

COLLEGE OF OPTOMETRY & EXECUTIVE ORDER 88

April 2015



STATE UNIVERSITY OF NEW YORK
COLLEGE OF OPTOMETRY

EXECUTIVE ORDER 88

Background

Build Smart NY is New York Governor Andrew M. Cuomo's program for aggressively pursuing energy efficiency in government buildings while advancing economic growth, environmental protection, and energy security in New York State.

The centerpiece of Build Smart NY is Executive Order 88 ("Executive Order" or "EO 88") issued by Governor Cuomo on December 28, 2012. The Executive Order mandated a 20 percent improvement in the energy efficiency performance of New York State government buildings by April 2020.

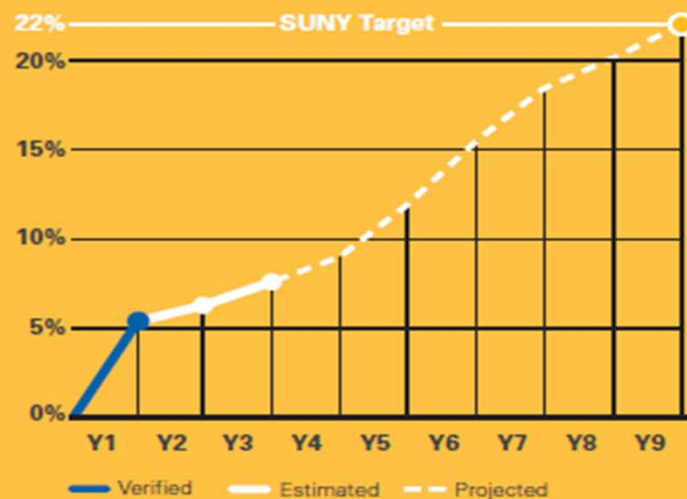
Source Energy Use Intensity (EUI), a leading industry indicator for measuring all energy use on a square foot basis, is the metric that will be used to assess State buildings' collective energy performance and to monitor the progress of various agency portfolios toward the Governor's 20 percent target.

EO 88 Reduction Goal



State University of New York

Cumulative Source EUI Reduction



Year 1 Performance Summary

-5.4%
Source EUI
Change

Energy Use Change **-3.8%**

Square Footage Change **+2.6%**

Notable Performers
Source EUI Reduction

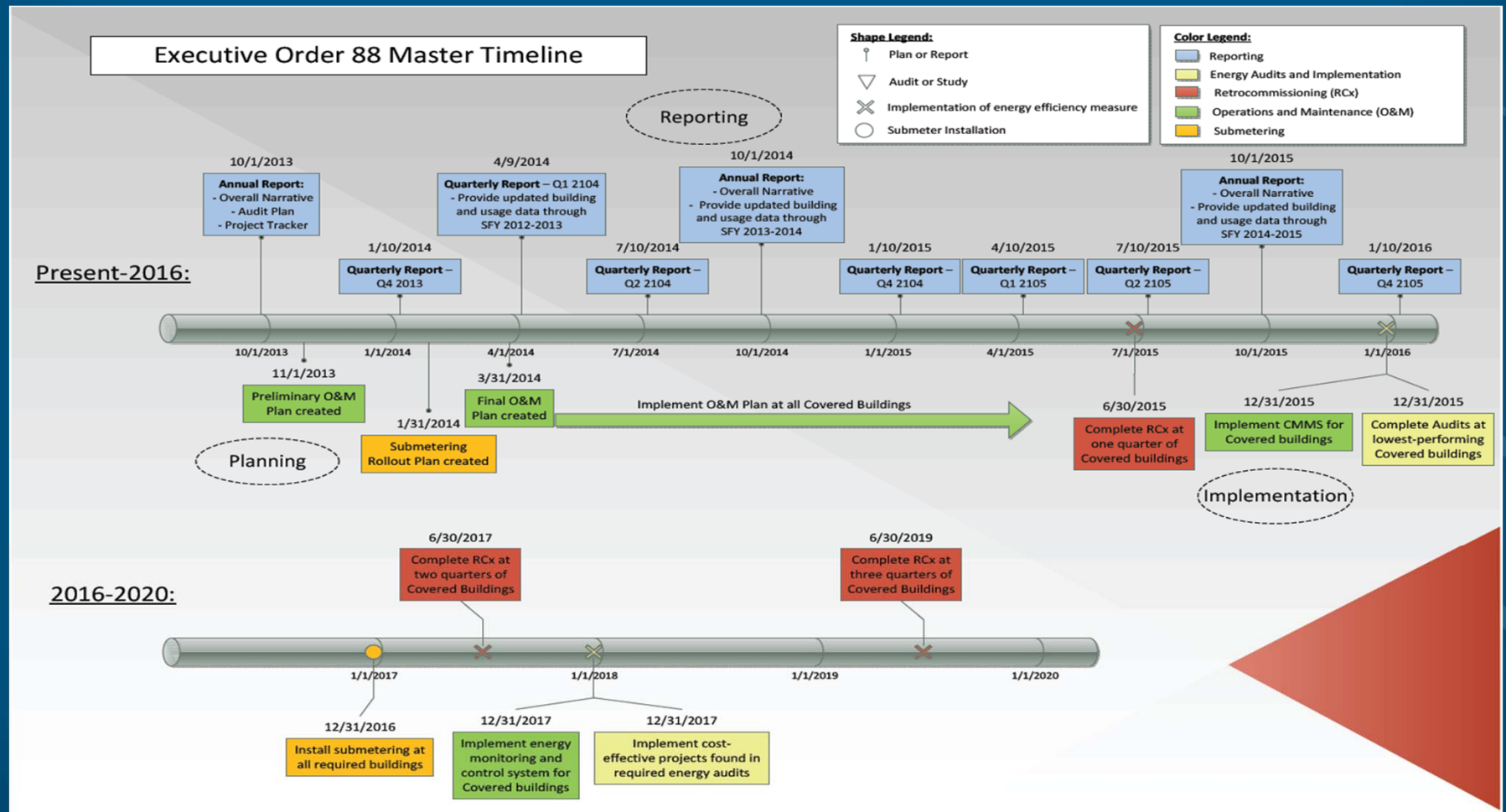
9.4%
University at
Buffalo

11%
Binghamton
University

5.6%
University at
Albany

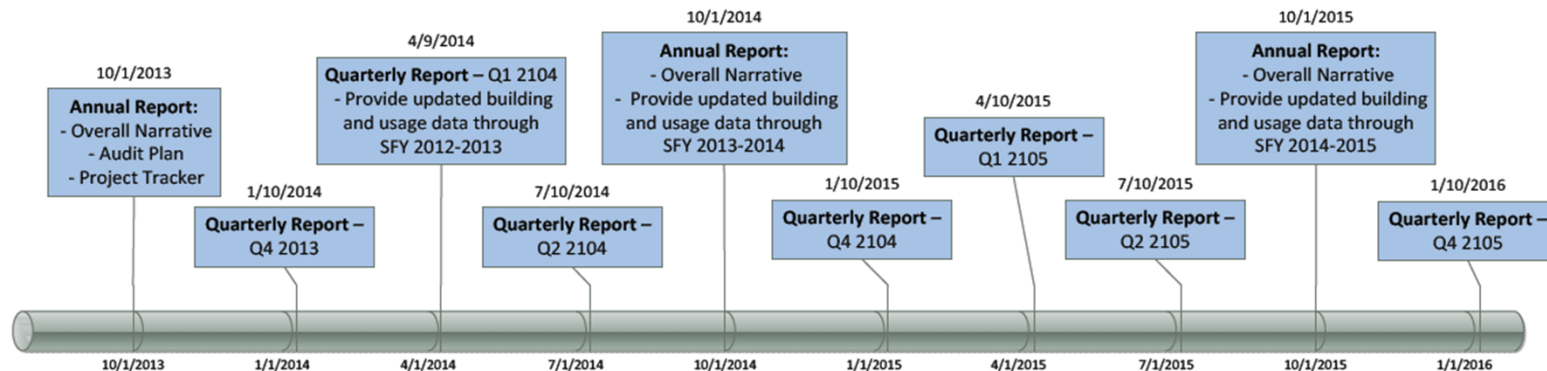
7.8%
Purchase
College

EO 88 Timeline



EO 88 Reporting Schedule

REPORTING TIMELINE THROUGH Q1 2016:



REPORTING & BENCHMARKING OUTLINE:

1. Why is reporting required?
2. Which State Entities and buildings are subject to reporting requirements?
3. What are the reporting deliverables?
4. When is reporting due?
5. How will buildings be benchmarked?

EO 88 Reporting Requirements

REPORTING & BENCHMARKING OUTLINE:

- **Why is reporting required?**
 - Reporting is essential in order to assess progress towards the energy efficiency targets.
- **Which State Entities and buildings are subject to reporting requirements?**
 - Any State Entity with at least one building with a gross floor area greater than 20,000 square feet
- **What are the reporting deliverables?**
 - State Entities shall submit Annual Reports no later than October 1st of each year.
 - State Entities shall submit Quarterly Reports to the Central Management and Implementation Team (CMIT) which illustrate progress towards savings targets.
- **How will buildings be benchmarked?**
 - Benchmarking will be performed at the campus level, for master-metered campuses, and at the building level for individually-metered buildings.
- **When is reporting due?**
 - Next slides will breakdown the reporting requirements

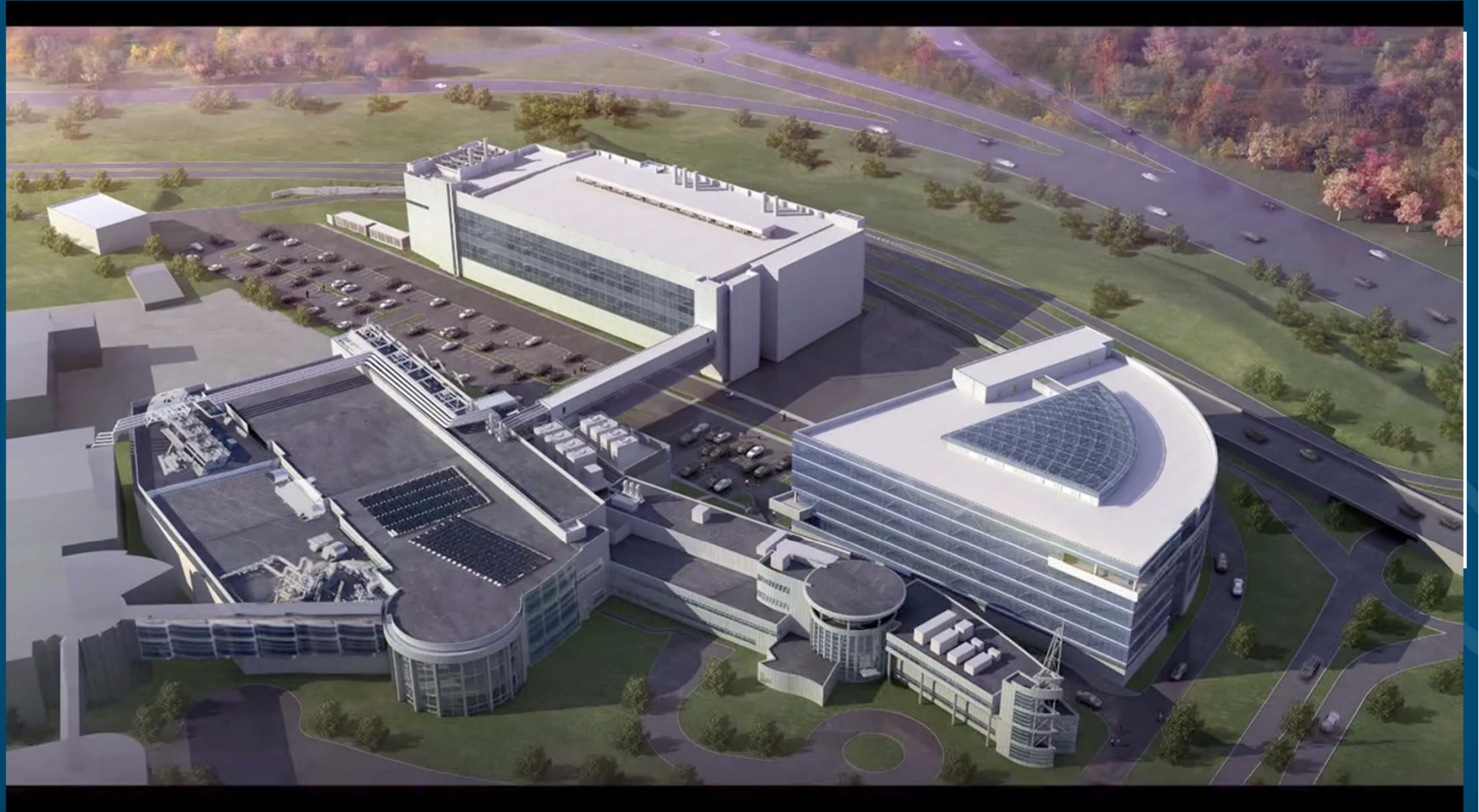
College of Optometry EO 88 Summary

Executive Order 88 requires the College to report on our progress in 4 key areas:

1. Progress in sub metering building
2. ASHRAE Level 2 Energy Audit
3. Retro commissioning the building systems.
4. Tracking of all projects related to achieving EO88 Goals.

Energy Usage: This will be done automatically with energy usage data reported to the NY Energy Manager.

NY Energy Manager



EO 88 Reporting schedule

October 1, 2013 Annual Report:

Finalize SFY 2010-2011 baseline.

Energy Auditing Plan for Covered buildings.

List all energy efficiency projects planned, underway, or completed since SFY 2010-2011.

November 1, 2013:

Preliminary Operations & Maintenance plan outlining current existing building operations and maintenance practices as they relate to energy efficiency, and plans for improvement of these practices.

EO 88 Reporting Schedule

February 1, 2014:

Sub-metering Rollout Plan Inventory of all buildings (by energy type) and plan for meeting sub-metering mandate.

March 31, 2014:

Provide detailed building utility data through SFY 2012-2013.

March 31, 2014:

Final Operations and Maintenance Plan. Detailed O&M plan to address maintenance schedules.

EO 88 Reporting Schedule

October 1, 2014 Annual Report :

Submit Covered building energy consumption and costs for SFY 2013-2014.

2014 Energy Audit Plan.

2014 Project Tracker.

June 30, 2015:

Deadline to Complete Retro-Commissioning studies and implementation for one-quarter (25%) of building

October 1, 2015 Annual Report :

Submit Covered building energy consumption and costs for SFY 2014-2015.

2015 Energy Audit Plan.

2015 Project Tracker.

2015 Sub Metering Plan.

EO 88 Reporting Schedule

December 31, 2015 :	Completion of ASHRAE II Audits of lowest performing state buildings.
December 31, 2015 :	Implementation of Operations and Maintenance Activities . Deploy a new or updated CMMS (Computerized Maintenance Management System) with energy related preventative maintenance protocols in place.
October 1, 2016 Annual Report :	Submit covered building energy consumption and costs for SFY 2015-2016. 2016 Energy Audit Plan. 2016 Project Tracker. 2016 Sub Meter Plan.

EO 88 Reporting Schedule

December 31, 2016:

Deadline for building larger than 100,000 NSF to be sub metered for all fuels.

June 30, 2017:

Deadline to complete retro-commissioning studies and implementation for one-half (50%) of building.

October 1, 2017 Annual Report :

Submit building energy consumption and costs for SFY 2016-2017.

2017 Project Tracker.

2017 Retro-Commissioning Plan.

December 31, 2017:

State entities shall be required to implement energy monitoring and control system.

EO 88 Reporting Schedule

October 1, 2018 Annual Report :	Submit building energy consumption and costs for SFY 2017-2018. 2018 Project Tracker. 2017 Retro-Commissioning Plan.
June 30, 2019:	Deadline to complete Retro-Commissioning studies and implementation for three-quarters (75%) of building
October 1, 2019 Annual Report :	Submit building energy consumption and costs for SFY 2018-2019. 2019 Project Tracker. 2019 Retro-Commissioning Plan.
December 31, 2019:	All state entities shall have completed at least one Retro-Commissioning Study

EO 88 Optometry O&M plan

The focus of The College of Optometry Operation & Maintenance plan (O&M plan) is to reduce energy use while having a minimal impact to the students, staff and patients. Some of these changes will be at no cost while others (noted with *) will have minimal cost for implementation. Some of the highlights are:

- Establish a building-wide summer and winter set-point for HVAC.
- Adjust the start time and stop time scheduling, to reduce overall running hours of all HVAC systems operation.
- Develop a program of community awareness to save energy by turning off unneeded electrical power such as: lights, computers, etc.
- Retro-commission the BRF HVAC systems so that only animal holding rooms are supplied with conditioned air 24/7 *.
- Investigate purchasing new energy efficient reduced wattage LED bulbs for the building *.
- Investigate the installation of occupancy sensors in offices, rooms and spaces where applicable *.

BuildSmart N.Y. Reports

In August 2013, the BuildSmart NY team completed the first Statewide assessment of energy use at New York State government buildings.

Baseline was established as SFY 2011, energy use was calculated for each state entity.

The College of Optometry is only mentioned once in this report.



BUILD SMART NY | Benchmarking Report 2013

Appendix B: Data tables

STATE UNIVERSITY OF NEW YORK	SQFT	TOTAL KBTU USAGE - SITE	TOTAL KBTU USAGE - SOURCE	TOTAL SITE EUI (KBTU/SQFT)	TOTAL SOURCE EUI (KBTU/SQFT)	AGENCY AVERAGE SOURCE EUI (KBTU/SQFT)	BUILDING EUI DIFFERENCE FROM AVERAGE
SUNY - OPTOMETRY	298,000	26,761,989	66,666,867	89.81	223.71	258.21	13%

Optometry Baseline EUI

BUILD SMART NY | Benchmarking Report 2013

Appendix B: Data tables

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SUNY - OPTOMETRY	298,000	26,761,989	66,666,867	89.81	223.71	258.21	13%



**Building
Area
298,000
SQFT**

Optometry Baseline EUI

STATE UNIVERSITY OF NEW YORK	SQFT	TOTAL KBTU USAGE - SITE	TOTAL KBTU USAGE - SOURCE	TOTAL SITE EUI (KBTU/SQFT)	TOTAL SOURCE EUI (KBTU/SQFT)	AGENCY AVERAGE SOURCE EUI (KBTU/SQFT)	BUILDING EUI DIFFERENCE FROM AVERAGE
SUNY - OPTOMETRY	298,000	26,761,989	66,666,867	89.81	223.71	258.21	13%

Site KBTU - is the total of energy used, expressed in thousands of BTU (British Thermal Units). This includes both electrical and steam.

26,761,989 KBTU represents the total energy used by the College from April 1, 2010 thru March 31, 2011 (as measured by the Consolidated Edison utility meters).

British Thermal Unit

1 BTU (British Thermal Unit) is the amount of energy required to raise the temperature of 1LB of water 1 °F.

For example a 16oz bottle of water weighs just about 1 LB and would require 1 BTU (British Thermal Unit) for each degree of temperature change.



Optometry Baseline EUI

STATE UNIVERSITY OF NEW YORK	SQFT	TOTAL KBTU USAGE - SITE	TOTAL KBTU USAGE - SOURCE	TOTAL SITE EUI (KBTU/SQFT)	TOTAL SOURCE EUI (KBTU/SQFT)	AGENCY AVERAGE SOURCE EUI (KBTU/SQFT)	BUILDING EUI DIFFERENCE FROM AVERAGE
SUNY - OPTOMETRY	298,000	26,761,989	66,666,867	89.81	223.71	258.21	13%

Source KBTU - Traces the steam and electricity consumption of the building back to the raw fuel input, thereby accounting for any losses in generation and transmission; this enables a complete thermodynamic assessment. Source KBTU is expressed in thousands of BTU.

The 66,666,867 KBTU is the total energy need to produce the steam and electricity used by the College from April 1, 2010 thru March 31, 2011.

Optometry Baseline EUI

STATE UNIVERSITY OF NEW YORK	SQFT	TOTAL KBTU USAGE - SITE	TOTAL KBTU USAGE - SOURCE	TOTAL SITE EUI (KBTU/SQFT)	TOTAL SOURCE EUI (KBTU/SQFT)	AGENCY AVERAGE SOURCE EUI (KBTU/SQFT)	BUILDING EUI DIFFERENCE FROM AVERAGE
SUNY - OPTOMETRY	298,000	26,761,989	66,666,867	89.81	223.71	258.21	13%

Total Source EUI is the product of a simple calculation

$$\text{KBTU} / \text{SQFT} = \text{Source EUI}$$

$$66,666,867 \text{ KBTU} / 298,000 \text{ Sq.'} = 223.71 \text{ Source EUI}$$

Changes Baseline



In August 2013, the BuildSmart NY Baseline report for SFY 2011 was published. In Appendix B The College of Optometry:

Baseline Source EUI was listed as **223.71**



In January 2014 the BuildSmart NY 1st annual progress report was published. In Appendix B the College of Optometry:

Baseline Source EUI was corrected to **220.5***

Our first year source EUI was listed as **210.5**

***This correction to Baseline EUI was needed because SUNY consumption data was compiled using SUNY Fiscal year (July 1,2010- June 30,2011) instead of State Fiscal year (April1,2010-March 31, 2011)**

Second Round of Changes to Baseline EUI

In the soon to be published 2015 Build Smart Annual Report. There has been a second correction to the College of Optometry Baseline EUI and also a correction to the year 1 EUI

- New Baseline EUI (State fiscal year 2011) 202.03*
- Year 1 EUI (State fiscal year 2012) 201.84*
- Year 2 EUI (State fiscal year 2013) 202.81
- Year 3 EUI (State fiscal year 2014)

Second Round of Changes to Baseline EUI

	SUNY fiscal year (7/1/10 to 6/30/11) with Original CBECS Electric Source to Site value of 3.34	Correct with State fiscal year (4/1/10 to 3/31/11) with Original CBECS Electric Source to Site value of 3.34	Correct with State fiscal year (4/1/10 to 3/31/11) & Energy Star Source to Site value of 3.14
Electric Source EUI	180	179	164
Steam Source EUI	43	41	41
Sub Total Source EUI	223	220	205
Weather Adj. Factor -3.24	0	0	-3.24
Source EUI	223	220	203

In 2003 Commercial Buildings Energy Consumption Survey (CBECS) published:
“National Median Source Energy Use and Performance Comparisons by Building Type”.

- This survey listed the site to source ratio for electricity at **3.34KBTU**

In December of 2007 U.S Department of Energy ENERGY STAR program published:
“Performance Ratings Methodology for Incorporating Source Energy Use”.

- The reference revised the Site to Source Ratio for electricity to **3.14KBTU**

Challenges to Achieve 20% Reduction

The College of Optometry is experiencing growth in several areas:

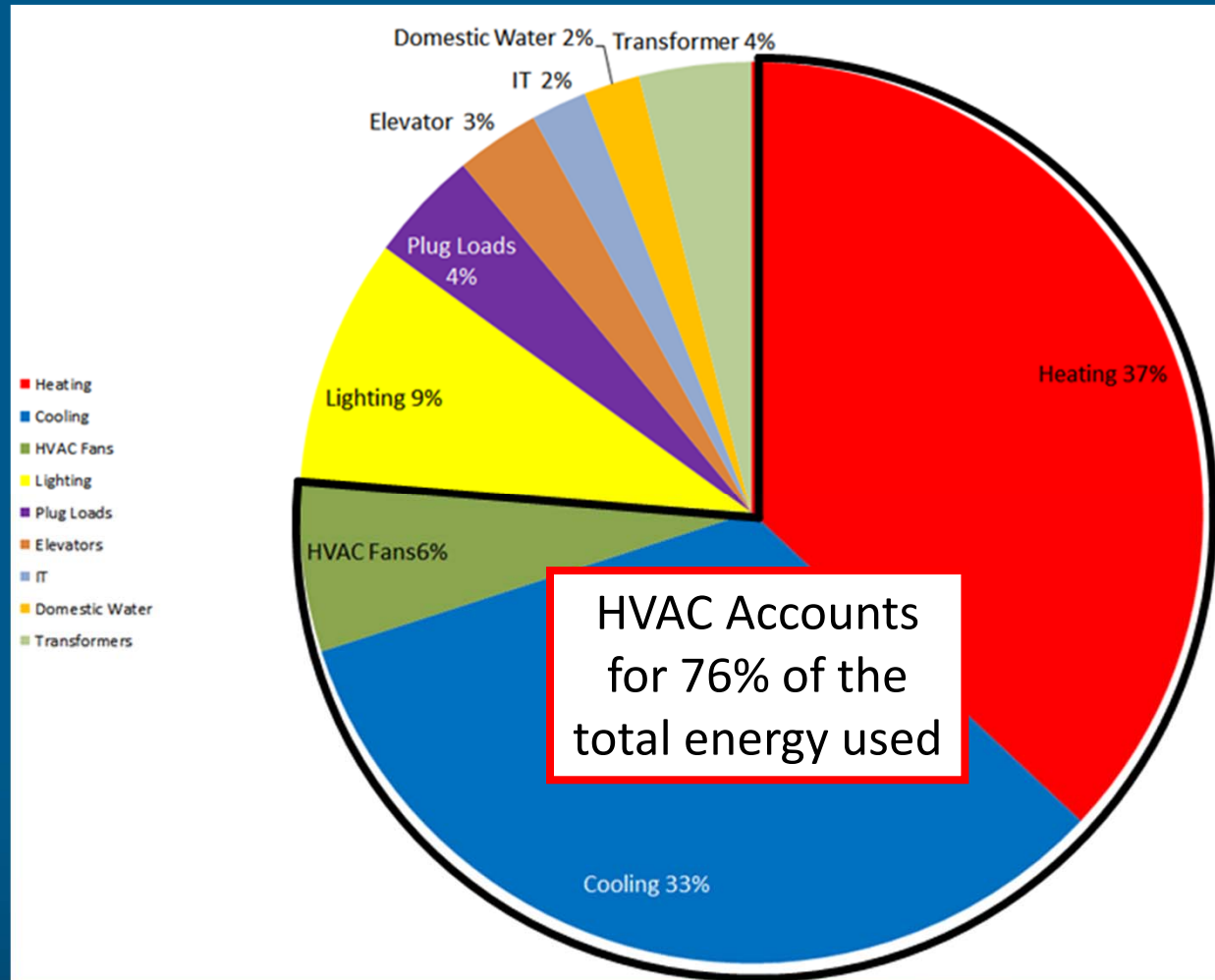
- 1) A SUNY-approved increase in student enrollment.
- 2) Expanding research programs in both laboratory and clinical settings.
- 3) The conversion of space to meet student quality of life or academic program needs.

This growth in the student body, research programs, new improved functionality of student and academic spaces has resulted in an increase in the building's HVAC capacity of a little over 9%.

- In SFY 2010-2011 the College total HVAC capacity was 922 Tons (1 Ton=12,000 BTU).
- Currently, the College total HVAC capacity is 1018 tons.

The increase in the College's HVAC capacity represents a significant percentage of the overall increase in power usage.

Optometry Estimated Energy Use Breakdown



Optometry EO 88 Requirements

1.ASHRAE Level 2 Energy Audit

2.Sub metering building

3.Retro Commissioning the Building HVAC systems.

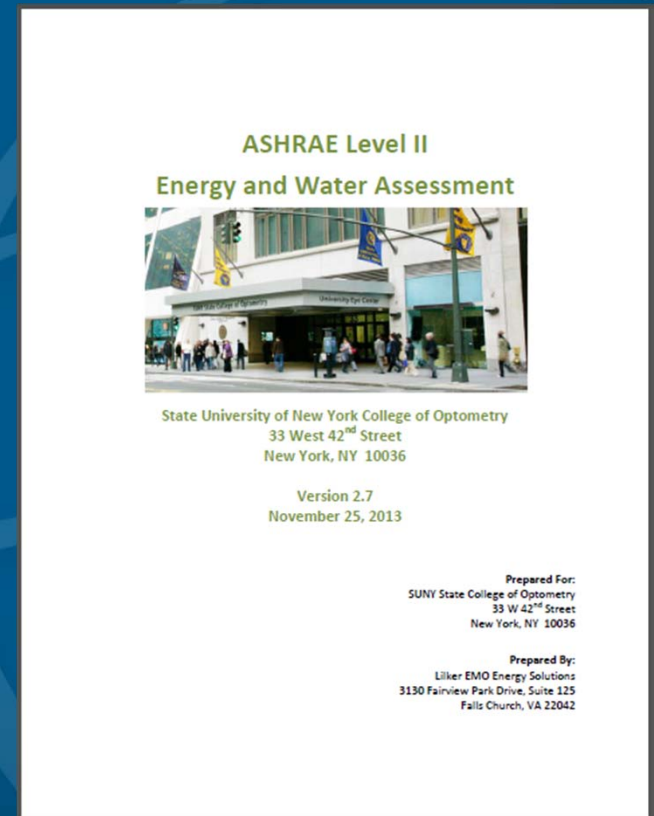
Optometry ASHRAE Level II Audit

The College was proactive and completed the ASHRAE Level II Audit over 2 years earlier than the required date.

The Audit completed in October of 2013, included a detail analyses of the building, it's systems and program use.

The Audit identified the main challenge to the College for energy use.

The Audit recommended 26 ECM (Energy Conservation Measures).



25 Energy Conservation Measures

Level I - "Low/No Cost" Measures

Measure Description	Initial Cost	Total Energy Savings (MBTU/yr.)	O&M Savings (\$/yr.)	Total Cost Savings (\$/yr.)	Payback (yrs.)	Status of Project
Level I - "Low/No Cost" Measures						
ECM 1 Condenser Water Reset	\$3,500	94	\$0	\$4,660	Immediate	DONE
ECM 2 Improve Occupied Temperature Set Points	\$2,500	1,133	\$0	\$65,506	Immediate	Executive level determination required
ECM 3 Synchronous Belts	\$17,761	306	\$0	\$15,151	0.2	DONE
ECM 4 Low Flow Showerheads	\$320	2	\$0	\$902	0.4	DONE
ECM 5 Program Computers to Hibernate	\$3,750	629	\$6,825	\$38,002	0.1	Information Technology Dept. investigating
ECM 6 Timers on Printers	\$3,945	45	\$905	\$3,160	0.6	Information Technology Dept. investigating
ECM 7 Cage Wash Hot Water from DHW Loop	\$5,200	173	\$0	\$2,255	2.3	DONE
ECM 8 Supply Air Temperature Reset	\$13,000	783		\$38,842	Immediate	Executive level determination required
ECM 9 Outdoor Lighting	\$400	1	\$7	\$69	4.9	Under Review
ECM 10 Demand Control Ventilation Schedule	\$2,500	19	\$0	\$937	1.7	Under Review
ECM 11 VFD on Domestic Water Pumps	\$6,100	52	\$0	\$2,592	1.4	Under Review
Total Low Cost/No Cost	\$58,976	3,237	\$7,737	\$172,076		

25 Energy Conservation Measures

Level II - "Capital Intensive" Measures

Measure Description	Initial Cost	Total Energy Savings (MBTU/yr.)	O&M Savings (\$/yr.)	Total Cost Savings (\$/yr.)	Payback (yrs.)	Status of Project
Level II - "Capital Intensive" Measures						
ECM 12 VSD's on Condenser Water Pumps	\$51,605	219	\$0	\$10,839	3.7	SUCF PROJECT #41056
ECM 13 Improved Water Treatment for Cooling Tower	\$77,000	151	\$9,113	\$19,152	3.7	SUCF PROJECT #41056
ECM 14 Window Solar Film	\$46,122	117	\$0	\$8,213	5	Under Review
ECM 15 Retro-Commissioning	\$134,100	830	\$0	\$56,186	1.7	Partially DONE
ECM 16 Virtualize Servers	\$53,393	365	\$21,684	\$39,764	0.9	Information Technology Dept. investigating
ECM 17 Server Management	\$17,500	60	\$2,460	\$5,430	2.7	Information Technology Dept. investigating
ECM 18 Occupancy Sensors	\$26,468	82	\$2,482	\$6,556	3.4	In Design
ECM 19 Indoor Lighting	\$59,634	551	\$3,313	\$22,712	1.4	In Testing
ECM 20 Replace Transformers	\$350,816	906	\$0	\$44,909	6.9	DONE
ECM 21 New SCU's with VFD's and Free Cooling (Air & Water)	\$4,358,160	2,348	\$0	\$116,436	36.5	Future Capitol Project
ECM 22 Replace Zone Boxes	\$185,775	91	\$0	\$8,208	22.2	Future Capitol Project
ECM 23 Perimeter Heating with VFD , Zone Controls and NSB	\$204,359	365	\$0	\$59,863	3.2	Future Capitol Project
ECM 24 Condensate Recovery (including Cage Wash)	\$45,000	27	\$0	\$9,849	4.6	DONE
ECM 25 Insulate Steam Station Piping	\$25,000	17	\$0	\$6,358	3.9	DONE
Total Capital Intensive	\$5,634,932	6,126	\$39,052	\$414,474		
ECM 26 Combined Heat and Power	\$500,000	A CHP Project Study should be undertaken to evaluate the feasibility and sizing of a possible CHP project at SUNY				

Executive Level Determination for ECM 2 & 8

ECM-2: Improve Occupied Temperature Settings

Existing Conditions:

The building temperature set points for heating and cooling are manually set between 72 and 73 degrees Fahrenheit. Cooling and heating temperature settings of 72 to 73 degrees are not optimal for energy savings while maintaining occupant comfort.

Recommendation:

Reprogram the EMS to maintain a space heating temperature of 70 degree Fahrenheit in the winter and a space cooling temperature of 75 degree Fahrenheit in the summer.

ECM-8: Supply Air Temperature Reset

Existing Conditions:

The SAC supply air temperatures are set manually by the Building Engineer based on tenant comfort levels and complaints to maintain an acceptable space temperature.

Recommendation:

Program the EMS with supply air reset to automatically adjust the supply air temperature for each SAC individually, based on the cooling requirements of the least satisfied zone.

Optometry Metering

By December 31, 2016 all campus are required to be completed with sub metering.

Currently the College of Optometry has:

- 2 electric meters Con Edison Service #1 & #2.
- 1 steam meter Con Edison.
- 3 water meters NYC DEC.
 - 2 of the water meters are for the building's potable water supply.
 - 1 water meter is a "Down Stream Meter" located on the roof at the cooling tower. This meter is used to obtain a credit for water evaporated by the cooling tower; therefore not going into the city sewer system.

Optometry Sub Metering

Currently the College has 9 sub meters:

- A sub meter to monitor AT&T electric usage.
 - AT&T has a 200 NSF foot print in the building and consumes 13,177 KWH per month. (65.9 KWH/SF)
- 3 sub meters for the elevators, (high rise, low rise and freight).
- Sub meter for the entire 16fl, the BRF and 1st floor HVAC.
- Sub meter for MDB # 1 (Main Distribution Board) Lights & Power.
- Sub meter for MDB # 2 (Main Distribution Board) Lights & Power.
- Sub meter for MDB # 3A (Main Distribution Board) HVAC loads.
- Sub meter for MDB # 3B (Main Distribution Board) HVAC loads.

When SUCF Project 41060 is completed all these meters will be on line and reporting to NY Energy Manager.

Retro-Commissioning

“Retro-commissioning is a process that seeks to improve how building equipment and systems function together. Depending on the age of the building, Retro-Commissioning can often resolve problems that occurred during design or construction, or address problems that have developed throughout the building’s life.”

Retro-commissioning activities already completed.

- Complete air balance of building 2010.
- Air balance the BRF 2013.
- Replace SAC 2 and balance 2nd floor.
- Replace SAC 1M, & 1MA .

Retro-commissioning activities planned.

- Balance of building condenser water system 2015.
- Balancing of HVAC basement, and theater.
- Balancing of SAC 1 and 1st floor.

Conclusion

Achieving the 20% energy reduction required by EO 88 will be a challenge to the College of Optometry:

- The finite space of the College.
- The College has experienced significant program growth since the end of the “Base Line year” (SFY 2011), which has increased the Colleges’ energy consumption.
- Source EUI is the relationship of Energy Use/Square Foot Basis

Program growth without increase in physical space results in a increase Source EUI.