gather information and data, review opportunities for action, and make recommendations.

- Renewable Resource Development
- Work-force Development and Education
- Energy and Transportation Infrastructure
- Energy Efficiency and Conservation
- Reduction of Greenhouse Gases and Carbon Emissions

#### Oversight Committee

Name	Title	Organization
Charmaine Tavares	Mayor	County of Maui
Sheri Morrison	Managing Director	County of Maui
Deidre Tegarden	Coordinator, Office of Economic Development	County of Maui
Victor Reyes	Energy Commissioner	County of Maui
Jeanne Skog	President	Maui Economic Development Board
Steve Perkins	Project Coordinator	Pacific Rim Land, Inc.
Clyde Sakamoto	Chancellor	Maui Community College
Bill Parks	On assignment with DBEDT	Department of Energy

Detailed information on the progress and membership of each working group is available at: <http://www.co.maui.hi.us/index.aspx?NID=1431>

## Appendix B

### Articles from the News Media

# Maui County Energy Alliance Outlines a Sustainable Future - MauiWeekly.com

After months of intense discussion in the confines of a county boardroom, the recommendations of the Maui County Energy Alliance (MCEA) were revealed to members of the public on Thursday, Sept. 10, at the Maui County Energy Expo 2009. In a 128-page document entitled “Sustainable Energy: Strategies for Implementation,” the alliance outlined the energy opportunities, obstacles and dilemmas facing Maui County today—and tomorrow.

The five working groups of the MCEA include representatives from the County of Maui, Maui Economic Development Board (MEDB), Maui Community College, the U.S. Department of Energy and 78 volunteers from various public, private and government sectors. Determined to break the cycle of fossil fuel dependence, Mayor Charmaine Tavares established the MCEA in 2008, following the inaugural Maui County Energy Expo in 2007.

Alliance members were assigned to one of five working groups and tasked to review current energy trends impacting Maui County and develop viable strategies to reach the county’s goal of using 95 percent renewable sources by 2020. Each working group was assigned to a specific energy topic, including Renewable Resource Development, Energy and Transportation Infrastructure, Energy Efficiency and Conservation in County Facilities, Greenhouse Gases and Carbon Emissions and Green Workforce Development and Education. Over the course of one year, alliance members convened to discuss a range of energy topics, assessing past, present and future trends and statistics in order to design policies and actions to enhance further sustainability.

The results of these discussions can be found within the pages of “Sustainable Energy: Strategies for Implementation,” which reveals that it is indeed possible to reach the goal of 95 percent renewable energy for Maui County in 2020. However, the report stressed that we will need to take advantage of all available renewable resources—wind, solar, hydroelectric, biogas, geothermal—and expand these existing resources as new ones are being developed. In addition, the alliance emphasized the important role of conservation; specifically, discovering new—and improved—ways to conserve energy across Maui County.

Priority recommendations from the working groups include the development of an “Energy Infrastructure Master Plan;” a standardized report for county energy and resource consumption; a “Green Permit” program to encourage green building and LEED-certified building in private and public projects; and legislation “that strengthens the commitment of Maui and Hawai‘i to achieving energy goals by ensuring that stated targets are legal mandates, not merely recommendations.”

Additionally, the group members recommended that the county fund a “Maui Renewable Energy Trust” to support energy policy and planning; expand the Maui Bus system to encourage public transportation; provide energy audits to businesses to promote energy-efficiency; reduce fees for eco-friendly projects; and “lead by example by designing and implementing renewable energy production into its facilities.” County facilities could use inline hydro power, landfill gas energy

conversion and landfill solid waste-to-energy, according to the report.

Other MCEA Working Group recommendations include the establishment of an annual renewable energy festival to heighten community awareness about the issue; developing a comprehensive strategy to identify and secure funding for green workforce development and sustainable energy education; expanding hydroelectric capabilities and building more wind farms.

At this year's Energy Expo, members of the five MCEA Working Groups presented these recommendations during a three-hour session, encouraging commentary and suggestions from the public. According to Mayor Tavares, the input received during the session will be considered for integration into the county's Energy Action Plan. She reminded attendees that the MCEA document is a work in progress, and more input is needed to secure a renewable energy future for Maui County.

The mayor also applauded the tireless efforts of the MCEA Working Group members. "The countless hours contributed by these volunteer members of the five working groups are deeply appreciated," she said. "It is gratifying to have had the support of so many organizations, businesses and agencies." In addition, Mayor Tavares said, "We will need to continue working together to meet the important goals we have set for energy efficiency and development of renewable energy from wind, solar and other sustainable sources... with the help of advanced technology and like-minded individuals who are committed to changing our dependence on imported fossil fuels, we have made great strides toward incorporating clean energy sources and reducing energy consumption—yet we have a long way to go. Our success is critical to our county's future, and as stewards of our island home, we must continue our efforts in this race against time."

For more information, or to view a copy of the Maui County Energy Alliance's "Strategies for Implementation: Recommendations from the Working Groups," visit [www.mauicounty.gov/energyexpo](http://www.mauicounty.gov/energyexpo).

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# Isles on way to becoming model for green energy | The Honolulu Advertiser

Posted on: Sunday, February 14, 2010

Isles on way to becoming model for green energy

By Alana Semuels  
Los Angeles Times

**KONA** — Take a ride in Ron Baird's pickup truck along the volcanic shore of the Big Island and he'll show you an inventor's wonderland.

On one parcel of this government-created energy laboratory, rows of mirrors shine white-hot in the sun, turning heat into energy. On another, brown water tanks harbor strands of algae that will be made into fuel. Nearby is a wind turbine whose blades spin parallel to the ground.

"It's an awesome amount of things going on here," said Baird, chief executive of National Energy Research Laboratory of Hawaii Authority, which is helping to nurture 42 green private-sector businesses on 877 acres of land in Kona.

Watch out, California.

Hawai'i is gunning for the title of the nation's green energy capital. It's aiming to obtain 70 percent of its total energy needs from clean sources within 20 years.

That ambitious target blows the solar panels off California's mandate to get a third of its electricity from renewables by 2020. But Hawai'i officials have concluded their state has little choice.

This tropical paradise is an energy beggar that depends almost solely on oil to fuel its vehicles and stoke its power plants. That's left the state, which doesn't produce a drop of crude, vulnerable to spills, price swings and geopolitics. Hawai'i residents already pay the highest pump prices and electricity rates in the country. The state imports around 51 million barrels of oil costing billions annually, according to government figures.

"We really are the canary in the coal mine," said Jeff Kissel, chief executive of the Gas Company of Hawaii. "What's happening to us with oil is going to happen to the rest of the country as supplies diminish."

More worrisome still is global warming. The threat of rising seas and pounding storms linked to climate change has put Hawai'i on a collision course with Mother Nature.

While Hawai'i's efforts to green itself won't make much of dent in the world's total carbon emissions,

environmentalists hope the state can prove what's possible. The goal is to transform the nation's most energy dependent state into its cleanest and most sustainable.

"We're adopting policies and technologies here that can serve as a model for the rest of the globe," said Jeff Mikulina, executive director of the Blue Planet Foundation, a Hawai'i clean energy advocacy group.

The state this year began requiring all new homes be built with solar water heaters. Hawai'i is working with electric transport firm Better Place of Palo Alto, Calif., to build a network of recharging stations to jump-start mass use of electric vehicles in the Islands. Meanwhile, the state's public utilities commission is devising a compensation system to encourage homeowners and businesses to go solar by paying them to generate green electricity.

The policies stem from an agreement Hawai'i signed with the Department of Energy in 2008. The state pledged to obtain 70 percent of its total energy needs by 2030 — 40 percent from renewable electricity generation and the remaining 30 percent from energy efficiency. Known as the Hawaii Clean Energy Initiative, that agreement has since been strengthened with binding legislation that exceeds California's mandate to get 33 percent of its electricity from renewables by 2020 (though Hawai'i has an extra decade to get there).

About 6.5 percent of Hawai'i's electricity came from renewable sources other than hydroelectric power in 2007, according to the National Renewable Energy Laboratory. That's about half of what California — the nation's solar champion and a major player in wind and geothermal — has achieved so far.

But experts said Hawai'i's small size and unique geography could prove advantageous in the race for energy independence. With just 1.3 million inhabitants, its energy consumption is small. The Islands are blessed with abundant solar, wind, geothermal and wave resources. And residents are less likely to object to the cost of renewables since they already pay high energy prices.

"It's easier for Hawai'i to pull this off than anyone else," said Alison Silverstein, an independent consultant and one-time energy regulator. "They know how bad things can get, and they are highly motivated to take action."

Some of Hawai'i's projects might sound like the stuff of science fiction. The state is looking into building a 30-mile undersea cable to link proposed wind farms on Lāna'i and Moloka'i into the electric grids on O'ahu and Maui. A local company is working to provide air conditioning in 40 Downtown buildings using chilly sea water pumped from three miles out in the ocean. And Hawai'i's own Gas Company is using municipal solid waste and animal fat to make synthetic natural gas to supply energy to its customers.

"If Saudi Arabia is rich in oil, you could use the analogy that Hawai'i is rich in renewable resources," said Will Rolston, energy coordinator for Hawai'i County.

The Big Island's grid already obtains about one-third of its power from renewables, Rolston said, including solar, wind and geothermal. It's also at the forefront of some of Hawai'i's biggest experiments, thanks in part to the National Energy Research Laboratory of Hawaii Authority.

In addition to its role as a green business incubator, the lab is a leading center for research on generating electricity by exploiting temperature differences between deep and shallow layers of sea water, a process known as ocean thermal energy conversion.

NELHA is also a showplace for innovations including seawater air conditioning. That technology uses cold, deep ocean water to cool the fresh water that circulates in a building's air conditioning system, eliminating the need for power-sucking chillers.

Baird likes to say that his office, which, like other NELHA buildings, uses the ocean air conditioning system, "is so cold I could lease it to Costco to store lettuce."

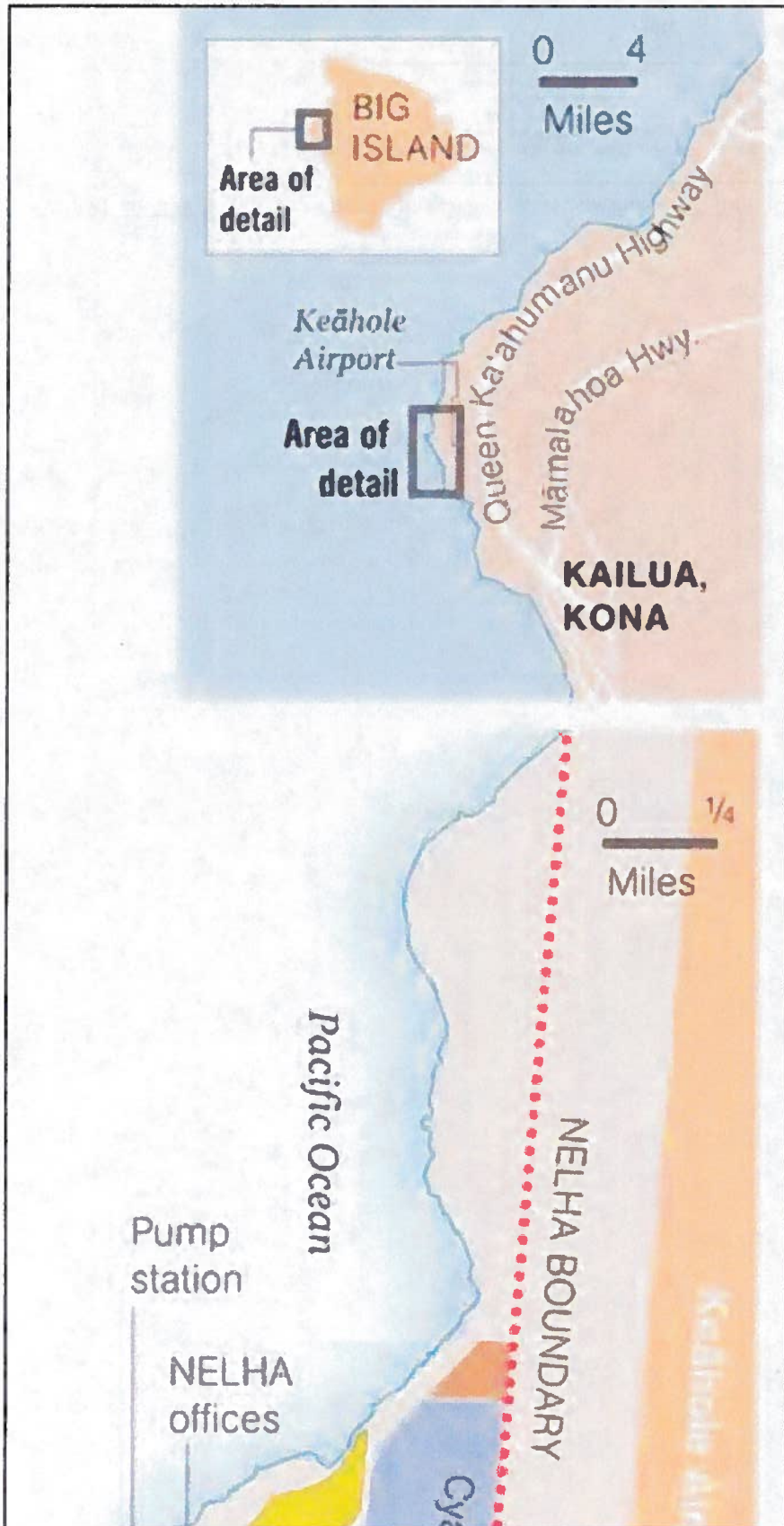
The other islands are getting on board. Military family housing being built on O'ahu will have meters in every home so that residents can tell how much energy they're using and compare it to their neighbor's usage. Such peer pressure has been proven to encourage conservation.

The military is also experimenting with electric generating turbines off the coast of O'ahu that harness energy from ocean waves.

Some Hawai'i residents are dubious about their state's big ambitions. The undersea cable proposal and a plan to build a commuter rail line have stirred concerns about cost. A survey by the Blue Planet Foundation found that residents rated energy independence behind other important issues including jobs, health care and traffic congestion.

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# College students are flocking to sustainability degrees, careers

By Jillian Berman, USA TODAY

Students interested in pursuing a job in sustainability now can choose from a variety of "green" degree programs.

With an increased interest in the environment and growth in the "green collar" job sector, colleges and universities are beginning to incorporate sustainability into their programs. From MBAs in sustainable-business practices to programs that give students the technical training necessary to operate wind turbines, students have an increasing array of options to choose from.

"Clearly, demand is there for these types of workers," says Marisa Michaud of Eduventures, a higher-education research and consulting firm. "Colleges are seeing that, and they want to provide appropriate educational programs to meet that demand."

Concern for the environment is the motivation, says Julian Dautremont-Smith of the Association for Sustainability in Higher Education.

"The past few years, society as a whole has become increasingly interested in sustainability," he says. "Higher education has been swept up as well."

David Soto of *The Princeton Review* says student interest is driving colleges to create programs that offer training in sustainability. Two-thirds of students surveyed for the company's recent "College Hopes and Worries" survey said a college's "environmental commitment" would be a factor in where they applied.

"Students are really savvy shoppers these days, so they're realizing, with a changing economy and green jobs looking to take a leap within the next couple of years, that they want to be armed with those types of skills," Soto says.

## **Green — not greed — is good**

One popular program is an MBA that teaches skills for operating sustainable businesses.

A University of Pennsylvania program that started this year lets students earn an MBA and a master's in environmental studies at the same time.

"There's an increasing interest among businesses to take the environment seriously," says Eric Orts, director of the Wharton School's Initiative for Global Environmental Leadership at Penn.

"Our take is you really need to have the science background and some other approaches that are not normally taught in the business school context," he says.

Architecture schools are responding to the increased interest in energy-efficient buildings.

Christoph Reinhart, associate professor of architectural technology at Harvard's Graduate School of Design, says the school's decision last summer to start offering a concentration in sustainable design was driven by interest from students and changes in the field.

"Over the past few years, there has been an increased interest and pressure to provide this knowledge in more depth, whereas before, maybe a class would have been sufficient," he says. "Now there's an expectation that more of these skills are being learned."

### **Newly minted grads**

Arizona State University's School of Sustainability graduated its first class in May. The school offers a bachelor of arts and a bachelor of science in sustainability as well as a graduate degree.

Charles Redman, the director of the School of Sustainability, says the school takes an interdisciplinary approach.

Student Drew Bryck says what drew him to the school was the opportunity to study biology, economics and a variety of other fields.

Bryck says he is "fairly confident" his degree will help him land a job because the need for people with a well-rounded background in sustainability is growing, especially in the private sector.

The program resonates with students, Redman says; 300 undergraduates enrolled the first year it was offered.

Bucknell University in Lewisburg, Pa., will require all students to take at least one class that explores the human connection to the environment.

Dina El-Mogazi, director of the Campus Greening Initiative, says courses in a variety of disciplines will fulfill the requirement.

"We feel that it's very important, given the current state of the world, that students understand both the way the environment supports human life and the way human decisions" affect the environment's ability to function.

A growing number of schools, including community colleges, are training students to operate green technology.

Kalamazoo (Mich.) Valley Community College will offer a 26-week program starting in October to train students in operating wind turbines.

Jim DeHaven, vice president for economic and business development at the college, says the school is offering the program to meet the needs of wind farms that are "scrambling" for trained technicians.

"They can really write their own future at this point because they're needed at all the wind farms," he says. "They don't want us to wait and put people through a two-year program or a one-year

certification — they want a fast track to employment."

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## As colleges add green majors and minors, classes fill up

Colleges are rapidly adding new majors and minors in green studies, and students are filling them fast.

Nationwide, more than 100 majors, minors or certificates were created this year in energy and sustainability-focused programs at colleges big and small, says the Association for the Advancement of Sustainability in Higher Education. That's up from just three programs added in 2005.

Two factors are driving the surge: Students want the courses, and employers want the trained students, says Paul Rowland, the association's executive director.

"There's a great perception that there's a sweet spot with energy to do good and do well, and it appears to be the place of job growth," says Rob Melnick, executive dean of the Global Institute of Sustainability at Arizona State University.

The institute started an undergraduate program in sustainability studies — with a focus on solar — a year and a half ago. It now has about 600 students who've declared sustainability a major. "The growth rate is unprecedented," even though the program has the toughest admission standards of any school at the university, Melnick says.

Other schools are also seeing big demand, including:

- Illinois State University in Normal, Ill. The school of 21,000 students has 65 majors in renewable energy, a program started in 2008 with help from a \$1 million Department of Energy grant. The program has "more students wanting in than we can handle," says Richard Boser, chair of the Department of Technology. Nearby employers, including those in wind energy, hope to hire future graduates, Boser says.

- Massachusetts Institute of Technology. In September it launched a minor in energy studies. A student survey said 43% of freshmen and sophomores were very or extremely interested in it. "That's a very large number," says Vladimir Bulovic, associate professor of communication and technology. MIT's student energy club has 1,700 members, vs. several hundred a few years ago, Bulovic says.

- University of California-Berkeley. The school has seen student interest in its introductory energy class explode. Ten years ago, it attracted 40 or so students. Now, the class runs 270, says Daniel Kammen, director of the school's Renewable and Appropriate Energy Laboratory.

The Obama administration has estimated that jobs in energy and environmental-related occupations will grow 52% from 2000 through 2016, vs. 14% for other occupations.

That's partly why budget-strapped schools are adding energy and sustainability programs even while cutting other majors, Rowland says.

# Maui County to Publish Green Book Directory of Eco Conscious Businesses « PRG NEWS WITH WENDY OSHER

Posted on February 3, 2010 by Wendy Osher

Eco-conscious businesses are invited to submit their information for inclusion in The Maui County Green Book. The publication is scheduled for release in May and will be printed on recycled paper with soy ink.

The guide is being created in partnership between the County of Maui and Haynes Publishing Company of Wailuku. The directory will include eco-conscious businesses on Maui, Molokai and Lanai that provide sustainable, and, or, environmentally friendly products or services.

In addition to the printed version, The Maui County Green Book will also be available digitally in the form of a searchable, interactive web directory.

To have your company included in The Maui County Green Book, fill out the application available at [www.maui-county-green-book.com](http://www.maui-county-green-book.com), describing products and, or, services offered.

Filed under: [GENERAL](#) | Tagged: [Maui](#), [Wailuku](#), [County of Maui](#), [Molokai](#), [Lanai](#), [eco friendly](#), [eco conscious](#), [eco business](#), [The Maui County Green Book](#), [Maui Green Book](#), [Green Book](#), [recycled paper](#), [soy ink](#), [Haynes Publishing Company](#), [sustainable](#), [environmental](#), [web directory](#)

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# Sustainability Professionals -- Research Shows You're Not Alone | Business



Sustainability Director, CSR Manager, Chief Innovation Officer, EHS Specialist, Environmental Affairs VP ... The list of titles of experts working on corporate environmental innovation goes on and on.

The good news about this diversity of positions? There's serious growth opportunity in this sector, and companies are looking for varied skill sets to meet their needs around sustainability.

The tough news? There's no set roadmap for companies to follow in an effort to design and implement a successful sustainability strategy. In fact, many of us working in this space are hungry for clear, concise information on how to tackle the sustainability challenge in a cost- and time-effective way.

Earlier this fall, the Environmental Defense Fund (EDF) worked with KRC Research to complete in-depth interviews with 25 senior professionals working day-to-day on corporate sustainability issues at Fortune 1000 companies.

We had three goals for this research: to better understand the primary issues these professionals address for their companies, to hear about the challenges they face in doing their jobs, and to learn more about how sustainability information flows within leading companies and professional networks.

The results of our research are summarized in a brief PowerPoint slide deck below. Feel free to share these slides with your colleagues and networks, and use them liberally in your own presentations if you find them helpful.

In brief, our research revealed seven key takeaways:

1. Making a business case for "green" is a must. Especially in this economy, the bottom line matters -- a lot. Corporate sustainability projects must be able to show cost savings



and a rapid ROI in order to be approved and widely supported within Fortune 1000 companies.

2. Energy usage, and how to curb it through efficiencies, is a huge priority. Of all the sustainability issues out there, the top corporate priority is how best to reduce energy use, cut costs and minimize carbon footprints.

3. Tracking and measuring is a big challenge. Many companies are struggling with the lack of standards and definitions when it comes to measuring a carbon footprint, tracking it over time, and working systematically to reduce it. This is particularly challenging for companies with complex supply chains that span the globe.

4. Regulatory compliance is a beast. Companies are subject to multiple levels of regulation -- federal, state, county and city -- as well as the regulations of other countries. Understanding and navigating this complex web of regulations is something companies need help with.

5. Information flows are numerous and dispersed, and often informal. Most companies we spoke with lack a central resource for information on sustainability. Sustainability professionals rely on emails, online articles, industry blogs and conferences to stay up to speed on developments in this space. Figuring out what other leading companies have done -- and done well -- is a challenge given the dispersed nature of this information.

6. Following the leader makes good sense. Sustainability professionals are in search of detailed examples and case studies outlining how other companies have successfully cracked the sustainability nut. While general information about sustainability trends and practices can be useful, best practices and cautionary tales from the field are the most valuable of all. In particular, companies want to hear how their competitors have done things right so they can avoid reinventing the wheel.

7. Partnering with others can help. Working with consultants, non-profit organizations and even reaching out to other companies can help a great deal. External expertise can bring a sound knowledge of the competitive landscape, a fresh perspective to corporate challenges, and third party validation to help companies -- as well as their clients and customers -- know they are on the right track when it comes to environmental sustainability initiatives.

So what's next? At EDF, our goal with the Innovation Exchange is to facilitate rapid, widespread adoption of environmental innovation across business. The research findings indicate that the best way to meet this goal is to provide concrete business case studies, share tools to help companies cut costs while working more sustainably, provide help navigating and understanding the regulatory landscape and act as a sounding board for companies embarking on aggressive sustainability platforms.

For help making the business case and uncovering hidden efficiencies, consider hiring a Climate Corps fellow. Over the past two years, they've helped a variety of businesses uncover nearly \$90 million in cost savings opportunities -- projects that could also avoid over 157,000 metric tons of greenhouse gas emissions per year -- equivalent to taking more than 19,000 SUVs off the road.

KRC Research Presentation

*Melanie Janin is the marketing communications director for corporate partnerships at Environmental Defense Fund. She is responsible for communications outreach and promotion around EDF's work with leading businesses on sustainability initiatives.*

*This article was cross-posted at EDF's [Innovation Exchange](#).*

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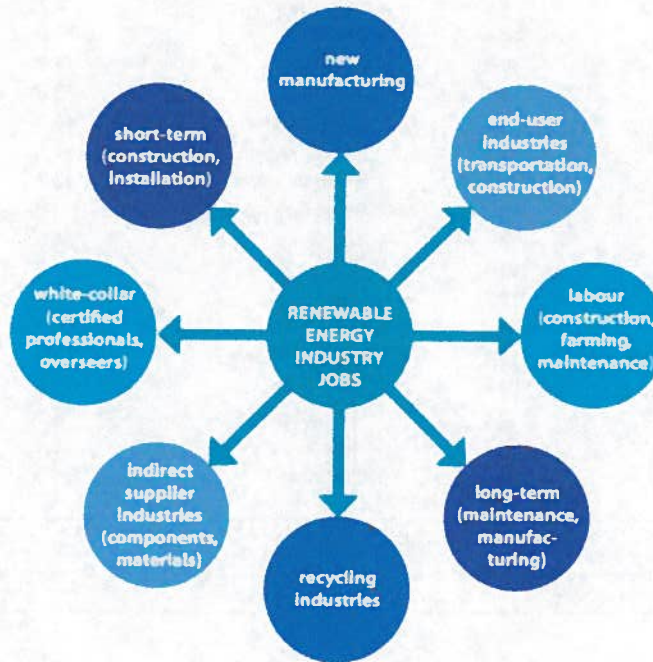
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## Appendix C

### Figures Supporting the Needs Assessment

**Figure 1**

The United Nations Development Program (UNDP) Annual Report for 2009, *Environment and Sustainable Development: Harnessing the Green Economy*, provides the following graphic illustrating the many types of jobs created by development of renewable energy projects. It is important to note the generic nomenclature of many of these positions.



Source: UN  
Illustration: Pamela Gesmar

**Figure 2**

Benefits from High Performance Buildings			
Federal Investment	GDP Gain	Personal Income	Total Jobs
\$89.9 Billion	\$373.03 Billion	\$250.17 Billion	827,260

Source: Apollo Alliance

Figure 3

Table 5. Estimated Impact of the ARRA on Employment by State

State	Jobs Impact Thousands	State	Jobs Impact Thousands
Alabama	13.5	Montana	2.9
Alaska	2.2	Nebraska	5.6
Arizona	21.4	Nevada	9.1
Arkansas	8.6	New Hampshire	4.0
California	139.7	New Jersey	31.2
Colorado	16.1	New Mexico	5.3
Connecticut	12.9	New York	72.5
Delaware	3.0	North Carolina	31.5
District of Columbia	4.9	North Dakota	2.2
Florida	55.4	Ohio	38.9
Georgia	30.8	Oklahoma	11.8
Hawaii	4.2	Oregon	13.6
Idaho	4.6	Pennsylvania	40.9
Illinois	50.4	Rhode Island	4.1
Indiana	24.4	South Carolina	13.7
Iowa	10.9	South Dakota	2.8
Kansas	9.1	Tennessee	20.0
Kentucky	13.1	Texas	71.9
Louisiana	12.7	Utah	9.5
Maine	4.8	Vermont	2.3
Maryland	17.4	Virginia	24.0
Massachusetts	27.4	Washington	22.6
Michigan	36.0	West Virginia	5.1
Minnesota	20.1	Wisconsin	22.1
Mississippi	8.3	Wyoming	1.8
Missouri	19.2		

Source: CEA estimates based on data from the Current Employment Statistics and the Quarterly Census of Employment and Wages.

Notes: Entries sum to the estimated cumulative impact of policy on level in Table 3 (1,040,000 jobs impacted). Items may not add to total due to rounding.

**Figure 4**

Current and Potential Green Jobs			
Honolulu, Hawaii			
Year	No. of Green Jobs	Change	Percent Change
2006	2,022		
2030	15,997	13,975	691%

*Source: U.S. Metro Economies Green Jobs Report, Appendix Current and Potential Green Jobs by Metropolitan Area.*

**Human Settlements Officer (Sustainable Housing and Construction Technology), P-3**  
[https://jobs.un.org/Galaxy/Release3/vacancy/Display\\_Vac.aspx?lang=1200&VACID=cec5c5ff-1d0e-45b9-b6d1-5e3e0aef393f](https://jobs.un.org/Galaxy/Release3/vacancy/Display_Vac.aspx?lang=1200&VACID=cec5c5ff-1d0e-45b9-b6d1-5e3e0aef393f)

**DEADLINE FOR APPLICATIONS:** 17 Apr 2010

**DATE OF ISSUANCE:** 16 Feb 2010

**ORGANIZATIONAL UNIT:** United Nations Human Settlement Programme

**DUTY STATION:** Nairobi

**VACANCY ANNOUNCEMENT NUMBER:** 10-PGM-UN-HABITAT-423345-R-NAIROBI

Staff members are subject to the authority of the Secretary-General and to assignment by him or her. In this context, all staff are expected to move periodically to new functions in their careers in accordance with established rules and procedures.

#### **Remuneration**

Depending on professional background, experience and family situation, a competitive compensation and benefits package is offered.

[More Info](#)

#### **United Nations Core Values: Integrity, Professionalism, Respect for Diversity**

#### **Responsibilities**

The United Nations Human Settlements Programme, UN-HABITAT, is the agency for human settlements. It is mandated by the UN General Assembly to promote socially and environmentally sustainable towns and cities with the goal of providing adequate shelter for all. The post is located in the Housing Policy Section (HPS), Shelter Branch, Shelter and Human Settlements Division. Under the supervision of the Chief, HPS, the incumbent will: a) Contribute to the development and implementation of UN-HABITAT's normative activities related to housing policies and programmes in line with the Habitat Agenda; b) Review and analyze existing national and international policies and instruments, plans of actions and programmes on sustainable housing in relation to climate change adaptation and mitigation which includes improving energy efficiency, reducing greenhouse gas emissions in buildings, technologies, human settlements and housing environments; c) Collect and analyze information about ongoing developments and research activities related to sustainable housing, low greenhouse gas emitting building materials and construction technologies at city, national, regional and global levels; d) Contribute to and draft UN-Habitat's outputs, highlighting innovative approaches and techniques in technical publications, reports, policy documents, guidelines, standards and toolkits; e) Draft project/programme proposals and participate in resources mobilization efforts; f) Ensure effective management of projects in coordination with UN-

Habitat regional offices and donors; g) Assist in organizing, coordinating, reporting and representing UN-Habitat at ad-hoc expert group meetings and other activities, such as regional consultations, workshops and seminars; h) Establish networks of stakeholders in the field of sustainable housing, climate change adaptation and mitigation, sustainable construction and building materials and human settlements planning fields; i) Formulate conceptual and operational frameworks to link sustainable human settlements and housing environments, the use and dissemination of sustainable buildings and construction technologies and planning with the realization of the right to adequate housing consistent with the Habitat Agenda; j) Provide appropriate technical advisory support to the Regional Offices and partners, through backstopping and fact-finding missions, monitoring and participating in the evaluation of project activities, projects and programmes; k) Prepare cooperation agreements, Memoranda of Understanding and grant agreements for governments and partners.

### **Competencies**

**Professionalism:** Knowledge and understanding of theories, concepts and approaches relevant to sustainable housing, building materials and technologies with regards to human settlements climate change adaptation and mitigation. Ability to identify key strategic issues, opportunities and risks. Ability to perceive, develop and promote coherent links between the organization's strategy and the work unit's goals. Demonstrated ability to provide innovative input in operational management and good judgement in negotiations and decision making. Capacity to work under stress and tight deadlines. Communication: Demonstrated ability to articulate and communicate complex concepts, ideas and messages to a wide variety of audiences. Planning and Organizing: Develop clear goals that are consistent with agreed strategies; identify priority activities and assignments; adjust priorities as required; allocate appropriate amount of time and resources for completing work. Client Orientation: Consider all those to whom services are provided within and outside the organization to be 'clients' and seek to see things from clients' point of view; meet timeline for delivery of products or services to client.

## **QUALIFICATIONS**

### **Education**

Advanced university degree (Master's degree or equivalent) in architecture, civil engineering, physical sciences or urban and regional planning, with focus on sustainable building materials, technologies and design that are relevant to sustainable housing and human settlements in relation to climate change adaptation and mitigation. A first level university degree in combination with qualifying experience may be accepted in lieu of the advanced university degree.

## INTERN GROWING SUSTAINABLE BUSINESS (GSB) JAPAN PROJECT, PRIVATE SECTOR DIVISION (PSD)

**Location :**

New York, UNITED STATES OF AMERICA

**Application Deadline :**

02-Apr-10

**Additional Category**

Poverty Reduction

**Type of Contract :**

Internship

**Languages Required :**

English

**Starting Date :**

15-Apr-2010

(date when the selected candidate is expected to start)

**Duration of Initial Contract :**

3-6 months

**Expected Duration of Assignment :**

Full-time (40 hours per week)

### **Background**

#### UNDP Private Sector Strategy

The United Nations Development Programme (UNDP) recognizes that achieving the Millennium Development Goals (MDGs) depends on vibrant economic growth, driven by private enterprises that create jobs and provide goods and services for the poor, as well as generate tax revenues to finance essential social and economic infrastructure. The private sector - from large multi-national companies to small enterprises and cooperatives servicing local markets - also has an essential role to play in achieving broader UNDP goals in areas such as energy and environmental service delivery, crisis prevention, gender equality and democratic governance.

The UNDP's private sector interventions aim at facilitating the development of inclusive market with the prospect of sustainable pro-poor growth by increasing the poor's access to markets for necessary products and services. UNDP bases its approach to the private sector on the concept of facilitating the development of 'Inclusive Markets.' The overall aim is to ensure that markets work better for the poor as entrepreneurs, wage employees and consumers.



In keeping with this approach UNDP focuses on five priorities.

Policy advisory support will be provided to governments that wish to establish legal and regulatory frameworks for rule based and non-discriminatory markets, including robust and transparent market institutions that promote fair competition whilst safeguarding the rights of producers, employees and consumers and ensuring the inclusion of the poor; Assistance will be provided for the development of integrated value chains in market sectors that offer the prospect of sustainable growth and transition to higher valued added and better remunerated forms of employment; Building on existing programmes in the area of pro-poor investment, further research on 'bottom of the pyramid' investment opportunities and sustainable business models will be undertaken in order to support countries to identify and facilitate the development of market sectors for key basic goods and services; Renewed efforts will be made to promote entrepreneurship for the poor. To this effect UNDP in conjunction with other development partners and the private sector will support the design and delivery of new best practice-based entrepreneurship development initiatives that are tailored to address local market realities; Continued efforts will be made to advocate for the use and alignment of private sector CSR resources in ways that contribute to the development of inclusive markets.

#### Global Initiatives of the Private Sector Division

UNDP also has a number of global programmes that are implemented at the national level with guidance and technical support from the Private Sector Division, Partnerships Bureau(PB) at headquarters. UNDP Private Sector Division has three complementary initiatives.

**Inclusive Market Development (IMD) and Growing Sustainable Business (GSB):** Country level operational initiative to broker and support inclusive business approaches.

**Growing Inclusive Markets initiative (GIM):** Global network for research, analysis and tools.

**Business Call to Action (BCtA):** Global platform for visibility, advice and monitoring and tracking.

#### The GSB Japan Project

GSB convenes different stakeholders to facilitate innovative business partnerships at country-level in support of the MDGs. The initiative grew out of the 2002 Global Compact Policy Dialogue on Business and Sustainable Development and is a key UNDP response to the report by the Commission on Private Sector and Development "Unleashing Entrepreneurship" 2004. The initiative was conceptualized by the private sector, announced and launched at the World Summit on Sustainable Development, Johannesburg

2002 - endorsed in a high level session.

There growing inclusive business model (Base at the Pyramid, BoP) movement in Japan and thus more companies are looking at inclusive business activities as new kind of business approach especially in emerging markets and developing countries. UNDP PSD has recognized the opportunities where more Japanese companies could engage into inclusive business activities and has set up a special project engaging with Japanese companies intending to work in African- and Asian developing countries.

## **Duties and Responsibilities**

***Under the guidance and direct supervision of the IMD Team Leader and PSD Deputy-Director, the intern shall perform, inter alia, the following tasks:***

Communication & Knowledge Management- 40%

Prepare relevant communications materials in Japanese

Compile information on GSB projects

Support the writing of Japanese inclusive business model Case Studies

Support updates of Intranet, Internet and Teamworks as required

Support coordination with UNDP Tokyo Office

Translate between English and Japanese as required

Provide support for Planning, Programme and Operations Activities- 40%

Review, draft and edit concepts notes and presentations

Review and shape inclusive business models and partnership concepts

Participate in meetings

Perform other tasks as required

Conduct research and manage files - 20%

Including research on donors, markets for the poor, bottom of the pyramid business model case studies and pro poor sector analysis.

## **Competencies**

Excellent writing skills, as well as strong analytical aptitude, communication and presentation skills.

Fluent in English and Japanese.

Excellent organizational, time management and strong interpersonal skills.

Computer proficiency: MS Office

Networking skills to engage with key internal and external partners.

Ability to work flexibly and meet tight deadlines.

Strong understanding of PSD Strategy.

Effective communications and interpersonal skills.

Attention to details and proven ability to work independently and effectively with minimum supervision.

## **Required Skills and Experience**

Currently enrolled in a graduate-level degree program as a full-time student in development related fields.

Work experience, preferably in Japanese companies, considered as an asset.



## Strong Energy Efficiency Policies under Consideration by Congress: Saving Hawaii Citizens Money, Creating Jobs and Reducing Emissions

According to a new report by the American Council for an Energy-Efficient Economy (ACEEE), energy efficiency provisions in the American Clean Energy and Security Act (ACES - H.R. 2454) with improvements could create more than 569,000 new jobs nationwide in the next 10 years and provide hundreds of dollars in annual savings for every household in America. By dramatically reducing the amount of unnecessary energy produced and used, these efficiency provisions would also result in significant carbon dioxide emissions reductions. The report shows that improvements to the energy efficiency provisions already included in the legislation adopted by the U.S. House of Representatives can help Hawaii tap into its vast energy-savings potential and put our country on the path to a cleaner, more prosperous economy.

Proposed improvements to the House-passed bill could generate the following benefits in Hawaii alone:

### Hawaii Energy Efficiency Benefits

Benefits from Energy Efficiency in ACES	2020		2030	
	ACES with Enhanced Efficiency	ACES	ACES with Enhanced Efficiency	ACES
Net Jobs Created	2,100	1,000	4,100	1,900
Net Annual Consumer Savings to State Economy (in million 2007 \$)	297	158	896	430
Net Annual Consumer Savings per Household (in 2007 \$)	604	322	1,825	876
Equivalent autos taken off the road as a result of avoided CO2 emissions (for given year)	623,403	349,097	1,585,750	803,628
Equivalent number of 300 MW power plants avoided	2	0.9	4	2

Note: Individual state savings may not add to national averages due to rounding errors.

The House-passed legislation is intended to reduce American energy use, reduce energy costs, and curb harmful carbon dioxide emissions while simultaneously creating green jobs. Energy efficiency is the cleanest, fastest, and cheapest way to achieve the objectives of the bill. Although ACES includes a number of provisions that will advance our nation's energy efficiency, ACEEE recommends that the U.S. Senate adopt the following enhancements to the House legislation:

- Strengthening the Energy Efficiency Resource Standard (EERS) by setting a 10% energy savings requirement for electric utility companies. (ACES includes potential for a 5% EERS with an optional 3% increase.)
- Requiring that one-third of the proceeds from the sale of electric utility emissions allowances be used for energy efficiency improvements, identical to what is required for use of proceeds from the sale of natural gas utility emissions allowances in ACES.
- Extending the allocation of 9.5% of carbon emissions allowance revenue to the *State Energy and Environmental Development* (SEED) fund to 2030. ACES ramps down SEED fund support beginning in 2016.

The report, *Energy Efficiency in the American Clean Energy Security Act of 2009: Impacts of Current Provisions and Opportunities to Enhance the Legislation* with technical appendix can be downloaded for free at <http://www.aceee.org/pubs/e096.htm>

## October 29 Sustainability Forum Results By Question

**1.) I am aware of current efforts for green workforce development.**

	Responses	
	(percent)	(count)
Yes	58.33%	7
Somewhat	41.67%	5
Not at all	0%	0
<b>Totals</b>	<b>100%</b>	<b>12</b>

**2.) The green business movement is providing opportunities to create new jobs, services, and products.**

	Responses	
	(percent)	(count)
Strongly Agree	69.23%	9
Agree	30.77%	4
Neutral	0%	0
Disagree	0%	0
Strongly Disagree	0%	0
<b>Totals</b>	<b>100%</b>	<b>13</b>

**3.) To compete in the green marketplace, a business needs to hire someone who has formal training in sustainable practices.**

	Responses	
	(percent)	(count)
Strongly Agree	23.08%	3
Agree	46.15%	6
Neutral	15.38%	2
Disagree	7.69%	1
Strongly Disagree	7.69%	1
<b>Totals</b>	<b>100%</b>	<b>13</b>

**4.) If your company wanted to hire someone to make your company more sustainable, the following education would be most qualified:**

	Responses	
	(percent)	(count)
No specialized education	0%	0
Certificate in sustainability	0%	0
2-year degree in sustainability	0%	0
4-year degree in sustainability	46.15%	6
Any undergraduate degree	0%	0
Masters degree	0%	0
Experience is more important than specialized education	53.85%	7
<b>Totals</b>	<b>100%</b>	<b>13</b>

**October 29 Sustainability Forum Results By Question**

**5.) Who in your company makes decisions about sustainability issues?**

	Responses	
	(percent)	(count)
Owner	53.85%	7
Engineer	0%	0
Purchasing	0%	0
Marketing	0%	0
Facilities manager	30.77%	4
New position	0%	0
None of the above	15.38%	2
<b>Totals</b>	<b>100%</b>	<b>13</b>

**6.) Are you interested in what tax credits and incentives may be available for green or sustainable practices?**

	Responses	
	(percent)	(count)
Yes	100%	13
No	0%	0
Maybe	0%	0
<b>Totals</b>	<b>100%</b>	<b>13</b>

**7.) Do you believe that sustainable practices make your company competitive?**

	Responses	
	(percent)	(count)
Yes	76.92%	10
No	0%	0
Maybe	23.08%	3
<b>Totals</b>	<b>100%</b>	<b>13</b>

**8.) Do you believe that sustainable or green practices enhance your image in the community?**

	Responses	
	(percent)	(count)
Yes	100%	13
No	0%	0
Maybe	0%	0
<b>Totals</b>	<b>100%</b>	<b>13</b>

## Appendix G

### County of Maui Sustainability-Related Employment – Current Position Listings

A selection of relevant SOC Codes:

Region Info							
Region: Maui + Kalawao, Hawaii (15901)							
SOC Code	Description	2010 Jobs	2016 Jobs	New & Rep. Jobs	Current Median Hourly Earnings	Current Avg Hourly Earnings	Education Level
11-3061	Purchasing managers	18	19	4	\$30.36	\$37.73	Degree plus work experience
11-9121	Natural sciences managers	21	21	3	\$44.80	\$45.66	Degree plus work experience
19-1031	Conservation scientists	19	18	2	\$25.58	\$26.87	Bachelor's degree
19-2041	Environmental scientists and specialists, including health	34	36	7	\$23.75	\$25.09	Master's degree
19-2042	Geoscientists, except hydrologists and geographers	<10	<10	--	--	--	Master's degree
19-2043	Hydrologists	<10	<10	--	--	--	Master's degree
19-3051	Urban and regional planners	37	38	7	\$27.86	\$28.24	Master's degree
19-4011	Agricultural and food science technicians	46	44	2	\$16.64	\$17.93	Associate's degree
19-4091	Environmental science and protection technicians, including health	19	20	5	\$19.68	\$20.39	Associate's degree
51-8031	Water and liquid waste treatment plant and system operators	78	82	22	\$19.47	\$19.97	Long-term on-the-job training
		289	308	58	\$23.40	\$24.70	

Source: EMSI Complete Employment - 3rd Quarter 2009

Examples of relevant position announcements (April 2010 search results):

#### County of Maui

Department of Water Supply  
Water Treatment Plant Operator

<http://www.co.maui.hi.us/jobs.aspx?jobID=109>

Wastewater Source Control Technician

<http://www.co.maui.hi.us/jobs.aspx?jobID=222>

#### Maui Electric Company

Renewable Energy Engineer

<http://tinyurl.com/y4klaj4>

Administrator, Renewable Energy Services

<http://tinyurl.com/yqhqsbr>

Maui County institutions, agencies, non-profit organizations, and businesses that utilize UH Maui College research assistants, interns, and Service-Learning students for positions related to sustainability

County of Maui

Department of Water Supply \*  
Planning Department  
Environmental Management  
Department of Transportation  
Department of Management  
Energy Management  
Management Information Systems

East Maui Watershed Restoration \*

Grand Wailea Hotel and Resort

Haleakala Ranch \*

Hawai'i Nature Center \*

Hawai'i Wildlife Fund

Ho'ike o Haleakala \*

H-Nu Photonics

Maui Electric Company\*

Maui Invasive Species Committee (MISC) \*

Maui Land & Pineapple Company \*

Maui Nui Botanical Garden \*

Maui Ocean Center \*

Pacific Disaster Center

Reef Environmental Education Foundation (REEF)

Rising Sun Solar

Ritz-Carlton Ocean Ambassador Program \*

Project S.E.A.-Link \*

State of Hawai'i

Department of Education, elementary, middle school, and high-school sciences \*

Department of Land & Natural Resources, Division of Conservation & Enforcement \*

Department of Land & Natural Resources, Division of Aquatic Resources \*

Department of Land & Natural Resources, Natural Area Reserve System \*

The Nature Conservancy \*

Trilogy \*

US National Wildlife Refuge at Kealia Pond \*

US Parks Department, Haleakala National Park \*

\* Have hired former and current UH Maui College students



## Appendix H

### UH Maui College Campus Sustainability Committee

Richard G Allen  
Herman Andaya  
Carlton Atay  
Shanti Berg (Student Representative - 2010)  
Robert E Burton  
Bruce Butler  
Andrew Carson  
Lehn Huff (Interim Director – SLIM)  
William Jacintho  
John McKee  
Rebecca Mirsky  
Kiope Raymond  
Dan Regan  
Clyde Sakamoto  
Janet Six  
Chris Speere  
David Tamanaha  
Joie Taylor  
Marvin Tengan  
Lori Teragawachi  
Stuart Zinner

**APPENDIX I  
Table 1**

<b>Proposed SOS course comparison with benchmarks</b>		
<b>UHMC SOS Course</b>	<b>Course Title</b>	<b>Benchmark College</b>
<b>100 Level courses</b>		
<b>SOS 101 Introduction to the Science of Sustainability</b>	SOS 110 Sustainable World	Arizona State University BS Sustainability
	SUST 100 Introduction to Sustainability	Philadelphia University BS Environmental Sustainability
	ESST 1003/RECR 1183 Sustainability Concepts and Systems	Acadia University BA Environmental & Sustainability Studies
	SUST 100 Introduction to Sustainability	Philadelphia University BS Environmental Sustainability
	SMGT 115 Environmental Science and Sustainability	University of Wisconsin BS Sustainability Management
<b>200 Level Courses</b>		
<b>SOS 201 Sustainable Building Design, Construction and Operations</b>	ENV 2579 Sustainable Facilities and Operations	Catawba College BS Sustainable Business and Community Development
	MAN 3504 Operations Management  MAN 3780 Sustainability in the Built Environment: Green Construction and Urban Planning	St. Petersburg College BAS Sustainability Management
<b>SOS 202 Sustainable Island Communities</b>	RECR 2033 Sustainable Community Development	Acadia University BA Environmental & Sustainability Studies
	SUST 200 Global Environmental History	Philadelphia University BS Environmental Sustainability
	SOS 111 Sustainable Cities SOS 323 Sustainable Urban Dynamics	Arizona State University BS Sustainability

<b>Proposed SOS course comparison with benchmarks (cont'd)</b>		
<b>UHMC SOS Course</b>	<b>Course Title</b>	<b>Benchmark College</b>
<b>300 Level Courses</b>		
<b>SOS 301 Sustainable Organizations</b>	BUSI 2763 Organizations and Sustainability	Acadia University BA Environmental & Sustainability Studies
	SB 320 Cases in Sustainable Business	Aquinas College BS Sustainable Business
	REL 262 Green Business	Baldwin Wallace College BA Sustainability
	MAN 3786 Sustainable Enterprise Planning	St. Petersburg College BAS Sustainability Management
<b>SOS 302 Environmental Health</b>	ENV3594 Ecological Change and Human Health	Catawba College BS Sustainable Business and Community Development
	MAN 3784 Sustainability in the Natural Environment	St. Petersburg College BAS Sustainability Management
	SOS 326 Sustainable Ecosystems	Arizona State University BS Sustainability
<b>SOS 303 Sustainable Science Processes</b>	SB 200 Sustainable Energy Systems	Aquinas College BS Sustainable Business
	SOS 323 Sustainable Energy, Materials, and Technology	Arizona State University BS Sustainability
	MAN 4787 Energy and Environmental techniques	St. Petersburg College BAS Sustainability Management
<b>SOS 393V Sustainability Internship</b>	MAN 3949 Cooperative Work Experience in College of Technology and Management	St. Petersburg College BAS Sustainability Management
	SOS 484 Sustainability Internship	Arizona State University BS Sustainability
	ENV 4221 Internship in Environmental Science	Catawba College BS Sustainable Business and Community Development
	MGT 4401 Internship in Business	

<b>Proposed SOS course comparison with benchmarks (cont'd)</b>		
<b>UHMC SOS Course</b>	<b>Course Title</b>	<b>Benchmark College</b>
<b>400 Level Courses</b>		
<b>SOS 401 Environmental Law, Policy and Justice</b>	SOS 321 Policy and Governance in Sustainable Systems	Arizona State University BS Sustainability
	SB 300 Environmental Economics and Policy	Aquinas College BS Sustainable Business
	SMGT 360 Environmental and Sustainability Policy	University of Wisconsin BS Sustainability Management
<b>SOS 402 Water Resources Management</b>	LAA 4260 Water Conservation through Site Design and Green Roof	University of Florida BS in Sustainability and the Built Environment
<b>SOS 403 Renewable Energy Integration</b>	MAN 4584 Process Improvement Methodologies	St. Petersburg College BAS Sustainability Management
	SMGT 370 Logistics Supply Chain Management, and Sustainability	University of Wisconsin BS Sustainability Management
	SMGT 440 Systems Thinking	University of Wisconsin BS Sustainability Management
<b>SOS 475 Sustainability Capstone</b>	SUST 4133 Sustainability Thesis	Lipscomb University BA in Sustainable Practice
	SMGT 495 Sustainable Management Capstone	University of Wisconsin BS Sustainability Management
	SUST 400 Sustainability Capstone	Philadelphia University BS Environmental Sustainability

This table shows a full program in Sustainability Management at the University of Wisconsin (UW) and compares it course by course to existing and proposed courses for the BAS in Sustainable Science and Management at UHMC to show program correlations. Many SMGT courses at UW have content comparable to existing courses offered by other departments at UHMC. The purpose of this table is to show program similarities and comparable course content. UHMC SOS courses may appear more than once if comparable course content appears in more than on UW SMGT course.

<b>Proposed UHMC BAS in Sustainable Science and Management compared to UW BS in Sustainable Management</b>	
<b>University of Wisconsin BS in Sustainable Management</b>	<b>UHMC BAS in Sustainable Science and Management</b>
<b>100 Level Courses</b>	
SMGT 115 Environmental Science and Sustainability	SOS 101 (SCI 190V) Introduction to the Science of Sustainability
<b>200 Level Courses</b>	
SMGT 230 Triple Bottom Line Accounting for Managers	ACC 202 Managerial Accounting
SMGT 235 Economics in Society and Sustainability	ECON 130 Principles of Economics: Microeconomics
SMGT 240 Technical Writing for Sustainable Management	ENG 209 Business and Managerial Writing  ENG 316 Advanced Research Writing
<b>300 Level Courses</b>	
SMGT 310 Ecology for Sustainable Management	BIOL 124 Environment & Ecology BIOL 124L Environment & Ecology
SMGT 315 Global Environmental Chemistry	CHEM 161 General Chemistry CHEM 161L General Chemistry Lab
SMGT 320 Energy for Sustainable Management	ENRG 101 Intro to Sustainable Technology ENRG 103 Energy Production Systems
SMGT 325 Natural Resource Management	HWST 107 Hawai'i: Center of the Pacific SOS 402 Water Resources

<b>Proposed BAS in Sustainable Science and Management compared to BS in Sustainable Management (continued)</b>	
<b>University of Wisconsin BS Sustainable Management</b>	<b>UHMC BAS in Sustainable Science and Management</b>
<b>300 Level Courses (continued)</b>	
SMGT 331 Sustainable Organizational Finance	ACC 201 Financial Accounting SOS 301 Sustainable Business Organization and Leadership
SMGT 332 Economics of Environmental Sustainability	No directly comparable course
SMGT 335 Management and Environmental Information Systems	MGT 310 Principles of Management
SMGT 340 Organizational Behavior and Sustainability	SOS 301 Sustainable Business Organization and Leadership
SMGT 350 Operations Management and Sustainability	SOS 201 Sustainable Building Design, Construction, and Operations
SMGT 360 Environmental and Sustainability Policy	SOS 401 Environmental Law, Policy, and Justice
SMGT 370 Logistics, Supply Chain Management, and Sustainability	SOS 301 Sustainable Business Organization and Leadership  MGT 322 Organizational Leadership and Management of Change
<b>400 Level Courses</b>	
SMGT 430 International Management for a Sustainable World	SOS 301 Sustainable Business Organization and Leadership  MGT 322 Organizational Leadership and Management of Change
SMGT 435 International Development and Sustainability	SOS 202 Sustainable Island Communities
SMGT 440 Systems Thinking	SOS 303 Sustainable Science Processes
SMGT 460 Environment and Society	SOS 302 Environmental Health HUM 400 Changes and Choices
SMGT 495 Sustainable Management Capstone	SOS 475 Sustainability Capstone

**Sampling of Sustainability Career Options Suggested by Colleges/Universities Offering Bachelors Degrees in Sustainability**

<p>Aquinas College Sustainable Business (BS)</p>	<p>There are many corporations in Michigan that are presently engaged in Sustainable Business Practices including General Motors, Ford Motor, Steelcase, Herman Miller, Dow Chemical and numerous small companies. These companies have expressed a keen interest in hiring interns and graduates of this program. In addition, most of our program graduates have landed some interesting positions at a variety of organizations.</p>
<p>University of Wisconsin Sustainable Management (BS - online degree)</p>	<p>A Bachelor of Science in Sustainable Management can be the foundation for a variety of positions including:</p> <ul style="list-style-type: none"> <li>• The Facilities Manager who must compare the costs of solar panels, clean coal, and biofuels, weighing both their currency costs and carbon costs.</li> <li>• The Plant Manager who must naturally manage storm water and install geothermal systems that use the earth's temperature to heat and cool the plant.</li> <li>• The Human Resources Director who must look at the long-term impact of today's labor decisions on the welfare of the community surrounding the corporation.</li> <li>• The Product Manager who must develop a new paint technology that reduces greenhouse gas emissions or evaluate existing paint products against today's sustainability standards.</li> </ul>
<p>Arizona State University Sustainability (BA/BS)</p>	<p>Sustainability graduates are prepared for admission into strong graduate and professional schools or may assume positions in higher education, industry, consultancy, utilities, regulatory agencies, non-profits, non-governmental organizations, or local, state or federal government. Recent interest in sustainability within business and government has created new employment opportunities in the field.</p> <p>By engaging a breadth of knowledge and experience, and by acquiring the skills to integrate various domains of knowledge, sustainability students prepare themselves for a variety of careers to help find solutions to challenges having to do with biodiversity and habitats, climate, social transformations, energy, materials and technology, governance and policy, international development, urbanization, and water.</p>
<p>Baldwin Wallace College Sustainability (BA)</p>	<p>Career fields in sustainability include:</p> <ul style="list-style-type: none"> <li>• corporate or municipal sustainability officer</li> <li>• non-profit environmental work</li> <li>• testing, marketing and sales of green products</li> <li>• environmental consulting and analysis</li> </ul>

From: Kelly King <ktk@biodiesel.com>  
To: Rebecca Mirsky <rmirsky@hawaii.edu>  
Cc: Joie Taylor <joiet@hawaii.edu>

Date: Thu, Apr 29, 2010 at 4:36 PM  
Subject Re: UH Maui College Sustainability degree - proposed curriculum

hide details Apr 29

Aloha Rebecca,

I finally had a few minutes to review your proposed curriculum and it looks great! I especially like the focus on business and the inclusion of marketing. It seems like coursework that will result in actual learned skills that can be applied in many businesses in our sector. I would be happy to provide a letter of support if you can send me a formatted template.

Ahui hou,

Kelly

Ms. Kelly King  
Vice President  
Pacific Biodiesel, Inc.  
ktk@biodiesel.com  
(808) 877-3144





UNIVERSITY of HAWAII  
**MAUI**  
COMMUNITY COLLEGE

Invitation for local community partners to sign on to Green Workforce Development & Education Partnership Opportunities with UH-Maui Community College (UH-Maui CC)

**Green Workforce Development & Education Partnership Opportunities:**

I am interested in the following green workforce development & education opportunities:

Type:	Expected number of desired positions per year:	My company/organization is willing to cover all or part of cost
<input type="checkbox"/> Paid Internships	_____	_____
<input type="checkbox"/> Non-Paid Internships	_____	_____
<input type="checkbox"/> Job shadowing	_____	_____
<input checked="" type="checkbox"/> Volunteering	4	_____
<input type="checkbox"/> Service learning	_____	_____
<input type="checkbox"/> Guest Lecturing	_____	_____
<input type="checkbox"/> Hosting Field trips	_____	_____
<input type="checkbox"/> Apprenticeships	_____	_____

**Contact information:**

Company/Organization Name: MAUI ECO BUILT

Company/Organization Address: 429 OMAOPIO RD, KULA, HI 96790

Name of Contact Person: ERIK BRAKA

Telephone Number of Contact Person: 283 3588

E-mail Address of Contact Person: ERIKBRAKA@AOL.COM

Specific Professional Fields in which your company/organization has opportunities (e.g. Energy Efficiency & Conservation, Renewable Energy Technologies (please specify), etc.):

RENEWABLE ENERGY TECHNOLOGY & CONSTRUCTION

Additional Comments: (also, please indicate if interested in similar K-12 initiatives)

VOLUNTEERS CAN HELP ASSEMBLE PHOTOVOLTAIC STRUCTURES FROM PARTS.

Please feel free to email us at [SLI@UH.MAUI.HI.EDU](mailto:SLI@UH.MAUI.HI.EDU) if you have any additional questions. We look forward to continued collaboration with community partners to address Maui County's Green Workforce Development and Education needs. Mahalo for your interest and support!



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<input checked="" type="checkbox"/> Paid Internships	← 1-2	Case by case
<input checked="" type="checkbox"/> Non-Paid Internships	as needed	
<input type="checkbox"/> Job shadowing		
<input type="checkbox"/> Volunteering		
<input type="checkbox"/> Service learning		
<input type="checkbox"/> Guest Lecturing		
<input type="checkbox"/> Hosting Field trips		
<input checked="" type="checkbox"/> Apprenticeships	2 to start	y

**Contact information:**

Company/Organization Name: PRE VISION SOLAR, Inc

Company/Organization Address: \_\_\_\_\_

Name of Contact Person: MIKE DUTTON

Telephone Number of Contact Person: 808 281 6186

E-mail Address of Contact Person: Mike@PVHawaii.com

**Specific Professional Fields in which your company/organization has opportunities (e.g. Energy Efficiency & Conservation, Renewable Energy Technologies (please specify), etc.):**

GRID-TIED Photovoltaic Systems -

**Additional Comments:** (also, please indicate if interested in similar K-12 initiatives)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please feel free to email us at [SLI@uhmaui.edu](mailto:SLI@uhmaui.edu) if you have any additional questions. We look forward to continued collaboration with community partners to address Maui County's Green Workforce Development and Education needs. Mahalo for your interest and support!



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Type:	Expected number of desired positions per year:	My company/organization is willing to cover all or part of cost
<input checked="" type="checkbox"/> Paid Internships	<u>1</u>	<u>PART OF</u>
<input checked="" type="checkbox"/> Non-Paid Internships	<u>1</u>	<u></u>
<input checked="" type="checkbox"/> Job shadowing	<u>3</u>	<u>YES</u>
<input type="checkbox"/> Volunteering	<u></u>	<u></u>
<input type="checkbox"/> Service learning	<u></u>	<u></u>
<input checked="" type="checkbox"/> Guest Lecturing	<u></u>	<u>YES</u>
<input checked="" type="checkbox"/> Hosting Field trips	<u></u>	<u>YES</u>
<input type="checkbox"/> Apprenticeships	<u></u>	<u></u>

- Proposal For Paid Internships:**
- UH-Maui CC proposes to commit most of initial funding of paid internship costs
  - Interns screened for commitment level and knowledge, skills, and abilities by UH-Maui CC in collaboration with intern host, and performance assessed

**Contact information:**

Company/Organization Name: ODLAND WAILEA  
 Company/Organization Address: 3850 WAILEA ALI'ANUI  
 Name of Contact Person: ROBERT HOONIAN / MATT BAILEY  
 Telephone Number of Contact Person: 808-874-7320  
 E-mail Address of Contact Person: ROBERT.HOONIAN@ODLANDWAILEA.COM

**Specific Professional Fields in which your company/organization has opportunities (e.g. Energy Efficiency & Conservation, Renewable Energy Technologies (please specify), etc.):** \_\_\_\_\_

**Additional Comments:** (also, please indicate if interested in similar K-12 initiatives)

\_\_\_\_\_

\_\_\_\_\_

Please feel free to contact us if you have any additional questions.  
 We look forward to continued collaboration with community partners to address Maui County's Green Workforce Development and Education needs. Mahalo for your interest and support!



Invitation for local community partners to sign on to Green Workforce Development & Education Partnership Opportunities with UH-Maui Community College (UH-Maui CC)

**Green Workforce Development & Education Partnership Opportunities:**

I am interested in the following green workforce development & education opportunities:

Type:	Expected number of desired positions per year:	My company/organization is willing to cover all or part of cost
<input type="checkbox"/> Paid Internships	_____	_____
<input checked="" type="checkbox"/> Non-Paid Internships	<i>possibly need to check w/ <sup>COO</sup> president or CTO</i>	_____
<input type="checkbox"/> Job shadowing	_____	_____
<input type="checkbox"/> Volunteering	_____	_____
<input type="checkbox"/> Service learning	_____	_____
<input checked="" type="checkbox"/> Guest Lecturing	<i>Possible by CTO or COO.</i>	_____
<input type="checkbox"/> Hosting Field trips	_____	_____
<input type="checkbox"/> Apprenticeships	_____	_____

- Proposal For Paid Internships:**
- UH-Maui CC proposes to commit most of initial funding of paid internship costs
  - Interns screened for commitment level and knowledge, skills, and abilities by UH-Maui CC in collaboration with intern host, and performance assessed

**Contact information:**

Company/Organization Name: ENERGY INDUSTRIES OR SOBOGY  
 Company/Organization Address: 2656 WAWAI LOOP HONOLULU 96819  
 Name of Contact Person: MILES KUBO OR DUANE ASHIMINE JARREN KIMURA  
 Telephone Number of Contact Person: 808-839-7300  
 E-mail Address of Contact Person: miles.kubo@energy-industries.com  
duane.ashimine@energy-industries.com

Specific Professional Fields in which your company/organization has opportunities (e.g. Energy Efficiency & Conservation, Renewable Energy Technologies (please specify), etc.): Energy Efficiency

**Additional Comments:** (also, please indicate if interested in similar K-12 initiatives)

Please feel free to contact us if you have any additional questions. We look forward to continued collaboration with community partners to address Maui County's Green Workforce Development and Education needs. Mahalo for your interest and support!



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Type:	Expected number of desired positions per year:	My company/organization is willing to cover all or part of cost
<input type="checkbox"/> Paid Internships	_____	_____
<input type="checkbox"/> Non-Paid Internships	_____	_____
<input checked="" type="checkbox"/> Job shadowing	2	_____
<input type="checkbox"/> Volunteering	2	_____
<input type="checkbox"/> Service learning	_____	_____
<input checked="" type="checkbox"/> Guest Lecturing	_____	_____
<input type="checkbox"/> Hosting Field trips	_____	_____
<input checked="" type="checkbox"/> Apprenticeships	Energy	_____

**Contact information:**

Company/Organization Name: REC SOLAR

Company/Organization Address: PO BOX 62090

Name of Contact Person: DREW BRADLEY

Telephone Number of Contact Person: 756 4824

E-mail Address of Contact Person: dbradley@recsolar.com

**Specific Professional Fields in which your company/organization has opportunities (e.g. Energy Efficiency & Conservation, Renewable Energy Technologies (please specify), etc.):**

PHOTOVOLTAICS

**Additional Comments:** (also, please indicate if interested in similar K-12 initiatives)

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Please feel free to email us at [SLI@uhmaui.edu](mailto:SLI@uhmaui.edu) if you have any additional questions. We look forward to continued collaboration with community partners to address Maui County's Green Workforce Development and Education needs. Mahalo for your interest and support!

## Student Internship Reports

MCC Sustainable Science  
Scholarship Program  
Fall Semester 2008

### Students:

Jonathan Stenger.....Maui Electric Company  
Tracie Kala.....Hnu Energy  
Karen Pollard.....Hawaiian Commercial & Sugar Company

### Company profiles:

Maui Electric Company provides power for all grid tied customers on the island of Maui. The main generation plant is located at Maalaea. Hawaii utility rates are the highest in the country due to dependence on generation based on fossil fuels. The Public Utilities Commission recently ruled that a third party must take over the conservation department because there is a conflict of interest involved. MECO, the seller of electricity, may be less motivated to encourage conservation and efficiency. One solution is called 'de-coupling'. In this scenario, the utility becomes a distribution center and its revenue is 'de-coupled' from the volume of energy provided.

During his internship, Jonathan Stenger, in addition to observing the roles of various departments and facilities, also did research to investigate how mainland electric companies are handling the process of incorporating grid-tied residential photovoltaic electric systems. The challenge is to find a way to encourage the addition of these systems. Anyone may want to install a system on their roof to get 'free electricity', but the cost is prohibitive. To encourage investment, some mainland companies offer a rebate of up to 50% of the invoiced price. There is also a federal tax credit of up to 30% of the price of a system. In Hawaii, we have, in addition to the federal tax credit, a state tax credit of 35% of the cost.

Currently, MECO offers a system of 'net-metering' in which a consumer with a photovoltaic system can effectively 'sell electricity' back to the electric company. Their meter runs backward, literally, when their production exceeds consumption. This scenario is typical considering households usually consume most energy use in the evening, while during the day, when the sun is out and their PV system is generating electricity, consumption may be low. The problem for the utility with expanding this program is that they are now paying customers with PV systems the same rate at which they sell electricity, whereas when they generate electricity with their generators or purchase power from other producers, such as Kaheawa /First Wind or HC&S, the cost of production is less and there is a profit margin, so they can continue to do business. A solution to this dilemma being considered is the adoption of time-of-use rate schedules for residential accounts. This system is already offered to business customers. Currently, a few businesses on Maui take advantage of the fact that electricity is cheaper between 9PM and 7AM. They use chillers at night, which freeze ice to use instead of running air conditioners all day. Air is cooled through the chillers and circulated through the building. This concept helps shift some of the load away from the peak use hours. MECO must maintain the capacity to produce enough energy to meet the demand at its highest

peak.

Hnu Energy company offers products and services such as PV systems, design and installation, vertical axis wind turbines and more. They are distributors of high quality LED lighting fixtures that are marketed to enhance a store's showroom appeal while using much less energy than traditional incandescent lighting and also create less heat, reducing the demand for air conditioning. Intern Tracie Kala worked as an administrative assistant. Among other office tasks, she helped with preparing folders that inform consumers about the various services available through Hnu. While incentives to implement PV or wind turbines exist in both reduced energy bills and in the satisfaction of generating electricity without the negative effects from fossil fuel based energy sources, again, the high, up-front costs make the choice unavailable to many.

One issue is that the good amount of support available through the state and federal tax incentives is not available to certain entities, such as public institutions. It is in everyone's best interest that government agencies should be able to save on their electric bills, as our taxes are providing the funding. One solution would be to allow the credits to be transferable to the installers who could then pass on the savings in a reduced cost for their services..

Creating an assortment of funding opportunities and then educating potential customers of the options available are steps one and two. Some have had concerns with the aesthetics of PV systems. Perhaps in the future some attention should be paid to new construction projects at the time of permitting. Can we encourage new construction projects to be oriented to maximize south facing roof space? (This could aid the aesthetic value by not having to use risers.) The final company participating in this semester's sustainable energy internship program is Hawaiian Commercial and Sugar Company. This is where the history of electricity on Maui began. Soon after the invention of the electric light, a system was installed to allow the processing of sugarcane to continue after dark. Presently, 20% of the \$100,000,000/year company's revenue comes from the sale of electricity to MECO. This helps MECO to meet the goal imposed upon it by the state/PUC to have x% of it's energy portfolio come from renewable sources. Mecoco gets approximately 7% of it's energy from HC&S, enough to fuel 10,000 households.

When sugarcane is milled, a sawdust like by-product called bagasse is produced. The bagasse is then burned providing the fuel to run the boilers and continue processing and also to generate electricity used in the offices and to power the irrigation pumps. A portion is sold to meet the contract with MECO. Burning bagasse is considered carbon neutral because during it's growth, sugarcane sequesters carbon within itself out of the atmosphere. It is then released back to the air when the cane is burned.

Economic conditions are calling for something to change in the 100+ year-old company. While sugar prices have remained stable, the cost of inputs have been rising steadily. Thought has been put into seeing if changing over to ethanol production, instead of producing sugar for consumption is a viable alternative. Under present circumstances it is not. Today's vehicles use a 10% blend of ethanol. The blending facilities are located on Oahu. If HC&S were to make the very large investment in infrastructure needed to produce ethanol and then ship the product to Oahu, the shipping costs involved would leave HC&S' product uncompetitive with the current source (ethanol from Brazil). However, if there were enough flex fuel cars operating on Maui, using the ethanol in an 85% ethanol blend, in that case, HC&S could produce enough ethanol to fuel the

equivalent of over half of the cars currently in use on Maui today.

A more immediate solution to the crises currently unfolding for the company needs to come from the PUC. Recently, the way in which calculations are made to determine the rate at which non-utility energy producers, such as HC&S are paid, was changed. The new rates are substantially lower. The goal was to reduce costs for the consumer. However, the result turns out to be a disincentive for HC&S the county's original source of energy produced by renewable resources. In the past, rates were associated with the 'avoided cost'; the cost of producing the energy that the utility avoided by purchasing it from elsewhere. MECO is just about unique in the world in that its energy production is based on petroleum products. Because of this, the 'avoided cost' is related to the fluctuating cost of oil. Other non-utility producers, namely First Wind/Kaheawa have two or three things going for them to insulate them from the current changes. One, their production costs are low and not related to the cost of oil. Secondly, their power purchase agreement contract is divided so that part of it is a flat rate, and only part is based on 'avoided cost'.

For HC&S, many of their input costs are related to the price of oil. The cost of fertilizer, herbicide and irrigation tubing fluctuate in addition to the fueling costs for company vehicles. In the past the rate at which the company was paid for the energy it provides covered these expenses. In the future, a system called a feed-in tariff is proposed. In order for this to work for HC&S, either the price must be high enough to accommodate changes in the price of oil, or have some other mechanism to cover the rise in the cost of production when it occurs.

During her study of operations at HC&S, intern Karen Pollard also attended meetings of the Maui County Energy Alliance, the mayor's advisory committee for renewable resources. There she learned of an incentive program being initiated in Berkeley, CA. Under this program, funding was secured by the city to create a loan fund to reimburse residential homeowners for investing in PV systems. The payback is tied to yearly property tax payments. In this way, the homeowner would not be stuck paying off the loan for the PV system in the event that they should sell their home. The payment remains with the house, through the property tax. If this system were used on Maui, the yearly payments would not be more than the savings realized in reduced electric bills.

The conclusion of the advisory committee was that to meet the goal of sustainable energy production, we need a variety of strategies. For PV, the issues revolve around funding, the technology is available today. In various circumstances, the best option may be either to rent roof space, or lease the PV system or find creative funding opportunities. The biggest user of electricity is the water department. Can windmills be used to supplement the pumps? The county should look into staking claims to prime generation locations before the state comes in and sets up operations with the intent of wiring the energy to Oahu.



## Appendix K

### BAS Sustainable Science and Management SOS Course Descriptions

#### SOS 101 Introduction to the Science of Sustainability

Introduces the science of sustainability including vocabulary and basic concepts in green building, water and wastewater, waste management, sustainable land use and planning, unique dimensions to island sustainability, transportation, sustainable materials choices and supply chains, energy efficiency, and policy strategies. *Prereq: ENG 19 with grade C or better or placement at least ENG 22, and MATH 1 or placement at least MATH 22; or consent. Recommended: placement at ENG 100.* 3 cr., 3 hr. lecture.

#### SOS 201 Sustainable Building Design, Construction, and Operations

Introduces principles of green building design and operations, including site planning and zoning, construction practices, energy efficiency, economics of green building, benefits and barriers, and the LEED rating system. *Prereq: SOS 101, ENRG 101; or consent.* 3cr., 3hr. lecture.

#### SOS 202 Sustainable Island Communities

Introduces and examines concepts for sustainability on islands, specifically Hawai'i. Examines unique aspects to island sustainability including land use planning, waste management, sustainable tourism, renewable energy resources, and natural resource management. Compares to sustainable urban environments. *Prereq: SOS 101; or consent.* 3cr., 3hr. lecture.

#### SOS 301 Sustainable Organizations

In this course students will learn how to construct a business case for sustainability-related activities; calculate the carbon footprint of a facility, organization, or set of purchases; identify sustainability metrics for an organization; and perform a sustainability assessment of an organization. *Prereq: SOS 101, MATH 115 with a "C" or better; or consent.* 3cr., 3hr. lecture.

#### SOS 302 Environmental Health

Evaluates the impact that chemical, physical, and biological agents have on environmental ecosystems. Examines how political, economic, and demographic diversity affects the natural environment with particular emphasis on island settings. *Prereq: SOS 101, CHEM 151, BIOL 124 with a C or better; or consent.* 3 cr. 3 hr. lecture.

#### SOS 303 Sustainable Science Processes

Introduces systems conversion of power sources to energy. Examines conversion processes of solar photovoltaic cells, wind turbines, wave technology, tidal technology, small and large scale hydro power technology, bio-mass, bio-fuel, waste to energy. *Prereq: ENRG 103, MATH 135 with a "C" or better. Recommended: CHEM 151, MATH 203.* 3cr., 3hr. lecture.

### SOS 393V Internship

Introduces students to the workplace in an occupation within the student's area of interest. Prepares students to perform entry-level work requirements. Develops basic skills for the work environment. Learning outcomes developed by students, instructor, and employment supervisor. Students will be required to write a research paper on a topic that is related to their internship. Evaluation performed jointly by instructor and employment supervisor. 3cr.

### SOS 401 Environmental Law, Policy and Justice

Introduces legal and policy issues of environmental protection and decision-making. Explores the interplay of race, socio-economic status, and interest group politics in the formulation and implementation of U.S. federal and state environmental policy. *Prereq: SOS 101, BLAW 201, SOC 101, ENG 209 with a "C" or better; or consent.* 3cr., 3hr. lecture.

### SOS 402 Water Resources Management

Examines ways to manage fresh water resources with emphasis on island water management techniques. Introduces water quality analysis techniques and parameters as well as waste water treatment processes. Reviews principles of surface and groundwater hydrology and implications for policy making. *Prereq: MATH 203, BIOL 124, CHEM 151, SOS 101 with a "C" or better; or consent.* 3cr., 3hr. lecture.

### SOS 403 Renewable Energy Integration

Introduces techniques and information technology for renewable energy integration and storage. Examines existing policies and their effects on energy management and the public utilities. Provides current information on storage, generation, incentives, and relevant political programs. *Prereq: SOS 101, MATH 203, ENRG 103 with a "C" or better; or consent.* 3cr, 3hr. lecture.

### SOS 475 Senior Capstone Project

Provides an opportunity to demonstrate the techniques and understanding developed throughout the BAS Sustainability program. Includes energy auditing, computational analysis, sustainable strategic planning and financial assessment, water and resource conservation, impacts to human and ecosystem health, land use and transportation, policy and regulatory analysis, and social equity and ethical considerations. A capstone project is required. *Prereq: Senior standing and approval of Sustainability faculty.* 6cr., 6hr., lect/lab

[Question Pools](#) | [Assessments](#) | [Grading](#) | [Test Drive](#) **Summary of Data**

BAS Sustainable Sciences Survey  
49% complete (25 of 51)

[Grade Submissions](#) | [Grade Questions](#) |  Summary of Data**Part 1 of 1****Question 1 of 3 25 answers**

How likely would you be to have chosen Sustainable Sciences as your major if a 4-year degree program were being offered when you declared your major?

- 5 (Highest) 36% (9)
- 4 24% (6)
- 3 20% (5)
- 2 16% (4)
- 1 (Lowest) 0% (0)

No answer given: 4% (1)

**Question 2 of 3 25 answers**

How likely would you be to take additional classes on sustainability topics?

- 5 (Highest) 64% (16)
- 4 20% (5)
- 3 8% (2)
- 2 4% (1)
- 1 (Lowest) 0% (0)

No answer given: 4% (1)

**Question 3 of 3 25 answers**

What is your interest level in pursuing employment related to sustainability?

- 5 (Highest) 56% (14)
- 4 16% (4)
- 3 20% (5)
- 2 4% (1)

Appendix M

**Academic Cost and Revenue Template with signature**

A	B	C	D	E	F	G	H	I	J	K
1	Academic Cost and Revenue	Template - New Program (adjust template for appropriate number of years)								
2	ENTER VALUES IN YELLOW CELLS ONLY									
3	CAMPUS/Program	UH Maul College-Sustainable Science & Management								
4	ENTER ACADEMIC YEAR (i.e., 2004-05)	Provisional Years (2 yrs for Certificate, 3 yrs for Associate Degree, 6 yrs for Bachelor's Degree, 3 yrs for Masters Degree, 5 yrs for Doc								
5	Students & SSH	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6			
6	A. Headcount enrollment (Fail)	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16			
7	B. Annual SSH	12	18	75	27	30	30			
8	Direct and Incremental Program Costs Without Fringe	216	432	900	972	1,080	1,080			
9	C. Instructional Cost without Fringe	\$ 113,126	\$ 118,044	\$ 121,660	\$ 125,429	\$ 130,446	\$ 135,664			
10	C1. Number (FTE) of FT Faculty/Lecturers	2.00	2.00	2.00	2.00	2.00	2.00			
11	C2. Number (FTE) of PT Lecturers	0.25	0.50	0.50	0.50	0.50	0.50			
12	D. Other Personnel Costs	\$ 56,421	\$ 56,421	\$ 58,178	\$ 59,990	\$ 62,389	\$ 64,865			
13	E. Unique Program Costs	\$ 41,700	\$ 103,700	\$ 46,600	\$ 67,100	\$ 56,600	\$ 56,600			
14	F. Total Direct and Incremental Costs	\$ 211,247	\$ 278,165	\$ 226,458	\$ 252,519	\$ 249,435	\$ 257,149			
15	Revenue	\$ 46,008	\$ 101,520	\$ 211,500	\$ 228,420	\$ 253,800	\$ 253,800			
16	G. Tuition	\$ 213	\$ 235	\$ 235	\$ 235	\$ 235	\$ 235			
17	H. Other	\$ 164,008	\$ 209,008	\$ 111,829	\$ 115,184	\$ 119,791	\$ 124,563			
18	I. Total Revenue	\$ 210,016	\$ 310,528	\$ 323,329	\$ 343,604	\$ 373,591	\$ 378,363			
19	J. Net Cost (Revenue)	1,231	-32,363	-96,871	-91,085	-124,156	-121,234			
20	Program Cost per SSH With Fringe	\$ 701	\$ 362	\$ 179	\$ 171	\$ 160	\$ 167			
21	K. Instructional Cost with Fringe/SSH	\$ 108,572	\$ 108,572	\$ 111,829	\$ 115,184	\$ 119,791	\$ 124,563			
22	K1. Total Salary FT Faculty/Lecturers	\$ 146,572	\$ 146,572	\$ 150,969	\$ 155,498	\$ 161,718	\$ 168,167			
23	K2. Cost Including Fringe of K1	\$ 4,554	\$ 9,472	\$ 9,851	\$ 10,245	\$ 10,695	\$ 11,081			
24	K3. Total Salary PT Lecturers	\$ 4,782	\$ 9,946	\$ 10,344	\$ 10,757	\$ 11,188	\$ 11,635			
25	K4. Cost including fringe of K3	\$ 214	\$ 214	\$ 214	\$ 214	\$ 214	\$ 214			
26	L. Support Cost/SSH	\$ 175	\$ 175	\$ 175	\$ 175	\$ 175	\$ 175			
27	Non-Instructional Exp/SSH	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39			
28	System-wide Support/SSH	\$ 915	\$ 576	\$ 393	\$ 385	\$ 374	\$ 381			
29	Organized Research/SSH	\$ 385	\$ 385	\$ 385	\$ 385	\$ 385	\$ 385			
30	M Total Program Cost/SSH	\$ 701	\$ 362	\$ 179	\$ 171	\$ 160	\$ 167			
31	N Total Campus Expenditure/SSH	\$ 1,440	\$ 571	\$ 506	\$ 507	\$ 509	\$ 520			
32	Instruction Cost with Fringe per SSH	Program used for comparison.								
33	K. Instructional Cost/SSH	BAS Business Technology-UHMC								
34	O. Comparable Cost/SSH									
35	Program used for comparison.									
36	Reviewed by campus VC for Administrative Affairs:	(date)								
37										
38										
39										
40										
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43										
44										
45										
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47										
48										

6/24/10

*[Signature]*

Appendix N

**Notes to Budget Template: Explanation of Calculations**

Notes to Budget Templates:  
**SUSTAINABLE SCIENCE & MANAGEMENT**  
 Explanation of Calculations

**A. Headcount enrollment (Fall)**

The following table displays headcounts for resident and non-resident students. Very modest increases were used to display increases in years 1-6.

Year	2011	2012	2013	2014	2015	2016
Resident	12	18	25	27	30	30
Nonresident	0	0	0	0	0	0
<b>Total</b>	<b>12</b>	<b>18</b>	<b>25</b>	<b>27</b>	<b>30</b>	<b>30</b>

**B. Annual SSH**

In the first year of the program, it is anticipated that the majority students will be part-time students. The average SSH will reflect, in subsequent years, an increase in full-time students.

Year	2011	2012	2013	2014	2015	2016
Headcount	12	18	25	27	30	30
Non-Majors Projected Enrollment	0	0	0	0	0	0
Average SSH per student	12	18	25	27	30	30
	18	24	36	36	36	36
<b>Total Annual SSH</b>	<b>216</b>	<b>432</b>	<b>900</b>	<b>972</b>	<b>1,080</b>	<b>1,080</b>

**D. Other Personnel Costs**

Year	2011	2012	2013	2014	2015	2016
clerical (0.25 FTE) \$	6,417	6,417	6,674	6,941	7,218	7,507
counseling (1 FTE) \$	50,004	50,004	51,504	53,049	55,171	57,378
<b>Total</b>	<b>\$56,421</b>	<b>\$56,421</b>	<b>\$58,178</b>	<b>\$59,990</b>	<b>\$62,389</b>	<b>\$64,885</b>
Basis for increases	CB	CB	CB 3%	CB 3%	4%	4%

**E. Unique Program Costs**

The unique program costs for this program are estimated based on anticipated expenditures and inflation.

Year	2011	2012	2013	2014	2015	2016
<b>Accreditation Expenses</b>						
Computer Software	\$2,000	\$5,000	\$6,000	\$7,000	\$8,000	\$8,000
Computer Upgrade Costs	\$15,000	\$0	\$0	\$15,000	\$0	\$0
Dues and Subscriptions	\$500	\$500	\$1,000	\$1,000	\$2,000	\$2,000
Equipment	\$5,000	\$25,000	\$10,000	\$10,000	\$10,000	\$10,000
Intrastate Travel	\$1,200	\$1,200	\$2,100	\$2,100	\$2,100	\$2,100
Out of State Travel	\$5,000	\$7,000	\$9,000	\$9,000	\$10,000	\$10,000
Library	\$2,500	\$5,000	\$5,000	\$7,500	\$7,500	\$7,500
Marketing, Advertising	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Photocopies	\$500	\$1,000	\$1,000	\$1,500	\$2,000	\$2,000
Supplies	\$1,000	\$1,500	\$1,500	\$2,000	\$2,000	\$2,000
Telecommunication Costs	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Training Costs	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Lab Supplies	\$2,500	\$50,000	\$2,500	\$2,500	\$2,500	\$2,500
Other Misc. Costs	\$1,000	\$2,000	\$3,000	\$4,000	\$5,000	\$5,000
<b>Total</b>	<b>\$41,700</b>	<b>\$103,700</b>	<b>\$46,600</b>	<b>\$67,100</b>	<b>\$56,600</b>	<b>\$56,600</b>

**G. Tuition Rate Per Credit**

The average tuition was calculated to reflect the proportion of resident and non-resident students.

Year	2011	2012	2013	2014	2015	2016
<b>Resident</b>						
Headcount	12	18	25	27	30	30
Annual SSH	18	24	36	36	36	36
Tuition per credit	\$213.00	\$235.00	\$235.00	\$235.00	\$235.00	\$235.00
<b>Non-Resident</b>						
Headcount	0	0	0	0	0	0
Annual SSH	0	0	0	0	-	0
Tuition per credit	\$650.00	\$713.00	\$713.00	\$713.00	\$713.00	\$713.00
<b>Average Tuition</b>	<b>\$213.00</b>	<b>\$235.00</b>	<b>\$235.00</b>	<b>\$235.00</b>	<b>\$235.00</b>	<b>\$235.00</b>



**H. Revenue - Other**

The following table displays anticipated revenues from other sources (e.g. grants) by year.

Year	2011	2012	2013	2014	2015	2016
Legislature	\$109,008	\$109,008	\$111,829	\$115,184	\$119,791	\$124,583
RDP	\$55,000	\$100,000				
Total	\$164,008	\$209,008	\$111,829	\$115,184	\$119,791	\$124,583

assuming full CB augmentation

**K. Total Salary FT Faculty/Lecturer**

The salary was based on an average of \$58,000 per year with 4% increases per subsequent year.

Curricular costs will be absorbed by two positions beginning Fall '10

The Hawaii State Legislature appropriated 2 faculty positions (\$109,008) for this program. Position and funds to begin in fiscal year 2009.

Faculty costs	\$	108,572	\$	108,572	\$	111,829	\$	115,184	\$	119,791	\$	124,583
Lecturer	\$	4,554	\$	9,472	\$	9,851	\$	10,245	\$	10,655	\$	11,081
	\$	113,126	\$	118,044	\$	121,680	\$	125,429	\$	130,446	\$	135,664

