

# Shining on the Big Apple: Satisfying New York City's Peak Electrical Needs with PV

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# Objective



- Use measured data to evaluate the potential of PV to satisfy the electrical needs of New York City (NYC) during peak load conditions

# Approach



- Obtain measured hourly data for 2005 to 2008
  - Electrical load data for NYC is from the NYISO
  - Solar insolation and weather data specific to NYC are from SolarAnywhere®
- Use PVSimulator™ to calculate output from 2 GW<sub>AC</sub> of horizontal, fixed orientation PV
- Match simulated PV output data to NYC loads

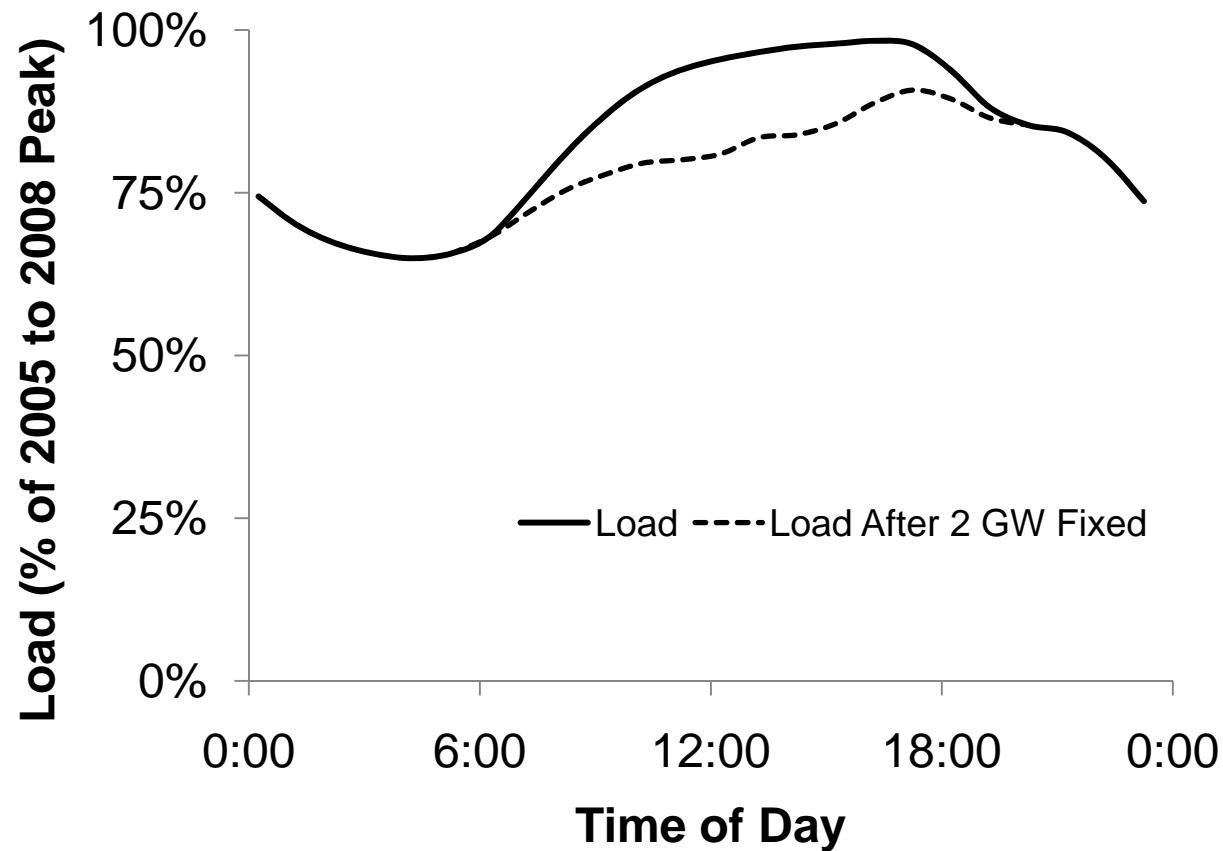
# Evaluation Metrics



- Perform an analysis for each year from 2005 through 2008 using the following metrics:
  - Peak Load Day match for 2 GW of PV
  - Annual Effective Load Carrying Capability (ELCC) for a range of PV sizes up to 30% of the NYC peak load
    - The ELCC is a measure of contribution to peak system load
    - Perfect contribution has 100% and no contribution has 0% ELCC
  - Backup energy required to provide firm capacity for a range of PV sizes up to 30% of the NYC peak load
    - Backup energy measures amount of energy needed to provide firm capacity
    - Perfect match needs 0% and no match needs 100% backup energy

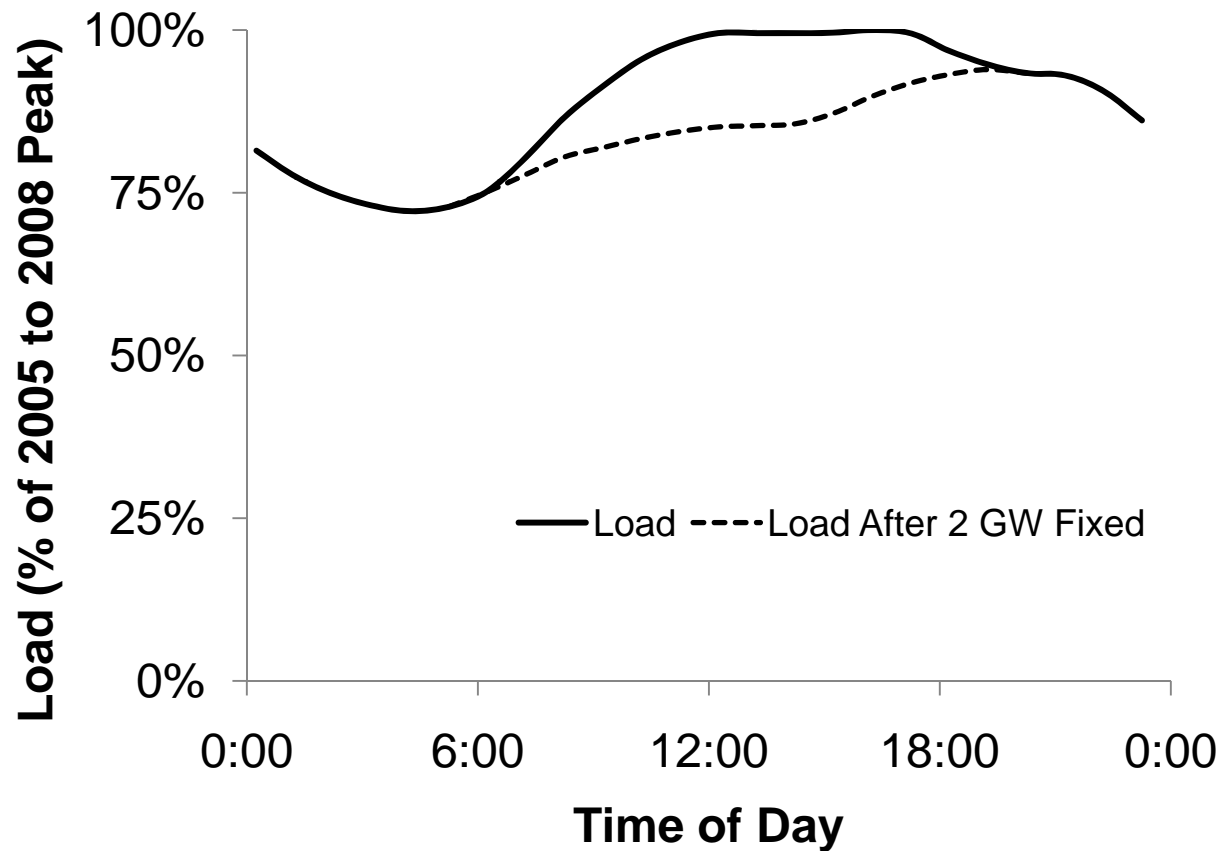
# Results: 2005 Peak Load Day Analysis

## 2005 Peak Load Day for NYC (July 27)



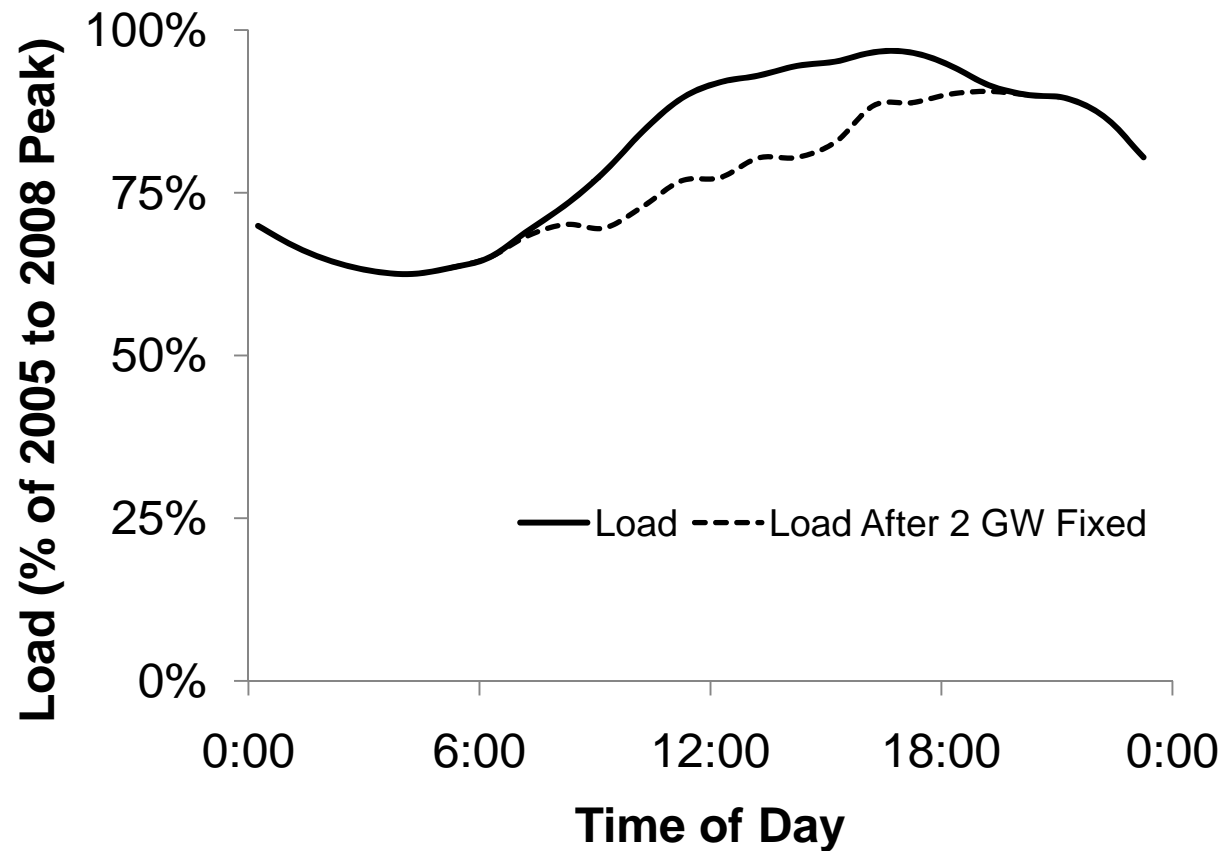
# Results: 2006 Peak Load Day Analysis

## 2006 Peak Load Day for NYC (August 2)



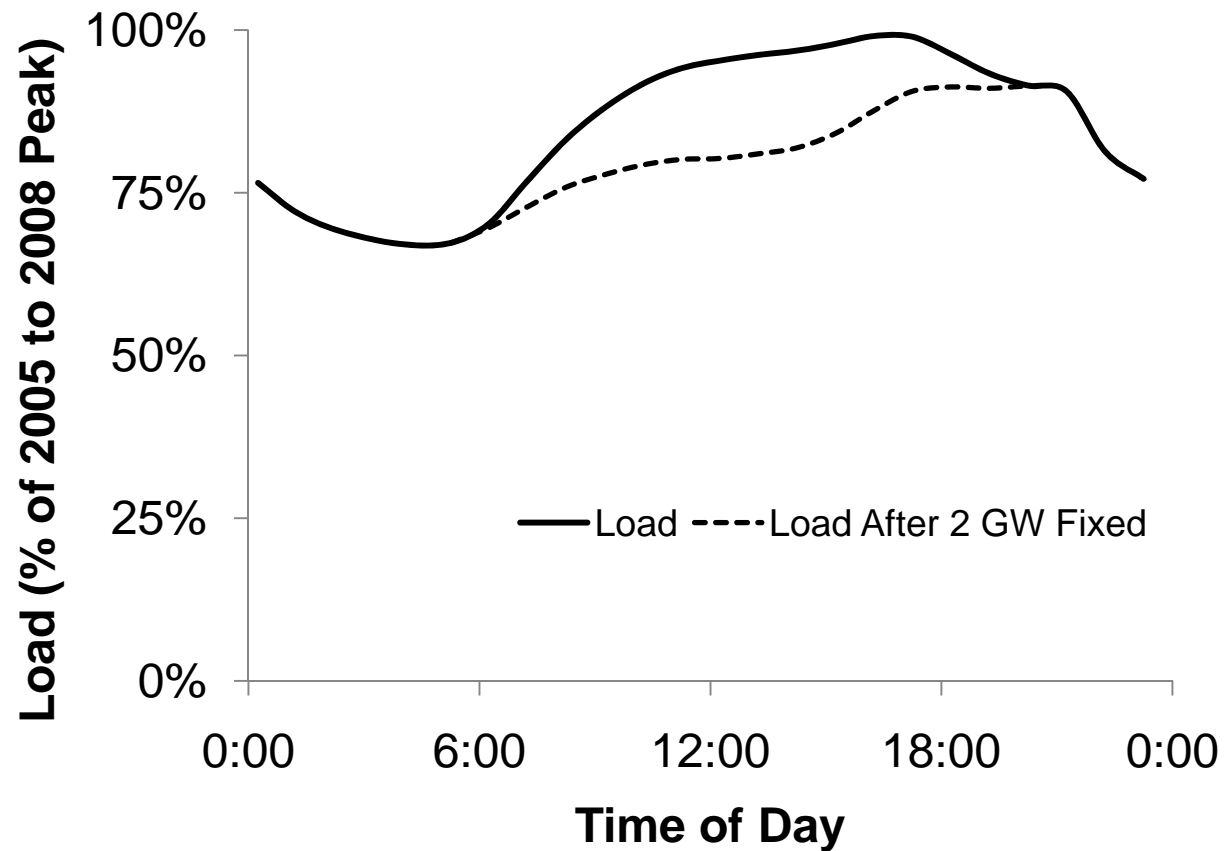
# Results: 2007 Peak Load Day Analysis

## 2007 Peak Load Day for NYC (August 8)



# Results: 2008 Peak Load Day Analysis

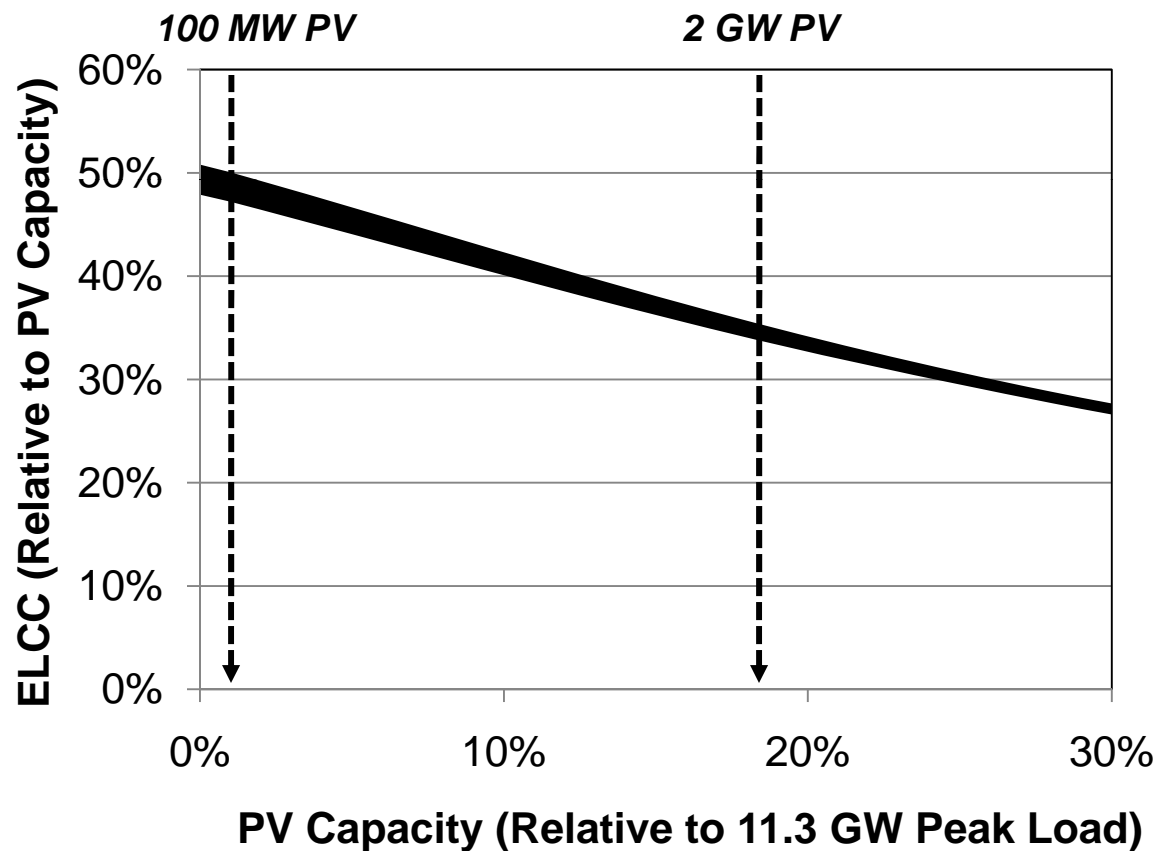
## 2008 Peak Load Day for NYC (June 10)





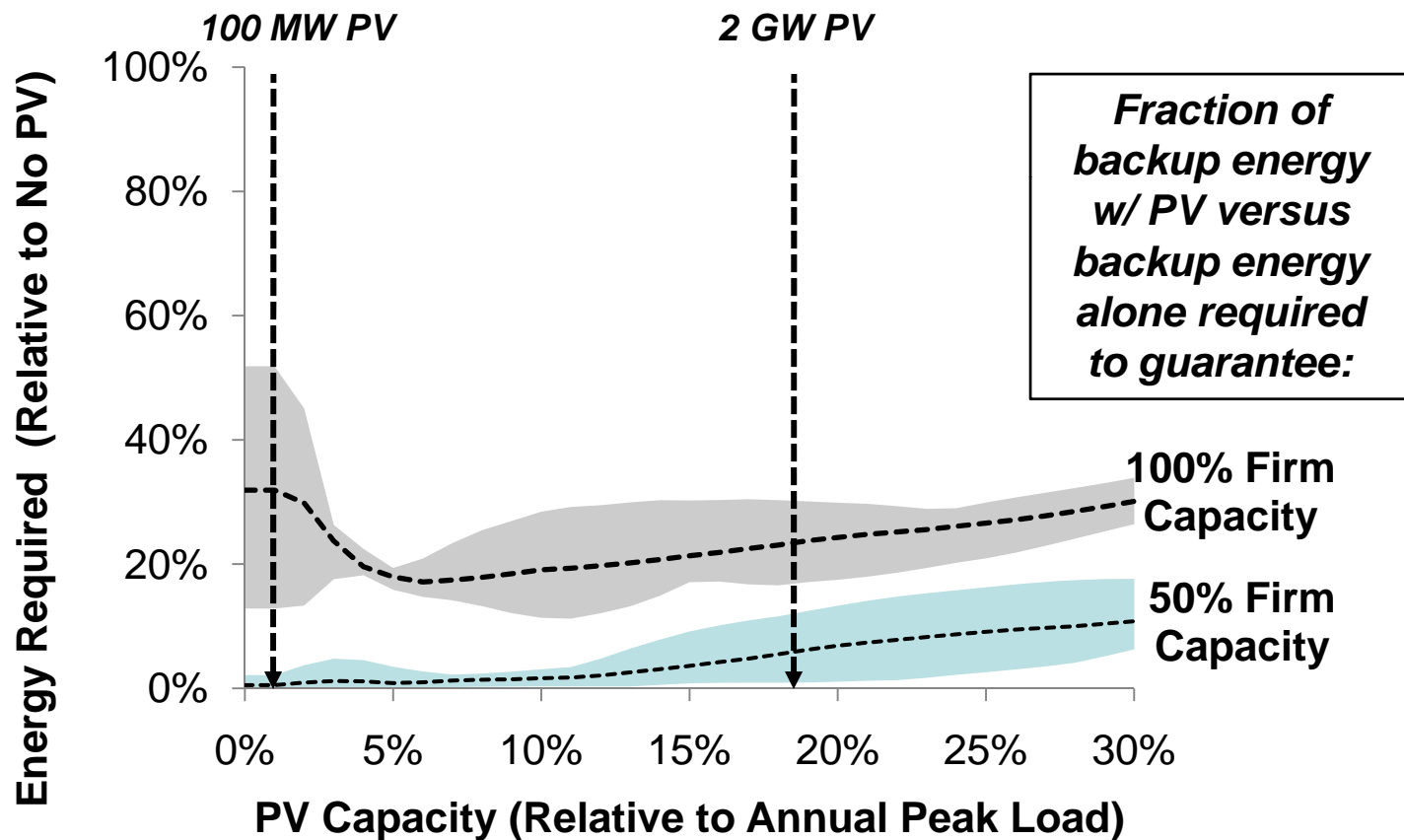
# Results: Effective Load Carrying Capability

**Annual ELCC vs. PV Penetration for NYC  
(Range Based on 2005 to 2008 Data)**



# Results: Backup Energy Required to Firm Capacity

**Backup Energy Required to Firm Capacity vs. PV Penetration for NYC (2005 to 2008 Data)**



# Conclusions



- 2 GW of PV would have been well-matched to NYC's electrical needs on each peak day for the past 4 years
- The annual load match when measured using the ELCC metric has been good and has had minimal variation from year to year
- Firm PV capacity value can be obtained using significantly reduced amounts of backup energy
- Higher ELCCs will occur for orientations other than horizontal fixed systems