

2030 District Program and Small Commercial Toolkit

2015 Building Technologies Office Peer Review



2030
DISTRICTS®



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

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Project Summary

Timeline:

Start date: October 1, 2013

Planned end date: March 30, 2016

Key Milestones

1. Develop program resources and tools, 9/30/14
2. Complete demonstrations, 9/30/15
3. Deployment to other 2030 Districts, 3/30/16

Budget:

Total DOE \$ to date: \$2M (for program and toolkit, no dollars are applied to retrofits – these costs are born by bldg owners)

Total future DOE \$: N/A

Target Market/Audience:

Small commercial office and retail buildings within 2030 Districts in major U.S. cities.

Key Partners:

LBNL	Architecture 2030
Cleveland 2030 District	Green Building Alliance / Pittsburgh 2030 District
Seattle 2030 District	Prospect Silicon Valley / City of San Jose
ASU	Emerging 2030 Districts

Project Goal:

Create 2030 District Program guidance and a technical Toolkit that provides products to promote, develop, and successfully execute 2030 District energy efficiency savings programs specifically for small commercial office and retail, which can be deployed nationwide.

Purpose and Objectives

Problem Statement: The small commercial buildings sector has distinct issues in implementing energy efficiency (EE) –

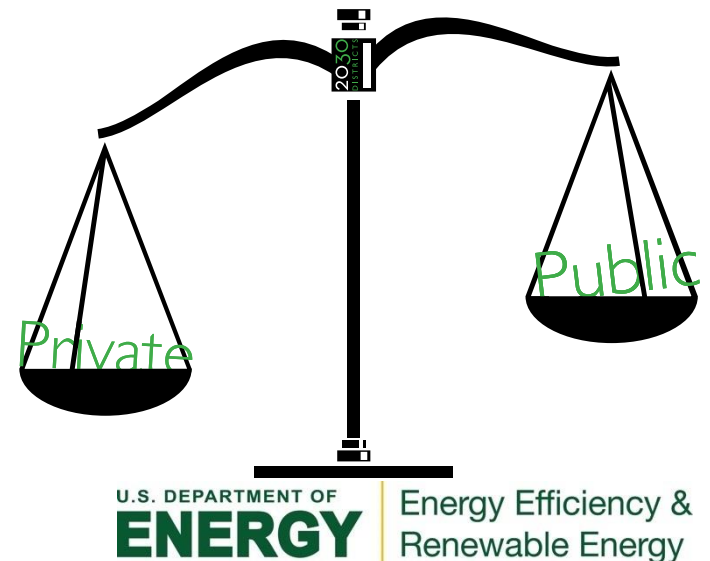
- Buildings are very resource constrained and lack access to affordable EE expertise (architects, engineers, consultants)
- Existing EE tools and services have high-cost entry points

Target Market and Audience: Commercial buildings under 50,000 square feet, (office and retail) representing over 90% of all U.S. commercial buildings and consumes over 40% of the sector's energy use. Small commercial property currently comprise 66% of the properties in the existing 2030 Districts. Total commercial building stock is 6.5 quads energy use, approximately half of which is attributed to small commercial.

Distinctive Characteristics:

2030 Districts are private sector-led – increases buy-in and ownership of the effort.

Independent demonstration areas are tied into a Network with shared goals, timelines and performance metrics. Increases best practice sharing and collaboration.



Purpose and Objectives - Impact

Planned Contribution to Energy Efficiency:

1. Project Yrs 1-3 – deliver program guidance to develop self-sufficient 2030 Districts, leveraging peer relationships to influence market uptake of EE. A suite of technical tools delivered, identifying cost effective EE strategies to achieve a minimum of 20% energy savings.
 - Exceeding target of 25-40 demonstration sites, with 53 sites targeting a minimum of 20% reduction per site, estimated savings of 11-20 million kBtu/yr. Energy savings reported annually through EnergyStar PM.
2. After Year 3 tools and program guidance will be deployed to:
 - 5-10 new 2030 District nationwide (200M sq. ft./commercial space, with 10M sq. ft. of small commercial). 2030 Districts and members commit to >20% building energy reduction, contributing to a target 10% energy reduction per District. Outreach to emerging districts during project.
 - Energy savings up to 2.4 billion kBtu/yr, \$40 million in energy cost savings, \$175 million/year of economic activity, \$290 million of increased asset values, 1640 direct and 3370 indirect jobs.

Approach

Approach: District scale approaches provide multiple advantages:

- motivates members
- leverages the needs at scale to deliver EE programmatic offerings such as low cost auditing and Cx, financing means and equipment purchase programs.

The best practices these districts employ to establish self-sustaining EE programmatic local resources are captured in this project for use by other districts. A suite of no- or low- cost EE tools and services will be packaged that serve this sector, designed for use by practitioners engaged in this sector, e.g. HVAC or electrical contractors. Existing tools are leveraged, and a small set developed to fill identified needs.

Key Issues: Some key barriers to energy reductions in this sector are:

Technical	Programmatic
1) access to centralized, comprehensive, cost-evaluative information about how to achieve energy targets	4) guidance on bringing disparate stakeholders together
2) affordable access to auditing services	5) financial models for district self-sufficiency
3) reduced transaction costs or incentives that make reduction efforts attractive	6) member outreach, including to historically underserved communities

2030 Districts Network



182 M
Square Feet
Committed

- 785 Buildings
- 236 Property Members
- 109 Professional Stakeholders
- 83 Community Stakeholders

District and Member Reduction Targets

Potential District Savings

20% Individual Building Retrofits by 2015	Up to 240 Million kBtu/year District Wide
10% Aggregated District Savings by 2015	\$4 Million in Energy Cost Savings
50% Incremental District Savings by 2030	\$17.5 Million/year Economic Activity = \$29 Million Asset Value Increases

2030 Districts + Small Commercial Building Toolkit



Key Project Highlights:

- Year 1 – Program guidance on Districts and Toolkit developed to enable and make easier identification, execution and tracking of efficiency measures and consumption
- Year 2 – 53 demonstration sites in 4 partner Districts, 20% reduction target per demonstration + 10% per district by 2015
- Year 3 - Deployment to 5-10 new Districts

Identify > Execute > Track

Year 1 - Small Commercial Program Toolkit Development

- Program guidance was developed using best practices from established and emerging districts. Provides multiple models for program approaches to achieve success on:



The pathways and protocols to establishing a 2030 District as a private/public partnership



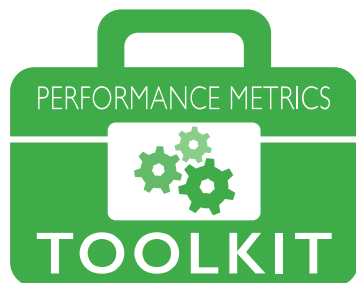
Identify and engage prospective property owners, aligned organizations and the general public



Overview of various financing strategies for 2030 Districts in their early stages.



Free and discounted resources to help property owners and managers

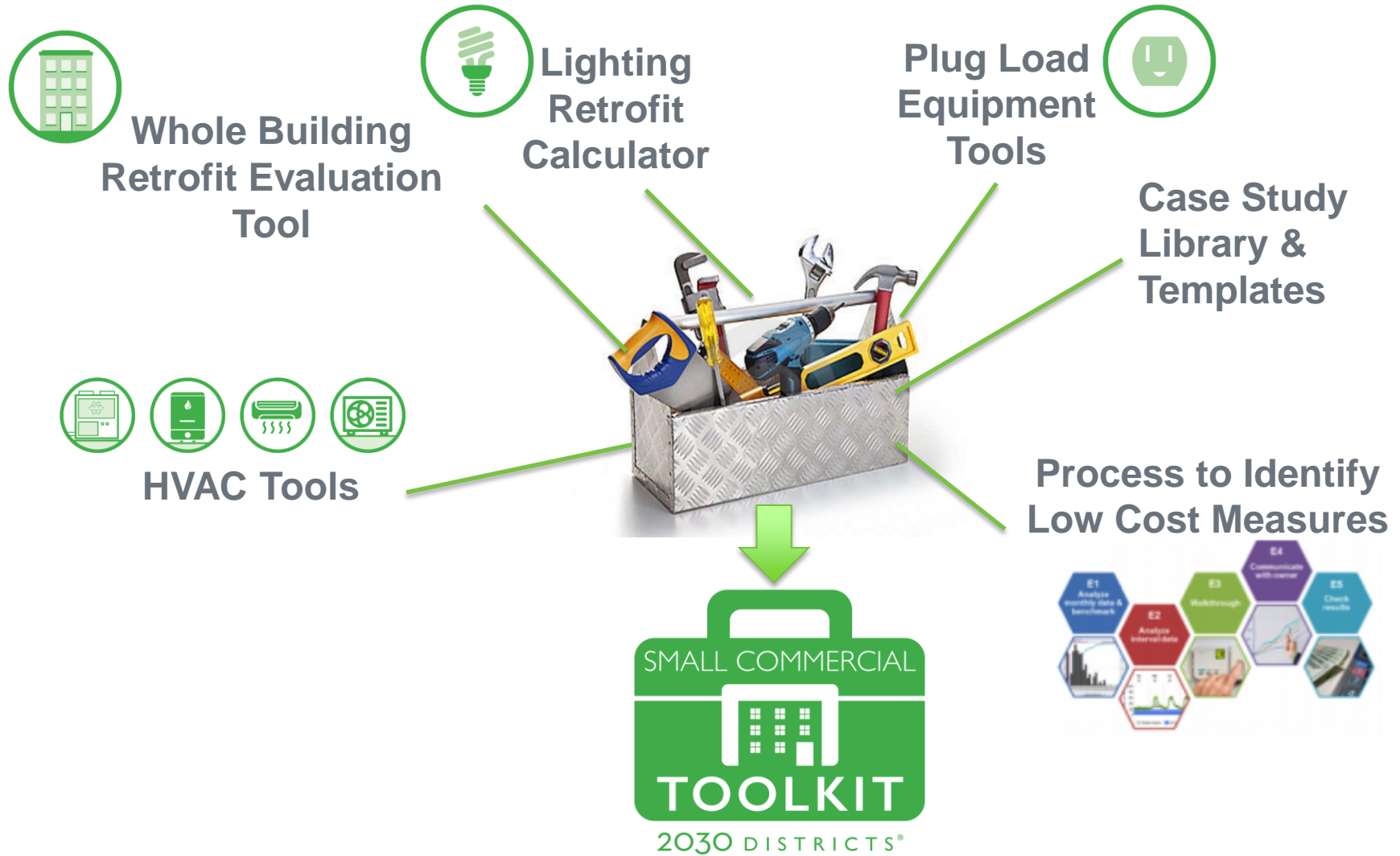


Collecting, analyzing, and reporting building performance data in a 2030 District.



Valuable resources and insight into the complex world of financing a performance oriented project

Year 1 - Small Commercial Technical Toolkit



Year 1 - Small Commercial Technical and Program Toolkit



High Performance Building Districts

TOOLKITS

- Small Commercial Toolkit Tutorials
- Small Commercial Toolkit
- Member Resources Toolkit
- Outreach & Communications Toolkit
- District Funding Toolkit
- Project Financing Toolkit
- District Formation Toolkit
- Performance Metrics Toolkit

2030 DISTRICTS NEWSLETTER

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First Name *

Last Name *

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WELCOME TO THE 2030 DISTRICT TOOLKITS



Small Commercial Toolkit Tutorials

This is a series of video tutorials of the programmatic and technical tools



Small Commercial Toolkit

The 2030 District Small Commercial Toolkit is a national 2030 District Program that includes a set of program and technical products aimed at small commercial buildings (Buildings < 50,000 s.f.)



Member Resources Toolkit

2030 Districts offer their members a number of free and discounted resources to help property owners and managers reach the maximum performance of their buildings and benefit from participating in



Outreach & Communications Toolkit

The Outreach and Communications Toolkit is a set of tools to assist 2030 Districts identify and engage prospective property owners, aligned organizations and the general public.



District Funding Toolkit

This is an overview of various financing strategies for 2030 Districts in their early Organizational stages.



Project Financing Toolkit

This guide provides some valuable resources and insight into the complex world of financing a performance oriented project.

www.2030districts.org/tech_tool/add/lrt/1074

LIGHTING RETROFIT TOOL

PROJECT: 123 Main Street | SESSION: [] | NEW SESSION: [] | SAVE TO RESULTS DASHBOARD | CANCEL

1 SELECT OR COLLECT →
 2 EDIT →
 3 APPLY & REVIEW →
 4 SUMMARY →
 SAVE

Open Office | Private Office | Summary

New Space Name [OpenOff1] | **Project** [] | Create New Space | Save | Duplicate | Delete | Reset | Apply

General | Schedule | Lighting | Economics | Controls 1 | Controls 2

Space Floor Area 6000 ft ²	Number of Workstations 70	Typical Workstation Area 86 ft ²
Location: State PA	Average Commercial Electricity Billing Rate \$ 0.0991 /kWh	Electricity Demand Cost \$ 12 kWh/month
Baseline Lighting Type T12 Fluorescent	Upgrade Lighting Type LED	

Upgrade Control Strategies
 Tuning
 Occupancy
 Daylight Dimming
 Personal Controls

Profile | Energy | Cost

Lighting Power Density Profile Curve

Savings Based On Controls
(CLICK TO VIEW)

62.3%
Energy Savings

51.3%
Peak Demand Savings

24.8 Years
Simple Payback Period

Year 2 – Demonstrations; Year 3 - Deployment

- Year 2 - **Program and Technical Toolkit Demonstrations** – 53 Small Commercial Sites in demonstration partner cities – Cleveland, Seattle, Pittsburgh and San Jose: 10 Retail; 16 Office; 27 Mixed Use
 - Commence energy tracking and savings verification
 - Refine Technical Tools and Programmatic Resources
 - Develop a group purchasing organization to obtain preferred pricing not currently available to small commercial owners on select high performance building technologies.
- Year 3 – **Verification and Deployment** - Demonstration site savings verification, case study development, outreach
 - Outreach and industry engagement, deploy 2030 District model, establishment of 5 to 10 New 2030 Districts
 - Educate potential partners about demonstrated successes and value to communities/cities
 - Case Studies and other materials disseminated at national conferences and partner events



2030 Toolkit – Emerging and New 2030 Districts

ESTABLISHED 2030 DISTRICTS:

STAMFORD

SEATTLE

CLEVELAND

PITTSBURGH (DOWNTOWN AND OAKLAND)

SAN FRANCISCO

LOS ANGELES

DENVER

DALLAS

EMERGING 2030 DISTRICTS:

ALBUQUERQUE

TORONTO

PORTLAND, ME

DETROIT

ITHACA

SAN ANTONIO

PROSPECTIVE 2030 DISTRICTS:

NEW YORK CITY

GRAND RAPIDS

BURLINGTON

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Progress and Accomplishments

Lessons Learned: Regardless of technically proficient tools and reasonable ROIs from analysis, any financial commitment to making improvements can deter some audiences. Financial incentive or alternative financing approach is a larger priority for this audience than in large commercial. The framing of EE assessments in the context of the business model of a small commercial owner/advocate can be useful as a first step.

Accomplishments:

- Technical tools developed, including the web portal, lighting retrofit tool, whole building retrofit tool, case study template and library, 'guide me' process, and the results dashboard.
- Program guidance developed on district formation, district funding, outreach and communications, project financing, performance metrics, and member resources.
- Trainings held in 4 partner cities with contractors.
- Los Angeles, Denver, Stamford, San Francisco and Dallas 2030 Districts launched. Network now totals 182 million sf committed.
- MOUs and relationships in place for partnerships with larger national organizations (e.g. EcoDistricts, EPA, ULI Greenprint, IFMA, LA-BBC, etc.)



Progress and Accomplishments

Market Impact: Project is just commencing the demonstration phase, projected energy savings figures or actual energy savings are not yet available. However, the team has completed industry workshops on small commercial tools, developed new tools and tracking tool, coordinated on web portal and completed six toolkits containing numerous program guides.

- Ensuring or accelerating market outcome(s) –
 - Exceeded target of 25-40 demonstration sites, with 53 enlisted
 - Partner cities conducting trainings with members on technical tools
 - Architecture 2030 is actively engaged with the other five established 2030 Districts and fostering inquiries and early formation activities with ten additional U.S. cities, priming the project for early deployment of the program guidance and tools
 - Industry outreach continuing with conferences and working on industry collaborations with national organizations to partner at the local level (e.g. BOMA, IFMA, ULI, ASHRAE)
 - 2030 District Network Summits to disseminate to emerging and prospective Districts



Awards/Recognition: N/A.

Project Integration and Collaboration

Project Integration and Communications:

- FOA Project team hold weekly meetings; trainings on tools and guidance
- 2030 District Summit, Sept 2014 – convenes all established, emerging and prospective districts. Toolkit tools and guides presented, coordinated.
- Trainings held with small commercial contractors – HVAC and electrical, in all 4 partner cities on the Energy Management Process
- 2030 Districts hold regularly meeting with their members and stakeholders and perform trainings on the toolkit with the demonstration partners.
- Architecture 2030 presented at the 2013 National Preservation Conference, the 2014 SPEER Summit, CNU22, and the 2014 EcoDistricts Summit.

Partners, Subcontractors, and Collaborators:

- Architecture 2030, program guidance and 2030 Districts convener
- Seattle, Cleveland and Pittsburgh 2030 Districts and Prospect Silicon Valley, small commercial outreach, demonstrations, best practices
- ASU, case studies template and library.
- Emerging 2030 Districts

Next Steps and Future Plans

The project is currently mid-way in its 30 month project period. Tasks that remain include:

- a. Complete dissemination and usage of technical toolkit to demonstration sites.
 - I. Document >20% energy savings in projects.
 - II. M&V period, collect M&V results.
 - III. Collect feedback, lessons learned and improve tools
- b. Complete and deploy program guidance to 2030 Districts.
 - I. Complete Special Purchasing Alliance program development.
 - II. Collect feedback, lessons learned, develop further as needed.
- c. Deploy technical and program toolkits to further 2030 Districts.
- d. Risks and mitigation

Demonstration sites may stagger implementation of the retrofits over a longer period than anticipated during the project timeframe, shortening M&V period. Mitigated by enlisting more than double the target number of sites to maintain a core number progressing in the project timeframe.

REFERENCE SLIDES

Project Budget

Project Budget: 2,000k, awarded by DOE FOA-0000829

Variances: No variances have occurred or are expected.

Cost to Date: 1,151k

Additional Funding: N/A

Budget History

FY2014 (past)		FY2015 (current)		FY2016 (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
2,000k	2,000k	N/A	N/A	N/A	N/A

Project Plan and Schedule

Project plan, milestones as noted in the schedule below. Project period 10/1/13-3/30/16.

- FY15Q1 milestone was delayed due to scheduling issues with participants

FY14 Go/No-go: Stop the demonstration phase if the following not met (9/30/14):

- # of tech. tools developed >4
- Case study library developed >20 case studies; # Case study templates >1
- # of program energy saving tracking tools developed > 1
- # of program guides & templates developed > 5

FY15 Go/No-go: Stop the demonstration phase <20 demonstrations in progress

Project Schedule													
Project Start: Oct. 1, 2013		Completed Work											
Projected End: Mar. 30, 2016		Active Task (in progress work)											
	◆	Milestone/Deliverable (Originally Planned)											
	◆	Milestone/Deliverable (Actual)											
		FY2014				FY2015				FY2016			
Task	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	
Past Work													
FY14Q1 Milestone: Conduct tool workshops		◆	◆										
FY14Q2 Milestone: Case study and initiate toolkit dev.			◆										
FY14Q3 Milestone: Identify demonstration sites in cities.				◆									
FY14Q4 Go/No Go: 4 tools developed, case study library >20, 5 program guides developed					◆								
FY15Q1 Milestone: Develop program resources and tools.						◆							
Current/Future Work													
FY15Q2 Milestone: Report on tool use by partners.							◆						
FY15Q3 Milestone: M&V period started for demo sites.								◆					

2030 Districts provide a common platform for each district's unique ways of defining goals and creating a common mode of discussion



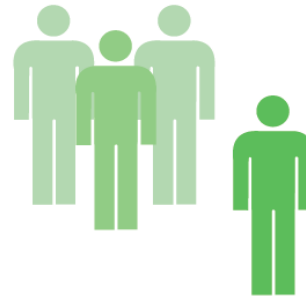


2030 Districts act as a concierge and GP – pointing partners towards tools for accurate diagnosis and treatment

For Building Owners, Managers and Developers



Utilize special financing programs



Improve competitive positioning



Access exclusive incentives, discounts & programs



Receive comparative analysis reports

High Performance Building Districts

- ✔ Contact form for 123 Main Street added.
- ✔ Project 123 Main Street has been created.

TOOLKITS

Small Commercial Toolkit Tutorials
 Small Commercial Toolkit
 Member Resources Toolkit
 District Formation Toolkit

123 MAIN STREET PROJECT TOOLS

PROJECT HOME

GUIDE ME

RECOMMENDATIONS

TECHNICAL TOOLS

RESULTS DASHBOARD

123 MAIN STREET

Edit Project

Share Project

Create Case Study

Delete Project



Mixed use, first floor dry goods retail, 2nd floor office

Project Address:

123 Main Street
Pittsburgh, PA

District Affiliation: Pittsburgh

Square Footage: 50000 S.f.

Year Built: 1960

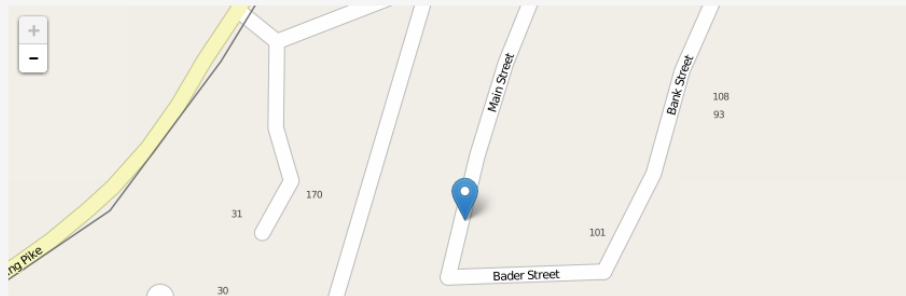
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WELCOME TO THE 2030 DISTRICT TOOLKITS



Small Commercial Toolkit Tutorials

This is a series of video tutorials of the programmatic and technical tools



Small Commercial Toolkit

The 2030 District Small Commercial Toolkit is a national 2030 District Program that includes a set of program and technical products aimed at small commercial buildings (Buildings < 50,000 s.f.)



Member Resources Toolkit

2030 Districts offer their members a number of free and discounted resources to help property owners and managers reach the maximum performance of their buildings and benefit from participating in



District Formation Toolkit

This toolkit explores the unique aspects of a 2030 District, how they differ from other aligned efforts, and the pathways and protocols to establishing a 2030 District as a private/public partnership.

High Performance Building Districts

TOOLKITS

- Small Commercial Toolkit Tutorials
- Small Commercial Toolkit
- Member Resources Toolkit
- District Formation Toolkit

WELCOME TO THE SMALL COMMERCIAL TOOLKIT

TECHNICAL TOOLS AND GUIDANCE FOR COMMERCIAL BUILDINGS UNDER 50,000 S.F.

Guide Me

You must be a registered user with a project to be guided to recommended resources and technical tools

I am experienced, just take me to the

Technical tools

High Performance Building Districts



GUIDE ME

A set of guides that, based on your response, will take you to different resource recommendations for the main resource categories (tools, financing, auditing, and case studies).

TOOLKITS

- Small Commercial Toolkit Tutorials
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- District Formation Toolkit

123 MAIN STREET PROJECT TOOLS

PROJECT HOME

GUIDE ME

RECOMMENDATIONS

TECHNICAL TOOLS

RESULTS DASHBOARD



GENERAL INFORMATION

By completing this section so that we can learn more about how you and your building.



GUIDE ME : GENERAL RESOURCES

By completing this section you will be guided to general resources centered around training programs, energy tracking systems, and other resources available for buildings in 2030 Districts.



GUIDE ME : TECHNICAL TOOLS

By completing this section you will be guided to US Department of Energy technical tools that are relevant to your project.



GUIDE ME : PROJECT FINANCING

By completing this section you will be guided to types of financing mechanisms that may be available for the project being analyzed.

High Performance Building Districts



GENERAL INFORMATION

By completing this section so that we can learn more about how you and your building.

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123 MAIN STREET PROJECT TOOLS

PROJECT HOME

GUIDE ME

RECOMMENDATIONS

TECHNICAL TOOLS

RESULTS DASHBOARD

General

What is your role in the project?

Property Manager

Type of Project

Mixed Use

- Office
- Residential
- Restaurant
- Retail

Estimated Size of Project

50000 SF

How long from today's date do you plan to be in your location?

>10 years

How long have you been in your location?

5 to 10 years

Input the building into Energy Star Portfolio Manager?

- No
- Yes

Are you currently benchmarking your buildings performance?

- No
- Yes

Had an Energy Audit in the last 12 months

- Full Audit w/ report
- Walkthrough w/ recommendations
- Other
- I haven't had an energy audit / assessment

How is your building/space operated

I do it

SAVE

CANCEL

High Performance Building Districts



GUIDE ME: GENERAL RESOURCES

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123 MAIN STREET PROJECT TOOLS

- PROJECT HOME
- GUIDE ME
- RECOMMENDATIONS
- TECHNICAL TOOLS
- RESULTS DASHBOARD

General Resources

What type of project are you doing?

Retrofit

Do you want to know about ways to track building energy use?

Yes

Have you engaged your tenants in a resource reduction strategy?

No

Are your facility managers trained in resource efficiency?

No

Do you have a resource efficiency plan?

No

Are you owner occupied?

No

How is your building/space operated?

The building is managed under contract by a property management company

SAVE CANCEL

High Performance Building Districts



GUIDE ME: PROJECT FINANCING

By completing this section you will be guided to types of financing mechanisms that may be available for the project being analyzed.

TOOLKITS

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123 MAIN STREET PROJECT TOOLS

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- TECHNICAL TOOLS
- RESULTS DASHBOARD

Financing

How do you plan to pay for your project?

Self Financed

Tax Implications

Are you a not for profit organization?

No

Do you want to know about any of these tax implications?

- 179D Questions
- Tax-exempt bond financing

Are you going to own the upgrade that you are doing?

Yes

What is the scope of your project?

This is the only project

Who will be doing the construction of your project?

Hire a General Contractor to oversee the entire project

SAVE CANCEL



North Texas Council of Governments (NTCOG) joins Dallas 2030 as a Community Stakeholder 11 March 2015 - 12:29pm



VIDEO: 2030 Districts Overview This video introduces 2030 Districts, which are being... 2030 Districts Introduction



2030 Districts @2030Districts RT @Arch2030: "The greenest building is the one that's already there" Nice adaptive reuse here: http://t.co/Zgmkmi79Ku @gbd_mag http://t.co... - 9 months 1 week ago

High Performance Building Districts



GUIDE ME: TECHNICAL TOOLS

By completing this section you will be guided to US Department of Energy technical tools that are relevant to your project.

TOOLKITS

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123 MAIN STREET PROJECT TOOLS

PROJECT HOME

GUIDE ME

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RESULTS DASHBOARD

Technical Tools

What energy use data do you have available?

Utility Bills

Type of Heating System?

Boilers

Type of Cooling System?

Other

In the last 5 years, have you done any of the following?

Yes No

Upgraded the majority of your Heating and Cooling System

- Boiler
- Chiller
- Heat Pump
- Rooftop Unit

What is the System's Efficiency?

Standard Performance

- Upgraded the majority of your lighting fixtures
- Upgraded the majority of your lighting controls
- Upgraded the majority of your roof insulation
- Installed a cool roof membrane
- Upgraded the majority of exterior walls
- Upgraded the majority of exterior windows
- Purchased new office-type equipment in the last 5 years?

Office Equipment

Below 50%

Kitchen Equipment

SAVE

CANCEL

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123 MAIN STREET PROJECT TOOLS

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SELECT A TOOL TO WORK WITH

Privacy



Air-Cooled Electric Chiller Calculator

Specifically tailored to Air-Cooled Electric Chillers, this cost calculator is a screening tool that estimates a product's lifetime energy cost savings at various efficiency levels.



Closed Loop Commercial Boiler Calculator

This cost calculator is a screening tool that estimates a product's lifetime energy cost savings at various efficiency levels.



Commercial Heat Pump Calculator

This cost calculator is a screening tool that estimates the efficiency of your commercial heat pump (systems between 5.4 and 20 Tons). Inputs give the ability to vary equipment size, energy cost, hours of operation, and /or efficiency level.



Lighting Retrofit Tool

A Technical Tool to estimate the energy savings that can be achieved from implementing lighting controls and fixture upgrades. The lighting controls include institutional tuning, daylight harvesting, occupancy sensing, and personal controls.



Plug Load Tool

A Tool based on inputs on the type of equipment currently in an office space the potential savings of using ENERGY STAR qualified products are quantified.



Rooftop Unit Comparison Calculator

The Rooftop Unit Comparison Calculator (RTUCC) simulates the energy usage of both a high efficiency and a standard efficiency air conditioner. It then compares their energy and economic performance.



Whole Building Retrofit

A rapid online retrofit assessment tool based on load shapes, benchmarking, and a pre-simulated database of retrofit measure energy savings results for small and medium office and retail buildings. The tool is being designed with three levels of analysis capabilities depending on the level of information available.

High Performance Building Districts

AIR-COOLED ELECTRIC CHILLER CALCULATOR

Privacy

PROJECT 123 Main Street SESSION Session #

SAVE TO RESULTS DASHBOARD CANCEL



BELOW IS THE CHILLER CALCULATOR ON THE DEPARTMENT OF ENERGY'S WEBSITE

Disable Interaction

This cost calculator is a screening tool that estimates a product's lifetime energy cost savings at various efficiency levels. Learn more about the calculator assumptions and definitions.

CAPTURE RESULTS ENTER RESULTS BELOW

Project Type: Is this a new installation or a replacement? (New/Replacement), How many chillers will you purchase? (1), Performance Factors: Existing condition (Full/Partial Load), Existing chiller capacity (10C tons), Existing full-load efficiency (10. EER), Existing partial-load efficiency (EER).

New: What is the new design condition? (Full/Partial Load), What is the cooling capacity of the new chiller? (10C tons)

New/Replacement tabs, Number of Chillers (1), Full Load/Partial Load tabs, Capacity of New Chiller (100 Tons), Cooling Efficiency of Existing Chiller (10.4 EER), Cooling Efficiency of New Chiller (11 EER)

High Performance Building Districts

CLOSED LOOP COMMERCIAL BOILER CALCULATOR

Privacy

PROJECT 123 Main Street SESSION Session # 1

SAVE TO RESULTS DASHBOARD CANCEL



BELOW IS THE BOILER CALCULATOR ON THE DEPARTMENT OF ENERGY'S WEBSITE



Home » Products & Technologies » Energy-Efficient Products » Energy Cost Savings Calculator for Commercial Boilers: Closed Loop, Space Heating Applications Only

ENERGY COST SAVINGS CALCULATOR FOR COMMERCIAL BOILERS: CLOSED LOOP, SPACE HEATING APPLICATIONS ONLY

Disable Interaction

This cost calculator is a screening tool that estimates a product's lifetime energy cost savings at various efficiency levels.

Learn more about the base model and other assumptions.

Project Type

Is this a new installation or a replacement?

New Replacement

What is the deliverable fluid type?

Water Steam

What fuel is used?

Gas Oil

How many boilers will you purchase?

1 unit(s)

Performance Factors

New Replacement Number of Boilers 1

High Performance Building Districts

COMMERCIAL HEAT PUMP CALCULATOR

Privacy

PROJECT 123 Main Street SESSION Session #

SAVE TO RESULTS DASHBOARD CANCEL



BELOW IS THE HEAT PUMP CALCULATOR ON THE DEPARTMENT OF ENERGY'S WEBSITE



Home » Products & Technologies » Energy-Efficient Products » Energy Cost Calculator for Commercial Heat Pumps (5.4 >=< 20 Tons)

ENERGY COST CALCULATOR FOR COMMERCIAL HEAT PUMPS (5.4 >=< 20 TONS)

Disable Interaction

Vary equipment size, energy cost, hours of operation, and /or efficiency level.

INPUT SECTION		
Input the following data (if any parameter is missing, calculator will set to default value).		Defaults
Project Type	Replacement	New Installation
Condenser Type	Air Source	Air Source
Existing Capacity *	10 ton	—
Existing Cooling Efficiency *	8 EER	—
Existing Heating Efficiency *	3.4 COP	—
Existing IPLV Efficiency *	IPLV	—
New Capacity	10 ton	10 tons
New Cooling Efficiency	10.5 EER	10.1 EER
New Heating Efficiency	3.5 COP	3.2 COP

New Replacement

New Capacity Tons

High Performance Building Districts

LIGHTING RETROFIT TOOL

Privacy

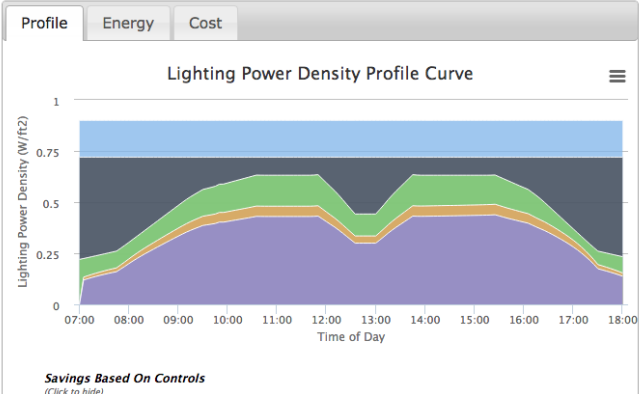
PROJECT 123 Main Street SESSION [] NEW SESSION [] SAVE TO RESULTS DASHBOARD CANCEL



Open Office Private Office Summary

New Space Name OpenOff1 Project Create New Space Save Duplicate Delete Reset Apply

General Schedule Lighting Economics Controls 1 Controls 2
Space Floor Area: 6000 ft2
Number of Workstations: 70
Typical Workstation Area: 86 ft2
Location: State: PA
Average Commercial Electricity Billing Rate: \$ 0.0991 /kWh
Electricity Demand Cost: \$ 12 kWh/month
Baseline Lighting Type: T12 Fluorescent
Upgrade Lighting Type: LED
Upgrade Control Strategies: Tuning, Occupancy, Daylight Dimming, Personal Controls



62.3% Energy Savings
51.3% Peak Demand Savings
24.8 Years Simple Payback Period

LIGHTING RETROFIT TOOL

Privacy

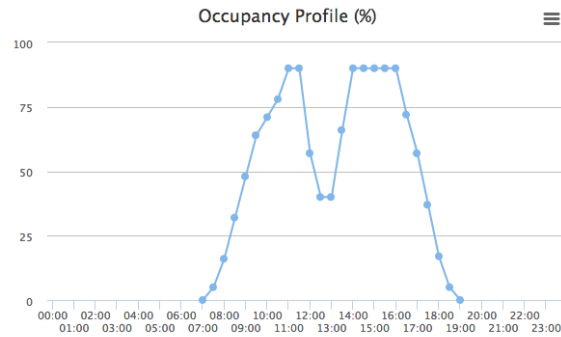
PROJECT 123 Main Street SESSION NEW SESSION SAVE TO RESULTS DASHBOARD CANCEL



Open Office Private Office Summary

New Space Name OpenOff1 Create New Space Project Save Duplicate Delete Reset Apply

General Schedule Lighting Economics Controls 1 Controls 2



Time	Occupancy (%)
07:00	0
07:30	5
08:00	16
08:30	32
09:00	48
09:30	64
10:00	71
10:30	78
11:00	90
11:30	90
12:00	57
12:30	40
13:00	40
13:30	66
14:00	90
14:30	90
15:00	90
15:30	90
16:00	90
16:30	72

Time interval: 07:00 - 19:00

Number of Workdays Per Year 250 days Daily Occupancy Peak Average 90 %

High Performance Building Districts

LIGHTING RETROFIT TOOL

Privacy

PROJECT 123 Main Street SESSION NEW SESSION SAVE TO RESULTS DASHBOARD CANCEL



Open Office Private Office Summary

New Space Name OpenOff1 Create New Space Project Save Duplicate Delete Reset Apply

General Schedule Lighting Economics Controls 1 Controls 2

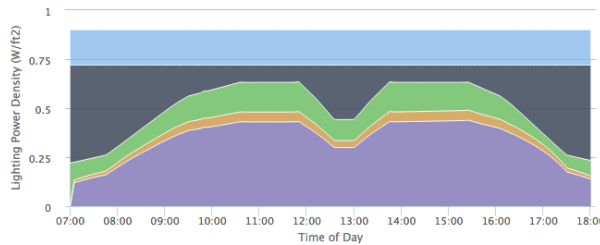
Lighting Power Density (LPD)

Code-based or National Average LPD Select Code/National Average ASHRAE 90.1-1989 Input your own LPD Fixture information to calculate LPD

Resulting LPD to be used for analysis 1.9 W/ft2 Lighting Type Selected T12 Fluorescent

Profile Energy Cost

Lighting Power Density Profile Curve



Savings Based On Controls

- Tuning, Personal Controls, Occupancy Sensor, Selected Controls, Daylight Dimming

62.3% Energy Savings
51.3% Peak Demand Savings
24.8 Years Simple Payback Period

High Performance Building Districts

LIGHTING RETROFIT TOOL

Privacy

PROJECT SESSION



Open Office Private Office Summary

New Space Name **Project**

General Schedule Lighting Economics Controls 1 Controls 2

Lighting Controls Costs

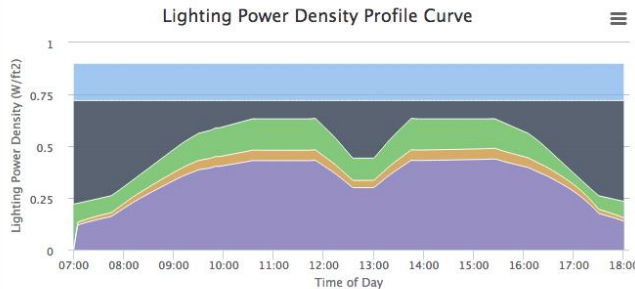
Space Type Project / ft2 / ft2

Rebates & Incentives

Gathers information on the potential rebates & incentives that will influence the cost, savings and payback period results

Demand Reduction / kWh saved / kWh saved

Profile Energy Cost



Savings Based On Controls

- Tuning
- Personal Controls
- Occupancy Sensor
- Selected Controls
- Daylight Dimming

62.3%
Energy Savings

51.3%
Peak Demand Savings

24.8 Years
Simple Payback Period

High Performance Building Districts

ROOFTOP UNIT COMPARISON CALCULATOR

Privacy

PROJECT 123 Main Street SESSION Session #

SAVE TO RESULTS DASHBOARD CANCEL



BELOW IS THE ROOFTOP UNIT COMPARISON CALCULATOR ON THE PACIFIC NORTHWEST NATIONAL LABORATORY'S WEBSITE
 CLICK HERE TO SHOW INPUTS

CAPTURE RESULTS
 ENTER RESULTS BELOW



Rooftop Unit Comparison Calculator

	Home	Submit	Restore	
<p>Welcome to the Rooftop Unit Comparison Calculator. The RTUCC simulates the energy usage of both a high efficiency and a standard efficiency air conditioner. It then compares their energy and economic performance.</p> <p>The RTUCC displays best in Mozilla Firefox. Good second choices for a web browser are Microsoft Internet Explorer and Google Chrome.</p> <p>To run the RTUCC, characterize the two systems and their environment using the controls on this page. Then click the 'submit' button. Use your browser 'back' button to return from the results page to this control page or click on the "Return to Controls Page" link. Use the 'Restore' button to change all values back to the defaults shown in the far right column (more on defaults).</p> <p>Move your cursor over a question mark near a control's name to display a help tip. Click on the question mark for more detailed information (more on help).</p> <p>Visit the quick start page which serves as a user guide for the RTUCC. The engineering methods pages have additional background information on the calculation engine. Click the version link (below) to view the revision history.</p> <p>Version 4.3</p>	Advanced Features <input type="checkbox"/>	Hidden		
	Show bin calculations <input type="checkbox"/>	Hide bin calcs		
	Building Type <input type="text" value="Office-Medium"/>	Office-Medium		
	State / City <input type="text" value="PA Pittsburgh"/>	MO Kansas City		
	Schedule <input type="text" value="All week, 6 a.m. to 10 p.m."/>	M-Fri, 7a.m. to 7p.m.		
	Indoor Temperature <input type="text" value="70"/> Setback <input type="text" value="5"/>	75 °F 5 °F		
	Total Capacity <input type="text" value="084"/> kBtuh	84 kBtuh		
	Oversizing Factor <input type="text" value="0"/> %	0%		
	Candidate Unit <input type="text" value="12 EER @ 4.5 k\$ 0 \$/yr"/>	12 EER \$4,500 \$0		
	Enable Economizer <input checked="" type="checkbox"/>	Economizer enabled		
Standard Unit <input type="text" value="9 EER @ 4 k\$ 0 \$/yr"/>	9 EER \$4,000 \$0			
Enable Economizer <input checked="" type="checkbox"/>	Economizer enabled			
Electric Utility Rate <input type="text" value="0.08"/> \$/kWhrs	0.08 \$/kWhrs			
Equipment Life <input type="text" value="20"/> years	15 years			
Number of Units <input type="text" value="1"/> units	1 unit			
Chart discounted costs <input checked="" type="checkbox"/> Discount Rate <input type="text" value="7"/> %	Discounted 7.0 %			

High Performance Building Districts

ROOFTOP UNIT COMPARISON CALCULATOR

[Privacy](#)

PROJECT SESSION

[SAVE TO RESULTS DASHBOARD](#)

[CANCEL](#)



BELOW IS THE ROOFTOP UNIT COMPARISON CALCULATOR ON THE PACIFIC NORTHWEST NATIONAL LABORATORY'S WEBSITE

[CLICK HERE TO EXPAND TOOL](#)

CAPTURE RESULTS

ENTER RESULTS BELOW



[PNNL Home](#) | [About](#) | [Research](#) | [Publications](#) | [Jobs](#)

Rooftop Unit Comparison Calculator

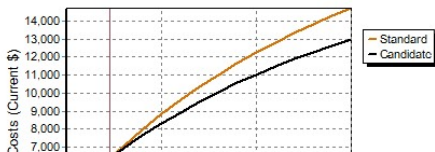
[Return to Controls Page](#)

RESULTS

PITTSBURGH, PA	Candidate	Standard	Savings
Annual Energy Consumption (kWhrs)	11,621	14,703	3,081
Annual Operating Cost (\$)	930	1,176	246
15 Year Life Cycle Cost (\$)	12,968	14,713	1,745
Annualized Cost (\$)	1,424	1,615	192
Net Present Value (\$)	1,745		
Payback (yrs)	2.3		
Rate of Return (%)	49.17		
Savings to Investment Ratio (SIR)	4.49		

Annual Energy Consumption of Candidate kWhrs

Annual Energy Consumption of Standard kWhrs



Annual Operating Cost of Candidate \$



Selections

Save Create New Session Summary Full Report



Select a Whole Building session below or enter your project's annual baseline energy use kWh

▼ **WHOLE BUILDING**



WHOLE BUILDING RETROFIT TOOL

Total Annual Energy Savings	Total Annual Energy Cost Savings	Simple Payback	Systems Included
-----------------------------	----------------------------------	----------------	------------------

▼ **LIGHTING AND PLUG LOADS**

System Annual Energy Saving	System Annual Energy Cost Savings	Simple Payback	Systems Included
-----------------------------	-----------------------------------	----------------	------------------

PLUG LOAD No Sessions Selected

LIGHTING No Session Selected

▼ **HVAC COMPONENTS**

System Annual Energy Savings	System Annual Energy Cost Savings	Simple Payback	Systems Included
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CHILLER No Session Selected

BOILER No Session Selected

ROOFTOP HVAC UNIT No Session Selected

HEAT PUMP No Session Selected

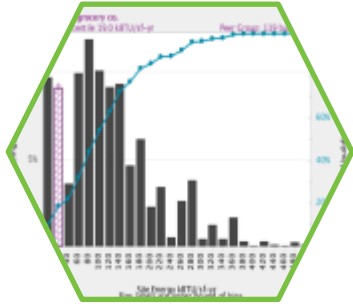
Energy Management Package - Auditing

- Streamlined package for energy management: guidelines & worksheets
- Focused on operational savings measures
- Delivered by HVAC contractors



Element 1: Monthly Data & Benchmarking

Analyze monthly data & benchmark



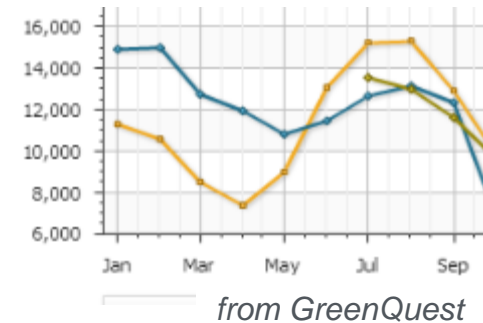
Requires:

- ❖ At least 1 year of monthly electricity and fuel use;
- ❖ Building floor area & type;
- ❖ 30-60 minutes

A) *What are the seasonal patterns?*

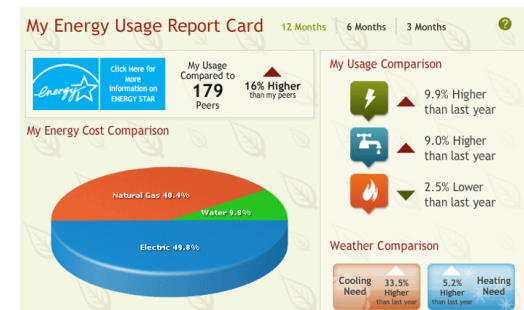


B) *How does this year compare with the previous year?*



C) *How does my building compare to others?*

- ❖ Energy use intensity (kBtu / sf – yr)
- ❖ % of buildings with higher EUI (Energy Star Score)

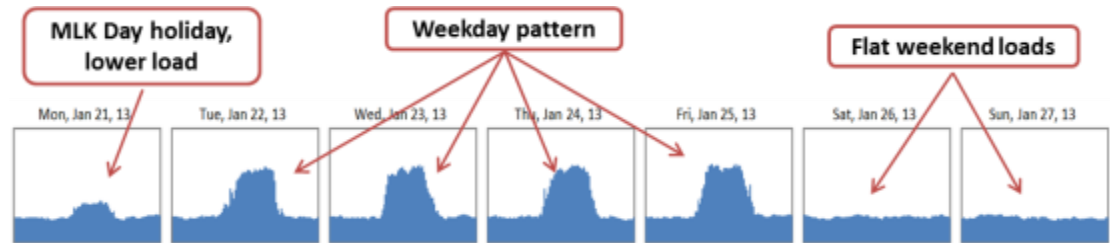


Element 2: Interval Data

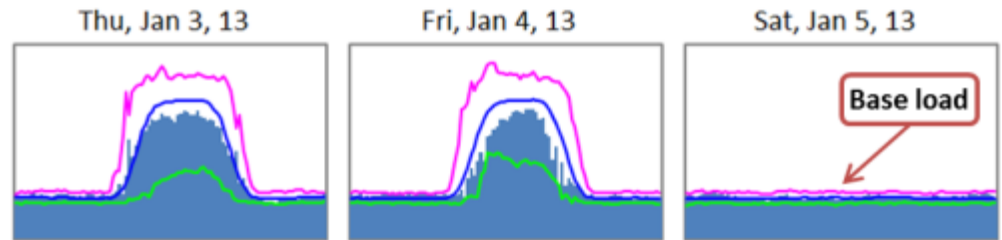
Requires:

- ❖ 3-12 months of hourly (smart meter) electricity data
- ❖ 30-60 minutes

A) *Are the daily and weekly load schedules as expected?*



B) *How much energy is used at night and on weekends (Base load)?*



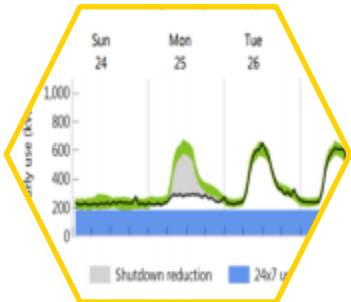
from BizEE

C) *Are there spikes or unusual activity ?*

D) *Can peak loads be reduced or shifted to non-peak periods in the day?*

E) *Are there changes over time?*

Analyze
interval data



Element 3: Walkthrough

Walkthrough



1 hour walkthrough at building site

Check lighting & thermostat settings

Consult with manager about energy management practices

E3 Walkthrough Worksheet

Building: _____ Date: _____
 Facility contact name: _____
 Phone: _____

Building operating hours:
 Weekdays _____ to _____
 Saturday: _____ to _____
 Sunday: _____ to _____



STEP 1 Overview

List major energy consuming equipment in this building: _____

✓	If issues were highlighted in:	Pay special attention to question number:
	E2 Step 3: High evening / weekend / base load	1, 5, 6, 7, 8, 11c, 11e, 12 (office), 13 (kitchen)
	E2 Step 2: Load schedule does not match occupancy schedule	8, 11a, 13 (kitchen)
	E2 Step 5: High peak, daytime loads	11b, 11d, 9
	E1 Step 5: High seasonal variability	10

Questions in bold below are the typically the most important to assess.

STEP 2 Look for these items throughout the building

#	Description	Yes	No	NA	Corrective Action / Comments	Solved ?
1	Are occupancy sensors installed and working? Are they placed appropriately? Consult manager / occupant about functioning.					
2	Are incandescents or T12 fixtures present?					
3	Are fans or portable space heaters being used?					
4	Are radiators and air vents clear and unobstructed?					

E3 Walkthrough Worksheet -- DRAFT: Do not Circulate

Element 4: Communicate with Owner

Communicate with owner

- ❖ Tips on pitching efficiency measures
- ❖ Tool to generate summary (right)
- ❖ Incentive identification
- ❖ Goal setting guidelines
 - ❖ *“I think together we can improve the Energy Star Score by 5 points this year.”*


How is your building performing?
 Prepared for Delightful Dentistry, 32 Main St. by GetyourBack HVAC

Your building uses 150 kWh/ft²/yr, which is more efficient than 8% of office buildings.

Your building's energy use has decreased by 2%, compared with the previous year.

Based on your percentile ranking, there are likely many low-cost opportunities to improve the energy efficiency of this facility.

By reducing your building's energy use by 5%, you could save \$310 annually, based on national average energy costs. This is equivalent to selling 31 more dental cleanings per year! This program aims to use low-cost measures to reduce energy use by 3-5%, but higher savings can be achieved by completing many recommendations or additional measures with higher upfront costs.



Knowing is half the battle. But what's the other half? The following table includes low-cost opportunities to reduce your building's energy costs. The more items you choose to implement, the more energy you are likely to save. Additionally, regular energy monitoring is recommended to maintain the energy savings that you achieve.

Recommendations	How easy is this?	Who?	Cost	Incentive?	Date Completed
Switch off computers and monitors at night	Easy	Owner	\$		
Replace T12 lamps with efficient T8 lamps	Medium	Lighting Contractor	\$\$	Utility rebate \$16/fixture	
Install occupancy sensors or time clocks for lighting control	Difficult	Lighting Contractor	\$\$\$	Utility rebate \$8/sensor	
Adjust thermostat setpoints	Medium	Owner or Contractor	\$		
Switch off copiers, printers, etc. at night	Easy	Owner	\$		
Address load spikes and erratic behavior in daily load profiles	Medium	Contractor and owner	\$\$		

Element 5: Check Results

Check results

Requires:

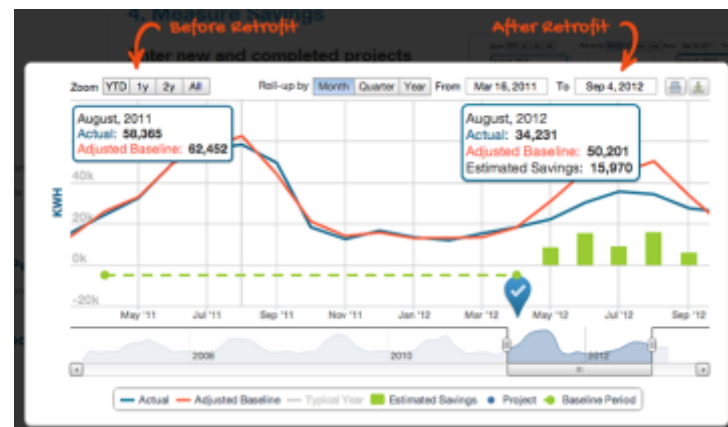
- ❖ Updated monthly and/or hourly data
- ❖ 30-60 minutes

A) *How much energy has been saved?*

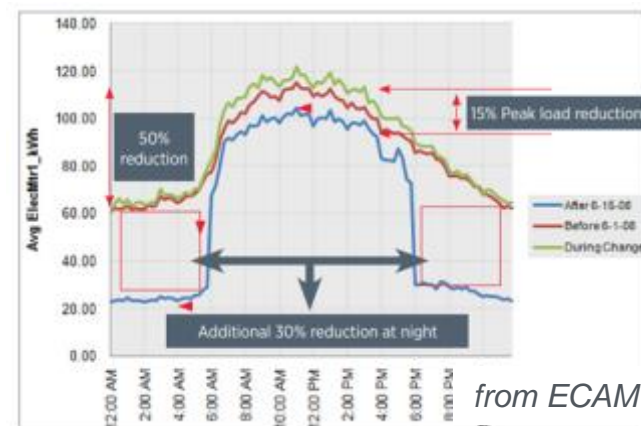
B) *Can we verify changes to scheduling?*

C) *Further steps to energy efficiency*

D) *Leveraging success in future sales opportunities*

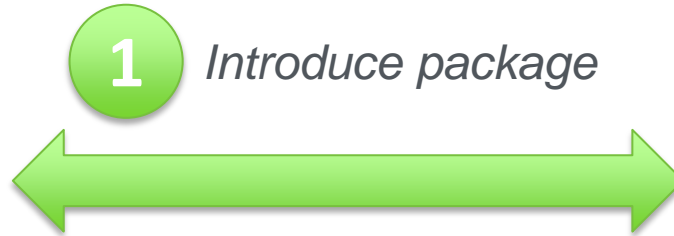


from Noesis



from ECAM

EMP is one option for 2030 Districts



2030
DISTRICT™

