

Dallas/Fort Worth International Airport Continuous Commissioning®

International Conference for Enhanced
Building Operations

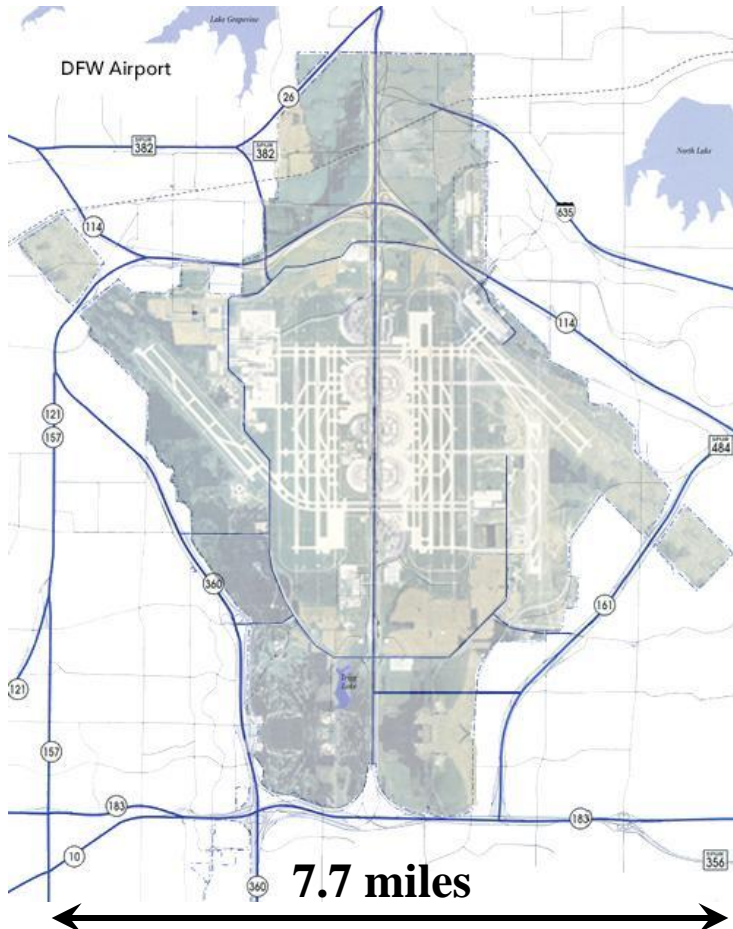
New York Marriott at the Brooklyn Bridge
New York, NY



Larry Kramer, P.E., LC, CEM

October 20, 2011

DFW Airport Overview



- Serves Dallas & Fort Worth
- 18,076 acres (29.8 square mi.)
- 7 runways - 4 are 13,400'
 - 4 aircraft can land simultaneously
- 3 control towers
- 5 terminals - 174 gates
- 685,000 operations annually
- 60 million passengers annually
- \$26.5 MM energy budget
 - ~200 electric accounts
 - 20 natural gas accounts

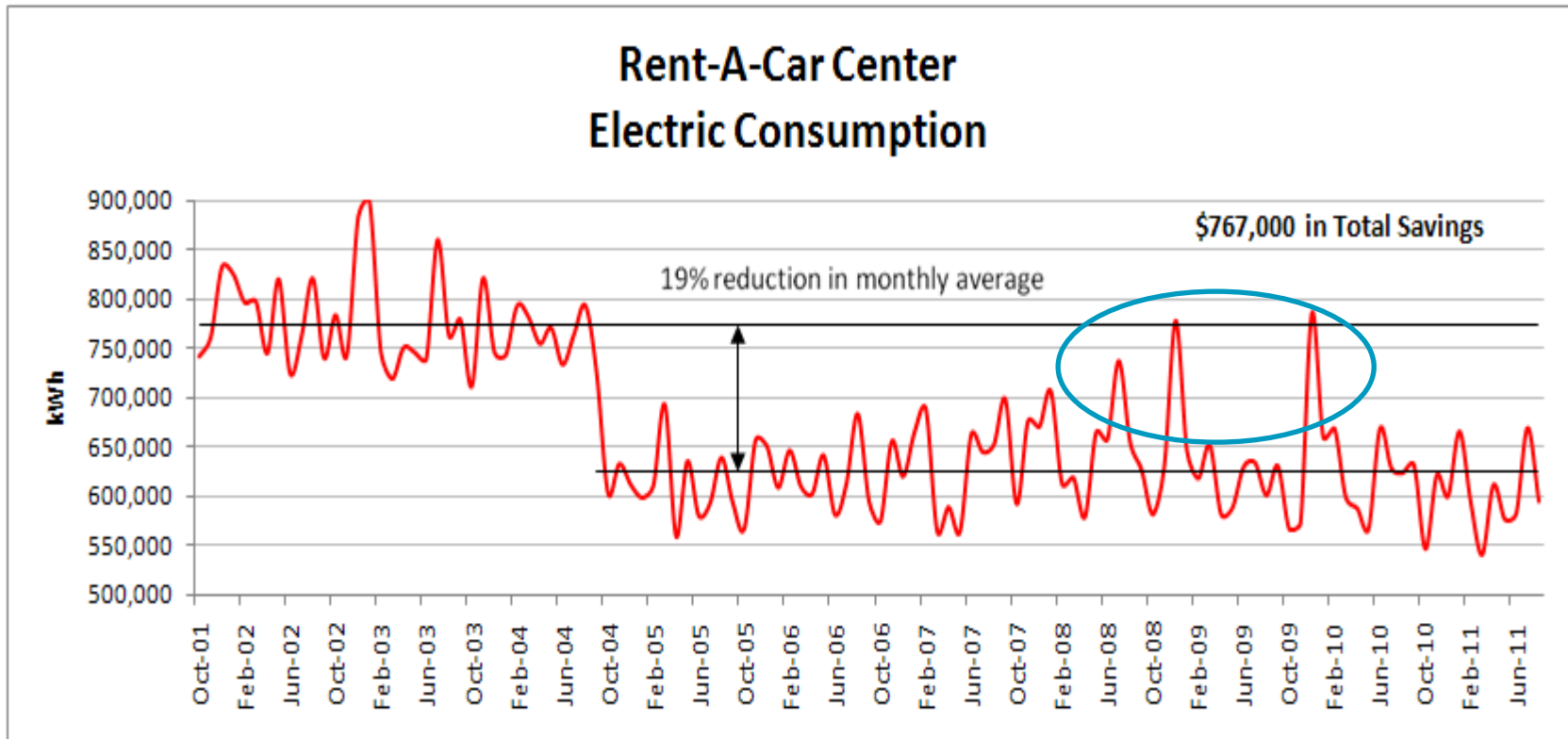
Continuous Commissioning® - Consolidated Rent-A-Car Center

- Opened in 2000, First CC in 2004 and a follow up in 2010
- Excessive outside air
- Duct static pressure too high
- Economizer cycle was not optimized
- Space temperatures varied from 65°F to 80°F (18°C to 26.7°C)
- Excessive reheat even in summer time
- Both 280 ton chillers were required to meet peak load (one was designed as a backup)



Continuous Commissioning® - Consolidated Rent-A-Car Center

Results of CC Project

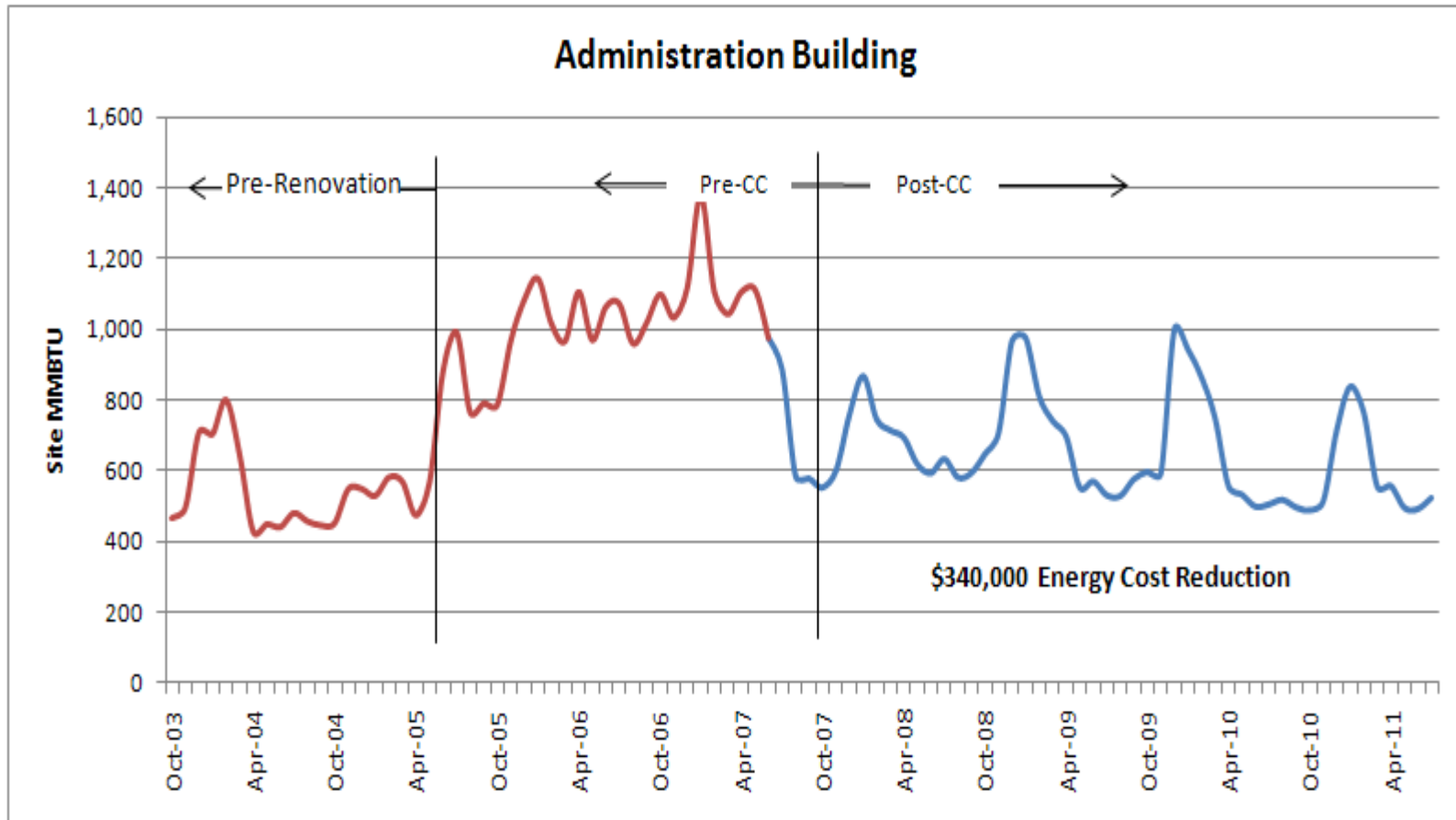


Continuous Commissioning® - Administration Building

- First phase built 1973 and renovated in 2004. CC® in 2010.
- AHU's running 24/7 although building is largely a weekday operation
- Most AHU's were being operated manually instead of by the BAS
- Supply air temperatures were generally set at a constant 56°F (13°C)
- Economizer cycle was not optimize
- No separation between heating and cooling set points
- Excessive reheat even in summer time
- Simultaneous heating and cooling



Continuous Commissioning® - Administration Building



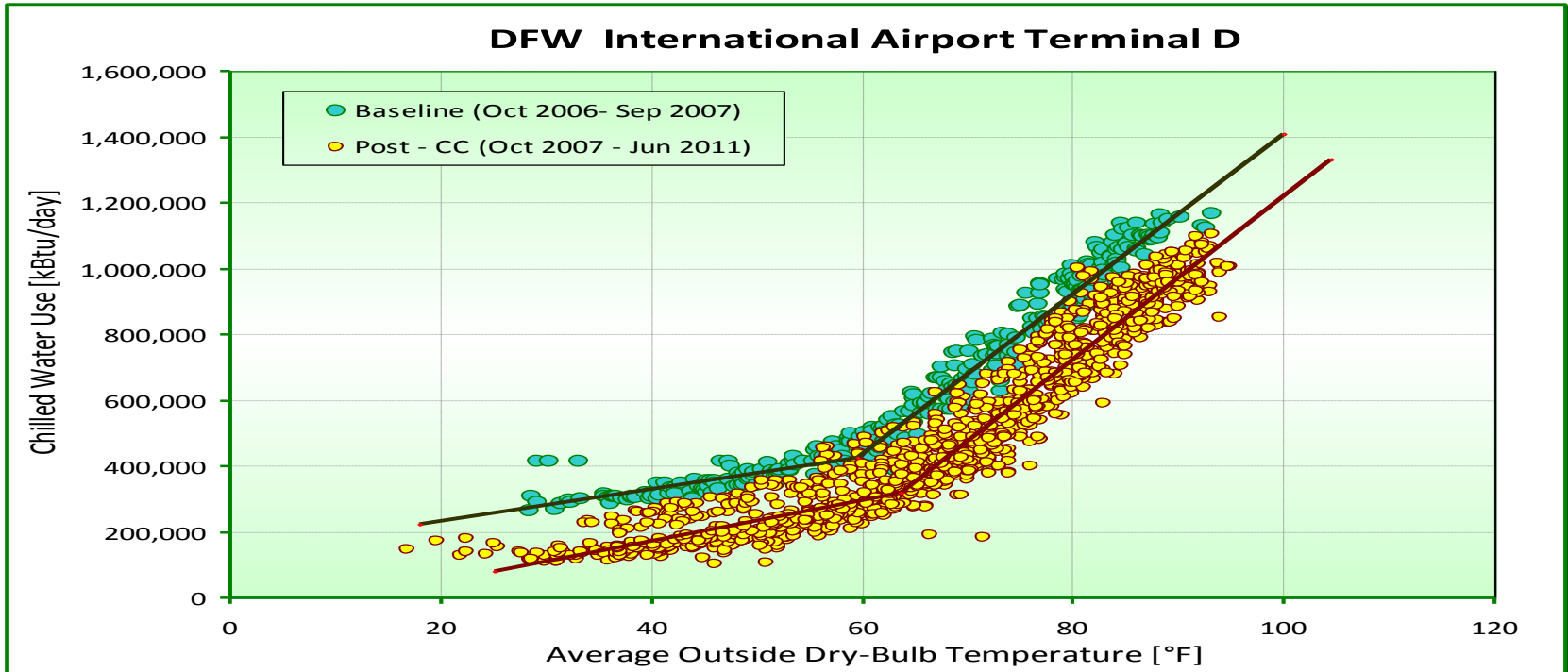
Continuous Commissioning® - Terminal D (International Terminal)

- Opened 2005, CC in 2008-2009
- Need to implement occupancy schedule for AHU's
- Reduce outside air during low occupancy period
- Standardize heating and cooling setpoints to eliminate simultaneous heating and cooling
- Convert some large constant volume AHU's to VAV operation by reprogramming controls sequence
- Optimize supply air temp., duct static pressure, and return fan speed

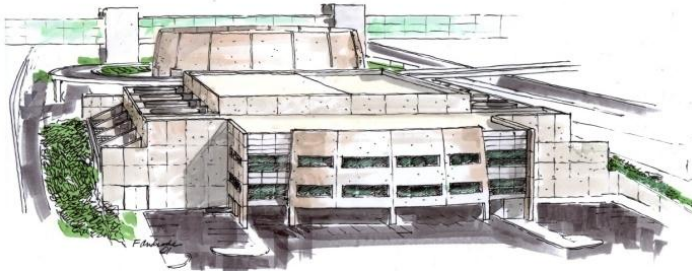


Continuous Commissioning® - Terminal D (International Terminal)

Results of CC Project – **\$4,690,000** in energy savings (direct electricity, hot and chilled water)



Continuous Commissioning® - Energy Plaza (CUP)



Carter-Burgess

DFW AIRPORT
SOUTH ENERGY PLAZA

A/E

- Originally opened in 1973, Upgraded in 2005
- 42,000 tons of cooling capacity
 - Provides cooling services to 6.6 million sq.ft. of conditioned space
 - 9,000 tons of Pre-conditioned Air (PCA) for docked Aircraft
- 6 million gallon thermal storage tank
 - Shifts 15 MW of on-peak demand
- 215,000 lbs/hr steam boiler capacity
- 79 million kWh of electricity annually
- 360,000 MMBtu of natural gas annually
- \$7MM annual energy budget

Continuous Commissioning® - Energy Plaza (CUP)

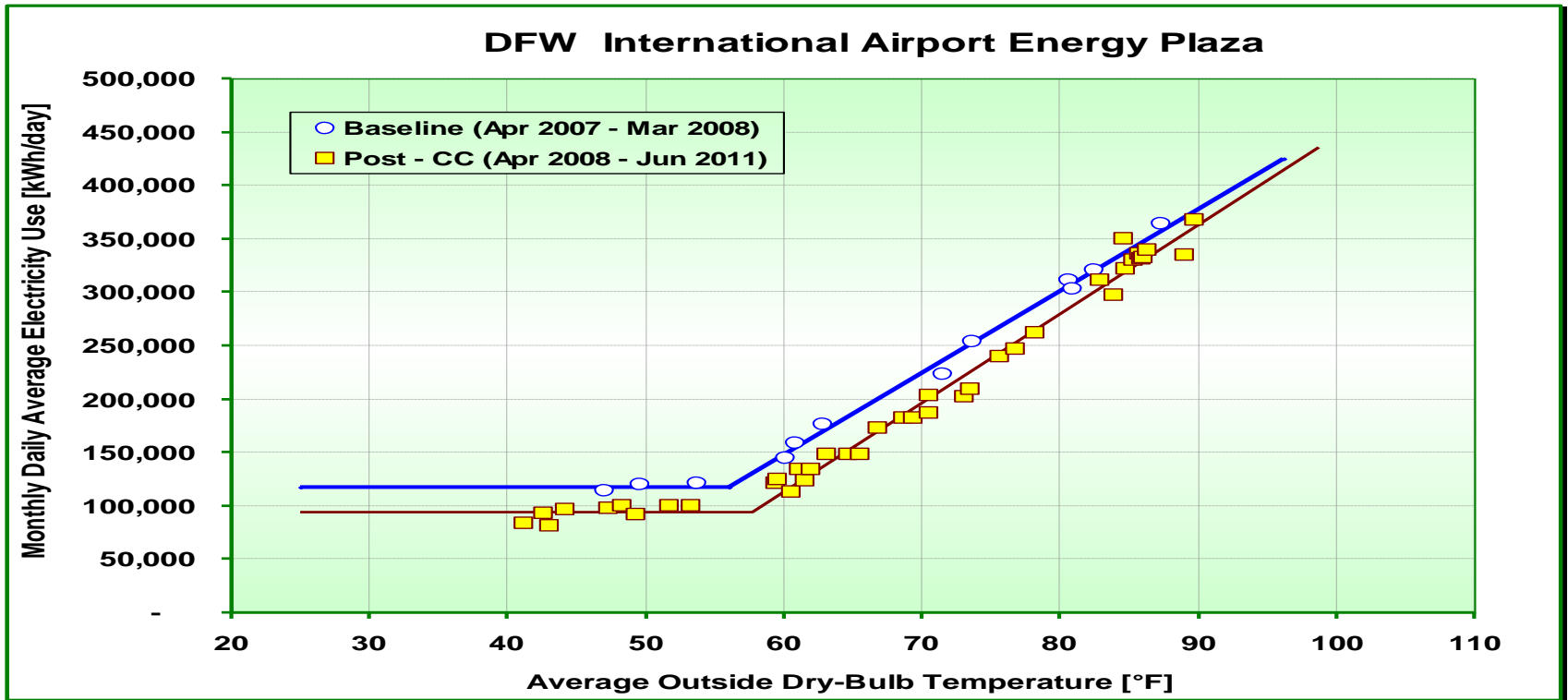
CC® Assessment/Implementation

- Optimize steam pressure
- Optimize TES operation
- Optimize cooling tower fan control strategy
- Implement a chiller cooling water temperature reset schedule
- Optimize PCA operation (minimize switching from heating to cooling)



Continuous Commissioning® - Energy Plaza (CUP)

Results of CC Project – **\$3,300,000 saved** (direct gas and electricity)

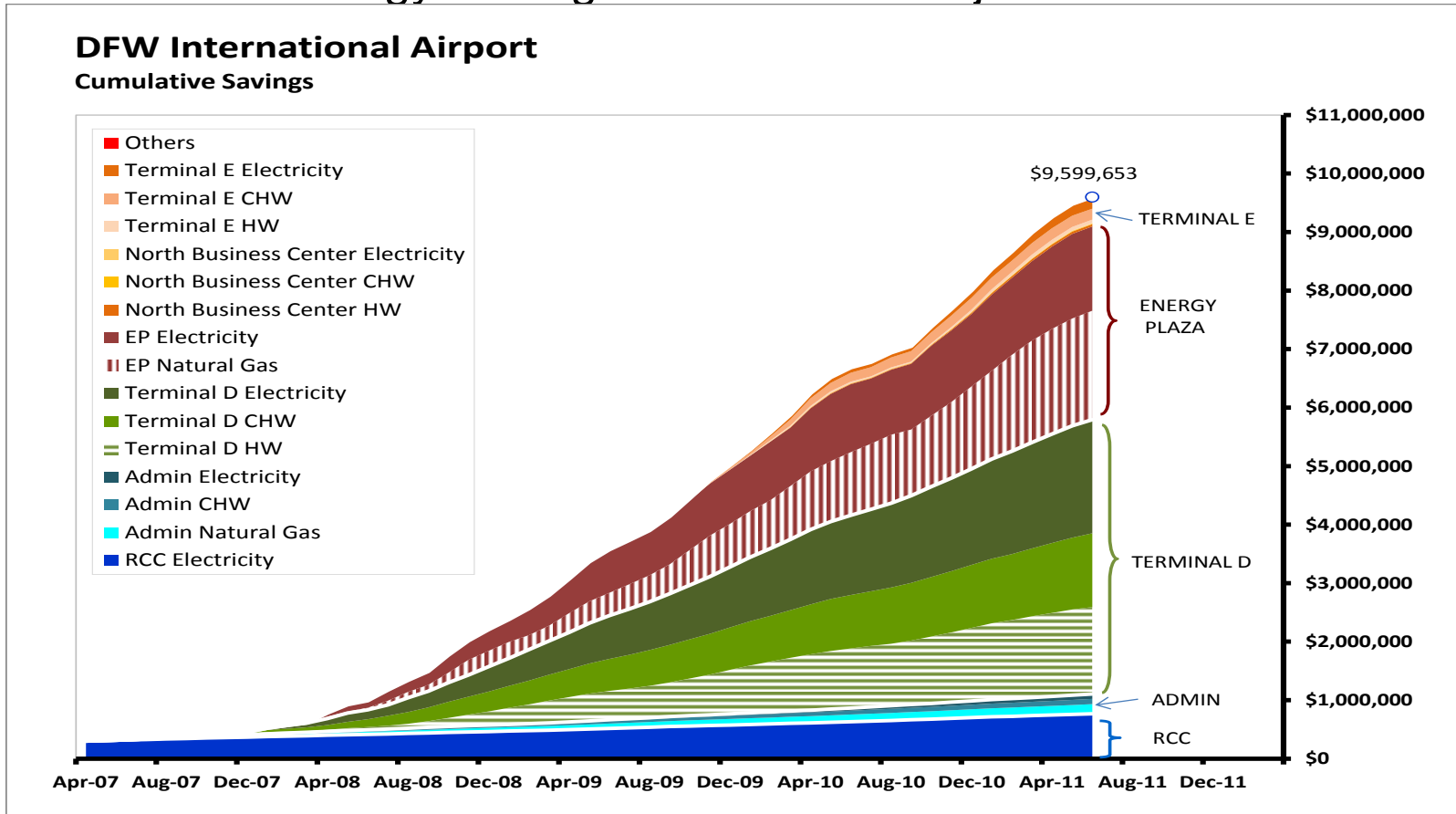


Continuous Commissioning® Projects

Site	Size (sq. ft)	Year
Rent-A-Car Center	130,000	2004, 2010
Administration Building	81,000	2007
Terminal D	2,000,000	2008-2009
Energy Plaza (CUP)	41,000 tons of capacity	2008-2009
Terminal E	460,000	2010
North Business Center	52,000	2010
Energy Plaza (HVAC)	125,000	2010
Skylink MSF	106,000	2011
Procurement Warehouse	61,000	2011
Human Resources	14,000	2011
Asset Management complex	98,000 (5 buildings)	2011
Total	3,257,000 sq ft	
4 Fire Stations, AOC, DataCenter, EAD, etc.	130,000 sq ft	2012

Continuous Commissioning® - Summary

Cumulative Energy Savings for All DFW Projects



DFW International Airport Dallas/Fort Worth Texas

**Larry Kramer, P.E., LC, CEM
Energy Engineer
LKramer@DFWAirport.com**

