The PEAK Coalition Presents:

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

April 21, 2021
WEBINAR LOGISTICS

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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)
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.
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 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 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

### NYC Peaker Replacement

## Focus of Today’s Discussion

<table>
<thead>
<tr>
<th>The Challenge</th>
<th>The Solution</th>
<th>What’s Next</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Why have peakers been needed historically?</td>
<td>+ Retire all New York City peakers by 2030</td>
<td>+ Work still ahead for achieving CLCPA vision in NYC</td>
</tr>
<tr>
<td>+ What environmental damage do peakers cause?</td>
<td>+ Replace with combination of rooftop solar, storage, offshore wind, energy efficiency</td>
<td>+ Policy actions needed to advance this vision</td>
</tr>
<tr>
<td>+ What’s the impact on communities?</td>
<td></td>
<td>+ Lessons and applications for other cities</td>
</tr>
</tbody>
</table>
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 NOx emissions on high ozone days
- Cost ~$375 million annually in pollution burden
Emissions impacts

Local Pollutants

+ Peakers emit \( \text{SO}_2 \) and \( \text{NO}_x \), precursors of \( \text{PM}_{2.5} \) 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 \( \text{CO}_2 \)
+ 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
+ \( \text{CO}_2 \) 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
We focused on the oldest and least-used power plants in NYC.

NYC Fossil Fueled Power Plant Fleet

6 GW of Peaker are prime candidates for retirement due to age and usage levels.
Key Ingredients: Wind, Storage, Solar and Energy Efficiency

- **Offshore Wind**: Significant energy resource that can interconnect directly into the city.
- **Rooftop Solar**: Local, clean energy that can be located in communities.
- **Storage**: Helps to balance renewable energy, increase flexibility, and meet peak demand period.
- **Energy Efficiency**: Helps reduce peak energy demand in the city and save customers energy.
**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**
Off-Shore Wind can connect directly to NYC

Many NY off-shore wind resources may interconnect into NYC

Source: Strategen based on NYSERDA, 2018 & 2020 Offshore Wind Solicitation Awards
NYC Rooftop Solar is low relative to the rest of the state

Only 6% of all NY rooftop solar has been installed in the city; NYC represents about a third of the population of NY state.

NREL estimates NYC rooftop solar potential of 8 GW.


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

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THE SOLUTION

NYC Incremental Energy Efficiency

Forecast by NYISO
THE SOLUTION

Storage and renewables can effectively replace peakers

NYC Clean Generation, 2030

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

Most new resources are already required as part of state law, but some additions will be incremental to the existing plan
### Peaker Retirement Roadmap

#### Units to retire by 2025

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

#### Units to retire by 2030

<table>
<thead>
<tr>
<th>Facility</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthur Kill ST (Units 2,3)</td>
<td>912</td>
</tr>
<tr>
<td>Astoria ST (Units 3, 5)</td>
<td>763</td>
</tr>
<tr>
<td>East River ST (Unit 7)</td>
<td>200</td>
</tr>
<tr>
<td>J.J. Seymour</td>
<td>94</td>
</tr>
<tr>
<td>Kent</td>
<td>47</td>
</tr>
<tr>
<td>Pouch</td>
<td>47</td>
</tr>
<tr>
<td>Ravenswood ST (Units 1, 2)</td>
<td>800</td>
</tr>
</tbody>
</table>

**Total retired capacity:**

- 2020: 6,094 MW
- 2025: -3,231 MW (6,094 MW - 2,863 MW)
- 2030: -2,863 MW

**Total capacity in 2020:** 6,094 MW

**Total capacity in 2025:** 2,863 MW

**Total capacity in 2030:** 0 MW
**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)

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**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.

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**Energy Storage Cost Effectiveness**

- Health & Mortality Benefits
- Climate Change Mitigation
- Resiliency
- Job Creation

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

**NYC Incremental Energy Efficiency**
CLCPA sets ambitious climate goals for NY

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 CO₂ Reduction through Energy Efficiency and Electrification**
- **85% Reduction in GHG Emissions by 2050**
### Key Policy Actions

<table>
<thead>
<tr>
<th>Grid Operators</th>
<th>State Policy Makers</th>
<th>Local Officials</th>
</tr>
</thead>
</table>
| + NYISO to pursue fair compensation of storage and renewables that fully values their grid contributions | + 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
Cities across the country face the challenge of cleaning their local energy supply

**NY Metro Area**
Peakers: 12,140 MW

**Los Angeles**
Peakers: 7,500 MW

**Chicago**
Peakers: 8,400 MW

**Philadelphia**
Peakers: 2,910 MW

**Houston**
Peakers: 4,090 MW

Urban Area
Gas plants by capacity factor:
- < 5%
- 5 - 15%
- 15 - 40%
- 40 - 65%
- 65 - 95%
- No C.F. info

**Peaker Plants**