



# Pathways to Decarbonize Existing Homes and Buildings

In order for states in the region to meet their climate goals, a comprehensive and robust solution to rapidly retrofit the existing building stock is critical. Existing commercial and residential buildings [represent the majority of America's building stock](#).

40%

of the United States' annual energy usage comes from residential dwellings, commercial buildings, and their operations.

33%

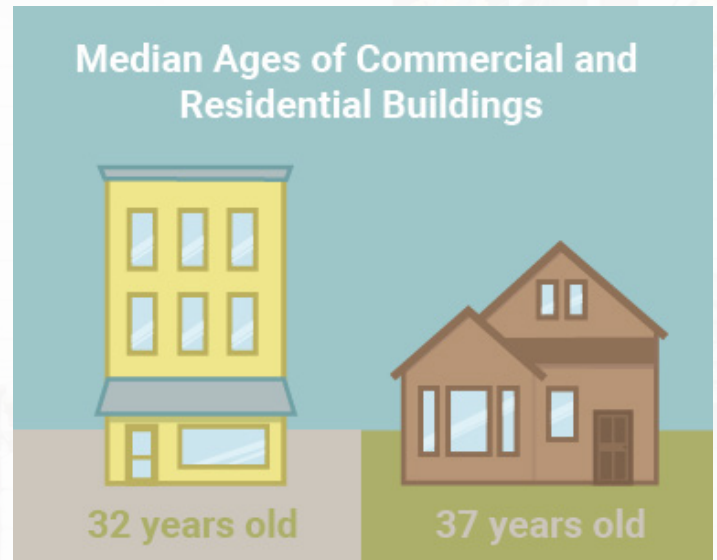
of carbon emissions in the United States also come from residential dwellings and commercial buildings.

Lowering the energy usage and greenhouse gas emissions of the building sector necessitates comprehensive, deep energy retrofit programs for existing residential and commercial buildings to achieve immediate carbon reductions as well as long-term energy savings, improved occupant health, and advanced building performance.

## Why We Must Address Existing Homes and Buildings

Improved efficiency of existing buildings saves big on energy, costs, and greenhouse gas emissions.

[At least half of the commercial buildings that will be operational in 2050 have already been built](#), many of them before energy codes required minimum levels of energy efficiency. These buildings will continue to waste energy, be expensive to operate, and emit greenhouse gases throughout their life cycle without substantial retrofits. Some older homes and residential buildings also have poor thermal comfort and indoor air quality (IAQ), which can have a negative health impact on occupants.



Retrofits can bring significant energy/water cost savings and health advantages by lowering the energy burden on owners and improving IAQ and comfort. **Many retrofit measures also include improvements that increase efficiency while simultaneously improving occupant health, safety, and comfort, like improving the building envelope or HVAC systems.** These, in turn, make the built environment more resilient to extreme weather by improving [passive survivability](#) for building occupants.

## Barriers

Upfront costs have largely prohibited comprehensive retrofit programs. Despite the long-term savings associated with retrofits, many home and building owners don't have adequate capital or appropriate incentives to invest in energy efficiency. And without state or local programs, the costs of retrofits often fall on the occupant or property owner. To complicate matters, owners with rental units don't pay utility bills so they lack investment incentives, and many low-income occupants don't have the money to invest in energy efficiency upgrades. This phenomenon is known as the "split incentive," largely due to government and utility unresponsiveness to the retrofit sector. Without dedicated funding to soften the upfront costs of retrofits, this will continue to be a barrier.

## Solutions

Comprehensive retrofit programs provide a pathway for existing home and buildings to rapidly decarbonize. States and utilities are uniquely positioned to offer these programs because they can determine program scope and drive widespread market adoption of retrofits. Programs should be designed to include funding and/or incentives that accomplish crucial goals like:

1. Simplify pathways towards resolving the costs of retrofits
2. Prioritize equity and communities most in need
3. Focus on the electrification of homes and buildings (strategic electrification)<sup>1</sup>
4. Promote cost-effective, energy-efficient technology (heat pumps, thermal storage, renewables)
5. Drive market transformation for existing building retrofits

Comprehensive retrofit programs should include co-beneficial strategies like expanded workforce training opportunities to increase the number of qualified trade professionals with deep energy retrofit knowledge.

It is also critical that affordability is holistically considered and prioritized in low-income communities where cost barriers are more prohibitive. Offering inclusive financing with bill neutrality, where utilities cover upfront costs for energy efficiency upgrades and are paid back through a recovery charge on utility bills so as not to exceed previous rates, is a great way to support communities with energy inefficient and unhealthy housing stocks.

### Comprehensive Retrofit Program Recommendations for Existing Homes and Buildings

- Set broad energy and carbon reduction targets for existing buildings
- Establish road maps to decarbonization for existing homes and buildings based on use type
- Offer comprehensive energy audits and scorecards for single-family homes
- Collect and track annual energy use data for existing commercial buildings using benchmarking tools like Portfolio Manager
- Connect homes that have received scorecards with existing appliance and weatherization rebate programs
- Offer inclusive financing with bill neutrality for residential energy efficiency upgrades
- Utilize retrocommissioning to establish energy targets and requirements that prioritize health and safety upgrades in older homes and multi-family buildings (i.e. ventilation for mold and moisture, ceiling repairs, and electrical work)
- Set periodic energy targets for existing homes and buildings based on usable floor space and building type
- Create pathways to compliance including a retrofit fund
- Revamp workforce training programs to include technical training for deep energy retrofit systems and mechanical knowledge
- Establish R&D pilot programs and industry incentives to explore cost effective retrofit packages and technology

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<sup>1</sup>Strategic electrification is powering end uses with electricity instead of fossil fuels in a way that increases energy efficiency and reduces pollution, while lowering costs to customers and society, as part of an integrated approach to deep decarbonization. For more information, visit: <https://neep.org/initiatives/building-decarbonization/strategic-electrification>



## Examples

### New York - Existing Buildings Initiatives

Comprehensive retrofit programs should also include [building energy performance standards \(BEPS\)](#) or [residential energy labeling](#) components. Benchmarking allows retrofit programs to drive ongoing improvements to the building stock by collecting and reporting annual building energy usage and establishing energy performance targets. An example of this is in New York City. With the passage of [Local Law 97 of 2019](#) under the Climate Mobilization Act, the city established carbon emissions limits for buildings based on their use classification and floor space. To meet GHG emissions targets, the emissions limits decrease over time, which New York City anticipates will drive the [retrofit market](#). The New York State Energy Research and Development Authority (NYSERDA) is exploring solutions to drive the retrofit market through its [RetrofitNY](#) program, which aims to create comprehensive and scalable retrofit solutions to decarbonize multifamily buildings across the state.

Existing buildings are a significant percentage of our energy load and the majority of the building stock. Addressing their impact is crucial to decarbonization efforts in our region. While there are cost barriers to retrofitting, comprehensive retrofit programs can address these barriers and create a truly holistic, equitable retrofit economy that drives rapid decarbonization within the built environment.

### Pennsylvania - [Weatherization Assistance Program \(WAP\)](#)

The Pennsylvania Department of Community and Economic Development (DCED) operates a weatherization program for qualified low-income households to seek energy efficiency retrofits that result in direct energy cost savings and increased comfort while ensuring health and safety. The program offers services like:

- Blower door guided air sealing to effectively locate and reduce air-leakage throughout the home
- Installation of attic, wall, basement and crawlspace insulation and ventilation to reduce energy loss
- Heating system modification or replacement to increase the efficiency and/or safety of the heating system
- Minor repairs, and/or health and safety measures are provided (when necessary) to allow the safe and effective installation of the weatherization measures
- Client education on the proper use and maintenance of the installed Weatherization measures and ways to reduce energy waste everyday

### Vermont - [Deep Energy Retrofits for Businesses](#)

Efficiency Vermont offers deep energy retrofit opportunities for commercial, industrial, or mixed use (commercial/multi-family) spaces that are greater than 5,000 square feet. Comprehensive energy measurements are conducted to determine energy use across fuel types. Business owners are paired with energy consultants and incentives up to \$160,000 are offered per building to implement deep energy retrofit measures.



## Resources

Benchmarking: From Policy to Action: <https://neep.org/blog/benchmarking-policy-action>

Building Decarbonization Public Policy Framework: [https://neep.org/sites/default/files/resources/policyframework\\_fixfinal.pdf](https://neep.org/sites/default/files/resources/policyframework_fixfinal.pdf)

Striking A Balance: Housing Affordability and Decarbonization In Large Multifamily Buildings: <https://neep.org/blog/striking-balance-housing-affordability-and-decarbonization-large-multifamily-buildings>

Mandatory Building Performance Standards: A Key Policy for Achieving Climate Goals: [https://www.aceee.org/sites/default/files/pdfs/buildings\\_standards\\_6.22.2020\\_0.pdf](https://www.aceee.org/sites/default/files/pdfs/buildings_standards_6.22.2020_0.pdf)

