ENERGY EFFICIENCY:

A Key Component of Environmental Sustainability Efforts and a Source of Substantial Cost Savings for FCGU

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Are we sustainable?

How do we know?

Recognition of the need for metrics

Recognition that similar efforts are now ongoing in commercial and industrial enterprises and at other academic venues world-wide

This IS a big deal for FGCU
Work of the ESC begun in 2010 -2011 AY:

Sub-committee: Komisar (chair), Baughman, Hehl, Benson, Johnson, Davis, Crawford, Savarese et al.

- What is our current energy usage on campus? (Benchmarking)
  - How does it compare with other buildings, schools?
  - Can we identify areas / buildings / practices where we can make improvements?
- And then what to do? How to dig deeper? (Energy Auditing)
  - Can we save $$$$$?
  - Will this improve our Green-House Gas footprint?
  - Will this have an impact on STARS Rankings, other Green Campus Rankings? Will this enhance our reputation? Is there significant PR value, recruitment and retention value, and donation/grant/award value?
  - Can we integrate this into our teaching, research and educational mission?
First steps:

◦ Targeted Whitaker Hall as test case
  • One of the original campus buildings
    ▪ Lab building, so high energy use and potential for savings
  ◦ Contacted local professional Engineering Firm
    ▪ Held Preliminary discussions
    ▪ Asked for a proposal to do an energy audit for Whitaker Hall and forwarded proposal to Admin.
    ▪ Admin. rejected proposal as too costly (over 10K) and not a top priority in tough budgetary climate
Subsequent Actions

- Alternative guidance sought for energy auditing of FGCU campus (Komisar, 2011 -2012)
- **Certified Energy Manager contacted** (Komisar, 2012 – 2013)
  - Contact is an Energy Audit (EA) expert, Energy Efficiency (EE) engineer, Renewable Energy (EA) analyst with expertise in building science, controls, and working in academic environments.
- CEM meets with key ESC and key Physical Plant personnel (Hehl, Komisar 2013 – 2014)
- CEM works with Physical Plant to benchmark and perform a level 1 energy audit on Whitaker
- CEM presents findings to ESC
- CEM benchmarks several campus buildings (2014-2015)
## Level 1 Energy Audit - WHITAKER HALL

### RECOMMENDED ENERGY EFFICIENCY MEASURES

<table>
<thead>
<tr>
<th>ENERGY RETROFIT</th>
<th>DESCRIPTION</th>
<th>SAVINGS</th>
<th>Installed</th>
<th>Simple</th>
<th>ROI</th>
<th>PB</th>
<th>% SAVINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> LED Lighting</td>
<td>Replace fixtures and lamps with LED and other lighting. 33 KW reduction (33,000 wattage). Use daylighting, de-lamping, and occupancy or photo sensors.</td>
<td>123,750</td>
<td>$12,897</td>
<td>$0</td>
<td>12,897</td>
<td>$180,000</td>
<td>13.96</td>
</tr>
<tr>
<td><strong>2</strong> Plug Load Management</td>
<td>Complete level 2 inventory of all stand-alone equipment, measure usage with kWh meters (samples), turn off unused equipment, remove inefficient units, establish usage and management protocols. Up to 50 KW reduction.</td>
<td>75,000</td>
<td>$5,705</td>
<td>$0</td>
<td>5,705</td>
<td>$5,000</td>
<td>0.88</td>
</tr>
<tr>
<td><strong>3</strong> Limit Air Changes</td>
<td>Reduce continuous exhaust (at least 2 hoods), prepare as-builds of all separate exhaust systems, create additional make-up air vents (pilot hood isolation strategies), create air locks for primary doors.</td>
<td>35,000</td>
<td>$2,662</td>
<td>25,000</td>
<td>$1,071</td>
<td>3,734</td>
<td>$16,000</td>
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<tr>
<td><strong>4</strong> HVAC Recommissioning</td>
<td>RCx of Whitaker HVAC systems should be engineered and tests completed before and after. Budget for retrofit to original factory performance.</td>
<td>110,000</td>
<td>$8,368</td>
<td>65,000</td>
<td>$2,785</td>
<td>11,153</td>
<td>$20,000</td>
</tr>
<tr>
<td><strong>5</strong> EMS/Johnson System Operations &amp; Controls Improvements</td>
<td>Explore energy management options for increasing temperature set points during varying occupancy. Common areas can maintain higher temps, for example. Reheat coils can be cycled for demand limiting.</td>
<td>76,000</td>
<td>$5,781</td>
<td>80,000</td>
<td>$3,428</td>
<td>9,209</td>
<td>$4,500</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>419,750</td>
<td>$35,414</td>
<td>170,000</td>
<td>$7,285</td>
<td>42,698</td>
<td>$225,500</td>
</tr>
<tr>
<td><strong>% SAVINGS</strong></td>
<td></td>
<td>31%</td>
<td>27%</td>
<td>27%</td>
<td></td>
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Here is some idea of the Potential: What Benchmarking Data from this one audit to date suggest:

FGCU’s annual energy bill (academics and housing) is about $3.5 million. Benchmarking, energy audits, and expanded use of building automations systems will provide a blueprint for reducing this by $1 million annually.

Cut energy use in academic buildings by 25% – save $600,000 per year.

In a similar vein, but a separate discussion with Housing, potential to cut energy use in residence halls by 30% – save $400,000 per year.
**Benchmarking FGCU Buildings**

The laboratory buildings – Whitaker, Holmes, and AB7 – are excellent targets for finding energy savings.

*Data courtesy of Energy-General, Inc.*
Benchmarking FGCU Buildings

Total Energy (MBTU)

- Lutgert
- Reed
- Griffin
- AB7
- Whitaker
- Holmes
- Average
- SE USA

Chilled Water
Electricity
We are pretty good already…but could be a whole lot better

“Florida Gulf Coast University is a regional showcase for energy efficiency and clean energy, and is developing a national – possibly international – reputation as well. FGCU has the lowest energy costs per ft² and highest energy efficiencies of the Florida Universities.* Energy Efficiency projects like the chiller plant ice storage, lighting, energy recovery ventilators, variable frequency motor drives, and energy controls are currently saving FGCU more than $1 million per year. Sample benchmarking shows overall campus building efficiency can be increased by 30% or more. (*FSUS 2014).”

From CEM’s report (© Energy-General Inc., 2015)
Recommendations of the ESC

- Energy Efficiency is a must in our Sustainability Efforts
  - Economic Impacts
    - Return on Investment is quite good
    - Payback period is relatively short
    - $$$ savings may be significant
  - Environmental Impacts:
    - GHG footprint reduction, STARS, external reputation
  - Social and Community Impacts:
    - Enhanced funding opportunities, branding and image, recruiting students, engaging the SW FL community, tie-ins with ETI…
    - Opportunity to engage students in the process and educate
  - a Triple Bottom Line!
Recommendations, continued:

- **Benchmark** all FGCU buildings
  - on and off-campus sites
    - (Housing and Foundation properties are a separate initiative)
- **Perform deeper energy audits** on those buildings where savings potential are greatest (~ 20 buildings)
- **Meter and sub-meter**
  (new buildings and retrofits)
Recommendation, continued

- Physical Plant leads on this initiative
  - Provide them seed funding to cover benchmarking and auditing
    - Physical Plant uses current Johnson Controls, FPL and their own expertise to coordinate data management.

- $EED, \$SAVE, RE–INVE$T
  - Cutting edge idea: a Green Revolving Fund
    - 30%+ Energy efficiency savings can be re-invested continuously
      - No additional FGCU monies after starting this kind of process
      - Self–sustaining
Recommendations, continued

- In addition, seriously consider:
  - Potential with our current footprint to add 4 MW of new alternative energy on already developed campus land:
    - solar panels on surface parking lots and garages
    - solar hot water retrofits
    - Solar retrofits on roofing
    - Solar everywhere we can
In other words:

- **Empower Physical Plant to Benchmark and Audit**
  - List possible energy efficiency projects that each audit identifies
    - calculate kWh and chilled water savings.
    - Estimate costs, simple paybacks, and ROI.
  - Integrate the results of the benchmarking and energy audits into a building automations process
    - The proposed 20 energy audits in aggregate will become a significant part of the FGCU energy master plan for 2015-2025.
- Be the Leader, Beacon, Example for our students and our SW Florida Community
- Ask ourselves: Isn’t this who we are?