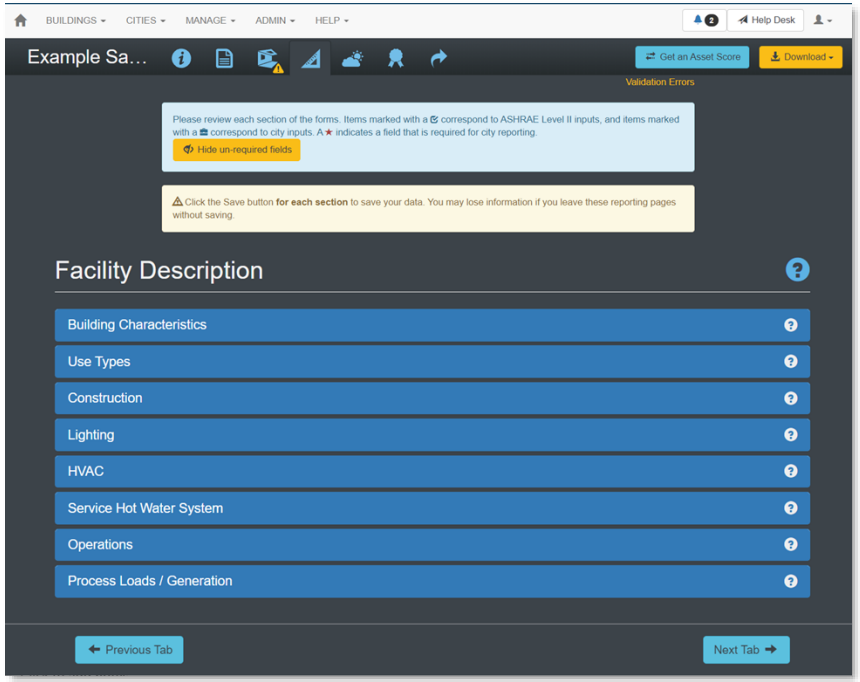
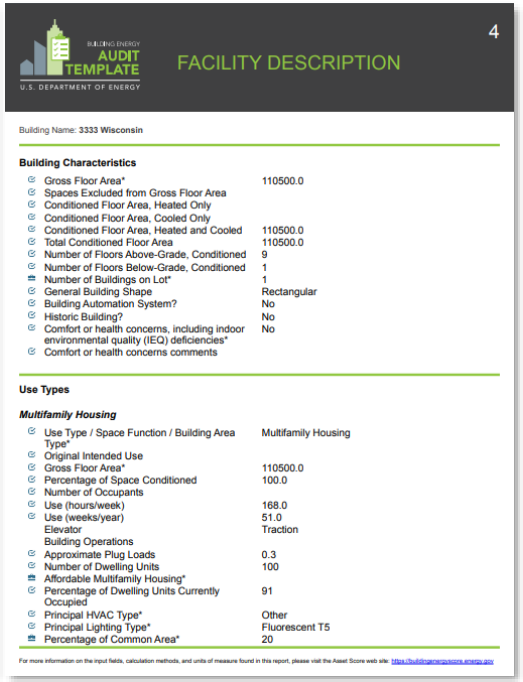
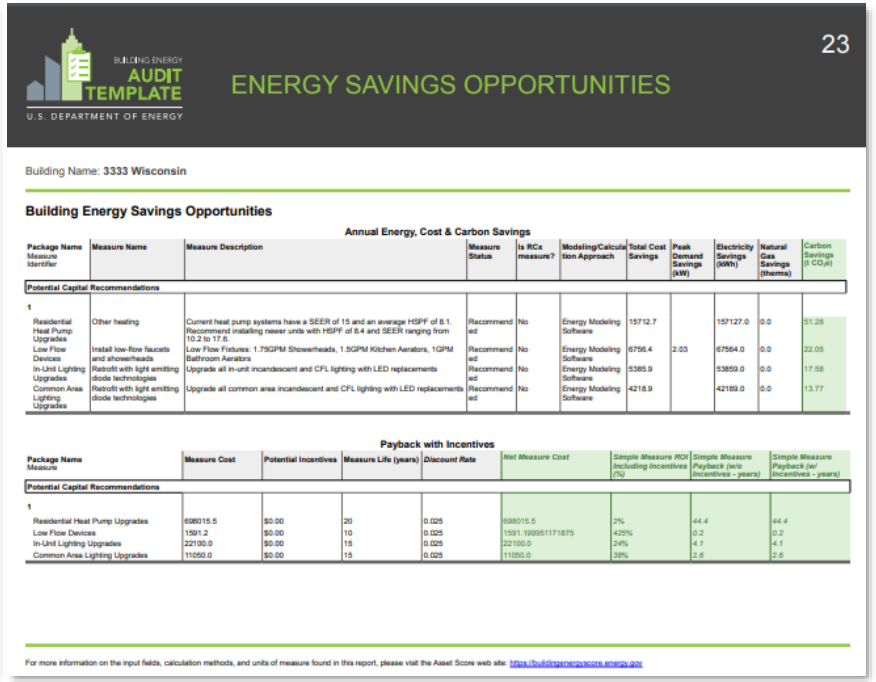
Audit Template







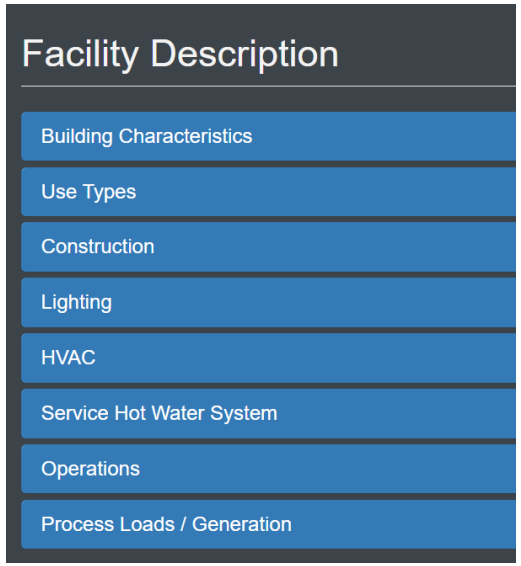
Supriya Goel
(503) 417-7554 supriya.goel@pnnl.gov
WBS # 2.5.1.50

Pacific Northwest
NATIONAL LABORATORY

Project Summary

Objective and outcome

- Provide a standard, data-driven framework for collecting, managing, and reporting building asset data (asset, audit, and retro-commissioning).
- Provide mechanisms for integration with other data collection/reporting tools through data exchange capabilities using BuildingSync XML schema.



BUILDING ENERGY AUDIT TEMPLATE
U.S. DEPARTMENT OF ENERGY

Team and Partners

PNNL

- Supriya Goel, Mark Borkum, Jared Chase, Edward Ellis, Kefei Mo, Juan Carlos Barajas

Partners

- New York City, U.S. Army, Washington, D.C. Department of Energy and Environment, City of Denver, San Francisco, Berkely, Brisbane, Washington

Stats

Performance Period: 2016 – Ongoing

DOE budget: FY23 - $460k, Cost Share: $200k (provided by U.S. Army and DC DOEE)

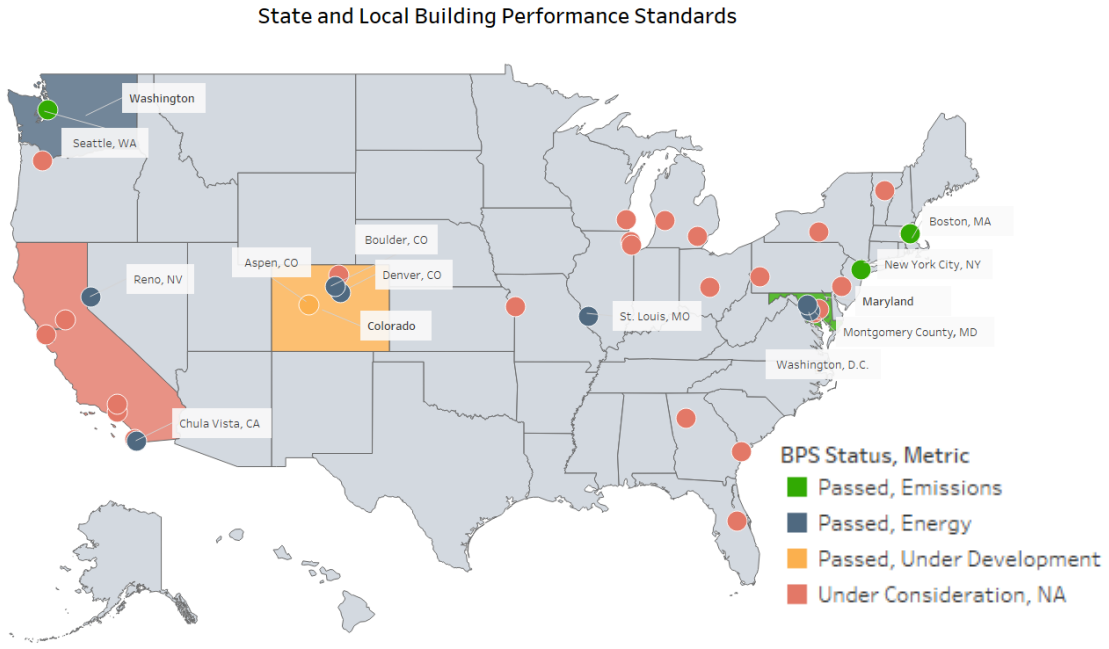
Milestone 1: Develop and deploy a capability for agencies to define custom templates through the tool interface (City Configurable Templates)

Milestone 2: Develop and deploy a retro-commissioning template to support DC's Building Energy Performance Standard

Milestone 3: Deploy a federal template following EISA 432 requirements to support US Army.

Problem

- **Problem:** Existing building stock accounts for over 40% of CO2 emissions –
- **Challenge:** jurisdictions need policies and tools to support building decarbonization and electrification.
  - Jurisdictions have **no standardized mechanisms for data collection and reporting**.
  - Data are submitted in spreadsheets and **stored in unstructured databases**, which limits their utilization
- **Opportunity:** Rising building performance standards (BPS) which will mandate existing building retrofit, electrification and decarbonization. Standard mechanisms for data collection and reporting would be critical to support such policies.



https://www.energycodes.gov/BPS

Solution: Audit Template provides a standardized, data-driven framework for collecting, managing, and reporting building asset data.

Alignment and Impact

Audit Template tool supports multiple EERE/BTO goals

Energy Efficiency

- Provides a **standardized approach** for collecting, managing, and reporting building asset data
- Having data in standard format allows it to be used to **track compliance, performance, and inform policy & program design.**

Decarbonization/ Electrification

- Allows reporting requirements to be **tailored based on policy objectives.**
- Requires assessors to identify energy efficiency measures and the associated energy savings and cost.
- Tool will be expanded to support **decarb audits and electrification plan** in FY24

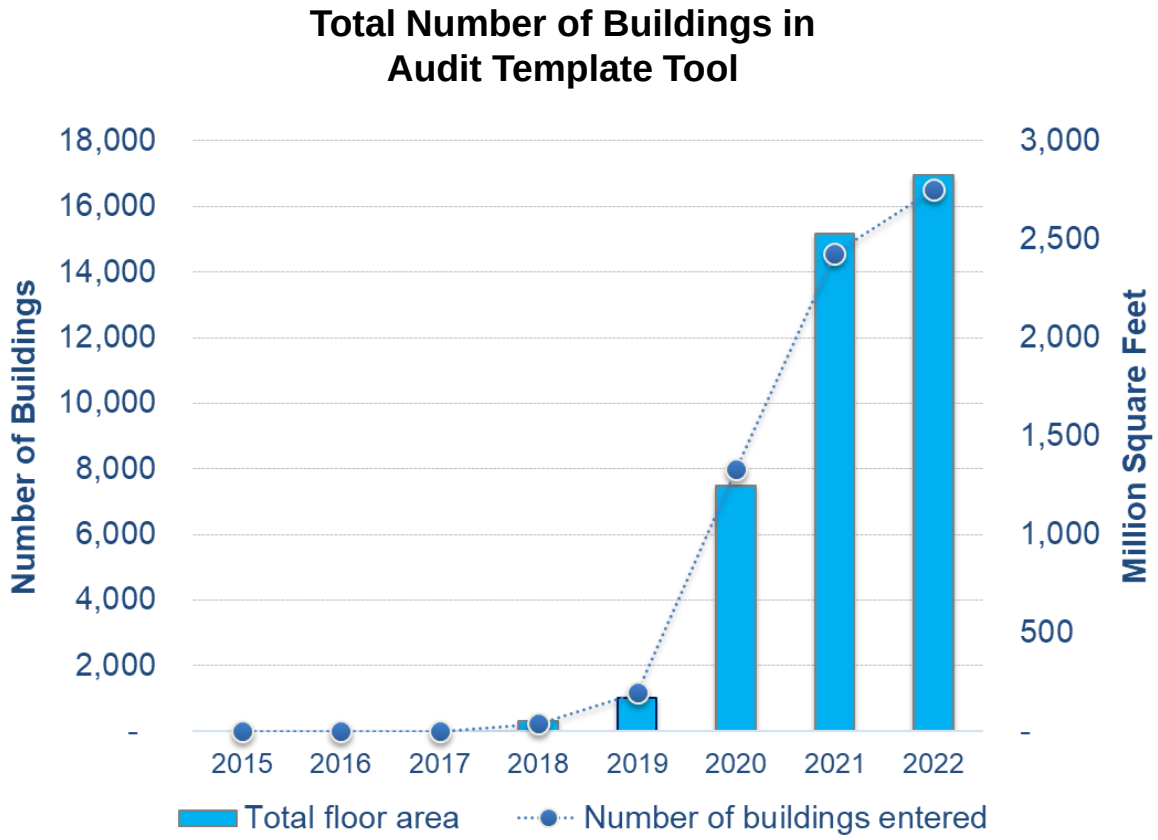
Equity and Affordability

- A **free web-based tool** with a dedicated help desk and several online training resources—Audit Template provides an **accessible capability to meet the needs of lower resourced jurisdictions.** It negates the need to develop custom reporting spreadsheets or platform

Alignment and Impact

Number of Buildings Submitted in Audit Template

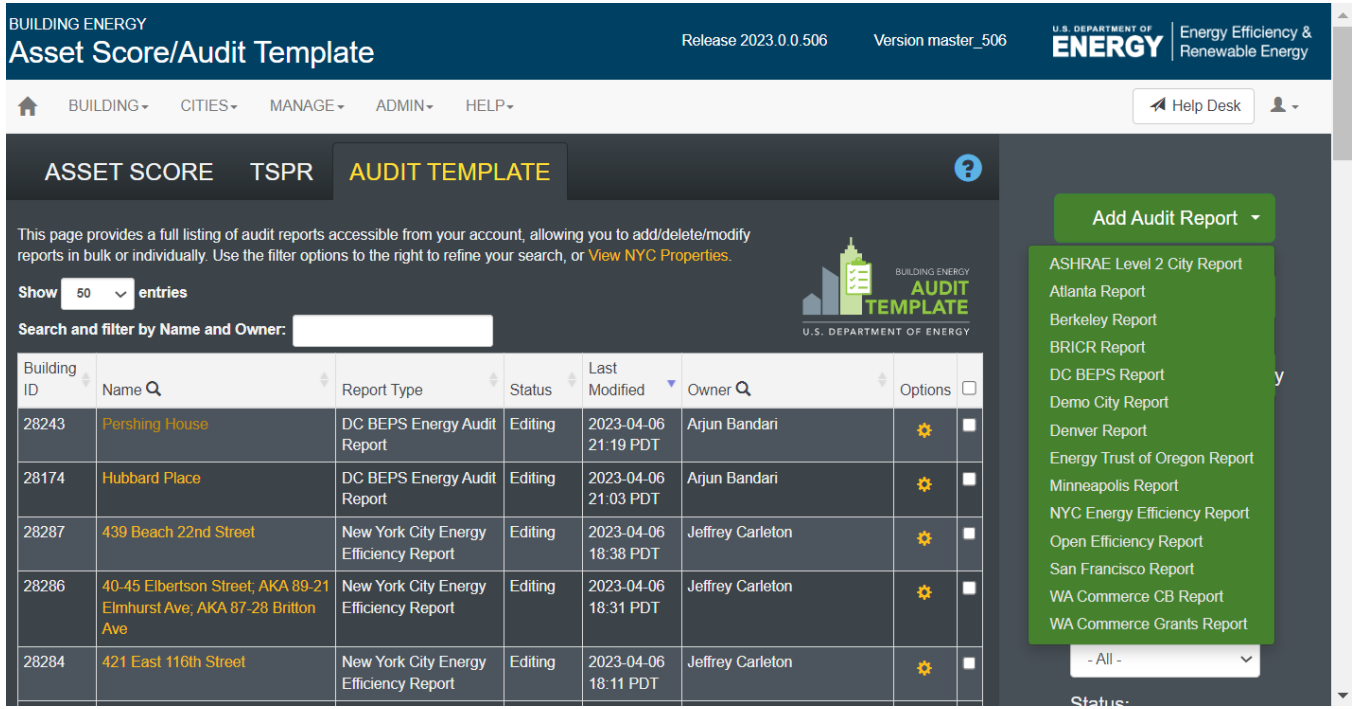
Total of 1,800+ audits per year required to go through Audit Template.



Alignment and Impact

Jurisdictions requiring Audit Template for local auditing ordinances:

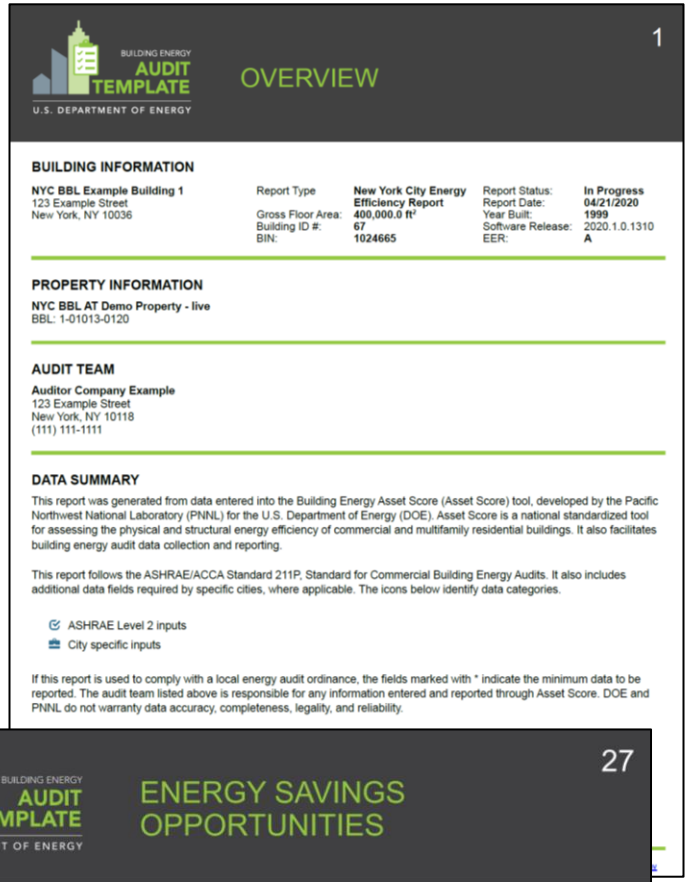
- New York, NY [1]
- San Francisco, CA [2]
- Berkeley, CA [3]
- Atlanta, GA [4]
- WA state [5]
- Washington, D.C. [6]
- City of Brisbane, CA
- City of Denver, CO [7]
- DOEE U.S. Army
- Several more being discussed

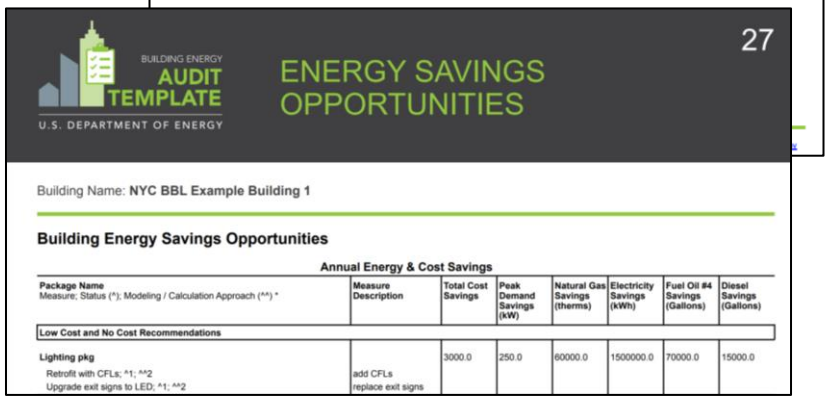


1. https://www1.nyc.gov/site/buildings/codes/energy-audits-retro-commissioning.page
2. https://sfenvironment.org/article/how-to-comply-and-report-to-sf-environment
3. https://www.cityofberkeley.info/BESOassessor/
4. https://atlantabuildingbenchmarking.wordpress.com/compliance/audit/
5. https://www.commerce.wa.gov/wp-content/uploads/2021/06/Clean-Buildings-Incentive-Program-Guidelines.pdf
6. https://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/BEPS_TaskForceMeeting_2021-8-03_Slides.pdf
7. https://denvergov.org/files/assets/public/climate-action/documents/energize-denver-hub/ed-technical-guidance-nov-2022-with-alt-text.pdf

Approach: What is Audit Template?

- **Free, web-based tool** to collect, store, and report building asset data (including ASHRAE Level 2 energy audits, based on Standard 211).
- **Produces an audit data report** that includes calculated tables that outline building energy use and energy efficiency measures.
- Offers **customized templates** to support different jurisdictions that have different data collection and reporting requirements.
- Audit data reports may be submitted to jurisdictions to **demonstrate audit completion** for ordinance compliance.





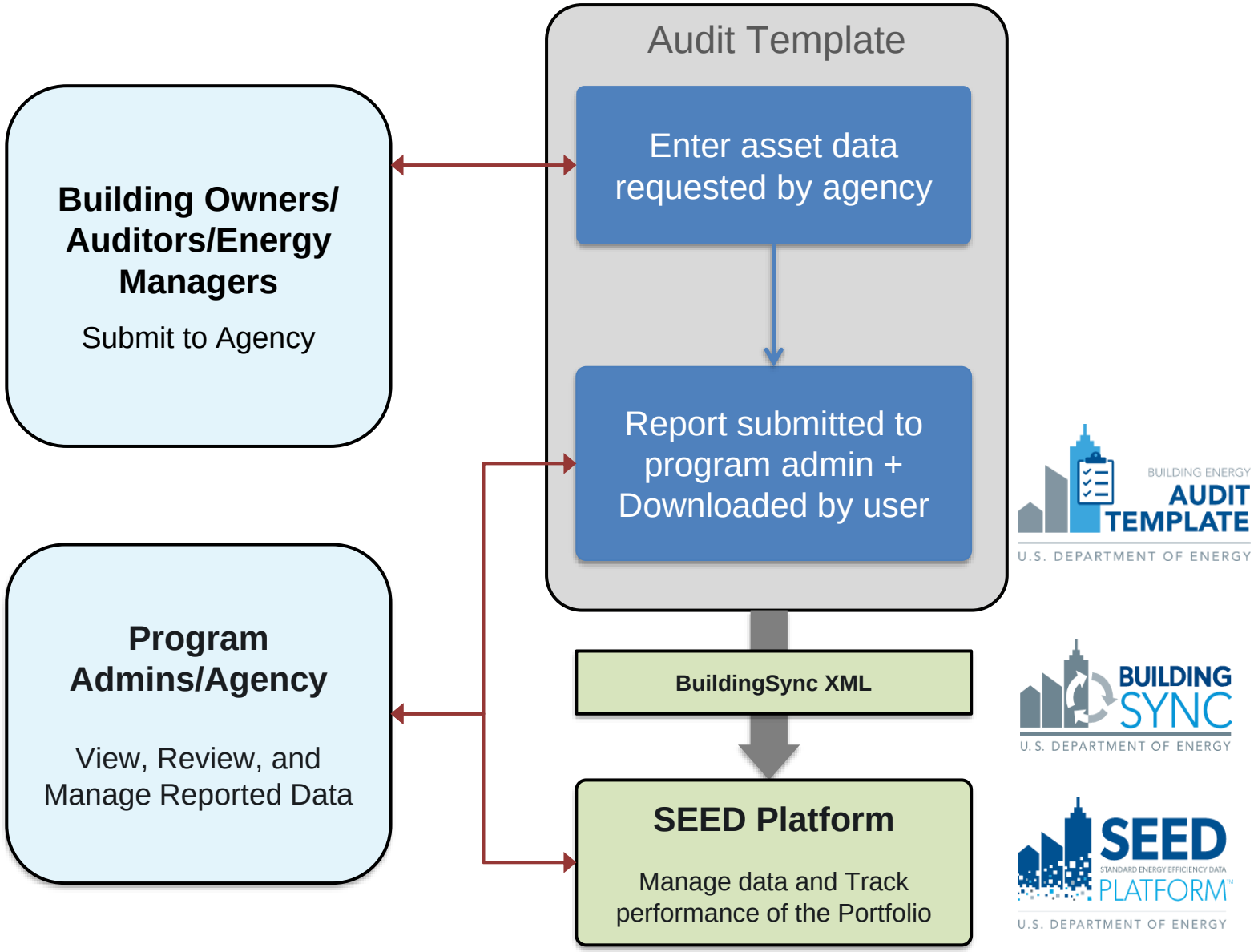
- ***New York:*** *Applicable commercial, mixed-use and residential buildings must submit an Energy Efficiency Report (EER) once every ten years.*
- https://www1.nyc.gov/site/buildings/business/energy-audits-and-retro-commissioning.page
- ***San Francisco and Berkeley:*** *Energy Audit - required every 5 years for nonresidential buildings.*
- https://sfenvironment.org/article/how-to-comply-and-report-to-sf-environment
- ***Other cities:*** *Atlanta, Minneapolis, Energy Trust of Oregon and more*

BUILDING ENERGY AUDIT TEMPLATE
U.S. DEPARTMENT OF ENERGY

Approach: Audit Template Workflow

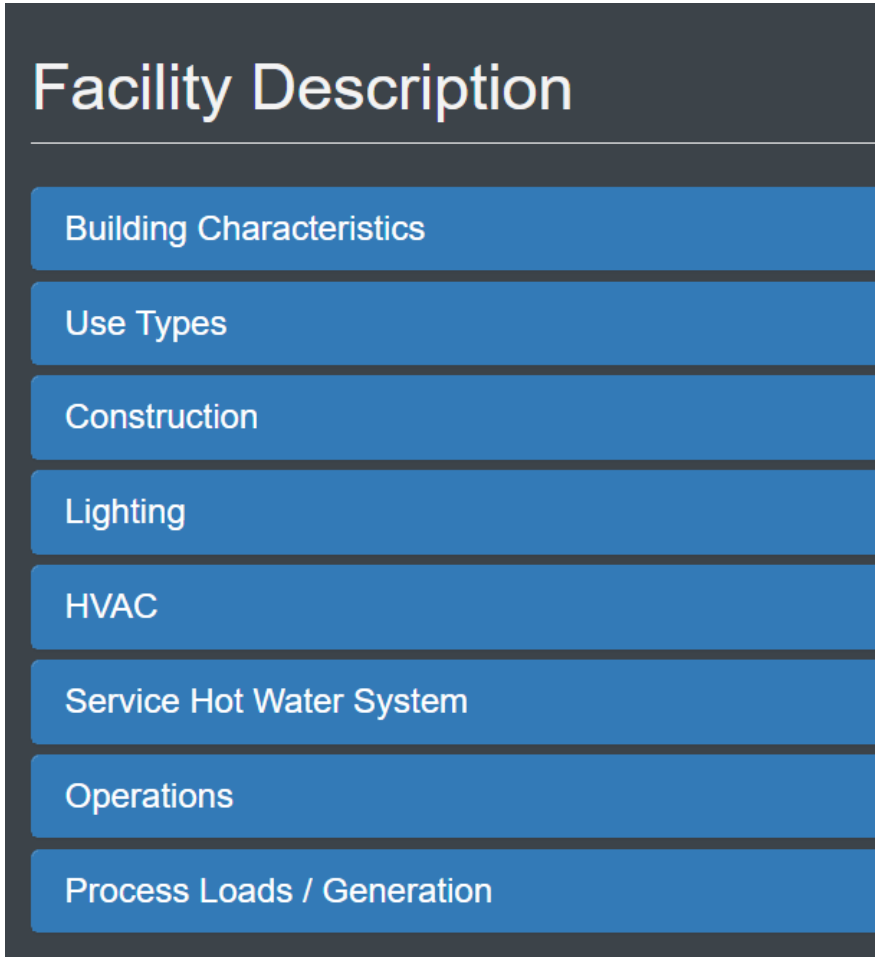
- Auditors can use the tool's user interface to **review reporting requirements** of their program and to **enter and submit data**.

- Program administrators can access a 'Dashboard' that allows them to **view the submitted data**, **review it for completeness**, and **export it in various data formats**.



Approach: Audit Template: At-a-Glance

- Inputs can be customized for each jurisdiction or agency based on their individual reporting requirements.
- Sample data collection categories currently available:
  - **Building Information**
    - Building characteristics, use types, construction, lighting, HVAC, SHW, operations, etc.
  - **Utility Data and Benchmarking from Portfolio Manager ®**
  - **Sub-metered Energy Use by End Use**
  - **Energy Savings Opportunities**



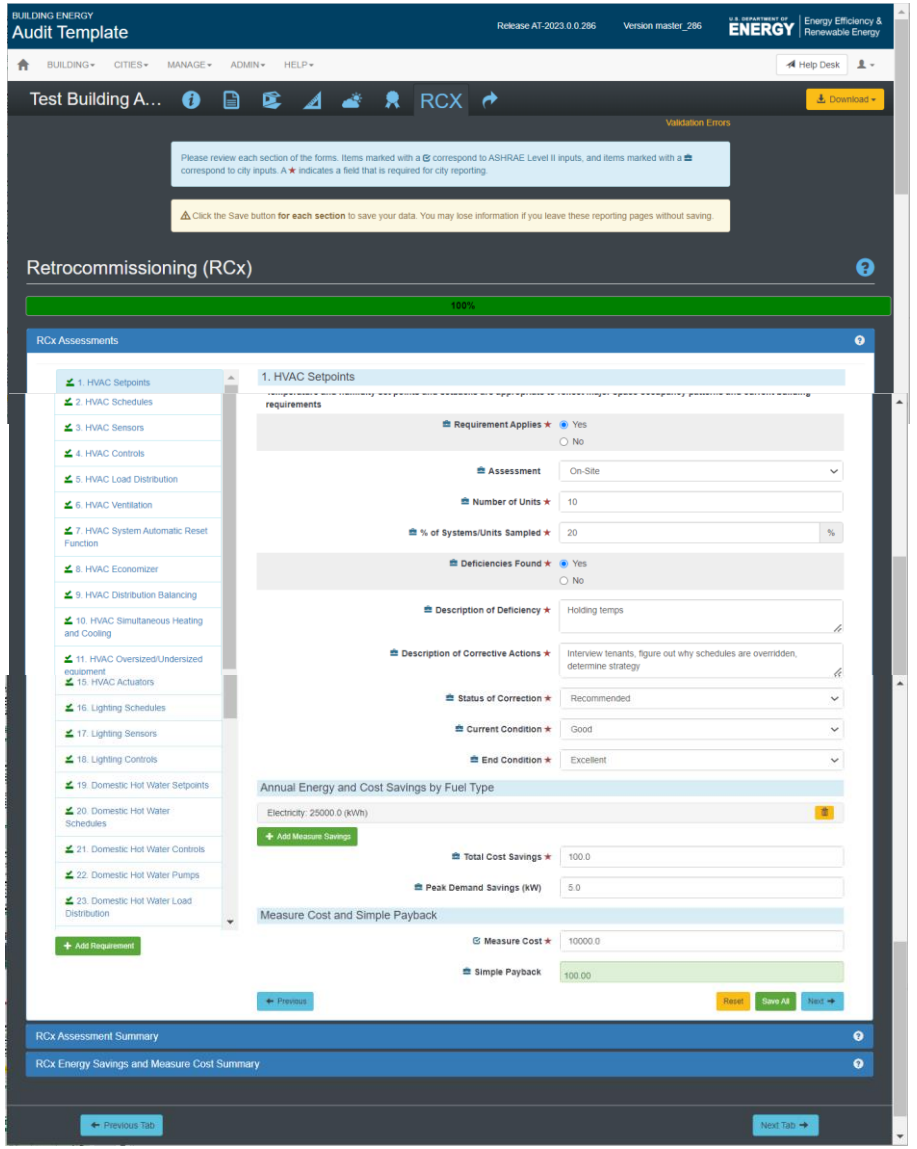
DC BEPS Energy Audit Report Categories

Approach: Audit Template: At-a-Glance

Retro Commissioning (RCx) Template

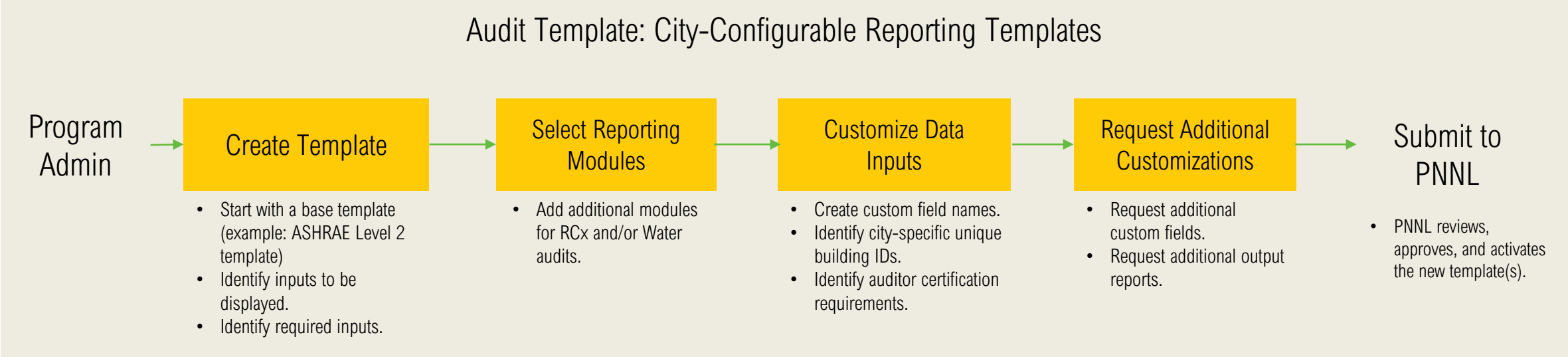
- Supports DC's Building Energy Performance Standard
- An Auditor can share a building with program and/or a RCx agent
- RCx agent receives a read-only version of the audit data and can conduct an RCx assessment for the assessments included in DC's RCx reporting template as well as add additional assessments if applicable
- The tool generates a PDF report summarizing the assessments, deficiencies found, corrective actions taken as well as the estimated savings and cost of the identified corrective actions.

RCx template can be customized to support other jurisdictions adopting RCx and tune-up ordinances



Approach: Supporting Growing Need for Custom Templates

- Audit template has grown from a single template (for ASHRAE Level 2 audits) to over a dozen templates and there is a growing demand to add additional templates. **BPS are defining multiple pathways for alternate compliance** which could involve a combination of ASHRAE Level 1 or Level 2 audit, and a pathway to demonstrate improvements (selection from a prescribed set of measures, and/or some level of electrification etc.)
- **City-configurable Reporting Templates** (deliverable for FY23) will facilitate this growth
- It will **allow jurisdictions** to use the tool's user interface to **select their own reporting requirements** and to publish new templates for reporting.



Progress

6+ years of the project

2016-2017	2018	2019	2020-2021	2022-23
• Development of tool framework based on ASHRAE Standard 211 • Development of San Francisco and NYC's template	• Development to support data exchange through BuildingSync XML schema	• Audit Template to Asset Score conversion capability	• WA State BPS template • Multiple new templates, including: Los Angeles, Berkeley, Atlanta, and Minneapolis	• City-configurable Templates Other Templates: • D.C. BPS (RCx Template) • Denver BPS • City of Brisbane • HUD • EISA Compliance for U.S. Army
Audit Template Tool with ASHRAE L2 Template + SF + NYC Template	100% L2 data import/export using BuildingSync	AT to AS feature	Additional Templates	CCT + Federal Template

Progress

FY23

- Complete **Retro- commissioning template** added for DC
- Complete the **City-configurable Template** capability Invite a few of the existing project partners to pilot this feature and provide feedback
- **Support Federal Agencies**
  - Complete the federal template and work with the U.S. Army (CERL) to pilot the capability
  - Engage additional federal agencies to pilot Audit Template as the means to meet the EISA 432 requirements and submit data to Compliance Tracking System.
- **Support BPS**
  - Engage cities and jurisdictions enacting BPS to identify requirements related to alternate compliance pathways that could be implemented in Audit Template tool

Future Work

- Expand the **City-configurable Reporting Template** capability to support BPS
  - Jurisdictions would be able to customize the **Alternate Compliance Pathway** in Audit Template by selecting from a base reporting template (Equipment inventory, L1 or L2 audit) and add additional reporting requirements
  - **Alternate compliance pathways being considered**
    - Prescriptive measures
    - Electrification plan
    - Decarbonization assessment
    - Any additional modules commonly adopted by jurisdictions
  - Each additional feature will **be implemented as a 'module'** to allow Audit Template to support most common alternate compliance pathways.

Summary

- Audit Template has been **successful in meeting a niche requirement for standardized data collection and reporting.**
- **BPS have generated a significant need** for an expanded version of AT that can support various degrees of detail for data collection.
- Through the FY23 proposed capabilities for city-configurable reporting templates and additional modules for BPS, **Audit Template would include mechanisms to provide data collection and reporting for most BPS ordinances**.
- Proposed features for **adding a decarbonization audit** will support agencies setting decarbonization goals

Thank You

Pacific Northwest National Laboratory
Supriya Goel
(503) 417-7554 supriya.goel@pnnl.gov
WBS # 2.5.1.50

REFERENCE SLIDES

Project Execution

	FY2021				FY2022				FY2023				FY2024			
Planned budget	$ 604,230				$ 814,788				$ 623,945				$ 153,535			
Spent budget	$ 570,677				$ 785,101				$ 374,367							
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Past Work																
Ability to import/export data to and from Audit Template, using a spreadheet format				◆												
GHG metrics for energy use and energy savings, added to Audit Template interface and PDF report				◆												
Usability improvements to support BPS and Energy Act of 2020								◆								
Current/Future Work																
Audit Template future development vision to support alternate compliance pathways in BPSs									◆							
DC BEPS RCx Template, deployed to the staging server										◆						
Federal template deployed to the staging											◆					
City Configurable Templates capability, deployed to the production server.												◆				

◆ Milestone/Deliverable - Originally Planned and Missed

◆ Milestone/Deliverable - Actual, Met on Time

Audit Template project has been successful in meeting deliverables on time.

Team

Supriya Goel
PI/PM

Mark Borkum
Lead Software Developer

Jared Chase
Software Engineer

Edward Ellis
Software Engineer

Kefei Mo
Software Testing
User Support and Training

Juan Carlos Barajas
Software Engineer

Key Partners

NYC Buildings

NYC Department of Buildings

SF Environment
Our home. Our city. Our planet.
A Department of the City and County of San Francisco

City of San Francisco

DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

DC- Department of Energy and Environment

CERL CONSTRUCTION ENGINEERING RESEARCH LABORATORY ERDC

US Army - CERL