

# Revamping Campus Infrastructure for Operations and Environmental Savings

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# The Challenge of Infrastructure Renewal



- Over **40 \$Billion** in deferred maintenance nation-wide. *(Wall Street Journal)*



- Colleges & Universities are looking for **additional cash flow streams** to help reduce deferred maintenance.



- **Guaranteed energy savings programs** can reduce deferred maintenance and fund the costs through energy savings.



- 20.4 billion **connected “devices”** in 2020. *(Gartner)*

# Agenda

- Introduction
- McDaniel College
- Infrastructure Challenges
- Energy & Infrastructure Program
- Program Focus - Building Automation Upgrade
- Program Results To Date





McDaniel College

# INTRODUCTION



# McDaniel College – Introduction

- Located in Westminster, Maryland
- Founded in 1867 as Western Maryland College
- Changed the name to McDaniel College in 2002
- Undergraduate enrollment of 1,550 and 525 graduate students



# McDaniel College – Introduction

- Liberal Arts curriculum with 149 full-time undergraduate faculty
- McDaniel is listed in the Colleges That Change Lives, Money Magazine's top 100 Best Colleges, one of The 50 Best Liberal Arts Colleges, and The 50 Most Affordable Private Colleges, among others
- Princeton Review lists McDaniel College as a Best in the Northeast, one of 228 colleges in 11 states chosen
- In 2011, the Weather Channel listed McDaniel College #6 in the top seven Tailgating Schools in the country

# McDaniel College – Campus Overview

- 160 acre campus in Westminster, MD
- 60 buildings including approximately 20 “major” buildings over 10,000 sf, plus a 9-hole golf course
- 1,030,000 Total campus building GSF
- Buildings range in age from over 100 years to about 10 years old
- Annual utility bill of about \$2.5 million



*McDaniel College – Westminster, MD*



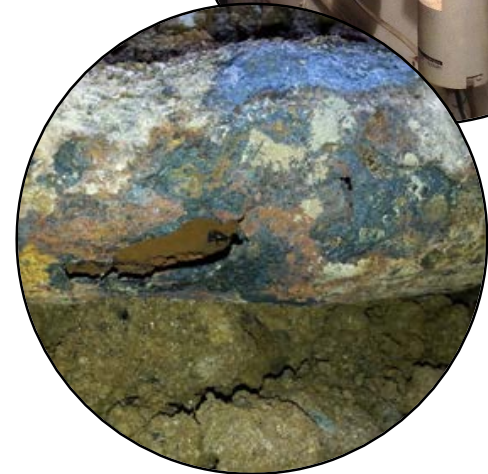
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# INFRASTRUCTURE CHALLENGES



# McDaniel College Physical Plant in 2014

- Major problems hidden behind the walls
- HVAC, controls, lighting, steam plant and distribution, etc.
- Persistent comfort complaints, frequent system failures, high energy costs



# How did Facilities Deteriorate to this Condition?

- **Shrinking net tuition revenue and climbing costs**
- **Competing demands for capital investment**
  - Athletic, Academic, Student Life Programs
- **Lack of focus on facilities maintenance in the past:**
  - Under-investment in physical infrastructure
  - Insufficient training of facilities staff
  - Reactive vs. proactive maintenance and repair program
  - Lack of accountability metrics for facilities team

# How Was the Problem Recognized?

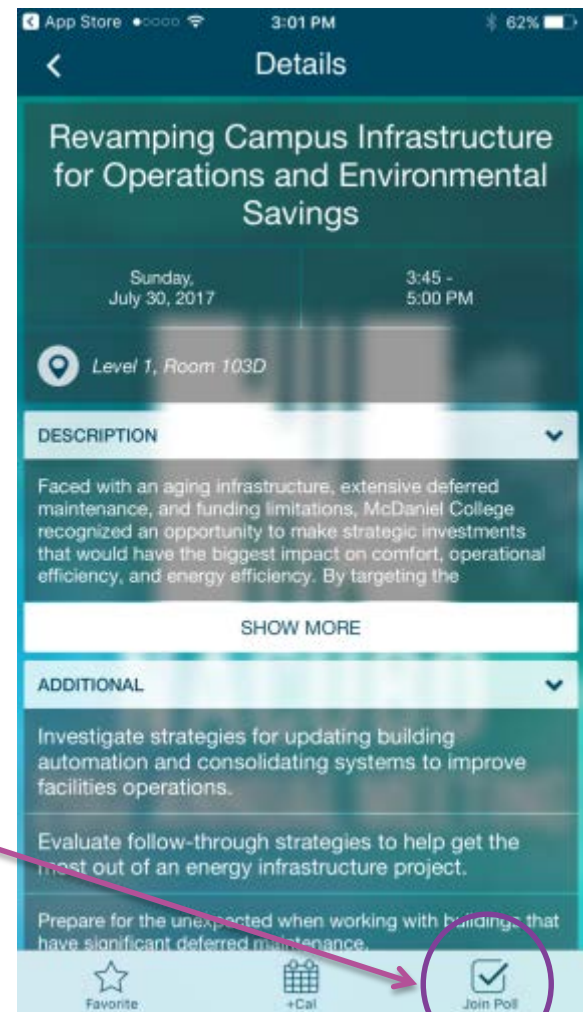
- **A pattern of unexpected power outages**
  - Infrastructure reliability questioned by CFO
- **Continuous comfort complaints**
- **Facilities Condition Assessment**
  - Provided perspective on the magnitude of issues as well as sources of potential opportunity



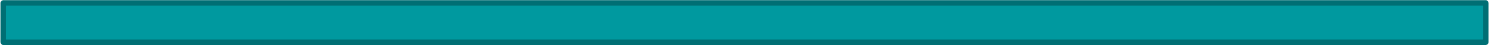


*Failed underground electrical cable*

# Audience Poll

- Open your NACUBO 2017 App
- Tap “**Sessions**” and navigate to the **Revamping Campus Infrastructure for Operations and Environmental Savings**
- Tap the “**Join Poll**” icon along the bottom of the screen. (top right for android devices).
- Select your answer to the question on the next screen.



# Which best describes your institution's effort toward addressing deferred maintenance?

1. We've had a facility condition assessment performed and have a strategy to address outstanding need.  
 0%
2. We've had a facility condition assessment performed, but have no compelling strategy to address outstanding need  
 0%
3. No – no significant assessment has been performed.  
 0%

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# Challenges Faced by McDaniel College

- **Over \$25 million in deferred maintenance**
  - 45% Architectural
  - 35% Mechanical / Electrical/ Plumbing
  - 20% Life Safety
- **Antiquated Campus Infrastructure**
  - HVAC & electrical systems
  - Inoperable Building Automation Systems
- **Extremely limited capital funds**



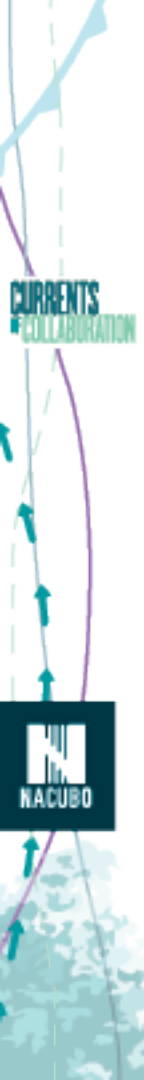


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# **ENERGY & INFRASTRUCTURE PROGRAM PART OF THE SOLUTION**

# Repair and Invest in the Future

- **Solution: Program Focus Given Limited Funding**
  - Ensure reliability of campus infrastructure
  - Improve comfort and energy and operating efficiency
  - Reduce deferred maintenance
  - Invest in technology to drive future operational performance
  - Elevate environmental stewardship





# Program Investment Overview

Energy Measure Category	Energy Only Investment (000's)	Deferred Need (000's)	Total Investment (000's)
BAS Upgrade/ HVAC Refurbishment	\$98	\$917	<b>\$1,015</b>
Steam System Improvements	\$325	\$109	<b>\$434</b>
Chilled Water System Improvements	\$0	\$87	<b>\$87</b>
Lighting Upgrades	\$682	\$228	<b>\$910</b>
Water Conservation	\$279	\$93	<b>\$372</b>
Misc. Measures	\$191	\$10	<b>\$201</b>
Electrical Distribution Repair	0	\$200	<b>\$200</b>
<b>Totals</b>	<b>\$1,567</b>	<b>\$1,653</b>	<b>\$3,220</b>



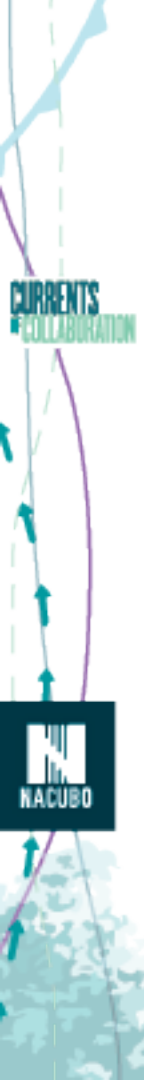
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# **BUILDING AUTOMATION UPGRADES - INVESTMENTS FOR TODAY AND TOMORROW**

**PREPARING FOR THE BIG DATA EVOLUTION IN BUILDING  
AND FACILITIES MANAGEMENT**

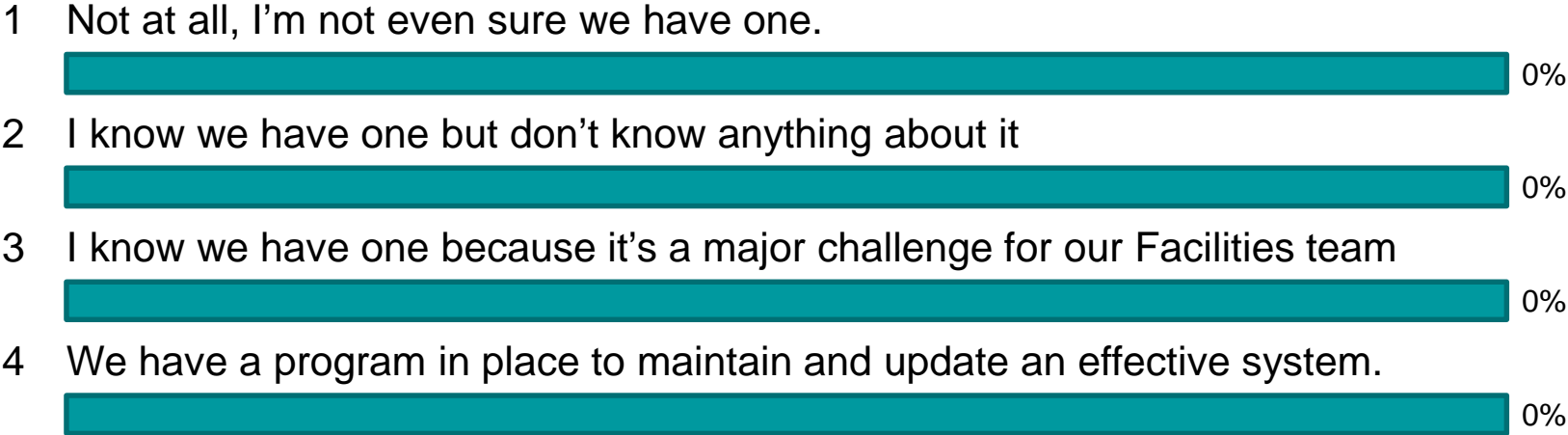
# Why Invest in Building Automation Renewal?

- Provides a **sizeable return** in facilities optimization and campus productivity relative to the investment.
  - Comfort, energy waste and even IT security issues.
- Positions McDaniel to **apply modern FM advancements**, such as Big Data, and Internet of Things (IoT)
- More effective utilization of **O&M staff**
- Allows better management of **deferred maintenance**.



# How familiar are you with your campus building automation systems (BAS)?

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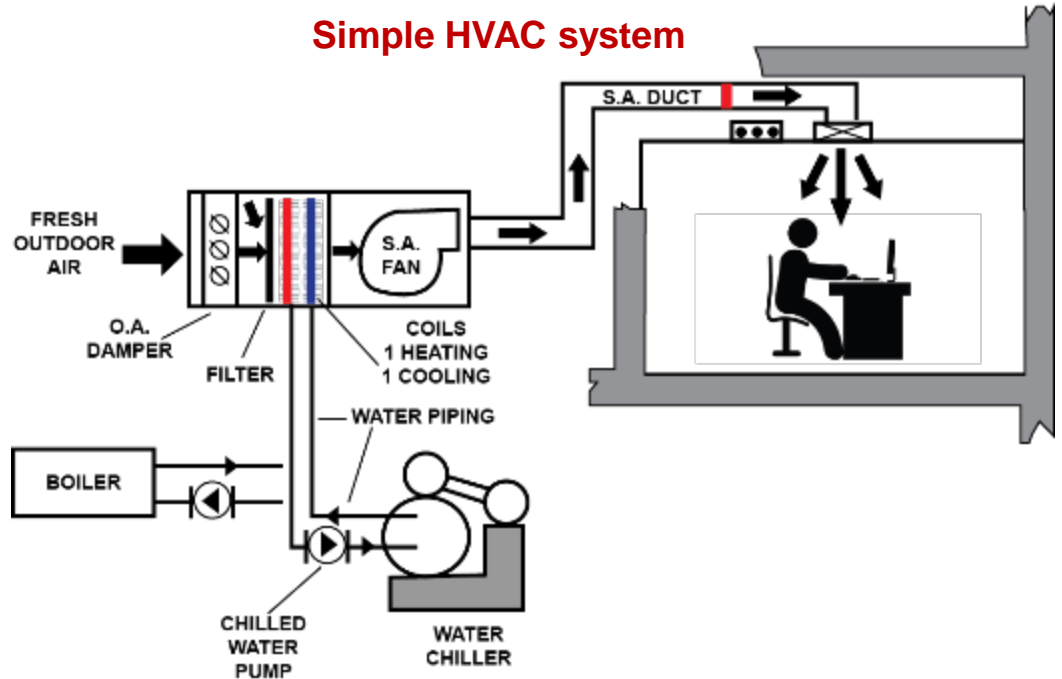


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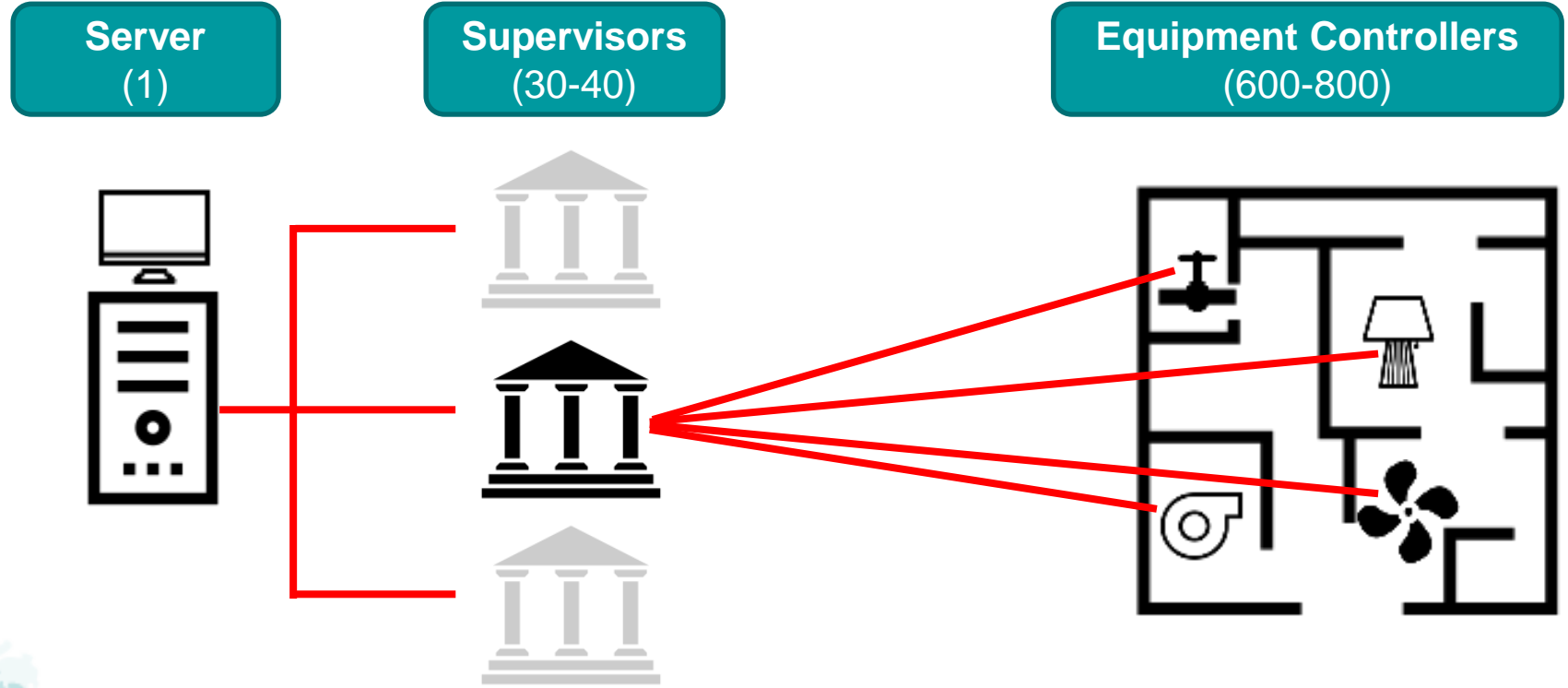
# The Maintenance Productivity Challenge

- 50%+ of work orders are “hot & cold” calls.
- Troubleshooting:
  - Complicated
  - Time consuming
  - Uncommon skill set
- Modern BAS provides better tools.
- Self-diagnostic systems exist today.

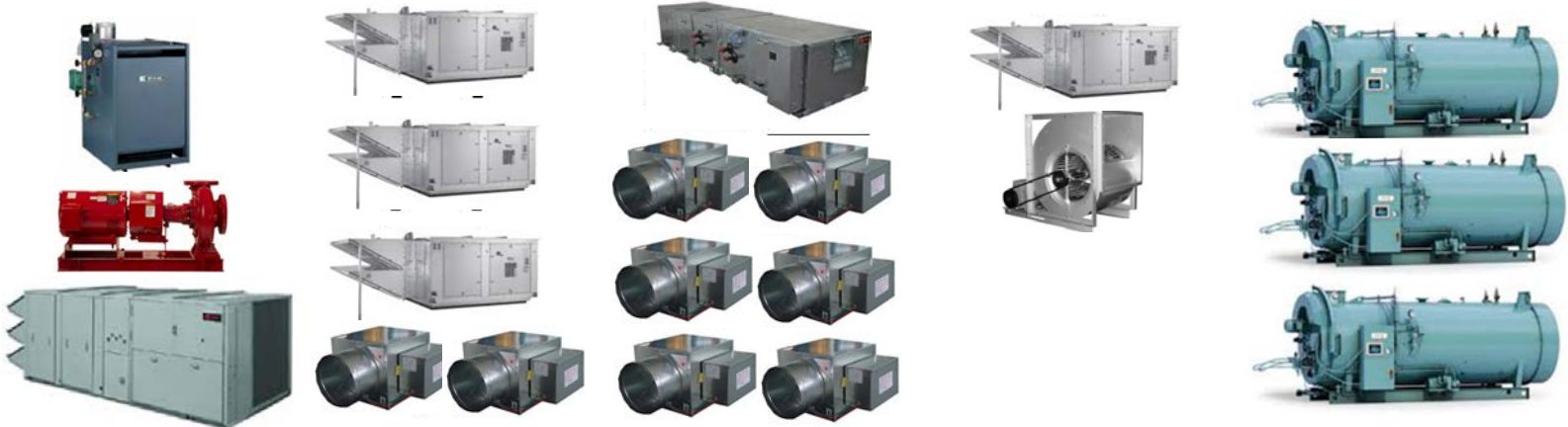
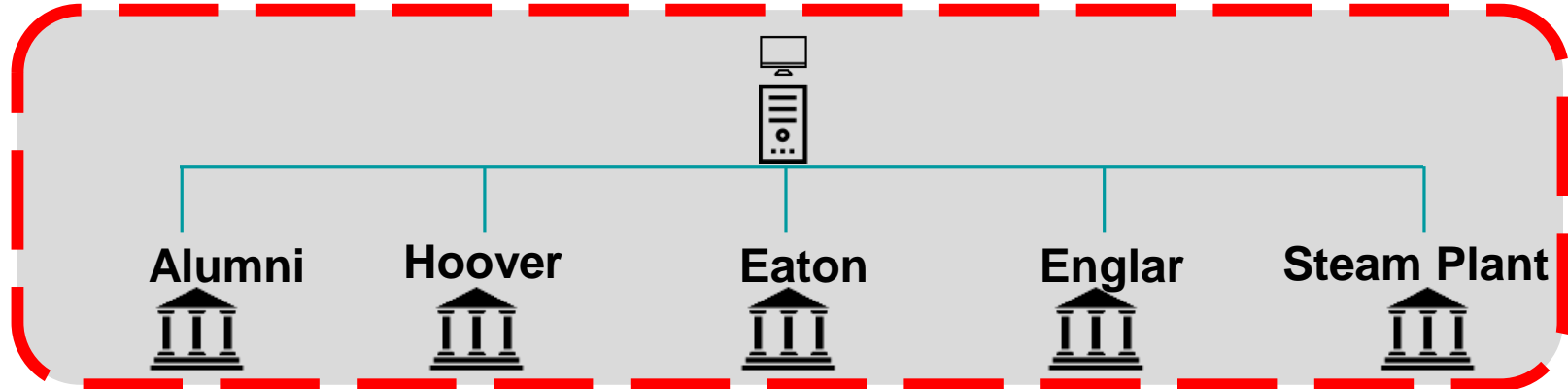


# Understanding a Building Automation System

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# Upgrade Strategy – Focus on Supervisory



# BAS Upgrade Program - Benefits to McDaniel

- **Simplified Troubleshooting**
  - Alarms, Trending
- **Improved Graphics**
- **Training Program / Remote Support**
- **Big Data/ AI / IoT Ready**

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# BAS Upgrade - Critical Project Success Factors

- **Operations Team Buy-in & IT Department Involvement**
- **Deficiency Reporting & Retro-commissioning**
- **Invest in staff training**
- **Select a BAS contractor that recognizes the Big Data opportunities of the future**



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# PROGRAM RESULTS TO DATE

# Performance Metrics



- Annual Guaranteed Savings = **\$400,900** - **13% ROI**



- Greenhouse gas reduction = **1,743 MTCDe** annually

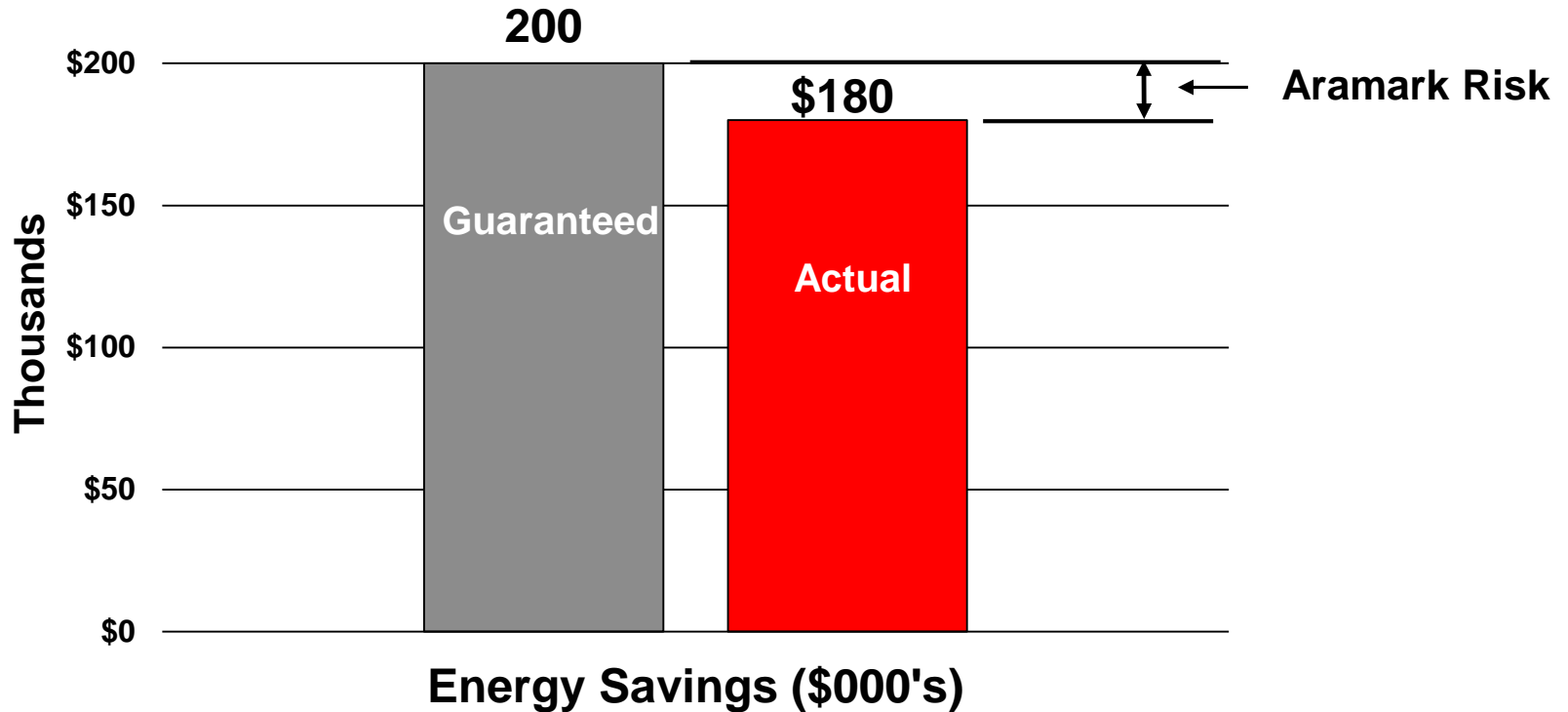


- Water savings = over **6 million gallons** annually



- Eliminate **\$1,653,000** in deferred need

# Project Savings Results - First 6 Months

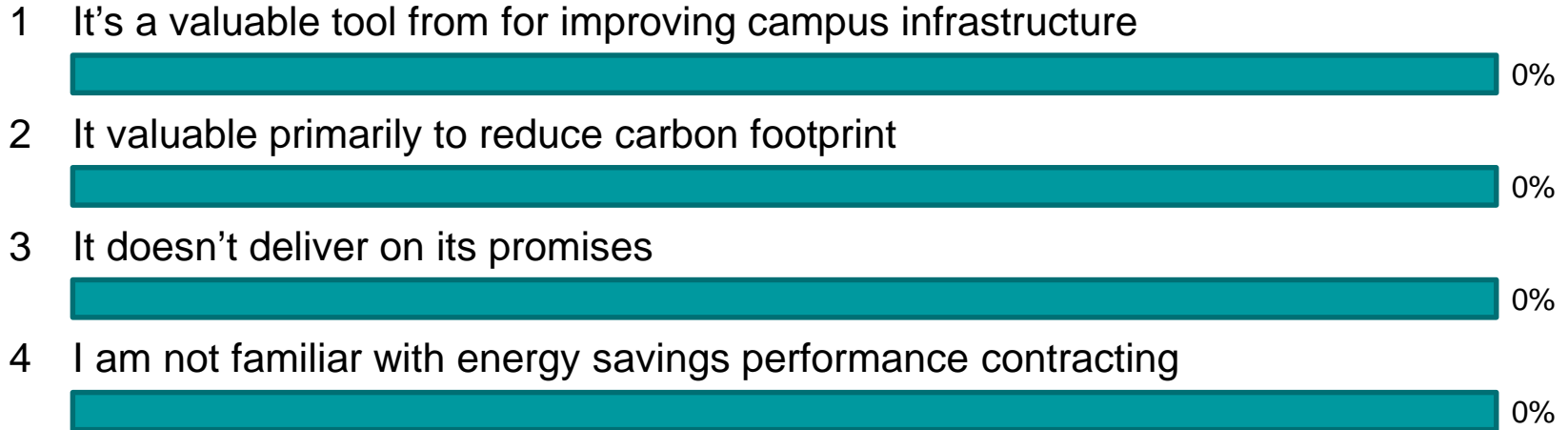


# Energy Savings Verification – 3 Things to Know

- Guaranteed savings vs. metered savings
- Energy cost savings vs. avoided cost
- Look for operational “outs” in savings contract

# What is your impression of energy savings performance contracting?

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# SESSION TAKEAWAYS



# 5 Things to Know, Do, or Ask

## 1. Collaborate with Operations Team

- Status of current BAS? Is it able to take advantage of Big Data/ AI/ IoT offerings that are becoming available?
- Do we have a plan to incorporate it into our operations strategy?

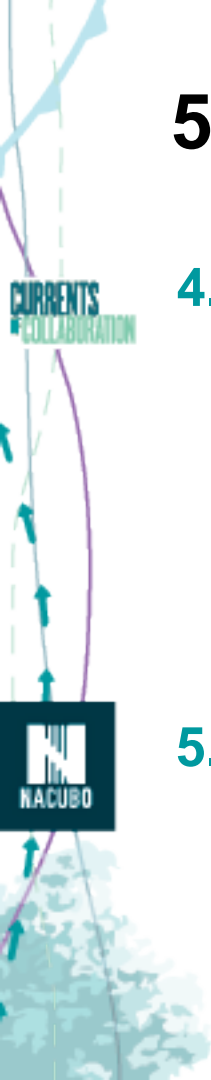
## 2. Incorporate the Capital Projects Team

- Is our new construction BAS and equipment being designed and coordinated to take advantage of technology at a reasonable cost?

## 3. Ensure Operations and IT are working together for all upgrades and planning for the future.



# 5 Things to Know, Do, or Ask

- 
4. **Insist on building / system** performance as a main deliverable for any BAS upgrade program or project.
- Specific performance criteria targets generate the best results.
  - Reporting of deficiencies found at the equipment level when supervisory systems are installed.
  - Commissioning is critical.
5. Start before you **need to**.

# McDaniel College

## QUESTIONS?

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