



## Energy Management Practices at Dallas/Fort Worth International Airport

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## Presentation Outline

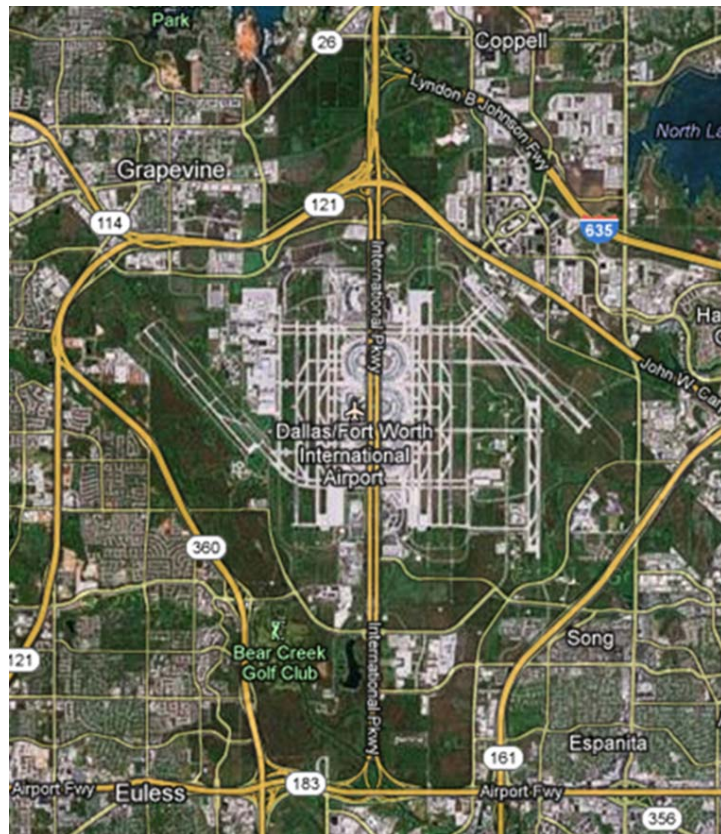
- DFW Airport Overview
- Energy Management Section
  - Structure & Mission
- Supply-Side Management
  - Reliability
  - Cost (Risk) mitigation
  - Environmental stewardship
- Demand-Side Management
  - Energy monitoring
  - Energy audits
  - Energy standards
  - Continuous Commissioning®
- Summary





## DFW Airport Overview

### Geography



8.1 miles

7.7 miles

- Located Between Dallas & Fort Worth
- 17,207 acres
  - 26.9 square miles
- 7 runways
  - 4 are 13,400'
- 3 control towers
- 5 terminals
  - 155 gates
- 4 aircraft can land simultaneously



## DFW Airport Overview (cont.)

### Operations

- 4<sup>th</sup>-busiest airport in the world in terms of operations
- 8<sup>th</sup>-busiest in terms of passengers
- 886 daily departures (646,803 total annual operations)
- 58 million passengers annually
- 653,000 tons of cargo annually







## DFW Airport Overview (cont.)

### Energy



- Board Managed Accounts
- ~200 electric accounts
  - 275,000,000 kWh
  - \$19 million
- ~20 natural gas accounts
  - 275,000 MMBtu
  - \$1.4 million



## Energy Management

- Structure & Mission
  - Energy, Transportation, & Asset Management Department
    - Energy & Utilities Services Business Unit
      - Energy Management Section
        - Energy Manager
        - Energy Engineer
        - Energy Analyst
        - Designer (CADD and GIS Support)
        - Electrical Supervisor (27 employees)
        - SEAMS Scheduler

### Mission Statement

Energy Management provides the business and technical expertise and resources necessary to meet the Airport's energy needs. Energy Management's comprehensive approach to the procurement and utilization of energy supports the reliability, sustainability, and cost management goals of the Airport Board.



## Supply-Side Management

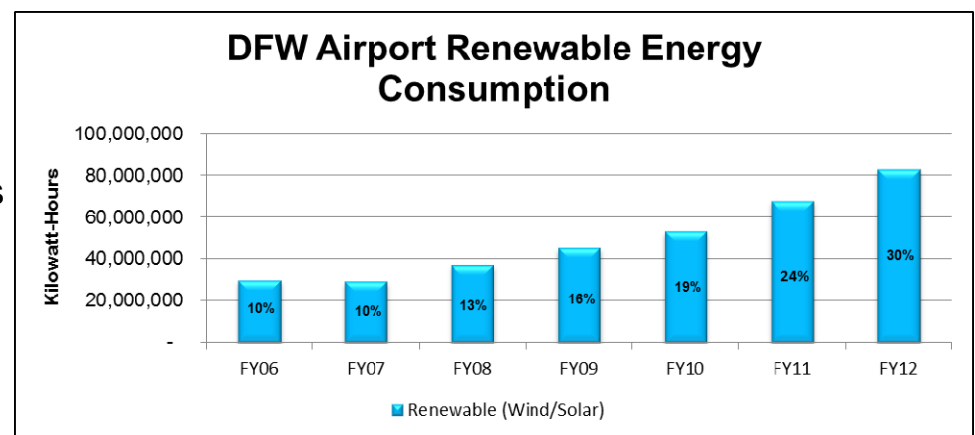
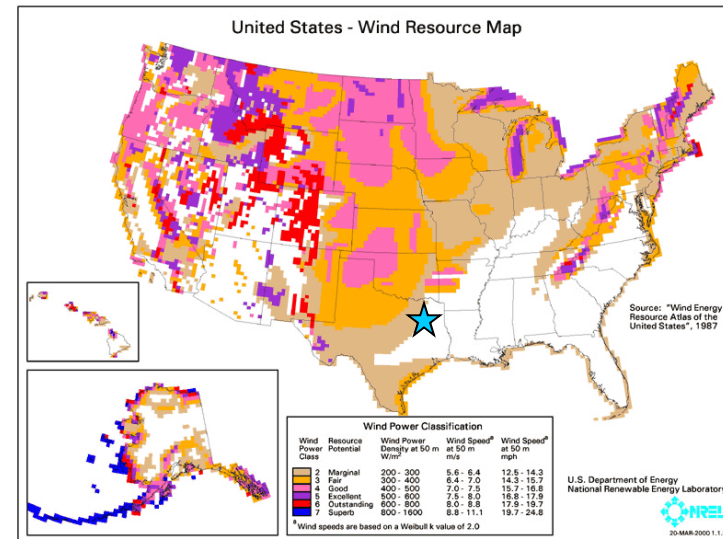
- Energy Procurement – Develop and implement an energy procurement strategy designed to insure availability and **environmental stewardship**, and mitigate cost volatility.
  - Electricity
  - Natural Gas
  - Propane
  - ~~Water / Waste Water~~
  - Vehicle Fuels
    - Compressed Natural Gas (CNG)
    - Unleaded Gasoline
    - Diesel
    - Biodiesel





## Supply-Side Management (cont.)

- Environmental Stewardship
  - Electricity
    - Onsite Renewable
      - Wind – Economically, geographically and operationally not practical
      - Solar – Economically not practical unless heavily subsidized
    - Offsite Renewable
      - Wind – Practical and very affordable
      - Renewable Energy Credits (REC)
        - 1 REC = 1 MWH
        - Currently at 30%







## Supply-Side Management (cont.)

- Environmental Stewardship (cont.)
  - Natural Gas
    - Landfill – Mostly spoken for
  - Vehicle Fuel
    - CNG – 2.25 million DGE annually (100% of our Bus Fleet)
      - Available, very affordable (\$1.50 DGE) (\$2.25 DGE – apples to apples)
    - Biodiesel
      - Available, affordable, mixed reviews

**Truck Fuel Filter  
Biodiesel Gels in Cold  
Temperatures**





## Demand-Side Management

- Energy Monitoring – Track and forecast energy usage for all Board facilities. This supports:
  - Budgeting
  - State and Federal reporting requirements
  - Energy Audits
  - Life cycle and return on investment calculations

	(From Electric Invoices)			(Calculated - Renewable/Fossil Fuel Split)				(From Natural Gas Invoices)		
		Electricity		Percent	Renewable/Grid	Renewable/ADE-PV	Fossil Fuel		Nat Gas	
	\$	KWH	\$/KWH	Renewable	KWH	KWH	KWH	\$	MMBtu	\$/MMBtu
10/1/2011	\$1,512,572	21,107,139	\$0.0717	30.0%	6,332,142	-	14,774,997	\$79,647	15,879	\$5.0160
11/1/2011	\$1,467,740	20,263,710	\$0.0724	30.0%	6,079,113	-	14,184,597	\$140,395	29,068	\$4.8299
12/1/2011	\$1,626,163	22,831,656	\$0.0712	30.0%	6,849,497	-	15,982,159	\$248,797	48,822	\$5.0960
1/1/2012	\$1,417,752	19,178,779	\$0.0739	30.0%	5,753,634	17,373	13,425,145	\$251,697	43,667	\$5.7641
2/1/2012	\$1,442,504	19,565,766	\$0.0737	30.0%	5,869,730	15,775	13,696,036	\$215,094	38,654	\$5.5646
3/1/2012	\$1,420,020	19,318,768	\$0.0735	30.0%	5,795,630	17,718	13,523,138	\$157,552	25,647	\$6.1432
4/1/2012	\$1,537,378	21,600,918	\$0.0712	30.0%	6,480,275	25,320	15,120,642	\$94,070	16,385	\$5.7412
5/1/2012	\$1,599,439	22,715,549	\$0.0704	30.0%	6,814,665	26,070	15,900,884	\$59,611	11,751	\$5.0727
6/1/2012	\$1,867,286	27,291,838	\$0.0684	30.0%	8,187,551	28,803	19,104,287	\$44,246	9,738	\$4.5434
7/1/2012	\$1,912,252	28,252,662	\$0.0677	30.0%	8,475,799	29,309	19,776,863	\$44,058	9,593	\$4.5929
8/1/2012	\$1,856,890	26,668,818	\$0.0696	30.0%	8,000,645	20,373	18,668,173	\$46,383	9,331	\$4.9709
9/1/2012	\$1,819,366	26,669,662	\$0.0682	30.0%	8,000,899	27,942	18,668,763	\$49,224	10,632	\$4.6296
<b>FY12</b>	<b>\$19,479,362</b>	<b>275,465,264</b>	<b>\$0.0707</b>	<b>30.0%</b>	<b>82,639,579</b>	<b>208,681</b>	<b>192,825,685</b>	<b>\$1,430,773</b>	<b>269,167</b>	<b>\$5.3156</b>



## Demand-Side Management (cont.)

- Energy Audits – A technical evaluation of a facility’s energy, typically resulting in the identification of energy savings opportunities.
  - Walk-through Audit – Identifies preliminary energy savings opportunities without detailed cost or savings estimates.
  - Scoping Audit – Identifies energy savings opportunities that appear likely to have a 5 year ROI.
  - Investment Grade Audit – A detailed engineering analysis intended to provide sufficient information to support informed choices for capital energy investments.




## Demand-Side Management (cont.)

- Energy Standards
  - Conduct research into new energy saving technologies.
    - Fanwall AHU
    - Lighting and controls
    - Geothermal heatpumps

Proposed Street Light for Southgate

### Quadro HO LED



### selux

Project: DFW Airport

Type: \_\_\_\_\_ Qty: \_\_\_\_\_

QHOL - - 1 - -

Series Optics Mounting Light Engine CCT Finish Voltage

Options Pole Series Height Finish Options

Series	Optics	Mounting	Light Engine	CCT	Finish	Voltage	Options
QHOL	R1 Type I	1 Single	6TL350 <sup>1</sup> 350mA/60w	30 3000K	WH White	120	HS House Side Shield
Quadro HO LED	R2 Type II		6TL500 500mA/87w	45 4500K	BK Black	208	PCT Photocell Tenon
	R3 Type III				BZ Bronze	277	DM <sup>1</sup> Dimming (0-10v)
	R4 Type IV				SV Silver	347	HL <sup>2</sup> Hi-Lo Switching
	R5 Type V				SP Specify Premium Color	480	

<sup>1</sup>No dimming at 300mA <sup>2</sup>120V, 277V only



Fanwall AHU (TRIP)

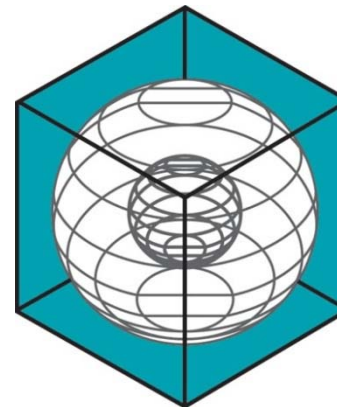
- Assist in the development and adoption of the Airport's energy conservation building codes and standards.





## Demand-Side Management (cont.)

- Continuous Commissioning®
  - Optimizes energy use based on actual building conditions and current requirements
  - Routinely achieves 10 – 25% whole building energy cost reductions
  - Maintain and/or improve comfort
  - Calibrate and repair sensors and malfunctioning devices
  - Modify control sequences and implement reset schedules
- Increase heating and cooling deadbands and implement uniform space temperature setpoints
- Training (transfer of knowledge)



**Energy  
Systems  
Laboratory**



## Demand-Side Management (cont.)



Terminal D

- Continuous Commissioning®
  - Opened in 2005
  - 2 million sq.ft. international terminal
  - 27 aviation gates
  - 60 retail spaces
  - 99 ticket positions
  - 91 elevators, 59 escalators, 34 moving sidewalks
  - 6 miles of baggage belts
  - 55 million kWh annually

CC Results:

- Electric – 9% reduction
- Chilled Water – 27% reduction
- Hot Water – 50% reduction
- Cost Savings - \$5 million



## Demand-Side Management (cont.)

- Continuous Commissioning®
  - Originally opened in 1973
  - Upgraded in 2005
    - 6 – 5,500 ton chillers
    - 6 million gallon TES
    - 4 boilers – 33,000 lbs/hr steam
    - 1 boiler – 83,000 lbs/hr steam
    - Pre-conditioned Air (PCA)
      - 12,000 tons cooling
      - 51 MMBtu heating
  - Provides heating and cooling services to 6.6 million sq.ft. of condition space
  - 77 million kWh annually
  - 400,000 MMBtu annually

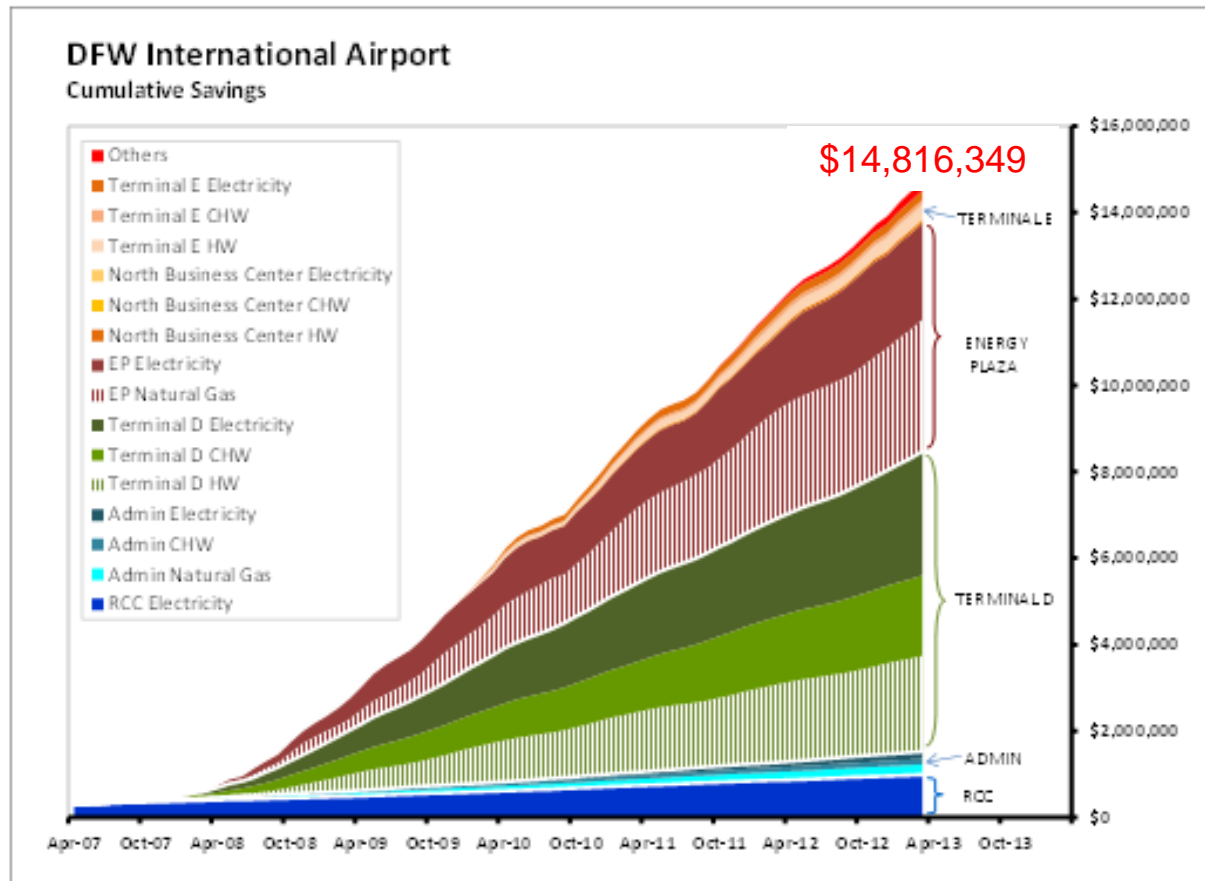
Energy  
Plaza



**CC Results:** Electric – 6% reduction  
 Natural Gas – 30% reduction  
 Cost Savings - \$4 million



# Demand-Side Management (cont.)



## Continuous Commissioning Savings Summary





# Summary

