REPLACING PEAKER PLANTS

DER Strategies for Sunset Park, Gowanus, and Bay Ridge

ELEMENTA

Disclaimer

CONTENTS

EXECUTIVE SUMMARY

In New York City, highly-polluting power generating facilities known as "peaker plants" are used to produce electricity when demand exceeds normal levels – primarily during the summer months when residents and businesses turn up their air conditioning during heat waves. Overwhelmingly, peaker plants run on fossil fuels, operate without modern pollution control equipment, and are located in or adjacent to communities of color and low-income communities. By some estimates, peaker plants in New York City emit twice as much carbon dioxide and 20 times as much nitrogen dioxide as regular power plants, contributing to chronic respiratory illnesses among the city's most vulnerable populations.[1]

New York City peaker plants, some of which are more than 60 years old, were originally intended to be used only for peak demand, but now run more frequently to meet the city's growing energy needs. Fortunately, there are cleaner alternatives in the form of distributed energy resources (DERs), such as renewable energy generation and battery storage, which can be deployed alongside building energy efficiency improvements and demand response measures to reduce air pollution in environmental justice communities. This study explores how these strategies can reduce runtime at the privately-owned Gowanus and Narrows peaker facilities, which are currently seeking a re-powering. These two facilities are part of the Bay Ridge load pocket - an area encompassing Bay Ridge, Gowanus, and Sunset Park, which is the focus of this 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, and iii) to identify areas for further analysis and research. Based on our analysis, combining distributed energy and load reduction strategies could result in a 38% reduction in peak electricity demand, theoretically corresponding to a 35-40% reduction in runtime at the Gowanus and Narrows generating facilities. Further analysis is needed to confirm these estimates and evaluate how DER strategies relate to broader initiatives to reduce greenhouse gas emissions and promote environmental justice in NYC.

PROJECT APPROACH

Overview

To evaluate the impact of each strategy, we started by building an urban-scale energy model, calibrated to existing conditions in the study area. Having a calibrated baseline model is an important foundation for analyzing future scenarios as it allows us to simulate energy use in the study area under different conditions. The baseline model is also an important tool for understanding how energy is used in the study area and what drives peak electricity demand. The baseline model is based on building typologies, which represent groups of similar buildings in the study area that exhibit similar patterns of energy use. For each typology, we created planning-level energy models and scaled the results by the relative size of each typology in the study area. The resulting urban-scale model represents the aggregated loads of the building-scale typology energy models.

Typology Identification

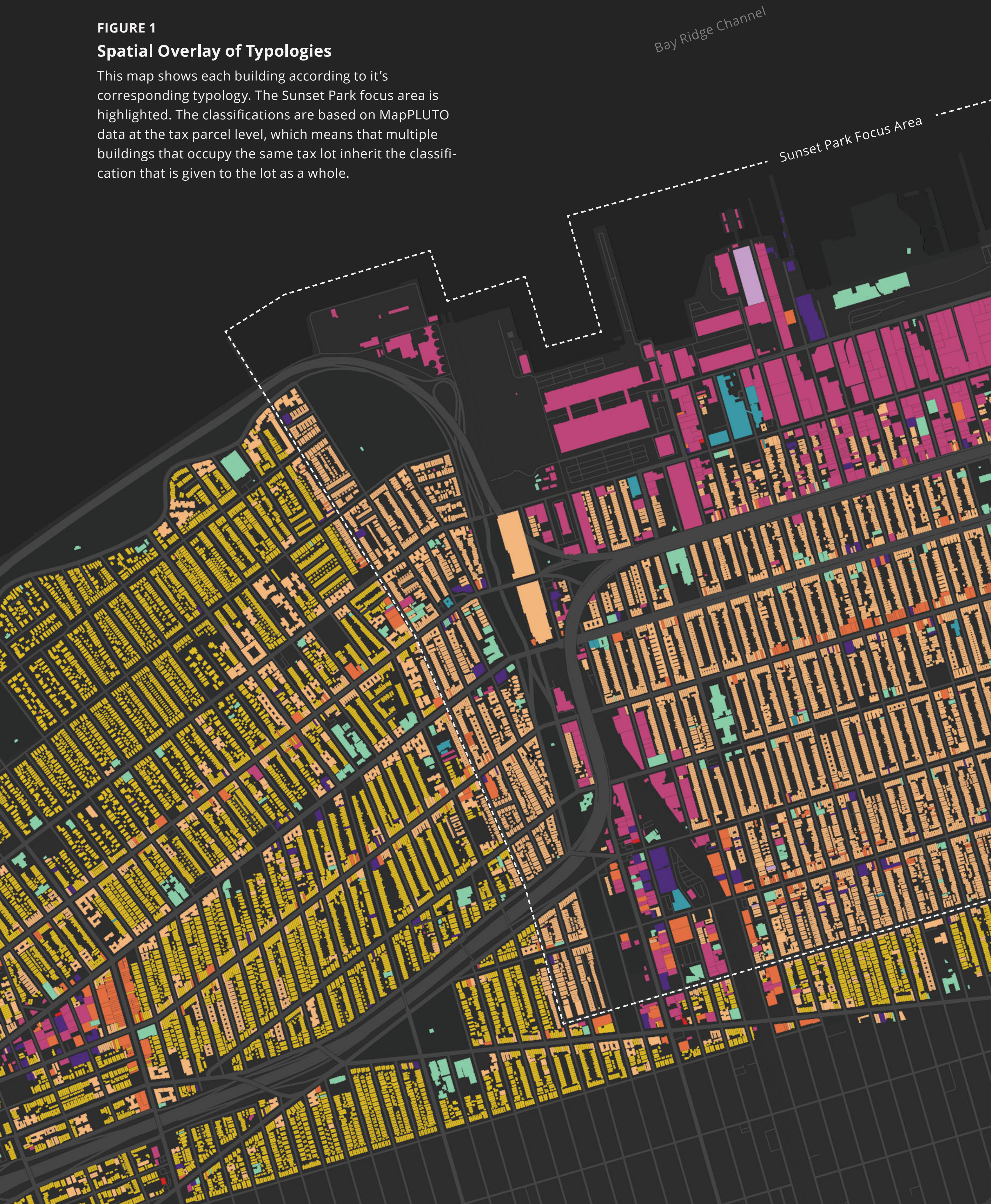
To identify the most appropriate typologies for this study area, we used three main datasets: i) 2018 Local Law (LL) 84 benchmarking data, ii) 2016 LL87 audit data, and iii) 2020 MapPLUTO tax assessor's data. The Local Law 84 benchmarking data contains information about annual energy use for buildings that are greater than 50,000 square feet.[2] The LL87 dataset represents a more limited set of buildings but includes more detailed information about energy use and building characteristics.[3] And finally, the MapPLUTO data combines land use and geographic information for each tax lot in the city with the Department of Finance's Digital Tax Map, and includes a number of important building level data points including building size, vintage, defining architectural features, renovation history, etc. Unlike the LL84 and LL87 data, the MapPLUTO dataset theoretically covers every building in the study area.

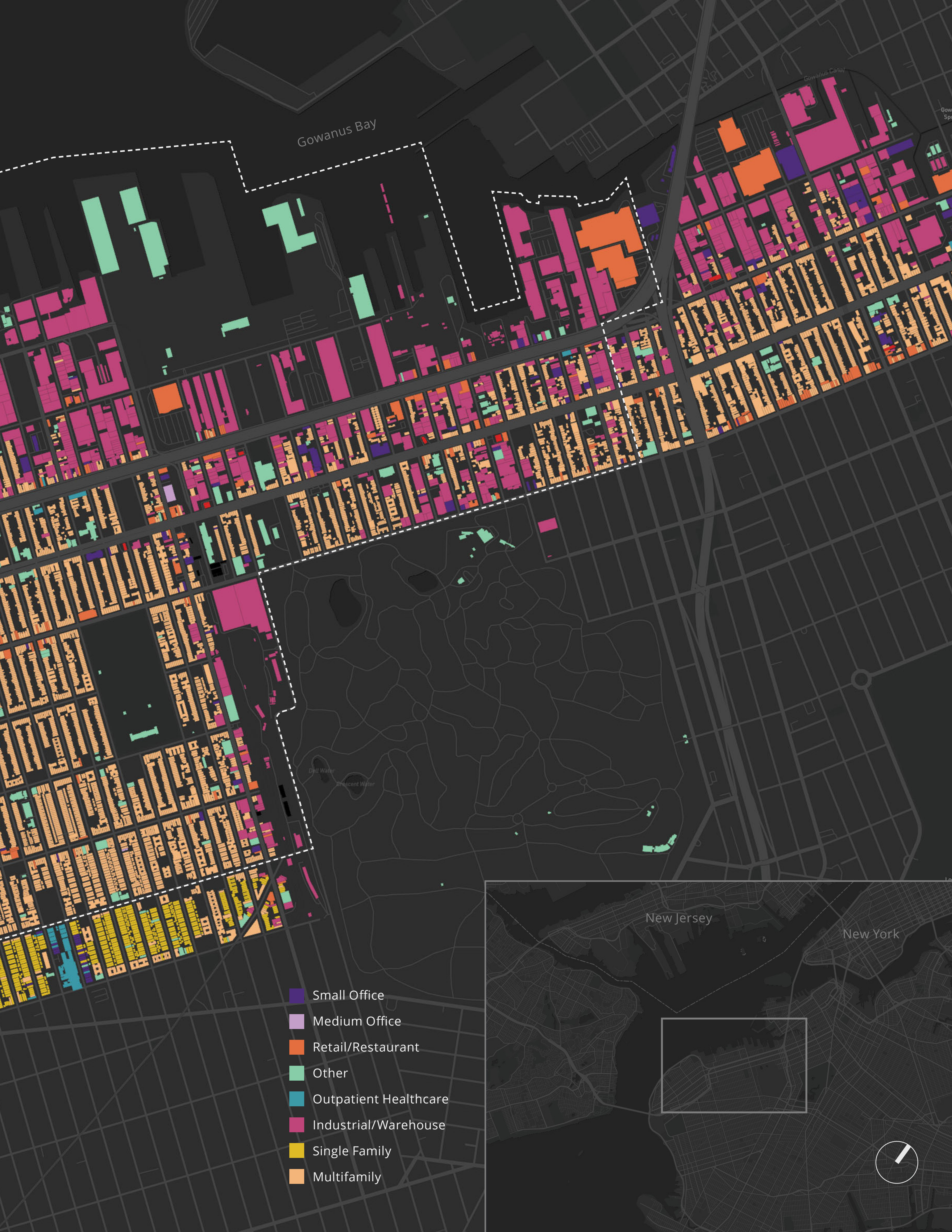
From these three datasets, we identified eight typologies in the study area: small office (<10,000 gsf), medium office, retail/restaurant, outpatient healthcare, industrial/warehouse, single-family, multifamily, and institutional. Institutional buildings include schools and cultural or religious centers such as churches, synagogues, and mosques. Of these eight, the most predominant typology in the Bay Ridge load pocket is multifamily residential, which

FIGURE 1

Spatial Overlay of Typologies

This map shows each building according to it’s corresponding typology. The Sunset Park focus area is highlighted. The classifications are based on MapPLUTO data at the tax parcel level, which means that multiple buildings that occupy the same tax lot inherit the classification that is given to the lot as a whole.



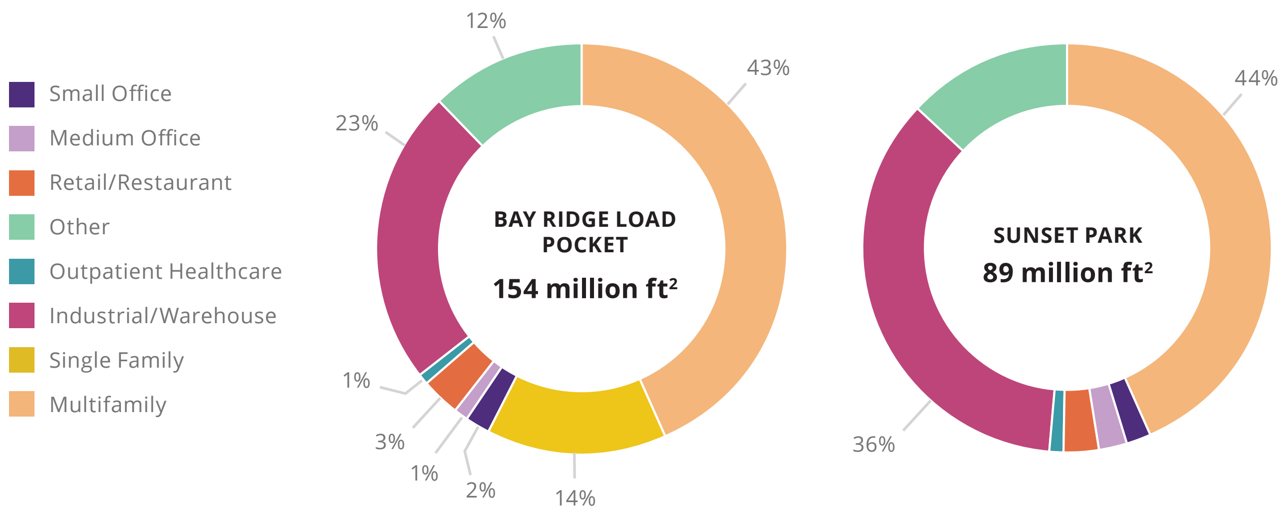


Gowanus Bay
New Jersey
New York
Small Office
Medium Office
Retail/Restaurant
Other
Outpatient Healthcare
Industrial/Warehouse
Single Family
Multifamily

FIGURE 2

Breakdown of Floor Area By Typology

The Bay Ridge load pocket includes roughly 154 million ft² of floor area. Sunset Park has roughly 89 million ft², with the majority of buildings classified as multifamily or industrial/warehouse.



accounts for roughly 43% of the total building area, followed by industrial/warehouse, which accounts for 23% of the total area. The majority of the industrial/warehouse buildings are in Sunset Park, which includes NYC's largest Significant Maritime Industrial Area (SMIA). Figure 2 shows a breakdown of the entire Bay Ridge load pocket by typology, alongside the specific breakdown for Sunset Park.

Baseline Model Development

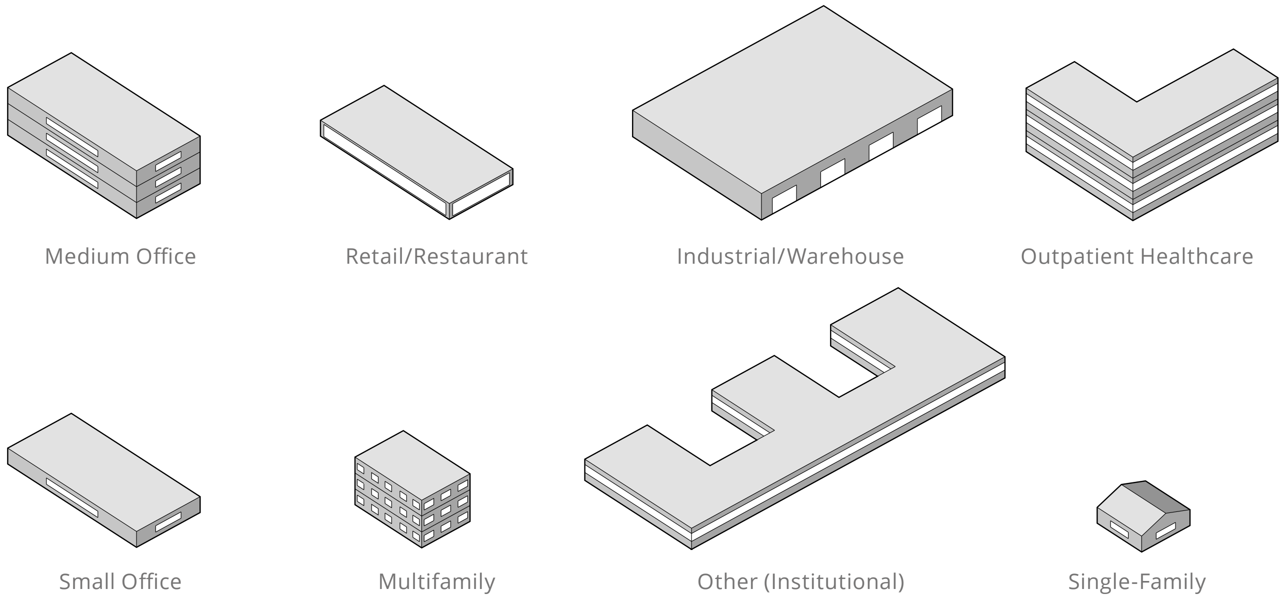
For each building typology, we created a baseline calibrated energy model, based loosely on prototype models from the Pacific Northwest National Laboratory (PNNL) that we used as the starting point for our input assumptions. The PNNL models helped us establish the general bounds for input parameters such as LPD and EPD loads and schedules, ventilation loads, cooling and heating setpoints, system types, and construction properties, which we further refined so that the energy use intensity aligned with measured data from the LL84 benchmarking dataset.

Calibrating the aggregated urban-scale energy model was an iterative process that involved making small changes to the typology energy models and comparing the aggregated results to Utility Energy Registry (UER) data[4] and hourly electricity use estimates from Con Edison.[5] The goal of this process was to ensure the aggregated energy use in the urban-scale model matched measured, real-world data. To quantify how closely the modeled data matched measured values, we used the ASHRAE Guideline 14 definition of "Goodness-of-Fit" (GOF). GOF is a weighted combination of normalized mean bias error (NMBE), which quantifies the percentage error between measured and modeled values summed over the year, and the coefficient of variation of root

FIGURE 3

Graphic Representation of Typology Models

The geometry of the energy models is based on PNNL prototype models. The goal of the typology modeling process is to create a simple planning level model to aggregate in the urban-scale model.



mean square error (CV_{RMSE}) which characterizes the variability of difference on a month by month basis. It is expressed as a single statistical index that represents an overall rating of simulation results. In accordance with ASHRAE Guideline 14 recommendations, a 3:1 weight is assigned for NMBE compared to CV_{RMSE}.[6] For the aggregated urban energy model, the NMBE was less than 4, and the CVRMSE was below 7, for a combined GOF of approximately 4. We consider any GOF value below 15 to represent a well-calibrated model.

Based on our analysis, the average annual electrical energy use intensity (EEUI) of buildings in the study area is between 34 and 318 KWh/m^2-yr (11-100 kbtu/ft^2-yr). Single family dwellings generally have the lowest EEUI, while outpatient healthcare facilities, with outsize cooling and equipment loads, have the highest. On an annual basis, industrial/warehouse facilities account for 36% of electricity use throughout the year, followed by multifamily residential (27%) and 'other' (primarily education and institutional buildings, which account for 16%). Equipment and process loads constitute the largest drivers of energy use, primarily in industrial and warehousing facilities.

In terms of monthly energy use, Figure 4 shows the comparison of the aggregated modeled data to measured electricity use from the 2018 UER data, broken down according to UER classifications: residential buildings, small commercial buildings, and other buildings (primarily large commercial, institutional, and industrial facilities). At the time of this analysis, the 2018 data was the most recent available for a complete calendar year.

In terms of hourly electricity use, Figure 5 shows

FIGURE 4

Monthly Electricity Use

Monthly electricity use shown for the three classifications of buildings in the Utility Energy Registry data: Residential, Small Commercial, and Other. The modeled data is shown as a solid line, while the measured data is shown as a dotted line.

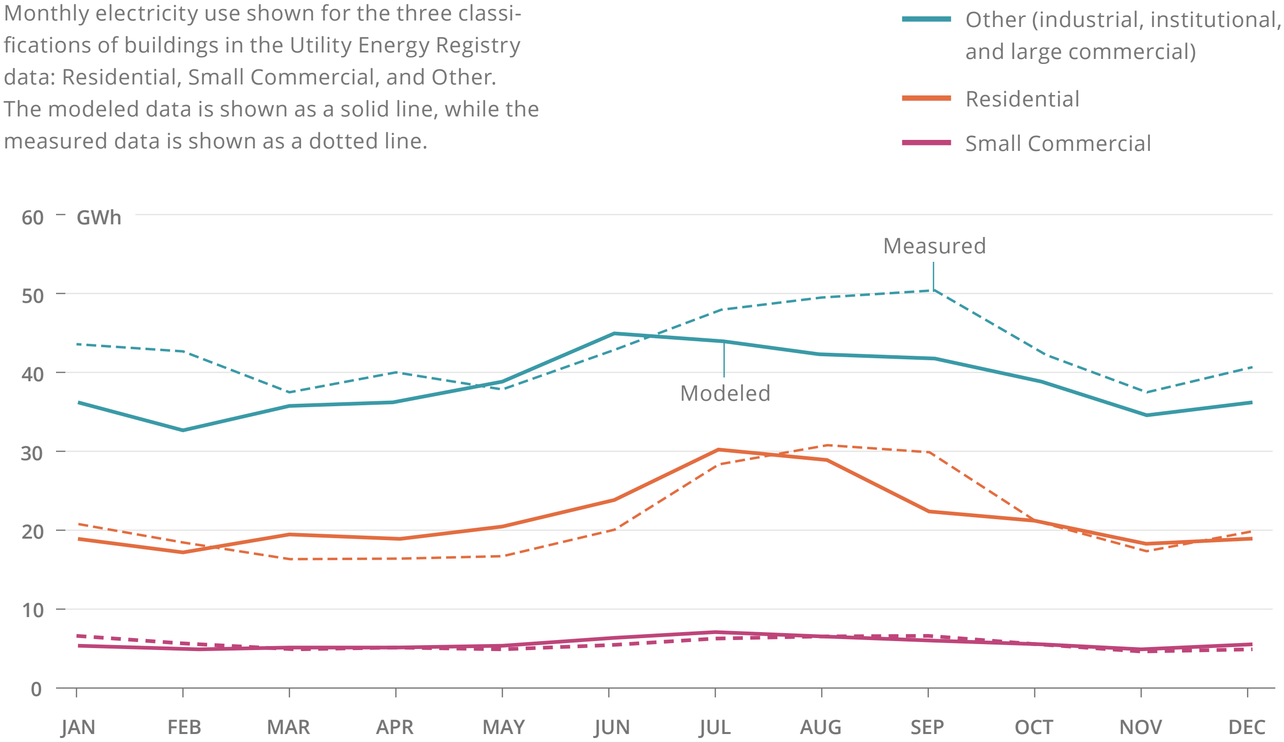
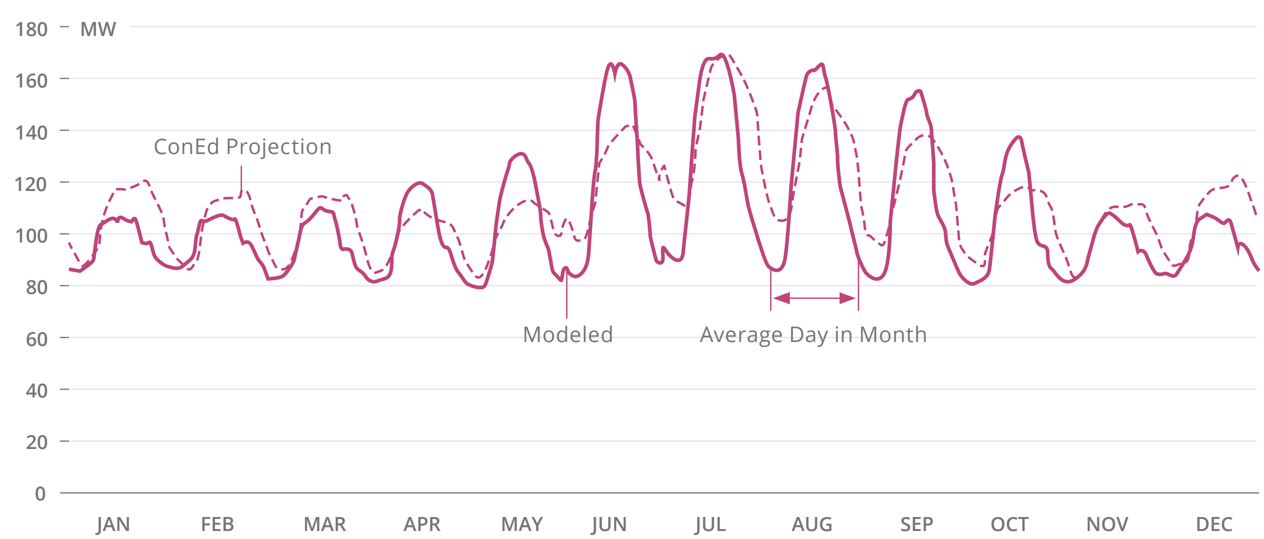


FIGURE 5

Average Day Hourly Electricity Use

This graph shows the average hourly demand profile for the study area for each month of the year. The modeled data is shown as a solid line, while the measured data is shown as a dotted line.



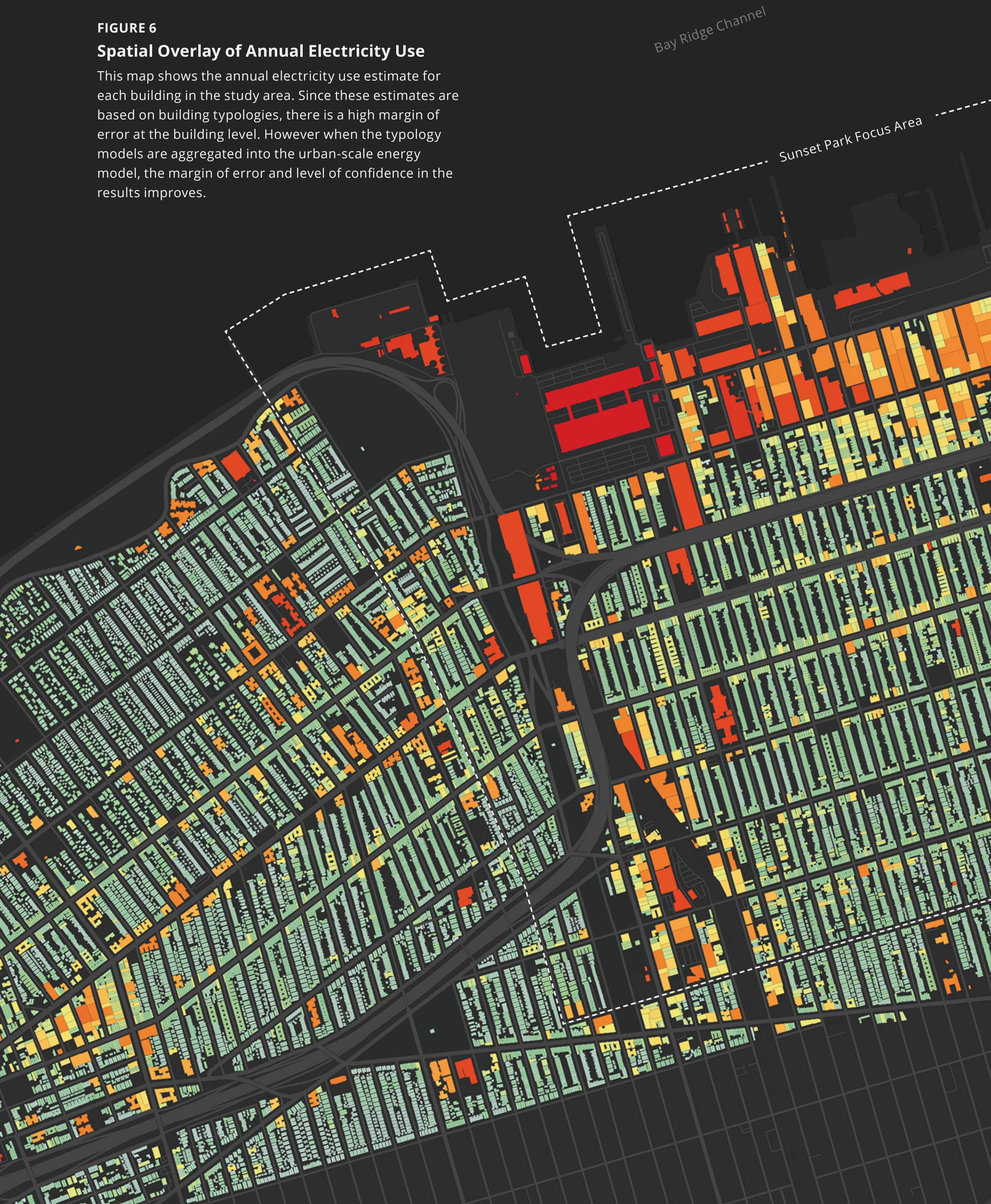
the comparison of the aggregated modeled data to hourly electricity use projections from ConEd. The ConEd projections represent the anticipated demand for 2021, based on historical trends. However, the annual amount of electricity use is roughly equal to the 2018 UER totals. The graph shows the average hourly demand profile for each month of the year. The average summertime peak demand, for building energy use, is around 170MW, although it can reach 232MW on the hottest days of the year. There is also a consistent baseload between 80-100MW.

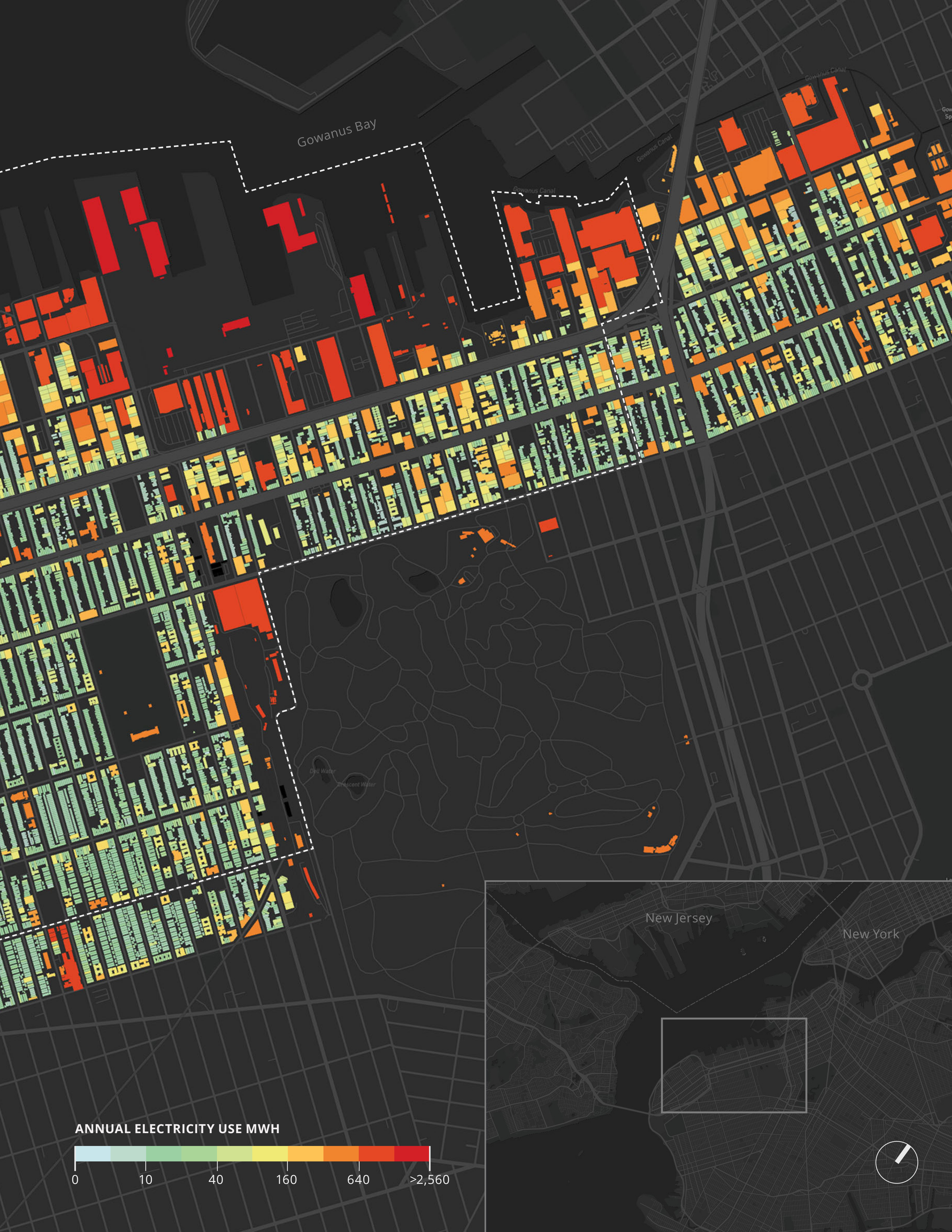
There will inevitably be small discrepancies between the modeled and measured data, on an hourly basis, due to the limited capacity of the typology models to fully capture load diversity, and the use of a typical meteorological year (TMY) weather file for simulating energy use. Nevertheless, the urban-scale energy model is a useful surrogate for understanding hourly demand and estimating the impact of various DER strategies on peak demand reduction.

FIGURE 6

Spatial Overlay of Annual Electricity Use

This map shows the annual electricity use estimate for each building in the study area. Since these estimates are based on building typologies, there is a high margin of error at the building level. However when the typology models are aggregated into the urban-scale energy model, the margin of error and level of confidence in the results improves.




Gowanus Bay
Gowanus Canal
New Jersey
New York
ANNUAL ELECTRICITY USE MWH
0
10
40
160
640
>2,560

PEAKER PLANT OPERATION

Overview

The study area includes three peaker plants. Two of the plants - the Gowanus and Narrows generating facilities - are privately owned. The other plant, the Joseph Seymour 23rd St/3rd Ave Power Plant, is owned by the New York Power Authority (NYPA). The Gowanus Station is an oil and gas-powered plant, built in 1971, with a nameplate capacity of approximately 640MW. The Narrows Facility also runs on oil and natural gas and was built in 1972 with a nameplate capacity of 352MW. The Joseph Seymour facility is a 94MW natural gas facility built in 2001. In 2018, according to the EPA Air Markets Program Data, these three facilities had a combined runtime of roughly 2,400 hours.[7]

Figures 7 shows the number of operating hours and the average load, at each hour of the day. In the study area, the average load is highest between 5pm and 7pm, typically when workers return home, switch on lights, and turn up the air conditioning. The average combined load of these three peaker plants during this time is roughly 350MW. Notably, this is significantly greater than the average peak demand projected by ConEd for the Bay Ridge load pocket (~170MW). In terms of peak output, Figure 8 shows the peak combined load for each day between July and September. Note that the peak (>600MW) is more than double the total peak demand for building energy use in the study area (232MW), indicating that the energy being generated by these two facilities is being consumed outside the study area, though more research may be needed to determine how energy is distributed in Brooklyn.[8]

It is also noteworthy that for approximately 35% of the total runtime hours, the Gowanus and Narrows facilities were operating at less than 10% of their nameplate capacity, which could indicate the use of standby mode or idling. This is not only a public health concern, but a financial concern as well, since the owners of these two facilities are paid billions of taxpayer dollars even when the facilities are not fully utilized.[9]

Correlation With OA Temperature

As peaker plants tend to operate to meet summertime peak loads, there is a strong correlation between peaker plant operation and outside air temperature. When tempera-

FIGURE 7

Peaker Plant Average Load

The graph below shows the average load during operating hours, combined with the frequency of operation at different times of the day (secondary axis), for the Gowanus and Narrows facilities.

Gowanus
Narrows
Joseph Seymour

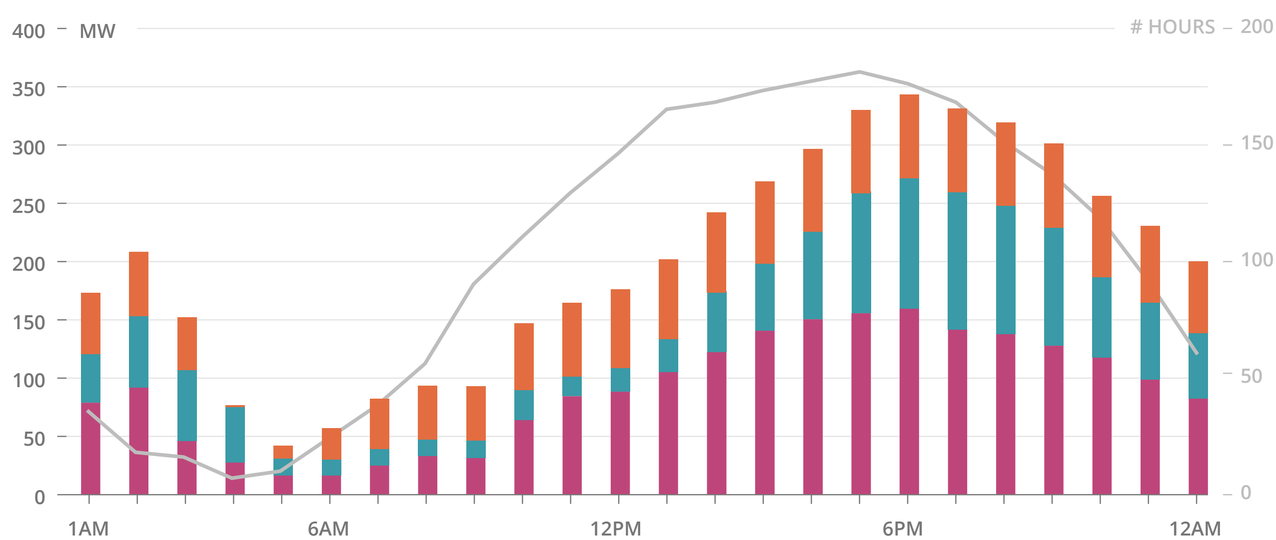


FIGURE 8

Peak Load July-September

The graph below shows the peak load for each day in 2018 between July and September. Note how the overall magnitude of peak load (>600MW) is more than double the building peak demand (232MW).

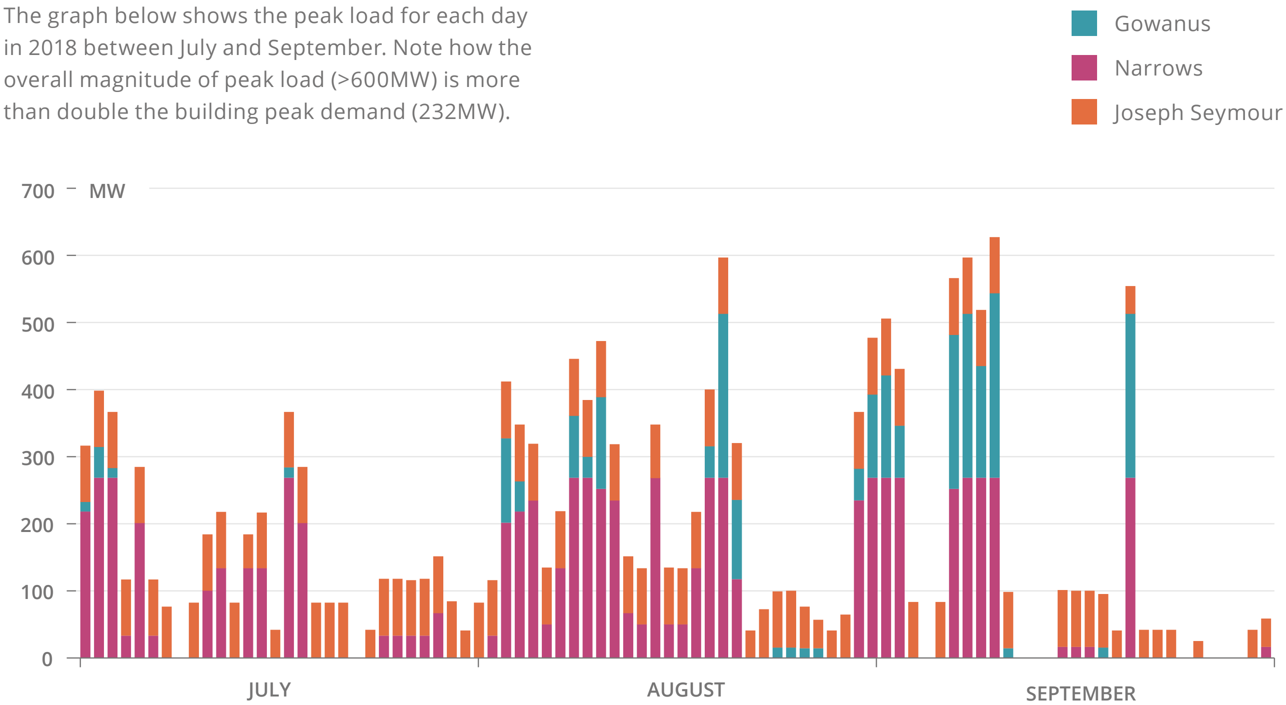
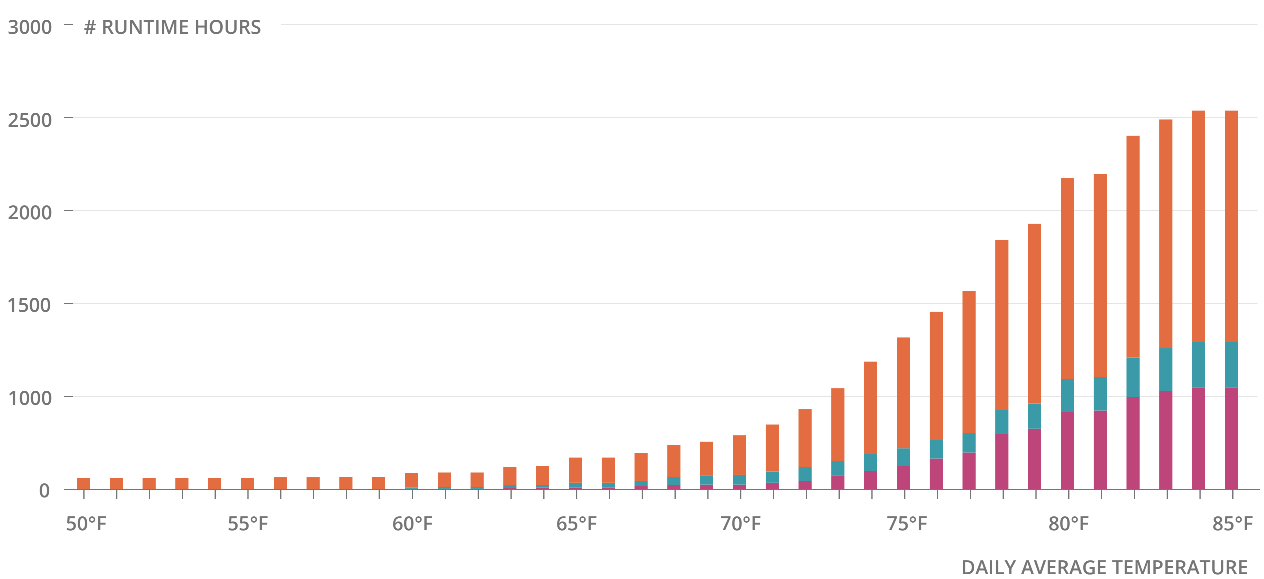


FIGURE 9

Cumulative Hours vs Daily Average Temperature

The number of runtime hours increases along with increasing daily average temperatures, starting around 60°F, due primarily to increased cooling loads during the summer months.



tures increase, residents and businesses turn up their air conditioning, which drives peak demand. Based on our analysis of the 2018 EPA Air Markets Program Data, the Gowanus and Narrows generating facilities begin operating when average daily temperatures exceed 60°F, with increasing temperatures corresponding to increasing loads. The Joseph Seymour facility is operated more frequently, and at lower average outside air temperatures, but there is still a strong correlation between outside air temperature and overall runtime. Figure 9 shows the number of operating hours compared to the average daily outside air temperature.

The relationship between outside air temperature and peaker plant runtime is especially important to consider in the context of climate change. Increasing temperatures and more severe heat waves will continue to drive peak demand in the future unless we implement strategies to either reduce loads (e.g. energy efficiency and demand response) or shift loads to off-peak hours (e.g. demand response and energy storage). These load shedding and load shifting strategies will be equally as important as renewable energy generation when it comes to creating a cleaner and more resilient energy infrastructure.

DER & EFFICIENCY STRATEGIES

Overview

For this analysis we used the calibrated baseline urban energy model to evaluate various DER strategies to determine what impact, if any, these strategies would have on peaker plant operation in the study area. The goal of this analysis was to identify the strategies that are most effective in terms of replacing the peaker plants in Sunset Park. After identifying these strategies, the community can develop a targeted implementation plan that will promote the most just and equitable transition toward cleaner energy solutions.

We modeled the following set of strategies individually, and as packaged scenarios: PV generation, battery storage, demand response, and energy efficiency. This is far from an exhaustive list of strategies, but it illustrates the range of potential high-level solutions – from generation to efficiency – that will ultimately be necessary to completely eliminate peaker plants in the study area, and throughout New York City. All of these strategies have been successfully implemented in other areas of the country, and in some cases in other areas of New York City, albeit on a smaller scale. Each of the referenced technologies, from photovoltaic panels to lithium-ion batteries, are mature and have well-established funding mechanisms.

PV Generation

Solar PV is one of the most cost-effective ways to build generating capacity within the study area. Solar PVs can be installed over parking lots, vacant land, and or even integrated into streets and sidewalks. However, given the uncertainty about rezoning and redevelopment plans in the area, we assumed that the most viable location for solar photovoltaics is existing building rooftops. There are many different development models for distributed rooftop PV – from owner-operated systems to community solar projects. Power generated by PVs would help offset some of the demand that occurs during the day, particularly from 10AM-2PM, reducing the need for peaker plants. In addition, solar power would reduce carbon emissions and, if configured correctly, reduce the need for additional transmission and distribution infrastructure in the study area. In New York City, premium PV panels (>20% efficiency) generate about 20 KWh/ft^2yr when operating under normal conditions.

We assessed three scenarios for PV generation: low, medium, and high. The low scenario assumes 1.5 million ft^2 of roof area (3% of total roof area in the study area) and achieves a 4% reduction of both peak and annual demand. The medium scenario assumes 4 million ft^2 of roof area (8% of total roof area) and achieves a 12% reduction of peak demand and 11% reduction of total demand. The high scenario assumes 6.1 million ft^2 of roof area (12% of total roof area) and achieves a 16% reduction of both peak and total demand. The total installed capacity for the low, medium, and high scenarios is 26MW, 71MW, and 106MW respectively. For size comparison purposes, there is currently about 200MW of installed solar capacity across all 5 boroughs of New York City. A typical multifamily row house in Sunset Park and Gowanus could theoretically accommodate a 5KW system, assuming there are no obstructions on the roof and decent solar exposure. In contrast, one of the large industrial buildings along Sunset Park's industrial waterfront could accommodate a 500KW-1MW system. For context, New York State has a target of 6,000MW installed photovoltaic capacity by 2025.

TABLE 1

Summary of PV Impact

	LOW	MID	HIGH
Roof Area (%)	3%	8%	12%
Installed Capacity (MW)	26MW	71MW	106MW
Generation (GWh/yr)[12]	37GWh	99GWh	148GWh
Peak Reduction (MW)	9MW	27MW	36MW
Peak Reduction (%)	4%	12%	16%

Battery Storage

Battery storage is another cost-effective mechanism for reducing peak demand. Battery storage systems will also improve infrastructural resiliency by providing backup power in the event of outages and would reduce the need for additional transmission and distribution capacity upgrades, the cost of which would likely be transferred to utility ratepayers. Like PV systems, there are a variety of deployment strategies when it comes to battery storage, particularly with respect to battery dispatch and control logic. For this analysis, we assumed optimal charging and discharging sequences to maximize peak demand reductions. In realty, a distributed battery storage system would operate according to localized needs and constraints, but this approach helps establish the theoretical potential of battery storage in the study area. Furthermore, we assumed a 1:4 power-energy ratio (1MW to 4MWh), which would provide resiliency benefits compared to smaller capacity battery systems.

We employed a similar low, medium and high scenario analysis for battery storage. The evaluated battery sizes, 30MW, 80MW and 120MW, result in a 8%, 17% and 24% peak reduction, respectively. After 80MW the impact of battery storage on peak demand in the study area diminishes, as both peak and off-peak demand approaches the daily average. For size comparison purposes, the Tesla Powerwall – a lithium-ion battery designed for residential applications – has a capacity of 14KWh, with a peak power rating of 7KW. The Tesla Megapack, designed for utility-scale storage applications, has a 3MWh capacity, with a peak power rating of 1.5MW. Theoretically, it would be possible to achieve the 80MW scenario with 22,500-23,000 Powerwalls, or 100-110 Tesla Megapacks. For context the New York State target for installed storage capacity is 1,500MW.

TABLE 2

Summary of Battery Storage Impact

	LOW	MID	HIGH
Battery Capacity	30MW / 120MWh	80MW / 320MWh	120MW / 460MWh
Peak Reduction (MW)	18MW	40MW	56MW
Peak Reduction (%)	8%	17%	24%

Demand Response

Demand response is yet another cost-effective way to reduce peak demand. Demand response represents a short-term reduction in system demand, "typically four hours or less in duration, that [is] provided by individual customers (or aggregated groups of customers) curtailing their electricity consumption or deploying emergency generation on request."[10]

Our analysis focuses on load curtailment rather than generation, which can be achieved by shutting off non-critical systems or, as is common in the residential market, adjusting temperature setpoints to reduce peak cooling demand. Con Edison has an existing demand response program, but our assumption is that it is underutilized and could be expanded to achieve at least a 12% reduction in peak demand. This is based on reports by Summit Blue Consulting and the Electric Power Research Institute (EPRI), which outline the projected savings from high participation in demand response programs.[11]

According to their analysis, offices represent the greatest opportunities for load reductions in New York City, followed by the single-family and multifamily residential sector. In our study area (Sunset Park, Gowanus, and Bay Ridge), all of the office and industrial/warehouse buildings should be enrolled in a demand response program. However, as the COVID-19 pandemic has shifted energy use from offices to residential buildings, the multifamily sector represents an equally strong opportunity for significant demand response savings. While theoretically harder to administrate, and to contractually guarantee specific load reductions, residential demand response programs will be an essential tool to curtail peak demand for the foreseeable future.

TABLE 3

Summary of Demand Response Impact

	HIGH PARTICIPATION
Peak Reduction (MW)	27MW
Peak Reduction (%)	12%

Energy Efficiency

Building energy efficiency will be essential for achieving deep reductions in peak demand and for eliminating the use of peaker plants in New York city. Similar to distributed generation, storage, and demand response, energy efficiency retrofits will improve resiliency (by keeping temperatures at comfortable levels during power outages), and will reduce the need for costly transmission and distribution capacity upgrades. To model the impact of energy efficiency, at a high-level, we assumed that all buildings in the study area could achieve a level of performance commensurate with the latest energy codes. This is roughly equivalent to the ASHRAE 90.1 2016 standard. In addition, we assumed that the average lighting power density of buildings in the study area could reduce by 20%.

This level of energy efficiency, which could be achieved through envelope and system upgrades, would reduce peak demand by 11%. It is important to note that energy-efficiency carries other benefits as well, such as improved occupant comfort, reduced utility bills, and greater resiliency. Energy efficiency will also be necessary to avoid increases in wintertime peak demand as buildings switch from combustion-based heating systems to electric heat pumps. Fuel switching is perhaps the most important strategy for decarbonizing the building sector, and energy efficiency is necessary to make it work.

Packaged Scenarios

TABLE 4

Summary of Energy Efficiency Impact

	UPGRADES TO ASHRAE 90.1 2016
Peak Reduction (MW)	26MW
Peak Reduction (%)	11%

The best approach to reducing peak demand and eliminating peaker plants in the study area is to combine strategies for maximum impact. Combining strategies also provides more flexibility in terms of financing and development strategies, to optimize outcomes for equity and environmental justice. We combined the strategies discussed above into three packaged scenarios:

1. Load Reduction: This package includes energy efficiency and demand response strategies.

2. Generation and Storage: This package focuses on distributed solar generation and battery storage, with 8% roof coverage for PV's (71MW installed capacity) and 80MW / 320MWh of battery storage.

3. Combined: This package combines load reduction strategies with 8% rooftop coverage of PVs (71MW installed capacity) and 30MW / 120MWh of battery storage.

The impact of each package is outlined in Table 5 and in Figure 10. The combined package, which includes both load reduction and generation and storage strategies, achieves a 38% reduction in peak demand – roughly 88MW off the estimated peak of 232MW. This package also achieves a 20% reduction in overall electricity use, totaling more than 186GWh. Notably, incorporating energy efficiency retrofits and demand response strategies reduces the need for extra battery storage capacity, which is why the Combined scenario only includes 30MW / 120MWh of battery storage. Incorporating more battery storage would help further reduce peak demand, but it comes with diminishing returns.

FIGURE 10

Average Day Hourly Electricity Use

Average hourly demand profile for each month of the year for each packed scenario. Note how the combination of solar and battery storage creates a more even demand profile throughout the day, with minimal seasonal variation.

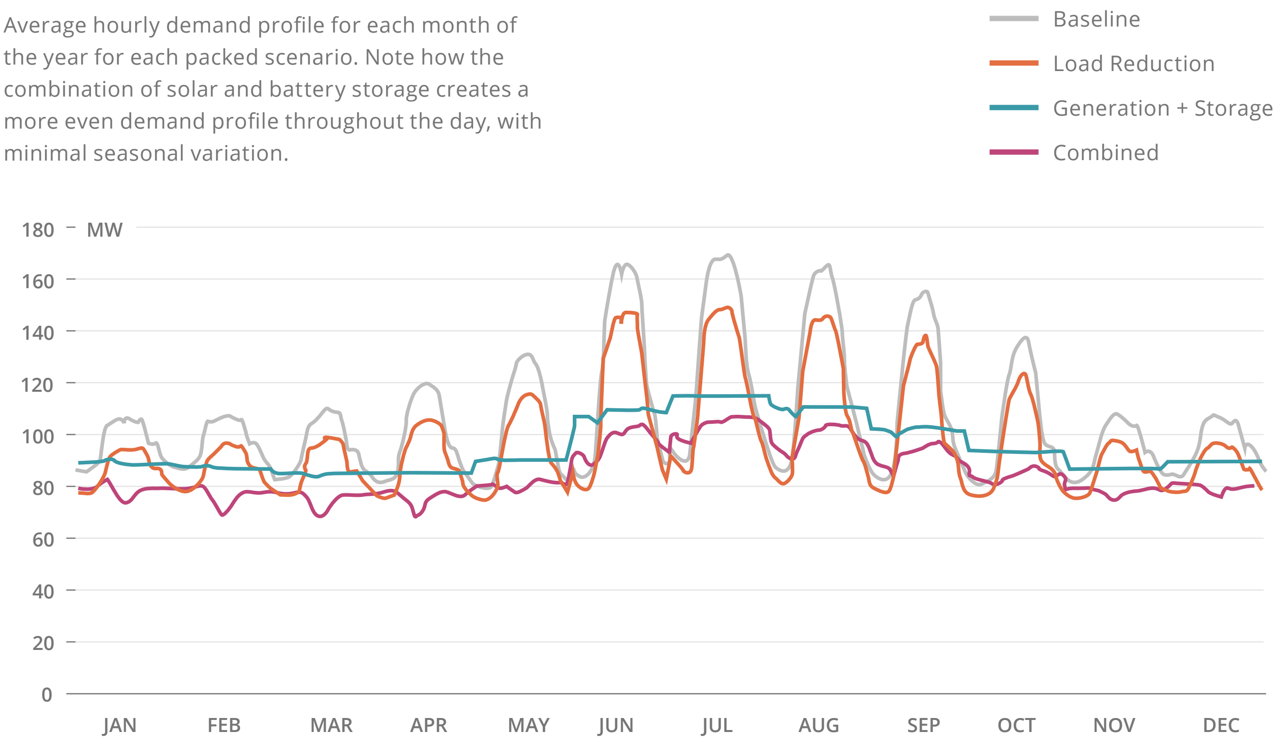


TABLE 5

Summary of Packaged Scenarios

PACKAGE DESCRIPTION	PEAK REDUCTION (%)	PEAK REDUCTION (MW)	TOTAL OFFSET (GWH)
Energy Efficiency (Retrofits + Demand Response)	20%	47MW	87GWh
Generation + Storage (71MW PV + 80MW/320MWh Battery)	32%	74MW	98GWh
Combined (Retrofits + Demand Response + 71MW PV + 30MW/120MWh Battery)	38%	88MW	186GWh

KEY FINDINGS & NEXT STEPS

Peak Demand Reduction
There are significant opportunities in the study area to reduce peak demand and peaker plant runtime. Based on our analysis, the theoretical potential for DER strategies, combined with energy efficiency and demand response, is approximately a 38% reduction in peak demand in the study area. This is based on aggressive, but realistic assumptions about PV deployment (71MW of total installed capacity), battery storage (30MW / 120MWh of battery capacity), energy efficiency, and demand response. Increasing the amount of PV and batteries, or further reducing energy use through energy efficiency upgrades and other load reduction strategies would result in higher savings, but those savings would come with diminishing returns, at least in terms of reductions to peak demand.

Reduced Peaker Plant Runtime
While it's difficult to estimate the impact this will have on peaker plant operation in the study area, it is likely these strategies would result in a 20% reduction in combined runtime at the Gowanus, Narrows, and Joseph Seymour facilities – from ~2,400 hours to ~1,940 hours. However, this is only a preliminary estimate, since it's unclear how the plants will be operated with reduced load, especially with respect to idling time and standby operation. Based on our analysis these two plants are serving loads outside our study area, which means that DER and load reduction strategies would need to be more widespread to fully eliminate these two plants. For a sense of scale, in 2018 the Gowanus, Narrows, and Joseph Seymour facilities had a peak combined output of over 600MW, while the peak demand in our study area, based on data from Con Edison, was just over 230MW. Replacing the entire generating capacity of these three facilities, using DER and load reduction strategies solely within the bounds of the study area, would be extremely challenging. However, by expanding the geographic extents of DER strategies, we can make a significant dent in peaker plant operation.

Environmental Justice
Reducing peaker plant runtime will lead to significant health benefits for environmental justice communities like Sunset Park that bear the brunt of polluting infrastructure like peaker

plants. The COVID-19 pandemic has hit environmental justice communities the hardest due to long term exposure to air pollution and historic health disparities. This study is an opportunity to support and work with frontline community leadership to replace polluting fossil fuel infrastructure, create well-paid clean energy jobs, and operationalize a Just Transition. This study also creates a replicable framework and innovative partnership model to help realize community-led clean energy projects.

Next Steps

This analysis is intended as a high-level assessment of DER, efficiency, and demand response strategies that provides a foundation for further exploration. While we have established the theoretical potential for these types of strategies, there is room for more detailed analysis related to siting and location of DER strategies, financing and procurement strategies, and even the impact of future decarbonization initiatives such as building electrification. The following is a list of questions for further research:

- What is the optimal strategy for siting renewable energy and battery storage systems?

- What is the optimal strategy for financing and operating distributed energy resources?

- What is the impact of building electrification (fuel switching) on peak electricity demand?

- What are the typical life cycle costs of energy efficiency upgrades with integrated PV and storage in multifamily buildings?

- How can we optimize battery control sequences to reduce peak demand?

- How can we design DER systems to promote resiliency and improve grid reliability?

The answers to many of these questions will depend on the availability of more granular data. This analysis was in some ways constrained by the lack of detailed information about hourly energy demand and peaker plant operation. Hourly load data for each of the typologies, based on a large sample size of buildings, would lead to a more robust bottom-up analysis of energy demand.

This could help shed light on opportunities for integrating DER strategies and implementing targeted energy efficiency upgrades. Similarly, having more detailed information about peaker plant operation, such as how the energy gets distributed and why these plants spend so much time idling, could help further identify opportunities for taking these plants offline and promoting environmental justice throughout New York City.

NOTES

1 New York Public Services Commission. This has also been reported on by Vice News in a September 25, 2020 article by Geoff Dembicki. "A Hedge Fund with Ties to Trump is Polluting One of Brooklyn's Poorest Communities"

https://www.vice.com/en/article/qj4yjb/sunset-park-brooklyn-pollution-narrows-peaker-trump

2 LL84 requires owners of large buildings to annually measure their energy use and water consumption and publicly disclose this information. Currently the law applies to commercial and multifamily properties that are greater than 50,000 GSF.

https://www1.nyc.gov/html/gbee/downloads/pdf/nycbenchmarkinglaw.pdf

3 LL87 data is not publicly available, but is well documented in the One City 80x50 Technical Working Group Report from 2016. That report summarizes the main findings of the audit data.

https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/TWGreport_04212016.pdf

4 NYSERDA is in the process of launching an online portal for utility generated energy consumption data. They have made preliminary Utility Energy Registry data available for Con Edison from 2016-2019. We used the 2018 data throughout this report.

https://www.nyserda.ny.gov/all-programs/programs/clean-energy-communities/community-energy-use-data

5 This information was provided to NYSERDA by Con Edison for the Bay Ridge load pocket. The projection refers to 2021 load estimates.

6 According to ASHRAE, the Guideline 14 procedures include, "the determination of energy, demand, and water savings from individual facilities or meters, applies to all forms of energy (including electricity, gas, oil, district heating/cooling, renewables, and water), and encompasses all types of facilities (commercial, industrial, and residential)."

https://energywatch-inc.com/ashrae-guideline-14/

7 The EPA Air Markets Program Data tool provides operating profiles for specific facilities. We pulled both 2018 and 2019 data though only 2018 data is referenced in this report. The ORISPL code for the Gowanus Generating Facility is 2494 and the code for Narrows is 2499.

8 There may also be other loads within the study area that are not accounted for in this analysis. For example, the MTA operating data was excluded from our analysis, though based on a preliminary dataset received from the MTA, that load represents only a small fraction (<2%) of the total electricity use in the study area.

9 Dirty Energy Big Money: How Private Companies Make Billions from Polluting Fossil Fuel Peaker Plants in New York City's Environmental Justice Communities - and How to Create a Cleaner, More Just Alternative. A Report by the Peak Coalition. May, 2020.

10 Summit Blue Consulting. Con Edison Callable Load Study, 2008.
https://uploads-ssl.webflow.com/5a08c6434056cc00011fd6f8/5a27177a5f89cb0001ea0c03_Schare%20Welch%20Edison%20Callable%20Load%20Study_Final%20Report_5-15-08.pdf

11 I. Rohmund, G. Wikler, A. Faruqui, O. Siddiqui, R. Tempchin. Assessment for Achievable Potential for Energy Efficiency and Demand Response in the U.S. (2010-2030).
https://www.aceee.org/files/proceedings/2008/data/papers/5_297.pdf

12 Annual generation estimates represent AC output after accounting for system and inverter losses.

ELEMENTA ENGINEERING
54 West 40th Street
New York, NY 10018