Energy Management for Local Governments:
Facility Retrofits to Reduce Overall Energy and Water Consumption

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

AUGUST 28, 2019

North Central Texas
Council of Governments

Regional Energy Manager Project

PARTNERSHIP WITHIN NCTCOG, BETWEEN TRANSPORTATION AND ENVIRONMENT & DEVELOPMENT STAFF

Project Overview

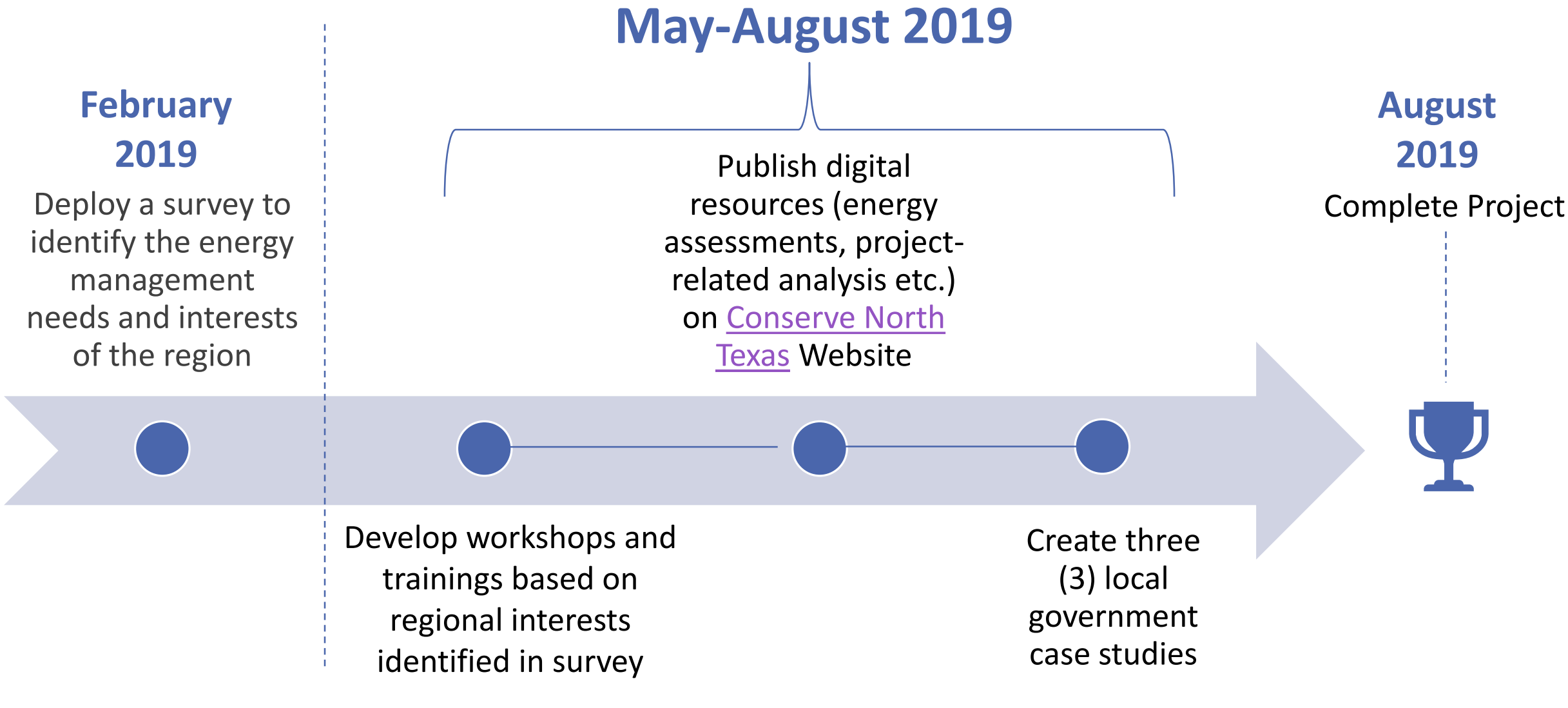
Purpose

- Expand Local Government Staff Capabilities in Energy Management Topics and Compliance to SB 898 Reporting
- Increase Use of Energy and Water Benchmarking Tools
- Improve Accuracy of Emissions Reduction Data Associated with Reduced Energy Use

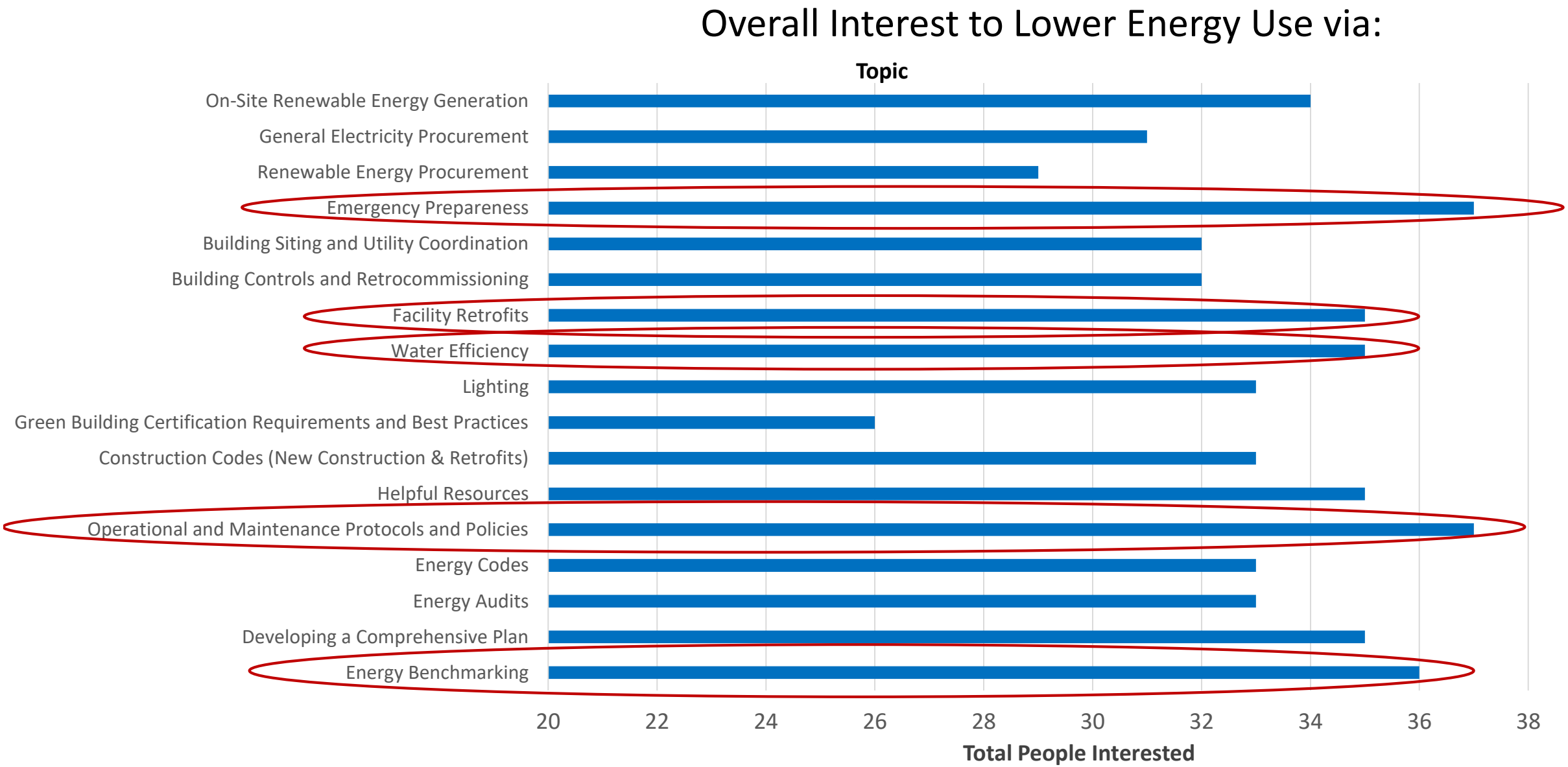
Outcome

- Demonstrate the value and benefits of increasing regional energy education
- Quantify facility energy consumption via benchmarking
- Assess energy reduction impacts on regional Air Quality data in order to serve as a regional template for other regions to utilize.

Project Timeline and Deliverables



Regional Survey Results



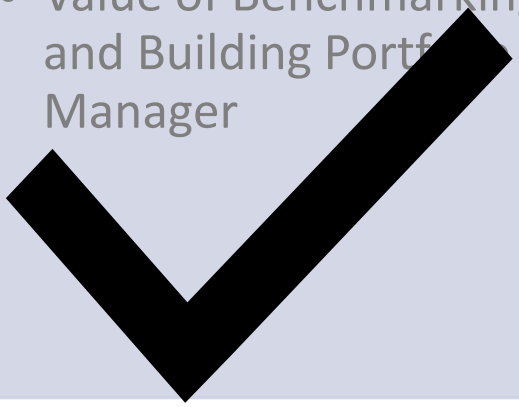
Upcoming Workshops + Trainings

May

Workshop 1

May 23

- SB 898
- Value of Benchmarking and Building Portf… Manager

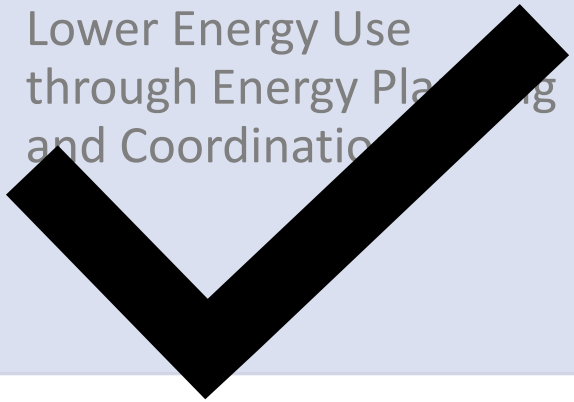


June

Workshop 2

June 28

- SB 898 (82R) / SB 241 (86R)
- Lower Energy Use through Energy Pla…g and Coordinatio…



August

Workshops 3 & 4

August 28

<u>Workshop 3 (9am-12pm)</u>

- Facility Retrofits to Reduce Overall Energy and Water Consumption

<u>Workshop 4 (1pm -4pm)</u>

- Energy Efficiency for Grid Resilience

Local Government Energy Reporting - SECO

SB898 (82R) amended by SB241 (86R) Section 388.005 (c) Health and Safety Code

Purpose: Lower Local Government Energy Consumption

Requirements: Requires all political subdivisions, institutes of higher education, and state agencies in the 42 Ozone Nonattainment and Near Nonattainment Counties to establish a goal of reducing electric consumption by at least 5% each state fiscal year for ~~10 years~~ **7 years** beginning September 1, ~~2011~~ **2019** and to Submit Annual Reporting

Issues: Lack of Awareness, Non-Compliance with Annual Reporting Requirement

Local Government Energy Reporting - SECO

Who Reports?

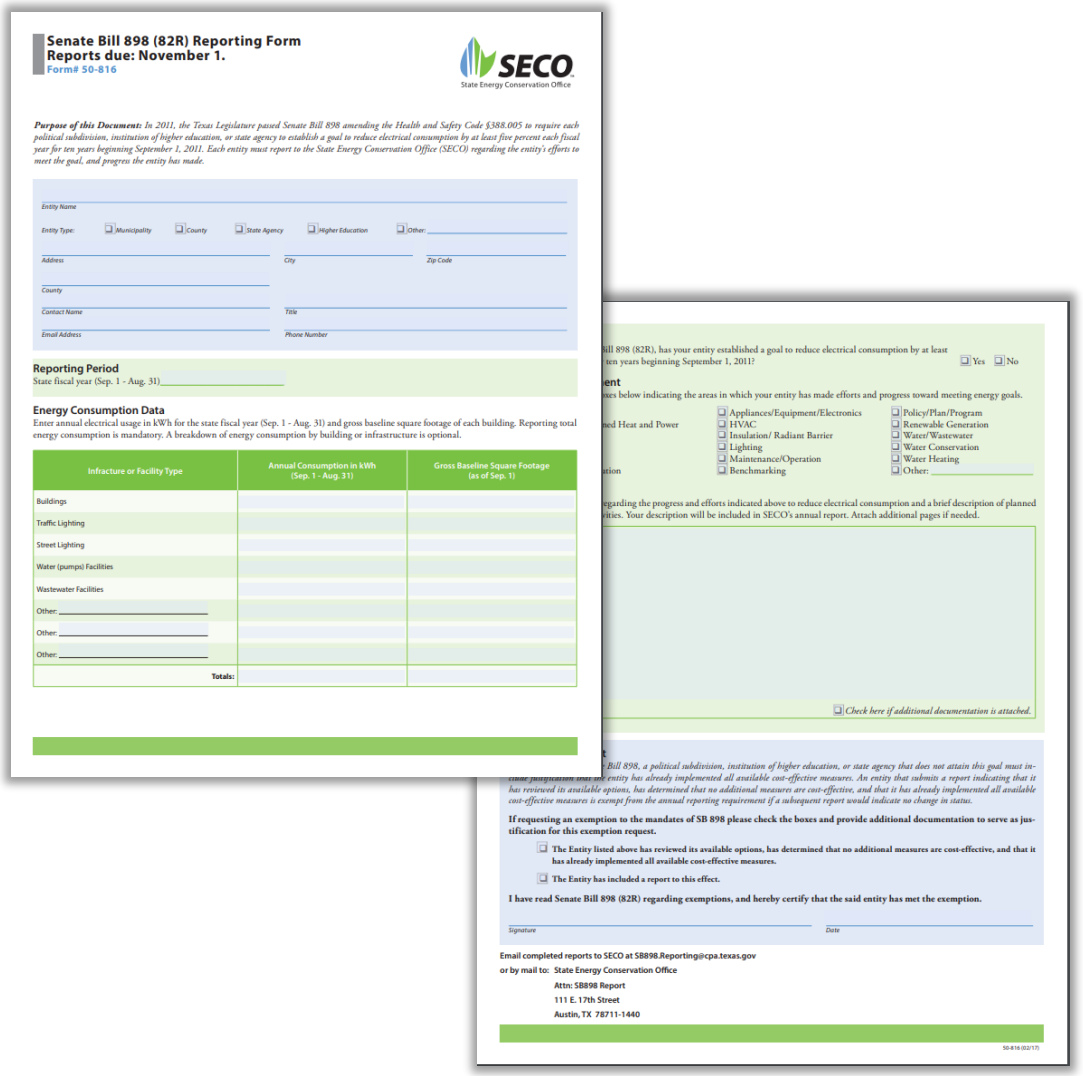
The following entities in 42 Nonattainment or Near Nonattainment counties:

- Cities and Counties
- State Agencies
- Institutes of Higher Education

What's Due:

Annual report to SECO regarding the entity's efforts and progress to meet the 5% energy reduction goal

DUE: November 1 (annually)



Senate Bill 898 (82R) Reporting Form
Reports due: November 1.
Form# 50-816

SECO
State Energy Conservation Office

Purpose of this Document: In 2011, the Texas Legislature passed Senate Bill 898 amending the Health and Safety Code §388.005 to require each political subdivision, institution of higher education, or state agency to establish a goal to reduce electrical consumption by at least five percent each fiscal year for ten years beginning September 1, 2011. Each entity must report to the State Energy Conservation Office (SECO) regarding the entity's efforts to meet the goal, and progress the entity has made.

Entity Name
Entity Type: ☐ Municipality ☐ County ☐ State Agency ☐ Higher Education ☐ Other:
Address
City
Zip Code
County
Contact Name
Title
Email Address
Phone Number

Reporting Period
State fiscal year (Sep. 1 - Aug. 31)

Energy Consumption Data
Enter annual electrical usage in kWh for the state fiscal year (Sep. 1 - Aug. 31) and gross baseline square footage of each building. Reporting total energy consumption is mandatory. A breakdown of energy consumption by building or infrastructure is optional.

Infracture or Facility Type	Annual Consumption in kWh (Sep. 1 - Aug. 31)	Gross Baseline Square Footage (as of Sep. 1)
Buildings		
Traffic Lighting		
Street Lighting		
Water (pumps) Facilities		
Wastewater Facilities		
Other:		
Other:		
Other:		
Totals:		

ill 898 (82R), has your entity established a goal to reduce electrical consumption by at least
ten years beginning September 1, 2011? ☐ Yes ☐ No

ent
xes below indicating the areas in which your entity has made efforts and progress toward meeting energy goals.

ed Heat and Power
ation

☐ Appliances/Equipment/Electronics
☐ HVAC
☐ Insulation/ Radiant Barrier
☐ Lighting
☐ Maintenance/Operation
☐ Benchmarking
☐ Policy/Plan/Program
☐ Renewable Generation
☐ Water/Wastewater
☐ Water Conservation
☐ Water Heating
☐ Other:

egarding the progress and efforts indicated above to reduce electrical consumption and a brief description of planned
ities. Your description will be included in SECO's annual report. Attach additional pages if needed.

☐ *Check here if additional documentation is attached.*

Bill 898, a political subdivision, institution of higher education, or state agency that does not attain this goal must in-
clude justification that the entity has already implemented all available cost-effective measures. An entity that submits a report indicating that it has reviewed its available options, has determined that no additional measures are cost-effective, and that it has already implemented all available cost-effective measures is exempt from the annual reporting requirement if a subsequent report would indicate no change in status.

If requesting an exemption to the mandates of SB 898 please check the boxes and provide additional documentation to serve as justification for this exemption request.

☐ **The Entity listed above has reviewed its available options, has determined that no additional measures are cost-effective, and that it has already implemented all available cost-effective measures.**

☐ **The Entity has included a report to this effect.**

I have read Senate Bill 898 (82R) regarding exemptions, and hereby certify that the said entity has met the exemption.

Signature *Date*

Email completed reports to SECO at SB898.Reporting@cpa.texas.gov
or by mail to: State Energy Conservation Office
Attn: SB898 Report
111 E. 17th Street
Austin, TX 78711-1440

50-816 (02/17)

Impact of Facility Retrofits and Upgrades

BY THE NUMBERS

Energy Use by Building Type

The top five energy-consuming building categories used about half of the energy consumed by all commercial buildings in 2012

% Consumption	Top five energy-consuming building categories:
15%	**Mercantile and service** - Malls and stores, Car dealerships, Dry cleaners, Gas stations
14%	**Office** - Professional and **Government Offices**, Banks
10%	**Education - Elementary, Middle, and High School, Colleges**
8%	**Health care** - Hospitals, Medical offices
6%	**Lodging** - Hotels, Dormitories, Nursing homes

Source: https://www.eia.gov/energyexplained/index.php?page=us_energy_commercial

Energy Consumption in Local Government Buildings

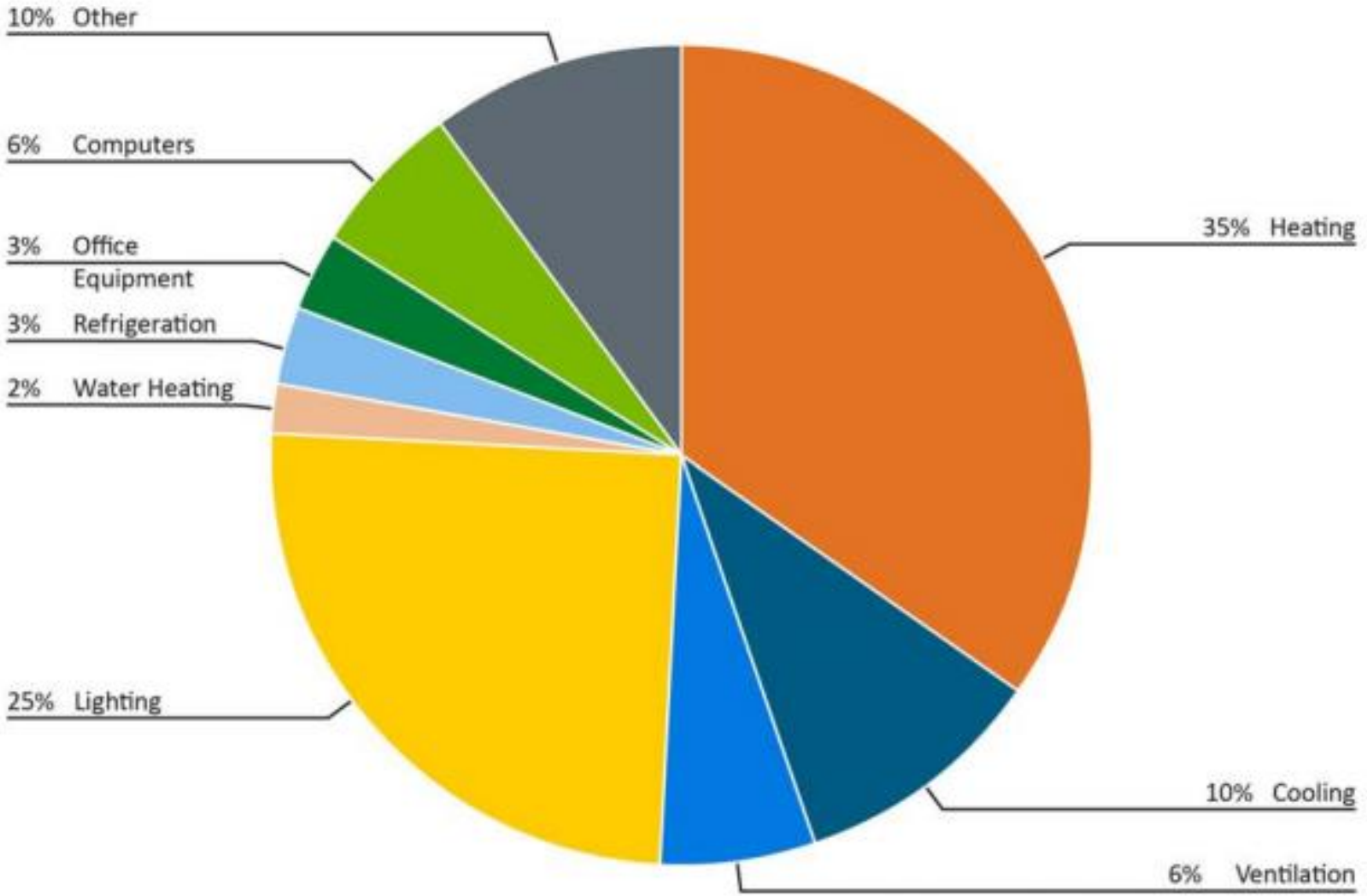


Figure 2.1. Percent Energy Use by Building System (U.S. Energy Information Administration, 2006)

Interior and Exterior Retrofits

HVAC Optimization

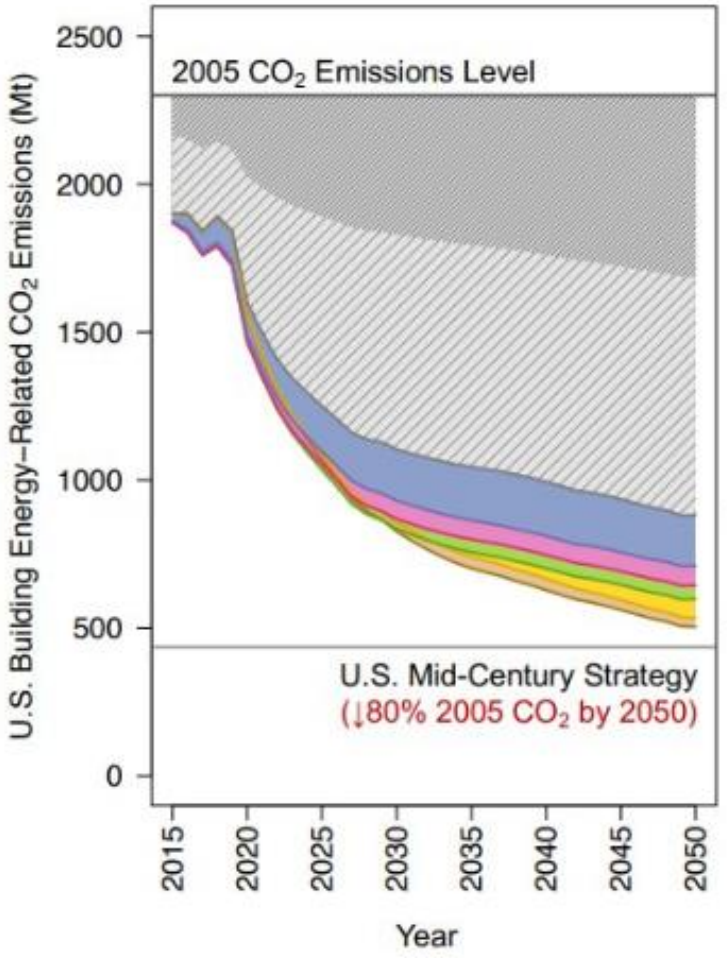
Source: https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf

Why Facility Retrofits?

Building energy use contributes to over one third of carbon dioxide (CO2) emissions in the U.S.

U.S. Mid-Century Strategy

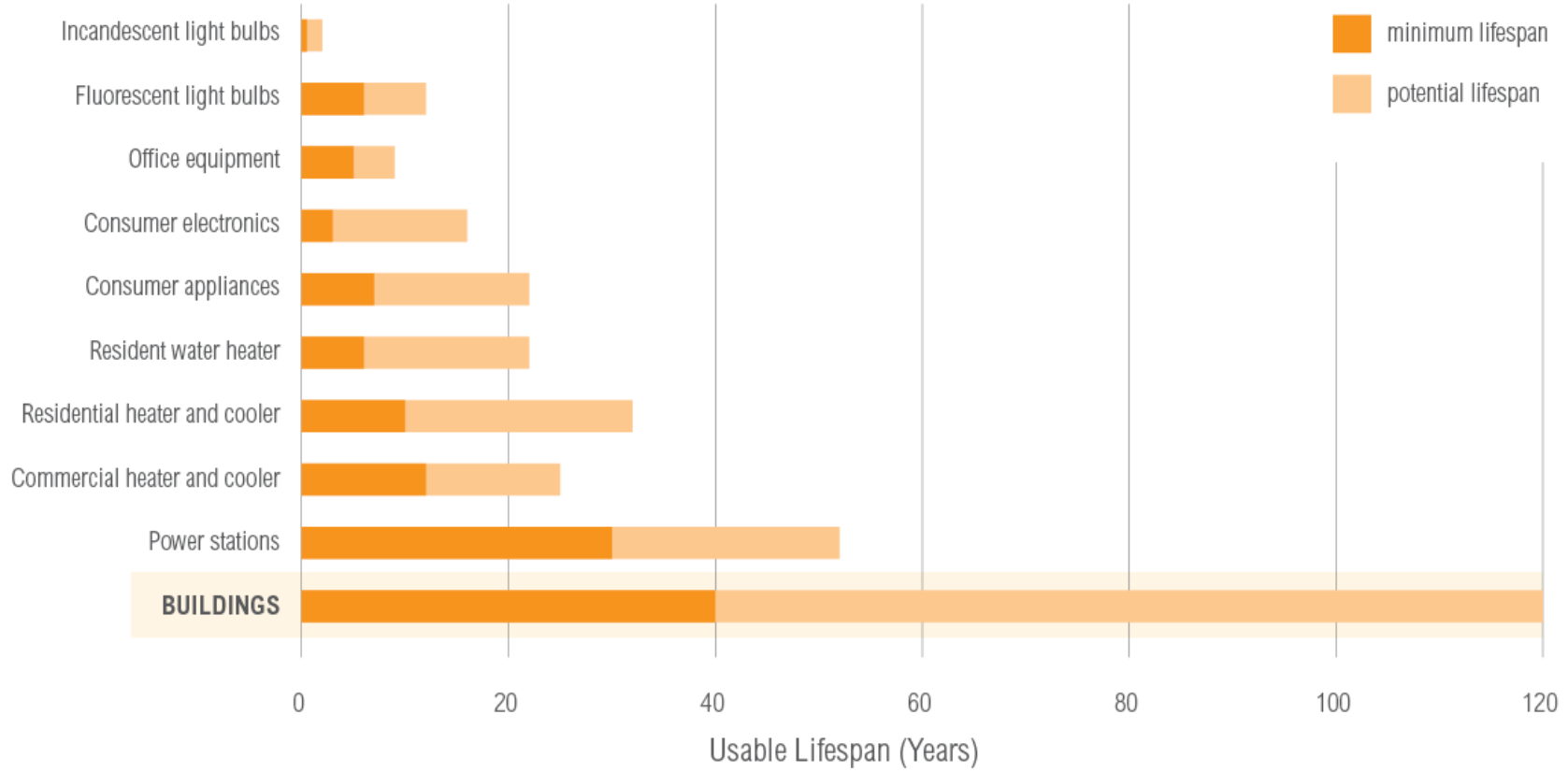
- Cut 2005 level CO2 emissions by 80%
- Install highly energy-efficient building technologies, new operational approaches, and electrification of building systems that consume fossil fuels directly,
- Increased share of electricity generated from renewable energy sources



scout
U.S. DEPARTMENT OF ENERGY
scout.energy.gov

Source: https://techxplore.com/news/2019-08-carbon-emissions.html

Buildings Have Long Economic Lifespans Compared to Other Energy-Consuming Infrastructure

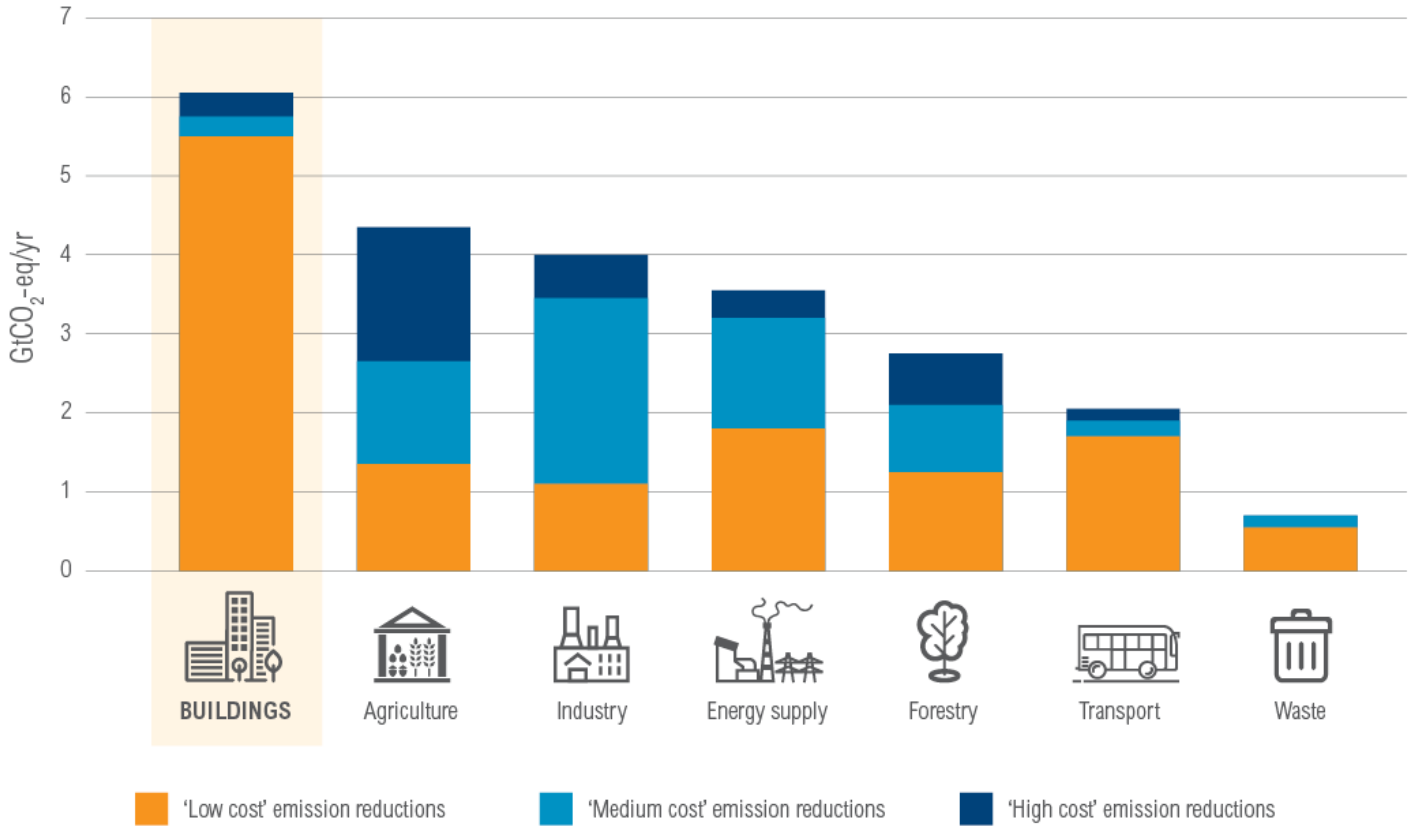


Source: International Energy Agency. 2013. Transition to Sustainable Buildings: Strategies and Opportunities to 2050. http://www.iea.org/publications/freepublications/publication/Building2013_free.pdf.

wri.org/buildingefficiency

WORLD RESOURCES INSTITUTE

Building Efficiency Is One of the Most Affordable Ways to Cut Emissions

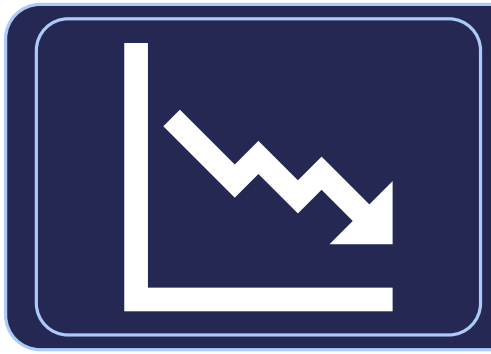


Note: 'Low cost' emission reductions = carbon price <20 US$/$tCO_2$-eq. 'Medium cost' emission reductions = carbon price <50 US$/$tCO^2$-eq.
'High cost' emission reductions = carbon price <100 US$/$tCO_2$-eq.
Source: IPCC. 2007. IPCC Fourth Assessment Report: Climate Change 2007: Synthesis Report. "4.3 Mitigation options." https://www.ipcc.ch/publications_and_data/ar4/syr/en/mains4-3.html

wri.org/buildingefficiency

WORLD RESOURCES INSTITUTE

Facility Retrofit Benefits:



Overall

Buildings can cut energy use by 15% by implementing no to low cost measures and 45% from deep retrofit measures

Financial Benefits

- For every $1 invested in energy efficiency, avoids $2 spent on the energy supply
- Resulting energy savings can increase available capital

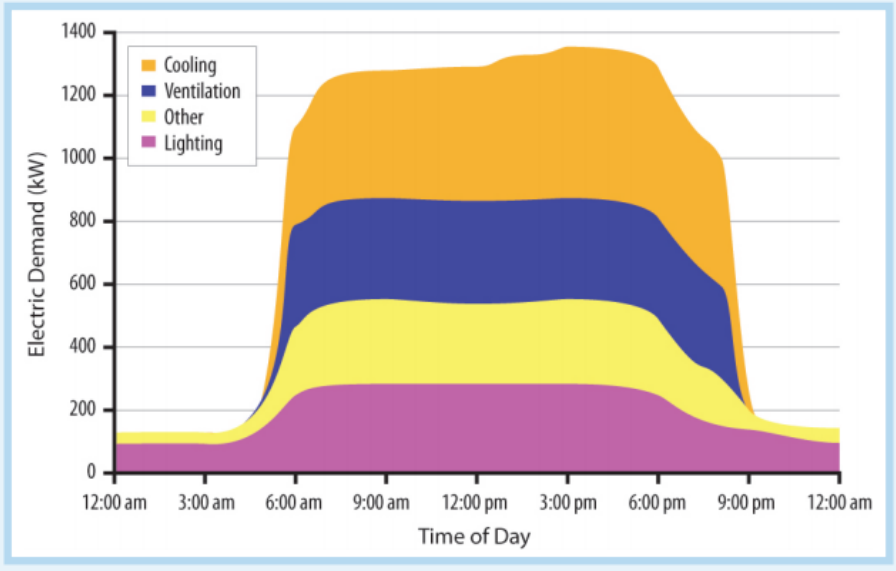
Environmental Benefits

- Reduce emissions and improve indoor and outdoor air quality
- Smooth out energy demand by reducing peak load demand and facilitating renewable sources onto the grid

Sources: http://c40-production-images.s3.amazonaws.com/good_practice_briefings/images/8_C40_GPG_MBE.original.pdf?1456789018; https://www.altenergymag.com/article/2015/04/retrofitting-buildings-to-improve-energy-efficiency/19349

Energy Impact on Building Load Profiles

Typical Office Building Load Profile



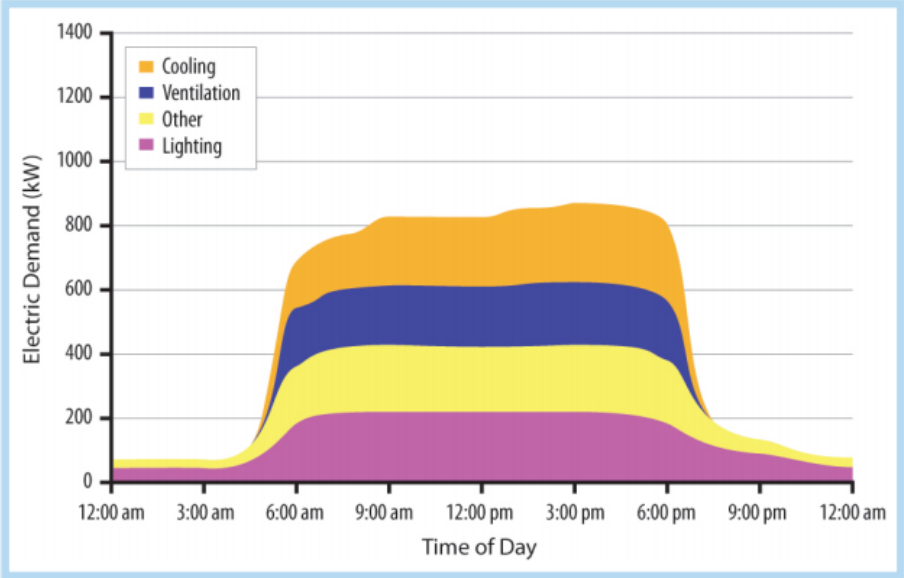
30%

Reduction

Implementing a suite of energy efficiency upgrades could significantly reduce the building's energy consumption. The graphic below illustrates the energy loads for the same building after implementing several upgrades, including:

- O&M/re-commissioning measures (e.g., optimizing temperature setpoints, HVAC scheduling, etc.).
- Lighting measures (CFLs, daylighting controls, etc.).
- HVAC measures (high efficiency chillers, premium efficiency motors, etc.).

Load Profile Post-Upgrade Implementations



*for a typical 250,000 square foot office building in Chicago during the summer

Source: https://www.epa.gov/sites/production/files/2015-08/documents/ee_municipal_operations.pdf

Preliminary Energy Assessments (PEAs)

The State Energy Conservation Office (SECO) provides preliminary energy assessments (PEAs) at no charge to municipal and county governments, ISDs, county hospitals, port authorities, major airports, public water authorities and municipally-owned utilities.

PEAs recommend **cost-effective resource efficiency measures** that could be implemented to reduce utility consumption or utility costs.

Check out these PEA Performing Entities!

Cities

- City of Denton (2018)
- City of Fort Worth (2015)
- City of Rockwall (2010)
- City of Richland (2007)

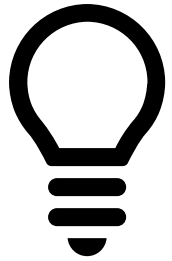
Water Districts

- Tarrant Regional Water District (2015)
- Trinity River Authority (2016)
- City of Fort Worth Water Production (2016)

- Ellis County (2004)

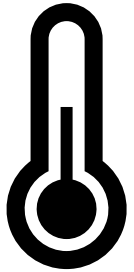
PEA Recommended Utility-Cost Reduction Measures

Lighting



- Lighting upgrades and replacements
- Occupancy/vacancy sensors

Temperature

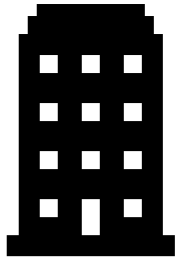


- Altering unoccupied cooling setpoints
- Installing programmable thermostats

HVAC/Equipment

- Variable Frequency Drive (VFD) installation
- HVAC unit replacements

Building Envelope



- Door and window weather stripping
- Hot water piping insulation

Source: Conserve North Texas Preliminary Energy Assessments -http://conservenorthtexas.org/item/preliminary-energy-assessments-peas

FOR MORE INFORMATION

Tamara Cook

Senior Program Manager
Environment and Development Department
(817) 695-9221
tcook@nctcog.org

Lori Clark

Program Manager
Transportation Department
(817) 695-9232
lclark@nctcog.org

https://www.nctcog.org/envir/natural-resources/energy-efficiency

North Central Texas
Council of Governments

Planning and Implementing Utility Cost Reduction Measures

NCTCOG

August 28, 2019

Presented By: Saleem Khan, P.E.

TEESI Engineering

(Texas Energy Engineering Services, Inc.)
1301 S. Capital of Texas Hwy., Suite B-325
Austin, Texas 78746
www.teesi.com
(512) 328-2533

Planning for Energy & Water Conservation Projects

- Initial Planning and Research
  - Goals
- Resource Allocation and Project Execution
  - Scheduling/timeline
  - Funding
  - Project Delivery Method &Procurement (Goods and services)
    - Pros & Cons
  - Implementation
  - Post implementation follow-up

Objective

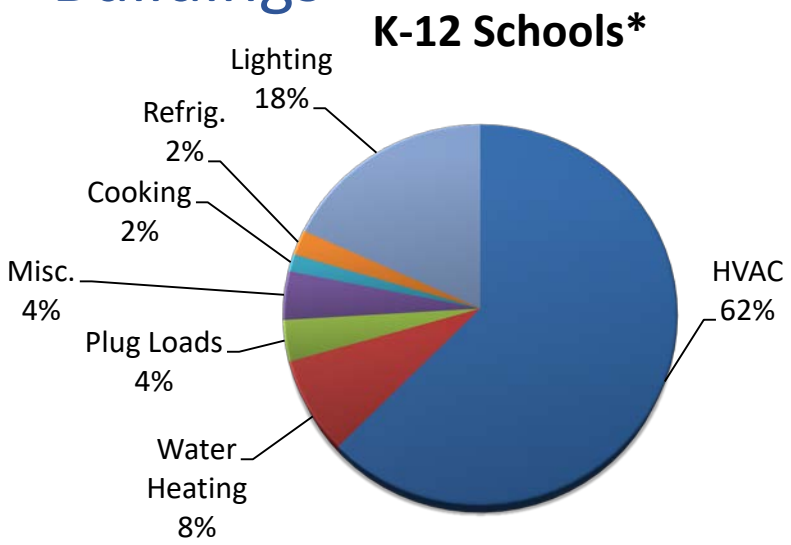
- Cost Savings
  - Measures that save $
  - Example(s): Power Factor Correction, Utility Rates, Purchase Power Agreements (PPA)
- Consumption & Cost Savings
  - Electric (kWh), Natural Gas (MCF), Water (kGal), etc.
  - Example(s): LED Lighting Retrofit, low flow plumbing fixtures
- Demand & Cost Savings
  - Electric Demand (kW) & electricity billing savings
  - Example(s): Thermal Energy Storage, Demand Response Technologies, Onsite generation

Energy Audit Types

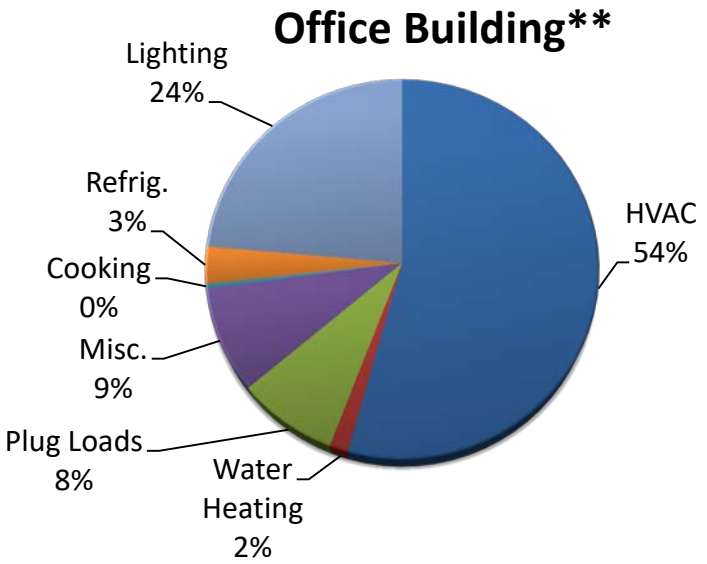
- Preliminary Energy Analysis
  - Initial Energy Audit or Survey
  - Walkthrough Survey/Assessment
  - Preliminary Energy Assessment (PEA)
- Detailed Energy Analysis (DEA)
  - Comprehensive Energy Analysis (CEA)
  - Investment Grade Audit (IGA)
  - Utility Assessment Report (UAR)
- ASHRAE categories:
  - Level I, Level II and Level III

Energy Consumption Breakdown

Buildings



* DOE EIA 2003 CBECS - K-12 Schools in West South Central Region (TX, OK, AR, LA)



** DOE EIA 2003 CBECS - Offices in West South Central Region (TX, OK, AR, LA)

Water & Wastewater Treatment Plants

- WWTPs could account for up to 70% of a Local Government's energy related consumption and costs

Typical Measures and Paybacks
Building Systems

➢ Low Cost/No Cost Measures	0 to 6 months
➢ Interior & Exterior Lighting Retrofit	2.5 to 10 years
➢ Motion Sensors & Day-lighting	2 to 8 years
➢ HVAC Retrofits	7 to 25 years
➢ Insulation	8 years +
➢ Commissioning	1.5 to 5 years
➢ Water Conservation	4 to 8 years
➢ Solar Thermal Pool Heating	12 to 14 years
➢ Solar PV Arrays	15 to 25 years

Typical Measures and Paybacks
Building Systems (cont.)

➢ Cooling Tower Replacement	8 to 14 years
➢ VAV Conversion	6 to 14 years
➢ Thermal Storage	12 to 20 + years
➢ Energy Management Control Systems	4 to 12 years
➢ Solar Control (Window film, shading)	6 years +
➢ Steam Systems Improvements	3 years +
➢ Power Factor Improvements	3 to 8 years

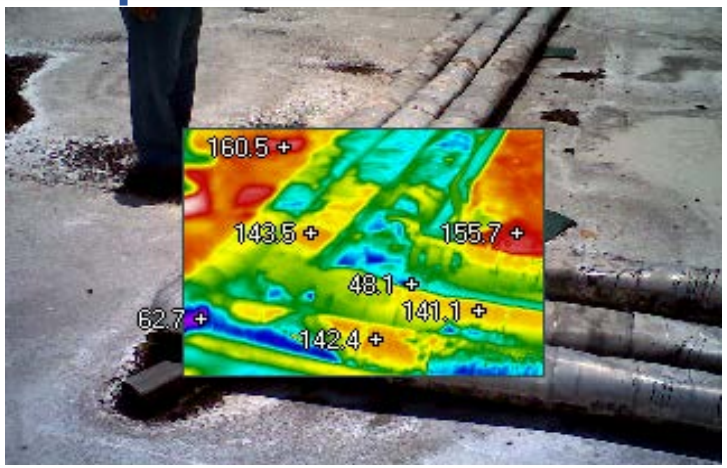
Low Cost / No Cost Measures

- Behavioral and operational practices
- Utilization of existing controls capabilities
- Maintenance & Operations (M&O)

- Payback: 0 – 6 months

Maintenance and Operations

Malfunctioning Photocells



Pipe Insulation Damage

Damaged Fins

Maintenance and Operations (cont.)

Leaking Cooling Tower

Cooling Tower Blowing Down

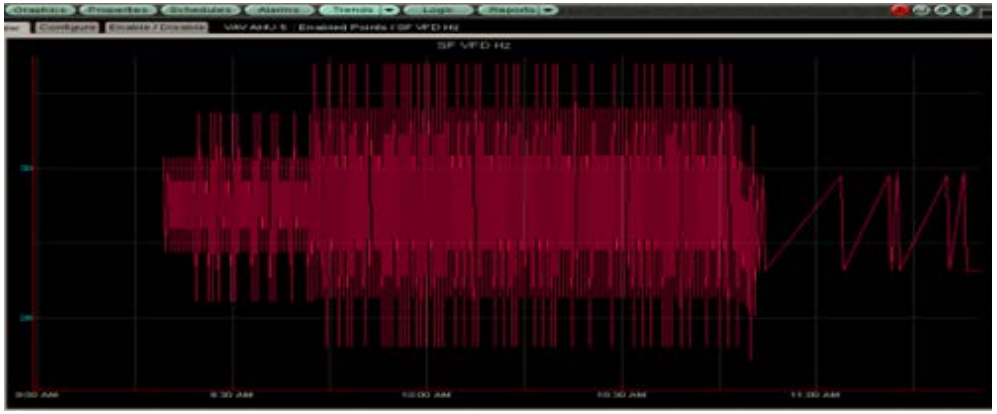
Maintenance and Operations (cont.)

Vending Machines Running 24/7

Unoccupied Room with Lights and Computers Left On

Maintenance and Operations (cont.)

Equipment In "Hand" Mode



EMS Screenshots – AHU VFD Hunting

LED Lighting Retrofits

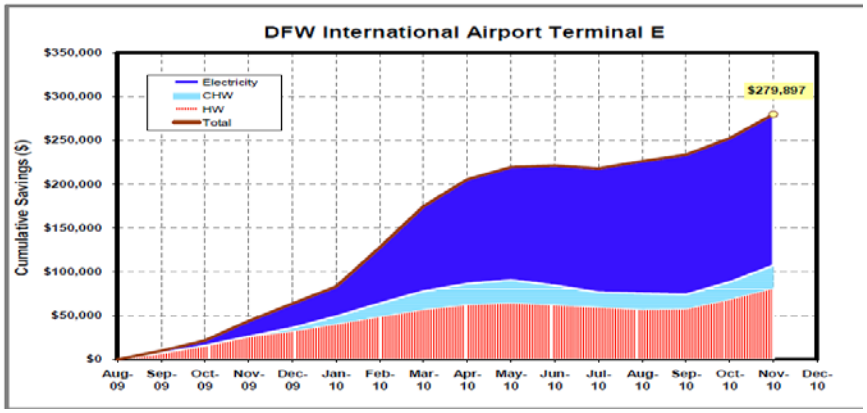
- Typical 2x4 fixtures with florescent lamps
  - Type A – “Plug & Play” LED tubes
    - Utilize existing fixture and electronic ballast
  - Type B – Ballast Bypass LED tubes
    - Remove bypass, “direct-wire”
  - Type C – Dedicated Driver & LED lamps
    - Replace existing ballast with LED driver
  - Fixture Changeout

HVAC Retrofits

- Forecasting replacements vs replace on burnout
- Split-DX, Rooftop Units, Chillers, Boilers, etc.
- Payback Considerations
  - First cost vs operating cost
    - Efficiency (EER, SEER, COP, etc.)
  - HVAC Unit replacements
    - R-22 phase out
- Construction considerations
  - Roofing, structural, etc.

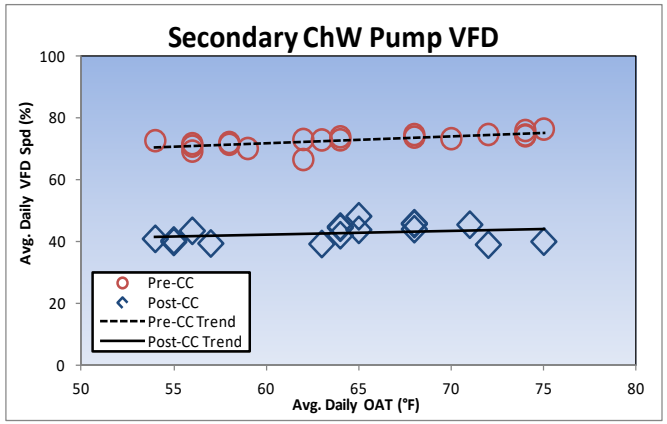
Commissioning (Cx)

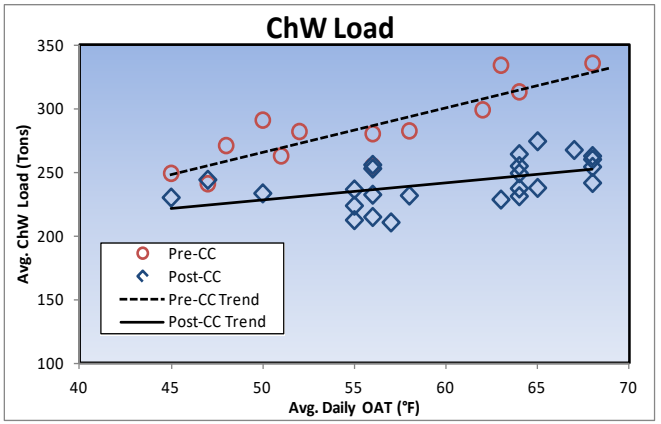
- Operate per design intent & energy savings
  - New Construction, Renovation, or Retro-Commissioning (RCx)
- Existing Continuous Commissioning ®(CC®)
  - Energy savings & comfort improvement
  - Calculate savings, implement CC® and document
  - Payback: 1 – 5 years (typical)

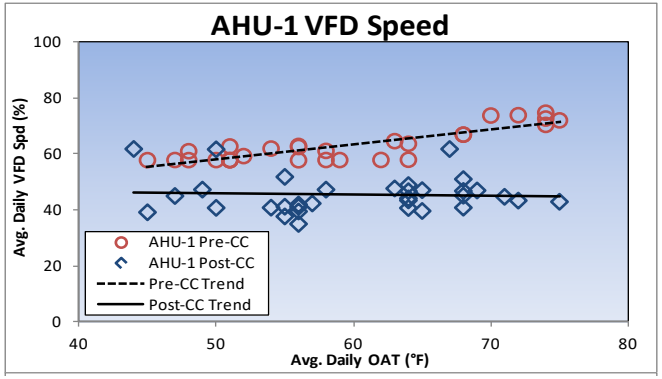


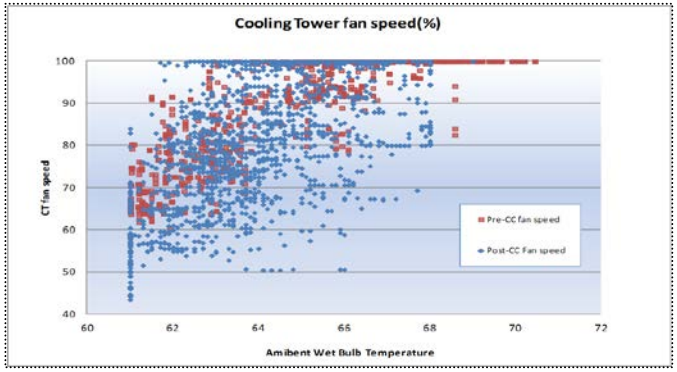
® Trademark Texas A&M Engineering Experiment Station's Energy Systems Laboratory (ESL)

Commissioning (cont.)









Domestic Water Conservation

- Low flow faucet aerators and flush valves reduce the amount of water used in lavatories, urinals, and toilets
- Faucet aerators – 0.5 GPM (gallons per minute)
- flush valves – 0.5-1.0 GPF (gallons per flush)
- Irrigation systems upgrades
- Payback: 3 – 8 years

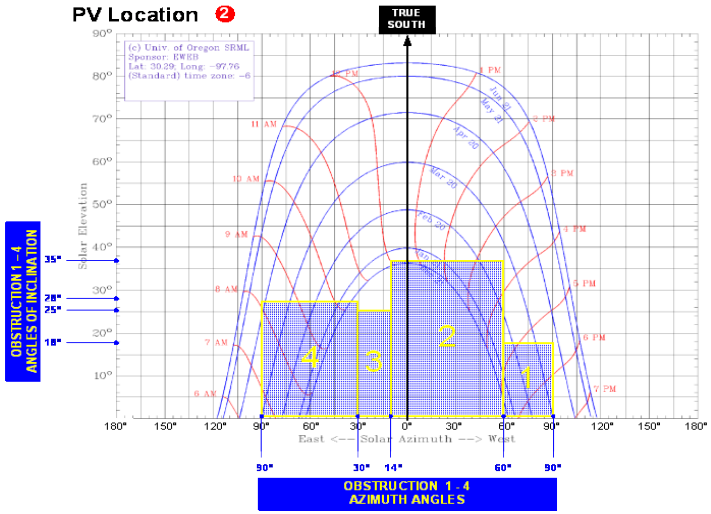
Solar Thermal Pool Heating

- Pool water can be heated by pumping the water through a solar tube array.
  - Traditional method of heating (Boiler) will be back-up
- Payback: 12 – 14 years

Solar Thermal Pool Heating

Solar PV Arrays

- On-site energy generation using solar photo-voltaic array systems reduce peak demand and curtail total energy consumption.
- Site suitability



Site Solar Survey

- Payback: 15 – 25 years

Thermal Energy Storage

- HVAC Application
- Two popular systems
  - Water based
  - Ice based
- Full Storage & Partial Storage
  - No chiller running during on-peak time (Full load shift)
  - Some chiller running during on-peak time (Partial load shift)

Power Factor Improvements

- $ Savings (Utility rate w/ power factor penalty)
- Installation of capacitors bank at main service entrance or end use equipment (motors etc.)
- Payback: 3 – 10 years

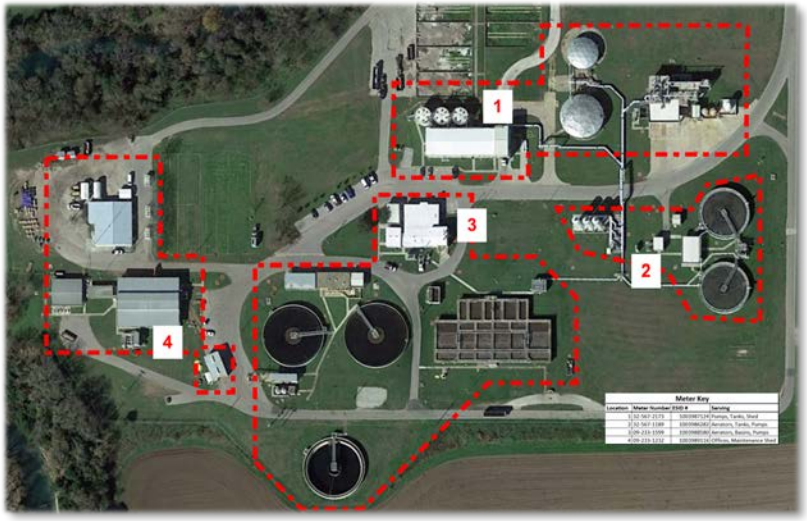
Typical Measures and Paybacks Water Treatment Plant (WTP) and Wastewater Treatment Plant (WWTP)

➢ WWTP Related O&M Measures	0 to 1 year
➢ Dissolved Oxygen Control	2 to 7 years
➢ High Efficiency Blowers	8 to 12 years
➢ Variable Speed Drives	8 to 15 years
➢ Optimize Aeration Design	5 to 10 years
➢ Power Factor Improvements	3 to 8 years
➢ Smart Meter Applications	5 to 8 years
➢ City Mains Leak Sensing Technology	1 to 6 years
➢ WWTP Demand Response	*

*Dependent on existing load profile and capital used for automation

Survey Plant

- Benchmarking WWTP plants
  - Energy use tied permitting requirement
- Identification & process power use
- May have one or multiple meters similar to buildings



Utility Meter Mapping

Wastewater Plant - Coarse Bubble to Fine Bubble Aeration Conversion

Coarse Bubble Aeration

Fine Bubble Aeration

Bubble Types

Fine Bubble

Coarse Bubble

High Efficiency Turbo Blowers

- High Efficiency, variable speed turbo blowers with integral VFD and air bearings
  - Typical blower system efficiency = 55% (approx.)
  - Turbo blower system efficiency = 75% (approx.)
- Control system to vary aerator airflow to maintain dissolved oxygen (DO) concentration at optimal value
- System upgrade (blower, VFD, fine bubble, DO sensor) for best results
  - Payback: 8 – 12 years

Wastewater Treatment – Control Dissolved Oxygen

- TCEQ Criteria : 2.0 mg/l of D.O.
- Process Requirements : 0.5 – 1.0 mg/l
- General Statement:

  "Anything over 1.0 mg/l is wasting power"

Advanced Infrastructure Upgrades (Water)

- Water Leak Detection
  - City wide distribution piping mains
- Automated Meter Reading (AMR)
- Reduces “Unaccounted for” water loss

Funding

- State Energy Conservation Office (SECO)
  - Texas LoanSTAR Program (low interest revolving loan)
  - Funding source for energy & water conservation projects
  - Notice of Loan Fund Availability (NOLFA)
  - https://comptroller.texas.gov/programs/seco/funding/
- Texas Water Development Board
  - http://www.twdb.texas.gov/
- US Department of Agriculture
  - https://www.usda.gov/
- Other
  - Bond, M&O, Third-party, ESPC etc.

SECO Resources

- SECO – Local Government & Schools Energy Technical Assistance Program
  - Cities, Counties, K-12 & Colleges
  - https://comptroller.texas.gov/programs/seco/programs/local/
  - https://comptroller.texas.gov/programs/seco/programs/schools/
- SECO - LoanSTAR Program
  - Funding open to all public entities
  - https://comptroller.texas.gov/programs/seco/funding/loanstar/
- Texas Building Energy Code
  - https://comptroller.texas.gov/programs/seco/code/
- SECO Website
  - https://comptroller.texas.gov/programs/seco/

Case Study – New Braunfels Utilities

Cost & Savings Summary for Identified UCRMs

(Preliminary Energy Analysis i.e. ***PEA by SECO****. WWTP Measures: Coarse to Fine Bubble Diffusion, Install WWTP Dissolved Oxygen Sensors, Install High Efficiency Variable Speed Turbo Blowers, City-Wide 5/8" Water Meter Changeout)*

Approximately 75-80% water meter changeout completed

Case Study – City of San Marcos

- Implementation (**SECO LoanSTAR Funding**)

➢Project Costs:	$1,981,037
➢Annual Savings:	$221,567
➢Simple Payback:	8.9 years

(Project Delivery – Traditional Design Bid & Build. Lighting Retrofit w/Motion Sensors, HVAC Replacement, Controls Upgrades/Retrofits, Solar Thermal Heating, Water Conservation Measures, WWTP – replace blower & automate aeration airflow)

Case Study – DFW

➢City of Dallas (2014-2018)

Energy Project Costs:	$17,400,000 (approx.)
Annual Savings:	$2,300,000
Simple Payback:	7.6 years

The City has completed several ESPC projects **SECO LoanSTAR funded*

➢City of Fort Worth (2003 -2013)

Energy Project Costs:	$67,547,559
Annual Savings:	$5,939,183
Simple Payback:	11.4 years

** Approx. $10 Million of projects funded through **SECO LoanSTAR** program, ESPC project*

Case Study – City of Laredo

- Preliminary Energy Assessment (2017)

Project Costs:	$7,500,000
Annual Savings:	$1,776,200
Simple Payback:	4.2 years

- Detailed Energy Assessment (2019) & Implementation* (**SECO LoanSTAR** Funding)

Project Costs:	$1,033,588
Annual Savings:	$159,420
Simple Payback:	6.5 years

** Traditional Design-Bid-Build - High Service Pump VFDs & Power Factor Correction. Currently in implementation phase*

Questions?

Saleem Khan, P.E., CxA
TEESI Engineering
saleem@teesi.com
512-328-2533
www.teesi.com

CITY OF DENTON PRELIMINARY ENERGY ASSESSMENT AND TRACKING RESULTS

James Douglas
Conservation Coordinator
City of Denton Sustainability

Introduction

- Background Denton and PEA's
- Background on Buildings Selected
- PEA Recommendations and Actual Changes
- Results of Changes
- Importance of Data Tracking
- The Bigger Picture

DENTON BACKGROUND

Background

- 58 Municipally owned and monitored buildings
- Municipal Green Building Policy adopted March 2014
- Residential and commercial energy efficiency efforts as well as municipal
- PEA Conducted 7/26/2018 on 10 facilities of different types

BUILDING ASSESSMENT

South Branch Library

Square Footage: 20,700

Initial EUI / Ranking: 70.62 / 3

Initial ECI / Ranking: 2.98 / 9

Fire Station #1

Square Footage: 26,238

Initial EUI / Ranking: 131.57 / 9

Initial ECI / Ranking: 2.56 / 7

Spencer Complex (DME Admin)

Square Footage: 8,500

Initial EUI / Ranking: 59.87 / 1

Initial ECI / Ranking: 1.82 / 3

North Branch Library

Square Footage: 33,000

Initial EUI / Ranking: 72.27 / 4

Initial ECI / Ranking: 1.84 / 4

DME Field Operations

Square Footage: 10,900

Initial EUI / Ranking: 60.80 / 2

Initial ECI / Ranking: 2.85 / 8

Animal Shelter

Square Footage: 18,156

Initial EUI / Ranking: 130.40 / 8

Initial ECI / Ranking: 2.27 / 6

Denia Recreation Center

Square Footage: 17,580

Initial EUI / Ranking: 76.48 / 6

Initial ECI / Ranking: 1.76 / 2

Emily Fowler Library

Square Footage: 22,876

Initial EUI / Ranking: 86.33 / 7

Initial ECI / Ranking: 2.00 / 5

City Hall East

Square Footage: 153,000

Initial EUI / Ranking: 72.56 / 5

Initial ECI / Ranking: 1.60 / 1

Spencer Complex

Square Footage: 9,838

Initial EUI / Ranking: 208.16 / 10

Initial ECI / Ranking: 5.55 / 10

RECOMMENDATIONS AND CHANGES

Recommendations

- Interior lighting retrofit
  - *All Buildings*
- Interior lighting controls
  - *City Hall*
  - *Denia*
  - *Fire Station #1*
  - *North Lib*
  - *South Lib*
- HVAC Night Setback
  - *Animal Shelter*
  - *Denia*
  - *Spencer Complex*
  - *DME Admin*
  - *Field Ops.*

Changes

- Roof Insulation
  - *Fire station #1*
  - *South Branch Library*
- LED Retrofits
  - *Fire Station #1*
- HVAC replacement
  - *DME Field Ops*

RESULTS

Before and After PEA

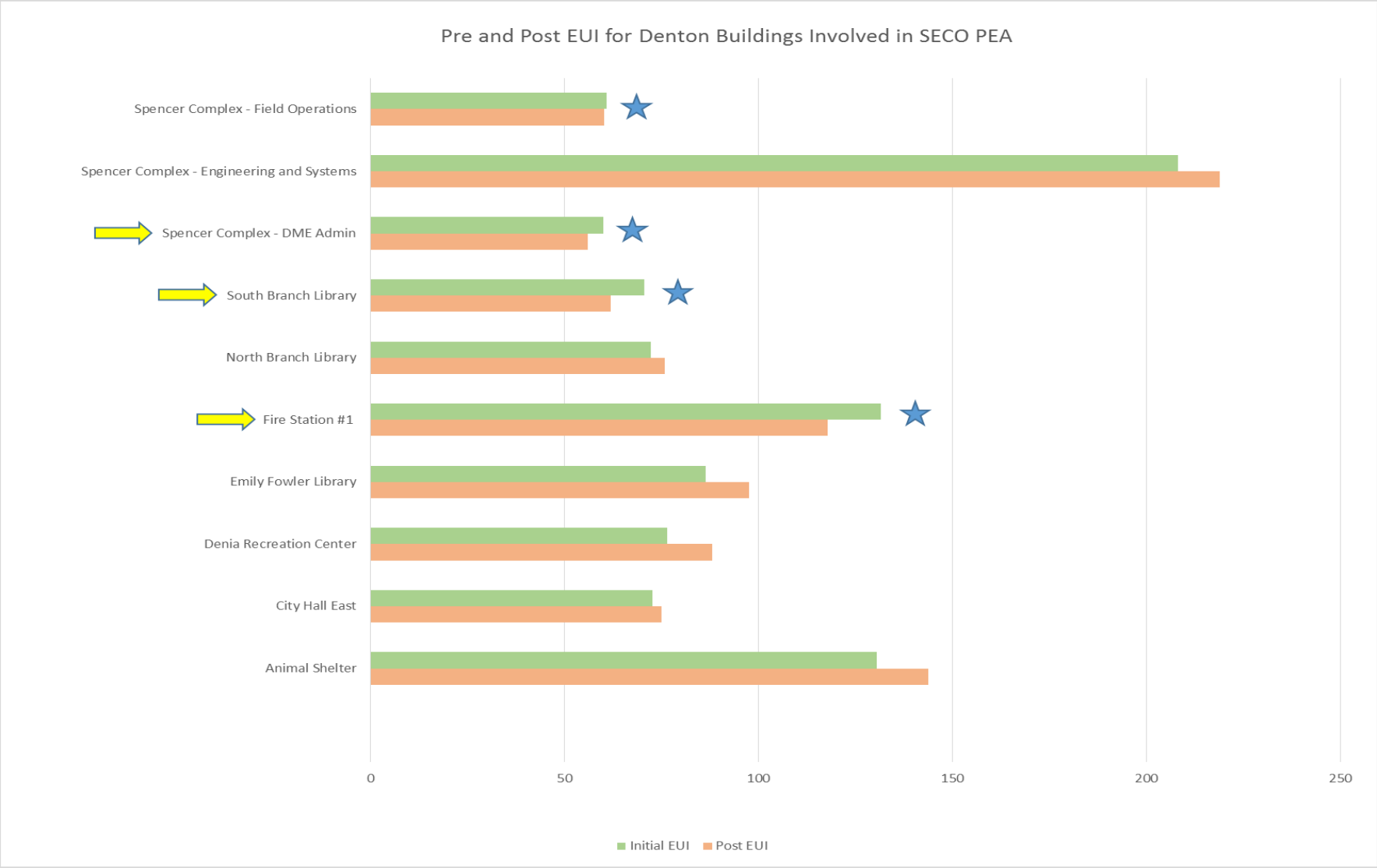
Buildings with upgrades

- Electricity Use ↓ 7.29%
- Natural Gas Use ↓ 13.64%
- EUI ↓ 7.98%
- ECI ↓ 17.77%

Buildings with no change

- Electricity Use ↑ 0.98%
- Natural Gas Use ↑ 22.14%
- EUI ↑ 6.44%
- ECI ↓ 2.96%

Other Visuals



THE BIGGER PICTURE

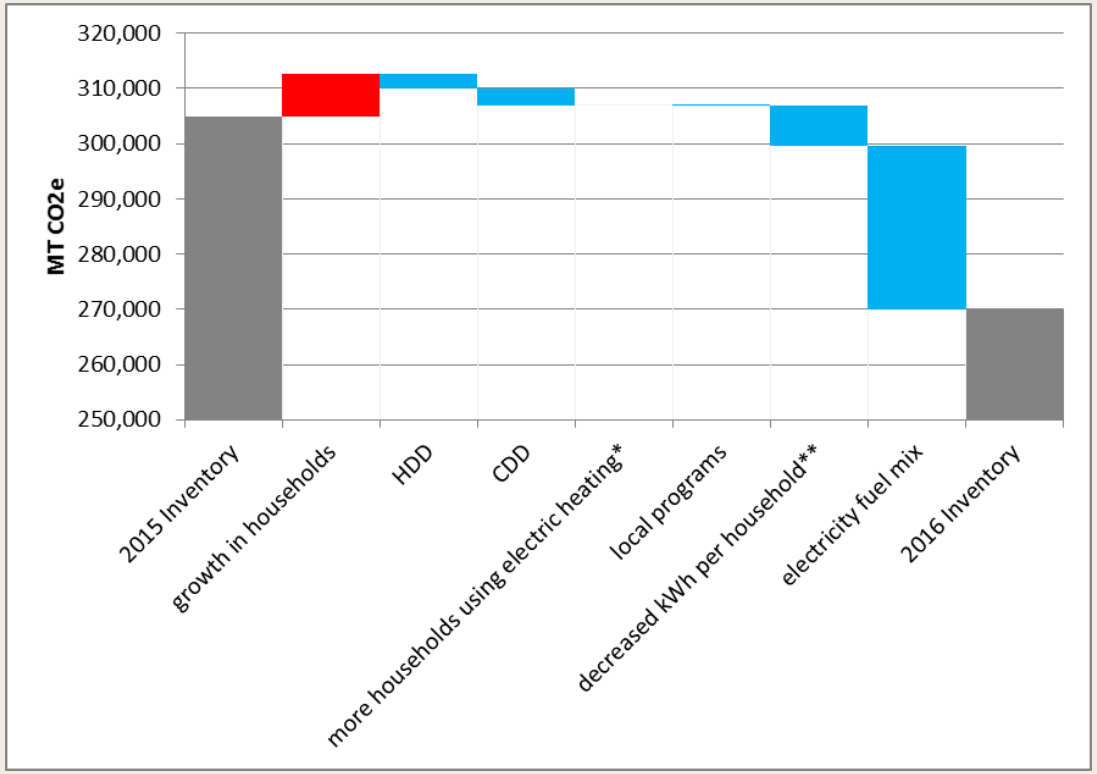
Why?

- Denton 2030
- Denton Strategic Plan 18-19
- Lower Peak Loading
- Environmental Benefit
  - *Approx. 40 MTCO2e*
- Economic Benefit
  - *Approx. $33,000*

TABLE OF CONTENTS

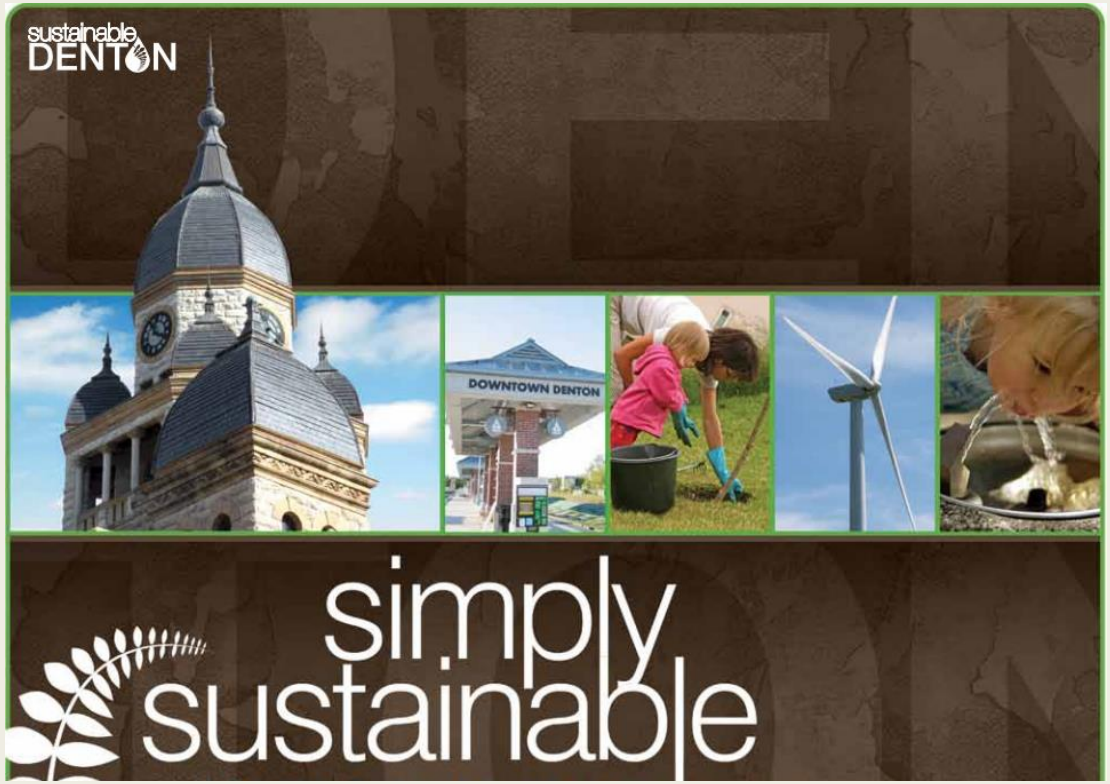
Data Tracking and Future Goals

- Your data is only as good as the questions you ask
- Many factors influencing a single number
- Benefits of breaking it down



What Else is Denton Doing

- Sustainability Plan Update
- GHG Inventory and Contribution Analysis
- Green Business Program
- Energy and Water Conservation Education and Outreach



QUESTIONS?

Resources for Energy Efficiency and Facility Retrofits

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

AUGUST 28, 2019

North Central Texas
Council of Governments

SECO

State Energy Conservation Office

SECO Resources

North Central Texas Council of Governments

About SECO

Mission Statement: To Increase the Efficient Use of Energy and Water While Protecting the Environment

Focus on Public Sector Facilities – Indirectly Benefitting Taxpayers

Support for Energy and Water Efficiency Project Implementation

- Education and Training
- Technical Assistance
- Project Financing

U.S. Department of Energy State-Level Program Conduit

- State Energy Program (SEP)
- Pantex/Waste Isolation Pilot Plant (WIPP)

SECO
State Energy Conservation Office

SECO Support

Training/Education

- Energy Codes (Workshops & Adoption Toolkit)
- WattWatchers

Technical Assistance

- Preliminary Energy Audits (K-12 & Local Governments)
- Virtual Energy Audits

Financing

- LoanSTAR Revolving Loan Program
- Energy Savings Performance Contract Guidelines & Education

SECO
State Energy Conservation Office

https://comptroller.texas.gov/programs/seco

Programs

SECO State Energy Conservation Office

STATE ENERGY CONSERVATION OFFICE

SECO partners with Texas local governments, county governments, public K-12 schools, public institutions of higher education and state agencies, to reduce utility costs and maximize efficiency. SECO also adopts energy codes for single- family residential, commercial, and state-funded buildings.

Funding & Incentives

- SECO Funding Opportunities
- LoanSTAR Revolving Loan Program
- Other Funding Resources

Programs

- Alternative Fuels Program
- Clean Energy Incubators
- Industrial Energy Efficiency
- Innovative Energy Demonstration Program
- Local Governments Program
- Schools Program
- State Agency and Higher Ed. Program
- Pantex Program

Energy Codes

- Training & Code Compliance
- Energy Code Adoption Process
- Code Contacts
- Commercial & Multi-Family Construction
- Single-Family Construction
- State-Funded Buildings
- Local Ordinances
- Texas Water Conservation Standards

Energy Reporting

- State Agencies and Institutions of Higher Ed
- Local Government
- Utilities
- Schools

Resources

- Combined Heat and Power in Texas
- Energy Efficiency Best Practices Guide
- Energy Savings Performance Contracting
- SECO Reports

About Us

- Contact Us
- Sign up to receive updates

LoanSTAR Revolving Loan

Finances Projects that Reduce Energy/Water/Utility Costs

- Simple Payback Period of 15 Years or Less
- 2% Loan Interest Rate; 1% if Choose ARRA Funds with More Reporting

Open Enrollment Through **August 30, 2019**

- Maximum $8 Million Loan Per Application
- Maximum 3 Loans per Entity

Program Overview:
https://www.youtube.com/watch?v=4IFuj_5ZeGI

Other Funding & Incentives

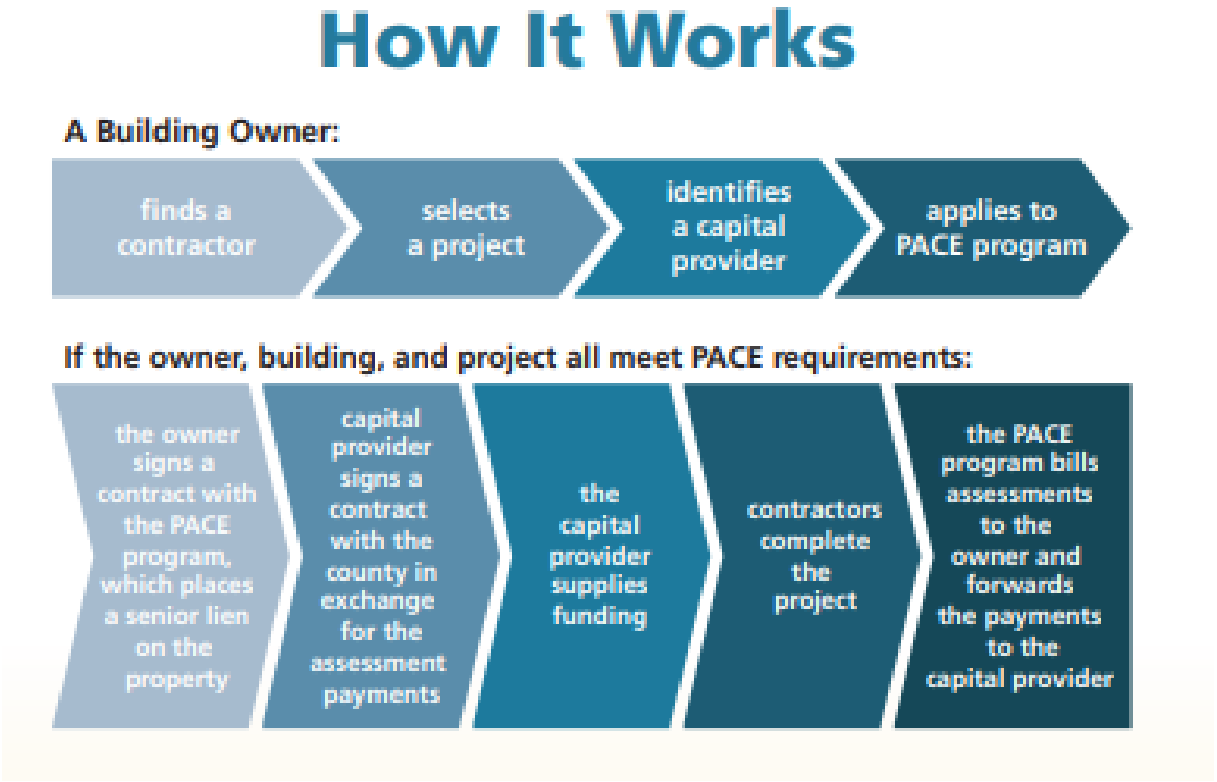
Database of State Incentives for Renewable Energy:
Local, Utility, State, Federal
www.dsireusa.org

Texas Department of Agriculture:
City Population < 50,000; County Population <200,000
Water / Wastewater infrastructure; Street / Drainage; Housing
Awards Range from $75,000 - $800,000
www.texasagriculture.gov/GrantsServices

Texas Water Development Board:
Financial Assistance Programs
Loans, Grants, Deferred Interest, Combination Grant/Loan
Political Subdivisions, non-Profit and Community Water Supply Corporations, Private
www.twdb.texas.gov/financial/programs

Texas Property Assessed Clean Energy (TX-PACE) Program

TX-PACE facilitates the use of private capital to finance water conservation**, energy efficiency**, resiliency, and distributed generation projects to eligible properties



Eligible Improvements:

Chillers, boilers, and furnaces • HVAC, BMS, BAS, EMS controls • Lighting • Water heating systems • Energy management systems and controls • Roofing • Windows • Doors • Insulation • Elevator modernization • Pool equipment • Cogeneration or combined heat and power • Heat recovery and steam traps • Solar panels • Wind turbines • Water management systems and controls • Irrigation equipment • Rainwater collection systems • Toilets • Faucets • Greywater systems... and more!

www.TexasPACEAuthority.org

Source: https://www.texaspaceauthority.org/wp-content/uploads/public-sector-2018-11-19.pdf

NCTCOG Resources

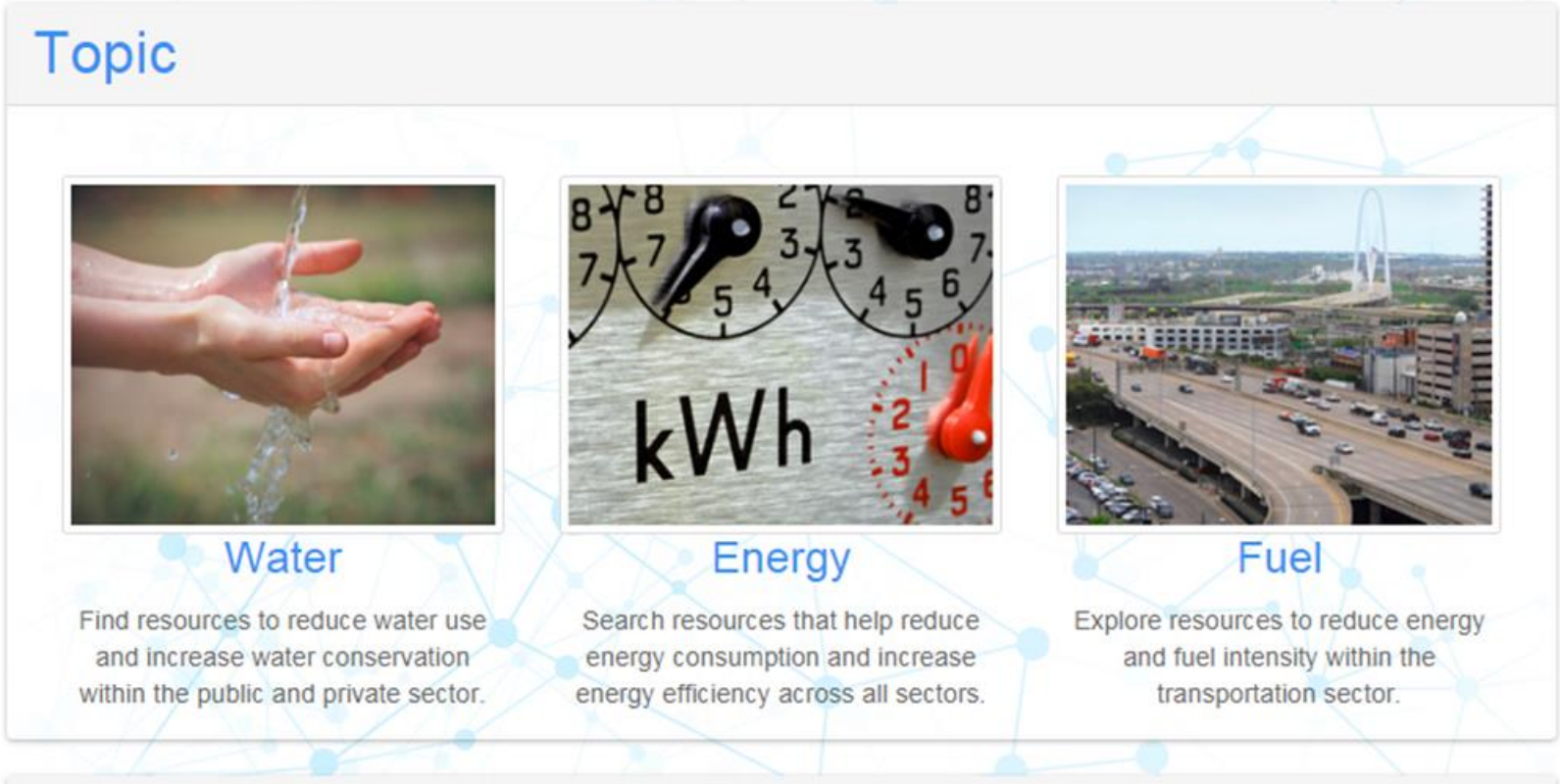
Conserve North Texas

Clearinghouse of Energy Efficiency, Water Conservation, and Transportation Resources

Resource Types:

- Programs
- Tools
- Calculators
- Case Studies

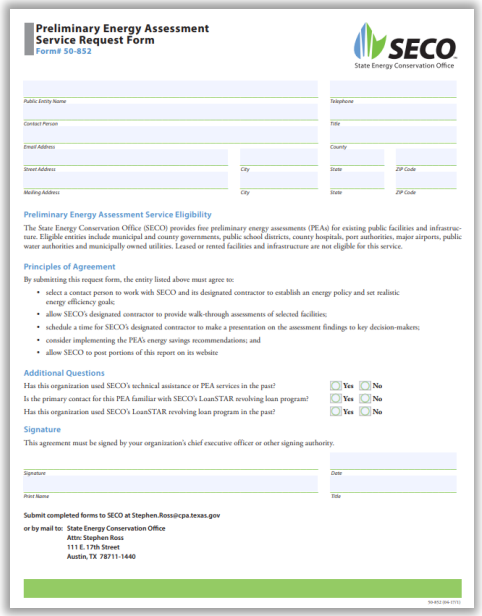
www.conservenorthtexas.org



Conserve North Texas Resource:
Preliminary Energy Assessments (PEAs)

Preliminary Energy Assessments (PEAs) are provided by the State Energy Conservation Office (SECO) and offer cost effective resource efficiency measures entities can implement to decrease energy consumption at **no cost to you!**

- Help guide the development of an energy management policy
- Provides facility benchmarking using ENERGY STAR Portfolio Manager
- Recommended maintenance procedures
- Develop efficiency level guidelines for equipment purchases



Preliminary Energy Assessment
Service Request Form
Form# 50-852

SECO
State Energy Conservation Office

Public Entity Name | Telephone
Contact Person | Title
Email Address | County
Street Address | City | State | ZIP Code
Mailing Address | City | State | ZIP Code

Preliminary Energy Assessment Service Eligibility

The State Energy Conservation Office (SECO) provides free preliminary energy assessments (PEAs) for existing public facilities and infrastructure. Eligible entities include municipal and county governments, public school districts, county hospitals, port authorities, major airports, public water authorities and municipally owned utilities. Leased or rented facilities and infrastructure are not eligible for this service.

Principles of Agreement

By submitting this request form, the entity listed above must agree to:

- select a contact person to work with SECO and its designated contractor to establish an energy policy and set realistic energy efficiency goals;
- allow SECO's designated contractor to provide walk-through assessments of selected facilities;
- schedule a time for SECO's designated contractor to make a presentation on the assessment findings to key decision-makers;
- consider implementing the PEAs energy savings recommendations; and
- allow SECO to post portions of this report on its website

Additional Questions

Has this organization used SECO's technical assistance or PEA services in the past? ☐ Yes ☐ No
Is the primary contact for this PEA familiar with SECO's LoanSTAR revolving loan program? ☐ Yes ☐ No
Has this organization used SECO's LoanSTAR revolving loan program in the past? ☐ Yes ☐ No

Signature

This agreement must be signed by your organization's chief executive officer or other signing authority.

Signature | Date
Print Name | Title

Submit completed forms to SECO at Stephen.Ross@cpa.texas.gov
or by mail to: State Energy Conservation Office
Attn: Stephen Ross
111 E. 17th Street
Austin, TX 78711-1440

50-852 (04-17/1)

List of Preliminary Energy Assessments (PEAs) from Entities in the North Central Texas Region:

Cities:

City of Richland – PEA 2007

City of Rockwall – PEA 2010

City of Fort Worth – PEA 2015

City of Denton – PEA 2018

Water Districts:

Tarrant Regional Water District – PEA 2010, PEA 2015

Trinity River Authority – PEA 2015, PEA 2016

City of Fort Worth Water Production – PEA 2016

Counties:

Ellis County – PEA 2004

ISD's:

Cedar Hill ISD – PEA 2009, PEA 2011

Crowley ISD – PEA 2009

Duncanville ISD – PEA 2009, PEA 2011

Rains ISD – PEA 2009

Allen ISD – PEA 2010

Find the full list of PEAs from entities in our region on Conserve North Texas here!

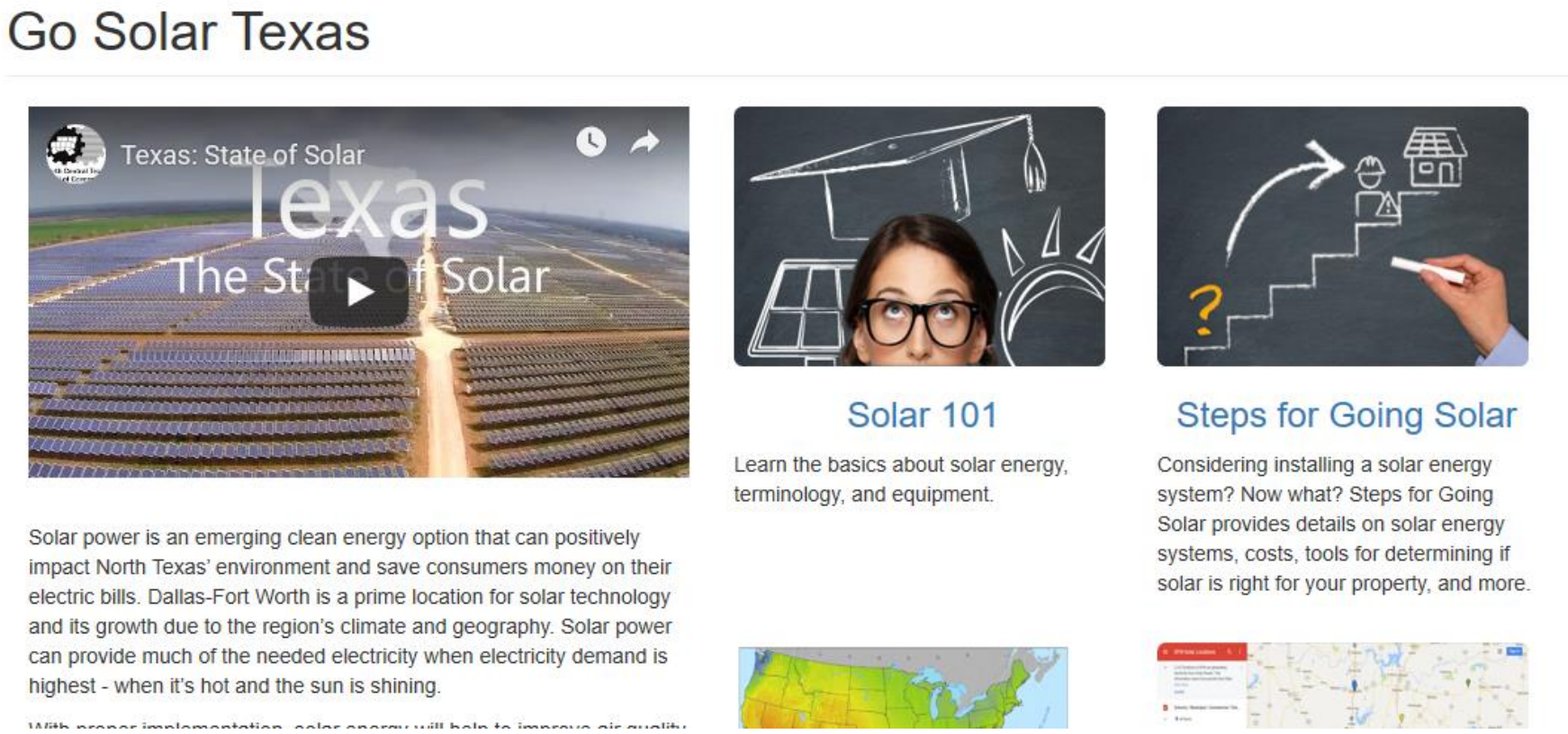
Go Solar Texas

Texas-Specific Information about Solar

Key Resource Types:

- Best Management Practices
- Cost Benefit Analysis
- Trainings
- Case Studies
- Meeting-in-a-Box

www.gosolartexas.org



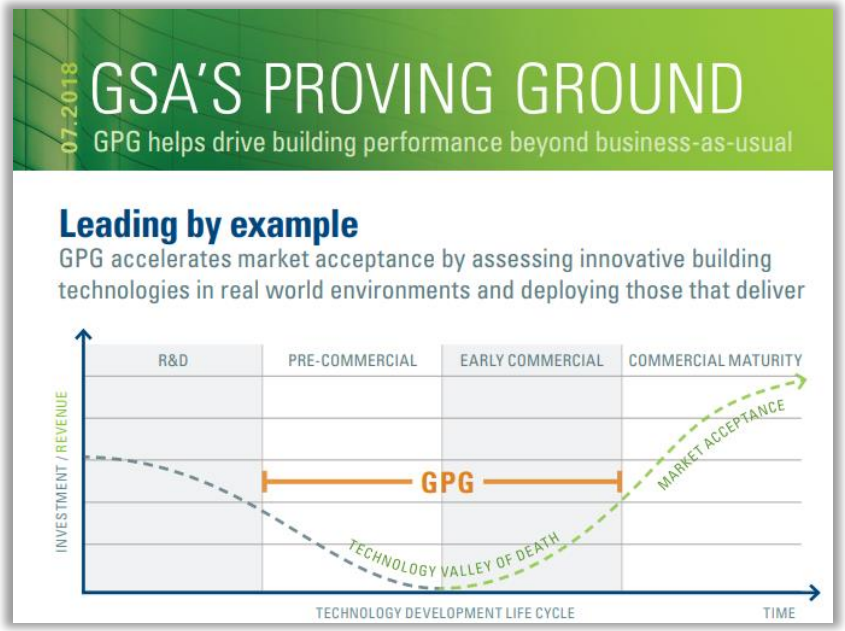
U.S. General Services Administration – Emerging Building Technologies Resources

GSA's Emerging Building Technologies Programs

- Enables GSA to make investments in next-generation technologies based on their performance

GSA Proving Ground (GPG)

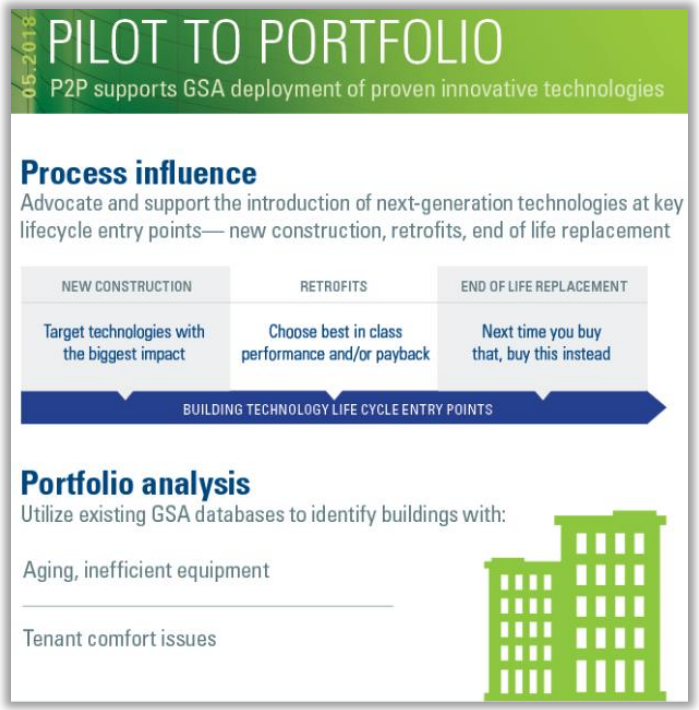
Objectively assesses innovative Building Technologies in real-world environments



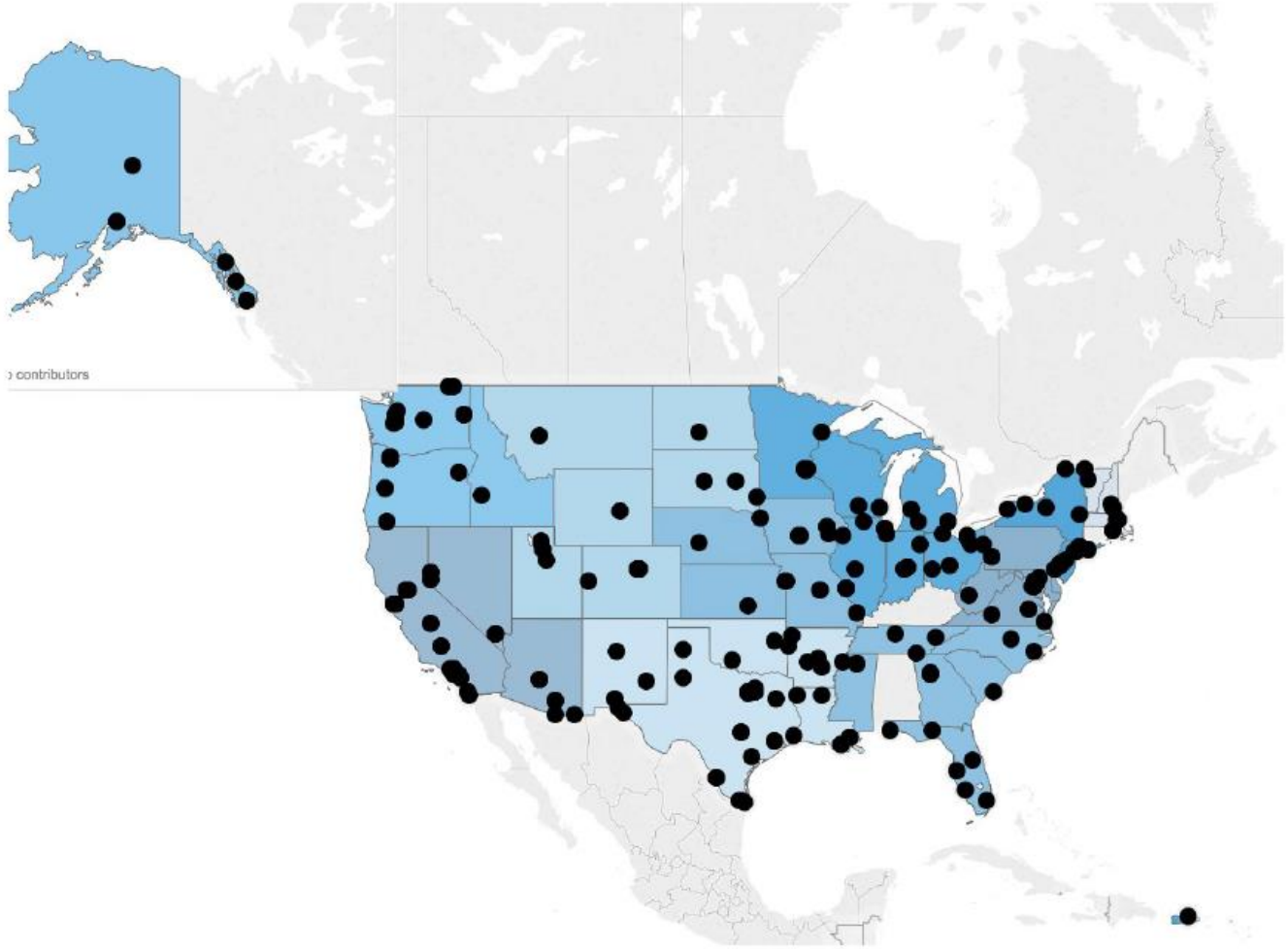
gsa.gov/GPG

Pilot to Portfolio (P2P)

Supports the deployment of proven next generation technologies



GPG Technology Deployments (2012 – 2017)



500+ facilities

Total Lifecycle Energy Savings

5,677,997 MMBTU

Total Lifecycle Cost Avoidance

$110 M

High-Performance Workspaces and Building Systems

The interactive tool allows users to discover **high-performance design best practices** in a variety of workplace settings.

The tool also generates a **cost savings** associated with a system upgrade as well as the impact to resources and human behavior.

https://sftool.gov/explore#building-systems

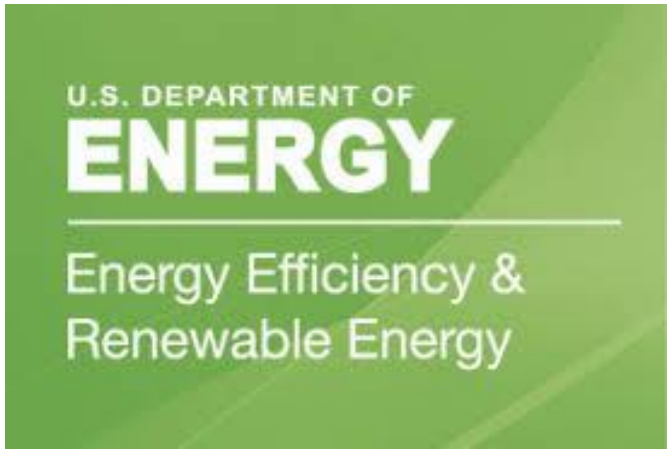
Cost-Effective Upgrades Tool

Select a **building size** and a respective U.S. **climate zone**

View **recommended building efficiency measures** and their payback periods, capital costs, annual savings, annual cost etc. based on building size in the respective climate zone

Measure	Simple Payback (years)	Approximate Capital Cost ($)	Annual Energy Savings (kBtu/sf)	Annual Energy Savings (kBtu/yr)	Annual Cost Savings ($/sf)	Annual Cost Savings ($/yr)
Shut down heating plant when there is no heating load	0-1	$200	5.4	130,000	$0.09	$2,200
Implement a retro-commissioning (RCx) package	1-2	$7,600	13.4	340,000	$0.18	$4,500
Widen zone temperature deadband and add conference room standby control (DDC zone controls)	1-2	$4,600	6.3	160,000	$0.09	$2,400

https://sftool.gov/plan/upgrades/selections



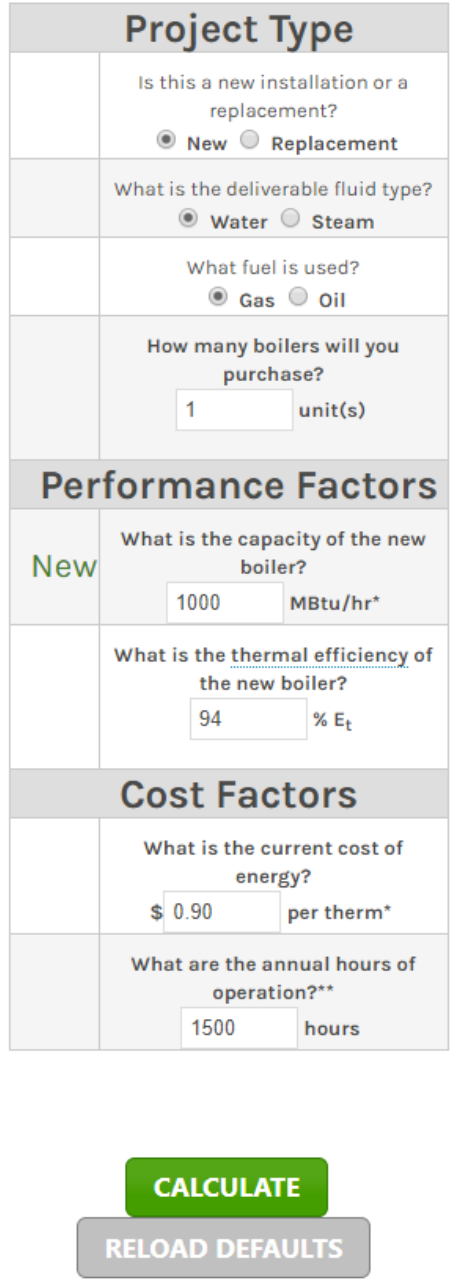
Energy Efficiency & Renewable Energy (EERE) – Tools & Resources

Energy and Cost-Savings Calculators for Energy-Efficient Products

Calculate energy and cost savings for a variety of energy and water efficient products:

- Boilers
- Central air conditioners
- CFLs
- Electric and gas water heaters etc.

*Energy cost savings calculator for **Commercial Boilers***



https://www.energy.gov/eere/femp/energy-and-cost-savings-calculators-energy-efficient-products

FOR MORE INFORMATION

Tamara Cook

Senior Program Manager

Environment and Development Department

(817) 695-9221

tcook@nctcog.org

Lori Clark

Program Manager

Transportation Department

(817) 695-9232

lclark@nctcog.org

https://www.nctcog.org/envir/natural-resources/energy-efficiency

North Central Texas
Council of Governments