CATF Energy Workgroup

Survey: GHG Emissions Reductions Potential

This survey will help the CATF Energy Workgroup to prioritize action items based upon the impact that each item will have on REDUCING CAMPUS GREENHOUSE GAS EMISSIONS.

Please rate each item below on a scale of 1 to 4, where 1 is lowest and 4 is highest, on the EMISSIONS REDUCTIONS POTENTIAL of the proposed initiative. Assume that reductions in energy use and increases in energy-related efficiencies are directly proportional to greenhouse gas emissions reductions. So that we can focus specifically on emissions reductions potential, please DISREGARD COST or any other potential barriers to implementation when you rate each item.

The following is a guideline to help with scoring:

1 = NEGLIGABLE emissions REDUCTIONS (i.e. negligible energy savings or efficiency increases).
2 = MODERATE emissions REDUCTIONS (i.e. moderate energy savings or efficiency increases).
3 = LARGE emissions REDUCTIONS (i.e. large energy savings or efficiency increases).
4 = VERY LARGE emissions REDUCTIONS (i.e. very large energy savings or efficiency increases).

I. Policy Adjustments

a.	Modify occupancy schedules for buildings with automation systems and reduce HVAC equipment schedules as appropriate.
b.	Modify class scheduling to reduce heating requirements and the number of buildings needed for classes.
c.	Develop a list of most energy efficient buildings. Give priority for class and meeting scheduling.
d.	Identify high incidents of energy related problems (e.g. through work order review) and use that information to prioritize corrective actions.
e.	Make energy and water conservation related points a priority in the LEED certification process.
f.	Minimize waste and energy associated with handling, processing, distributing, and, ultimately, disposing of, supplies delivered to campus.
g.	Implement campus temperature set points – Heating 68 degrees, cooling to 76 degrees.
h.	Implement a Residence Hall appliance policy. Limit the number of each appliance type allowed per room (e.g. refrigerators, microwaves). Require ENERGY STAR certified appliances. Require the use of CFL or higher efficiency light bulbs in fixtures.
i.	Commit to renewable energy goals for campus energy supply (e.g. 20% by 2015).
j.	Establish a campus "green purchasing policy" - e.g. give preference to products and vendors that are energy efficient, minimize waste generation and associated packaging, have demonstrated durability, and incorporate local, recycled, or rapidly renewable resources. Require contractors to submit environmental sustainability profiles for their company.
k.	Set a goal of zero-waste for campus dining operations. Maximize food waste recycling - e.g. composting, dehydrating for landscaping applications, biodiesel generation. Restrict the use of disposal and single-use products in campus food operations. Require vendors to provide items in recyclable, reusable, or compostable packaging. Maximize the use of local vendors.

II. Financing Opportunities

a.	Revenue Generation Opportunity. Research and track opportunities to obtain CO2 credits under the regional greenhouse gas initiative (RGGI) or other class III renewable energy credits (RECs) to sell on open market.
b.	Develop a self-sustaining campus financing mechanism to support implementation of energy conservation projects (e.g. a revolving fund).
c.	Charge a semesterly student utility fee. Offer a rebate to residence halls that remain below a set energy use standard.
d.	Charge a semesterly student fee (e.g. $1-5) to help fund energy efficiency improvements and conservation projects in student specific areas of campus (e.g. residence halls, class rooms, student union).
e.	Develop a system to charge academic departments for energy use and reward for conservation efforts - e.g. prorate building use by department square footage; implement an annual fee based upon department size and function, etc.
f.	Require a portion of grant monies associated with energy intensive on-campus research be returned to cover associated energy costs.

III. Utility Infrastructure

a.	Develop and initiate a boiler efficiency and emissions reductions program.
b.	Recover waste heat from refrigeration, laundry dryers, and other heat producing mechanical devices; consider heat recovery ventilation.
c.	Operate the power plant to maximize efficiency and reduce costs.
d.	Correct inefficiencies in the utility distribution systems, including steam, chilled water, electricity, water supply, and sewer.
e.	Centralize utility systems as much as possible (chilled water, electricity, emergency power, steam). Examine opportunities to integrate building projects to maximize utility system efficiency.
f.	Review emergency generator needs and consolidate generators.
g.	Audit all campus transformers and downsize or consolidate where possible.
h.	Complete the steam trap maintenance program in the Central Utility Plant and in the tunnels.
i.	Develop a maintenance program for steam pits not covered under the current steam trap maintenance project, along with zone and shop/DRL buildings.
j.	Raise the Chill Water system temperature during the winter from 42 degrees to 48 degrees.
k.	Identify energy storage opportunities, such as hydroelectric applications or ice bank storage.

IV. Buildings -General/Other	
a.	Identify campus 'energy hogs' and target for retrofitting to reduce energy usage.
b.	Evaluate plug loads and phantom loads in office and residential spaces and to develop a reduction strategy.
c.	Evaluate applications for variable-frequency drives (VFDs), which control the rotational speed of an alternating current electric motor by controlling the frequency of the electrical power supplied to the motor.
d.	Perform energy audits on all buildings, prioritizing audits by current building energy usage or other economic means.
e.	Maintain and upgrade building envelopes (e.g. windows, insulation) to minimize energy consumption- focus on water and wind infiltration prevention.
f.	Engage DAS contractors to perform lighting and HVAC audits where we can use the clean energy efficiency fund (CEEF) to finance projects.
g.	Install solar water heaters with new constructions and retrofit existing buildings where possible. Solar water heaters can reduce conventional water heating needs by ~ 66%.
h.	Install geothermal heating systems with all new construction projects, and, where appropriate, renovations, if the lifetime energy savings exceeds the cost of installation. Geothermal heat pumps can reduce electricity consumption by 25-50%.

V. Buildings - HVAC	
a.	Switch to heat zoning, to address certain areas of buildings based on occupancy, equipment, or function, that require deviation from established set points.
b.	Expand the current Energy Management System (Andover) to incorporate and monitor buildings and areas that are not currently monitored.
c.	Complete the installation of submeters on all unmetered buildings and verify proper functioning.
d.	Develop a University protocol for monitoring, tracking and trending meter data, including integration with outreach efforts.
e.	Establish a building HVAC re-commissioning program.
f.	Require the use high-efficiency filters for all HVAC systems to reduce drag.
g.	Survey and install additional occupancy sensors for HVAC control.
h.	Enforce and educate the school population on the space heater guideline.
i.	Eliminate use of window AC units wherever possible. If window AC units are deemed necessary, require ENERGY STAR or better and cover during winter.

VI. Campus Lighting	
a.	Install occupancy sensors and dimmers to control lighting in areas with variable occupancy frequencies (e.g. laboratories, common areas, bathrooms, hallways).
b.	Install photosensors on lights in areas suitable for daylighting.
c.	Develop and implement a building re-lamping program to replace older florescent bulbs with the most efficient energy efficient types available.
d.	Replace all existing non-LED building exit signs to LED signs; require all new constructions to use the most energy efficient exit signs available (LED or other).
e.	Improve parking garage lighting lighting efficiency (e.g. install LED sources and occupancy-based dimming controls).
f.	Improve efficiency of campus traffic lights by switching to LED lights and linking to solar panels.
g.	Require 'full cutoff' lights for all exterior lighting to ensure maximum lighting efficiency.
h.	Use solar energy to power exterior lighting along roadways, sidewalks, parking lots, and paths (e.g. not building associated).
i.	Install motion sensors with dimming technologies to maximize safety while minimizing energy use associated with lighting campus pathways (e.g. Celeron path).

VII. Equipment	
a.	Minimize computer related energy use in office settings. Implement employee training, equipment use protocol, and energy efficient purchasing standards.
b.	Develop a purchasing policies that exceeds ENERGY STAR requirements; review all purchasing to require that ENERGY STAR or better equipment is requested wherever possible.
c.	Evaluate on-campus refrigerators, freezers and dishwashers and replace inefficient and/or older models.
d.	Develop a campus rental system/store for residence hall appliances and light bulbs. Require that students rent/purchase specific appliances from this system or demonstrate proof that their personal appliance is of equal or superior efficiency.
e.	Install vending machine misers on all equipment (e.g. soda and snack machines, food displays). Replace any open display refrigerators or freezers with closed door units. Inventory equipment and frequency of use, and consolidate to reduce overall machine numbers. Work with vendors to ensure the most efficient units possible are being utilized or install meters and bill vendors for energy use.

VIII. Laboratory-Specific Recommendations	
a.	Require energy-efficiency in laboratory design criteria when designing and/or renovating buildings (e.g. EPA's Lab 21 Environmental Performance Criteria).
b.	Implement lab water recirculation and/or closed loop cooling.
c.	Work with building managers to reduce occupied versus unoccupied hours, temperatures and standardizing temperatures, and air change rates. Conduct a complete energy audit for all campus buildings to identify unanticipated sources of high energy use.
d.	Replace constant volume hoods on campus with the most efficient available hood type (e.g. variable air volume hood) for the intended purpose.
e.	Evaluate departmental fume hood need and use; temporarily turn off fume hoods that are not currently in use.
f.	Require all campus computer lab managers and supervisors attend energy conservation training. Install sleep software on all computer lab equipment and require that equipment is shut down when not in use. Initiate a 'spot check' program to ensure compliance. Limit computer lab hours of operation.
g.	Maximize efficiency of laboratory airflow. Install Usage Based Controls (UBC) (which modulate hood flows based on the presence or absence of a fume hood operator), Phoenix controls, or a comparable option, on all campus fume hoods.
h.	Develop and implement fume hood 'responsible use' policy that includes mandatory training and revocation of use rights if hoods are left open.

IX. Renewable Energies - Research, Generation, Use & Campus Demonstration Projects	
a.	Develop a renewable energy master plan for the main and depot campuses. Identify target locations for renewable energy expansion/use, including high visibility pilot projects.
b.	Implement wind demonstration projects; consider private and public partnerships to help defray costs.
c.	Expand on-campus biodiesel production and use. Identify additional partners.
d.	Install geothermal demonstration projects; require geothermal feasibility evaluation in all new construction projects.
e.	Incorporate solar PVs and solar thermal into building designs. Retrofit buildings wherever possible.
f.	Identify a fuel cell industry partner to develop a fuel cell demonstration project on either the main or depot campus.
g.	Utilize solar lighting for small uplighting projects, wherever possible.
h.	Reclaim hydraulic energy off of the wastewater plant discharge using hydroturbines.
i.	Capture gases associated with the wastewater treatment facility for reuse.
j.	Develop a campus nuclear reactor. Replace the cogeneration facility when its lifetime is exceeded with nuclear power.
k.	Capture landfill gases for reuse.

X. Behavioral & Education Opportunities	
a.	Implement an energy conservation education campaign for students, faculty and staff.
b.	Place electronic displays of building energy usage in highly trafficked campus buildings and in all residence halls. Integrate with energy conservation outreach efforts.
c.	Provide incentives/recognize individuals who report energy and/or water conservation related problems.
e.	Develop a department/building monitor program to identify opportunities to increase energy efficiency and conservation.
f.	Develop a student eco-rep program to monitor and report energy and water use issues in residence halls.
g.	Collaborate with First Year Programs to expand the number of 1-credit sustainability and energy conservation based courses available to students.
h.	Encourage and provide support (e.g. monetary, advisor) to senior design projects or Honors theses that increase campus energy efficiency and/or conservation.
i.	Implement housing based educational/demonstration opportunities for alternative energy (e.g. EcoHouse).
j.	Conduct more routine energy conservation challenges within the residence halls. Provide campus environmental groups monetary incentives for participation if they can demonstrate that their assistance contributed to energy reductions.
k.	Increase the number of in-residence hall education opportunities and projects. Expand the number and type of sustainability and energy conservation training options available to hall directors and community assistants.
l.	Develop a green job training program and integrate with renewable energy and energy efficiency efforts.
m.	Provide incentives for faculty to incorporate energy efficiency/conservation exercises into their courses.

SCORE (1-4):

SCORE (1-4):

SCORE (1-4):

SCORE (1-4):

SCORE (1-4):

SCORE (1-4):

SCORE (1-4):

SCORE (1-4):

SCORE (1-4):

SCORE (1-4):