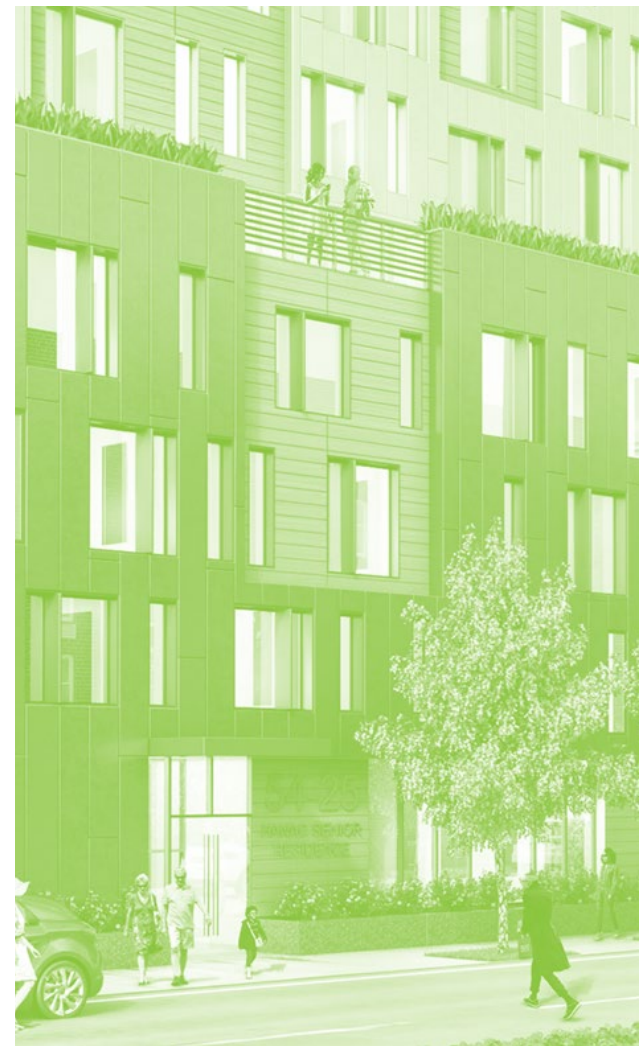


# Future Housing: A New Paradigm for Multifamily Building Performance





+



# Executive Summary

Future Housing:  
A New Paradigm for  
Multifamily Building Performance

Executive Summary  
Purpose  
A New Paradigm for Evaluating Multifamily Housing Performance  
Presenting the Future Housing Performance Metrics  
Analysis Examples: Comparing Performance Across Peers  
The Pathway Forward, from Vision to Reality

Appendix  
About the Future Housing Initiative  
Sample Metric Calculations  
Metric Calculation Methodology  
Data Collection Methodology: Sample Property

Credits  
Disclaimer

## Driving the transition to low-carbon, multifamily housing with real world data.

The Future Housing Initiative is driving a new paradigm for evaluating multifamily building performance. One that looks beyond traditional building performance metrics to include factors that reflect the residents' experience. This holistic approach includes three core building blocks: Resident Experience, Health Risk, and Carbon Performance.

Expanding upon past work, Future Housing launched a data collection pilot at six high-performance multifamily properties across the Northeast. These pilots tested resident engagement tools and strategies, including surveys, in-unit tours, and site events, while building owners and managers provided utility and property data.

The subsequent data analysis included developing a scoring methodology for Resident Experience and Health Risks, supplemented by detailed qualitative feedback. The comprehensive dataset and novel scoring system is a proof of concept that demonstrates the viability of combining resident-centered information with more traditional carbon and energy metrics.

Key take-aways from the pilot include the value of on-site resident engagement, which yielded untapped insights, and the impact of contextualizing carbon and energy metrics with neighborhood demographics and building systems information. At the same time, the pilots revealed limitations such as small sample sizes, participation biases, and the need for peer datasets to establish baselines.

By centering residents in the definition of performance, the Future Housing Initiative seeks to align decarbonization with the lived realities of the people multifamily housing is meant to serve: residents. This approach will empower industry stakeholders — such as owners, lenders, and policymakers — to drive the transition to low-carbon, multifamily housing more effectively.

# A New Paradigm for Evaluating Multifamily Housing Performance

At its core, housing is for people. Residents of multifamily buildings want to feel safe, respected by building management, and have a sense of community in their homes. The presence of health risks such as mold, pests, poor ventilation or extreme temperatures in homes directly affects the comfort, safety, and well-being of residents. To truly understand how a building is “performing” requires talking to the people living there.

Professionals working in the multifamily sector focus on the financing, design, construction, renovation, and management of multifamily properties. Current industry practice measures building performance on the balance of income and expenses, rent levels, and per square foot energy efficiency and carbon emission scores. But these all serve as proxies for the goal of providing good homes for people. These proxies are selected because they reflect industry standards, but they overlook what residents identify as important.

**Future Housing redefines “building performance” to include a focus on buildings’ residents. Specifically, Future Housing’s definition consists of three parts: Resident Experience, Health Risk, and Carbon Performance.** These three metrics are the backbone of how Future Housing defines performance. Adding resident-centered metrics to building performance assessment is fundamental to a just transition to low-carbon multifamily housing. Using this approach, Future Housing will build a national dataset on low-carbon multifamily buildings’ performance (see page 26).

# Using this Report

This report offers a proof of concept. It both demonstrates the viability of resident-centric metrics and also shares Future Housing’s methodology to calculate them. Future Housing based this methodology on an extensive literature review and several pilot projects funded by the Bank of America Foundation and the New York State Energy Research and Development Authority (NYSERDA). This report presents the first set of low-carbon properties where Future Housing collected complete data. The data set, while small, illustrates a resident-centered performance analysis. It also explores what could be learned with a large, robust data set. Future Housing is working to build a public, national dataset using this approach.

Future Housing aims to prompt an industry discussion about ways to prioritize residents in building performance metrics. The Future Housing team has invested time and effort in research to pilot a data collection process and develop metric calculations. The initial methodology requires further refinement. The Future Housing team looks forward to discussing and improving this with others.

## Future Housing Initiative’s Intended Audience

The Future Housing Initiative’s primary audience is entities which fund multifamily energy efficiency and decarbonization. This includes lenders, housing finance agencies, state energy offices, and utility program managers. Policymakers, developers, architects, engineers, energy consultants, and property owners and managers may also find value in the data.

## Past Projects

Future Housing has completed several projects to date with support from NYSERDA and the Bank of America Foundation laying the groundwork for this vision.

## Equity, Health, and Carbon Database for Multifamily Housing (three phases)

- Completed an extensive literature review and best practices research on equitable decarbonization and healthy housing.
- Hosted resident events at five affordable properties to learn from residents what defines the quality of their residential experience.
- Researched and developed a holistic data structure for Future Housing including energy, carbon, resident perspectives, health risk, and neighborhood context.
- Developed and piloted an approach to engaging and surveying residents of multifamily properties.

## Underwriting Standards for Low Carbon Housing

- Collected a data set of energy and property information from 30 low-carbon multifamily properties in the Northeast.
- Calculated typical owner energy expenses for low-carbon multifamily in NY State.
- Worked with NY State lenders and housing agencies on incorporating actual energy expenses data from low-carbon properties into their underwriting process.

Future Housing proposes that three independent metrics should always be used to best evaluate the true performance of multifamily buildings:

- **Resident Experience** captures how satisfied residents are living in the building, based on resident-identified priorities such as Management Responsiveness, Cleanliness / Maintenance, and Safety and Security. Multifamily housing exists to house people, but standard performance metrics fail to include how residents experience their homes. This omission leaves managers, owners, funders, and others working towards decarbonization without the information they need to improve residents' lives while addressing climate change. This novel metric, introduced by the Future Housing Initiative, awards points based on resident input, cross checked against a survey completed by one or more members of site staff. In total, 50 points are possible, and higher scores reflect a more positive resident experience.
- **Health Risk** shows the prevalence of building conditions that put residents' health at risk. This metric highlights the role of housing in health, and, in particular, that housing quality can harm residents' health. It uses established healthy housing research that identifies a healthy home as one that is safe from accidents, contaminant-free, maintained, thermally controlled, and dry. This novel metric, introduced by the Future Housing Initiative, adds deductions for risks reported at the property, up to a possible 50. A higher score indicates a higher level of risk.
- **Carbon Performance** uses standard normalized metrics for carbon emissions, energy consumption, and energy cost. It prioritizes a novel per-person normalization for carbon emissions. This honors the lower carbon impact of people who use less housing space per person, in addition to building energy efficiency. The most common energy efficiency metric, energy use per square foot (EUI), is also presented along with owner and resident energy cost metrics, which directly impact the operating costs and affordability of housing.

Resident Experience, Health Risk, and Carbon Performance, as well as the individual submetrics included in each of the three areas, have been selected based on past Future Housing research and pilot projects. The Future Housing team developed this list of metrics iteratively over several years and multiple projects. This work was completed in partnership with residents, industry advisors, funders, and project consultants. The resident engagement, health, and underwriting projects each included an Advisory Group curated to the project focus. Project consultants, including Kinetic Communities Consulting (KC3), Environmental Resources Management (ERM), CoEquity Consulting, and Simpson Strategic, have challenged Future Housing assumptions and ensured a focus on residents. Based on this input, a Bright Power analysis team translated resident responses and property data into the first version of Future Housing metrics presented here.

**Resident Experience:** In 2023, Future Housing hosted events with residents at five affordable multifamily properties. The purpose of these events was to identify issues that low-income multifamily residents name as most important to their quality of life. Residents identified three priority topics: feeling respected by building management, feeling safe, and their sense of community. These themes are not typically measured by building developers, owners, and management. Residents told Future Housing that topics that the industry references as healthy housing are important to residents, although they often describe them as quality-of-life issues. This research shaped the Resident Experience metrics.

**Health Risk:** In 2024, Future Housing hosted a research project to identify health submetrics and test data collection methods. Future Housing partnered with ERM to complete a literature review of research-indicated building health risks. Based on this review, ERM recommended health risk submetrics and survey questions. The recommended approach relies on established research that has defined a healthy home as one that is safe from accidents, contaminant-free, maintained, and thermally controlled and dry. To evaluate the potential health submetrics, Future Housing conducted resident and building manager surveys at 11 buildings in New York, Pennsylvania, and Massachusetts. The results guided a revision of the recommendations and surveys. Future Housing merged the tools from both the 2023 and 2024 projects into a single streamlined set of surveys to pilot in the 2025 project.

**Carbon Performance:** Input from housing agencies and lenders, including NYC Department of Housing Preservation and Development (NYC HPD), New York State Homes and Community Renewal (NYS HCR), Community Preservation Corporation (CPC), and Massachusetts Housing Partnership (MHP), informed the selection of energy cost submetrics. In particular, it highlighted the need to separate owner and resident expenses. As a leading provider of energy tracking services for multifamily properties for more than a decade, Bright Power's own experience also informed the Carbon Metric selection.

[See here for more information](#) on the results of research behind the Resident Experience metrics.

# Presenting the Future Housing Performance Metrics

Future Housing Property Reports provide both performance information and property context. The presentation emphasizes that performance includes Resident Experience + Health Risk + Carbon Performance. The report includes a summary and detailed version of Performance. The detailed Resident Experience, Health Risk, and Carbon Performance sections explore how individual submetrics contribute to the summary score. The property context includes rental affordability, as well as key characteristics of the residents, the neighborhood, the property, building systems, and details on data collection. The following section illustrates how Future Housing presents scores and metrics using graphics from an anonymized participating property—a recently built, PHIUS certified, 100+ unit multifamily property in New York.



## Performance Summary

The Performance Summary includes three metrics: Resident Experience score, Health Risk score, and Carbon Performance. Resident Experience and Health Risks come first to reinforce the focus on residents. Carbon intensity is presented as carbon use per person for the same reason.

### Example: FH-00003 Performance Summary

| Resident Experience Score          | Health Risk Score                      | Carbon Performance                    |
|------------------------------------|--|---------------------------------------|
| Composite score (out of 50 points) | Composite score (out of 50 deductions) | lbs CO <sub>2</sub> e/person/year     |
| <b>32</b><br>(Close to average)    | <b>18</b><br>(Close to average)        | <b>2,375</b><br>(Better than Average) |

This property earns a 32 Resident Experience score, an 18 Health Risk Score, and uses 2,375 lbs CO<sub>2</sub>e/person/year. Currently, the Resident Experience and Health comparisons (e.g. “Close to average”) are only compared to the 6 property pilot data set and not robust. The property emissions per person is relatively efficient, coming in at the 16th percentile among similar properties in the EnergyScoreCards database. Future Housing plans to build a peer comparison data set for resident and health metrics to enable similar comparisons.

The detailed performance metrics break down each area into component parts. This shows a property’s strengths and where there is opportunity for improvement.

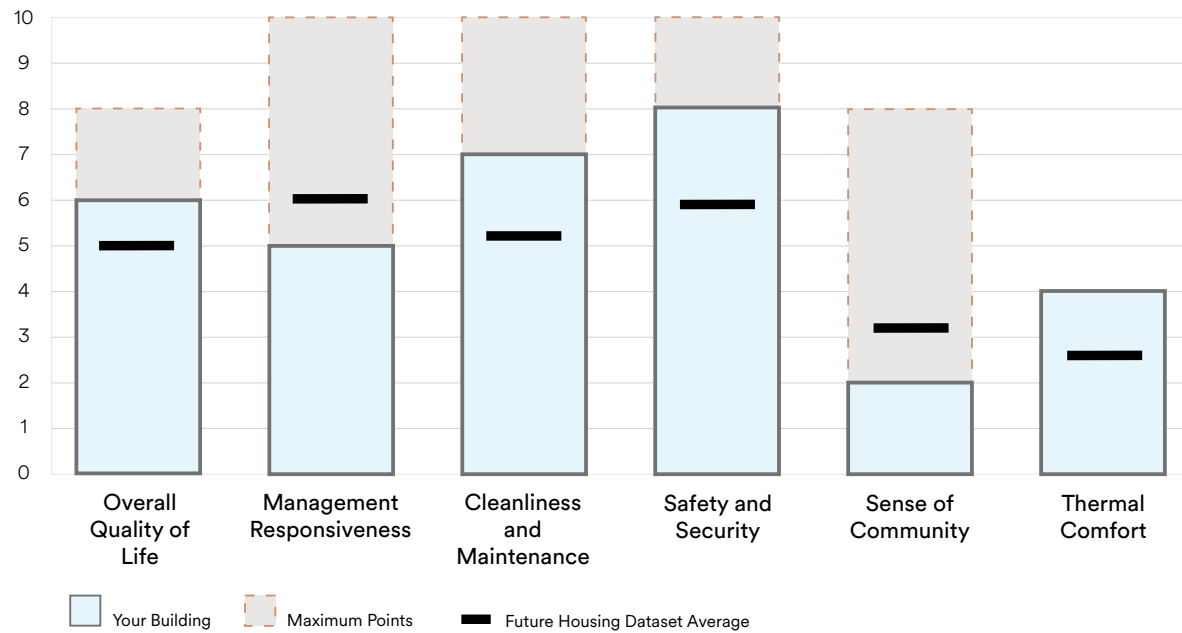
|                                    |
|------------------------------------|
| <b>Resident Experience Score</b>   |
| Composite score (out of 50 points) |
| <b>32</b>                          |
| (Close to average)                 |

The detailed Resident Experience scores below show that the property performs well on Safety and Security and on Thermal Comfort. Passive House designers often put a strong emphasis on thermal comfort and efficiency, so they should be happy with this result. The building performs less well on Sense of Community and Management Responsiveness. Surfacing this feedback may be helpful for property owners and management.

Resident Experience Score Example: Property Submetric Overview

| Resident Experience Score | Submetric                   | Value  |
|---------------------------|-----------------------------|--------|
|                           | Overall Quality of Life     | 6 / 8  |
|                           | Management Responsiveness   | 5 / 10 |
|                           | Cleanliness and Maintenance | 7 / 10 |
|                           | Safety and Security         | 8 / 10 |
|                           | Sense of Community          | 2 / 8  |
|                           | Thermal Comfort             | 4 / 4  |

Resident Experience Score Example: Property Submetric Graph



The scores are also shown on a graph. This contextualizes the property scored compared to potential maximum scores and compared to other properties in the data set. Direct resident quotes from qualitative data sources augment the presentation of the Resident Experience Score and submetrics. Reports also include a brief synthesis of observations, learnings, or opportunities.

The Resident Experience Score is the sum of six Resident Experience submetric scores. These six submetrics are weighted by setting different maximum scores for each, ranging between four and 10 points. The largest share of each submetric score derives from how residents assess each category on a scale of 1-10 in the Resident Survey. A component of each submetric score is an Interpreter Assessment score, which translates qualitative resident inputs (open-ended questions in the Resident Survey, In-Unit Tours, and Focus Groups) into a number, using sentiment analysis. Where applicable, residents’ evaluations are cross-checked with data from the Leasing/Operations/Maintenance (LOM) Survey.

The weighting reflects each submetric’s relative importance to residents, learned during the 2023 project. The three submetrics most important to residents, Management Responsiveness, Cleanliness / Maintenance, and Safety and Security, are eligible for 10 points each. Two submetrics, Overall Quality of Life, and Sense of Community, are eligible for eight points each. Thermal Comfort was a lower priority for residents, included because of its importance in decarbonization, and it adds only four points.

- **Quality of Life** captures how residents evaluate their experience living in their building, without any topic focus. (Up to 8 points)
- **Management Responsiveness** includes the ability to communicate with management, the response to repair requests, and feeling treated with respect by staff. (Up to 10 points)
- **Cleanliness and Maintenance** focuses on the condition of building common areas, as residents perceive care for shared space as a symbol of management care for residents. (Up to 10 points)
- **Safety and Security** includes freedom from interpersonal conflicts and crime inside of the building. (Up to 10 points)
- **Sense of Community** shows how connected residents feel and how often they interact with their neighbors and site staff. (Up to 8 points)
- **Thermal Comfort** addresses how comfortable residents are in their own units year-round. (Up to 4 points)

Submetric Calculation: Example

| Resident Experience Score | Submetric                   | Value        |
|---------------------------|-----------------------------|--------------|
|                           | Overall Quality of Life     | 6 / 8        |
|                           | Management Responsiveness   | 5 / 10       |
|                           | Cleanliness and Maintenance | 7 / 10       |
|                           | Safety and Security         | 8 / 10       |
|                           | <b>Sense of Community</b>   | <b>2 / 8</b> |
|                           | Thermal Comfort             | 4 / 4        |

| Sense of Community | Component (Assessment Question)                         | Source             | Point Range | Total |
|--------------------|---|--------------------|-------------|-------|
|                    | How do residents rate their sense of community? (1-10)  | Resident survey    | 2 to 5      | 8     |
|                    | How often do residents greet neighbors?                 | Resident survey    | 0 to 1      |       |
|                    | Sentiment score: Resident Sense of Community            | Qualitative source | -1 to 1     |       |
|                    | Sentiment score: Do staff treat residents with respect? | Qualitative source | -1 to 1     |       |

The detailed performance metrics break down each area into component parts. This shows a property’s strengths and where there is opportunity for improvement.

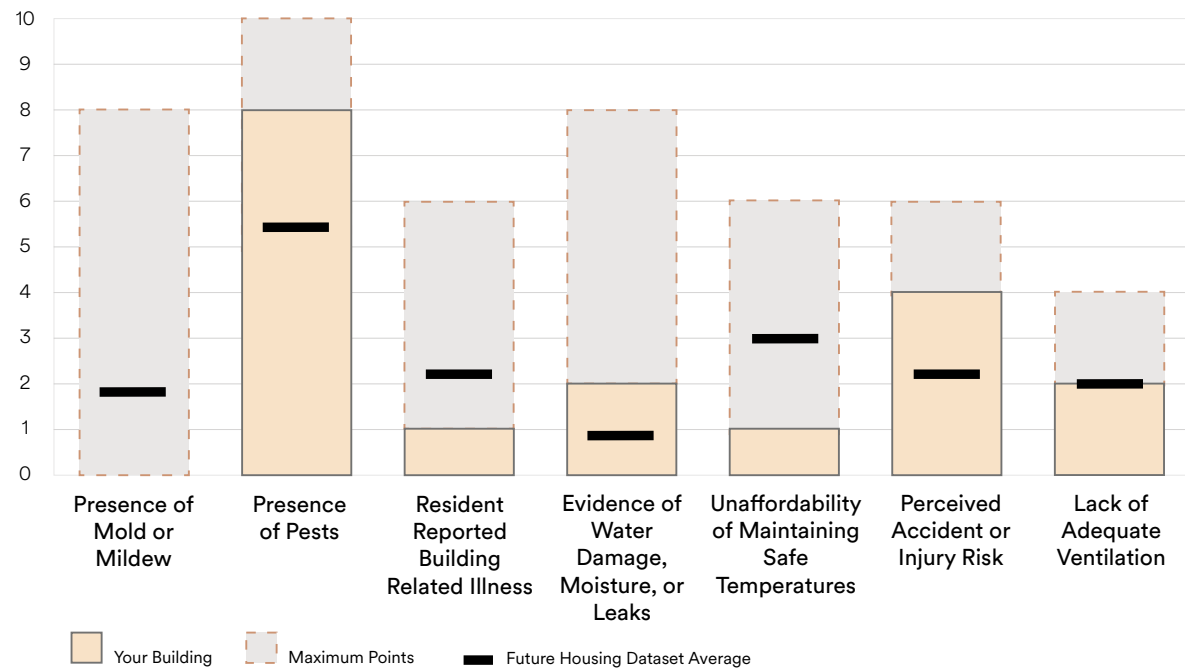
|  |
|--|
| <b>Health Risk Score</b><br>Composite score (out of 50 deductions) |
| <b>18</b><br>(Close to average)                                    |

The detailed Health Risk scores below show that the property is minimizing health risks from mold or mildew, and there are very few reports of building related illness or financial strain to pay heating/cooling costs. However, there were several mentions of pest issues, and residents report feeling at risk for slips, trips, and falls.

Health Risk Score Example: Property Submetric Overview

| <b>Health Risk Score</b> | Submetric  | Value  |
|--------------------------|--|--------|
|                          | Presence of Mold or Mildew                       | 0 / 10 |
|                          | Presence of Pests                                | 8 / 10 |
|                          | Building Related Illness                         | 1 / 6  |
|                          | Evidence of Water Damage, Moisture, or Leaks     | 2 / 8  |
|                          | Unaffordability of Maintaining Safe Temperatures | 1 / 6  |
|                          | Perceived Accident or Injury Risk                | 4 / 6  |
|                          | Lack of Adequate Ventilation                     | 2 / 4  |

Health Risk Score Example: Property Submetric Graph

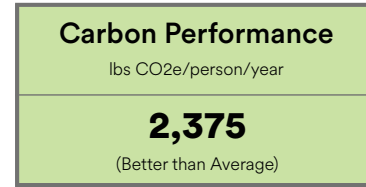


The Health Risk Score is the sum of seven Health Risk submetric scores. These seven submetrics are weighted by setting different maximum scores, ranging between four and 10 points. Future Housing’s Health Risk score increases with reporting or evidence of risk factors that have the potential to harm residents’ health. Low scores indicate the least chronic risk. The risks most likely to affect chronic health have a greater maximum score, giving them more weight. Within each submetric, on-site observations by trained facilitators have greater influence.

Most components are calculated using multiple data points collected during site engagement events. Data inputs were gathered through a visual inspection of the property, In-Unit Tours, Resident Surveys, and a Leasing/Operations/Maintenance Survey. Only the Lack of Adequate Ventilation submetric includes an Interpreter Assessment score using qualitative data from a Focus Group, In-Unit Tours, and open-ended responses in the Resident Survey.

- **Presence of Mold or Mildew**, as mold and mildew are triggers for respiratory ailments. (Up to 10 points)
- **Presence of Pests** (rodents, roaches, bedbugs), which are triggers for respiratory ailments. (Up to 10 points)
- **Resident-reported Building-related Illness** when moving into or out of the building indicate that the building plays a role in symptoms. (Up to 6 points)
- **Evidence of Water Damage, Moisture, or Leaks** is weighted less than the first two factors but indicates the potential for hidden mold and mildew. (Up to 8 points)
- **Unaffordability of Maintaining Safe Temperatures** in the home is a measure of energy cost burden. With increasing temperatures, it also indicates residents are at risk from extreme heat. (Up to 6 points)
- **Perceived Accident or Injury Risk** captures the perceived “slips, trips, and falls” risks and the perceived presence of dangers in common areas. While incidents are unlikely, they can result in serious injuries. (Up to 6 points)
- **Lack of Adequate Ventilation** means air pollutants remain in homes and exacerbates mold and mildew. (Up to 4 points)

The detailed performance metrics break down each area into component parts. This shows a property’s strengths and where there is opportunity for improvement.



The detailed energy and carbon submetrics show that the property performs better (lower) than the median across all carbon, energy consumption and cost submetrics. The Peer Percentile shows a comparison for each submetric to similar properties in the EnergyScoreCards database. Comparison properties are located in the same region, built since 2003, and have the same utility payment structure. The property’s peer percentile for carbon is lower per person than per square foot, reflecting an efficient property that is relatively densely occupied. The low resident energy cost submetrics are consistent with the health submetrics which showed relatively few residents concerned about the cost of maintaining safe temperatures in their apartments.

**Carbon Performance Example:** Property Submetric Overview

| Submetric                            | Units              | Value  | Peer Percentile |
|--------------------------------------|--------------------|--------|-----------------|
| Emissions per square foot            | lbs CO2e/SF/yr     | 5.5    | 26%             |
| Emissions per person                 | lbs CO2e/person/yr | 2375   | 16%             |
| Resident energy cost per square foot | \$/SF/yr           | \$0.34 | 28%             |
| Resident energy cost per unit        | \$/unit/yr         | \$323  | 29%             |
| Owner energy cost per square foot    | \$/SF/yr           | \$0.92 | 23%             |
| Owner energy cost per unit           | \$/unit/yr         | \$867  | 23%             |
| Energy per person                    | mmBTU/person/yr    | 16     | 31%             |
| Energy Use Intensity (EUI)           | kBTU/SF/yr         | 36     | 31%             |

1. A lower percentile indicates better performance, as it reflects lower costs, consumption, or emissions. The property is compared to a dataset of multifamily properties of a similar vintage (built after 2010) and location (mid-Atlantic: DC, DE, MD, NJ, NY, PA, VA, WV), in the EnergyScoreCards database. Therefore, a property in the 30th percentile, for example, is performing better than 70% of other properties in terms of cost, energy consumption, or emissions, highlighting its efficiency and sustainability relative to comparable buildings.

Carbon Performance does not have a cumulative score; it instead uses lbs CO2e/person/year as the primary carbon performance metric. The detailed Carbon Performance includes eight submetrics encompassing building carbon, energy consumption and energy cost. Normalizing the primary metric of Carbon Performance by the number of people in the building shows the carbon efficiency of the housing provided, instead of the building. Emphasizing carbon emissions per person makes the connection between income and housing emissions transparent. Individuals with higher incomes tend to have more residential square feet for each person, which translates to higher per-person emissions. People with lower incomes tend to have more people living in smaller units, which translates to emissions which are lower per-person emissions but sometimes higher per square foot. The other submetrics provide additional insight on the emissions and energy intensity and utility costs for building owners and residents:

- **Emissions per Square Foot** (lbs CO2e/SF/year) normalizes carbon emissions by building area, in parallel to more commonly used energy efficiency metrics based on building area. Emissions per square foot is also used by some Building Performance Standards to determine compliance with building carbon limits.
- **Emissions per person** (lbs CO2e/person/year) normalizes carbon emissions per household.
- **Energy costs are shown in several submetrics:**
  - Resident Energy Cost/Square Foot/year
  - Resident Energy Cost/unit/year
  - Owner Energy Cost/Square Foot/year
  - Owner Energy Cost/unit/year
    - These provide useful metrics to understand both owner and resident costs to operate the home.

- **Energy Use per Person** (mmBTU/person/year), normalizes consumption to occupancy to provide transparency on each individuals’ energy consumption in their home. While not good or bad in itself, energy use is the underlying activity which drives both emissions and utility costs. Again with this metric, people are the denominator rather than units, to accurately allocate use to individuals.
- **Energy Use Intensity (EUI)** (kBTU/square foot/year) is the most common metric of building energy efficiency, normalized by residential building area.

Bright Power developed these eight submetrics through an iterative process informed by years of experience providing energy benchmarking for multifamily housing portfolios and multifamily lenders. Future Housing also shows the percentile for each score as compared to similar buildings to contextualize carbon metrics. These percentiles are generated as compared to the EnergyScoreCards database, Bright Power’s national platform with information on over 2.5 million units of multifamily housing. The data informing carbon metrics come from utility bill information showing energy cost and consumption, published factors for calculating emissions from energy use, and property information such as building square footage, number of apartments and the occupancy.

2. For example, New York City’s Local Law 97 (<https://www.nyc.gov/site/buildings/codes/ll97-greenhouse-gas-emissions-reductions.page>) uses carbon emissions per square foot thresholds to determine compliance and fines for buildings over 25,000 square feet. Thresholds vary by building type.

3. “Similar” buildings are defined as other multifamily properties within the same geographic region, of a similar vintage, and at which owners and residents pay for the same portion of major energy uses: apartment electricity, cooling, heating and hot water.

A Property Overview is included with details about the property and its location. This includes demographic information on building residents, an overview of the property, the energy and water systems and amenities, and key characteristics of the surrounding neighborhood. The reader can quickly get a sense of who lives in the building, the building’s systems attributes, and how it fits into its city and neighborhood. The Data Collection Details indicate how current the information is.

Property Overview

|  |                           |   |
|--|---------------------------|---|
| Property Photo                               | Location                  | City, State   |
|  | Owner Type                | [For / Not for] Profit  |
|  | Year Built                | YYYY  |
|  | Size                      | SQFT   Number of Units  |
|  | Future Housing Criteria   | Certification   |
| Property Affordability Rules                 |                           | % AMI   |
| Average Residents per Household              |                           | Number, rounded to 2 decimal points                               |
| Neighborhood Average Residents per Household |                           | Number, rounded to 2 decimal points                               |
| Restricted Occupancy                         |                           | Unrestricted / Senior / Homeless / Supportive / Student / Veteran |
| Race/<br>Ethnicity                           | Your Building             |   |
|  | Neighborhood <sup>4</sup> |   |
| Income                                       | Your Building             |   |
|  | Neighborhood <sup>5</sup> |   |

|                         |   |
|-------------------------|---|
| Future Housing Criteria | Certification                             |
| Fuel Type               | Fuel used for cooling, heating, hot water |
| Payment Type            | Party responsible for energy payment      |
| Primary Heating System  | System                                    |
| Primary Cooling System  | System                                    |
| Primary DHW System      | System                                    |
| Ventilation             | System                                    |
| Envelope                | Design Standard                           |
| Onsite Renewables       | Renewables type                           |
| List of Amenities       | Amenities onsite                          |

|                                   |                         |
|-----------------------------------|-------------------------|
| Data Collection Contact           | Contact                 |
| Utility Data Date                 | Month YYYY - Month YYYY |
| Resident Survey Date              | Quarter YYYY            |
| Number of Participating Residents | Participating / Total   |

4. Data on neighborhood race/ethnicity obtained from the U.S. Census Bureau: <https://data.census.gov/table?q=1000000US360810972041011>  
 5. Data on neighborhood income obtained from the U.S. Census Bureau: <https://data.census.gov/table/ACSST5Y2023.S1901?g=860XX00US11691>

Each of the three performance metrics—Resident Experience, Health Risk, and Carbon Performance—provides a different and useful perspective on the property. Building owners, managers and residents can highlight specific areas for improvement. Across a larger dataset, analysis can suggest new policies, confirm the impact of current programs, and point to areas for industry learning or improvements in building design, construction, and operation.

Over time, Future Housing will seek to build peer datasets for the Resident Experience and Health Risk Performance in order to contextualize low-carbon property performance with conventional buildings.

#### Data Collection Process

Future Housing developed a data collection approach to ensure reliable, detailed information on Resident Experience and Health Risks. Resident engagement research as well as the experience of FHI partners and advisors affirmed that only in-person, onsite events could achieve this goal. One Future Housing pilot necessitated online-only Resident Surveys, which demonstrated that on-site events result in substantially higher response rates and richer information. Future Housing intends to host resident events to collect data every 5 years at Future Housing properties.

Future Housing collects data for the Resident Experience and Health Risk metrics during a three-hour, on-site, resident event. A trusted staff member or resident serves as “Site Host” to assist with logistics and event promotion. Residents and the Site Hosts receive stipends to thank them for sharing their time and expertise. They are also invited to review the final report. The events use the following data collection methods:

- **Resident Survey**, integrated into an open house designed for residents to learn about the Future Housing Initiative and the ways decarbonization relates to their lives.
- **Resident Focus Group**, open to residents that have participated in the open house and completed the Resident Survey.
- **Resident In-Unit Tours**, hosted by residents in their units with Future Housing facilitation team members.
- **Site Visual Survey**, completed by the Future Housing facilitation team.
- **Leasing/Operations/Maintenance (LOM) Survey**, completed by on-site staff.

Carbon Performance is based on property information collected through a Property Survey, completed by Property Owners or Management. This survey also includes authorization for Future Housing to access utility bill data. Detailed utility bill data is collected by Future Housing and analyzed in EnergyScoreCards.

A description of the utility data collection and analysis methodology is included in the [2024 Future Housing guidebook](#).

# Analysis Examples: Comparing Performance Across Peers

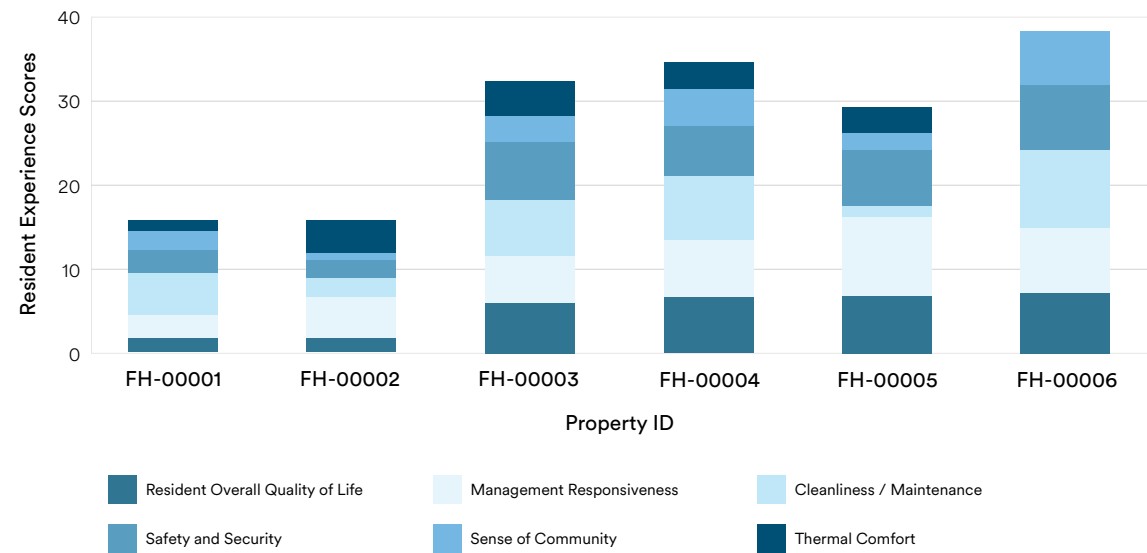
The Future Housing resident dataset currently includes six high-performance properties. While Future Housing does not yet have a peer dataset against which to compare the resident and health metrics, this comparison provides an initial sense of how the properties in the dataset perform relative to each other.



## Resident Experience Observations

The Future Housing resident data set currently includes six high-performance properties. Comparing Resident experience scores shows differences in both overall Resident Experience and component strengths and weaknesses between sites.

### Resident Experience: Scores by Property



In the chart above, comparing FH-00002 to FH-00003, while the Management Responsiveness and Thermal Comfort are similar, FH-00003 performs better across all other categories. FH-00005 shows the best Management Responsiveness score and has strong scores across most categories, but scores poorly on Cleanliness / Maintenance. This is an area important to residents which the property management could address without major repairs or a capital expense.

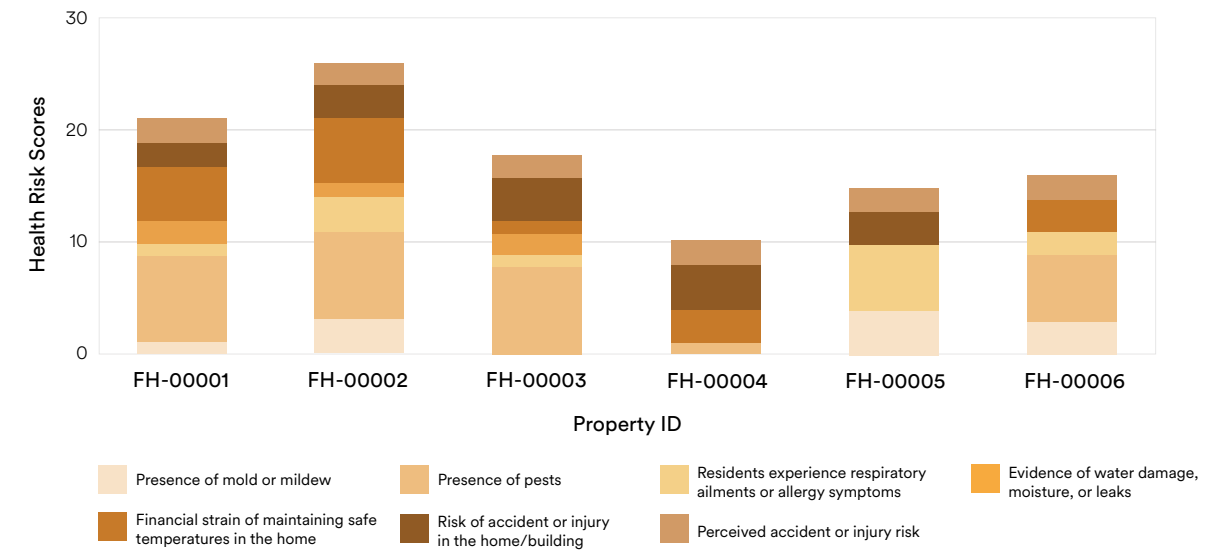
## Health Risk Observations

Comparing Health Risk Scores reveals notable differences between properties that have similar scores.

For example, FH-00004, FH-00005, FH-00006 show the three best (lowest) scores, but different strengths and weaknesses:

- FH-00004 shows no water damage observations or respiratory ailments concerns. On the other hand, residents are concerned about the cost of keeping their homes at safe temperatures and their perceived risk of injury.
- FH-00005 shows strength in many categories but notable concerns around respiratory ailments.
- FH-00006 shows no water damage observations, and residents report limited respiratory ailments. Residents worry about the cost of keeping their homes at safe temperatures and pests.

## Health Risk: Scores by Property

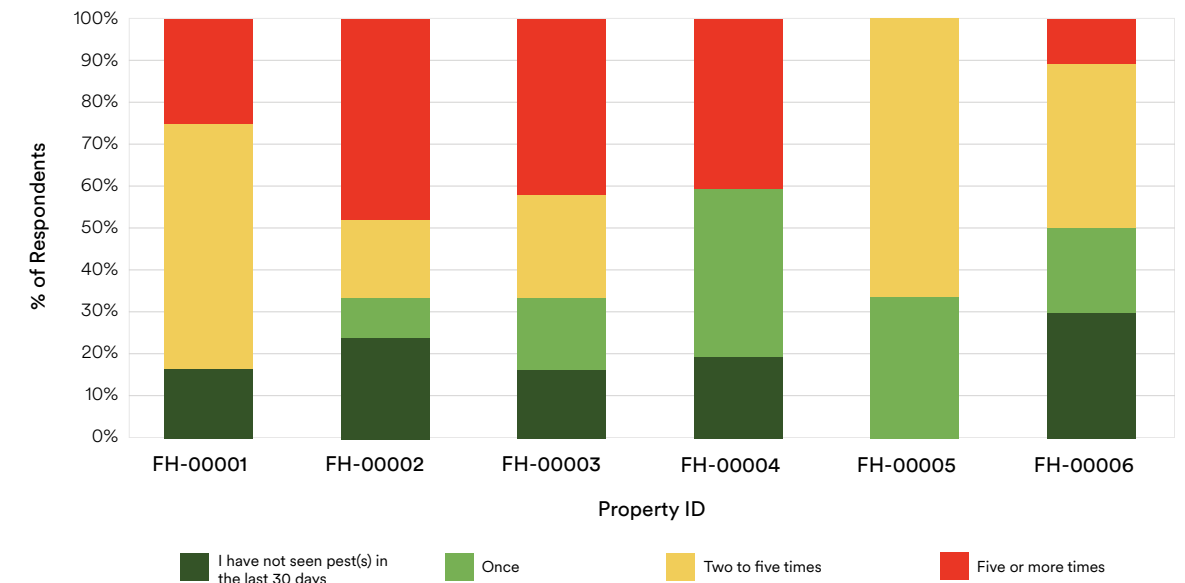


These scores should be considered indicators of the presence or absence of health risks in a property and not definitive diagnoses. Funders or policymakers might track these metrics across a portfolio. They could guide program requirements or incentives. For owners, property managers, or technical consultants, they point to areas worth further investigation or management attention.

Each detailed score is a composite of multiple survey responses, observations, or qualitative feedback provided in In-Unit tours and Focus Groups. On some questions, the responses show significant variation. For example, the figure below shows survey responses on the frequency of pest sightings, which vary widely both within and between properties.

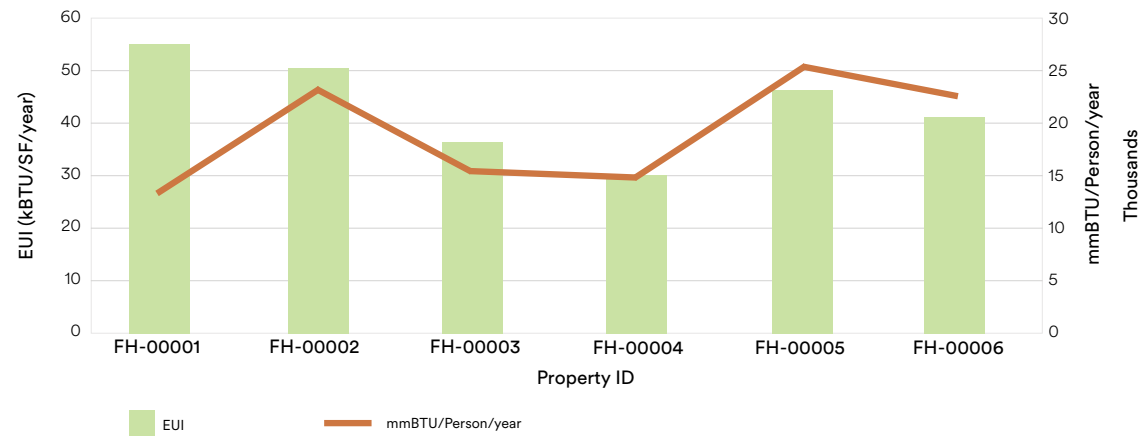
Importantly, without baseline data in these areas, Future Housing cannot yet state how these results compare to what would be found in conventional buildings.

### Health Risk: Frequency of Seeing Pests



Comparing across properties also yields more nuanced insights on carbon, energy consumption, and energy cost performance. The metrics here have different units and are not additive but instead use standard measures. Here, lower numbers are better, indicating more affordable, efficient, and lower-carbon operations.

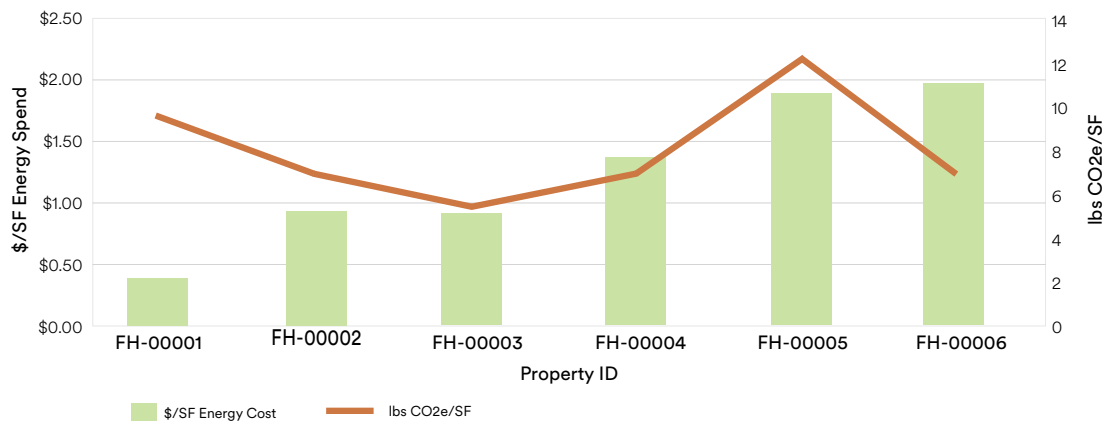
Carbon Performance: Energy Use Intensity



The value of the resident-centered approach to energy performance is visible when comparing energy intensity per person and per square foot (EUI). For example, FH-00001 has the highest EUI, but it also has the most people per unit. This results in the lowest energy use per person, reversing what otherwise looks like the least efficient property of the six. There may be opportunities to improve efficiency, but viewing this property as the most energy intensive housing in the set would be a mistake.

Showing owner energy spending against emissions intensity shows the trade-offs properties pursuing decarbonization may face. More efficient properties generally spend less on energy, but the difference in gas and electricity prices complicates this relationship. FH-00005 and FH-00006 show the highest energy spending, but FH-00006 has lower emissions while using more expensive electricity. FH-00001 shows striking low owner energy spending, but high resident spending. Qualitative comments from the resident and staff survey reveal that the central heating system has had issues necessitating space heaters being distributed to residents. This appears to have shifted substantial heating costs from owners to residents during the period analyzed.

Carbon Performance: Owner Energy Spend and Emissions Intensity



Future Housing demonstrates the viability of resident-centered property performance metrics and one way to merge them with traditional carbon and energy performance metrics. This report shows the types of insights that could be available if this approach were widely adopted.

A larger data set, including baseline data from conventional buildings, would make it possible to explore key questions around building performance:

- How do resident experience and health risk relate to energy and carbon performance?
- How do resident experience and health risk in low-carbon buildings compare to conventional buildings?
- What property context and/or characteristics, like factors in building design, construction and operation lead to low health risks and positive resident experiences?
- What are reasonable expectations for building management in high performance buildings and with difference populations and neighborhood constraints?
- Future Housing expects the analysis methodology to evolve as the data set grows based on input from the industry. Notably, many important questions remain related to the methodology:
  - What Resident Experience and Health Risk scores should be considered good or bad? This is impossible to judge without similar surveys across a large building population, including standard properties.
  - How stable will these results be over time at the same property? That is, if the property were surveyed on a different day in the same year, would results be similar? How much do results depend on the particular residents who attend an event as compared to site conditions or seasons?
  - Does the calculation method appropriately weight different categories? Does it appropriately curve the responses? Responses across the sites appeared similar when using the full 1-10 score range. As a result, the calculation increases the minimum in converting to a 1-10 score to make the differences more visible. This scaling may need adjustment with a larger dataset that includes conventional properties. Future Housing plans to solicit additional input from advisors on the weighting and threshold methodology.
  - Does a positive or negative resident experience in one area affect responses in other areas? For example, does a low sense of personal safety correlate with less or more concern about other metrics? If correlations are strong between metrics, it may be possible to reduce the number of metrics that are needed to provide a full picture.

# The Pathway Forward, from Vision to Reality

Future Housing argues that it is critical to center residents' experiences in the pursuit of a just energy transition in the multifamily housing sector. That requires both measuring and reporting how residents experience their homes as part of any building performance report.

Future Housing has developed a repeatable approach to collecting resident insights, including online tools and instructions for on-site events. Results from the first set of properties with Resident Experience, Health Risks, and Carbon Performance metrics prove that this approach is viable, and that it can reveal new and useful insights.

This new resident-centered approach to building performance raises questions and opportunities. Future Housing hopes to explore them with other industry stakeholders. Whether you are a government agency, lender, building owner, or program manager, Future Housing is eager to hear from you.

1. What would it take for you to pilot this approach to performance tracking in a voluntary energy efficiency or decarbonization program for multifamily properties?
2. What would it take for you to incorporate this approach into existing energy benchmarking or loan reporting requirements? What pilots or proofs of concept would you need before adopting this approach?
3. How do the understandings in this approach reinforce the benefits of low-carbon housing? How can policymakers, funders, and affordable housing and energy programs value those benefits along with other policy objectives?
4. How can Future Housing help you progress towards a just energy transition?

## Get Involved

The Future Housing Initiative invites interested individuals and organizations to support this work. The Initiative seeks programs and housing agencies with decarbonization goals as partners to participate in the Data Hub, to test the metrics, and to build a national data set of low-carbon multifamily new construction and retrofit projects. The Initiative is looking for opportunities to present at conferences or to publish papers.

Please share this report and the Future Housing website with interested colleagues and partners organizations. Please reach out to [info@futurehousinghub.org](mailto:info@futurehousinghub.org) to receive a detailed guide to hosting resident data collection events or to share opportunities for projects, partnerships, or presentations.

In the near term, Future Housing seeks partners and funding to accomplish four core objectives:

- Expand the data set of low-carbon multifamily properties** to include all regions of the country and low-carbon retrofits. Experience has shown that the most viable approach is in partnership with decarbonization programs that incentivize or require participation as a condition of receiving funds for upgrades.
- Build peer data sets** of conventional multifamily with resident and health surveys to develop a baseline. This improves the interpretation of results and will further hone the methodology.
- Develop a Building Resilience score** that addresses resident safety in extreme situations, including weather and climate extremes that are becoming more common as the climate changes.
- Launch the Future Housing Data Hub** to share these results with the industry on an ongoing basis through a user-friendly, interactive platform.

# About the Future Housing Initiative

## Future Housing Principles

Future Housing has identified four strategic principles to create a durable, trusted resource that meets practical stakeholder needs:

- Future Housing will take responsibility for data collection, quality control, and maintenance.** Self-submitted data resources have failed to achieve scale or longevity and suffer from inconsistent data quality.
- Future Housing will present analyzed data useful to users.** Information on building performance requires careful analysis and presentation to be useful. Based on focus group discussions with key audiences, the Future Housing Data Hub will analyze and present data tailored to meet audiences' needs. Users will also be able to manipulate the presentation to their own needs.
- Future Housing will prioritize resident voices and human-centered metrics** in the data structure, definitions and presentations. This applies to both resident survey data and energy and carbon data.
- Future Housing will present building data in context.** Users can see characteristics of the neighborhood, building population, and ownership type when interpreting building performance metrics. Insights on the connections between carbon, energy, equity, health, and resident experience help inform policymaking, financing, design, construction and operation.

## Future Housing Initiative Activities, Strategies, and Status

| Activities  | Strategies   | Status  |
|---|--|---|
| Collecting actual energy, carbon and utility cost information | Hands-on data collection support through EnergyScoreCards  | Tested and shown feasible in NYSERDA-funded Northeast low-carbon data set   |
| Collecting resident experience and health data                | Onsite engagement events with focus groups   | Tested and shown feasible at 6 properties in the Northeast low-carbon data set  |
| Recruiting buildings to participate in Future Housing         | Hands-on building recruitment paired with data-sharing commitments from low-carbon incentive programs                                  | Direct outreach has achieved project recruitment goals to date, but the effort required for building-by-building outreach is unsustainable. Currently working to establish data sharing partnerships with multifamily decarbonization programs. |
| Synthesis and presentation of resident and health data        | Show summarized metrics for resident experience and health risks alongside energy/carbon performance, with detailed breakout available | Developed method for composite resident experience and health risk metrics (this report). Need refinement with a larger data set and more industry feedback.  |

The centerpiece of Future Housing will be the Future Housing Data Hub, an accessible website providing reliable and holistic performance information on low-carbon multifamily buildings. The Data Hub will include performance on Resident Experience, Health Risks, and Carbon Performance, alongside building context. The data presentation may evolve over time to include other areas like resilience and operations and maintenance. Funders of multifamily energy efficiency and decarbonization are the primary audience for this dataset.

Core Future Housing Data Hub functionality will include:

- Accessible visualizations and exports of key data points such as:
  - Typical performance metrics on each performance category
  - Charts showing the distribution of performance among different subgroups of buildings in the dataset
  - Information on the data set and property characteristics, and search and filter tools to see the most relevant results
  - Neighborhood context information for each property in the dataset
- A user-friendly Application Programming Interface (API) to make it easy for other software tools to connect directly to the dataset for other applications, services, or research.

- Definitions of terms, data sources, and metric calculations.
- A description of the intent, background research, funding, organization, and partners supporting Future Housing.
- Ability to contact Future Housing team for:
  - Assistance accessing and understanding the data
  - Potential research or data partnerships
  - To submit more properties to the database
  - Advising or feedback on the initiative, data structure, and methodology
- Links to partner websites or research that leverages Future Housing or addresses related topics on real world performance tracking for low-carbon multifamily.
- Interface to add new projects or update project data online using web-forms and spreadsheet upload.

In addition to sharing results via the Data Hub, stakeholders at each participating property receive a property-specific Future Housing report, sharing their property's results. Residents are invited to request this during the resident event.

Properties contribute to Future Housing through in-kind contributions of property information and hosting a resident engagement event approximately every 5th year.

- Property Identification through one of three pathways
  - Part of participating program
  - Direct outreach to likely eligible properties by Future Housing team
  - Self-identification by owner/manager
- Confirm Property Eligibility (Owner/Manager with Future Housing team)
- Complete Online Building Survey (Owner/Manager)

- Provide Utility access for owner and resident/whole building data on an annual basis.
- Host Resident Engagement Event (Owner/Manager) every 5th year
  - Identify Site Host to work with the Future Housing facilitation team
  - Schedule Event
  - Complete online Leasing, Operations, Maintenance survey
  - Host Event (materials provided and event facilitated by Future Housing team)
- Receive Property-specific Report (Future Housing team delivers to Owner/Manager and participating residents who request the report)

Future Housing Property Eligibility Requirements (New Construction)

To be eligible for the Future Housing dataset, properties must be:

1. Multifamily properties with five or more apartment units
2. Built after 2003
3. Located within the United States
4. Have had at least 12 months of full (or stable) occupancy
5. Meet one or more of the three low-carbon criteria pathways:
  - Path 1: Certification Property must provide documentation to demonstrate it has achieved or is anticipating certification from a low-carbon certification, such as Green Building Initiatives Net Zero, Passive House (PHIUS or PHI), and USGBC LEED Zero Energy.
  - Path 2: Modeled Performance Property must provide documentation to demonstrate that it was designed to achieve a source EUI of < 38 kBtu/ft<sup>2</sup>/yr pre-renewable source energy. Typically this will be documented with an energy model.

- Path 3: Prescriptive Projects that are not pursuing an accepted certification and do not have an energy model projecting an accepted EUI can be included if they can confirm the use of the following design strategies:
  - Heat pumps for primary heating and domestic water heating service
  - Air leakage, prove either:
    - Whole building: 0.6 ACH @ 50 Pascals or 0.08 CFM/SF of envelope area @ 50 Pascals
    - Compartmentalization: 0.13 CFM50/SF envelope area
  - Use of ERVs for whole building ventilation
  - LED lighting + lighting controls
  - Window-to-wall ratio below 30%
  - Form factor below 3

# Sample Metric Calculations

## Future Housing Data Demonstration: Calculating the Safety and Security Submetric Hub

This table shows the calculation for the Safety and Security submetric. It has 4 components: an assessment of how residents rate security in the building, deductions based on the presence of broken security locks, and 2 sentiment scores that interpret the residents' sense of safety and the frequency of physically dangerous situations. Each component is weighted and calculated differently. How residents rate their sense of security makes up the largest proportion of the submetric score, contributing up to 9 points of the metric's possible 10. The other 3 components contribute points, which may be negative, bringing the overall score up or down. The total score cannot be below zero.

For the full methodology on how the Resident Experience score is calculated, see the Appendix: Metric Calculation Methodology.

### Example: Safety and Security

| Component (Assessment Question)  | Score Intervals  | Source              | Points Range | Total |
|--|--|---------------------|--------------|-------|
| How do residents rate security? (1-10)   | 4.03 avg. = +2pts; 4.72 avg. = +3pts; 5.41 avg. = +4pts; 6.10 avg. = +5pts; 6.79 avg. = +6pts; 7.48 avg. = +7pts; 8.17 avg. = +8pts; 8.86 avg. = +9pts | Resident Survey     | 2 to 9       | 10    |
| How many days have security locks broken in the past year?   | -1pt if broken for more than 2-days, -2pts if more than 4-days   | LOM Survey          | -2 to 0      |       |
| Sentiment score: Safety and security   |  | Qualitative sources | -1 to 1      |       |
| Sentiment score: Are there multiple signs of physically dangerous situations such as in-building assaults and chronic trespassing? |  | Qualitative sources | -1 to 0      |       |

## Demonstration: Calculating the Presence of Mold or Mildew Submetric

This table shows the calculation for the Presence of Mold or Mildew submetric. It has 3 components: an assessment of signs of mold on-site, the degree of mold presence self-reported by residents, and an assessment of Leasing's/Operations'/Maintenance's (LOM's) awareness of mold presence in the building. Each component is weighted differently, with 3 maximum deductions for the in-unit assessment, 5 possible deductions for resident self-reporting, and 2 for the LOM component. Components are often scored based on the frequency of a condition, as indicated by the Score Intervals column. For example, for signs of mold during in-unit tours, the maximum of 3 deductions are given if more than 75% of the unit sample show signs of mold, 2 deductions are given if 50-75% of the unit sample show signs of mold, and 1 deduction is given if 25-50% of the unit sample show signs of mold.

For the full methodology on how the Health Risk score is calculated, see the Appendix: Metric Calculation Methodology.

### Example: Presence of Mold or Mildew

| Submetric                  | Component (Assessment Question)                               | Score Intervals   | Source               | Points Range | Total |
|----------------------------|---|---|----------------------|--------------|-------|
| Presence of Mold or Mildew | Are there current or previous signs of mold in units?         | 3deds if more than 75% of units show signs of mold; 2deds if 50-75%; 1deds if 25-50%                              | In-Unit Tour         | 0 to 3       | 10    |
|                            | Is there mold in residents' homes?                            | 5deds if more than 35% of residents report mold; 4deds 28-35%; 3deds for 20-28%; 2deds for 15-19%; 1ded for 7-14% | Resident Survey      | 0 to 5       |       |
|                            | Do LOM have an accurate awareness of actual presence of mold? | 2deds if signs of mold are seen in the in-unit tour and LOM report no mold at the property                        | LOM, Resident Survey | 0 to 2       |       |

Key: ded/deds – Deduction(s)

# Metric Calculation Methodology

## Calculating the Health Risk Score

| Submetric  | Component (Assessment Question)   | Score Intervals   | Source               | Deduction Range | Total |
|--|---|---|----------------------|-----------------|-------|
| Presence of Mold or Mildew                       | Are there current or previous signs of mold in units?   | 3ded if more than 75% of units show signs of mold; 2ded if 50-75%; 1ded if 25-50%   | In-Unit Tour         | 0 to 3          | 10    |
|  | Is there mold in residents' homes?  | 5ded if more than 35% of residents report mold; 4ded 28-35%; 3ded for 20-28%; 2ded for 15-19%; 1ded for 7-14%   | Resident Survey      | 0 to 5          |       |
|  | Do LOM have an accurate awareness of actual presence of mold?                                       | 2ded if signs of mold are seen in the in-unit tour and LOM report no mold at the property   | LOM, Resident Survey | 0 to 2          |       |
| Presence of Pests                                | How many pest sightings have residents experienced in their homes in the last 30 days?              | 5ded for an avg. of 5+ days of sightings; 4ded for 4-days; 3ded for 3-days; 2ded for 2-days; 1ded for 1-day   | Resident Survey      | 0 to 5          | 10    |
|  | What percentage of residents have experienced pest sightings in their homes in the last year?       | 3ded for 60% of residents reporting pests; 2ded 40% reporting, 1ded for 20% reporting   | Resident Survey      | 0 to 3          |       |
|  | Do LOM have an accurate awareness of actual presence of pests?                                      | 2ded if LOM underreport number of residents experiencing pest sightings by 30%; 1ded if underreported by 20%  | LOM, Resident Survey | 0 to 2          |       |
| Building-Related Illness                         | Are residents' symptoms related to the building?  | 6ded if more than 48% of residents match the criteria <sup>6</sup> ; 5ded for 40-48%; 4ded for 32-40%; 3ded for 24-32%; 2ded for 16-24%; 1ded for 8-16% | Resident Survey      | 0 to 6          | 6     |
| Evidence of Water Damage, Moisture, or Leaks     | Are there signs of water leaks?   | 6ded if more than 75% of units show signs of an active leak; 4ded if 50-75%; 2ded if 25-50%   | In-Unit Tour         | 0 to 6          | 8     |
|  | Is there evidence of water damage?  | 2ded if more than 30% of units show signs of water damage; 1ded for 20-30%  | Resident Survey      | 0 to 2          |       |
| Unaffordability of Maintaining Safe Temperatures | Do residents need to choose between paying bills or keeping temperatures safe?                      | 6ded if more than 70% have had to choose; 5ded for 60-70%; 4ded for 50-60%; 3ded for 40-50%; 2ded for 30-40%; 1ded for 20-30%                           | Resident Survey      | 0 to 6          | 6     |
| Perceived Accident or Injury Risk                | Can residents identify physical safety concerns in their home or common areas in the last 3 months? | 2ded for more than 50% reporting concerns, 1ded for 25-50%  | Resident Survey      | 0 to 2          | 6     |
|  | Do LOM have an accurate awareness of actual presence of safety concerns?                            | 2ded if LOM underreport risk by 50% compared to residents, 1ded if underreported 25-50%   | LOM, Resident Survey | 0 to 2          |       |
|  | Do residents use a secondary method for heating in winter?  | 2ded if more than 50% report secondary heating use; 1ded for 30-50%   | Resident Survey      | 0 to 2          |       |
| Lack of Adequate Ventilation                     |   | Inadequate ventilation is assumed, properties start with 1ded   |                      | 1               | 4     |
|  | Are residents experiencing excess humidity/dampness?  | 1ded if more than 25% of residents report excess  | Resident Survey      | 0 to 1          |       |
|  | Is there poor ventilation or lack of cooking ventilation?   | 1ded if more than 25% of units show either absent cooking ventilation or poor cooking ventilation   | In-Unit Tour         | 0 to 1          |       |
|  | Sentiment score: Presence of adequate ventilation   |   | Qualitative sources  | -1 to 1         |       |

Key: avg. – Average; pt/pts – Point(s); ded/deds – Deduction(s)

6. Residents with building-related illness is defined as residents who have both symptoms that do not improve after leaving their home and symptoms that worsen in the home

## Calculating the Resident Experience Score

| Submetric                   | Component (Assessment Question)  | Score Intervals   | Source                           | Points Range | Total |
|-----------------------------|--|---|----------------------------------|--------------|-------|
| Overall Quality of Life     | How do residents rate their overall experience? (1-10)   | 4.60 avg. = +1pt; 5.23 avg. = +2pts; 5.87 avg. = +3pts; 6.50 avg. = +4pts; 7.14 avg. = +5pts; 7.77 avg. = +6pts; 8.41 avg. = +7pts                                    | Resident Survey                  | 1 to 7       | 8     |
|                             | Sentiment score of resident quality of life  |   | Qualitative sources <sup>7</sup> | -1 to 1      |       |
| Management Responsiveness   | How do residents rate management satisfaction? (1-10)  | 4.59 avg. = +1pt; 5.21 avg. = +2pts; 5.83 avg. = +3pts; 6.45 avg. = +4pts; 7.08 avg. = +5pts; 7.70 avg. = +6pts; 8.32 avg. = +7pts                                    | Resident Survey                  | 1 to 7       | 10    |
|                             | Do LOM have an accurate awareness of actual resident satisfaction?   | -1 pt if LOM rates resident satisfaction 2pts higher than resident avg.; -2pts if LOM rates resident satisfaction 4pts higher   | LOM, Resident Survey             | -2 to 0      |       |
|                             | Can residents speak to management in a comfortable language most of the time?  | -1pt if fewer than 85% of residents can speak to management comfortably (at least) most of the time; -2pts if fewer than 70%  | Resident Survey                  | -2 to 0      |       |
|                             | What is the average turnaround time for maintenance requests?  | +2pts for a 1-day avg. turnaround time; +1pt for a 2-day avg.   | LOM Survey                       | 0 to 2       |       |
|                             | Sentiment score: Do things get fixed, in a reasonable amount of time, by respectful people?  |   | Qualitative sources              | -1 to 1      |       |
| Cleanliness and Maintenance | How do residents rate the cleanliness of the building? (1-10)  | 4.29 avg. = +1pt; 4.88 avg. = +2pts; 5.47 avg. = +3pts; 6.05 avg. = +4pts; 6.64 avg. = +5pts; 7.23 avg. = +6pts; 7.82 avg. = +7pts; 8.41 avg. = +8pts; 9 avg. = +9pts | Resident Survey                  | 1 to 9       | 10    |
|                             | Sentiment score: Are the common spaces clean?  |   | Qualitative sources              | -1 to 1      |       |
| Safety and Security         | How do residents rate security? (1-10)   | 4.03 avg. = +2pts; 4.72 avg. = +3pts; 5.41 avg. = +4pts; 6.10 avg. = +5pts; 6.79 avg. = +6pts; 7.48 avg. = +7pts; 8.17 avg. = +8pts; 8.86 avg. = +9pts                | Resident Survey                  | 2 to 9       | 10    |
|                             | How many days have security locks broken in the past year?   | -1pt if broken for more than 2-days, -2pts if more than 4-days  | LOM Survey                       | -2 to 0      |       |
|                             | Sentiment score: Safety and security   |   | Qualitative sources              | -1 to 1      |       |
|                             | Sentiment score: Are there multiple signs of physically dangerous situations such as in-building assaults and chronic trespassing? |   | Qualitative sources              | -1 to 0      |       |
| Sense of Community          | How do residents rate their sense of community? (1-10)   | 4.30 avg. = +2pts; 5.51 avg. = +3pts; 6.71 avg. = +4pts; 7.92 avg. = +5pts  | Resident Survey                  | 2 to 5       | 8     |
|                             | How often do residents greet neighbors?  | +1 = residents greet, or are greeted by their neighbor/staff, at least 5 times a week on average  | Resident Survey                  | 0 to 1       |       |
|                             | Sentiment score: Resident Sense of Community   |   | Qualitative sources              | -1 to 1      |       |
|                             | Sentiment score: Do staff treat residents with respect?  |   | Qualitative sources              | -1 to 1      |       |
| Thermal Comfort             |  | Comfort is assumed, properties start with 3pts  |                                  | 3            | 4     |
|                             | Are residents comfortable in the summer?   | -1pt = Less than 80% of residents report thermal comfort  | Resident Survey                  | -1 to 0      |       |
|                             | Do residents use a secondary method for heating in winter?   | -1pt = More than 20% of residents report using secondary heating  | Resident Survey                  | -1 to 0      |       |
|                             | Sentiment score: Thermal comfort   |   | Qualitative sources              | -1 to 1      |       |

7. Qualitative sources include open-ended questions in the Resident Survey, conversation during In-Unit Tours, and Focus Groups at Building Events

# Data Collection Methodology: Sample Property

Carbon Performance data is based on utility data collected and analyzed through Bright Power's EnergyScoreCards platform. The property contact provides utility data access and authorizations. Bright Power's team uses these to collect energy data from the local utility. Utility data is imported into EnergyScoreCards, and reviewed for gaps, errors, and anomalies. The data is weather-normalized and analyzed to calculate annualized metrics.

Resident Experience and Health Risk data is collected at an on-site resident event. Working with the property contact, Bright Power identifies a Site Host for the resident engagement event. The Site Host selects the event date, coordinating with the Future Housing facilitation team. The Future Housing team provides materials including an overview of site host expectations, information on resident and site host stipends, and recruitment materials to promote the event to residents.

At property FH-00003, the resident engagement event was held in March 2025 with the following participation:

- 16 resident surveys completed
- 6 residents participated in a focus group
- 2 residents opened their apartments to a home tour by Future Housing staff

The data collected from the surveys, focus groups and home tours consisted of:

- 300 data points from online survey completion including multiple choice responses, 1-10 ratings, short answer text fields.
- Notes from focus groups and home tour conversations
- Leasing/Operations/Maintenance Survey
- Visual survey and notes on the property completed by the trained facilitation team

## Strengths and Limitations of Resident Data

11 Future Housing pilot projects have demonstrated the resident engagement event structure is effective with diverse residents. This includes data from the 6 properties in this report and 5 properties from earlier surveys at conventional affordable properties that did not include the full set of health survey questions.

Pilot sites have included public, affordable, and market rate properties. These properties included supportive housing, youth- and senior buildings. Residents have come from varied racial, linguistic, and ethnic backgrounds.

There are inherent limitations with resident data collection. Future Housing provides stipends for participating in event activities, which successfully encourages participation. However, the number of participants is inherently small and not statistically significant. Apartment buildings as small as 5 units are eligible to participate, and not all residents participate. Future Housing targets the following minimum participation:

- 15 residents to complete the resident survey,
- 5 residents participate in the focus groups
- 5 households allow an in-unit tour by Future Housing staff

## Representation

It is unlikely that participating residents are representative of all building residents. People are more likely to participate in feedback when they want to complain, while residents with a positive relationship with staff are most likely to respond to site staff outreach.

The event scheduling influences which residents participate. The time of day may introduce bias for residents unavailable due to work schedules, childcare obligations, or other conflicts.

The outreach itself influences participation. At one site, the site host hadn't posted event information, so the facilitators flyer'd the building immediately before the event began. At another site, the event was scheduled for staff convenience rather than residents' schedules. At the third site, a small number of residents shared their opinion that the site host had done outreach to "favored" residents and not informed all residents of the event.

## Life Experience Influence on Scoring

Future Housing has observed that residents' life experiences influence how they rate aspects of Resident Experience. People who feel at risk of homelessness score their buildings differently than people with incomes enabling many housing choices.

At one property, residents' responses focused heavily on appreciation for simply having a home. Residents shared little about other aspects of their experience. They rated their quality of life high despite identifying concerns when prompted on other topics. The property provided supportive housing for formerly homeless youth, who had recently had no shelter. In context, their positive responses are no surprise.

In contrast, at a mixed-income property a high number of market-rate residents participated. Resident ratings were lower here, although responses about specific potential issues were less likely to identify concerns. Specifically, the open-ended responses indicated that the residents with incomes above \$200,000 had high expectations for building performance, how staff treated residents, and amenities. They rated performance on a tougher scale.

## Tendency Towards the Mean

Residents are unlikely to select ratings at the extremes of the scale (e.g. 0 or 10), reducing the apparent variation in ratings between properties. Of the six buildings that are shared in this report, the average score for Safety and Security ranged from slightly above six to 8.5. Yet open-ended responses shed light on strikingly different conditions. For example, while one site reported assaults on both residents and staff, another site with a similar resident profile reported a couple of broken door locks as the worst security concern.

Management needs to accurately understand residents' satisfaction and to manage issues relating to durability and issues that can harm residents' health. It is challenging for management to be aware of the presence of pests, of disrespectful staff behavior, or of non-functioning thermostats when residents are unable or choose not to report problems. Successful management, however, plans for these challenges. This is true whether residents choose to report issues or not, where there are cultural or language barriers or risk of misunderstandings, and no matter the specific circumstances in a building.

The Future Housing team chose to use the accuracy of the Leasing/Operations/Management (LOM) Survey compared to the Resident Survey as a test of management's understanding of some aspects of Resident Experience and Health Risk. This only applies when the LOM Survey is optimistic in favor of building management. Future Housing emphasizes that a discrepancy in Resident and LOM Survey scoring likely reflects resident reporting and communication and is no indication of irresponsible management or intentional misreporting. The Future Housing team hopes that having this feedback invites management teams to reflect on the underlying reason for the discrepancy and to develop strategies to mitigate challenges.

## Glossary

- **Benchmarking** - The practice of comparing building performance—typically energy or water use—against standardized metrics, peers, or historical data to identify areas for improvement.
- **Cleanliness / Maintenance** - The condition of shared and private areas in a building, as perceived by residents, including routine upkeep and responsiveness to repair requests.
- **Composite score** - An aggregate performance metric calculated by combining multiple weighted indicators to reflect an overall result for a given category, such as Resident Experience or Health Risk.
- **Data Hub** - A centralized platform or tool used to store, organize, and display building performance data for stakeholders including resident experience and health risk data.
- **Decarbonization** - The process of reducing or eliminating carbon emissions from building operations, often through electrification, energy efficiency, and renewable energy adoption.
- **Energy Consumption** - The total energy used by a building over a defined period, often reported in mmBTU or kBTU.
- **Energy Use Per Person** - A measure of energy intensity that divides total building energy use by the number of residents, used to highlight efficiency and climate impact on a per person basis. mmBTU/person/year
- **EnergyScoreCards** - A benchmarking and analysis platform developed by Bright Power that collects and analyzes building energy and water data.
- **EUI – Energy Use Intensity**. A standard energy efficiency metric calculated as total energy use divided by the building's square footage (kBTU/sq ft/year).
- **Evidence of Water Damage, Moisture, or Leaks** - Visible signs—such as staining, mold, or musty smells—indicating previous or current water intrusion issues in the building.
- **Financial Strain of Maintaining Safe Temperatures in the Home** - Resident-reported difficulty affording heating or cooling costs necessary to stay safe and comfortable in extreme temperatures.
- **Fuel Type** - The kind of energy source used in a building, such as electricity, natural gas, oil, or steam for cooling, heating, and hot water.
- **Future Housing Criteria** - The set of standards that qualifies a property for inclusion in the Future Housing Initiative dataset. Recently built properties must meet multiple requirements, such as being certified by a low-carbon program and a minimum number of units. Future Housing Criteria for low-carbon retrofits are still in development as of this writing.
- **Green Design / Certification criteria** - Recognized standards or certifications for environmentally sustainable buildings, such as PHIUS or LEED.
- **Health Risk Score** - A metric reflecting the presence of conditions that pose health risks to residents, including mold, pests, poor ventilation, trip hazards, and more.

## Glossary

- **Lack of Adequate Ventilation** – Within the Future Housing metrics, a building condition where residents experience airflow as insufficient. A lack of adequate ventilation contributes to poor air quality and exacerbating health risks such as mold or respiratory issues. Resident perceptions may or may not indicate a health risk.
- **Management Responsiveness** - A resident-reported measure of how effectively and respectfully building staff handle repair requests and general communication.
- **New Construction** – Future Housing Criteria identify buildings built after 2003 as qualifying under new construction standards.
- **Owner Type** - The classification of who owns a property, in Future Housing listed as PHA (Public Housing Authority), For-profit owner, or Nonprofit organization.
- **Passive House/ PHIUS/ PHI Certified** - High-performance building standards that emphasize super tight and insulated building envelopes, deep energy efficiency and indoor comfort; PHIUS and PHI certifications confirm compliance with these standards.
- **Payment Type** - A classification that specifies the party responsible for covering utility expenses at a property, typically indicating whether the owner or residents pay for services such as electricity, cooling, heating, and water heating.
- **Peer Percentile** - A comparative ranking that shows how a building's performance stacks up against others in a dataset. A metric at the 25th percentile is lower than 75% of the comparison data set.
- **Performance Metrics** - Quantitative indicators used to assess how well a building meets specific criteria, such as Resident Experience, Health Risk, or Climate Performance.
- **Presence of Mold or Mildew** - Fungal growth in a building, reported by residents, staff, or Future Housing facilitators. This is a condition which can pose health risks to occupants.
- **Presence of Pests** - The occurrence of insects or rodents in the building, as reported by residents or observed by staff.
- **Property Affordability Rules** - Contractually set affordability rules applied to units in a property. These can include income limits and restrictions on setting rents. Typically stated as percentages of the Area Median Income (AMI), a definition set by HUD.
- **Resident Engagement Event** - An in-person event hosted by the Future Housing Initiative to gather feedback from residents on their experiences and conditions in the building. Events include an open house to learn about the initiative and the relevance of decarbonized housing to their own lives, a Resident Survey, In-Unit Tours, a Focus Group, a Future Housing facilitator Visual Survey of the property, and a Leasing/Operations/ Maintenance (LOM) Survey.
- **Resident Experience Score** - An overall metric based on survey responses and observations that reflect residents' experience of their building.
- **Resident Overall Quality of Life** - A broad assessment of residents' satisfaction with their home environment.
- **Residents Reported Building Related Illness** - Survey responses indicating whether residents or household members experience breathing issues potentially linked to building conditions.
- **Restricted Occupancy** - The designation of a building based on its intended residents, such as Unrestricted, Senior, Homeless, Supportive, Student, or Veteran.
- **Risk of Accident or Injury** - Observed or reported conditions that could cause harm, such as slippery floors, broken stairs, or inadequate lighting.
- **Safety and Security** - Residents' perception of their personal safety in the building, including crime, conflict, and building access control.
- **Sense of Community** - How connected and supported residents feel by their neighbors and building staff.
- **Site Host** - The individual at a property who facilitates resident engagement and assists with outreach and logistics for the Resident Engagement Event.
- **Thermal Comfort** - Residents' perception of indoor temperature comfort throughout different seasons.
- **Weather Normalization** - A data adjustment method that accounts for seasonal temperature variations to allow fair comparison of energy use across properties and time.

# Credits

## Project Team

Building Energy Exchange (BE-Ex)  
Richard Yancey  
Katie Schwamb  
Evana Said-Herz

## Bright Power

Janne Flisrand  
Jonathan Braman  
Khaleah Edwards  
Olivia Willnow  
Kelly Jiang  
Yawen Zhang

## Kinetic Communities Consulting (KC3)

Daphany Sanchez  
Yangchen Dolma  
Emily Baumbach

## Additional Bright Power Contributors

Stephen Walsh  
Orly Arbit  
Aisha Tijjani  
Mehnaj Zarin  
Jessica Owens  
Sam Weisenberg  
Alice Suh

## Design

Might Could

## Acknowledgements

This report synthesizes and was informed by work from multiple projects funded by NYSERDA and Bank of America and in-kind funding from project partners. Bright Power, Building Energy Exchange have led project work and initiative fundraising to date. Kinetic Communities Consulting (KC3), ERM, CoEquity Consulting, and Simpson Strategic, have challenged Future Housing to reconsider assumptions and always focus on residents. NYC HPD, NYS HCR, Community Preservation Corporation, Bank of America provided invaluable feedback from the perspective of lenders, agencies and affordable housing. Steven Winter Associates provided technical advising and review. Our advisory group has convened for multiple focus groups and virtual workshops and includes representatives from 36 organizations. Special thanks to Jen Leone for her persistent questions about low-carbon multifamily and to Amy Brusiloff for her enduring support for innovative approaches to financing energy efficiency.

## Disclaimer

While every effort has been made to contain correct information, neither Building Energy Exchange nor the authors or project advisors makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. None of the parties involved in the funding or the creation of this study assume any liability or responsibility to the user or any third party for the accuracy, completeness, or use or reliance on any information contained in the report, or for any injuries, losses or damages arising from such use or reliance. any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. None of the parties involved in the funding or the creation of this study assume any liability or responsibility to the user or any third party for the accuracy, completeness, or use or reliance on any information contained in the report, or for any injuries, losses or damages arising from such use or reliance.

©Building Energy Exchange  
All Rights Reserved  
October 2025  
be-exchange.org

## Advisory Group

### Resident Tools and Data

Abe Kruger, SK Collaborative  
Claire Cowan, Slipstream  
Sean Armstrong, Redwood Energy  
Andrew Brooks, AEA West, Association for Energy Affordability  
Brady Mills, Partner Energy  
Becky Shaaf, Vermont Energy Investment Corporation  
Abby Corso, Elevate  
Bob Dean, Elevate  
Joanna Grab, Steven Winter Associates  
Sam Culpepper, Southface Institute  
Amelia Godfrey, Southface Institute  
Lucas Toffoli, Rocky Mountain Institute  
John Beaumont, New Ecology  
Marty Josten, New Ecology  
Aimee Powelka, Massachusetts Energy and Environmental Affairs  
Daniel Engelberg, Massachusetts Energy and Environmental Affairs  
Charlie Stevens, Colorado Energy Office  
Loren Ahonen, Colorado Energy Office  
Michael Reed, NYSERDA

### Equity & Carbon Database for Multifamily Housing

Rich Brown, Bank of America,  
Amy Brusiloff, Bank of America  
David Davenport, NY Green Bank  
Lauryn Enrico, Federal Housing Finance Agency  
Kenaz Flores, Bank of America  
Kim Foreman, Environmental Health Watch  
Angelina Gonzalez Aller, Montana Human Rights Network  
Kimelyn Harris, Bank of America  
David Hsu, Massachusetts Institute of Technology  
Bomee Jung, Cadence OneFive  
Jamal Lewis, Rewiring America  
Adam Meier, Housing Partnership Network  
John Moon, Wells Fargo  
Raymond Nevo, National Housing Trust  
Sarah Newman, Pacific Northwest National Laboratory  
Lisa Patel, Medical Society and Consortium on Climate and Health  
Erin Rose, Three3 Inc.  
Lauren Westmoreland, Stewards of Affordable Housing for the Future  
Jonathan Wilson, National Center for Healthy Housing  
Jamie Woodwell, Mortgage Bankers Association

### Underwriting Standards for Low-Carbon Housing

Amy Brusiloff, Bank of America  
Lauren Baumann, Massachusetts Housing Partnership  
Ryan Cassidy, Riseboro Community Partnership  
Beverly Craig, Massachusetts CEC  
Rebecca Hudson, EPA  
Joshua Kace, Lawrence Berkeley National Lab  
Elizabeth Kelly, EDK Solutions  
Bing Liu, Pacific Northwest National Laboratory  
Ken Levenson, The Passive House Network  
Christina McPike, WinnCompanies  
Katelyn Meehan, Wells Fargo  
Trish Ostergaard, NYC Housing Development Corporation  
Samantha Pearce, NYS Housing & Community Renewal  
Lindsay Robbins, CPC  
Becky Schaaf, VEIC  
Molly Simpson, Fannie Mae  
Christoph Stump, Trinity Financial, Inc.  
Lucas Toffoli, RMI

The Future Housing Initiative is a new endeavor launched by Bright Power and Building Energy Exchange to help drive the transition to low-carbon, multifamily housing with real world data and analysis of building performance.

