Clean Energy Fund Quarterly Performance Report through June 2023

Final Report | August 2023

NEW YORK STATE | NYSERDA

NYSERDA's Promise to New Yorkers:

NYSERDA provides resources, expertise, and objective information so New Yorkers can make confident, informed energy decisions.

Our Vision:

New York is a global climate leader building a healthier future with thriving communities; homes and businesses powered by clean energy; and economic opportunities accessible to all New Yorkers.

Our Mission:

Advance clean energy innovation and investments to combat climate change, improving the health, resiliency, and prosperity of New Yorkers and delivering benefits equitably to all.

NYSERDA Record of Revision

Document Title
Clean Energy Fund Quarterly Performance Report through June 30,2023

Revision Date	Description of Changes	Revision on Page(s)
August 29, 2023	Original Issue	

Clean Energy Fund Quarterly Performance Report through June 30, 2023

Final Report

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About The Clean Energy Fund and This Report

The Clean Energy Fund (CEF), approved by the Public Service Commission (PSC) Order on January 21, 2016[1] and later modified on September 9, 2021,[2] was established as a commitment to clean energy and efficiency measures, recognizing that deploying programs at scale has potential to address the pressing environmental and energy challenges, while providing enormous economic opportunity for New York State. The CEF supports New York State's advancement of clean energy and climate goals along with a more affordable and resilient energy system. Energy efficiency is a cornerstone of the State's strategy to promote clean energy solutions for consumers while addressing climate change. The New Efficiency New York recommendations, as advanced in the white paper, issued by the Department of Public Service (DPS) and New York State Energy Research and Development Authority (NYSERDA or the Authority) on April 26, 2018, and as adopted by the Public Service Commission in its December 13, 2019 order, establishes a new 2025 energy efficiency target of 185 trillion British thermal units (TBtu) of cumulative annual site energy savings.[3] The Climate Leadership and Community Protection Act (Climate Act), signed July 2019 and effective January 1, 2020, adopted this energy efficiency target, which puts the State on a path to complete carbon-neutrality across all sectors of the economy, including power generation, transportation, buildings, industry, and agriculture. In April 2022, the PSC approved an expansion to the NY-Sun program to further support efforts meeting the State's clean electricity goals. The Climate Act mandates the following:

- 85% Reduction in GHG Emissions by 2050
- 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[4]
- 6,000 MW of Solar by 2025 and 10,000 MW of Solar by 2030
- 22 million tons of carbon reduction through Energy Efficiency and Electrification
- Minimum 35 percent of the benefits of clean energy investments are directed to disadvantaged communities

With these goals, New York State is undertaking one of the most aggressive clean energy agendas in the nation. Through the CEF and its other portfolios, NYSERDA works to foster the transformation of markets, pushing them to accurately value clean energy, energy efficiency, and resiliency, while encouraging competition and innovation that delivers value to consumers.

The CEF is comprised of four distinct portfolios (CEF Portfolio):

- Market Development (MD)
- Innovation & Research (IR)
- NY-Sun
- NY Green Bank

This report provides a collective view of progress for all four portfolios against CEF targets (Figures 1 and 2) and further details quarterly and cumulative activity for the MD and IR portfolios through June 30, 2023 (Figure 3). The September 9, 2021, PSC Order requires quarterly reporting for the MD and IR portfolios which continue to include the following:

- Progress toward cumulative and annually-prorated incremental targets and budgets.
- Progress toward the CEF's contribution to New Efficiency: New York (NE:NY) targets.
- A performance summary discussion of key CEF initiatives.
- A summary of acquired benefits and projected benefits committed, compared to investment plan projections.

To meet these reporting requirements, this report document is accompanied by a scorecard (spreadsheet) that contains all plan and progress information related to CEF activity, also filed quarterly. This New York State Energy Research and Development Authority (NYSERDA) scorecard is consolidated with each State utility scorecard to publish data on Open NY, where it is available to all stakeholders. Finally, the publishing of these data sets coincides with a similar update to the Clean Energy Dashboard (CED), an interactive and dynamic tool first published in 2019 to improve accessibility and transparency of ratepayer-funded clean energy program reporting statewide.

NY-Sun reports progress quarterly within the NYSERDA scorecard and CED and is summarized in section 3 of this report. Quarterly reporting for NY Green Bank is similarly provided within NYSERDA's quarterly scorecard and the CED, but also within a separately filed report.[5]

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1 Clean Energy Fund Performance Overview

1.1 Progress Toward Aggregate Clean Energy Fund Goals

Figures 1 and 2 present a comprehensive picture of progress against the CEF authorized budget and associated benefit targets reflecting all four CEF Portfolios (MD, IR, NY-Sun, and NY Green Bank). Progress shown against each key performance metric represents results through June 30, 2023, and nets out overlap across portfolios where it is known to occur.

Figure 1 captures the status of CEF funding while Figure 2 depicts progress of the combined portfolios against the latest CEF ordered benefit targets. Figures 1 and 2 should be viewed together to properly relate investments to results. In each of these visuals, combining what has been expended/acquired with encumbered/committed results demonstrates NYSERDA's progress toward CEF targets, while adding in the remaining expected (planned) values serves to illustrate the full potential in NYSERDA's programmed portfolios.

Figure 1. Clean Energy Fund Portfolio Expected Investment versus Targets

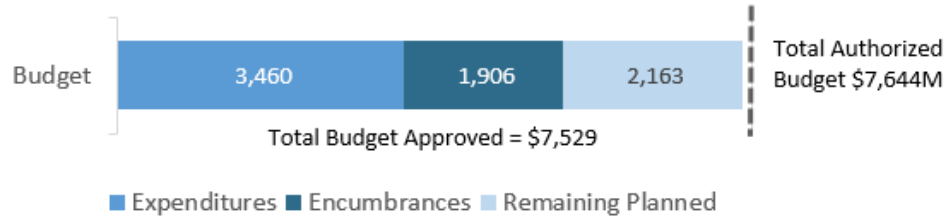


Figure 1 Supporting data		Total Authorized Budget	Budget Approved		Expended Funds		Encumbered Funds		Remaining Planned		Funding Not Yet Approved
			Current Total	% of Authorized	Current Total	% of Authorized	Current Total	% of Authorized	Total Balance	% of Authorized	
Market Development (MD)	Program Funds	$ 2,399.7 M	$ 2,332.2 M	98%	$ 1,083.9 M	46%	$ 632.6 M	26%	$ 615.7 M	26%	$ 39.8 M
	NYS Cost Recovery Fee		$ 27.7 M		$ 13.8 M		$ 0.0 M		$ 13.9 M		
Innovation & Research (IR)	Program Funds	$ 631.7 M	$ 570.2 M	91%	$ 220.3 M	35%	$ 225.4 M	36%	$ 124.4 M	20%	$ 55.0 M
	NYS Cost Recovery Fee		$ 6.5 M		$ 2.6 M		$ 0.0 M		$ 3.9 M		
MD and IR combined	Administration	$ 274.4 M	$ 265.2 M	97%	$ 175.7 M	64%	$ 0.0 M	0%	$ 89.5 M	33%	$ 9.2 M
	Evaluation	$ 124.2 M	$ 113.3 M	91%	$ 33.0 M	27%	$ 15.7 M	13%	$ 64.6 M	52%	$ 10.9 M
	MD and IR Total	**$ 3,430.0 M**	**$ 3,315.1 M**	**97%**	**$ 1,529.4 M**	**45%**	**$ 873.7 M**	**25%**	**$ 912.1 M**	**28%**	**$ 114.9 M**
NY-Sun	Program Funds	$ 3,162.8 M	$ 3,162.8 M	100%	$ 950.4 M	30%	$ 1,031.0 M	33%	$ 1,181.4 M	37%	$ 0.0 M
	NYS Cost Recovery Fee	$ 41.8 M	$ 41.8 M	100%	$ 9.0 M	22%	$ 0.0 M	0%	$ 32.8 M	78%	$ 0.0 M
	Administration	$ 58.8 M	$ 58.8 M	100%	$ 22.6 M	39%	$ 0.2 M	0%	$ 35.9 M	61%	$ 0.0 M
	Evaluation	$ 3.5 M	$ 3.5 M	100%	$ 1.1 M	32%	$ 0.9 M	26%	$ 1.5 M	42%	$ 0.0 M
	NY-Sun Total	**$ 3,266.8 M**	**$ 3,266.8 M**	100%	**$ 983.2 M**	**30%**	**$ 1,032.1 M**	**32%**	**$ 1,251.6 M**	**38%**	$ 0.0 M
NY Green Bank	**Total**	**$ 947.1 M**	**$ 947.1 M**	**100%**	**$ 947.1 M**	**100%**	**$ 0.0 M**	-	**$ 0.0 M**	-	-
CEF Total		**$ 7,643.9 M**	**$ 7,529.1 M**	**98%**	**$ 3,459.7 M**	**45%**	**$ 1,905.7 M**	**25%**	**$ 2,163.7 M**	**28%**	**$ 114.9 M**

- Authorized Funding per Order: Approving Clean Energy Fund Modifications, issued and effective September 9, 2021 and inclusive of the approved 10 GW Distributed Solar Roadmap in April 2022.
- NY-Sun totals shown here exclude $667 million in non-CEF NYSERDA funded solar projects.

The summary of benefit progress reflects evaluated totals, incorporating verified gross acquired savings where evaluations have been completed, and reflects gross savings values elsewhere. Indirect benefits from market transformation are included in acquired totals where they have been quantified through evaluation. Indirect benefits are also included in the remaining plans, discounted by 50 percent, as consistent with other plan filings to account for uncertainty in timing and potential overlap across the portfolio that has yet to be fully evaluated.

Figure 2. Clean Energy Fund Portfolio Expected Benefits versus Targets

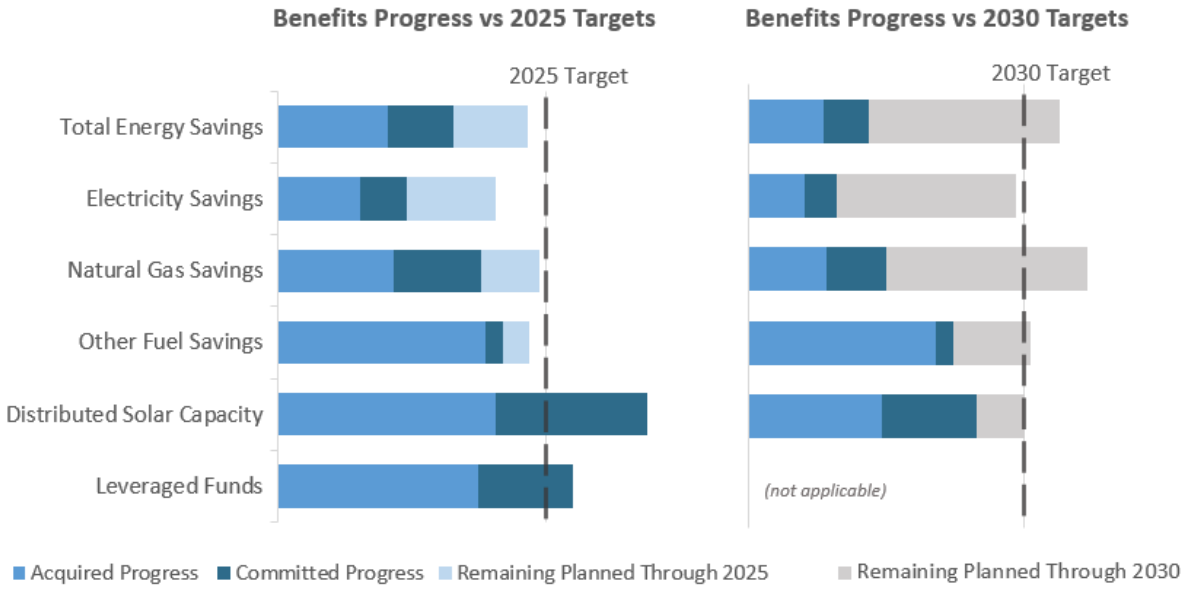


Figure 2 Supporting Data	Acquired Progress	Committed Progress	Remaining Planned Through 2025	Total Expected Through 2025	2025 Order Target	Remaining Planned Through 2030	Total Expected Through 2030	2030 Order Target
Total Energy Savings (MMBtu equivalent, millions)	21.7	13.0	14.7	49.4	53.0	54.8	89.5	79.0
Electricity Savings (MWh, millions)	2.0	1.2	2.2	5.5	6.7	6.5	9.7	10.0
Natural Gas Savings (MMBtu, millions)	10.8	8.2	5.4	24.4	25.0	27.8	46.8	38.0
Other Fuels Savings (MMBtu, millions)	11.6	1.1	1.5	14.1	15.0	4.8	17.4	17.0
Distributed Solar Capacity (Renewable MW)	4,863	3,411	-	8,274	6,000	1,773	10,048	10,000
Leveraged Funds ($ millions)	$14,959	$7,053	-	$22,012	$20,000	-	$22,012	n/a

Benefits Metrics Progress as Percent of Totals	Acquired + Committed (values summed from above)		Acquired + Committed as a Percentage of the Expectations / Targets				
			Total Expected Through 2025	2025 Order Target		Total Expected Through 2030	2030 Order Target
Total Energy Savings (MMBtu equivalent, millions)	34.7	→	70%	66%		39%	44%
Electricity Savings (MWh, millions)	3.2		59%	48%		33%	32%
Natural Gas Savings (MMBtu, millions)	19.0		78%	76%		41%	50%
Other Fuels Savings (MMBtu, millions)	12.6		90%	84%		73%	74%
Distributed Solar Capacity (Renewable MW)	8,274		100%	138%		82%	83%
Leveraged Funds ($ millions)	$22,012		100%	110%		100%	n/a

Table notes are on the next page

- Energy savings values are annual; Total Energy Savings measures the combined Electricity and Fuel savings net of usage; therefore, values will not sum to the total of individual electric and fuel savings values.
- CEF initiatives not dedicated to building energy efficiency (Electric Vehicles - Rebate, Combined Heat and Power, and Fuel Cells) have been excluded from progress and plans toward the first four energy saving targets shown above.
- Overlap where it is known or perceived to exist between portfolios has been removed from progress reported.
- Distributed Solar Capacity includes 1,091 MW of non-NYSERDA installations taken from the Statewide Solar Projects dashboard, which is populated with data from utility interconnection inventories. This data set includes all distributed solar interconnected in NYS, including hundreds of MWs which did not receive NYSERDA funding. Committed project data is maintained by NYSERDA independently of interconnection data. Since the two data sets define project completion date differently, some projects reported as committed may also be included as acquired under the "Non-NYSERDA Statewide Installations" (interconnection balance) figure. As the pipeline of NYSERDA commitments are drawn down over time (projects are considered acquired in both data sources), this overlap will be systematically eliminated.
- Leveraged Funds progress here includes non-CEF NYSERDA funded solar projects of $1,848 million acquired and $119 million committed, consistent with overall reporting toward CEF distributed solar targets which include all solar statewide.
- Leveraged Funds Total Expected benefit values do not currently include any anticipated indirect impacts.
- Neither Distributed Solar or Leveraged Funds Total Expected Through 2025 and 2030 values include forward-looking estimates from NY Sun or NY Green Bank portfolios at this time.
- Benefits metrics that have not been given 2030 Targets in the Order are shown as "not applicable."

As Figures 1 and 2 illustrate, the sum of expended and committed budget progress continues to align well with the sum of acquired and committed benefits progress reported through this point in time in all areas except electric savings, where the latest plans convey a longer timeline for achieving the megawatt-hour target. An explanation of progress and the current portfolio mix is as follows:

- Total Energy Savings (MMBtu equivalent) is a measure of NYSERDA effectiveness in delivering site energy efficiency savings, primarily through the combined MD/IR portfolios, to meet the expected contribution toward overall NE:NY goals. Unlike the individual energy savings goals, this metric accounts for both savings and usage to measure overall net impact and trends here are reflective of the individual MWh and MMBtu components.
- NYSERDA maintains confidence in the ability of the CEF portfolio to deliver the overall impact outlined by CEF 2030 Targets as illustrated in that Total Energy Savings bar; however, the forecast of all MD/IR initiatives illustrates NYSERDA's expectation that the delivery of near-term benefits will continue to be impacted by current challenges facing the clean energy market today, specifically challenges with supply chain, skilled labor availability, and increased construction costs, all of which are delaying or slowing projects and contributing to NYSERDA's lower outlook for the 2025 timeframe. NYSERDA will continue to work to counter-balance this outcome with active and adaptive portfolio management.
- Electricity savings in megawatt hours acquired and committed total has lagged the pace of fuel savings and the 2025 target and shows a slight gap to the threshold established for 2030, however the portfolio has been bolstered by fuel savings that are anticipated to exceed all targets.
- Fuel Savings continues to show strong momentum to deliver in both 2025 and 2030 timelines, of which significant savings are already considered acquired in the portfolio.
- Renewable energy capacity MW is dominated by NY-Sun contributions, which began in 2014 and is performing well against the 2025 target, on a trajectory to achieve the target early. The portfolio is also well positioned to achieve the expanded 2030 target of 10 GW.
- Leveraged funding acquired and committed progress is outpacing other metrics due to some strong Innovation & Research returns reported in 2022.

The September 2021 CEF Order also included a target regarding equity for disadvantaged communities, specifically that a minimum of 35 percent of the benefits of CEF investments would accrue to disadvantaged communities. In the "Order Directing Energy Efficiency and Building Electrification Proposals" issued July 20, 2023, the PSC directed NYSERDA and Investor Owned Utilities to publish the first disadvantaged communities report for ratepayer funded programs by December 31, 2023. More broadly, NYSERDA is working with other State agencies and stakeholders, including the Climate Justice Working Group, to establish a statewide benefits/metrics framework and reporting system for the Climate Act disadvantaged community mandate. This annual statewide report would include place-based investments across all funds, not just CEF. NYSERDA is working with DPS to ensure that disadvantaged communities reporting for CEF funds is consistent with the Statewide reporting process being finalized.

Additionally, NYSERDA is required to track and report other reference metrics outlined in appendix C of the CEF Order. Carbon emissions reductions and bill saving metrics are presented below for the combined CEF portfolios.

Table 1. Other Anticipated Benefits through 2025 and 2030

Annual Benefits Metrics ** Direct + Indirect Benefits ** Overlap Accounted	Acquired Progress	Committed Progress	Total Progress as of Current Reporting Period	2025 Order Expectation (Anticipated Benefit)	2030 Order Expectation (Anticipated Benefit)
Emissions Reductions (CO_2e Metric Tons, millions)	5.4	3.3	8.7	9.0	14.0
Participant Bill Savings ($ millions)	$1,037	$689	$1,726	n/a	n/a

- These metrics reflect all the same inclusions/exclusions and assumptions, including overlap—where known or perceived—between the four CEF portfolios and their reported benefits, as is applied to Figures 1 and 2 above.

2 Market Development and Innovation & Research Performance

On May 20, 2022, NYSERDA filed a comprehensive update to all MD and IR portfolio plans in the first edition of the Compiled Investment Plans (CIP), as prescribed in the CEF Order. These plans convey expected funding and benefit progress for each initiative, which are used to gauge progress over time as outlined in these quarterly reports and elsewhere. Each fall NYSERDA completes its annual update to forecasts for all CEF initiatives, which incorporates reported historical progress and revises forward looking plans to account for that history as well as to learn from the market. On November 1, 2022 NYSERDA completed the annual filing and since that major update, two subsequent filings were made in February and May and later approved by DPS. A third filing was made in August and awaits DPS review and response. Progress of the CEF is measured in contrast to the latest approved plans for the current reporting period, therefore the plans in this report reflect the May 1, 2023 CIP filing.

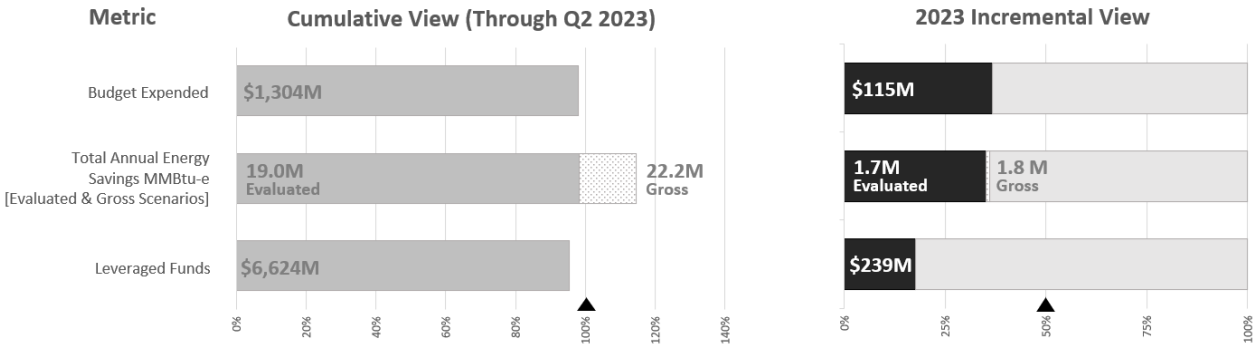
Cumulative performance against the current approved (filed) plans remains the ultimate measure of success for delivering on the CEF benefits targets. As a secondary measure, NYSERDA also monitors incremental progress toward the current year goal to provide another viewpoint from which to assess performance, including how quickly funds are put to work in the market based on near-term expectations. Both cumulative and incremental values can be reviewed in granular detail for the portfolio and for each program and metric within the Clean Energy Dashboard.

Figure 3 provides a high-level view of NYSERDA's MD and IR portfolio performance to plan, measuring progress toward expended funding and acquired direct benefit plans through Q2 2023. Key points to interpret Figure 3 include:

- The Cumulative View (Through Q2 2023) represents years 2016–2022, plus two quarters of 2023; 100 percent in this view represents the cumulative *planned* amounts for that timeframe, prorated to enable comparison of progress to plan.
- The 2023 Incremental View represents progress reported in the current calendar year against the current calendar year plan, with an expectation that 100 percent of the plan should be achieved by year-end. This secondary measure helps NYSERDA monitor and assess specific trends throughout the year. Progress illustrated in this view can be influence by how NYSERDA finishes the previous year as those plans represent an estimate; the portfolio may start the new year either ahead or behind the forecasted finish of the previous year.
- Total Annual Energy Savings is measured in MMBtu equivalents consistent with Figure 2; Gross and Evaluated (Verified Gross) reported savings scenarios are reflected in these progress bars to illustrate both viewpoints of progress as the results from evaluation studies become more prominent in NYSERDA progress reporting.

- For each of these metrics, all CEF MD and IR initiatives are included (no exclusions); CEF Admin, Evaluation, and NYS Cost Recovery Fees are excluded from the budget totals.

Figure 3. Market Development/Innovation & Research Progress and Performance



Halfway through 2023, NYSERDA's cumulative progress of these three benchmark measures remains strong, though the incremental view shows slower progress toward the 2023 plan. Note that incremental progress here is measured against a simple linear progression and real progress seldom unfolds in a linear manner, especially early in the year. The portfolio is trending behind a linear plan for expenditures through June, with the incremental view compounded by a strong finish to 2022 (ahead of plan) making it appear further behind. Evaluation studies concluding this year have resulted in adjustments to reported energy savings for some initiatives. One instance identified the need to update the model (method) for estimating and reporting savings which is illustrated by the slower incremental pace when compared to linear progress for 2023. Reporting of acquired leveraged funding is on a lag for several CEF initiatives so additional time is needed to evaluate true performance trends in 2023 with an expectation that Q3 reporting will provide a clearer picture of progress for the year.

Two new evaluation studies for direct benefits impacts, New Construction and Energy Management Technology/Real Time Energy Management, were concluded in the second quarter of 2023 and the results are presented in Section 4. Previous measurement and verification have reduced the gross energy savings reported for the portfolio in aggregate. Some of the lower savings from early studies can be attributed to delays impacting the construction market broadly, and this will be further understood through continued study efforts. Several of the evaluation studies have follow-on analysis for subsequent years (more mature CEF operations) and NYSERDA anticipates realization rates will improve and close much of the gap noted above.

As NYSERDA noted during the 2021 CEF review conducted by the PSC, strengthening the processes and tools used to effectively manage the portfolio has been a key focus of the organization. NYSERDA has taken steps to improve both process and tools, refining the focus of quarterly performance discussions and

bolstering the annual planning process used to set expectations for the immediate year ahead as well as the longer-term view of individual initiative and collective portfolio goals. A more detailed assessment of the portfolio's top programs with energy saving impact can be found in the following section.

2.1 Top Energy Impact Initiative Performance Summary

In NYSERDA's Market Development portfolio, 15 key initiatives currently account for approximately 91 percent of the expected total energy saving benefits (represented by equivalent annual MMBtu) and 47 percent of the total approved budget. These initiatives warrant special attention due to the weight they carry in terms of the overall success of the CEF in delivering expected benefits and are characterized in greater detail in Table 2 that follows.

Table 2. Performance Summary for Market Development's Top Energy Impact Initiatives

Cumulative progress to plan is measured on a prorated basis through Q2 as described in detail for Figure 3 above. Budget Percent Performance is progress against approved funding expenditure plans while Energy Percent Performance is progress against the equivalent annual MMBtu acquired plan. Benefits analysis conducted with both Gross and Verified Gross (evaluated) direct savings where applicable.

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
1	Energy Management Technology	106%	Gross: Evaluated:	108% 45%	Progress of budget expenditures and gross energy benefits is trending favorably through the second quarter of 2023. The RTEM program has a robust pipeline of projects that are in various stages of implementation. A verified gross savings analysis significantly reduced energy performance from the gross values reported. A notable amount of this reduction is due to delayed installation of capital improvement measures (observed across several NYSERDA initiatives) and a longer than anticipated timeline for measure installations. An update to this study was finalized in Q2 2023 with RRs for electric savings (which represent the majority of program savings) more than doubling. RRs for MMBtus remained fairly constant, however, an additional update to this study is in process now to address data challenges that have persistently made verifying historical progress difficult. NYSERDA will be updating the forecasted impacts of this initiative in the upcoming annual reforecast which commences in Q3. An evaluation study is also commencing to quantify indirect benefits from this program, which have yet to be counted.

Table 2 continued

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
2	Building Operations and Maintenance Partnerships	104%	Gross: Evaluated:	62% 75%	During Q2 the program received sixteen proposals, of which seven were recommended for funding and are expected to be committed in the following quarter. Two new projects from the prior round have also been committed. The completion of projects in the pipeline is anticipated to pick up in Q3 and Q4 2023 based on project progress and schedules, bringing the cumulative progress on energy savings closer to plan. The program shifted to a new solicitation with rolling applications to encourage and speed up the contracting of new projects. Market and impact evaluations were completed for this initiative in Q3 2022. Realization rates were high and indirect impacts were assessed; both were incorporated into reporting. An update to the impact evaluation study is underway now.
3	Technical Services	109%	Gross: Evaluated:	131% n/a	Progress of budget expenditures and energy benefits continues to be strong. An impact evaluation is planned and will result in updated measure adoption rates. Future reports will detail results from these studies as they are completed.
4	Product and Appliance Standards	55%	Gross: Evaluated:	n/a n/a	NYSERDA successfully adopted 21 appliance standards for NYS by the 1/1/23 statutory deadline and the standards went into effect on 6/26/23. The core work to implement those standards is now underway but have been awaiting State budget negotiations to conclude. Commitments and expenditures have shown progress throughout the year and are expected to further ramp up as the program is expanded. Given the late date of passage in July 2022, delayed compliance launch, and limited staffing resources, NYSERDA expenditures for 2023 will track low compared to the plan. This initiative forecasts all impacts as indirect savings; those benefits will be reported in the future as evaluation studies conclude and the market impact over time is understood. Scoping has begun on evaluation activities and future quarterly reports will detail findings.
5	Market Challenges	96%	Gross: Evaluated:	170% n/a	Commercial & Industrial Carbon Challenge continues to receive strong market interest with savings reported to date trending favorably to plan. NYSERDA launched a Commercial & Industrial Accelerated Efficiency initiative in Q2 targeting efficiency projects with more aggressive completion schedules. The first projects funded under the Empire Building Challenge are in the very early stages of implementation, and benefits are expected to be acquired in 2024 (at the earliest). Scoping for evaluation in underway and future reports will detail results.
6	Electric Vehicles – Rebate	100%	Gross: Evaluated:	139% 100%	CEF funding for this initiative has been fully committed and all rebates have been paid out as of Q1 2021. A verified gross savings analysis reduced energy performance from the gross values reported. This reduction is attributed to lower vehicle miles traveled as compared to the program assumptions. An initial assessment of indirect benefits was completed on EV-Rebates. However, given the ongoing presence of rebates through RGGI funding, no indirect savings were estimated as part of this study. Evaluation studies will continue to assess indirect impacts going forward.

Table 2 continued

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
7	LMI Multifamily	97%	Gross: Evaluated:	87% 80%	While expenditures are currently on track to the plan, commitments are lagging due to two primary drivers; slower than anticipated uptake in retrofit projects through the NYS Homes and Community Renewal Clean Energy initiative (HCR CEI) and decommitments from Multifamily Performance Program (MPP) projects. In Q2 2023, NYSERDA conducted a deep dive assessment with HCR on their retrofit pipeline and emerged with the expectation this progress will ramp up in future quarters. In addition, NYSERDA re-assessed the remaining MPP project pipeline and expect remaining project commitments to move into construction and be fully paid out. Evaluation activities are being scoped for this program area now; future reports will detail results.
8	Industrial Transition	99%	Gross: Evaluated:	109% 101%	This program has been inactive since the end of 2019. The program is performing well on both budget and energy benefits, noting that NYSERDA anticipates some level of attrition over time as open projects move to closure—either completion or cancellation. Prior gross savings analysis confirmed the energy performance of this program with a strong realization rate; a final assessment of performance is in scoping now.
9	Energy Management Practices	99%	Gross: Evaluated:	63% 69%	Strategic Energy Management market response continues to increase over the previous quarter with participation in both Commercial and Industrial sectors. The On-Site Energy Manager initiative continues to lag forecasts and NYSERDA is responding with changes in Q3 to bolster participation. The methodology behind energy savings assumptions for projects in this program was recently updated as a result of an evaluation study, requiring a reduction to the reported amount and now reflected in the lower performance to plan. The plan will fully incorporate this feedback during the annual reforecast later this year. An update to the initial evaluation study for Energy Management Practices will be complete in Q3 2023.
10	Clean Energy Communities	95%	Gross: Evaluated:	255% 102%	Progress of budget expenditures and energy benefits slowed moderately in Q2 2023 with now more than half of municipalities in the state participating in the program. Communities remain engaged in the program and continue to work toward grant thresholds. Evaluation results being reported are for the program onset years of 2016-2018. With the shift of program impacts from direct to indirect proposed in the 8/1 CIP filing, NYSERDA intends to launch an evaluation that will quantify these recent impacts immediately following plan approval.
11	Codes and Standards for Carbon Neutral Buildings	103%	Gross: Evaluated:	n/a n/a	Progress of budget expenditures continues to trend favorably through Q2. Core work for code advancement and training is moving forward expeditiously and proposals for the next State code update are underway. Contracts were finalized for the support of code adoption and enactment this quarter. This initiative forecasts all impacts as indirect savings and through the initial study completed, indirect benefits measured exceeded plan for the period of study. The study shows that NYSERDA's long-standing engagement in this space is responsible for more than 3 TBtu of energy savings, of which approximately 1.2 TBtu is reflective of CEF-specific efforts. An update to this study is expected Q1 2024.

Table 2 continued

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
12	New Construction – Market Rate	105%	Gross: Evaluated:	94% 93%	The initiative continues to perform well on both budget and energy benefits, with the greatest expenditure activity this quarter coming from the open enrollment commercial and housing programs as projects advance through construction stages toward completion. There was also strong continued expenditure from the Carbon Neutral Community Economic Development program. Commitments are on track to exceed goal this year with new solicitation rounds of both large competitive programs launching by Q3. A market evaluation on the single family, multifamily and commercial sectors was finalized in Q2. Through the study, approximately 1.9 TBtu of indirect impacts were quantified, significantly more than forecasted. In addition, an impact evaluation of the single family component was also finalized showing strong performance in verified savings over time. An impact evaluation of multifamily and commercial is in process now and future reports will detail results.
13	REV Campus Challenge	99%	Gross: Evaluated:	46% 100%	Progress of budget expenditures and evaluated energy benefits is trending favorably through the first half of 2023. A verified gross savings analysis confirmed the energy performance of this program with a strong realization rate. The very high realization rate suggests that program methods to account for acquired savings may be overly conservative; future savings projections were adjusted during the 2022 reforecast and will be reflected going forward. A market evaluation is anticipated to be complete Q3 2023.
14	P-12 Schools	105%	Gross: Evaluated:	106% n/a	Evaluation studies will result in updates to realization rates for reporting of gross savings in 2024. The initiative is progressing to plan, accepting applications for building decarbonization studies and energy master plans.
15	RetrofitNY - LMI	58%	Gross: Evaluated:	90% n/a	In Q2 2023, NYSERDA continued to work with the remaining projects in Round 1 and Round 2 and expects to make decisions on which projects will move forward later this year. No additional project applications were received under the current program structure. NYSERDA is currently assessing the progress and performance of this initiative with anticipation to propose updates to multifamily offerings in the annual CIP update later this year. Impact evaluation will be conducted on completed projects, leveraging data from the program's implementation contractor. Where applicable, market evaluation will also be undertaken, and future reports will detail results.

2.2 Quarterly Benefits Progress Versus Plan

Table 3. Market Development and Innovation & Research Portfolio—Annual Direct Benefits

The table that follows represents the Market Development and Innovation & Research initiatives and their associated direct benefits. Progress reported here is a blend of verified gross and gross savings. Where evaluation studies have been completed and yield realization rates, verified gross acquired savings are reported. Where studies are not yet complete, those initiatives and/or time periods will continue reporting gross savings.

Annual Benefits Metrics	**Evaluated Totals** (verified gross where evaluated; gross where not)								
Market Development Innovation & Research ** Direct Only **	**Planned Incremental Acquired Benefits in Current Year**	**Current Year Acquired Benefits Through Current Quarter**	**Cumulative Acquired Benefits Through Current Quarter**	**Committed Benefits as of Current Quarter** (Committed but not acquired)	**Total Progress as of Current Quarter** (Total Acquired + Committed)	**Total Expected Benefits Through 2025**	**Total Progress as % of Total Expected Benefits Thru 2025**	**Total Expected Benefits Through 2030**	**Total Progress as % of Total Expected Benefits Thru 2030**
Total Energy Savings (MMBtu)	4,954,840	1,745,802	19,014,136	12,599,535	31,613,671	33,625,663	94%	46,517,718	68%
Electricity Savings (MWh)	703,974	184,607	1,885,740	1,336,275	3,222,015	3,633,161	89%	4,344,027	74%
Total Fuel Savings (MMBtu)	3,626,108	1,822,951	22,051,899	9,280,768	31,332,668	31,522,442	99%	42,191,132	74%
Natural Gas Fuel Savings (MMBtu)	3,240,311	1,590,939	9,436,167	8,224,584	17,660,752	17,785,178	99%	27,247,085	65%
Other Fuel Savings (MMBtu)	385,797	232,012	12,615,732	1,056,184	13,671,916	13,737,264	100%	14,944,048	91%
Renewable Energy Generation (MWh)	64,262	10,930	265,242	59,180	324,423	614,807	53%	617,407	53%
Renewable Energy Capacity (MW)	65	5	420	2	422	842	50%	844	50%
Total Leveraged Funds ($M)	$1,358	$239	$6,624	$3,205	$9,829	$10,330	95%	$12,711	77%

- Verified savings as a percent of total reported savings varies by metric and includes electricity (61% verified), natural gas (65%), and other fuels (13%). The measurement and verification work to verify savings is done on a periodic basis, most commonly covering at least 1-2 years of program activity. This work can only begin once adequate post-installation operation has occurred. Additionally, methods and data availability vary significantly between electricity, natural gas, and other fuels, which is one of the underlying causes of varying percentages of savings verified.
- Total Energy Savings measures the combined electricity and fuel savings net of usage; therefore, may not sum to the total of individual electric and fuel savings values.
- NYSERDA makes no claim to the environmental attributes or any New York Generation Attribute Tracking System (NYGATS) certificates that may be associated with these projects.

Table 4. Market Development and Innovation & Research Portfolio—Annual Indirect Benefits

Indirect benefits are defined as long-term market effects from follow-on market activity not directly funded by NYSERDA. Progress is reported as market impacts are verified through the completion of market studies which will occur gradually and grow over time, depending upon the period of each study, which varies from one initiative to another. More information on the Evaluation, Measurement, and Verification can be found in section 4 of this report. Expected benefits shown through 2025 and 2030 are discounted by 50 percent to account for uncertainty in timing and potential overlap that has not yet been assessed across the portfolio.

Market Development ** Indirect Only **	Cumulative Indirect Benefits Evaluated Through Previous Period	Indirect Benefits Evaluated in Current Reporting Period	Total Indirect Benefits Evaluated Through Current Reporting Period	Total Indirect Benefits Expected Through 2025	Total Indirect Benefits Evaluated as % of Total Expected Through 2025	Total Indirect Benefits Expected Through 2030	Total Indirect Benefits Evaluated as % of Total Expected Through 2030
Total Energy Savings (MMBtu equivalent)	1,905,393	802,538	2,707,931	18,210,291	15%	49,085,527	6%
Electricity Savings (MWh)	319,886	65,313	385,199	2,186,622	18%	5,766,772	7%
Total Fuel Savings (MMBtu)	816,433	579,690	1,396,123	11,434,811	12%	30,965,736	5%
Natural Gas Fuel Savings (MMBtu)	748,273	579,690	1,327,963	6,650,703	20%	19,547,759	7%
Other Fuel Savings (MMBtu)	68,160	-	68,160	4,784,108	1%	11,417,977	1%
Renewable Energy Generation (MWh)	478,683	-	478,683	482,654	99%	688,757	69%
Renewable Energy Capacity (MW)	58	-	58	188	31%	313	19%

- Indirect benefits are reported for the initiatives and specific time periods for which studies have concluded; these impacts will be added over time as additional studies conclude, regularly growing these evaluated totals.
- Cumulative Indirect Benefits Evaluated Through Previous Period reflects the total reported indirect benefits as of the period, but not necessarily all indirect savings anticipated through the reporting period, since additional studies will likely conclude for past periods and add to these overall figures.
- Indirect plans as represented in the "Total Expected" columns conservatively include only 50 percent of the estimated total indirect benefits from market transformation to avoid overlap in these values and to account for uncertainty associated with the forecasting and measurement of indirect benefits over time.
- Total Indirect Benefits Evaluated Through Current Reporting Period, Total Energy Savings updated to include Energy Usage which is not presented as its own metric on this table. Of reported Electricity Usage, 730 MWh is netted in the Total Energy Savings calculation.
- Indirect leveraged funding will be captured with future assessments.

2.3 Quarterly Budgets Progress Versus Plan

Table 5. Market Development Initiatives by Focus Area—Budgets and Spending

See endnote section for more information.[6,7,8]

Market Development Focus Area | Initiative	Current Year Expenditures Plan	Current Year Expenditures Through Current Quarter	Encumbrances as of Current Quarter	Total Progress as of Current Quarter (Expended + Encumbered)	Total Expected Expenditures Through 2025	Total Progress as % of Total Expenditures Through 2025	Total Expected Expenditures Through 2030	Total Progress as % of Total Expenditures Through 2030
Clean Heat & Cooling								
Heat Pumps Phase 1 (2017)	$2,806,508	$1,292,253	$4,077,193	$57,779,752	$57,491,685	101%	$57,491,685	101%
Heat Pumps Phase 2 (2020)	$13,033,617	$3,853,241	$25,151,354	$48,442,086	$53,604,755	90%	$57,536,939	84%
Renewable Heat NY - Clean and Efficient Biomass Heating	$452,248	$247,820	$369,270	$13,403,215	$13,410,575	100%	$13,410,575	100%
Solar Thermal Transition	-	-	-	$287,513	$287,513	100%	$287,513	100%
Clean Heat & Cooling Total	**$16,292,373**	**$5,393,314**	**$29,597,817**	**$119,912,566**	**$124,794,528**	**96%**	**$128,726,712**	**93%**
Codes and Standards, & Other Multisector Initiatives								
Codes and Standards for Carbon Neutral Buildings	$5,465,000	$2,183,883	$13,686,179	$27,037,808	$37,262,900	73%	$57,000,000	47%
Information Products and Brokering	$440,000	$134,705	$664,691	$2,700,253	$4,860,000	56%	$5,500,000	49%
Market Characterization & Design Market Development	$4,231,155	$1,112,837	$6,080,300	$22,082,480	$30,137,463	73%	$30,452,510	73%
Product and Appliance Standards	$4,443,380	$600,034	$9,007,750	$11,607,776	$17,481,046	66%	$25,699,000	45%
REV Connect	$1,332,000	$601,980	$5,128,429	$10,199,666	$13,000,000	78%	$13,000,000	78%
Codes and Standards, & Other Multisector Initiatives Total	**$15,911,535**	**$4,633,439**	**$34,567,350**	**$73,627,983**	**$102,741,410**	**72%**	**$131,651,510**	**56%**
Commercial / Industrial / Agriculture								
Advancing Agricultural Energy Technologies	$875,000	$5,988	$1,792,412	$2,104,449	$3,760,000	56%	$3,760,000	56%
Agriculture Transition	-	-	-	$3,598,821	$3,598,821	100%	$3,598,821	100%
Commercial Transition	$330,000	$221,682	$735,808	$12,359,688	$12,272,799	101%	$12,559,148	98%
Energy Management Practices	$3,539,500	$1,298,052	$8,269,713	$22,550,278	$25,391,811	89%	$28,876,778	78%
Energy Management Technology	$10,491,000	$5,031,858	$28,231,090	$77,049,869	$85,476,432	90%	$108,298,862	71%
Greenhouse Lighting and Systems Engineering	$482,648	$390,215	$1,676,450	$5,000,000	$4,837,785	103%	$5,000,000	100%
Industrial Transition	$1,593,925	$1,010,075	$1,622,630	$46,183,877	$48,223,374	96%	$48,223,374	96%
Market Challenges	$8,870,589	$4,100,844	$63,657,169	$80,306,310	$74,918,755	107%	$127,955,956	63%
P-12 Schools	$2,500,000	$895,220	$19,601,894	$27,284,520	$17,867,874	153%	$57,600,000	47%
Pay for Performance	$278,006	$20,042	$182,979	$1,827,547	$1,902,532	96%	$1,902,532	96%
Real Estate Tenant	$1,160,662	$558,500	$921,946	$14,728,074	$15,223,877	97%	$15,798,390	93%
REV Campus Challenge	$2,150,000	$464,660	$9,427,894	$21,291,964	$17,694,448	120%	$21,650,002	98%
Technical Services	$6,441,857	$4,523,558	$32,939,916	$62,410,305	$56,441,101	111%	$86,597,185	72%
Commercial / Industrial / Agriculture Total	**$38,713,187**	**$18,520,694**	**$169,059,899**	**$376,695,702**	**$367,609,607**	**102%**	**$521,821,047**	**72%**
Communities								
Clean Energy Communities	$6,527,633	$2,934,670	$10,783,817	$38,172,455	$53,293,153	72%	$81,271,963	47%
Community Energy Engagement	-	-	-	$4,388,546	$4,407,818	100%	$4,407,818	100%
Communities Total	**$6,527,633**	**$2,934,670**	**$10,783,817**	**$42,561,002**	**$57,700,971**	**74%**	**$85,679,781**	**50%**

Table 5 continued

Market Development Focus Area | Initiative	Current Year Expenditures Plan	Current Year Expenditures Through Current Quarter	Encumbrances as of Current Quarter	Total Progress as of Current Quarter (Expended + Encumbered)	Total Expected Expenditures Through 2025	Total Progress as % of Total Expenditures Through 2025	Total Expected Expenditures Through 2030	Total Progress as % of Total Expenditures Through 2030
Low-to-Moderate Income								
Healthy Homes Feasibility Study	$32,865	-	$32,865	$212,147	$212,147	100%	$212,147	100%
Heat Pumps Phase 2 (2020)	$4,580,000	$748,706	$4,564,571	$11,374,013	$24,587,625	46%	$30,000,000	38%
LMI Multifamily	$12,742,374	$3,346,202	$33,051,777	$64,475,996	$106,089,055	61%	$159,328,622	40%
LMI Outreach & Engagement	$1,393,525	$305,140	$847,086	$3,397,440	$7,419,045	46%	$8,467,401	40%
LMI Pilots	$639,499	-	$383,699	$852,665	$1,648,099	52%	$2,443,533	35%
Low Rise New Construction Transition - LMI	$375,000	$178,008	$700,710	$7,910,548	$7,970,376	99%	$7,970,376	99%
Multifamily New Construction Transition - LMI	$810,000	$400,428	$2,033,862	$8,002,177	$8,420,981	95%	$8,420,981	95%
New Construction - LMI	$5,384,699	$5,381,117	$82,441,013	$110,339,942	$62,666,191	176%	$134,631,362	82%
NYS Healthy Homes Value Based Payment Pilot	$3,780,136	$547,829	$1,051,864	$3,335,097	$9,791,294	34%	$9,791,294	34%
Regional Clean Energy Hubs	$9,473,115	$1,858,836	$29,873,623	$33,385,987	$32,921,931	101%	$42,000,000	79%
RetrofitNY - LMI	$5,353,383	$276,235	$2,424,153	$7,040,103	$29,169,070	24%	$30,503,500	23%
REVitalize	-	-	-	$291,424	$291,424	100%	$291,424	100%
Single Family - Low Income	$16,631,077	$15,009,752	$3,193,132	$247,431,254	$249,028,568	99%	$249,028,568	99%
Single Family - Moderate Income	$5,535,802	$2,011,345	$2,050,840	$95,653,290	$102,751,836	93%	$102,751,836	93%
Solar for All	$1,300,000	$469,774	$7,835,421	$12,617,728	$8,523,937	148%	$13,011,046	97%
Low-to-Moderate Income Total	**$68,031,475**	**$30,533,372**	**$170,484,617**	**$606,319,811**	**$651,491,580**	**93%**	**$798,852,088**	**76%**
Multifamily Residential								
Energy Management Technology	$2,226,026	$271,871	$3,775,151	$10,331,681	$13,126,688	79%	$14,099,239	73%
Market Challenges	$1,327,024	$381,450	$7,140,090	$9,642,900	$9,967,046	97%	$10,000,000	96%
Multifamily Low Carbon Pathways	$3,900,954	$316,743	$3,366,945	$4,209,938	$17,018,812	25%	$24,638,016	17%
Multifamily Market Rate Transition	-	-	-	$156,214	$156,214	100%	$156,214	100%
Technical Services	$5,827,866	$1,827,467	$11,521,061	$17,441,816	$17,678,124	99%	$25,749,999	68%
Multifamily Residential Total	**$13,281,869**	**$2,797,530**	**$25,803,247**	**$41,782,548**	**$57,946,882**	**72%**	**$74,643,467**	**56%**
New Construction								
Commercial New Construction Transition	$750,000	$325,509	$5,123,640	$13,990,078	$13,094,630	107%	$14,645,983	96%
Low Rise New Construction Transition - Market Rate	$137,359	$42,690	$277,245	$4,371,320	$4,381,285	100%	$4,381,285	100%
Multifamily New Construction Transition - Market Rate	$124,000	$11,398	$249,209	$1,610,542	$1,626,873	99%	$1,626,873	99%
New Construction - Market Rate	$3,925,584	$2,727,666	$97,247,242	$114,524,817	$61,915,493	185%	$152,150,505	75%
New Construction Total	**$4,936,943**	**$3,107,263**	**$102,897,337**	**$134,496,757**	**$81,018,281**	**166%**	**$172,804,647**	**78%**

Table 5 continued

Market Development Focus Area | Initiative	Current Year Expenditures Plan	Current Year Expenditures Through Current Quarter	Encumbrances as of Current Quarter	Total Progress as of Current Quarter (Expended + Encumbered)	Total Expected Expenditures Through 2025	Total Progress as % of Total Expenditures Through 2025	Total Expected Expenditures Through 2030	Total Progress as % of Total Expenditures Through 2030
Renewables / Distributed Energy Resources (DER)								
Anaerobic Digesters Transition	$4,050,000	$623,947	$7,812,545	$13,622,321	$11,870,723	115%	$13,634,032	100%
Clean Energy Siting and Soft Cost Reduction	$1,313,777	$360,679	$3,356,012	$5,436,945	$6,245,732	87%	$8,795,000	62%
Combined Heat & Power Transition	$12,124,782	$1,197,383	$19,425,297	$57,003,053	$58,091,908	98%	$58,091,908	98%
Fuel Cells	$2,156,250	$500,000	$3,412,500	$7,199,144	$7,199,144	100%	$7,199,144	100%
Offshore Wind Master Plan	-	-	-	$4,965,882	$4,965,882	100%	$4,965,882	100%
Offshore Wind Pre-Development Activities	$342,809	$7,280	$360,893	$9,839,394	$9,789,462	101%	$9,789,462	101%
ORES Support	$2,250,000	$177,287	$2,171,667	$4,690,489	$8,397,053	56%	$9,000,000	52%
Reducing Barriers to Distributed Deployment	$1,330,000	$158,374	$4,835,901	$14,260,475	$13,314,716	107%	$15,450,000	92%
Small Wind Transition	-	-	$39,088	$3,362,761	$3,557,768	95%	$3,557,768	95%
Solar Plus Energy Storage	$27,149,772	$13,999,999	$10,424,500	$36,820,771	$36,820,772	100%	$36,820,772	100%
Renewables / Distributed Energy Resources (DER) Total	**$50,717,389**	**$17,024,949**	**$51,838,403**	**$157,201,235**	**$160,253,159**	**98%**	**$167,303,968**	**94%**
Single Family Residential								
Consumer Awareness	-	-	-	$2,251,671	$2,251,671	100%	$2,251,671	100%
Heat Pumps Phase 2 (2020)	$1,700,000	$688,422	$2,753,210	$5,041,722	$10,749,989	47%	$12,000,000	42%
Pay for Performance	$10,000	$14,936	(10000)	$885,489	$890,553	99%	$890,553	99%
Residential	$14,592,829	$4,121,988	$5,379,816	$21,875,175	$52,551,537	42%	$56,998,862	38%
Single Family Market Rate Transition	-	(0)	-	$23,528,344	$23,530,396	100%	$23,530,396	100%
Single Family Residential Total	**$16,302,829**	**$4,825,347**	**$8,123,027**	**$53,582,400**	**$89,974,146**	**60%**	**$95,671,482**	**56%**
Transportation								
Electric Vehicles - Rebate	$118,037	$4,758	$129,630	$39,498,889	$39,500,000	100%	$39,500,000	100%
EV Charging and Engagement	$1,250,000	-	-	-	$6,550,000	0%	$7,200,000	0%
Transportation Total	**$1,368,037**	**$4,758**	**$129,630**	**$39,498,889**	**$46,050,000**	**86%**	**$46,700,000**	**85%**
Workforce Development								
Building Operations and Maintenance Partnerships	$2,717,188	$1,570,415	$9,010,979	$21,300,545	$22,289,857	96%	$33,345,000	64%
Talent Pipeline	$9,303,818	$4,246,026	$20,255,686	$49,496,079	$60,385,798	82%	$75,000,000	66%
Workforce Development Total	**$12,021,005**	**$5,816,441**	**$29,266,665**	**$70,796,624**	**$82,675,655**	**86%**	**$108,345,000**	**65%**
NYS Cost Recovery Fee Market Development	$2,795,654	$1,057,469	-	$13,806,136	$22,182,220	62%	$27,721,347	50%
Total Market Development	**$246,899,929**	**$96,649,244**	**$632,551,809**	**$1,730,281,653**	**$1,844,438,439**	**94%**	**$2,359,921,050**	**73%**

Table 6. Innovation & Research Initiatives by Focus Area—Budgets and Spending

See endnote section for more information.[9,10 11]

Innovation & Research Focus Area | Initiative	Current Year Expenditures Plan	Current Year Expenditures Through Current Quarter	Encumbrances as of Current Quarter	Total Progress as of Current Quarter (Expended + Encumbered)	Total Expected Expenditures Through 2025	Total Progress as % of Total Expenditures Through 2025	Total Expected Expenditures Through 2030	Total Progress as % of Total Expenditures Through 2030
Buildings Innovation								
Climatetech Commercialization Support	$2,166,667	$40,000	$9,135,000	$9,500,000	$10,000,000	95%	$10,000,000	95%
NextGen Buildings	$8,050,000	$1,538,688	$30,202,308	$40,751,076	$43,781,786	93%	$65,000,000	63%
Buildings Innovation Chapter Total	**$10,216,667**	**$1,578,688**	**$39,337,308**	**$50,251,076**	**$53,781,786**	**93%**	**$75,000,000**	**67%**
Clean Transportation Innovation								
Electric Vehicle Innovation	$4,050,000	$1,098,633	$13,140,153	$20,443,026	$26,490,029	77%	$31,850,000	64%
Public Transportation and Mobility	$1,585,458	$1,835,297	$3,133,345	$10,301,656	$15,168,472	68%	$22,500,000	46%
Clean Transportation Innovation Total	**$5,635,458**	**$2,933,929**	**$16,273,499**	**$30,744,682**	**$41,658,500**	**74%**	**$54,350,000**	**57%**
Climate Resilience Innovation								
Hydrogen Innovation	$490,000	-	$215,000	$215,000	$4,297,600	5%	$7,000,000	3%
Market Characterization & Design Innovation & Research	$900,000	$298,458	$642,732	$1,462,891	$1,750,653	84%	$1,750,653	84%
Climate Resilience Innovation Total	**$1,390,000**	**$298,458**	**$857,732**	**$1,677,891**	**$6,048,253**	**28%**	**$8,750,653**	**19%**
Energy Focused Environmental Research								
Energy-Related Environmental Research	$6,276,000	$3,427,973	$13,733,371	$40,748,618	$39,609,269	103%	$47,800,000	85%
Energy Focused Environmental Research Total	**$6,276,000**	**$3,427,973**	**$13,733,371**	**$40,748,618**	**$39,609,269**	**103%**	**$47,800,000**	**85%**
Gas Innovation								
Hydrogen Innovation	$1,646,000	$88,258	$1,673,098	$1,761,356	$11,492,000	15%	$20,000,000	9%
Long Duration Energy Storage	$1,800,000	-	$14,818,443	$14,818,443	$10,880,000	136%	$17,000,000	87%
Utility Thermal Network Technical Support	$500,000	$48,757	$1,243	$50,000	$3,000,000	2%	$3,000,000	2%
Gas Innovation Total	**$3,946,000**	**$137,016**	**$16,492,783**	**$16,629,799**	**$25,372,000**	**66%**	**$40,000,000**	**42%**
Grid Modernization								
Future Grid Performance Challenge	$5,400,000	$1,483,715	$23,323,585	$30,294,456	$26,400,000	115%	$43,000,000	70%
Grid ClimateTech Ready Capital	$730,000	-	$137,364	$137,364	$5,230,000	3%	$9,000,000	2%
High Performing Electric Grid	$7,345,960	$3,190,133	$23,916,766	$63,549,312	$57,933,678	110%	$64,800,000	98%
Power Electronics Manufacturing Consortium	-	-	-	$16,694,490	$16,694,490	100%	$16,694,490	100%
Grid Modernization Chapter Total	**$13,475,960**	**$4,673,848**	**$47,377,714**	**$110,675,622**	**$106,258,168**	**104%**	**$133,494,490**	**83%**
Negative Emissions Technologies								
CarbonTech Development	$1,595,995	-	$4,722,500	$5,000,000	$4,998,980	100%	$5,113,980	98%
Natural Carbon Solutions	$562,500	$65,608	$11,909,233	$12,000,001	$5,987,500	200%	$12,500,000	96%
Negative Emissions Technologies Total	**$2,158,495**	**$65,608**	**$16,631,733**	**$17,000,001**	**$10,986,480**	**155%**	**$17,613,980**	**97%**
Renewables Optimization								
Energy Storage Technology and Product Development	$7,700,000	$623,319	$19,242,548	$30,081,238	$34,549,342	87%	$39,500,000	76%
National Offshore Wind Research & Development Consortium	$4,250,000	$1,780,587	$8,314,322	$22,119,170	$22,500,000	98%	$22,500,000	98%
Renewables Optimization Total	**$11,950,000**	**$2,403,906**	**$27,556,870**	**$52,200,408**	**$57,049,342**	**92%**	**$62,000,000**	**84%**
Technology to Market								
CarbonTech Development	$3,821,505	$875,000	$11,818,500	$14,146,000	$14,251,020	99%	$14,362,020	98%
Catalytic Capital for Climatetech	$1,664,179	$231,304	$2,008,933	$19,287,389	$19,360,229	100%	$19,360,229	100%
Climatetech Commercialization Support	$5,869,271	$1,823,204	$22,410,181	$54,927,458	$54,572,215	101%	$54,927,913	100%
Climatetech Expertise & Talent	$1,769,054	$55,350	$215,383	$7,410,469	$12,049,276	62%	$12,049,276	62%
Manufacturing Corps	$518,726	$833,585	$3,792,326	$16,852,465	$17,058,959	99%	$17,058,959	99%
Novel Business Models and Offerings	$1,284,717	$265,186	$6,932,483	$13,226,955	$13,383,394	99%	$13,383,394	99%
Technology to Market Total	**$14,927,452**	**$4,083,629**	**$47,177,805**	**$125,850,736**	**$130,675,093**	**96%**	**$131,141,791**	**96%**
NYS Cost Recovery Fee Innovation & Research	$800,502	$220,183	-	$2,589,377	$5,459,484	48%	$6,528,307	40%
Total Innovation and Research	**$70,776,534**	**$19,823,238**	**$225,438,815**	**$448,368,209**	**$476,898,375**	**94%**	**$576,679,221**	**78%**

3 NY-Sun Performance

As represented in Figure 2 above, NYSERDA's NY-Sun Portfolio continues to show strong progress toward the CEF distributed solar capacity targets. Progress in the following tables is conveyed in both capacity (megawatts direct current) and generation (megawatt-hours). Additional detail around progress by year can be found in the NYSERDA-Supported Solar Projects dashboard. Major highlights that speak to progress through the current quarter include:

- In April 2022, the PSC issued an Order expanding the NY-Sun program to target 10 GW of installed distributed solar capacity by 2030. Robust uptake of NY-Sun incentives continues through Q2 2023, as illustrated in the Quarterly Benefits Table.
- By November 17, 2022, incentive uptake achieved one of the thresholds set in the April 2022 Order (commitment of more than 50% of new Upstate capacity) to trigger a Mid-Point Review of the NY-Sun program. NYSERDA and DPS staff jointly filed the Mid-Point Review in January 2023. The Mid-Point Review included an analysis of the expected impacts of the IRA and proposed program adjustments.
- During 2022, NY-Sun installed more distributed solar capacity than in any previous year, making it the most successful year for the program in terms of new renewable energy generating capacity.
- On January 17, 2023, NYSERDA and DPS jointly filed the NY-Sun Program Mid-Point Review. This report provided a status update on NY-Sun Program Activity, and an overview of recent economic and policy changes to the distributed solar industry. NYSERDA and DPS also presented several recommendations to the Commission, including adjustments to the NY-Sun Prevailing Wage incentive adder, a recommendation for launching a floating solar incentive adder, and a proposal to require the Joint Utilities to implement multiple customer discount rates for net credited community distributed generation projects. The Commission issued an Order on June 23, 2023, adopting most of the recommendation from the Mid-Point Review.
- New York's national leadership in community solar continued during the first half of 2023, with 281 MW completed during this time.

Quarterly benefit and budget progress is conveyed in the tables that follow.

3.1 Quarterly Benefits Progress

Table 7. NY-Sun—Installed Capacity and Production (NY-Sun Only)

Table 7 shows installed solar capacity (MW) and production (MWh) across major market sectors. The table includes all projects receiving NY-Sun funding, including those that are supported by the Solar Energy Equity Framework (SEEF). Projects included in SEEF benefit low- to –moderate-income (LMI) households, affordable housing providers, residents of disadvantaged communities (DACs), and public schools serving DACs. As an example, a solar installation at the residence of an eligible LMI homeowner in Albany would be included in the "Upstate-Residential" category in Table 7, as well as in the "SEEF Only" Table 8. Community solar projects are categorized based on their location and size, with most of the State's total community solar capacity categorized as "Upstate-Commercial/Industrial" for the purpose of this table.

Annual Benefits		Evaluated Totals (verified gross where evaluated; gross where not)						
NY-Sun ** Includes SEEF and non-SEEF Projects **		**Projects Completed (Installed) through Prior Year**	**Projects Completed (Installed) in Current Year**	**Cumulative Projects Completed (Installed Units) through Current Quarter**	**Projects Approved or Contracted But Not Yet Completed (Current Pipeline)**	**Total Progress (Installed + Pipeline) through Current Quarter**	**Total Expected Installed Projects through 2030**	**Total Progress as % of 2030 Goal**
Distributed Solar Energy Capacity (MW)	Commercial/Industrial (Competitive)	117.6	-	117.6	-	117.6	117.6	100%
	Upstate - Residential	427.4	36.8	464.2	24.4	488.5	527.0	93%
	Upstate - Nonresidential	125.2	11.7	137.0	28.8	165.8	279.0	59%
	Upstate - Commercial/Industrial	1,702.5	293.0	1,995.5	3,093.6	5,089.1	6,213.0	82%
	Con Ed - Residential	270.1	38.2	308.3	26.9	335.2	441.0	76%
	Con Ed - Nonresidential	135.2	15.4	150.6	192.5	343.1	735.0	47%
	Capacity Total	**2,778.1**	**395.1**	**3,173.2**	**3,366.2**	**6,539.3**	**8,312.6**	79%
Distributed Solar Energy Production (MWh)	Commercial/Industrial (Competitive)	136,652	-	136,652	-	136,652	n/a	
	Upstate - Residential	445,921	36,147	482,068	24,002	506,070		
	Upstate - Nonresidential	141,487	12,841	154,328	32,888	187,216		
	Upstate - Commercial/Industrial	2,039,924	433,645	2,473,568	4,068,792	6,542,361		
	Con Ed - Residential	287,365	39,073	326,438	27,621	354,059		
	Con Ed - Nonresidential	156,888	17,984	174,872	231,559	406,431		
	Production Total	**3,208,236**	**539,689**	**3,747,926**	**4,384,862**	**8,132,788**		

Table 8. NY-Sun—Installed Capacity and Production (NY-Sun SEEF Only)

Table 8 is limited to projects that are supported by SEEF, which includes "adder" incentives for qualifying projects that are offered in additional to the "base" NY-Sun incentives received by all qualifying projects in the applicable market sector. The projects included in Table 8 are a subset of those in Table 7.

Annual Benefits		**Evaluated Totals** (verified gross where evaluated; gross where not)				
NY-Sun ** Solar Energy Equity Framework ONLY **		**Projects Completed (Installed Units) Through Prior Year**	**Projects Completed (Installed Units) in Current Year**	**Cumulative Projects Completed (Installed Units) Through Current Quarter**	**Projects Approved or Contracted But Not Yet Completed (Current Pipeline)**	**Total (Installed + Pipeline) Through Current Quarter**
Distributed Solar Energy Capacity (MW)	Upstate - Residential	5.5	0.4	5.9	0.4	6.3
	Upstate - Nonresidential	0.8	0.0	0.8	1.6	2.4
	Upstate - Commercial/Industrial	15.5	29.9	45.3	425.7	471.1
	Con Ed - Residential	1.6	1.1	2.7	1.0	3.7
	Con Ed - Nonresidential	17.1	1.4	18.5	15.3	33.8
	Capacity Total	**40.4**	**32.8**	**73.2**	**444.1**	**517.2**
Distributed Solar Energy Production (MWh)	Upstate - Residential	6,013	367	6,381	406	6,787
	Upstate - Nonresidential	828	41	869	2,044	2,913
	Upstate - Commercial/Industrial	17,956	63,577	81,533	561,088	654,750
	Con Ed - Residential	1,737	1,140	2,877	1,121	3,998
	Con Ed - Nonresidential	19,985	2,581	22,566	18,947	41,115
	Production Total	**46,520**	**67,706**	**114,226**	**583,607**	**709,564**

Table 9. All Other Solar—Installed Capacity and Production Beyond NY-Sun

Table 9 tracks all other reported progress toward the statewide solar deployment goals of 6 GW by 2025 and 10 GW by 2030. It includes projects that received non-CEF NYSERDA funding as well as projects installed independent of NYSERDA funding. NYSERDA utilizes data from utility interconnection inventories published by the Department of Public Service to determine non-NYSERDA reported installations. Since the two data sets can define project completion date differently, some overlap may exist between the two, however the totals presented here (MW, MWh) will never exceed the reported interconnected totals. As the pipeline of NYSERDA commitments are drawn down over time (projects are considered acquired in both data sources), this overlap is systematically eliminated.

Annual Benefits		**Evaluated Totals** (verified gross where evaluated; gross where not)				
Other Solar Installations		**Projects Completed (Installed Units) Through Prior Year**	**Projects Completed (Installed Units) in Current Year**	**Cumulative Projects Completed (Installed Units) Through Current Quarter**	**Projects Approved or Contracted But Not Yet Completed (Current Pipeline)**	**Total (Installed + Pipeline) Through Current Quarter**
Distributed Solar Energy Capacity (MW)	NYSERDA (non-CEF) Installations	588.7	10.0	598.8	44.7	643.5
	Non-NYSERDA Statewide Installations			1,091.5		1,091.5
	Capacity Total	**588.7**	**10.0**	**1,690.2**	**44.7**	**1,735.0**
Distributed Solar Energy Production (MWh)	NYSERDA (non-CEF) Installations	649,743	11,339	661,082	53,779	714,861
	Non-NYSERDA Statewide Installations			1,255,844		1,255,844
	Production Total	**649,743**	**11,339**	**1,916,926**	**53,779**	**1,970,705**

3.2 Quarterly Budgets Progress

Table 10. NY-Sun—Budgets and Spending

Table 10 shows encumbrances and expenditures across major market sectors and programmatic areas with the NY-Sun initiative. The "MW Block Incentives & Adders" section breaks down encumbrances and expenditures across the major market sectors, excluding funding with the Solar Energy Equity Framework. All SEEF encumbrances and expenditures, including "adder" incentives, are tracked as a line item. As an example, for a solar installation at the residence of an eligible LMI homeowner in Albany the expenditure of the "base" NY-Sun incentive would be included in the "Upstate-Residential" sub-category in the "MW Block Incentives & Adder" section, while the "adder" incentive from the SEEF budget would be included in the "Solar Energy Equity Framework (SEEF)" line item. Table 11 provides a more in-depth look at SEEF encumbrances and expenditures and tracks the total NY-Sun funding committed to SEEF-eligible projects.

NY-Sun	Expenditures through Prior Year	Current Year Expenditures through Current Quarter	Cumulative Expenditures through Current Quarter	Encumbrances as of Current Quarter	Total Progress as of Current Quarter (Expended +	Total Expected Expenditures	Total Progress as % of Total Expected Expenditures
MW Block Incentives & Adders							
Commercial/Industrial (Competitive)	$48,616,265	$0	$48,616,265	$299,343	$48,915,609	n/a	
Upstate - Residential	$203,657,491	$12,371,801	$216,029,291	$8,165,431	$224,194,722		
Upstate - Nonresidential	$57,331,524	$4,256,237	$61,587,761	$10,902,677	$72,490,438		
Upstate - Commercial/Industrial	$345,605,430	$65,948,557	$411,553,987	$800,912,779	$1,212,466,766		
Con Ed - Residential	$91,735,655	$6,719,885	$98,455,540	$5,553,799	$104,009,339		
Con Ed - Nonresidential	$73,499,396	$8,594,137	$82,093,533	$122,205,767	$204,299,299		
MW Block Subtotal	**$820,445,760**	**$97,890,617**	**$918,336,377**	**$948,039,796**	**$1,866,376,173**	**$2,485,201,000**	71%
Solar Energy Equity Framework (SEEF) Adder	$12,776,814	$2,181,073	$14,957,887	$69,753,628	$84,711,515	$399,764,000	21%
Funds to Assist Transition to Prevailing Wage	$0	$0	$0	$5,347,939	$5,347,939	$238,725,000	2%
Consumer Education	$1,527,958	$8,510	$1,536,468	$3,935,575	$5,472,042	$6,500,000	84%
Implementation and Quality Assurance	$14,786,545	$818,138	$15,604,683	$3,882,332	$19,487,016	$32,600,000	60%
Administration	$20,880,083	$1,749,509	$22,629,592	$182,313	$22,811,905	$58,756,000	39%
Evaluation	$837,964	$267,495	$1,105,459	$909,070	$2,014,529	$3,500,000	58%
NYS Cost Recovery	$8,053,635	$972,585	$9,026,221	$0	$9,026,221	$41,800,000	22%
NY-Sun Total	**$879,308,760**	**$103,887,927**	**$983,196,687**	**$1,032,050,653**	**$2,015,247,340**	**$3,266,846,000**	62%

Table 11. NY-Sun—Solar Energy Equity Framework (SEEF) Spending Details

This table is a subset of budget and spending data reported in Table 9, intended to provide greater detail on SEEF and Other Incentive investments relative to the broader NY-Sun budget. Other Incentives shown here reflect the base MW Block and non-SEEF incentive adders and are a subset of spending shown in Table 10 under MW Block Incentives & Adders.

Solar Energy Equity Framework (SEEF)	SEEF Adder Expenditures	Other Incentive Expenditures	SEEF Adder Encumbrances	Other Incentive Encumbrances	SEEF Adder Total Progress	Other Incentive Total Progress	SEEF Total Progress
Upstate - Residential	$2,021,097	$2,176,141	$198,651	$158,880	$2,219,748	$2,335,021	$4,554,769
Upstate - Nonresidential	$217,271	$333,995	$565,513	$619,003	$782,784	$952,998	$1,735,782
Upstate - Commercial/Industrial	$465,234	$6,134,653	$56,076,113	$102,462,037	$56,541,347	$108,596,691	$165,138,038
Con Ed - Residential	$1,375,376	$537,974	$727,768	$245,485	$2,103,144	$783,459	$2,886,603
Con Ed - Nonresidential	$6,920,473	$8,100,974	$9,323,260	$9,789,428	$16,243,733	$17,890,402	$34,134,135
Technical Assistance and Implementation	$3,958,437	$0	$2,862,322	$0	$6,820,759	$0	$6,820,759
Total	**$14,957,887**	**$17,283,738**	**$69,753,628**	**$113,274,833**	**$84,711,515**	**$130,558,571**	**$215,270,087**

Table 12. Non-CEF NYSERDA Solar Spending

This table quantifies NYSERDA investments in solar projects that are funded outside of the Clean Energy Fund. Project costs related to other non-NYSERDA installed solar (statewide interconnections) is not available and therefore not included.

Other Solar Installations	Expenditures through Prior Year	Current Year Expenditures through Current Quarter	Cumulative Expenditures through Current Quarter	Encumbrances as of Current Quarter	Total Progress as of Current Quarter (Expended + Encumbered
NYSERDA (non-CEF) Installations	$654,764,639	$12,578,534	$667,343,174	$38,088,841	$705,432,015

4 Evaluation, Measurement, and Verification Summary

In accordance with CE-05: Evaluation, Measurement, & Verification (EM&V) Guidance, NYSERDA is required to file all final EM&V Reports in the Document and Matter Management system. This section will include a compilation of the high-level summaries of the EM&V reports due for filing within the reporting period.

For the Q2 2023 reporting period, four studies were finalized as presented in Table 13. For more information on the schedule of studies as they pertain to NYSERDA's Market Development and Innovation & Research initiatives, please reference the Compiled Investment Plan or view reporting for historical periods to see past summaries both found on NYSERDA's website.

Table 13. Evaluations Completed Q2 2023

Evaluated Program	Evaluation type	Evaluated program year(s)
Energy Management Technology/Real Time Energy Management	Impact	2017-2021
Energy-Related Environmental Research	Market	1998-2022
New Construction	Impact & Market	2016-2022
University of Buffalo Case Study	Market	N/A

The latest Compiled Investment Plans:

https://www.nyserda.ny.gov/About/Funding/Clean-Energy-Fund/

Clean Energy Fund Reports:

https://www.nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/Clean-Energy-Fund-Reports

Note that NYSERDA began providing these summaries with the 2021 Annual CEF Performance Report.

4.1 Energy Management Technology – Real Time Energy Management (2017-2021)

Since Real Time Energy Management (RTEM) is no longer offered as a standalone program, the following findings and recommendations are provided to document lessons learned and best practices that should be taken into consideration to improve the design, performance and evaluability of programs of similar nature in the future. This study is the second formal evaluation conducted on RTEM encompassing the period 2017-2021. This study focused specifically on verifying direct impacts and a follow up study is in scoping now to verify additional impacts that have accrued since 2021. In addition, a separate study is also in scoping now to assess market transformation effects emanating from this initiative.

Summary of Report Findings, Recommendations and NYSERDA Response to Recommendations

Key findings and associated recommendations from the RTEM Impact Evaluation include: [12]

Finding 1. Program-based measurement and verification (M&V) is conducted and captures program savings. Baseline utility data has been collected for every site enrolled in the program since Q4 2020, but is only collecting post-installation data for a sample of those sites.

Recommendation: Acquire permission and account numbers from the customer and collect two years of pre-participation utility billing data as well as key operational data, such as occupancy and operating hours at the time of enrollment where this is feasible. Ideally billing data is collected directly from the utility through electronic data interchange (EDI[13]) or similar approaches. Direct from utility billing data should retain meta data important for modelling savings such as read dates and whether the data for a time period is an actual or estimated read. Requesting data through EDI must be done promptly upon program enrollment, as the data will not be easily accessible later. This would also benefit future evaluations, removing the barrier of requesting permission to access utility data and securing the pre- period data from the source. Having two years of pre- and post- utility billing data allows for more accurate results during evaluation (e.g., using pooled regression analysis, the difference-in-differences method) and reduces uncertainty arising from a large percentage of estimated reads.

NYSERDA Response to Recommendation: Implemented**.** NYSERDA continues to take steps to calculate energy savings with reasonable and appropriate methods. NYSERDA is collecting baseline energy use for all new participants and has worked to continuously improve its savings methodologies.

Recommendation: Any analyses of energy savings by program or future evaluations should stratify by two dimensions to weight the sampled sites in order to better capture any cross-correlation of effects related to important site features. For this evaluation, the first dimension is facility type, and the second is facility size. This approach will allow for more accurate representation of the population along these dimensions. Below are the recommended stratification segments, based on the population of 528 sites that were evaluated to date. Each evaluation should assess the current population for the best stratification dimensions and segments within each dimension. Additionally, once the program increases its available data, sample and extrapolate savings within the expected fuel use type.

Facility Type:

- **Commercial Office:** These account for 95 out of 528 sites, and 73% of the total population energy use
- **Multifamily**: These account for 141 out of 528 sites, and 7% of the total population energy use.
- **Other:** These account for 292 out of 528 sites, and 21% of the total population energy use

Facility Size:

- Sites greater than 1,000,000 sq ft
- Sites between 100,000 sq ft and 1,000,000 sq ft
- Sites less than 100,000 sq ft

NYSERDA Response to Recommendation: Implemented. NYSERDA program implementers and evaluators will adopt this recommendation where sample size allows.

Recommendation: Collect detailed information on operational and behavioral changes from sites prior to using post-COVID-19 (2020 to present) data in billing analyses. This will allow for insight related to post-COVID operation and behavior effects as well as better differentiate use patterns and opportunities related to those employing Automated System Optimization.

NYSERDA Response to Recommendation: Pending. NYSERDA will collect this information where relevant for future evaluations.

Finding 2. In reviewing the service reports provided by the vendors, inconsistent and missing measure-level information was identified. In total, less than 50% of the sites in the population have detailed information in their reports. The evaluation found that reports are primarily generated for NYSERDA's program requirements and are often not developed with the customer in mind. In addition, NYSERDA does not currently impose any penalties on reports that show no savings or no recommendations. As a result, some vendors

generate reports with the minimum accepted content to satisfy NYSERDA's requirements only. The current structure may not allow the program to get a full picture of the activities happening at sites due to the RTEM system, but the extent of this limitation is unknown. This finding is consistent with NYSERDA findings as well.

Recommendation: Simplify the format of the measure-level savings information that is collected from the vendors. Outlining what measures were recommended, their installation status, the energy savings by fuel associated with them, and a brief description or narrative of how the measure contributes to energy savings will suffice. This will allow NYSERDA to understand participant actions better, provide supporting evidence for M&V activities, and minimize the level of effort required from the vendors. NYSERDA could consider offering an incentive that scales with the savings recommended.

NYSERDA Response to Recommendation: Pending. Implementation is underway to improve customer and vendor data collection.

Finding 3. Heating fuel information is less reliable than electric information in both the service reports and billing data. Heating fuel billing data was not available for all sites with electric data. In addition, there was no indicator as to what heating fuel(s) each facility uses. For example, if natural gas data is provided for a particular site, it is not clear whether oil or steam service is also applicable to that facility. As a result, conducting a heating fuel billing analysis would have provided an incomplete picture.

The evaluation found that the program claimed oil and natural gas savings when the service reports predominantly reported natural gas savings and, in some instances, steam.

Recommendation: Similar to the electric measure and utility data recommendations above, collect natural gas billing data information as part of the program sign-on process as well. In addition, collect heating fuel measure information as part of the simplified measure collection process. This will provide greater visibility to NYSERDA on heating fuel measures and allow for improved evaluability in the future.

NYSERDA Response to Recommendation: Pending. NYSERDA is piloting use of utility data aggregators for collection of electric data directly from end customers and/or vendors. If the pilot is successful, NYSERDA will consider this for other fuels.

Finding 4. NYSERDA incentives and information continue to be transmitted through the vendor; this may perpetuate challenges obtaining energy data and associated information directly from sites especially as the program evolves to encompass RTEM and Commercial Real Estate (CRE)-Tenant.

Recommendation: Consider evaluability and evaluation approach(s) in the integration of the RTEM and CRE-Tenant programs. Obliging vendors to more thoroughly document facility utility meter(s) and corresponding RTEM monitored equipment up-front will be important for any billing analysis-based approaches. Documenting tenant space meters and linking measures in tenant spaces to RTEM affected meters will also be important, as some tenant measures may have measurable interactive effects on the whole building meter in some cases.

NYSERDA Response to Recommendation: Implemented.

Recommendation: Obtain detailed information from the vendors to better categorize the systems being implemented at each host site. These data-points include:

- Service offered: Software only/ Full Building Management System (BMS) service
- System types being implemented: Automated System Optimization (ASO) / Fault Detection and Diagnostics (FDD)/ Combination
- Systems that are being monitored and controls installed alongside/as a part of the RTEM system
- Collect metrics on these equipment that would facilitate Technical Resource Manual (TRM)-level savings calculations (Size, efficiency, age, etc.)

In the case of a full BMS service, specify what systems are connected to controls which are existing to the facility vs newly installed by vendor.

NYSERDA Response to Recommendation: Pending. NYSERDA is working to further characterize service offerings and system types across vendors.

Recommendation: Implement a system with the vendors to easily identify the most knowledgeable individual at the customer facility and collect their contact information. Having access to the appropriate contact facilitates outreach efforts that can supplement future evaluation work. The current customer relationship management (CRM) does include contact information but does not consistently include their roles within the organization. Being unable to identify the appropriate contact is generally a barrier during outreach efforts and can lead to outreach exhaustion, low response rates and incomplete information.

NYSERDA Response to Recommendation: Implemented.

Finding 5. When examining how long vendors tend to be engaged with a specific site, the trend overall showed that sites are dropping out of the program after two years. Conversations with NYSERDA identified two main reasons for this:

1. Vendor-customer relationship ends for various reasons. This event limits long-term savings potential and reduces the persistence of operational changes made.
2. Vendor-NYSERDA relationship ends. The customer presumably continues to receive service, but NYSERDA no longer has visibility to facility improvements and therefore to the savings from measures installed in the future.

Recommendation: Where possible, document the service contract length upon entry to the program, any extensions to the contract and the reason a site stops reporting information to the program, particularly if the information exchange stops before the end of the initial three-year period. Understanding these reasons can help in assessing the long-term impacts of the RTEM system. For example, if most stop reporting, but continue the vendor-customer relationship, persistence and long-term savings may be higher as compared to the early ending of the contract between vendors and end-users.

NYSERDA Response to Recommendation: Implemented.

Recommendation: The current evaluation found savings leveling off after two years and applies the two-year result to all sites. Supported by better information on drop out timing and reasons, future evaluations should consider whether different time frames of savings should be applied to different categories of sites based on their status with the program and possibly their reason for ending participation where applicable.

NYSERDA Response to Recommendation: Pending. NYSERDA will consider this for future evaluations that include these market actors and site types.

Finding 6. The evaluation calculated VGS RRs for RTEM as presented in Table 14 below. The VGS RR for electric has more than doubled since the 2021 study with electric representing a majority of program savings. The VGS RR for natural gas has remained fairly constant in the context of known data challenges. For reference, in the 2021 study, the electric VGS RR was calculated to be 20% and natural gas 42%.

Table 14. VGS RRs for RTEM

Time Period	Realization Rate	
	MWh	MMBtu
Q1 2017 – Q4 2020	32%	33%
Q1 2021 - present	61%	34%

4.2 Energy-Related Environmental Research Citation Analysis (1998-2022)

Summary of Report Findings, Recommendations and NYSERDA Response to Recommendations

Key findings and associated recommendations from the Energy Focused Environmental Research Citation analysis include: [14]

Finding 1. ERER funding supports research that is being widely disseminated in academic literature and beyond. This analysis captures only part of the academic reach of ERER, and these results indicate that the research is being utilized by academics at a greater rate than other literature in the field. The trend over time shows that the intellectual reach continues to expand, reaching more journals and scientists than ever before, and that an increasing number of ERER articles are being cited more often.

Conducting a similar citation analysis with another vendor such as Scopus would provide additional insights into the intellectual reach of the ERER-funded papers. It is possible that other platforms, like the Elsevier abstract and citation database (used by Scopus), Google Scholar or PubMed, might include ERER work published in journals not included in the database used in this study, Clarivate's Web of Science, and therefore might capture additional reach of the ERER research.

Recommendation: Consider the inclusion of an analysis of other publication databases to ensure that the full reach of NYSERDA-funded research is being captured by the citation analysis. While the Web of Science database contains data from peer-reviewed journals, conferences and some books it does not include sources like website publications (i.e., on NYSERDA or United States Geologic Survey websites) or non-published technical papers. Additionally, the databases that offer access to the widest range of publications may change over time.

NYSERDA Response to Recommendation: Pending. Several other database options, including Scopus, Google Scholar and PubMed could help more fully capture the reach of the ERER publications, either in place of or in addition to Clarivate's Web of Science database. This can be decided when scoping for future citation analyses.

4.3 New Construction Market and Impact Study (2016-2022)

Summary of Report Findings, Recommendations and NYSERDA Response to Recommendations

This study encompassed a market assessment of all three building sectors (single-family, multifamily, and commercial buildings) which included in-depth interviews with program partner organizations and a survey of participant and non-participant property owners and building professionals. The study also included an impact analysis of funded projects in the single-family sector. Key findings and associated recommendations from each component are detailed below.[15]

New Construction Program Market Assessment

Key findings and associated recommendations from the Clean Energy Fund New Construction Program (NCP) Market Assessment include:

Finding 1. Program participant properties showed an increased penetration of the highest efficiency tier buildings compared to the non-participant population (15% of the participants compared to 4% of non-participants). This includes those buildings with qualitatively better building components (including highest-efficiency envelope and highest efficiency mechanical systems, such as geothermal) and renewables. The higher percentage of participant buildings achieving this performance tier aligns with the program shift towards promoting carbon neutral and low carbon designs. Even those New Construction participants that did not achieve the highest efficiency tier performed better than the non-participant market in general. For example, the average single-family home participating in the New Construction Program performed 14% and 35% better than code for modeled electric and gas use, respectively.

Finding 2. Financial barriers are reported as key obstacles to building substantially above code. The top three reported barriers to building substantially above code were: 1) the up-front cost of clean energy feature(s), 2) lack of available financing, and 3) lifetime savings that impact the financial value proposition. These top three barriers were shared by both participants and non-participants.

Participants also reported low satisfaction with the NCP incentives, suggesting those could be larger. While this is a common response during program evaluations, it may suggest the need to increase awareness of different incentive levels for targeted projects that meet higher criteria; one respondent noted that they would have been

interested in pursuing even greater levels of efficiency for their projects if there had been higher incentives available. Non-participants also suggested the program should offer more incentives, specifically identifying "tax credits" or "lower property taxes" as possible incentive options. While NYSERDA cannot offer tax credits or lower property taxes, the program could reach out to economic development entities that could offer a tax incentive.

Recommendation: Consider a more active partnership with state or regional economic development organizations and even NCP partners to educate owners and developers and design professionals of not only the NCP incentives but also other available incentives.

NYSERDA Response to Recommendation: Implemented. NYSERDA already markets its programs to Industrial Development Agencies (IDAs) through support of the New York State Economic Development Council events, meetings and IDA Trainings, as well as through other State Agencies advancing economic development including Empire State Development and Department of State. However, there are over 100 individual IDAs across the State, and they can only support commercial projects (i.e., not single family or multifamily projects). The NYSERDA New Construction Team also has established a significant network of channel partners throughout the State that actively promote programs and projects across all New Construction supported sectors.

Finding 3. The program appears to be helping decision-makers minimize incremental cost of efficient shell and HVAC systems. The participant property decision-makers claimed significantly lower incremental cost for the efficient shell and efficient HVAC system than non-participating property decision-makers. The reported incremental cost of these two efficiency solutions was generally 10%-12% for participant and 18%-23% for non-participant properties that incorporated these solutions.

Recommendation: Explore how the participant properties incorporated the efficient shell and highly efficient HVAC systems without paying more than 10-12% premium for those solutions and share insights to the wider market.

NYSERDA Response to Recommendation: Implemented. NYSERDA has published successful case studies and solution sets, as well as cost and performance data in multiple venues. This includes promoting case studies on the Program and Initiative case studies section of the NYSERDA website as well as the Buildings of Excellence website, which publishes and updates case studies, webinars and cost and performance data. The New Construction Team also has established a significant network of channel partners where carbon neutral and net zero energy projects are highlighted. NYSERDA also participates in webinars, conferences and industry events throughout the year.

Finding 4: Only 38% of non-participant design professionals reported being aware of integrated design, and among those that were aware, about one-third reported receiving training on integrated design. This means that less than one-tenth (7%) of surveyed design professionals who worked on non-participant properties received training on integrated design.

The higher use of integrated design in best-in-class buildings implies that integrated design is useful when building NZE/NZE-capable buildings. However, these properties were found to be a small subset of the above-code new construction market. Between 2016 and mid-2021, about 4% to 8% of the market were NZE/NZE-capable buildings that leveraged integrated design.

Recommendation: In addition to encouraging an integrated design model, NYSERDA should investigate adding intervention strategies that could work for those that leverage non-integrated design contracting (such as design-bid-build) arrangements to encourage carbon neutral and net zero energy construction.

NYSERDA Response to Recommendation: Implemented. Good design practices can occur prior to bidding, and integrated project delivery can still occur in these contracting arrangements. The NYSERDA New Construction Team will continue to work with the market to explore design and construction practices that help reduce incremental costs, reduce construction time, and improve building operational performance related to health, comfort, resiliency, and productivity.

Finding 5. Overall, the evaluation found significant indirect savings associated with New Construction Program activities. The total indirect savings for all program activity from 2016 through September 2021 are shown below in Table 15. In terms of total energy, indirect savings are approximately 2.5 TBtu equivalent.

Table 15. Indirect Savings for New Construction through September 2021

	Savings	Unit
Electric Savings	209,689	MWh
Natural Gas/Propane Savings	1,790,850	MMBtu

Key findings from the Single-Family Impact Evaluation include:

Finding 1. The verified gross electric savings is 4,629 MWh and the verified gross natural gas/propane savings estimate is 125,121 MMBTU with initial verified gross realization rates of 76.5% and 84.9%. Alternative perspective realization rates (APRRs) of 104.5% and 112.8% were also calculated for electric and natural gas/propane respectively. However, as APRRs cannot exceed 100% per DPS VGS Guidance, an APRR of 100% will be applied. Precisions around the results are lower than anticipated due primarily to the baseline issue (incorrectly using a previous version of the building code as a baseline when evaluating building

energy savings) driving a wider variation of gross savings than anticipated. See Table 16 below showing these findings.

Recommendation: Apply VGS RR of 76.5% for electricity and 84.9% for natural gas for Q3 2016 through Q2 2021. For the period Q3 2021 through Q4 2022, apply APRR of 100% for both electricity and natural gas.

NYSERDA Response to Recommendation: Implemented. NYSERDA will apply these RRs per these timeframes.

Finding 2. As indicated by the RRs, savings are slightly overstated due to the extraction process that pulls Ekotrope or REM/Rate modeled savings through Salesforce into the NYSERDA reporting Scorecard. The current system of moving single-family project savings from Salesforce to the reporting system is automated to pull actual modeled savings that are input from REM/Rate and Ekotrope models. However, if no actual modeled savings are present in Salesforce or if it has a zero (0) listed as the savings, the program will extract and credit non-evaluated estimated savings into the Scorecard.

Recommendation: Revisit the extraction process to ensure that when actual savings equal zero, that the zero savings is pulled from Salesforce as opposed to reverting to the estimated savings.

NYSERDA Recommendation Response: Implemented. This data extraction process has been revised.

Finding 3. Many single-family REM/Rate models from a single vendor incorrectly used 2010 code as the baseline for impacts reported in the Scorecard, which had a substantial effect on the realization rate. Use of REM/Rate as a modeling software requires the selection of a User Defined Reference Home (UDR) that reflects code at the time of permitting to produce program impacts. NYSERDA terminated this vendor from the program due to performance issues prior to the evaluation work occurring and the issue was not noted in any other vendor models during this Phase 1 evaluation.

Recommendation: Regularly create and gather baseline or reference homes that can be used for modeling and monitoring the correct application of code, given its importance to accurate savings claims. This will make savings more auditable for NYSERDA and evaluators for estimating future program realization rates. This issue was observed with the use of REM/Rate where savings are dependent on the individual rater selecting the correct UDR to produce savings.

NYSERDA Response to Recommendation: Implemented/In Progress. This model selection issue was limited to a single vendor who was terminated from the program due to an inability to meet program quality requirements. The issue specifically arose after the new code went into effect, so it impacted a sub-set of their work. Since this is a market transformation program that in part works with the market to continually help

improve the market's performance, there will always be a similar risk at each code change. NYSERDA will continue to work with all vendors and builders to continue to improve market capacity and improve modeled and predicted results, as well as verified and M&V results. NYSERDA will also work to ensure that current-code reference homes are used to estimate savings for single family homes going forward.

Finding 4. Based on the savings from the sample of single-family models reviewed with appropriate baselines, appliances and lighting are driving much of the electric savings (74%). Appliances and lighting tend to be short-lived measures that are transient in nature.

Recommendation: Work with program vendors to review the end uses producing electric savings among recent single-family participants to see if electric savings continue to be driven by appliances and lighting. To the extent the NCP is intended to achieve long-term electric savings, pursuing more diverse savings that are directly integrated into the home will be more productive in achieving that goal.

NYSERDA Recommendation Response: Implemented. Since 2021, New Construction programs began to require significant envelope performance improvements beyond code, and are fossil fuel free buildings. Therefore, significant electric savings are generated from space heating and cooling equipment, as well as domestic hot water equipment.

Finding 5. The current single-family program tracking system collects program savings, but not consumption of the treated homes.

Recommendation: As NYSERDA moves to an increased focus on NZE homes and greenhouse gas metrics, it might consider tracking the modeled base usage of homes in addition to savings. This would allow administrators to track program performance in terms of savings as a percent of consumption for each fuel. This can be a valuable metric for single-family projects within the NCP and programs of a similar nature.

NYSERDA Response to Recommendation: Pending. There are significant requirements already in place for participant compliance with program rules. Program participants routinely indicate that additional requirements would present undue burden and would likely impact their decision to participate in the programs. Program team will evaluate if there is a no-effort way to collect additional baseline information in future modeling efforts, as appropriate.

Finding 6. DNV analyzed an additional 2022 sample of single-family homes to estimate an updated Verified Gross Savings Realization Rate (VGSRR) in early 2023, as the APRR estimated in the original Phase 1 study was only able to be applied for a period of 18 months. This analysis resulted in updated VGSRR of 86.1% and 104.4% for electric and natural gas respectively. Although DNV found a high rate of baseline misapplication in the sample reviewed, the difference in energy consumption between the 2016

baseline (based on IECC 2015) and the 2020 baseline (based on IESS 2018) represents a comparably small difference in energy savings (2%) compared to the difference in energy consumption between the 2016 baseline and the 2010 baseline. This results in an overall adjustment due to baseline misapplication that is smaller than that observed in the initial VGS analysis performed on the single-family sector of the New Construction Program. This results in higher VGS RRs than observed in the first study. See Table 16 below showing these findings.

Recommendation: Apply VGS RR of 86.1% for electricity and 104.4% for natural gas for program savings claims beginning Q1 2023.

NYSERDA Response to Recommendation: Implemented. NYSERDA will apply these updated realization rates, starting in Q1 2023.

Finding 7. This review of 2022 single family sites found that 12 out of 44 sites examined were using a per unit value for electric and gas savings for participating homes which are likely overestimating impacts. If NYSERDA continues to regularly use these values, it is likely to produce a lower realization rate when actual savings are reviewed against estimated savings.

Recommendation: It is recommended that NYSERDA develop a 2020 baseline home to base savings on for both Ekotrope and REM/Rate models. This will help facilitate the use of appropriate baselines and improved realization rates in future evaluations.

NYSERDA Response to Recommendation: Pending. NYSERDA is reviewing the methodology used for estimating and verifying savings, and what tools would be most useful for future analyses.

Table 16. Single Family New Construction Realization Rates

Period of Application		Electric		Natural Gas/Propane	
		Realization Rate	Precision (90% c.i.)	Realization Rate	Precision (90% c.i.)
Original VGSRR	Q3 2016 – Q2 2021	76.5%	±26.5%	84.9%	±26.6%
APRR	Q3 2021 – Q4 2022	100%* (104.5%)	±5.9%	100%* (112.8%)	±10.7%
Desk Review Updated VGSRR	Q1 2023 - Current	86.1%	±11.9	104.4%	±11.6

* DPS VGS guidance does not allow APRRs to be greater than 100%. For reporting purposes, NYSERDA uses 100% during the APRR application period.

4.4 University of Buffalo Case Study

The State University of New York at Buffalo (University of Buffalo; UB) was the focus of a recently completed case study. As detailed below, UB has had long-standing engagement with and investment by NYSERDA that has served to significantly support the university's strong commitment to sustainability, clean energy and decarbonization. Further, with NYSERDA's assistance, UB's work in advancing these goals in the context of higher education has demonstrated the path to carbon neutrality for other higher educational institutions and provided unique opportunities for experiential learning for students and the public at large.

Summary of Case Study Findings

Key findings from the University of Buffalo Case Study include: [16]

For close to three decades, NYSERDA has supported UB's commitment to sustainability by providing approximately $2 million dollars in funding across 100 projects, with approximately 30 projects being funded in the last five years. These projects have included direct investments in building and infrastructure improvements, funding for feasibility and other technical studies, process evaluations, tech to market studies, and technology-focused research projects. NYSERDA's largest single investment to date was a $1 million grant awarded in 2017 through the Energy to Lead (ETL) program, which allowed UB to pursue an ambitious effort to develop opportunities for new solar projects both onsite at UB and with other local public entities in the greater Buffalo region (hereafter referred to as "the solar project"). At UB, the solar project ultimately generated 12 MWh of new solar energy on UB's campus. In addition to creating renewable energy jobs, the solar project will help advance UB's climate neutrality efforts, including reaching net neutrality by 2030.

In 2020, with NYSERDA's "catalyzing" assistance, UB updated its Climate Action Plan (CAP) with the goal to achieve net-zero emissions by 2030 and developed its "10 in 10" roadmap which includes actionable steps to meet these longer-term goals. The development and implementation of the current CAP involved a number of NYSERDA-assisted projects that have helped UB to lower its energy use and carbon footprint, and will provide additional energy benefits into the future. The projects include:

- Three large, ground-mounted solar arrays [Millersport (often referred to as the Solar Stroll), Creekside, and Bizer Creek];
- Four rooftop solar projects;
- An electrification study, that is expected to increase efficiency and lead to a large-scale effort to transition the heating to clean and renewable sources of all 46 buildings and 2.8 million square feet of space on UB's South campus; and;
- The Garden, Relax or Work (GRoW) Clean Energy Center, a net energy-positive, 1,100 square foot demonstration home that serves as a clean energy center for the UB campus, has provided experiential learning opportunities for hundreds of students and the public. The GRoW Clean Energy Center was designed by UB students and faculty and entered in the U.S. Department of

Energy's 2015 Solar Decathlon competition where it came in second overall (and relocated to the UB campus in 2021 with assistance from NYSERDA).

- NYSERDA ETL and NYSERDA's Clean Green Campuses programs (formerly REV Campus Challenge) directly assisted UB with all of its new ground-mounted arrays and rooftop solar projects. Combined, these NYSERDA-assisted projects account for 10.1 MW of capacity and are expected to generate over 12.7 million kWh/year, giving UB the largest solar capacity of any institution within the SUNY system at the time of this writing. Altogether, UB's solar projects have the capability to generate roughly 18 million kWh/yr and represents approximately 10% of UB's electrical demand.
    - In addition, these projects will avoid emitting roughly 6,000 tons of CO_2 , 7,000 pounds of NOx, 1,500 pounds of PM2.5, and 1,600 pounds of SO_2 annually, resulting in health and environmental benefits across the State and region

In addition to the quantifiable environmental and energy benefits of reducing fossil fuel usage, the NYSERDA-assisted three ground-mounted solar projects (Solar Stroll, Creekside and Bizer Creek) resulted in economic benefits to UB and generated regional economic benefits during construction and over the lifetime of the projects, with total estimated value-added benefits of $13,224,000. Adding the four rooftop solar projects resulted in an additional $1,895,000 in regional economic and lifetime benefits.

Other notable findings from the case study include:

- UB has been recognized by multiple publications as a leader for its commitment to sustainability, mainly through its Climate Action Plan (CAP) which targets net-zero emissions by 2030. In 2021 the Times Higher Education Impact Rankings rated UB No. 1 in the world in addressing the United Nations Sustainable Development Goal pertaining to climate action, which instructs organizations to "take urgent action to combat climate change and its impacts."
- In total, UB solar projects have resulted in roughly $15.1 million in regional economic impacts and created 125 jobs during construction. UB's solar projects will generate $215,000 in regional economic impacts annually, and create nearly three full-time equivalent (FTE) positions for the duration of these projects.

Endnotes

[1] Order Authorizing the Clean Energy Fund Framework, issued and effective January 21, 2016. [LINK]

[2] Order Approving Clean Energy Fund Modifications, issued and effective September 9, 2021. [LINK]

[3] http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?Mattercaseno=18-M-0084 [NYS Department of Public Service Commission Files]

[4] Governor Hochul announces new framework to achieve nation-leading energy storage target (6GW by 2030), which can be referenced in the PSC filing of the Energy Storage Roadmap https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={7D4753BA-916B-483E-9E35-6749B20384A6}

[5] https://greenbank.ny.gov/Resources/Public-Filings [NY Green Bank Public Filings]

[6] If solicitations with upcoming due dates were factored into the total NYSERDA commitments in the Market Development Budgets and Spending table, an additional $33,907,488 or 74.3% of the total approved budget to date, would be included with total NYSERDA commitments.

[7] The Market Characterization and Design initiative includes funds to support overarching, non-initiative-specific evaluation studies.

[8] Initiative commitments that are in excess of their total budgets are in anticipation of program attrition. No initiative will have total expenditures in excess of that initiative's total budget at the close of the program.

[9] If solicitations with upcoming due dates were factored into the total NYSERDA commitments in the Innovation and Research Budget and Spending table, an additional $0 or 78.7% of the total approved budget to date, would be included with total NYSERDA commitments.

[10] The Market Characterization and Design initiative includes funds to support overarching, non-initiative-specific evaluation studies.

[11] A modification on September 9, 2022 to the Renewables Optimization Investment Plan expanded the activities and budget of the Energy Storage Technology and Product Development initiative to focus on solutions providing 10 to 100+ hours of storage for various grid applications to enable the transition away from natural gas infrastructure. In a subsequent filing on November 1, 2022 this new portion of the initiative was renamed to Long Duration Energy Storage as its own initiative the Gas Innovation focus area.

[12] The final study will be posted to NYSERDA's website soon.

[13] EDI is a method for NYSERDA to securely request and collect utility data information from various utilities within New York State

[14] The final study will be posted to NYSERDA's website soon.

[15] The final study will be posted to NYSERDA's website soon.

[16] The final case study will be posted to NYSERDA's website soon.

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and support to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

To learn more about NYSERDA's programs and funding opportunities, visit nyserda.ny.gov or follow us on Twitter, Facebook, YouTube, or Instagram.

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