

Climate Resiliency in New York City: Opportunities and Challenges



*Advanced Energy Group
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September 2004: Flooding after a downpour on 9th Street, Brooklyn, NY (Credit: Seth Wenig/The New York Times)

HURRICANE SANDY CAUSED UNPRECEDENTED DAMAGE AND EXPOSED BROADER VULNERABILITY

51 square miles flooded

88,700 buildings inundated

44 lives lost

\$19 billion in damages and lost
economic activity

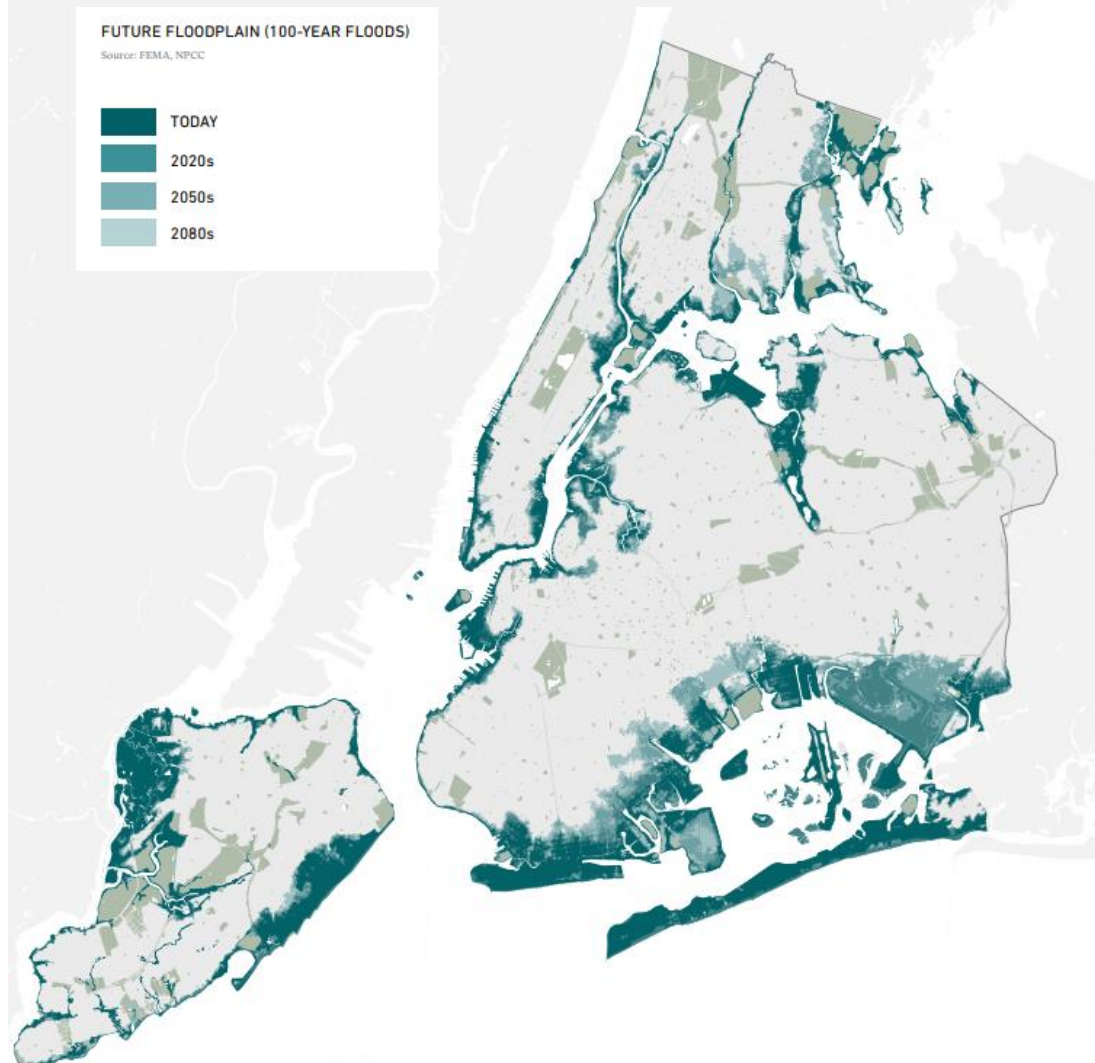
2 million New Yorkers left without
power for several weeks

Thousands displaced from home



NYC IS EXPOSED TO MULTIPLE TYPES OF FLOODING

- **NYC has 520 miles of coastline**, more than Miami, Boston, San Francisco, and Los Angeles *combined*
- **Coastal storms will threaten 1.2 million New Yorkers** by 2100, three times as many as are currently at risk
- **Sea level rise will significantly increase the size of NYC's floodplain** and impacts from tidal flooding
- Inland areas are also flooding with more frequency due to **increasingly intense precipitation**



EXTREME HEAT IS THE DEADLIEST NATURAL HAZARD IN NYC

- **Densely developed cities are up to 22°F hotter than surrounding areas, and indoor temperatures can be 20°F hotter than outdoor conditions**
- **In an average year, extreme heat in NYC causes...**
 - **13 heat stroke deaths**
 - **450 heat-related ER visits**
 - **115 excess deaths** from natural causes worsened by heat exposure
- **Extreme heat impacts our most vulnerable residents, especially older adults and those with mental and chronic health conditions. Poverty and poor housing quality also amplify vulnerability to heat.**



An elderly woman faints from heat on the Upper East Side.
2011, NY Daily News/Marcus Santos

NYC MUST PREPARE FOR A RANGE OF CLIMATE HAZARDS



**COASTAL
STORMS**

+50%
increase in
intense
hurricanes
by 2100

MORE FREQUENT,
MORE DESTRUCTIVE
HURRICANES



SEA LEVEL RISE

Up to
30 in
SLR by
2050s

INCREASED
TIDAL FLOODING +
GROUNDWATER
TABLE RISE



PRECIPITATION

Up to
1.5x
rain days > 1"
by 2080s

FLOODING IN
NON-COASTAL AREAS

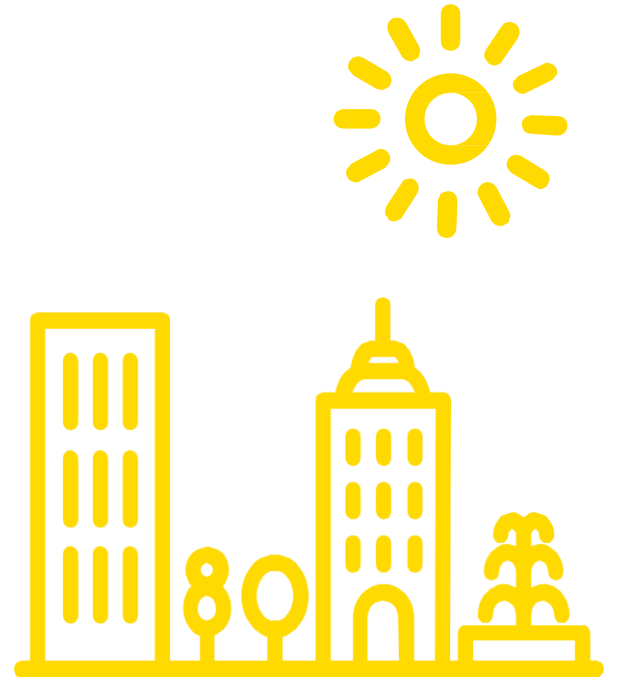


TEMPERATURE

of days
above 90°F
TRIPLE
by 2050s

LONGER, MORE
DANGEROUS HEAT
WAVES

OUR RESPONSE TO THIS UNPRECEDENTED CHALLENGE



Applying climate change projections in capital project design

Goal of the Guidelines: establish consistent approach for using climate change data across the City capital plan to address:

1. extreme heat and higher average temperatures
2. extreme rainfall
3. tidal inundation with sea level rise, and
4. coastal storms

Who will use the guidelines?

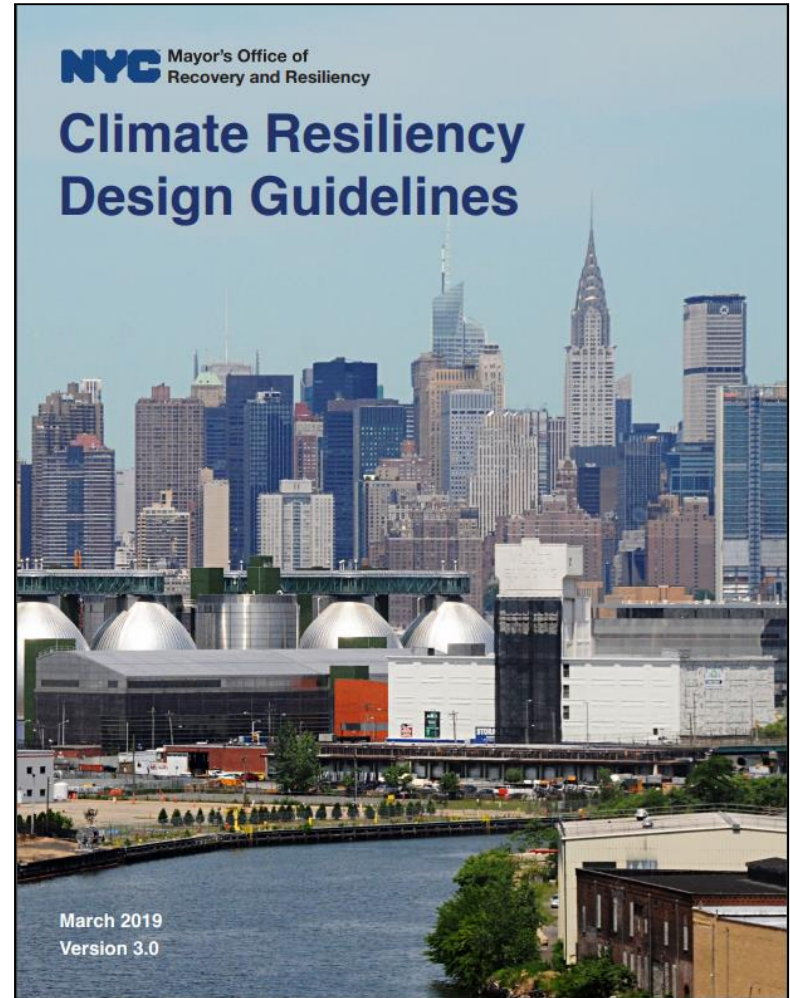
- City agencies
- Engineers, architects, and planners

What kinds of projects?

- Buildings, infrastructure, and landscapes
- City of NY capital construction & major rehabs

What kinds of assets are not included?

- Coastal protection projects
- Private developments



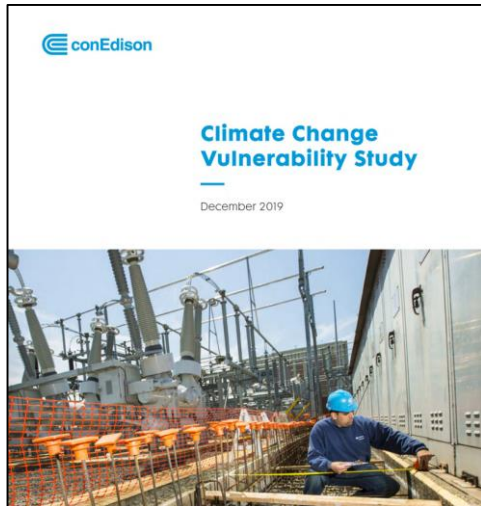
Evaluating risks posed by extreme rain

- Flooding from extreme rain is happening today
- New York City is mapping the effects of extreme rain and developing a mitigation plan focused on operational response to flash flooding
- We expect rainstorms to intensify and sea level rise to block outfalls, reducing future capacity of the sewer network
- More stormwater needs to be managed onsite and through green infrastructure given drainage network limitations
- NYC will release maps and a mitigation plan by end of year 2020

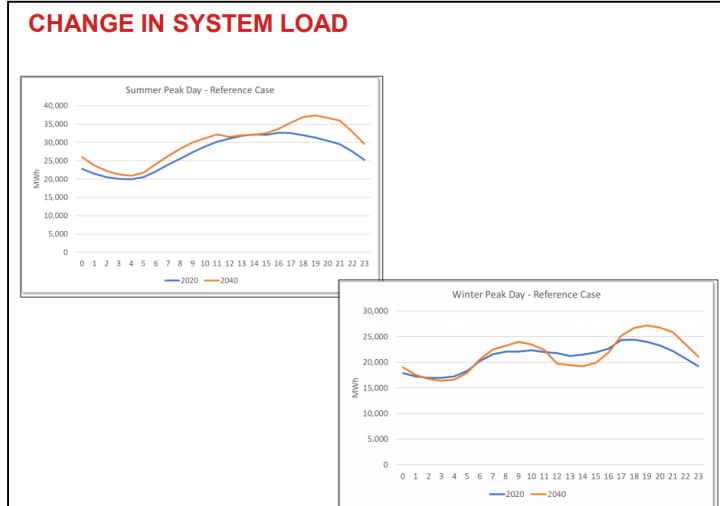


Ensuring resilient energy infrastructure as we decarbonize

Con Edison Climate Change Vulnerability Study



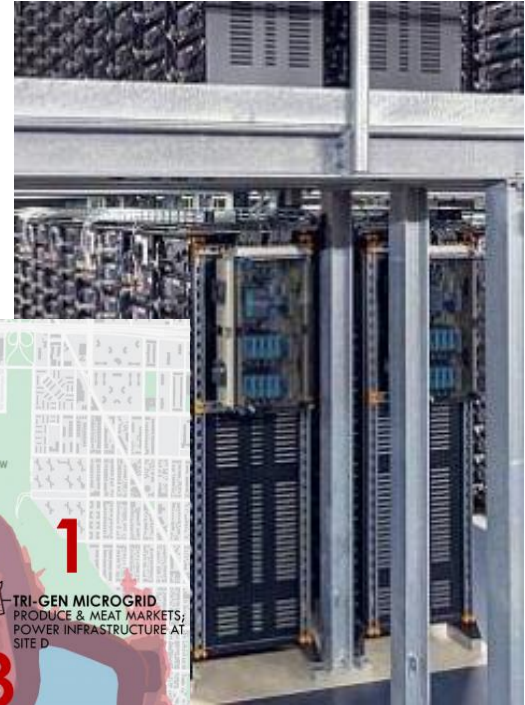
NYISO Climate Change Study



Energy Infrastructure Deep Decarbonization Pathways Study



Unlocking resilient community energy



Problem Statement: leveraging “cloudburst” design principles to manage urban rainfall

Concept: enhance stormwater management through storage and surface flow conveyance, while creating urban areas and green space with co-benefits for the citizens, local businesses, and the city.

CONCEPTUAL CLOUDBURST ROAD

A generic road profile is re-designed in order to illustrate the potential of cloudburst roads. The design suggests a bike lane and rain gardens in the side of the road for retention. A green roundabout can also retain large volumes of water and help ease the transit through the area.

