



## Museum of Modern Art – Queens Campus

### Building Owner:

Museum of Modern Art

### Region:

New York City

### Number of Buildings:

1

### FlexTech Consultant:

Jaros, Baum & Bolles  
Consulting Engineers, LLP

### Sector:

Museum

### Square Footage:

156,756 sq.ft.

### Pre-COVID Condition:

- Filters: MERV 15 primarily; MERV 8 and 11 observed in four units
- Ventilation: 11 mixed air handling units are served by a rooftop dedicated outdoor air unit that delivers air to variable air volume boxes with reheat capabilities. These units serve a variety of archive, office, industrial and exhibit spaces. Two mixed-air rooftop units serve office spaces, and one mixed-air rooftop unit serves the library stacks. The units do not utilize demand control ventilation or airside energy recovery.
- Outside Air: 18,026 CFM/ 8%

## Study Overview

NYSERDA funded this energy efficiency indoor air quality study that identified the energy use associated with the ASHRAE Epidemic Task Force (ETF) Building Readiness guidance<sup>1</sup> HVAC-related measures aimed at preventing the risk of COVID-19 infection that are feasible at the building. Additionally, the study investigated alternate opportunities that were more energy efficient, yet equally risk adverse from an indoor air quality perspective, as the ASHRAE guidance measures.

## Measures Evaluated

Measure Name	Measure Status	Electric Savings (kWh)	Fossil Fuel Savings (MMBtu)	Energy Cost Savings (\$)	Measure Cost (\$)
<b>ASHRAE Epidemic Task Force (ETF) Guidelines Measures Evaluated</b>					
Maximum Outdoor Air Increase	Not Recommended	-10,565	-62	-\$2,190	\$3,000
2 Hour Flush Pre and Post Occupancy	Not Recommended	-192,967	-96	-\$31,538	\$3,000
MERV 13 Filters	Recommended	-7,689	0	-\$1,226	\$340
Totals:		-211,221	-158	-\$34,954	\$6,340
<b>Energy Efficiency Package Measures Evaluated</b>					
Portable Air Cleaners	Not Recommended	-197,450	0	-\$31,474	\$317,400
UV-C In-Unit	Not Recommended	-90	0	-\$14,346	\$185,094
Decrease to Design Level Outdoor Air	Recommended	10,565	62	\$2,189	\$0
3 Outdoor Air Change Flush Pre & Post Occupancy	Recommended	1,407	72	\$813	\$6,000
MERV 16 Filters	Optional	-105,000	0	-16,737	\$1,420
Recommended Measures Totals:		11,972	134	\$3,002	\$6,000

• All energy use and energy cost values are presented on an annual basis

• Negative values represent increased use/cost

• The Energy Efficiency Package Measure savings are presented with the ASHRAE ETF Guidelines Measures Totals as the baseline

<sup>1</sup>The ASHRAE ETF guidance used for this study was based on one or more of the following document versions: Building Readiness v.5-21-2020, Commercial v.4-20-2020, Schools & Universities v. 5-5-2020, Healthcare v. 6-17-2020, Filtration & Disinfection v. 5-27-2020, ERV Practical Guide v. 6-9-2020

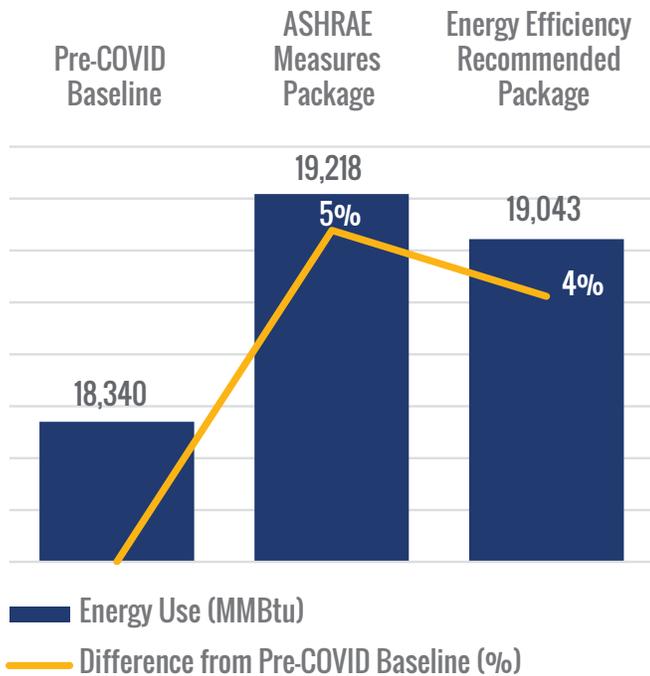
## Key Notes

Measure recommendations are based on the ability to achieve five effective air changes per hour (ACH<sub>e</sub>) at design airflow rates with minimized energy, carbon, and cost impact. This study revealed that increasing outdoor air, MERV filtration levels, installing ultraviolet germicidal irradiation (UVGI) units, or portable air cleaners would not be necessary based the pre-COVID operations exceeding five ACH<sub>e</sub> at design airflow.

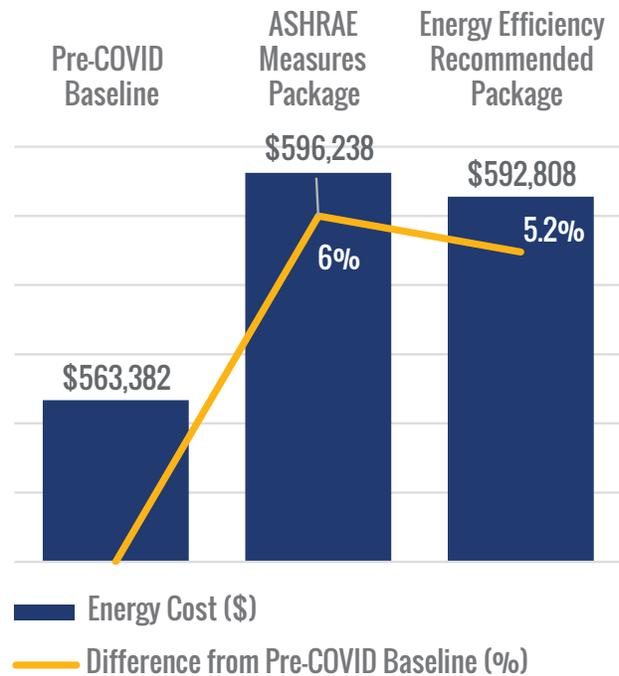
Early ASHRAE guidance suggested a two-hour flushing period before and after occupancy at maximum outdoor air levels. Although an alternative flushing approach of targeting three outdoor air changes before and after occupancy at design outdoor air levels would take 130 minutes at MoMA Queens, this method will reduce energy, cost, and carbon in comparison.

## Impact Results

Energy Use Impacts



Energy Cost Impacts



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