



# A GREENER FUTURE

for sustainable Airports

**FAA Northwest Mountain Region Airports Conference**  
Tom Rossbach - HNTB  
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## Sustainability for Airport Architecture

- Sustainability
- USGBC LEED® rating tool
- LEED categories (6)
  - Sustainable sites, water efficiency, energy & atmosphere, materials & resources, indoor environmental quality, innovative design
- LEED ratings
  - Certified, Silver, Gold, Platinum



## Building Envelope

- Passive solar orientation
- Glazing and reduction of solar gain
  - Energy efficient glazing
  - Shading devices on south
- Daylighting
- Reflective light-colored high emissive roofs



Boise Airport

## Sustainable Sites

- Storm water management
  - Cistern
  - Grey water re-use
  - Pervious paving system
  - Bio swales
  - Landscape



## Access to Surface Transportation

- Integrate mass transportation centers into airports
  - Trains
  - APMs
  - Bus center
  - Alternative fueling stations



Baton Rouge Metropolitan Airport

## Water Efficiency

- Waterless urinals, dual flush toilets, auto faucets
- Rainwater harvesting systems from roofs
- Grey water re-use can reduce total water demand
- Grey water for landscaping, toilet flushing, car washing
- Reduces costs for water and sanitary sewer district fees



## Energy & Atmosphere

- Reduce energy or produce alternative energy
  - Lighting controls
  - Highly efficient motors (consume 60% power in terminal buildings)
    - Continuous running equipment
      - Escalators, moving walks
      - HVAC motors, fans, compressors
      - Baggage systems
  - Efficient light fixtures



## Energy & Atmosphere

- Reduce energy or produce alternative energy *[cont'd]*
  - Automated building management system
  - Continuous re-commissioning of building systems
  - Electrified GSE
  - 400Hz for every aircraft gate



## Alternative Energy Production

- Key is analyzing your airport
- Co-Generation at central plant
- Fuel cells
- Wind turbines
  - Small horizontal or vertical axis
- Solar thermal for hot water
- Solar photovoltaics for power
- Geo-Thermal
- Tidal power
- Deep ocean heat sink recycling



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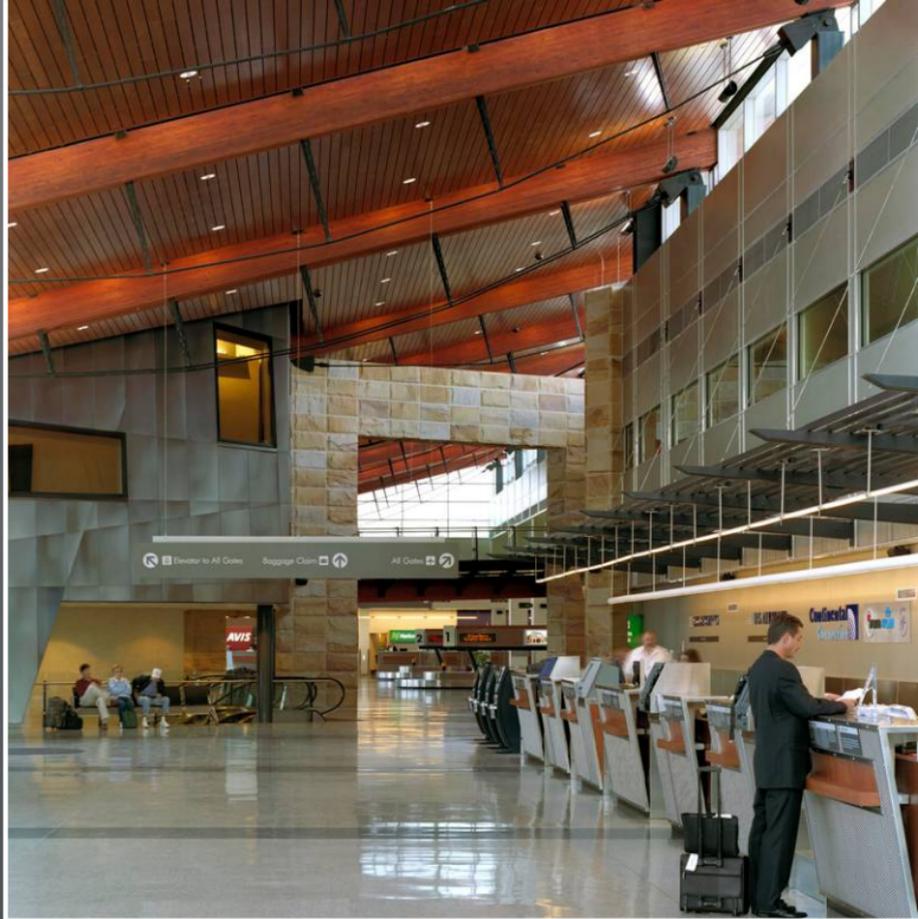


Wichita Airport – Landside Canopy

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## Materials & Resources

- Recycling
- Building re-use
- Recycled content
  - Reduce construction waste
- Local and regional materials
  - Reduces shipping costs
- Certified wood



## Indoor Environmental Quality Control

- Humidity control
- Adequate ventilation
- Carbon dioxide monitoring
- Low VOC materials



## Innovation & Design Process

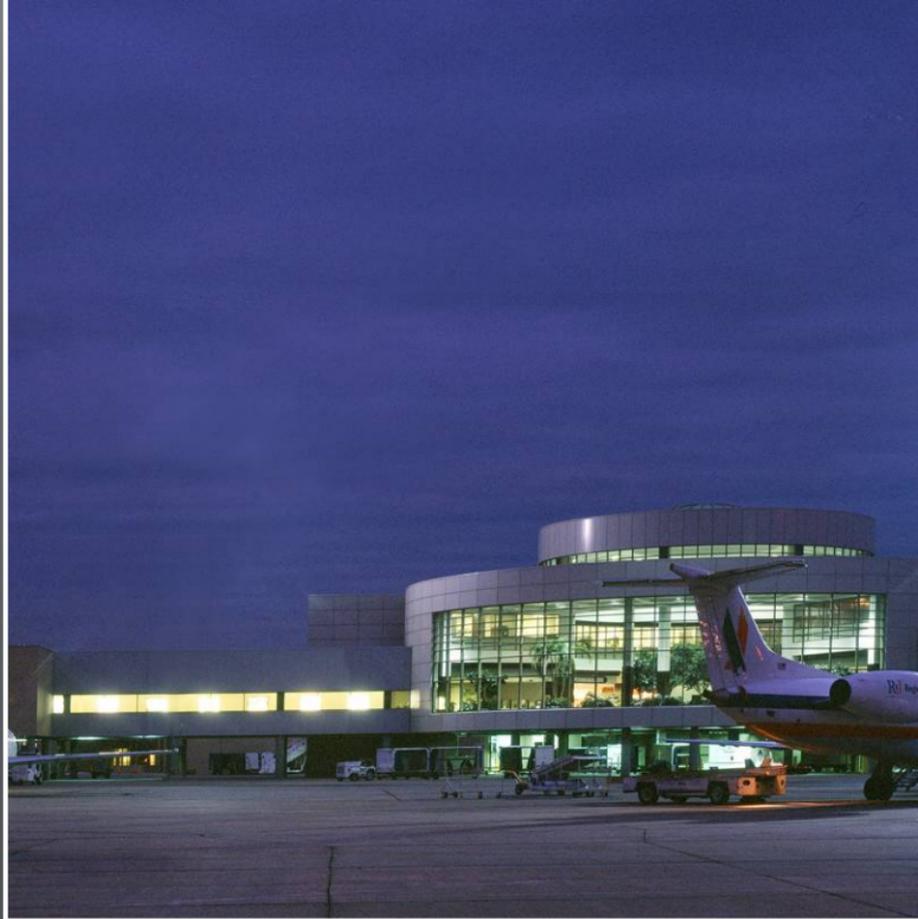
- Airport innovation points
  - 400 HZ
  - Pre-conditioned air
  - Electrified GSE or alternative fuels
  - FIDS driven building management
  - Rental car QTA water recycling
  - E-kiosks to buy carbon credit
  - Electrical recharging outlets in garages / lots for electric cars



Chicago Midway Airport

## LEED and Airports

- LEED does not adequately address airports
  - Need more Innovation Points tailored to Airport issues
  - Need credits for what Airports have been achieving



Baton Rouge Metropolitan Airport

## Beyond LEED... CASE STUDIES:

- Santa Barbara Airport Carbon Footprint Study
  - City requested Greenhouse Gases (GHG) Inventory
  - Created a CFP reduction Plan
  - Largest Emission contributors
    - Aircraft
    - Motor vehicles
    - GSE equipment
    - Electrical usage
  - Silver LEED



Santa Barbara Airport

## Airport Unique Conditions

### CASE STUDIES:

- Bermuda International Airport
  - Water conservation is critical
    - Rainwater collection/cisterns
    - grey water re-use
    - Low flow plumbing fixtures
  - Lots of Sunshine/Ocean
    - Solar photovoltaics
    - Solar thermal hot water heating
    - Tidal power
- LEED Silver design



Bermuda International Airport

## Airport Unique Conditions

- New Ivanpah Airport (Las Vegas)
  - Water conservation (desert)
    - Grey water for irrigation/toilets
  - Lots of sunshine and limited rain
    - Solar photovoltaics
    - Solar thermal power generation
    - Roof shading
    - Geothermal wells
    - Thermal energy storage



## Airport Unique Conditions

- Wichita Mid-Continent Airport
  - LEED Silver design
  - Location: Central Plains – “wind swept”
    - Wind turbines for energy production
    - Geothermal wells
    - Electrified GSE charging stations



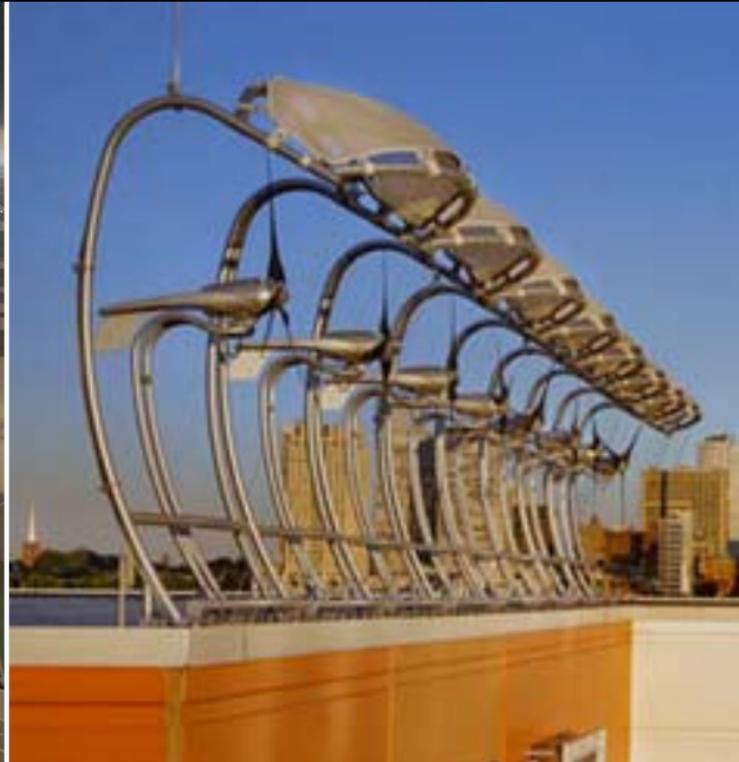
Wichita Mid-Continent Airport

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Wichita Mid-Continent Airport

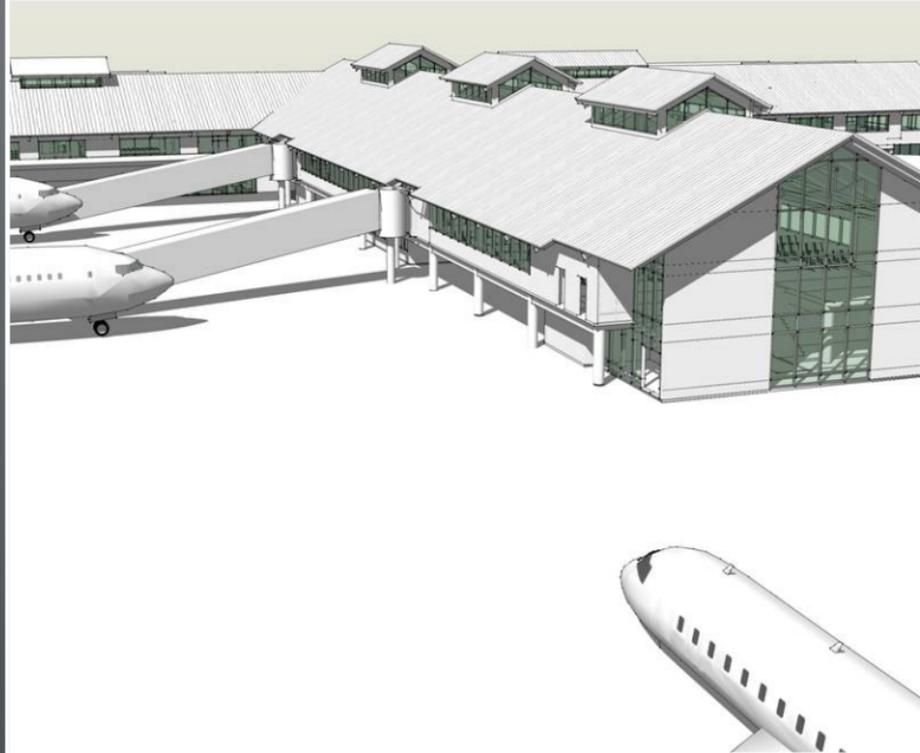


Boston Logan Int'l Airport

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## Airport Unique Conditions

- Panama City-Bay County International Airport
  - First “Green Field” airport since Denver
    - Terminal Building
      - Hot-Humid site
        - Roof overhangs for sun control
        - Louvered sunscreens on South
  - Sustainable Site Innovations
    - Storm water retention
    - Bio-swales
    - Wetland protection



## Airport Unique Conditions

- Kona International Airport (Hawaii)
  - Sun, wind and ocean access
  - Deep cold ocean water thermal energy conversion
    - 40°F allows thermal energy conversion
    - Chilled water for airport
  - Solar photovoltaic panels



Kona International Airport (Hawaii)

## Implementing Energy Efficiency without Capital

- Performance based Finance-Design-Build (FDB) contracting
- Requires Energy Service Contractors to FDB
- Airport's Energy savings payback contractor over time
- Benefit: Airport is more sustainable, and no capital is used



DFW Terminal D

## Steps for Energy Improvements without Capital

- Conduct an energy audit
- Identify high return improvements
- Adjust accounting methodology to shift O&M savings to fund energy improvements
- Obtain expert to write RFP and oversee implementation



## Return on Investment of Sustainable Features

Simple payback 0 to 2 years:

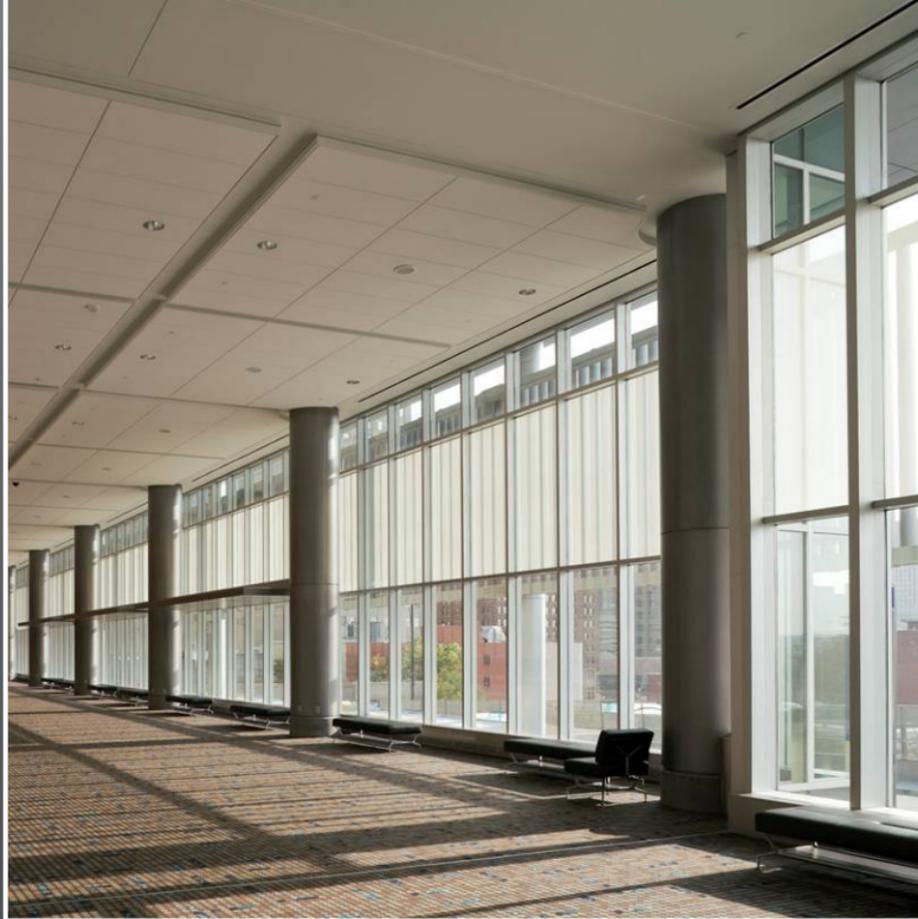
- Lighting controls
- Efficient lighting (LED)
- Super-efficient motors
  - Motors consume 60% of airport terminal energy
- Updated building management systems
- Baggage system motion shut down systems
- Electrical charging for GSE
- Variable speed pumps
- Light-colored roofs



## Return on Investment of Sustainable Features

Simple payback 2 to 10 years:

- Daylighting building design
- Solar shading devices
- High performance glazing
- High efficiency VAV HVAC
- Solar thermal hot water panels
- Recycled grey water system
- Geothermal energy (site-specific)
- Wind turbines (site-specific)
- Fuel cells (fuel-source specific)



Bartle Concourse

## Return on Investment of Sustainable Features

Simple payback 10 to 20+ years

- Vegetative roofs
- Solar thermal concentrator power generation
- Solar photovoltaics
- Tidal power



Thanks for being Sustainable!