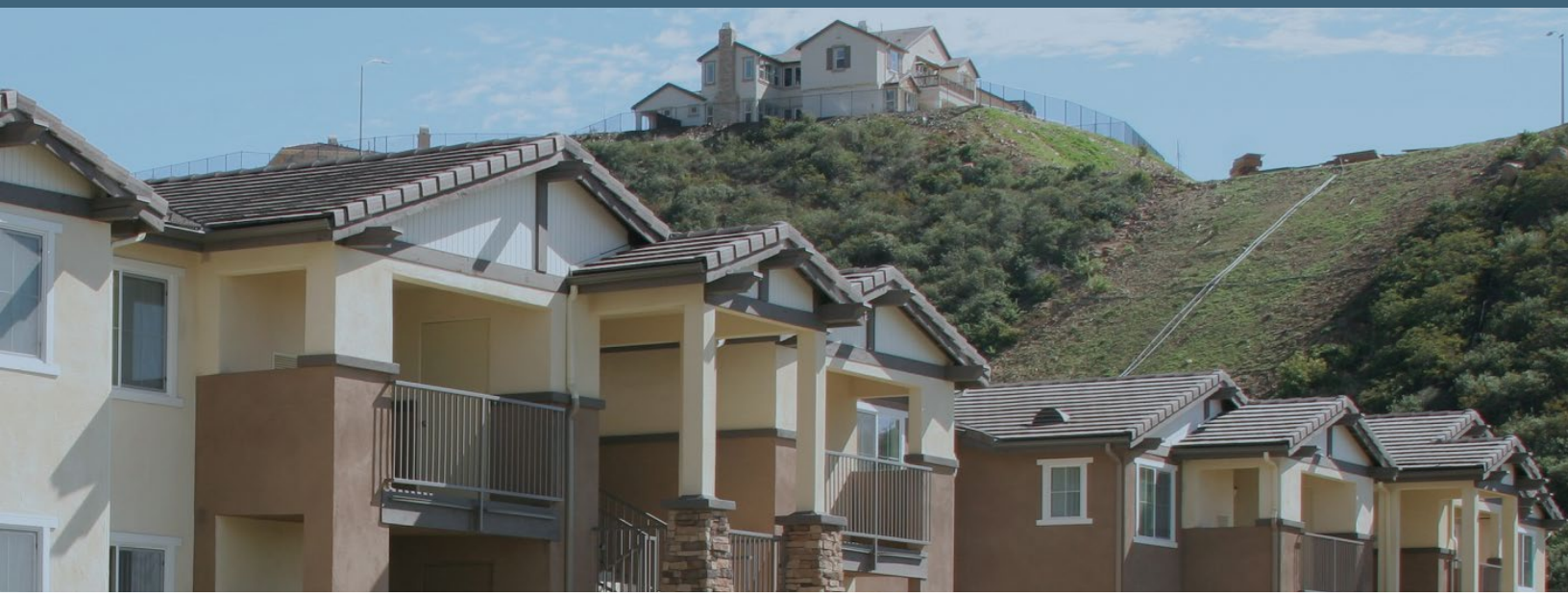
The Big Reach

A COLLECTIVE GOAL TO REDUCE PORTFOLIO-WIDE ENERGY AND WATER CONSUMPTION



SAHF

STEWARDS OF AFFORDABLE HOUSING FOR THE FUTURE

Acknowledgements

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Authors

Rebecca Schaaf, Tawechote Wongbuphanimitr and Andrea Ponsor.

About SAHF

Stewards of Affordable Housing for the Future (SAHF) is a national collaborative of 13 nonprofit affordable housing developers whose mission-driven alliance accelerates resident-centered policy changes, equitable investments and sustainable solutions for the rental housing sector. Together, our members own, operate and manage affordable rental homes in 49 states, District of Columbia, Puerto Rico and the Virgin Islands. SAHF plays a pivotal role between practitioners, policymakers and partners to create healthy, equitable communities by translating policy into practice and forging connections between the affordable housing and environmental sustainability sectors.

Cover photos: top, Preservation of Affordable Housing's The Jackson at Woodlawn Park, bottom, BRIDGE Housing, Sage Canyon.

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In 2019 SAHF members showed

29%

IN ENERGY SAVINGS

In 2019 SAHF members showed

24%

IN WATER SAVINGS

By 2020 SAHF members exceed the portfolio-wide

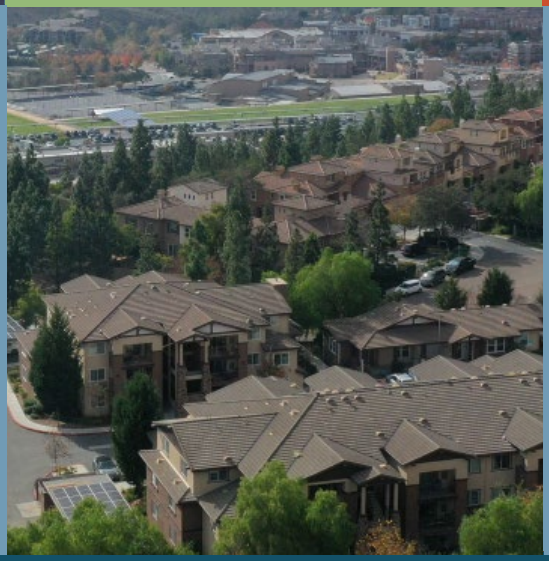
20%

REDUCTION GOAL FOR BOTH ENERGY AND WATER

The 29% energy reduction translates into more than

4.9 B kBtus

enough power to charge the entire population's smartphones for a year!



The 24% water reduction saves over

1.7 B gallons

enough water to fill an Olympic pool more than 2,680 times

These utility consumption savings translate to cost savings of an estimated **$58 million annually**, or approximately **$400 per household** per year in lower energy and water bills.

Photos from left to right and from top to bottom: The Community Builders, National Housing Trust, Mercy Housing, BRIDGE Housing

Executive Summary

Green building strategies and practices empower affordable housing providers and residents to be **part of the solution to climate change**, provide healthier, more comfortable homes for residents, support connected and climate-resilient communities, and are a critical factor in reducing emissions and mitigating climate change. But how do we operationalize and scale these impactful strategies?

Stewards of Affordable Housing for the Future (SAHF)'s Big Reach initiative offers lessons for scaling strategies and shifting cultures. Created in 2013 by SAHF and its members, the goal of the Big Reach is to **lead the industry in the long-term preservation of affordable housing by reducing energy and water use portfolio-wide by 20% by 2020, achieved through a mix of energy and water efficiency, energy and water conservation, and renewable energy**. SAHF members exceed the savings goal of 20% and, equally importantly, unlocked key pathways for savings and drove changes in policy and practice.

Adopting a time-bound, numeric target led to organizational culture change and was an impetus for SAHF and its members to influence the policy and program environment in which affordable housing operates. The promise of the Big Reach was that going beyond an opportunistic, property-by-property approach would truly realize the value of sustainability measures for the long-term preservation of affordable housing and pave the way for sustainable development and operations to be embraced as a norm in the multifamily affordable housing sector.

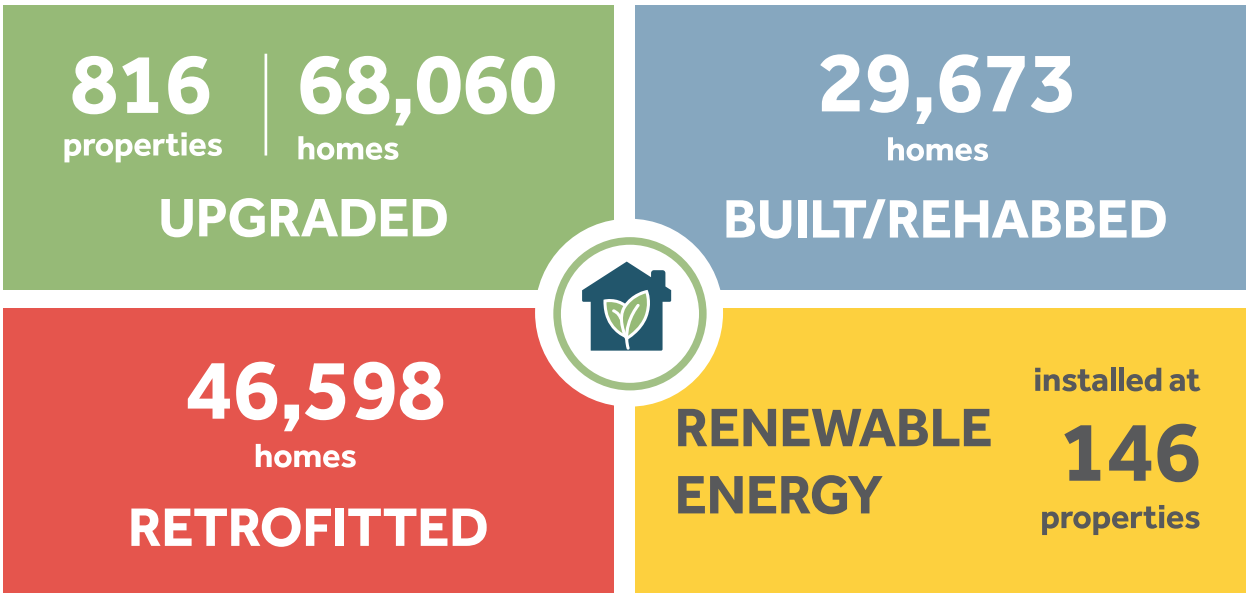
The seven-year reach for significant, portfolio-wide savings yielded significant results:

- Momentous utility consumption reductions with attendant cost savings and environmental benefits.
- Shifts in organizational cultures and the policy environment for sustainable affordable housing.
- Thousands of homes upgraded through the Big Reach delivered healthier, more comfortable living environments for residents.

By 2020, the SAHF members not only met but exceeded the portfolio-wide 20% reduction goal for both energy and water. Data from calendar year 2019 across the SAHF membership showed 29% energy savings and 24% water savings against the 2010 baseline. The 29% energy savings figure translates into more than 4.9 billion kBtus of electricity and natural gas saved – enough power to charge the entire U.S. population's smart phones[1] for a whole year! These energy savings avoided approximately 786,000 metric tons of carbon emissions – equivalent to running 170 wind turbines for a year. On the water side, a 24% reduction saves over 1.7 billion gallons of water, which would fill an Olympic-sized swimming pool more than 2,680 times. These utility consumption savings translate to cost savings of an estimated $58 million annually, or approximately $400 per unit per year in lower energy and water bills.[2]

1 https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references#smartphones

2 The cost savings figures are based on the national average rates. Water=$8.37per kgal (Source: American Water Works Association, 2010), Electricity=13.01 cents per kWh (Source: U.S. Energy Information Administration, 2019), Natural Gas ($10.51 per cubic feet natural gas).



No one factor was the key to this level of success. Members systematizing their sustainability work and SAHF's advocating for a supportive policy environment enabled a myriad of building upgrades.

The top strategies for upgrading buildings in the Big Reach were:

- Prioritizing performance and utilizing green building standards in **new construction and major rehabs.**
- Undertaking **discretionary retrofits** to upgrade equipment outside of a capital event using state- and utility-funded efficiency programs, pay-from-savings programs, and government and foundation grants.
- Incorporating **renewable energy** such as solar panels or geothermal, particularly in states with supportive local policies.

In addition to physical building upgrades, members also prioritized behavioral approaches to energy and water savings, such as finding and fixing energy and water waste through **green operations and maintenance** and helping to deliver quality of life benefits to residents through **resident engagement**. Although ultimately implemented at the property-level, SAHF members' work on systematizing and integrating these approaches through corporate policies and practices was critical to their widespread implementation and substantial energy and water savings.

Focusing on a portfolio-level goal also required organizational investments in sustainability staff as well as data infrastructure and benchmarking capacity. These large-scale changes were complemented and supported by changes in the broader operating environment that SAHF and its members influenced through the Big Reach. SAHF was a partner to the Department of Housing and Urban Development in formulating incentives for owners of HUD-assisted housing that would overcome split incentives, provide guidance on allowable measures, and ease administrative burden. At the state and local level, efficiency programs are a main source of funding for retrofits, and SAHF worked with utilities and their regulators to advocate for deeper and easier to access funding for discretionary retrofits.

The successes of the Big Reach lay the groundwork for us to rise to the challenge we face today – the need to continue to deeply decarbonize and embrace health and equity principles while meeting the nation's tremendous need for healthy, affordable homes in thriving, sustainable communities.

Introduction

Today we face dual crises of housing affordability and climate change. Across the country, almost half of all renters pay more than the recommended 30% of their income on rent, leaving too little for costs like food, health care and education. Climate change also poses a threat to the stability of American renter households. According to the Harvard Joint Center for Housing Studies' 2020 report on America's Rental Housing, nearly a quarter of the country's renter households live in zip codes substantially affected by natural disasters between 2008 and 2018. Additionally, more than 18% of renter households reported not having the financial means to evacuate their homes in the face of a natural disaster.

Green building strategies and practices empower affordable housing providers and residents to be **part of the solution to climate change**, provide healthier, more comfortable homes for residents, support connected and climate-resilient communities, and are a critical factor in reducing emissions and mitigating climate change. At the same time, energy and water efficiency is a core strategy for easing cash-strapped properties' operating costs and reducing energy burdens for residents. However, the affordable housing field has yet to fully deploy these strategies for the benefit of people, communities, and housing providers. Significant strides were made in the early 2000s, but policy, cultural and practical barriers to scaled efficiency remain.

With a shared vision of a world where every person has a healthy home in a thriving community, SAHF member organizations are nonprofit housing providers committed to doing more than providing just a stable home. SAHF members challenge one another to harness the full power of healthy, sustainable affordable rental homes that foster equity, opportunity, and wellness for people of limited economic resources. SAHF and its members recognized early on that energy and water efficiency solutions must be a key part of how we work towards achieving our collective mission.

While the Big Reach has required a deep mission commitment, SAHF's early efficiency activities were driven by operational realities. Around 2007, SAHF and its members recognized the importance of these operating cost impacts as members sought ways to manage rising electricity rates. This prompted a detailed examination of property and portfolio level utility costs between 2008 and 2010. In the following years, members engaged in a series of pilots and demonstrations on ways to improve energy and water efficiency, taking advantage of energy auditing, participating in HUD's Green Retrofit Program and ARRA-funded Weatherization Assistance, implementing widescale lighting retrofits, and participating in a demonstration of Energy Performance Contracting for the privately-owned, assisted portfolio.

These smaller-scale successes illuminated the untapped potential for scaled, systematized efficiency work to serve their mission of providing and preserving housing that is affordable, healthy, and an asset to the communities we serve and the planet we call home.

Starting in 2012, SAHF undertook a year-long, collaborative goal-setting exercise with its members to develop a sustainability initiative. SAHF first hosted discussions with members' executive-level leadership who make up the SAHF board and with sustainability staff who participate in an Energy Peer Group. In these meetings, members affirmed their interest in moving their environmental sustainability work to the next level through a member-wide, collaborative initiative with SAHF. From there, SAHF worked with external consultants to interview member staff at the board and peer group level. The consultants also conducted a literature review to assess what kinds of goals and initiatives were common in the real estate sector. These factors informed an in-person planning session with the Energy Peer Group, and ultimately a proposed initiative written up and presented to the SAHF board in May 2013.

Photo: National Housing Trust

At that meeting, SAHF and its members launched the Big Reach initiative with the following goal:

> *"SAHF members will lead the industry in the long-term preservation of affordable housing by reducing energy and water use portfolio-wide by 20% by 2020, achieved through a mix of energy and water efficiency, energy and water conservation, and renewable energy."*

SAHF and its members embraced a time-bound, numeric target as an act of leadership and a way to change organizational cultures and influence the policy and program environment in which affordable housing operates. Going beyond an opportunistic, property-by-property approach would truly realize the value of sustainability measures for the long-term preservation of affordable housing and pave the way for sustainable development and operations to be embraced as a norm in the multifamily affordable housing sector.

In addition to this high-level, numeric target, the Big Reach had an articulated, multi-faceted definition of success:

- Reduce operating costs
- Reduce energy and water rate risk exposure
- Promote change within affordable housing regulatory structures
- Influence utility incentive programs
- Change organziational cultures
- Be responsible stewards

A written set of "commitments" between SAHF and its members further defined how we intended to undertake the Big Reach. While members had complete flexibility on what building upgrades they implemented, all members committed to incorporating behavioral approaches to energy and water conservation through green operations and maintenance and resident engagement. These behavioral approaches are both effective at generating energy consumption savings, but also a critical component of changing organizational cultures to embrace environmental sustainability.

Charting a Path to 20% Savings

At the time that the SAHF members adopted the Big Reach, recognition programs for energy efficiency commonly targeted a 20% energy reduction at the individual building level, but a portfolio-wide target was an audacious move within the multifamily affordable housing sector. No multifamily affordable housing providers were known to have taken on a portfolio-wide goal. SAHF's goal was modeled on the Department of Energy's Better Buildings Challenge, which at the time was an initiative for commercial and industrial building owners. Other sectors' willingness to take on and progress towards an ambitious portfolio-wide goal provided some comfort that a 20% target was achievable, but SAHF members were acutely aware of the challenges of implementing efficiency in multifamily affordable housing, such as limited staff capacity, considerable capital constraints and a panoply of split incentives.

To build confidence that the 20% goal was grounded in practical solutions, SAHF members needed a way to identify a set of savings interventions that made sense for their unique portfolios. To address this need, SAHF worked with consultants from the Vermont Energy Investment Corporation (VEIC) to develop a work plan template ("The Big Reach Work Plan Template"). VEIC had supported the formulation of the Big Reach initiative and understood members' perspectives on the need and the opportunity in affordable housing. The work plan uses estimated percent savings for different activities applied to a per unit baseline energy consumption figure to pinpoint a set of activities expected to reach the 20% reduction target. VEIC's background in establishing savings estimates for utilities' efficiency programs gave them the professional expertise to provide quality judgments on expected savings in multifamily housing.

The Savings Maze: Split Incentives in Affordable Housing

In both market-rate and affordable rental properties, the "split incentive" is an impediment to energy efficiency. When residents pay utility bills directly, property owners have little incentive to invest in efficiency, but when utilities are included in rent, residents lack an incentive to conserve energy in their homes. In multifamily affordable housing, the classic split incentive described above plays out with a few additional dimensions:

- In properties with HUD rental assistance, residents' rent payments are reduced by a 'utility allowance' that reflects average costs at the property. If their utility bills go down, the utility allowance eventually also decreases, leading to an increase in residents' rent payments – a split incentive between residents and HUD.
- For a subset of subsidized properties, the HUD subsidy level is based on a budget of property expenses. If the owner's utility costs decrease, their subsidy level may also decrease – a split incentive between owners and HUD.
- Assembling the funding to build or rehabilitate multifamily affordable housing commonly requires multiple sources, which then have a stake in the property's net operating income or cashflow. A property's cashflow "waterfall" can mean that utility savings are not available to finance retrofits on a performance basis.

The Big Reach Work Plan Template has been adapted for use by Multifamily Partners in the Department of Energy's Better Buildings Challenge and is freely available for use by multifamily portfolio owners planning towards an energy and/or water reduction target. A recorded webinar on how to use the tool is also available on the HUD Exchange website.

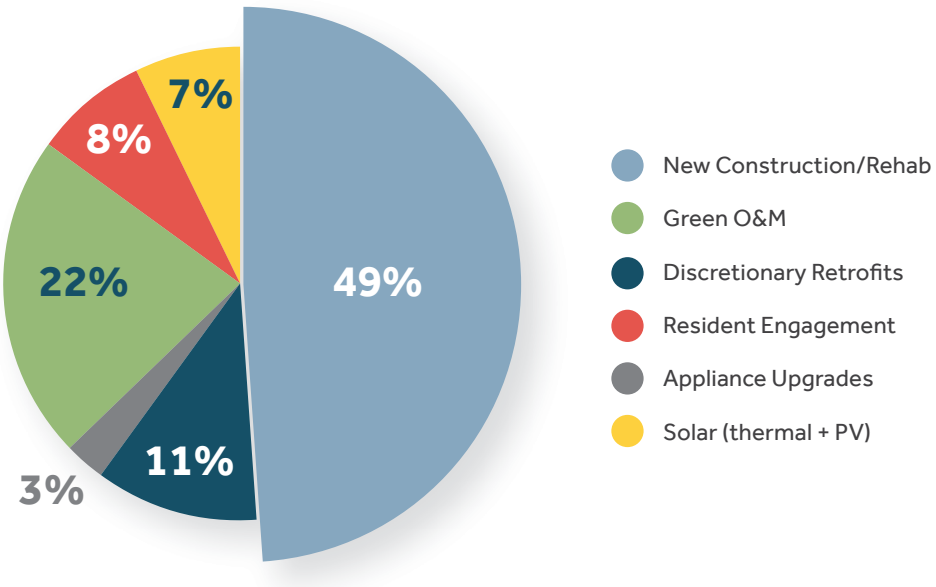
The pathways to energy and water savings[3] laid out in the Work Plan are:

- Deep efficiency at new construction or major rehab
- Discretionary retrofits[4], categorized as light, medium, or deep
- Appliance upgrade at time or replacement
- Green operations and maintenance practices
- Resident engagement
- Solar thermal (for heating water)
- Solar photovoltaics (for producing electricity)

SAHF staff met with a cross-departmental team from each member organization to build out work plans, and each member had a unique set of solutions based on its anticipated development pipeline, utility program landscape, and organizational priorities. The process revealed that each member had considerable savings opportunities and pointed to the potential to meet or even exceed the Big Reach goal.

The pathways expected to deliver the most energy savings represent vastly different approaches. Targeting deep efficiency in new construction and major rehabilitation projects was the pathway with the greatest expected savings – accounting for 49% of expected savings. The high level of savings expected from each individual project meant that they were slated to deliver a large share of savings despite the relatively small share (33%) of the portfolio expected to be built or rehabbed during the Big Reach. In contrast, the second most impactful pathway for expected savings was less glamorous or impactful but offered opportunities at ALL properties: operations and maintenance (O&M). Although green O&M practices were expected to achieve only a low level of savings on a per-unit basis, the plan to implement these practices across 100% of the portfolio meant that green O&M was the second largest energy-saving pathway, accounting for 22% of the expected savings.

Figure 1: Share of Expected Savings by Big Reach



3 Detailed descriptions of the pathways and considerations for how to go about making estimates are laid out in the work plan template.
4 Discretionary retrofits refer to upgrades to energy or water systems that take place outside of a major capital event.

Partnering with the Better Buildings Challenge

While SAHF was looking to the Better Buildings Challenge (BBC) as a model for taking on an ambitious portfolio-wide goal, leaders at the Department of Energy (DOE) and the Department of Housing and Urban Development (HUD) were exploring the potential to expand the BBC to the Multifamily sector. Concurrent with the formulation of Big Reach work plans, SAHF was also in discussions with HUD about joining the inaugural cohort of Multifamily Partners to the BBC. The Big Reach and the BBC are not perfectly aligned, but participating in both offered certain advantages. The promise of technical assistance and incentives from HUD for BBC partners convinced all of the SAHF membership to join once we had reached an agreement on data tracking protocols. At the launch of the Multifamily BBC, the SAHF members constituted 50% of the square footage committed.

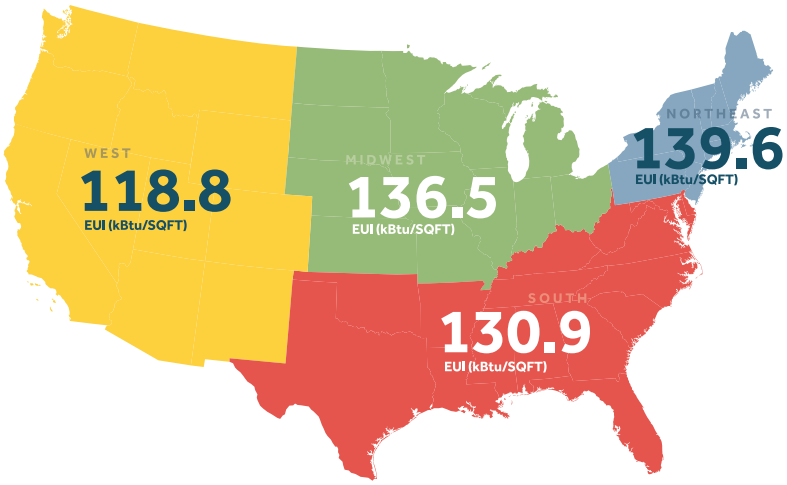
Gearing up for a Goal – Data Protocols

Meeting a time-bound, numeric goal requires data, and utility data benchmarking was a focus of the Big Reach. At the launch of the Big Reach in 2013, a majority of SAHF members were tracking their utility costs, but only three SAHF members were routinely tracking energy consumption for their owner-paid utilities. Tracking consumption requires greater energy and data expertise and typically relies on a paid, third-party benchmarking service. Tracking of resident-paid utilities is an even greater hurdle, requiring not only organization and analysis of the data, but access to the consumption data in the first place. Privacy concerns and IT capacity issues at utility companies meant that in 2013, access to either unit-level or aggregated whole-building data was a significant challenge for multifamily housing providers.

To avoid spending years gathering data before we could begin measuring progress, SAHF adopted a baseline protocol for the Big Reach based on the 2009 Residential Energy Consumption Survey from the United States Energy Information Administration (EIA RECS). The average consumption figures for multifamily homes in buildings with five or more units closely mirrored the average energy consumption of SAHF member properties for which 2010 whole-building consumption was available. To account for regional differences among the SAHF members, SAHF calculated the average energy use figures for each of the four Census Regions used in RECS.

SAHF took a similar approach to establishing members' baseline water consumption, using the U.S. Geological Survey's 2010 average for the residential sector of 88 gallons per person per day. Over the course of the Big Reach, the members agreed to pursue a phased approach to data collection to compare their portfolio's performance to the Big Reach baseline.

Figure 2: Energy Use Intensity baselines for the four U.S. Census Regions per 2009 EIA RECS



By 2020, the SAHF members not only met but in fact exceeded the portfolio-wide 20% reduction goal for both energy and water. Data from calendar year 2019 across the SAHF membership showed 29% energy savings and 24% water savings against the 2010 baseline.

Photo: National Housing Trust

Results

The seven-year effort to reach for significant, portfolio-wide savings yielded significant results across multiple spheres. To start, the utility savings themselves are momentous consumption reductions with attendant cost savings and environmental benefits. At the broadest level, the Big Reach delivered on its intention to shift organizational cultures and the policy environment for sustainable affordable housing. Additionally, the thousands of homes upgraded through the Big Reach deliver healthier, more comfortable living environments for residents.

Results Summary

UTILITY SAVINGS	
29% Energy Savings	**24% Water Savings**
ORGANIZATIONAL CULTURE CHANGE	
Operations and Maintenance	Resident Engagement
Data Infrastructure	Staffing
POLICY INFLUENCE	
HUD Incentives	Utility Program Design and Funding
UPGRADES TO HOMES	
816 properties / 68,060 homes upgraded	**29,673 homes** built or rehabbed
46,598 homes retrofitted	Renewable Energy on **146 properties**

Utility Savings

By 2020, the SAHF members not only met but in fact exceeded the portfolio-wide 20% reduction goal for both energy and water. Data from calendar year 2019 across the SAHF membership showed 29% energy savings and 24% water savings against the 2010 baseline. The 29% energy savings figure translates into more than 4.9 billion kBtus of electricity and natural gas saved – enough power to charge the entire U.S. population's smart phones[5] for a whole year! These energy savings avoided approximately 786,000 metric tons of carbon emissions – equivalent to running 170 wind turbines for a year. On the

5 U.S. Environmental Protection Agency (n.d.). *Greenhouse Gases Equivalencies Calculator – Calculations and References.* https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references#smartphones

water side, a 24% reduction saves over 1.7 billion gallons of water, which would fill an Olympic-sized swimming pool more than 2,680 times. These utility consumption savings translate to cost savings of an estimated $58 million annually, or approximately $400 per unit per year in lower energy and water bills.[6] No one factor was the key to this level of success, but rather, a myriad of building upgrades were supported by broader scale efforts to systematize sustainability work within member organizations and to promote a better enabling environment in the wider policy landscape.

Culture Change

The portfolio-wide goal established under the Big Reach was intended to foster changes in organizational culture – moving sustainability from something undertaken a special, side project, to something integrated in all aspects of housing development, ownership, and management. During the course of the Big Reach, SAHF members supported this greater integration of sustainability by building their utility data infrastructure and their staff capacity at both the headquarters and the property levels. Members' commitments to using green operations and maintenance (O&M) and resident engagement as savings mechanisms also led to these functions being integrated into organizational processes and evolving practices for how they are approached.

Photo: National Housing Trust

For **operations and maintenance**, ways to find and fix energy and water waste were integrated into property-level practices through standardized checklists, protocols, and trainings. For **resident engagement**, SAHF members' approach evolved through the years. At the start, members focused on offering residents tips and information on how they could reduce their energy or water consumption such as adjusting thermostat temperatures or remembering to turn off lights. More recently, we are developing approaches to designing retrofit scopes of work that factor in quality of life considerations alongside savings potentials and involve residents in decision-making.

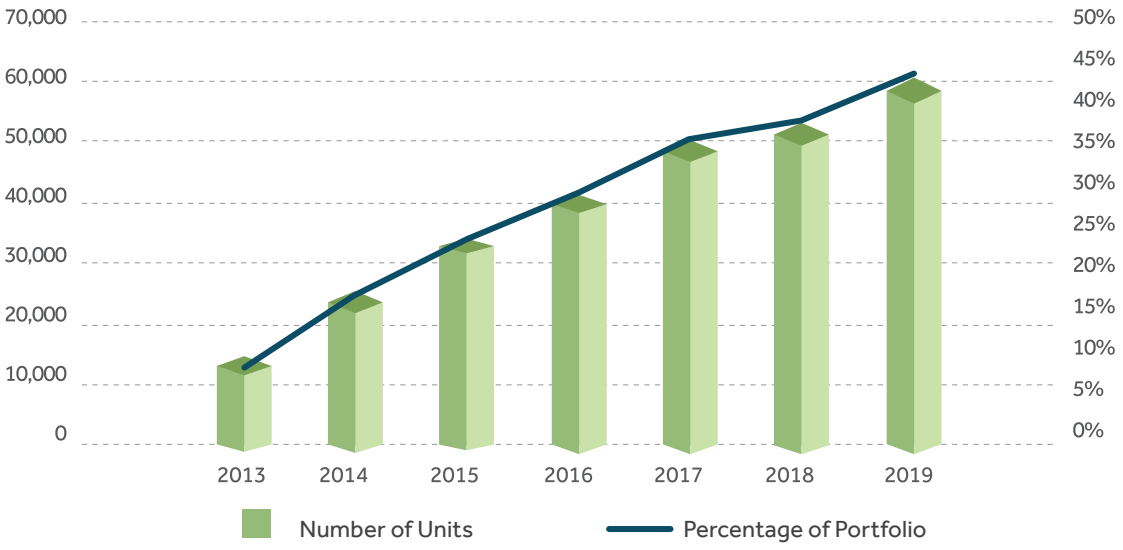
Prior to the Big Reach, three SAHF members had a dedicated staff member for sustainability. **Staffing up for sustainability** was one of the main organizational changes that took place during the Big Reach. Four additional members hired dedicated sustainability staff, and four members built out their sustainability staff to teams of two to four people. For members without dedicated sustainability staff, the practice of the expressly naming sustainability as part of someone's role proved important for creating momentum on environmental efforts.

At the start of the Big Reach, the three SAHF members with dedicated sustainability staff were also the three members routinely tracking the utility consumption for their owner-paid accounts. The need to track progress toward the Big Reach goal focused members' attention on data collection and **benchmarking**, and members complemented their internal capacity by contracting with third-party

6 The cost savings figures are based on the national average rates. Water=$8.37per kgal (Source: American Water Works Association, 2010), Electricity=13.01 cents per kWh (Source: U.S. Energy Information Administration, 2019), Natural Gas ($10.51 per cubic feet natural gas).

benchmarking providers. The benchmarking providers' online systems provide utility data analytics including comparisons to similar properties within the providers' larger data set. Using a phased approach, members first went about benchmarking their owner-paid data, then expanded their efforts to include data related to resident-paid accounts where data access permitted. Since the start of the Big Reach, access to whole-building data has grown from approximately 9% of the SAHF members' portfolio to 44% in 2019, so that today members have complete data for more than 55,000 homes.

Figure 3: Utility Benchmarking Over Time using ENERGY STAR Portfolio Manager Data



Policy Influence

While members understood the value of efficiency and the types of upgrades that could reach a 20% reduction goal, they also understood the significant role the larger housing and energy policy environments play in setting the boundaries on what is possible for sustainable affordable housing. At the federal level, SAHF was a partner to HUD in developing incentives for owners of HUD-assisted housing that would overcome split incentives, provide guidance on allowable measures, and ease administrative burden. These incentives helped SAHF members cover the costs of sustainability staff and benchmarking capacity. At the state and local level, efficiency programs are a main source of funding for retrofits, and SAHF worked with utilities and their regulators to advocate for deeper and easier to access incentives. The use of utility programs directly contributed to upgrades of more than 20,000 homes during the Big Reach.

Upgrades to Homes

There is no short answer to how SAHF members achieved these hard-earned savings, no "silver bullet" to greening affordable housing. Portfolio-wide savings in diverse geographies and building configurations require a "silver buckshot" approach, a myriad of upgrades and operational approaches that align with a property's physical, locational, and population characteristics, as well as where the property is in its financing lifecycle. As a complement to the utility consumption data, SAHF and its members collected and analyzed data on the types of upgrades undertaken at the property and portfolio levels to generate savings in an Excel spreadsheet referred to as the "Big Reach Tracker."

Portfolio-Level Tracking

Certain efficiency and conservation approaches are implemented as a matter of corporate policy and practice and are not tracked at the property level. For operations and maintenance and resident engagement, members provided SAHF with narrative updates on portfolio-level policies rather than tracking actions taken at the property level. Examples include:

- Equipment replacement standards that specify certain efficiency levels or products for when equipment is replaced at the end of its useful life.
- Preventative maintenance protocols based on equipment type.
- Standardized information for residents' move-in packets on ways they can support a culture of conservation in their communities.

Property-Level Tracking

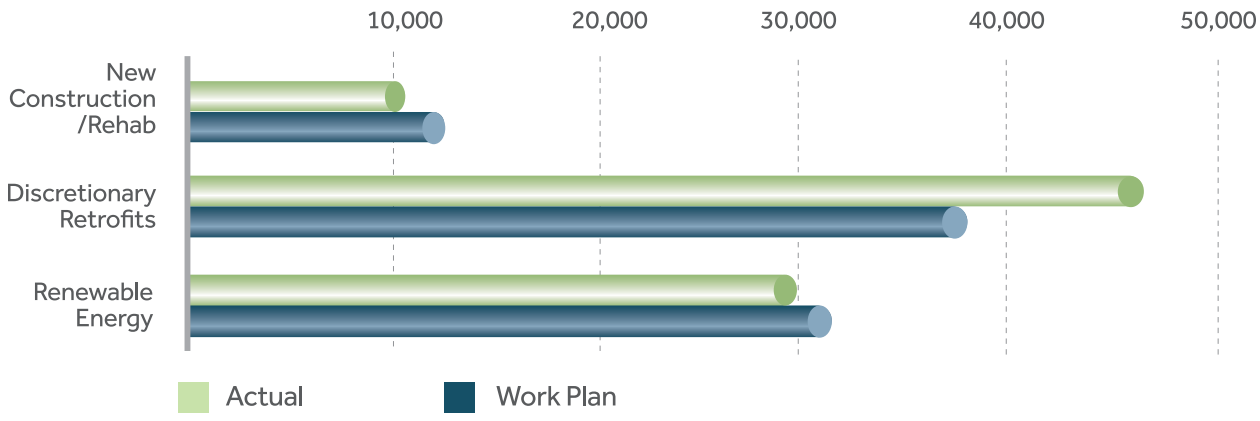
In addition to sharing when their organizations made changes to portfolio-level policies, SAHF members also tracked certain upgrades at the property level according to a similar set of pathways, as were used in the Big Reach Work Plan file:

- New Construction
- Major Rehabs
- Discretionary Retrofits (proactive equipment replacement outside of a capital event)
- Solar Photovoltaics (for electricity generation)
- Solar Thermal (for heating domestic hot water)
- Other Renewables (e.g., geothermal)

Over the course of the Big Reach, the SAHF members reported property-specific upgrades at more than 800 properties encompassing nearly 70,000 homes.

Although the Big Reach work plan exercise was intended to assess feasibility and not to be a commitment to what specific actions members would take, the volume of activity in different broad categories was within a range of what was projected in the work plans. While the realized levels of new construction/rehab and renewable energy implementation were slightly lower than anticipated, but the volume of discretionary retrofits exceeded expectations.

Figure 4: Affordable Rental Homes Upgraded by Category (***"Big Reach Pathway"***) – Workplan versus Actual



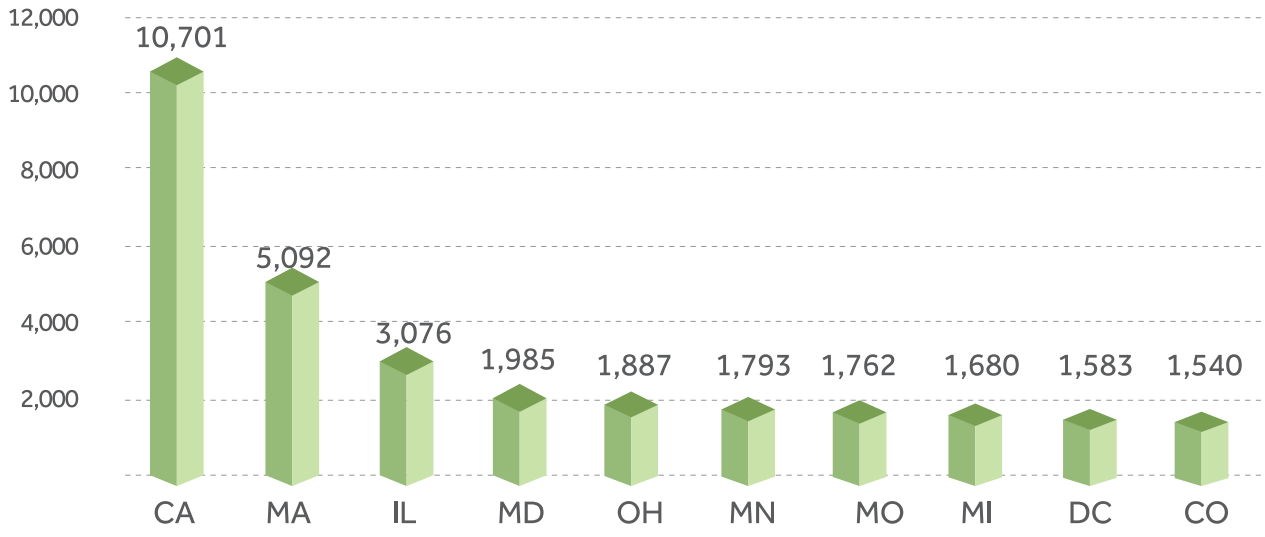
During the Big Reach, members built or rehabbed 336 properties comprising nearly 30,000 units. This same time period saw the growth in application of green building standards, with Housing Finance Agencies incentivizing their use in properties using equity from Low Income Housing Tax Credits and lending programs incentivizing green construction from Fannie Mae, Freddie Mac, and the Federal Housing Administration.

Green building standards used by SAHF members during the Big Reach:

- Earthcraft
- Energy Star
- Enterprise Green Communities
- Evergreen Sustainable Development Standard
- Leadership in Energy and Environmental Design
- National Green Building Standard

Discretionary retrofits were the most widely reported upgrade category and were funded through a variety of sources. In some cases, pay-from-savings programs are available where a third party will cover the cost of a retrofit and agree to be paid back over time from the savings to property operations costs. In other cases, members use property reserves or access government or foundation grants. The most prevalent source of funding for discretionary retrofits is utility rebates and incentives, which funded upgrades at more than 20,000 homes in 236 properties. This funding provided a substantial investment in the upgraded properties, **averaging more than $1,000 per unit of investment from the utility partner, and generating annual savings of more than $150 per unit per year.** The states where the largest number of units were retrofitted is a fitting cross section of where the SAHF members have a large presence and where states and utilities have well-designed efficiency programs that target the low-income, multifamily sector.[7]

Figure 5: Top ten states for units retrofitted under the Big Reach

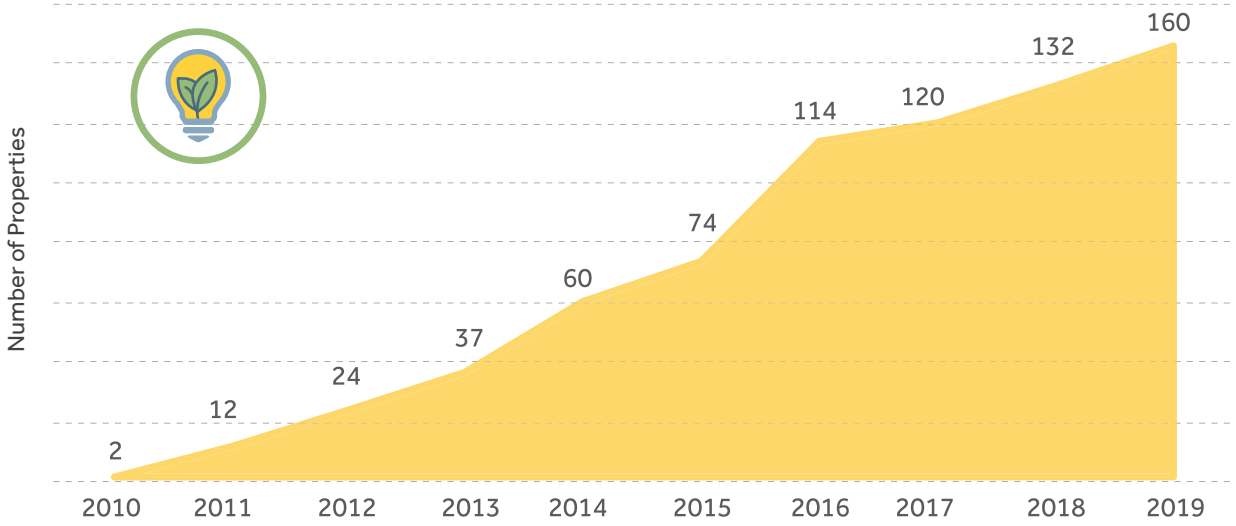


7 Samarripas, S. and York, D. (2019). *Closing the Gap in Energy Efficiency Programs for Multifamily Housing.* American Council for an Energy Efficient Economy. https://www.aceee.org/research-report/u1903

> *Discretionary retrofits are widely used for low-hanging fruit measures such as lighting and water-saving devices, and more comprehensive programs address some of a properties' mechanical systems and/or limited air sealing and insulation. However, deep efficiency measures related to the building envelope and a more comprehensive overhaul of a property's mechanical systems is often limited to major capital events, and new construction is the point in time when it is most cost effective to address sustainability measures.*

Within the category of renewable energy, most properties benefitted from on-site solar photovoltaics to generate electricity, with a smaller share implementing solar thermal to pre-heat domestic hot water, and a few properties installing geothermal heating and cooling systems. SAHF member implementation of renewable energy is heavily concentrated in states with supportive local policies. A majority of the properties with renewable energy are located in California, and more than 90% are in just four jurisdictions: California, the District of Columbia, Illinois, and Massachusetts. Despite not being as widely deployed as originally envisioned, the prospects for renewable energy increased dramatically during the Big Reach, growing from a baseline of two properties in 2010 to 146 properties producing renewable energy on-site by 2019.

Figure 6: SAHF members' renewable energy deployment during the Big Reach



This varied set of building upgrades, supported by investments in staffing and data as well as policy change, ultimately delivered savings beyond the Big Reach target that are complimented by meaningful quality of life improvements and environmental benefits.

Reaching Up: Case Studies on Members' Successes

The following sections provide overviews and member projects for each of the major categories of building upgrades tracked in the Big Reach: New Construction and Major Rehabs, Discretionary Retrofits, and Renewable Energy.

New Construction and Major Rehabs

Multifamily affordable homes are a long-term investment in neighborhoods and in the millions of people that call them home. Green buildings make healthy and affordable homes for residents and benefit the broader community. With proper construction and maintenance, buildings can last several decades. So it is of the utmost importance to build sustainability into a property in the initial construction. This is especially true for envelope measures that are hard to upgrade on a retrofit basis and provide tremendous efficiency, health, and resilience benefits to owners and residents.

Although new construction is an opportune and critical time to integrate sustainability, budget constraints and workforce barriers sometimes limit the extent to which green building practices are incorporated in new construction or major rehab properties. As detailed in the case studies below, state and utility policies that promote efficient affordable housing development and rehabilitation are critical to "pushing the envelope" on green building.

Photo: National Church Residences

Envelope upgrades, such as air sealing, insulation, and windows, pose the highest opportunity costs if not addressed up front. In a retrofit context, envelope measures require extensive work and more upfront capital. Since envelope measures tend to last 30 to 50 years, there is not the same natural point of replacements as there is for appliance and other common energy efficiency measures. Affordable housing owners and developers should make high-performance buildings a priority from the start, so both owners and residents can access a myriad of benefits, ranging from increased energy savings to improved comfort to building resilience.

CASE STUDY

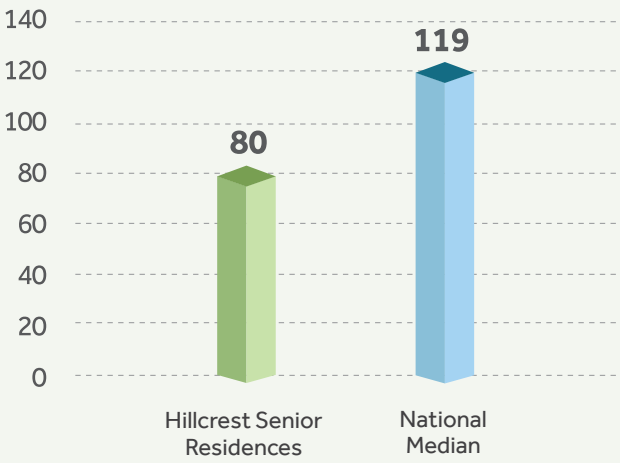
The Community Builders Achieves High Performance through Passive House

New construction presents the most advantageous time to design and construct high-performance buildings with communities and the planet in mind – all from the start. The Passive Building Standard takes a rigorous, performance-based approach to energy efficiency, with building performance criteria for five principles: airtightness, ventilation, waterproofing, heating and cooling, and electrical loads. Together, these principles produce properties with extremely low heating and cooling loads that keep residents comfortable and energy bills low. The Passive House principles can also reduce operating costs, increase the resilience of the housing, and better steward public resources. The Standard was originally developed in Germany, and the Pennsylvania Housing Finance Agency was the first in the U.S. to incentivize Passive House construction through the Qualified Allocation Plan it uses to award allocations of Low Income Housing Tax Credits.

This catalyzed The Community Builders to pursue Passive House certification and provide healthier and more sustainable affordable homes to low-income senior residents at Hillcrest Senior Residences in Pittsburgh, Pennsylvania.

Hillcrest Senior Residences is certified by the Passive House Institute of the US (PHIUS), and was the largest PHIUS-certified building in North America when it officially opened in 2018. Hillcrest Residences met the Passive Building Standard through a mix of air sealing, continuous insulation, triple-pane windows, high performance doors, energy recovery ventilation, high efficiency domestic hot water systems, and Energy Star appliances. In addition to serving the property's energy efficiency targets, the energy recovery ventilation system also promotes excellent indoor air quality for residents by continuously filtering and supplying fresh air. The Passive House approach to energy systems led Hillcrest Residences to outperform the median EUI for that location (as reported by the EPA's ENERGYSTAR Portfolio Manager tool) by approximately 33%, with a source EUI of 80 compared to an average of 119.

Figure 7: Energy Use Intensity Comparison Comparison



Driven by its mission to create stronger communities, The Community Builders went beyond achieving energy efficiency standards and embraced a number of additional green building principles to create an environment where residents can thrive. The property is close to public transportation and neighborhood retail and dining options. It also features a community garden and offers amenities that include an outdoor terrace, a business center, a fitness room, and a private room for health services. This holistic approach to healthy and sustainable housing is a model for high-quality affordable housing for the future. Additionally, other Housing Finance Agencies have been able to follow in Pennsylvania's footsteps, once developing affordable housing to the Passive House Standard proved feasible. As of 2020, 13 states incentivized Passive House development through their Qualified Allocation Plans.[8]

8 Energy Efficiency for All (n.d.). *State Strategies to Increase Energy and Water Efficiency in Low Income Housing Tax Credit Properties.* http://www.nationalhousingtrust.org/sites/default/files/news_file_attachments/Energy%20Efficiency%20Strategies%20in%20LIHTC%20properties.pdf

EmPOWER-ing Maryland

Photo: Homes of America

Addressing sustainability during a rehab can be more challenging than at new construction but is still a good opportunity to apply green building practices. It is especially opportune when state-run efficiency programs that recognize and reward the value of sustainable affordable housing are able to fund efficiency measures. Homes for America incorporates efficiency in its major rehab projects with support from the Maryland Department of Housing and Community Development's (DHCD's) Multifamily Energy Efficiency and Housing Affordability-EmPOWER program (MEEHA). To date, Homes for America has incorporated efficiency through the MEEHA grant program at 13 communities, with an additional four projects underway in 2021.

A highlight from Homes for America's work in Maryland was Bowman Place & Homes at Monument. The property includes a 60-unit multifamily building and 21-unit set of townhomes in Annapolis, Maryland. When HFA acquired this affordable housing community in 2015, Bowman Place & Homes at Monument was in need of significant renovations. Homes for America applied for and accessed Tax Credits and state loan funds from DHCD and additional funds from its lender to rehabilitate the property. They also layered in another source of funding through DHCD's MEEHA program. This efficiency-focused grant enabled Homes for America to incorporate significant efficiency upgrades, such as new windows, heat pump system replacement for heating and cooling, and high-efficiency electric hot water heaters, to the rehab's scope of work with minimal upfront costs from the owner. The project completed in 2018.

Prioritizing efficiency at Bowman House & Homes at Monument will enable Homes for America to continue serving low-income community members in Annapolis, Maryland for many years to come. The efficiency improvements are projected to save this affordable housing community close to 140,479 kWh in energy savings and $20,510 in cost savings annually. This investment also continues to support residents in additional ways beyond energy and cost savings, such as dedicated resident services and green design that contribute to residents' health and well-being. Homes for America was recognized for its excellent preservation work by the Affordable Housing Tax Credit Coalition in 2019.

Photo: Homes of America

Photo: Preservation of Affordable Housing

What's Next for New Construction and Major Rehabs

Over the past decade, SAHF members have supported a growing movement to develop affordable housing with high standards for both building performance and residents' quality-of-life. The opportunity ahead is to scale these one-off and pilot projects into a new standard for new construction and major rehabilitation. SAHF members' early efforts have paved the way for fellow member organizations and the broader affordable housing industry to favorably examine advanced building standards such as Passive House or Zero Net Energy. For instance, SAHF member Preservation of Affordable Housing (POAH) now considers Passive House certification for all new construction projects and has six Passive House projects in development. With its ability to dramatically lower energy use in comparison to standard construction,[9] POAH views Passive House construction as the foundation for achieving Net Zero Energy construction through the addition of solar. In both new construction and major rehab projects, SAHF members are evaluating ways to integrate health measures such as healthier building materials and indoor air quality monitoring to reduce residents' exposure to airborne contaminants and particulates.

Discretionary Retrofits

While capital events are an opportune time to address sustainability measures, these events occur infrequently – approximately every 15 years. Replacing equipment at the time it fails is another common approach, but one that carries maintenance costs and operational risks, and may miss out on opportunities for significant operational savings.

Discretionary retrofits entail proactively replacing equipment outside of a capital event (refinancing), particularly for the sake of efficiency improvements. Discretionary retrofits may be initiated by an owner with their own funds or through pay-out-of-savings programs, grants, or utility- or state-funded efficiency programs. Through incentive programs, key partnerships, and development of innovative tools, SAHF members scaled up the adoption of energy and water efficiency across their multi-state portfolios and increased residents' access to sustainable and healthy affordable homes.

9 Fitzgerald-Redd (2016). *For Better Homes, is it Net Zero or Passive House?* Insulation Institute. https://information.insulationinstitute.org/blog/for-better-homes-is-it-net-zero-or-passive-house-1

Volunteers of America Makes Retrofits EZ

Part of the challenge of implementing efficiency upgrades outside of a capital event is the difficulty in determining what scope of work can be covered with available resources and what levels of utility consumption and cost savings to expect from the efficiency upgrades. Members' interest in discretionary retrofits is driven by the fact that every building has opportunities to save money through energy and water efficiency. However, identifying and evaluating those savings opportunities is not always easy. To help multifamily housing providers independently initiate retrofits, SAHF developed EZ Retrofit, a free, do-it-yourself audit tool designed specifically for multifamily affordable housing owners and managers. With the support of HUD and partners Bright Power and ICF International, the EZ Retrofit tool provides a no-cost and simple way for SAHF members and other affordable housing providers to select measures that meet their criteria.

In 2014, Volunteers of America (VOA) demonstrated the value a simple audit tool can have on both affordable housing owners and residents at one of their Colorado properties. After inputting detailed data on the building's characteristics and systems into EZ Retrofit, VOA received an evaluation of systems in ten categories along with recommended retrofits. Using the EZ Retrofit results, VOA determined a scope of work that aligned with the property's needs. VOA worked with a local utility program implementer, Energy Outreach Colorado, to identify the right incentives, and eventually moved forward with retrofits to boilers, refrigerators, and lights. EZ Retrofit offered an easy way to visualize what savings and non-energy benefits[10] to expect over time. EZ Retrofit assesses ten key systems: HVAC, water heaters, clothes washers, kitchen appliances, lighting, motors and controls, air sealing, duct sealing, water fixtures, and toilets. Based on the energy savings opportunities at the property and available incentives through Energy Outreach

Photos: Volunteers of America

Colorado, VOA moved forward with upgrading to ENERGY STAR Refrigerators, LED lighting for their common areas and exterior lighting, and replacing two hot water boilers from the building's initial construction in 1971 with high-efficiency models.

VOA's investment in these efficiency measures reduced the property's energy use by 20% and generated 22% in cost savings, which provides long-term benefits for VOA and the residents they serve. Since the launch of EZ Retrofit in 2013, other SAHF members, affordable housing providers in the Better Buildings Challenge network, and certain multifamily efficiency program implementers have found similar value and benefits to using the EZ Retrofit tool.

10 As part of the EZ Retrofit project, SAHF and ICF developed a compendium of non-energy benefits that is incorporated into the Audit Reports produced by EZ Retrofit. https://sahfnet.org/sites/default/files/uploads/non-energy_benefits_summary_ez_retrofit.pdf

CASE STUDY

Mercy Housing Scales Savings in California

The Big Reach was about scale and impact. SAHF members understood at a high level the benefits energy and water efficiency can have on the communities they serve and the environment, but the biggest unknown in 2013 was how to scale up the deployment of sustainable solutions across SAHF members' entire portfolio given limited resources for retrofits.

Mercy Housing overcame the persistent challenge of delivering sustainable and healthy homes with limited resources with a multi-phase retrofit effort in California. Through a partnership with Affordable Community Energy (ACE) and Bright Power, Mercy Housing leveraged some of the nation's best energy efficiency programs and implemented a pay-from-savings model designed by ACE. Many pay-from-savings programs pre-assign a "deemed" savings amount to the measures implemented, essentially setting out a payment schedule based on expected performance. The ACE model, on the other hand, uses actual, post-retrofit, weather-normalized data to measure the level of savings in fact realized at the property and protecting the property from the risk of the measures not reaching their expected savings levels.

Photos: Mercy Housing

The ACE model enabled Mercy Housing to address a range of retrofit needs across its California portfolio by taking a two-pronged approach. First, the team evaluated the range of efficiency programs available in California to determine which program was the best fit for a given property and the likely measures that could be covered by those programs. Second, the team evaluated the full set of retrofit needs at the property to determine what could be covered through a combination of retrofit incentives plus pay-from-savings financing, with no capital investment required by any of the Mercy Housing properties.

> *Through a dedicated environmental sustainability team at Mercy Housing and innovative on-the-ground implementation partners, the ACE project has generated more than a million dollars of utility cost savings to date, reduced ongoing maintenance expenses, helped Mercy Housing avoid future capital costs, and delivered financial, health, safety, and resilience benefits to residents.*

The power of this approach to deliver deep retrofits is evidenced at Ardenaire Apartments, a 53-unit affordable housing community with 19 permanent supportive housing units dedicated to individuals who have severe mental disabilities and are chronically homeless in Sacramento, CA. Mercy Housing and its implementation partners converted Ardenaire's existing gas domestic hot water system to an electric heat pump water system – one of the earliest documented electrification projects in multifamily affordable housing in the United States. Other measures included LED lighting, low-flow aerators and showerheads, pipe and attic insulation, domestic hot water recirculation flow control and Energy Star washing machines. The property also hosts a 6kW solar photovoltaic system, further reducing its environmental impact. This extensive scope of work was made feasible by California's Low Income Weatherization Program, and the improvements led to a dramatic 67% reduction in the property's Energy Use Intensity. Ardenaire was recognized by National Apartment Association (NAA) for its 2019 NAA Excellence Award. The work speaks for itself – Mercy Housing not only lowered the environmental impacts from its California portfolio, but the savings generated by the ACE work at Ardenaire and other communities are ensuring more residents with limited resources have access to sustainable and healthy affordable homes.

Sustainability for Seniors at Retirement Housing Foundation's Angelus Plaza

For most SAHF members, getting to scale means retrofitting a portfolio of properties, but the Retirement Housing Foundation (RHF) was able to achieve scale at a single affordable housing community. Angelus Plaza, a 1,092-unit community in downtown Los Angeles, is the largest subsidized affordable housing community for seniors with low incomes in the United States. As one of the nation's largest non-profit housing providers, RHF has made energy and water efficiency a top priority to improve resident quality-of-life and to help preserve housing affordability for the residents they serve. Since its opening in 1981, Angelus Plaza had not undergone significant energy or water improvements and was due for a substantial refresh.

Retrofitting a fully-occupied affordable housing community of Angelus Plaza's size requires coordination and substantial financial and technical support. The opportunity presented itself in 2017 when RHF's local utilities, Southern California Gas (SoCalGas) and the Los Angeles Department of Water and Power (LADWP), invited Angelus Plaza to participate in the Energy Savings Assistance Program-Common Area Measures program. Through the program, SoCalGas and LADWP provided a streamlined process for RHF to identify and implement both in-unit and common area efficiency measures that met the needs of the property and the residents. The $1 million efficiency project led to the replacement of boiler systems for domestic hot water and space heating, pipe insulation, LED retrofits, refrigerators, and low-water fixtures.

Completed in October 2019, the extensive retrofit work is estimated to save Angelus Plaza and residents over 160,000 therms in natural gas, 169,400 kWh in electricity, and over 6.8 million gallons of water annually. From the energy efficiency work alone, Angelus Plaza will benefit from $150,000 in reduced operating expenses annually as well as reduced energy burden for the residents they serve. To date, RHF has retrofitted approximately half of its portfolio and is on to the next half, finding additional opportunities to scale up energy and water efficiency.

Angelus Plaza and residents saved annually

160,000
therms of natural gas

169,400 kWh
in electricity

6.8 million
gallons of water

$150,000
in reduced operating expenses

CASE STUDY

"Every Drop Counts" - The NHP Foundation's Water Retrofits

Utility rebates and incentives are a major source of funding for discretionary retrofits for energy savings. That same level of opportunity is not available for the largest culprit for water use in multifamily housing – toilets. Water utilities are even more fragmented than energy utilities, with hundreds of unique water providers serving the SAHF members' national portfolio. Beyond the complication of navigating a myriad of different companies, water utilities are less likely than energy companies to offer rebates and incentives. Luckily, the energy savings from reduced hot water use is generally sufficient for energy utilities to incentivize water-saving devices such as showerheads and faucet aerators, but for toilets, the lack of cross benefits mean there are few if any pathways to incentives.

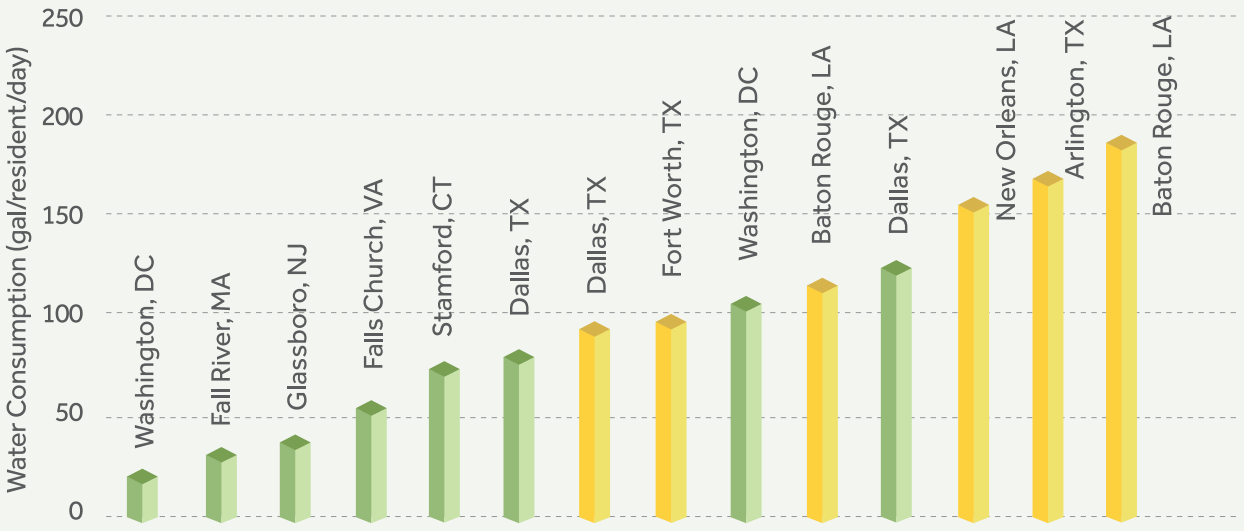
Although incentives from water utilities are rare, water retrofits are often feasible because water is the utility most often master metered and entirely paid by multifamily owners. Water measures often pay back quickly, making pay-from-savings approaches widely applicable.

The NHP Foundation leveraged a pay-from-savings approach to finance and deploy water conservation solutions that lowered its water use and operating costs at its properties for the long term. The NHP Foundation took the following steps in its water retrofit program.

Step One: *Benchmarking*

A major component of any sustainability project is utility data benchmarking. Members track both energy and water data to identify the high utility users and prioritize properties for retrofits. The NHP Foundation began its utility benchmarking program by benchmarking water usage and working with the third-party management companies with which they had the strongest relationships. Early in this process, they identified certain properties with high water use within their portfolio. Overlaying these high users with knowledge of what properties would soon be sold or rehabbed, as well as where their implementation partner operated, led the NHP Foundation to prioritize six properties for water retrofits.

Figure 8: Water scorecard used to assess The NHP Foundation's portfolio for water savings opportunities in 2013



Step Two: *Implementation*

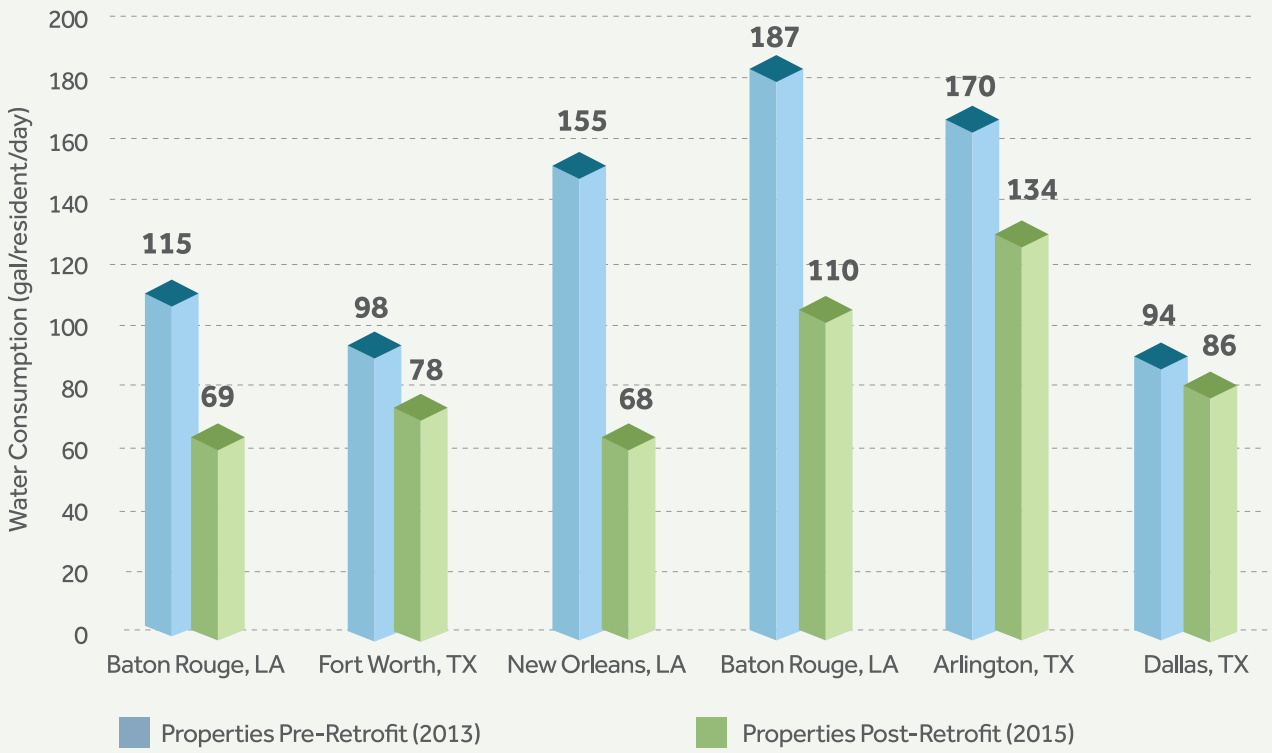
Once the properties were identified, the NHP Foundation's asset management team and their implementation partner moved forward with implementing water-saving retrofits. Taking advantage of Minol USA's pay-out-of-savings program was a way around the persistent challenge of limited funds to cover upfront costs. NHP Foundation provided Minol with a basic property survey and twelve months of water data on their properties. Based on this information, Minol shared back a water conservation evaluation and plan. NHP Foundation then contracted with Minol to upgrade six properties with new, heavy-duty toilet flappers, low-flow showerheads, and faucet aerators. Minol covered the upfront installation costs, and NHP Foundation paid off the installation cost over time out of the monthly water and sewer cost savings.

Step Three: *Monitoring and Evaluation*

Ongoing utility data benchmarking proved out the value of retrofitting these properties. All six properties saw a decrease in water consumption, ranging from 9% to 56% when comparing their 2015 consumption to a 2013 baseline. Across the six properties, the savings averaged 33%.

The NHP Foundation has continued to prioritize water savings in its portfolio and was able to implement water retrofits at 1,311 affordable homes between 2018 and 2020.[11]

Figure 9: The NHP Foundation's Pre- and Post-Retrofit Water Performance



11 The NHP Foundation (2020). *Impact Report 2020.* https://resources.nhpfoundation.org/view/462171118/

What's Next for Discretionary Retrofits

During the Big Reach, SAHF members found opportunities to retrofit more than 45,000 homes for energy or water efficiency outside of a capital event. Yet there is still a large outstanding opportunity within the SAHF members' portfolio as well as in the larger multifamily affordable housing sector. The split incentive – that owners are not incentivized to invest in efficiency if residents pay the bills and residents are not incentivized to conserve energy if owners pay the bills – is a persistent problem that inhibits otherwise cost-effective retrofits. Luckily, within the HUD-assisted affordable housing portfolio, the fact that rent payments take into account a 'utility allowance' creates an opportunity to address the split incentive between owners, residents, and HUD through changes to utility allowance policies. SAHF's memo to HUD on Opportunities for Immediate Administrative Action include recommendations on ways to address the split incentive.

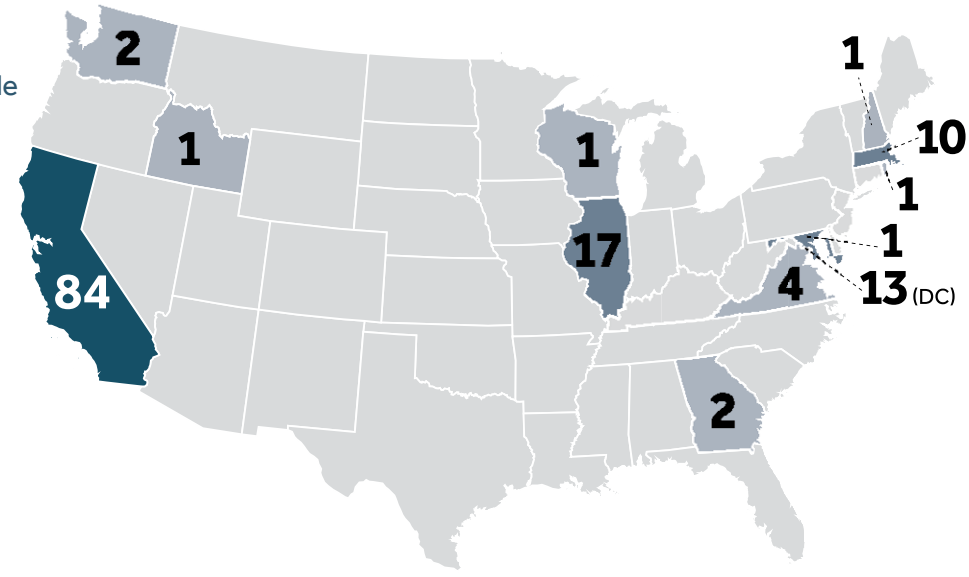
Until the split incentive is overcome and capital constraints alleviated, we expect utility- and state-funded programs to be a main driver of discretionary retrofits. In the coming years, we expect evolving utility programs to expand the opportunity and pressure to retrofit affordable housing. Numerous states[12] have set ambitious clean energy goals, and moving to clean electricity is a priority area for the Biden Administration. Programs that support efficiency, distributed renewable energy, electrification, and load flexibility all will be critical to meeting these goals and will create opportunities to retrofit multifamily affordable housing.

Renewable Energy

Since the start of the Big Reach, renewable energy transitioned from a solution implemented only a rare, "special project" basis to a pathway many SAHF members have adopted to lower energy costs and the property's carbon footprint. The combination of localities with strong clean energy policies, federal tax credits, and public and private grants specifically for affordable housing made it possible for SAHF members to deliver clean energy to multiple affordable housing communities in 13 states. To date, 10 out of 13 SAHF members have implemented a range of residential renewable energy solutions, including on-site solar photovoltaic systems, solar thermal systems for water heating, and geothermal heat pump system for heating and cooling.

Figure 10: Properties with On-Site Renewable Energy

(Darker Color Indicates More Properties)



12 Natural Resources Defense Council (2020). *Race to 100% Clean.* https://www.nrdc.org/resources/race-100-clean

The National Housing Trust and BRIDGE Housing Take Charge of Their Renewable Futures

SAHF member National Housing Trust (NHT) was an early pioneer and leader in designing and implementing renewable energy in multifamily affordable housing. From their headquarters in Washington, DC, several factors motivated NHT to take charge of its renewable future.

- *Barriers to financing solar energy were high, especially for affordable housing owners.*
- *The solar industry was still in its infancy and did not fully understand the complexity of subsidized affordable housing.*
- *They saw an opportunity to implement energy-saving solutions that deliver long-term benefits to the property and the environment.*

With support from financial partners and a forward-looking city government, NHT developed an ownership model that enables an affordable housing provider to own, operate, and manage solar installations. Creating a separate entity, NHT Renewable, allowed NHT to overcome the regulatory and administrative barriers that are commonly associated with subsidized affordable housing, such as taking on additional debt at the property level, and to capture more of the benefit of solar than when partnering with third-party intermediaries. As the solar developer, owner, and manager, NHT Renewable assembles the financing for the renewable energy system, contracts for installation of the solar panels, and enters into a Power Purchase Agreement with the property, which pays NHT Renewable for the solar electricity delivered on site. NHT was able to scale up the installation of solar systems across five of its DC properties at one time. They also took advantage of the Federal Solar Investment Tax Credit and reaped additional economic benefits from developer and ongoing asset management fees. In Fall 2014, NHT Renewable completed its first project installing ten solar photovoltaic systems generating 180,000 kWh per year, and six solar thermal systems generating 6,500 therms per year. In partnership with other

Photo: National Housing Trust

DC-based affordable housing providers, this project covered 13 buildings across five properties in Washington, DC. The policy environment and partnerships in DC made it possible for NHT take charge of its renewable energy work.

NHT also has been a pioneer in deploying community solar models that benefit low-income renters by providing low- to no-cost clean energy to residents of affordable housing communities. Community solar refers to solar arrays within a geographic area that have multiple subscribers. Rather than directly crediting a particular utility meter, subscribers receive credits for a share of the total energy produced. In partnership with other DC-based affordable housing organizations and businesses, NHT ventured into community solar by becoming one of the early participants in DC's Solar for All program, a local community solar program launched in 2017. NHT-owned and managed solar has produced close to two megawatts MW of electricity, reducing the operating costs for affordable housing properties and the energy burden for hundreds of low-income residents. NHT is currently installing a second pool of projects under Solar for All that will add an additional 3 MW of community solar capacity in 2021.

CASE STUDY

Along with the District of Columbia, California has also created a local policy environment conducive to rooftop solar. This helped SAHF member BRIDGE Housing to utilize NHT's solar implementation model

> *According to the Solar Energy Industries Association, "Community solar refers to local solar facilities shared by multiple community subscribers who receive credit on their electricity bills for their share of the power produced."*

for a subset of their properties, forming the BRIDGE Aggregate Solar Company.[13] BRIDGE also was able to participate in one of the nation's first solar subsidy programs designed explicitly to benefit residents of affordable housing, California's Solar on Multifamily Affordable Housing (SOMAH) Program. SOMAH subsidizes the installation of rooftop solar and comes with a requirement that 51% of the solar credits generated by the system be allocated to residents. After solar panels are installed, the value of the electricity generated is divided among residents and the common area according to a pre-set allocation of shares. Residents of the property receive a direct credit on their monthly electricity bills.

Working with a national solar provider in a leasing arrangement that exposes BRIDGE to minimal risk, they have been able to pass on more than the required 51% of the benefits to residents. At the 37 BRIDGE properties participating in SOMAH, an average of approximately 70% of the benefits are allocated to residents. Across these properties, residents are expected to receive more than 8.6 million kWh of free electricity, with an estimated cost savings of almost $1.3 million annually. The first solar array installed under SOMAH was completed in January 2021 at Sage Canyon, where residents can expect to see their household electricity bills go down by more than $500 in 2021.

What's Next for Renewable Energy

Renewable energy is an area of expanding opportunity for SAHF members and other affordable housing providers, with falling solar installation prices and an expanding number of states adopting community solar policies. In 2020, SAHF and three members joined the U.S. Department of Energy's National Community Solar Partnership-Multifamily Affordable Housing Collaborative to develop and pilot scalable community solar models and policy solutions that deliver affordable clean energy to affordable housing communities nationally.

13 National Housing Trust (2020). *BRIDGE Announces Completion of its First Solar Project.* https://www.nationalhousingtrust.org/news-article/bridge-announces-completion-of-its-first-solar-project

The Human Side of Sustainability

From the start, SAHF and its members recognized that achieving energy performance across a portfolio is not just a matter of building design and efficient equipment. The people who live and work at properties are the prime drivers of both the *why* and the *how* of green building. With the human side of sustainability squarely in mind from the start, green operations and maintenance (O&M) and resident engagement were central components of SAHF's Big Reach. All SAHF members committed to utilizing these savings pathways, which also contribute to SAHF members' intention to use the Big Reach as an impetus to change organizational cultures.

Operations and Maintenance

The maintenance staff of multifamily communities are the standard bearers for maintaining a safe and healthy physical environment and keeping the properties operating. Green operations and maintenance (O&M) practices are ways of proactively monitoring for energy or water waste and evaluating whether systems are performing efficiently. Green O&M can reduce energy and water consumption and catch failing systems before they lead to service outages and greater disruptions to residents.

Benefits of Green O&M to Residents

- Reduces disruptions from system failures or repairs
- Critical equipment remains powered on during major weather events or utility power outages
- Reduces utility costs
- Improves comfort and more control over systems
- Produces better indoor air quality

In the early years of the Big Reach, SAHF worked with partners to provide resources and trainings and to access technical assistance for green O&M. A Multifamily Energy and Water Toolkit that SAHF developed with longstanding benchmarking partner Bright Power was a foundational resource for trainings and technical assistance during the Big Reach. SAHF and Bright Power held six on-site, in-person trainings for maintenance staff. Members also took advantage of Technical Assistance funded by HUD in support of the Better Buildings Challenge to integrate resources from the Toolkit into their O&M practices and to develop portfolio-level tools and protocols to address green O&M. Examples of the portfolio-level tools are available on SAHF's website. This set of tools, trainings, and technical assistance formed a foundation of operational excellence that played a strong role in SAHF members' success.

CASE STUDY

Streamlining Operations and Maintenance at National Church Residences

National Church Residences has placed a strong emphasis on achieving efficiency through systematized operations and maintenance protocols for its portfolio of 310 communities in 25 states and Puerto Rico. National Church Residences' Energy and Capital Planning team led a multi-year initiative to develop and roll out a robust National Maintenance program in 2017. Their program included building up staff capacity and transitioning to an online system to better address maintenance issues across its multi-state portfolio. Strong protocols are a way to both find and fix energy and water waste quickly and provide more consistent energy services (e.g., heating, cooling, and hot water) to residents.

As part of its National Maintenance program, National Church Residences developed a Capital Planning Database (CPD) to track capital projects and planning. The CPD allows corporate staff to utilize data in Capital Needs Assessments (CNAs) to track capital projects and allocate funding toward continuous improvement projects. Maintenance issues at properties are documented through "work orders," and a transition from paper-based reporting to an online system created an opportunity to use this data to inform capital planning.

The creation of Regional Maintenance Leads throughout its multi-state portfolio facilitated National Church Residences's shift to an online maintenance system and allowed them to systematize tracking in a way that improved efficiency. All of its maintenance staff transitioned from a system that relied on paper work orders to an online maintenance system, so that property and corporate staff were receiving and viewing the same updates.

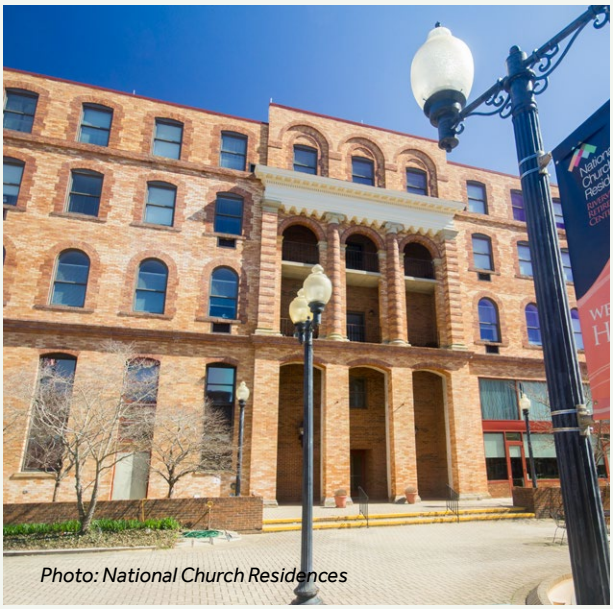


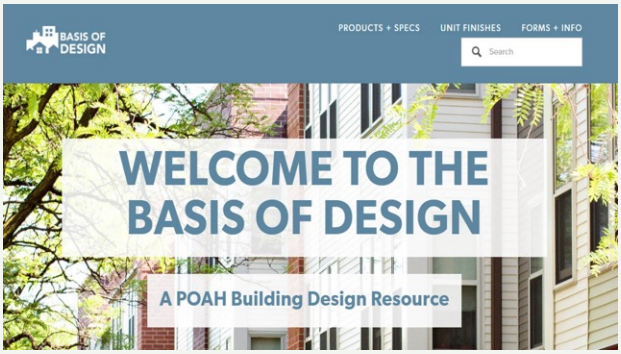
Photo: National Church Residences

Photo: National Church Residences

National Church Residences implemented the Yardi Maintenance online system to track and report work orders. They have also incorporated InspectCheck, a tablet-based system to complete internal and pre-Real Estate Assessment Center (REAC) inspections. All of these National Maintenance functions have been incorporated into mobile platforms on tablets distributed to maintenance staff. With the transition, the data from these mobile-based application feed into the central account used at the corporate level. Energy and capital planning staff can see how long certain types of maintenance issues are going unresolved, improve efficiency by dedicating staff time to respond to urgent maintenance requests, and identify repeated maintenance issues that may need a larger commissioning exercise and/or capital upgrades.

Preservation of Affordable Housing's Basis of Design

A number of SAHF members developed and implemented Equipment Replacement Standards as part of the O&M Technical Assistance access through the Better Buildings Challenge. SAHF member Preservation of Affordable Housing (POAH) took this approach to standardizing incremental improvements a step further by developing a web-based Basis of Design (BOD). The POAH BOD is a publicly available, on-line resource which lays out POAH's product preferences, specifications, and performance criteria for both new development and ongoing operations. As a living document, BOD is periodically updated to help bridge the development and property management teams within the organization. In addition to providing a streamlined product portal, this platform allows for a feedback loop on performance, durability, and pricing across product users and suppliers. POAH's BOD has also provided a valuable resource to other SAHF members and other affordable housing providers who have implemented similar design standards internally to encourage efficiency and building performance.



CommonBond Communities' Green Cleaning Pilot

In addition for looking for ways to identify and eliminate energy and water waste, another important element of green operations and maintenance is green cleaning. SAHF works with the Healthy Building Network (HBN) to identify and promote ways to reduce exposure to hazardous chemicals in building materials and supplies. In partnership with HBN, CommonBond Communities undertook a green cleaning pilot at its largest affordable housing community, Skyline Tower in St. Paul, Minnesota. CommonBond used a third party cleaning service at this 504-unit property. The pilot began with a review of the cleaning products being used at the property and available alternatives that held a green certification and were verified by HBN as being healthier cleaning products.

After confirming that it was possible to employ green cleaning practices at Skyline Tower, the pilot went on to evaluate the products' effectiveness and the cost of shifting to green cleaning. The pilot was ultimately a success on all fronts. At regular meetings between CommonBond's facilities management staff, the cleaning services company, and the cleaning supply company, the team confirmed that the products performed well. The cleaning supplies themselves were comparably priced and the pilot ultimately reduced costs due to the shift to a dispensing system which reduced waste and allowed for more economical use of cleaning supplies.

Staff from CommonBond Communities presented on their pilot in detail at a meeting of SAHF's Energy Peer Group, and additional SAHF members have pursued green cleaning products in their communities following CommonBond's lead.

Photo: CommonBond Communities

What's Next for Green Operations and Maintenance

Using operations and maintenance practices to generate savings is a growing opportunity. The expanding availability and decreasing cost of devices that allow owners and residents to monitor real-time and/or system-level energy usage are an important new tool for green O&M. Additionally, heating, cooling, and hot water systems today come with a wider range of controls and information to optimize their performance. Taking advantage of advanced energy management systems requires an investment not only in technology but also in the people that interact with and respond to the technology. Since the days of SAHF's green operations and maintenance trainings, an increasing number of third-party O&M trainings are available to train maintenance staff in how to operate high-efficiency equipment for conservation and performance and how to work with data systems that provide real time information on utility consumption and system performance.

Resident Engagement, Benefits, and Agency

SAHF members' focus on residents started with fostering a culture of sustainability inclusive of property staff and residents by providing residents with tips and resources on how they can conserve energy. During the course of the Big Reach, this culture evolved to a focus on resident empowerment around decisions made about the places they call home.

Prior to the launch of the Big Reach, SAHF had engaged Greenroots Strategies to develop a resident engagement toolkit for energy conservation. Launched in August 2014, the toolkit contains a guide to designing a resident engagement program as well as a wide range of resident engagement resources. Available as editable forms in both English and Spanish, the resources can be used to design an ongoing, comprehensive program or individual elements can be incorporated into broader resident communications programs.

SAHF members used individual resources from the toolkit as part of other resident services offerings and to emphasize water conservation during times of drought. However, ongoing resident engagement to generate savings proved difficult to implement on a widespread basis. While resident engagement activities such as competitions have been shown to deliver demonstrable savings,[14] the savings tend to diminish once the program is complete, and members prioritized longer lasting and less labor intensive savings options.

A resident-centered approach to the Big Reach that had greater resonance with the SAHF members was considering the benefits beyond energy/water savings when making decisions about energy upgrades. Rather than having a singular focus on maximizing energy savings, consideration of what is sometimes called "non-energy benefits" – factors such as indoor air quality, thermal comfort, noise, and safety – could guide retrofit decisions. SAHF incorporated consideration of "non-energy benefits" into its EZ Retrofit do-it-yourself audit tool in 2015.

In 2018, SAHF built on this work, documenting in detail the financial, health, comfort, education, and social resiliency benefits of different categories of building upgrades in its *Driving toward the Greater Good* white paper, developed with consultant Elizabeth Chant. The white paper promotes a further evolution to SAHF's approach to resident engagement by not only considering the benefits to residents of different energy measures, but also laying out a framework for incorporating residents into decision-making around building upgrades.

14 O'Connor, N., Macur, R. Engaging residents in affordable housing—resident engagement pilot at Denver Housing Authority Westridge apartments. Energy Efficiency 11, 1871–1886 (2018). https://doi.org/10.1007/s12053-018-9641-9

Community Housing Partners' Resident-Centered Rehab

Drawing on principles set forth in SAHF's Driving toward the Greater Good *white paper, SAHF member Community Housing Partners (CHP) developed a process for involving residents in decision making for a property rehabilitation. Cedar Crest Apartments in Blacksburg, Virginia, is a 78-unit affordable townhome community slated for renovation in August 2021. Before finalizing a scope of work for the $6,330,000 planned renovation, CHP wanted to solicit residents' input on their experience of the existing building design and recommendations for potential in-unit and community-level improvements. SAHF worked with CHP to design a resident survey that could be administered as an online survey. This format of survey was expected to be effective for Cedar Crest's residents and was a method appropriate to the kinds of COVID-19 precautions necessary in fall 2020. The online survey was promoted through door hangers and resulted in a fairly high – nearly 50% – response rate.*

The survey was designed to solicit resident input on factors for which it would be feasible to make design changes within the scope and budget of the planned rehabilitation, and the survey results provided valuable insights that led to changes in specific products and appliances used. For example, residents' responses led CHP to specify larger refrigerators as well as wider and deeper vanities for bathrooms. On community facilities, the survey also revealed that a majority of respondents would be interested in a community garden, and that the most sought-after additional facility was a fitness area for teens and adults. With the ongoing realities of COVID-19 in mind, the survey also provided an opportunity for residents to indicate what kinds of support they would need to allow for a rehabilitation to take place during the pandemic. Resident responses informed how CHP is planning to phase the rehabilitation process to minimize disruption for residents.

The importance of communicating with residents about their experiences of the built environment and potential changes to their homes and communities came through in resident focus groups for a qualitative report on Resident Voice and Agency in Affordable Rental Housing published by SAHF in 2020. CHP is taking a proactive approach to engaging with residents on the progress of the rehab through a webpage and other modes of communications. Lessons from CHP's experience can be used to help address this need through flexible engagement methodologies that are sensitive to residents needs and as a model for COVID-19 sensitive community engagement and rehabilitation practices.

Photo: Community Housing Partners

> *An example of how SAHF members incorporate residents in decision-making around building design comes from The Evangelical Lutheran Good Samaritan Society. A standard part of their rehabilitation design process is to work with residents early on to create a wish list of building improvements. While not all resident requests can be accommodated, the wish list process always brings a critical eye to the rehab design and leads to better retrofit decisions and a smoother retrofit process.*

Additional examples of how SAHF members worked with residents on energy upgrades are documented in SAHF's Resident Voices videos, which share residents' and property staff's perspectives on how intentional, sustainable building practices can positively impact residents' quality of life.

What's Next for Resident Engagement?

Drawing on Community Housing Partners' experience, SAHF will continue to work with members and other affordable housing partners to identify ways to strengthen residents' voice and agency in decisions around properties' design and operations. SAHF's focus on resident voice and agency spans across its programmatic areas and builds on members' experience with trauma-informed care and trauma-informed design.

Photo: Mercy Housing

Photo: National Housing Trust

Photo: The NHP Foundation

Changing Organizational Cultures

Part of the rationale for the Big Reach was the idea that a portfolio-wide goal would be an impetus to change organizational culture – moving sustainability from something undertaken as a special, side project, to something integrated in all aspects of housing development, ownership, and management. The portfolio-level approaches to operations and maintenance and corporate policies around resident engagement discussed above enabled organizations to achieve savings and required organizational change. The Big Reach also brought organizational changes in staffing as well as data collection and benchmarking practices. Collaboration and exchange through SAHF peer groups promoted and reinforced organizational change among the members.

Staffing and Peer Exchange

At the start of the Big Reach, three SAHF members had a staff member expressly dedicated address sustainability. Over the course of the Big Reach, that number grew to seven members, and some organizations now have multiple sustainability staff to fill different areas of expertise from development to retrofit projects to data analysis and materials selection. Other members chose to identify a person on their staff to be the point person for sustainability, typically someone on the asset management team. Even when sustainability is only a portion of a position's responsibilities, having it specifically identified as part of their responsibilities is important for creating momentum on environmental efforts.

The staff members identified as responsible for sustainability came together through SAHF to participate in an "Energy Peer Group" through which SAHF members jointly problem solved and shared opportunities and approaches. Peer exchange between staff in similar positions at the different member organizations was critical to the Big Reach's success. An example of how the Energy Peer Group fostered organizational change is that the Peer Group had in depth discussions about how O&M roles are staffed at different member organizations. SAHF compiled organizational charts related to maintenance staff, and members discussed the pros and cons of different organizational models. This exchange resulted in a move toward more regional facilities manager roles being added to provide leadership to and be a resource for property-level maintenance staff.

Beyond the Energy Peer Group, SAHF's peer group structure helped advance a culture of sustainability within the SAHF members through periodic sustainability discussions among disciplines throughout the member organizations, including developers, asset managers, communications, and policy staff. Among developers, an example of organizational change during the Big Reach was the extent to which green building standards such as Enterprise Green Communities evolved from being a showcase project to being the basis for members' internal development standards.

Data Infrastructure and Benchmarking Capacity

Another area in which SAHF members greatly expanded their capacity during the course of the Big Reach was on utility data infrastructure and benchmarking capacity. At the start of the Big Reach, some SAHF members already were benchmarking their owner-paid utility accounts, and others began benchmarking at this time. To serve their benchmarking needs, the majority of SAHF members work with one of two benchmarking platforms: Bright Power's EnergyScoreCards or AppFolio's WegoWise. The web-based platforms provide analytics on subscribers' data use, including high usage alerts.

Among the SAHF members, properties where all of the utilities are paid by the owner constitute approximately 18% of the portfolio. Residents pay at least one utility bill at a large majority of properties, and information from both owner and resident accounts was need to assess progress against the Big Reach's portfolio-wide reduction goal. In many utility districts, accessing data related to residents' accounts is only possible by collecting individual releases in a form provided by the utility. The data access processes vary across the hundreds of utilities in whose territories SAHF members operate and include significant hurdles.[15]

Luckily, a new approach to accessing whole-building data became more prominent during the course of the Big Reach. Between 2014 and 2019, several major jurisdictions across the country enacted benchmarking ordinances, which successfully influenced utilities to offer aggregated, whole-building consumption data to landlords. Rather than submitting releases and receiving unit-level data, owners can access monthly data at the property level through a much simpler data request. SAHF members met this increase in data access with an increased internal capacity to manage data, developing processes for working with benchmarking providers, responding to alerts provided by benchmarking softwares, and using benchmarking data to find and pursue energy savings.

Benchmarking owner-paid data and access to whole-building data have each proved useful for identifying actionable energy-saving opportunities. Whole-building data is useful for portfolio-level analyses and identifying outlier properties. It also is beneficial for increasing the accuracy of comprehensive energy audits and evaluating energy savings opportunities during capital events, when funds are available to pay for upgrades that affect both owner and resident accounts. Outside of a capital event, state- or utility-funded efficiency programs are a main avenue for comprehensive retrofits. Data on owner-paid utilities is particularly useful for identifying retrofit opportunities that will yield a return on investment. These are good candidates to be paid for out of property funds and can in some cases be financed from the savings they generate. In addition to internal uses, sharing data with partners like SAHF or groups designing policies to support efficiency can lead to better targeted programs and policies.

15 Examples of obstacles SAHF members faced in accessing resident data include: All releases must be signed and submitted in the same month (precluding owners from collecting releases at lease-up or lease renewal); Residents must separately call the utility to confirm the release in addition to signing the form; Data is provided by fax; Data is provided in PDF form; Only cost data is provided

Policy Advocacy – Progress with Partners

Sustainability efforts can be helped or hindered by a range of federal, state, and local policies. The Big Reach had an express goal to influence policies and programs to make energy and water efficiency measures easier to implement across the sector. At the federal level, SAHF was a partner to HUD in developing incentives for owners of HUD-assisted housing that would overcome split incentives, provide guidance on allowable measures, and ease administrative burden. At the state and local level, efficiency programs are a main source of funding for discretionary retrofits, and SAHF worked with utilities and their regulators to advocate for deeper and easier to access incentives.

HUD Incentives

Drawing on its own experience implementing efficiency projects with its members as well as barriers and concerns surfaced by the members while developing the Big Reach, SAHF engaged with HUD early on about a range of incentives that would encourage energy and water saving activities in subsidized affordable housing. SAHF and HUD discussed a range of incentives that would compensate owners for reducing residents' utility bills, provide guidance to field offices on the types of measures that could paid for with property funds, and offer faster review times to reduce administrative burden and incentivize efficiency upgrades. At the time, HUD and DOE were preparing to expand the Better Buildings Challenge (BBC) to multifamily partners, and HUD saw the value of incentives both for encouraging multifamily property owners to sign up for the BBC and for helping them make progress on their goals. At the launch of the Multifamily BBC, HUD unveiled a set of proposed incentives that drew on SAHF's suggestions.

Photo: Mercy Housing

SAHF was a partner to HUD in developing the incentives ultimately made available to BBC Partners. One incentive in particular – the Management Add-on Fee – proved to be a meaningful funding source for energy management activities. The incentive provides $1 per unit per month (or a maximum of $5,000 per year) for each of four energy management activities: Operations and Maintenance, Tenant Engagement, Data Collection, and Benchmarking. These activities are fundamental to utility management and each comes at a price in terms of staff time at both the property and headquarters level as well as third-party services. As HUD looks to implement efficiency across the subsidized portfolio, mechanisms for owners to reliably cover these costs will be a critical element to building capacity throughout the portfolio.

Improved Efficiency Program Design

State- and utility-funded efficiency programs were a major funding source for members' discretionary retrofits under the Big Reach, but the quality of program offerings for low-income multifamily varies substantially from state to state. As opportunities to influence federal policies diminished, SAHF turned its attention to influencing utility programs to offer more robust opportunities for discretionary retrofits of multifamily affordable housing. Much of SAHF's utility program advocacy is undertaken in partnership with the Energy Efficiency for All initiative. The focus of SAHF's utility program advocacy is to call for more comprehensive, whole-building programs that reward deeper retrofits through performance-based incentives and offer straightforward qualification criteria and processes for low-income programs.[16] In addition to advocating for better program design, SAHF and its members also supported state and local benchmarking ordinances. These ordinances were the foundation for members' increasing access to aggregated, whole-building consumption data for their properties that was critical to targeting retrofit activities and assessing progress under the Big Reach.

16 A good example program is Ameren Missouri's Multifamily Energy Savings Program https://sahfnet.org/sites/default/files/uploads/mo_ameren_-_april_2019.pdf

The Reach Ahead

The successes of the Big Reach lay the groundwork for the pressing challenge we face today. To create and sustain healthy and thriving communities, we must deeply decarbonize and we must do so by embracing health and equity principles, including creating and preserving quality affordable rental homes.

SAHF's Big Reach initiative demonstrates that that substantial and impactful change is possible with deep commitment, collaboration, and an ambitious goal. The work that went into pursuing a 20% reduction goal resulted in substantial upgrades to the SAHF members' portfolios, cost savings and lower operational and cost risk for owners and residents alike, and improved quality of life for residents and working environments for property-level staff. The Big Reach also had an impact on the broader affordable housing sector through SAHF and its members' peer sharing and advocacy for policies and programs that integrate green building practices into affordable housing development and operations.

However, the need for sustainable affordable housing is great and there is much left to be done.

The way that the COVID pandemic acted as a threat multiplier to existing social vulnerabilities is a clear lesson for climate change. Heat waves, natural disasters, and even extreme precipitation that overwhelms stormwater systems are expected to disrupt people's home and work lives as well as our supply chains and health systems in the coming decades. The need to build on successes like SAHF's Big Reach and continue to create and preserve sustainable housing that mitigates climate change and provides healthy and stable living environments has never been clearer.

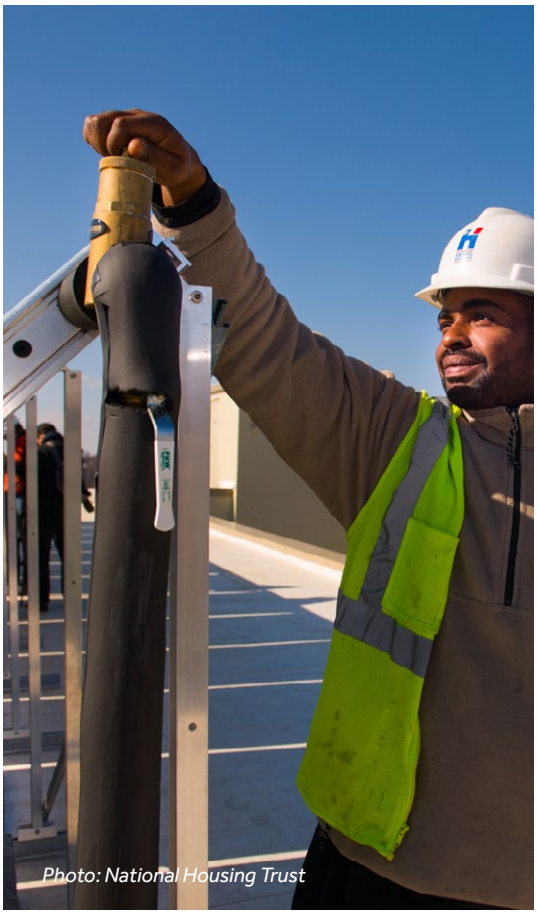


Photo: National Housing Trust

Despite a significant move toward sustainable building design and operations in the affordable housing sector over the past decade, significant untapped potential remains. State-level policies such as Housing Finance Agencies' incentives for green new construction and rehabilitation projects or utility-funded efficiency programs to retrofit buildings outside of a capital event are major drivers of green building practices but are unevenly implemented throughout the country. There are still large segments of the country where green building is not prioritized or retrofits are difficult to fund, particularly for multifamily affordable housing.

The SAHF members foresaw the need to continue our progress in 2018, when SAHF began developing our current strategic plan. In that plan, the SAHF board committed to achieving the Big Reach and "continuing to move toward a low-carbon future that benefits low-income residents and communities and mitigates the impacts of climate change." Carbon reduction strategies include all of the approaches leveraged under the Big Reach but also additional factors such as greater regional variation, attention to when energy is used in support of clean electricity, and attention to the carbon intensity of building materials.

Several factors are already creating an enabling environment for this shift toward a low-carbon future. The green building standards that guided so much of what the SAHF members were able to accomplish in the Big Reach are shifting to incorporate a greater emphasis on greenhouse gas emissions, resilience, and health. Utility programs that are a major funding source for retrofits are shifting to embrace a switch from fossil fuels toward greater clean electricity and rewarding energy management that helps utilities manage a highly-renewable electricity grid. At the federal level, there is increasing recognition of the importance of programs that support the weatherization and resilience of affordable housing. These programs in particular have the potential to embrace a holistic approach that addresses cost savings, carbon reduction, health, and resilience in a comprehensive manner.

Alongside these supportive factors, affordable housing providers will need an additional suite of tools and resources to support their being part of the solution to climate change and delivering the financial, health, and resilience benefits of the clean-energy transition to some of the populations most vulnerable to climate change disruptions. A portfolio-level planning tool similar to the Big Reach Work Plan Template would be foundational to affordable housing providers taking that first, powerful step of setting a goal. Additionally, while utility data analysis tools can capture a portion of a property's carbon impact, additional tools for assessing the carbon intensity of electricity on a time-of-use basis are largely unavailable to most real-estate providers today. In many geographies, there also is a need for innovation in program delivery that more effectively bundles solutions to make important decarbonization strategies like electrification also address the need for energy affordability. Solutions to the split-incentive between owners, residents, and HUD would be a tremendous step forward in expanding opportunities for energy efficiency and renewable energy in affordable housing.

These are known, but not insurmountable gaps. The Big Reach demonstrates that through investment in capacity, collaboration, policy advocacy, behavioral approaches to efficiency, and a myriad of building upgrades, mission-driven affordable housing providers are able to move the needle on sustainability in affordable housing. The Big Reach achieved results worth reaching for – kilowatts of energy and gallons of water saved that drive down environmental impact; bill reductions for residents and properties alike that allow funds to be directed toward other pressing needs; comfort, health, and resilience in sustainable, affordable homes. But perhaps the greatest achievement of the Big Reach is that its lessons and models lay the groundwork for the mission ahead – an equitable, low-carbon future for all.

Big Reach Milestones

TOOL | MILESTONE | SAHF | PROGRAMATIC | POLICY | DATA

2012 — **Reaching Big!** Yearlong collaborative goal-setting initiated with members and VEIC to assess energy reduction potential and develop tailored work plans.

May 2013 — **Launch of the "Big Reach" Initiative.** SAHF members committed to reducing energy and water use by 20% by 2020.

June 2013 — **Multifamily Better Buildings Challenge.** Discussions with DOE and HUD on member participation.

May 2014 — **O&M Toolkit.** Multifamily Energy and Water Management Toolkit released with Bright Power and piloted with members to improve operations and maintenance.

2015 — **Pay for Success Pilot.** Pilot development with HUD, Enterprise Community Partners, and the Low Income Investment Fund included in the Surface Transportation Reauthorization and Reform Act in December 2015.

May 2016 — **BBC Accelerator.** Joined the Clean Energy for Low Income Communities Program Accelerator to collaborate with DOE on clean energy adoption in low-income communities.

Spring 2016 — **Elevating O&M.** Hosted training for property and maintenance staff with NeighborWorks America and Bright Power on use of the O&M Toolkit.

2017 — **O&M Video Training Series.** Released The Preventative Maintenance, Energy, and Water Conservation Series with HAI Group.

February 2018 — **A Planning Tool for Multifamily Owners.** Released the Roadmap to 20% Energy Savings Tool for BBC Multifamily Partners to create a customized strategy for reaching energy or water reduction targets.

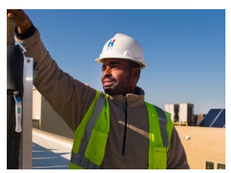
2019 — **A Low-Carbon Future.** Adopted a four-year strategic plan that included a shift towards a low-carbon future.

March 2019 — **Resident benefits.** Released the Driving toward the Greater Good white paper on resident benefits of efficiency upgrades along with a Resident Benefits Indicator tool.

2020 — **Reach achieved!** Members achieved their Big Reach! Collectively, they reduced energy by 29% and water by 24% against the 2010 baseline.

2012

March 2012 — **EZ Retrofit Award.** U.S. Department of Housing and Urban Development Energy Innovation Fund grant implemented with ICF International and Bright Power.



2013

September 2013 — **Utility Benchmarking.** Members took on tracking sustainability upgrades and utility benchmarking. Access to whole-building energy was approximately 9% of the SAHF members' portfolio.

December 2013 — **Launch of the BBC Multifamily Sector.** Members were 50% of the square footage of the inaugural Multifamily Partners. HUD commits to BBC incentives for Multifamily Partners.

2014

August 2014 — **Resident Engagement Toolkit.** Toolkit released with GreenRoots Strategies to engage residents on reducing energy and water waste.

September 2014 — **EZ Retrofit v1.0 released.**

Fall 2014 — **Making Retrofits EZ.** EZ Retrofit audit tool piloted with four members.

2015

2015 — **A New and Improved Audit Tool.** EZ Retrofit 3.0 incorporated industry feedback.

2015 — **O&M Technical Assistance.** Members accessed Technical Assistance from Bright Power to integrate improved O&M practices across their portfolios.

2015 — **Fall 2015 – O&M Trainings.** Hosted on-site, in-person O&M trainings with Bright Power in four regions across the U.S.

2016

August 2016 — **ENERGY STAR Partnership.** Partnered with the U.S. Environmental Protection Agency to improve strategic energy management in multifamily affordable housing.

December 2016 — **Overcoming Energy Benchmarking Barriers .** Laid out a practical path forward to expanding HUD and owner access to and use of utility benchmarking in comments on a HUD benchmarking Notice.

2017

January 2017 — **Expanded membership.** CommonBond Communities and Community Housing Partners joined SAHF and committed to the Big Reach.

November 2017 — **Bringing Sustainability Home.** SAHF launched its second sustainability initiative to increase adoption of sustainable and healthy building practices.

2018

July 2018 — **Spanish Toolkits.** Released Spanish language versions of the Resident Engagement and O&M Toolkits.

2018 — **First portfolio-wide assessment of all 13 members' whole-building energy and water data.**

2019

October 2019 — **Data thresholds.** The BBC updated the data threshold requirements for BBC Multifamily Partners.

2019 — **Expanding data collection** – Members' access to the whole-building data increased to 44% of portfolio.

November 2019 — **Resident Voices videos.** Released two Resident Voices videos documenting the quality-of-life improvements residents experienced as a result of deep energy upgrades.

2020

Resources

Case Studies

EmPOWER-ing Maryland (2019). This case study documents SAHF member Homes for America's experience with Maryland's Multifamily Energy Efficiency and Housing Affordability - EmPOWER Program and the program design features underlying this popular and effective program.

Leveraging Utility Programs AND Financing for Efficiency (2019). This case study documents the innovative approach SAHF member Mercy Housing took to achieve deep levels of retrofits and greater utility savings for its multifamily affordable housing properties in California.

EZ Retrofit: Saving Energy, Water, and Money in the Mile-High City (2015). This case study documents how SAHF's EZ Retrofit tool supported Volunteers of America in driving energy and cost savings at an affordable multifamily property in Colorado.

Reports / Factsheets

Bridging the Digital Divide in Affordable Housing Communities: A Practitioner's Resource for Multifamily Operators (2021). Developed by SAHF, this practitioner's resource provides an overview of the current challenges, case studies of short and longer term solutions, and practical considerations for affordable housing operators and their partners seeking to connect residents to the wide range of online platforms that support their well-being.

Resident Voice and Agency in Affordable Rental Housing: A Qualitative Analysis (2020). This SAHF report documents the existing strategies and barriers to collaborating with residents to promote greater resident agency and voice at both organizational and property levels at three different SAHF member properties.

Improving Income Qualification for Energy Efficiency Programs: Recommended Approaches for Subsidized Affordable Housing (2020). In collaboration with Energy Efficiency for All, SAHF developed this fact sheet to offer guidance on how utilities and program implementers can design and administer income-eligibility criteria for low-income utility efficiency programs in ways that reduce barriers for affordable housing owners and residents.

Utility Program Descriptions (2019). Developed in collaboration with Energy Efficiency for All, these fact sheets provide affordable housing owners with practical information on how to participate in utility- or state-funded efficiency programs that can support capital improvements and improve building performance.

Driving toward the Greater Good (2019). A white paper developed by Elizabeth Chant for SAHF that provides a framework for multifamily affordable housing providers to understand the relationship between different building upgrades and resident benefits and how to conscientiously incorporate resident benefits in retrofit decision-making process.

Efficiency Opportunities in Multifamily Common Area Laundry Facilities (2017). A SAHF and Natural Resources Defense Council study that provides insight into the current laundry landscape in multifamily housing, utility cost savings opportunities, and how utility programs can spur efficiency in multifamily common area laundry facilities.

Energy and Water Savings in Multifamily (2016). This Bright Power and SAHF report documents the results from the U.S. Department of Housing and Urban Development's Green Retrofit Program and the Energy Savers Program in Illinois.

Toolkits

Resident Benefits Indicator Tool (2019). An accompanying tool that builds on the framework outlined in the *Driving toward the Greater Good* white paper. This tool is geared towards building owners and other stakeholders who are reviewing energy audit reports and deciding on scopes of work to evaluate different retrofit packages based on their levels of resident benefits.

Better Buildings Planning Workbook (2018). An Excel-based planning tool developed for the Better Buildings Challenge Multifamily Sector. The tool can be used by building owners to set portfolio-level energy or water reduction targets, customize conservation strategies, and make informed choices for their portfolios.

EZ Retrofit (2016). Developed by SAHF, ICF International, and Bright Power, this free, do-it-yourself Excel-based audit tool and accompanying resources give multifamily property owners and managers an easy way to identify cost-effective energy and water efficiency upgrades.

Multifamily Energy and Water Management Toolkit (2014). Developed by Bright Power and SAHF, this toolkit provides multifamily owners and managers with a set of checklists, worksheets, references and other helpful tips to help cut energy and water consumption and costs while maintaining optimal building performance. The full toolkit is available in both English and Spanish.

Resident Engagement Toolkit (2014). In collaboration with Greenroots Strategies, SAHF developed this toolkit for multifamily affordable housing providers to design a tailored resident engagement program that meets the needs of a particular property. This toolkit contains editable forms in both English and Spanish.

Videos

SAHF Resident Voices Videos (2019). A set of videos that documents the quality-of-life improvements affordable housing residents experienced as a result of deep energy upgrades at two SAHF-member properties.

Better Buildings Challenge – Roadmap to 20% Energy Savings: A Quantitative Tool to Plan Your Strategy (2018). A recorded U.S. Department of Housing and Urban Development webinar that demonstrates the use of a planning tool developed by SAHF to help building owners set and achieve their own energy and water reduction goals.

SAHF EZ Retrofit Resources (2018). A set of videos developed by SAHF to provide multifamily building owners and managers with a detailed introduction to the EZ Retrofit audit tool and its applications.

The Big Reach

SAHF

p (202) 737-5970 @SAHForg www.sahfnet.org