Energy and Energy Project Procurement

Module 2 in the "Procurement Strategies for K-12 Facility and Energy Managers" Course

January 11, 2024

Today's Presenters

John Jameson and Adam Agalloco

John has over 10 years supporting local governments and education institutions in building energy efficiency and clean energy projects. He has supported numerous local, state and federal energy programs including DOE's Better Buildings Initiative where he's worked with DOE national laboratories to provide technical assistance to partners across the country. He currently oversees EPA's ENERGY STAR building certification program.

Adam is a Director for Climate Change and Sustainability at ICF. In his role, he helps organizations manage their energy use, carbon emissions and sustainability strategies through strategic planning and implementation support. Adam is experienced in developing and implementing energy conservation, energy efficiency and renewable energy projects and expertise in carbon accounting, building energy systems, and energy procurement. He has over 17 years of experience and has a diverse background in energy, spending time as a project engineer for renewable energy development and in building mechanical design. Adam is a Certified Energy Manager and a LEED Accredited Professional

Today's Agenda

- Welcome and Introductions
- Learning Objectives
- **Energy Procurement**
  - Key Terms
  - Basics of Electricity, Natural Gas, and Vehicle Fuel Markets
  - Optimizing Energy Purchasing
  - Energy Procurement Goals
- **Energy Project Procurement**
  - Basics of Building Energy Systems
  - Basics of Building Energy Upgrades
  - Prioritizing Upgrades and Structuring Requests for Proposals
  - Evaluating Proposal Responses and Selecting a Contractor

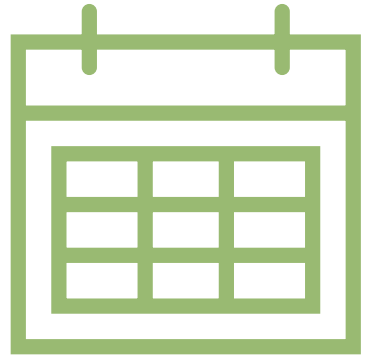
Overview of the Procurement Strategies Course

- January 04, 2024:
  Getting Started + Managing and Collecting Data

- **January 11, 2024:**
  Energy Procurement + Energy Project Procurement

- January 18, 2024:
  Financing Approaches + Applications to Achieve Your Goals

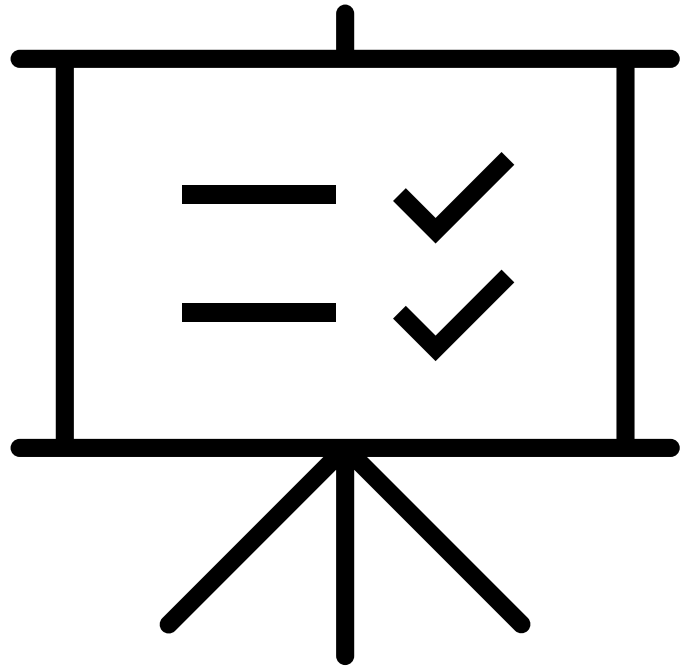
- January 23, 2024 (**3PM-4PM Eastern**):
  Procurement Strategies Cohort Meeting



Sessions will take place from 3:00 – 5:00 PM (Eastern) unless otherwise noted

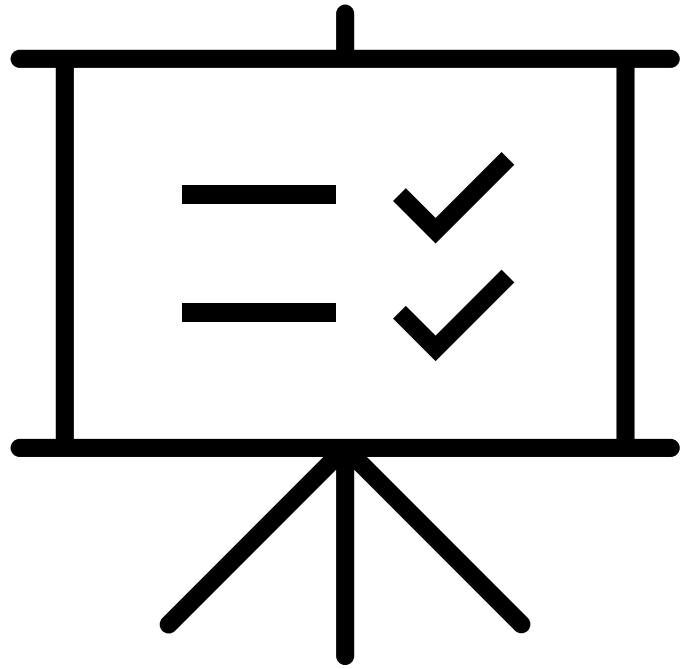
Learning Objectives

- In part 1 of today's session, attendees will:
  - Develop an understanding of the basics of energy systems
  - Learn about the electricity, natural gas, and vehicle fuel markets
  - Learn about Renewable Energy Credits, Renewable Fuels, and Renewable Portfolio Standards
  - Develop an understanding of energy procurement options
  - Learn about Energy Procurement Goals



Learning Objectives

- In part 2 of today's session, attendees will:
  - Learn the basics of building energy systems and building energy upgrades
  - Develop and understanding of building energy upgrades, and how to plan for/prioritize them
  - Learn how to structure Request for Proposal (RFPs) by setting clear performance targets and offering flexible approaches.
  - Learn strategies for effectively evaluating RFP responses



Part 1 Energy Procurement

Key Terms Used in This Course

Key Terms

- Electric Retail Choice Market
  - Markets where customers have been granted (at the state level) the right to procure electricity from a competitive electricity supplier other than their traditional utility provider
    - Also known as: Competitive Retail Electricity Market, Deregulated Retail Marker, Restructured Market, Direct Access Market

- Renewable Energy Credit (REC)
  - A credit representing the clean energy attributes of 1 MWh of renewable electricity and conveying the environmental and social attributes of the generated electricity to customers

Definitions provided by: https://cityrenewables.org/glossary/

Key Terms

- Green or Renewable Energy Tariff
  - An electricity rate which allows customers to opt into a portion or all of their electricity from new renewable energy projects by purchasing both the electricity and the associated RECs. Typically, these programs are designed for large consumers of energy.
- Power Purchase Agreement
  - A contract with an energy project where customers agree to purchase the energy produced by a generator over a set period at a predetermined price per unit energy.
    - Physical PPAs have the seller directly deliver the purchased electricity to the customer
    - Virtual PPAs do not have the electricity delivered directly to the purchaser, but instead have the electricity sold to the wholesale marker while the purchaser receives the RECs along with the cost or profit difference from the agreed-on price.

Definitions provided by: https://cityrenewables.org/glossary/

Key Terms

- Kilowatt Hour, Megawatt Hour
  - A measure of energy equivalent to 1,000 watts being generated for 1 hour (kWh)
  - A measure of energy equivalent to 1,000,000 watts (1,000 kW) being generated for 1 hour (MWh)

- MMBTU
  - One Million British Thermal Units. This unit is typically used to measure the energy delivered from natural gas and fuel systems compared with kWHs and MWHs from electricity.

Definitions provided by: https://cityrenewables.org/glossary/

Basics of Energy Systems

Understanding Energy Systems

- The cost for major energy types are governed by a range of energy companies, regulators, utilities and other organizations. Together these make up a global energy markets, which is further made up of national and regional energy markets.

- Major energy markets and systems are interconnected and increasingly global.
  - *For example: a weather event could drive higher prices for natural gas, which could increase electricity costs as natural gas fueled electricity plants pay a higher rate for fuel.*

- Energy procurement options vary significantly by state and region.

Energy Providers (Electricity and Gas)

- Regulated Wholesale Energy Markets
  - Local utility companies responsible for both energy supply and the delivery of energy to customers.
  - Customers typically receive a single bill from their utility.

- Restructured (Deregulated or Competitive) Energy Markets
  - Customers can buy the energy portion from competitive suppliers rather than the local utility.
  - Local utility companies remain responsible for delivery.
  - Customers may receive a single bill from the local utility, or they may receive separate bills from the local utility and the energy supplier.

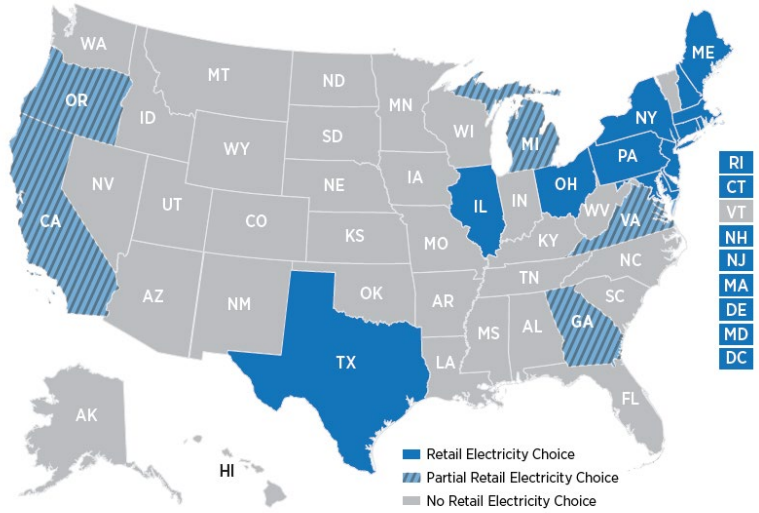


Figure 1. States with retail electricity choice

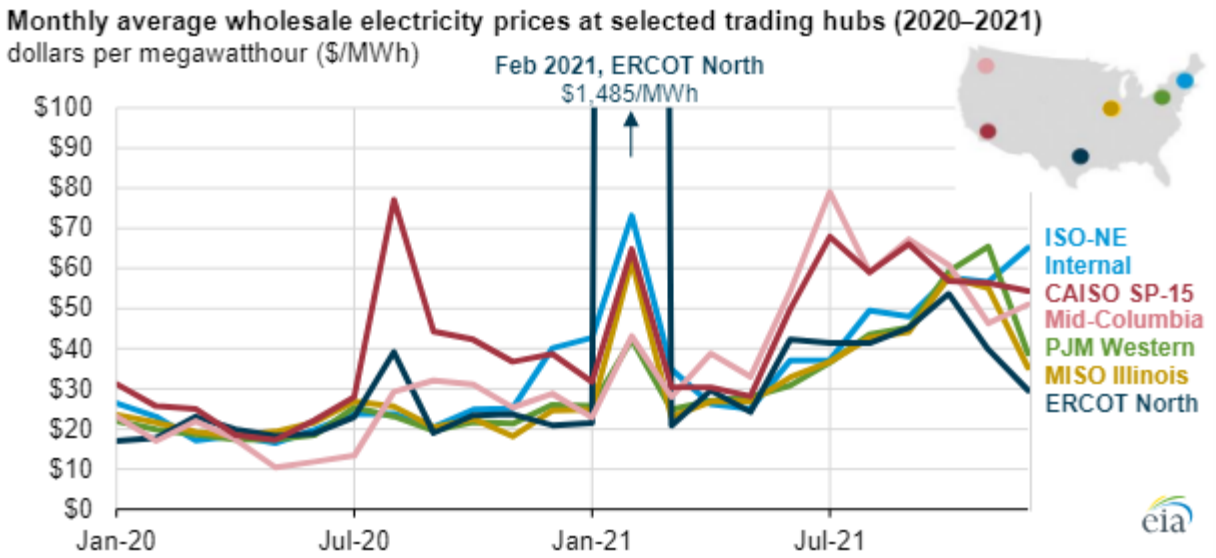
Source: State public utility commissions (2017)*

Source: https://www.epa.gov/green-power-markets/power-market-structure

Energy Markets

- In restructured energy markets utilities determine the mix of cost of resources that they use to generate and deliver energy, with approval from state public utility commissions.

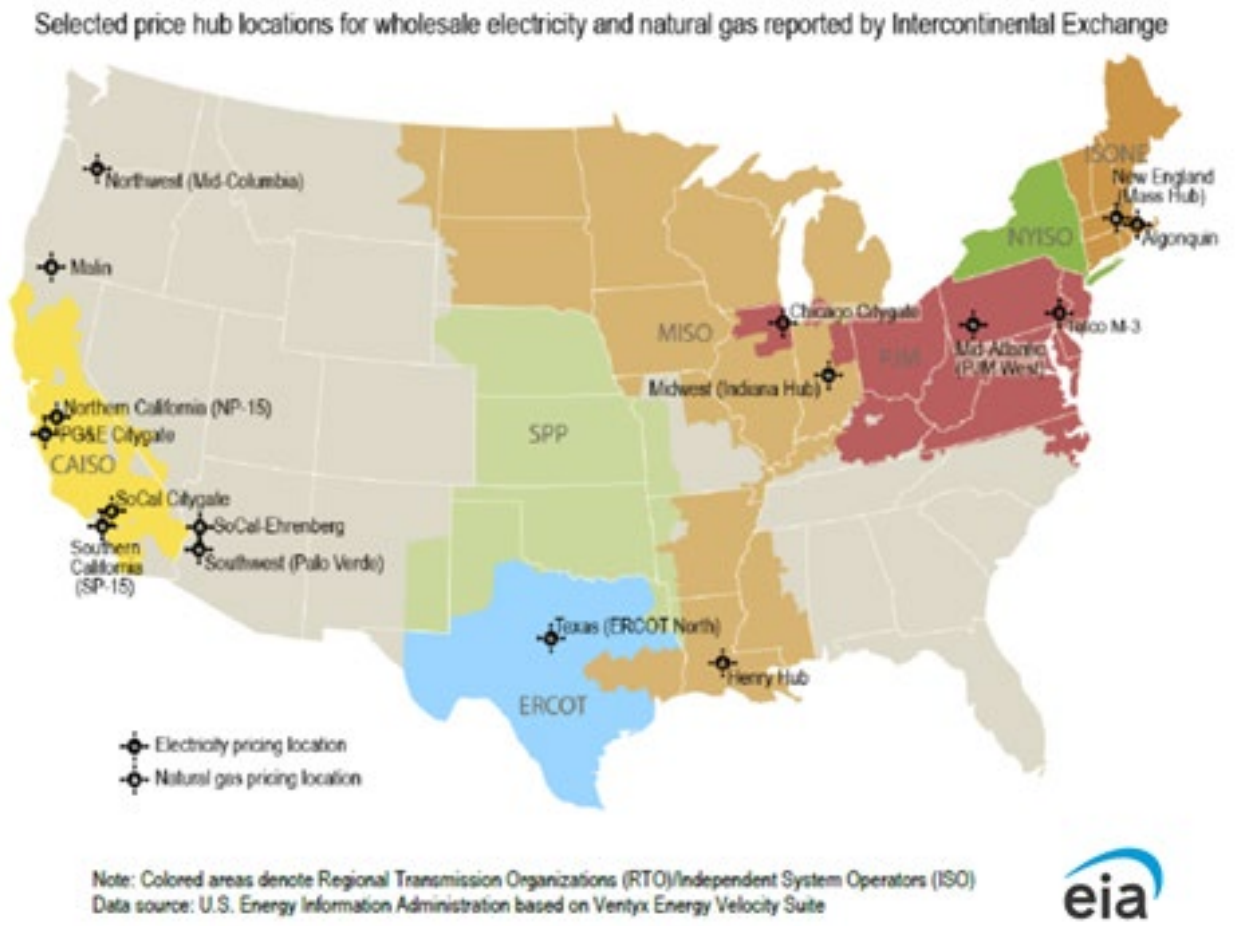
- In energy choice markets, wholesale energy markets help set prices of energy costs. Wholesale energy markets are set by market rules and operated under regulation from FERC and other entities



https://www.eia.gov/todayinenergy/detail.php?id=50798

Understanding Energy Markets

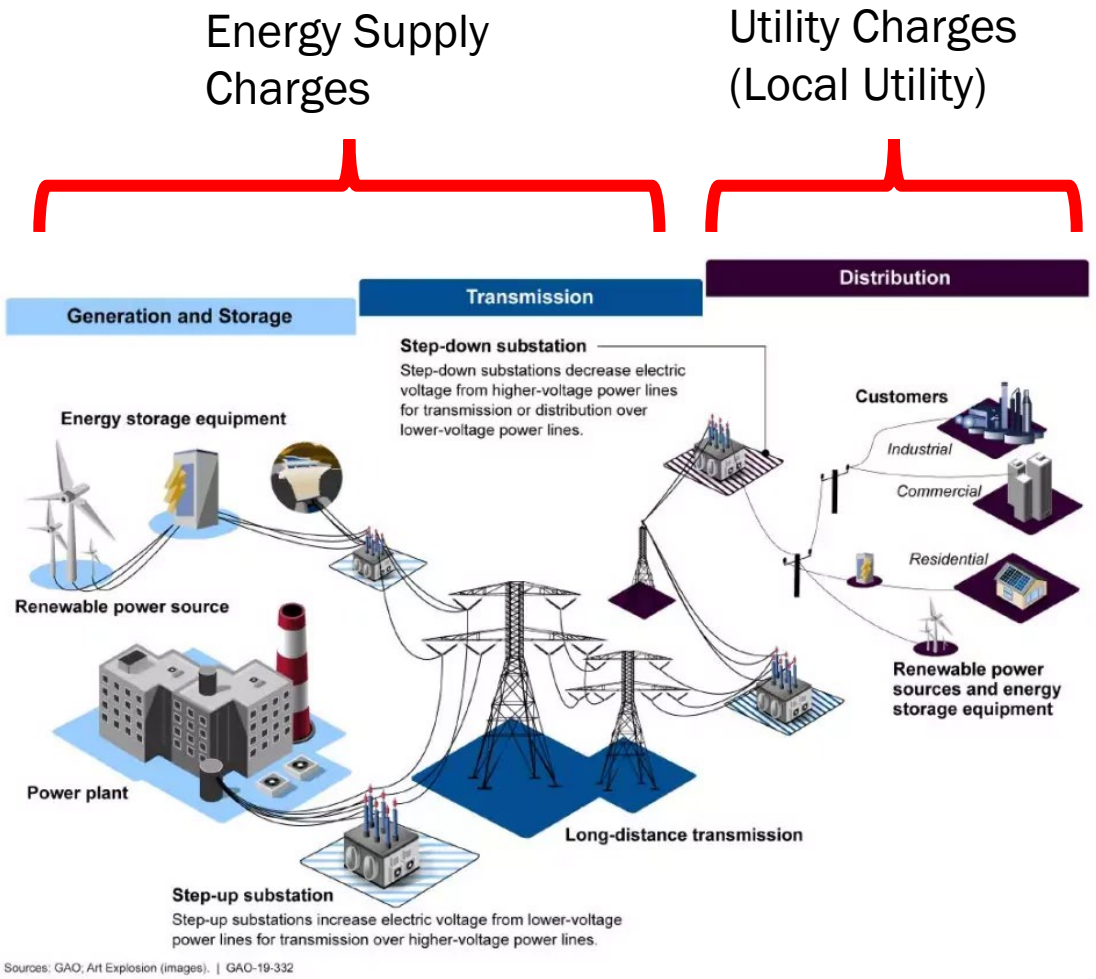
- National Prices for electricity and natural gas markets are set at specific locations
- Depending on the commodity and location, the market prices for energy will differ



https://www.eia.gov/electricity/wholesale/

Electricity Markets

- There are three major systems in the electricity system. (generation, transmission and distribution)
- Depending on where you are located, you may see charges associated with distribution, separate from generation and transmission (typically called energy supply).
- In retail electricity choice locations (next slide), you can determine how you purchase electricity supply.



https://www.gao.gov/blog/securing-u.s.-electricity-grid-cyberattacks

Electricity Markets

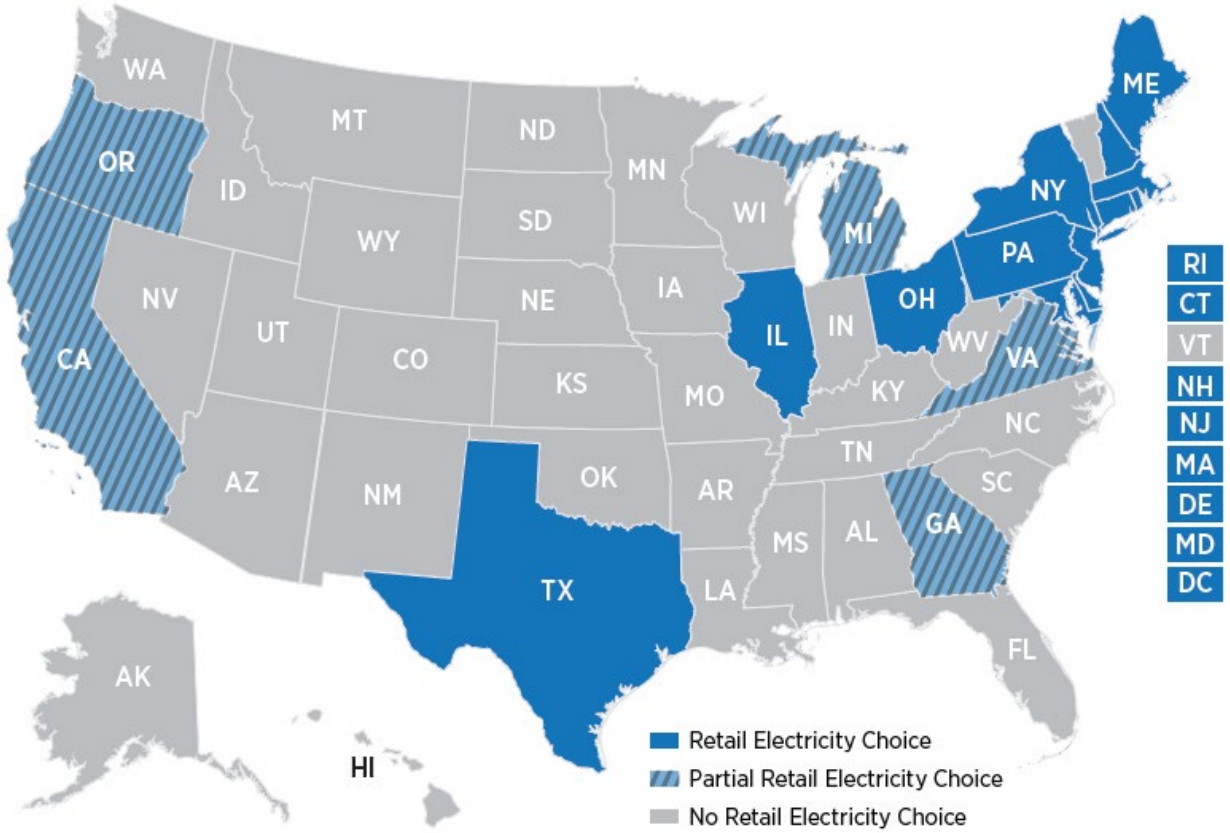


Figure 1. States with retail electricity choice

Source: State public utility commissions (2017)*

Source: https://www.epa.gov/green-power-markets/power-market-structure

Electricity Markets

States with Vertically Integrated Utilities

- Customers must pay all parts (Distribution, Transmission, Generation) to the same utility

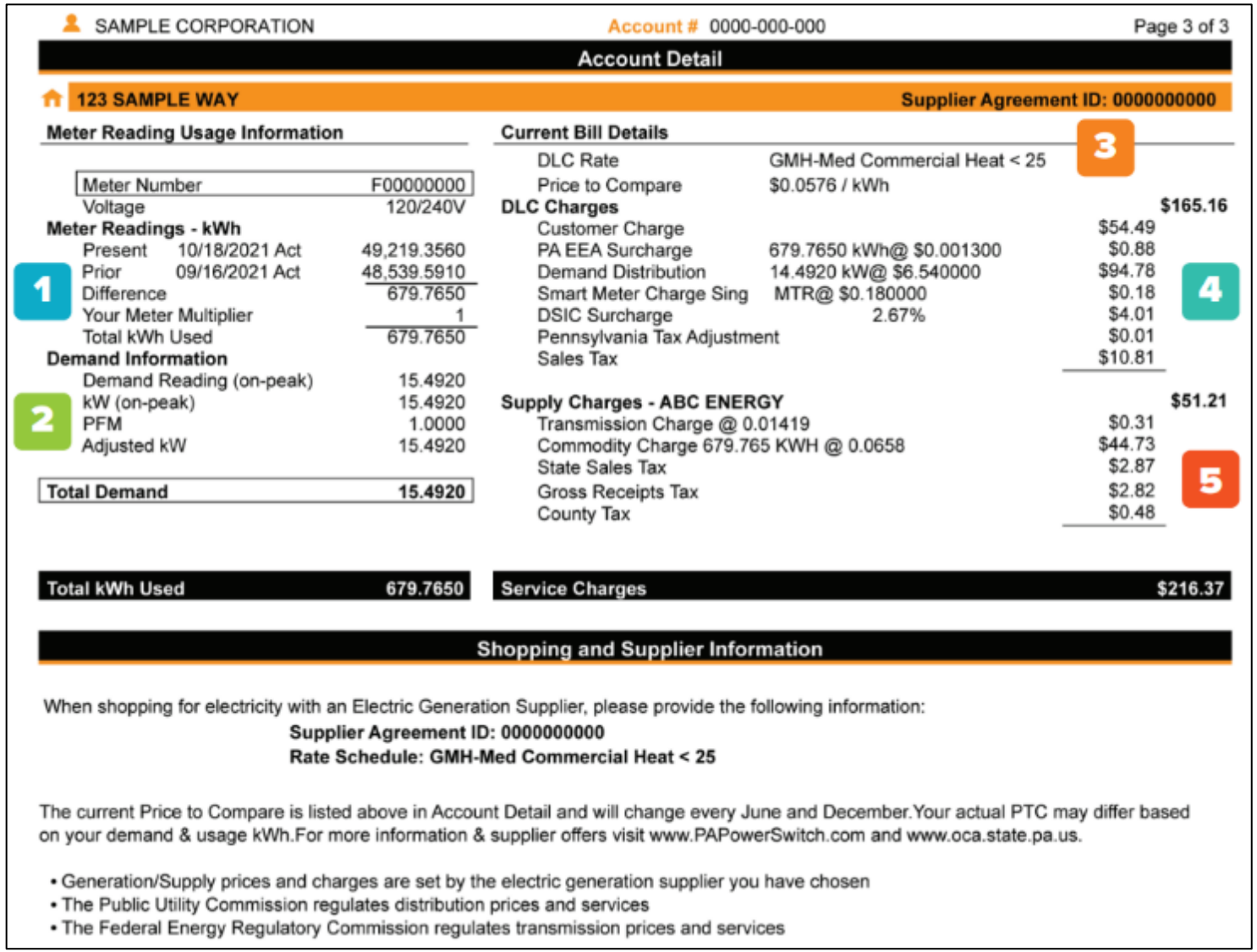
Partially Deregulated Electricity Market State

- Some customer classes can purchase electricity supply separately.

Electricity Choice States

- Costs associated with distributions system are born by your local utility.
- All customer classes can purchase electricity supply separately, if they opt not to, they will be supplied by the local electric utility.

Billing Detail Example – Duquesne Light Co.



SAMPLE CORPORATION Account # 0000-000-000 Page 3 of 3

Account Detail

123 SAMPLE WAY **Supplier Agreement ID: 0000000000**

Meter Reading Usage Information

Meter Number		F00000000
Voltage		120/240V
Meter Readings - kWh		
Present	10/18/2021 Act	49,219.3560
Prior	09/16/2021 Act	48,539.5910
Difference		679.7650
Your Meter Multiplier		1
Total kWh Used		679.7650
Demand Information		
Demand Reading (on-peak)		15.4920
kW (on-peak)		15.4920
PFM		1.0000
Adjusted kW		15.4920
Total Demand		**15.4920**

Current Bill Details

DLC Rate	GMH-Med Commercial Heat < 25	
Price to Compare	$0.0576 / kWh	
DLC Charges		**$165.16**
Customer Charge		$54.49
PA EEA Surcharge	679.7650 kWh@ $0.001300	$0.88
Demand Distribution	14.4920 kW@ $6.540000	$94.78
Smart Meter Charge Sing	MTR@ $0.180000	$0.18
DSIC Surcharge	2.67%	$4.01
Pennsylvania Tax Adjustment		$0.01
Sales Tax		$10.81
Supply Charges - ABC ENERGY		**$51.21**
Transmission Charge @ 0.01419		$0.31
Commodity Charge 679.765 KWH @ 0.0658		$44.73
State Sales Tax		$2.87
Gross Receipts Tax		$2.82
County Tax		$0.48

Total kWh Used 679.7650 **Service Charges** $216.37

Shopping and Supplier Information

When shopping for electricity with an Electric Generation Supplier, please provide the following information:
Supplier Agreement ID: 0000000000
Rate Schedule: GMH-Med Commercial Heat < 25

The current Price to Compare is listed above in Account Detail and will change every June and December.Your actual PTC may differ based on your demand & usage kWh.For more information & supplier offers visit www.PAPowerSwitch.com and www.oca.state.pa.us.

- Generation/Supply prices and charges are set by the electric generation supplier you have chosen
- The Public Utility Commission regulates distribution prices and services
- The Federal Energy Regulatory Commission regulates transmission prices and services

1 2 3 4 5

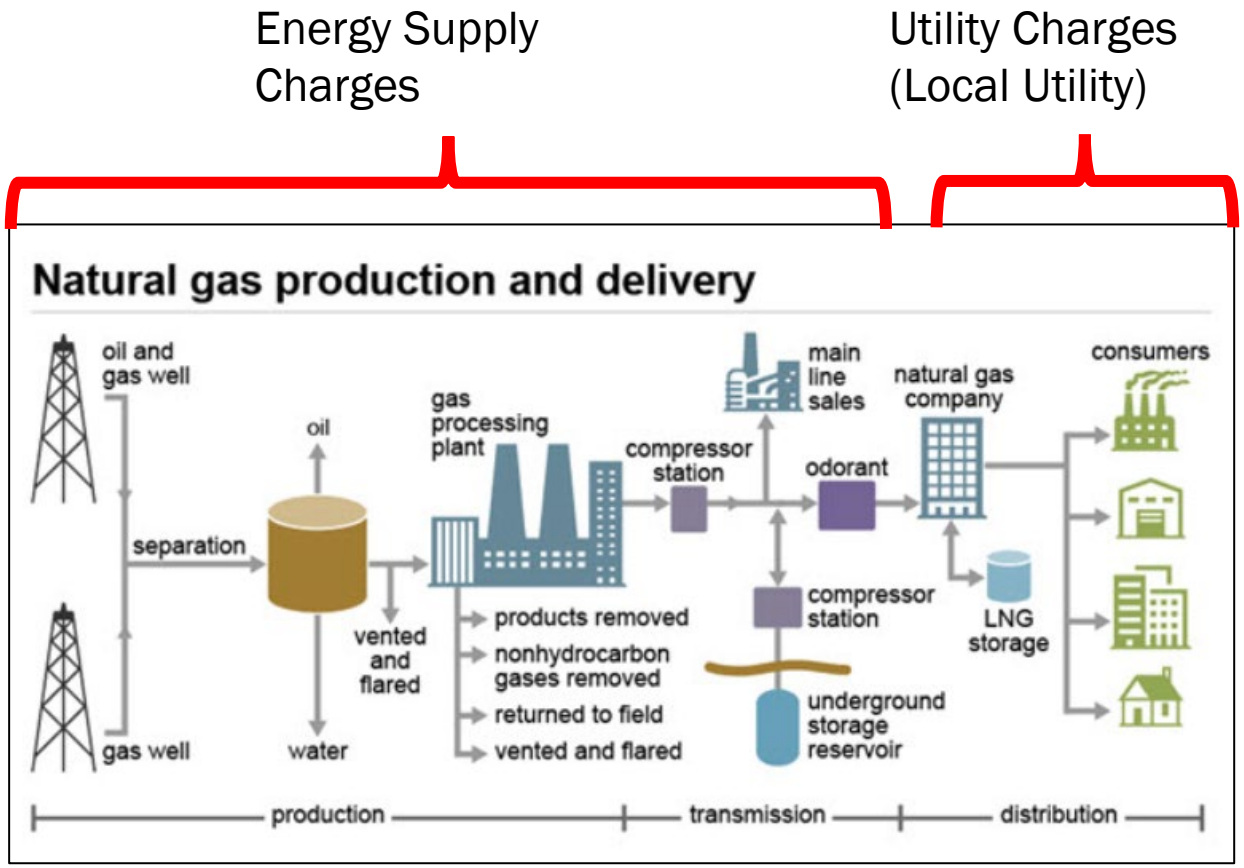
Energy Supply Charges

Utility Charges (Local Utility)

Source: https://www.duquesnelight.com/docs/default-source/pdf-library/7137_dlc_bill_commercial_redesignjan62021.pdf

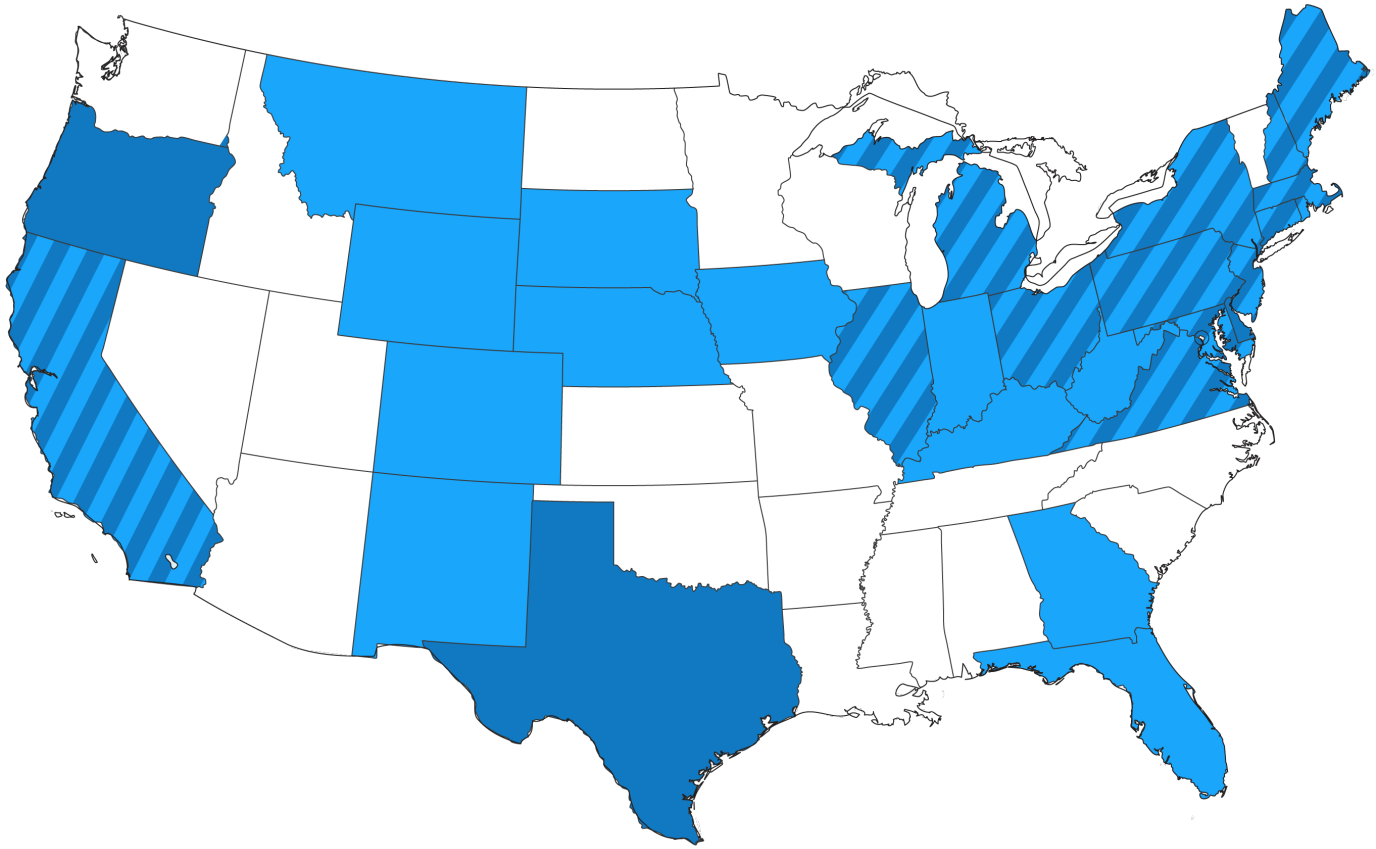
Natural Gas Markets

- There are three major systems in the electricity system (production, transmission and distribution)
- Depending on where you are located, you may see charges associated with distribution, separate from production and transmission (energy supply).
- In retail natural gas choice locations (next slide), you can determine where you purchase supply.



https://www.energy.gov/fecm/natural-gas-technologies-rd

Natural Gas Markets



https://www.electricchoice.com/map-deregulated-energy-markets/

Natural Gas Markets

States with Vertically Integrated Utilities

- Customers must pay all parts (Distribution, Transmission, Production) to the same utility

Natural Gas Choice States

- Costs associated with distributions system are born by your local utility.
- Customer classes can purchase natural gas supply separately, if they opt not to, they will be supplied by the local gas utility.

Fuel Markets

- Fuel markets are not set or governed by regulators (although they can influence them)
- Most organizations participate in the retail market with regional supplier (or a group of suppliers) who pass along prices set from the global upstream fuel markets
- Fuel purchases (whether for vehicles or heating oil) can still use many of the same techniques to manage costs.

Renewable Portfolio Standards

- Renewable portfolio standards (RPS), also referred to as clean or renewable electricity standards (CES and RES), are policies designed to increase the use of renewable energy sources for electricity generation.

- These policies require or encourage electricity suppliers to provide their customers with a stated minimum share of electricity from eligible renewable resources.

- Policies vary significantly by state (next slide) and costs may be bundled into your utility costs or separate depending on how you procure energy

Renewable Energy Procurement

Energy procurement and renewable energy procurement are increasingly connected as organizations seek to manage costs, clean their energy sources and meet a range of energy and climate goals.

- Renewable energy markets are unique, but connected to energy markets
- Renewable energy can be part of a cost management strategy
- Both onsite and offsite renewable energy projects are available to schools

Renewable Energy Credits

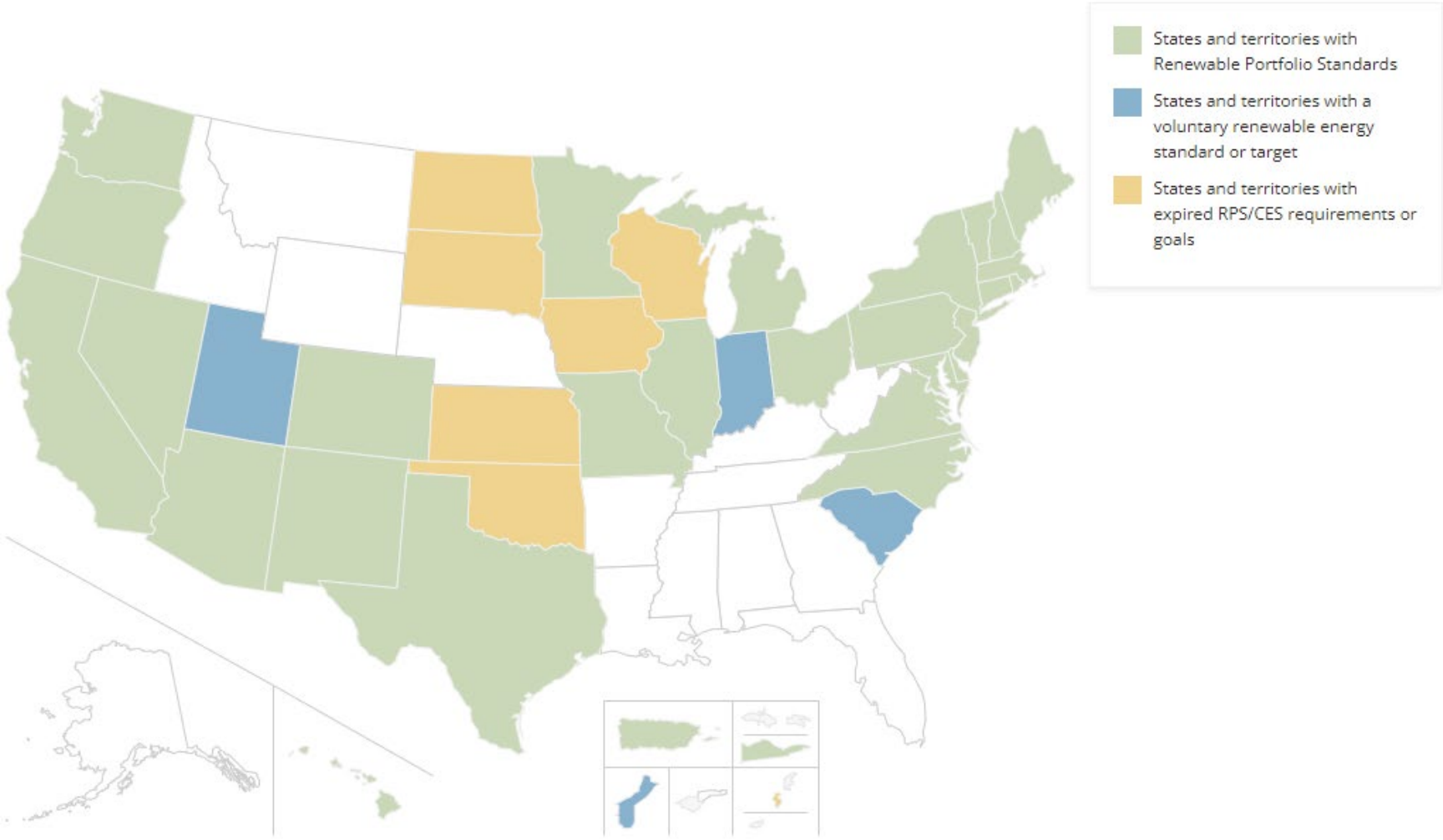
Renewable Electricity Project

1 MWh of electricity

1 Renewable Energy Credit (REC)

- For each unit of electricity generated from renewable sources, a Renewable Energy Credit (REC) can be generated
- RECs also can include attributes such as resource type (solar, wind, etc), location (region, state or locality), and vintage (year produced)
- Based on their attributes, they may have more or less value

Renewable Portfolio Standards



Source: https://www.ncsl.org/energy/state-renewable-portfolio-standards-and-goals

Renewable Energy Procurement

- RECs and other forms of Renewable Energy can be bought and sold based on organizational goals and needs.
  - *Example: An organization could sell RECs from their own solar array to help pay for the project, or an organization could purchase RECs to support their climate goals*

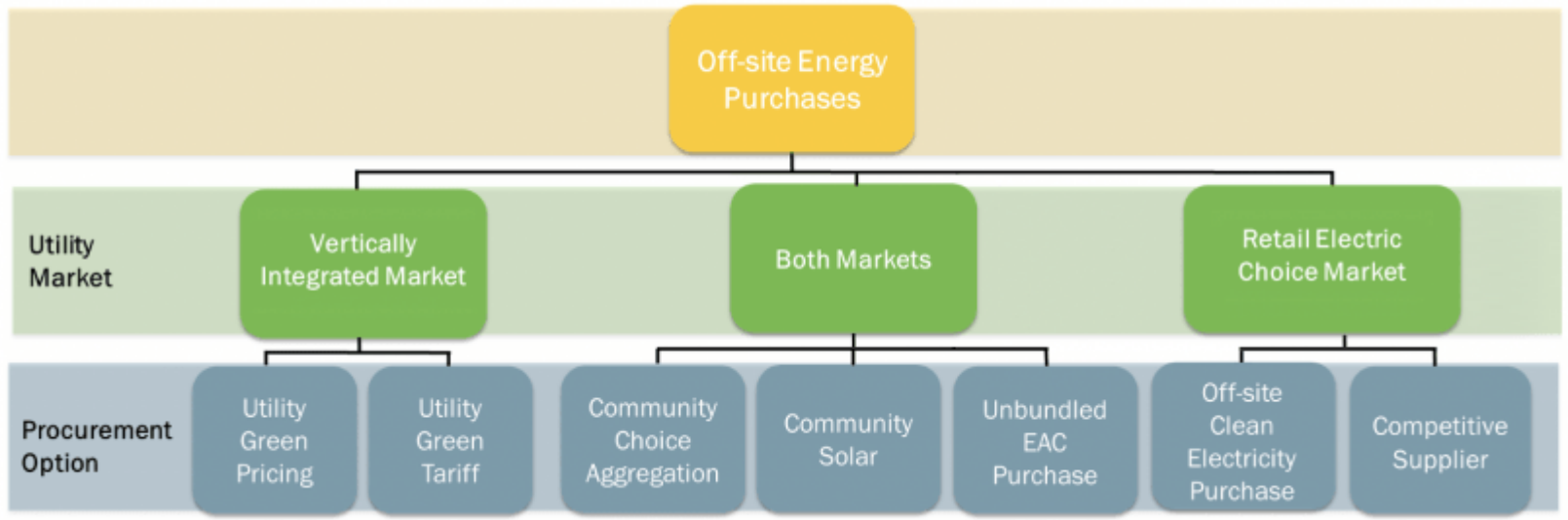
- Organizations procure renewable energy for a range of different reasons
  - To support climate or sustainability goals or efforts
  - To support compliance needs as required to meet the state RPS
  - As part of their procurement goals to maintain price stability

- Renewable Energy and be purchase with our without
  - Bundled- RECs attached to the project
  - Unbundled- RECs separate from the project
  - Swaps- project RECs are replaced with non-project RECs

Renewable Energy Purchasing Options

Range of renewable energy purchasing types and contract vehicles in addition or as part of a managed energy procurement strategy

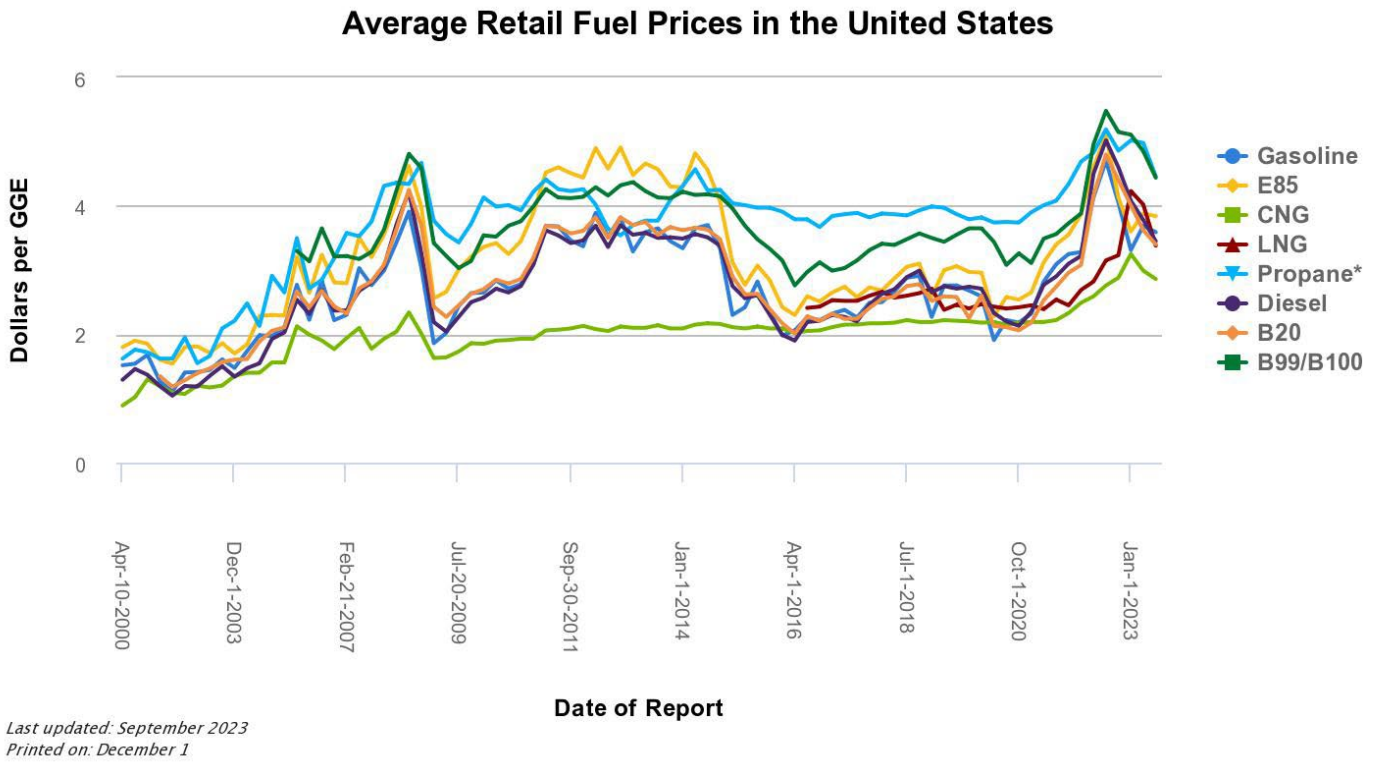
- Onsite Solar (and/or storage)
- Offsite Renewables
- Unbundled RECs



https://www.energy.gov/femp/federal-site-clean-energy-procurement-options

Renewable Fuels

- Range of commodity renewable and clean fuels available
- Purchased to support climate or sustainability initiatives, or as part of infrastructure and vehicle planning
- Many similarities with other energy markets, but usually through specialized vendors



Source: https://afdc.energy.gov/fuels/prices.html

Energy Procurement Strategies

- Energy procurement options are vast, but major approaches include:
  - Fixed price contracts which hold a cost stable regardless of how the market changes
  - Partially fixed price contracts (sometimes called Block and index) which holds a portion of the costs stable (a percentage set by you), while allowing the other portions to vary according to energy markets.
  - Variable price contracts (sometimes called index contract) which allow organizations to have full market exposure.

Depending on the goals you have for energy procurement, and how sophisticated you plan on managing energy procurement, one approach may be more favorable.

Energy Procurement Strategies

Fixed Price Contracts

Advantages:

- Price stability - supports budgeting and planning)
- Simplified procurement processes

Disadvantages

- Long term market price risk- if the fixed price could end up being above the market rate, adding costs to the organization
- Lack of flexibility- difficult to adjust the price after negotiation

Source: https://bestpracticeenergy.com/2020/03/31/purchasing-strategies-made-for-your-business/

Energy Procurement Strategies

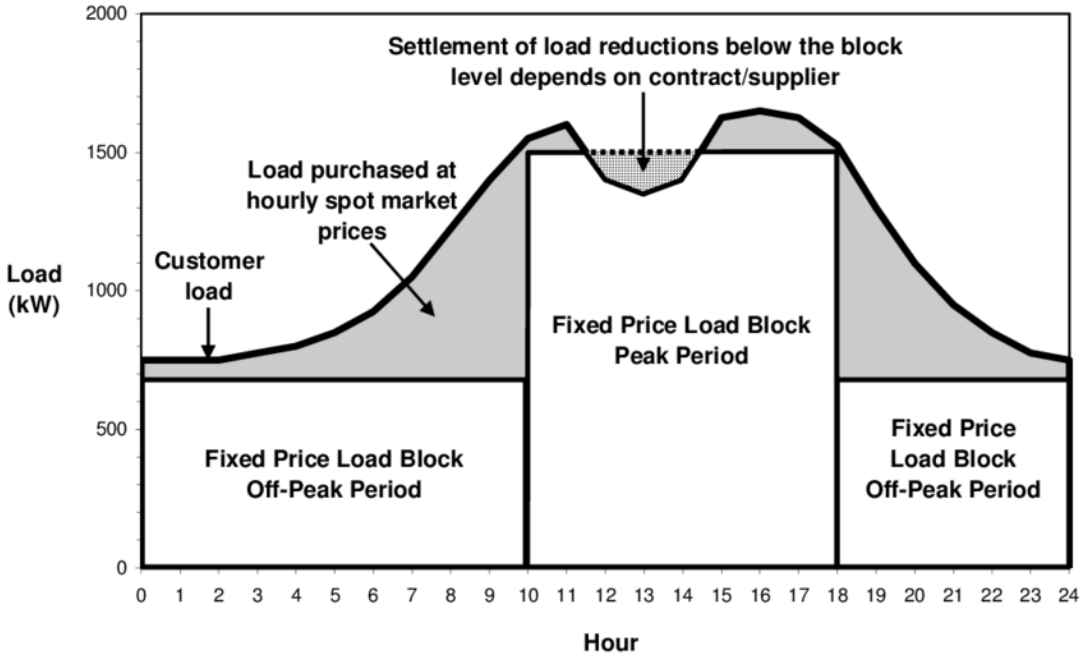
Partially Fixed Price Contracts

Advantages:

- Price flexibility - supports budgeting and planning, but wit less certainty
- Protection against long term price volatility- energy costs will be reduced with any long-term energy price reduction
- Can have a more complicated procurement processes

Disadvantages

- Ongoing management is required
- Spot market price risk- if the fixed price could end up being above the market rate, adding costs to the organization
- Less predictable energy costs



Source: https://www.researchgate.net/publication/237390612_Killing_Two_Birds_with_One_Stone_Can_Real-Time_Pricing_SupportRetail_Competition_and_Demand_Response

Energy Procurement Strategies

Variable Price Contracts

Advantages:

- Can result in the lowest Prices if implemented over a long period of time
- Low Management

Disadvantages

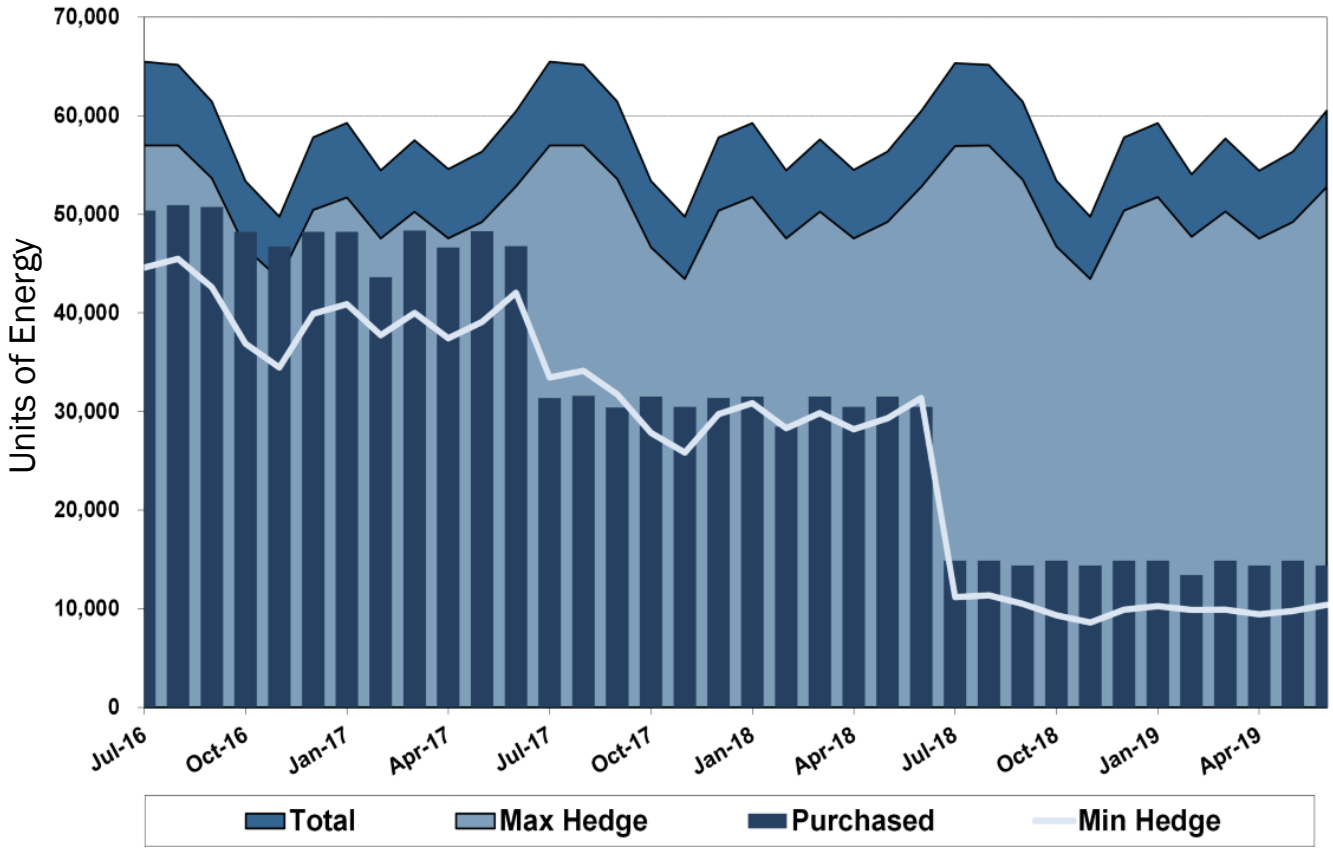
- High risk and uncertainty on energy costs
- Challenging to budget for and forecast long term planning
- Less predictable energy costs

Source: https://bestpracticeenergy.com/2020/03/31/purchasing-strategies-made-for-your-business/

Energy Procurement Strategies

- Chart shows a sample managed portfolio using a partially fixed rate strategy for procurement
- In this example, a portion of energy is purchased for three years. The closest year has more purchases, while the later years have less.
- Using this approach, if energy prices were to spike, the organization would have multiple years to absorb the costs. If prices were to drop, the organization would capture that value on the remaining energy (indexed amount) and in purchases made.

An example energy procurement strategy with hedging



Source: ICF consulting

Energy Procurement Goals

Types

- Cost - Absolute or Cost Intensity
- Renewable (or Carbon Free) Energy- percentage or load matching
- Carbon Reduction Goals- absolute or intensity

Reasoning

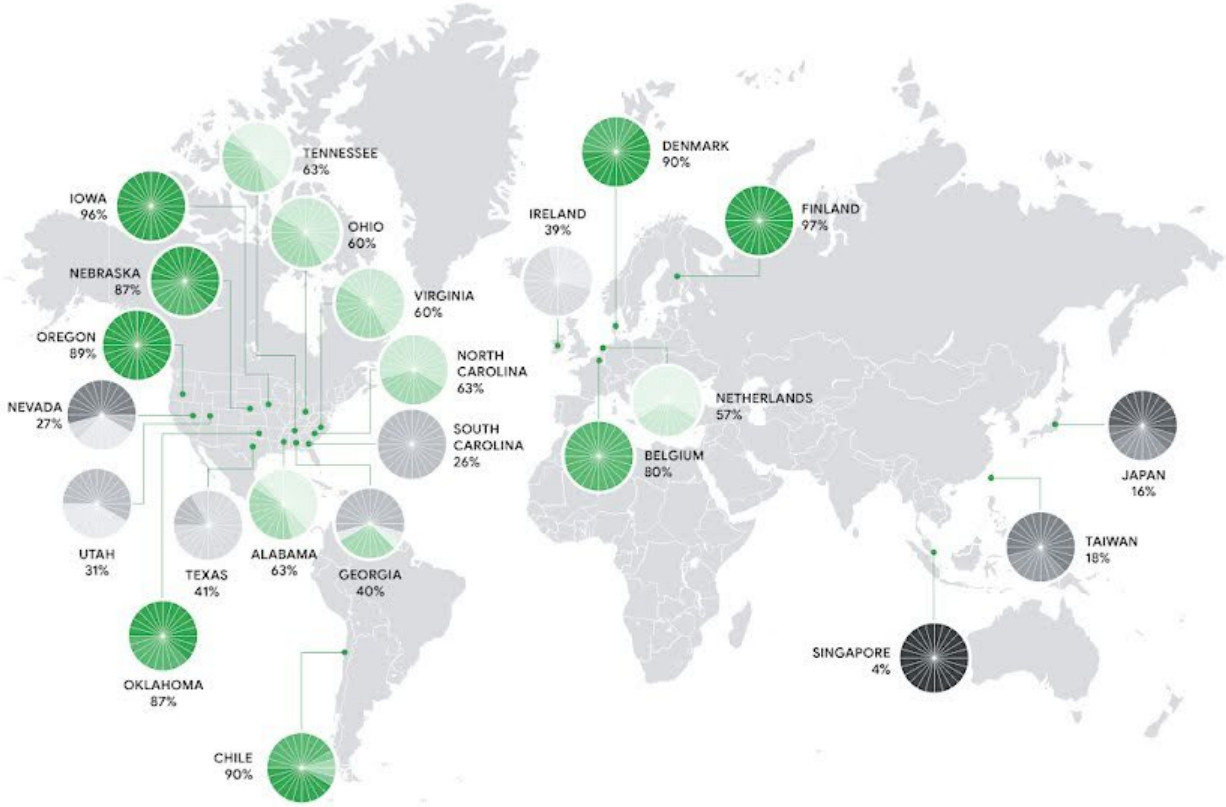
- Climate Leadership
- Energy Independence
- Cost Strategy

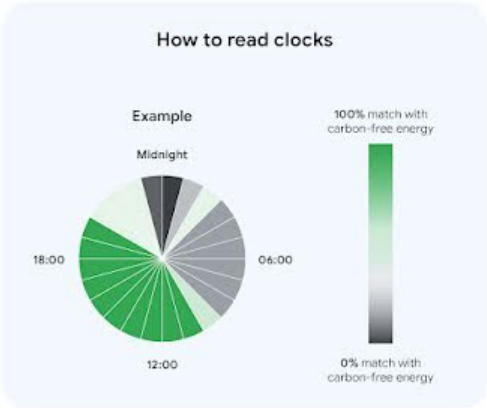
Organizational Example

Google's Goal of Operating on 24/7 Carbon-Free Energy by 2030.

Global data center carbon-free energy map

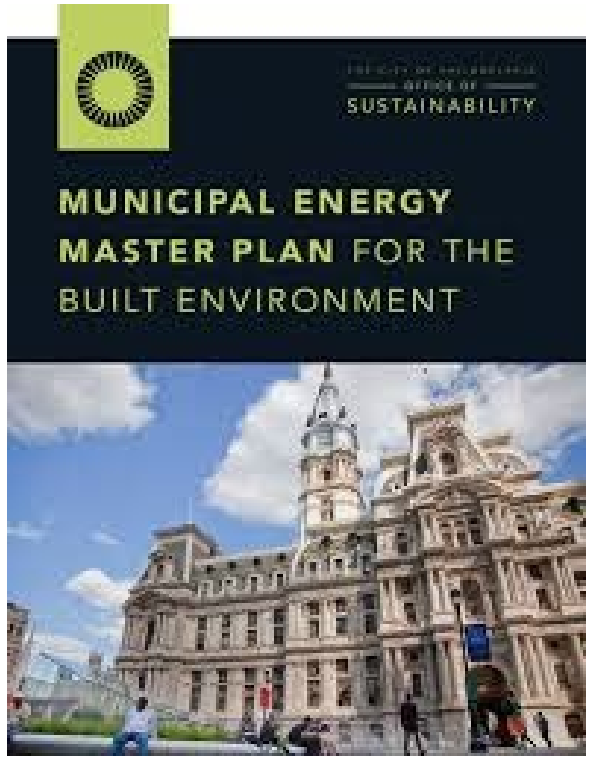
In 2022, Google reached 64% carbon-free energy globally on an hourly basis. This performance varied widely by region, with seven of our regions achieving at least 90% carbon-free energy, and thirteen achieving at least 85%.





https://sustainability.google/progress/energy/

Organizational Example



Reduce greenhouse gas emissions from the City's built environment 50 percent by 2030

Reduce the City's built environment energy use 20 percent by 2030

Generate or purchase 100 percent of all electricity for the City's built environment from renewable resources by 2030

Maintain or reduce the City's built environment cost of energy

https://www.phila.gov/media/20170927092513/MunicipalEnergyMasterPlan.pdf

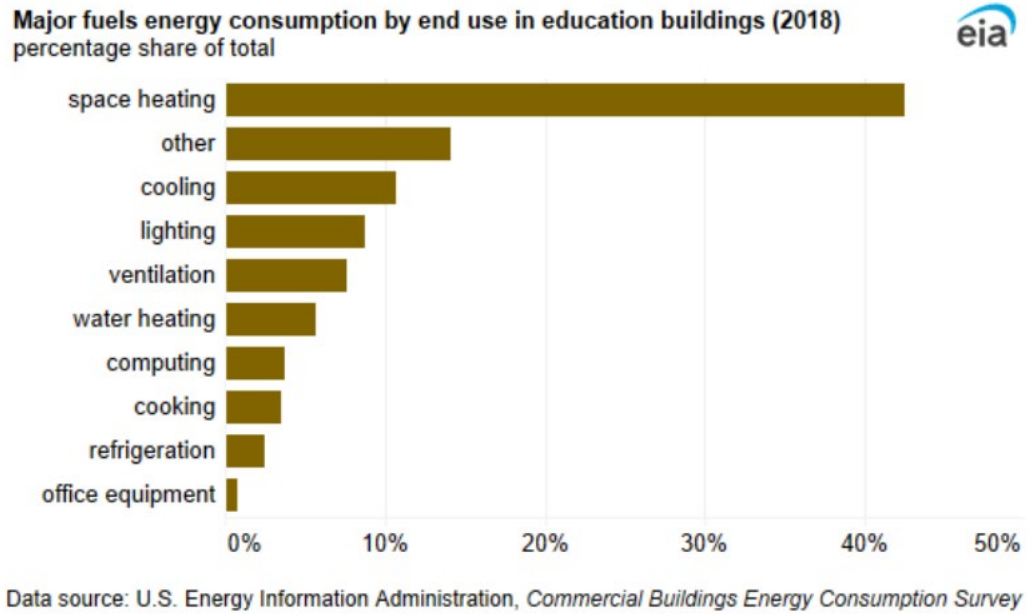
Part 2 Energy Project Procurement

Basics of Building Energy Systems

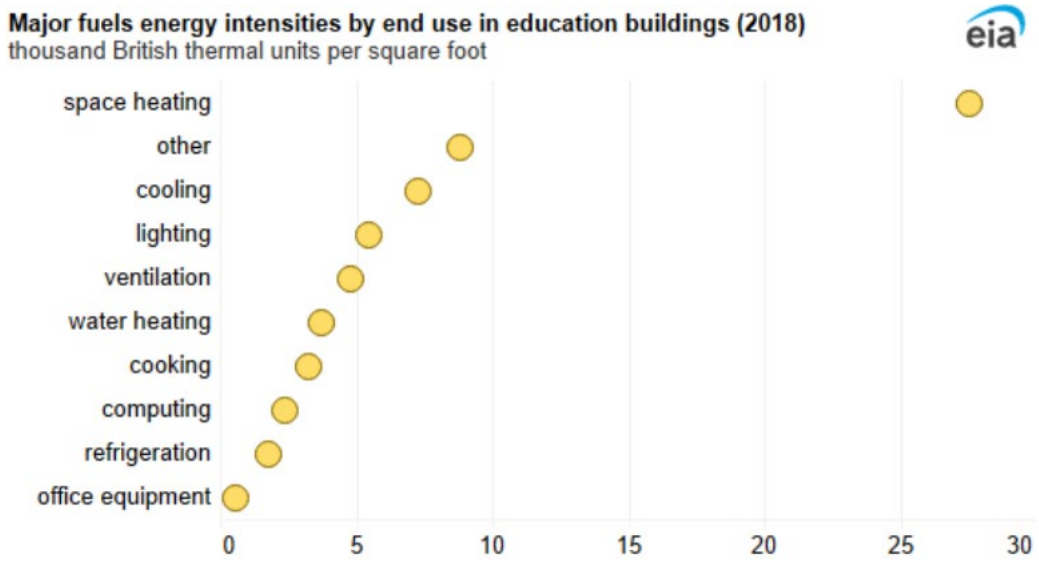
Pop Quiz

- What is the primary energy end use in your schools?
  - Space heating
  - Space cooling
  - Lighting
  - Ventilation
  - Plug & Process Loads
  - Other
  - I don’t know

Energy Consumption by End Use



Data source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*



Data source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*

Source: https://www.eia.gov/consumption/commercial/pba/education.php

Pop Quiz

How are your schools heated (primarily)?

- Packaged rooftop units (RTUs)
- Boilers
- Furnaces
- Heat pumps
- Other
- I don't know

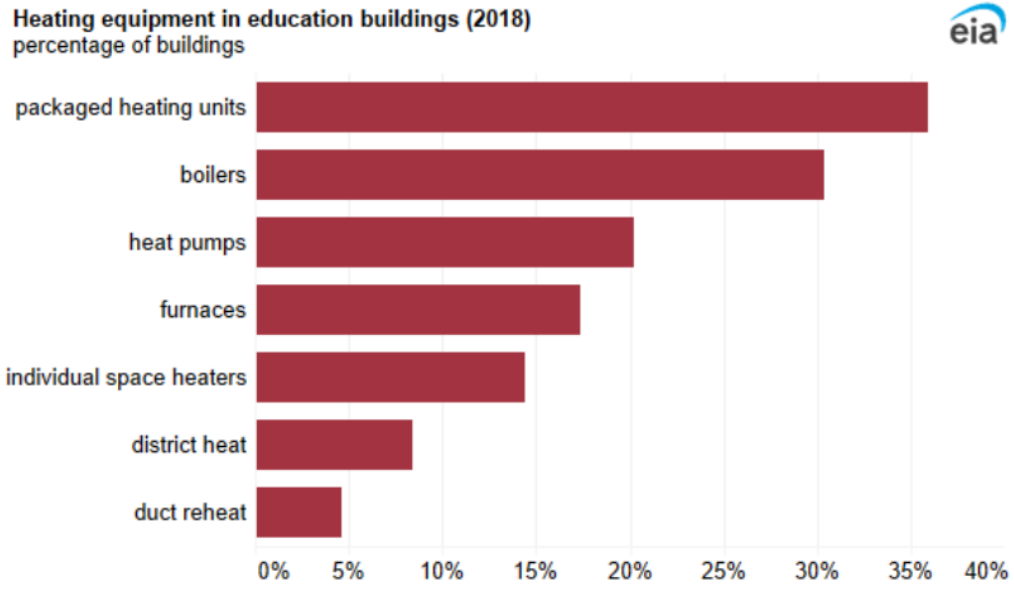
How are your schools cooled (primarily)?

- Packaged rooftop units (RTUs)
- Central air conditioners (“residential style”)
- Window units
- Heat pumps
- Chillers
- No cooling
- I don’t know

Heating & Cooling Equipment

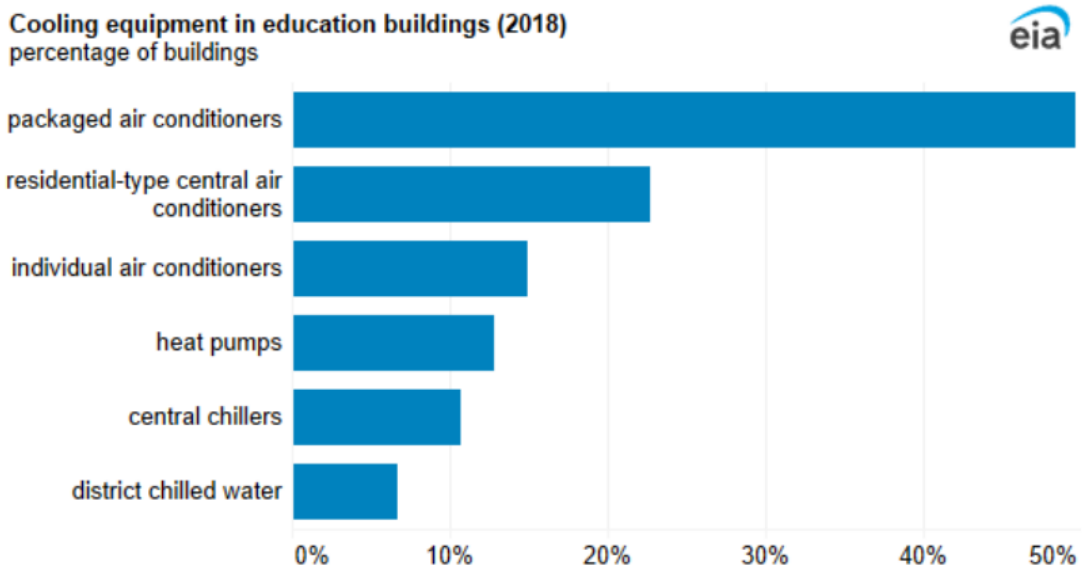
INSIDE EDUCATION BUILDINGS

Packaged heating units were the most common heating equipment and were used in 36% of education buildings. Boilers were used in 30% of education buildings, and heat pumps were used in 20% of education buildings.



Data source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*
Note: More than one type of heating equipment may apply.

Packaged air conditioners cooled one-half of education buildings in 2018. The second-most-used cooling equipment was residential-type air conditioners (23%).



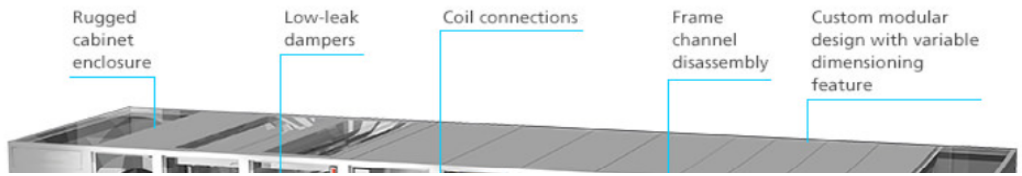
Data source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*
Note: More than one type of cooling equipment may apply.

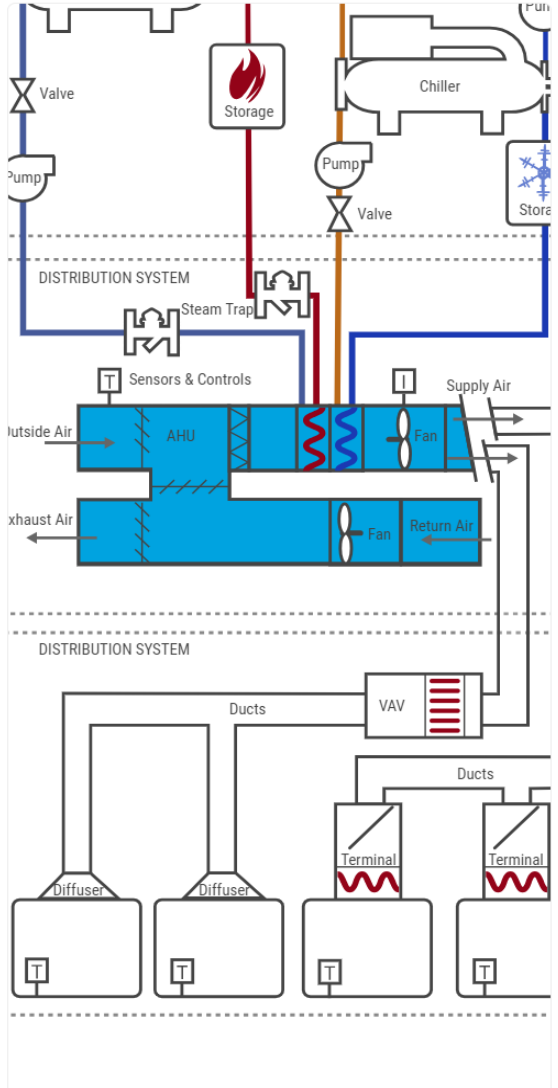
Source: https://www.eia.gov/consumption/commercial/pba/education.php

Air Handling Units: General Description and Uses

Air handling units (AHUs) are devices that transfer heat between water/refrigerant and air and regulate the air supply throughout a building. The hot/cold water coming from the central plant passes through coils. The heating/cooling can also be provided directly by the refrigerant in a direct expansion (DX) air-conditioning system.

A blow/draw through fan blows/draws air over the coils, then circulates it through the building ducts. The AHU has an opening for return air (recirculated from the building) and outside air (fresh air taken in for ventilation purposes). An important component of the AHU is the filter. Commonly used filters include fiberglass; polyester; pleated, high efficiency particulate (HEPA) and washable air filters. Filter effectiveness is rated based on the minimum energy reporting value (MERV) ranging from 1 to 16. The higher the MERV rating, the more effective the filter, i.e., it can catch finer particles. Filters with higher MERV ratings have higher pressure drops compared to those with lower MERV ratings; however, not all high-MERV filters have high pressure drops. MERV ratings ≥ are efficient for capturing airborne viruses. Ultraviolet (UV) energy, especially UV-C energy, can be an effective method to inactivate viral, bacterial, and fungal organisms to clean the indoor air and AHU coils. UV systems should be carefully designed, installed, and maintained to avoid human exposure and proper performance.





HVAC Resource Map: https://hvacresourcemap.nrel.gov/

Lighting & Plug Loads

Lighting

- High-efficiency Fluorescents
- Solid State (LEDs)
- Networked Lighting and Lighting Controls

Source: Better Buildings Lighting Systems Team

Plug Loads

- Advanced Power Strips
- Computer Power Management
- Appliances & Kitchen Equipment
- Vending Machines Controls
- Occupancy Sensors

Source: Better Buildings Plug & Process Loads Team

Plug Load Utility Incentives Tracker

Tracks incentives by utility across the country, including a link to the utility's offering

PPL Strategy Definitions	
Appliances and Kitchen Equipment	*Procurement of plug load equipment, that is often ENERGY STAR certified, that reduces overall plug load energy usage in a space*
APS	*Unlike typical power strips, Advanced Power Strips (APSs) have increased functionality to combat PPLs. They have outlets that are designated as primary/master outlets, seconda*
Computer Power Management	*Installation of software on PCs to enable a centralized, server-level control of power management settings*
Occupancy Sensor	*Occupancy sensors can be installed specifically for the purpose of managing and controlling plug load energy usage*
Vending Machine Controller	*Vending Machine control devices that use a motion sensor to automatically power down the vending machine when the area around it is unoccupied, and power up the machine w*
Whole Building	*These programs allow you to create your own plug load savings strategies and receive a custom incentive if it meets the utility's requirements*
Type of Incentive	
Custom Rebate	*Incentive is offered by the reduction of energy consumption due to new measures*
Prescriptive Rebate	*Incentive is based on the installation of a specific device or software*
Upstream Rebate	*Incentive is offered directly from the vendor/manufacturer*

Incentive Sponsor	State	Rebate/Incentiv	Applica	Type of Incer	PPL Strategy	URL	Details
Empire Arkansas	AR	$90/unit	Commerci	Prescriptive Reb	Vending Machine Controlle	http://empirearkansas.programprocessing.com/content/prescrip	Occupancy controls for Refrige
Empire Arkansas	AR	$90/unit	Commerci	Prescriptive Reb	Vending Machine Controlle	http://empirearkansas.programprocessing.com/content/prescrip	Occupancy controls for Refrige
Empire Arkansas	AR	$40/unit	Commerci	Prescriptive Reb	Vending Machine Controlle	http://empirearkansas.programprocessing.com/content/prescrip	Occupancy controls for Non-ref
Empire Arkansas	AR	$145/unit	Commerci	Prescriptive Reb	Vending Machine Controlle	http://empirearkansas.programprocessing.com/content/prescrip	Evaporative fan control for walk
Entergy Arkansas	AR	$0.10/kWh	Commerci	Custom Rebate	Computer Power Manager	http://www.entergy-arkansas.com/your_business/save_money/I	Up to 100% of cost if the mana
Arizona Public Service Company (APS)	AZ	Varies	Commerci	Prescriptive Reb	Whole Building	https://www.aps.com/-/media/APS/APSCOM-PDFs/Business/S	Contact program for more infor
Arizona Public Service Company (APS)	AZ	$8/computer	Commerci	Prescriptive Reb	Computer Power Manager	https://www.aps.com/-/media/APS/APSCOM-PDFs/Business/S	CPM Software
Arizona Public Service Company (APS)	AZ	$100/unit	Commerci	Prescriptive Reb	Vending Machine Controlle	https://www.aps.com/-/media/APS/APSCOM-PDFs/Business/S	Beverage machine controller
Arizona Public Service Company (APS)	AZ	$50/unit	Commerci	Prescriptive Reb	Vending Machine Controlle	https://www.aps.com/-/media/APS/APSCOM-PDFs/Business/S	Snack machine controller
SRP	AZ	$100/controller	Commerci	Prescriptive Reb	Vending Machine Controlle	http://www.savewithsrpbiz.com/rebates/standardrebate.aspx	Reach-in cooler controls
SRP	AZ	$100/controller	Commerci	Prescriptive Reb	Vending Machine Controlle	http://www.savewithsrpbiz.com/rebates/standardrebate.aspx	Beverage machine controls
SRP	AZ	$40/controller	Commerci	Prescriptive Reb	Vending Machine Controlle	http://www.savewithsrpbiz.com/rebates/standardrebate.aspx	Snack machine controls
SRP	AZ	$8/PC	Commerci	Prescriptive Reb	Computer Power Manager	http://www.savewithsrpbiz.com/rebates/standardrebate.aspx	Networked PC power manager
SRP	AZ	$200/server	Commerci	Prescriptive Reb	Computer Power Manager	http://www.savewithsrpbiz.com/rebates/standardrebate.aspx	Server virtualization
SRP	AZ	$300/server	Commerci	Prescriptive Reb	Computer Power Manager	http://www.savewithsrpbiz.com/rebates/standardrebate.aspx	High-efficiency server replacem
SRP	AZ	$130/unit	Commerci	Prescriptive Reb	Vending Machine Controlle	http://www.savewithsrpbiz.com/rebates/standardrebate.aspx	Refrigerated beverage vending
SRP	AZ	Varies	Commerci	Prescriptive Reb	Appliances and Kitchen Eq	http://www.savewithsrpbiz.com/rebates/standardrebate.aspx	Kitchen Equipment including gri
Tucson Electric Power (TEP)	AZ	$85/controller	Commerci	Prescriptive Reb	Vending Machine Controlle	https://www.tepcommercialenergysolutions.com/projects62/Def	Vending machine controls (for S
Tucson Electric Power (TEP)	AZ	$85/controller	Commerci	Prescriptive Reb	Vending Machine Controlle	https://www.tepcommercialenergysolutions.com/projects62/Def	Vending machine controls (Beve
Tucson Electric Power (TEP)	AZ	$9/strip	Commerci	Prescriptive Reb	APS	https://www.tepcommercialenergysolutions.com/projects62/Def	Plug-load smart strips
UniSource Energy Services	AZ	$45/controller	Commerci	Prescriptive Reb	Vending Machine Controlle	https://www.uescommercialenergysolutions.com/projects62/Def	Non-Refrigerated vending mach
Unisource Energy Services	AZ	$45/controller	Commerci	Prescriptive Reb	Vending Machine Controlle	https://www.uescommercialenergysolutions.com/projects62/Def	Reach-in cooler controls
Unisource Energy Services	AZ	$45 per controller	Commerci	Prescriptive Reb	Vending Machine Controlle	https://www.uescommercialenergysolutions.com/projects62/Def	Refrigerated vending machine c
Unisource Energy Services	AZ	$5/strip	Commerci	Prescriptive Reb	APS	https://www.uescommercialenergysolutions.com/projects62/Def	Plug-load smart strip
Unisource Energy Services	AZ	$0.10/kWh	Commerci	Custom Rebate	Whole Building	https://www.uescommercialenergysolutions.com/projects62/Def	Custom measures, capped at 7
SouthWest Gas	AZ	$200/unit	Commerci	Prescriptive Reb	Appliances and Kitchen Eq	https://www.swgas.com/en/rebates-and-promotions-search-bus	EnergyStar model of commerci

Incentives

Source: Plug Load Efficiency Utility Incentives

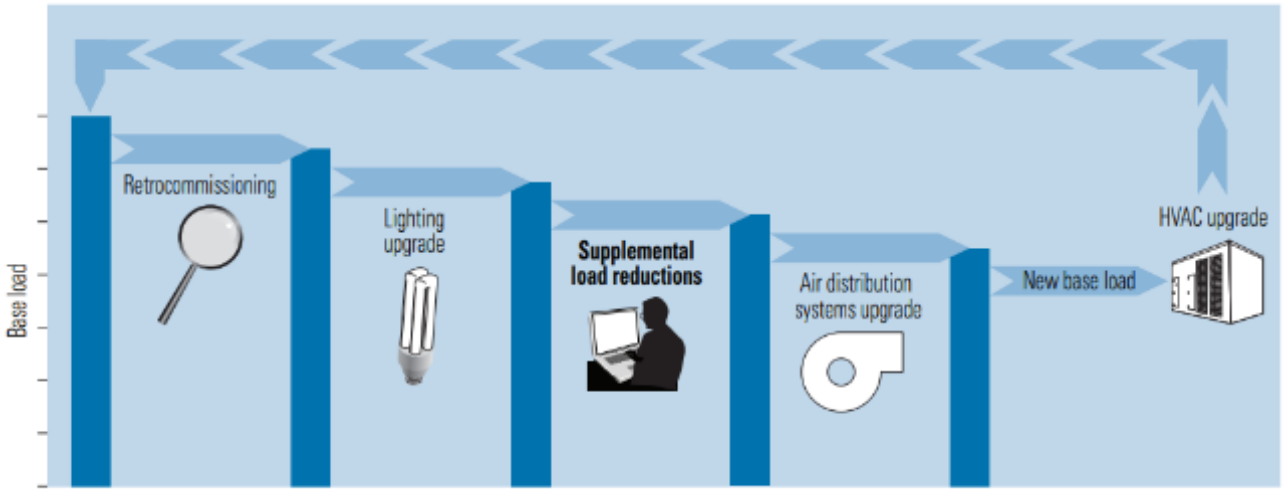
Basics of Building Energy Upgrades

Whole-Building vs. System-Level Orientation

- Building systems do not operate in isolation; changes to one system may impact others.
- Whole-building focus allows the impact of O&M and behavioral measures to be captured, in addition to equipment-level improvements.
- Bundling measures at the whole-building level may help to improve project financials (measures with shorter paybacks can offset measures with longer paybacks)

Sequencing Upgrades

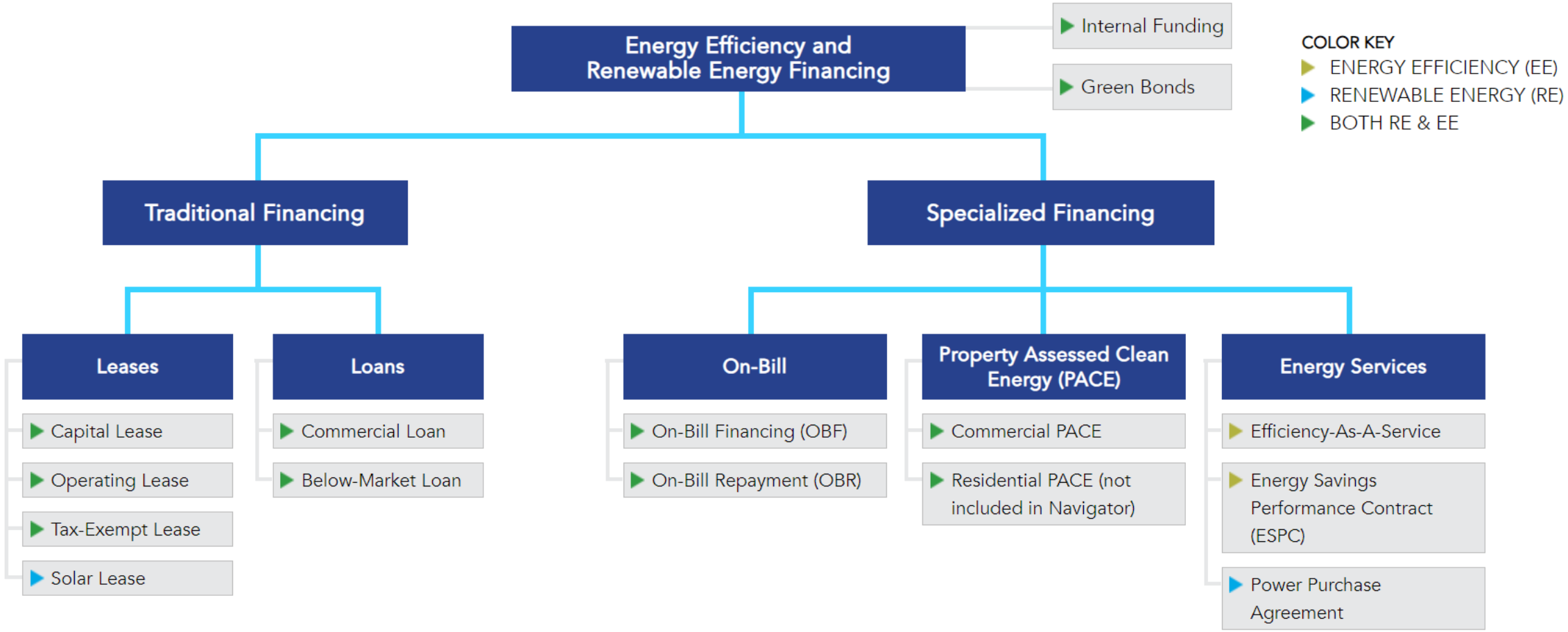
- Start small and build up.
- Emphasize the identification and elimination of unnecessary energy use before upgrading systems.
  - Especially important for key building systems that needs to be sized to the building load (e.g., boilers/furnaces, chillers, air distribution).
  - Critical if onsite renewable energy is part of your vision.



Stages of an integrated upgrade approach

Source: https://www.energystar.gov/sites/default/files/buildings/tools/EPA_BUM_Full.pdf

Financing Landscape



Source: Better Buildings Financing Navigator

Prioritizing Upgrades and Structuring Requests for Proposals

Advanced RTU Campaign: Decision Tree for RTU Replacements or Retrofits

Resources
http://www.advancedrtu.org

Preliminary Screening

What is the general condition, age, and size of each RTU?

Is the RTU a candidate for retrofit or replacement?

General Condition
Remaining Useful Service Life
Size

Initial Inventory
Building name, Space type, Age, Size, Manufacturer, Model, General condition, Maintenance history

- **Fair-Good, Over 5 years Under 7 tons**
- **Fair-Good, Over 5 years Over 7 tons**
- **Fair-Good, Under 5 years**
- **Poor**

RTU Inventory Spreadsheet

Evaluation and Analysis

What is the result of the field evaluation?

Can a replacement be combined with other energy efficiency measures?

Is the RTU properly sized?

What is the predicted energy savings and ROI for retrofit or replacement and does it meet your requirements?

- **Detailed Inventory** Controls, Usage, Features
- **Field Evaluation**
- **Retrofit Analysis**
- **Replacement Analysis** (NEW)

RTU Inventory Spreadsheet
RTU Field Evaluation Checklist
RTU Comparison Calculator
RTU Incentives Database
RTU Sizing Guidance
Case Studies

Planning and Procurement

Do you need to hire engineering support or a service company?

Which are the best RTUs for your applications?

What is the predicted energy savings and payback?

Do you need to include measurement and verification?

- no action
- no action
- yes
- no action
- yes
- **Project Planning**
- **Spec Retrofit**
- **Spec Replacement** (NEW)

Proactive RTU Business Case
RTU Sizing Guidance
RTU Incentives Database
Procurement Specifications
M&V Guidance
Case Studies

Learn more at betterbuildings.energy.gov

Prepared by the National Renewable Energy Laboratory

Source: [Business Case for Proactive Rooftop Unit (RTU) Replacement]

Identify & Estimate Costs

- Up-Front Costs
  - Design & analysis
  - Price of high-efficiency units
  - Installation costs (labor)
  - Building upgrade costs
  - Utility incentives to reduce upfront costs
- Variable Ongoing Costs
  - Adapting operations & maintenance to new equipment
  - Tax depreciation

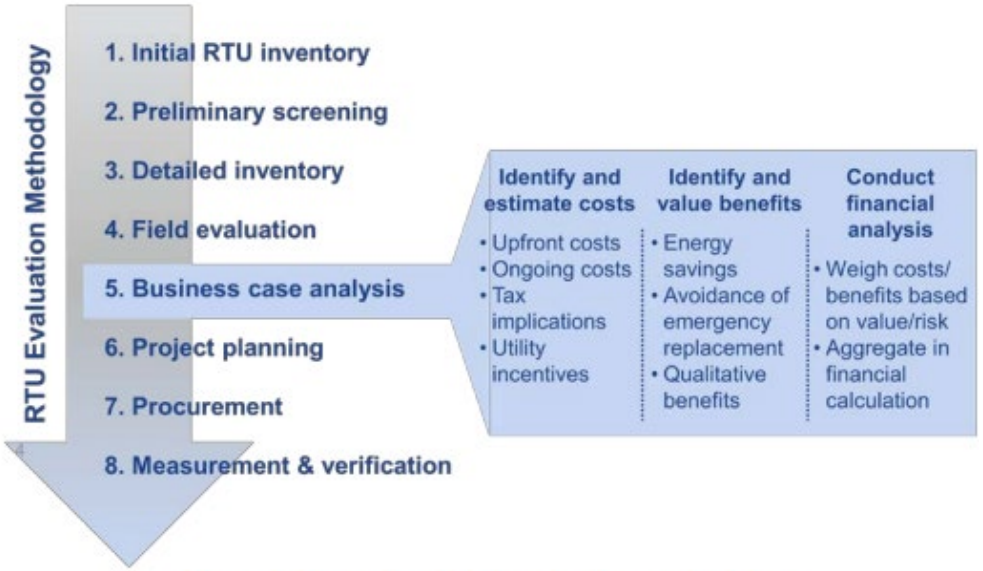


Figure 1. Streamlined RTU evaluation methodology

Source: [Business Case for Proactive Rooftop Unit (RTU) Replacement]

Identify & Value Benefits

- Energy Cost Savings
  - High-efficiency units
  - Right-sized equipment
- Avoidance of unexpected failure, emergency replacement
- Bulk purchasing for multiple upgrades
- Variable Ongoing Costs
  - Adapting operations & maintenance to new equipment
  - Tax depreciation

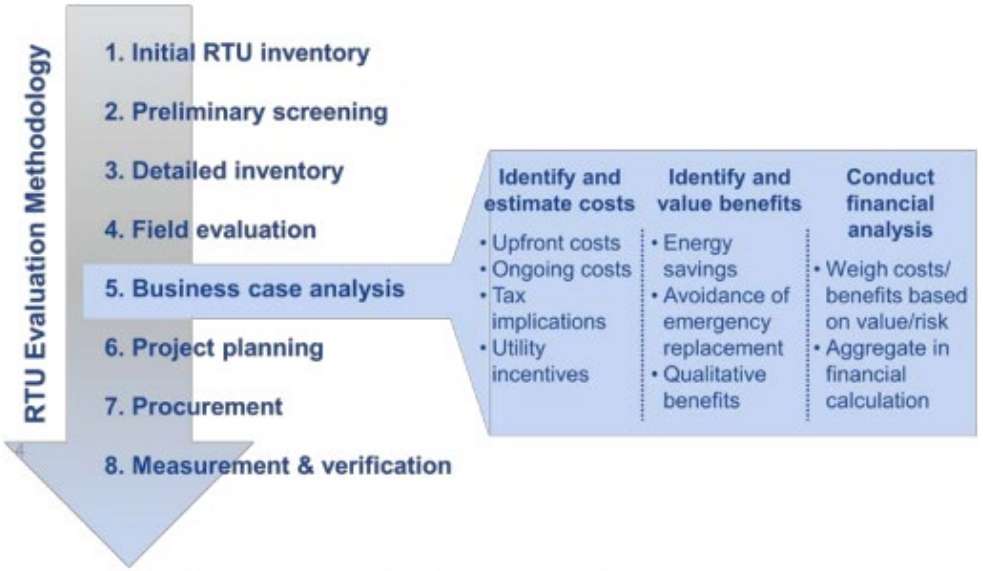


Figure 1. Streamlined RTU evaluation methodology

Source: [Business Case for Proactive Rooftop Unit (RTU) Replacement]

Example of Business Case

- Early retirement of existing equipment can make financial sense
- Business officers may see it as an unnecessary cost, but it can be a compelling cost-saving opportunity

Source: Business Case for Proactive Rooftop Unit (RTU) Replacement

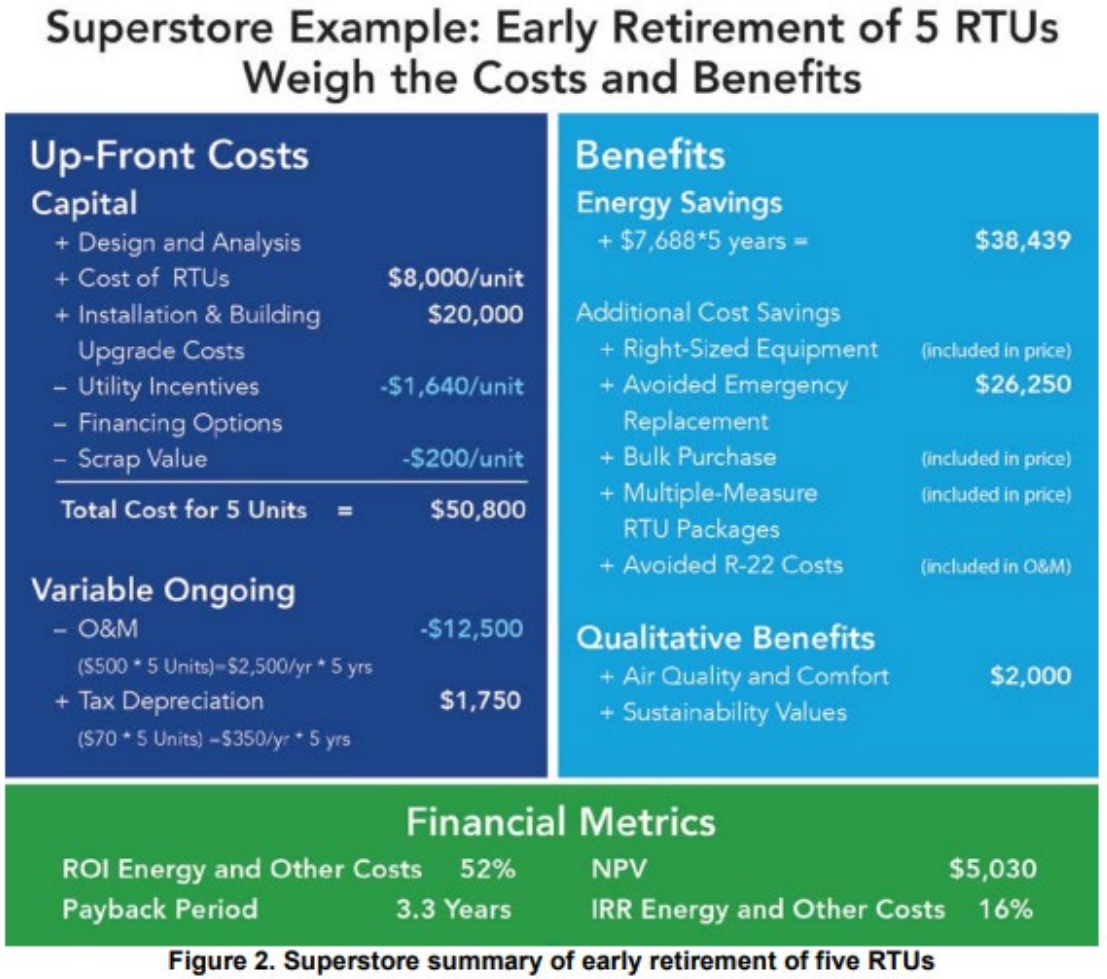


Figure 2. Superstore summary of early retirement of five RTUs

Why an RFP?

- Define services you want to receive
- Require vendors to specifically address their approach to services you want
- Do an “apples to apples” comparison of vendors and consultants
- Start to define the terms of a guarantee
- Require normalization of energy consumption (for weather, school days, etc.)

Performance Specifications

Clearly state performance objectives in the RFP so all contractors are meeting your needs, and so you are making “apples to apples” comparisons between responses.

Typical Performance Spec

- RFP states, “Client desires a new widget be installed at this property.”
- The contractor states, “We will install a new model XR9 widget controller and RDF109 communication module. Work includes all hardware and will be performed after hours.”

You think you’re getting a good bid because you can see what’s going to be installed. But there’s nothing stating that it will actually work for what you want to achieve.

Preferred Performance Spec

- You state, “Client desires installation of a widget that will control existing HVAC system providing access to X and programmed to achieve Y and Z.”
- The contractor states, “Understanding that client needs a widget controller to provide access to X and can achieve Y and Z, we propose the following solution which will achieve these results.” They continue to state all the parts and labor required for a clear bid.

Now you know that in addition to the parts that will be installed, the contractor will set them up to achieve your goals or risk being in breach of contract.

Evaluating Proposal Responses and Selecting a Contractor

Example Proposal Review Matrices

Proposal Evaluation Criteria	Score [1-10]	Assigned Weight [1-5]	Weighted Score (Score x Weight)
Cost proposal			
Compliance with scope of work			
Ability to deliver additional unspecified value			
Qualifications, experience, and certification			
Quality of site visit			
Overall Quality of the Proposal			
		Total Proposal Score	

Source: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/EMIS%20Specification_LBNL_Dec2020.docx

		Bidder X	
Proposal Evaluation Criteria	**Weight**	**Score**	**Weighted Score**
	[assign a weight of 1–5]	*[assign a score of 1–10]*	*[score x weight]*
Cost proposal	3	9	27
Ability to deliver services outlined in scope of work	5	8	40
Followed RFP directions	4	10	40
Provided references	5	10	50
Provided case studies related to healthcare	5	5	25
Ability to deliver additional unspecified capabilities of value	3	8	24
Qualifications and experience of staff	4	6	24
Proposed guarantee language is in compliance with guarantee language provided by Beaumont	5	7	35
Overall quality of the proposal	4	9	36
Local presence, proper staffing	5	5	25
Implementation timeline (Ph. 1 and 2)	4	8	32
Alternate Services	3	7	21
Total		**379**	

Source: https://betterbuildingssolutioncenter.energy.gov/sites/default/files/slides/SEA-C-Navigating_RFPs.pdf

Cost Evaluation

- How reasonable are the Proposer's pricing estimates?
- Was anything left out of the cost proposal, e.g., subcontracts for controls vendor or other work?
- How well does the Proposer meet the owner's financial requirements, considered over both the short term and the long term?
- How well did the Proposer communicate the pricing structure for the proposed technology and scope of work?
- How well did the Proposer communicate their value?
- Is the Proposer bonded for the amount of the installation?

Compliance with Scope of Work

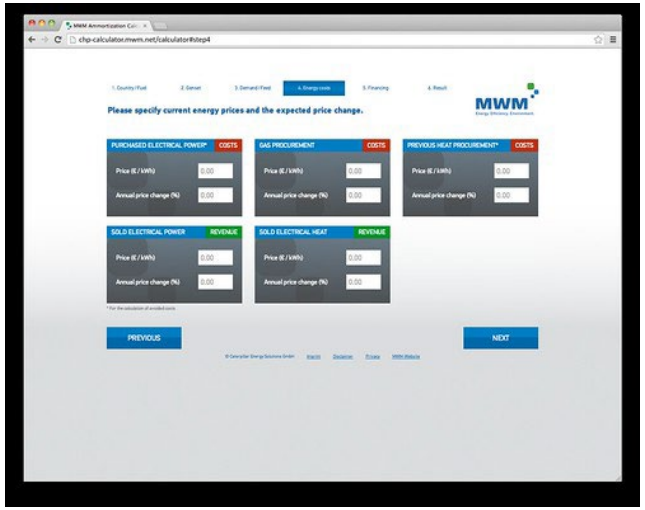
- How well does the Proposer demonstrate an understanding of the project objectives?
- Do the proposed technology and services satisfy the **required** capabilities and functions defined in the specification?
- Do the proposed technology and services satisfy the ***preferred*** capabilities and functions defined in the specification?
- How well does the technology interoperate and communicate with other systems?
- How well does the proposed technology satisfy the IT and security requirements?
- How well do the proposed services and maintenance meet the needs defined in the specification?
- How well has the Proposer demonstrated that they understand the project scope and have a viable plan and schedule for successful implementation?
- How clear is the description of how required data will be acquired, given your specific site characteristics and existing monitoring and metering infrastructure?
- How scalable and expandable is the proposed technology?
- To what extent can BAS, EIS and/or FDD data results and or reporting be leveraged by third-party service providers? (Does the provider provide an open, API accessible means of collecting data and adding faults for analysis?)

Ability to deliver additional unspecified features of value

- What additional value is being offered in the proposal from features that were not explicitly requested?

For example:

- Is the contractor offering opportunities for student engagement (e.g., dashboards)?
- Is the contractor creating high-value space (e.g., green roof)?



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Qualifications and Experience

- Do the proposing company and personnel possess the qualifications necessary to successfully complete the scope of work?
- Does the Proposer have a good history of experience with portfolios or sites similar to yours?
- Does the Proposer's software have enough flexibility and configurability to meet the owner's needs while not requiring a custom implementation to achieve this?
- Does the Proposer demonstrate strong experience with technology design, provisioning, installation, and commissioning?
- Has the Proposer demonstrated timely and successful completion of similar projects, within budget?
- Has the Proposer provided credible claims of savings from past projects using the technology as presented in the proposal?
- Has the proposed technology been demonstrated to integrate effectively with the owner's system types? In the absence of past demonstrations, what evidence is provided that integration will be effective?
- How strong are the references that the Proposer has provided?

Overall Quality of the Proposal

- Have all the elements addressed in the Proposal Format Guidelines of the RFP been addressed?
- In the event of disruptions to the Proposer's normal operations, are the protections and assurances for continuity of services sufficiently addressed?
- Is the writing clear and concise?
- Is the proposal content well organized and easy to follow?
- Are the technical aspects of the proposal described clearly, with minimal jargon and with a sufficient level of detail?

Guest Speaker

Today's Guest Speaker

Mia Hocking

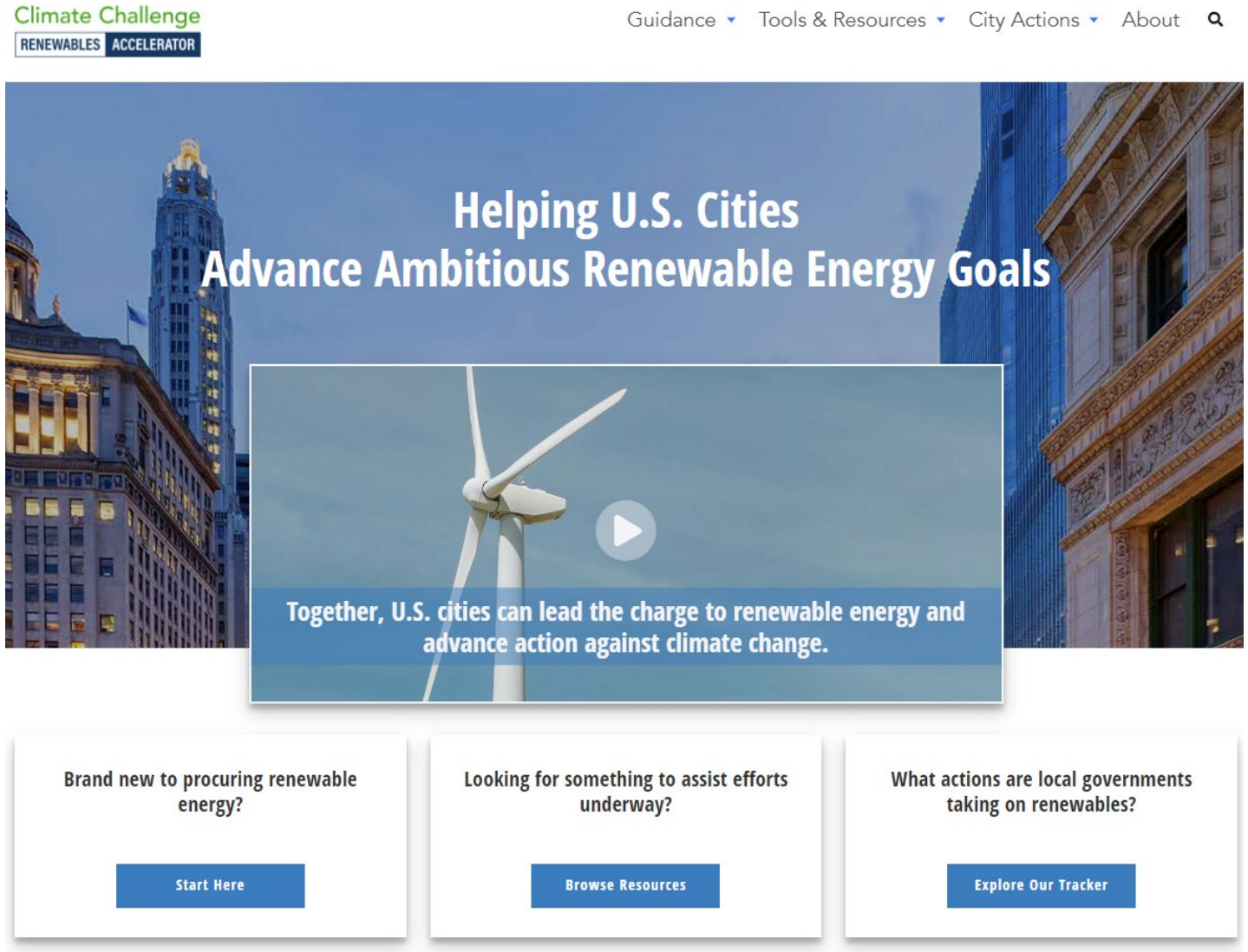
Resource Conservation Manager

Hillsboro School District, OR

Mia Hocking is currently the Resource Conservation Manager for Hillsboro School District. Mia started working for the Hillsboro School District in 2010. In 2018, she assumed the role of Resource Conservation Manager within the Facilities & Maintenance Department. Mia is an HSD graduate and is excited to serve have the opportunity to serve the district in her Hillsboro community. She earned her Certified Energy Manager (CEM) certification through the Association of Energy Engineers in December 2023.

Other Key Resources

American Cities Climate Challenge Renewable Energy Resource



Source: https://cityrenewables.org/

PNNL Building Re-tuning Training

- Free, online interactive training
- Asynchronous - take anytime

[Source: https://buildingretuning.pnnl.gov/](https://buildingretuning.pnnl.gov/)

Better Buildings Financing Navigator

- Answer 10 simple questions to find financing suited for a specific project
- Or explore the universe of financing options available for clean energy projects

Better Buildings Financing Navigator

Cohort Interest Polls

1. Would you like cohorts to be organized by procurement topic of interest?
   - Yes
   - No
   - Depends on the topics

2. If you answered “Yes” or “Depends” to the first question, which topic would you like to participate in?

   (select all that apply)

1. Direct Organizational Capital (Tax Revenue, Bonds, Loans)
2. Grants
3. Utility Rebates and Incentives
4. Power Purchase Agreements (PPAs)
5. Energy Savings Performance Contracts (ESPCs)
6. Community Solar
7. Energy as a Service Contracts (EaaS)
8. Tax Credits/Deductions:
   Elective/Direct Pay & Transferability, Energy Efficiency Commercial Building Deduction (179D)
9. Energy Procurement
10. Other (please specify in the chat)

Summary from Today (Part 1)

Back to Learning Objectives:

- Develop an understanding of the basics of energy systems
- Learn about the electricity, natural gas, and vehicle fuel markets
- Learn about Renewable Energy Credits, Renewable Fuels, and Renewable Portfolio Standards
- Develop an understanding of energy procurement options
- Learn about Energy Procurement Goals

Next Steps:

- Determine which energy procurement options are available in your market and for your organization
- Determine what types of new goals might be the best fit for your organization
- Start (or continue) development of energy procurement strategies and projects

Summary from Today (Part 2)

Back to Learning Objectives:

- Learn the basics of building energy systems and building energy upgrades
- Develop and understanding of building energy upgrades, and how to plan for/prioritize them
- Learn how to structure Request for Proposal (RFPs) by setting clear performance targets and offering flexible approaches.
- Learn strategies for effectively evaluating RFP responses

Next Steps:

- Inventory existing building systems
- Evaluate equipment to determine potential retrofit/replacement opportunities and draft business case to determine if opportunities are cost-effective. Can multiple measures be combined?
- Assemble RFP for services and evaluate responses using provided materials

Questions?

We look forward to working with you!