The PEAK Coalition Presents:

Replacing Peaker Power Plants with Clean Energy: A Frontline Vision for New York City

April 21, 2021

NEW YORK CITY ENVIRONMENTAL JUSTICE ALLIANCE N·Y·C E·J·A 1991

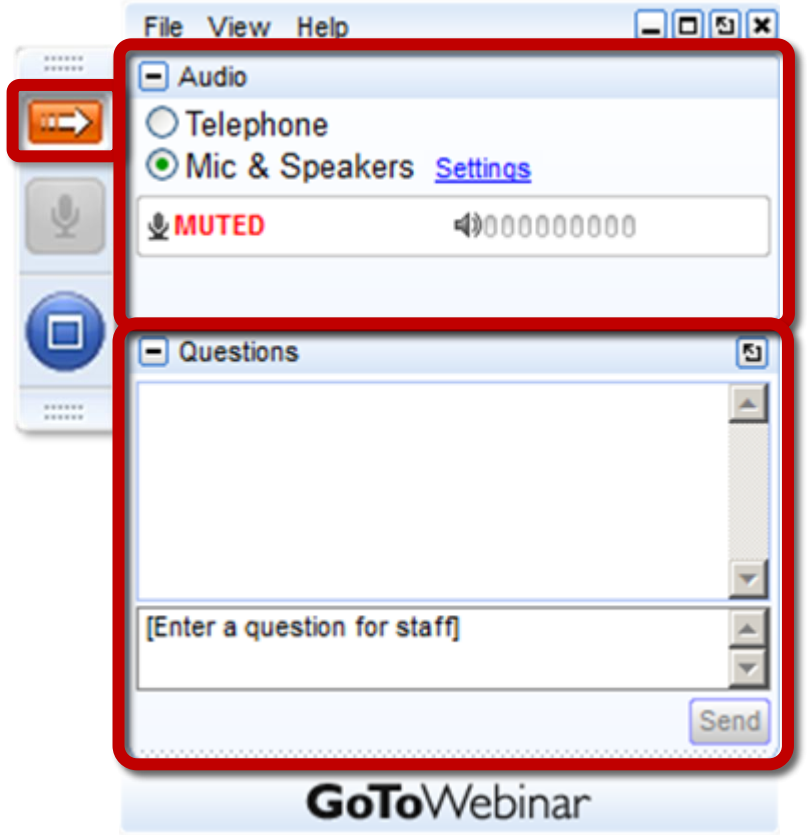
NYLPI JUSTICE THROUGH COMMUNITY POWER

UPROSE

THE POINT

CleanEnergyGroup Innovation in Finance, Technology & Policy

WEBINAR LOGISTICS



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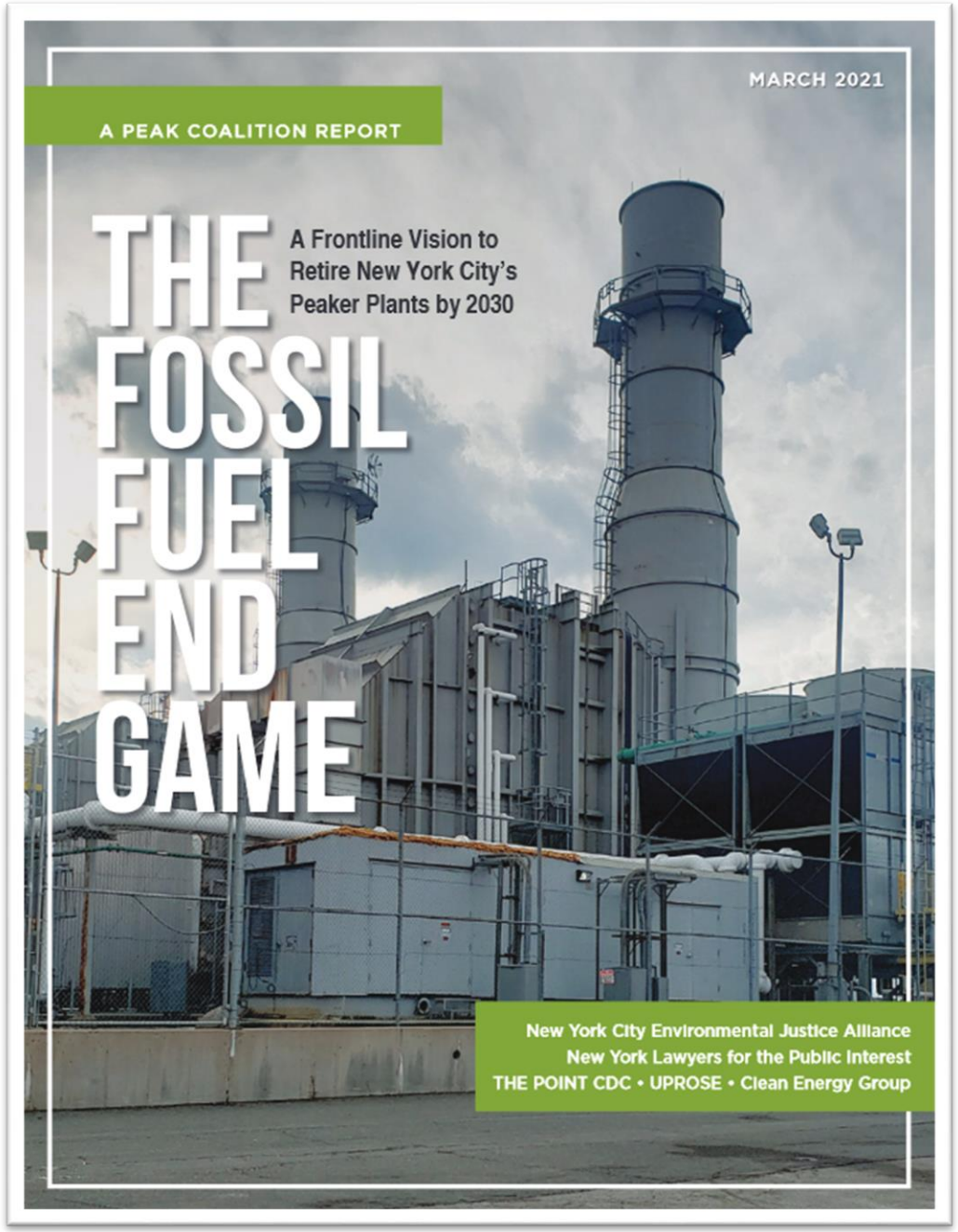
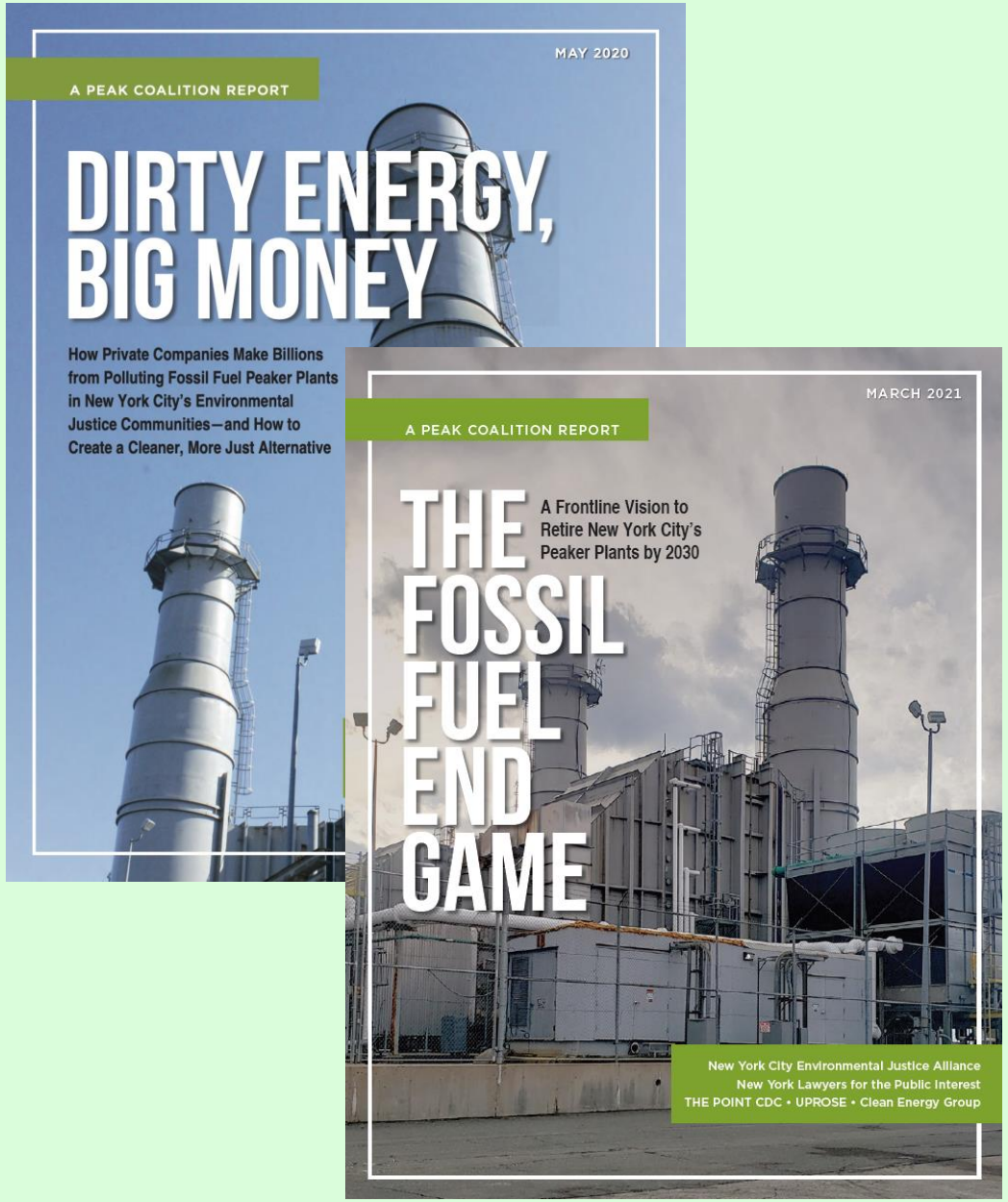


Read it here: www.cleanegroup.org/ceg-resources/resource/fossil-fuel-end-game

PANELISTS

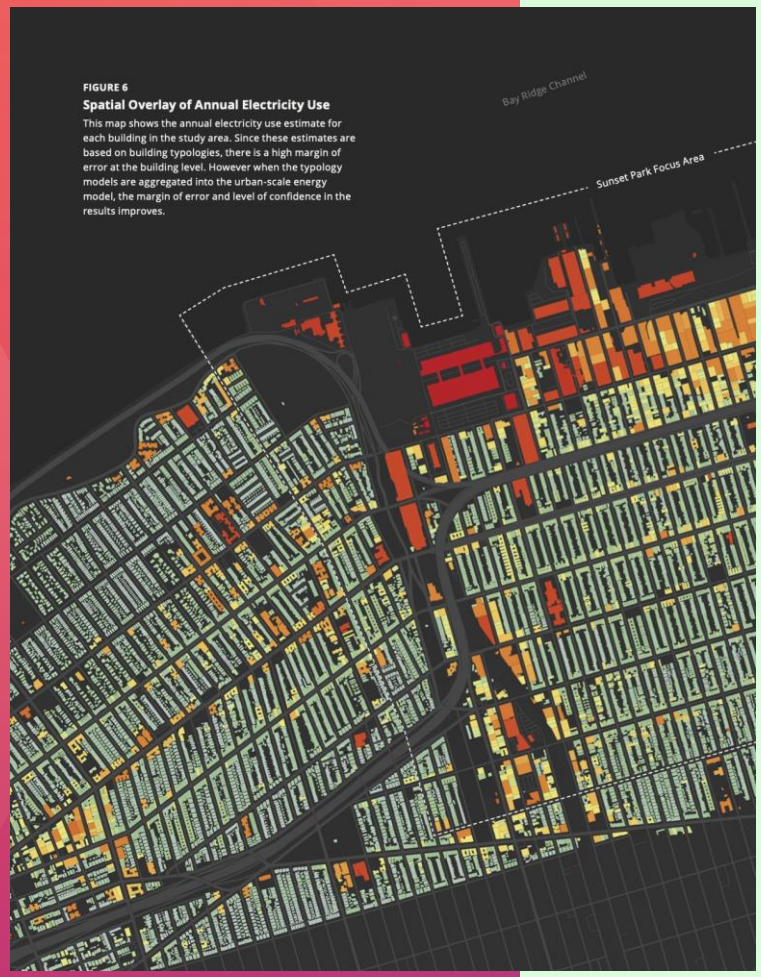
- **Carlos Garcia**, Energy Planner, New York City Environmental Justice Alliance
- **Erin Childs**, Senior Manager, Strategen Consulting
- **Eliasid Animas**, Senior Analyst, Strategen Consulting
- **Dariella Rodriguez**, Director of Community Development, THE POINT CDC
- **Seth Mullendore,** Vice President & Project Director, Clean Energy Group (moderator)



PEAK COALITION

- The PEAK coalition—UPROSE, THE POINT CDC, New York City Environmental Justice Alliance (NYC-EJA), New York Lawyers for the Public Interest (NYLPI), and Clean Energy Group (CEG)— has come together to end the long-standing pollution burden from power plants on the city's most climate-vulnerable people.
- Our collaboration brings technical, legal, public health, and planning expertise to support organizing and advocacy led by communities harmed by peaker plant emissions.
- Together with communities, we are advocating for a system of localized renewable energy generation and battery storage to replace peaker plants, reduce GHG and local emissions, lower energy bills and make the electricity system more resilient in the face of increased storms and climate impacts.

NYSERDA - COMMUNITY ENERGY STUDY



There are three primary objectives of this work:

i) To establish the theoretical potential of each strategy to reduce peak demand

ii) To assess the overall impact of peak demand reduction on peaker plant operation

iii) To identify areas for further analysis and research.

NYPA – PEAK PARTNERSHIP MOU

NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

For Immediate Release: 10/14/20
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New York Power Authority and Environmental Justice Groups Agree to Explore Options for Transitioning NYPA's Natural Gas 'Peaker' Plants to Cleaner Energy Technologies

Landmark Agreement to Explore Battery Storage and New Low to Zero Carbon Emission Resources and Technologies to Continue to Reliably Meet New York City's and Long Island's Peak Energy Demands, Ensure Resiliency of Grid

WHITE PLAINS—The New York Power Authority (NYPA) and the PEAK Coalition, a group of five leading environmental justice and clean energy interests, today unveiled an agreement to assess how NYPA can transition its natural gas fired 'peaker' plants, six located in New York City and one on Long Island with a total capacity of 461 megawatts, to utilize clean energy technologies, such as battery storage and low to zero carbon emission resources and technologies, while continuing to meet the unique electricity reliability and resiliency requirements of New York City. The agreement sets the path for the transition of NYPA's plants to low to zero carbon emission resources and technologies. Implementation of such technologies will help accelerate the clean energy goals outlined in Governor Andrew M. Cuomo's Climate Leadership and Community Protection Act, nation-leading climate legislation passed last year, that calls for zero-carbon emission electricity in New York State by 2040.

"NYPA is leading by example in transitioning our plants to utilize clean technologies to help expedite Governor Cuomo's ambitious climate leadership targets," **said Gil C. Quinones, NYPA president and CEO**. "NYPA has committed to being a first-mover, exploring new clean energy frontiers, so that we, together with our partners and along with other utilities, can demonstrate a direct path to a cleaner environment for all New Yorkers."

The agreement, in the form of a Memorandum of Understanding (MOU), contains two notable commitments:

- NYPA will collaborate with environmental justice groups to explore cleaner energy options for its entire fleet of city-wide, peaker power plants – the first time a utility has agreed to enter into such a collaboration in the country.
- NYPA has agreed to support consultants who will work alongside the Authority and independently support the PEAK Coalition partners to develop alternative clean energy replacement options.

NYPA and PEAK entered into a collaborative agreement:

- To analyze the potential for replacement and retirement of NYPA's six peaker plants in NYC and one in Long Island
- To engage two technical consultants to execute the assessment process, one on behalf of NYPA (E3) and an additional independent consultant acting on behalf of PEAK (Strategen)

Replacing Peaker Power Plants with Clean Energy

Erin Childs, Senior Manager

STRATEGEN

Strategen is a globally connected, impact driven firm on a mission to decarbonize energy systems

ERIN CHILDS
Senior Manager

- Specializes in grid planning and decarbonization; emerging technologies and business models; and retail and market incentive mechanisms.
- Previously worked at Southern California Edison on building a clean energy focused utility and advancing economy-wide decarbonization
- B.A. in Mathematics & Environmental Economics from Pomona College.

ELIASID ANIMAS
Senior Analyst

- Works on policy and business strategy leveraging experience on energy storage, peak energy, DER integration and resource adequacy.
- Previous work as a consultant across the development sector focused on city planning, mobility and energy efficiency.
- B.A. in City and Regional Planning from UNAM and Fulbright grantee in UC Berkeley

Strategen & PEAK are advancing clean community solutions

Our Objectives

+ Understand the economic and environmental costs of peaker plants in New York City
+ Identify viable and technically feasible solutions to retire peakers and replace them with clean energy
+ Advance a roadmap to enable an aligned and thoughtful transition

Clean Energy Group, 2021. ***The Fossil Fuel End Game: A Frontline Vision to Retire New York City's Peaker Plants by 2030***

Focus of Today's Discussion

The Challenge

+ Why have peakers been needed historically?
+ What environmental damage do peakers cause?
+ What's the impact on communities?

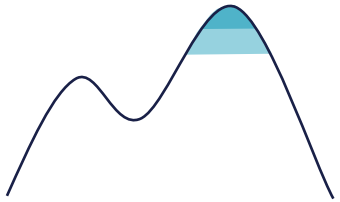
The Solution

+ Retire all New York City peakers by 2030
+ Replace with combination of rooftop solar, storage, offshore wind, energy efficiency

What's Next

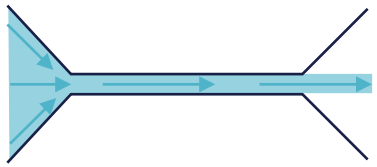
+ Work still ahead for achieving CLCPA vision in NYC
+ Policy actions needed to advance this vision
+ Lessons and applications for other cities

Peakers play a necessary role in local reliability



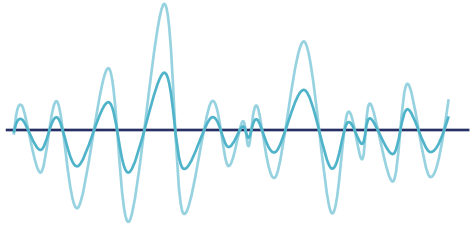
Peaker plants provide fast-response generation when demand spikes

Peakers have been an important part of the overall portfolio specifically for their flexibility to meet these peak demands



Peakers generate in urban load pockets to address transmission constraints

These constraints create load pockets where the physical space for new resources is scarce and resource capacity is valuable

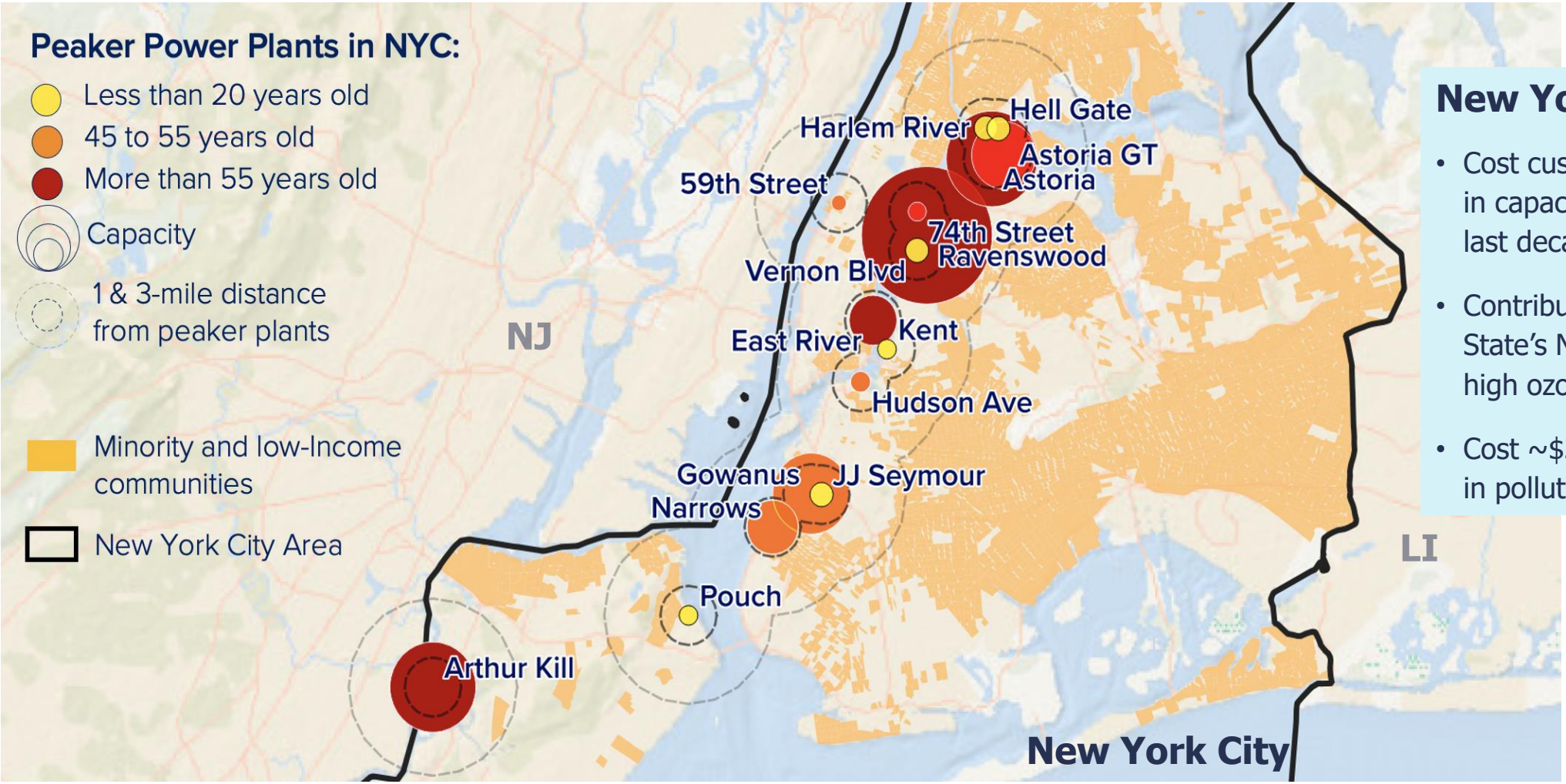


Peakers can provide voltage and local reliability services

Constrained local areas may see peakers running specifically to provide these services, especially during stressed grid conditions

The services historically provided by peakers are important for urban reliability

Peakers are often located in minority & low-income communities



New York Peakers

- Cost customers ~$4.8 billion in capacity payments in the last decade
- Contribute up to 94% of the State's NO_X emissions on high ozone days
- Cost ~$375 million annually in pollution burden

Emissions impacts

Local Pollutants

+ **Peakers emit SO_2 and NO_X, precursors of $PM_{2.5}$ at a disproportionate rate**
+ **Cause damage near their emissions source: respiratory illness, cancer, premature mortality**
+ **Peakers are disproportionately located close to communities of color and low income**
+ **NYC Peakers cost the State an estimated $43 million annually**
  - increasing to $50 million by 2030 based on morbidity and mortality

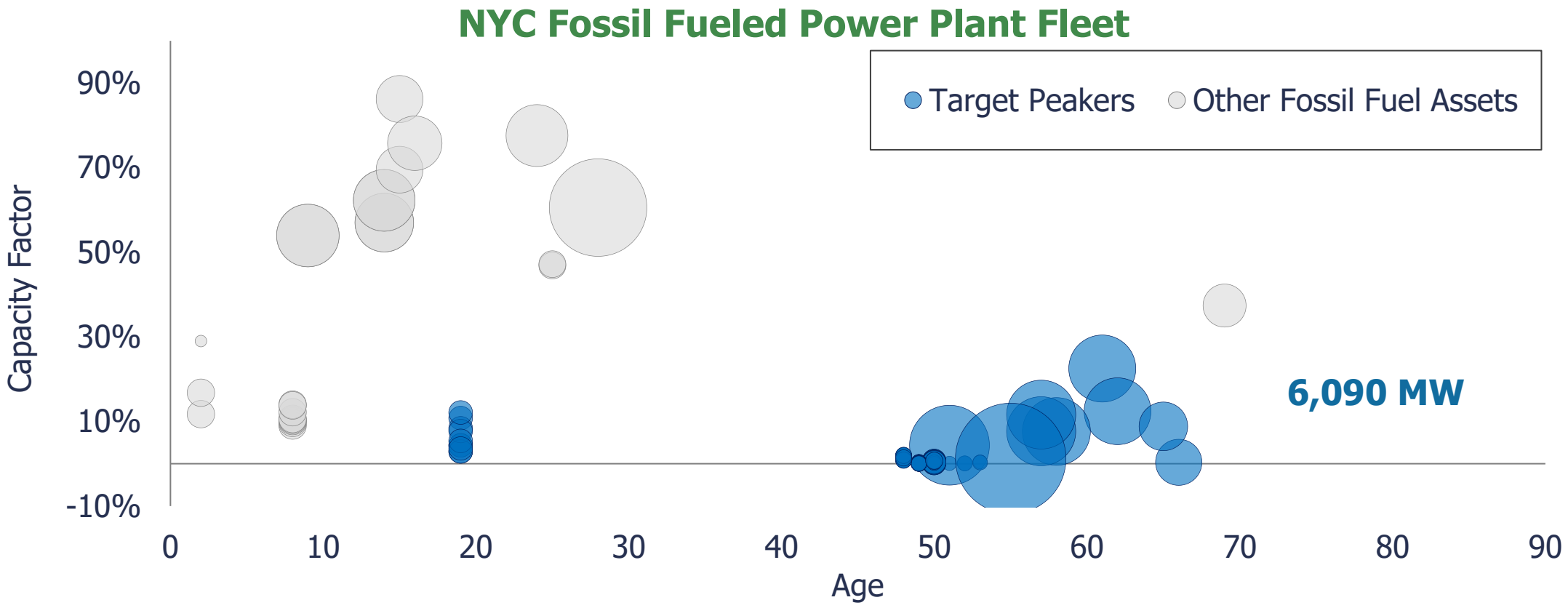
Global Pollutants

+ **Refer to GHG emissions, most importantly CO_2**
+ **Cause climate changes worldwide accounted for in the value of carbon**
  - Impacts related to changes in net agricultural productivity, property damages from increased flood risks, human health, energy system costs, and other aspects of the economy
+ **CO_2 emissions of the NYC peakers cost the world about $332 million annually**
  - increasing to $377 million by 2030

Following the proposed replacement roadmap, savings by 2035 could bring a net present value of $1,166 million in emissions reduction

THE CHALLENGE

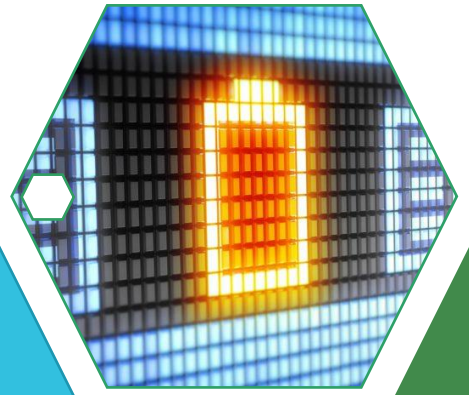
We focused on the oldest and least-used power plants in NYC



6 GW of Peaker are prime candidates for retirement due to age and usage levels

THE SOLUTION

Key Ingredients: Wind, Storage, Solar and Energy Efficiency



Storage

- Helps to balance renewable energy, increase flexibility, and meet peak demand period

Offshore Wind

- Significant energy resource that can interconnect directly into the

Rooftop solar

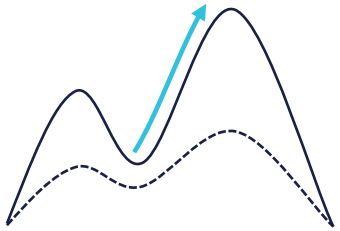
- Local, clean energy that can be located communities

Energy Efficiency

- Helps reduce peak energy demand in the city and save customers energy

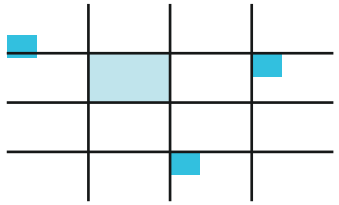
THE SOLUTION

Storage is a must-have to replace peakers



Storage has faster ramping capabilities than peakers to integrate renewables

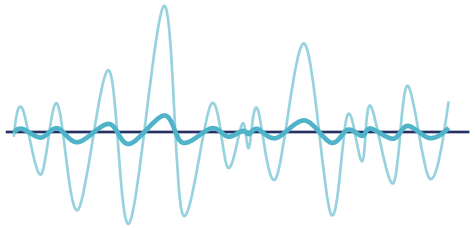
Can integrate intermittent resources and avoid unnecessary use of fossil fuel power plants



Storage has a small physical footprint, perfect for urban areas

Can help alleviate load pocket constraints without producing local emissions

Can be deployed in diverse configurations, from residential and community to utility scale



Storage can provide faster response voltage and local reliability services

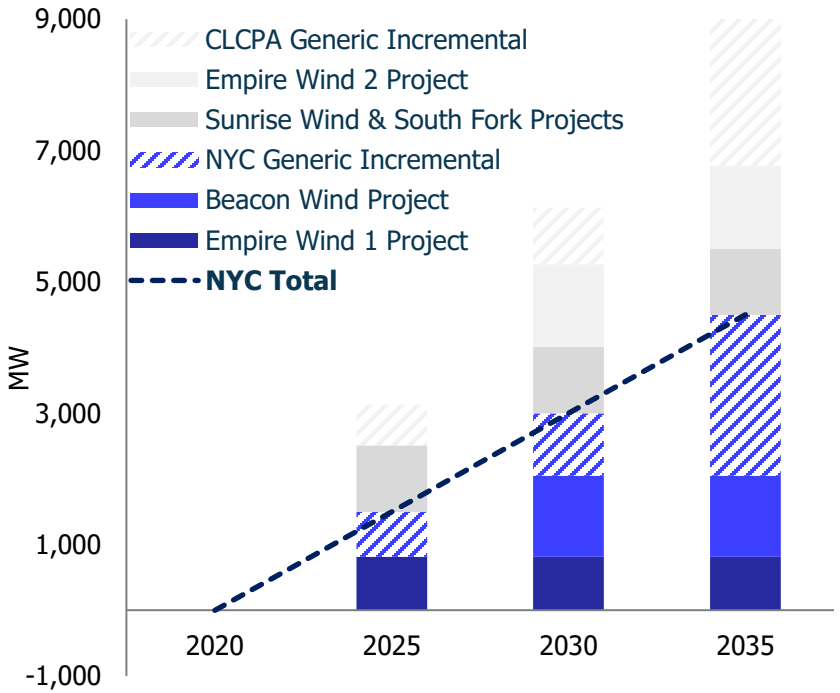
Faster response services can improve the quality of regulation and voltage support, specially at the distributed level

Energy storage can address grid services historically provided by peakers

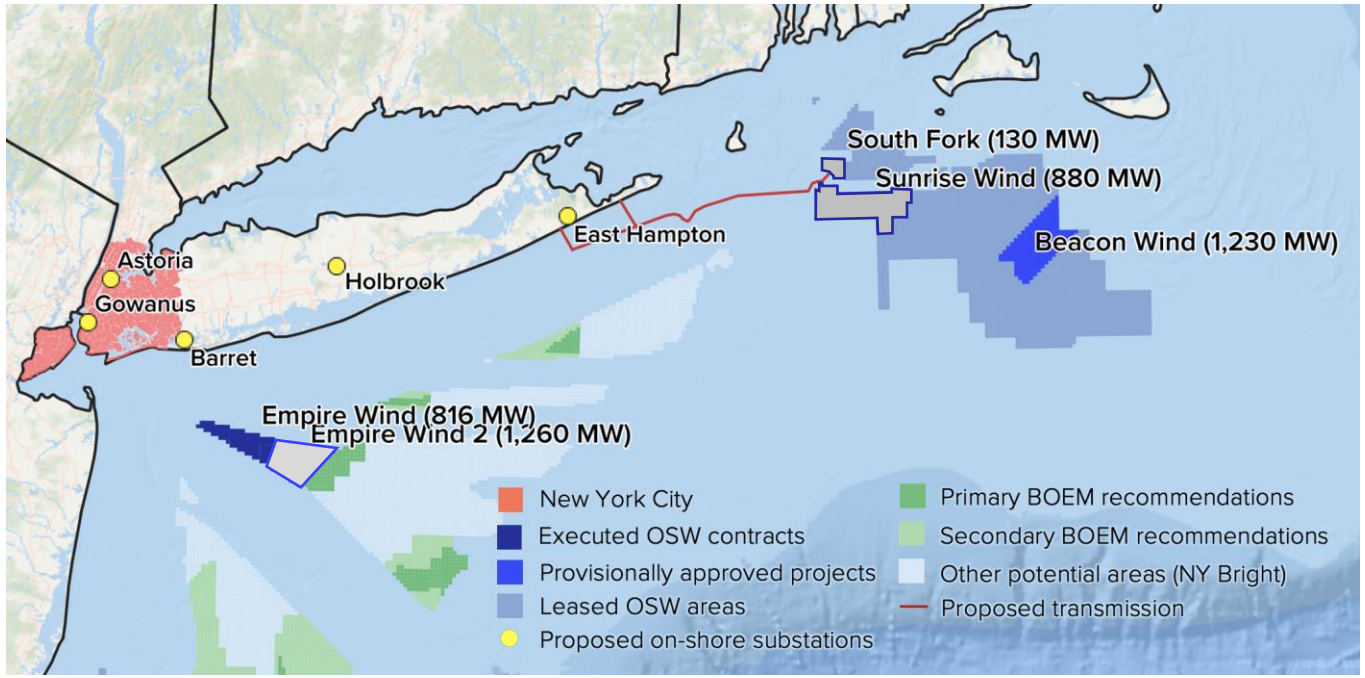
THE SOLUTION

Off-Shore Wind can connect directly to NYC

NY OSW Targets & Projects



NY OSW Leasing Areas and Proposed Substations



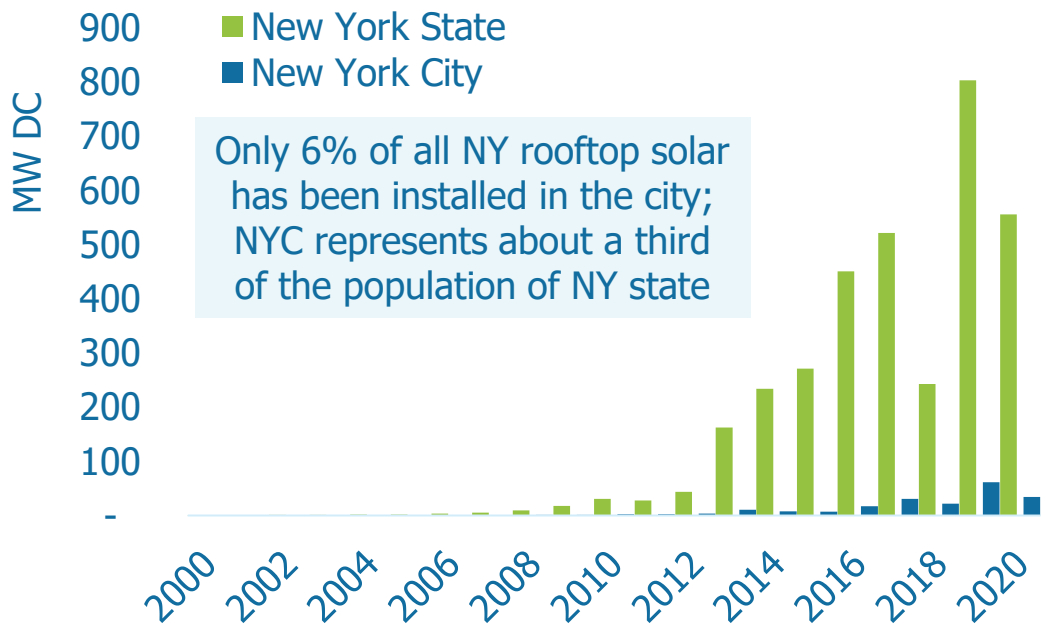
Source: Strategen based on NYSERDA, 2018 & 2020 Offshore Wind Solicitation Awards

Many NY off-shore wind resources may interconnect into NYC

THE SOLUTION

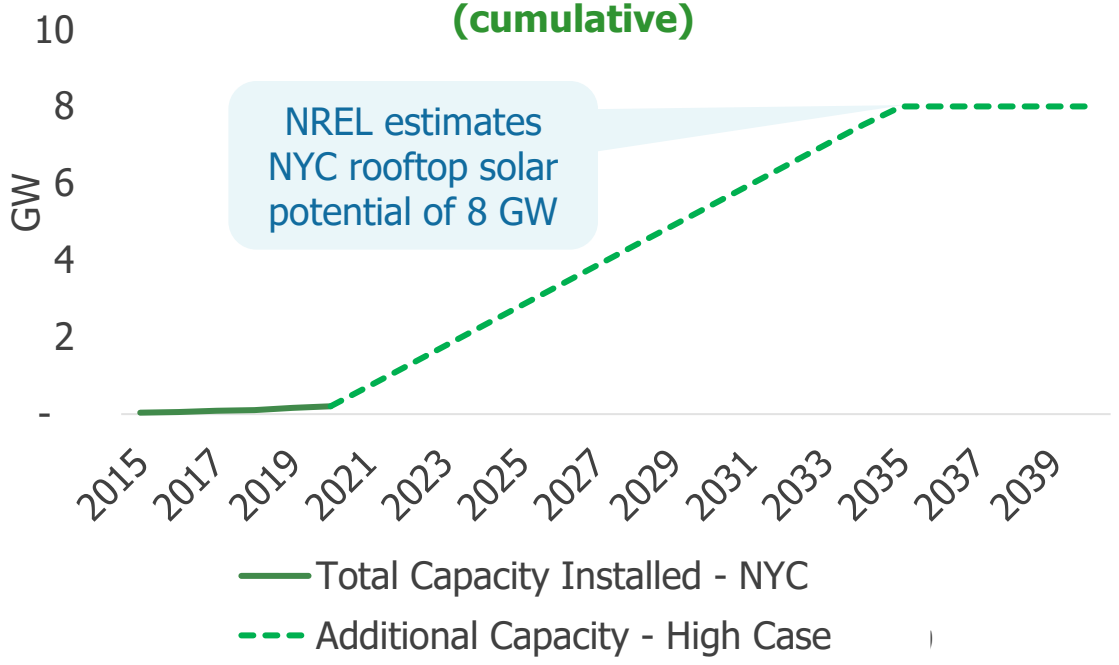
NYC Rooftop Solar is low relative to the rest of the state

Installed Distributed Solar



Source: NYSERDA-Supported Solar Projects, 2020

Potential NYC Rooftop Solar Additions (cumulative)



Source: NREL, 2016. Rooftop Solar Photovoltaic Technical Potential in the United States

To retire peakers, NY must right-size NYC solar to be inline with the rest of the state

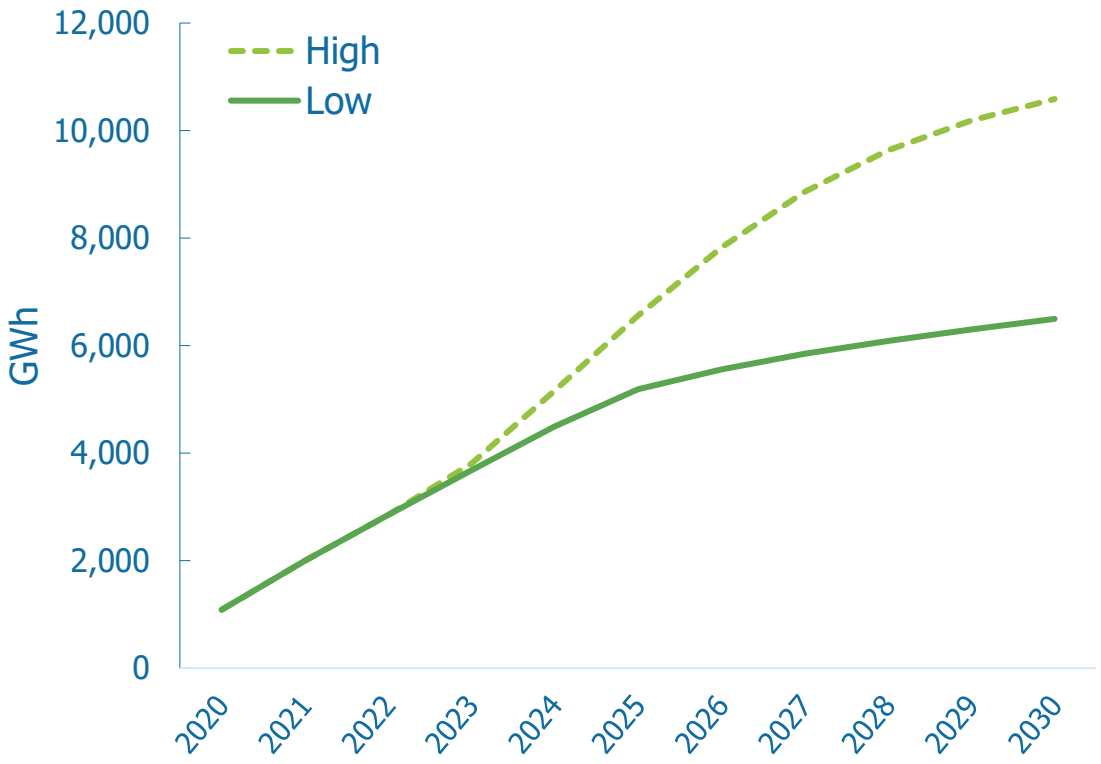
THE SOLUTION

NY is already planning for Energy Efficiency investments

Energy Efficiency is a key resource to enable peaker retirement:

+ Load contribution aligns with demand: most efficient resource to reduce peaks
+ In meeting CLCPA target, New York will deliver one third of its 40% reduction in GHG mandate
+ Key initiatives include Build Smart NY, Smart Street Lighting NY, the Five Cities Energy Program, Local Law 97.
+ Energy efficiency targets can be increasingly hard to achieve

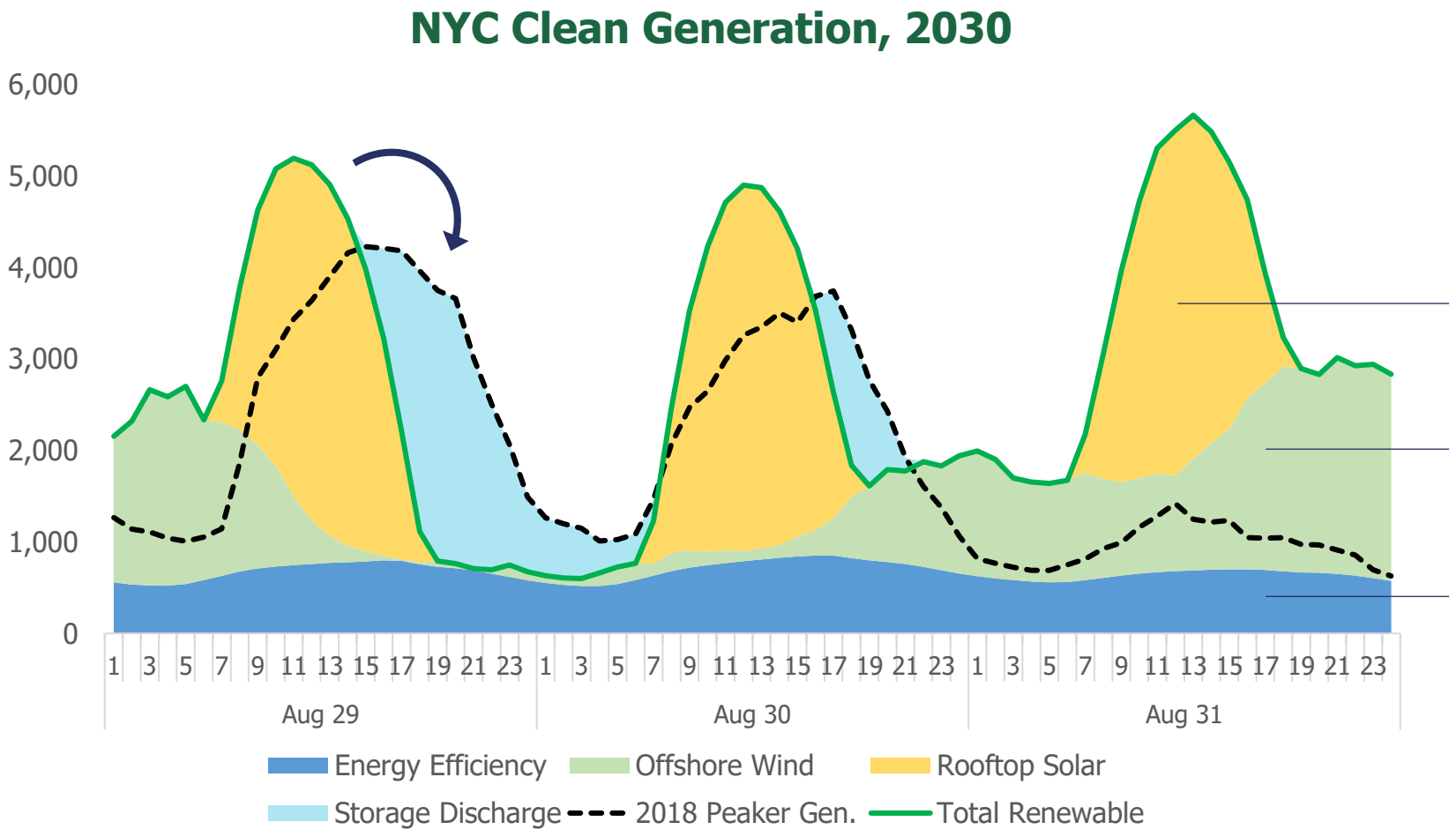
NYC Incremental Energy Efficiency



Forecast by NYISO

THE SOLUTION

Storage and renewables can effectively replace peakers



By 2030, we expect to see…

5.6 GW of rooftop solar

3 GW of offshore wind

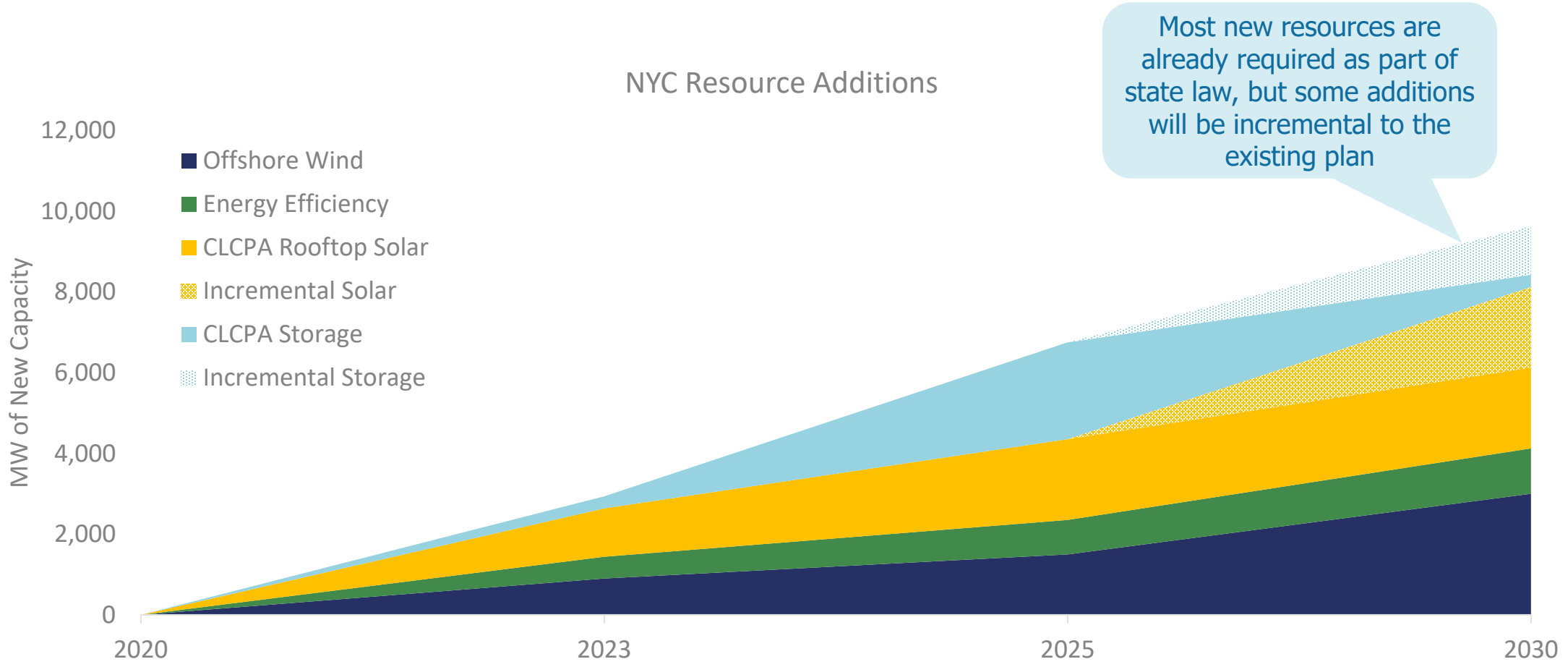
5,400 GWh of energy efficiency

Integrated by 4,200 MW of 8-hour storage (or equivalent)

*New planned transmission import capability will reduce these energy needs

THE SOLUTION

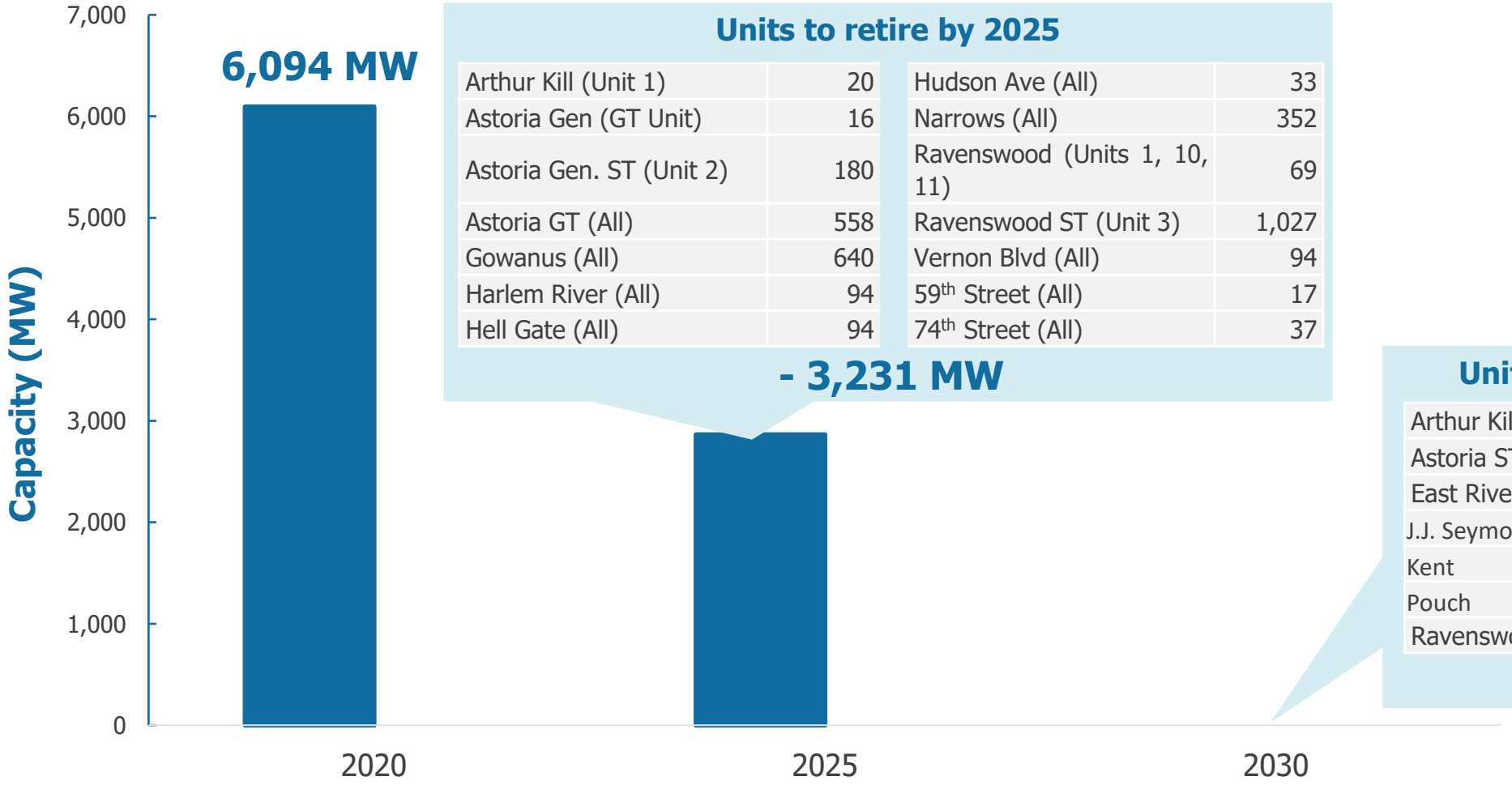
Roadmap for Resource Additions



New resources will be needed to coincide with peaker retirement timelines

THE SOLUTION

Peaker Retirement Roadmap



Units to retire by 2025

Arthur Kill (Unit 1)	20	Hudson Ave (All)	33
Astoria Gen (GT Unit)	16	Narrows (All)	352
Astoria Gen. ST (Unit 2)	180	Ravenswood (Units 1, 10, 11)	69
Astoria GT (All)	558	Ravenswood ST (Unit 3)	1,027
Gowanus (All)	640	Vernon Blvd (All)	94
Harlem River (All)	94	59th Street (All)	17
Hell Gate (All)	94	74th Street (All)	37

- 3,231 MW

Units to retire by 2030

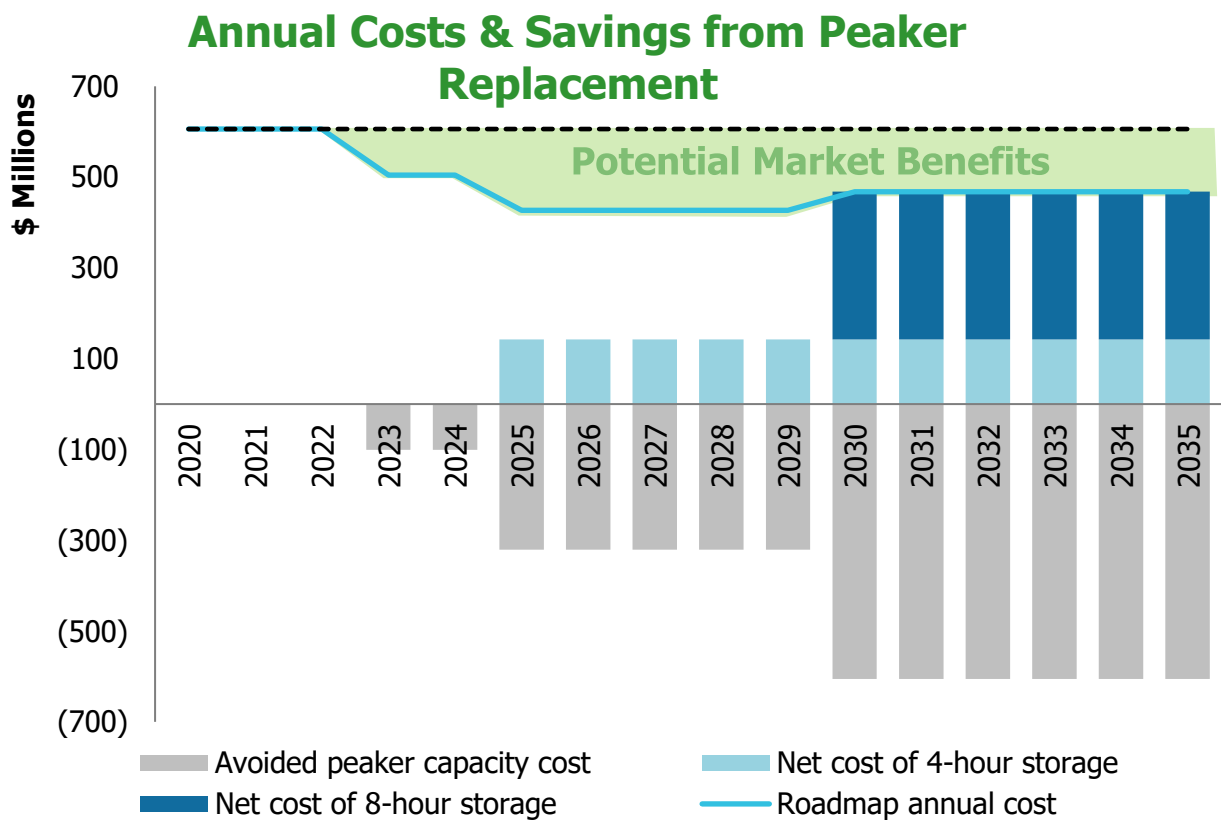
Arthur Kill ST (Units 2,3)	912
Astoria ST (Units 3, 5)	763
East River ST (Unit 7)	200
J.J. Seymour	94
Kent	47
Pouch	47
Ravenswood ST (Units 1, 2)	800

- 2,863 MW

Costs and Benefits through 2030

Key cost drivers:

+ Declining cost of storage (especially 8-hour duration)
+ Sustained value of capacity in NYISO Zone J (region covering NYC)
+ Increasing cost of fuel (natural gas and fuel oil)



There is potential to save $1 Billion in the energy market by 2035 (net present value)

Other Benefits for NYC

+ Health & Mortality Benefits

- Local emissions from the peaker fleet in NYC cost the State an estimated $43 million annually (increasing to $50 million by 2030)

+ Climate Change Mitigation

- CO2 emissions of the peaker fleet cost the world about $332 million annually (increasing to $377 million by 2030)

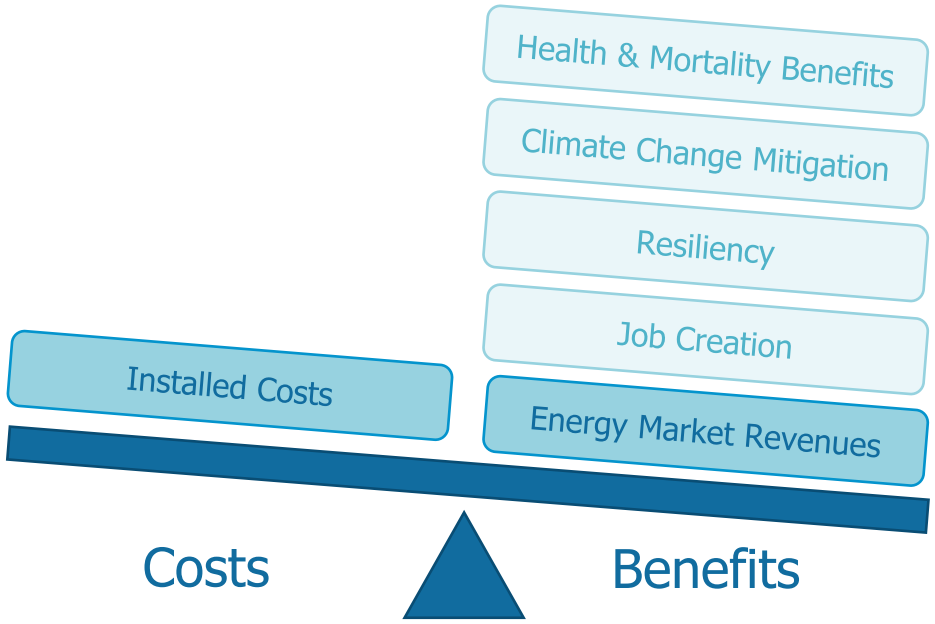
+ Resiliency

- Potential to prevent up to $2.5 billion in business interruption losses in a super storm event (like Sandy)

+ Job Creation

- Jobs per MW of energy capacity are significantly higher for storage and DER than for traditional peaker plants.

Energy Storage Cost Effectiveness



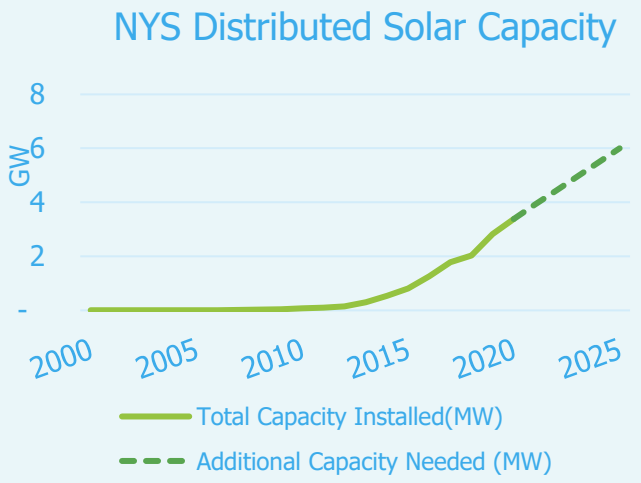
Not all benefits are captured in traditional energy cost-effectiveness tests

THE SOLUTION

The biggest challenges to this vision

Rooftop Solar

- Proposed rooftop solar targets are 13 times historic levels of deployment in NYC, and will require changes to existing rules

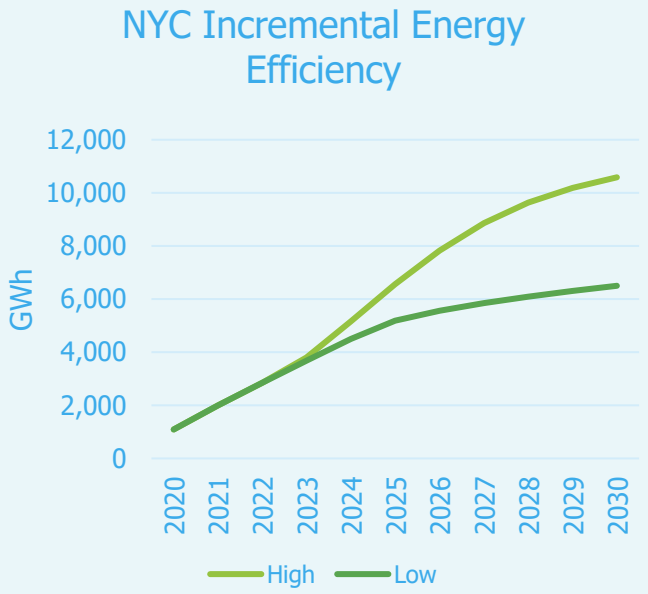


Energy Storage

- Storage has been hard to develop in the city due to land availability
- Local utilities have yet to develop significant storage projects
- Storage compensation has been complicated by FERC capacity market rules
- In NYC today, storage of duration >4-hrs is not currently cost effective as a capacity resource; but this will change over time

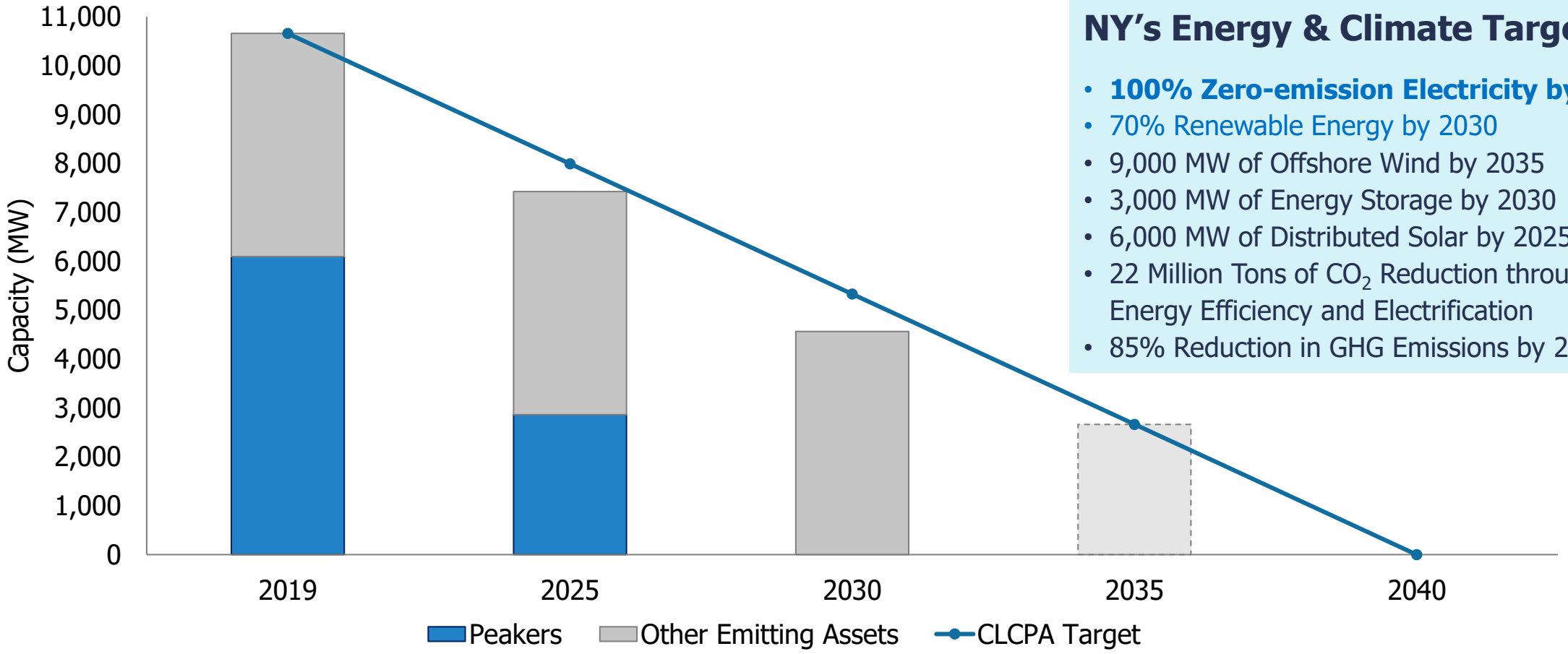
Energy Efficiency

- NYISO energy efficiency forecasts may require investments & building retrofits



CLCPA sets ambitious climate goals for NY

Retirement Trajectory of Emitting Power Capacity in NYC



NY's Energy & Climate Targets:

- **100% Zero-emission Electricity by 2040**
- 70% Renewable Energy by 2030
- 9,000 MW of Offshore Wind by 2035
- 3,000 MW of Energy Storage by 2030
- 6,000 MW of Distributed Solar by 2025
- 22 Million Tons of CO_2 Reduction through Energy Efficiency and Electrification
- 85% Reduction in GHG Emissions by 2050

WHAT'S NEXT

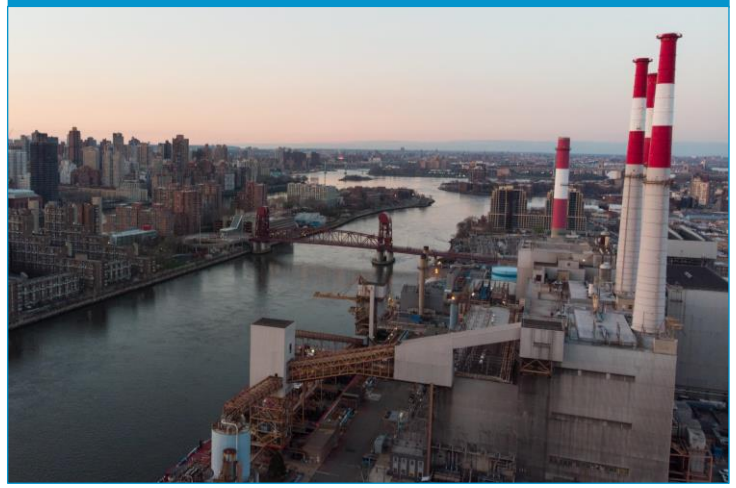
Key Policy Actions

Grid Operators	State Policy Makers	Local Officials
+ NYISO to pursue fair compensation of storage and renewables that fully values their grid contributions + Support locational valuation of Distributed Energy Resources + Consider capacity-based mechanisms to ensure addition of sufficient clean resources	+ Continue to advance energy storage, energy efficiency, community resources, and other DER in NYC + Allow distributed resources to earn Renewable Energy Credits (RECs) + Partner with developers to identify, reduce and remove barriers to development of offshore wind for NYC + Procurement of energy storage by State agencies	+ Prioritize urban land for clean energy development; remove barriers in zoning, permitting, siting and interconnection + Advance customer-focused policy goals, such as the State's energy efficiency targets + Continue collaborating with key stakeholders to address challenges and opportunities for clean resources

Key actions are focused on removing barriers and enabling value streams for energy storage and DER

What we're seeing now: urban storage applications

New York City



LS Power's 316 MW (8-hr) battery to replace Ravenswood oil and gas peaker plant

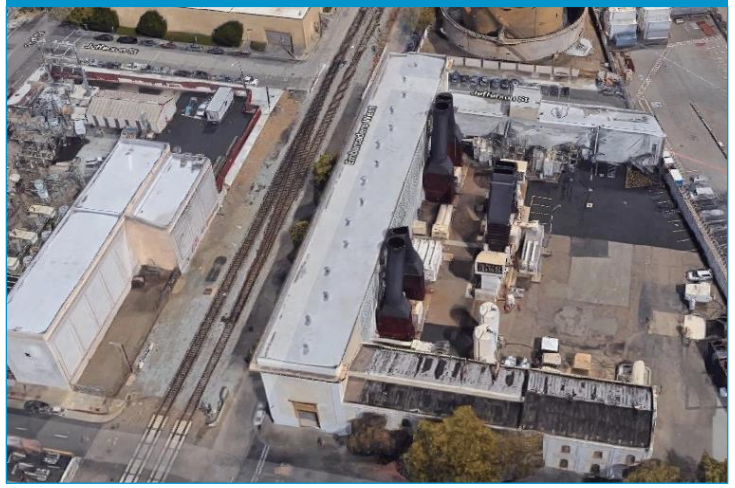
- Expected to be online 2022-2024
- Approved & waiting contractor

Los Angeles

SoCal Edison is using 195 MW of 4-hr batteries to replace Puente Gas Power Plant (262 MW)

- Decision followed the push-back of community & environment advocates

The Bay Area



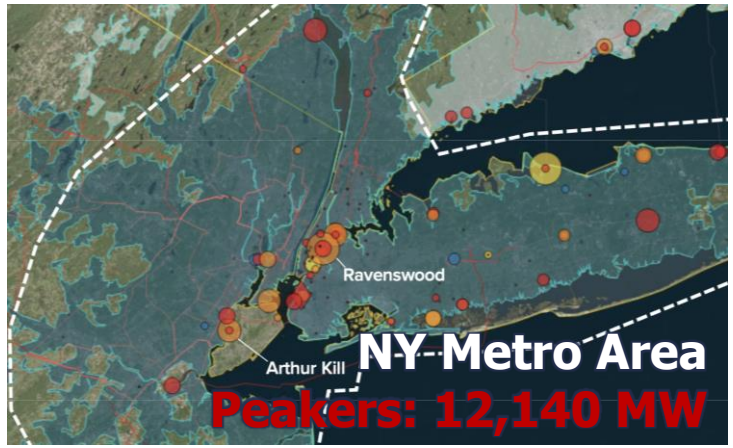
East Bay CCA replaces Oakland peaker with 20 MW (4-hr) battery and home solar+ storage

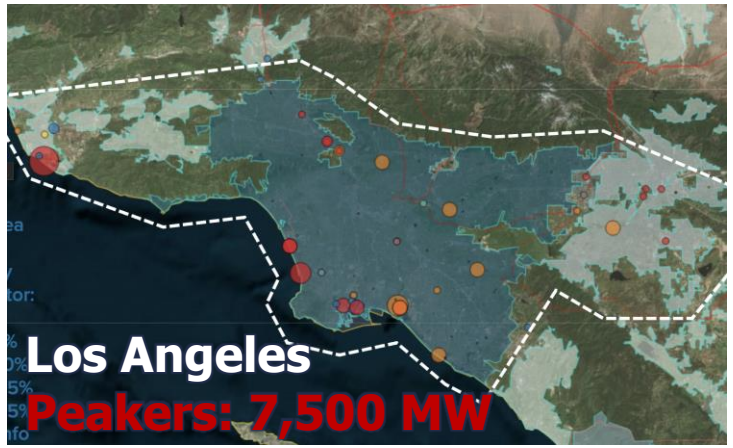
- 2 MWh of batteries on 500 low-income units in the area before 2022.

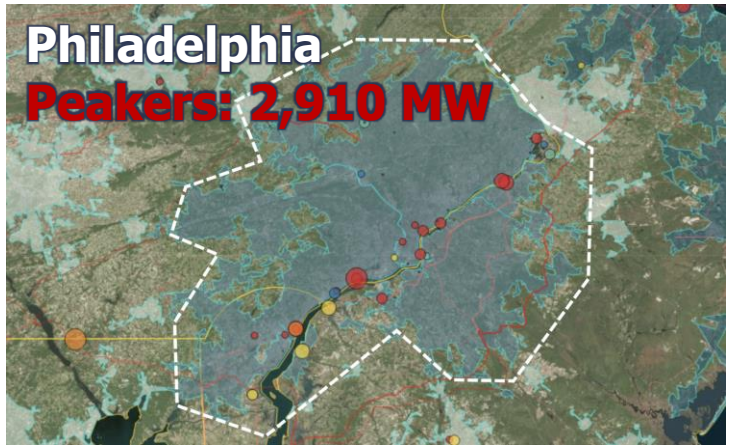
Storage is already replacing urban peakers around the country

Next Steps

Cities across the country face the challenge of cleaning their local energy supply





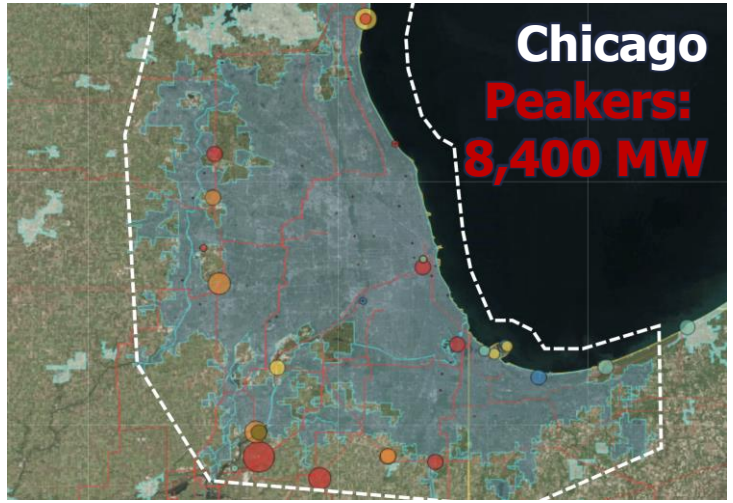


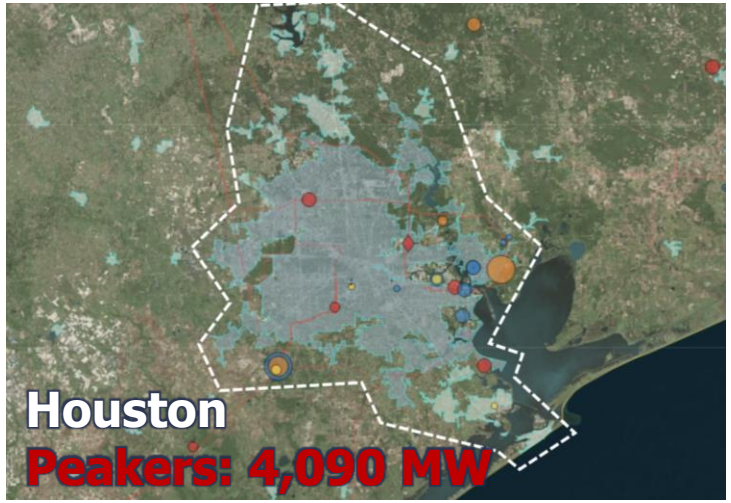
Urban Area

Gas plants by capacity factor:

- < 5%
- 5 - 15%
- 15 - 40%
- 40 - 65%
- 65 - 95%
- No C.F. info

Peaker Plants





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