Case Study: University of Virginia: Campbell Hall

UNIVERSITY OF VIRGINIA: CAMPBELL HALL

SECTOR TYPE

Secondary Education/University

City/State Location

Charlottesville, Virginia

PROJECT SIZE

140,000 Square Feet

FINANCIAL OVERVIEW

Project Cost $1.2 Million

Project Location

110 Bayly Dr, Charlottesville, VA 22903

Produced By: BigFoot Reduction, Inc., 2022

BACKGROUND

In 2011, Campbell Hall completed a significant chiller plant optimization process. Afterwards, various energy efficiency projects were identified for the building thanks to encouragement from the Architecture School. All of the following upgrades are projected to reduce energy consumption by 35% and save $82,000 in annual utility costs, a 17% reduction.

Built in the 1960s, Campbell Hall has been home to UVA's School of Architecture for nearly 50 years. The most recent renovation came in 2008 with an addition designed by the Architecture faculty. This 2008 renovation introduced new classroom space and rooms designed specifically for student review, presentations, along with storm water and architectural features that truly reflect the use of the building.

SOLUTIONS

The initial chiller plant optimization included a controls and equipment upgrade that will continue to reduce the energy consumption of all of the buildings it serves for years to come. In subsequent Campbell Hall upgrades, working together with the building occupants ameliorated the task of identifying and implementing energy conservation measures (ECMs).

As with any old building, the first defined task was to improve the control system. A controls upgrade, in 2011, converted many of the circa 1969 pneumatic controls to modern and more energy efficient electronic ones. A lighting retrofit accompanied this controls upgrade about a year later, replacing 2,579 – or 81% – of the 3,192 bulbs.

This retrofit included the installation of:

1,973 fluorescent bulbs

554 LED bulbs

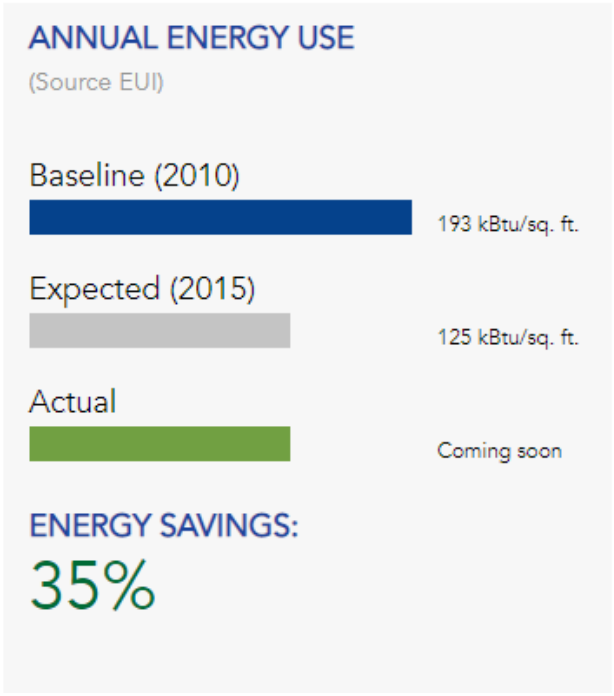
42 HID bulbs

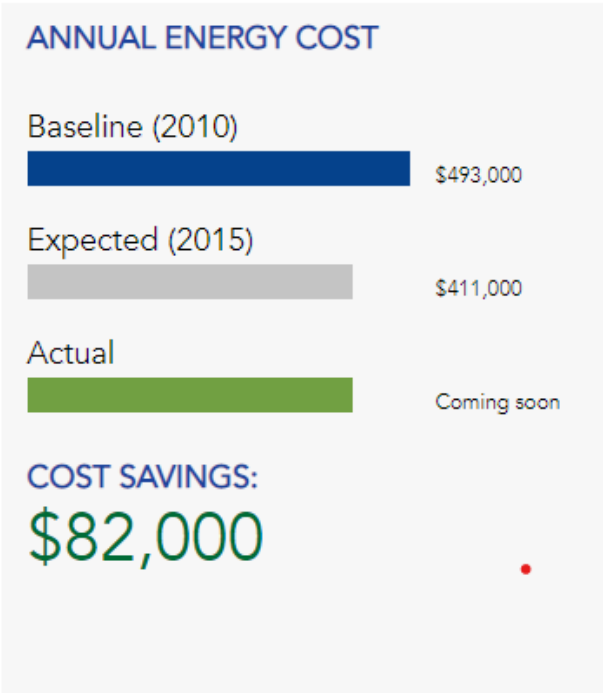
RESULTS

As a result, peak lighting wattage in the building has been reduced from 131.4 kW to 83.3 kW – a 37% improvement expected to save 244,000 kWh and 139 metric tons of greenhouse gas emissions annually. Expected future work includes enhanced lighting control and further HVAC scheduling and control.

OTHER BENEFITED OUTCOMES

With these energy reductions, the University will consider the feasibility of an ENERGY STAR® prerequisite rating for LEED® EBO&M.





Source: DOE University of Virginia: Campbell Hall | Better Buildings Initiative (energy.gov)

AFTER THE FACT ANALYSIS BY BIGFOOT REDUCTION, INC.

There are a few items here one must consider, that are not presented in this report per the DOE and they are,

- Logistics
- Timeline
- Cost Benefit Analysis
- Break Even Point
- ROI
- Effective Use of Capital

Logistics

Occupied facilities present a unique challenge, especially during peak seasons, such as Fall Semester, Spring Semester and Summer Terms A/B/C respectively. As such, facilities are limited to what they can do and when they can do it. Semester timing should be considered when planning this type of project.

Timeline

The timeline for the retrofit was spread out over 2011 and 2012. First with sensor upgrade controls and then with lighting fixture upgrades to LED. Things a client should consider with timeline,

1. Is there a permit needed?
2. How long is the permitting process?
3. How long is the inspection process?
4. Lead time on materials?
5. Is there a requirement for an electrical engineer?
6. Is there a requirement for a photometrics?
7. Subcontractor availability?
8. Parking?
9. Material storage?
10. Delivery and receiving of personnel and materials?

Cost Benefit Analysis

The saying is, "If I had $1 to spend, where would I spend it?" The dollar is fought over by many departments and needs, and the order of merit is typically, on the scale of critical versus urgent versus important. Looking at the financials of this case, we can determine the following cost benefit analysis.

Project Cost - $1.2MM

Energy Savings - $82,000/Year

Breakeven Year – 17

Positive Return Starting Year – Year 18

Opportunity Cost on $1.2MM, if it was invested in the following funds over the same period,

- State of Virginia Money Market Fund used for the VRS (Virginia Retirement System)
    - 10-yr yield from 2010-2020
        - .72%
- State of Virginia Stable Fund used for the VRS (Virginia Retirement System)
    - 10-yr yield from 2010-2020
        - 1.95%
- State of Virginia Bond Fund used for the VRS (Virginia Retirement System)
    - 10-yr yield from 2010-2020
        - 3.07%

- State of Virginia 2025 Target Date Retirement Fund used for the VRS (Virginia Retirement System)
    - 10-yr yield from 2010-2020
        - 8.61%

Source: [Home | Virginia Retirement System (varetire.org)]

Actual Rate of Return Breakdown by Year for Project (Project was not completed in first year).

Cost of Project	Utility Savings Per Year	Year Number	% Return
$1,400,000	$0	0	0
0	$82,000	1	-94%
0	$82,000	2	-88%
0	$82,000	3	-82%
0	$82,000	4	-76%
0	$82,000	5	-70%
0	$82,000	6	-64%
0	$82,000	7	-58%
0	$82,000	8	-52%
0	$82,000	9	-46%
0	$82,000	10	-40%
0	$82,000	11	-36%
0	$82,000	12	-30%
0	$82,000	13	-24%
0	$82,000	14	-18%
0	$82,000	15	-12%
0	$82,000	16	-6%
0	$82,000	17	0%

Comparing to the 2025 target date fund, using an assumed average 8.61% yield/year using $1.2MM, this University would have produced an additional $103,320/year, which is more than the $82,000 of savings. At the end of 15 years, the client would have had $1,549,800 in an asset, instead of breaking even on the $1.2MM cost. The opportunity cost here was approx. $2,749,800.

The takeaway from this illustration is that “more money in” doesn’t mean more savings, so a good auditor should have a cost benefit analysis and a cost of waiting analysis, along with a breakeven point.

A more effective use of capital would have been to use an incentive offset for a net zero cash outlay, and an immediate return with a break-even year of 3 years. At that rate, the ROR from year 0-17 would have been, $1,394,000 or 99.57% ROR.

Does this look like a challenge you've faced? Don't worry, BigFoot can help!

We specialize in cash flow design, along with the retrofit, that is presented ahead of the project to prevent projects like this from happening.

Call 813-810-2901 for details now or email dball@bigfootreduction.com.

Dave Ball

CEO, BigFoot Reduction, Inc.

501 E. Kennedy Blvd. Suite 1040

Tampa, FL. 33602

www.bigfootreduction.com

Sources:

DOE University of Virginia: Campbell Hall | Better Buildings Initiative (energy.gov)

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