

# Audit Template

Example Sa... Get an Asset Score Download

Validation Errors

Please review each section of the forms. Items marked with a **G** correspond to ASHRAE Level II inputs, and items marked with a **C** correspond to city inputs. A **\*** indicates a field that is required for city reporting.

[Hide un-required fields](#)

Click the Save button for each section to save your data. You may lose information if you leave these reporting pages without saving.

## Facility Description

- Building Characteristics
- Use Types
- Construction
- Lighting
- HVAC
- Service Hot Water System
- Operations
- Process Loads / Generation

[Previous Tab](#) [Next Tab](#)

## FACILITY DESCRIPTION

Building Name: 3333 Wisconsin

### Building Characteristics

- Gross Floor Area\* 110500.0
- Spaces Excluded from Gross Floor Area
- Conditioned Floor Area, Heated Only
- Conditioned Floor Area, Heated and Cooled 110500.0
- Total Conditioned Floor Area 110500.0
- Number of Floors Above-Grade, Conditioned 9
- Number of Floors Below-Grade, Conditioned 1
- Number of Buildings on Lot\* 1
- General Building Shape Rectangular
- Building Automation System? No
- Historic Building? No
- Comfort or health concerns, including indoor environmental quality (IEQ) deficiencies\* No
- Comfort or health concerns comments

### Use Types

#### Multifamily Housing

- Use Type / Space Function / Building Area Type\* Multifamily Housing
- Original Intended Use
- Gross Floor Area\* 110500.0
- Percentage of Space Conditioned 100.0
- Number of Occupants
- Use (hours/week) 168.0
- Use (weeks/year) 51.0
- Elevator Traction
- Building Operations
- Approximate Plug Loads 0.3
- Number of Dwelling Units 100
- Affordable Multifamily Housing\*
- Percentage of Dwelling Units Currently Occupied 91
- Principal HVAC Type\* Other
- Principal Lighting Type\* Fluorescent T5
- Percentage of Common Area\* 20

For more information on the input fields, calculation methods, and units of measure found in this report, please visit the Asset Score web site: <https://buildingenergy.usdoe.gov>

## ENERGY SAVINGS OPPORTUNITIES

Building Name: 3333 Wisconsin

### Building Energy Savings Opportunities

#### Annual Energy, Cost & Carbon Savings

| Package Name / Measure Identifier        | Measure Name                   | Measure Description                            | Measure Status  | Is RCE measure? | Modeling/Calculation Approach | Total Cost Savings                          | Peak Demand Savings (kW)                       | Electricity Savings (kWh)                      | Natural Gas Savings (therms) | Carbon Savings (t CO <sub>2</sub> e) |       |
|--|--------------------------------|--|---|-----------------|-------------------------------|---|--|--|------------------------------|--------------------------------------|-------|
| <b>Potential Capital Recommendations</b> |                                |  |   |                 |                               |   |  |  |                              |                                      |       |
| 1  | Residential Heat Pump Upgrades | Other heating                                  | Current heat pump systems have a SEER of 15 and an average HSPF of 8.1. Recommend installing newer units with HSPF of 8.4 and SEER ranging from 15.2 to 17.0. | Recommended     | No                            | Energy Modeling Software                    | 15712.7  |  | 12127.0                      | 0.0                                  | 91.38 |
|  | Low Flow Devices               | Install low-flow faucets and showerheads       | Bathroom Aerators   | Recommended     | No                            | Energy Modeling Software                    | 6756.4   | 2.03   | 6756.4                       | 0.0                                  | 22.05 |
|  | In-Light Lighting Upgrades     | Replace with light emitting diode technologies | Upgrade all in-unit incandescent and CFL lighting with LED replacements   | Recommended     | No                            | Energy Modeling Software                    | 5385.9   |  | 5385.9                       | 0.0                                  | 17.38 |
|  | Common Area Lighting Upgrades  | Replace with light emitting diode technologies | Upgrade all common area incandescent and CFL lighting with LED replacements   | Recommended     | No                            | Energy Modeling Software                    | 4218.9   |  | 4218.9                       | 0.0                                  | 13.77 |
| <b>Payback with Incentives</b>           |                                |  |   |                 |                               |   |  |  |                              |                                      |       |
| Package Name / Measure                   | Measure Cost                   | Potential Incentives                           | Measure Life (years)  | Discount Rate   | Net Measure Cost              | Simple Measure ROI (including incentives %) | Simple Measure Payback (no incentives - years) | Simple Measure Payback (w/ incentives - years) |                              |                                      |       |
| <b>Potential Capital Recommendations</b> |                                |  |   |                 |                               |   |  |  |                              |                                      |       |
| 1  | Residential Heat Pump Upgrades | 958015.5                                       | \$0.00  | 20              | 0.025                         | 958015.5                                    | 2%   | 44.4   | 44.4                         |                                      |       |
|  | Low Flow Devices               | 1581.2   | \$0.00  | 10              | 0.025                         | 1581.199991171875                           | 425%   | 0.2  | 0.2                          |                                      |       |
|  | In-Light Lighting Upgrades     | 22100.0  | \$0.00  | 15              | 0.025                         | 22100.0                                     | 24%  | 4.1  | 4.1                          |                                      |       |
|  | Common Area Lighting Upgrades  | 11050.0  | \$0.00  | 15              | 0.025                         | 11050.0                                     | 38%  | 2.6  | 2.6                          |                                      |       |

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 WBS # 2.5.1.50



# 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.

## 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

## Facility Description

Building Characteristics

Use Types

Construction

Lighting

HVAC

Service Hot Water System

Operations

Process Loads / Generation



## Stats

Performance Period: 2016 – Ongoing

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

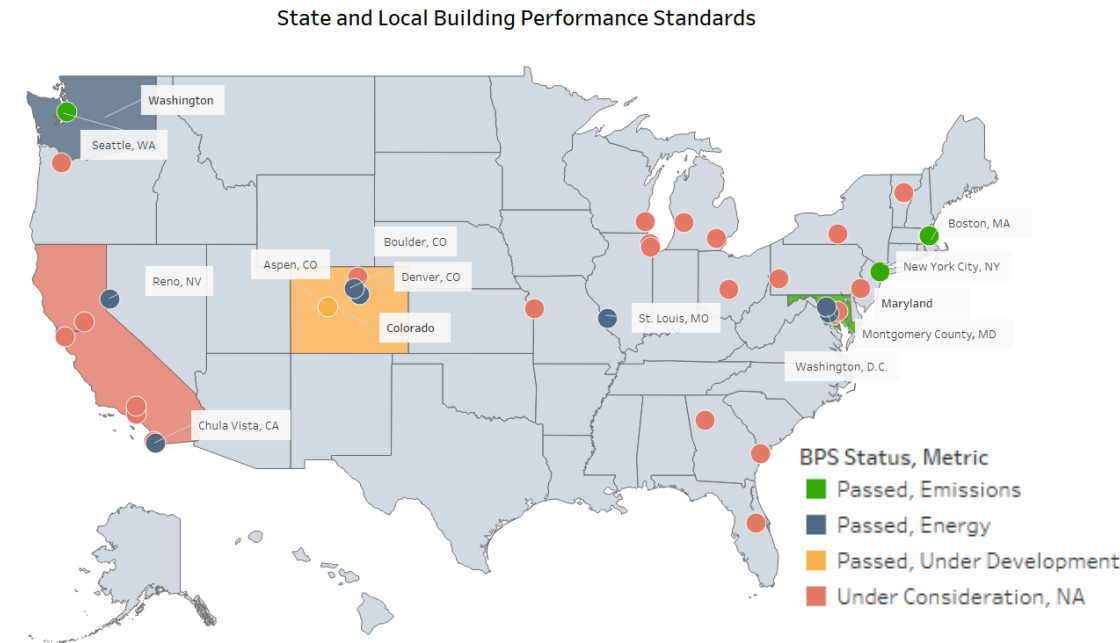
Milestone 1: Develop and deploy a capability for agencies to define custom templates through the tool interface (City Configurable Templates)

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

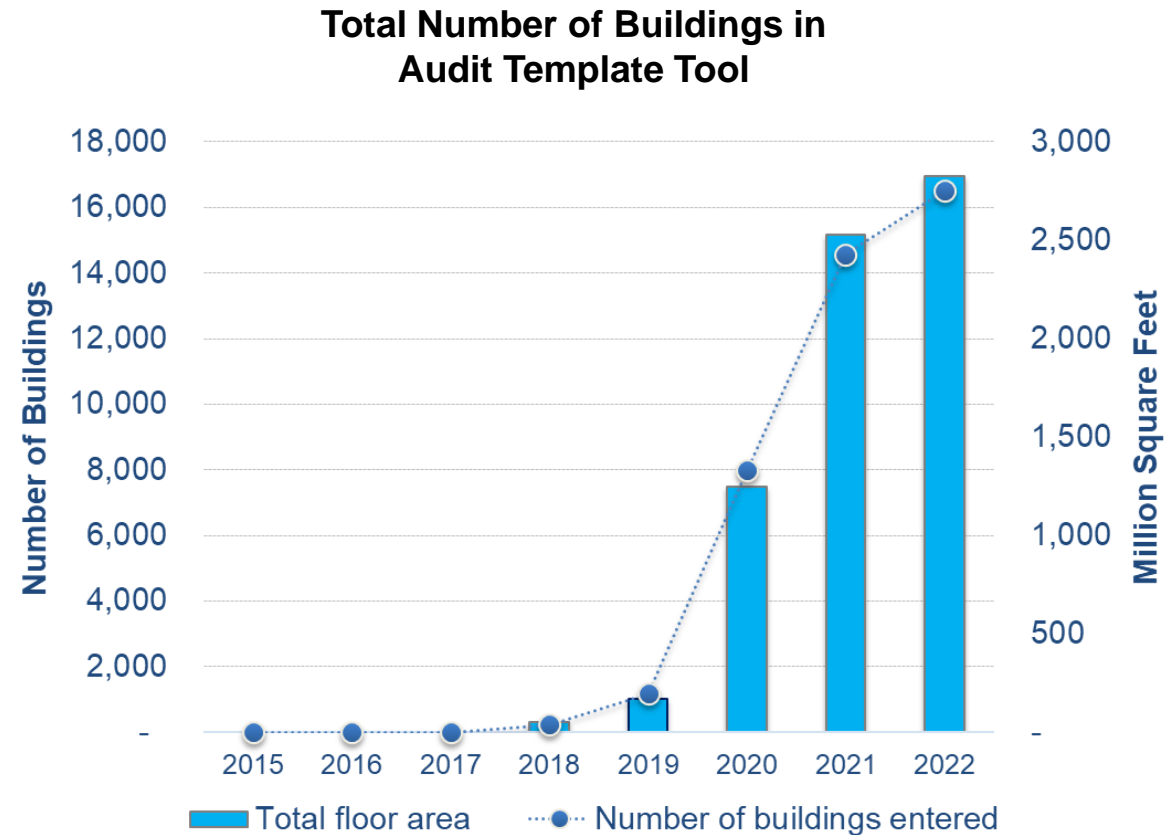
- A **free web-based tool** with a dedicated help desk and several online training resources—Audit Template provides an **accessible capability to meet the needs of lower resourced jurisdictions.** It negates the need to develop custom reporting spreadsheets or platform



# 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

The screenshot shows the 'BUILDING ENERGY Asset Score/Audit Template' web application. The header includes the U.S. Department of Energy logo and version information (Release 2023.0.0.506, Version master\_506). The main navigation bar has tabs for ASSET SCORE, TSPR, and AUDIT TEMPLATE (which is selected). Below the navigation, there is a search and filter section with a dropdown for 'Show 50 entries' and a search box for 'Name and Owner'. A table lists several audit reports with columns for Building ID, Name, Report Type, Status, Last Modified, and Owner. To the right of the table is a sidebar with a dropdown menu for 'Add Audit Report' and a list of report types including ASHRAE Level 2 City Report, Atlanta Report, Berkeley Report, BRICR Report, DC BEPS Report, Demo City Report, Denver Report, Energy Trust of Oregon Report, Minneapolis Report, NYC Energy Efficiency Report, Open Efficiency Report, San Francisco Report, WA Commerce CB Report, and WA Commerce Grants Report.

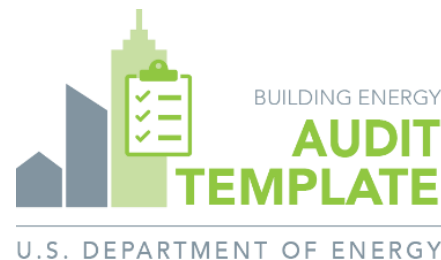
| Building ID | Name  | Report Type                            | Status  | Last Modified        | Owner            | Options |
|-------------|---|--|---------|----------------------|------------------|---------|
| 28243       | Pershing House  | DC BEPS Energy Audit Report            | Editing | 2023-04-06 21:19 PDT | Arjun Bandari    | ⚙️      |
| 28174       | Hubbard Place   | DC BEPS Energy Audit Report            | Editing | 2023-04-06 21:03 PDT | Arjun Bandari    | ⚙️      |
| 28287       | 439 Beach 22nd Street   | New York City Energy Efficiency Report | Editing | 2023-04-06 18:38 PDT | Jeffrey Carleton | ⚙️      |
| 28286       | 40-45 Elbertson Street, AKA 89-21 Elmhurst Ave, AKA 87-28 Britton Ave | New York City Energy Efficiency Report | Editing | 2023-04-06 18:31 PDT | Jeffrey Carleton | ⚙️      |
| 28284       | 421 East 116th Street   | New York City Energy Efficiency Report | Editing | 2023-04-06 18:11 PDT | Jeffrey Carleton | ⚙️      |

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/doe/service\\_content/attachments/BEPS\\_TaskForceMeeting\\_2021-8-03\\_Slides.pdf](https://doee.dc.gov/sites/default/files/dc/sites/doe/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



OVERVIEW
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**BUILDING INFORMATION**

|  |   |  |                      |                 |                               |                            |                     |                                    |           |
|--|---|--|----------------------|-----------------|-------------------------------|----------------------------|---------------------|------------------------------------|-----------|
| NYC BBL Example Building 1<br>123 Example Street<br>New York, NY 10036 | Report Type<br>New York City Energy Efficiency Report | Gross Floor Area:<br>400,000.0 ft <sup>2</sup> | Building ID #:<br>67 | BIN:<br>1024665 | Report Status:<br>In Progress | Report Date:<br>04/21/2020 | Year Built:<br>1999 | Software Release:<br>2020.1.0.1310 | EER:<br>A |
|--|---|--|----------------------|-----------------|-------------------------------|----------------------------|---------------------|------------------------------------|-----------|

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**PROPERTY INFORMATION**

NYC BBL AT Demo Property - live  
BBL: 1-01013-0120

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**AUDIT TEAM**

Auditor Company Example  
123 Example Street  
New York, NY 10118  
(111) 111-1111

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**DATA SUMMARY**

This report was generated from data entered into the Building Energy Asset Score (Asset Score) tool, developed by the Pacific Northwest National Laboratory (PNNL) for the U.S. Department of Energy (DOE). Asset Score is a national standardized tool for assessing the physical and structural energy efficiency of commercial and multifamily residential buildings. It also facilitates building energy audit data collection and reporting.

This report follows the ASHRAE/ACCA Standard 211P, Standard for Commercial Building Energy Audits. It also includes additional data fields required by specific cities, where applicable. The icons below identify data categories.

ASHRAE Level 2 inputs  
 City specific inputs

If this report is used to comply with a local energy audit ordinance, the fields marked with \* indicate the minimum data to be reported. The audit team listed above is responsible for any information entered and reported through Asset Score. DOE and PNNL do not warranty data accuracy, completeness, legality, and reliability.

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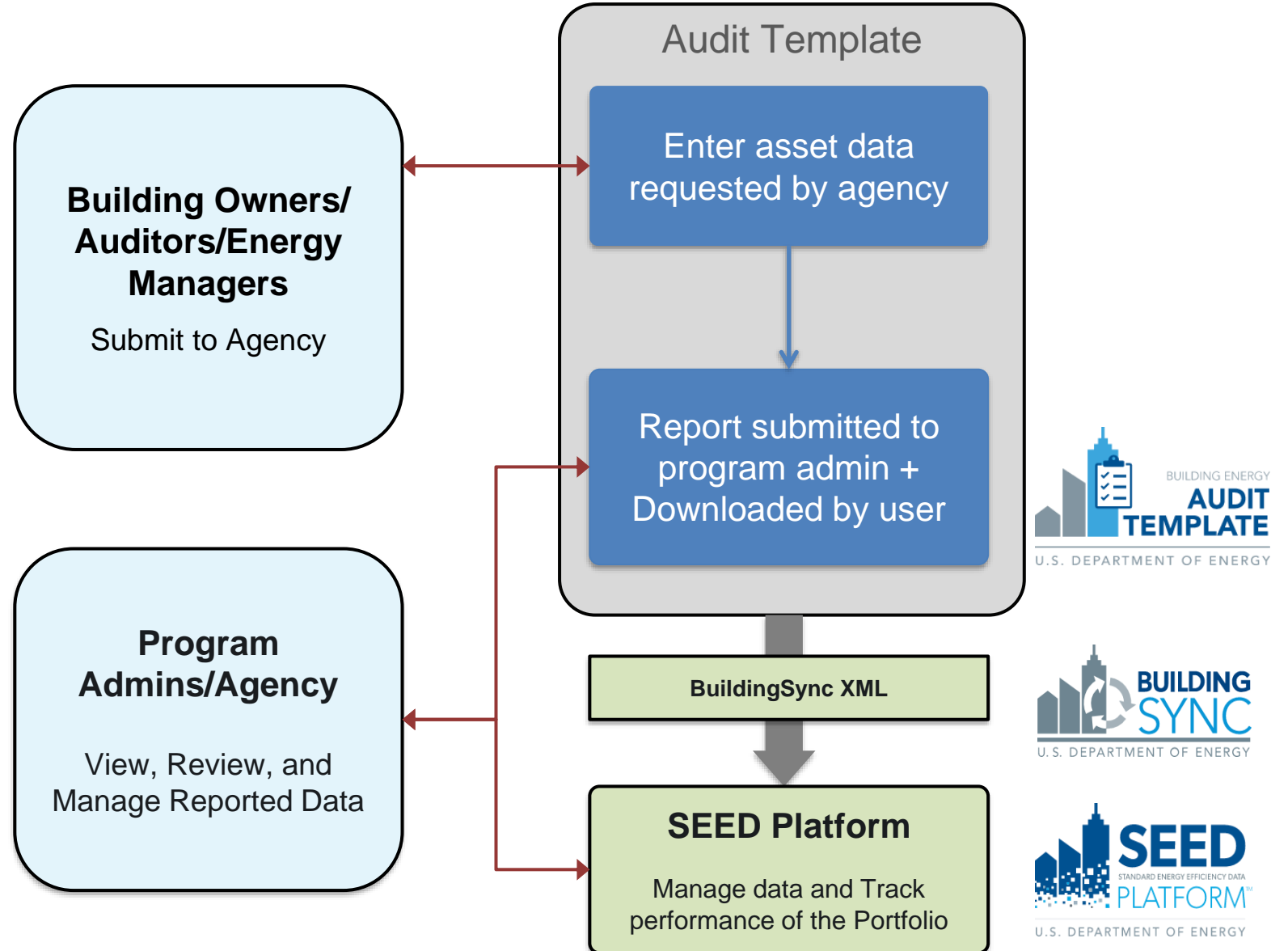
Building Name: NYC BBL Example Building 1

**Building Energy Savings Opportunities**

| Package Name<br>Measure: Status (*); Modeling / Calculation Approach (**)         | Annual Energy & Cost Savings   |                    |                          |                              |                           |                               |                          |
|---|--------------------------------|--------------------|--------------------------|------------------------------|---------------------------|-------------------------------|--------------------------|
|   | Measure Description            | Total Cost Savings | Peak Demand Savings (kW) | Natural Gas Savings (therms) | Electricity Savings (kWh) | Fuel Oil #4 Savings (Gallons) | Diesel Savings (Gallons) |
| <b>Low Cost and No Cost Recommendations</b>                                       |                                |                    |                          |                              |                           |                               |                          |
| Lighting pkg<br>Retrofit with CFLs: *1, **2<br>Upgrade exit signs to LED: *1, **2 | add CFLs<br>replace exit signs | 3000.0             | 250.0                    | 60000.0                      | 1500000.0                 | 70000.0                       | 15000.0                  |

# Approach: Audit Template Workflow

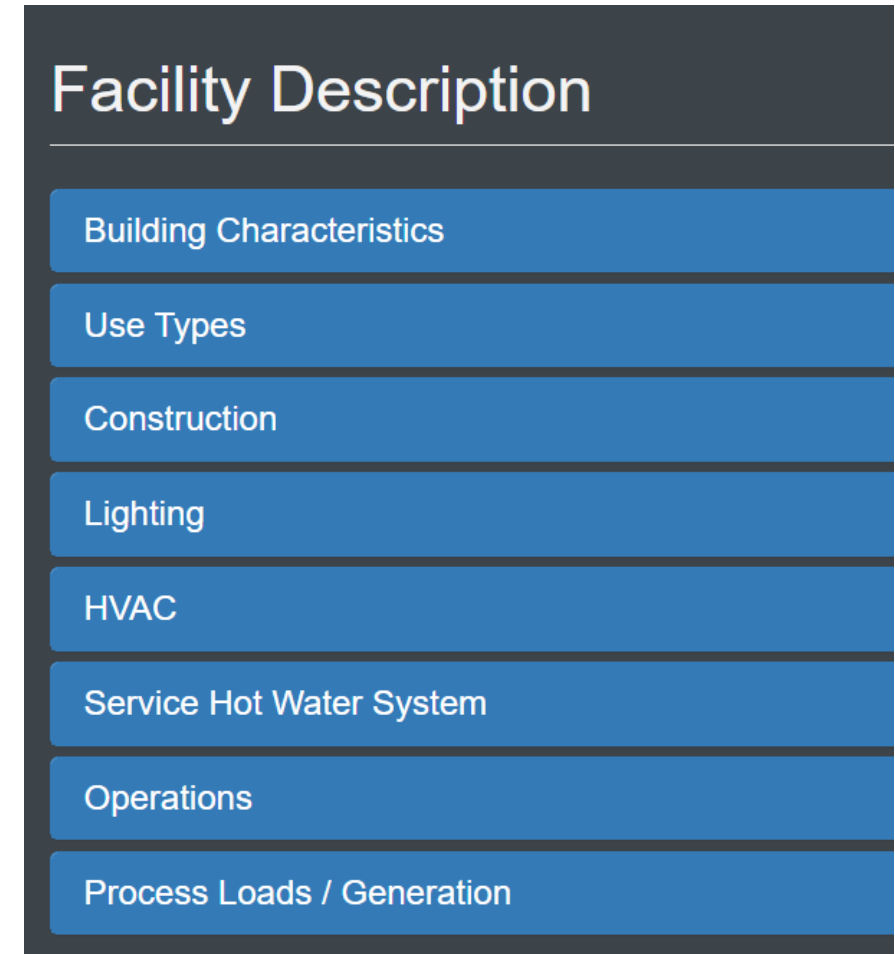
- Auditors can use the tool's user interface to **review reporting requirements** of their program and to **enter and submit data**.
- Program administrators can access a 'Dashboard' that allows them to **view the submitted data**, **review it for completeness**, and **export it in various data formats**.





# 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<sup>®</sup>**
  - **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*

The screenshot displays the 'BUILDING ENERGY Audit Template' interface. The top navigation bar includes 'BUILDING', 'CITIES', 'MANAGE', 'ADMIN', and 'HELP'. The main content area is titled 'Test Building A...' and 'RCX'. A validation error message is visible: 'Please review each section of the forms. Items marked with a G correspond to ASHRAE Level II inputs, and items marked with a C correspond to city inputs. A \* indicates a field that is required for city reporting.' Below this, a warning states: 'Click the Save button for each section to save your data. You may lose information if you leave these reporting pages without saving.'

The 'Retrocommissioning (RCx)' section shows a progress bar at 100%. The 'RCx Assessments' sidebar lists various categories, with '1. HVAC Setpoints' selected. The main form for '1. HVAC Setpoints' includes the following fields:

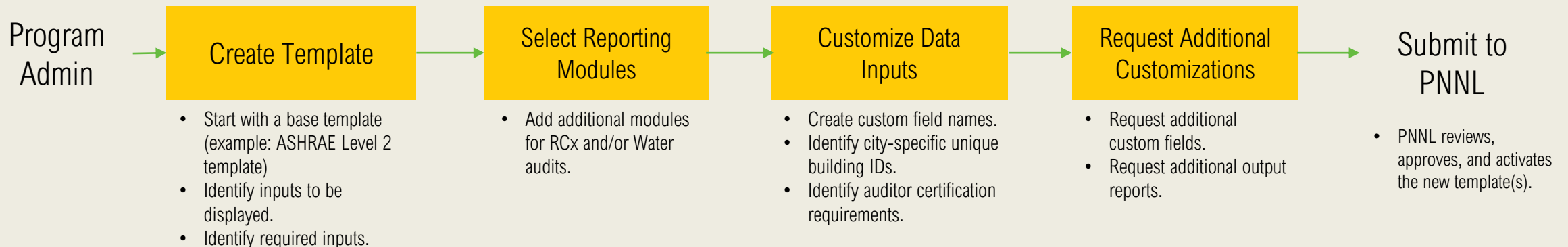
- Requirement Applies:** Yes (selected), No
- Assessment:** On-Site
- Number of Units:** 10
- % of Systems/Units Sampled:** 20
- Deficiencies Found:** Yes (selected), No
- Description of Deficiency:** Holding temps
- Description of Corrective Actions:** Interview tenants, figure out why schedules are overridden, determine strategy
- Status of Correction:** Recommended
- Current Condition:** Good
- End Condition:** Excellent

Below the form, the 'Annual Energy and Cost Savings by Fuel Type' section shows 'Electricity: 25000.0 (kWh)'. The 'Measure Cost and Simple Payback' section shows 'Measure Cost: 10000.0' and 'Simple Payback: 100.00'. Navigation buttons for 'Previous', 'Next', 'Reset', 'Save All', and 'Next Tab' are visible at the bottom.

# Approach: Supporting Growing Need for Custom Templates

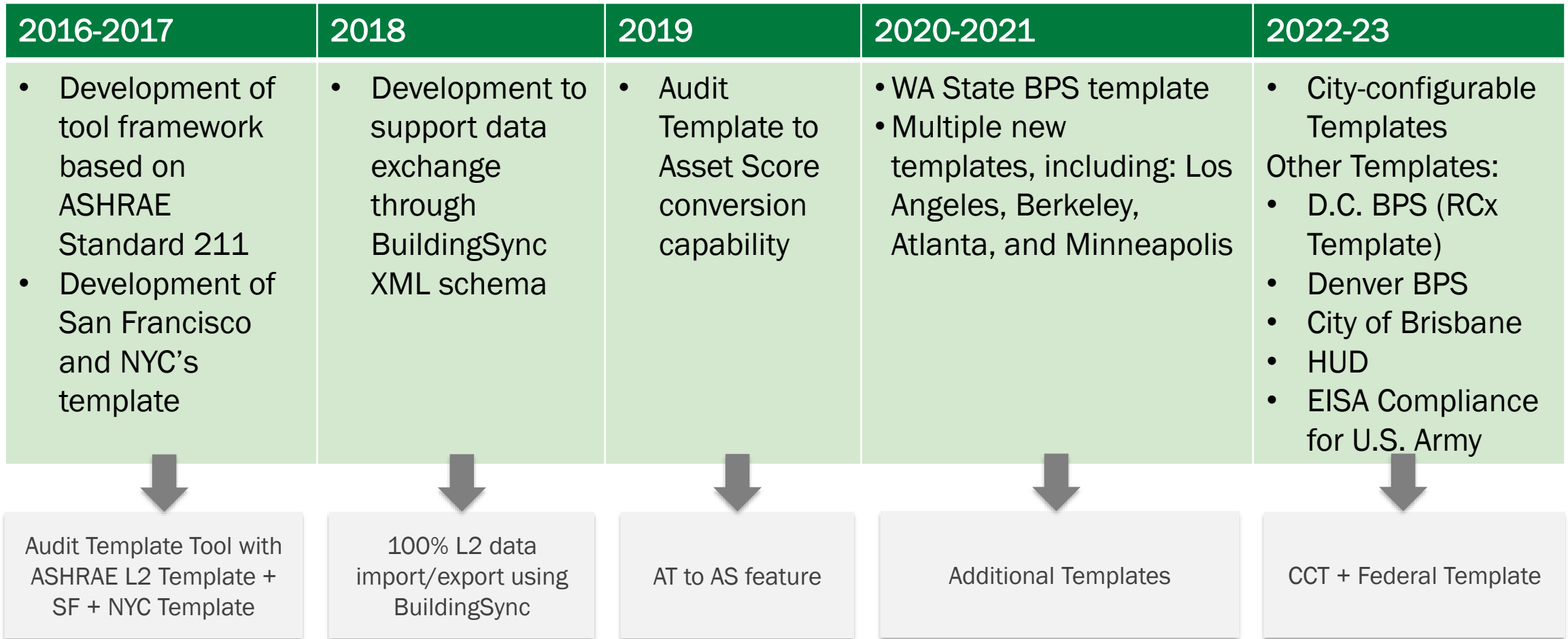
- Audit template has grown from a single template (for ASHRAE Level 2 audits) to over a dozen templates and there is a growing demand to add additional templates. **BPS are defining multiple pathways for alternate compliance** which could involve a combination of ASHRAE Level 1 or Level 2 audit, and 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.

## Audit Template: City-Configurable Reporting Templates



# Progress

6+ years of the project



# 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

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# Thank You

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WBS # 2.5.1.50



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# 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 |
| <b>Past Work</b>  |            |    |    |    |            |    |    |    |            |    |    |    |            |    |    |    |
| Ability to import/export data to and from Audit Template, using a spreadsheet 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                                    |            |    |    |    |            |    |    |    |            |    | ◆  |    |            |    |    |    |
| <b>Current/Future Work</b>  |            |    |    |    |            |    |    |    |            |    |    |    |            |    |    |    |
| 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  
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



GOVERNMENT OF THE DISTRICT OF COLUMBIA

DC- Department of  
Energy and  
Environment



US Army - CERL