

Designing, Launching, and Managing Programs for Multifamily Affordable Housing

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INTRODUCTION

This document is in response to federal and state agencies seeking to expend their Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL) funding on residential markets, especially income-qualified residents.

Government agencies across the country have issued Requests for Information (RFIs) asking for comments and feedback from subject matter experts (SMEs) on various aspects of a residential program design, launch, or management, be they for energy efficiency, solar, energy storage, electric vehicles, etc. This



document will provide answers to these RFIs, from a SME, regarding greening multifamily (MF), especially the MF affordable housing (MFAH) market segment. It also aims to debunk the myth that MF/AH market segment is a “hard to serve” market and show that is actually the opposite, if the program is well-designed and executed.

Note that unless otherwise stated, our use of “MFAH” refers to both:

- subsidized properties, e.g., U.S. Dept. of Housing and Urban Development (HUD)-assisted housing, U.S. Dept. of Agriculture-Rural Development (USDA-RD)-assisted housing, and Low-Income Housing Tax Credit (LIHTC)-financed housing; and
- “naturally occurring affordable housing” (NOAH) properties, which constitutes a majority of MFAH. NOAH properties are typically in poor condition (Class C and D), or located in distressed or “not so nice” neighborhoods.

We will only distinguish between NOAH and subsidized properties if the context requires that level of specificity.

ICAST (International Center for Appropriate and Sustainable Technology) is a national 501c3 nonprofit with a 22-year history of designing and scaling clean energy solutions solely for LMI households in MF housing, primarily subsidized and unsubsidized MFAH properties. In 2024, ICAST plans to serve over 60,000 LMI families living in apartments. ICAST has designed, launched, and currently manages MF/AH focused programs including Statewide Weatherization, Solar PV, Beneficial Electrification, Healthy Homes, utility Energy Efficiency, Workforce Training, etc. Given our expertise and experience in the MF/AH space, we aim to demonstrate that a well-designed and managed program targeting the MF/AH market segment, is the best path to cost-effectively and efficiently scaling a solution that will meet Justice40 Initiative goals and expend the BIL and IRA funds.

THE NEED FOR MULTIFAMILY-FOCUSED PROGRAMS

The MF/AH market is effectively a huge, missed opportunity in terms of energy savings, fossil fuel reductions, energy management opportunities, and benefits for LI communities and DACs. Almost a

third of the nation's housing is in MF properties, and MF new construction has been increasing.^{1,2} Starts for new MF rental and condominium construction reached a new high in 2022.³ Historically, 85% of MF residents are LMI and currently, MF buildings provide housing for over 19 million LI households nationally.⁴ Many MF properties, especially MFAH properties, are 50+ years old with deteriorating mechanical systems and building shells, and plagued by health and safety hazards. These conditions also inflate utility bills, which are the largest variable operating expense for MFAH.⁵ High energy burdens make it difficult for the LI residents to keep up with rent and utility payments *and* pay for other necessary living costs, such as healthcare, food, medicines, transportation (to and from work), etc. It is also worth noting that the MF housing sector supports 17.5 million jobs and generates over \$3.4 trillion in economic activity.⁶



Buildings account for more than 30% of the U.S.'s greenhouse gas emissions, and housing (its availability, affordability, and condition) is a recognized social determinant of health.^{7,8} The MF sector has long been grossly underserved by clean energy and energy efficiency programs. It largely benefits from utility energy efficiency programs only as far as common, "low-hanging fruit" upgrades such as LED lighting and low-flow devices. It is also chronically neglected by the

federal WAP despite housing the very communities that WAP is designed to serve, i.e., LI households with high energy burdens. Traditional barriers to serving MF and MFAH have included:

- property owners' lack of resources such as time, funds, and/or in-house expertise;
- property owners' ignorance of and/or aversion to clean energy programs;
- the inherent diversity in MF building stock (size, configuration, financing/ownership models, age), which can seem daunting to program administrators and their service providers;
- the 'split incentive' issue, i.e., owners pay for the upgrades and believe the tenants benefit from the utility bill savings (it should be noted that tenant-paid utilities are, in themselves, an energy efficiency measure because tenants are less apt to waste energy if they are paying for it); and
- a contractor base that is largely unfamiliar with either MF properties, high-efficiency technologies, the paperwork requirements of working with government funds, or all of the above.

THE BENEFITS OF MULTIFAMILY-FOCUSED PROGRAMS

For program administrators, focusing on MF/AH is, in some ways, swimming downstream. Because:

- ✓ the demographics of the MF/AH tenant population can make it an easy fit with Justice40 goals, and
- ✓ a well-designed MFAH program can scale easily, is more cost-effective, and is simpler to administer than a single-family (SF) program.

Some jurisdictions are already headed in this direction. For example, New York has been incentivizing MF decarbonization through its Clean Heat for All Challenge.⁹ The District of Columbia’s (D.C.) Affordable Housing Retrofit Accelerator offers technical and financial assistance for MFAH buildings to meet D.C.’s Building Performance Standard performance requirements.¹⁰ Many states are contemplating dedicating all or a large percentage of their DOE Home Energy Rebate formula funds to this sector, and many have launched new MFAH-focused weatherization programs with their BIL funds. The MF/AH sector is even garnering attention from groups outside the U.S.—the International Energy Agency has described heat pumps as “the central technology in the global transition to secure and sustainable heating” and noted that particular attention needs to be paid to increasing heat pump deployment in MF and commercial buildings.¹¹

HOW TO LAUNCH A TOP-NOTCH MULTIFAMILY AFFORDABLE HOUSING PROGRAM

The good news is that there is plenty of research and data to show the path toward a successful MF/AH program design. Many papers and references showcase national best practices (provided in the “**Supporting Research and Additional Resources**” section of this paper). Below are best practices and lessons learned culled from existing work in the MF and MFAH space. Note that programs work best when designed and implemented on a whole-property basis, as opposed to serving individual apartments, one at a time.

1) The Best Way to Engage, Recruit, And Effectively Serve MF, Is with A One-Stop-Shop Approach.

The U.S. DOE, American Council for an Energy-Efficient Economy (ACEEE), and others highly recommend the one-stop-shop (OSS) service model, where the program implementer offers turnkey services that include outreach and education to MFAH owners and managers, energy assessments, project design and engineering, identifying and applying for incentives and financing, construction planning, contractor selection and management, inspection/monitoring, and reporting. This implementer can reduce the cost of projects by the value of all available rebates and incentives (i.e., offer point-of-sale rebates) while braiding financial resources from various sources to offset project costs. The OSS accommodates the fact the MFAH owners and managers have many competing priorities, and makes it easy, clean, and streamlined for them to sign up for green upgrades. This approach is not new; various programs have successfully leveraged the OSS for years.

For example, the following is an excerpt from an ACEEE report produced in 2019 (the full report is provided under “**Supporting Research and Additional Resources**”): “*In our research and interviews we identified additional features of MFAH programs that are important for program effectiveness...*

Quick Facts/Key Stats
<ul style="list-style-type: none"> • Almost a third of the nation’s housing is in multifamily properties • Multifamily buildings provide housing for over 19 million low-income households • Utility bills are the largest variable operating expense for multifamily affordable housing • The multifamily housing sector supports 17.5 million jobs • The multifamily housing sector generates over \$3.4 trillion in economic activity • Buildings account for more than 30% of the nation’s greenhouse gas emissions

Programs based on a one-stop shop model are prevalent among leading programs. Having a single point of contact throughout the application and implementation processes is helpful to support projects that combine multiple rebates or take advantage of performance-based incentives. This reduces the complexity of energy efficiency retrofits, making program participation easy for property owners and building managers. In MFAH this is especially important as building owners may not have staff available to take on such additional projects. The one-stop shop model also provides consistency and effective management of projects from start to finish, and it can be administered at relatively low cost. One approach to saving on the cost of these services is for program administrators to partner with other utilities or organizations and share costs, as CenterPoint Energy and Xcel Energy are doing in Minnesota in offering a joint program. One-stop shops still can provide flexibility for participants, which is important in adjusting to the needs and preferences of participants.”

2) Programs Must Utilize Simple Rules and Processes for Qualification, Intake, Processing, and Reporting.

This can take several forms. For example:

- There needs to be uniformity in the definitions of LI and LMI, i.e., households earning up to 80% of area median income (AMI) are considered LI, and families earning up to 120% AMI are considered moderate income. Most federal and state agencies use these definitions, but not all. The exceptions make it harder to scale a program since MFAH owners and managers are used to the standard definitions and track for them. Anything else is an unwarranted complexity.
- Programs should allow for income qualification of the entire MFAH property via certifications and proof from the owner, rather than requiring each tenant to submit proof of income. MFAH owners and/or managers of subsidized properties already have the income data for their tenants because they are required to document this information to ensure that they meet their subsidizing agency(s) requirements. Therefore, going door-to-door (as required in a SF program) is unnecessary, time-consuming, and does not yield the desired results since MF tenants have no incentive to prove they are low-income. (Note that renter households in MF relocate approximately every two years on average.)
- Programs should leverage Categorical Eligibility, which can take multiple forms: (1) federal agencies’ published lists of subsidized properties that automatically qualify for services without the need for further verification, and (2) proactively seeking properties that qualify for categorical eligibility but are currently unlisted, such as public housing authority properties and housing finance agencies. It is worth noting that for the latter approach, an OSS implementer can help submit the documentation necessary for those properties to be included on agencies’ published lists (e.g., Certification of Income Eligibility).



- For the energy audit, MF programs should utilize a standardized sampling plan for the property. Most programs, such as Utility Demand-Side Management (DSM) and WAP programs focused on MF, require a representative 10% sampling of each unit type on the property, with a minimum of three units of each type of unit, e.g., 3-bedroom, studio, etc. Again, programs with different sampling requirements—or worse, requiring 100% of units to be audited—significantly add to the program costs and complexity. Inspections, of course, need to be done at 100% of the units with appropriate data gathered per unit for reporting and invoicing purposes.
- Any benchmarking requirements should be flexible and incorporate all reasonable workarounds and exceptions to ensure that all eligible MFAH customers can participate. Utility consumption is not uniformly available across all utilities, so Benchmarking requirements can ultimately box out MFAH customers, especially rural properties (see EPA’s map on which utilities provide benchmarking data to understand that benchmarking is mainly an urban and East/West Coast phenomenon).
 - HUD’s GRRP is an example of how benchmarking can be replaced with something else. To increase program participation, HUD created a new tool, called Multifamily Building Efficiency Screen Tool (or “MBEST”), to screen MF buildings based on existing systems and building features that impact energy use. HUD allows properties that cannot achieve Benchmarking to use MBEST.

3) When Possible, Programs Should Incorporate A 100% Pay-For-Performance Model.

Under the Pay-for-Performance (P4P) model, implementers and MFAH properties are compensated for achieved program goals, such as energy savings. This aligns the goals for all stakeholders and minimizes the risk for the government administrator. ACEEE found that the P4P model is one of several strategic incentive tools that can be leveraged to encourage building owners to pursue more extensive energy-saving projects, resulting in higher energy savings and providing building owners with more certainty around the project’s success.¹²

4) Programs Should Allow Flexibility in Staff Location.

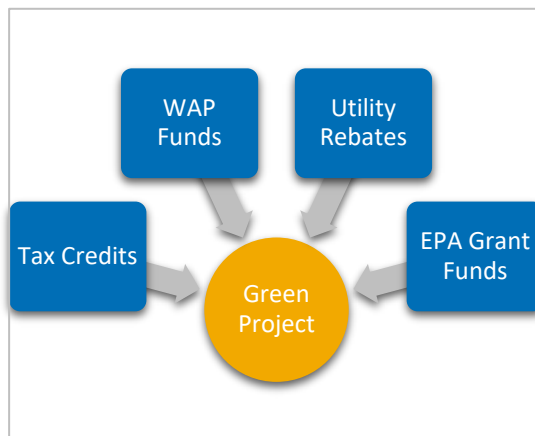
Service providers should be allowed to remain flexible in terms of subcontractor recruitment and remote work.

Programs can be effectively run with a few local staff strategically distributed through the service territory, covering functions such as outreach and education, auditing, inspections, and community support. If the service provider can offer evidence of successful program management from remote offices, programs should not require the service providers to be fully, physically established in the given service territory.



5) Program Should Offer “Braiding” And “Co-Funding” With Other Available Programs.

Leveraging different program funds reduces the need for heavy investments by the MFAH property owner. This, in combination with education regarding the benefits property owners can expect from the upgrades (e.g., increased property value and net operating income, reduced operating costs), helps negate the “split incentive.” Braiding allows for the creation of capital stacks that include WAP dollars, tax credits and deductions (solar and storage ITC, 45L, 179D), utility rebates, Home Energy Rebate Programs funds, EPA grant funds, etc. As long as two federal funding sources—with the exception of tax credits—are not used for the same green measure, braiding is a very useful tool. Braiding can become exponentially complex as sources of funds increase, so organizations rarely take it to its full potential. With IRA and BIL, **now** is the time to utilize the best practices for braiding and leveraging.



This is a recommendation that has been echoed by other stakeholders. For example, the Building Performance Association’s response to the Home Energy Rebate Programs RFI (200+ other organizations, companies, individuals, and industry leaders from over 35 states signed on with BPA to submit these comments) included the following: *“DOE guidelines should encourage state, territorial, and Tribal programs to work with Weatherization and Community Services Block Grant (CSBG) State Offices, as well as local Community Action Agencies and Weatherization Agencies to braid WAP funding and ensure there is no overlap between the energy measures used for WAP and the Home Energy Rebate programs. These Offices and Agencies have decades-long histories in communities, and know the populations well, including disadvantaged communities. They also have outreach structures in place that state programs can leverage to ensure the target audience is aware of Home Energy Rebate programs.”*

Note that there is a range of vocabulary dedicated to this process, including “leveraging,” “braiding,” “co-funding,” “stacking,” and “blending.” Some of these terms can be used interchangeably; others cannot because they have different implications. Programs should be explicit about these terms and what they mean, and should provide clear guidance for program implementers on expectations and performance goals in this area.

6) Programs Should Incorporate A “Mass Customization” Approach.

Under the “mass customization” approach, every project is tailored to drive the highest benefits for each specific property based on its unique needs. A “one-size-fits-all” retrofit program can only offer the most common “low-impact” solutions such as LED lights, low-flow showerheads and aerators, pipe wraps, etc., that lead to negligible savings or benefits. For projects to incorporate whole-

building solutions, they need to be tailored individually to maximize energy efficiency savings and provide significant and measurable benefits.

Per the National Housing Trust, *“A one-size-fits-all program design will deny access to benefits for specific populations. Reaching renters requires tailored program approaches that account for the economic and structural differences between single-family detached and multifamily housing. Energy efficiency programs that do not account for the varying realities of different building types have not equitably served multifamily renters.”* Note that nearly 50 local, state, and national organizations, spanning affordable housing providers and advocates, environmental justice organizations, energy efficiency and environmental advocates, and housing finance agencies, signed on to these comments.

It should be noted that electrification for MFAH must be implemented with thorough due diligence. Natural gas is typically much cheaper than electricity, so properties transitioning away from gas can see utility bills increase unless other energy efficiency solutions are implemented to increase the overall efficiency of the property while pursuing electrification. A best practice for ensuring cost reductions is leveraging electrification solutions with other energy efficiency measures and PV solar. Note, however, that for subsidized MFAH, because of the 30% rule (i.e., no more than 30% of the tenant’s income can be spent on rent-plus-utilities) the LI residents will NOT be impacted if electrification does increase their utility bills, because their rent will be reduced by the same amount. Thus, there is no impact to their total rent and utility costs.



7) Successful Programs Need Strong Partnerships for Guidance, Referrals, and Execution.

New programs being launched should partner with existing local programs if those programs have a history of meeting the desired goals. If no such program exists locally, program administrators should recruit an implementer who has (1) a history of successfully implementing similar programs, and (2) the capacity to expand into your territory. Additional partners should include MFAH owners and managers, local associations, utilities, contractors, financial institutions, other service providers, etc. Existing partnerships can make the program launch easy and quick (within weeks, not months). The right team can assist in the seamless, holistic provision of services.

8) Program Administrators Should Leverage Their Programs as an Opportunity to Maximize Cost Efficiencies.

Large program implementers and even large MF/AH owners and managers buy equipment and services in bulk and get volume discounts from manufacturers and distributors. Programs should be

designed to allow for such cost efficiencies by not requiring each individual project to be bid out, but rather, issue a Request for Qualifications for the entire program or for large portions of it.

CONCLUSIONS

Most organizations, on advice of consultants, believe that a residential program designed for SF will work for MF (and MFAH). **This document highlights the impossibility of folding MF/AH into a SF program:**

MF programs operate in a business-to-business (B2B) setting. They rely heavily on relationships and trust with customers that provide repeat business. A SF program is a business-to-consumer (B2C) deal, with no repeat customer.



A successful SF program builds no relationships with its customers and instead relies heavily on its network of retailers, equipment distributors, small contractors, etc., who provide services to a SF homeowner and move to the next. SF contractors can therefore afford to do shoddy work and scam homeowners, because the customers do not provide repeat business. MF contractors cannot afford to displease the owners or managers because it's a small, niche market where a bad reputation travels fast within the MF/AH customer base. So, the high level of oversight needed to keep bad actors out for a SF program is not as necessary for a MF/AH program.

The heightened risk of bad actors in SF programs necessitates strict oversight requirements that are not necessary for a MF program. And this is just one small reason that MF programs are much more cost-effective. Other, more significant reasons include:

- The volume efficiencies of a single contract that covers potentially hundreds of units (vs. one contract per home for SF that requires traveling to 100 eligible SF homes spread across a city.)
- MF apartments are on avg. 700 sq. ft., whereas a typical SF home 2,100 sq. ft.
- Larger contracts executed by larger contractors who bring their volume discounts to bear, further reducing costs for MF.
- MF properties tend to require far fewer health and safety interventions before beginning energy efficiency work, in contrast to SF programs. Ultimately, MF projects have fewer costs and logistical hurdles to delivering projects.
- LI SF homeowners need extensive upfront education on the program, in various formats—events, meetings, etc.—and in different languages, adding significant costs. In contrast, engaging directly with LI households does not apply to MF because it is a B2B program. The management company engages with the tenants, as they do for all other services and complaint-resolution processes.
- SF programs should also include the cost of educating the owners on the energy efficiency solutions installed, i.e., how they perform, how to operate and maintain them, etc. With MF

programs, the property maintenance staff are the ones that receive education on the upgrades—a much smaller pool of individuals and thus, a lower cost.

- MFAH programs can leverage financial resources that LI SF programs cannot, such as monetization of tax credits and depreciation, applying for grants, etc. Asking LI SF homeowners to fund upgrades or take on debt to pay for those upgrades is not a viable option. But asking a MF property owner is viable, given the financial benefit they accrue from a higher-value, better-performing property, and they can be asked to take on a loan—thus adding to the leveraging potential.

MF programs are easier for program administrators to scale up because the contractor base for MF typically serves commercial properties, not SF homes. These contractors are larger and more financially sound than their SF counterparts, so they have the size, talent pool, and financial wherewithal to scale their operations quickly. They can also reduce the cost of the project by the value of the incentives, i.e., offer a point-of-sale discount more easily than SF contractors, who are typically not large enough to “float” the discount and do not have the systems and processes to verify income eligibility.

We hope this document has convinced you that MF and MFAH is NOT a “hard to serve” market, and in fact, is the most cost-effective, easiest, and simplest to scale market segment that also meets Justice40 goals and can judiciously expend your program funds while meeting and exceeding program metrics.

APPENDIX A: CASE STUDIES

Rocky Mountain Power (RMP) Multifamily DSM Program, Utah.

This DSM program was launched in 2017 and is one of the most successful programs in the U.S. for electrification in MF properties. It covers the entire MF market, serving both affordable and market-rate properties and both new construction and retrofit projects. It focuses on holistic, deep energy savings, paying custom incentives tied directly to energy savings. The incentives are designed to compensate for any cost increases for the selection and installation of very-high-efficiency equipment. MFAH receives larger incentives for the same energy efficiency measures. All incentives and the program implementer are on a 100% P4P structure. The program leverages the OSS service model, offering a single point of contact for the customer, design assistance, energy modeling, construction planning and management, local contractor selection and management, point of sale rebates, and other services—all designed to make the customer engagement hassle-free and easy. RMP worked with policy advocates and other stakeholders to launch this program because its MF clients were a neglected segment. RMP believed the program, if designed right, could grow significantly, as it has: almost 500% since its launch and continues to grow (versus standard MFAH programs that decline rapidly once the free “low-hanging fruit” measures are installed). This program has incentivized the installation of over 10,000 heat pump HVAC systems after receiving state approval for fuel-switching from natural gas to electric systems. RMP and all MF customers have access to real-time status updates on the program and individual projects via an online reporting system. This program is now gearing up for another large scale-up by partnering with the various IRA programs expected to hit Utah and braiding those incentives with the RMP program rebates and owner contributions.



New Mexico Statewide Multifamily WAP. Launched in late 2013, this program was designed to serve the LI households living in MFAH, who had been neglected for decades by DOE’s WAP. In 2015, rebate funding from New Mexico Gas Company was added to the WAP funds. Currently, the program braids funding from three of the large utilities in New Mexico, plus the WAP BIL funds, HUD Healthy Home funds, tax credits, and owner contributions. The braided funds reduce the spend per household for everyone, giving every source a better “bang for its buck.” The program is run with an OSS approach, it offers a point-of-sale discount to the MFAH owners, and it provides the State of New Mexico’s WAP Administrator a simple, streamlined, turnkey implementation that includes:



- Identification of and outreach to eligible MFAH properties (including building and leveraging strong referral networks)
- Education and technical assistance to MFAH clients
- Managing the MFAH qualification and approval process
- Performance of energy audits and modeling to develop cost and savings estimates
- Scope of work development and approval from all funding agencies incl. MFAH owner
- Securing owner contribution and identification of/securing other funds
- Oversight of construction/installation
- Quality Control Inspections
- Project invoicing and
- Program reporting, which includes access to real-time data via an online reporting system.

This program is also gearing up for another large scale-up by partnering with the various IRA programs to braid those incentives for its MFAH clients.

APPENDIX B: SUPPORTING RESEARCH AND ADDITIONAL RESOURCES

ACEEE's "Adapting Energy Efficiency Programs to Reach Underserved Residents" Toolkit:

www.aceee.org/toolkit/2023/11/adapting-energy-efficiency-programs-reach-underserved-residents.

ACEEE's "Closing the Gap in Energy Efficiency Programs for Affordable Multifamily Housing" Report:

<https://www.aceee.org/research-report/u1903>

ACEEE's "Energy Equity for Renters - Initiative" Resources Page: www.aceee.org/energy-equity-for-renters

ACEEE's "Increasing Sustainability of Multifamily Buildings with Heat Pump Water Heaters" Report:

www.aceee.org/research-report/b2101

ACEEE's "Programs to Electrify Space Heating in Homes and Buildings" Report:

https://www.aceee.org/sites/default/files/pdfs/programs_to_electrify_space_heating_brief_final_6-23-20.pdf

ACEEE's "The Multifamily Energy Savings Project" Resources Page: www.aceee.org/multifamily-project

Brooking's Primer on Braiding and Blending. [https://www.brookings.edu/wp-](https://www.brookings.edu/wp-content/uploads/2020/04/BraidingAndBlending20200403.pdf)

[content/uploads/2020/04/BraidingAndBlending20200403.pdf](https://www.brookings.edu/wp-content/uploads/2020/04/BraidingAndBlending20200403.pdf)

Cited RFI Comment Submissions from Industry Leaders:

- Building Performance Association: [3.3.23 Building Performance Association HOMES/HEEHR RFI Response Web Version \(building-performance.org\)](https://www.bpa.org/resources/3.3.23-Building-Performance-Association-HOMES/HEEHR-RFI-Response-Web-Version)
- National Housing Trust: [recommendations-to-doe-re-affordable-housing-in-home-rebate-programs.pdf \(nationalhousingtrust.org\)](https://www.nationalhousingtrust.org/recommendations-to-doe-re-affordable-housing-in-home-rebate-programs.pdf)

DOE's "Multifamily | Better Buildings Initiative" resources:

<https://betterbuildingssolutioncenter.energy.gov/sectors/multifamily>

DOE's "Serving Affordable Multifamily Buildings with Home Energy Rebates" Page:

www.energy.gov/scep/slsc/home-energy-rebate-program/serving-affordable-multifamily-buildings-home-energy-rebates

Joint Center For Housing Studies' Report on Weatherizing Multifamily Properties with BIL Funds:

https://jchs.harvard.edu/sites/default/files/research/files/harvard_jchs_weatherization_martin_etal_2023.pdf

"Low-Income Solar Policy Guide" Resource, from GRID Alternatives, Vote Solar, and the Center for Social Inclusion: www.lowincomesolar.org/.

National Association of State Community Services Programs' "Multifamily Weatherization" Resources Page: nascsp.org/multifamily-weatherization/

National Association of State Energy Offices' "Buildings" Resources Page:
www.naseo.org/issues/buildings.

National Multifamily Housing Council's "Primary Policy Priorities and Goals" Resources
Page: www.nmhc.org, www.nmhc.org/advocacy/nmhc-primary-policy-priorities-and-goals/

Program Design Guide: Energy Efficiency Programs In Multifamily Affordable Housing, from National Resources Defense Council, National Housing Trust, Energy Foundation, and Elevate Energy Produced With The Assistance Of ICF International:
https://downloads.ctfassets.net/ntcn17ss1ow9/5tmOEuPodqb7jCvWrTltwd/31a339ee94c734a781e6cd92fca2524/Full_Program_Design_Guide.pdf

The Regional Energy Efficiency Organizations' Report on Multifamily Energy Efficiency Retrofits:
https://neep.org/sites/default/files/resources/REEO_MF_Report.pdf

Additional details at www.icastusa.org.

¹ "Explore Census Data." Data.census.gov, data.census.gov/table/ACSDP1Y2019.DP04?q=dp04. Accessed 23 Nov. 2023.

² "The Trend Is Clear: Multifamily Construction on the Rise." www.nar.realtor, 26 Oct. 2022, www.nar.realtor/blogs/economists-outlook/the-trend-is-clear-multifamily-construction-on-the-rise#:~:text=Data%20shows%20that%20multifamily%20construction%20is%20on%20the. Accessed 30 Nov. 2023.

³ "Mid-2023 Multifamily Construction Update | Fannie Mae Multifamily." Multifamily.fanniemae.com, multifamily.fanniemae.com/news-insights/multifamily-market-commentary/mid-2023-multifamily-construction-update . Accessed 23 Nov. 2023.

⁴ Analysis of ACS 2020 data from the LEAD tool. Data available at <https://www.energy.gov/scep/slsc/lead-tool>.

⁵ "National Housing Trust Stabilizes Utility Costs by Installing Solar Systems | Better Buildings Initiative." Energy.gov, 2023, betterbuildingssolutioncenter.energy.gov/implementation-models/national-housing-trust-stabilizes-utility-costs-installing-solar-systems . Accessed 23 Nov. 2023.

⁶ "Primary Policy Priorities and Goals." www.nmhc.org, www.nmhc.org/advocacy/nmhc-primary-policy-priorities-and-goals/. Accessed 30 Nov. 2023.

⁷ U.S. Energy Information Administration (EIA), Annual Energy Outlook 2020 with Projections to 2050 (Washington, D.C.: EIA, January 2020), accessed February 2021, www.eia.gov/aeo; U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018, EPA 430-R-20-002 (Washington, D.C.: U.S. EPA, 2020), accessed February 2021, <https://www.epa.gov/ghgemissions/inventory-us-greenhousegas-emissions-and-sinks-1990-2018>.

⁸ Rolfe, Steve, et al. "Housing as a Social Determinant of Health and Wellbeing: Developing an Empirically-Informed Realist Theoretical Framework." *BMC Public Health*, vol. 20, no. 1, 20 July 2020, pp. 1–19, bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09224-0, <https://doi.org/10.1186/s12889-020-09224-0>.

⁹ Subramanian, Sagarika, et al. 2022 State Energy Efficiency Scorecard. 2022. <https://www.aceee.org/sites/default/files/pdfs/u2206.pdf>

¹⁰ Ibid.

¹¹ "Executive Summary – the Future of Heat Pumps – Analysis." IEA, www.iea.org/reports/the-future-of-heat-pumps/executive-summary.

¹² An Overview of Affordable Multifamily Programs: Best Practices and Context for Utilities. 2021.
https://www.aceee.org/sites/default/files/pdfs/affordable_multifamily_programs_final_9-14-21.pdf