Deep Energy Retrofit Planning Report

Supplement to the LL87 Energy Efficiency Report

User Manual

NYC Mayor's Office of Sustainability

Introduction

This user manual provides step-by-step instructions on preparing a building-specific report with the Deep Energy Retrofit Planning Tool (80x50 Tool).

The 80x50 tool is meant to be a simple reporting process for energy auditors based on Local Law LL87 reporting data. The tool can be completed within minutes. The report can be generated almost exclusively on auto-populated information, or customized based on owner and auditor input.

Tool Layout

The 80x50 tool is organized into three tabs in the Excel Workbook

- "Audit Template Import": Output data from the United States Department of Energy Building Energy Asset Score tool (Asset Score tool) can be pasted here to populate the tool.

- "Instructions & Inputs": The user completing the report can use this page to review the input data, adjust as necessary, and input additional information not provided by the "Audit Template Import" tab.

- "Report": The tab contains the generated report that can be converted to a .PDF file or printed.

Important Notes

The blue cells in the "Instructions & Inputs" tab are auto-populated by data in the "Audit Template Import" tab, which then determine the content of the final report. It is crucial that the data be reviewed at every step to ensure the report output is as accurate as possible for the building.
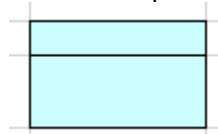
Blue-colored cell

Auto-populated blue cells can be overridden in the tool. Overriding these cells, however, removes the equations to populate these cells from the Audit Template Import tab. If a cell was overridden, a new copy of the tool must be downloaded and the process restarted to revert to the original assumptions generated by the tool.

Energy savings targets and recommendations are based on building typologies. The New York City Buildings Technical Working Group report (TWG) categorized buildings with similar characteristics into common building typologies. Building typologies are identified based on the buildings' primary use, age, and height. Grouping buildings into typologies helps to identify energy savings opportunities that may be replicable across entire typologies. The 80x50 tool associates the building with one of the several different building typologies based on the input energy audit data. The selected typology governs the recommended deep energy retrofit packages.

- **Note:** Some building typologies do not have sufficient TWG data available to prepare appropriate 80x50 endpoints.

  As a result, some typologies will have specific notes appear in the report and energy end use targets are not included in their reports. Measure recommendations are still presented.

Less common space use types and complex commercial buildings cannot have energy savings projections that are reliable enough to present as part of this report, so more general information is presented.

Complex commercial buildings are those with commercial use as the primary space type and which use a central chiller plant for cooling. This information is imported from the energy audit data file and can be overridden by the auditor if desired.

1. Export Building Data from the Asset Score Tool

The tool can be populated by a comma-separated values (CSV) file from the Asset Score Tool. The Asset Score tool is required for LL87. The information compiled for LL87 is used to generate the Deep Energy Retrofit Planning Tool.

Note on Buildings Without Data in the Asset Score Tool
Buildings that do not have information entered into the Asset Score Tool can still populate a report. Simply skip to Step 3 below and adjust data inputs manually as described.

- After reporting building data in the Asset Score Tool, download it as a CSV using the "Download" button in the top right corner of the screen:
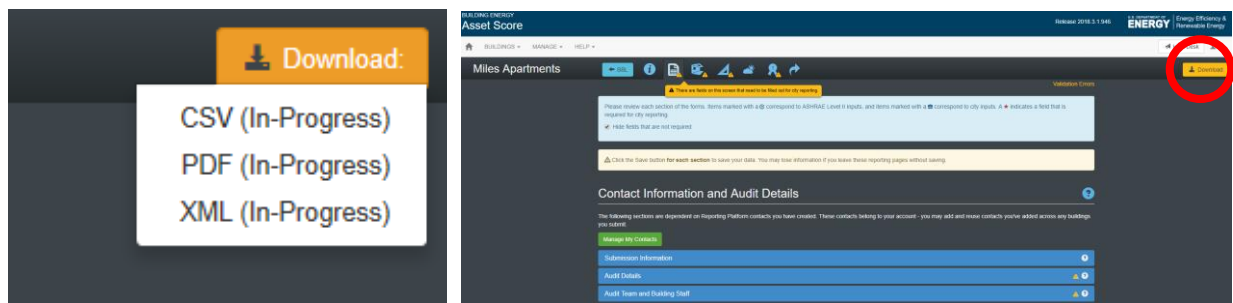
CSV output download button (left); CSV output download button location (right)

- Open the CSV file to make sure the second row is populated with the correct data.

- Visit the DOE Asset Score Tool's Help Page for more information on downloading building data: https://help.buildingenergyscore.com/support/solutions/articles/8000053384-audit-report

2. Copy Building Data Into the 80x50 Tool

- Copy the building data from the downloaded CSV and paste it into the "Audit Template Import" tab in the 80x50 tool.

  - This tab has the same columns as the CSV output. The tool pulls data from this tab; ensure the columns and the data line up correctly when pasting the data.

  - The CSV file data should be pasted in starting in Column A. Make sure not to copy in the column headers from the CSV file below Row 1.

Sample Audit Template Import Tab with Building Data

3. Review & Adjust Data as Needed

The "Instructions & Inputs" tab contains information that is auto-populated from data in the "Audit Template Import" tab about the building, its mechanical systems, and its energy use. This tab is organized into four separate sections:

- Your Building's Information
- Existing/Proposed Energy Use
- 80x50 Opportunity Sequencing
- Additional Auditor Comments

Your Building's Information
Each item below appears directly in the report and helps to determine the building's typology. Retrofit packages are specific to a building's typology and existing systems.

- Address or Building Name
    - When making a report for multiple buildings on one BBL, choose an address that best represents the property

- Primary Space Type

- Gross Floor Area (square feet)

- Year Constructed

- Height (floors/stories)

- Primary Heating System

- Primary Heating Fuel

- Cooling System
    - The 80x50 tool only makes a differentiation between a central cooling plant or room by room cooling.

- Hot Water Production

- Wall Construction

- TWG typology based on audit input
    - This cell is auto-populated based on building characteristics
    - This cell is based on the 80x50 TWG working group's original building typology definitions
    - This typology assignment can be used to cross reference with the TWG report and is for reference only

- Enter the TWG Typology (same as above if appropriate)
    - The auditor has an opportunity to manually change the typology if they feel the one selected by the tool is not appropriate for their building
    - This typology assignment can be used to cross reference with the TWG report and is for reference only

- Building Typology Assignment
    - This cell is auto-populated based on building characteristics
    - This typology assignment is specific to this 80x50 Report
    - This typology assignment governs the types of measures recommend and the energy savings in the report

- Enter the Building Typology (same as above if appropriate)
    - The auditor has an opportunity to manually change the typology if they feel the one selected by the tool is not appropriate for their building.
    - The building types are as follows:
        - Commercial or Institutional, curtainwall, district steam
        - Commercial or Institutional, curtainwall, on-site heating plant
        - Commercial or Institutional, mass walls, district steam
        - Commercial or Institutional, mass walls, on-site heating plant
        - Hospital
        - Industrial, Garage or vehicle use
        - Industrial or other, greater than three stories
        - Industrial or other, less than four stories
        - K-12 School
        - MF, Dorm, or Hotel, district steam heat
        - MF, Dorm, or Hotel, electrically heated
        - MF, Dorm, or Hotel, post-1980 construction, hydronic heat
        - MF, Dorm, or Hotel, post-1980 construction, steam heat
        - MF, Dorm, or Hotel, pre-1980 construction, hydronic heat
        - MF, Dorm, or Hotel, pre-1980 construction, steam heat

    - **Note:** This typology assignment governs the package recommendations and the energy savings in the report

Your Building's Information	
Address or Building Name	123 Sustainability Way, New York 10036
Primary Space Type	Office
Gross Floor Area (square feet)	52,500
Year Constructed	1920
Height (floors/stories)	6
Primary Heating System	Steam Boiler
Primary Heating Fuel	Fuel Oil #2
Cooling System	Room by Room
Hot Water Production	No SHW System
Wall Construction	Select from list
TWG typology based on audit input	*Commercial, Pre-war up to 7 stories*
Enter the Building TWG Typology (same as above if appropriate)	Commercial, Pre-war up to 7 stories
Building Typology Assignment	*Commercial or Institutional, mass walls, on-site heating plant*
Enter the Building Typology (same as above if appropriate)	Commercial or Institutional, mass walls, on-site heating plant

Sample Building Information

- Enter the building's current ENERGY STAR ® score
  - This information is requested in the Asset Score Tool and will populate automatically in the 80x50 tool.

  - If this information was not entered in the Asset Score Tool as part of LL87 it can be entered manually.

- Enter the building's current Building Energy Efficiency Rating
  - This grade is populated automatically based on the ENERGY STAR score
  - New York City determines letter grades based on building performance.

Enter the building's current ENERGY STAR ® score	55
Enter the building's current Energy Efficiency Grade	D

Building Energy Efficiency Rating cells

Review the data in the cells. **The building's typology must be correct, or the tool will not recommend the appropriate retrofit packages for the building.**

If any information is incorrect, it was either not reported correctly, or the DOE tool did not have an option that accurately described the building. There are two options for addressing incorrect information:

- Correct the information in the Asset Score tool and export a new CSV file, then generate a new report.

Energy Use
This section shows the total energy use in the building, separated by fuel type, and compares it to the energy use of the building after implementing ECMs recommended under LL87 energy audits.

- This data should be reviewed to make sure it was correctly imported from the "Audit Template Import" tab.

End Uses Type	Existing Annual Energy Use					Proposed Annual Energy Use				
	Electricity (kBTU)	Natural Gas (kBTU)	Fuel Oil (kBTU)	Steam (kBTU)	Total Site Energy Use	Electricity (kBTU)	Natural Gas (kBTU)	Fuel Oil (kBTU)	Steam (kBTU)	Total Site Energy Use
Total Estimated	131,074,161	0	0	149,134,182	280,208,343	124,845,726	0	0	75,949,700	200,795,426
Percent of Energy Type Paid for by Tenants	80%	0%	0%	0%						

Energy Use Data

There are blue cells under the energy use that the auditor must populate manually. These are the only cells that are not populated automatically by the Asset Score Tool data:

- Percent of Energy Type Paid for by Tenants
  - The percentage split between owner and tenant paid utilities can be calculated using the End Use Breakdown data already calculated in LL87.

80x50 Opportunity Sequencing
This table is a tool to understand and plan out the timeframes for the implementation of energy conservation measures. In the report, the table provides a roadmap for the building to reach 80x50 goals. It is organized such that low to no cost improvements are recommended before capital improvements, and mechanical system upgrades are recommended based on the year they were installed and their expected useful life.

NOTE: Above the Sequencing table in this section there is a line where the auditor can enter the next year there will be a refinance, substantial retrofit, re-positioning, or other major financial consideration (if the year is known). This will factor into the sequencing table.

The tool's assumptions for the end of useful life of equipment are pulled from these standard references on equipment lifetimes:

- Multifamily: FannieMae Instructions for Performing a Multifamily Property Condition Assessment (Version 2.0) Appendix F – Useful Life Tables[1]

- Commercial: ASHRAE Equipment Life Expectancy Chart - 2015 ASHRAE Handbook of HVAC Applications

The blue cells in this table can be overridden if any of the assumptions are not applicable to the building. The timeline for replacing equipment can be altered per the building's needs or capital plans.

Page five of the 80x50 report (on the Report tab of this workbook) expands on end of useful life measures, as well as the **Sequencing and Planning Guide**.

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[1] https://www.fanniemae.com/content/guide_form/4099f.pdf

Opportunity and Type		Equipment Install Year (if applicable)	Expected Useful Life	Timeframe for Decision (default can be overridden)	Within 5 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years
Existing Building System Optimization										
Dom. Hot Water	Low flow fixtures	N/A	15	Within 5 years	■					
Air Sealing	Common area air sealing	N/A		Within 5 years	■					
Space Heating	Optimized heat distribution	N/A		Within 5 years	■					
Space Heating	Room by room heat control	N/A		Within 5 years	■					
Lights/Appliances	Common area efficiency and controls upgrade	N/A		Within 5 years	■					
Ventilation	Seal and balance existing ductwork	N/A		Within 5 years	■					
On Site Generation	Onsite or community solar electricity supply	N/A		Within 5 years	■					
Tenant Turnover										
Lights/Appliances	Improved tenant space lighting efficiency/controls	Continuous		Within 5 years	■					
Lights/Appliances	Improved tenant space plug load efficiency/controls	Continuous		Within 5 years	■					
Air Sealing	Tenant space air sealing	Continuous		Within 5 years	■					
Existing Building System End of Life										
Space Heating	Package 1: condensate heat recovery; Package 2: low temp hydronic; Packages 3 and 4: heat pumps for space heating	1969	40	Within 5 years	■					
Space Cooling	Package 1: several cooling methods, higher efficiency; Package 2: water-cooled DX and cooling tower; Packages 3 and 4: central cooling from heat pumps	1969	10	Within 5 years	■					
Ventilation	Maximized use of energy recovery for centralized equipment	1969	20	Within 5 years	■					
Dom. Hot Water	Air-water heat pump	N/A	15	15-19 years				■		
Exterior Walls	Packages 1, 2, and 3: no major change; Package 4: increased wall insulation	N/A	50	10-14 years			■			
Windows	Double pane insulated windows and frames	1969	30	Within 5 years						
Roof	Maximize roof insulation	1969		Within 5 years						
Planned Financial Considerations										
	i.e. refinance, scheduled retrofit, re-positioning, acquisition	N/A								

Sample Section of the Opportunity Sequencing Table

- Review this table and change the sequencing timeline as needed.

Reminder: Once a cell is overridden in this tab, the original reference to the energy audit data in the Audit Template Import tab is gone. Restart the process with a new blank tool to revisit the assumptions.

Additional Auditor Comments
The last section in this tab is a blank space for comments from the auditor to expand upon any capital considerations in the building or provide reasoning for any decisions made in the report.

Additional Auditor Comments

This section is transferred to Page 6 of the report output, and has additional input from the auditor on this building's characteristics and circumstances which can affect the long term deep energy retrofit planning process. Considerations can touch on savings estimates, capital planning and financing options, impacts to occupants and their spaces, and explanation of timing recommendations.

The auditor may type free-form into this box, or paste in text from elsewhere to describe building-specific considerations regarding deep energy retrofit planning.

Additional Auditor Comments Box

4. Review & Download the 80x50 Report

The "Report" tab contains the final report. Review the data one last time to ensure the report is appropriate to discuss with the building owner.

The auditor can insert a logo of their firm on the cover of the report if desired.

The auditor does not make any edits to the report tab itself otherwise.

To export the report as a PDF:

- Go to File → Print and choose to print as a PDF

- Alternatively, go to File → Save As and choose to save it as a PDF