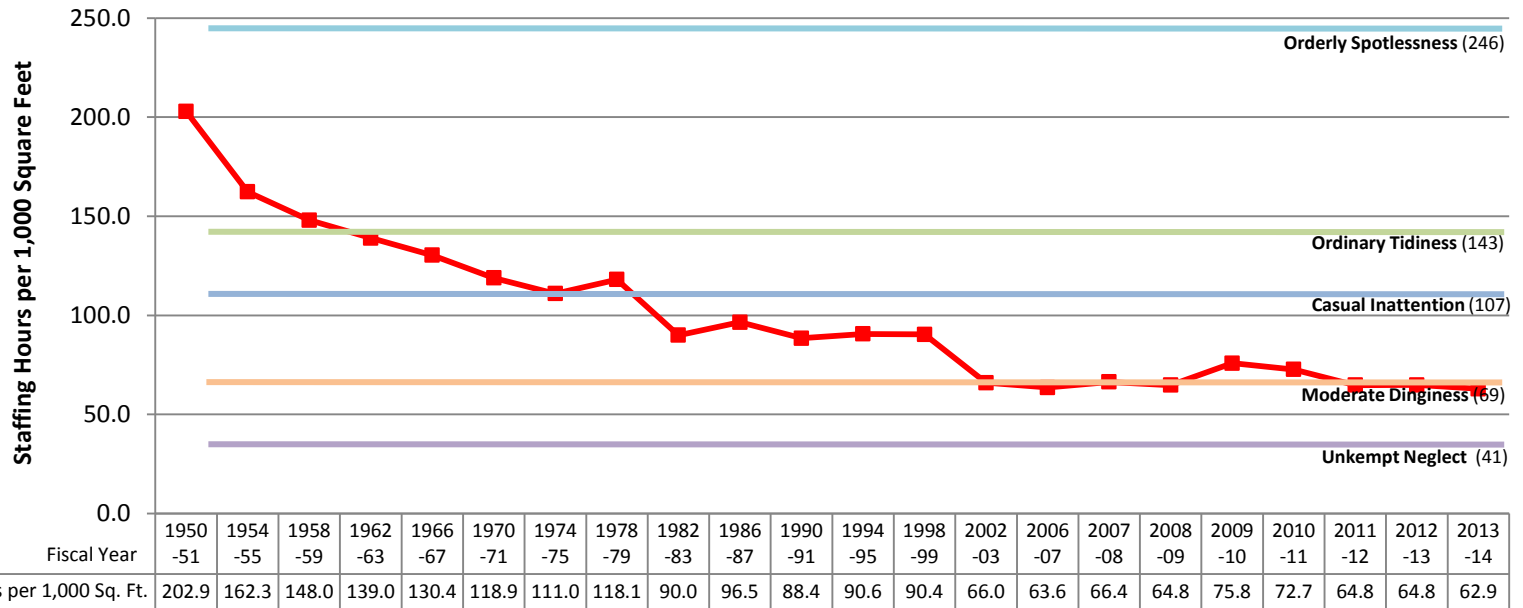
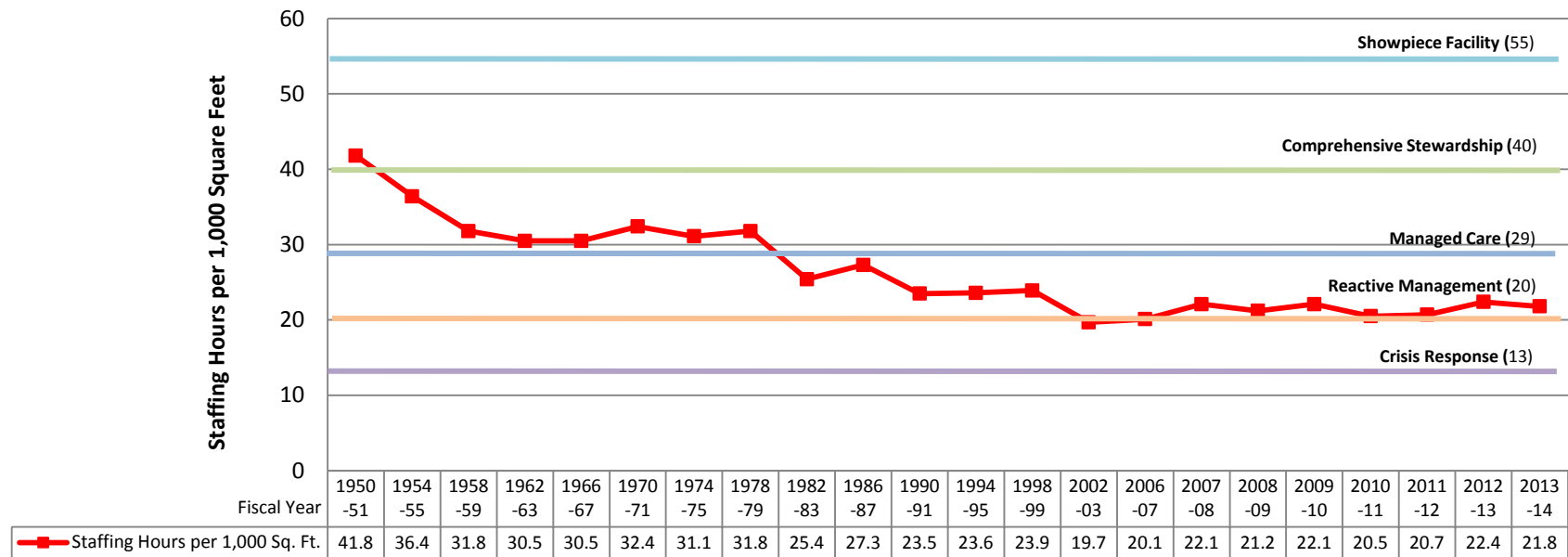


## Custodial Services Workload Analysis with Association of Higher Education Facilities Officers Standard Service Levels



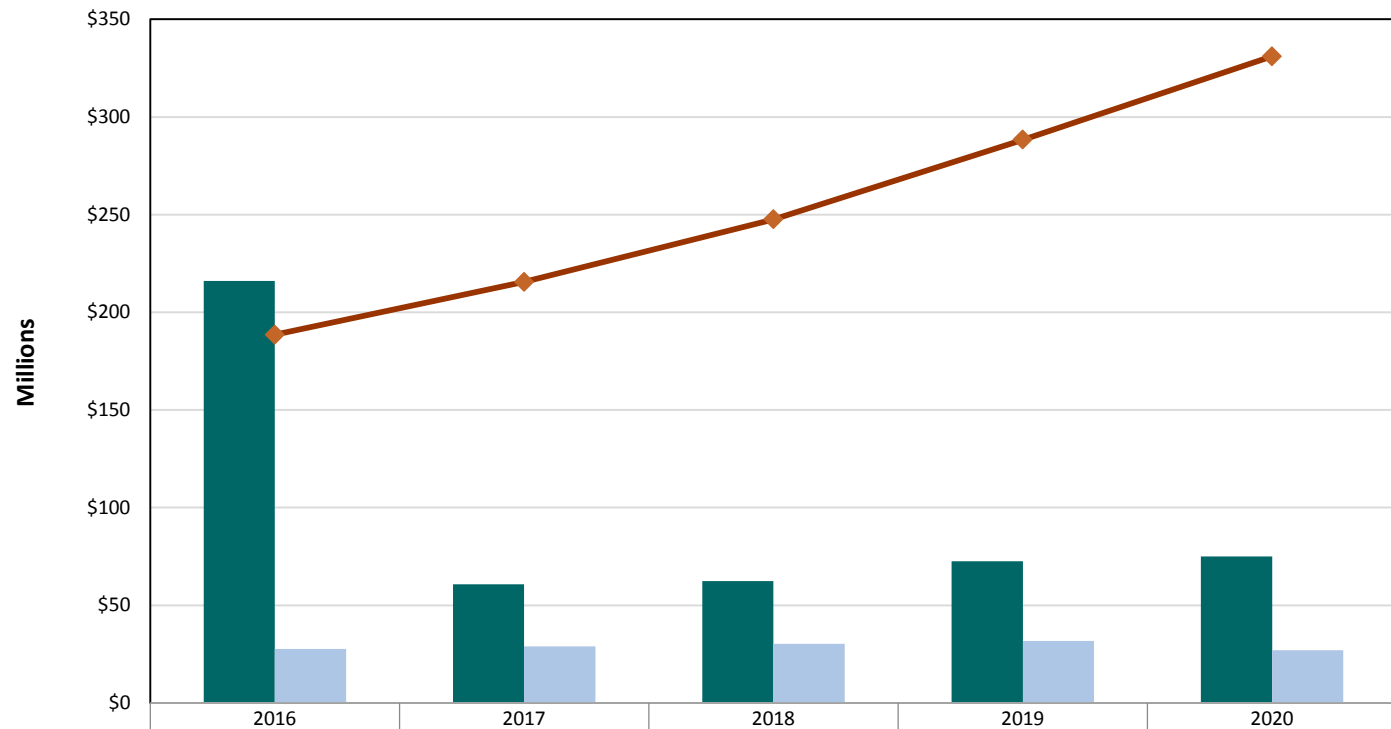
**DESCRIPTION:** The APPA (Association of Higher Education Facilities Officers) defines five cleanliness categories from highest to lowest: Orderly Spotlessness, the highest standard, requires that "Floors and base moldings shine bright and are clean; colors are fresh. There is no build up in corners or along walls." The lowest standard, Unkempt Neglect, is defined as "Floors and carpets are dull, dirty, dingy, scuffed and/or matted. There is a conspicuous buildup of old dirt, and/or floor finish in corners and along walls. Base molding is dirty, stained and streaked. Gum, stains, dirt, dust balls and trash are broadcast." The definitions for the three categories of cleanliness between the best and worst show a gradual deterioration of conditions. There are similar standards at each level for all horizontal and vertical surfaces, washroom fixtures and shower fixtures and supplies, light fixtures, trash containers, pencil sharpeners, chalk boards and trays, windows and window blinds, air vents and furniture. In FY 2008-09 we were able to calculate the cleanable square feet for the first time using the FAMIS Space Management Module. This change has resulted in an 18-percent increase in cleanable square feet, thus an equivalent decrease in cleaning hours. The same ratio was applied to all of the data provided since 2001-02 since the data-refining process began at that time.

## Maintenance Services Workload Analysis with Association of Higher Education Facilities Operators Standard Service Levels



**DESCRIPTION:** The APPA (Association of Higher Education Facilities Officers) defines five levels of maintenance: Showpiece Facility, Comprehensive Stewardship, Managed Care, Reactive Management and Crisis Response. The highest level, "Showpiece Facility" requires immediate response to any type of service, maintaining a facility with a like-new appearance that is completely functional. Preventative maintenance is highly organized and routine and breakdowns are rare, but corrected immediately. The lowest level of maintenance is "Crisis Response" which as the name implies, is activated only by top administration, not by customer request: most higher educational facilities' maintenance activities fall in the middle three levels on this continuum of decreasing planning and organization and increasing neglect and customer dissatisfaction.

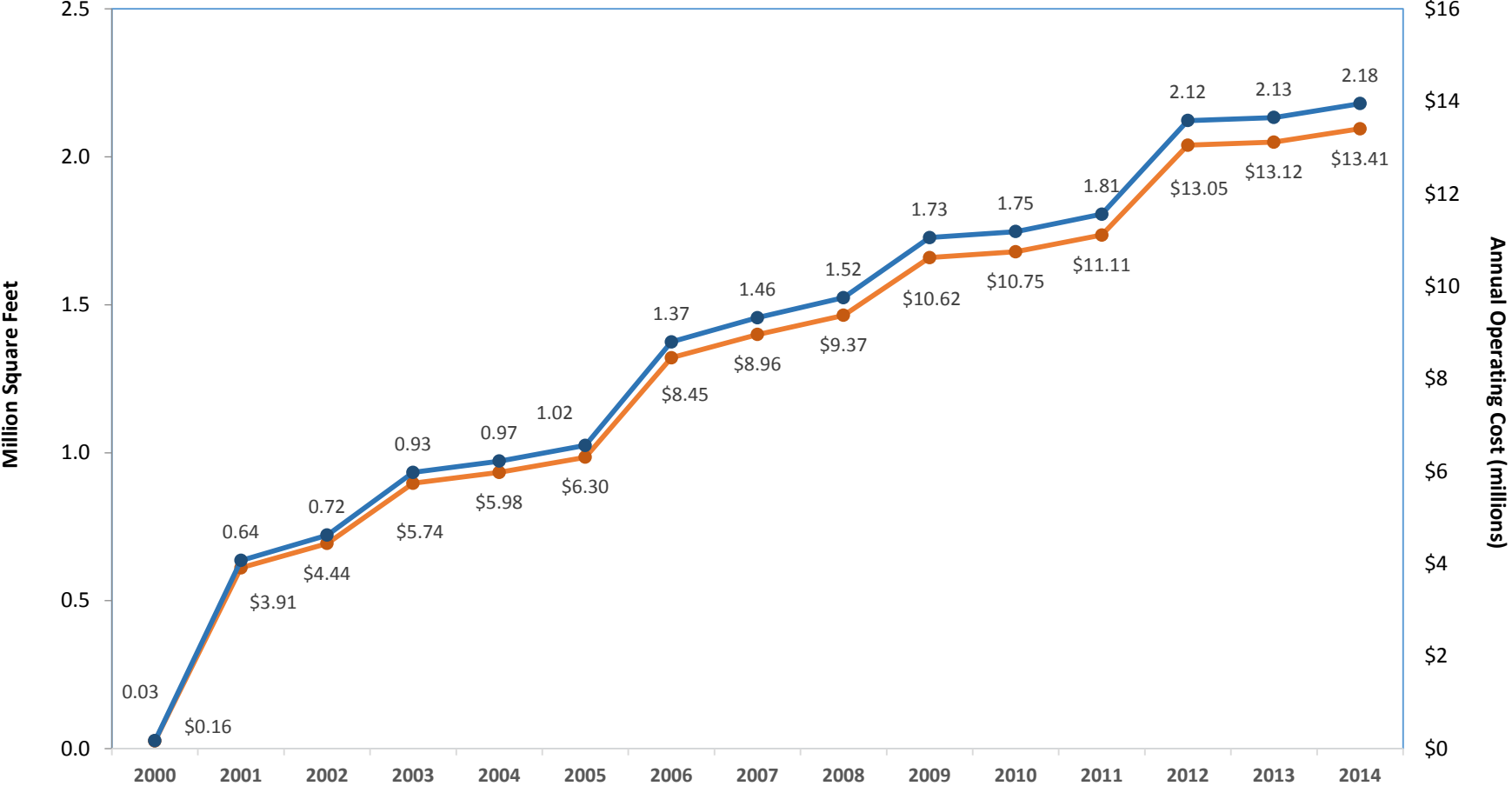
## Cumulative Unfunded Just-in-Time Capital Renewal



|   | 2016          | 2017          | 2018          | 2019          | 2020          |
|---|---------------|---------------|---------------|---------------|---------------|
| JIT capital renewal                     | \$216,000,000 | \$60,749,203  | \$62,426,203  | \$72,557,203  | \$75,000,000  |
| Projected funding                       | \$27,572,814  | \$28,914,163  | \$30,319,919  | \$31,792,981  | \$27,000,000  |
| Cumulative unfunded JIT capital renewal | \$188,500,000 | \$215,480,901 | \$247,587,185 | \$288,351,407 | \$331,000,000 |

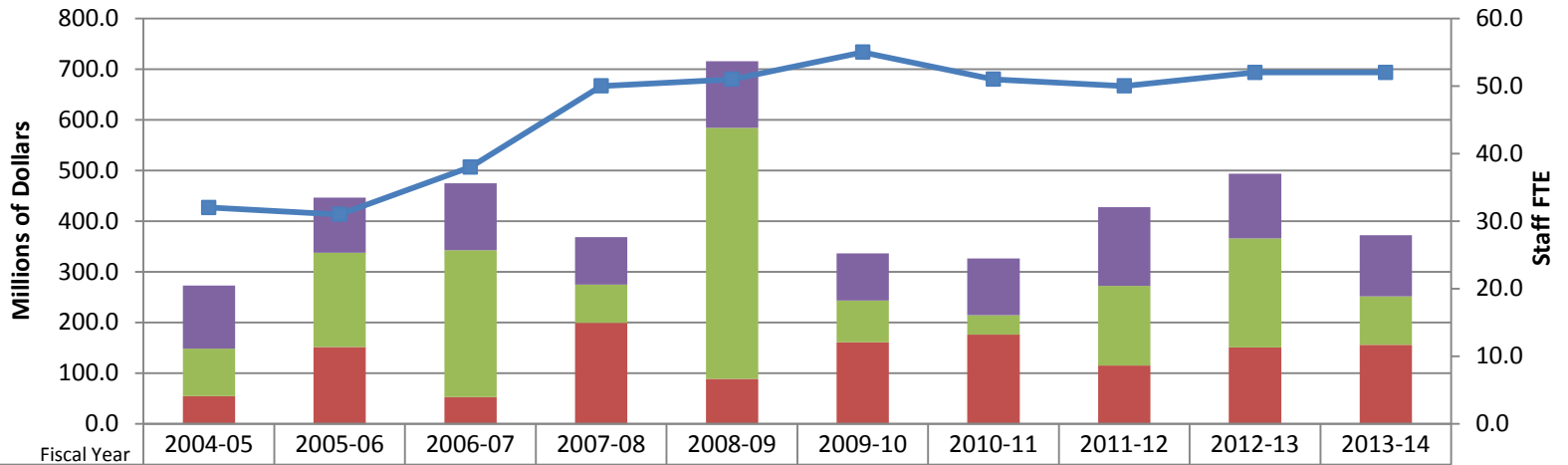
**DESCRIPTION:** The graph shows the value of Just-in-Time (JIT) capital renewal needs, the projected funding available to address those needs, and the cumulative unfunded backlog.

# Academic Space Growth and Operating Cost



**DESCRIPTION:** The graph reflects the growth in square footage of academic space since the year 2000 and the corresponding increase in annual operating costs.

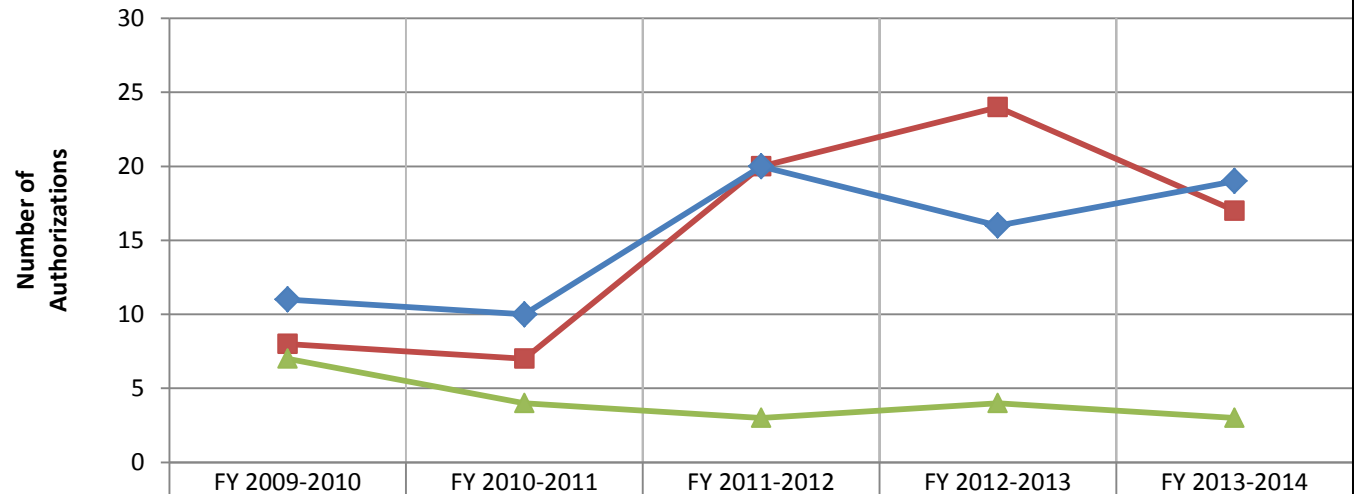
## Engineering and Architectural Services Workload and Staff



|                          |       |       |       |       |       |       |       |       |       |       |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Construction in Millions | 124.8 | 108.7 | 132.0 | 93.6  | 131.5 | 93.2  | 112.2 | 155.1 | 127.4 | 120.9 |
| Estimates in Millions    | 93.4  | 186.6 | 290.0 | 75.4  | 496.0 | 82.5  | 38.2  | 157.5 | 215   | 95.5  |
| Design in Millions       | 54.6  | 151.3 | 52.8  | 199.4 | 88.4  | 160.9 | 176.0 | 115.0 | 151   | 155.7 |
| Staff FTE                | 32.0  | 31.0  | 38.0  | 50.0  | 51.0  | 55.0  | 51.0  | 50.0  | 52.0  | 52    |

**DESCRIPTION:** Engineering and Architectural Services administers the estimates, designs and construction of new buildings and remodeled or expanded buildings on campus. Work done is measured in dollar volume of each function, which is derived from the cost of the design and construction of the finished construction.

## Number of Board of Trustees Construction Authorizations



|   |    |    |    |    |    |
|---|----|----|----|----|----|
| Authorization to Proceed - Construction Management/Design-Build | 8  | 7  | 20 | 24 | 17 |
| Authorization to Proceed - Design-Bid-Build                     | 7  | 4  | 3  | 4  | 3  |
| Authorization to Plan   | 11 | 10 | 20 | 16 | 19 |

**Description:** This graph analyzes the number of Board of Trustees actions by project step for the past five fiscal years. This graph is based on the Board Authorization policy approved in April 2006, and is materially different than past years' reports. Projects authorized for planning (step 1) are approved to begin the design process, including retaining design consultants. The costs are only an estimate at that point, pending validation of the scope and schedule. Projects authorized to proceed (step 2) have a defined scope, schedule, and project budget. If the project is using a construction management or design-build delivery method, construction can proceed. If the project is design-bid-build, the project must return for bid and contract award (step 3).

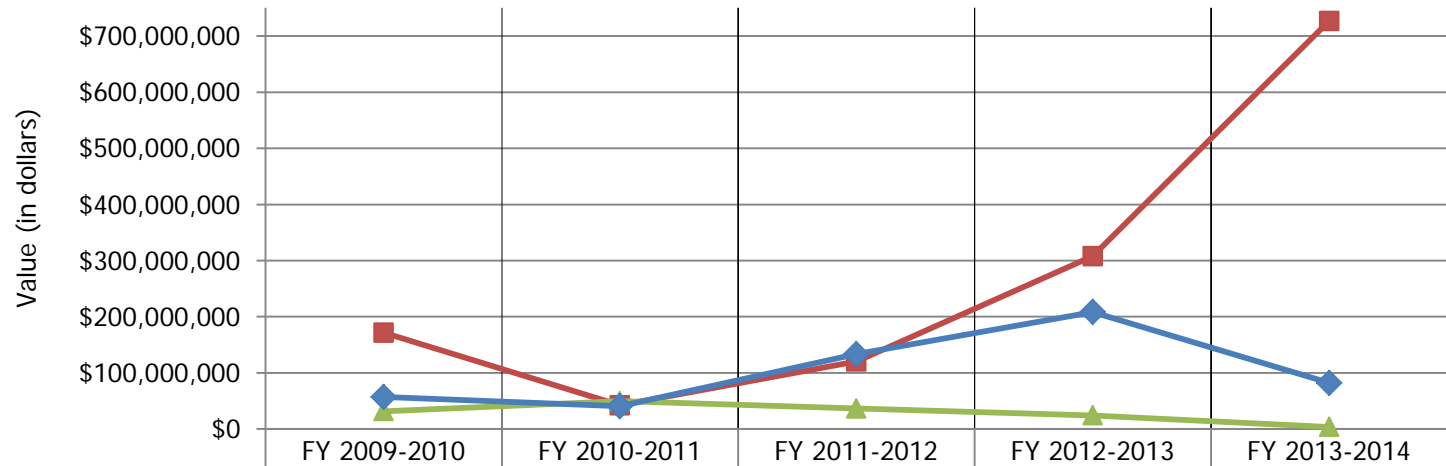
**Note:**

\*Includes FRIB CP09298

\*Starting in FY12-13, if a project goes through multiple Board approval steps within the same fiscal year (e.g. Steps 2 and 3 or Steps 1 and 2), it will be counted twice.

\*Starting in FY12-13, approved Board Resolutions without a preliminary cost estimate specified *are* counted in this chart.

## Value of Board of Trustees Construction Authorizations



|  |               |              |               |               |               |
|--|---------------|--------------|---------------|---------------|---------------|
| <span style="color: red;">■</span> Authorization to Proceed - Construction Management/Design-Build | \$171,550,000 | \$42,340,000 | \$120,200,003 | \$307,955,000 | \$726,793,300 |
| <span style="color: green;">▲</span> Authorization to Proceed - Design-Bid-Build                   | \$31,714,000  | \$49,550,000 | \$36,600,000  | \$24,260,000  | \$3,820,000   |
| <span style="color: blue;">◆</span> Authorization to Plan  | \$57,100,000  | \$40,500,000 | \$133,437,000 | \$208,300,000 | \$82,063,100  |

**Description:** This graph analyzes the value of Board of Trustees actions by project step for the past five fiscal years. This graph is based on the Board Authorization approved in April 2006. Projects authorized for planning (step 1) are approved to begin the design process, including retaining design consultants. The costs are only an estimate at that point, pending validation of the scope and schedule. Projects authorized to proceed (step 2) have a defined scope, schedule, and project budget. If the project is using a construction manager or design-build delivery method, construction can proceed. If the project is design-bid-build, the project must return for bid and contract award (step 3).

**Notes:**

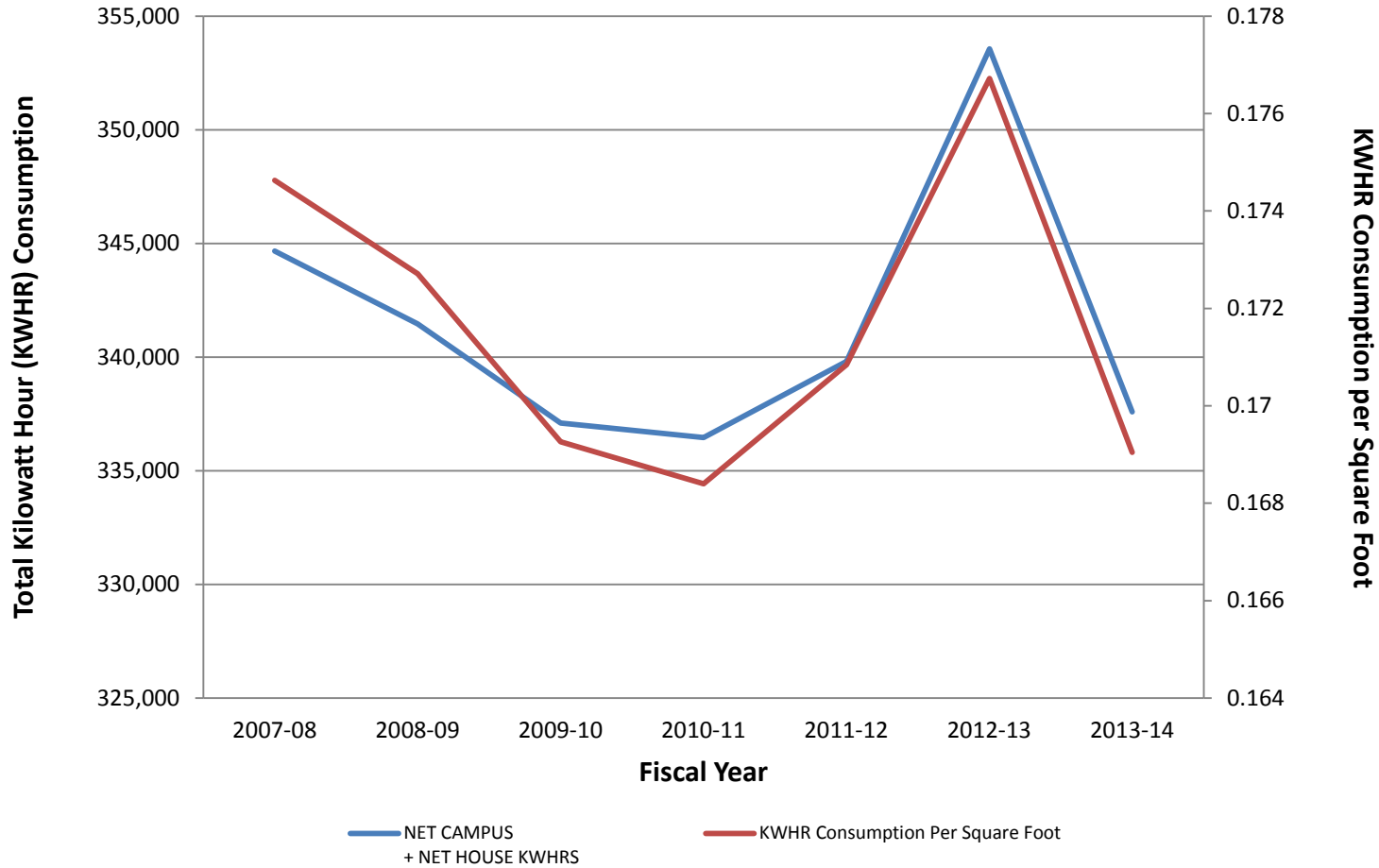
\*Includes FRIB CP09298

\*Value Ranges appearing on a resolution letter are represented by the midpoint amount (e.g. \$8-10 Million budget range is \$9 Million on chart).

\*Starting in FY12-13, if a project goes through multiple Board approval steps within the same fiscal year (e.g. Steps 2 and 3 or Steps 1 and 2), its value will be counted twice.

\*Starting in FY12-13, approved Board Resolutions without a preliminary cost estimate specified *are not* reflected in this chart.

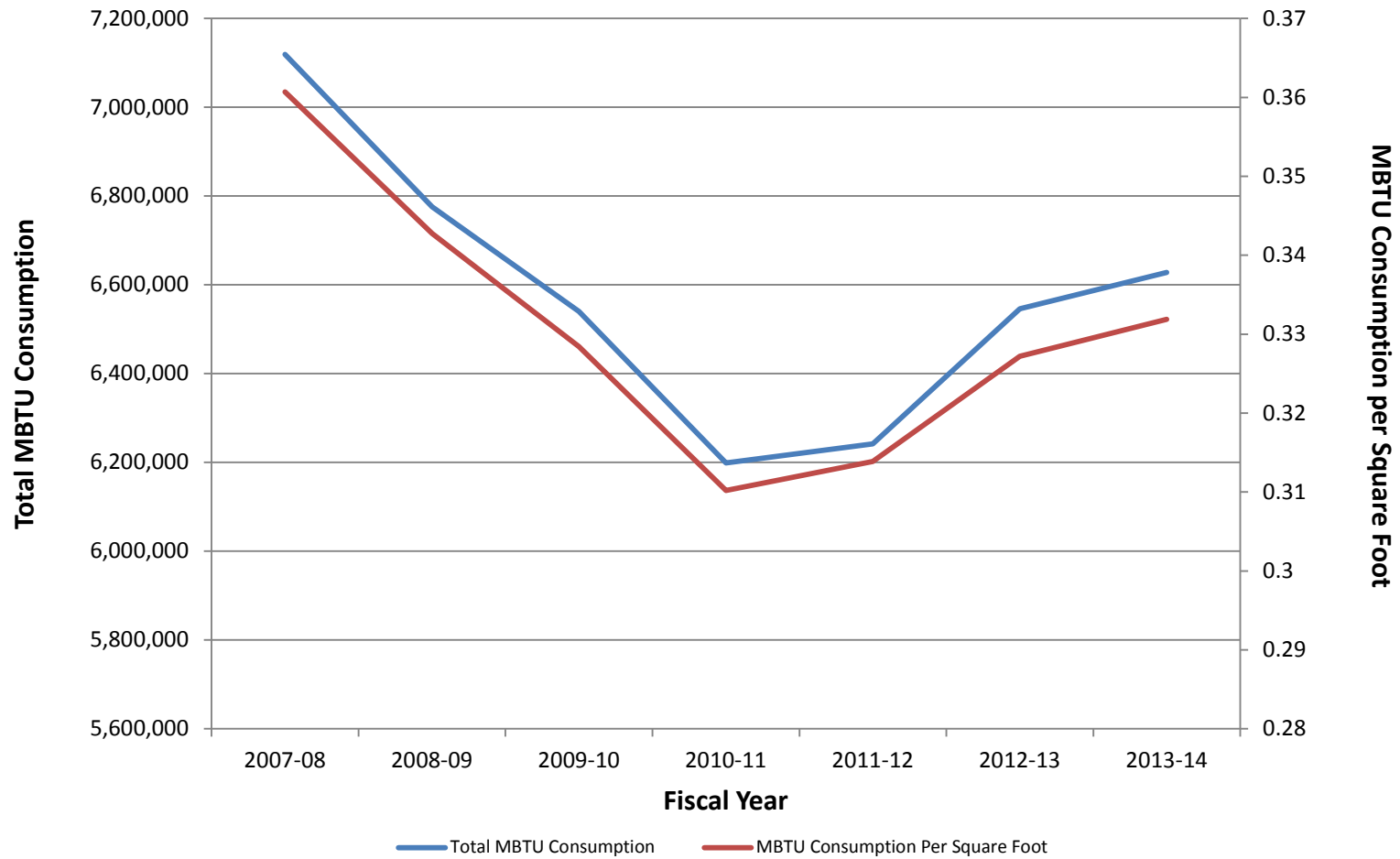
## Electrical Consumption - Main Campus Total and Per Square Foot



**DESCRIPTION:** Campus electrical consumption, including in-house usage in the T.B. Simon Power Plant, is shown for the total campus, as well as consumption per square foot.

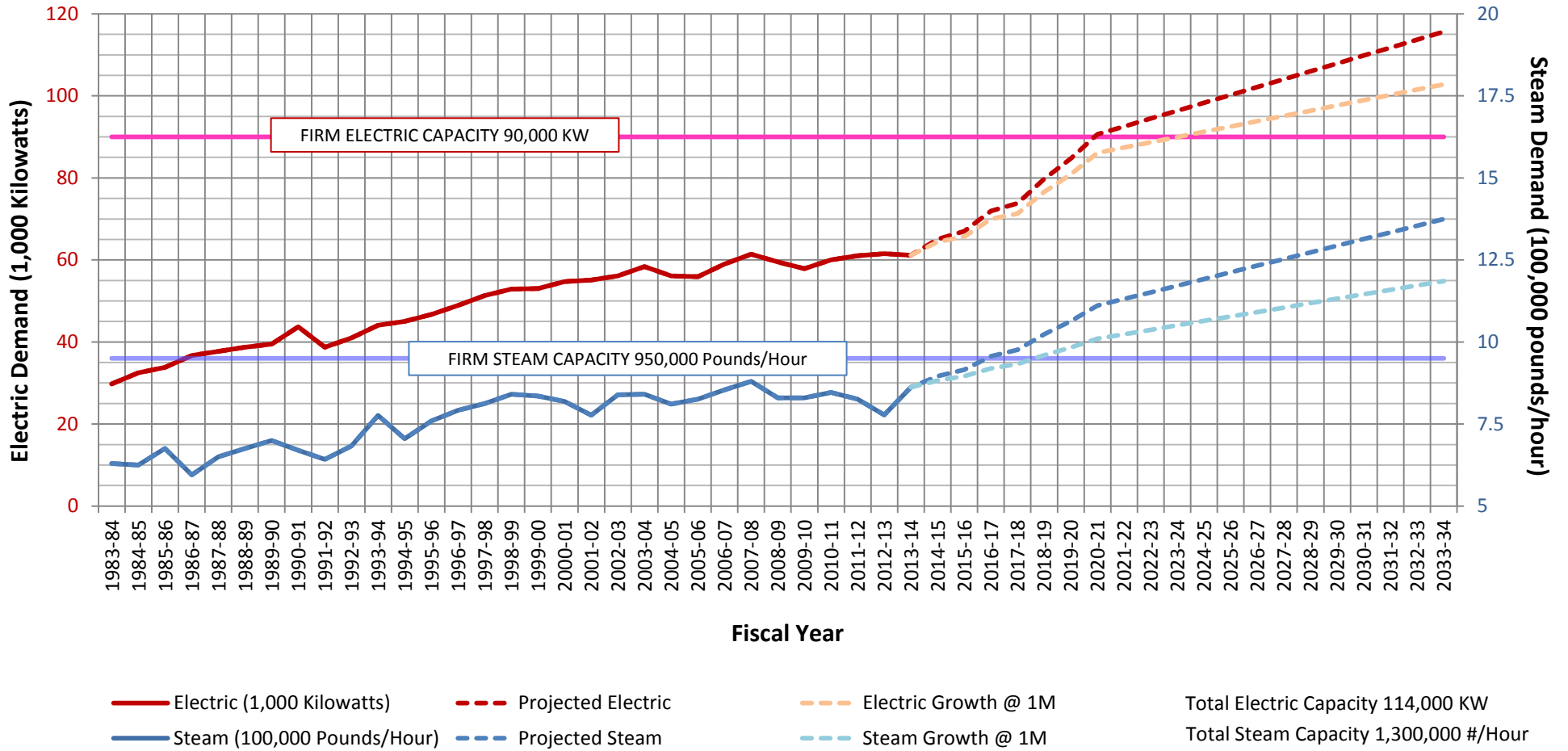


## Million British Thermal Unit (MBTU) Consumption Main Campus Total and Per Square Foot



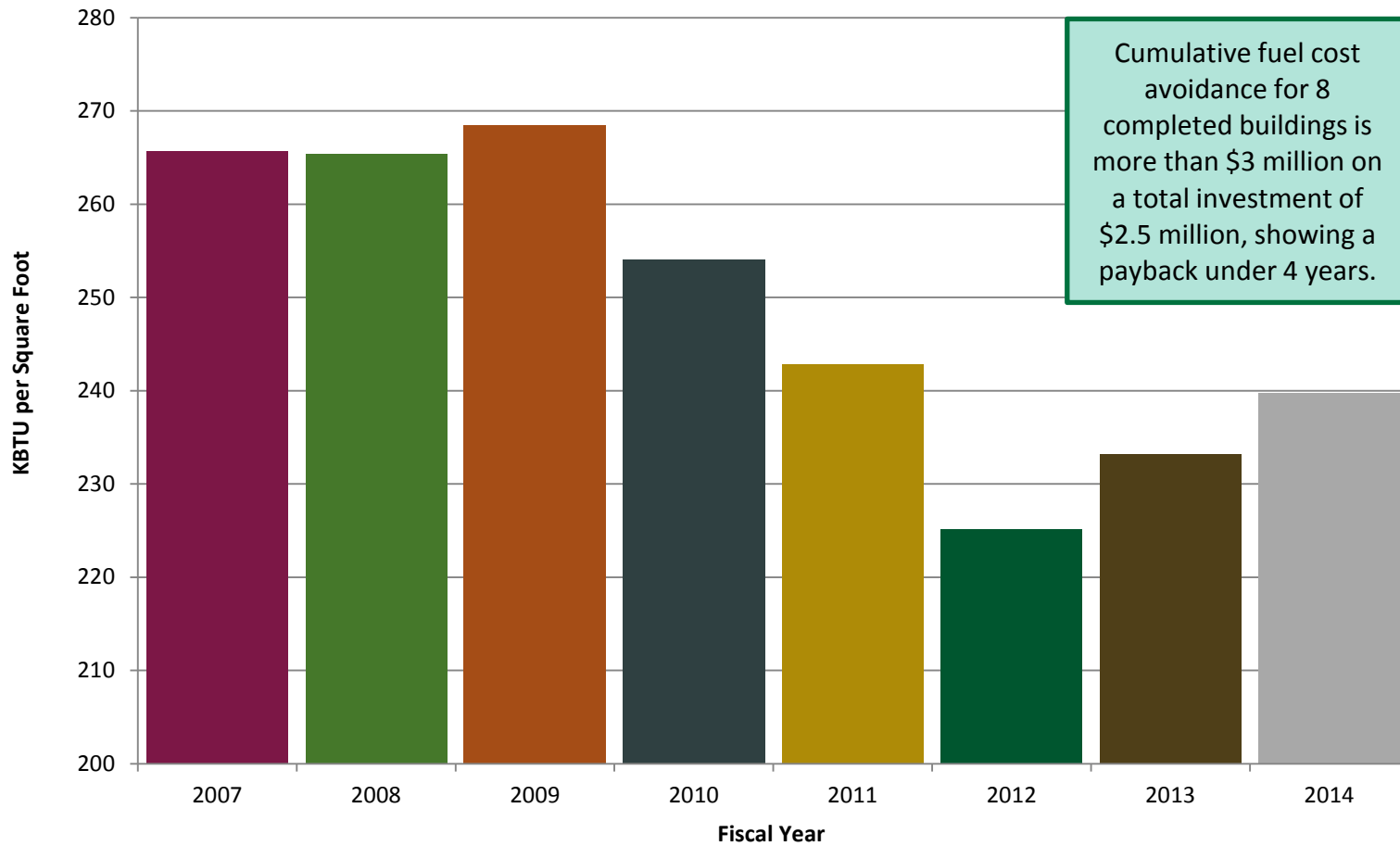
**DESCRIPTION:** Campus BTU consumption, including in-house usage in the T.B. Simon Power Plant, is shown for the total campus, as well as consumption per square foot.

# Peak Annual Steam and Electric Demands



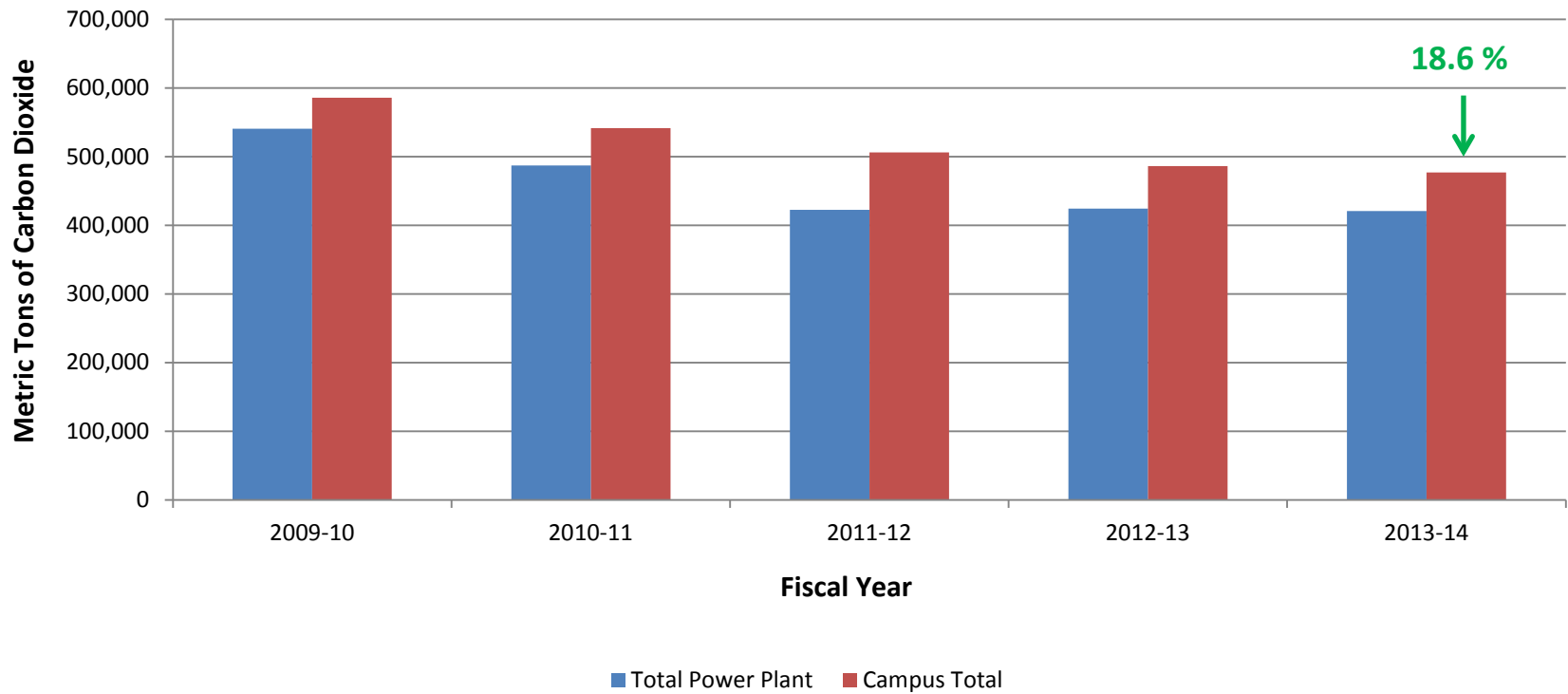
**DESCRIPTION:** This graph presents the historical campus steam and electric demand and the projected future demand. Future demand is based on the additional power requirements of FRIB and the assumption that 1.5 million square feet of new space will be added over the next decade. This is consistent with the results of the two previous decades and what is currently in construction and design. The new energy financial model is assuming 1.5 million square feet will be added over the next decade. A second projection line indicates future demand if growth is limited to 1 million square feet per decade.

## BTU Change in Commissioned Buildings



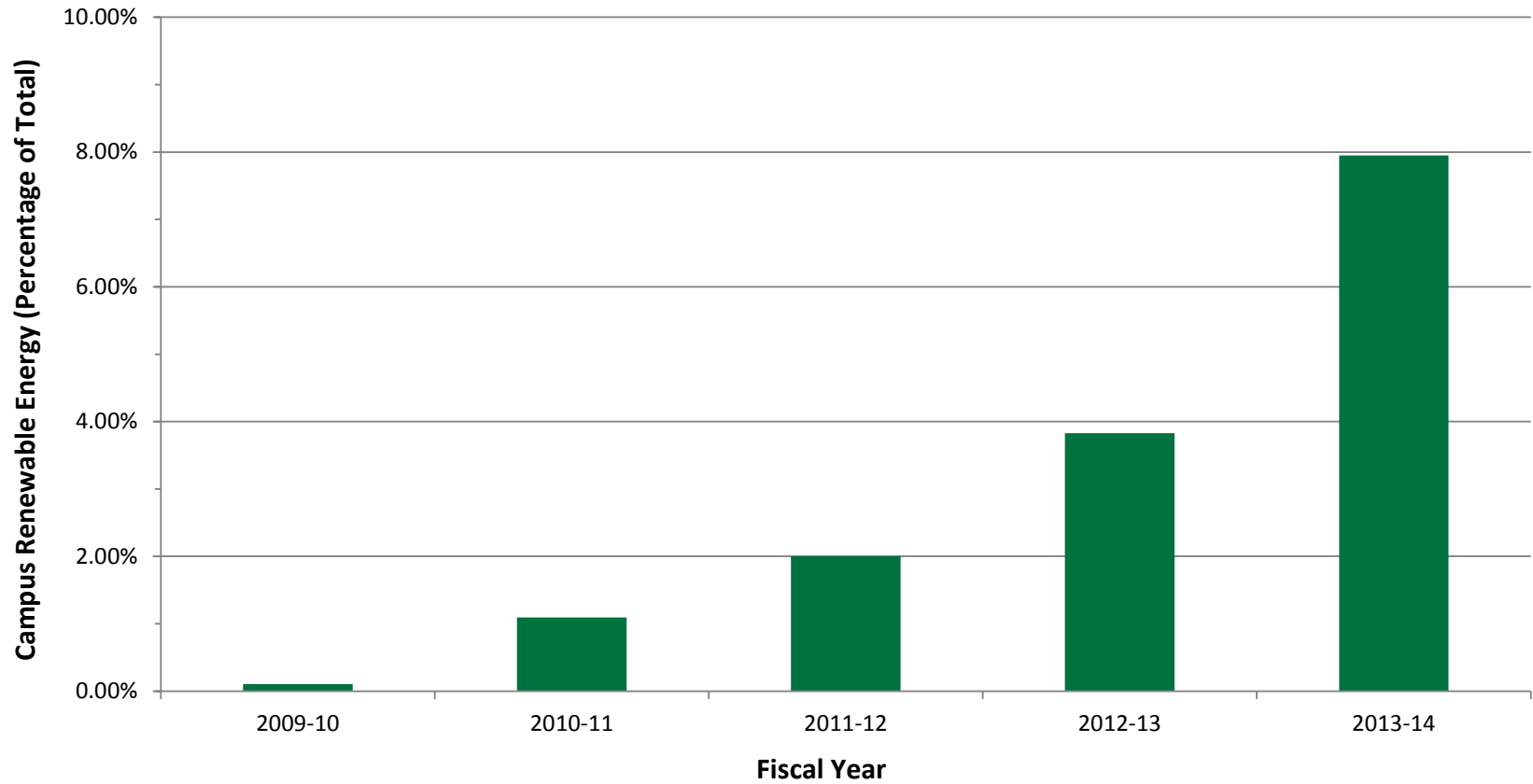
**DESCRIPTION:** This graph shows the actual metered energy reduction of both electrical and steam consumption in buildings where commissioning is finished, M&R (maintenance and repair) repairs are done, and ECMs (energy conservation measures) are substantially complete. Completed buildings are: Erickson, Food Science, Food Safety, Biochemistry, Radiology, Football, Holden, Owen. **Anthony is complete, but full reductions have not yet been measured. Consumption numbers are not adjusted for weather and heating and cooling degree days were much higher in FY 2014, offsetting conservation efforts.**

## Greenhouse Gas Emissions



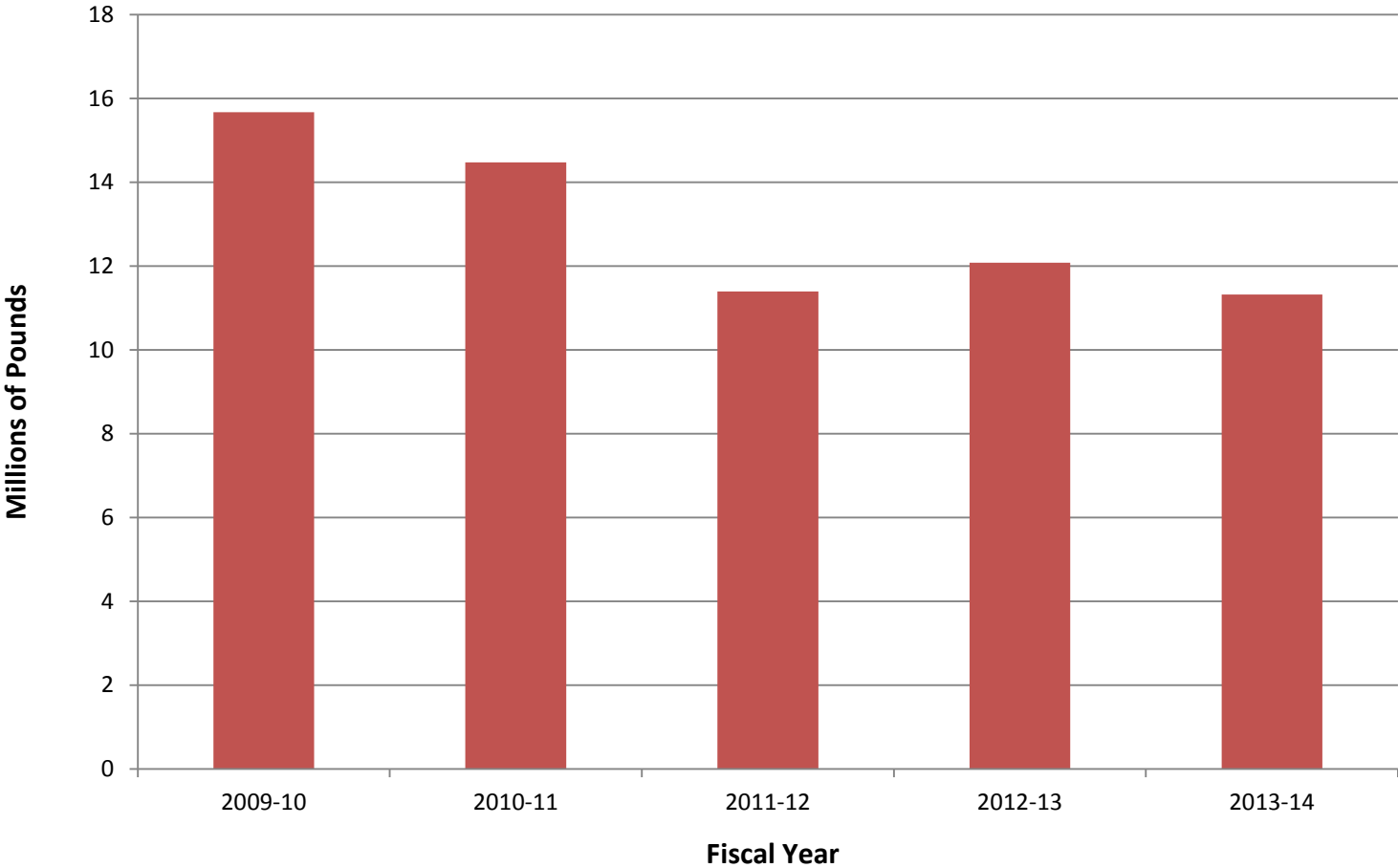
**DESCRIPTION:** This graph represents emissions by fiscal year, as defined by the Energy Transition Plan approved by the Board of Trustees in April 2012. It includes all Scope 1 emissions (direct fuel burned for campus heating, including fuel burned at the power plant, south campus farms and in MSU fleet vehicles), as well as all Scope 2 emissions (purchased electricity from Consumers Energy and the Lansing Board of Water and Light).

## Renewable Energy Portfolio



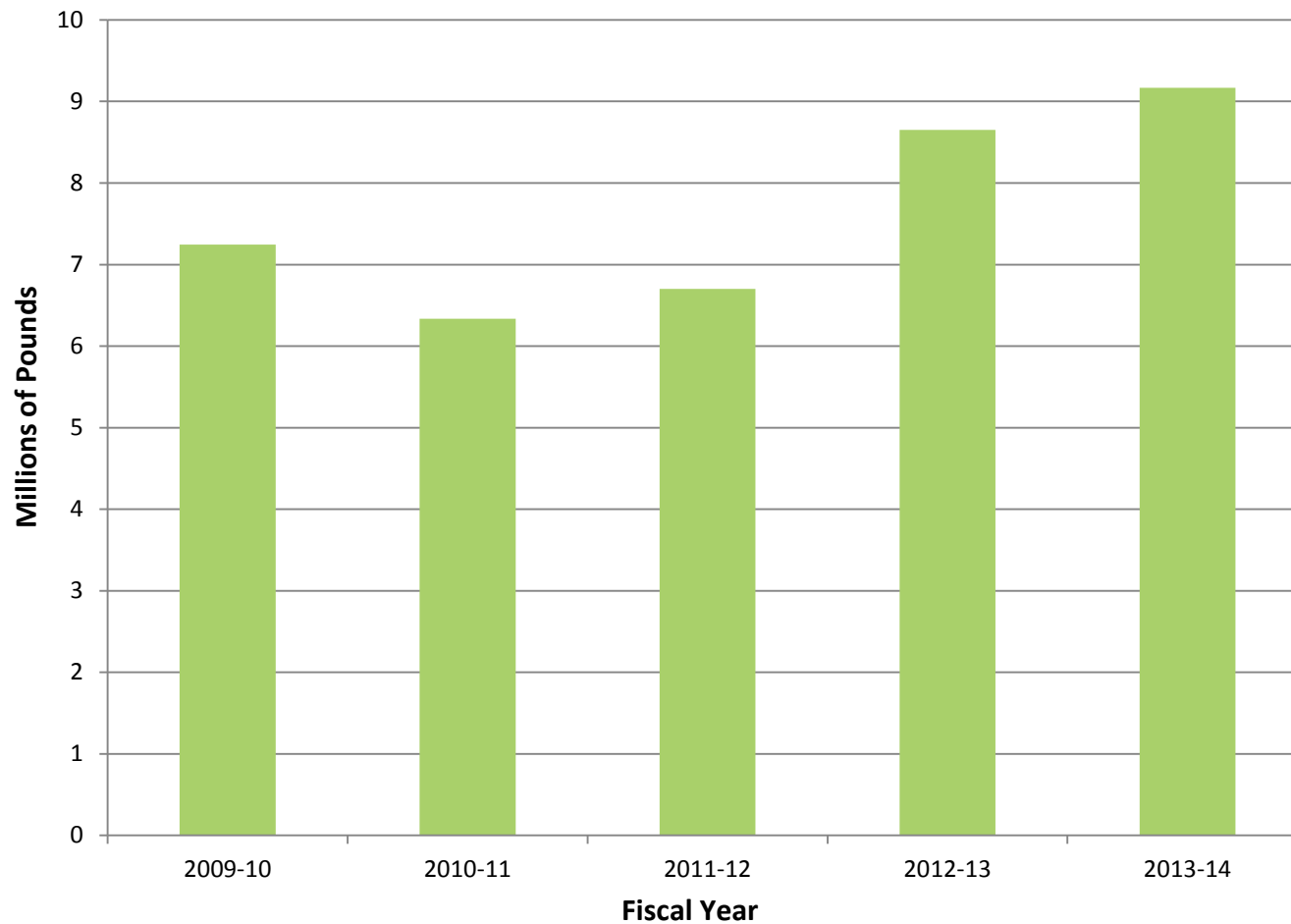
**DESCRIPTION:** Renewable energy calculation aligns with the Renewable Portfolio Standard established for the utilities in the State of Michigan by Public Act 295. This includes wind and solar generation, alternative fuels that are considered biomass, and energy optimization.

### Total Campus Refuse in Pounds



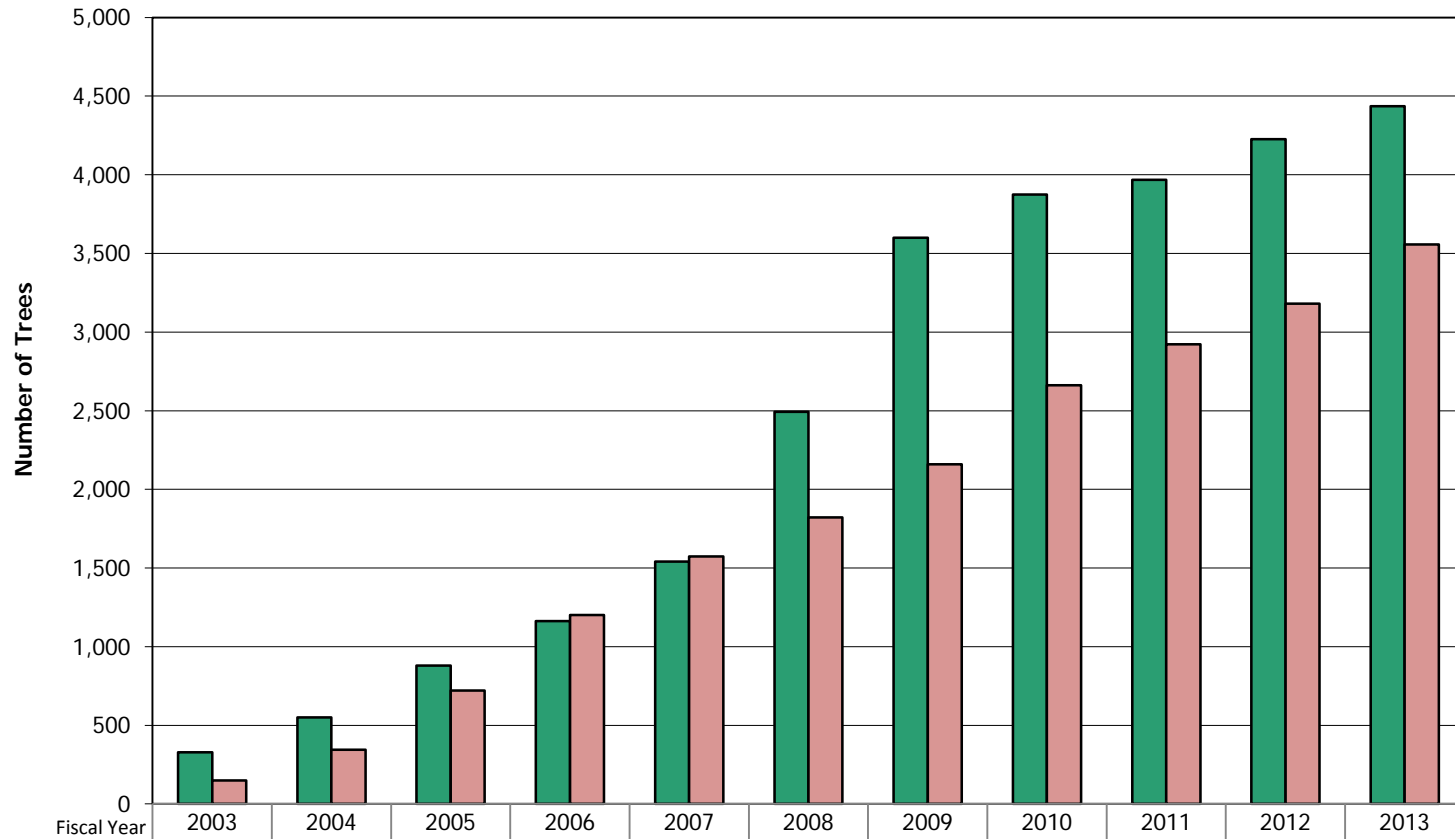
**DESCRIPTION:** The chart displays the total amount of campus waste in millions of pounds over the past five fiscal years. Campus refuse is defined as all waste and materials going to a landfill. The amount of refuse going to landfills has decreased consistently since fiscal year 2009, which could be attributed to the continuing initiatives to educate the campus community on sustainability. It is possible this trend will continue as more materials are recycled rather than landfilled.

## Campus Recycling in Pounds



**DESCRIPTION:** The chart displays the total amount of materials recycled on campus in millions of pounds over the past five fiscal years. Recycled materials include: cardboard, office paper, newspaper, paperboard, magazines, books, plastics and metals. The chart shows that recycling has increased over the past two fiscal years. This can be attributed to the use of new equipment which has improved how recycling is collected and measured as well as the ongoing efforts of programs educating the campus community on the necessity for recycling.

## Cumulative Trees Planted and Removed

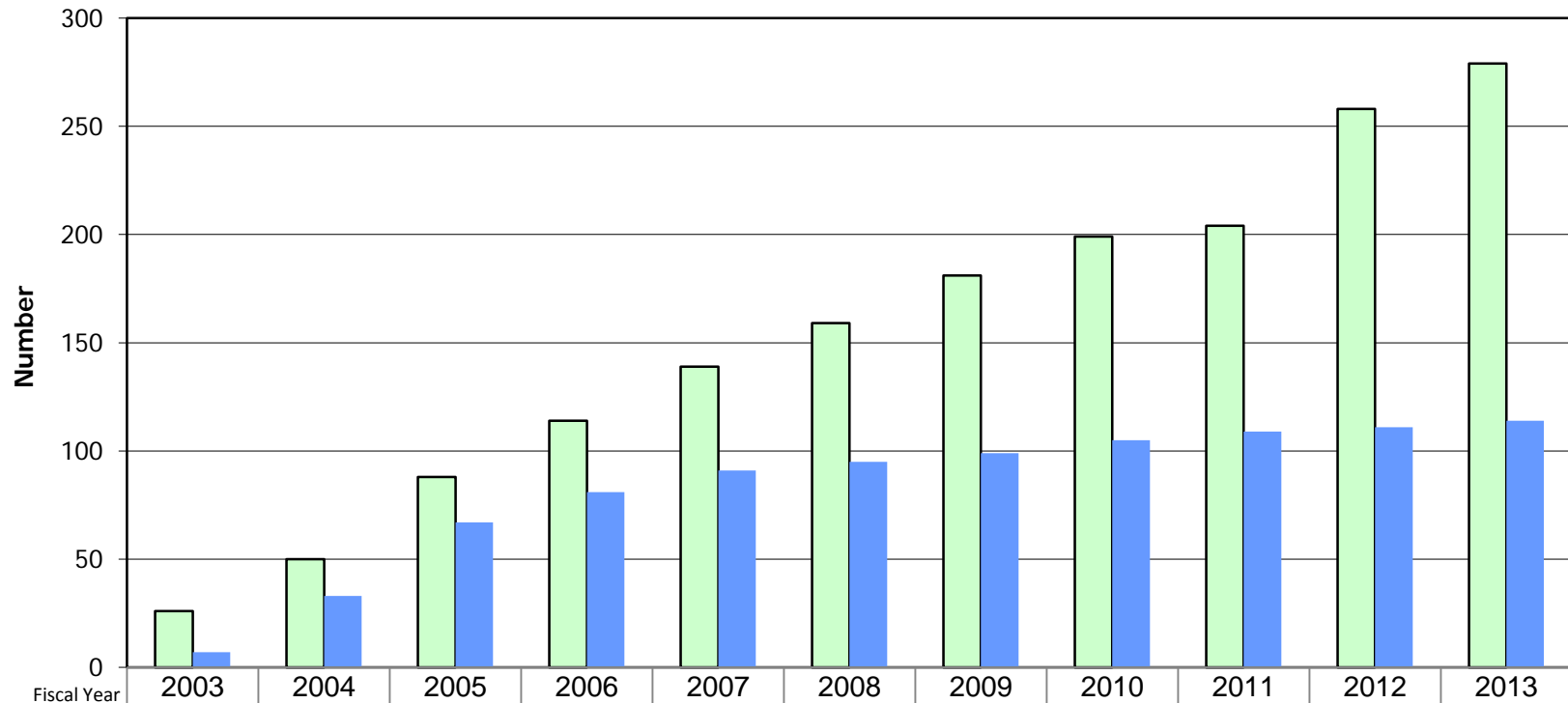


|                                   |     |     |     |       |       |       |       |       |       |       |       |
|-----------------------------------|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|
| ■ Cumulative Sum of Trees Planted | 329 | 550 | 879 | 1,163 | 1,540 | 2,493 | 3,599 | 3,875 | 3,968 | 4,226 | 4,435 |
| ■ Cumulative Sum of Trees Removed | 149 | 345 | 722 | 1,202 | 1,574 | 1,821 | 2,160 | 2,661 | 2,923 | 3,180 | 3,556 |

**Description:** This graph analyzes the cumulative increase in tree planting and removals on campus for the period 2003 through 2013. For the purpose of this analysis, a tree is defined as a plant with an upward height of at least 10 feet at maturity. There are currently 18,457 recorded trees on the developed campus. The data is reported by calendar year.



## Cumulative Woody Plant Diversity Gained and Lost from Campus Arboretum



|                         |    |    |    |     |     |     |     |     |     |     |     |
|-------------------------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| █ Cumulative Taxa Added | 26 | 50 | 88 | 114 | 139 | 159 | 181 | 199 | 204 | 258 | 279 |
| █ Cumulative Taxa Lost  | 7  | 33 | 67 | 81  | 91  | 95  | 99  | 105 | 109 | 111 | 114 |

**Description:** This is an analysis of the cumulative woody plant taxa lost or gained for the past ten years, 2003-2013. Taxa are unique taxonomic classifications down to the level including varieties, cultivars, subspecies, etc. There are currently 1,895 recorded taxa on the developed campus. The data is reported by calendar year.