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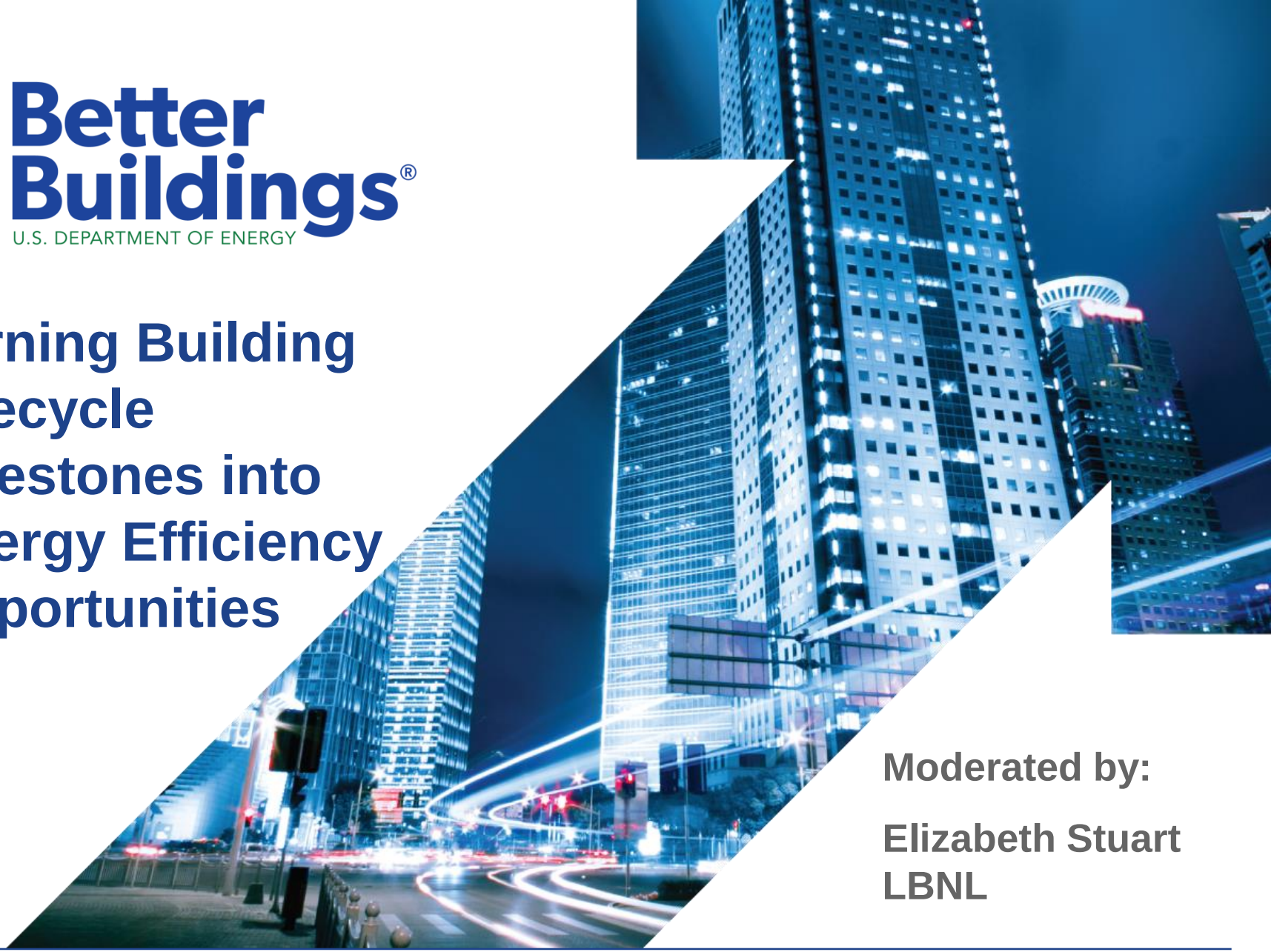
# Turning Building Lifecycle Milestones into Energy Efficiency Opportunities




**Moderated by:**

**Elizabeth Stuart**
**LBNL**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# Building Lifecycle Milestones into EE Opportunities

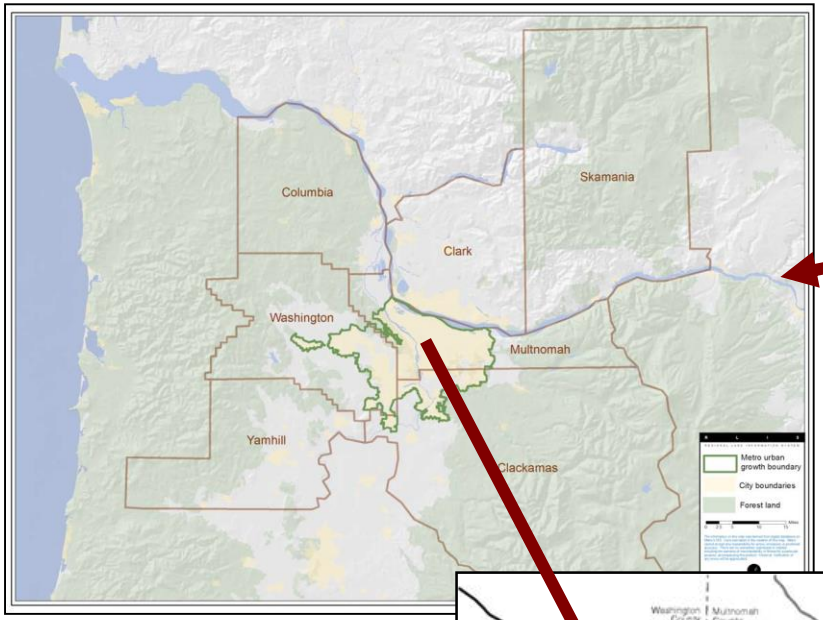
Peter Brandom
City of Hillsboro, OR

# Energy Efficiency with Building Milestones

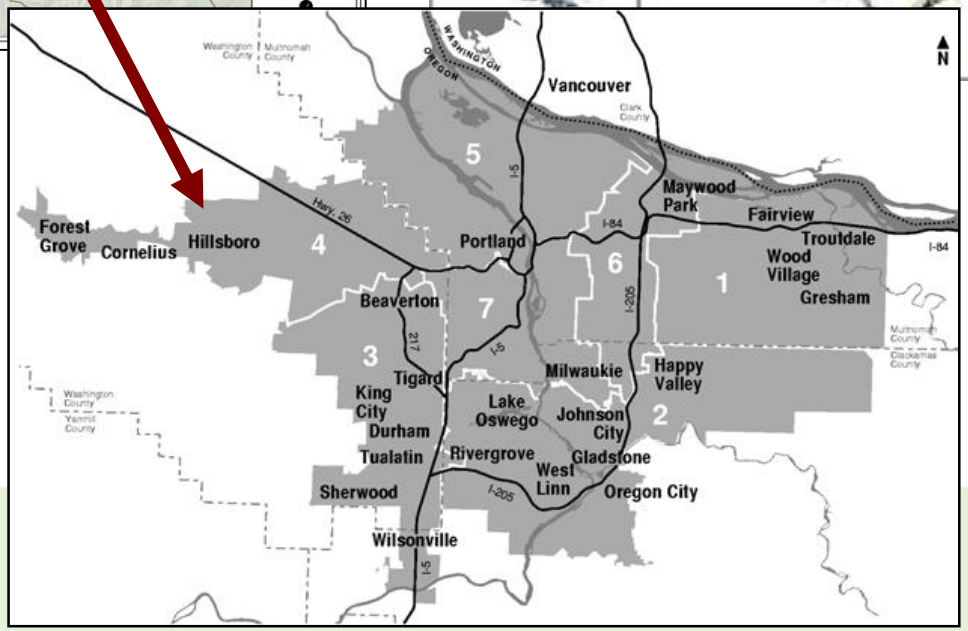
Better Buildings Conference May 28, 2015

Hillsboro OREGON

# Hillsboro, Oregon





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Hillsboro OREGON

# City Portfolio

- 13 departments
- 800 employees
- 60 facilities
- 400 vehicles
- 4,000 streetlights
- 30 City-maintained traffic intersections
- Water treatment and distribution system

- ❖ 565,722 total sq ft
- ❖ 475,000 sq ft in BBC
- ❖ 200+ kW on-site renewables
- ❖ 35 City-installed electric vehicle charging stations

# 2030 Sustainability Goals – City Operations

**Materials management:**

• Achieve a rate of construction material consumption that meets internal standards for sustainability

• 100% of all inputs purchased by the City are sourced from sustainable sources or meet internally established criteria (e.g., zero waste, zero toxins) where technologically and financially feasible

• Zero toxic emissions

• 100% recycling of waste from City operations

• Zero construction and maintenance waste (no waste from construction and maintenance activities is sent to landfill). May be accomplished via public/private partnerships

**Policy:**

• 100% of City development investments meet a standard set for sustainable development, and City promotes and encourages sustainable development by others

• 100% of applicable City policies incorporate the principles of sustainability

• All city facilities constructed or renovated shall meet current Leadership in Energy and Environmental Design (LEED) standards or equivalent, unless cost prohibitive based on Return on Investment (ROI) or cost/benefit

**Energy and air quality:**

**• 60% reduced City facility energy consumption per square foot (2007 baseline)**

**• 100% of electricity and natural gas sourced from renewable sources for City facilities and exterior lighting infrastructure**

**• 80% reduction in greenhouse gas emissions; 100% of remaining emissions offset (2007 baseline)**

**• 80% production of energy for City facilities from renewable energy sources**

• 100% fossil fuel-free staff vehicles and 40% reduction for other exempt vehicles (non-passenger emergency response, etc.) [Based on available technologies and cost effectiveness] (2007 baseline)

**• All City facilities zero net energy consumption, if feasible based on Return on Investment (ROI) or cost/benefit analysis**

**Natural Resources:**

**• 25% reduction in water consumption by City facilities against established baseline (including re-use and other measures) (2007 baseline)**

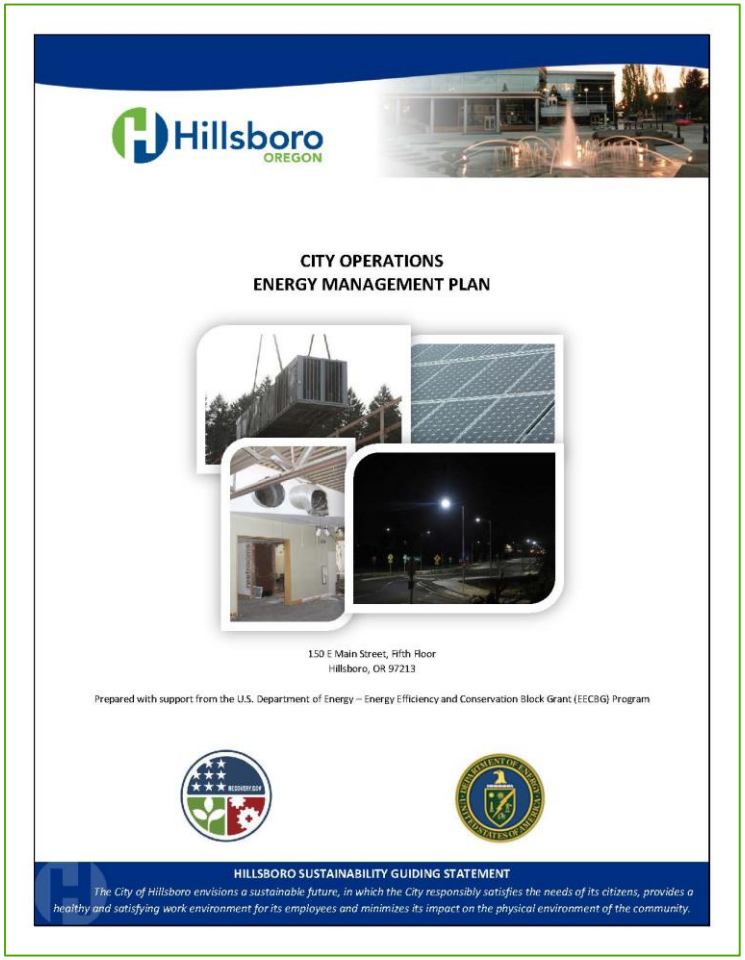
Hillsboro OREGON

# Building Milestones

- New construction & renovation
- Operations & Maintenance
- Related Policy Opportunities

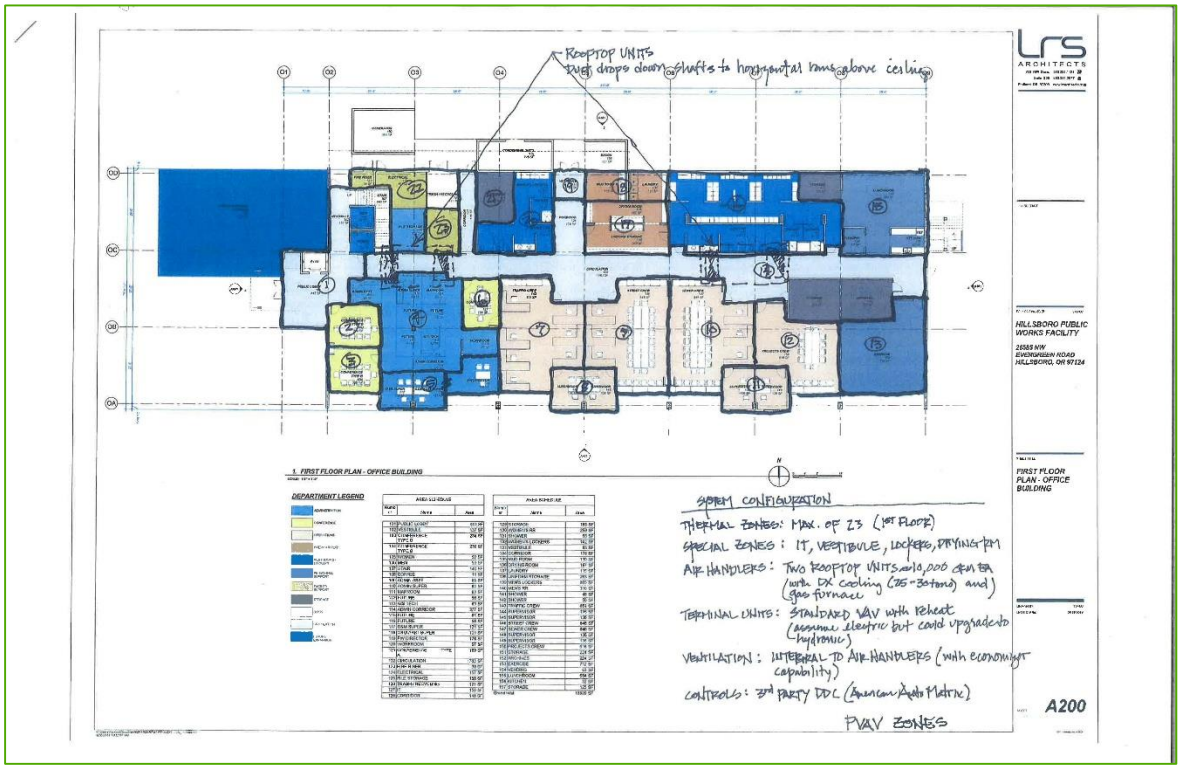
# Milestone – New Construction & Renovation

- Policy
  - LEED useful for design, but…
  - Energy modeling
  - 3rd party commissioning

# Milestone – New Construction & Renovation

- Design
  - Must marry designers with operators

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# Milestone – New Construction & Renovation

- Renovations (**ren**-*uh*-veyt)
  - "to restore to good condition; make new or as if new again; repair"
  - "to reinvigorate; refresh, revive"
- Shute Park Library BBC Showcase Project

Before

# Milestone – New Construction & Renovation

- Shute Park Library BBC Showcase Project

After


# Milestone – New Construction & Renovation

- Shute Park Library BBC Showcase Project

Pre- and post-remodel:

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**CITY OF HILLSBORO**
**Showcase Project: Shute Park Library**

LOCATION
Hillsboro, OR

PROJECT SIZE
16,000 Square Feet

**Annual Energy Use** (Source EUI)

| | |
|---|---|
| Baseline (2012) | 267 kBtu/sq. ft. |
| Expected (2014) | 214 kBtu/sq. ft. |
| Actual | COMING SOON |

Expected Energy Savings: 20%

**Annual Energy Cost**

| | |
|---|---|
| Baseline (2012) | $32,000 |
| Expected (2014) | $25,600 |
| Actual | COMING SOON |

Expected Savings: $6,400

BACKGROUND
The City of Hillsboro owns and

SOLUTIONS
A study of the facility concluded

OTHER BENEFITS
This project has resulted in a

Not eligible to apply for ENERGY STAR Certification

**Weather-Normalized Source EUI (kBtu/ft²)**

**Current EUI:** 173.7
(26.3% lower than median.)

**Baseline EUI:** 263.8
(13.3% higher than median.)

ign

**Metrics Summary** — Change Time Period

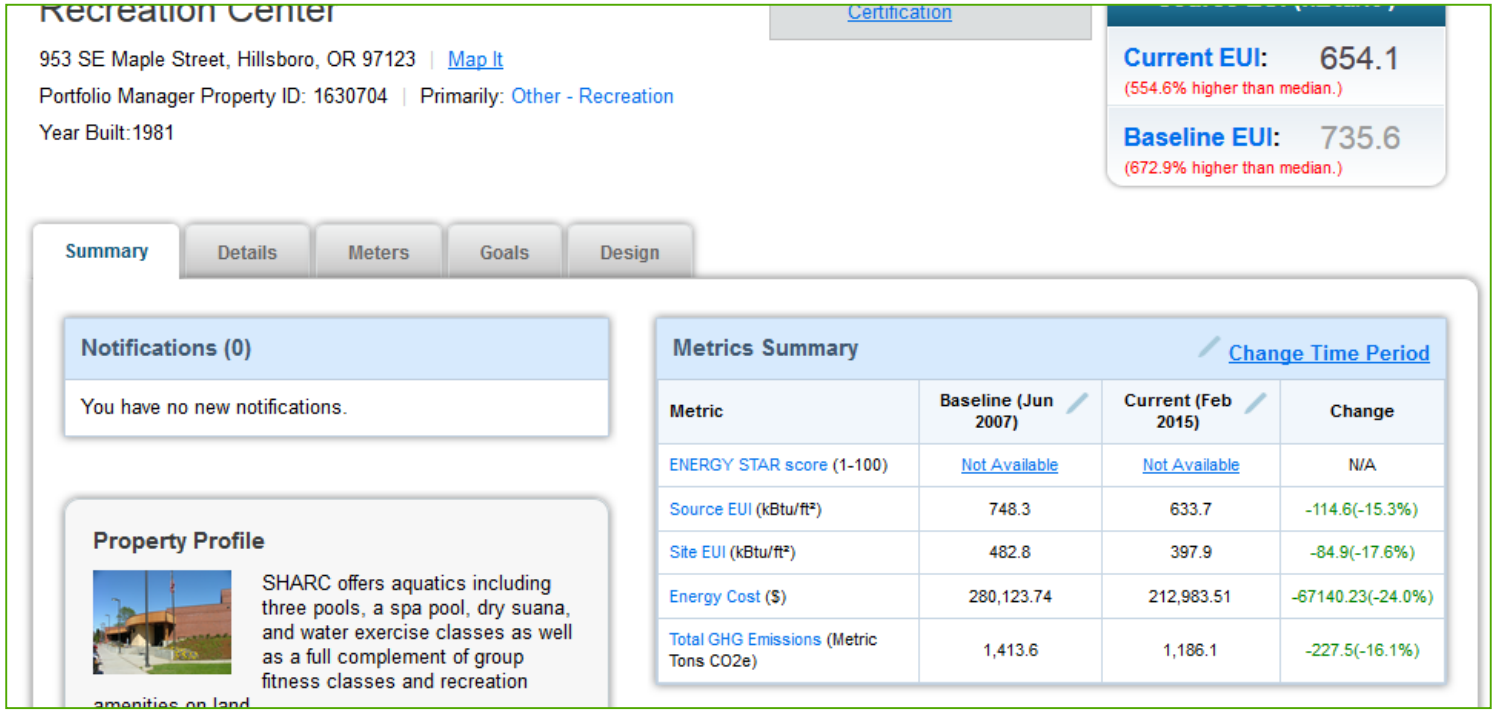
| Metric | Baseline (Jun 2007) | Current (Feb 2015) | Change |
|---|---|---|---|
| ENERGY STAR score (1-100) | Not Available | Not Available | N/A |
| Source EUI (kBtu/ft²) | 267.1 | 173.7 | -93.4(-35.0%) |
| Site EUI (kBtu/ft²) | 179.1 | 57.6 | -121.5(-67.8%) |
| Energy Cost ($) | 42,099.02 | 27,195.29 | -14903.73(-35.4%) |
| Total GHG Emissions (Metric Tons CO2e) | 188.2 | 100.5 | -87.7(-46.6%) |

# Milestone – Operations & Maintenance

- Policy
  - 3rd party commissioning
  - *How* buildings are maintained – focus on energy management, occupant behavior
- Operations
  - EMP prescribes process, calendar
  - Controls
  - Data, facility energy use tracking, reporting

# Milestone – Operations & Maintenance

- Seasonal maintenance opportunities
- Shute Park Aquatic Center



Recreation Center

Certification

953 SE Maple Street, Hillsboro, OR 97123 | Map It

Portfolio Manager Property ID: 1630704 | Primarily: Other - Recreation

Year Built:1981

**Current EUI:** 654.1
(554.6% higher than median.)

**Baseline EUI:** 735.6
(672.9% higher than median.)

Summary | Details | Meters | Goals | Design

**Notifications (0)**

You have no new notifications.

**Property Profile**

SHARC offers aquatics including three pools, a spa pool, dry suana, and water exercise classes as well as a full complement of group fitness classes and recreation amenities on land

**Metrics Summary** Change Time Period

| Metric | Baseline (Jun 2007) | Current (Feb 2015) | Change |
|---|---|---|---|
| ENERGY STAR score (1-100) | Not Available | Not Available | N/A |
| Source EUI (kBtu/ft²) | 748.3 | 633.7 | -114.6(-15.3%) |
| Site EUI (kBtu/ft²) | 482.8 | 397.9 | -84.9(-17.6%) |
| Energy Cost ($) | 280,123.74 | 212,983.51 | -67140.23(-24.0%) |
| Total GHG Emissions (Metric Tons CO2e) | 1,413.6 | 1,186.1 | -227.5(-16.1%) |

# Milestone – Related Policy Opportunities

- Dark sky and energy efficient lighting





# Thank You

***"The City of Hillsboro envisions a sustainable future, in which the City responsibly satisfies the needs of its citizens, provides a healthy and satisfying work environment for its employees and minimizes its impact on the physical environment of the community"***

peter.brandom@hillsboro-oregon.gov

hillsboro-oregon.gov/sustainability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Hillsboro OREGON

# Building Lifecycle Milestones into EE Opportunities

Darien Crimmin
Winn Companies

# WinnCompanies

## Seize the Day: Turning Building Lifecycle Milestones Into Energy Efficiency Opportunities



WinnCompanies

Development | Residential | Military

# WinnCompanies

Develops, acquires, and manages a diverse portfolio of properties across the United States.

Largest manager of affordable housing in the country

Over 3,000 employees span 3 divisions:

- WinnDevelopment
- WinnResidential
- WinnResidential Military Housing Services



WinnCcompanies
Development | Residential | Military

# Saxonville Village

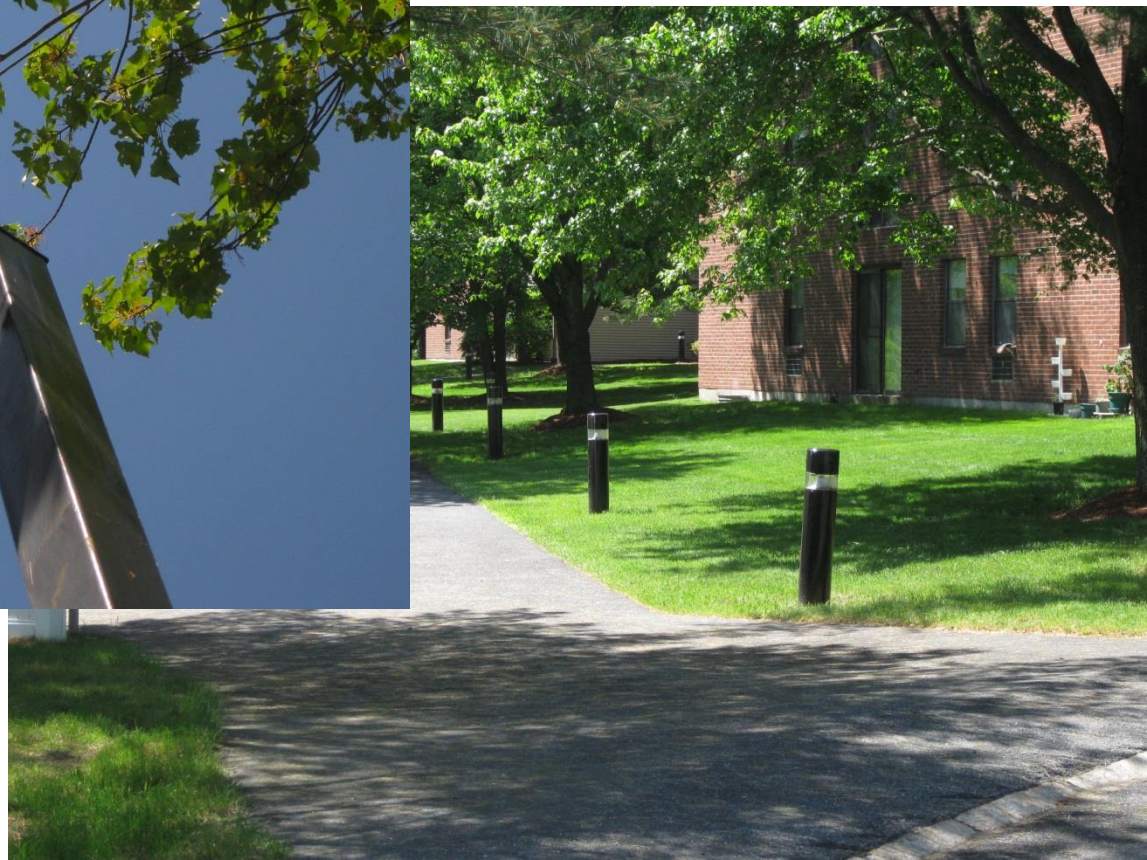
- 64 unit elderly community in Framingham, MA
- 2010 – refinancing planned to reduce loan rate and replace kitchens and baths
- Energy Audit identified:
  - Poor insulation
  - Drafty windows
  - Atmospheric boilers
  - Inefficient interior lighting
  - High maintenance site lighting
  - High water and sewer charges

Voluntary energy audit informed owner of tangible value-add opportunities that could be funded from refinancing proceeds.

# Saxonville Village

WinnCcompanies
Development | Residential | Military

# Saxonville Village



# Reserve Accounts

## Bank Controlled Replacement Reserve Account

$576,000

In general, this account can be used to help defray the costs of replacing the project's capital items in accordance with the Regulatory Agreement.

## Winn Controlled Replacement Reserve Account

$424,000

The PCNA outlines the replacement cost of certain capital items; but not energy efficient improvements. Winn saw the opportunity to achieve utility savings by voluntarily replacing certain capital items with more efficient alternatives.

# Dedicated Reserves for Energy Efficiency

***Apartment Interiors***. Replace kitchen and bathroom faucet aerators, shower heads, and toilets, saving of approximately $13,000 per year

***Building Envelope***. Save approximately $18,000 per year by installing new energy star windows and sliders; and insulting and air sealing the attic.

***Heating and Plumbing***. Replace the heating boilers with new high efficiency equipment and replace the unit controls and thermostats with electronic control valves for baseboard zones, saving approximately $12,000 per year.

***Electrical***. Replace exterior ground lighting with compact fluorescent lighting, replace the exterior pole lighting with LED pole lighting, yielding $6,500 per year of savings.

**$424,000 invested yields $50,000 in annual savings = 8.5 year simple payback**

# Saxonville Village



WinnCompanies
Development | Residential | Military

# Saxonville Village



WinnCompanies
Development | Residential | Military

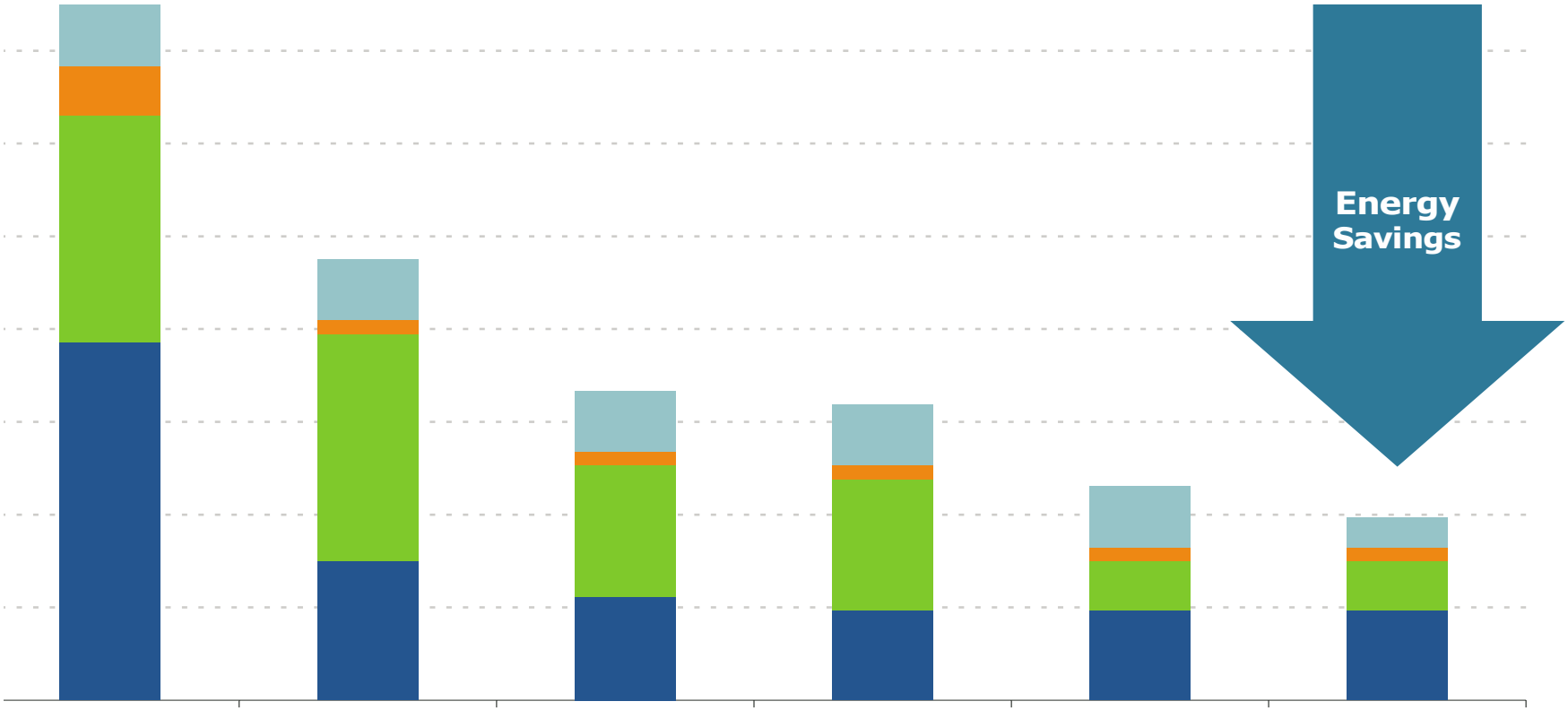
# Deep Energy Retrofits

Stand alone façade work has extremely long paybacks

- Windows
- Roofs
- Exterior insulation

Expanding opportunities for Deep Energy Retrofits by leveraging other necessary work

# Exterior Insulated Façade



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# Exterior Insulated Façade

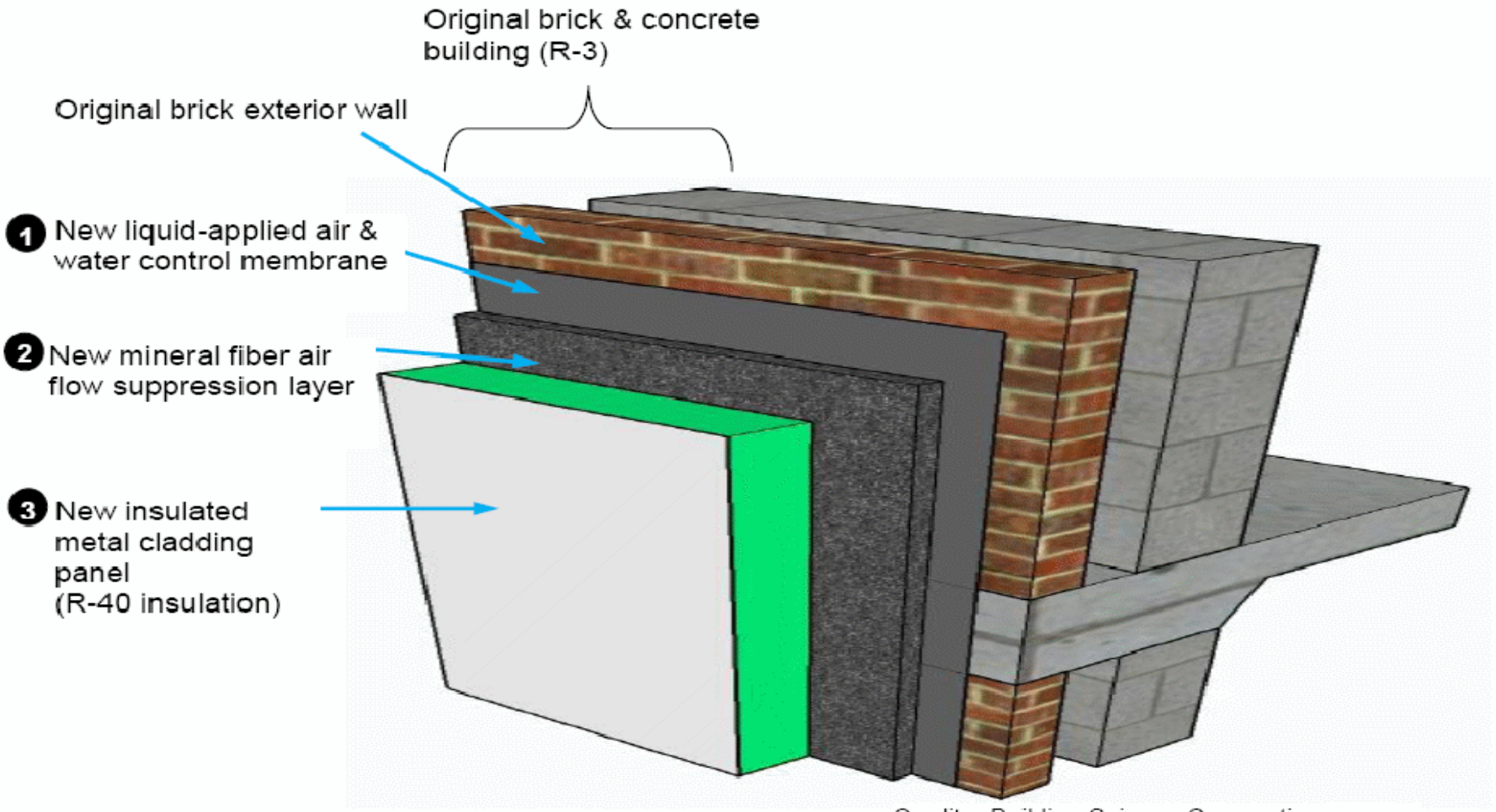


Figure 1 - Castle Square Insulated Exterior Wall System

# Thank you

**Darien Crimmin**
Vice President of Energy & Sustainability
dcrimmin@winnco.com



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# Building Lifecycle Milestones into EE Opportunities

Jesse Warren
University of Virginia

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# Turning Building Lifecycle Milestones Into Energy Efficiency Opportunities

Jesse Warren, Sustainability Program Manager – Buildings & Operations

Better Buildings Summit

May 28, 2015

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# Office For Sustainability



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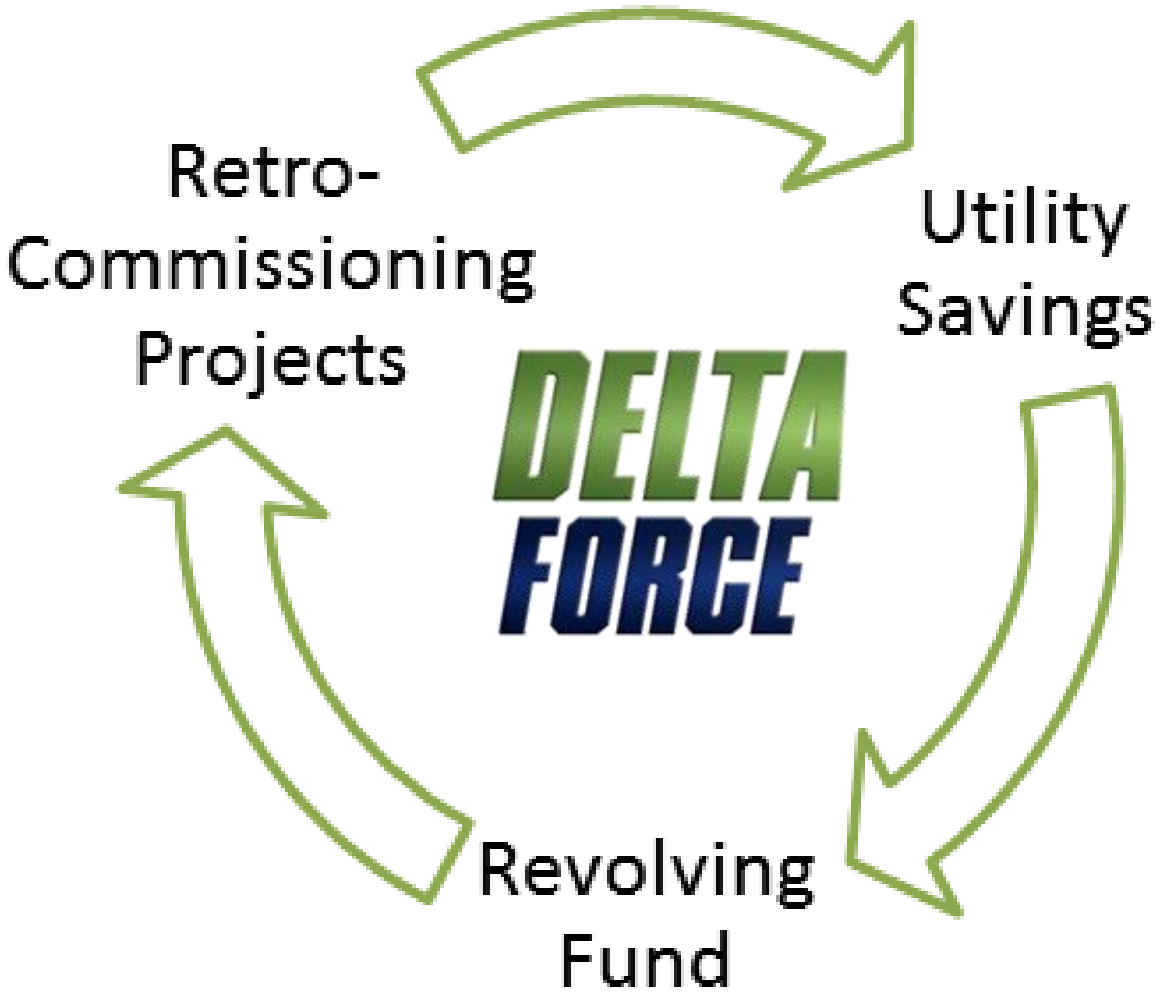


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# Bryan Hall

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# Bryan Hall

## Relamping



L•PRIZE®
WINNER

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## Repair Insulation and Add Insulating Jackets


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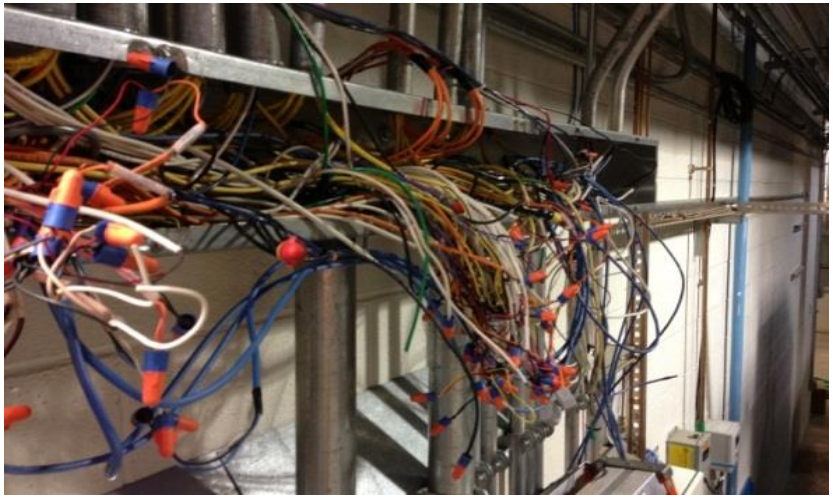
# Bryan Hall

## Upgrade to Digital Controls

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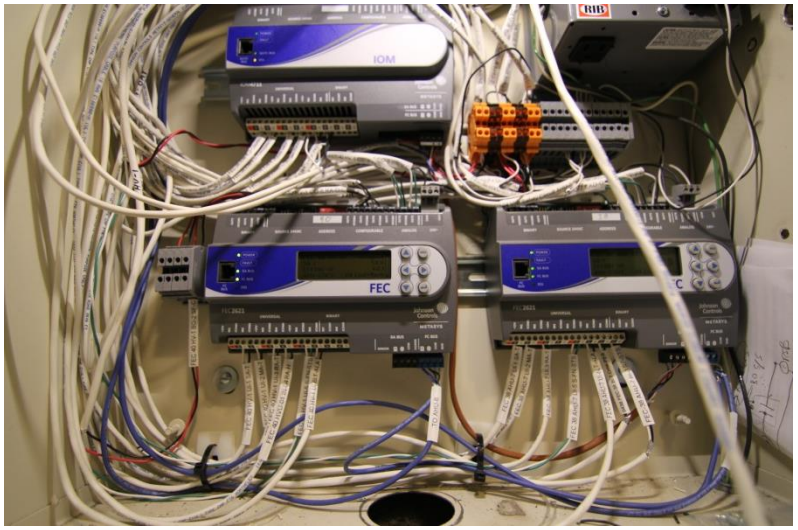
# Bryan Hall

## Upgrade to Digital Controls

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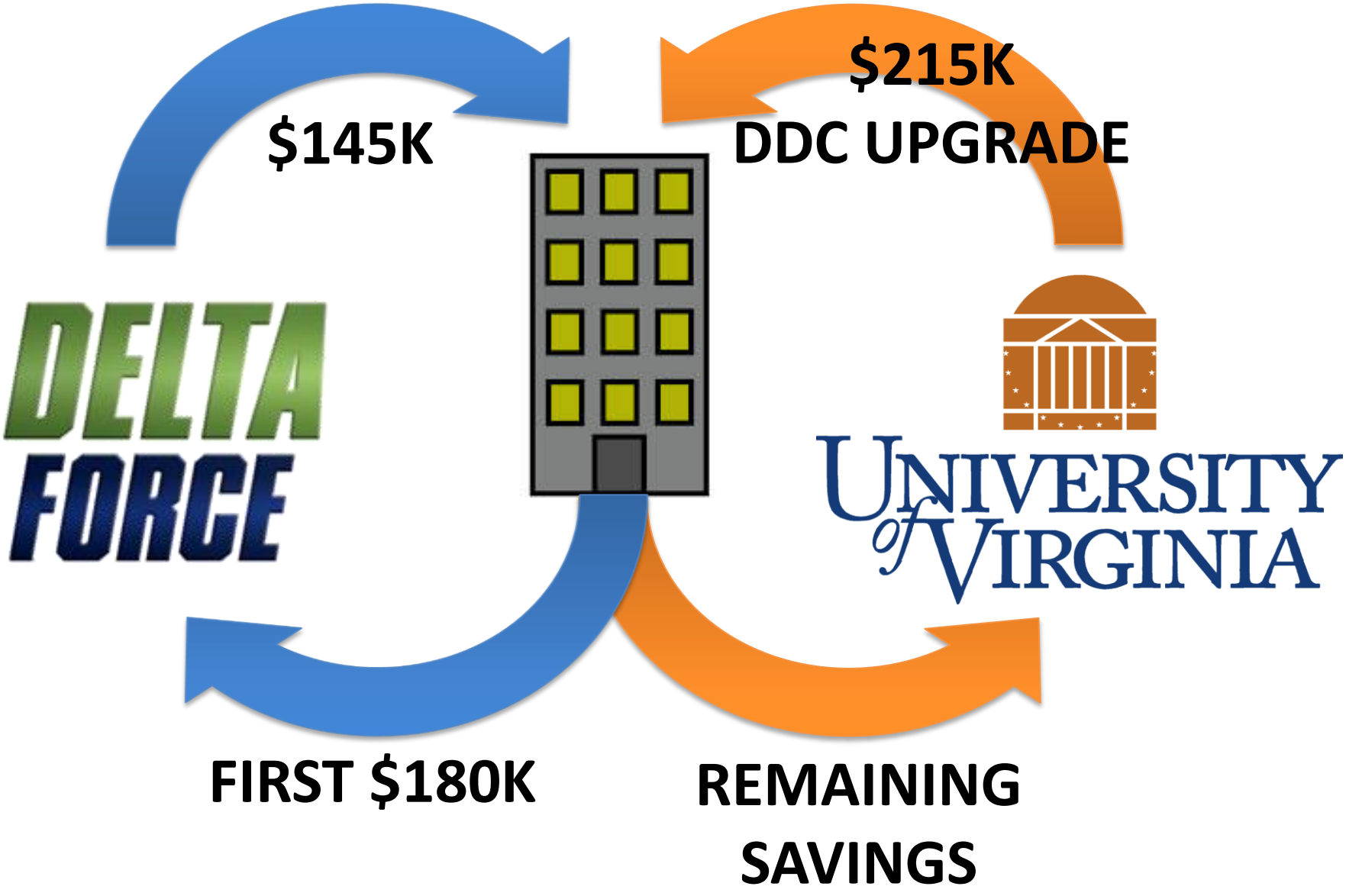
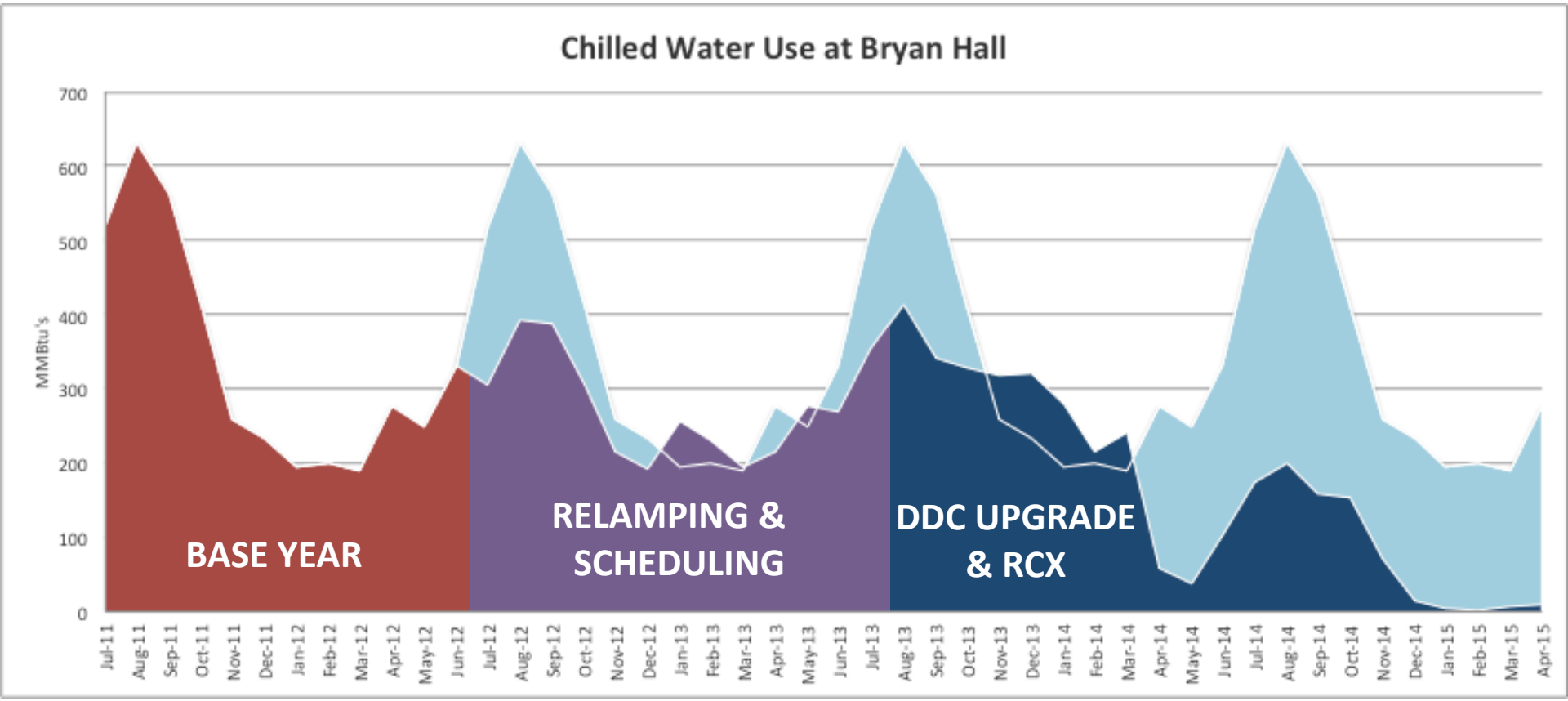
# Bryan Hall Funding



# Chilled Water Use

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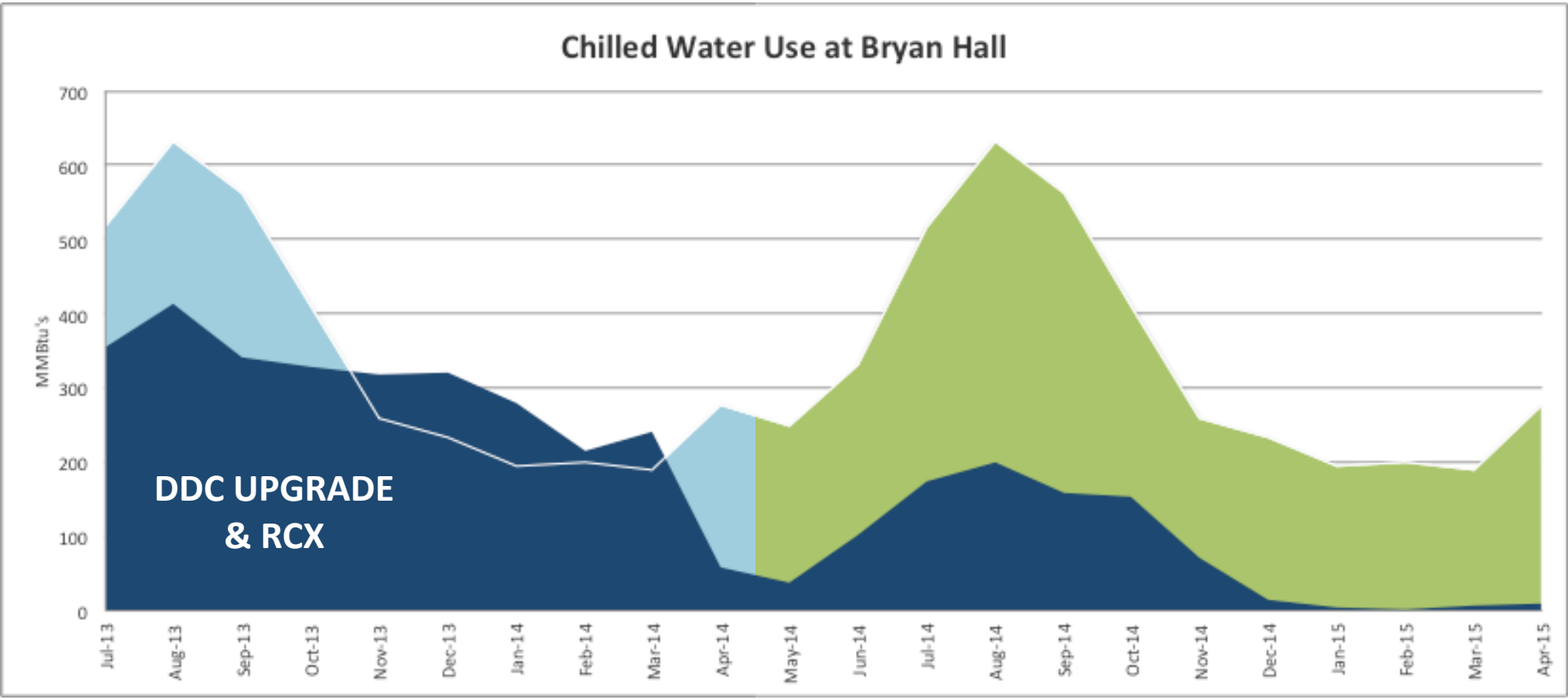
# Chilled Water Use

## Over 75% Reduction Last Year

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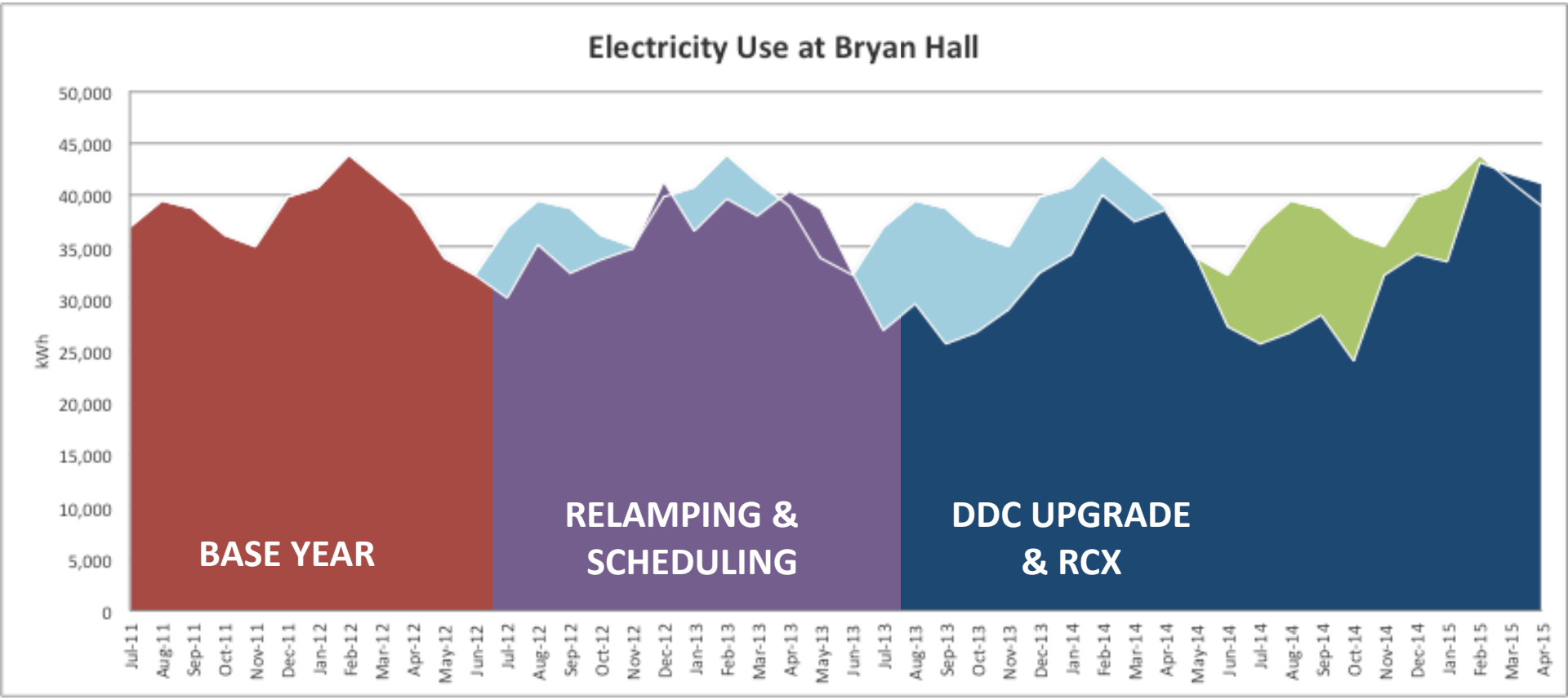
# Electricity Use

## 14% Reduction Last Year

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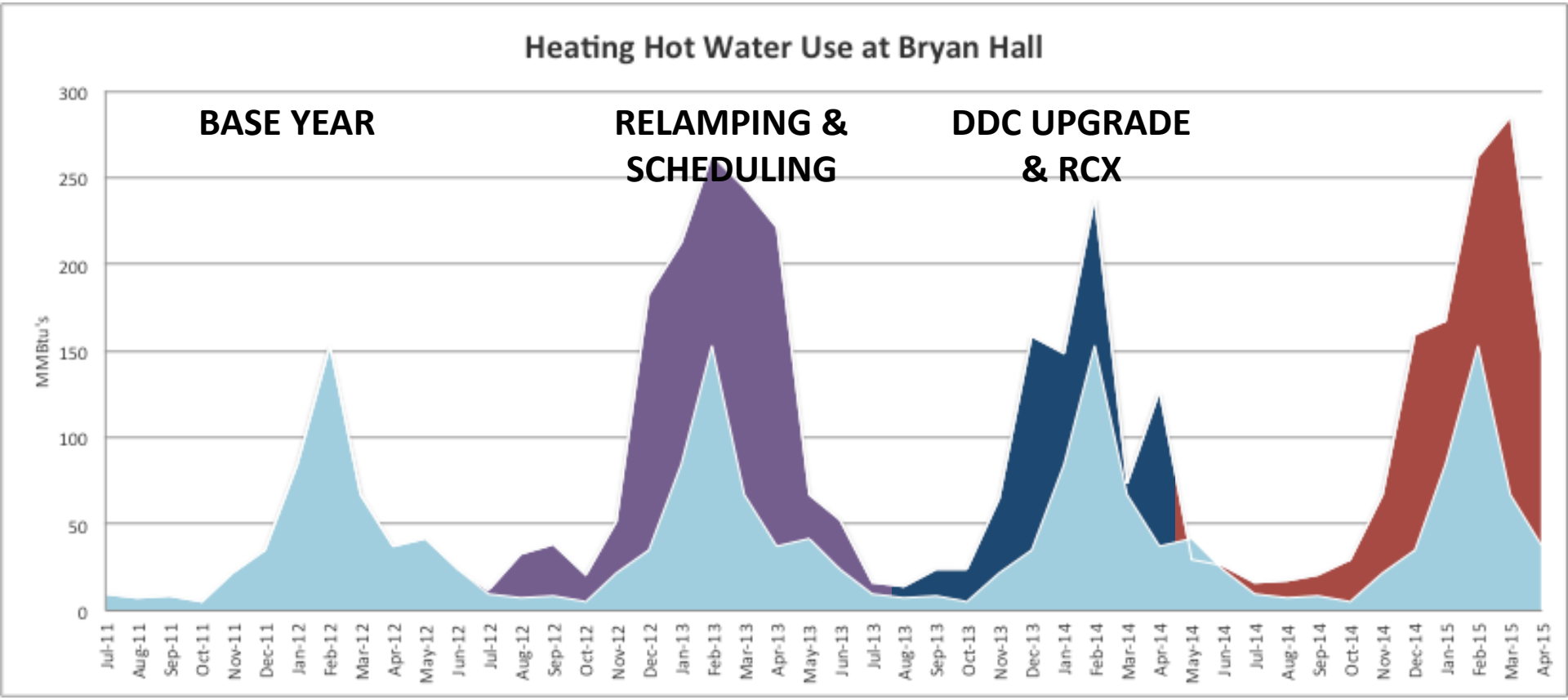
# Heating Hot Water Use

## 150% Increase Last Year

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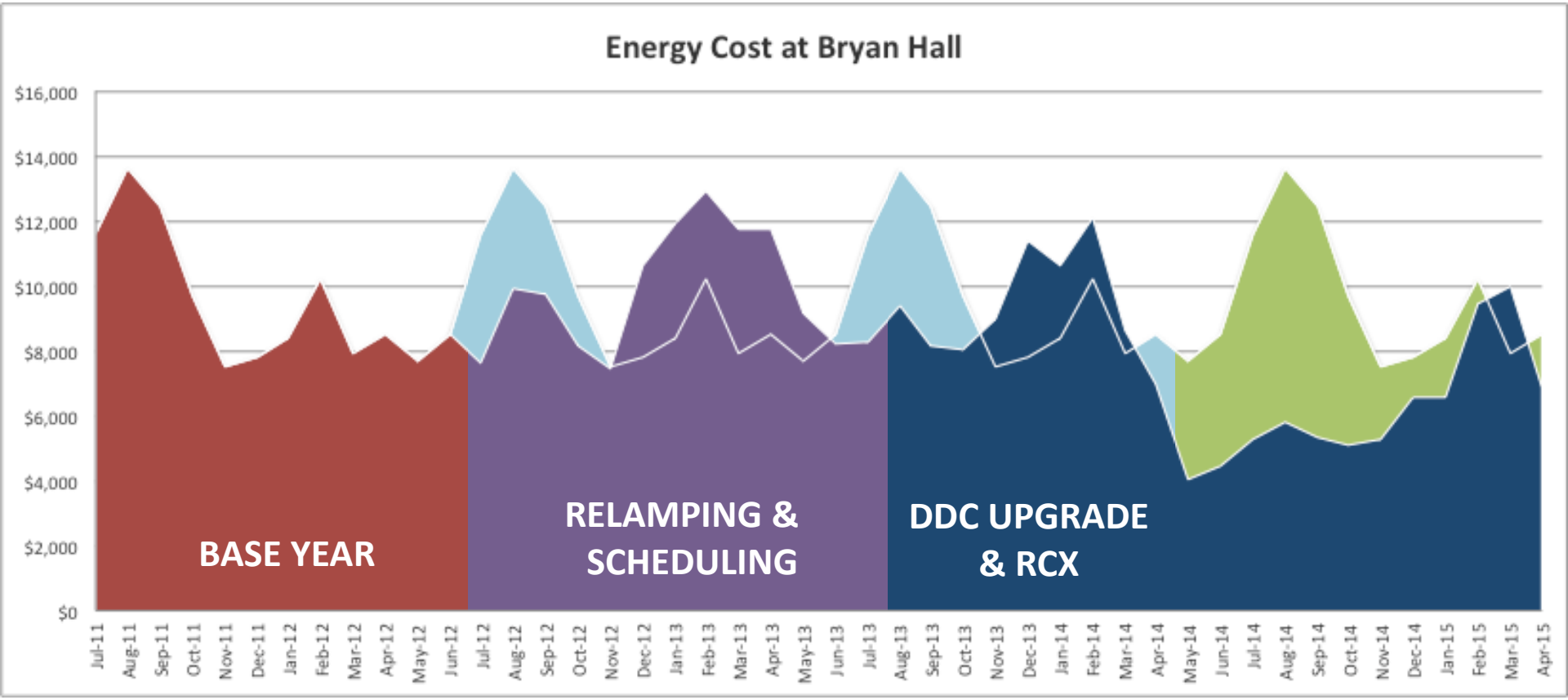
# Energy Cost

## $38k (34%) Reduction Last Year

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# Newcomb Hall

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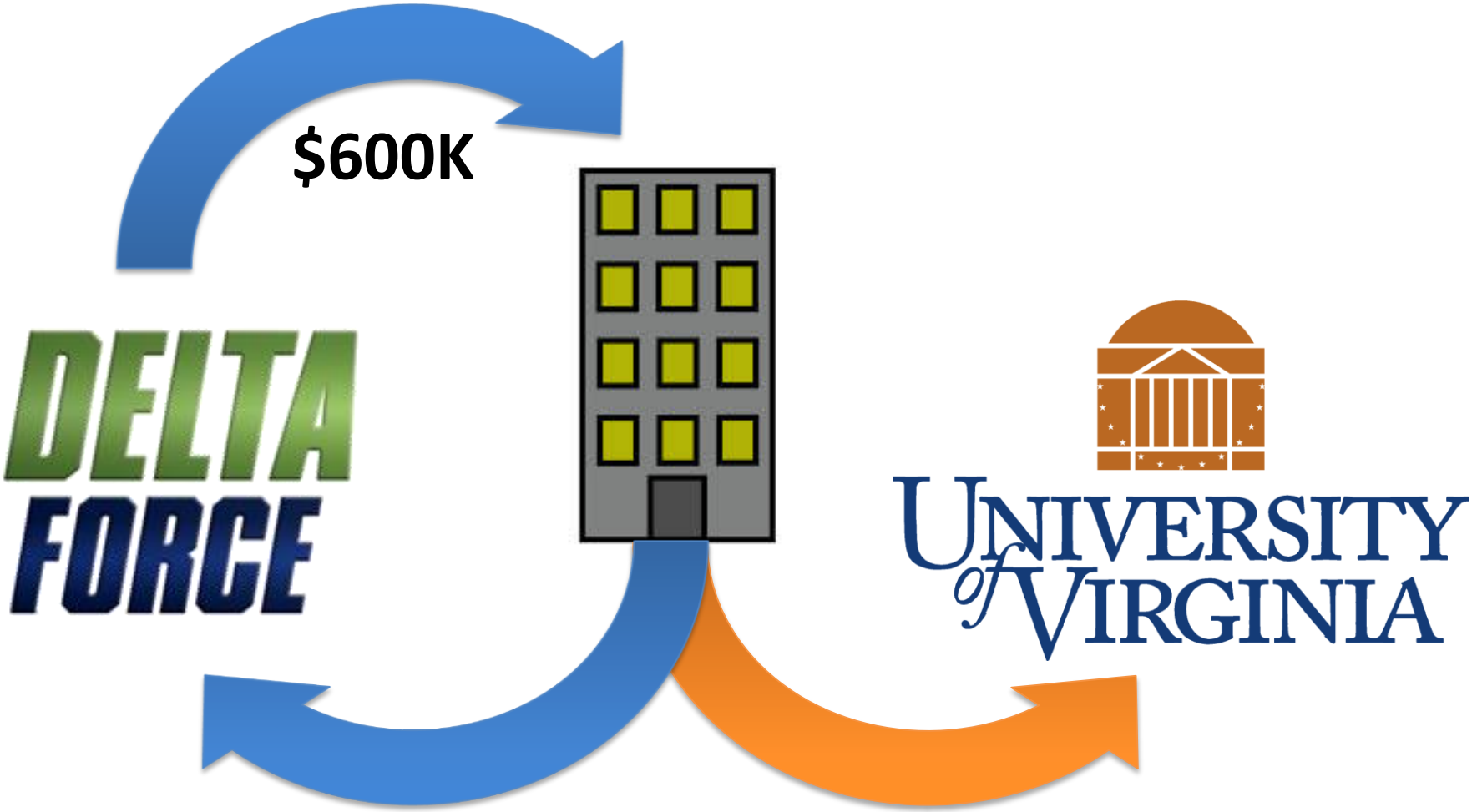
# Newcomb Hall Funding

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# Clark Hall

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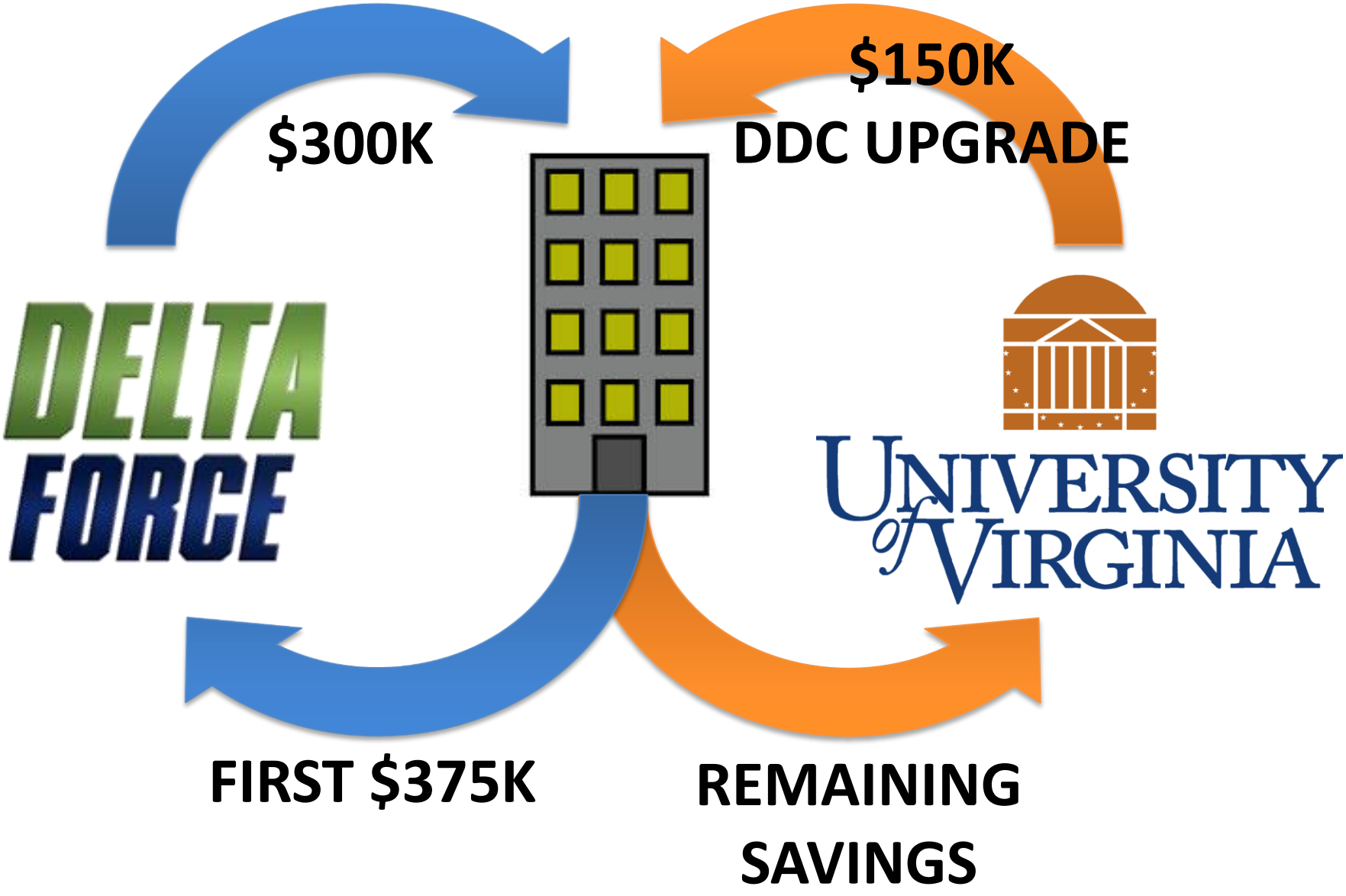
# Clark Hall Funding



# Building Sustainability

BUILDING OPERATIONS AND MAINTENANCE

LEED

LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

*Image: USGBC*

DELTA FORCE

B.O.T.

Green Labs »

*Image: Harvard Office for Sustainability*

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*From the Grounds Up*
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# Gilmer Hall and Chemistry Renovation

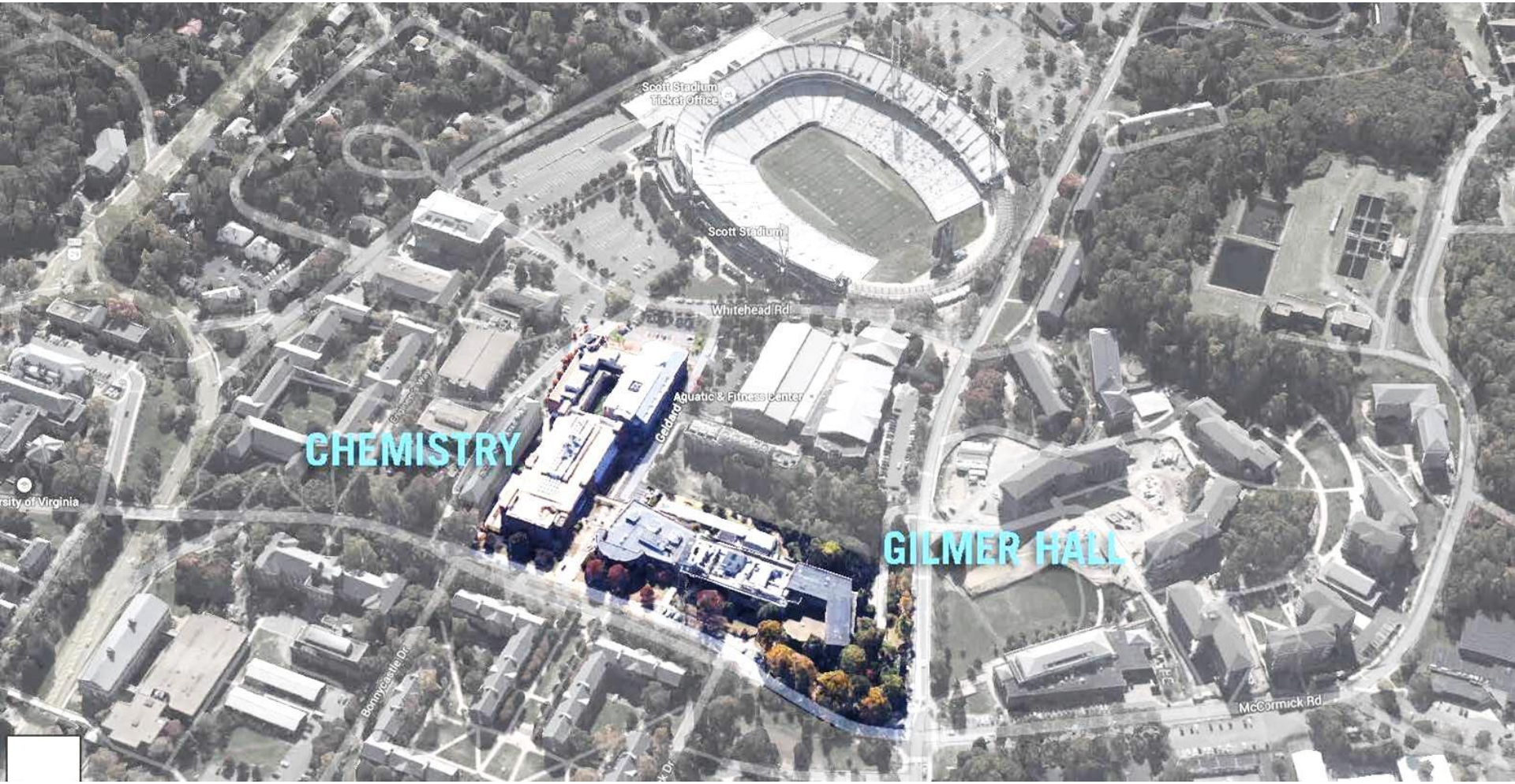


*Image: Perkins & Will*

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# Gilmer Hall Renovation

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SUSTAINABILITY · UVA

# Gilmer Hall Renovation


*Image: Perkins & Will*

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# Gilmer Hall Renovation


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# Gilmer Hall Renovation

**High Efficiency Systems**
Energy Recovery Wheels
Chilled Beams

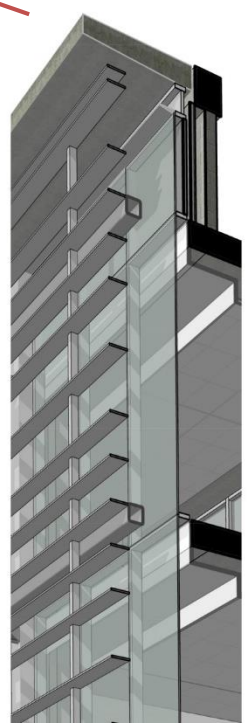
**Water Efficiency**
Low Flow Fixtures
Water Efficient Landscaping

**Design Innovation**
Green Labs Certification
Air Quality Sensing with HVAC Response
Advanced Energy Monitoring & Metering

**Healthy and Responsible Materials**
Nox Testing Over SF-6

**Indoor Environmental Quality**
Daylight Harvesting
Dual Occupancy Sensing
Advanced Lighting Controls

**Energy Responsive Facade**
Insulated Low-e Glazing
Exterior Shading
Improved Building Envelope
Low Albedo Roof



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# Questions

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# Questions & Discussion

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