# Sustainable Operations & Maintenance Programs

APPA Institute
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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

## Course Description

This course will provide an overview of O&M programs that are striving to be sustainable. This interactive session will explore what sustainability means to facilities managers, review the many questions and challenges presented by sustainability, as well as share practical success stories from around the country. Topics will include how campuses are structuring their sustainable O&M programs, current trends & new initiatives in waste management, water & energy conservation, tree & turf care, green cleaning, pest control, and more. The session will also look at developing appropriate metrics and how to effectively use them in related outreach programs.

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## Learning Objectives

1. Explore what sustainability means to facility managers
2. Review the questions and challenges presented by sustainability
3. Learn the current trends and initiatives in waste management, electrification, tree & turf care, and more
4. Share practical stories from around the country.

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## Personal Introduction

- Division of Infrastructure & Sustainability
- Sustainability Program Manager as of 1/1/17
- Formerly the Assistant Director for Environmental Operations
- Former programs
  - In-house waste collection & processing
    - Recycling, composting, solid waste
    - On campus recycling facility
    - Service contracts
  - Integrated Pest Management
  - Wildlife management
- Current Focus
  - Operational support
  - High Performance Construction
  - Electrification

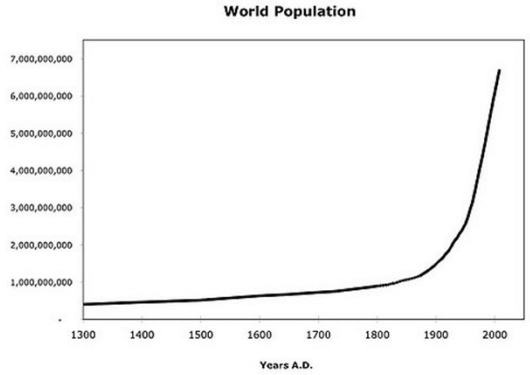
## Course Goals

- Explore the definition of 'Sustainability'
- Link sustainability to accepted / existing practices
- Share examples of initiatives striving for sustainability
- Demonstrate the role of O&M
- Explore challenges and pitfalls
- Review role of certification programs
- Link metrics to outreach

## Introduction: Why Should We Care?

1 Billion more people roughly every 14 yrs.

- 1B – 1804
- 2B – 1927 (+123 years)
- 3B – 1959 (+32)
- 4B – 1974 (+15)
- 5B – 1987 (+13)
- 6B – 1999 (+12)
- 7B – 2012 (+13)
- 8B – 2026 (+14)
- 9B – 2042 (+16)




## Definition of Sustainability?

Compliance vs. Sustainability

~ Compliance with est. rules, regulations, policies - mandatory

~ Sustainability addresses impacts and issues beyond required compliance

Sustainability Initiatives vs. Sustainable Initiatives

~ Few programs can be considered 'sustainable' at this time

~ Many programs are striving for sustainability….difficult to achieve

## Easier to Define than to Achieve

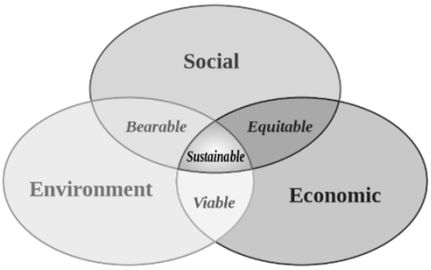
7th Generation Principle

The "7th generation" principle taught by Native Americans says that in **every decision**, be it personal, governmental or corporate, we must **consider how it will affect our descendants** seven generations into the future.

Generally speaking:
Meeting your needs without causing immediate harm or impacting the ability of others to do the same (in the future)

- **long-term view**
- **forward thinking**
- **comprehensive planning**

## Today's facilities manager must look for balance among the 3 pillars.




Thoughts?

## SUSTAINABILITY

**Is / Should be About**

- Everyone's job / responsibility
- Continuous Improvement
- Long term
- Data & metrics driven
- Interconnected
- Collaborative
- Consistent
  - In effort, not approach
- Adapted to regional conditions / realities

## Sustainability as it relates to accepted and applied Terms & Practices

- Total Quality Management (TQM)
- Continuous Improvement (CI)
- Data Driven Decision Making (DDDM)
  - Focus within APPA
  - Used by NACUBO
    - Nat'l Assoc. of College & University Business Officers
- Total Cost of Ownership (TCO)
  - HIGHLY relevant to sustainability
    - Incorporates life cycle costs as well as concept of 'Externalities' **
    - Goes beyond compliance

    ** ***externalities = uncompensated environmental effects of production and consumption***

    ***Examples?***

## Continuous Improvement as a Driver of Sustainability

- Notion can be daunting but offers flexibility
  - Will it ever end?!
  - Can't achieve everything at once
  - Will always be a next phase or second chance of sorts
  - Under promise and over deliver
- Routine updates, maintenance as important as continuous improvement…*Drift!*

## Drivers of Continuous Improvement

- Change, in general
- Time
- Staffing turnover
- Wear & tear: equipment, vehicles, infrastructure
- Changing profile: waste; energy; space; demographics
- Cost of utilities
- Scarcity of resource
- Changing climate: campus; city/county; state; national

- Campus Goals / Initiatives

## 'Zero Waste' Epiphany

- Zero Waste defined as a minimum of 90% landfill diversion
- Athletic Dept. & Chancellor fixated on the last 10%
  - "What will we do with athletic tape?!"
- New approach: equated ZW goal to that of a 'Zero Accidents' program on a construction site
  - Becomes part of the daily planning and process
- Zero Waste goals became the driver for Continuous Improvement

## Getting Started – aim high but start 'small'

Win – Win – Win

- Financial
- Environmental
- Social
  - Housekeepers
  - Laundry staff




## Sustainability Initiatives

- Integrated Landscape Management
- Wildlife Management
- Zero Waste Events
- Energy Management
- M&O Waste / C&D waste
- Reporting & Certifications
- Metrics

## Integrated Landscape Management

Elm Bark Beetle example

- Campus lost hundreds of mature (80+ year old) American Elms in 1980's
- Only 34 remain
- Annual (preventive) spraying of all trees during spring break (regardless of need)

## Solution / Results

- Sanitation pruning
  - Dead & dying wood
- Annual inspection (students)
  - Is treatment needed?
- Soil injections instead of synthetic broadcast sprays

## Soil Injections

## Wildlife Management

Research ponds example

- Beavers damming up pond connectors
- Flooding adjacent areas
- Mature trees lost
- Repeated relocations
- Costly

## Solution / Results

- 'Beaver Deceivers' installed
- Water level stabilized
- Mature trees wrapped and protected
- Relocation unnecessary
- Resource limits regulate population

Sustainable?

## Zero Waste Athletic Events

Folsom Stadium example (Pre 2008)

- Recycling only outside gates and tailgate lots for decades; no composting
- Disposables used throughout stadium
- Significant waste produced each game
- Unserved food thrown away
- Sourcing of products not a concern
- Sponsors and vendors not particularly 'green'


## Solution / Results

- Everything inside security perimeter now 'Zero Waste'
- Established recycling & composting stations; eliminated public trash cans
- Converted most landfill items (low value plastics) to compostable ware
- Expanded use of reusable serving ware
- Contract, sponsor and vendor reform
  - Esp. those selling/serving or giving anything away
- Improved sourcing
  - Food, paper (publications), shirts for volunteers
- Game day diversion rate more than doubled
  - <40% (2007) to >90% (2014)
  - Holding steady at >85%

RALPHIE'S GREEN STAMPEDE

- *Numerous other energy, water, and transportation initiatives*

## Landfill Diversion Rate

**Lbs. of Diverted Materials**
**(Recycled, Composted, Re-used / Donated)**

_____ x 100

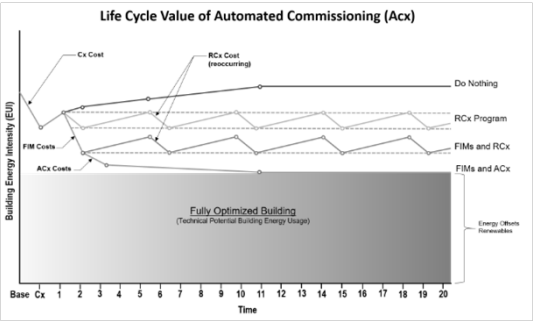
**Lbs. of Diversion + Lbs. of Landfill**
**(Total Waste Generated)**

## Sustainable?

Table exercise – 10 min.

- 5 min w/ group
- 5 min report out

## Energy Management Saw-tooth



## Montana State University M&O

Residence Hall Upgrades

- Replacing ~900 platform beds with 'loft-able' beds
- Voluminous waste destined for landfill
- Work began on graduation day
- Student supported effort

## Solution / Results

Reduced disposal costs

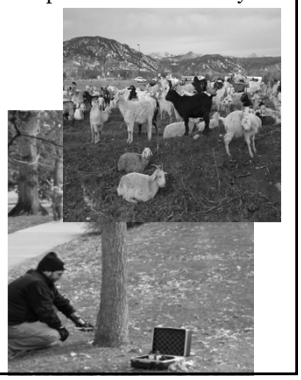
- 100% of metal lofts recycled (15,000 lbs.)
- 78% of wood from beds repurposed.
- ~700 mattresses recycled

Collaborative effort

- Meaningful student involvement
- Potential to help underserved community – temporary housing for homeless
- Leveraged event to collect other items (food, electronics, spare change)


UCB Outdoor Services – Champions of Sustainability

- Pesticide use reduction
  - Turf – none since 2012
  - Trees – trunk injections
  - Beds – steam machine
- Noxious weed management
  - Goat grazing
  - Insect bio-controls



- Synthetic fertilizer redux
  - Compost tea
  - Dry poultry waste
  - Aggressive cultural practices

- Fuel use reduction
  - EV's
  - E-bikes
  - Handheld tools

- Zero Waste
  - Outdoor ZW stations
  - Organics diversion
- Water conservation
  - Weather based irrigation
  - Leaky head/valve detection
    - Mosquito habitat redux
- Pollinator protection
  - Colony protection & relocation
  - Pollinator gardens

## Summary

Your Shop / Trade / Operation doesn't have to have a specific focus on sustainability to implement sustainable practices…

- Waste Management
  - Co-collections in custodial, grounds, food service
- Recycling as a "Gateway Drug"
  - Aggressive recycling, reuse, repurposing
  - Paint cans, carboys, scrap metal, electronics, pallets
- Purchasing
  - Office supplies, M&O supplies, food
  - Recycled content; packaging
  - Carbon footprint / embodied carbon
- Green Office:
  - Energy & water conservation
  - Reusables use – mugs, plates, utensils
  - Paper use

## Other Opportunities

- Use of less toxic chemicals
  - Cleaning supplies
  - Adhesives
  - Finishes
  - Carpet, composite materials, furniture
- Pesticide use reduction
  - Request IPM for your shop space
  - IPM design standards
- Travel
  - Bus, shuttle, rideshare, train
  - Carbon offsets
- Vehicle / Fleet
  - Use of E-bikes
  - EVs, PHEVs, Hybrids
  - Bio-diesel, CNG

## Win-Win-Win

Financial, environmental, and social benefits!

## Elevator and Fire Suppression Technicians

## Sourcing is one of the most impactful ways to make strides on the Social leg of the sustainability stool.

~ Applies to both services and purchasing

~ Look at both contract and vendor reforms

- Support of small & medium sized (local) women & minority owned businesses
- Green manufacturing practices
  - Local protection of resources
  - Chemical use
  - Renewable energy use
- Packaging – redux, take-backs
- High performance certifications – i.e., EPA Energy Star ®, LEED
- Country of origin – many health & environmental implications

## Role of Certification Programs…not to be confused with competitions or challenges

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

LEED – LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

## Third-Party Sustainability Frameworks

- STARS (Gold 2010, '14, '18, '21)
  - Academics / Research
  - Engagement
  - **Operations**
  - Planning & Coordination
  - Innovation
- LEED
  - Sustainable Sites
  - Water Efficiency
  - Energy and Atmosphere
  - Materials and Resources
  - Indoor Environmental Quality
  - Innovation / Regional Priority / Pilot

STARS GOLD AASHE

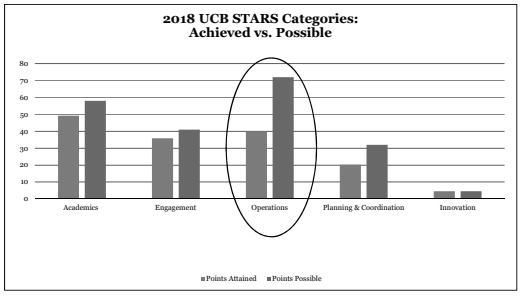
U.S. GREEN BUILDING COUNCIL LEED USGBC

The Sustainability Tracking, Assessment & Rating System™ (STARS®)

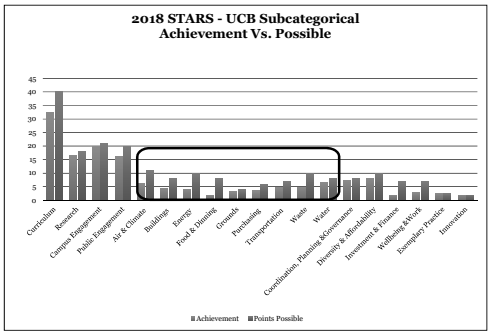
A transparent, self-reporting framework for colleges and universities to measure their sustainability performance.

STARS is designed to **Provides a Roadmap**

## STARS: UC Boulder Gap Analysis




## STARS



# LEED

**Leadership in Energy and Environmental Design** (LEED) is a third-party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings.

Sustainable Site

Water Efficiency

Energy & Atmosphere

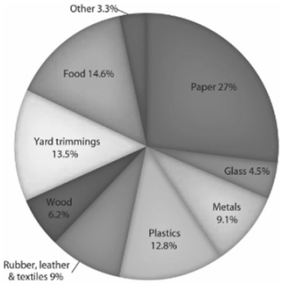
Materials & Resources

IEQ

Innovation / Regional Priority

Images from USGBC

# Metrics 101

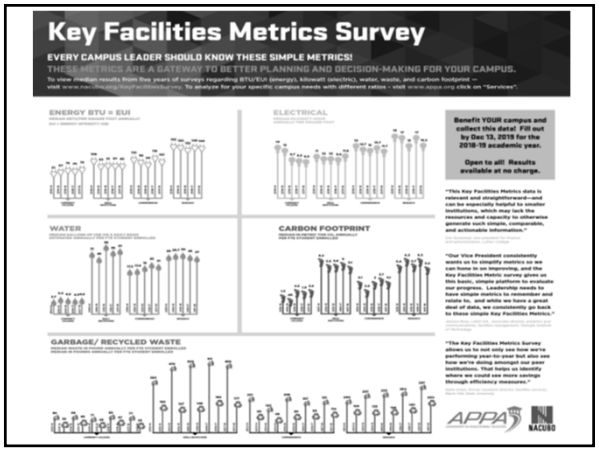


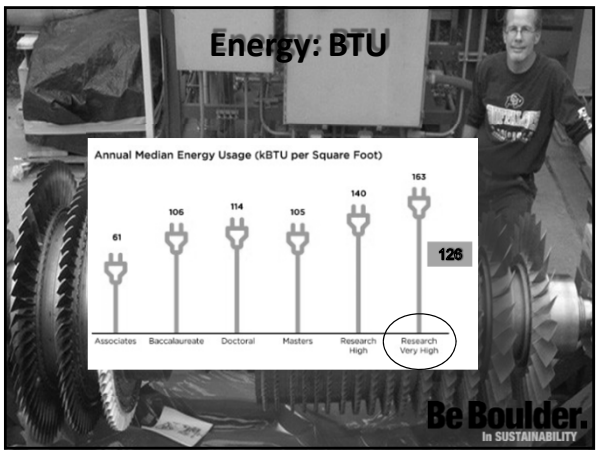

# Foundational Metrics

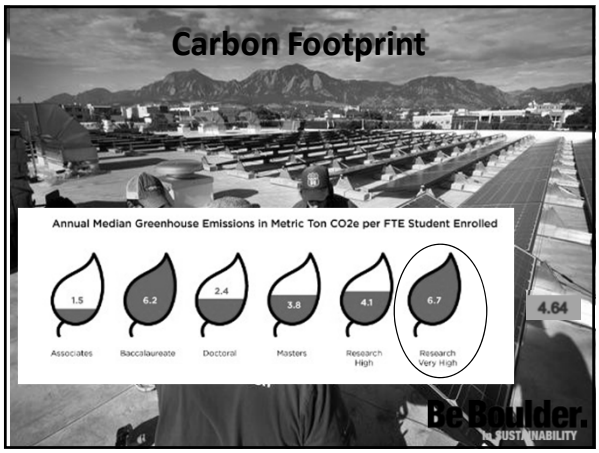
- Begin with the end in mind
  - Have a vision for your metrics
    - What do you hope to demonstrate? What story to be told?
  - Build room for expansion, evolution
- Establish minimum data collection needs in the core areas:
  - Environmental (Planet)
  - Social (People)
  - Fiscal (Profit)
- **Good metrics will provide clarity, confidence, and justification in decision making**
  - **Examples?**

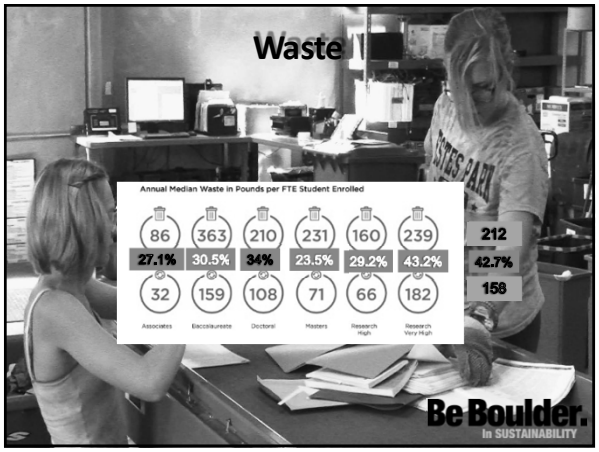
## Metrics as a driver of Sustainability & Engagement

- Can provide another alternative to formal certifications
  - Must be robust, consistent, and credible
- Benchmark against peer institutions
  - Use as basis for your plan
- Tailor outreach & education programs to focus on deficiencies
  - Acknowledge you are not perfect






Continuous Improvement of Metrics

- Accuracy
  - Actuals vs. projections?
    - Metered?
    - Certified scales?
  - Inclusive?
- Diversity
  - Weight vs. volume
  - Percent vs. actual
  - Timeframe
  - Baseline
  - Benchmarking
- Transparency

## Avoiding Inconsistencies in your Metrics

1. Diversion Rate: add to numerator but not denominator
   1. Construction waste, e.g.
2. Diversion Rate: exclude portions of data / sectors of waste entirely
   1. Restrooms in Stadium, e.g.
   2. Trash roll-offs in competition, e.g.
3. Diversion Rate: Total waste vs. Per capita
4. Energy use: Total use vs. 'Per square foot' (EUI)

## Honesty, Integrity, Accountability

- Honesty vs. Integrity
  - Only people to truly understand the details / history of your data is <u>you</u>, the generator.

**Hold yourself to a higher standard**

I.e., Pilot conversion to single stream recycling (UCB)

**Other examples?**

## Survival Tips

- Own your plan
  - FM has many responsibilities and needs
  - Be upfront about your concerns, challenges, and limitations
- Strong Planning
  - Begin with the end in mind
  - Identify potential obstacles
- Forge internal partnerships
  - Utilities, custodial, grounds, trades, surplus property
  - Once partnered in operations, coordinate on outreach & promotions
- Don't promote too early

## Takeaways

- Collaborate
- Make the business case
- Shoot for the moon but take small steps (Hotel Linens, i.e.)
  - Low-lying fruit
  - Small risk / Big impact
  - Under promise & over deliver
- Learn from failures
- Build off each success
- Consistent & credible metrics and communication

## THANK YOU!

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