



2016 ACEEE Intelligent Efficiency Conference

# Energy Systems Laboratory Overview

Dr. David E. Claridge, Director  
Energy Systems Laboratory  
Texas A&M Engineering Experiment Station

# Mission

- ESL conducts applied research and technology development on energy-efficiency and renewables, and deploys technologies, solutions and training that meet clients' needs worldwide.



- **Continuous Commissioning® for Energy Optimization**
- **Testing & Certification of HVAC Systems**

- **Energy Codes & Regulations**
- **Emissions Reduction from Energy Efficiency**
- **Training, Conferences**

# Facilities & Programs

## 1. RELLIS Energy Efficiency Lab

*Over 75 years of testing and research for the HVAC industry*

- Fan Testing/Certification and Acoustic Testing
- Heating/Cooling Coil Testing
- Psychrometric Chambers for AC and HP testing
- Solar Test Facility
- Membrane Dehumidifier and Air Conditioning



# Facilities & Programs Texas

## 2. Emissions Reduction Program (TERP)

In 2001, the Texas Legislature Mandated the ESL to:

- Calculate Air Pollution Reduction & Energy Savings from Energy Efficiency, Wind and other Renewables programs.
- Determine impact of building energy standards on air pollution and compliance of city-proposed code changes
- Provide technical assistance to municipalities and the legislature
- Certify municipal inspectors



**Houston: Clear day vs. Ozone day**

# Facilities & Programs Texas

## 2. Emissions Reduction Program (TERP)



TEXAS A&M ENGINEERING  
EXPERIMENT STATION

- **Over \$ 3.5 B Energy Savings from energy-code compliance in residential construction**



**Houston: Clear day vs. Ozone day**

# Facilities and Programs

## 3. Industrial Assessment Center



TEXAS A&M ENGINEERING  
EXPERIMENT STATION

DOE funded Center since 1986

- Energy Audits (> 640)
- Training of students on energy audits
- Energy saving measures



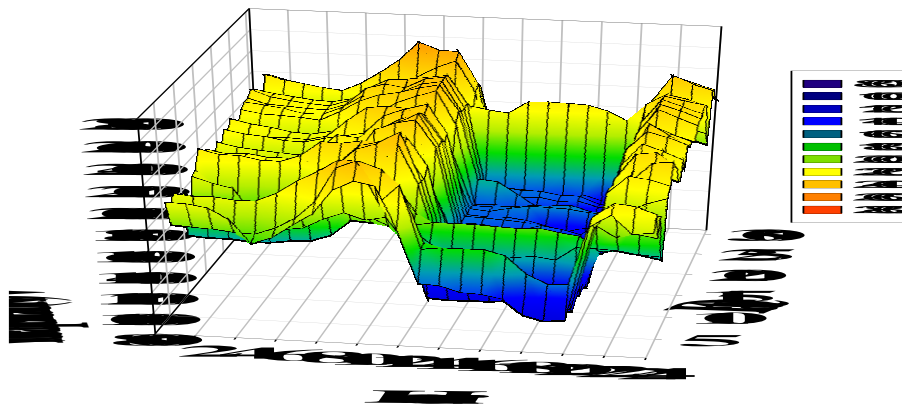
# Facilities & Programs

## 4. Continuous Commissioning<sup>®</sup> (CC<sup>®</sup>)



TEXAS A&M ENGINEERING  
EXPERIMENT STATION

- Incorporates and extends the best of existing building commissioning (EBCx) practices.
- Integrates cost effective measures, including operational strategies / processes, and cutting-edge tools and technologies developed by the ESL.
- ESL pioneered Retro-Commissioning Industry.

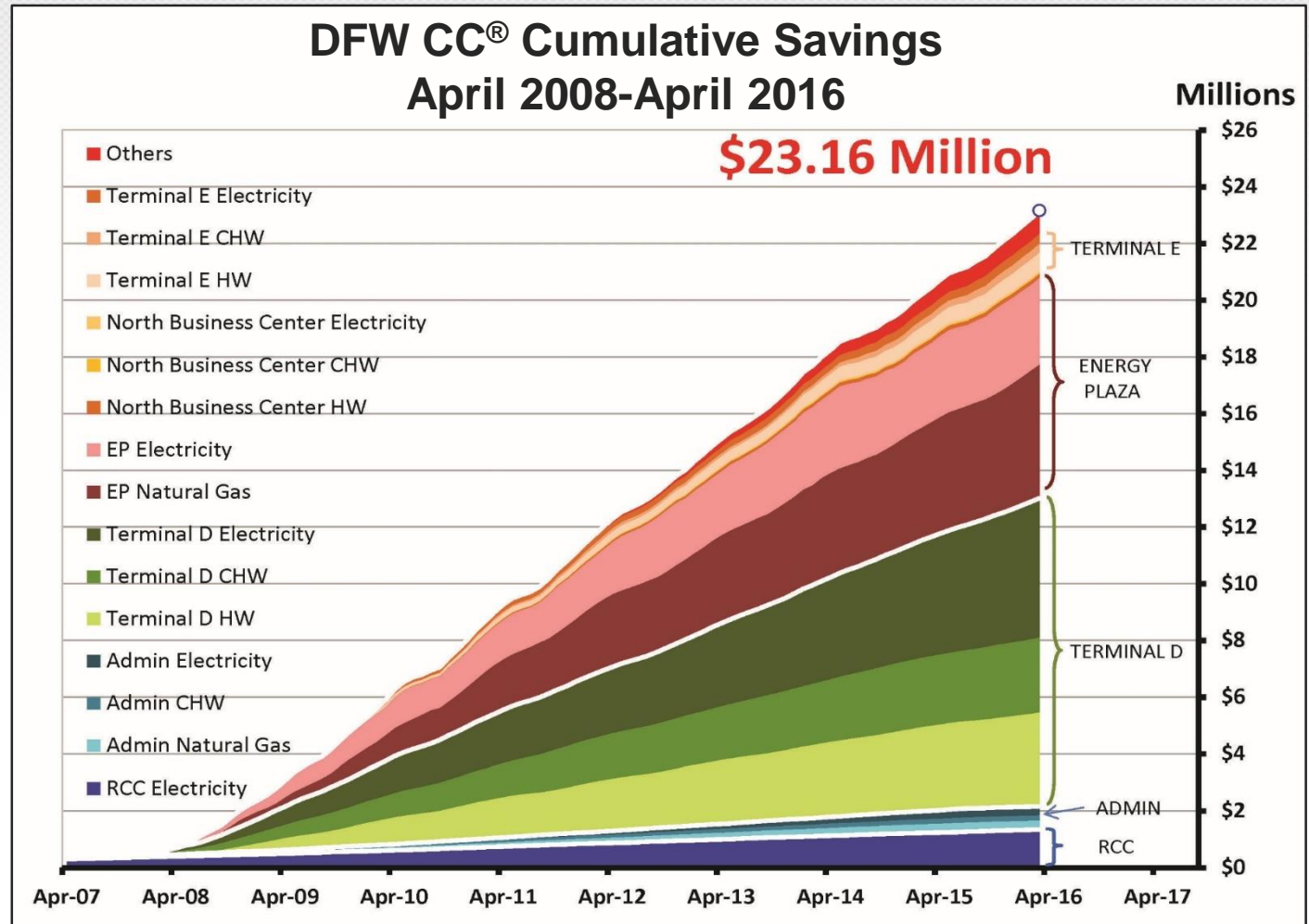




# DFW CC<sup>®</sup> Project

Cumulative  
Savings:  
**\$23.16 Million**

Cumulative  
Cost:  
**\$3.2 Million**



# Facilities & Programs

## 4. Continuous Commissioning<sup>®</sup> (CC<sup>®</sup>)

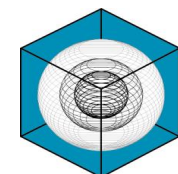
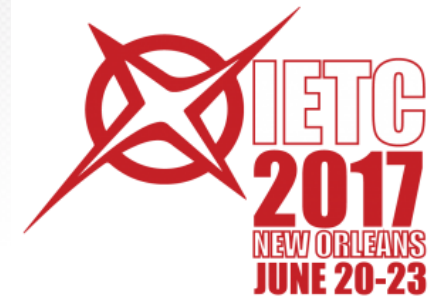
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# Facilities & Programs

## 5. ESL Conferences & Training

- **CATEE**
  - Clean Air Through Energy Efficiency Conference
- **IETC**
  - Industrial Energy Technology Conference
- **ICEBO**
  - International Conference on Enhanced Building Operation
- **H&H**
  - Hot and Humid Symposium



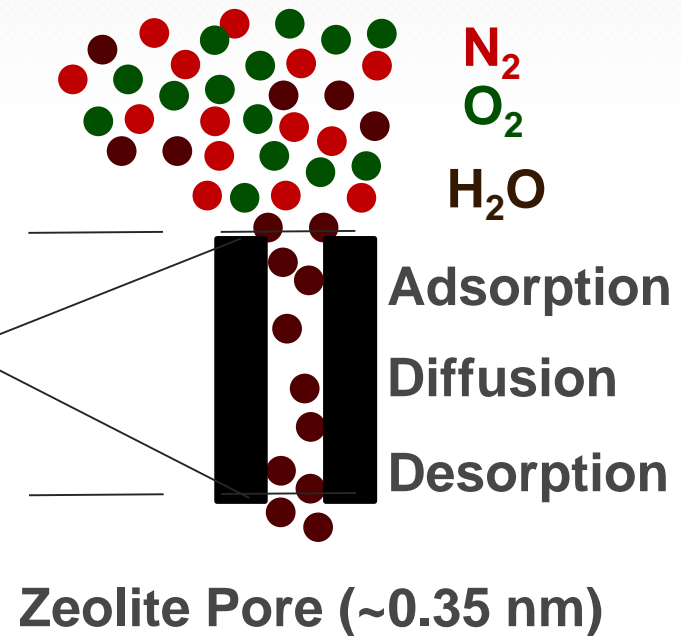
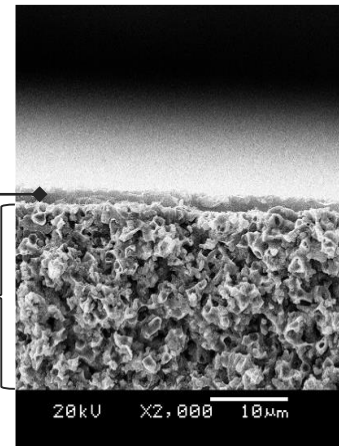
# Technology Development

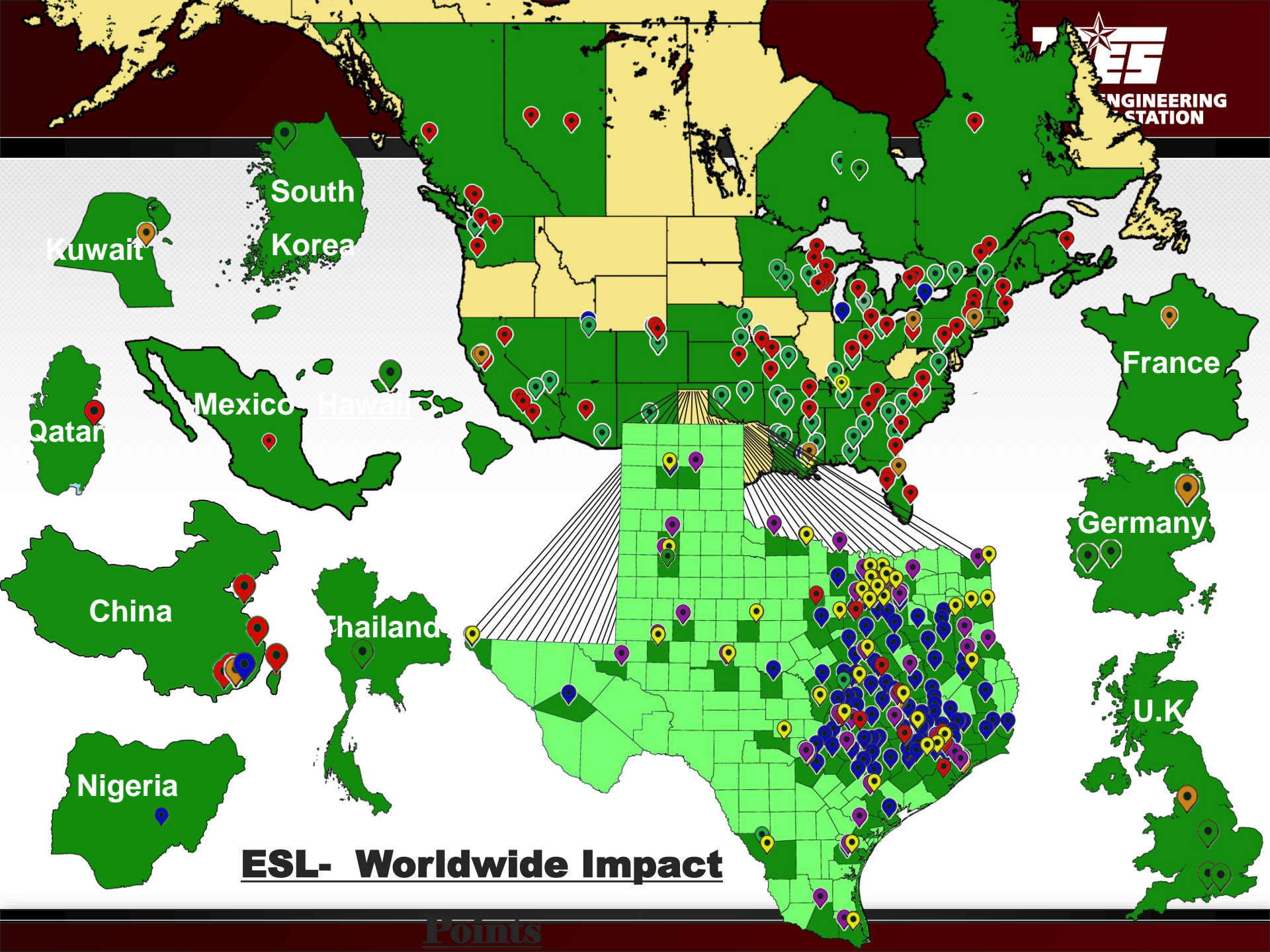
## Ex: Molecular Membrane Air Conditioner (MMAC)

- Zeolite membrane permits water vapor to pass through - blocks most air passage
  - Acts as a “sieve” for water vapor to dehumidify air without the energy penalty of condensation

### • Disruptive Air Conditioning Technology!

- ✓ No refrigerants
- ✓ Improved efficiency
- ✓ Purified water as by-product





Kuwait

South  
Korea

Qatar

Mexico  
Hawaii

China

Thailand

Nigeria

France

Germany

U.K

# **ESL- Worldwide Impact**