



# Thermal Storage at 11 Madison Avenue

Energy Storage – DOE EAC Meeting

May 28, 2020



# Building Profile – 11 Madison Avenue

- Built in 1932, 30-story, 2.2M SFT office building, situated on a full city block directly across from Madison Square Park
- Major Tenants include: Credit Suisse, SONY, Yelp, 3 Michelin Star restaurant – Eleven Madison Park
- LEED GOLD – Certified, ENERGY STAR rated, Wired Certified Platinum
- 2019 BOMA Pinnacle Award Operating Building, 2019 BOMA Grand Pinnacle Award
- Owner: SL Green Realty Corp. (NYSE: SLG) – New York City’s largest office landlord



# Challenges

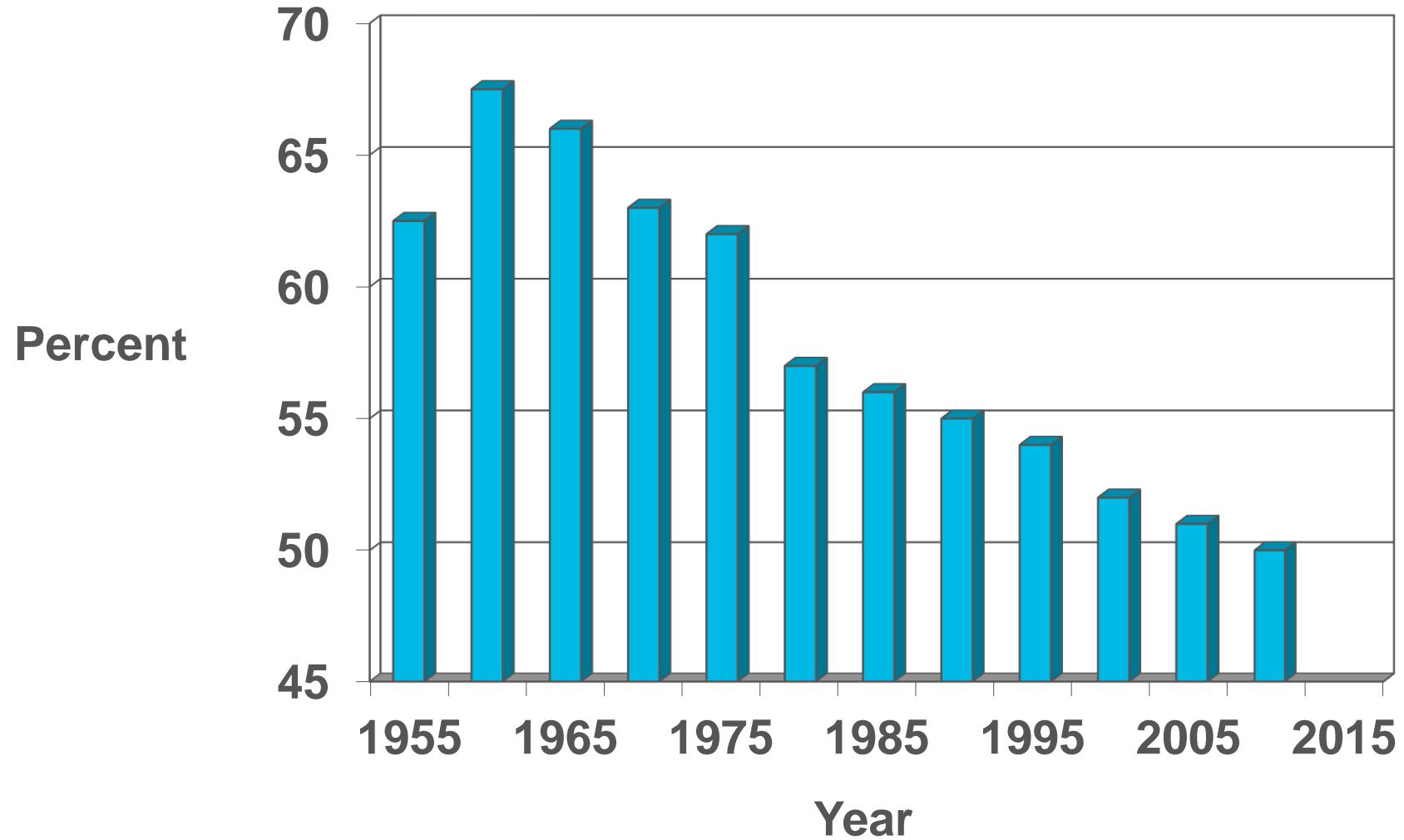
- ✓ Aging infrastructure
- ✓ Operational efficiency
- ✓ Environmental sustainability
  - NYC Mayor's Carbon Challenge
  - Carbon Disclosure Project
- ✓ Rising electricity costs

# Solution

- ✓ Thermal Battery™ cooling system
  - Two high efficiency centrifugal chillers
  - 1.367MW of thermal energy storage
  - 64 thermal battery storage tanks
  - 500,000 lbs of ice
- ✓ Reduce energy intensity
- ✓ Modernize base building
- ✓ Reduce operating costs



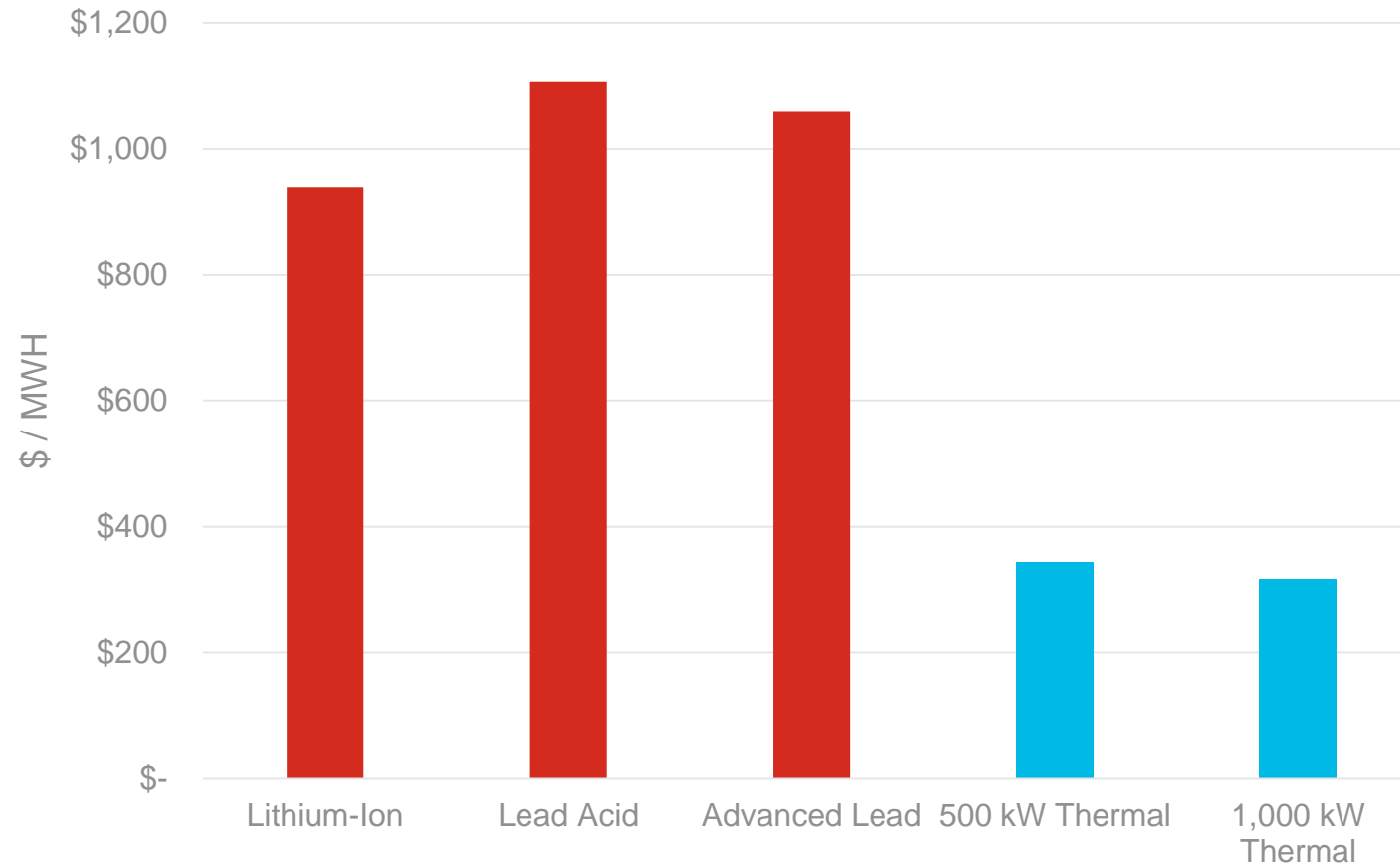
# National Utility Load Factors (Average/Peak)



# Storage Solutions: Thermal and Chemical Batteries



## Levelized Technology Cost for Applications<sup>1,2</sup>

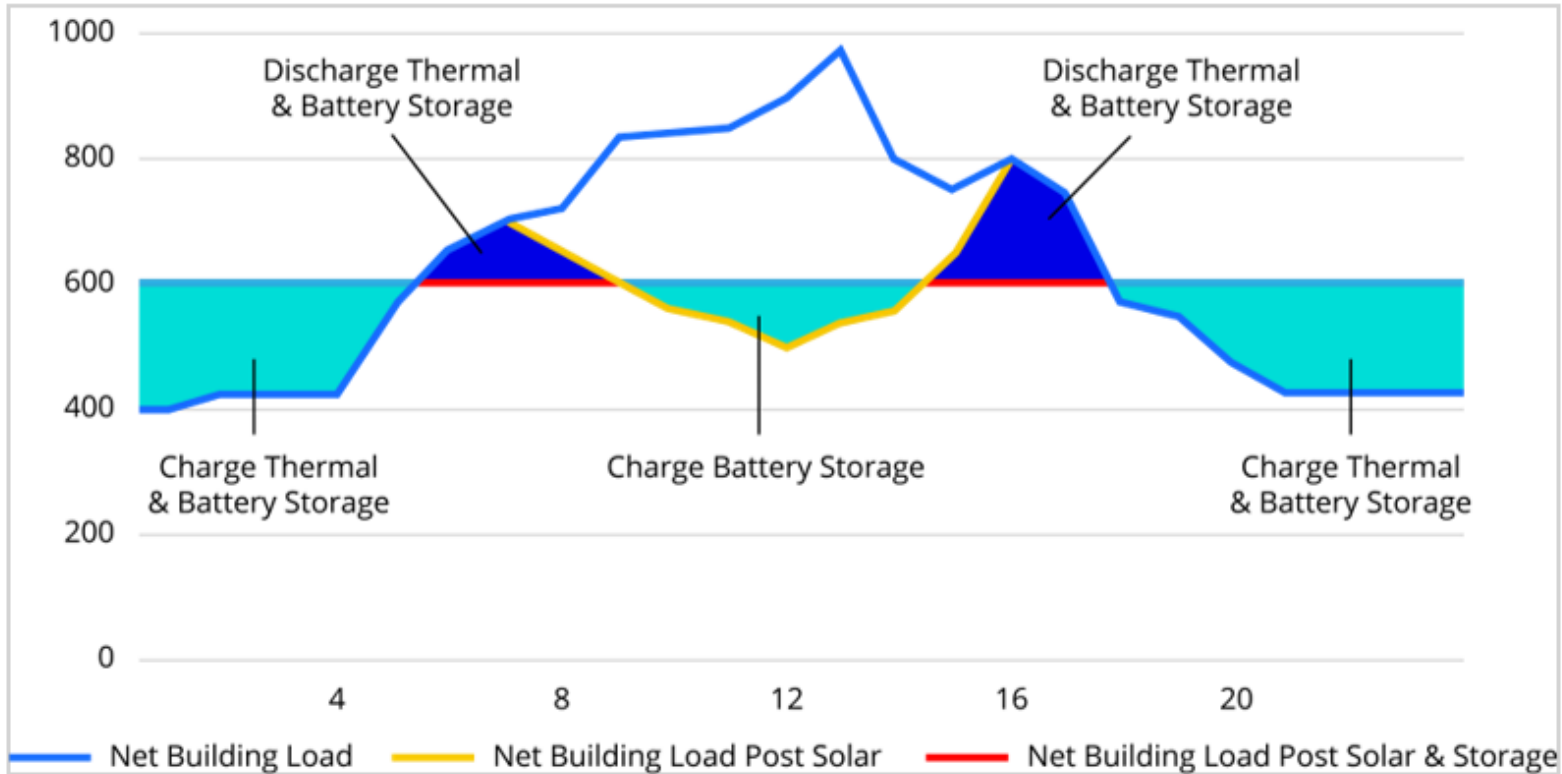


- Cost advantages
  - ✓ No inverter expense
  - ✓ Lower component costs, including balance of system; lower O&M
  - ✓ No need for capacity addition due to degradation
- Lower capital costs mean lower financing costs

1. Costs represent average of range pulled from LCOS 3.0 for battery technologies.  
2. Conservative case that includes full cost of chiller.



# Thermal Battery™ and Chemical Battery



## Complete Energy Solution

- ✓ Load Agility
- ✓ Increased Power Factor
- ✓ Renewable support



# Outcomes



---

## Project Energy Performance

1,035 kW Summer Peak Demand Reduction

25% reduction in Central Plant kWh consumption

---

## Project Environmental Performance

1.4M lbs of CO<sub>2</sub> reduction annually

Taking 130 cars off the road

Planting 188 acres of trees

---

## Project Financial Performance

Expected savings of \$14M in utility bills over 20-year period

Received \$2.4M in Con Ed incentives

---