Santa Ana College

Facilities Meeting

March 18, 2014

SAC Facilities Committee
March 18, 2014
1:30p.m. – 3:00p.m.
SAC Foundation Board Room, S-215

THE FACILITIES COMMITTEE is the participatory governance committee responsible for identifying and prioritizing capital projects including scheduled maintenance projects. It serves as an information and exchange body on facilities projects that are in construction or that are being planned.

Santa Ana College Participatory Governance Structure Handbook (May 8, 2013)

Agenda

1. Welcome and Introductions

2. Public Comments

3. Approval of Minutes – February 18, 2014 — ACTION

4. Project Updates- Carri Matsumoto/ Darryl Taylor — INFORMATION
   - Bond Projects Update
     - Central Mall conceptual design
   - SAC Active Project Update
   - Scheduled Maintenance Projects

5. Standing Reports (5mins.) — INFORMATION
   - HEPSS Task Force – Don Mahany
   - Facilities Report – Mark Wheeler
   - Environmental Task Force – Susan Sherod

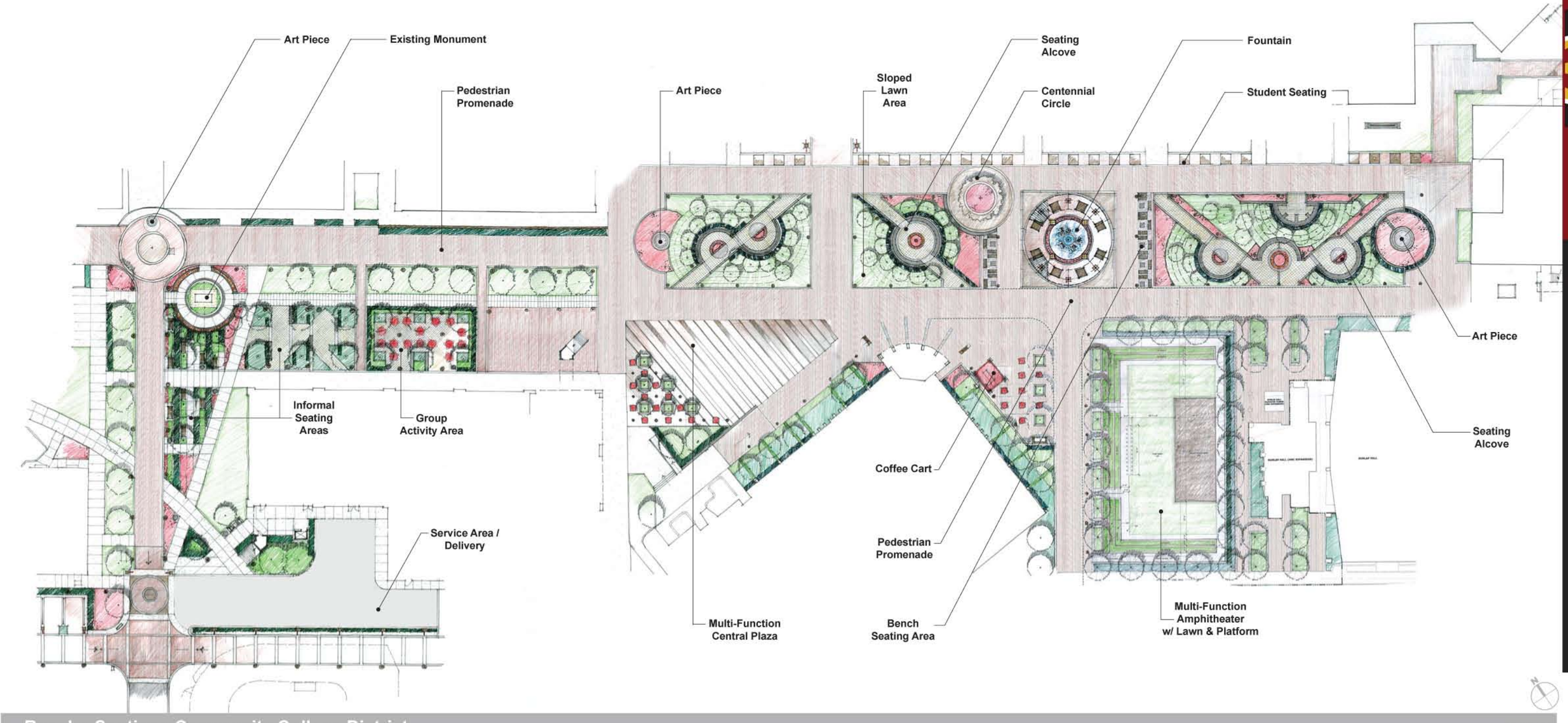
6. Old Business
   - Committee goals evaluation — INFORMATION

7. New Business

8. Other

Next meeting April 29, 2014

The mission of Santa Ana College is to be a leader and partner in meeting the intellectual, cultural, technological, workforce and economic development needs of our diverse community. Santa Ana College prepares students for transfer, employment, careers and lifelong intellectual pursuit in a dynamic learning environment.



Santa Ana College
Central Mall Conceptual Design

SANTA ANA COLLEGE

Facilities update
3/18/2014

- We have received 181 work orders and have 29 open work orders on the books.
- The pool heater was replaced and we are submitting the necessary paperwork to the AQMD for compliance, and the gas company for a $2500 rebate.
- The main elevator in U building has been repaired and is in good working order.
- W106 electrical installation has been completed along with the removal of mirrors and the patch and paint of the walls.
- We are in the process of devising a way to eliminate the fumes created by the machines in the machine shop from being entrained back into the building. This will mean removing a large window and installing a louver. It will also entail balancing the system.
- The Russell Hall guardrail installation project is currently underway. The replacement panels are scheduled to be installed on April 7th, 2014. It appears the project is on schedule and going well.
- We have started the 3 pack project; lot 11/swing space, retention basin and the planetarium. McCarthy is on site and pressing forward. There has been a significant amount of fencing installed and traffic, both foot and vehicular are being affected. We are doing all we can to minimize the overall impact. The scheduled completion date in September 30th, 2014. The fences will be coming down in some areas prior to that date.
- The job walk for the H building renovation has been scheduled for March 27th with bids due back on April 4th.

Update for 3-18-14

1. **The Environmental Task Force studied the payback time for traditional and Solar Assisted Natural Ventilation with the following results:**

Outcomes for Solar Assisted Natural Ventilation Design

The environmental and economic outcomes could lower costs for energy to cool, for a savings of 70% to 100% of energy formerly used for cooling, and reduce the costs to heat the building. Overall energy cost of the building is estimated to be reduced by 10 - 30% ***for the natural ventilation alone*** (Walker**),** ***but it will be higher with the addition of fans and controls, perhaps 60% or more*** (Graham). In addition, adding all fresh air to the building should reduce exposure to routine pathogens that are trapped and re-circulated by mechanical HVAC type systems currently in place. ***Since long term costs are up to 75% of the life cost (Siegler) for a building of this type, it is even better that the project will result in perhaps only 10% (Maisey) as much cost for maintenance and repairs as a mechanical HVAC system would.***

Santa Ana College Electrical Savings with Solar Assisted Natural Ventilation Design

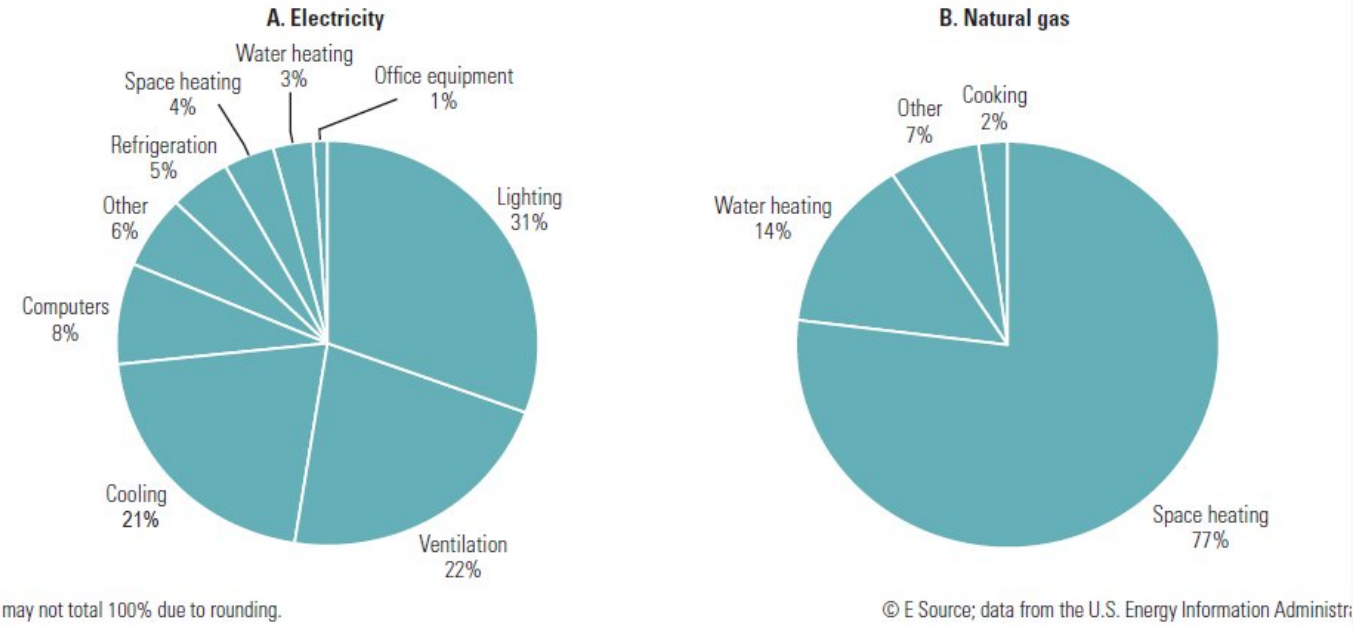
Annual electric cost at Santa Ana College is approximately $1.8 million USD (data provided by Don Maus). From data in the chart below, we can see the cost for HVAC is about 43% of the electric, or $774,000.

Colleges and universities spend around $1.95 per ft^2 on electricity and $0.15/ft^2 on natural gas annually (assuming energy use of 18.94 kilowatt-hours [kWh]/ft^2 and 0.17 hundred

difference, but remember that every 1,000,000 kWh sav
turning things off takes $100,000 off your institution's
bill annually (assuming electricity costs of $0.10/kWh).

FIGURE 1: Energy consumption in U.S. educational facilities by end use

Data from the U.S. Energy Information Administration show that lighting, ventilation, and cooling account for 74 percent of electric use (A) and space heating dominates natural gas use at 77 percent (B).



Note: Sum may not total 100% due to rounding.

© E Source; data from the U.S. Energy Information Administra

EPA estimates $1.95/sq. foot for higher education campus electric cost. SAC Campus square footage is approximately 823,700 sq. feet. SAC cost/square feet = $1.8 million/823,700 sq. feet = $2.185/sq. foot. SAC

operates with an apparently higher than average electric cost for a higher education facility, so the savings will be greater than average.

The opening statements in the document with the above image, by E-Source Company Direct, (2010) says " By implementing economical energy efficiency measures, many colleges and universities have the potential to cut their energy bills by 30 percent or more." Santa Ana College has already implemented some of their recommended strategies such as schedule changes, but if we can do much better.

Typical scheduling changes and updating to traditional energy efficient HVAC equipment on the campus might net 30% of electric bill savings, where 30% x $774,000 = $232,000 annually.

Updating to Solar Assisted Natural Ventilation would result in savings of 60% of electric bill savings, where 60% * $774,000 = $464,400 annually, or more in years when less to no AC is needed, plus the reduced long term maintenance cost savings of 90% of the life cost of the system, for a total savings of perhaps 70% of electricor more, annually.

Better yet, Solar Assisted Natural Ventilation upgrades don't require tearing up the campus and buildings as much, and the new equipment needed costs less, possibly less than a quarter of the cost of an $8 million dollar central plant since adding solar assisted natural ventilation is probably between $55,000 and $100,00 per building on campus per information provided by a vendor of solar roof vent fans. For example, the installed cost of four such solar roof vent fans was quoted as only $42,000 in 2012.

Sources:

Graham, Carl Ian, PE. High-Performance HVAC. Whole Building Design Guide. 12-07-2009. Web

Maisey & Milestone. Optimizing HVAC Life-Cycle Performance. 08-31-2010. http://www.wbdg.org/resources/tqc.php. Web. Accessed 12-8-2011.

Maisey, Grahame E. PE. The death of HVAC. 08/09/2010. http://www.plantengineering.com/industry-news/mechanical-news/single-article/the-death-of-hvac/2954b71fec.html. Accessed 12-8-2011.

Milne, Murray, & Gomez, Carlos, & LaRoche, Pablo, & Morton, Jessica. Why Design Matters:Comparing Three Passive Cooling Strategies In Sixteen Different Climate Zones. UCLA, Department of Architecture and Urban Planning. http://www.energy-design-tools.aud.ucla.edu/papers/ASES05-Milne.pdf . Web. Accessed 11-27-11.

Walker, Andy. Natural Ventilation. Whole Building Design Guide sponsored by National Renewable Energy Laboratory. 06-15-2010. Web. Accessed 12-8-2011.

2. **The Environmental Task force found some free General Services Administration tools that can be used for Design and Analysis.**

Design and Analysis Tools

http://eponline.com/articles/2011/02/11/free-gsa-sustainable-facilities-tool-available-now.aspx

The use of computer programs can considerably reduce the time and effort spent on formulating the LCCA, performing the computations, and documenting the study. Listed below are several LCCA-related software programs:

- Building Life-Cycle Cost (BLCC) Program-Economic analysis tool developed by the National Institute of Standards and Technology for the U.S. Department of Energy Federal Energy Management Program (FEMP).

- ECONPACK for Windows-An economic analysis tool developed by the U.S. Army Corps of Engineers in support of DOD funding requests.
- Energy-10-Cost estimating program available from the Sustainable Buildings Industry Council (SBIC).
- SuccessEstimator Estimating and Cost Management System-Cost estimating tool available from U.S. Cost.

3. The Environmental Task Force researched software, for Life-Cycle Cost Analysis and found there is some free and some not free software as follows.

Life-Cycle Cost Analysis Software

Free Software

Building for Environmental and Economic Sustainability (BEES) (http://www.bfrl.nist.gov/oae/software/bees/) is a tool that helps select cost-effective building products from more than 200 environmentally preferred items. BEES is based on consensus standards and measures the environmental performance of building products by using the life-cycle assessment approach specified in the International Organization for Standardization (ISO) 14040 series of standards (http://www.iso.org/iso/home.htm). BEES has been adapted for application to biobased products—see BEES for USDA (http://www.bfrl.nist.gov/oae/software/bees/bees_USDA.html). BEES has been supported in part by the U.S. Environmental Protection Agency's Environmentally Preferable Purchasing program (http://www.epa.gov/epp/).

The **Chilled Water System Analysis Tool** (http://www1.eere.energy.gov/industry/bestpractices/software.html) is used to determine the energy requirements of chilled water cooling systems and to evaluate opportunities for energy and cost savings by applying improvement measures. The program, developed by the U.S. Department of Energy (DOE), allows you to calculate the current energy consumption of an existing system, then select proposed equipment or operational changes for comparison.

The **Combined Heat and Power Application Tool** (http://www1.eere.energy.gov/industry/bestpractices/software.html) is used to evaluate the feasibility of combined heat and power. This tool, developed by the DOE, will estimate system costs and payback period. It also performs "what if" analyses for various utility costs. It includes performance data and preliminary cost information for many commercially available gas turbines and default values that can be adapted to meet specific application requirements.

The **Construction Waste Calculator** (http://www.metrokc.gov/dnrp/swd/greenbuilding/construction-recycling/cost-effectiveness.asp) from King County Solid Waste Division, WA, explains how to determine the cost effectiveness of recycling versus disposal by using the Recycling Economics Worksheet (http://www.metrokc.gov/dnrp/swd/greenbuilding/documents/economics_worksheet.xls). The worksheet contains separate calculation sheets for commercial-hauling and self-hauling options, as well as samples of completed worksheets.

The **Cool Roof Calculator** estimates cooling and heating savings for flat and low-slope roofs with surfaces that are not black. It includes DOE Web-based software programs for managers of small and medium-sized facilities that purchase electricity without a demand charge (http://www.ornl.gov/sci/roofs+walls/facts/CoolCalcEnergy.htm) and for large facilities that purchase electricity with a demand charge based on peak monthly load (http://www.ornl.gov/sci/roofs+walls/facts/CoolCalcPeak.htm).

DOE-2 (http://www.doe2.com/) is a frequently updated **FORTRAN** program developed by James J. Hirsch & Associates in collaboration with Lawrence Berkeley National Laboratory. It calculates the hourly energy use and energy cost of a commercial or residential building based on user-supplied information about the building's climate, construction, operation, utility rate schedule, and heating, ventilating, and air-conditioning (HVAC) equipment. It can be used in its basic form or accessed through a friendlier interface such as eQUEST, EnergyPlus, Green Building Studio, or PowerDOE, all of which are described in this section.

Energy Cost Calculators (http://www.fedcenter.gov/_kd/go.cfm?destination=ShowItem&Item_ID=8336) from the Federal Energy Management Program allow users to enter their own utility rates, hours of use, and so forth, to estimate the energy cost savings from buying a more efficient product. Calculators are available for compact fluorescent lamps, commercial unitary air conditioners, air-cooled chillers, water-cooled chillers, commercial heat pumps, boilers, refrigerators, freezers, beverage vending machines, computers, monitors, faxes, printers, copiers, faucets/showerheads, toilets/urinals, central air conditioners, gas furnaces, electric/gas water heaters, clothes washers, and dishwashers.

Energy-10 (http://www.nrel.gov/buildings/energy10.html) from the National Renewable Energy Laboratory helps architects and building designers quickly identify the most cost-effective energy-saving measures for small commercial and residential buildings. It integrates daylighting, passive solar heating, and low-energy cooling strategies with energy efficient shell design and mechanical equipment. It enables designers to make good decisions about energy efficiency early in the design process.

EnergyPlus (http://www.eere.energy.gov/buildings/energyplus/) is a DOE building energy simulation program for modeling a building's heating, cooling, lighting, ventilating, and other energy flows. It is based on the most popular features and capabilities of DOE-2, but it includes simulation capabilities such as time steps of less than an hour, modular systems, HVAC zone simulation, multizone air flow, thermal comfort, and photovoltaic systems.

eQUEST (http://www.energydesignresources.com/resource/130) was developed by Energy Design Resources to perform a detailed analysis of state-of-the-art building design technologies without requiring extensive experience in the "art" of building performance modeling. It combines a building creation wizard, an energy efficiency measure wizard, and a graphical results display module with a DOE-2 building energy-use simulation program. Results are displayed in tables and graphs. eQUEST appears to be one of the most popular energy-use simulation programs, probably because of its

ability to display energy consumption over time using colorful, easy to- read graphs and tables.

The **Financing Alternatives Comparison Tool** (http://epa.gov/owm/cwfinance/cwsrf/fact.htm) is a U.S. Environmental Protection Agency (EPA) financial analysis tool that helps identify the most cost-effective method to fund a wastewater or drinking water management project. This tool produces a comprehensive analysis that compares various financing options for these projects by incorporating financing, regulatory, and other important costs.

The **Life-Cycle Cost Analysis Model** (http://www.green.ca.gov/LCCA/default.htm) was developed by the State of California to determine the cost effectiveness of implementing energy conservation measures using the results of energy audits or energy feasibility studies. This Excel spreadsheet has information specific to California (details about energy costs, California energy tariffs, peak/part-peak/off-peak rates, etc.) already filled in, although the information can be modified. The model provides detailed analysis of energy cost savings and implementation costs.

Radiance (Windows version at http://radsite.lbl.gov/deskrad/ and Unix version at http://radsite.lbl.gov/radiance/) is a tool for lighting design and rendering, developed by the DOE and the Swiss Federal Government through the Lawrence Berkeley National Laboratory. It quantitatively renders daylight in building models to provide graphic displays and luminance numbers that can be used to determine how much artificial lighting is needed in a room or how room configuration could be changed to eliminate the need for artificial light.

The **Target Finder** (http://www.energystar.gov/index.cfm?c=new_bldg_design.bus_target_finder) is an EPA energy modeling tool that helps architects and building owners set aggressive, realistic energy targets and rate a commercial building's estimated energy use, based on the EPA's survey of existing buildings and climate by ZIP code. Site and source energy calculations are provided for both energy use intensity and total annual energy.

The **Unitary Air Conditioner Cost Estimator** (http://www1.eere.energy.gov/femp/procurement/eep_unitary_ac_calc.html) compares high-efficiency rooftop air conditioners to standard equipment in terms of life-cycle cost. This estimator, developed by the DOE, accounts for local climate and partial load as well as full load efficiencies. The Web-based, menu-driven format is easy to learn and use. It quickly estimates life-cycle cost, simple payback, return on investment, and the savings-to-investment ratio based on user-specified air conditioning requirements and building use patterns. Results are easily downloaded as graphic files for further analysis or for presentations.

Commercial Software

Ecotect (http://squ1.com/) is a whole-building simulator from Square One Research that "combines an interactive building design interface and 3D modeler with a wide range of environmental analysis tools for a detailed assessment of solar, thermal,

lighting, shadows and shading design, energy and building regulations, acoustics, air flow, cost, and resource performance of buildings at any scale." It works with Square One's CAD engine, or you can import building information from AutoCAD.

Green Building Studio (http://usa.autodesk.com/adsk/servlet/index?siteID=123112&id=11179531) is one of the many interfaces to DOE-2. It also is compatible with other energy-analysis software. Green Building Studio has tools that help evaluate building designs for energy consumption and carbon footprints.

PowerDOE (http://www.doe2.com/Download/Docs/D22PDSum.pdf) is a commercial interface to DOE-2 (see the "Free Software" section) that uses graphics, building images, and models to both organize data input and display building energy use for heating, cooling, lighting, ventilating, and so forth.

The **Virtual Environment** (http://www.iesve.com/content/default.asp?page=home_Our%20Software) can act as a plugin to AutoCAD's Revit, calculating heating and cooling loads. Developed by Integrated Environmental Solutions, Ltd. This plugin can also be used to model several other systems from within Revit.

Life-Cycle Assessment Software

Free Software

Building for Environmental and Economic Sustainability (BEES) (http://www.bfrl.nist.gov/oae/software/bees/) is a tool that helps select cost-effective building products from more than 200 environmentally preferred items. BEES is based on consensus standards and measures the environmental performance of building products by using the life-cycle assessment approach specified in the International Organization for Standardization (ISO) 14040 series of standards (http://www.iso.org/iso/home.htm). BEES has been adapted for application to biobased products—see BEES for USDA (http://www.bfrl.nist.gov/oae/software/bees/bees_USDA.html). BEES has been supported in part by the U.S. Environmental Protection Agency's Environmentally Preferable Purchasing program (http://www.epa.gov/epp/).

Building Materials Reuse Calculator (http://www.wastematch.org/calculator/calculator.htm) from New York City's NY Wa$teMatch Materials Exchange estimates the environmental benefits of salvaging and reusing building materials, rather than buying and installing new ones. The calculator measures the environmental benefits of reusing building materials.

Pharos (http://www.pharoslens.net/about/) is a labeling system that is sponsored by the Healthy Building Network and its partners. The labeling system, still being developed, is intended to be a consumer-friendly display of the evaluation of materials across impact categories, including energy/ water usage, air quality impacts, toxicity, occupational safety, social justice, and habitat impacts. The PharosWiki

(http://www.pharosproject.net/wiki/index.php?title=Main_Page) is available, although the labeling system was not yet available when this report was prepared.

Comparison and Evaluation:

The **Sustainability Tracking, Assessment & Rating System™** (STARS) is a transparent, self-reporting framework **for colleges** and universities to measure their sustainability performance.

https://stars.aashe.org/pages/register/register-stars.html

4. Environmental Task Force Next Steps

We recommend further investigation of the tools available. We will review them in greater depth as much as we can if it pleases the Facilities Committee.

Respectfully Submitted,

Susan M. Sherod

SANTA ANA COLLEGE

Facilities Committee Goals 2013/2014

1. Align SAC Facilities Improvements with the RSCCD Sustainability Initiative. Maximum effort will be made to ensure that all improvements be created and managed sustainably for reduction of fossil fuel consumption, and thus the reduction of the campus carbon footprint. "Green" efforts will be considered as a means of reducing utility costs and improving the campus and community environment.

2. Receive and disseminate reports on maintenance, repair, renovations, and upgrades to existing buildings, infrastructure, and equipment, as well as progress on new construction as new buildings are approved, designed, and started. Provide feedback as appropriate.

3. Monitor efforts to maintain and improve campus appearance.

4. Continue to review and implement the SAC Facilities Master Plan at ancillary sites.

5. Monitor efforts and support the Environmental task force and the HEPSS (Health, Emergency Preparedness, Safety and Security) task force.

6. Monitor the campus grounds and facilities for ADA compliance and review the ADA Transition Plan. Recommend that modifications be made in a timely manner to correct known deficiencies.

7. Provide a conduit for communication for faculty, staff and students to bring forward facility related issues to administrative attention, as well as provide regular updates to College Council.

Approved 2/18/14