Future Housing Initiative: Researching Resident Priorities for Inclusion in An Equity & Carbon Database for Multifamily Housing

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ABSTRACT

The Future Housing Initiative (FHI) is a new endeavor to help drive the transition to low-carbon, multifamily housing. The Initiative will create a national, equity-centered database of real-world performance data on low-carbon multifamily buildings. The data will be organized around what residents participating in the research described here identify as most important to them. This will ensure the information on low-carbon housing includes not only carbon, energy, and physical building attributes, but also resident priorities like affordability, quality of life, and health. The data will be accessible via an online hub, sharing metrics informed by the research. Applied research is also driving initial data collection to populate the database.

Future Housing has three completed research projects. This paper discusses field work at five diverse NYC sites to learn from residents about their housing priorities. These residents - who are underrepresented in policy work, energy efficiency work, and program design teams - identified three primary resident priorities, all interrelated and shaped by management. The first, Personal Safety, focused heavily on building security. The second, Building Management, highlighted how building staff and site cleanliness contribute to feeling respected in their homes. Finally, a sense of Community is particularly important to residents.

Introduction

The Future Housing Initiative is creating a national database of real-world performance data on low-carbon multifamily buildings. The initiative will center the priorities of affordable housing residents. To deliver data and analysis that supports equitable decarbonization of the multifamily building sector, the data will center metrics reporting the priorities of affordable housing residents, affordability, and health alongside energy use and carbon emissions.

The Future Housing Data Hub[1] will be the Initiative's centerpiece. The user-friendly website will provide real world information on a set of specific low-carbon multifamily properties across five categories:

- Property information (e.g., location, size, building and system types, green certifications, financing, occupancy)
- Building operation (e.g., energy and water consumption, spending, carbon emissions)
- Neighborhood characteristics (e.g., income, household size, public transportation)
- Resident experience (e.g., perception of safety, thermal comfort, building management).

[1] https://be-exchange.org/beexreport/future-housing/

- Building health risks (e.g. clean, dry, safe, ventilated, maintained)

The Future Housing Initiative has three initial projects. The first completed field work at five affordable NYC sites to learn from residents about their housing priorities. This paper shares findings from this resident engagement. The second collected and analyzed energy use data for more than 40 low-carbon multifamily buildings in the Northeastern United States to facilitate financing low-carbon multifamily housing. The third identified and tested the feasibility of collecting healthy housing metrics.

This paper presents the findings and recommendations from the resident field research. The research goal was uncovering residents' top priorities for their quality of life, as defined by the residents themselves. It was open to any quality-of-life themes, recognizing that a resident-centered resource must reflect all resident priorities, extending beyond building sustainability. The events were held in conventional (i.e. not green) affordable buildings with three goals:

- Provide residents a chance to share their perceptions and experiences on topics including energy and water use, housing quality, and the conditions of their homes.
- Ask low-income renters to share what most affects their housing experience.
- Gather input from residents living in diverse building types and use their quality of life scoring to begin setting a baseline for existing building performance.

Residents are the experts in which factors determine their quality of life, and this project tested the possibility and cost of engaging residents to learn how they evaluate their building's performance in providing a high resident quality of life.

This work was a partnership between Building Energy Exchange and Bright Power, with support from CoEquity Consulting and Kinetic Communities Consulting, and Simpson Strategic Solutions.

Resident Priorities Project Overview

Future Housing Initiative aims to center resident voices and experiences. The Equity & Carbon Database field research serves several purposes. First, it developed and tested an intersectional, anti-racist approach to data collection. Second, the research was a space for residents to teach the project team what is most important to residents' quality of life and what they most want from their housing. Third, the resident priority findings guided development of resident-centered metrics, listed below. Finally, with minor revisions resulting from this research, this resident engagement approach will be replicated at properties included in the Future Housing Data Hub. Those events will generate quality-of-life metrics to both share back with the participating residents and to share via the Data Hub.

The research approach centered low-income members of marginalized groups, particularly people of color. Findings were shared directly with contributing residents. The research team assembled a group of Project Advisors and conducted a literature review. The literature review summarizes past research, reports, industry experience and best practices that inform the Future Housing approach. Advisor workshops provided feedback to enhance the field research plan and the analysis of the findings.

The research team applied empowerment-focused principles of inclusivity, transparency, accessibility, and ethical considerations in the research design.[2] These required that the processes and outcomes of these activities contribute to the empowerment of individuals and communities. They apply throughout the entire data lifecycle, from data collection through analysis.

Methodology

Future Housing hosted events with residents in five NYC multifamily buildings with primarily low-income renters. The research team asked residents to teach us what matters to them. Qualitative and observational research methods helped fill a gap in the multifamily housing industry's lack of social and equity metrics. Low-income renters' physical, logistical, and financial needs shaped the data collection, analysis, and recommendations.

Table 1 shows site eligibility requirements and site recruitment goals. The intent was to identify priorities of communities historically least likely to be consulted when setting metrics. The sites use traditional and not green construction, to begin setting a baseline for the Data Hub.

Table 1. Eligibility requirements and site recruitment goals

Eligibility requirements	Recruitment goals
Within New York City Building built before 2018 Rent affordable to a household of four earning New York City Area Median Income (AMI) or $133,400; this translates to a monthly rent of $3,700 or less Minimum 40 apartments in building Ownership type known	Mix of with and without on-site management Resident type diversity (one senior building, one supportive housing building) Racial diversity: no more than two buildings have the same dominant racial population Income diversity (one affordable to renters with incomes 30% AMI or less, rent $1,112/month, one mixed income) One public owner (NYCHA or similar)

Source: Bright Power 2023.

Sites were secured through Bright Power's business, staff, and project partner networks. Bright Power shared basic information about Future Housing and the events with potential hosts. For interested sites, the field research team shared details about expectations and the event plans, including the requirement for a "site host" to serve as a trusted partner with the building residents in promoting and helping host the events. Each host site signed an agreement that included a non-retaliation agreement and limitations on how site owners, managers, and supers could participate in the engagement event.

[2] Inclusivity: Engage residents and community leaders to gather diverse perspectives for comprehensive data. Participation: Involve low-income residents in field research. Give them the power to shape the database and define housing quality. Ethical considerations: Emphasize anti-racist, equity-focused research, employing ethical practices to protect residents' rights. Transparency and accountability: Share findings directly with participating residents. Communicate purpose, methods, and limitations while addressing community concerns. Publish data through an open and accessible database. Contextual relevance: Understand the specific needs and priorities of low-income residents in multifamily housing. Consider social, economic, and cultural factors. Capacity building: Empower residents to shape the database and research agenda. Make space for active resident participation. Action-oriented outcomes: Incorporate resident perspectives in the database to improve quality of life and drive creation of equitable, low-carbon, multifamily homes.

Two sites were owned by Bright Power clients, two were home to Bright Power staff, and a field research team member identified one property. The five sites varied in age, size, ownership, and location, and they achieved the site recruitment goals. Table 2 shows the building characteristics and resident demographics.

Table 2. Building characteristics and resident demographics

	Property A	Property B	Property C	Property D	Property E
Location	Queens	Brooklyn	Manhattan	Brooklyn	Manhattan
Year Built	1979	2011	1910	2019	1952
Rent	30% of resident income	$3,343 - $4,523	$1,200 - $3,500 mortgage plus monthly fee	$411 - $1148	30% of resident income
Units	250 units	271 units	40 units	79 units	2056 units
Ownership Type	Non-profit	For-profit	HDFC Limited Income Coop	Non-profit	Public
Residents	Seniors, Primarily Korean, Secondarily Hispanic	Mixed age, race, and income	Mixed age, race, and income, primarily white	Supportive Housing, Youth, Primarily Black	Primarily Hispanic, Secondarily Black

Source: Bright Power 2023.

Field events were designed with low-income renters' physical, logistical, and financial needs in mind. Each site hosted a voluntary resident open house with parallel input opportunities that allowed residents to control their time and to choose which topics and activities interested them. Data was gathered from participating residents through a survey, a focus group, unit tours, interactive comment posters, and informal conversations open to any resident of the properties. The surveys were printed in both English and Spanish and real-time translation services ensured residents who spoke other languages could easily respond. The event team also completed a visual survey of the site. All participants documented informed consent before participating. Site hosts and residents received stipends acknowledging the value of their time and expertise and were invited to request a text or email copy of the report. Events took place in April 2023. Table 3 shows that participation exceeded research goals.

Table 3. Future Housing participation goals and actuals

	Survey	Focus Group	In-Unit Tours
Participation Goal	100+	30+	20+
Total Participation	144	75	24
Property A	52	36	0[3]
Property B	28	9	7
Property C	14	6	5

[3] The property had in-unit maintenance disallowing in-unit tours the day of the engagement.

Property D	13	6	6
Property E	32	18	6

Source: Bright Power 2023.

The text data from all sources was compiled into a central spreadsheet. All members of the field research team and project team reviewed the results. The teams held work sessions to review and debrief the data by theme, building, and across demographic and building characteristics. A Bright Power data analyst used quantitative methods to explore the survey results. Note that this research is qualitative in nature and is not statistically meaningful.

Results

Resident Participant Demographics

Resident survey responses show we engaged a diverse group of renters. Forty-two of 144 participants (29 percent) had annual incomes below $10,000, and another 22 people (15 percent) had incomes below $25,000. Overall, 60 percent of residents' annual incomes were $75,000 or lower, and only 7 percent had incomes over $150,000. Three sites were skewed towards very low incomes, while two were evenly mixed across all income categories. Residents of all ages participated, with the smallest cohort including only two people under 25, notable as one site included supportive housing for youth. Seniors 65+ were overrepresented as the highest engagement took place in a senior property. More women than men participated, reflecting that the senior and public housing residents skew female. Six people identified as non-binary, transgender, or preferred to self-describe. There was also significant racial diversity among participants, with variation in which race predominated at each site, as shown in Figure 1.

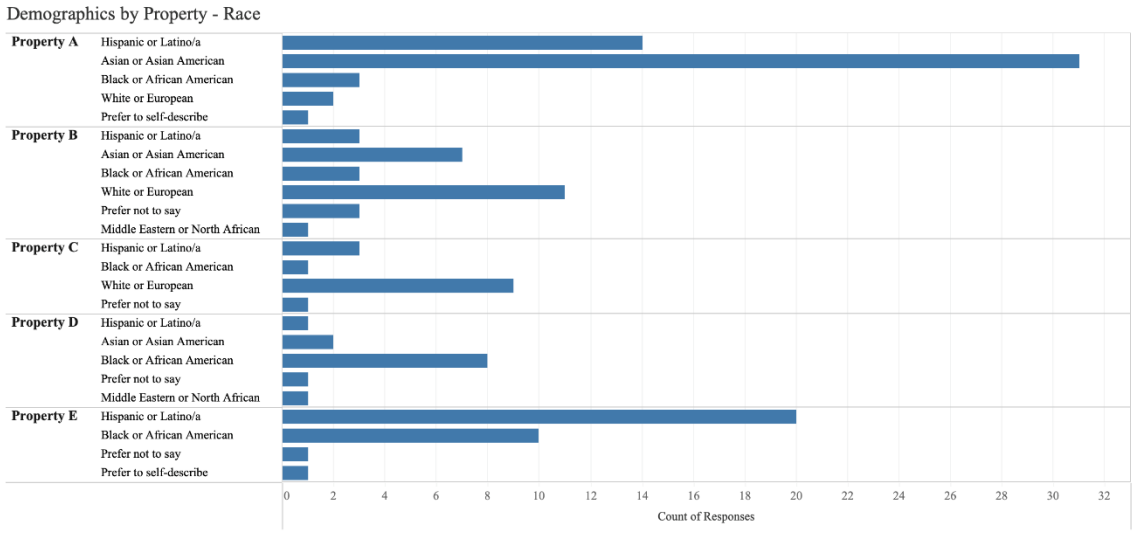


Figure 1. Racial demographics by property. *Source*: Bright Power 2023.

Quality of Life

The survey asked residents, "How would you rate the quality of life in your building?" and offered a scale of 1-10. There were clear differences across buildings, shown in Figure 2.

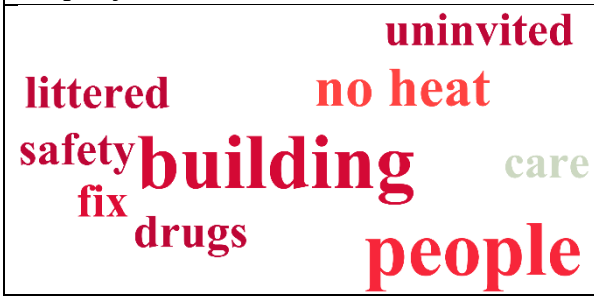
Generally, residents were happy with the quality of life in Properties A and B, with mixed responses in Properties C and D. Most ratings in property E were negative.

Figure 2. Quality of life ratings by property. *Source*: Bright Power 2023.

An open text question asked, "What is the reason you picked that number?" The most common responses were: clean, convenient, people, safe, elevators, people, staff, location, problems, and issues. The variation across sites is evident when the responses are disaggregated by site, as in Table 4 below which shows words used two or more times per site. The color of the word indicates the average quality-of-life rating given by people who used that word, while size indicates frequency. Because few residents at Property D responded to the open-ended question, the mixed quality-of-life ratings at that site are not visible here. Property E "no heat" indicates serious maintenance issues, which were visible throughout the survey and focus groups responses. People rank their quality of life most highly when they perceive buildings as safe, clean, convenient, with community and staff. They rank their quality of life low when there are roaches, noise, uninvited people, drugs, litter, or a lack of safety.

Table 4. Residents' reasons for selecting quality-of-life ratings

Property A	Property B
convenient roaches very convenient very safe security everything location building clean safe no problems calm very good apartment	staff amenities nice elevator outside neighbors building friendly location
Property C	**Property D**
space apartment street building outdoor noise community	building clean

Property E	
	

Source: Bright Power 2023, Tableau.

Management and Maintenance

Survey results show very uneven resident experiences engaging with building management and maintenance staff across sites. Residents contact management and maintenance the least often in Property A where residents reported the highest quality of life. There, nearly two in five residents report they never contact management or maintenance. This is mirrored at Property E with the lowest reported quality of life. There, more than one in four residents contacts management about issues or concerns twice a week, and another one in four contacts management twice a month, significantly more often than any other building.

Figure 3 shows a parallel pattern in resident expectations for resolving maintenance issues. Residents in properties A and B, with the highest quality-of-life rankings, expect maintenance to resolve their problems nearly all the time. Residents in the three other sites have mixed expectations, with the lowest expectations in the site with the lowest quality-of-life score.

Figure 3. Residents' expectations for maintenance to resolve their requests. *Source*: Bright Power 2023.

Residents identified the reasons they contact maintenance or management. The bars in Figure 4 are colored by average quality-of-life rating at each building as shown in Figure 2. Dark green bars indicate a high quality-of-life rating, while dark red bars indicate a low quality-of-life rating. For example, people who selected "Unit repairs" in Property A gave extremely high average quality-of-life ratings, while residents who selected "Unit repairs" in Property E gave low quality-of-life ratings. Some residents selected "Other." Reviewing their explanations, two

thirds left the reason blank, noted “none,” or listed building or unit issues (for example, “no heat”). Additional reasons residents contacted management include translation support, assistance for visitors, problems with keys, and borrowing tools.

Figure 4. Reasons that residents contact management. *Source*: Bright Power 2023.

Feeling of Personal Safety

The survey also asked residents, “In one word, how would you describe your feeling of personal safety when you are inside your building?” Peace, safety, and comfort correlate with high average quality-of-life ratings. Insecurity, unsafe, and okay correlate with the lowest quality-of-life ratings, as shown in Figure 5.

Figure 5. Words that residents used to describe personal safety. *Source*: Bright Power 2023.

Physical Safety Concerns

The survey asked about building conditions that create safety hazards. There is a strong correlation with quality-of-life ratings and physical safety concerns. In Figure 6, dark green bars indicate the highest average quality-of-life rating for people who selected that answer, and dark red bars indicate the lowest average quality-of-life rating for people who selected that option, again referencing the ratings in Figure 2. Respondents who selected “other” most often mentioned elevators. Broken elevators were limited to one property (Property A). Other physical safety concerns were listed only once. These concerns included wet ceilings, tubs that do not drain, lack of fire escapes, AC not working, and health concerns such as mold and exterminator spraying.

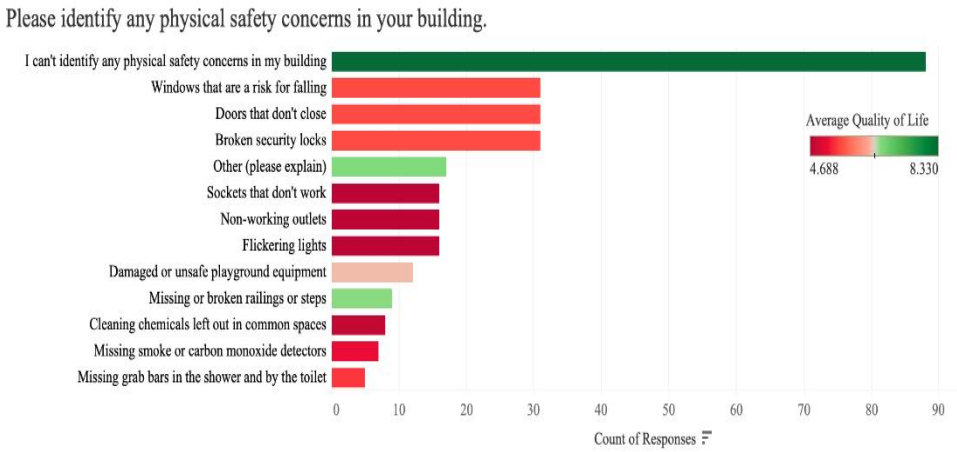


Figure 6. Physical safety concerns identified by residents. *Source*: Bright Power 2023.

Health Concerns

High quality-of-life ratings correlate with identifying no health concerns. The exception was toxic pest management chemicals and “other.” Figure 7 shows the number of residents that identified a particular health concern, with the color of the bar indicating the average quality-of-life rating associated with those responses.

Most people with other health concerns listed issues typically managed by ventilation. The most-named symptom was "smell," with details like smoke, garbage, cooking, air flow, and discolored or peeling finishes. Our team observed limited ventilation during home tours. Mechanical kitchen ventilation existed in only half of the toured units, but not one system met air flow rates recommended for healthy housing. The field research team used a simple kitchen ventilation flow rate test. Approximately 25 cubic feet of air per minute (cfm) draw holds one piece of 2-ply toilet paper against the fan. Healthy housing experts recommend a kitchen fan draw 100 cfm (which can hold up a pile of four squares of paper). Only two in five units had enough draw to hold up one or two pieces of toilet paper.

Our team also observed current water leaks in one of every four units they visited. They observed signs of mold, musty odors, or staining on walls or ceiling that came from leaky pipes or outside through the roof or windows in 11 of 23 units. Approximately one in four units had

issues with rodents or other pests. More than one in four had issues with the condition of flooring, walls or ceilings like open cracks, which are places where pests might access units.

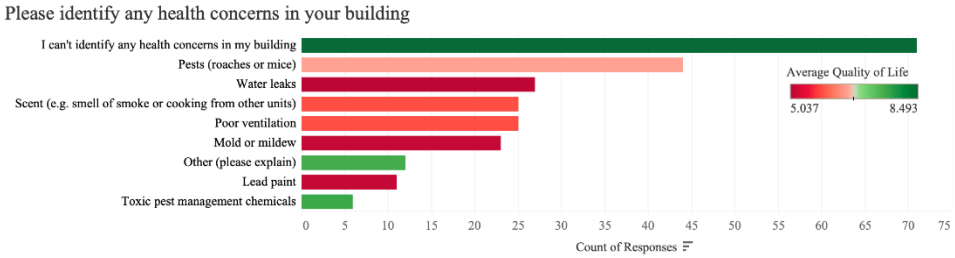


Figure 7. Health concerns identified by residents. *Source*: Bright Power 2023.

Thermal Comfort

Many residents reported being too warm in the summer or too cold in the winter. Figure 8 shows that at three sites, more than two of every five residents reported "too warm" temperatures in the summer. Figure 9 shows at two properties, more than half of residents reported "too cold" temperatures in the winter. One site had exceptionally high comfort ratings year-round. Comfort does not correlate with the building age.

The survey asked, "Can you control the temperature in your home without using space heaters, your own air conditioner, or appliances not intended for heating or cooling a home?" The results shown in Figures 8 and 9 also indicate that in most cases, people who report the ability to control the temperature in their homes report higher thermal comfort (larger gray portion of bar in the charts below) than those who do not. Interestingly, each property shows a mix of residents able and not able to control the temperature. The type of equipment is likely similar in most apartments in the same building. This suggests mixed resident understanding of how to use equipment or the operating condition of equipment may be behind this variation.

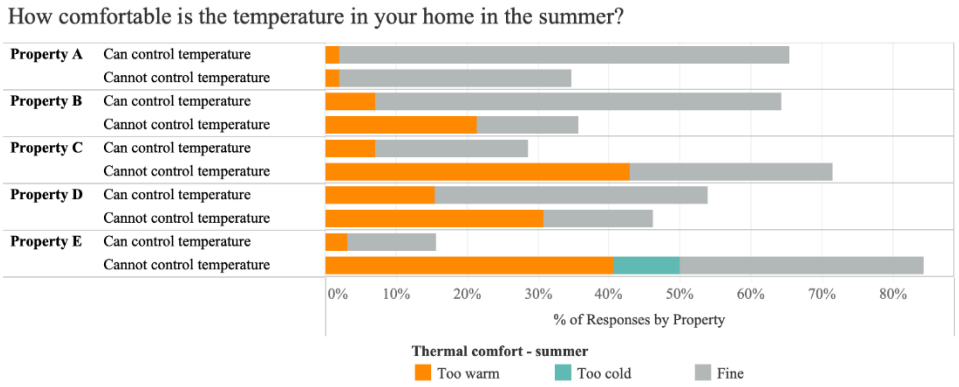


Figure 8. Summer thermal comfort by property. *Source*: Bright Power 2023.

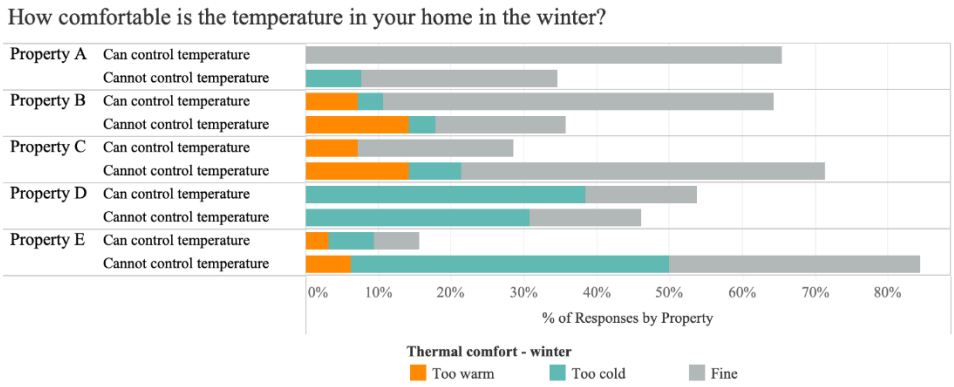


Figure 9. Winter thermal comfort by property. *Source*: Bright Power 2023.

Discussion

Our research goal was to identify what matters most to resident quality of life, as defined by residents. This discussion synthesizes the quantitative data in the previous section with open-ended survey responses, quotes from focus group participants, and quotes from home tours. We heard three primary themes of safety, the quality of building management, and community. Two secondary themes are of particular interest to people working on energy efficiency in multifamily buildings: thermal comfort and healthy housing.

Before exploring those themes, it is important to contextualize our analysis within the United States housing` system. Some resident-named themes reflect larger systemic issues independent of an individual building's performance.

First, for many renters and especially low-income renters, housing is tenuous. Multiple times in different properties, residents expressed thankfulness that they weren't living on the streets or in a shelter, especially when they were identifying things that could be better about their current home. Second, the combination of exclusion from labor and housing markets, of conscious and unconscious bias, of inequitable education, and other structural forces has created a world in which race and income are inextricably correlated. The correlation of race and income sorts people into different quality buildings by race. We see patterns in people's experiences by race resulting from a mix of explicit bias, implicit bias, and structural forces. This reality shapes which neighborhoods residents live in and the quality of their homes.

Personal Safety

Building management plays a major role in whether people feel safe. People named features like exterior security doors and the presence of a 24-hour doorman as things that made them feel safe. Inversely, lack of maintenance, non-functional security doors, non-residents loitering in the building, or the fear of staff or resident-leader retaliation make people feel unsafe. This mattered more than the neighborhood people lived in. One resident said, "I would recommend the building but would state that walking from the subway at night doesn't always feel safe."

"I like that the main door is locked and so it feels safe but for the same price, I can get a better apartment with more amenities."- young focus group participant

Building Management

Residents valued respectful and responsive interactions with building management very highly. Residents want to be heard, validated, and treated fairly by all representatives of building management, including front desk staff, management office staff, and maintenance staff. When residents talked about management issues, they named actions that symbolize care: staff interactions, cleanliness, and maintenance. When management fails to show care and responsiveness, residents hear an implicit message that they do not matter. That breaks trust in the building management, it also undermines safety and community within the building.

There are tensions inherent in residential management. These arise from inconvenient building maintenance, rent changes or lease non-renewals, unit damage, or conflicts between neighbors. Property management is as much managing relationships as it is managing finances, buildings, or regulations. Management has the power position in relationships with residents. Management must treat residents with respect while handling challenging, fraught situations.

Residents identified three aspects of management that each deserve discussion: staff interactions, cleanliness, and maintenance.

Staff interactions. When residents interact with staff, they know staff must mediate between competing interests and that staff have power over their lives. When there is property damage, a rent increase, or a noise complaint, residents want staff to hear and validate their experience and to feel respected. This extends to whether front desk staff greet everyone uniformly, and maintenance staff.

"They close tickets without repairing and say they're out of tickets" - focus group participant

"Thankful for having staff that are very personable and friendly" - woman in her mid-forties or fifties

Cleanliness. To residents, a well-kept and clean environment is a symbol of care. Residents used descriptions of cleanliness as shorthand to point to high-quality management. They notice whether maintenance staff care about the cleanliness of their home. One resident appreciated the "overall clean building" and that "management/maintenance address issues timely." Residents used examples of uncleanliness or filth as shorthand for management indifference. The presence of filth also has a psychological impact. It undermines their confidence and erodes their trust in building management.

"The elevator is always dirty, it always smells like urine, and there's a lot of garbage in the hallways." - elder resident during focus group

Maintenance. Maintenance is often understood as care for the building and systems: fixing a leak, tuning up a heating system. Maintenance, seen through the experience of resident maintenance requests, is only in part about the building. Residents hear both, "Are they taking care of the building and my home?" and also, "Do they care about me?" The response to maintenance tickets symbolizes care, and that care fosters or undermines trust. Responding to a

request is an opportunity to build a relationship with residents. The way maintenance responds is as important to residents as making the repairs.

In one surveyed building, residents repeatedly shared how the maintenance team closed requests without taking any action. Residents may make requests where the problem is outside of maintenance responsibilities. It makes sense to staff to close these without action. However, residents experienced that ticket closure as dismissing them. When tickets are not addressed or are closed when partially complete, it leaves people living in unrepaired homes, residents hear the message their safety is unimportant to management. These are the stories residents shared to explain why they didn't trust management. Other residents told of times maintenance staff took the time to help with things outside of their responsibilities. They shared instances where maintenance staff explained what they could and couldn't do. There, residents appreciated management, and they felt their concerns were heard.

"We need better trained maintenance and better response time. People who paint the apartments are contracted and they don't care. We used to have our management and that was better." - *older man during a focus group*

Community

The sense of community within their buildings was extremely important to residents. A positive sense of community comes from interactions with staff, socializing with neighbors, community-building activities, and a sense of belonging with the community outside the building.

"Friendly neighbors, community aspect of the building and I told my friend to come live in the building…The diversity of the neighborhood is really great too and the building is friendly." - *woman in her forties or fifties during focus group*

Thermal Comfort

Residents did not spontaneously comment on thermal comfort. The Future Housing team asked about thermal comfort due to the decarbonization goals of the initiative. Responses reveal poor thermal comfort in four of the five field research buildings. This is consistent with research that has found widespread problems with thermal comfort in multifamily buildings. Residents' comfort varied widely across seasons and across floors within the same building. The survey responses suggest that even when residents can control the temperature in their units, a substantial number do not *know* that they can control the temperature or how to use equipment.

Quality of Life versus Healthy Housing

Residents highlighted a set of issues they classify as quality-of-life concerns, but that researchers and policy makers classify as healthy housing issues. The most common were pests and poor ventilation or ventilation that brought smoke from other units into their own unit. In one site, residents expressed concern about being trapped in their apartments during monthly fumigation, unable to open the windows. These comments were seldom explicitly linked to health. A small number of residents named specific but extreme health concerns. This included instances of cancer that they named as caused by their housing situation.

"The ventilation and roaches and the fire escape gate doesn't lock. Ventilation makes me feel stuffy, congested" - Woman in her thirties or forties with a child under 12 living with her during in-unit home tour

One resident shared they suffer from "Lupus, {as a} condition of building impacts health" and "I love it, been here since I was 14." - Elder woman during a home tour

According to the Centers for Disease Control and Prevention CDC, housing insecurity is associated with poor health outcomes and the concerns the residents named trigger or exacerbate health problems. These findings suggest that changing healthy housing messaging to be framed as quality of life may more effectively engage residents and improve health outcomes.

Recommended Metrics

The Future Housing Database and presentation will be organized around the resident priorities in Table 4. These reflect the field research themes that emerged as most important to residents. They aim to track resident-reported perceptions, observations, and resident-experienced quality of life. The metrics include a mix of resident ratings and manager-reported events. The Future Housing Initiative will refine and select the most useful of these metrics to include in the database, including a minimum of one from each category.

Table 4. Recommended resident quality-of-life metrics

Category	Resident Quality-of-Life Metric
Building security	Resident rating of safety Days/year security doors malfunctioning
Management responsiveness and degree of trust	Resident rating of common space cleanliness and maintenance Resident satisfaction rating of maintenance resolutions Average days between maintenance request and repair Number of maintenance requests closed without resolution or resident interaction Ability to interact with management in mutually spoken language
Sense of Community	Resident rating of their sense of community in the building Number of neighbors and staff residents can name Frequency a resident greets another resident when leaving or entering their home Accessibility for people living with disabilities Number of community events on site/month, organized by staff or residents
Thermal comfort	Resident ranking of comfort in summer Resident ranking of comfort in winter

	Resident control of unit temperature
Quality of life (other)	Resident reporting of issues Resident reports of pests (rodents, insects)/year Resident rating of adequate in-unit ventilation Resident rating of excess humidity or dampness in their units Noise complaints/year Presence of dangerous substances (asbestos, lead, etc.) Presence of mold and mildew Physical safety or structural risks in the home/building

Source: Bright Power 2023.

Conclusion

This field research confirms the viability of meaningful resident engagement when using resident-centered planning and design. As a result of creating a flexible field research setting inviting resident-led, in-person interactions, residents invited us into deeper conversations. Many people shared personal stories and invited us into their homes. In choosing to share their expertise with us, we gained a nuanced understanding of residents' needs and priorities. The success of this approach relied upon robust on-site/community partnerships. It required collaborating closely with trusted site hosts to invite and welcome residents, compensating both hosts and participants, and proactively addressing potential barriers like language differences.

While residents' concerns and priorities overlap with energy professionals and healthy housing experts focus areas, residents use different language and concepts to describe the topics. Residents talk about pests, ventilation, and hazardous substances within the context of their quality of life. This emphasis on quality of life rather than on health is pivotal for effectively addressing their concerns and communicating about interventions in a manner that resonates with residents. This pattern extends to topics affected by building interventions focused on energy use and carbon emissions. Building professionals might highlight improved resident thermal comfort, but few residents identify thermal comfort as a priority. Equitable decarbonization is a crucial goal, and building managers and project teams will need to focus on other benefits that resonate with residents' experiences and priorities when communicating about planned decarbonization improvements.

Residents across all five field research sites highlighted similar themes of Safety, Building Management, and Community. However, they reported significant variability across sites when rating their experiences and quality of life ranging from very negative to very positive. Energy services firms and programs emphasize that it is important to measure energy, water, and carbon savings to ensure that savings goals are achieved, which is common in building sustainability programs. We believe it is equally important to measure building performance on resident quality of life and experience metrics, and we recommend adoption of the list of metrics in Table 4. Measurement is the only way programs focused on equity-oriented improvement and companies that aim to provide high-quality homes will be able to assess whether they have achieved their goals.

Additional research is needed. This paper shares original and novel research and the recommended metrics for measuring resident quality of life based on a small field study. We recommend similar field studies in other geographies to replicate or challenge these findings.

Additional research is also required to confirm that the recommended metrics reflect resident's own ratings of safety, building management, and community. Residents highlighted the importance of community, but resident comments did not provide enough detail to be able to identify the factors that created a strong sense of community. Additional research is also needed to identify those factors.

Direct resident engagement is indispensable for equitable decarbonization efforts. The Future Housing Initiative endeavors to help drive the transition to low-carbon, multifamily housing. As the Initiative creates a national, equity-centered database of real-world performance data on low-carbon multifamily buildings, we will include resident engagement as part of the standard building data collection protocol. Future Housing will also pursue additional research on resident experience to answer the questions outlined in this conclusion.