Sustainability for Today’s Airports

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Learning objectives

• Understand the importance of sustainable airports
  o Reasons for sustainability
  o Benefits of sustainability
  o Potential rebates/incentives

• Learn the keys to creating sustainable airports

• ASHRAE standards and building codes
  o Standards 90.1 and 189.1

• Net Zero

• How to succeed
Reasons for Sustainability

• Economic
• Environmental
• Indoor Air Quality & Comfort
Airport Electrical Expense

Electric Cost

$-  $5,000  $10,000  $15,000  $20,000  $25,000

JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC

2010
Target

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AirTAP
Airport Technical Assistance Program
$8 Sales = $1 Efficiency

Not all dollars are created equal…
Environmental
Climate Change
Limited natural resources
Pollution
Benefits of Sustainability

Air quality and comfort

- Avoid complaints
- Improved Health
- Reduced staff absenteeism
- Staff retention
- Good PR
Energy rebates/incentives

- Minnesota Energy Resources
  - Energy audit rebate
  - Division of Energy Resources
- Xcel Energy
  - Renewable energy programs
  - Equipment efficiencies
  - Energy Audits
- Division of Energy Resources
  - Energy tax credits
Keys to Sustainability:

- Energy efficiency first
  - Building orientation
  - Envelope improvements
  - Equipment efficiency improvement
- Renewable energies second
Energy Efficiency

- Energy Audit
- Whole Building Lighting Analysis
- Building Tune Up (BTUP)
- Retro-commissioning (RCx)
Energy Audit:

Discrete Measures Examples

• **Assessment**
  - Assesses facility equipment, controls, maintenance, and operation

• **Benchmarking**
  - Compare to other, similar facilities
Building Tune Up (BTUP)

• Aim at building’s peak efficiency and utility reduction
• Identify improvement measures with simple payback periods of less than 5 years.
  o Hot water heater replacement
  o Lighting replacement
  o VFD installation
• Owner training
Retro-commissioning (RCx)

- RCx performs more functional performance testing of building and equipment.
- Easy improvements with quick paybacks
- More comprehensive study than the BTUP
Why Building Tune up or RCx?

Buildings, like cars, can be out of control.
Before Tune Up or RCx
After Tune Up or RCx
Keys to Sustainability:
Monitor and Measure

“You can’t manage what you don’t measure”
Monitor and measure: Electric Demand
ASHRAE Standard 90.1

• Energy Standard for Buildings
• Many codes incorporate requirements from this standard

ASHRAE STANDARD
ANSI/ASHRAE/IESNA Standard 90.1-2007
(Supersedes ANSI/ASHRAE/IESNA Standard 90.1-2004)
Includes ANSI/ASHRAE/IESNA Addenda listed in Appendix F
ASHRAE Standard 90.1

- Requirements
  - Envelope
  - HVAC
  - Water heating
  - Power & lighting

ASHRAE STANDARD
ANSI/ASHRAE/IESNA Standard 90.1-2007
(Supersedes ANSI/ASHRAE/IESNA
Standard 90.1-2004)
Includes ANSI/ASHRAE/IESNA Addenda
listed in Appendix F
ASHRAE Standard 189.1

• Standard for the Design of high-Performance Green Buildings
• ASHRAE/USGBC/IES collaboration
ASHRAE Standard 189.1

• Why needed?
  • Fill gap in evolving building codes

• Purpose?
  • Provide minimum requirements for the siting, design, construction, and plans for operation of high performance buildings

ASHRAE STANDARD
ANSI/ASHRAE/USGBC/IES Standard 189.1-2009
ASHRAE Standard 189.1

- **Scope**
  - Provides minimum criteria that apply to new buildings and major renovations
  - Addresses site sustainability, water and energy efficiency, IEQ, materials and resources

ASHRAE STANDARD
ANSI/ASHRAE/USGBC/IES Standard 189.1-2009
ASHRAE Standard 189.1

- Table of contents
  - Site Sustainability
  - Water Use Efficiency
  - Energy Efficiency
  - Indoor Environmental Quality (IEQ)
  - Impact on the Atmosphere, Materials, and Resources

ASHRAE STANDARD
ANSI/ASHRAE/USGBC/IES Standard
189.1-2009
ASHRAE Standard 189.1

- Basic structure
  - x.1: Scope
  - x.2: Compliance
  - x.3: Mandatory (required for all projects)
  - x.4: Prescriptive option (simple option, minimal choices, few calcs)
  - x.5: Performance option (more sophisticated, flexibility, but more effort)
ASHRAE Standard 189.1

- 30% better energy usage performance than 90.1
- Reduce water usage
- Reduce storm water run-off

ASHRAE STANDARD
ANSI/ASHRAE/USGBC/IES Standard 189.1-2009
ASHRAE Standard 189.1

- Different requirements for the respective region of the country
ASHRAE Standard 189.1

- Potential users:
  - Organizations with green building rating systems (LEED)
  - Developers on individual projects
  - Corporations
  - Universities
  - Airports
The Future: Net-Zero Energy Airports

- Design attempts to reduce energy consumption beyond code requirements by up to 70%
- The remaining energy use is derived from renewable sources
Renewable Energies

- Geothermal
- Solar Hot Water
- Photovoltaic (PV)
Solar Hot Water
Photovoltaic (PV)
How to Succeed

- Highly motivated building owner
- Highly motivated building operators
- Unique architectural and technological design features to minimize energy use
- Renewable energy systems
- Highly integrated systems and controls
- Ongoing energy measurement