



Energy Management Practices at Dallas/Fort Worth International Airport

Jerry R. Dennis, CEM, CEP
Energy Manager
May 14, 2015

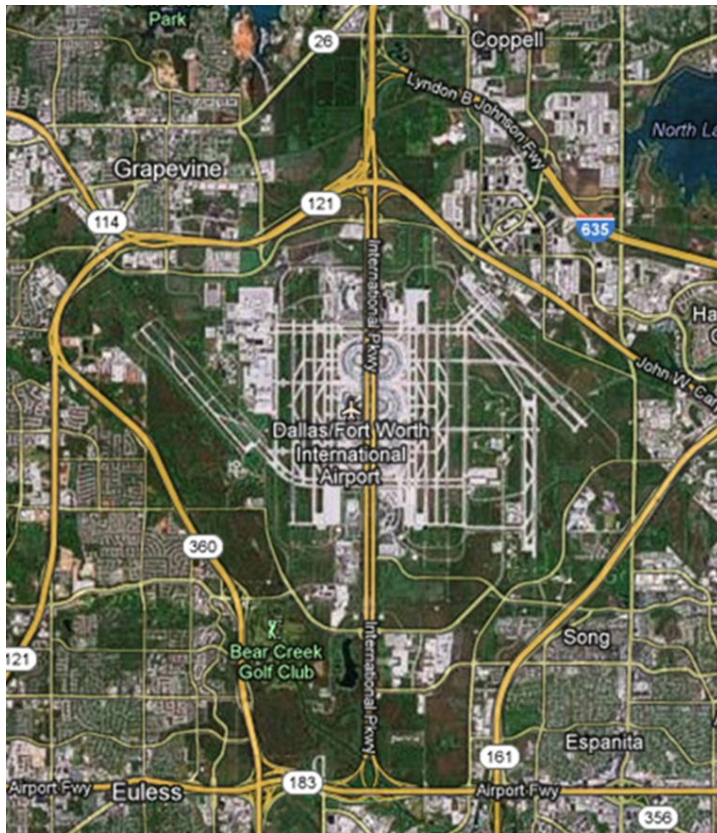
Presentation Outline

- 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
 - 165 gates
- 4 aircraft can land simultaneously

DFW Airport Overview (cont.)

Operations

- 3rd busiest airport in the world in terms of operations
- 9th busiest in terms of passengers
- 931 daily operations (679,820 total annual operations)
- 63.5 million passengers annually
- 700,000 tons of cargo annually



DFW Airport Overview (cont.)

Energy



- Board Managed Accounts
- ~250 electric accounts
 - 295,000,000 kWh
 - \$19 million
- ~20 natural gas accounts
 - 350,000 MMBtu
 - \$1.8 million

Energy Management

- Structure & Mission
 - Energy, Transportation, & Asset Management Department
 - Energy & Utilities Services Business Unit
 - Energy Management Section (33)
 - Energy Manager
 - Energy Engineer
 - Energy Analyst
 - Designer (CADD and GIS Support)
 - SEAMS Scheduler
 - Electrical Supervisor
 - 27 electrical & electronics technicians

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.

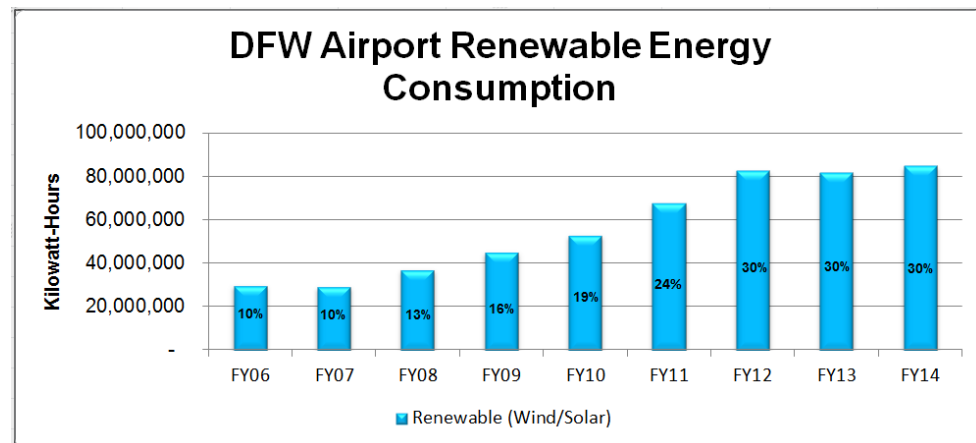
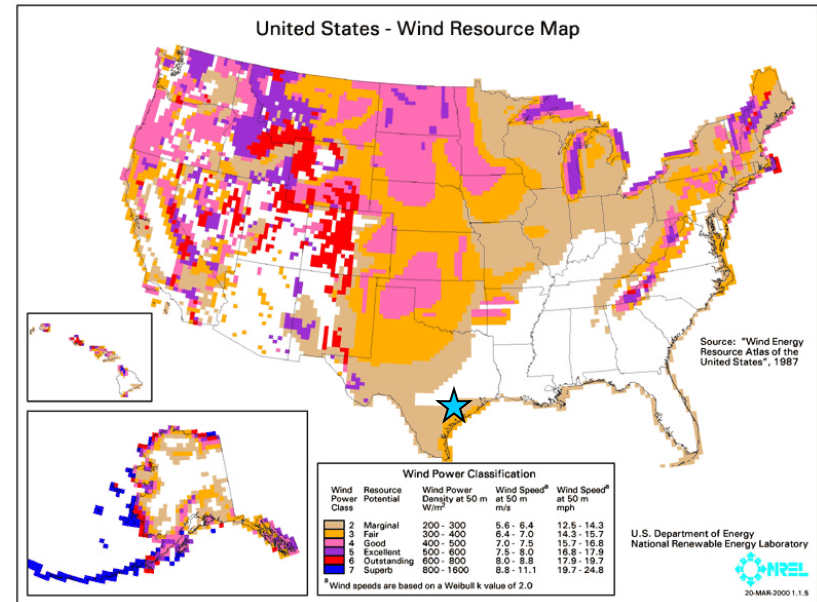
Supply-Side Management

- 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 Gas (methane) – Mostly spoken for
 - Vehicle Fuel
 - CNG – 2.25 million DGE annually
 - Available, very affordable (\$1.78 DGE)
 - 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	Renewable/ Grid KWH	Renewable/ADE-PV KWH	Fossil Fuel KWH	\$	Nat Gas		
		KWH	\$/KWH						MMBtu	\$/MMBtu	
10/1/2013	\$1,366,761	21,837,298	\$0.0626	30.0%	6,551,190	20,323	15,286,109	\$88,619	19,427	\$4.5617	
11/1/2013	\$1,240,642	19,163,095	\$0.0647	30.0%	5,748,928	15,685	13,414,166	\$164,850	37,072	\$4.4467	
12/1/2013	\$1,465,448	23,880,643	\$0.0614	30.0%	7,164,193	8,128	16,716,450	\$282,525	60,304	\$4.6850	
1/1/2014	\$1,349,134	21,272,719	\$0.0634	30.0%	6,381,816	18,606	14,890,903	\$274,630	57,261	\$4.7961	
2/1/2014	\$1,337,190	20,946,506	\$0.0638	30.0%	6,283,952	14,586	14,662,554	\$291,416	54,473	\$5.3497	
3/1/2014	\$1,343,270	20,300,171	\$0.0662	30.0%	6,090,051	20,621	14,210,120	\$197,440	38,453	\$5.1346	
4/1/2014	\$1,364,591	21,441,633	\$0.0636	30.0%	6,432,490	22,891	15,009,143	\$132,659	25,893	\$5.1233	
5/1/2014	\$1,494,331	24,067,785	\$0.0621	30.0%	7,220,335	28,921	16,847,449	\$85,972	17,001	\$5.0570	
6/1/2014	\$1,582,537	25,683,152	\$0.0616	30.0%	7,704,946	25,735	17,978,206	\$59,482	11,908	\$4.9951	
7/1/2014	\$1,683,441	27,712,766	\$0.0607	30.0%	8,313,830	26,081	19,398,936	\$64,589	12,899	\$5.0072	
8/1/2014	\$1,723,144	28,465,905	\$0.0605	30.0%	8,539,772	26,299	19,926,134	\$54,773	11,090	\$4.9391	
9/1/2014	\$1,679,783	27,336,798	\$0.0614	30.0%	8,201,039	22,209	19,135,759	\$63,017	12,682	\$4.9691	
FY14	\$17,630,273	282,108,471	\$0.0625	30.0%	84,632,541	250,083	197,475,930	\$1,759,972	358,462	\$4.9098	

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 ¹ 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 ¹ Dimming (0-10v)
	R4 Type IV				SV Silver	347	HL ² Hi-Lo Switching
	R5 Type V				SP Specify Premium Color	480	

*No dimming at 300mA ² 120V, 277V only

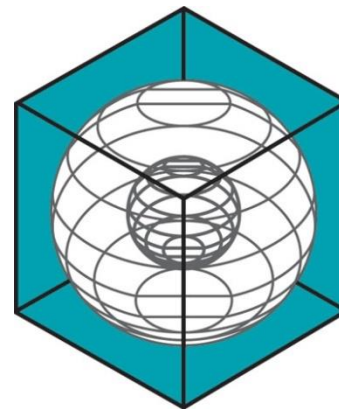


Fanwall AHU (TRIP)

- 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.)

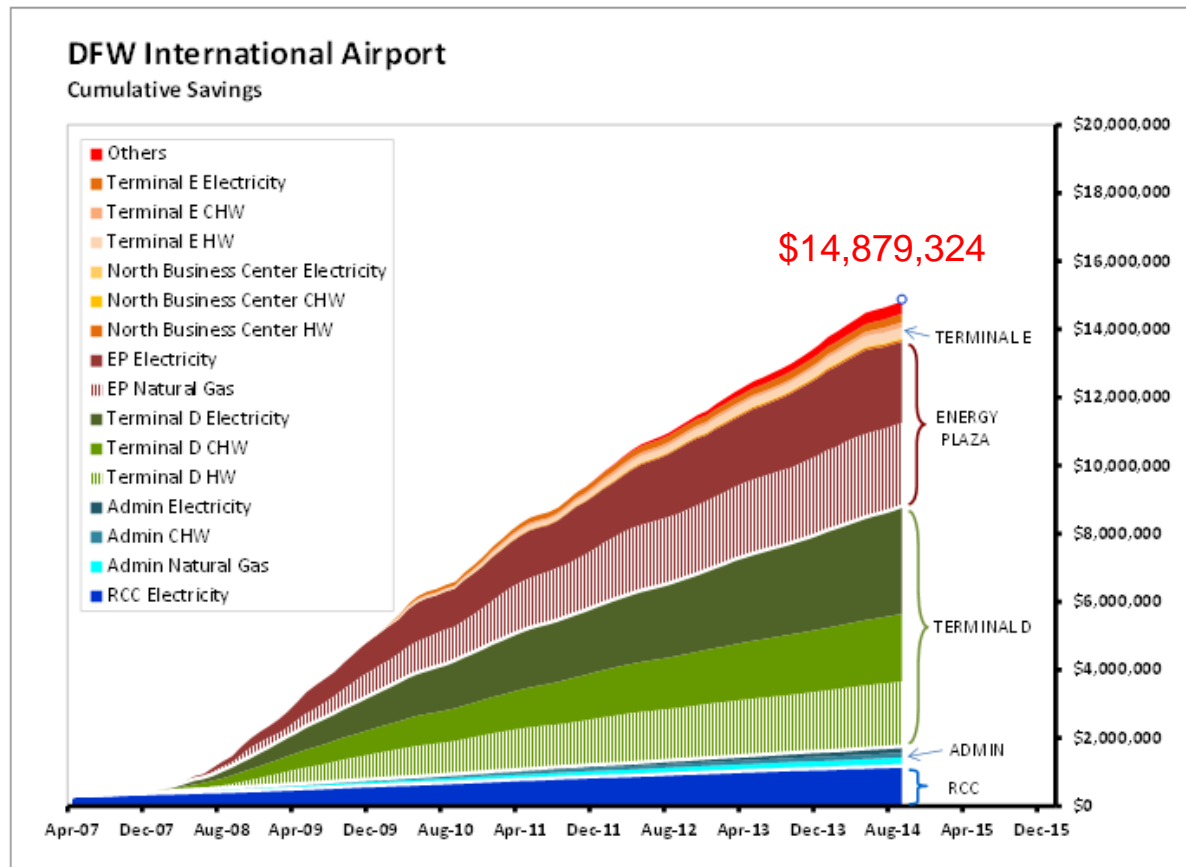
- Continuous Commissioning®
 - Originally opened in 1973
 - Upgraded in 2005
 - 6 – 5,500 ton chillers
 - 6 million gallon TES
 - 4 boilers – 33,000 lbs/hr steam
 - 1 boiler – 83,000 lbs/hr steam
 - Pre-conditioned Air (PCA)
 - 12,000 tons cooling
 - 51 MMBtu heating
 - Provides heating and cooling services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

Energy Plaza



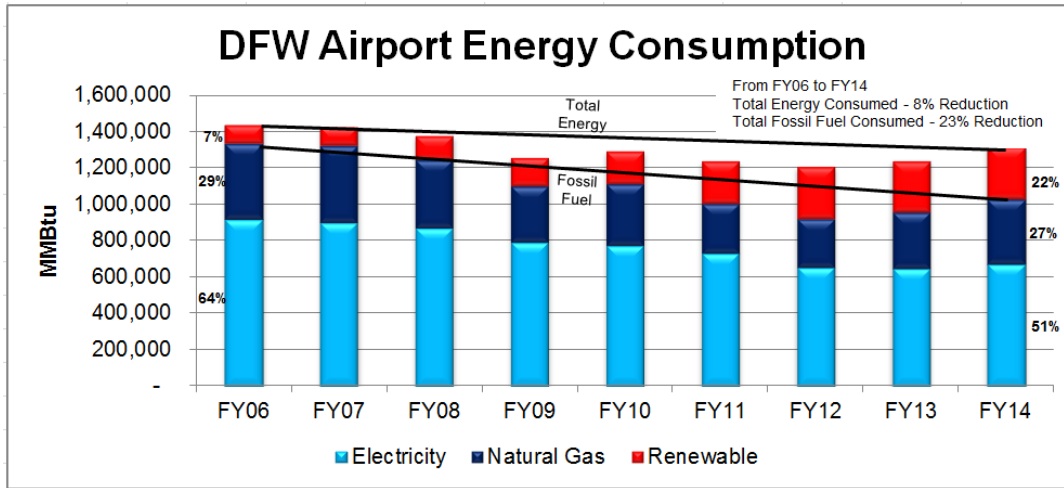
CC Results: Electric – 6% reduction
 Natural Gas – 30% reduction
 Cost Savings - \$4 million

Demand-Side Management (cont.)

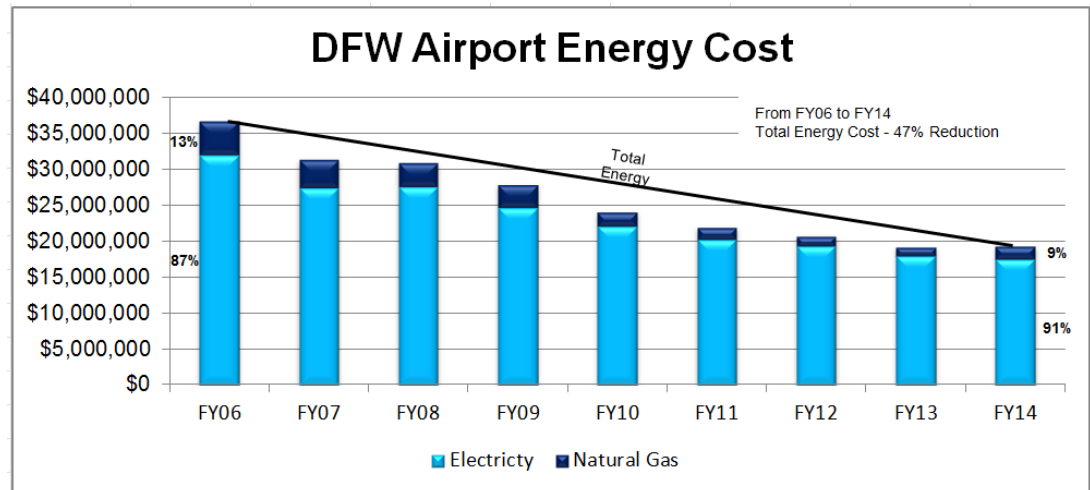


Continuous Commissioning Savings Summary

Summary



8% Reduction in Total Energy
23% Reduction in Fossil Fuel



47% Cost Reduction