

PNNL Data and Tools Overview

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Abstract

The U.S. Department of Energy (DOE) has developed a comprehensive suite of tools for accessing, managing, analyzing, and sharing building energy and water data. The Asset Score tool assesses the energy efficiency of a building's physical systems and produces an "Energy Asset Score" report. Asset Score identifies energy efficiency measures to help buildings meet energy, water, and carbon emissions goals for compliance with a jurisdiction's building performance standards (BPS) policy. The Audit Template tool is an online portal that jurisdictions use to collect standardized information about a building's physical systems and recommended upgrades. Audit Template can be used to implement audit, retrocommissioning, or BPS policies, to manage private or municipal building stock, and to track audit submissions and compliance. The Unique Building Identifier (UBID) is a natural key for buildings, based on geospatial coordinates. UBIDs implement audit, benchmarking, and BPS policies, to generate unique and cross-referenceable identifiers for buildings, and to simplify reporting for building owners.

Find the tools at <https://buildingenergyscore.energy.gov> and <https://buildingid.github.io>.

Asset Score

Asset Score is a simple, web-based tool that uses minimal building information to analyze a building's as-designed efficiency, provide insights on the efficiency levels of its existing systems, and identify opportunities for improvements.

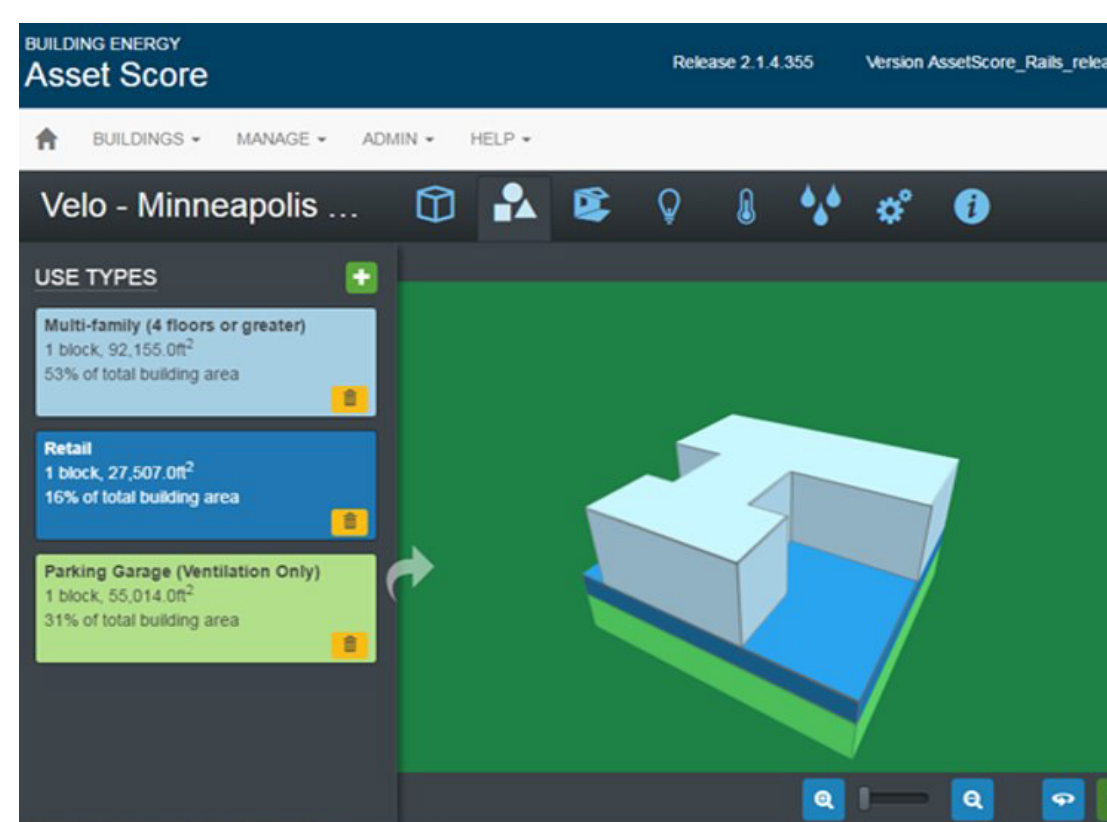


Figure 1. Asset Score user interface.

The "Energy Asset Score" is a quantitative rating of a building's as-designed efficiency based on an evaluation of its construction. The tool automatically generates and simulates current and optimized OpenStudio and EnergyPlus models to identify and evaluate the efficacy of energy savings measures and electrification opportunities for:

- Lighting systems
- Heating, ventilation, and air conditioning (HVAC)
- Building envelope and fenestration
- Service hot water systems

Asset Score Report

The simulation results, system assessments, energy savings recommendations, and electrification, health and safety opportunities are reported in human-readable documents that can be downloaded from the tool.

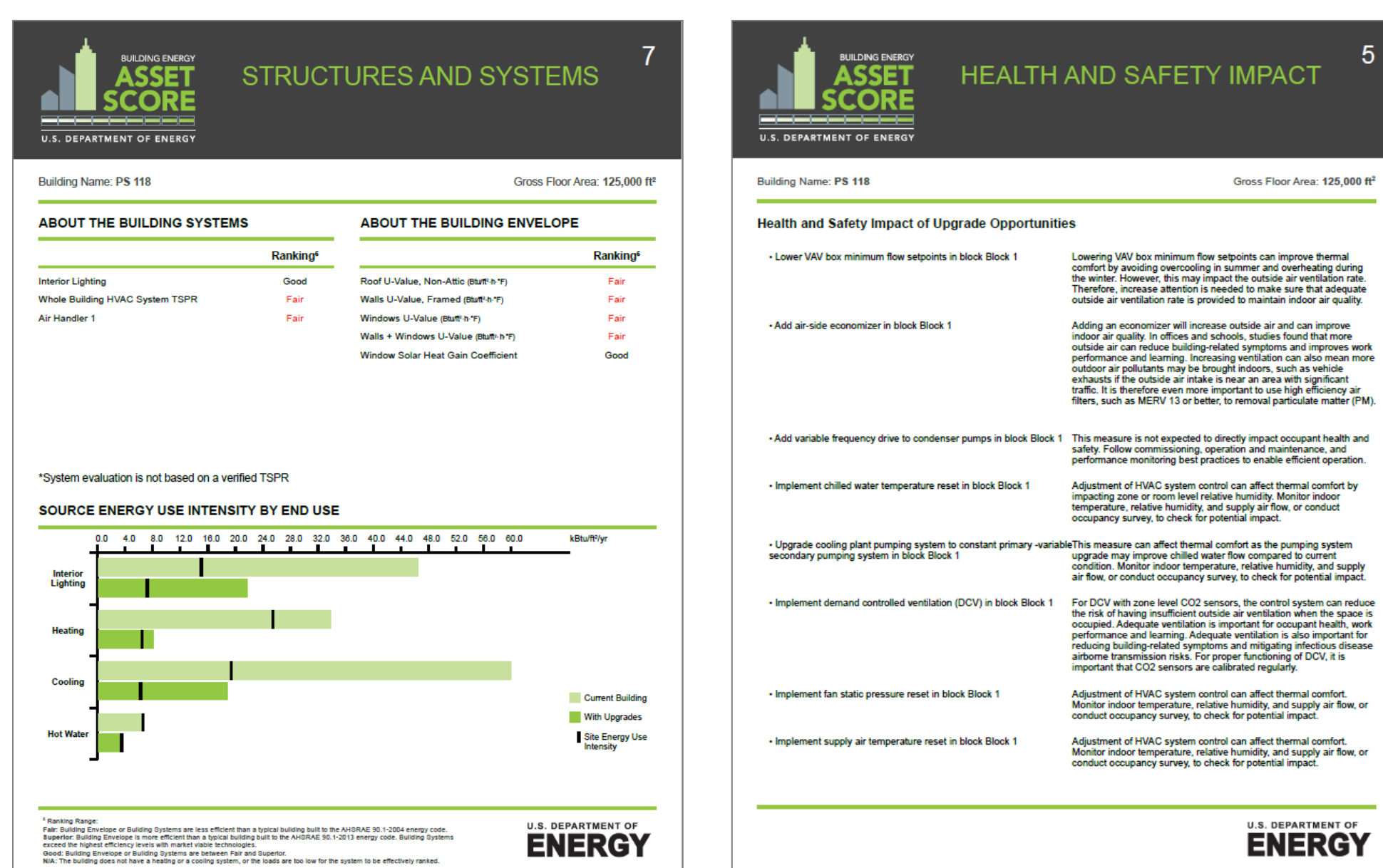


Figure 2. Asset Score report.

Audit Template

Audit Template is a free, web-based tool for the collection and reporting of building energy and water audit data. Based on ASHRAE Standard 211, the tool offers jurisdictions the capability to create and customize audit report templates that satisfy their unique data collection and reporting requirements, facilitating the implementation of BPS policies and audit ordinances, enabling building owners to demonstrate audit completion for ordinance compliance.

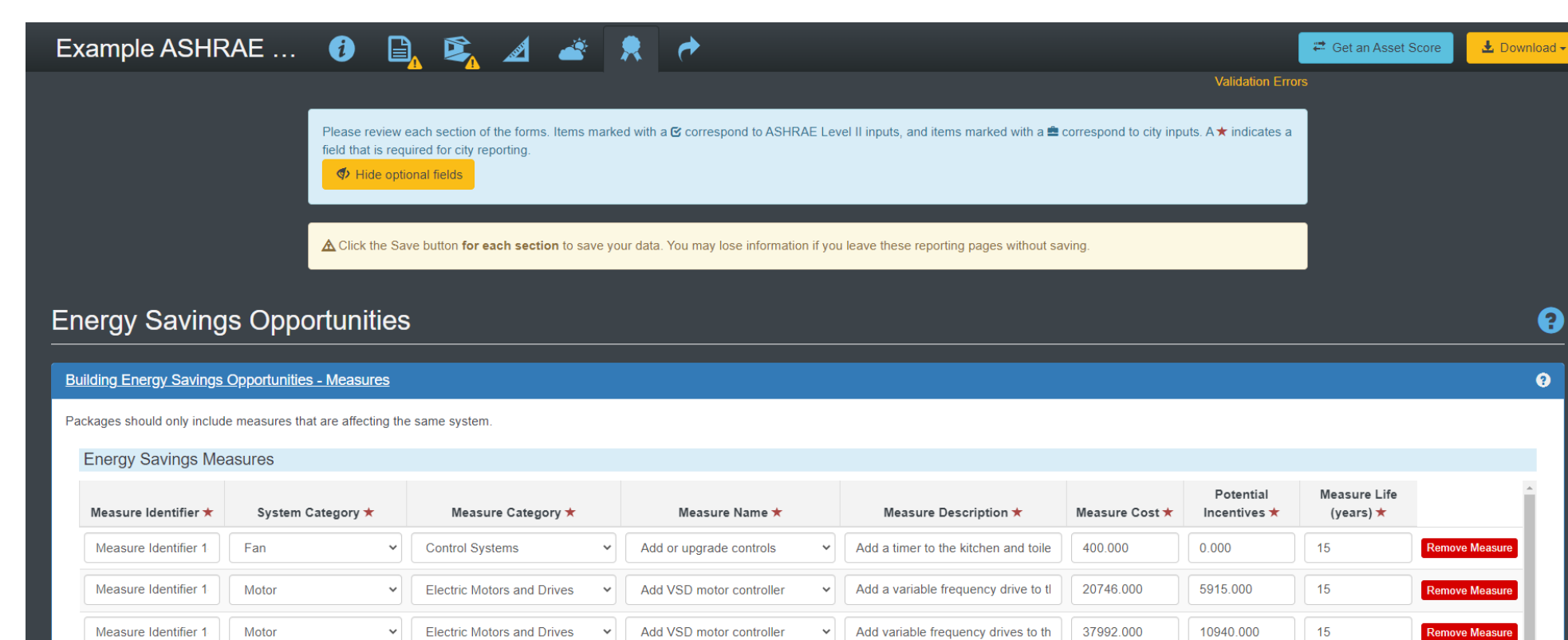


Figure 3. Audit Template user interface.

Data are collected for all ASHRAE Level 2 audit inputs, including building information, utility data and benchmarking, energy use by end use, and energy savings opportunities. Additional, custom inputs can be added for jurisdictions, based on their reporting requirements. The tool supports the export of a variety of human- and machine-readable data formats, including:

- BuildingSync documents [1].
- Federal Energy Management Program (FEMP) EISA 432 Compliance Tracking System (CTS) spreadsheets [2].

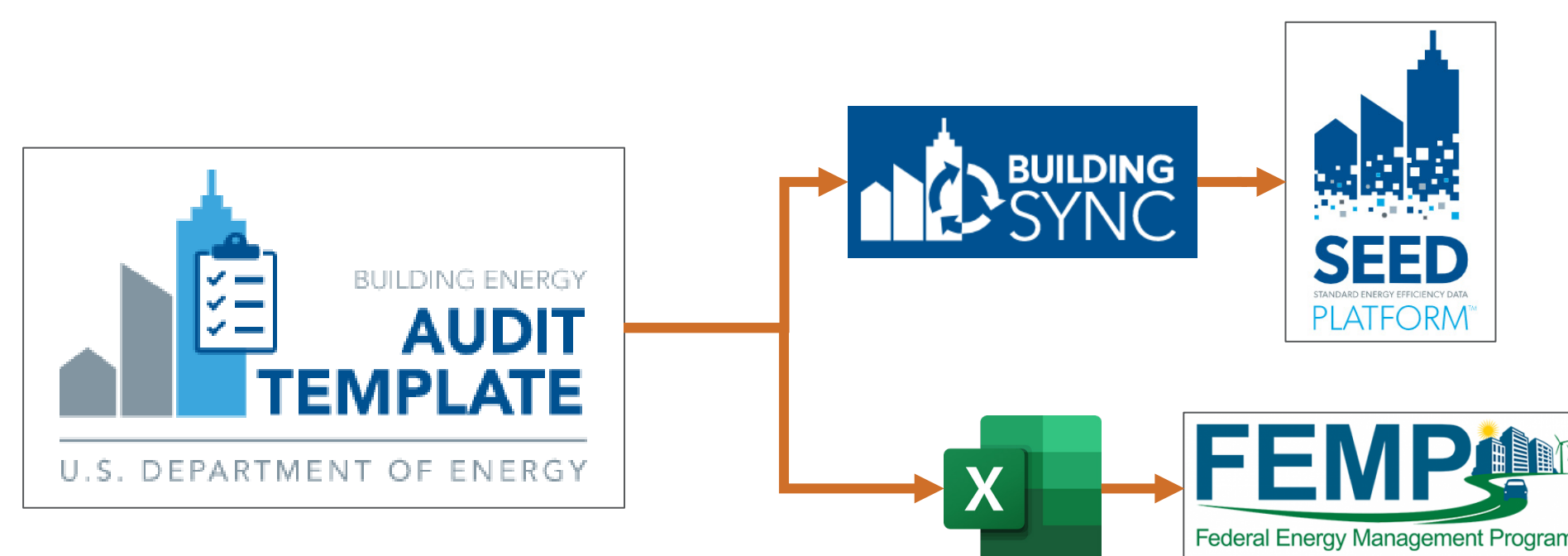


Figure 4. Audit Template data exchange with SEED [3] via BuildingSync documents [1] and FEMP via CTS [2] spreadsheets.

Since its launch in 2016, Audit Template has grown from a single reporting template to over a dozen reporting templates. The tool is actively used by several major U.S. cities, including New York City, San Francisco, Atlanta, and Washington, D.C., collectively contributing over 1,800 audits per year. The data that are collected by the tool can be used by policy makers to help inform decisions and to improve new and existing programs.

Unique Building Identifier

The Unique Building Identifier (UBID) can be used to generate and assign unique record numbers—referred to as UBIDs—to 2-dimensional footprints on a map occupied by any object for which data are collected and tracked over time. Assigning UBIDs allows object-specific data to be reliably cross-referenced and matched between datasets to yield actionable insights.

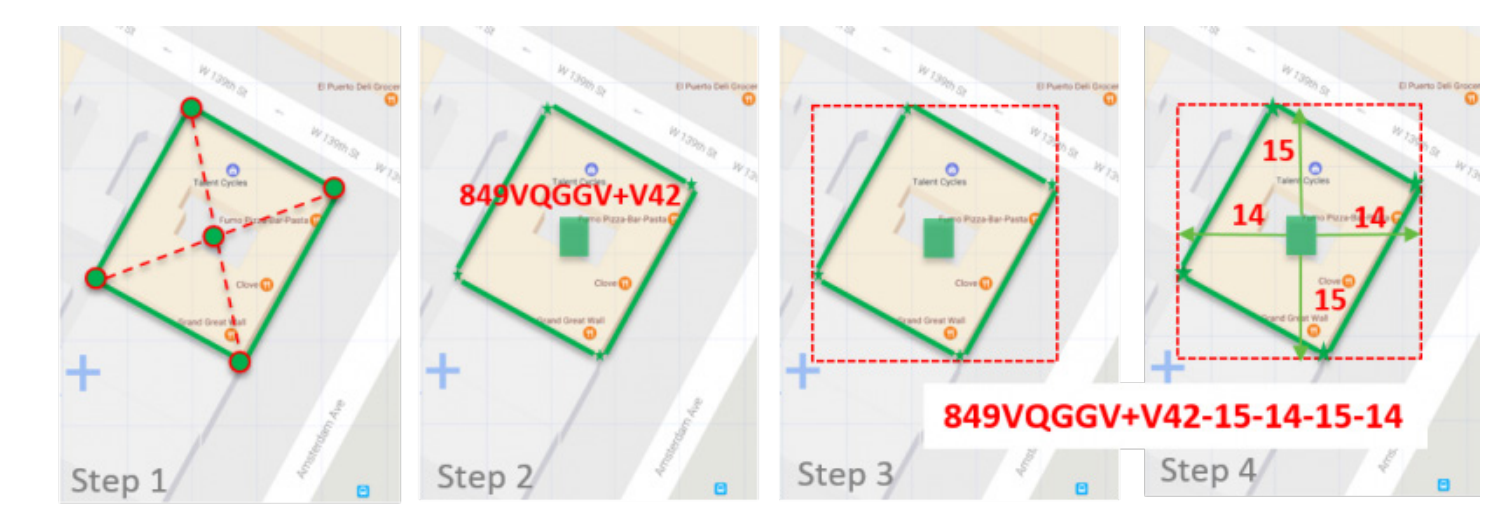


Figure 5. UBID assignment for a building footprint.

UBID is a free, open-source software tool. UBID is incorporated into the Standard Energy Efficiency Data (SEED) Platform and ENERGY STAR Portfolio Manager as a "Standard ID" for buildings and properties. This integration provides a pathway to portfolio-level data collection and tracking that may not otherwise be possible for all jurisdictions.

Quick Building Assessment Tool

Developed in 2022, Asset Score's Quick Building Assessment Tool (QBAT) offers an accessible capability to support the Funding Opportunity Announcement (FOA) for energy improvements at public K-12 school facilities as part of the Bipartisan Infrastructure Law (BIL). Using only 5 simple inputs and robust inferences, QBAT creates, models, and recommends energy efficiency, health, and safety measures for schools.

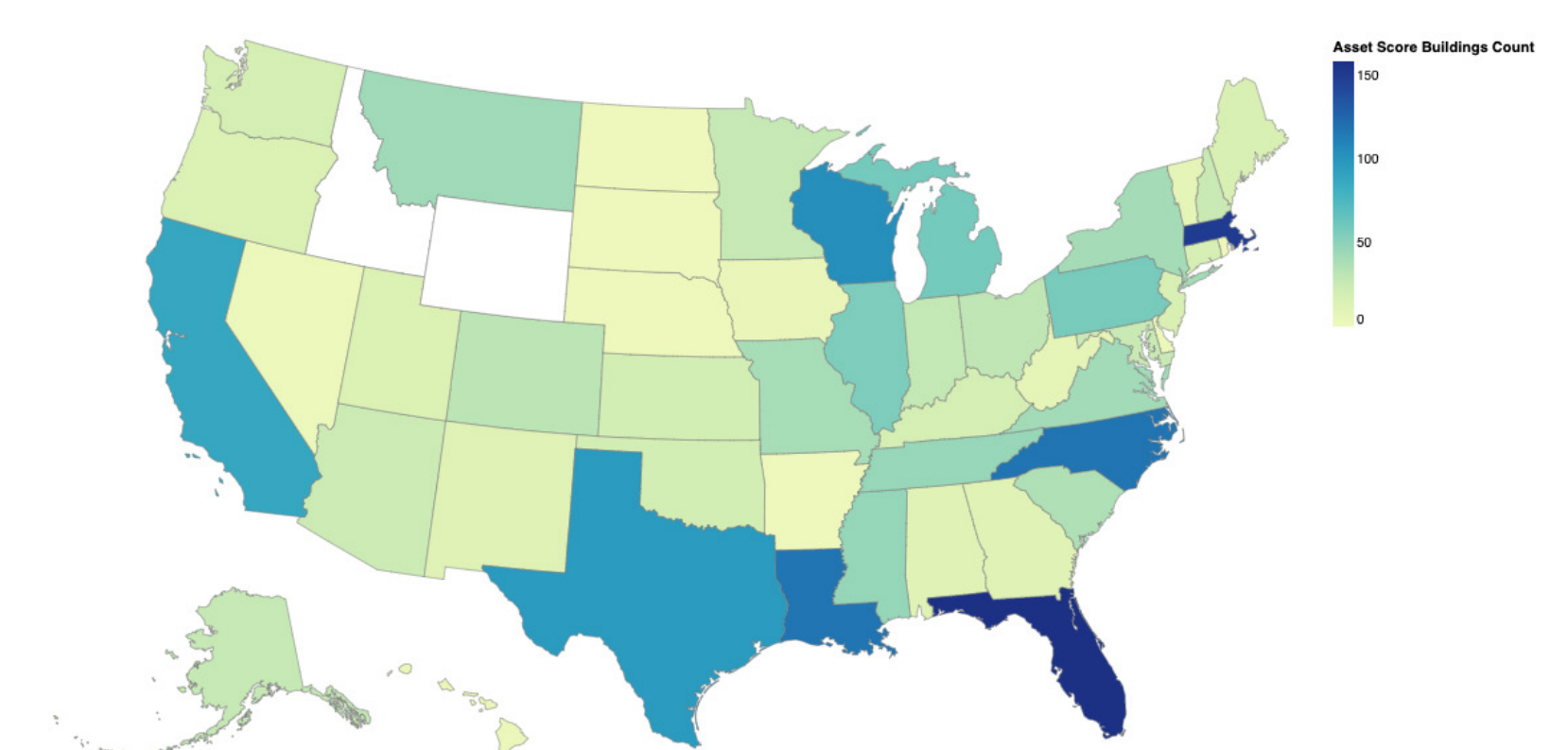


Figure 6. Locations of the 2,000+ public K-12 school facilities that were analyzed using Asset Score's QBAT capability during the first round of the BIL FOA from November 2022 to January 2023.

References

1. Long, N., Fleming, K., CaraDonna, C., & Mosiman, C. (2021). BuildingSync: A schema for commercial building energy audit data exchange. *Developments in the Built Environment*, 7, 100054.
2. Energy Independence and Security Act, 42 U.S.C. § 432 (2007)
3. Taylor, C. (2012). Standard Energy Efficiency Data (SEED) Platform: A tool for Jurisdictions to Track and Transact Energy Data.