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U.S. DEPARTMENT OF ENERGY

Energy Tracking and Benchmarking

Module 2 in the "Benchmarking and Energy Management for K-12 Facility and Energy Managers" Course

October 24, 2023

SCEP
STATE & COMMUNITY ENERGY PROGRAMS

Today's Presenter

Kudret Ütebay

Mr. Ütebay has over 25 years of experience in the education, research, energy, science, and technology fields. He supported EPA's ENERGY STAR Commercial, Institutional and Industrial Sectors contract for more than two decades. Mr. Ütebay plays a key role in marketing and implementing voluntary and mandatory programs to all public and private sectors by developing key messaging, tools, and resources for a wide variety of audiences at every level of an organization to help them overcome issues. For the past two decades, he has worked closely with organizations to promote a holistic approach to energy efficiency and indoor air quality, wrote articles, and presented at conferences. He developed best practice guidance documents on benchmarking, energy efficiency, and indoor air quality topics that speak to a variety of audiences. He provided training and technical support to all local and state governments (50) with benchmarking and building performance standard mandates. He also provided support to U.S. DOE and most federal agencies on benchmarking federal facilities. To date, Mr. Utebay benchmarked more than 30,000 properties, nearly half of which are school buildings.

Today's Agenda

- Welcome and Introductions
- Learning Objectives
- What is Benchmarking?
- Understanding State and Local Benchmarking Mandates
- Collecting and Organizing Data
- Benchmarking Your Schools in Portfolio Manager
- Interpreting Benchmarking Results

Overview of the Benchmarking & Energy Management Course

- October 17, 2023: Introduction to Energy Management
- **October 24, 2023: Energy Tracking and Benchmarking**
- October 31, 2023: Developing Energy Efficiency Projects
- November 7, 2023: Institutionalizing Continuous Improvement
- November 14, 2023: Benchmarking & Energy Management Cohort

All sessions will take place from 3:00 – 5:00 PM (Eastern)

Learning Objectives

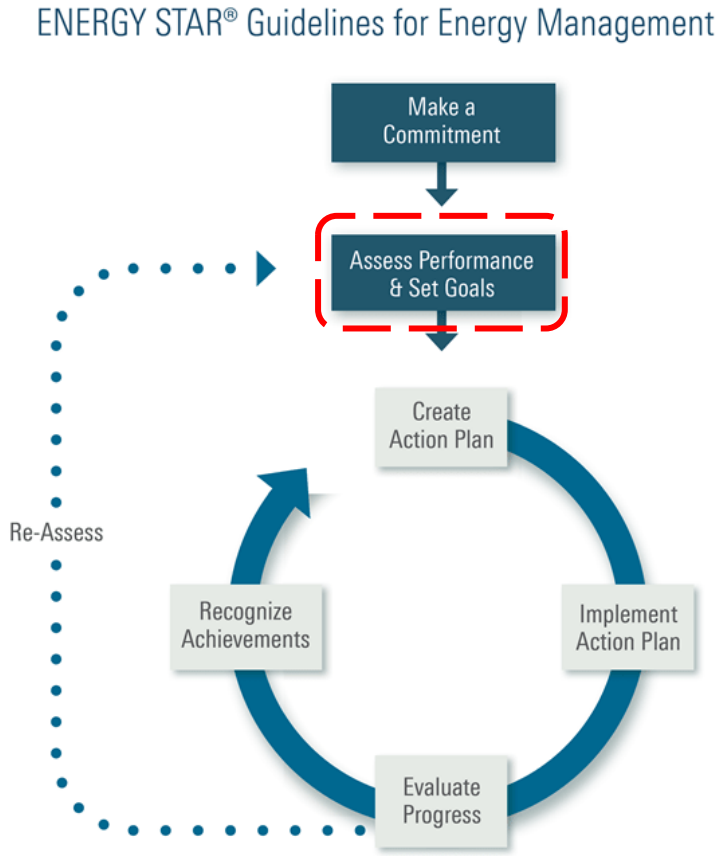
- In today's session, attendees will:

  - Appreciate the role of benchmarking in energy management.
  - Understand state and local benchmarking mandates, and how participation in the Energy CLASS Prize may facilitate compliance.
  - Learn about common approaches to collecting and organizing data for benchmarking.
  - Develop familiarity with EPA's ENERGY STAR® Portfolio Manager® tool, including existing training resources.
  - Learn how to interpret benchmarking results in order to identify priorities and next steps.

What is Energy Benchmarking?

Energy Benchmarking Is…

- The process of **measuring and tracking** energy data for a property or portfolio of properties over time, in order to:
  - **Identify and assess changes** in performance; and/or
  - **Compare performance** against other similar properties.
- Foundational component of strategic energy management ("You can't manage what you don't measure").
- Different benchmarking tools and platforms exist, but we will be focusing primarily on the ENERGY STAR Portfolio Manager tool.



Portfolio Manager Basics

- Metrics calculator
  - Energy, water, and waste performance
  - ENERGY STAR 1-100 score
  - Financial indicators
  - Greenhouse gas emissions

- Management tool
  - Track multi-building portfolios in one location
  - Track green power purchases
  - Share data with other users
  - Customized reporting
  - Apply for ENERGY STAR certification

ENERGY STAR® PortfolioManager®

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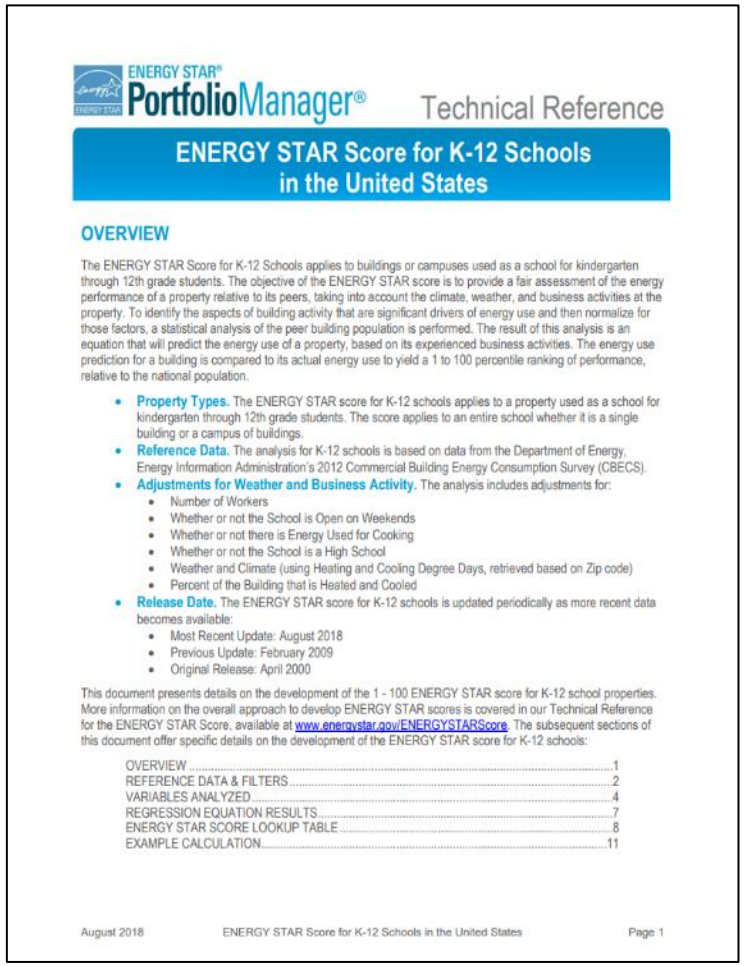
energystar.gov/benchmark

Benchmarking in Portfolio Manager Allows You To…

- Understand current and historical performance of individual properties.
- Obtain comparisons to other similar buildings (national median, ENERGY STAR 1-100 score).
- Identify high and low performers within a larger portfolio of properties.
- Identify potential problems by looking at trends.
- Track the impact of energy management strategies on actual property performance.

K-12 Schools in Portfolio Manager

- Eligible to earn the 1-100 score.
- Score model developed from nationwide data set (EIA's Commercial Building Energy Consumption Survey).
  - Allows schools to be compared against similar properties nationwide, normalizing for weather, property size, and operating characteristics.
- Superior performers (score of 75+) can earn ENERGY STAR certification.
  - To date, nearly 13,000 K-12 schools comprising more than 1.35 billion ft^2 have earned the ENERGY STAR certification
- Further descriptive statistics on K-12 schools available via the new Portfolio Manager Data Explorer.



ENERGY STAR® PortfolioManager® Technical Reference

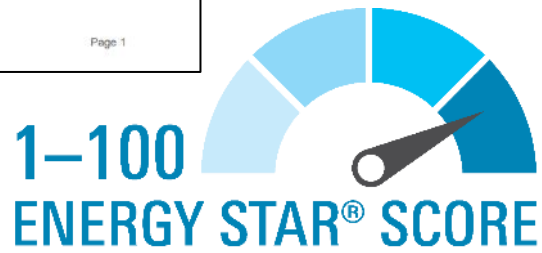
ENERGY STAR Score for K-12 Schools in the United States

OVERVIEW

The ENERGY STAR Score for K-12 Schools applies to buildings or campuses used as a school for kindergarten through 12th grade students. The objective of the ENERGY STAR score is to provide a fair assessment of the energy performance of a property relative to its peers, taking into account the climate, weather, and business activities at the property. To identify the aspects of building activity that are significant drivers of energy use and then normalize for those factors, a statistical analysis of the peer building population is performed. The result of this analysis is an equation that will predict the energy use of a property, based on its experienced business activities. The energy use prediction for a building is compared to its actual energy use to yield a 1 to 100 percentile ranking of performance, relative to the national population.

- **Property Types.** The ENERGY STAR score for K-12 schools applies to a property used as a school for kindergarten through 12th grade students. The score applies to an entire school whether it is a single building or a campus of buildings.
- **Reference Data.** The analysis for K-12 schools is based on data from the Department of Energy, Energy Information Administration's 2012 Commercial Building Energy Consumption Survey (CBECS).
- **Adjustments for Weather and Business Activity.** The analysis includes adjustments for:
  - Number of Workers
  - Whether or not the School is Open on Weekends
  - Whether or not there is Energy Used for Cooking
  - Whether or not the School is a High School
  - Weather and Climate (using Heating and Cooling Degree Days, retrieved based on Zip code)
  - Percent of the Building that is Heated and Cooled
- **Release Date.** The ENERGY STAR score for K-12 schools is updated periodically as more recent data becomes available:
  - Most Recent Update: August 2018
  - Previous Update: February 2009
  - Original Release: April 2000

This document presents details on the development of the 1 - 100 ENERGY STAR score for K-12 school properties. More information on the overall approach to develop ENERGY STAR scores is covered in our Technical Reference for the ENERGY STAR Score, available at www.energystar.gov/ENERGYSTARScore. The subsequent sections of this document offer specific details on the development of the ENERGY STAR score for K-12 schools:



Polling Break

1. Are you currently benchmarking the energy performance of the schools in your District?
   a) Yes (all schools)
   b) Yes (some, but not all schools)
   c) No
   d) I don't know

2. If you are benchmarking, what tools/platforms are you using?
   a) ENERGY STAR Portfolio Manager
   b) Other dedicated platform (please identify)
   c) Internal spreadsheet-based tracking

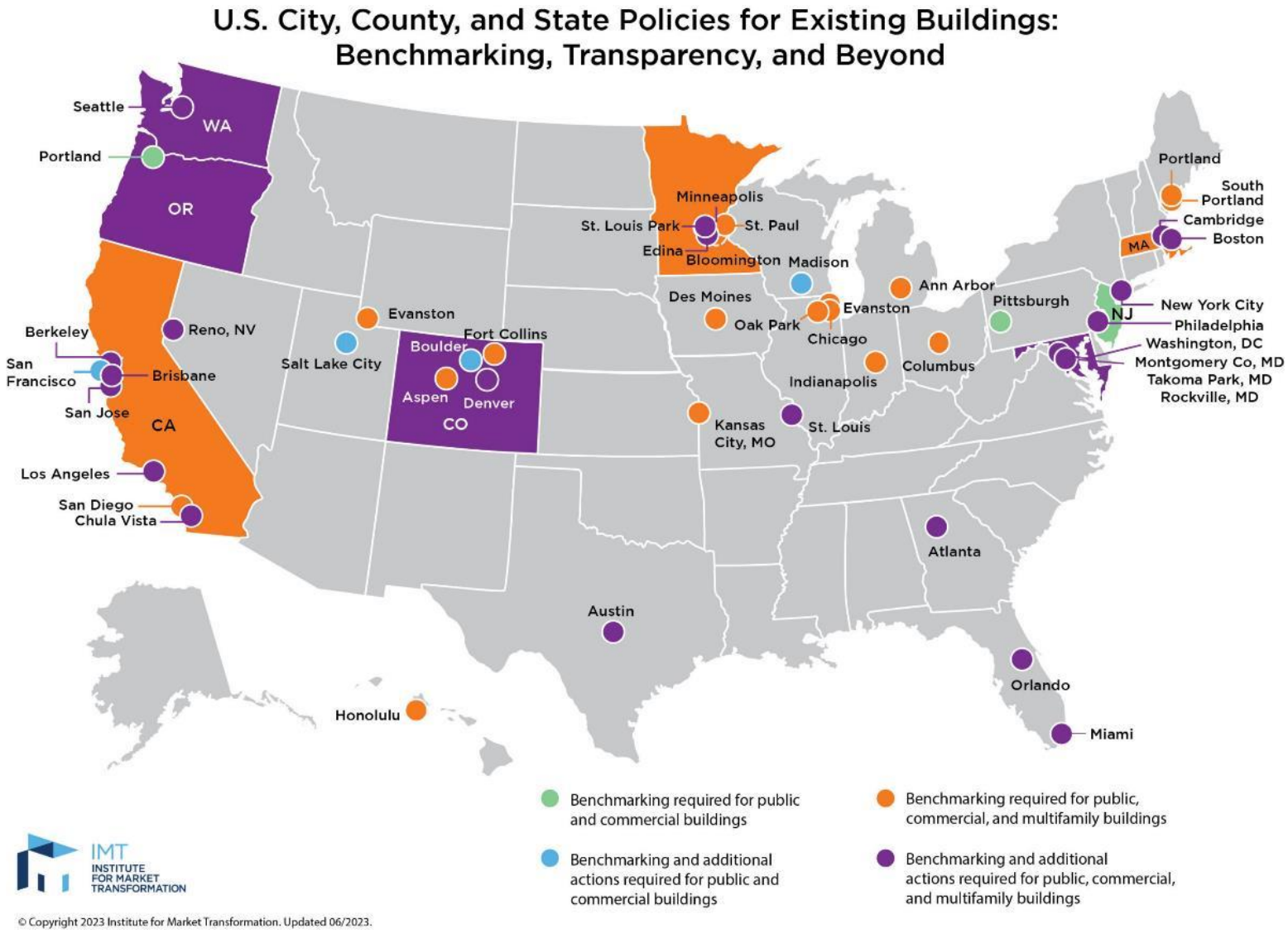
Please enter your responses in the chat! (1 a, 2 b, etc.)

Understanding State and Local Benchmarking Requirements

Benchmarking Policy Drivers

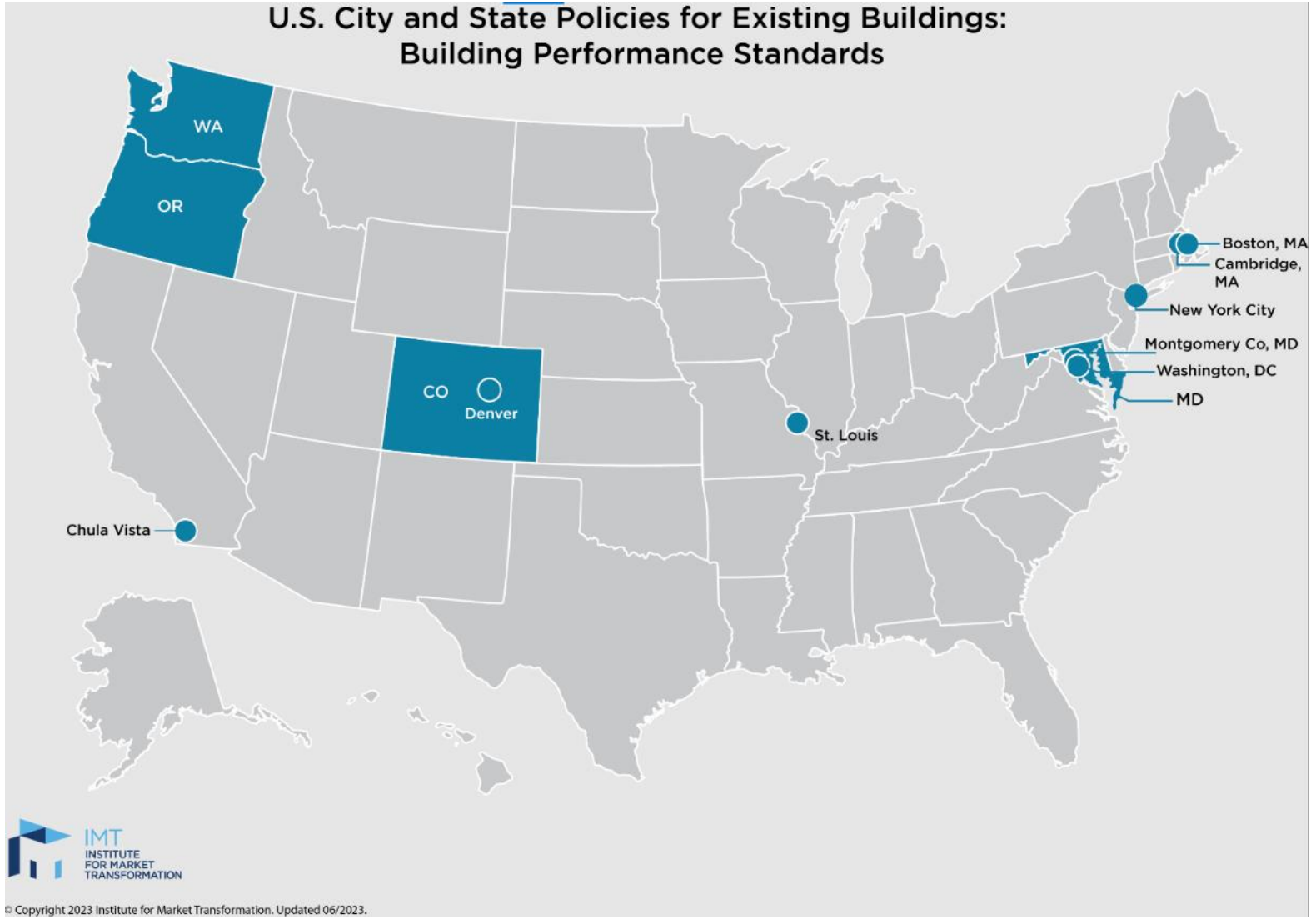
- Driven by local and state governments (not an EPA requirement).
- Transparency/disclosure of energy performance intended to drive awareness of and improvements in building performance.
- Can take different forms
  - Local/state government “lead by example” efforts (focused on public facilities).
  - Voluntary efforts (e.g., local or state benchmarking/energy reduction competition)
  - Annual benchmarking and disclosure for all commercial buildings.
  - Transaction-based disclosure (building lease or sale).
  - Benchmarking + additional action (e.g., audits, retro-commissioning).
- Building performance standards are becoming more common
  - Requirement to achieve specified level of performance;
  - May be focused on energy consumption and/or greenhouse gas emissions.

Local- and Statewide Benchmarking Mandates



Source: BuildingPerformance Policy Center - IMT

Building Performance Standards



Source: BuildingPerformance Policy Center - IMT

What if Our Jurisdiction Doesn't Have Any Benchmarking Policies?

- Benchmarking is a best practice for energy management.
- Leading organizations benchmark their portfolios, regardless of policy requirements.
- The development and passage of new benchmarking mandates at the state and local level continues; now is the best time to get a head start!

Polling Break

3. Is your District required or encouraged to benchmark its schools as a result of mandatory or voluntary policies/programs (select all that apply)?
   a) State/local benchmarking ordinance
   b) State/local building performance standard
   c) State/local government "lead by example" program
   d) School district policy
   e) Voluntary campaign (e.g., competition)
   f) We are not required or encouraged to benchmark our schools

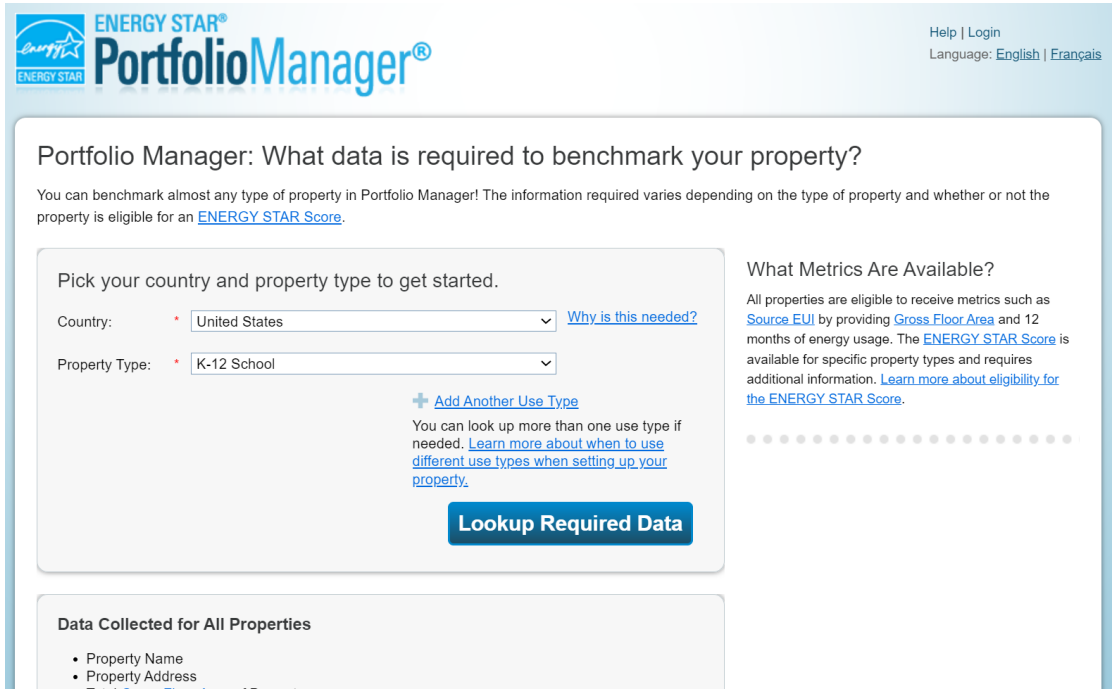
Please enter your responses in the chat! (3 a, b, etc.)

Collecting and Organizing Data

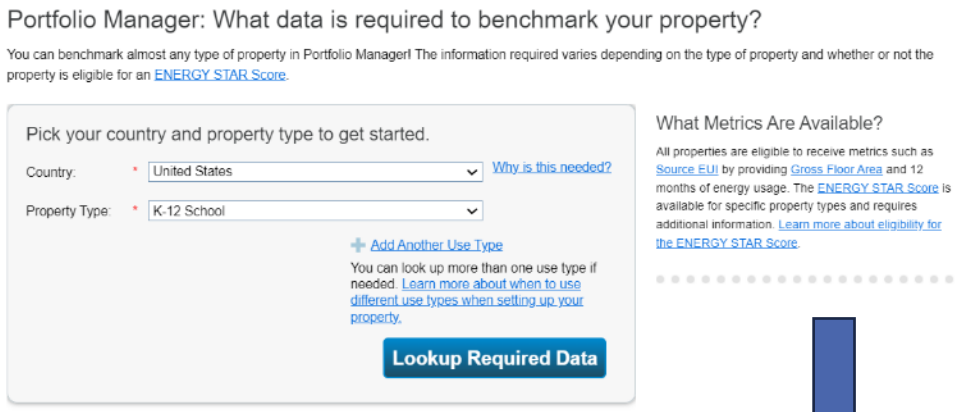
Benchmarking Data Requirements

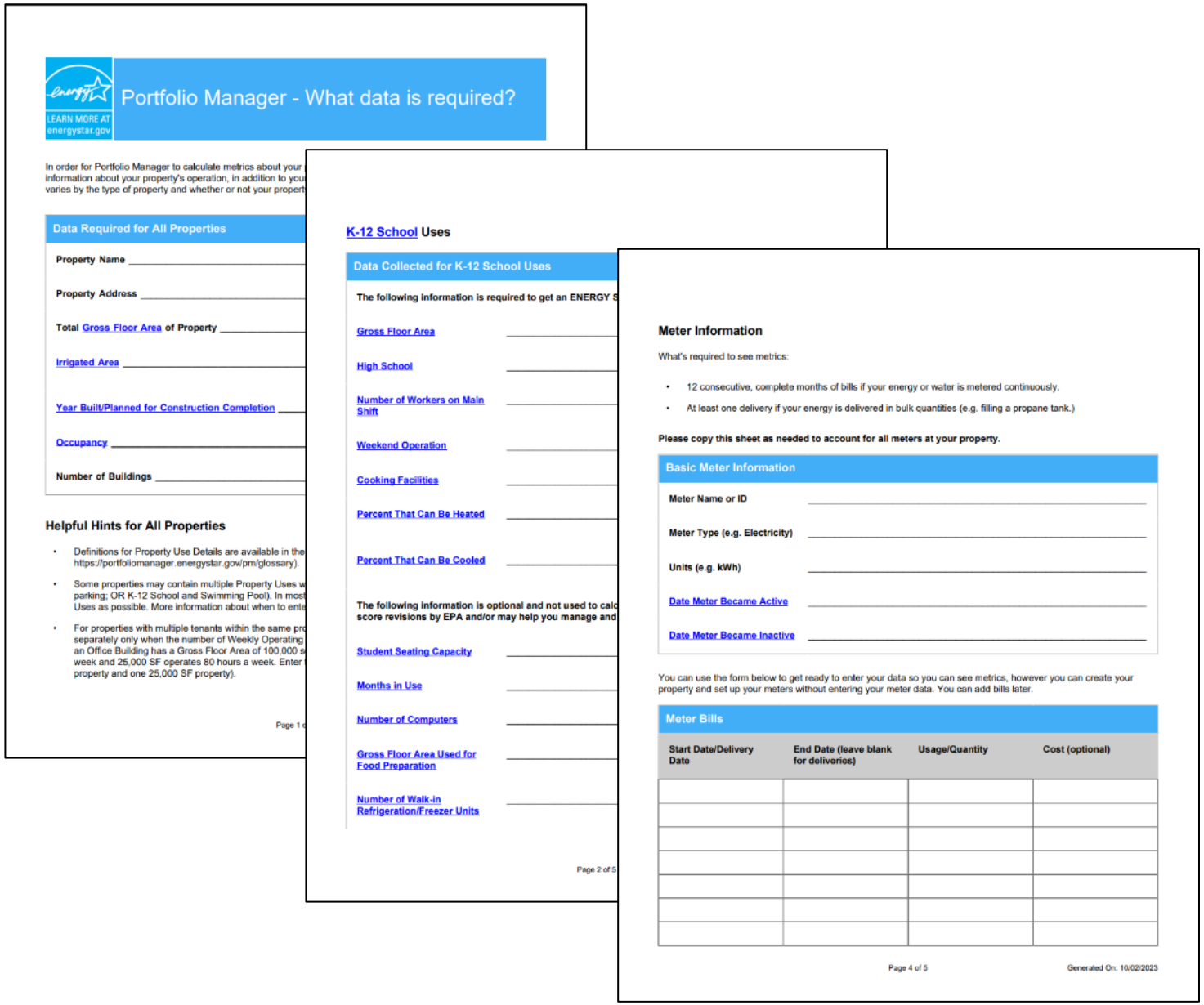
Data Collection Worksheet
https://portfoliomanager.energystar.gov/pm/dataCollectionWorksheet

- Basic property information
  - Name
  - Address
  - Gross floor area
  - Year built
  - Occupancy
  - Number of buildings
- School-specific details
  - Number of workers
  - Weekend operation (yes/no)
  - High school (yes/no)
  - Cooking facilities (yes/no)
  - Percent of school that can be heated/cooled
- At least 12 consecutive months of consumption data for all energy types used to operate the property (monthly granularity is recommended).



Data Collection Tools





https://portfoliomanager.energystar.gov/pm/dataCollectionWorksheet

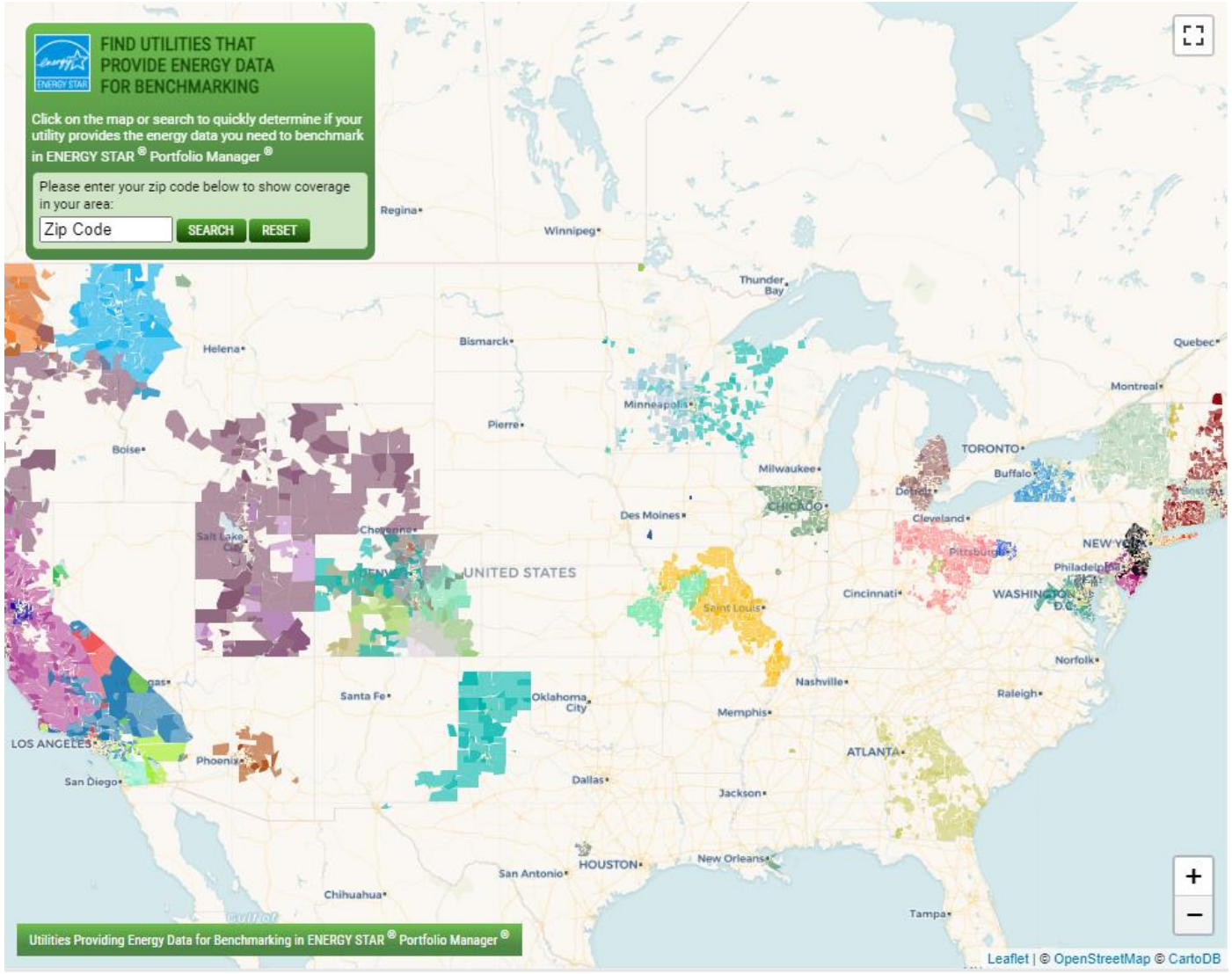
Key Considerations for Benchmarking Data Collection

- Who receives/reviews energy bills and where is this information stored?
  - School- vs. District-level
    - Paper vs. electronic?
    - Spreadsheet vs. database?
    - Reviewed by facilities/energy management staff, or just paid by accounts payable?
  - 3rd party utility bill pay providers

- What other data tracking systems are in place?
  - Building management/building automation systems
  - 3rd party energy tracking/analytics platforms (e.g., EnergyCAP, Brightly, EduCon)
    - Many 3rd party providers have built direct integrations between their systems and Portfolio Manager.
    - For more information, see the list of ENERGY STAR Service Providers That Exchange Data with Portfolio Manager via Web Services

Your Utility May Be Able to Help You Obtain Streamlined Access to Energy Consumption Data for Benchmarking

www.energystar.gov/utilitydata



Polling Break

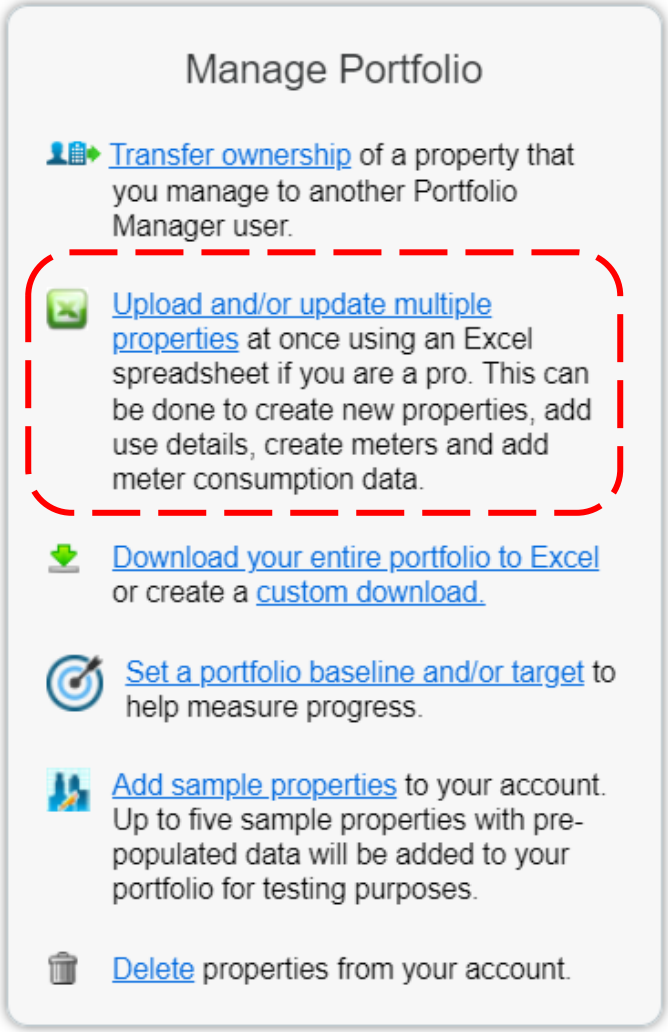
4. Which of the following resources is your District using to facilitate energy data collection and management (select all that apply)?
   a) Hard copy utility bills
   b) Online utility account access (e.g., "My Account")
   c) Internal spreadsheets/database
   d) Building automation system
   e) Third-party utility bill-pay services
   f) Third-party energy tracking/analytics software

Please enter your responses in the chat! (4 a, b, etc.)

Benchmarking Your Schools in Portfolio Manager

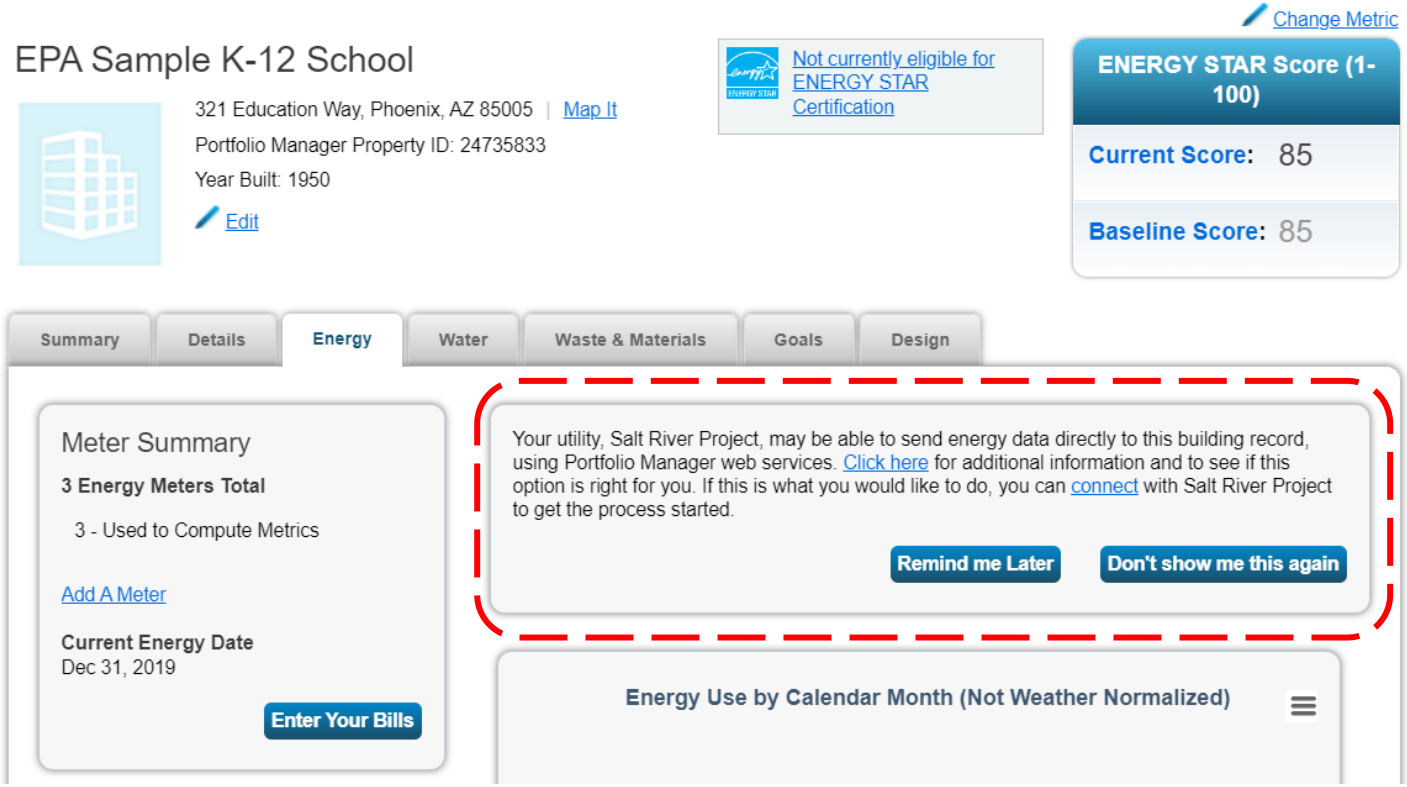
Multiple Approaches to Data Entry

- Manual Data Entry
  - Directly in the Portfolio Manager web interface
  - Create and update one property at a time.
- Spreadsheet Upload
  - “In-between” option
  - Requires access to Portfolio Manager web interface, but data input can be streamlined through dedicated spreadsheet upload pathway.
    - Add Properties
    - Add Meters to Existing Properties
    - Add Bills to Existing Meters
    - Update Use Details



Multiple Approaches to Data Entry, cont'd.

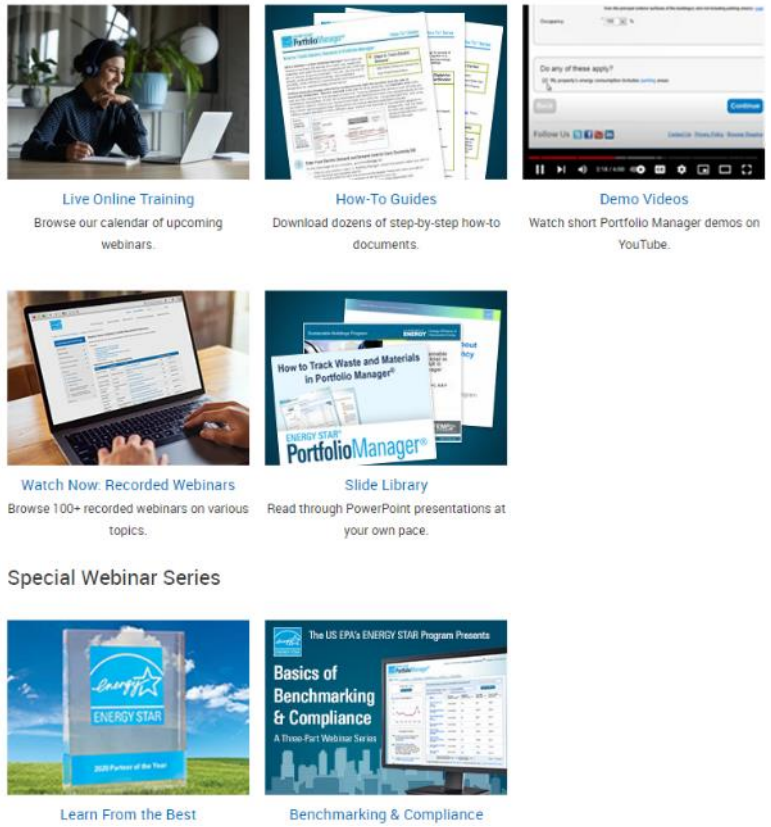
- Data Exchange via Web Services
  - Approved 3rd parties (energy service providers, utilities) can send data directly to your Portfolio Manager account.
    - May be a free service (most utility data access solutions) or a paid solution (energy management software providers).
  - Can be configured to provide ongoing (monthly) data updates without the need for new requests



Find an ENERGY STAR Service and Product Provider

Extensive Training Resources Available

- The ENERGY STAR Buildings Training webpage is your source for:
  - Access to registration for live webinars (via Webex).
  - Webinar recordings.
  - Downloadable “How To” Guides for different areas of Portfolio Manager functionality.
    - Creating and updating property record
    - Creating and updating meters
    - Sharing property records with other Portfolio Manager users
    - Reporting (standard, custom, responding to Data Requests)
    - Campus benchmarking
    - Benchmarking properties with onsite renewable energy
    - How to apply for ENERGY STAR certification
  - YouTube demonstration videos.
  - Slide library (for “train the trainer” efforts).



https://www.energystar.gov/buildings/training

Let's Dive In!

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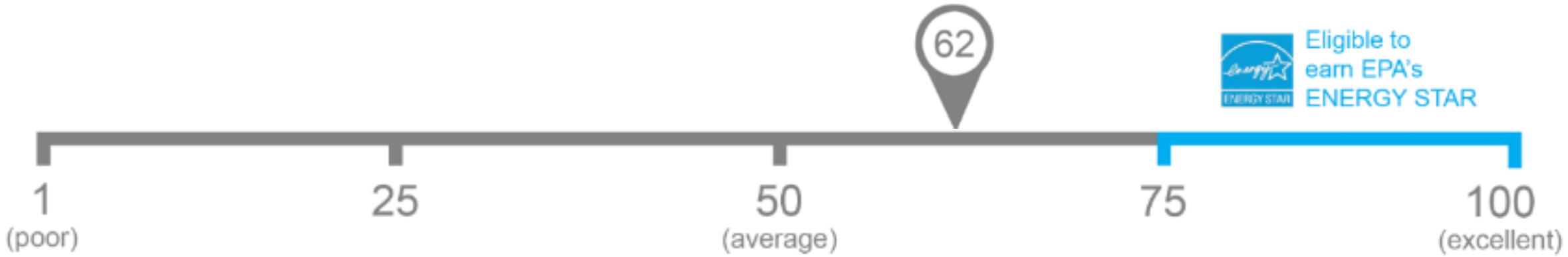
Today's Demo

- Live screen share
- Walk through the basic steps to set up a K-12 school property in Portfolio Manager
  - Data entry
  - Review of metrics
  - Reporting options
- Detailed screen shots (for future/ongoing reference) can be found in ENERGY STAR Training slide decks:
  - Portfolio Manager 101: Set up properties and meters, generate reports
  - Portfolio Manager 201: Edit and correct property data, use data quality checker, share properties
  - Portfolio Manager 301: Update data, set baselines, goals, and targets, create custom reports, use the Sustainable Buildings Checklist

Interpreting Benchmarking Results

The 1-100 ENERGY STAR Score



One simple number
understood by ALL stakeholders.

What the 1-100 ENERGY STAR Score Does (and Doesn't) Tell You

- Does help you assess how your building is performing and identify which buildings offer the best opportunities for improvement or recognition!
- Does not explain why a building performs a certain way, or how to change the building's performance.

The Score Does	The Score Does Not
• Evaluate actual billed energy data • Normalize for business activity (hours, workers, climate) • Compare buildings to the national population • Indicate the level of energy performance	• Sum the energy use of each piece of equipment • Credit specific technologies • Compare buildings with others in Portfolio Manager • Explain why a building performs well or poorly

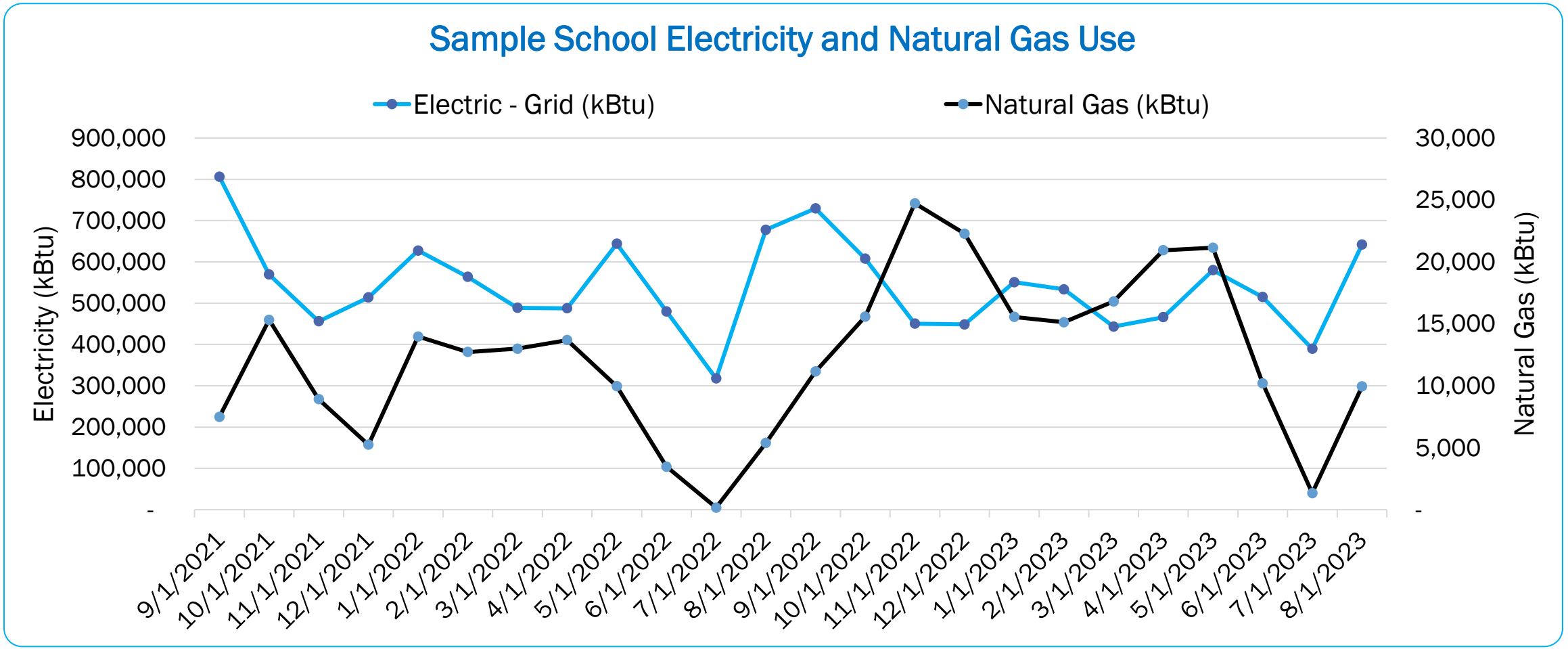
General / Indicative Guidance Based on Score

- 1 – 49
  - Underperforming compared to similar K-12 properties nationwide.
  - Greatest opportunity for improvement.
  - Capital expenditure may be needed to get building to average performance or above.

- 50 – 74
  - Performing at or above the national median for K-12 properties
  - No- and low-cost measures (enhanced O&M, behavioral approaches, quick payback retrofits) may result in significant improvement

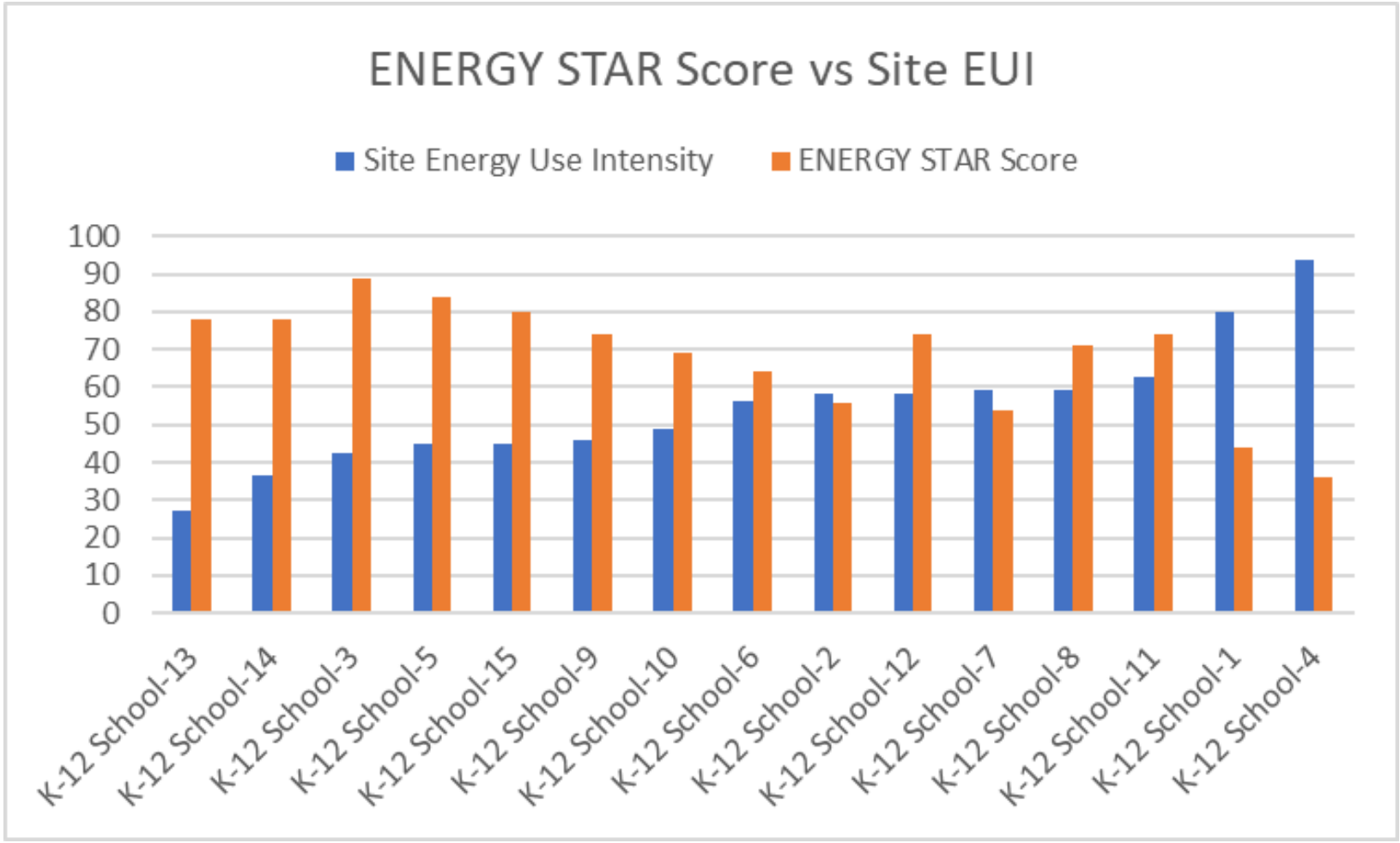
- 75 – 100
  - Superior energy performance.
  - Critical to identify and maintain the energy management best practices that have resulted in this level of performance.
  - Opportunity to apply for ENERGY STAR certification.

Identify Patterns and/or Anomalies in the Data



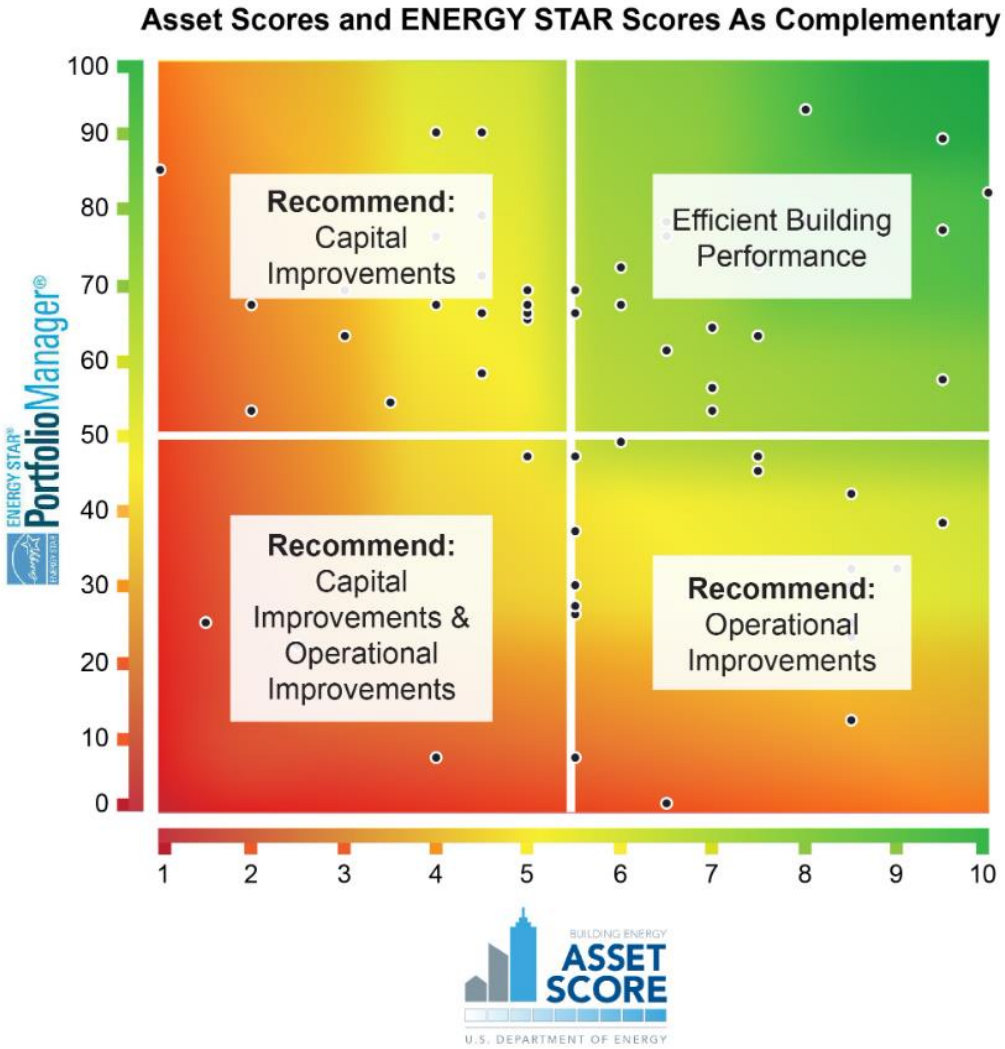
Prioritize Next Steps Across a Portfolio of Schools

- Which schools are the best options for next steps (assessments, upgrades)?
  - How would you prioritize School 7 vs. School 8 (same EUIs, different ENERGY STAR scores)?
- Which schools are the best performers
  - What are they doing to achieve this level of performance?
  - Can best practices be shared across all the schools?



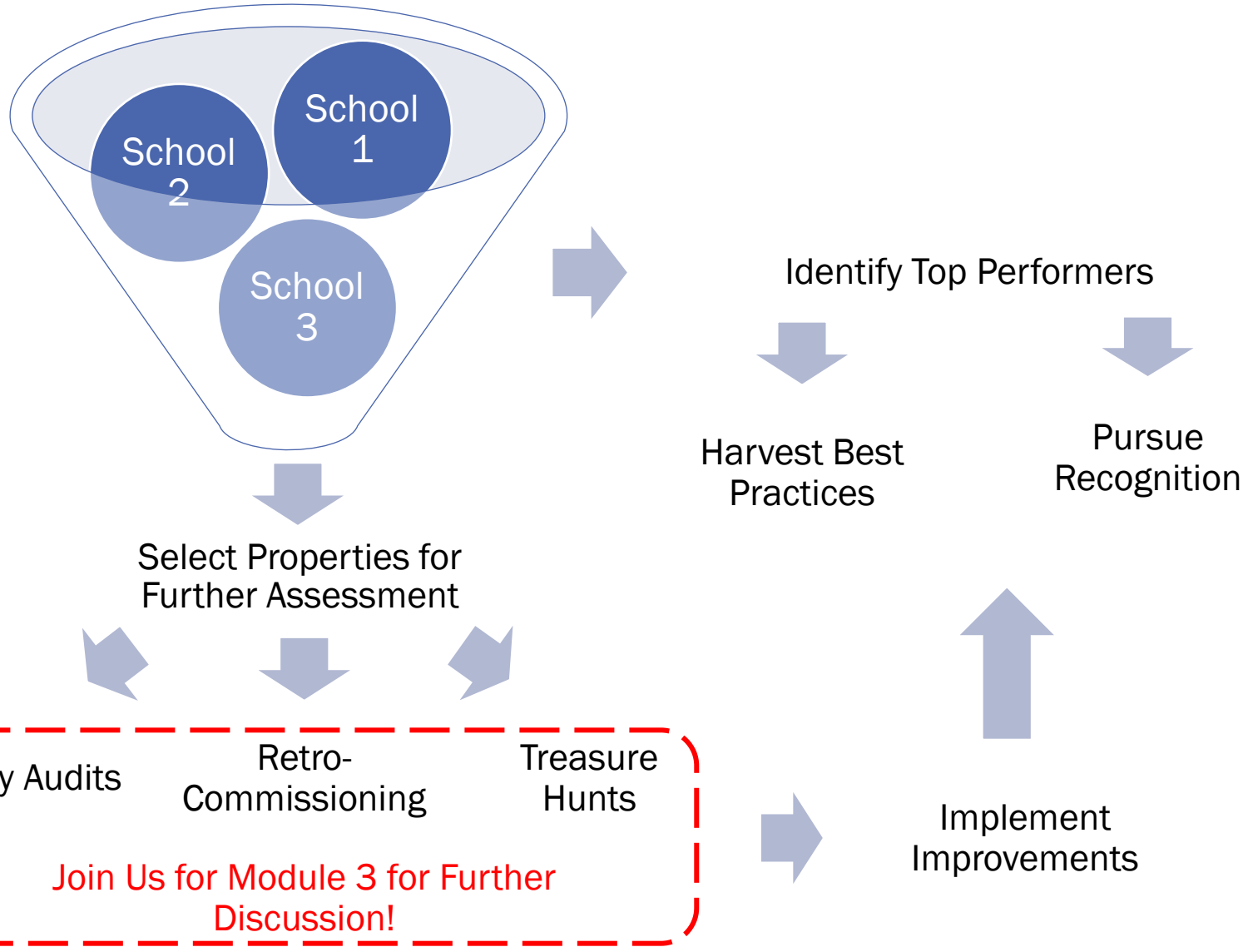
Portfolio Manager Results Can Be Combined With Other Insights

- Age of building(s)
  - Newer buildings do not necessarily perform better, but they may have more advanced equipment that can deliver higher performance, when combined with strong operations.
- History of energy assessments and/or upgrades
  - Has the building received an energy audit or retro-commissioning in the past 3-5 years?
  - Were any of the identified measures implemented?
    - If so, how have they performed?
    - If not, why not?
- DOE Asset Score
  - Understand the potential performance of your property based on building design, construction, and energy systems



Building Data Tools | Asset Score (energy.gov)

Benchmarking Informs Next Steps to Achieve Energy Performance Improvements



Polling Break

5. How is your District using benchmarking results (select all that apply)?
   a) Demonstrating compliance with state/local mandates
   b) Identifying schools for further assessment (prior to project selection)
   c) Identifying schools for energy upgrades/improvements (without additional assessment)
   d) Identifying top performers and distilling best practices
   e) Seeking recognition (e.g., ENERGY STAR certification)
   f) We are not using benchmarking to inform next steps

Please enter your responses in the chat! (5 a, b, etc.)

Questions?

We look forward to working with you!