Benchmarking Energy Use and Assessing Energy and GHG Performance During A Pandemic

September 9, 2021

ENERGY STAR Learn From the Best Webinar Series

Partner of the Year Award

- ✓Excellence in Energy Management
  - Robust energy management practices & program
  - Address all areas of the ENERGY STAR Guidelines for Energy Management
  - Help define best practices
- ✓Leverage ENERGY STAR tools
- ✓Excellent internal & external communications
- ✓Active in the Partner community
- ✓Strong energy performance
- ✓Awarded annually

Energystar.gov/awards

Today's webinar

- Features ENERGY STAR Partners sharing their experience benchmarking energy use and assessing energy performance during the pandemic
- The COVID-19 pandemic changed the way many buildings in the United States operate. The EPA has assessed the impact of these changes on 1-100 ENERGY STAR scores and in 2020 we updated our benchmarking guidance accordingly.
- Please visit www.energystar.gov/covidupdates for a summary of ENERGY STAR benchmarking and certification guidance issued previously (spring 2021), as well as FAQs related to operational impacts from COVID-19.

Today's Speakers

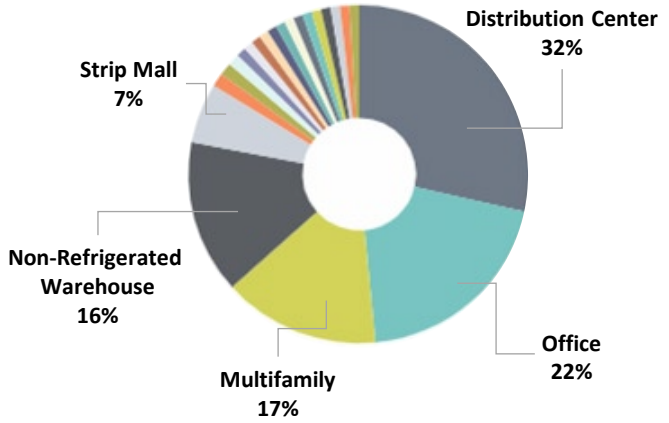
- **Rielle Green** – Manager, Energy & Sustainability, CBRE

- **Barry Abramson** – Principal, Servidyne

Investment management client

Over 120 million Sq Ft in U.S.

Platform-wide ESG strategy



CBRE

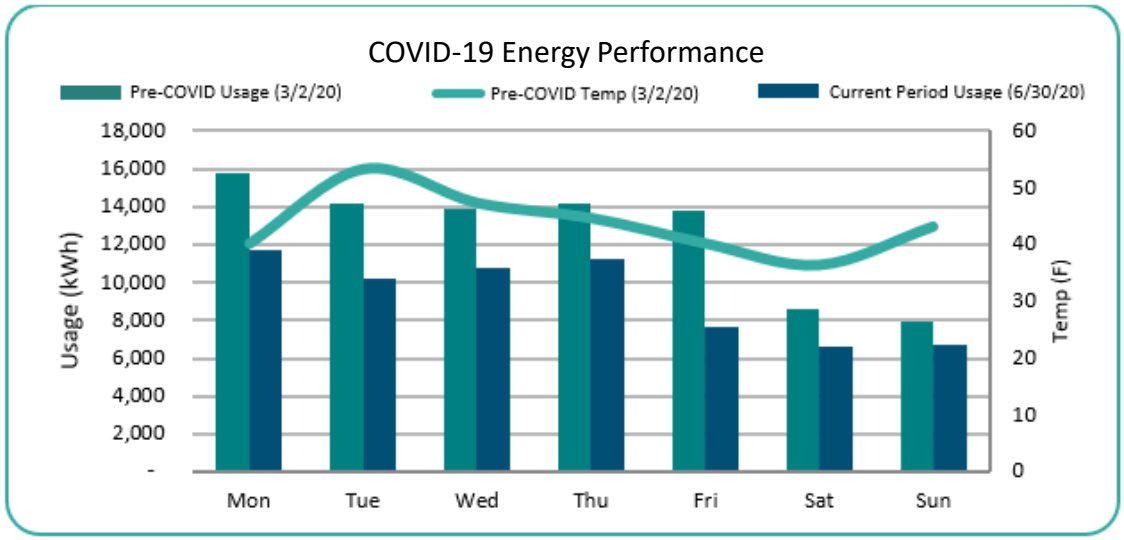
Industry-leading management platform

Over 2.7 billion Sq Ft worldwide

COVID-19 Response Case Study

Operational changes to realize savings:

- Taking advantage of free cooling in full economizer mode
- Reducing run times on individual heat pumps
- Shutting-down HVAC for individual tenants by request
- Adjusting cooling set-points to limit HVAC demand
- Reducing pump and fan motor consumption
- Drastically reducing overtime HVAC



The graph to the left shows the dramatic drop in energy consumption for the week ending June 30 over the COVID "baseline," set to the week of March 2 through March 8, 2020.

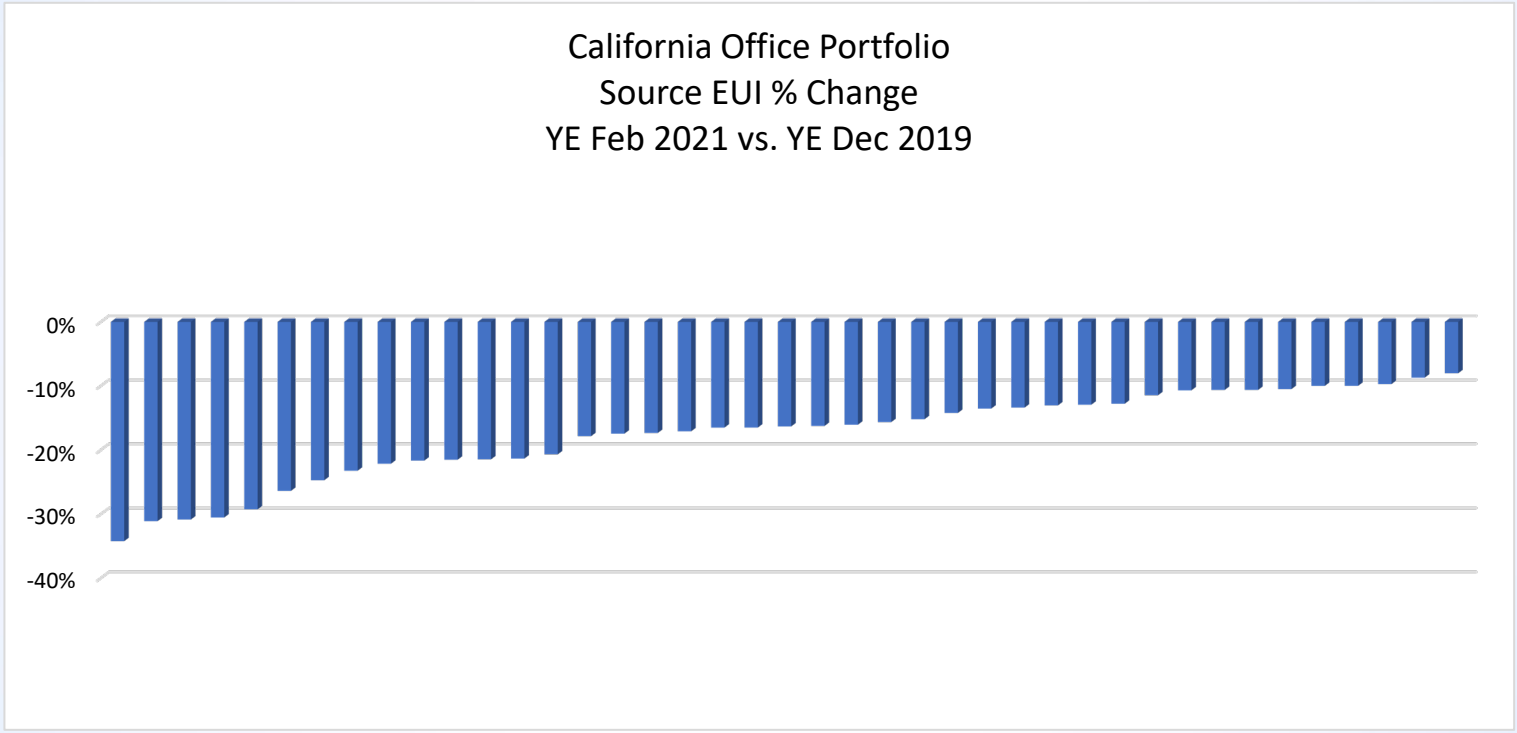
HIGHLIGHTS

- ~500,000 kWh confirmed energy savings in the first 2.5 months of the pandemic (through June 30, 2020)
- ~$85K confirmed cost savings through June 30, 2020

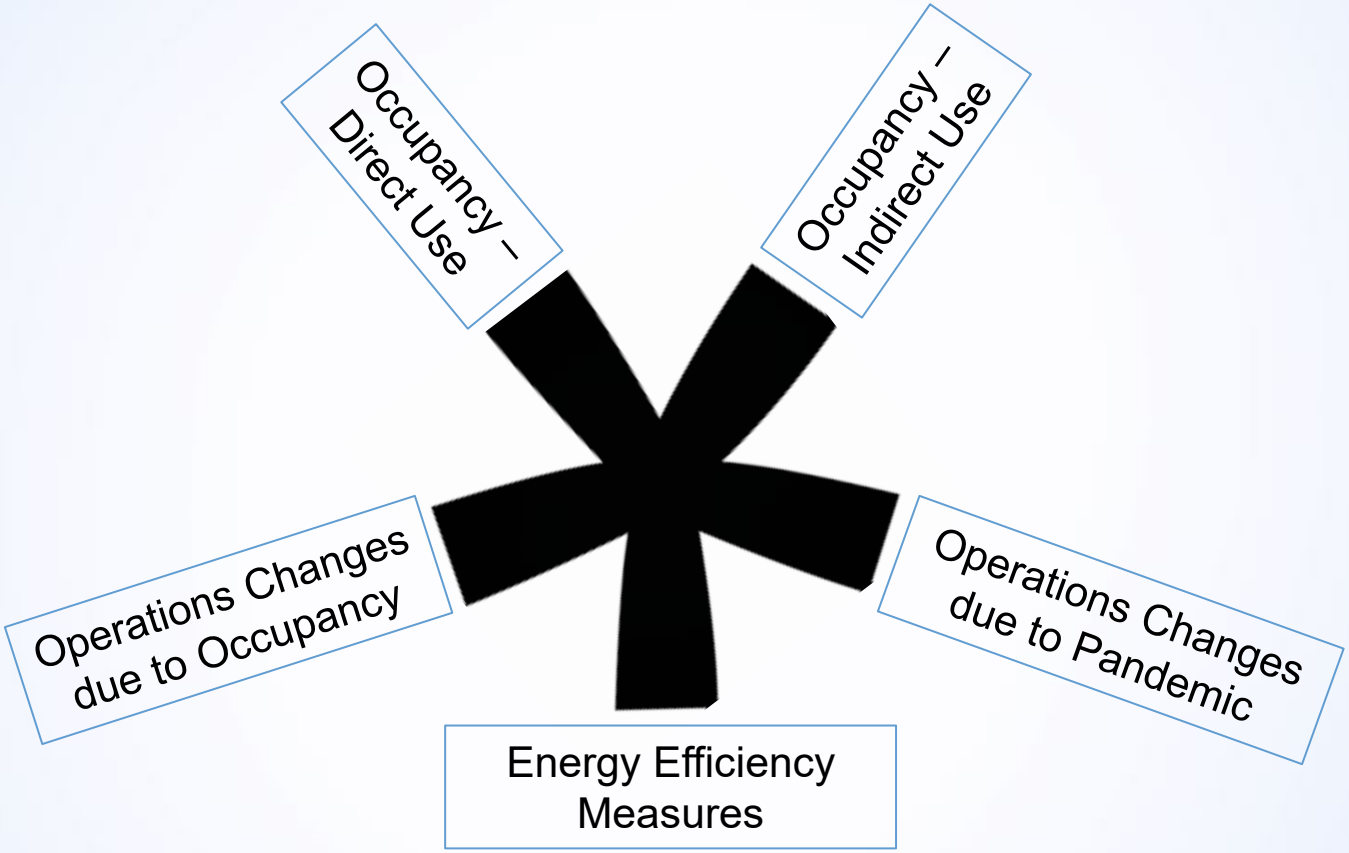
2020*

2020* + 2021?

2020* + 2021? = #$%?!


California Office Portfolio
Source EUI % Change
YE Feb 2021 vs. YE Dec 2019
0%
-10%
-20%
-30%
-40%

National Multifamily Portfolio
Source EUI % Change
YE Feb 2021 vs. YE Dec 2019


Occupancy – Direct Use
Occupancy – Indirect Use
Operations Changes due to Occupancy
Operations Changes due to Pandemic
Energy Efficiency Measures

Variables

- Occupancy – Direct Use
- Occupancy – Indirect Use
- Operations Changes – Occupancy
- Operations Changes – Pandemic
- Energy Efficiency Measures

Variables

- Occupancy – Direct Use
- Occupancy – Indirect Use
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- Lighting, Plug Loads
- Cooling, Heating
- Schedules, Setpoints
- Filters, OA, Purge Period
- Lighting/HVAC Retrofits

Benchmarking Models

ENERGY STAR® Portfolio Manager™

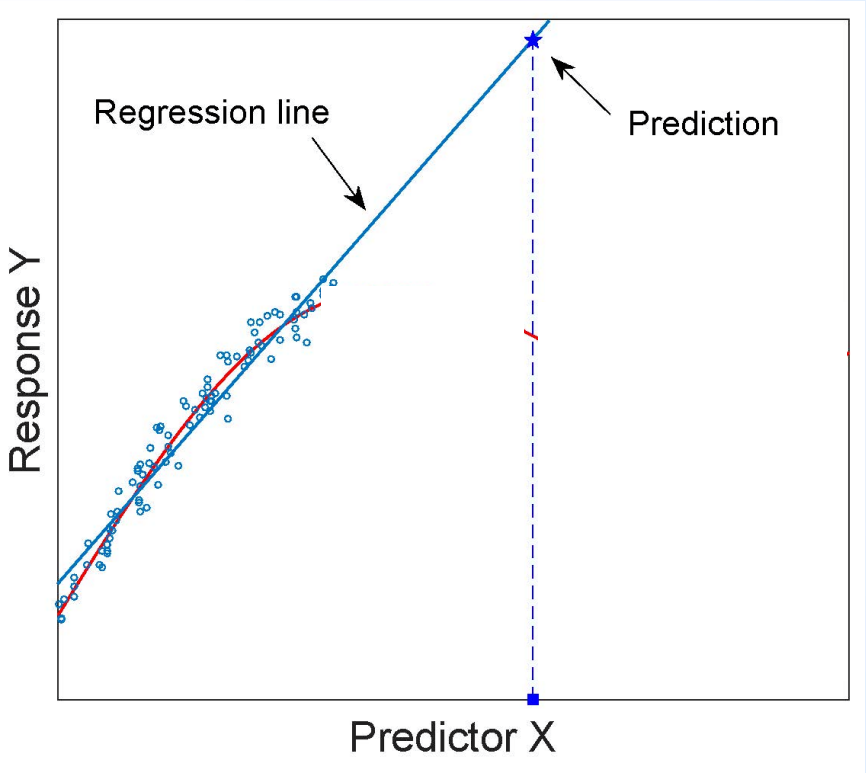
Office

- Floor Area
- Number of Workers
- Number of Computers
- Operating Hours
- Climate

Multifamily

- Number of Units
- Bedrooms Per Unit
- Percent of Units in Low-Rise Buildings
- Climate

Uncharted Territory Example #1: Regression



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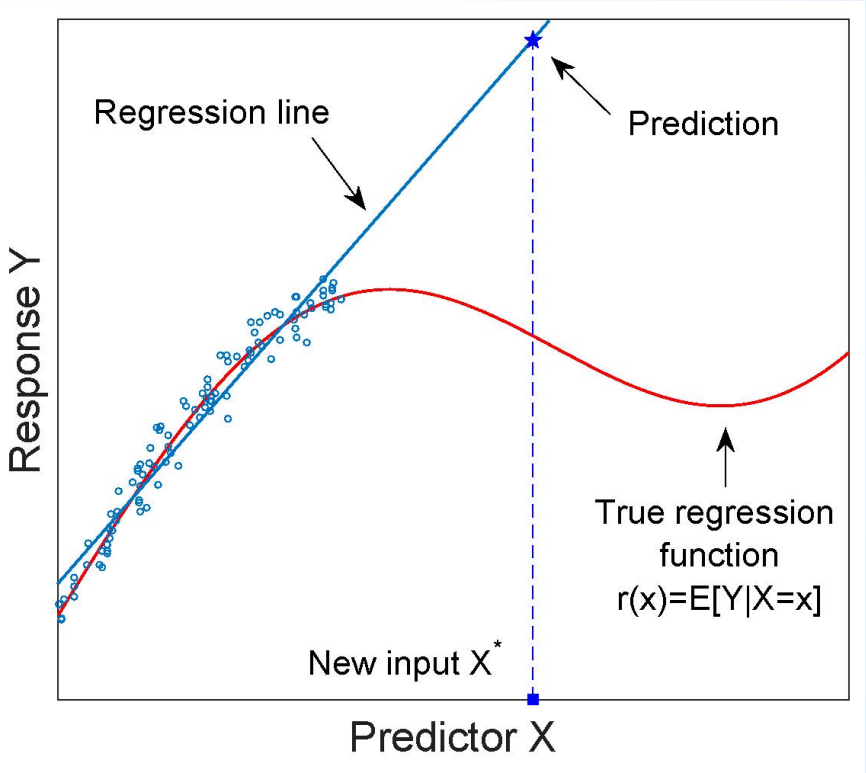
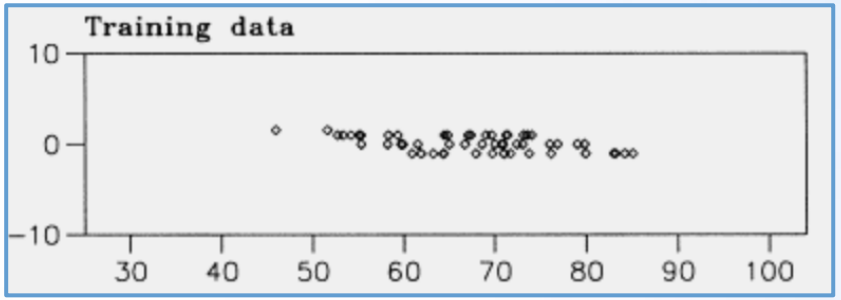


Uncharted Territory Example #2: Machine Learning



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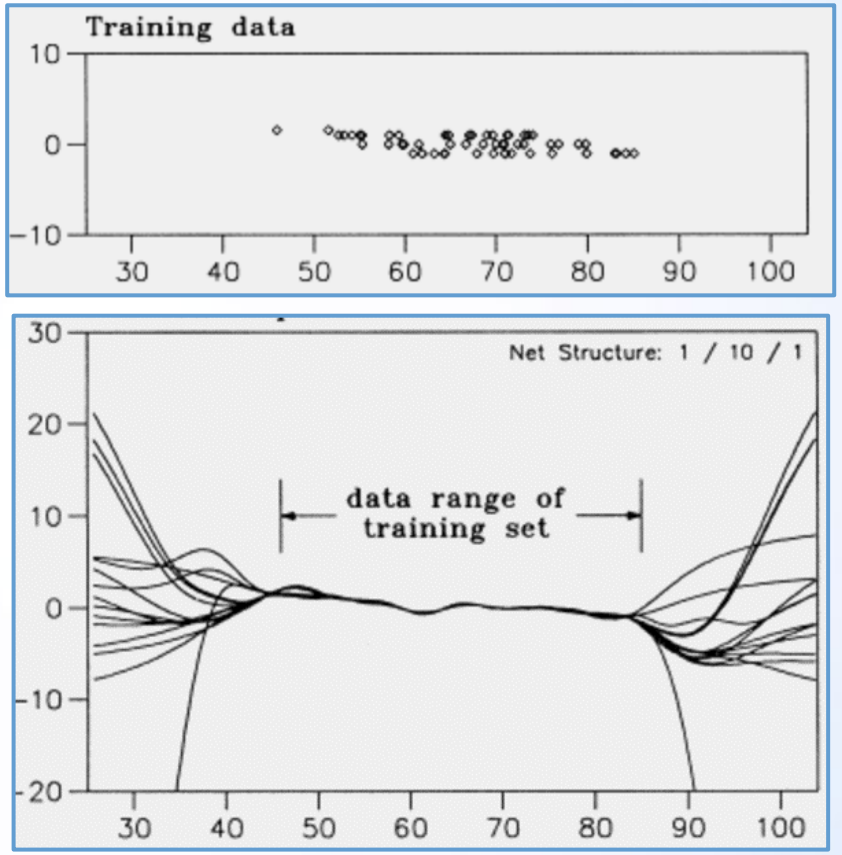

ENERGY STAR® PortfolioManager™

Metrics Summary

Metric	Dec 2019 (Energy Baseline)	Feb 2021 (Energy Current)	Change
ENERGY STAR Score (1-100)	91	90	-1.00 (-1.10%)
Source EUI (kBtu/ft²)	131.4	115.4	-16.00 (-12.20%)
Site EUI (kBtu/ft²)	46.9	41.2	-5.70 (-12.20%)
Energy Cost ($)	400,356.36	344,348.63	-56007.73 (-14.00%)
Total GHG Emissions Intensity (kgCO2e/ft²)	6.4	5.7	-0.70 (-10.90%)
Water Use (All Water Sources) (kgal)	2,892.9	1,651.0	-1241.90 (-42.90%)

2019 Baseline

- No. of Workers
  - **1,050**
- No. of Computers
  - **1,050**
- Operating Hours
  - **60**

ENERGY STAR® Portfolio Manager™

Dashboard (Metrics current as of 05/28/2021 08:20 AM EDT)

Search by ID or Name

Test Group (3) | Baseline 2019 | Refresh Metrics

Add/Edit/Delete Groups | Add/Edit/Delete Views

Name	Energy Baseline Date	ENERGY STAR Score	Source EUI (kBtu/ft²)	Water Use Intensity (All Water Sources) (gal/ft²)
01 Test Office Building - Full Occupancy 16096093	12/31/2019	91	131.4	11.57
02 Test Office Building - Actual Occupancy 16096092	12/31/2019	91	131.4	11.57
03 Test Office Building - Actual Occupancy & Computers 16096094	12/31/2019	91	131.4	11.57

Mar2020 – Feb2021

- No. of Workers
  - **1) 1,050**
  - **2) 1,050…150…225**
  - **3) 1,050…150…225**
- No. of Computers
  - **1) 1,050**
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ENERGY STAR® Portfolio Manager™

Dashboard (Metrics current as of 05/28/2021 08:19 AM EDT)

Search by ID or Name

Test Group (3) | Pandemic | Refresh Metrics

Add/Edit/Delete Groups | Add/Edit/Delete Views

Name	Energy Current Date	ENERGY STAR Score	Source EUI (kBtu/ft²)	Water Use Intensity (All Water Sources) (gal/ft²)
01 Test Office Building - Full Occupancy 16096093	02/28/2021	95	115.4	6.60
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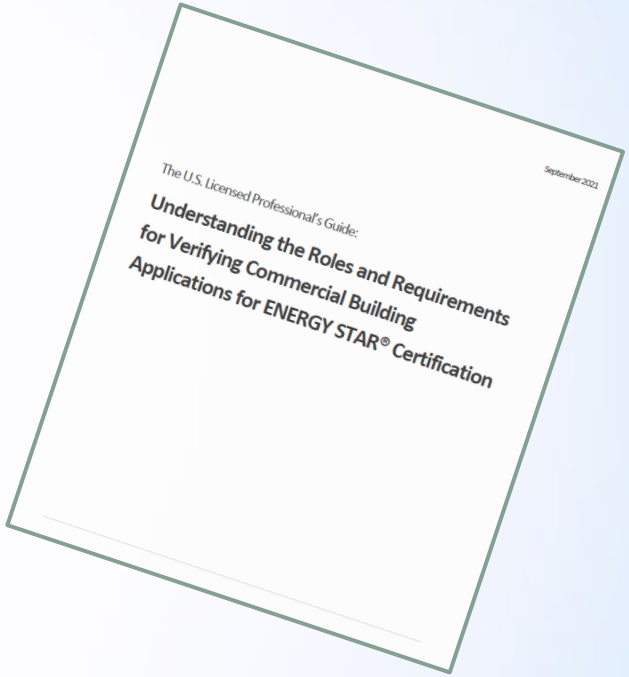
Licensed Professional's Guide

- "**EPA reserves the right to request additional details and documentation on how use details were verified during the site visit for any property applying for certification, for any reason…** If sufficient detail cannot be provided to confirm that the use details shown on the application are accurate, EPA reserves the right to deny the application."



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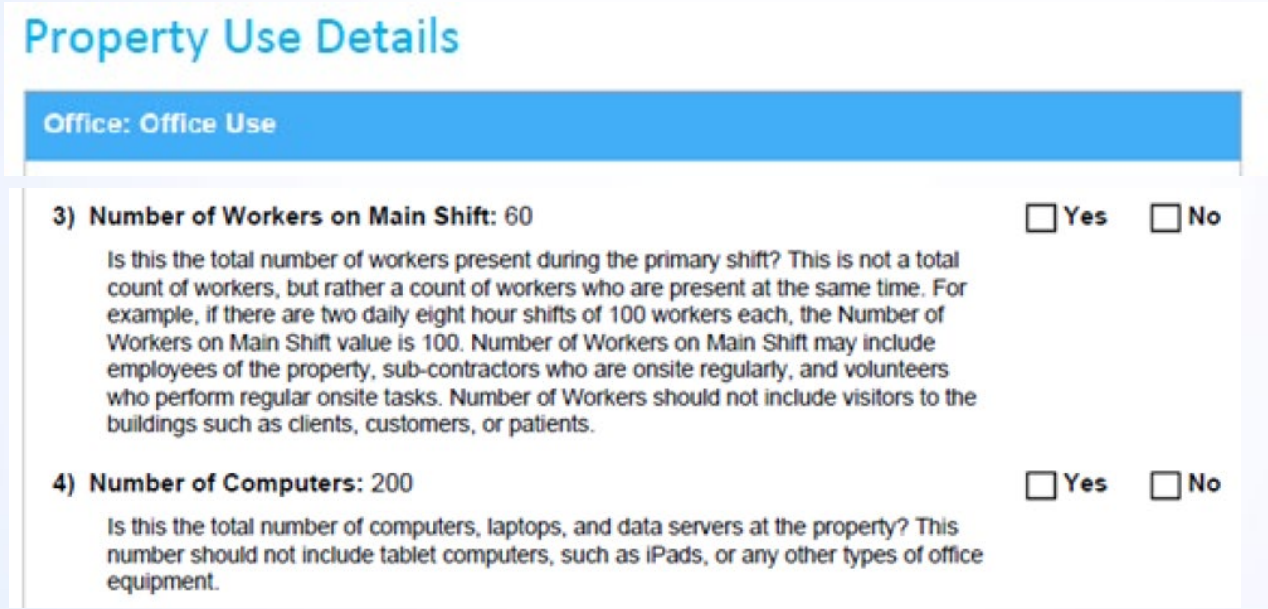


Property Use Details

Office: Office Use

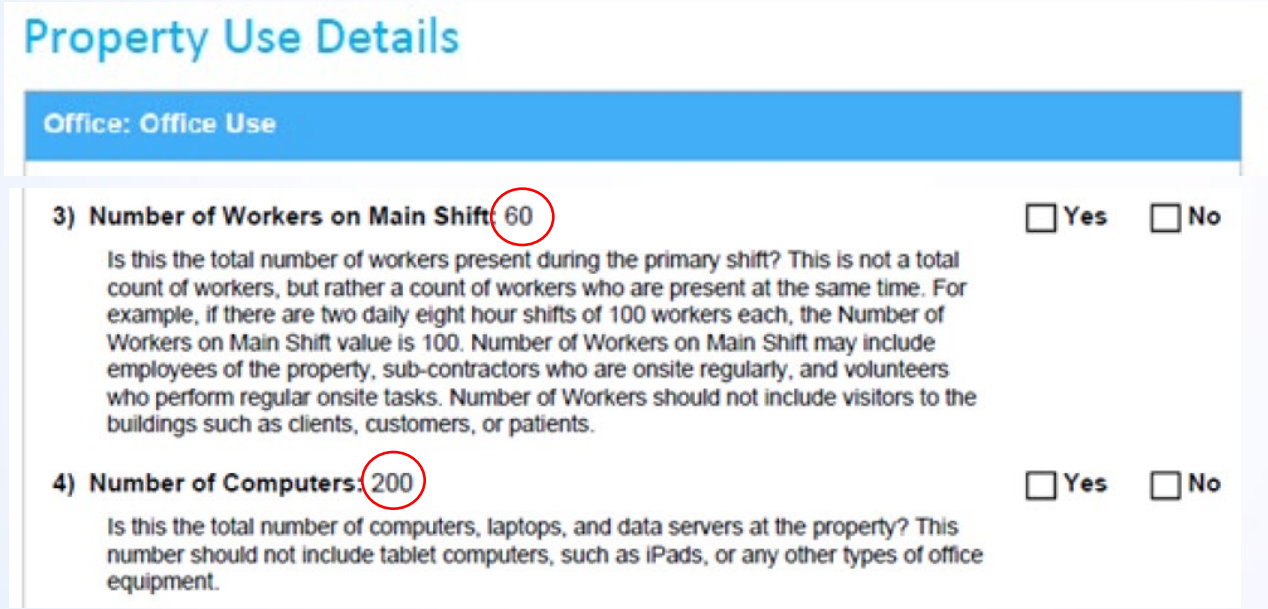
3) Number of Workers on Main Shift: 60 ☐ Yes ☐ No

Is this the total number of workers present during the primary shift? This is not a total count of workers, but rather a count of workers who are present at the same time. For example, if there are two daily eight hour shifts of 100 workers each, the Number of Workers on Main Shift value is 100. Number of Workers on Main Shift may include employees of the property, sub-contractors who are onsite regularly, and volunteers who perform regular onsite tasks. Number of Workers should not include visitors to the buildings such as clients, customers, or patients.

4) Number of Computers: 200 ☐ Yes ☐ No

Is this the total number of computers, laptops, and data servers at the property? This number should not include tablet computers, such as iPads, or any other types of office equipment.

Licensed Professional's Guide



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Explaining Variations

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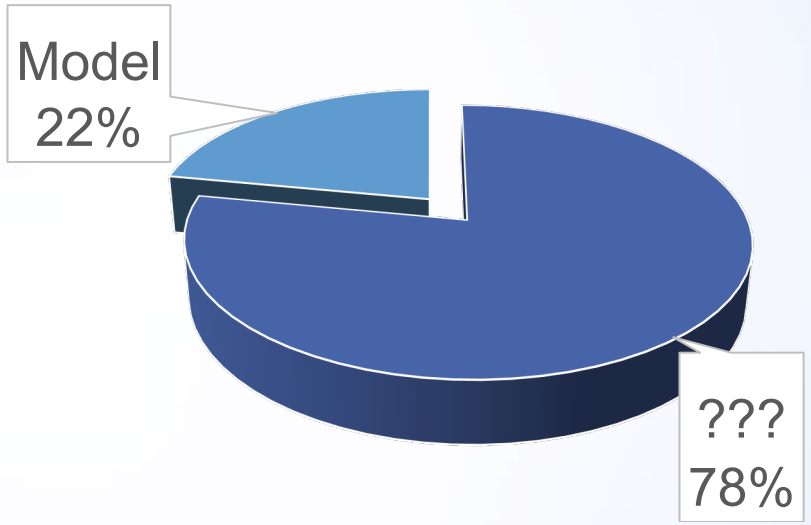


Office Model

- Number of Workers
- Number of Computers
- Operating Hours
- Climate

Operations Changes due to Pandemic

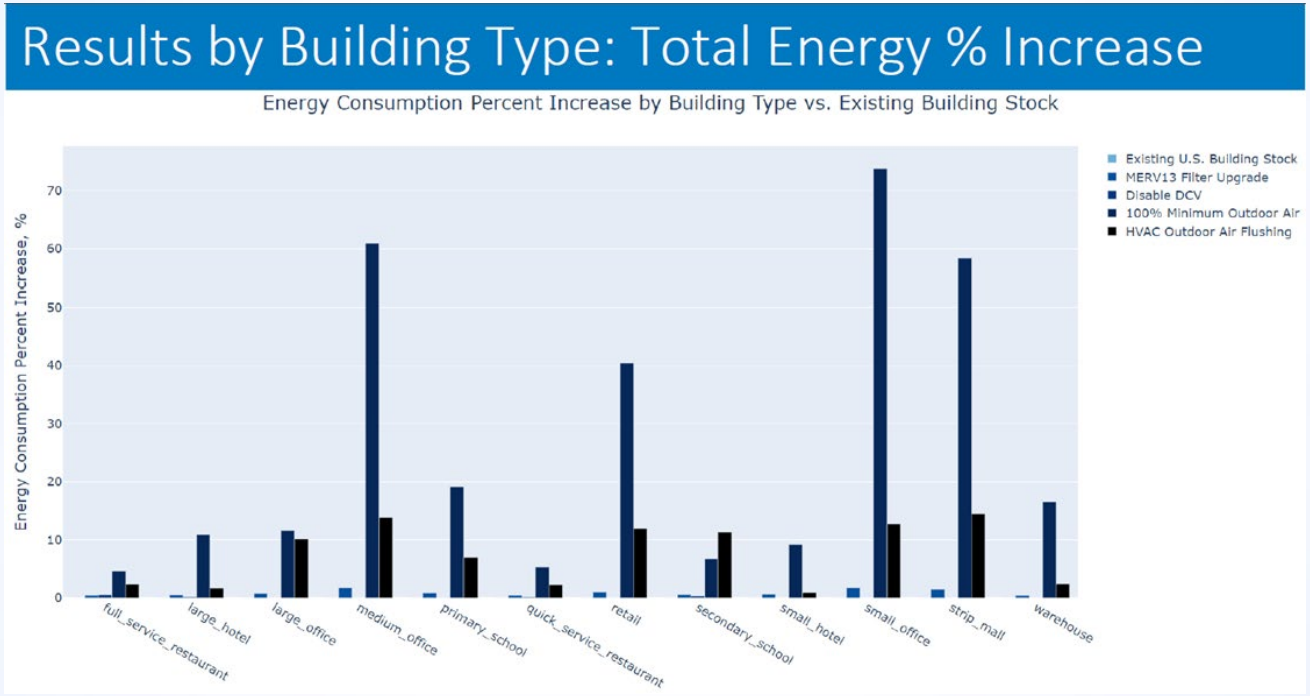
Operations Changes due to Pandemic

COVID-19 Mitigation Strategies for Analysis

ASHRAE ETF-recommended strategies studied:

- Upgrade to MERV-13 filters
- Disable demand control ventilation (DCV)
- Increase minimum outdoor air to 100%
- HVAC flushing mode operation

Operations Changes due to Pandemic



Upcoming ENERGY STAR Award Winner Webinars

October 14 @ 1 PM EDT	**Virtually Proven: Technology-Based Solutions for Remote Energy Management**
November 9 @ 1PM EST	**Dive into water and waste savings strategies from BOMA's W2 Challenge Champions**
December 9 @ 1 PM EST	**Working Together to Save Energy: Employee Engagement Strategies**

Register here:
https://www.energystar.gov/buildings/training/learn_best

Questions?

Upcoming Industrial webinars

- **Cement and Glass,** *Wed, Oct 13th: 12- 1 PM ET*
  - *Speakers:*
    - CalPortland's Rillito, Arizona cement plant
    - Ardagh Glass's Bridgeton, New Jersey container glass plant
    - Register here: https://esbuildings.webex.com/esbuildings/onstage/g.php?MTID=ea77f8296df4ea5df7799be0e1fcc46c4

Paper and Petroleum, *Wed, Nov 17th: 12 - 1 PM ET*

  - *Speakers:*
    - Georgia Pacific's Brewton, Alabama containerboard mill
    - Marathon Petroleum Corporation's Robinson, Illinois Refinery
    - Register here: https://esbuildings.webex.com/esbuildings/onstage/g.php?MTID=e5f5c7527ddd88edf4aac0e130bc6d0f4

- **Bakeries,** Wed, *Feb 9th:12 - 1 PM ET*
  - *Speakers:*
    - Weston Foods' ACE Gaffney, South Carolina
    - Winnipeg, Canada commercial bakeries
    - Register here: https://esbuildings.webex.com/esbuildings/onstage/g.php?MTID=eadb8a3fc9ec5d842165d5b09b0ddad98