California State University Maritime: Assessing the Sustainability of the California State University System

Derrick Williamson

Dr. Katherine Cushing

San Jose State University

ABSTRACT

The twenty three campuses of the California State University (CSU) system are major users of energy and natural resources. In recognition of this, the CSU system has established several goals for reducing resource use system wide. Mandates include meeting energy reduction requirements, reducing water use, improving on campus recycling, adopting procurement practices that emphasize products with recycled content, and applying more stringent green building standards to new and existing construction. To achieve this, a sustainability advisory committee was created to inform the leadership of sustainable practices and to make recommendations to campuses making the sustainable transition. In support of this goal, many campuses have created sustainability coordinator positions and corresponding task forces of students and faculty to plan sustainability projects (California State University, 2008).

This report is part of a series of research projects conducted by students under the guidance of Dr. Katherine Cushing, sustainability coordinator and professor of Environmental Studies at San Jose State University, to gauge the level of response among the CSU campuses to these mandates. Each campus of the CSU system is evaluated for sustainability among several factors. Physical factors such as water use, electricity use, waste generation, and recycling programs are considered; as are intangible factors such as student involvement, research sponsored or conducted by the university, and components of the

curriculum that emphasize sustainable practices or awareness. Though each campus is evaluated, it is not for purposes of comparison. Each report is a case study of progress being made. The intention is to identify factors that have effectively promoted sustainability on campus and to identify causes that may have delayed progress towards reaching the CSU goals. Further, the purpose is to evaluate the effectiveness of the different means campuses have pursued to attain these goals. Once completed, the series will provide a comprehensive assessment of the sustainability of the CSU system, informing future decision making processes. Findings may be used to identify problem areas, understand current setbacks, engage CSU campuses in a sustainability dialog, and identify models of practice and effective sustainability that can be replicated at other campuses.

The campuses evaluated in this report is the Maritime Academy located in Vallejo. It is one of the newest members of the CSU system and is unique among colleges in that its historical emphasis has been on training students for shipboard operations. It is the only Maritime academy on the west coast. Since becoming a CSU it has gradually diversified campuses offerings and subsequently has steadily grown, though it remains a small university, the smallest of the CSUs.

CSU Maritime faces several unique challenges in meeting sustainability goals. The specificity of its programs, emphasizing the operation of ships, makes it difficult to incorporate a curriculum with a traditional sustainability component. And the demands placed on students, as well the small student population, make student involvement a challenge. The campus is also challenged by the age of its facilities, many buildings on campus were constructed during World War II, and the need to maintain the ship they use for training operations. The uniqueness of its program though has been identified as a strength of the Maritime academy. Course offerings are being expanded that extend the traditional maritime curriculum to offerings in global and marine sciences and a graduate program in global studies has been created, the first graduate program available at the university, that takes advantage of the global exposure students receive. Most student will take a months long training cruise that will visit several countries. The operation of the ship has also been identified as a resource that can be used for research into efficient shipboard operations, an important consideration during a time of global trade, and preventing the undesirable consequences of global sea trade, such as species invasion through contaminated ballast water. Maritime is also strong in programs with an emphasis on energy. Students in the energy program receive hands on training in energy generation through their service aboard and many students, following service at sea, find employment in the energy sector.

The special demands of the Maritime academy require special consideration and an understanding of the context in which it operates. While traditional sustainability may be lagging on campus, for several reasons which are discussed, nontraditional programs that may be construed as meeting sustainability goals are growing.

GENERAL CAMPUS INFORMATION

California State University Maritime was founded in 1929 as the "California Nautical School," in Tiburon, California. The first expansion of the university came in 1936 when the United States Congress passed the Merchant Marine Act, increasing federal and state funds to maritime schools, to bolster the maritime capabilities of the nation in support of international and domestic trade. Initially, the school offered few programs: training in deck operations and engineering.

The school became the "California Maritime Academy" in 1939 and in 1940 was relocated to the Ferry Building in San Francisco. During World War II, the cadet programs were intensified into a 17 month long program with many graduates serving in the war. It was during the course of the war that the school was relocated to its current home, Morrow Cove, adjacent to the Carquinez Strait, in Vallejo. (Peterson, 2004).

The school became a four year college in the early 1970s, the same period in which it began enrolling women. Initially it offered two majors: Nautical Industrial Technology and Marine Engineering Technology. The first graduating class was in 1978. In the late 1980s two more majors were added: Mechanical Engineering and Business Administration. Additionally, the Nautical Industrial Technology program was replaced with a program in Marine Transportation.

The school became the 22nd California State University (CSU) campus in 1995 and shortly thereafter expanded its program to offer a Facilities Engineering major to certify plant engineers for land based operations. A major in Global Studies and Maritime Affairs was initiated in 2003 ("General Catalog", 2008).

California State University Maritime (CSUM) is the only degree granting maritime academy on the West Coast. And with an 80 acre campus, only 51 of which are usable due to the steep slope on much of the site, and a student population of 858, as of 2008, is the smallest campus of the CSU system. The school does not currently offer any graduate level programs and of the 858 students, 66 attend part time. The average age of students on campus is 22 years old and 15% of students are over the age of 25. The oldest member of the class of 2009 is 55 years old ("Freshman", 2005).

The largest minority group represented are Asians and Pacific Islanders which represent 11% of the student body. Hispanics are the the second largest group, representing 10% of the population. At 3% of the student body, African Americans represent the third largest minority groups, followed by American Indians and Alaskan Natives at 2% of the student body. For 11% of students, the race or ethnicity was not known. It should also be noted that the school is

largely male due to its history as a training academy and that it did not enroll women until 1973. Eighty three percent of the student body is male. Though compared to many engineering specific school the enrollment of females is higher than average. The majority, nearly 3/4 of the students, come from California and 19% come from other states and territories. Eight percent comes from other countries(College Portrait 2008). The majority of students that come from other states, come from other western coast states: Alaska, Oregon, Washington, and Hawaii ("Freshman," 2005).

The school maintains a favorable faculty to student ratio of 11 to 1 and has a faculty size of 57. Of the faculty, 16% are women and 18% are of minority groups. Sixty nine percent have the highest degree available in their field. Eighty two percent of classes have fewer than 30 students (College Portrait, 2008).

The school offers six degree programs, all with an emphasis on maritime activities. The school offers Bachelor of Science degree in Business Administration, Facilities Engineering Technology, Marine Engineering Technology, Marine Transportation, and Mechanical Engineering. A Global Studies and Maritime Affairs program is offered as a Bachelor of Arts degree. Additionally, several of the program are offered as minors including Business Administration, Global Studies and Maritime Affairs, Law, Marine Science, Naval Science, and

Qualified Member of the Engineering Department. Several certificates are also offered: Certified Plant Engineer-in-Training, Engineer-in- Training, Third Assistant Engineer Coast Guard certification, and Third Mate Coast Guard certification. Military training is also offered in preparation for service in the U.S. Coast Guard and the U.S. Navy ("General Catalog", 2008).

Extended learning programs are also offered. The school offers extended learning in Bridge Management, Tanker Vessel Operations for Dangerous Liquids, Firefighting, First Aid, Survival, Radar Operations, OSHA Hazwoper training, Emergency Response, Environmental Health and Safety, Maritime Security, and Management ("Extended Learning," 2007).

As part of the curriculum, many students also undergo a two-month international cruise aboard the school's training vessel, the *Training Ship Golden Bear* (TSGB), a refitted oceanographic vessel originally built in 1989 for the U.S. Navy and commissioned as the *USNS Maury*. Further cruises are taken aboard the TSGB or aboard other commercial vessels and the school maintains study abroad programs with many other maritime schools ("General Catalog," 2007).

Unless living with family, all freshmen are required to live on campus. Overall, 66% of undergraduates live on campus. Many live in coed dorms and several reside on the TSGB throughout the year. The campus is situated on the

edge of San Francisco Bay on Morrow Cove just outside of Vallejo, a major suburb of San Francisco, in an industrial sector of the town. The campus itself is largely secluded from the city (College Portrait, 2008).

As of 2006, since becoming a CSU, enrollment at Maritime has grown 50 percent in 10 years and it is expected to grow further. The incoming freshmen class of 2010 is 250 students versus just 84 students compared to just 84 students in 1995. The continuing growth is attributed to several factors. One is that the school continues to be recognized by US News and Word Report's college rankings as one of the best engineering schools in the country and US News and Word Report has called it a well kept secret (Webster, 2008). Further, alumni of the school are receiving increasing attention as they achieve positions in the media as expert consultants and as they fill global leadership positions. The school's job fair is routinely sold out and attracts recruiters from around the country (Whitty, 2005). And the school has above average graduating salaries and placement rates. Third, the school maintains an average of four years to graduate students versus a national average of nearly six years. Students at Maritime routinely handle over 20 hours of coursework whereas the CSU system defines a full time equivalent student as one taking 15 hours of coursework per semester ("Admissions Viewbook," 2009)("Letter," 2006).

POLICY AND PLANNING DATA

CSU Maritime has as its mission four goals:

- "Provide each student with a college education combining intellectual learning, applied technology, leadership development, and global awareness.
- Provide the highest quality licensed officers and other personnel for the merchant marine and national maritime industries.
- Provide continuing education opportunities for those in the transportation and related industries.
- Be an information and technology resource center for the transportation and related industries."

In addition to its mission statement, the university also has designated a vision statement:

> *"The California Maritime Academy will be a leading educational institution, recognized for excellence in the business, engineering, operations, and policy of the transportation and related industries of the Pacific Rim and beyond."*

The university has not yet adopted an official environmental policy but it has made energy and environmental issues a part of its academic master plan. It establishes a goal of recruiting faculty with expertise in "sustainable, renewable, green, efficient" energy, and in environmental issues pertaining to "marine, coastal, atmospheric, and fisheries" issues. As part of this academic goal, the university is exploring the creation of a renewable energy major as well as a coastal and environmental sciences major.

CSU maritime is expecting enrollment to grow by 11% in the next year and following the creation of a graduate degree program will an additional 50 students to this population increase. To accommodate more students the

university is exploring ways of graduating students faster, and is renovating buildings on campus to provide increased classroom space. Further, it is developing a plan to provide classes online. Some programs will be finishable without requiring a visit to the campus. Though Maritime Academy is extending its programs to provide learning opportunities in Environmental and Energy fields the campus does not maintain an sustainability guideline in its master plan or procurement procedures.

There is no full time staff dedicated to adopting sustainability best practices or improving campus sustainability ("Academic Master Plan," 2009). The university is a member of the United States Green Building Council, Association for the Advancement of Sustainability in Higher Education, and the California Climate Action Registry ("Systemwide Sustainability," 2008). To improve energy and resource efficiency on campus, an assessment of campus resource use was commissioned. Though this review did not assess sustainability directly, it did not for example consider GHG emissions or waste generation, findings have led to efficiency upgrades and retrofits (Jackson, 2008).

TEACHING, RESEARCH, AND EXTRACURRICULAR DATA

Of the six majors offered, the Bachelor of Arts degree in Global Studies and Maritime Affairs offers the broadest selection of courses that consider environmental issues. The program is designed to provide "[a] solid theoretical background in the social sciences, applied to the needs of the greater maritime and transportation industries." The program provides detailed knowledge of government agencies, organizations, and business most involved with maritime affairs and it provides an in depth political and economic background designed to foster an understanding of maritime history, maritime power, and maritime issues related to security, trade, and the environment. The program emphasizes four policy areas: Trade, Security, Law, and Environmental Policy. The environmental policy area focuses on environmental issues related to marine industries and trade and includes topics of "whaling, fisheries management, and environmental standards of shipbuilding."

Several courses within the major promote an extensive discussion of pertinent current issues of the environment as they concern the oceans. GMA 100, part of the core curriculum for the major, is broken into several parts with the last part being devoted to global environmental concerns: global warming, fisheries degradation, freshwater access, and many others. With the Ocean Politics class, GMA 105, methods of mitigating environmental disputes are addressed, focusing on current maritime laws. GMA 200 is a course on

globalization examining the expanding global economy and the effect globalization has had on the environment ("Global and Maritime Studies").

Ocean Environmental Management, GMA 320, is the most comprehensive course dedicated to furthering student's understanding of the marine environment. Designed for students without a scientific background, the course examines the impact of population growth on natural resources, maritime pollution, impacts of growing energy demand, habitat conservation, species conservation, and the "various solutions proposed to deal with them." Additionally, the course is designed to teach a scientific understanding of issues as diverse as bio-diversity, population, pesticides and food, waste management, and sustainable development. Students are encouraged to continue studies in these fields further in GMA 450, Special Topics in Maritime Policy. Topics have included marine invasive species and fisheries management. These topics are also explore in LAW 200, Environmental Law which review laws governing pollution, radioactive waste, fisheries, and environmental enforcement. The department has also just recently added a course called Intro to Environmental Politics which details domestic environmental policy and was said to have developed a "very strong reception among the students (Dudley, 2008)."

More scientifically oriented, several Marine Science programs are offered. MSC 100 is an introduction to the geological and chemical processes of

oceanography and includes the study of seawater chemistry, sea floor features, and ocean resources. MSC 105 expands the curriculum to include the study of the biology and physical processes of the ocean and includes introductions to atmosphere-earth-ocean interactions, global climate process, ocean circulation waves, tidal process, and marine biology. Both of these courses satisfy a natural science elective requirement. The methods of studying and quantifying the processes and chemistry of the oceans is taught in MSC 200, Oceanographic Instruments and Analysis which provides hands-on experience in sampling and analysis techniques. Students learn methods to measure salinity temperature, dissolved oxygen, phosphate, chlorophyll, pH, carbon dioxide, and submarine light levels. MSC 205, Marine Biology, is devoted to the ecology of oceans and the marine environment. Topics covered are invertebrates, algae, fishes, and mammals, as well as the study of tide pool, reef, beach, and deep benthos ecologies. This course also satisfies a natural or life science elective requirement ("General Catalog," 2008).

Of the few degrees offered, the Bachelor of Arts degree in Global Studies and Maritime Affairs (GSMA) was identified as having the most sustainability and environmentally oriented content. Several classes from within the major are required for the other degrees on campus and so most students are exposed to environmental content and the specific concerns of maritime ecology and environmental restrictions within their industry. The GSMA major is the newest

on campus and is unique on campus in that its students are not necessarily preparing for careers aboard ships but have several different focuses including preparing for careers in law, policy creation, and environmental regulation .

Maritime, because of its history, is not currently a research oriented institution. Though, as it expands to fill its roll as a CSU campus, it is beginning to explore ways in which its nautical heritage can be drawn upon to promote unique research opportunities and to provide the resources necessary for those wanting to conduct research into maritime affairs. The GSMA program is one example of this and the GSMA department is beginning to develop the first graduate level programs the school will offer (Dudley, 2008).

The program has sponsored several lectures on campus to discuss contemporary environmental concerns of importance to the industry. They have sponsored lectures on the global impacts of climate change and the expected changes to the industry. They have invited the Port Environmental Planning Supervisor from the city of Oakland to lecture on the "Environmental Policies and Regulations at a Container Port." And most recently they sponsored a lecture to discuss air emissions from vessels and ways to reduce the release of Nox, Sox, PM, and GHG through fuel switching, hull design, control technologies, and operational methods such as speed reduction (Dudley, 2008).

Another example of the kind of research the school in beginning to undertake, one that is a direct concern to the industry, is research into ballast water treatment methods to help prevent the spread of non-native plants and animals. The school received a $700,000 dollar grant to develop a Shipboard Ballast Water Treatment Research, Development, Test, and Evaluation Facility aboard their training ship. The facility will make it easier to test and certify different methods of ballast water treatment systems. Currently, systems are tested on any available commercial ship. Funding for the project comes from the National Oceanographic and Atmospheric Administration (NOAA), US Maritime Administration (MARAD), and the California State Lands Commission (Webster, "$700M in Grants," 2008).

The research is being conducted in conjunction with research scientist from the University of Washington School of Aquatic and Fishery Sciences in advance of approaching deadlines to meet new ballast water standards. The Cal Maritime Facility will streamline the process by which different methods can be tested for effectiveness by creating a "plug and play" system aboard the training ship. The ship will have standardized components that will easily plug into existing ballast water research platforms installed in 20 foot shipping containers and interface with the ships ballast tanks. The location of the school near the confluence of the Sacramento River delta and San Francisco Bay, both of which have several non-native species, makes it possible to conduct accurate test of

the effectiveness of each treatment method in reducing the spread of non-native species. The facility will be operational this coming year (Davidson, 2008).

An additional concern to the maritime industry is the continuous threat of hazardous spills. The campus recently opened a Simulator Center which houses bridge and radar operations simulators as well as liquid cargo and oil spill/crisis management simulators. The Pisces-2 Hazardous Spill Simulator can be transfered to actual spill sites to help direct resource allocation as well as provide realistic spill scenarios to train personnel in spill containment and clean-up ("Making Way, 2006).

Professor Tom Nodernholz, a mechanical engineering professor, "received a CSU Research, Scholarly, and Creative Activity Grant to study wind energy training." He has been working with facilities and student engineering groups to try to purchase, install, and operate small wind turbine systems to train students on wind generation technologies. He feels that due to the demanding energy curriculum the school offers, alternative energy and especially wind energy companies "should know about us."

Students on campus he believes are very interested in sustainability, stating "They see the writing on the wall," and they would pursue more sustainability efforts "if [CSUM] had more to offer them." He is continuing to

push renewable energy classes on campus and currently dedicates a portion of his energy generation classes to renewable approaches of energy generation (Nordenholz, 2008).

There are currently no clubs on campus dedicated to sustainability, though the Associated Student (AS) government has sponsored several activities to promote a more environmentally friendly campus. There had been a recycling club that worked with students to recover recyclables from the residents halls, but that program was incorporated into facilities management. The major sustainability oriented events on campus are organized by AS and include an Earth Day celebration and regular coastal cleanup days (Prather, 2008). Many reasons were given for the lack of student involvement in extracurricular sustainability oriented activities. The most commonly cited reason was the intense workload most students maintain which leaves very little time for student clubs. Other reasons given include the narrow focus of most events on campus in general, the daily requirements of students to adhere to a certain schedule and order that includes dress codes and mandatory roll calls, and some thought that the nature of the campus attracted a more conservative student body. The small size of the campus also was thought to make it difficult to recruit students for club activities (Godde, 2008).

GREEN BUILDING DATA

The greatest period of construction on the CSU Maritime campus came during World War II when the school was used to train sailors to support the war effort. Many of these buildings are still in regular use and the age of many of the facilities on campus contributes to excessive energy and water use. Recognizing this, Cal Maritime commissioned an energy and resource audit of the entire campus to identify cost effective ways to reduce energy and resource waste. As the school is expected to continue to grow, information from the energy audit will be used to determine retrofits of existing buildings and the needs for new construction. Currently, there are no green buildings on campus but the campus is committed to reducing its environmental footprint as it renovates and expands in coordination with the goals of the CSU system.

The school contracted DMJM, a design build subsidiary of AECOM, to conduct a campus wide energy and resource audit which identified 21 energy conservation measures. As the last major period of construction on campus came during World War II, outdated equipment and facilities was the largest contributor to inefficiencies on campus. For example, many of the HVAC systems as well the dinning commons refrigeration equipment were found to be leaking fluids and to have malfunctioning condensers and coils. The gas boilers for many of the buildings on campus were similarly in a state of disrepair due to

age. An additional challenge CSU Maritime faces is the maintenance and operation of its training ship Golden Bear. Prior to its acquisition by CSU Maritime, Golden Bear was a naval survey vessel. When not used for the annual training cruises students are required to take, in port the ship is used as supplementary student housing with vastly different energy and water demands. The ship was found to contribute significantly to inefficiencies for several reasons. The first was the disrepair of equipment due to use and the second was the size of the equipment. On board generators, boilers, and chillers, were sized to be efficient as a sea going vessel. At port, their use contributed significant strain on the equipment promoting inefficiency. The ship was designed to use electric boilers to generate steam while in port. The installation of a dockside gas fired turbine proved an economical and efficient replacement.

The utilities audit was conducted in four phases: regular site visits including faculty and staff interviews, schematic design evaluation and proposals for mechanical and electrical systems, cost estimate for energy conservation measures, and savings and payback calculations.

The findings of the energy audit suggested several renovations for improving energy and water efficiency on campus and to promote broader use of renewable energy. While no new construction is planned, several renovation have been planned campus wide to retrofit existing outdated facilities. The

renovations are not planned as part of a green building strategy with the purpose of obtaining green building certification, but will make existing buildings dramatically more resource efficient when compared to the performance of the old facilities and structures. The first aspect of the campus targeted for renovation was the existing lighting system. While the campus has, in the past, adopted energy efficient lighting, a mix of old and new technologies was in place. The goal of the lighting retrofits was to standardize lighting across campus and to install the most up to date high efficiency lighting. Additionally, occupancy sensors were adapted campus wide and emergency lightening such as exit signs that depended on incandescent lights were replace with LED versions.

Much of the renovation planned was for the training ship Golden Bear. In port, the ship function as student housing as well as a classroom and so remains in constant use. The systems aboard however were sized for continual operation while underway. In port, the facilities are too large for the required demands. For many of the systems, it was recommended that light duty systems be installed. Light use of the existing facilities had also contributed to premature wear so it is expected that supplementing these systems with light duty equipment will extend the life of the equipment for sea going operations and will have a favorable payback period. A further suggestion was that in port the ship could use the naturally cold waters of the Carquinez Strait to power a heat exchanger which could meet cooling needs. Electricity production for the

ship was another concern and three scenarios were considered for meeting electricity needs aboard when the ship is dockside; A cogeneration plant, a fuel cell, and an on-shore boiler were all considered. An important consideration among each of these option was the ability to generate steam, which at the time of the audit was generated with electricity, and the ability to meet power needs.

The campus computer network was also target for retrofits. It was recommended that the SURVEYOR network management software should be installed. SURVEYOR is a server-side based application that allows continuous monitoring of computer network energy usage and tabulates it so that networks and computers not using energy saving features can be identified. It also supplements existing power saving strategies PCs use by allowing network manager control of power saving features.

The second campus wide retrofit recommended was installation of water saving devices. Low flow toilets and urinals, low flow shower heads, as well a improved aerators on bathroom and kitchen sinks were recommended. Most toilets on campus were flushing with 3.75 gallons of water and will be replaced with low flow toilets that use 1.6 gallons per flush. Three hundred and fifty six devices were scheduled for retrofit.

In many of the buildings on campus, a common problem was observed: heaters, boilers, chillers, and other equipment operating beyond its anticipated life expectancy, contributing to high maintenance costs and inefficient operation. Newer models were suggested to replace this aging equipment.

The campus has initiated a goal installing 200kw of solar power. Currently, there is none. A 175kw system has been proposed for installation on the roof of a residence hall and the remaining 25kw will be installed above a classroom building. The system being used to install the panels is also anticipated to reduce heating and cooling demand by adding insulation to the roof. The installation system is a non penetrating system. The solar panel installation is viewed as a positive first step towards promoting a "greener" campus.

RESOURCE USE, WASTE GENERATION, AND CONSERVATION DATA

Pacific Gas and Electric is the electricity provider for the campus. Electricity for the period between 2003 and 2007, averaged 4,220,000 kWh annually. An increase of 9% was observed during the same time period. Peak electricity use tended to occur in September or October. During the same time period natural gas use also increased 13%. During the same period natural gas use averaged 190,000 therms.

Vallejo provides water and sewage service to the campus. In 2006, the campus used 3,092 CCF. Water usage data may be inaccurate however. There were inconsistencies in water metering indicating that one or both of the meters monitoring campus use were in need of repair or replacement. For example, campus water use varied according to one meter between 3000 CCF and 240 CCF monthly. Many bills were also missing. It was estimated that the campus uses 700 CCF a month. Peak water usage occurred in July and August.

Energy use on campus was divided between the main campus, which generated 60 percent of demand, and the training ship, which generated the remaining demand, though this varied significantly with when the training ship was in port. At times, a month to month breakdown of when the ship was in port indicates a reversal of these figures. Light and air handling were the two largest sources of electricity demand. Space heating was responsible for 77

percent of natural gas needs. The energy audit further breaks down energy use and natural gas demands on campus for individual buildings. The residence hall had the highest energy requirements on campus. Total campus square footage accounting for energy use is 278,000 square feet divided amongst 36 buildings. On the training ship Golden Bear, space heating generated the highest demand for energy use. In port, an electric boiler is used to generate steam. Associated pumps were also a significant contributor to energy use (Jaeckel, 2008).

[author's note: Green building data and resource use data were obtained from the investment grade energy audit solicited by CSU Maritime. This audit is unpublished. Additional information was obtained through a personal interview with the University Planner, Roger Jaeckel.]

CONCLUSIONS

California State University Maritime has faced special challenges in meeting sustainability objectives. As the smallest member of the CSU, its limited, specialized, curriculum and small student body limits activities students can pursue on campus. The age and type of facilities the school must maintain, including a fully operational, oceangoing ship, further challenges the campus' ability to be proactive in sustainability. Many efforts are underway however. A campus wide audit of energy and resource was conducted that quantified resource use and has prompted extensive energy and water efficiency retrofits. Maritime has also begun to utilize many of the resources available to its students that are specific to the campus, such as the training ship and training cruises, to develop a curriculum that considers sustainability more directly and uses these resources to inform students of the special considerations and impacts of their industry. For student not pursuing majors that emphasize sea going, the curriculum is being expanded. These programs benefit from their proximity to the more traditional majors on campus. The campus has also become more involved in research efforts and has recently planned its first graduate level program in Global Studies. The training ship is participating in programs to test ballast water treatment technologies. While Maritime may be behind other campuses in the usual criteria of sustainability, it is a goal being actively pursued in a niche no other CSU campus can fulfill.

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