



# Emission Reduction Strategies at the Dallas/Fort Worth International Airport

**TRB 85<sup>th</sup> Annual Meeting  
Multi-Modal Air Quality Workshop  
Washington, D.C.  
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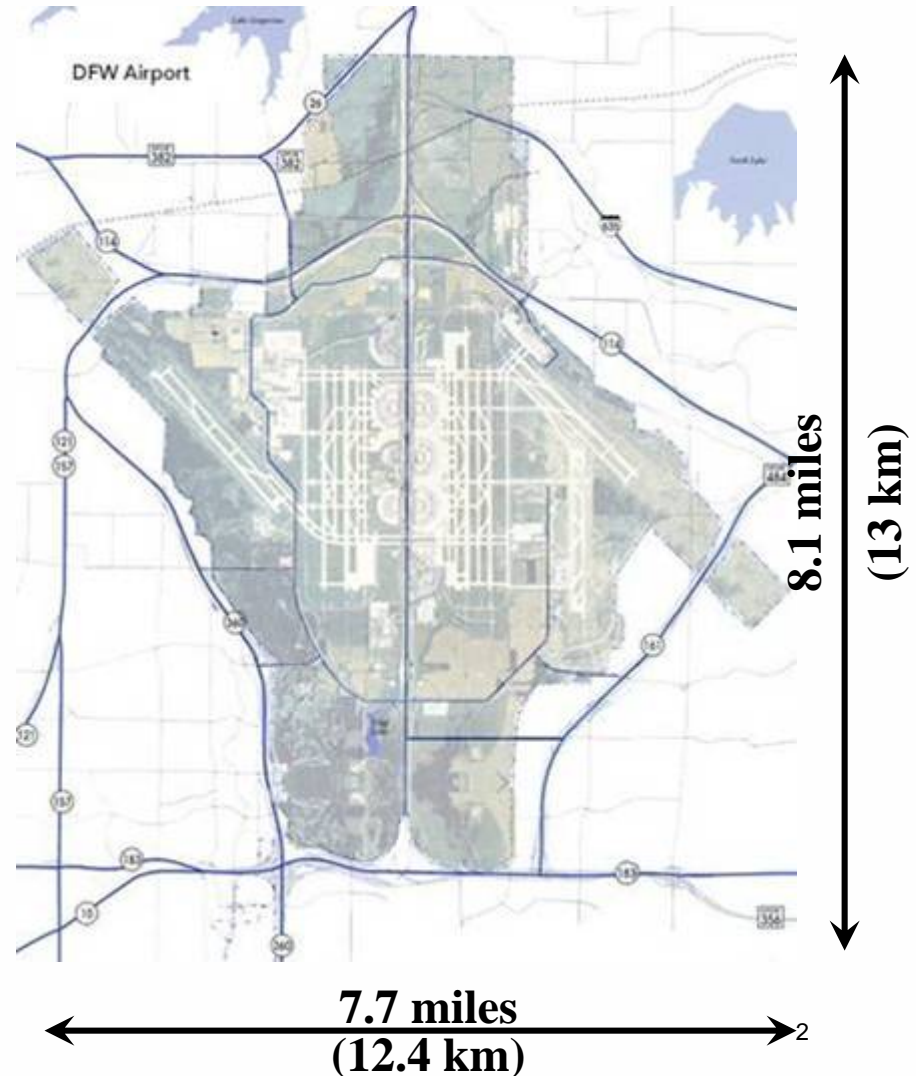


# Airport Overview

## DFW Airport

- Jointly owned by Cities of Dallas and Fort Worth
- Opened in 1974
- The world's 2<sup>nd</sup> largest airport encompassing 18,000 acres including 9,000 acres of natural resource areas
- Ranked third worldwide in operations totaling over 804,000 annually
- Ranked sixth worldwide in serving 59.4M passengers

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# DFW CLEAN AIR POLICY



The “DFW Metroplex” was designated a Serious Ozone Non-attainment Area in 2001 requiring a new State Implementation Plan (SIP).

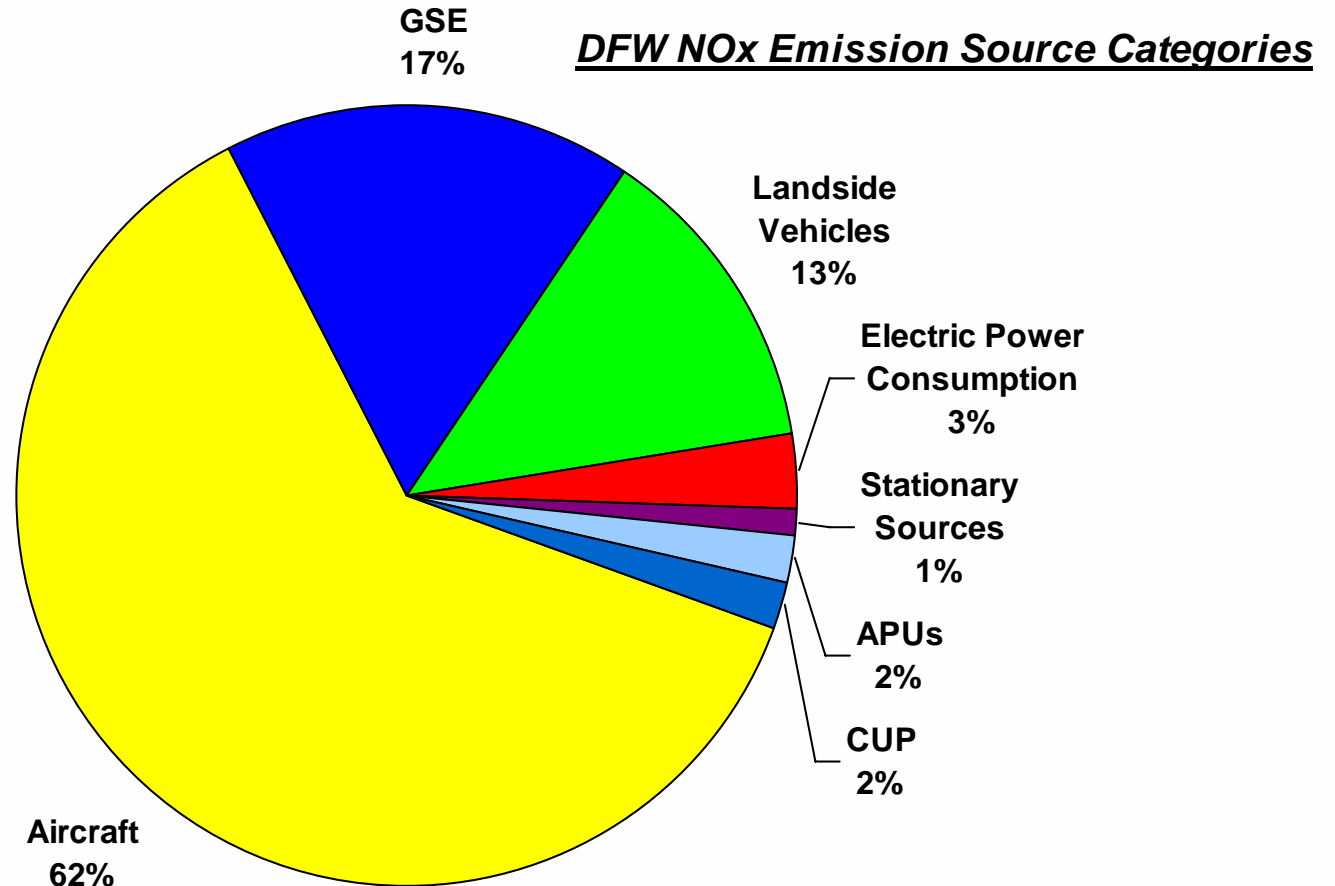
DFW’s Clean Air Policy (May 2000) states:

Recognizing the importance of clean air to Dallas, Fort Worth and the Region, the Dallas/Fort Worth International Airport Board is committed to improving air quality by reducing air pollution from Airport operations and increasing energy efficiency.

Through strong environmental innovations driven by DFW Board’s Clean Air Policy, DFW has rolled back emissions 95%!



# DFW Airport 2001 Emissions Inventory



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# Emission Reduction Strategies

- Mobile Source Reductions
- Stationary Source Reductions
- Energy Efficiency/Renewable Energy
- Travel Demand Management
- Airport Sustainability Initiative



# Mobile Source Strategies

- Airport Clean Fleet Program
- Contract service provider clean fleet requirements
- Airline Ground Service Equipment (GSE) Electrification
- Refueling/recharging infrastructure development
- Technology development



# Mobile Source Emission Reductions



- 87% of DFW's Light & Medium Duty Fleet consists of vehicles which meet or exceed Super Ultra Low Emission Vehicle Standards (SULEV) as defined by EPA's National Low Emission Vehicle (NLEV) program
- DFW has converted 100% of the Bus & Shuttle Van Fleet to Alternative Fuel Vehicles
- 100% of the Light & Medium Duty Fleet and 72% of the Heavy Duty & Off-road Fleet were converted to Clean Fuel Vehicles
- DFW has achieved an estimated 2 tons per ozone season day reduction in NOx emissions from the fleet conversion program



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# Fueling Infrastructure

## Public Access CNG Refueling Station



- Highest volume public access station in America
- Multiple storage banks capable of simultaneously fueling 8 passenger buses

- Public/private partnership



# GSE Electrification

## Memorandum of Agreement with TCEQ to reduce GSE NOx emission to 0.56 tpd by 2007



- Current GSE NOx emissions 5 tons per day (tpd)
- Over 2,150 units in service
- Over 530 electric GSE units in service at DFW, mostly operated by American Airlines



**DOT/FAA ILEAV Pilot Program supporting the deployment of Electrically Powered GSE**



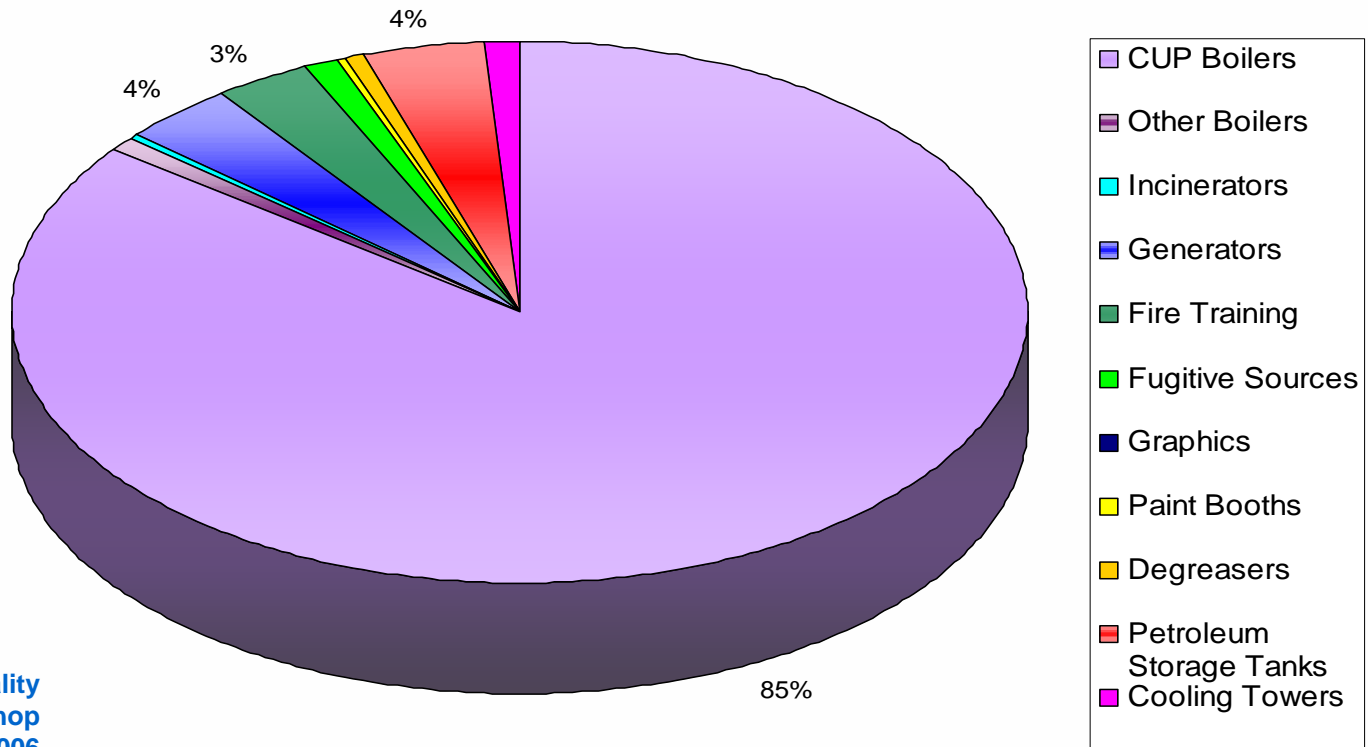
# Stationary Source Strategies

- International waste disposal
- Centralized Pre-Conditioned Air (PCA) and Ground Power (400Hz) systems for gated aircraft
- Thermal energy production
  - Electrification
  - Low NO<sub>x</sub> combustion technologies

# DFW Stationary Emission Sources

## Sources

District Energy Plant Boilers make up 85% of Stationary Emission Sources



# Stationary Source Reductions

## District Energy Plant Upgrade Project

### ■ Chiller Repowering

- Remove existing steam driven equipment (22,000 tons)
- Install 6 - 5,500 ton electric drive centrifugal chillers (33,000 tons)

### ■ Boiler Replacement

- Remove existing equipment - 405,000 lbs/hr (~100 PPM NO<sub>x</sub>)
- Install 5 new boilers - 222,000 lbs/hr @ 125 psig (~9 PPM NO<sub>x</sub>)
- 86% Reductions in Air Emissions

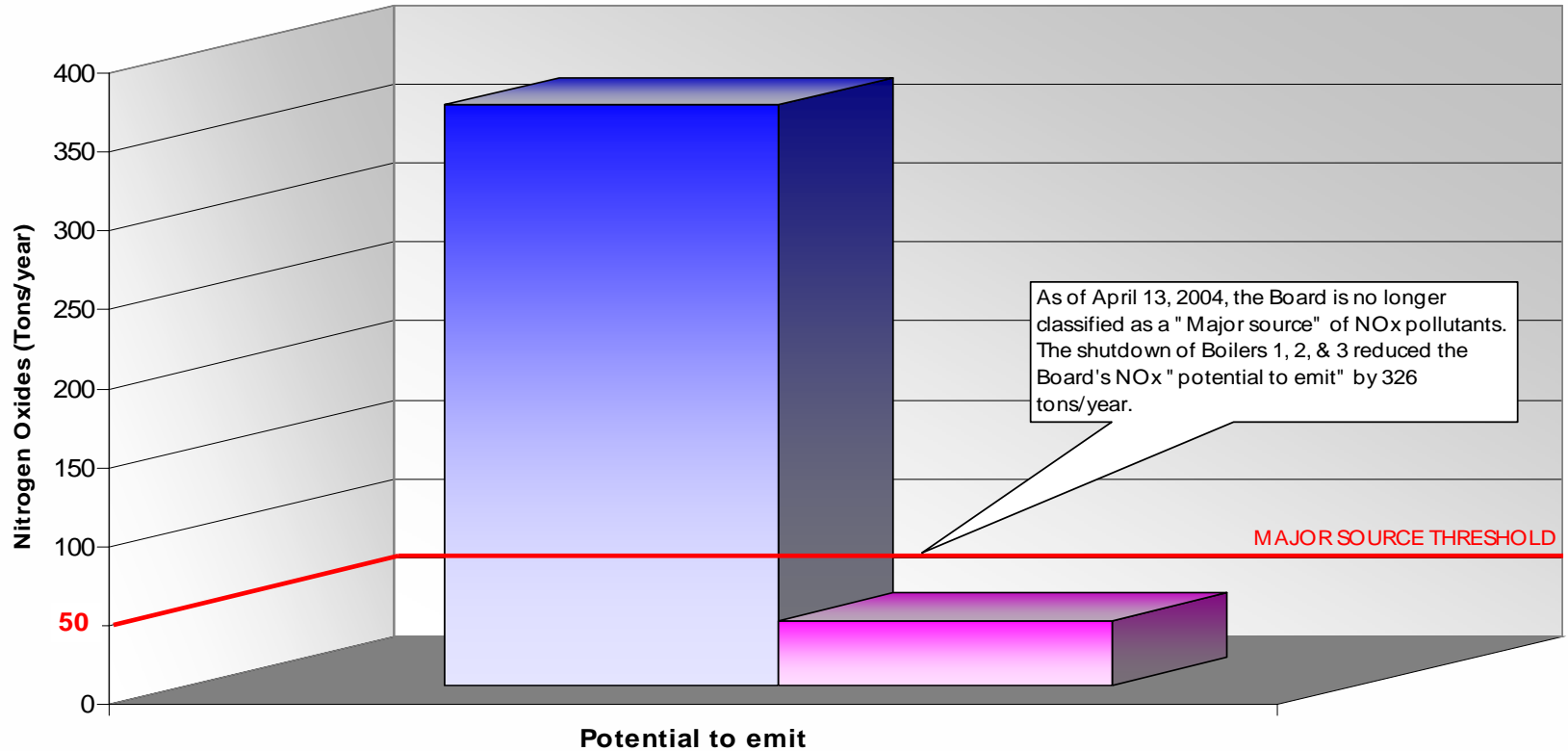




# Potential NOx Emissions

## District Energy Plant Upgrades Project

Pre-CUP Upgrades    Post-CUP Upgrades



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# EE/RE Strategies

- Energy Efficiency program
  - Operations & Maintenance processes
  - Retrofit applications
  - New construction
- Renewable energy
- Technology development
  - Research partnership with Energy Systems Laboratory
  - ESL Emissions Calculator

# EE in New Construction

## Terminal D

- Complies with 2001 IEEC (ASHRAE 90.1 - 1999)
- Heating & cooling from state-of-the-art district energy system
- HVAC design uses stratification in large open areas
- Extensive use of VFDs on fans and pumps
- Integrated energy management system monitoring all HVAC, lighting and conveyance equipment



# EE in New Construction

## Terminal D

- Innovative envelope measures to reduce heat gain and infiltration
- Employs latest in fluorescent, MH and LED lighting technologies (1.3 w/ft<sup>2</sup>)
- Extensive use of daylighting, daylight responsive controls and occupancy sensors
- PCA and Ground Power to service aircraft integrated at each gate



# EE in New Construction



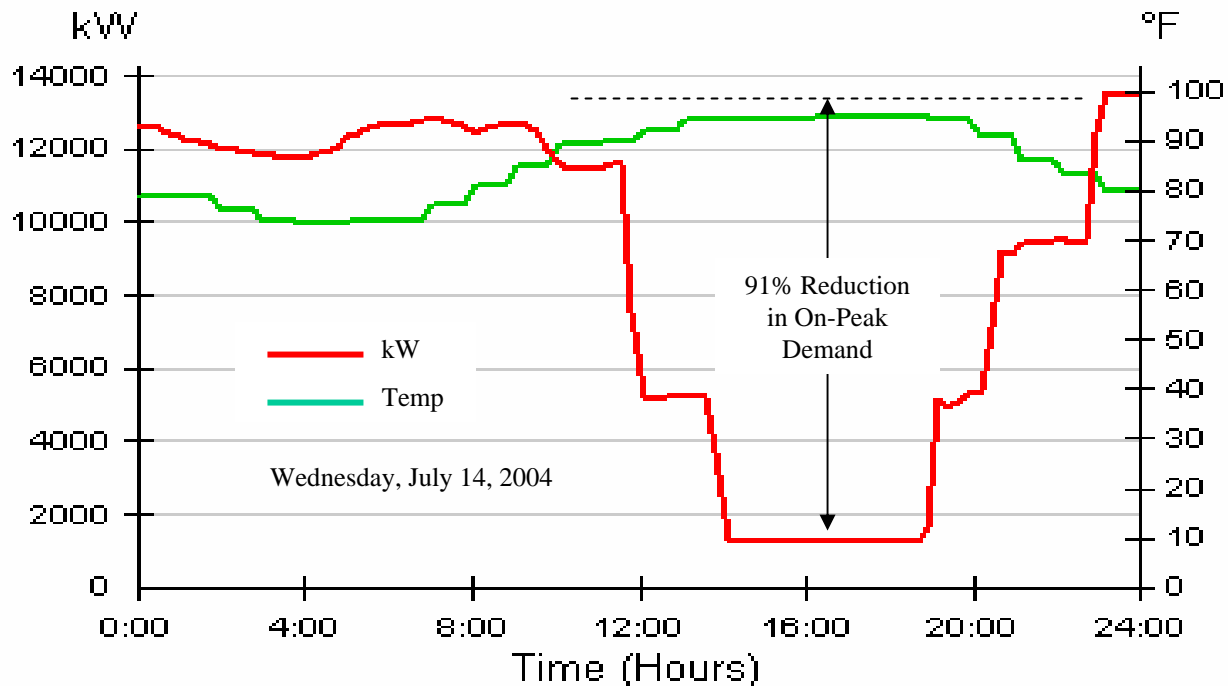
## District Energy Plant Upgrade Project

- Innovative technology included thermal energy storage & state-of-the-art boilers and chillers.
- Yields a projected avoided future energy use of 25 million MMBTUs over the useful life of the facilities.
- **Thermal Energy Storage Tank**
  - 6 million gallons
  - 90,000 ton-hours
  - Ability to shift a minimum of 5 MW off-peak
- **Centralized Pre-Conditioned Air System**
  - 12,000 tons Cooling
  - 51 MMBtu Heating



# EE in New Construction

## District Energy Plant Upgrade Project Thermal storage system performance

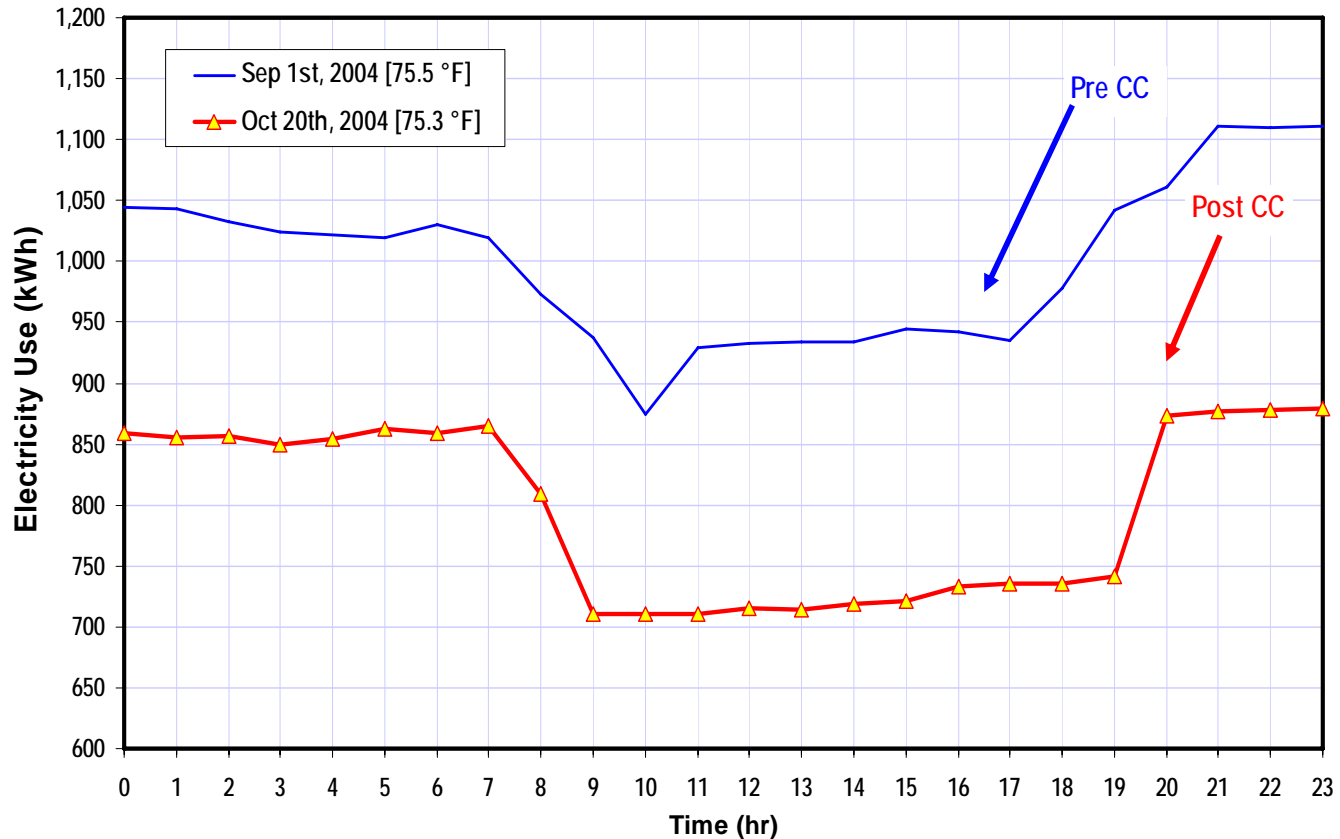




# Building Optimization

## Energy Savings - 1 million (kWh) / yr (11%)

### Rent-A-Car (RAC) Center at DFW Int'l Airport



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# Self-Dimming Ballast Field Test

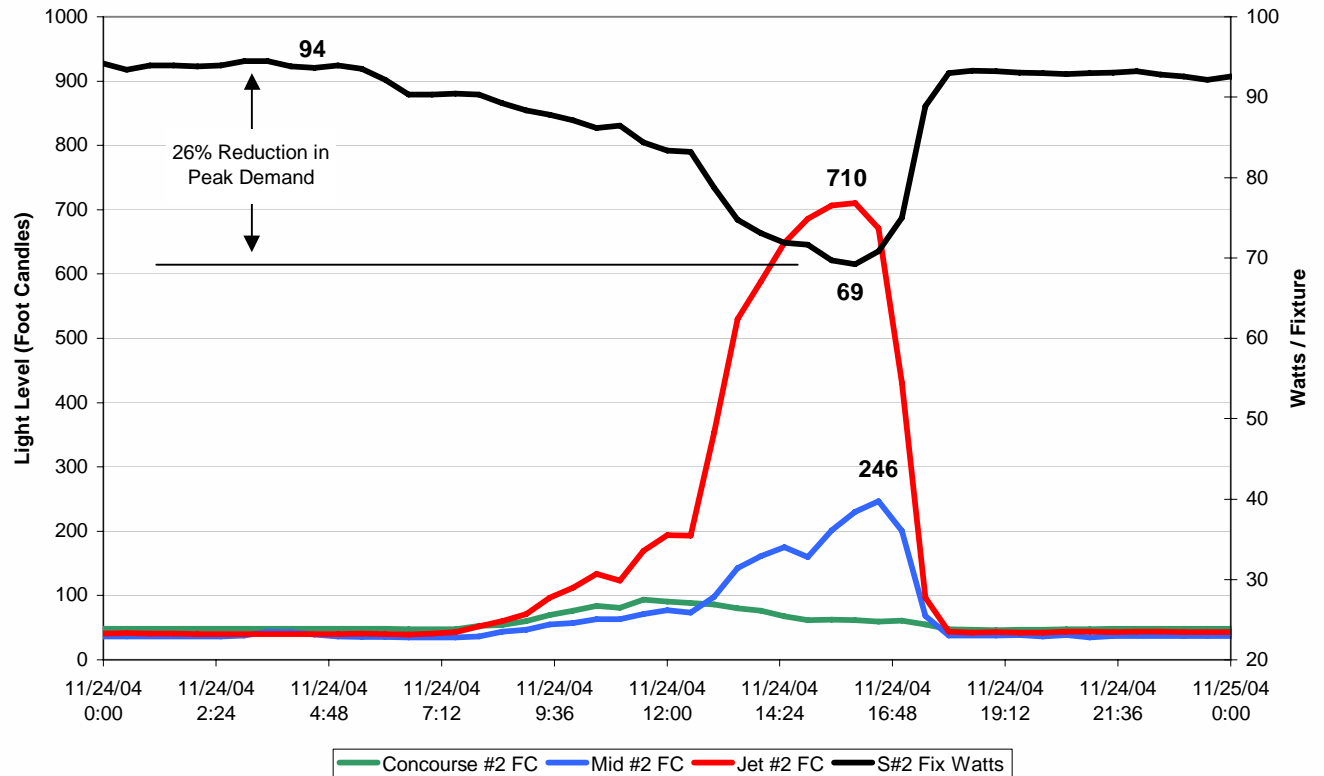


Axis Technologies



JustRightLight

Seating Area Watts/Fixture & Light Level Profiles  
(Sunny Day - Peak Daylight)



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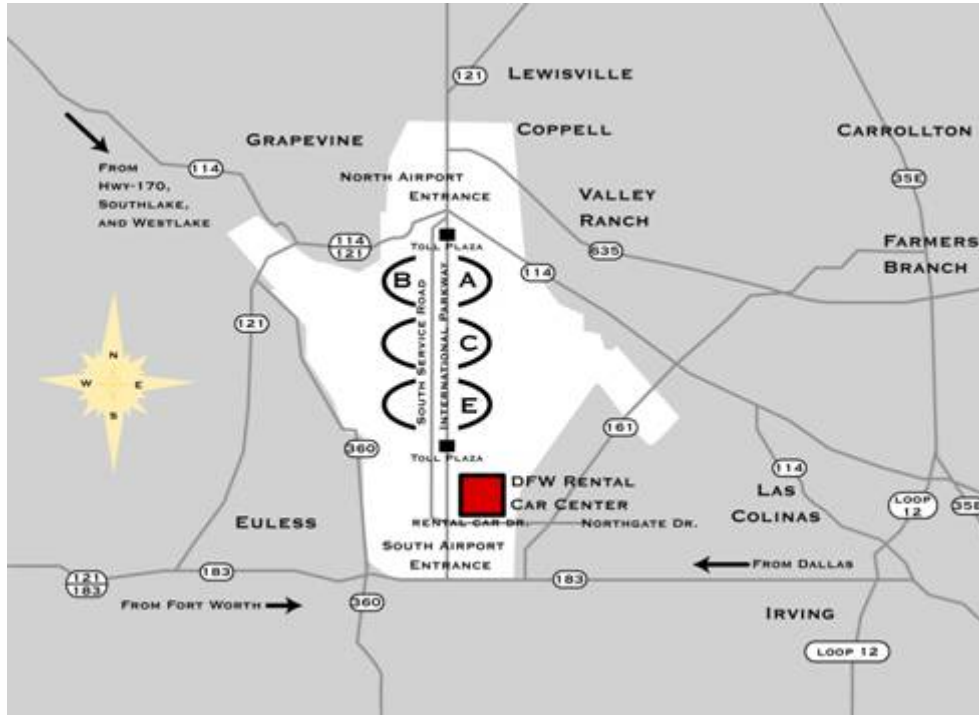




# Travel Demand Mgt Strategies

- Trip reduction
- Idle reduction
- Aircraft traffic management

# Travel Demand Management



- Consolidated Rental Car Busing Operation (initiated March 1998)
- One fleet of 40 buses traveling a shorter distance
- Reduced mileage driven by approximately 70%
- Estimated NOx reductions are almost 1 ton per day
- Multiple value streams
  - Customer service
  - Lower cost
  - Lower emissions



# Travel Demand Management

- Skylink (Automated People Mover System), began operation in May 2005, and reduces dependence on Terminal Link bus system for inter-terminal transfers.
- Easy Pass Parking (Passkey) System has reduced queue delays at parking control toll plazas by 90%, thereby reducing idle time and associated emissions. The system served over 100,000 vehicles per ozone season weekday.
- Perimeter Taxiways and RNAV (Area Navigation) Procedures will further reduce aircraft emissions on the ground (queuing) and in flight.



# Waste Minimization

## Construction Material

- 2.5 million yd<sup>3</sup> of excavated soil were reused on-airport for runway extensions & bedding material
- 355,000 tons of demolished concrete were reused on-airport for base and bedding material.
- Rigid foam roof insulation reuse during terminal re-roof project avoided 200,000 ft<sup>3</sup> in waste.

## Aircraft Deicing Waste Capture

- Discrete spent aircraft deicing/anti-icing fluid capture, storage and treatment infrastructure allows on-airport treatment or disposal via POTW.



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January 22, 2006





# Aviation Industry Sustainability

- ACI-NA Environmental and Technology Committee initiative
- Holistic business approach that ensures the Economic, Operational, Natural Resource and Social integrity of the airport – and integrated approach to asset ownership
- Working Group formed to develop framework, processes, outreach, best practices and sustainability standards



***“Action without philosophy is a lethal weapon; philosophy without action is worthless”***

**Soichiro Honda**

***“You miss 100% of the shots you never take”***

**Wayne Gretzky**



***Thank you!***

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