JANUARY 2026

SUNLIGHT AND STORAGE INTO SAVINGS

Evaluating Energy Cost Savings from Distributed Solar and Storage Additions in New York

---

Prepared by
Synapse Energy Economics

Authors
Selma Sharaf
Pat Knight
Deniz Karabakal

Prepared for
Coalition for Community Solar Access (CCSA)

CONTENTS

Executive Summary

New York is on track to meet its goal of 10 gigawatts (GW) of distributed solar by 2030, but it can aim higher. In light of federal barriers and uncertainty with respect to large-scale renewables and offshore wind, New York needs to take new action to reduce carbon pollution and meet the statutory mandates in its climate law. Ramping up distributed solar and storage can solve that need, and, at the same time, produce large savings for all consumers.

For this report, Synapse modeled the impacts of distributed solar and storage growth in New York under two scenarios: a "Business-as-Usual" (BAU) case that assumes 12.9 GW of distributed solar by 2035 (an extrapolation of the state's existing target of 10 GW by 2030), and a "Policy" case based on a new proposed target of 20 GW of distributed solar by 2035.

In both scenarios, energy storage complements solar deployment by extending the benefits of midday solar generation into the evenings when electricity demand is high. The BAU case assumes distributed storage levels consistent with those modeled in the New York Energy Plan Pathways "No Action" scenario, producing 0.9 GW of distributed storage by 2035. In the Policy case, we model 3.7 GW of distributed storage by 2035 (extrapolating the state's target of 1.7 GW of additional distributed storage by 2030).

We found the following:

$1 billion

- Increasing the level of distributed solar and storage deployment in New York results in an estimated $1 billion in **avoided energy costs** in 2035.

$542 | $481 million

- The energy cost savings from additional distributed solar and storage are **shared across the state**. Of the savings in 2035, approximately $542 million accrue upstate and $481 million downstate.

$87 | $46 per year

- **Avoided energy costs benefit all New York ratepayers**, regardless of whether they have installed solar or storage. These savings translate into average electricity savings of $87 annually for upstate residential customers and $46 annually for downstate residential customers.

56 percent

- Solar and storage are **valuable even in the winter months**, with 56 percent of energy cost savings occurring between November and March. Dispatch of these resources aligns with NYISO-identified winter reliability event hours.

11 percent

- Additional distributed solar and storage **avoid 59 Bcf of gas used for electricity generation** in 2035, protecting ratepayers from gas price volatility. This is equivalent to 11 percent of New York's total gas consumption for electricity generation in 2024.

$947 million

- Additional distributed solar and storage in the Policy case **reduce carbon dioxide emissions costs** by an estimated $947 million in 2035. There are several other benefits of distributed solar and storage, including capacity market cost reductions, avoided or deferred infrastructure upgrades, economic benefits, and public health benefits. These are meaningful but not quantified in this study.

New York Shows Major Potential for Expanding Distributed Solar and Storage

New York has a history of achieving and expanding its distributed solar and energy storage goals. As electricity demand rises due to electrification and large-load growth, maintaining this momentum will be key to providing customers with reliable and affordable power.

While distributed solar and storage have proven successful in the state, other clean energy sectors face challenges. Given federal barriers and ongoing uncertainty surrounding large-scale renewables and offshore wind, New York needs additional action to meet the statutory mandates of the *Climate Leadership and Community Protection Act* (CLCPA).[1, 2] This means doubling down on distributed solar and storage, which offer a more promising path forward.

New York reached its CLCPA target of 6 gigawatts (GW) of distributed solar by 2025 one year ahead of schedule.[3] This success was driven in part by the New York State Energy Research and Development Authority's (NYSERDA) NY-Sun Initiative, a public-private partnership designed to accelerate solar deployment and reduce costs.[4] Building on this progress, Governor Hochul directed NYSERDA and the Department of Public Service to expand the goal to 10 GW by 2030.

The 10 GW target includes ground-mounted, rooftop, and community solar projects, in which New York leads the country.[5,6] The state is on track to surpass this expanded goal, with more than 10.5 GW of distributed solar expected by 2030, including 7.3 GW currently installed and an additional 2.8 GW in the

[1] New York State Senate Bill 2025-S6599. Available at: https://www.nysenate.gov/legislation/bills/2019/S6599.

[2] New York State. 2025. "Climate Act Dashboard.". Climate Act. Available at: https://climate.ny.gov/dashboard.

[3] New York State Energy Research and Development Authority (NYSERDA). 2024. "New York State Has Achieved Major Solar Milestone A Year Early." Available at: https://www.nyserda.ny.gov/About/Newsroom/2024-Announcements/2024-10-17-Governor-Hochul-Announces-New-York-State-Has-Achieved-Major-Solar-Milestone.

[4] NY-Sun. 2025. Available at: https://www.nyserda.ny.gov/All-Programs/NY-Sun.

[5] NYSERDA. 2025. "NY Achieves 6 Gigawatts of Solar." Available at: https://www.nyserda.ny.gov/All-Programs/NY-Sun/Six-Gigawatts-of-Solar-Achieved.

[6] NYSERDA. 2025. "New York Leads U.S. on Community Solar." Available at: https://www.nyserda.ny.gov/Featured-Stories/New-York-Leads-on-Community-Solar.

development pipeline.[7, 8] As a result of this strong performance, developers and policymakers have proposed further expanding the distributed solar target to 20 GW by 2035.[9,10]

New York has experienced similar progress in energy storage development. In 2024, the state doubled its energy storage target from 3 GW to 6 GW by 2030. This goal includes 3 GW of additional bulk storage, 1.5 GW of new retail storage, and 200 megawatts (MW) of additional residential storage. These targets build on the state's existing 1.3 GW of storage capacity.[11] New York is on a path to meet this target, with approximately 0.5 GW currently installed and another 0.6 GW in the pipeline. As of April 2025, there were 0.3 GW of retail and residential storage installed and an additional 0.3 GW contracted or awarded, and these figures have continued to grow.[12]

As state energy policy evolves, it is useful for policymakers to understand the value of expanding distributed solar and storage resources. Against this backdrop, this report quantifies the economic and reliability benefits of additional distributed solar and storage deployment. It also demonstrates how these resources help meet New York's growing electricity demand while reducing energy costs for ratepayers.

---

[7] New York State. 2025. "Distributed Solar." *Climate Act*. Available at: https://climate.ny.gov/Our-Impact/Our-Progress/Distributed-Solar.

[8] New York State. 2025. "Climate Act Dashboard." *Climate Act*. Available at: https://climate.ny.gov/dashboard.

[9] New York Solar Energy Industries Association. 2024. *20 Gigawatts by 2035: Raising New York's Distributed Solar Goal*. Available at: https://www.nysolarroadmap.org/the-report.

[10] *Accelerate Solar for Affordable Power (ASAP) Act*. New York State Senate Bill 2025-S6570. Available at: https://www.nysenate.gov/legislation/bills/2025/S6570.

[11] NYSERDA. 2024. *New York's 6 GW Energy Storage Roadmap: Policy Options for Continued Growth in Energy Storage*. Available at: https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/Energy-Storage/Energy-Storage-Roadmap.pdf.

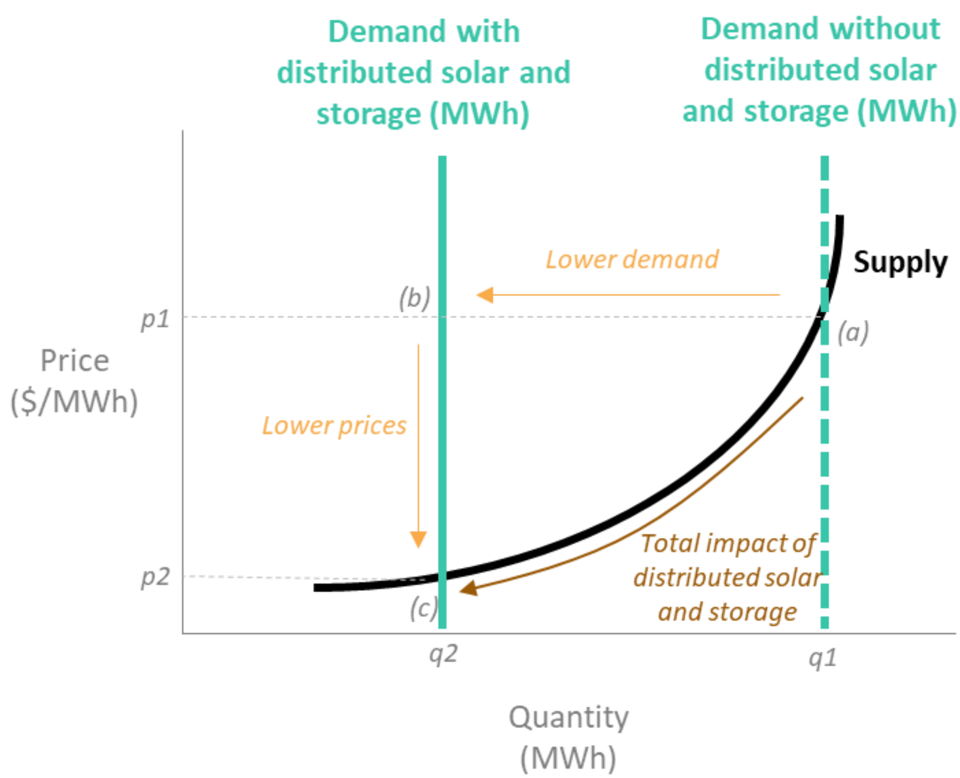
[12] NY Department of Public Service. 2025. *State of Storage in New York.* Available at: https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BF03F3A96-0000-CE19-A1B9-03455BB61011%7D.

Quantifying the Energy Benefits of Distributed Solar and Storage

Distributed solar and storage decrease demand on the grid by providing energy at or near where it will be consumed. This decrease in demand reduces the overall amount of electricity purchased by and from the New York Independent System Operator (NYISO) wholesale energy market. In doing so, it also lowers the market clearing price (since the price is set by the most expensive resource needed to meet demand). These wholesale cost savings can be referred to as "avoided energy costs."

Energy storage can enhance the benefits of solar by charging during periods with low demand and thus further lower electricity prices by discharging during periods of high demand and high prices. This allows the system to meet hourly demand while avoiding the need to dispatch more expensive resources. See Figure 1 for an illustration of the market effects of distributed solar and storage.

Figure 1. Price and load effects for distributed solar and storage



Estimating electricity prices

The main factors impacting electricity prices in New York are electricity demand, gas prices, and Regional Greenhouse Gas Initiative (RGGI) prices, in that order. We conducted regression analyses using historical data from 2022 to 2025 to estimate electricity prices in the region based on these three variables. We conducted this analysis for each month of the year, for "on-peak" and "off-peak" periods. We produced 24 predictive equations of hourly wholesale electricity price, each corresponding to a month and on-peak or off-peak periods.[13]

Calculating avoided energy costs

We modeled two scenarios: a "Business-as-Usual" (BAU) case, which reflects quantities of distributed solar and storage likely to be deployed by 2035, and a "Policy" case, which assumes higher adoption of these resources.[14] For both scenarios, we modeled hourly impacts in 2035.

In the BAU case, we assumed 12.9 GW of distributed solar by 2035, based on a linear extrapolation of New York's 10-GW-by-2030 target, and 0.9 GW of distributed storage by 2035, using the "No Action" scenario from the 2025 New York State Energy Plan modeling (see Table 1).[15] In the Policy case, we assumed the proposed target of 20 GW of distributed solar by 2035.[16] For storage, we assumed 3.7 GW by 2035, based on a linear extrapolation of the retail and residential portions of New York's goal to reach 6 GW of energy storage by 2030.

We relied on NYSERDA databases of statewide distributed solar and storage projects to (a) allocate these totals into paired and standalone resources and (b) allocate these totals to upstate and downstate regions by county.[17,18] We defined upstate as counties in NYISO zones A through F, and downstate as counties in zones G through K.[19]

13 We use the NYISO definitions of these time periods. On-peak is weekdays from 7 am to 11 pm; off-peak is weekdays from 11 pm to 7 am, plus weekends and holidays.

14 NYISO defines distributed resources as behind-the-meter resources or small aggregations of community generation that are typically operated to meet the customer's electric load. We adopt the project size limit from the New York State Public Service Commission's "Value Stack" compensation mechanism, where distributed solar and storage have nameplate capacities of 5 MW AC or less.

15 We assume that 36 percent of the total energy storage modeled is distributed, based on the proportion of bulk storage in New York's energy storage target.

16 See New York Senate Bill 2025-S6570.

17 NYSERDA. 2025 "Statewide Distributed Solar Projects: Beginning 2000". *Open NY*. Available at: https://data.ny.gov/Energy-Environment/Statewide-Distributed-Solar-Projects-Beginning-200/wgsj-jt5f/about_data.

18 NYSERDA. 2025 "All Statewide Energy Storage Projects". *Open NY*. Available at: https://data.ny.gov/Energy-Environment/All-Statewide-Energy-Storage-Projects/hspb-4n4p/about_data.

19 Note that our definition differs from that of NYSERDA, which classifies NYISO zone F as downstate.

Table 1. Modeled resource quantities (GW)

	Installed quantities in 2035 modeled in BAU case		Installed quantities in 2035 modeled in Policy case	
	Upstate	Downstate	Upstate	Downstate
Standalone solar	7.1	5.3	10.9	8.1
Standalone storage	0.2	0.2	1.2	1.8
Paired solar	0.3	0.3	0.5	0.4
Paired storage	0.2	0.3	0.3	0.4

We converted the solar capacities in Table 1 into hourly MWh generation using hourly capacity factors developed by PowerGEM. We assumed storage resources charge during the hours with the lowest electricity prices (and likely the lowest demand) and discharge during hours with the highest electricity prices (and likely the highest demand). See Appendix A for our detailed storage assumptions.

For each hour of the year, we calculated NYISO energy prices using the predictive equations from the regression analyses. We adjusted the demand input to account for the load not met by solar, storage, or other resources we expect to come online during the modeling timeframe. New wind, hydro, large-scale solar and storage, and other zero-marginal cost resources have price suppression effects in both the BAU case and the Policy case. We used NYSERDA data to estimate additions of large-scale renewables, including Empire Wind I, Sunrise Wind, and Champlain Hudson Power Express.[20] For storage, we assumed 3 GW of additional bulk storage comes online, consistent with the state's 2030 target. As the supply curve is extended, there are diminishing returns from adding zero-marginal cost capacity. It is possible that, due to federal policy or other barriers, not all of these projects are developed. If fewer large-scale resources come online, the benefits from distributed solar and storage will be even higher.

We multiplied the energy prices by the total New York electricity demand to obtain total hourly costs. The difference between the Policy and BAU cases represents the costs avoided in 2035 through additional deployment of solar and storage (i.e., "avoided energy costs").

These energy benefits can be classified as "load impacts" (benefits associated with reducing the overall consumption of electricity) and "price impacts" (benefits associated with changing the market clearing price). We allocated price impacts to upstate or downstate New York based on the amount of new solar and storage resources installed, and we allocated load impacts based on the amount of electricity consumed by each region.

Finally, we repeated this analysis for 23 weather-years to reflect a wide range of possible conditions—and resulting benefits—in 2035.

[20] NYSERDA. 2025 "Large-scale Renewable Projects Reported by NYSERDA: Beginning 2004". *Open NY*. Available at: https://data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye/about_data.

What We Found

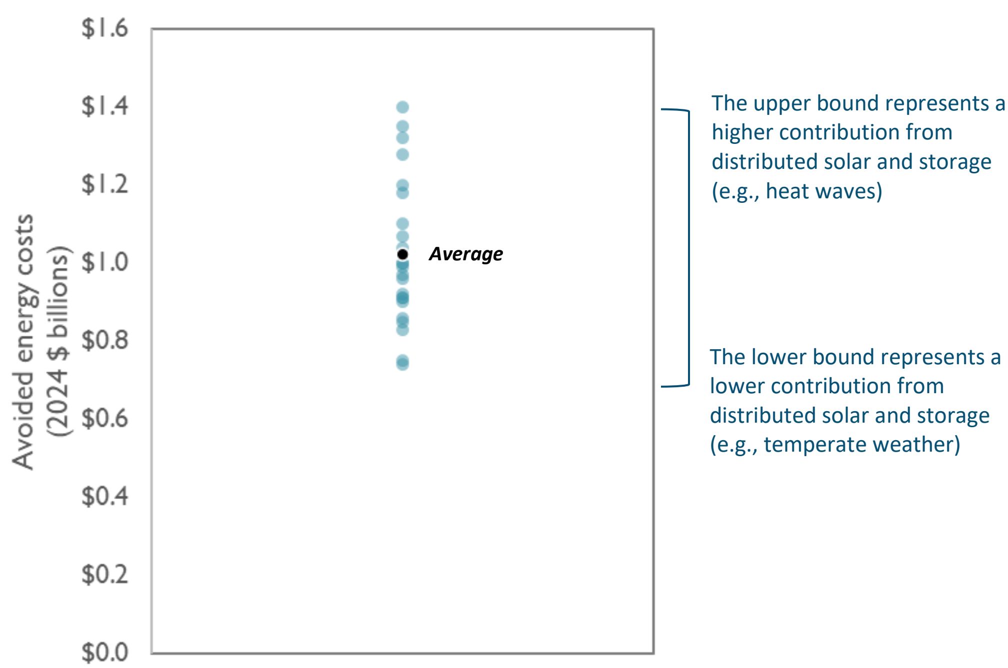
Distributed solar and storage can provide substantial savings. We find that incremental solar and storage can provide hundreds of millions of dollars in benefits in just one year, reducing customer bills in a way that is aligned with winter reliability needs.

Distributed solar and storage additions under the Policy case deliver an additional $1 billion in annual benefits relative to BAU

We estimate that additional distributed solar and storage will produce energy benefits of about $1 billion in New York in 2035 (see Figure 2).[21] Of these benefits, $542 million accrue in upstate New York and $481 million downstate.

The range of data points in Figure 2 reflects scenarios in which 2035 experiences weather conditions from historical years that were temperate, hot, and cold. Across years, energy cost savings in New York in 2035 range as high as $1.4 billion. These high savings tend to occur in years when distributed solar and storage contributions particularly align with high load hours, providing the most benefits in terms of lower energy prices.

Figure 2. Distribution of 2035 savings across weather-years



[21] All costs and savings are reported in 2024 dollars.

Energy cost savings from distributed solar and storage in the Policy case reduce average customer electricity bills by $46 to $87 annually in 2035

Energy cost savings are a wholesale effect, meaning that all customers benefit from these savings, regardless of whether they have installed solar and storage. To estimate the impacts on customer bills, we multiplied the energy cost savings by the residential share of loads, then divided by the projected number of residential customers in 2035.

We found that in 2035, customers in upstate New York will save an average of $87 annually on their electricity bills, while those in downstate New York will save an average of $46. These values only represent the bill savings from the incremental distributed solar and storage in the Policy case relative to the BAU; total energy-driven bill savings from these resources are higher.

The benefits of distributed solar and storage align with winter reliability needs

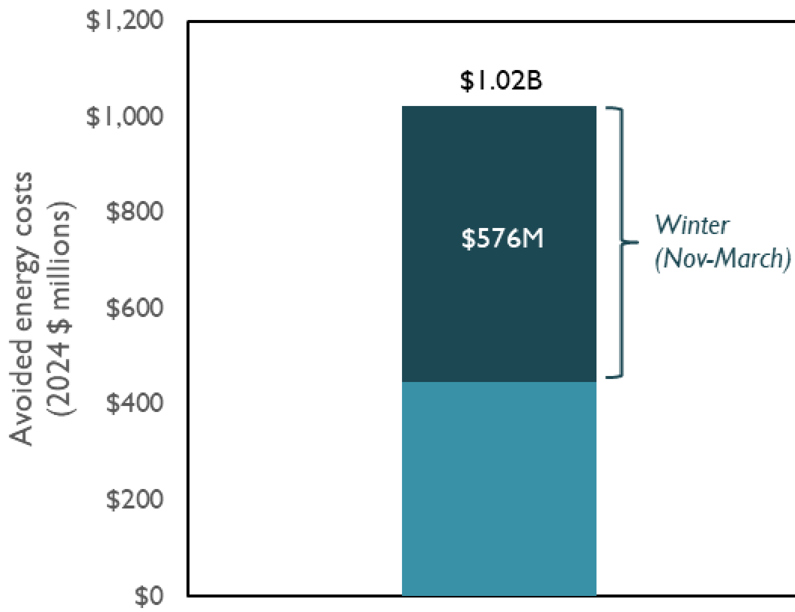
NYISO has forecasted that New York's hour of highest demand— its peak—will shift from the summer to the winter in the mid-2030s as electrification of heating increases.[22] Currently, New York relies heavily on natural-gas-fired power plants, which are subject to freezing and fuel availability constraints during extreme winter weather.[23]

We find that distributed solar and storage will provide valuable contributions to winter reliability. Battery storage shifts net load and flattens the peak by charging when there is excess generation and discharging during high-demand periods. Distributed solar resources complement storage by producing that excess supply with little to no variable cost. Of the avoided costs from additional distributed solar and storage in New York modeled in the Policy case, 56 percent occur in the November through March winter months (see Figure 3).

[22] NYISO. *2024 Power Trends Report*. Available at: https://www.nyiso.com/documents/20142/2223020/2024-Power-Trends.pdf.

[23] Arbaje, P., Specht, M. 2024. "Gas Malfunction: Calling into Question the Reliability of Gas Power Plants". Union of Concerned Scientists. Available at: https://www.ucs.org/resources/gas-malfunction#top.

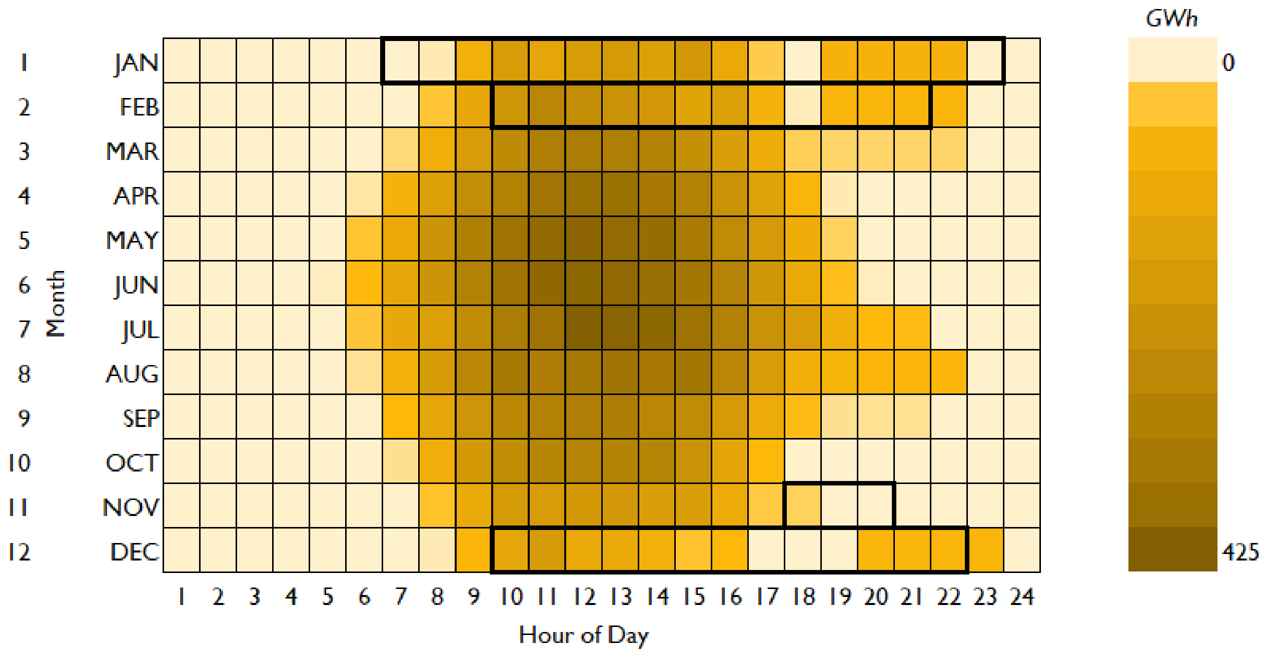
Figure 3. Winter share of avoided-cost benefits from additional distributed solar and storage



These winter savings align closely with the timing of grid stress in New York, thereby contributing to system reliability. Every two years, NYISO evaluates the resource adequacy of the grid as part of its Reliability Needs Assessment (RNA). The 2024 RNA modeled a study period through 2034 and found that winter reliability events in that year tend to occur in the evening hours in January, February, and December.[24] Figure 4 shows that while solar and storage dispatch is most concentrated in summer daytime hours (as one would expect), it is also actively providing benefits during the many of the hours when reliability events are most likely. These hours are shown in bold.

[24] NYISO. *2024 Reliability Needs Assessment – Appendix E*. Available at: https://www.nyiso.com/documents/20142/48283847/2024-RNA-Appendices.pdf.

Figure 4. Hourly generation from distributed solar and storage



Lower gas consumption in the Policy case helps protect New York from fuel price volatility

By displacing natural-gas-fired generation, solar and storage resources will help New York retain energy dollars that would otherwise flow out of the state to pay for natural gas fuel. Relative to the BAU, the Policy case avoids the consumption of 59 Bcf of gas in New York in 2035. This is about 11 percent of the amount of gas consumed by New York's electric sector in 2024.[25] Without the addition of solar and storage, New York would have to depend on importing this fuel rather than generating electricity with in-state resources. Gas prices are also highly sensitive to market conditions and therefore subject to volatility.[26] Solar energy can protect ratepayers from this volatility by reducing reliance on gas, particularly during times of high demand when gas prices spike.

[25] U.S. Energy Information Administration. 2025. "Natural Gas Consumption by End Use." Natural Gas Data. Available at: https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SNY_a.htm.

[26] U.S. Energy Information Administration. 2022. "U.S. natural gas price saw record volatility in the first quarter of 2022." *Today in Energy*. Available at: https://www.eia.gov/todayinenergy/detail.php?id=53579.

The Policy case avoids $947 million per year in greenhouse gas costs, among other benefits

Our analysis estimates that the additional distributed solar and storage in the Policy case relative to BAU will avoid about 3.2 million metric tons of carbon dioxide emissions in New York in 2035. As of April 2025, the New York State Department of Environmental Conservation's social cost of carbon is $295 per metric ton for 2035 (in 2024 dollars, using a central 2 percent discount rate). This represents the economic damages caused by an incremental increase in carbon dioxide emissions, such as impacts to agriculture, human health, and infrastructure. Applying this social cost of carbon to 3.2 million metric tons yields estimated avoided greenhouse gas emission benefits of $947 million in 2035.

There are several other benefits to distributed solar and storage that are not quantified in this study, but that are notable nonetheless. These include:

- additional grid benefits including avoided capacity costs, avoided transmission costs, avoided or deferred distribution system investments, reduced line losses, and ancillary services;
- public health benefits due to reduced emissions of criteria pollutants (e.g., NO_X and particulate matter) that contribute to respiratory and cardiovascular illness;
- jobs and economic development benefits; and
- direct bill savings realized by solar customers.

CONCLUSIONS

With the existing target for distributed solar and storage deployment in New York well within reach, and other CLCPA goals far behind, the state has the opportunity to unlock even greater benefits of distributed solar and storage. This is especially true given federal barriers that have created uncertainty for offshore wind and other large-scale renewable development. By 2035, the expanded deployment of these resources will result in energy cost savings, reduced reliance on gas, reliability contributions, and other benefits. We present a summary of our findings in Table 2.

Table 2. Summary of expanded distributed solar and storage impacts in New York

		Average	Range (min and max weather-year)
Total avoided energy costs	*2024 $ millions*	$1,023	$740-1,400
Residential bill savings	*$/year*	$87 (upstate); $46 (downstate)	$62-119 (upstate); $33-63 (downstate)
Avoided gas	*Bcf*	59	55-63
Avoided emissions	*Million metric tons CO_2*	3.2	3.0-3.5

These findings provide insight into the fundamental role of solar and storage in New York's energy portfolio. Key benefits include the following:

- Lower energy costs: Additional distributed solar and storage additions in New York reduce energy costs in 2035 by an average of $1 billion.
- Reduced reliance on imported gas: Additional distributed solar and storage allow New York to decrease its dependence on imported gas resources, reducing the need for 59 Bcf of gas in the state in 2035. This keeps dollars within the local economy and protects New York families and businesses from gas price volatility.
- Year-round reliability: Distributed solar and storage deliver benefits even in winter months, with 56 percent of avoided energy costs occurring from November through March.
- Climate benefits: Additional New York-based distributed solar and storage provide an estimated $947 million in avoided greenhouse gas emissions benefits in 2035. Reducing emissions helps protect residents from expensive climate impacts of gas-fired generation.

Appendix A. Input Assumptions

Table 3. List of key input assumptions

Hourly load forecast	
Loads	Based on NYISO's 2025 load forecast, which includes electric vehicles and building electrification. We model 2035 at an hourly level over 23 weather-years to reflect varying solar, wind, and load conditions. The results are conservative relative to a high-load growth scenario.
Solar and storage quantities	
Capacities	Extrapolated from existing and proposed NY state targets and the 2025 NY State Energy Plan. We estimated capacities for upstate and downstate New York using NYSERDA data, for 4 different categories of resources (combinations of solar/storage and standalone/paired).
Paired vs. standalone	Assumed a percentage breakdown based on data from NYSERDA.
Capacity factors	From PowerGEM Strategic Energy & Risk Valuation Model (SERVM) database.
Storage dispatch	
Charging and discharging patterns	Daily charging and discharging profile for each month based on our analysis of electricity prices with only solar. We align charging hours with solar generation profiles to capture the benefits of solar's zero variable cost.
Storage characteristics	Assumed average duration of 4 hours. For other parameters, we adopted defaults from EPA's AVoided Emissions and geneRation Tool (AVERT):[27] lithium-ion batteries with 80% depth of discharge, 85% round-trip efficiency, and 150 maximum allowable discharge cycles per year (on the 150 highest load days).[28, 29] Storage could provide additional benefits if it is long-duration or allowed to dispatch more frequently.

[27] AVERT User Manual – Appendix K. Synapse Energy Economics for US EPA. April 2024. Available at: https://www.epa.gov/system/files/documents/2024-04/avert-user-manual-v4.3.pdf.

[28] Cole, W. and A.W. Frazier. 2019. Cost Projections for Utility-Scale Battery Storage. NREL. Available at: https://www.nrel.gov/docs/fy19osti/73222.pdf.

[29] Viswanathan, V., et al. 2022. 2022 Grid Energy Storage Technology Cost and Performance Assessment. PNNL. Available at: www.pnnl.gov/sites/default/files/media/file/ESGC%20Cost%20Performance%20Report%202022%20PNNL33283.pdf.

Other resources	
Resource additions besides solar and storage	Assumed projects in NYSERDA large-scale renewables database will come online by 2035 and impact the supply curve alongside solar and storage resources in both scenarios. We modeled Sunrise Wind, Empire Wind 1, Champlain Hudson Power Express, and large-scale solar and onshore wind, plus 3 GW of additional large-scale storage (reflecting the state's 2030 target).
Other variables	
Gas prices	Historical prices and short-term futures from Natural Gas Intelligence, long-term price forecast from U.S. Energy Information Administration's 2025 Annual Energy Outlook. We used variation in daily heating degree days to translate monthly gas prices to hourly values.
RGGI prices	From RGGI, Inc. (forecasted prices from Case B Policy Scenario).
Historical electricity prices	From NYISO data.
Historical weather data	From PowerGEM SERVM database.
Historical loads	From PowerGEM SERVM database and NYISO data.
Residential customers	Based on scaling U.S. Energy Information Administration Form 861 by conventional load forecast.
Avoided emissions inputs	
Marginal CO_2 emissions rate	From Avoided Energy Supply Costs in New England 2024 Report, Table 97.
Gas CO_2 emissions rate	From U.S. Energy Information Administration.
Social cost of carbon	From New York State Department of Environmental Conservation Value of Carbon Guidance April 2025 Update.
Bill impacts	
Wholesale price adjustments	We assume the retail price is equal to the wholesale price / [(1-TD) x (1-WRP)], where the transmission and distribution losses (TD) are 9 percent and the wholesale risk premiums (WRP) are 8 percent. These rates are based on the Avoided Energy Supply Costs in New England 2024 Report assumptions.