THE BUILDING EDUCATION SERIES 2016
PRESENTED BY:

AIA Cleveland
CLEVELAND 2030 DISTRICT
ASHRAE Cleveland Chapter
NEO NORTHEAST OHIO CHAPTER OF THE USGBC
Building Enclosure Council
COSA council of smaller enterprises
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Air Force One
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THE BUILDING EDUCATION SERIES 2017:
THE OSWALD BUILDING, 1100 SUPERIOR
7:30 AM COFFEE AND REGISTRATION
8:00 – 10:00 AM PRESENTATION

JANUARY 26: PROJECT FINANCING OPTIONS

MARCH 16: RETROFITS FOR HISTORIC BUILDINGS

MAY 18: ALTERNATIVE TRANSPORTATION

JULY 20: VEGETATED ROOFS

SEPTEMBER 20: LIGHTING, DAYLIGHTING AND AUTOMATED CONTROLS

NOVEMBER 16: BUILDING SAFETY, SECURITY, EMERGENCY PROCEDURES AND DISASTER PREPAREDNESS
OPERATIONS MAINTENANCE AND STAFF AND TENANT ENGAGEMENT

OUR SPEAKERS:

DEBRA DIXON, AIR FORCE ONE

ED REBISH, AIR FORCE ONE

MARC DIVIS, CLEVELAND THERMAL
Debra Dixon  
Director of Business Development, Air Force One

Debra enjoyed her position at AFO for the last three years. She brings her extensive experience in the energy arena where she provided consultancy and procurement services for commercial and industrial users coast to coast.

Ed Rebish  
Building Automation Group Manager for Northeast Region, Air Force One

Ed has 19 years experience in the HVAC field with 16 years in the building automation industry. He has extensive experience with BAS system design, programming, commissioning and integration.
A Roadmap to Sustainability: Operations, Maintenance and Building Occupant Engagement

DEBRA DIXON: DIRECTOR OF BUSINESS DEVELOPMENT
ED REBISH: AUTOMATION GROUP MANAGER

AIR FORCE ONE
OPTIMAL BUILDING PERFORMANCE.
A Shared Big Picture Goal of Being Greener
HOW DO WE GET THERE FROM HERE?
To Achieve TRUE Efficiency We MUST

Create Catalyst for 2 Key Types of Behavioral Changes!

1. Building Occupants – whether employees or tenant

2. Facilities Operations & Equipment Maintenance
CASE STUDY #1
Mandate to Produce & Deliver Products Sustainably

- By 2020 they will reduce its environmental footprint by 60%
- CO2 emissions at ALL plants & distribution centers will be reduced by 60% in _absolute terms_ from the 2005 baseline
- For distribution – the challenge is significant for the on site implementers, the low hanging fruit has been picked and identifying impactful initiatives is difficult at best
Crafting a Pathway to Success

• Create a means of capturing critical data through sub-metering that establishes essential baselines
• Provide empirical data to understand and evaluate projects to reach corporate mandate
• Create a means of occupant engagement
The Air Force One Solution

• Established baseline Emissions Factor
• Monitors CO2 in real time
• Market peers focus exclusively on commodity based factors – not full scope of impact on sustainability
• Ability to segregate and focus on 3 key sectors: HVAC, Data Room & Lighting – to drill down on project impact evaluation relative to 2020 mandates
Tracking meaningful metrics allowed sustainability goals to be met and exceed!
CREATE
Wallboard Example For Lobby

- **Warehouse**: YTD Emissions.
- **Manufacturing**: YTD Emissions.

- **Weather Forecast Right Now**: 75°, Clear.
- **Next Hour**: Clear for the hour.
- **Later**: Light rain starting tomorrow afternoon.


- **Current Demand**: Office - Floor 1: 180 kW.
- **Current Demand**: Office - Floor 2: 254 kW.
- **Current Demand**: Warehouse: 276 kW.
- **Current Demand**: Manufacturing: 252 kW.
CASE STUDY #2
CLASSIC CASE OF . . .

SEE NO EVIL, HEAR NO EVIL, SPEAK NO EVIL
World Headquarters of a Retail Food Services Organization

- Customer enjoys a sprawling single site HQ
- Considerable pain associated with building operation
- Little to no control of facility – essential 24/7 operation
- Cost overruns galore with no real appreciation of the opportunity cost control could afford the organization
TWO CRITICAL POINTS OF ENGAGEMENT

• Maintenance Staff – adjust protocols, expectations and responsibilities
• Department Managers – monitoring and reporting allowed each department to be “sub-metered” in terms of commodity usage and “charged” to their department P&L accordingly
• Additional financial consequences heightened vigilance AND freed up dollars on the facilities budget to undertake other capital projects
CASE STUDY #3
SCHOOL DISTRICT BEHAVIORAL NUANCE

• District engaged in the meter and monitoring program

• Enjoying savings and some interest from its occupants

• Teacher creates a sustainability project based on the tracking found on the wallboard
Wallboard Example For Lobby

- **Office - Floor 1**: Today's Gas Usage - 4 ccf, Last updated at 22:14
- **Office - Floor 2**: Today's Gas Usage - 1 ccf, Last updated at 22:14
- **Warehouse**: YTD Emissions
- **Manufacturing**: YTD Emissions
- **Weather Forecast**: Current: 75°, Clear; Next Hour: Clear for the hour, Later: Light rain starting tomorrow afternoon
- **Current Demand**: Office - Floor 1: 180 kW, Office - Floor 2: 254 kW, Warehouse: 276 kW, Manufacturing: 252 kW
THE NUANCE CULPRIT!
The Hard Facts: Why Maintenance Matters
Need for Behavior Changes are NOT Limited to Building Occupants
HVAC Systems: Optimize - Maintain - Benefit
HVAC Systems

Maintenance saves money

Fewer than half of companies perform maintenance on their building HVAC systems – even though studies show that good maintenance can:

1. Reduce energy costs
2. Extend equipment life
3. Improve occupant comfort
4. Increase uptime.

- Effective maintenance can reduce energy spend by 5-40%
- HVAC needs ongoing maintenance or performance can suffer.
HVAC Systems

Efficiency is key

- When manufacturers determine efficiency ratings, the equipment is new, and in a clean, controlled environment.

- Maintenance keeps equipment in best condition possible to preserve its efficiency and extend its life.

- Frequency depends on the environment and the type of equipment.
Chiller System

Chilled Water Loop
- Restricted tubes/build-up and poor water quality can reduce heat transfer
- Reduces Efficiency
- Chiller has to use more energy to meet the same building demand

Cleaning tubes and implementing water treatment can result in an energy savings from 10-35% depending on severity of existing conditions

Condenser & Cooling Tower Loop
- Restrictions/build-up and poor water quality can reduce heat transfer
- Tower Fans/Pumps have to run harder to cool condenser water
- Chiller will run harder and can even shut down from inability to reject heat

A 20% reduction in condenser flow rate will result in a 3% increase in energy consumption at full load conditions.
Chiller System

Air-Cooled Systems
- Dirty, restricted condenser coils reduce heat transfer
- Condenser Fans have to run harder to move the air across the coil
- Chiller will run harder and can even shut down from inability to reject heat

Cleaning condenser coils can result in energy savings from 10-30%

All Chiller Systems
- Incorrect Refrigerant Charge (Over/Under)
- This can be due to leaks, improper service etc.
- Reduces efficiency and effectiveness

Fixing leaks and maintaining proper charge can result in energy savings up to 20%
Steam Systems
- Restrictions/build-up and poor water quality can reduce heat transfer
- Improper Air/Fuel Mixture results in poor combustion efficiency
- Malfunctioning Steam Traps dramatically reduce efficiency and are dangerous!

Even a well maintained Steam System experiences failure of about 10% of the steam traps every year.

Hydronic Hot Water Systems
- Restrictions/build-up and poor water quality can reduce heat transfer
- Improper Air/Fuel Mixture results in poor combustion efficiency

Have Combustion Efficiency analyzed every year to maintain efficiency at highest level
System Pumps

- Pumps that do not get bearings lubricated can end up overheating and seizing
- Rebuild & Replacement are both costly
- If no backup pump is present, downtime can occur

Backup pumps should also be exercised frequently to make sure they will run if/when needed.
Air Handling System

Filters & Indoor Coils
- Air Filters that remain unchanged for too long start a domino effect
  1. Dirt & Debris penetrate and pass through filter media
  2. Dirt & Debris then penetrate and obstruct coils
  3. Dirt & Debris then pass through & cling to the blower wheel blades
- Airflow/Heat Transfer/ Efficiency all are reduced
- Fans work harder or have to speed up to compensate for restrictions
- Dirt & Debris particles often make it to the conditioned space

Changing Filters often, cleaning coils, cleaning blower wheels can result in 10-30% energy savings.
Air Handling System

Belts
- Loose, unchanged belts cause numerous issues
  1. Reduce Airflow, Heat Transfer, Efficiency
  2. Reduce Heating/Cooling Capacity
  3. Can cause fan motors to speed up to compensate
- Belts that break cause downtime, possible equipment damage
- Over tightened belts also cause numerous issues
  1. Premature belt wear/failure
  2. Premature pulley wear/failure
  3. Premature bearing wear/failure

Changing belts at the proper intervals and proper tension help maintain the efficiency and extend life of critical components
BAS Systems

- BAS Systems are very useful tools and provide great information.... If they are actually used!

- Keep systems backed up and updated to stay current

- Keep them easy to access and use

- Tablet and Smartphone access is also very important

43% of BAS Systems are underutilized and prevent an additional 15-30% of Energy Savings
Easy to Monitor – Easy to Maintain

Find Problem areas quickly so corrective actions can be implemented quickly.
Graphics Are Key

Operators vary in skill level and background – Make it as easy as possible
Graphics Are Key
Case Studies

Chiller System

System Pumps

BAS System

AIR FORCE ONE®
OPTIMAL BUILDING PERFORMANCE.
Questions?
Thank you for your time and interest today!