

A Case for Window Retrofits

Many of the windows in old apartment buildings are leaky and have high thermal transmittance (i.e., in the winter heat easily travels through the window to the outside). These old windows can cause unhappy tenants and unhappy management! But unless a window is at the end of its useful life, it is not generally cost-effective to replace it from an energy standpoint alone. This has pushed us to look for other methods of reducing infiltration and increasing the energy performance of existing windows.

Quanta Technologies' idea: low-e interior storm windows. The "e" stands for emissivity and low emissivity means that more heat is trapped inside the apartment in the winter and solar heat in the summer is kept outside.

The goal is to reduce energy consumption for heating and increase tenant comfort in two ways:

- 1) Decrease the air infiltration around the window
- 2) Increase the overall thermal resistance of the window assembly by adding an extra layer of air and glass as well as the low e coating.

A case study was conducted on a sample window in a New York City apartment building to investigate the reduction in air infiltration. The test assembly consisted of two double-hung windows side by side on the top with a fixed pane on the bottom right and a removable pane on the bottom left to cover the window AC in the winter (it can be removed in the summer for AC operation).

Air leakage was measured before and after the storm window, the results of which are shown in the table below. Effective leakage area represents the size of a hole that is equal to all of the leakage through and around the window added together.





Leakage Reduction from Storm Window Installation

	Effective Leakage Area (in ²)	Savings per Window
Total leakage reduction from QUANTAPANEL installation	10.39	\$40
Leakage reduction attributed to left side of the window (double-hung plus window AC panel)	7.55	\$29
Leakage reduction attributed to right side of the window (double-hung plus fixed pane)	2.84	\$11

Assumptions: Fuel is natural gas at \$1.15/therm, 75% heating plant efficiency, 10 story building and NYC 30-year typical weather conditions. Buildings that consume oil for space heating, have lower heating plant efficiency or are taller may see greater savings.

These numbers do not include the benefits from increased thermal resistance, which would provide additional savings. Based on this analysis, installing QUANTAPANELS would reduce the overall air infiltration for the building by 30% and would have a better payback than a full window replacement.