Report Summary

Multifamily Passive House: Connecting Performance to Financing – How energy efficiency and operational savings can provide additional, ongoing cash flow.

Overview

From June 2019 to April 2020, the New York City Department of Housing Preservation and Development (NYC HPD), the Community Preservation Corporation (CPC), Bright Power, and Steven Winter Associates (SWA) collaborated on a study to assess the costs and savings of constructing and operating Passive House multifamily housing developments, compared to conventionally built buildings. The study aims to help lenders develop underwriting standards that more accurately reflect Passive House building performance, in order to encourage more financing of such projects and overcome incremental first cost barriers.

Findings show that the Passive House buildings included in the study use far less energy than typical multifamily buildings do. These results translate into operating cost savings that can increase access to private debt and may decrease reliance on public subsidies for certain types of affordable housing. Passive House buildings also emit significantly less carbon than conventional buildings, aligning them with long-term decarbonization goals set by New York City (NYC) and New York State (NYS).

Establishing the Control Groups

To understand how Passive House buildings compare to their conventionally built peers, the research team established two control groups representing different points of comparison and measured them against early adopters of the Passive House standard. For the baseline, the team compiled data on multifamily properties with at least 12 months of whole-building energy consumption data (tenant and owner paid) from Bright Power's energy benchmarking platform, EnergyScoreCards.

- **A pre-2003** existing building group is comprised of benchmarking data from 1,633 NYC multifamily properties. Approximately 96% of the properties have gas heating and 4% have electric heating.
- **A post-2003** conventional new construction group is made up of 315 NYC multifamily buildings built after 2003. Approximately 94% of the properties have gas heating and 6% have electric heating.

Establishing the Case Study Group

The case study group includes six multifamily NYC buildings that were early-adopters of Passive House design and had at least 12 months of whole-building energy consumption data.

Analyzing Energy Savings

Control and case study group data was analyzed to determine site energy use intensity (EUI) for weather-normalized operations. Figure A illustrates the following:

- The Passive House case study buildings perform 32% to 58% better than the post-2003 control group.
- Passive House buildings with electric heating and cooling systems perform better than their gas-heated peers.
- Certified Passive House buildings (C-5 and C-6) consume the least energy of all the buildings.

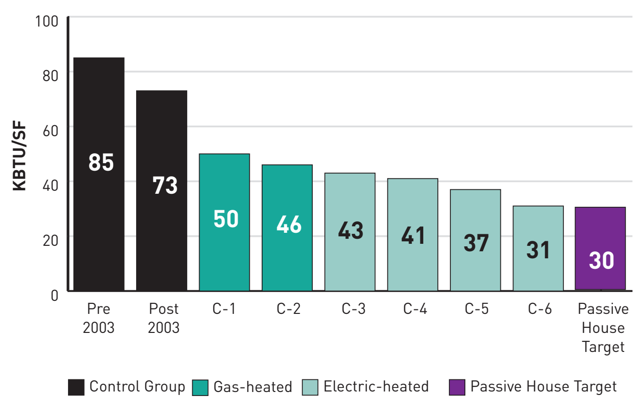

Figure A. The Passive House case study buildings use 32% to 58% less energy than their conventionally built peers.

Analyzing Carbon Emissions

How well do the case study buildings meet carbon emission caps set by NYC's Local Law 97? All six would comply with both the 2024 emissions limit and the more stringent 2030 cap, thus complying with NYC's near term carbon legislation. Figure B illustrates the following findings:

- Both the Pre-2003 and Post-2003 control group would need to invest in significant energy efficiency capital improvements to comply with the 2030 emissions limits, or be liable for civil penalties.

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- The entire Passive House study group would meet the 2024 and 2030 limits and would not need to invest in energy measures.
- All but one of the case study buildings would meet the strict 2050 limit, while the control groups would not.

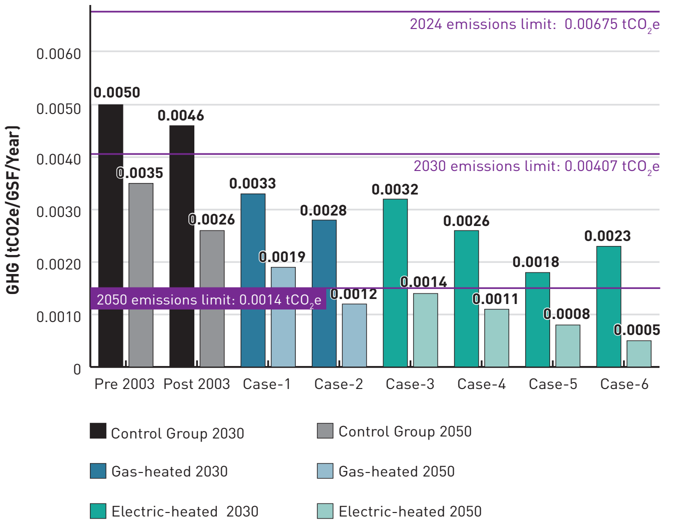

Figure B. The Passive House early adopters would comply with the 2024 and 2030 LL97 emissions caps, and all but one would meet the 2050 cap. The control groups, however, would need to invest in energy efficiency upgrades to avoid civil penalties in 2030 and 2050.

Analyzing Utility Cost Savings

All Passive House study group showed significant reductions in energy costs ranging from 28% to 68%. Figure C shows how case study C-5 saved 68% on annual utility expenses, compared to owner and tenant utility expenses for a hypothetical, baseline affordable housing development of the same size and density.

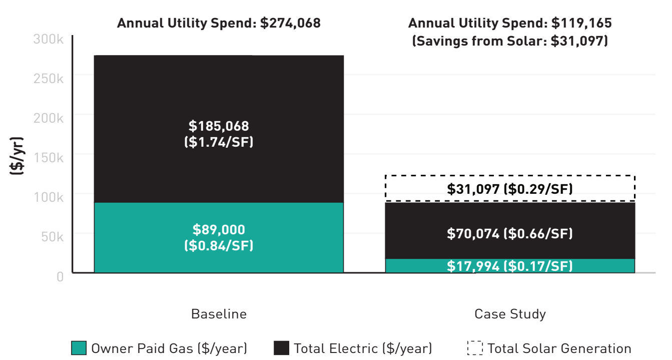

Figure C. Case study C-5 is a certified, large multifamily Passive House building with electric heating and cooling plus onsite solar and co-generation. The baseline budget is $274,068. The case study utility costs based on energy consumption is $119,165, or a 56% operational energy cost savings. After factoring savings from on-site solar, the total energy spending is $88,068 a year, or a 68% savings from the baseline.

Translating Savings into Additional Private Debt

Information reviewed as part this study—including experience from other Northeast states employing Passive House to address climate goals – indicates that it is possible to construct Passive House multifamily buildings at minimal additional cost, ranging from 0-5% for experienced, project teams. Incremental costs are strongly correlated with the baseline of comparison, but are expected to approach zero as code requirements and market demand increase, and as products become more widely available and cost-competitive.

One way to pay for an incremental cost increase is to include the improved performance and utility costs savings in the project's underwriting as shown in Figure D.
Key considerations for lenders evaluating underwriting of improved performance into the first mortgage include:

1. Collect project information:
   a. Does the team plan to certify? Has the team built to Passive House standard before?
   b. HVAC design and fuel source (i.e. gas vs. electricity)?
   c. Does the project include renewables?
   d. How does the projected performance compare to conventional M&O and available comparables?
2. Assess the comps and information to determine how to incorporate high performance
3. Determine NOI
4. Determine additional debt that the project can leverage

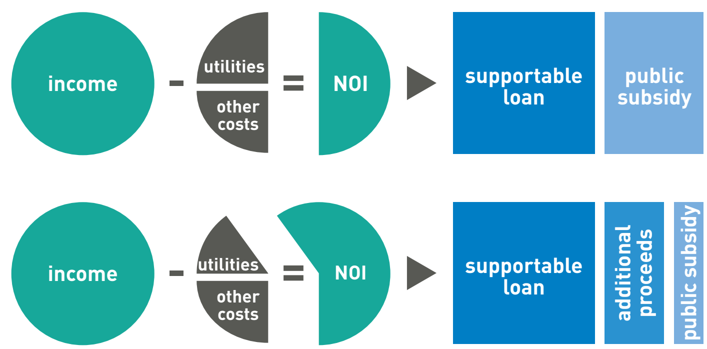

Figure D. Improved energy performance and utility cost savings support additional private debt and can reduce reliance on subsidies.

Conclusion

This research found that the Passive House study group buildings could leverage an additional $2- $13/sf in debt, which would offset any incremental costs, especially when paired with other incentives. To learn more, read the full report at be-exchange.org.

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