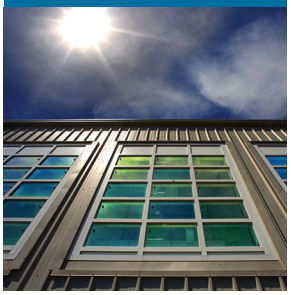
# Modeling the Impacts of Climate Change

## on Building Energy Performance in New York State

New York State has a large and widely varying building stock made up of more than 5 million buildings and several different building typologies. To increase the overall resilience of the State, these typologies have to be analyzed in order to understand how they will operate in a changing climate. Maintaining proper building operations as climate events become more extreme is critical to improving energy performance statewide.

**Improving energy performance in existing buildings will help to increase the resilience of buildings, cities, and communities as we adapt to changing climate conditions.**



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### Why do building typologies matter?

1 The building typologies include low-rise residential, multifamily residential, commercial, industrial, and educational, each playing a protective role during hazardous climate events. While varying in program and location, the majority of New York State's building stock could improve its energy performance through a series of energy conservation methods specifically selected for each typology.

### How were these different building typologies tested and analyzed?

2 Five different building typologies were modeled, each based on an existing building in New York State. Each of these buildings was modeled and tested with baseline systems and upgraded systems following energy conservation methods. Tests were then run to investigate the impact of those system-upgrade measures on use, demand, cost, and emissions, and passive survivability.

### What energy conservation measures were investigated?

3 The conservation measures, including improved insulation, upgraded windows, high albedo roof, lighting, and A/C equipment, were investigated to determine possible reductions in electricity use, natural gas use, and emissions. The study also looked at how long the payback periods would be for implementing these measures.

### What is passive survivability?

4 Passive survivability is "a building's ability to maintain critical life-support conditions in the event of extended loss of power, heating fuel, or water, or in the event of extraordinary heat spells." Regarding this, the study calculated the number of hours that heating and cooling loads were not met, maximum interior temperatures, and the number of hours where the interior temperature exceeded 82.4°F.

### Are these measures effective?

5 Almost every energy conservation measure in each building typology throughout the State showed reductions in energy use. These results help to confirm the value of ECM implementation and show the potential that these system upgrades can have in improving the resilience of our existing buildings.

### [QUICK FACTS]

**KEY FINDINGS**

- Improved lighting design was particularly effective in reducing energy consumption across every case study
- Improved insulation created significant reductions across all externally load dominated buildings
- ECMs reduced the summer electrical peak for a low-rise residential building in the Southern Tier region by 46.0%
- ECMs reduced the annual energy cost for an educational building in the NYC and Long Island region by 18.7%