Clean Energy Fund Quarterly Performance Report through September 2024

Final Report | November 2024

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 September 30, 2024

Revision Date	Description of Changes	Revision on Page(s)
November 26, 2024	Original Issue	

Clean Energy Fund Quarterly Performance Report through September 30, 2024

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 September 30, 2024 (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

1.0 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 September 30, 2024, and nets out overlap across portfolios where it is known to occur. Plans depicted throughout this report reflect the July 3, 2024, Compiled Investment Plan (CIP) filing made by NYSERDA and later approved by DPS August 7, 2024.

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 total 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

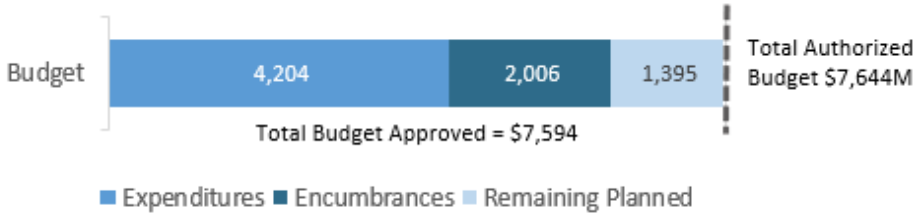


Figure 1 Supporting data		Total Authorized Budget	Budget Approved		Expended Funds		Encumbered Funds		Remaining Planned		Funding Not Yet Approved
			Current Total	% of Authorized	Current Total	% of Authorized	Current Total	% of Authorized	Total Balance	% of Authorized	
Market Development (MD)	Program Funds	$ 2,399.7 M	$ 2,337.2 M	99%	$ 1,342.0 M	57%	$ 666.5 M	28%	$ 328.8 M	14%	$ 34.4 M
	NYS Cost Recovery Fee		$ 28.1 M		$ 16.5 M		$ 0.0 M		$ 11.6 M		
Innovation & Research (IR)	Program Funds	$ 631.7 M	$ 623.0 M	100%	$ 286.5 M	46%	$ 199.2 M	32%	$ 137.4 M	22%	$ 1.8 M
	NYS Cost Recovery Fee		$ 6.9 M		$ 3.1 M		$ 0.0 M		$ 3.7 M		
MD and IR combined	Administration	$ 274.4 M	$ 271.2 M	99%	$ 210.9 M	77%	$ 0.0 M	0%	$ 60.4 M	22%	$ 3.2 M
	Evaluation	$ 124.2 M	$ 124.2 M	100%	$ 46.6 M	37%	$ 15.2 M	12%	$ 62.4 M	50%	$ 0.0 M
	MD and IR Total	**$ 3,430.0 M**	**$ 3,390.6 M**	**99%**	**$ 1,905.5 M**	**56%**	**$ 880.9 M**	**26%**	**$ 604.3 M**	**18%**	**$ 39.4 M**
NY-Sun	Program Funds	$ 3,162.8 M	$ 3,162.8 M	100%	$ 1,310.1 M	41%	$ 1,124.8 M	36%	$ 727.9 M	23%	$ 0.0 M
	NYS Cost Recovery Fee	$ 41.8 M	$ 41.8 M	100%	$ 12.1 M	29%	$ 0.0 M	0%	$ 29.7 M	71%	$ 0.0 M
	Administration	$ 58.8 M	$ 58.8 M	100%	$ 27.4 M	47%	$ 0.0 M	0%	$ 31.3 M	53%	$ 0.0 M
	Evaluation	$ 3.5 M	$ 3.5 M	100%	$ 1.6 M	44%	$ 0.5 M	14%	$ 1.5 M	42%	$ 0.0 M
	NY-Sun Total	**$ 3,266.8 M**	**$ 3,266.8 M**	100%	**$ 1,351.2 M**	**41%**	**$ 1,125.3 M**	**34%**	**$ 790.4 M**	**24%**	$ 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	$ 7,604.6 M	99%	$ 4,203.8 M	55%	$ 2,006.1 M	26%	$ 1,394.6 M	18%	$ 39.4 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 $399 million in non-CEF NYSERDA funded solar projects (see Table 12).

The summary of benefit progress reflects evaluated totals, incorporating verified gross acquired savings where evaluations have been completed, and reflects gross savings values elsewhere. Through Q3 2024, measurement and verification activities have resulted in an adjustment to direct gross energy savings by approximately -3.0 TBtu. Indirect benefits from market transformation are included in acquired totals where they have been quantified through evaluation, now adding approximately 5.9 TBtu energy savings. Conservative estimates of indirect benefits are also included in the remaining plans generally reflecting 50 percent of the anticipated achievement as is consistent with other plan filings that 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

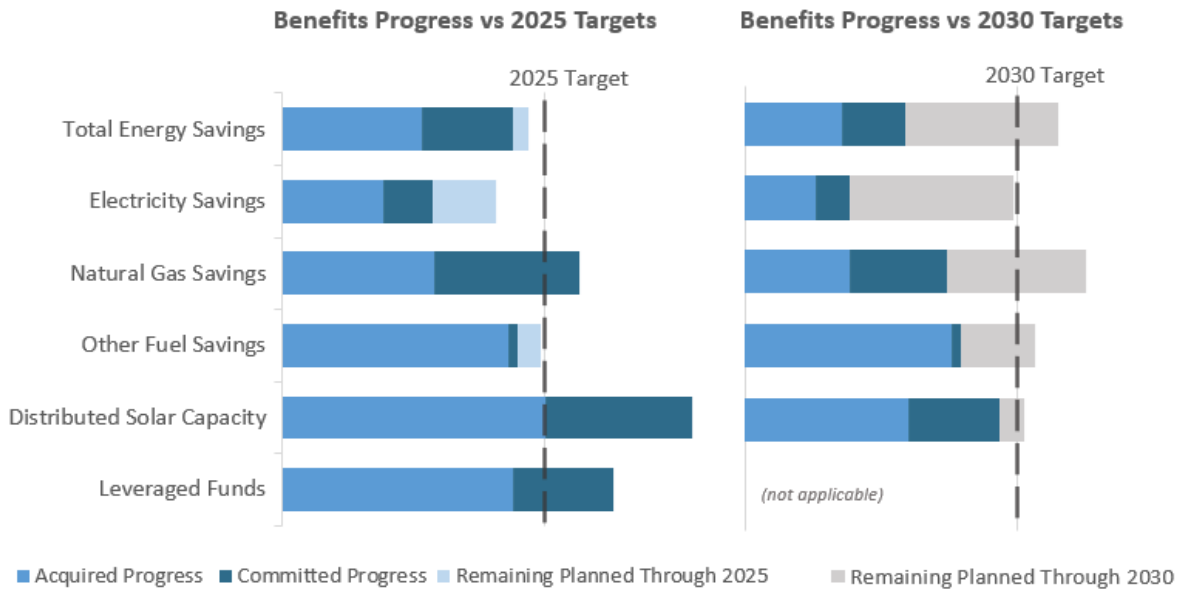


Figure 2 Supporting Data	Acquired Progress	Committed Progress	Remaining Planned Through 2025	Total Expected Through 2025	2025 Order Target	Remaining Planned Through 2030	Total Expected Through 2030	2030 Order Target
Total Energy Savings (MMBtu equivalent, millions)	28.2	18.2	3.3	49.7	53.0	44.7	91.1	79.0
Electricity Savings (MWh, millions)	2.6	1.3	1.6	5.4	6.7	6.0	9.9	10.0
Natural Gas Savings (MMBtu, millions)	14.5	13.7	-	24.5	25.0	19.5	47.7	38.0
Other Fuels Savings (MMBtu, millions)	12.9	0.6	1.3	14.8	15.0	4.7	18.1	17.0
Distributed Solar Capacity (Renewable MW)	6,007	3,344	-	9,351	6,000	900	10,251	10,000
Leveraged Funds ($ millions)	$17,549	$7,653	-	$25,202	$20,000	-	$25,202	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)	46.4	→	93%	88%		51%	59%
Electricity Savings (MWh, millions)	3.8		71%	57%		39%	38%
Natural Gas Savings (MMBtu, millions)	28.2		115%	113%		59%	74%
Other Fuels Savings (MMBtu, millions)	13.5		91%	90%		74%	79%
Distributed Solar Capacity (Renewable MW)	9,351		100%	156%		91%	94%
Leveraged Funds ($ millions)	$25,202		100%	126%		100%	n/a

- 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 1,289 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 $1,978 million acquired and $111 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, NYSERDA has made significant progress positioning the collective portfolios to achieve the CEF Order Targets on both 2025 and 2030 timelines. An explanation of progress and the current portfolio mix is as follows:

- Eight and a half years into the ten-year CEF commitment timeline every metric with the exception of electricity savings is at or above a linear measure of progress when comparing the total committed benefits through the current quarter, and this progress will only be bolstered as more evaluation studies enable reporting of indirect impacts from earlier years of the CEF.
- Near-term projections for Total Energy Savings (MMBtu equivalent) through 2025 continue to show the effects of current clean energy and broader market challenges (supply chain disruptions, skilled labor availability, increased construction costs) however NYSERDA maintains confidence in the ability of the CEF portfolio to deliver the overall impact outlined by CEF 2030 Targets.
- Projects delivering electricity savings remain behind the pace of fuel savings as illustrated by the Figure 2 visual, but the strong foundation of fuel-related projects, of which significant savings are already considered acquired in the portfolio, is boosting the near-term 2025 view and firming up the overall potential for 2030 achievement.

- Renewable energy capacity MW surpassed the 6GW 2025 target in Q3 2024 and the portfolio is well positioned to achieve the expanded 2030 target of 10 GW.
- Leveraged funding acquired and committed progress is outpacing other metrics due to strong NY-Sun and Innovation & Research returns.

The September 2021 CEF Order included a target regarding equity for disadvantaged communities (DACs), specifically that a minimum of 35 percent of the benefits of CEF investments would accrue to disadvantaged communities. On November 15, 2023, NYSERDA filed with the PSC its first Disadvantaged Communities Report for ratepayer funded programs, which included place-based investments and benefits across the Clean Energy Fund portfolio covering years 2020 - 2022. Another filing spanning years 2020 – 2023 was made in March 2024 and summarized in NYSERDA's CEF Annual Report. Reporting requirements outlined by DPS are aligned with a broader statewide effort, where NYSERDA is working with other State agencies and stakeholders, including the Climate Justice Working Group and the Department of Environmental Conservation, 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, and is expected to be compiled and released in 2025.

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 (CO2e Metric Tons, millions)	6.5	3.6	10.1	9.0	14.0
Participant Bill Savings ($ millions)	$1,206	$747	$1,953	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.

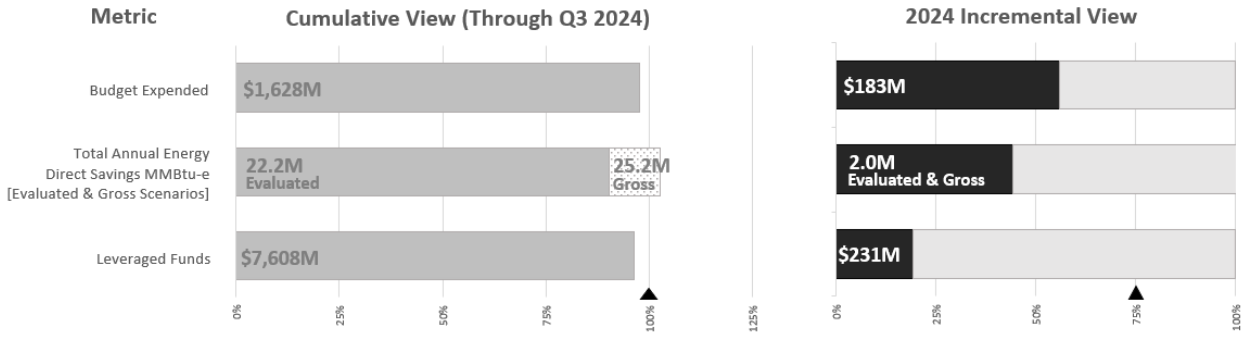
2 Market Development and Innovation & Research Performance

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. This update was filed November 1, 2024 and is pending DPS review and approval. Once approved, these plans will be operational beginning January 1, 2025. Reporting for Q3 2024 reflects the plans filed on July 3, 2024 and approved August 7, 2024. NYSERDA closely monitors progress of the portfolios towards CEF benefits targets using both cumulative and incremental measures, which 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 Q3 2024. Key points to understand the data presented in Figure 3 include:

- The Cumulative View (Through Q3 2024) represents years 2016–2023, plus three quarters of 2024; 100 percent in this view represents the cumulative *planned* amounts for that timeframe, prorated to enable comparison of progress through the current quarter.
- The 2024 Incremental View represents progress reported in the current calendar year against the current calendar year plan in total, 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 influenced 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



Through Q3 2024, NYSERDA's cumulative progress of these three benchmark measures remains strong, though the incremental view shows slower progress toward the 2024 plan. Progress toward expenditure goals has slowed in 2024. Although there are very few significant expenditure shortfalls, there are a larger number of projects with small shortfalls in planned expenditures that are driving the current situation. Total energy savings continued to lag against the 2024 plan, which is discussed in greater detail for the Top 15 Energy Savings Impact initiatives in Table 2 that follows. While Innovation & Research projects report leveraged funding progress on a lag and additional progress will be reported and help to close the current gap shown, two Market Development initiatives (Energy Management Technology, LMI Multifamily) are not expected to meet their leveraged funding plan through 2024 due to project delays as well as methodological changes in NYSERDA's assessment of partner projects and how they should be reflecting in plans and reporting. Both of these scenarios have informed updates to forecasts filed in the November 1st CIP noted above.

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 51 percent of the total approved Market Development 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 Q3 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	99%	Gross: Evaluated:	72% 31%	Expenditures are trending favorably through Q3 2024 though energy benefits still lag plan. An evaluation of verified gross savings significantly reduced energy savings from the gross values reported. A notable amount of this reduction was due to delayed installation of capital improvement measures, (observed across several NYSERDA initiatives) and a longer-than-anticipated timeline for measure installations, which created a delay in acquiring projects. A second evaluation concluded in 2023 showing improved realization rates. Several large projects anticipated for completion early in 2024 have experienced delays but are still expected to be completed before the end of 2024. A third evaluation study is underway now with expected completion in Q1 2025. This evaluation will be instrumental in assessing the full impact of the program related to both direct and indirect impacts. Future quarterly reports will detail results.
2	Technical Services	116%	Gross: Evaluated:	137% 138%	Progress of budget expenditures and benefits remains strong. Commercial funds were fully committed by Q2 2024 and additional funding of $9.6M was approved August 7, 2024, in a Compiled Investment Plan filing. An impact evaluation is planned to begin Q4 2024, and future reports will detail results.
3	Product and Appliance Standards	91%	Gross: Evaluated:	n/a n/a	Work continues to implement standards approved in 2023 with the expansion of the statewide compliance program. This initiative forecasts all energy savings as indirect. An evaluation of indirect energy savings is underway and is expected to conclude in mid-2025. Future quarterly reports will detail findings.
4	Building Operations and Maintenance Partnerships	111%	Gross: Evaluated:	61% 75%	While acquired energy savings is tracking behind plan for 2024 due to some project delays and some projects completing only partial training scopes of work, the program continues to receive new applications through the open enrollment process. The current pipeline of projects expected to close in 2024 will likely fall below forecasted values due to some cancellations, reduced training scopes, and extensions into 2025. An updated impact evaluation is underway and is projected to be completed later in 2024. Future reports will detail results and impact on savings.

Table 2 continued

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
5	Market Challenges	89%	Gross: Evaluated:	71% n/a	Commercial and Industrial Carbon Challenge closed in Q3 2024 for competitive funding in the consolidated funding application and awards are expected to be announced in Q4 2024. Carbon Challenge awards from previous rounds are moving forward with slight delays. The Empire Building Challenge demonstration projects are in the early stage of implementation and benefits will begin to be acquired in Q4 2024. The third round of Empire Building Challenge projects are expected to be selected in Q4 2024. An evaluation is anticipated to begin in early 2025 and future reports will detail results.
6	Electric Vehicles – Rebate	100%	Gross: Evaluated:	139% 100%	Inactive. 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, and no identified sales increase beyond incentives that could be linked to program funding, no indirect savings were estimated as part of this study. Evaluation studies will continue to assess indirect impacts going forward.
7	LMI Multifamily	102%	Gross: Evaluated:	65% 60%	Acquired savings did not increase materially in Q3, compared to Q2, but are expected to improve by year end, pending the invoicing for New York State Homes and Community Renewal (HCR) December project awards and Multifamily Performance Program (MPP) projects meeting NYSERDA deadlines. Further savings are expected to be realized later in Q4 2024 from New York City Housing Preservation and Development (HPD) projects awarded through the new Resilient and Equitable Decarbonization Initiative for Existing Buildings Program. NYSERDA expects to start acquiring savings in Q4 2024 through two newly-launched programs – FlexTech "Lite" which will provide 100% cost share to LMI buildings and On-Site Energy Manager (cost share towards on-site staff hires). An evaluation of MPP is underway and anticipated to be complete Q2 2025. In addition, an evaluation of Direct Injection is in scoping. Future reports will detail results.
8	Industrial Transition	99%	Gross: Evaluated:	105% 98%	Inactive. One project remains open with anticipated completion by Q2 2025. Evaluation assessment has confirmed the energy performance of this program with a strong realization rate. A final assessment of performance is underway with scheduled completion by Q1 2025.
9	Energy Management Practices	105%	Gross: Evaluated:	88% 97%	Industrial On-site Energy Manager and Strategic Energy Management both saw an increase in applications in Q3 2024 resulting in positive market response; budgets and energy savings metrics are trending in a positive direction. An evaluation study focusing on the Industrial component of Energy Management Practices was completed in Q2 2024 showing strong realization rates for both programs.

Table 2 continued

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
10	Codes and Standards for Carbon Neutral Buildings	93%	Gross: Evaluated:	n/a n/a	Core work for code advancement and training is moving forward expeditiously and proposals for the next State code update have been released publicly by The Department of State. This initiative forecasts all impacts as indirect savings and, through ongoing evaluation studies, measured indirect benefits have exceeded plan for the period of study (260%). The latest evaluation study completed Q1 2024 shows that NYSERDA's long-standing engagement in this space is responsible for approximately 3.4 TBtu of energy savings during the period 2017-2023, of which approximately 1.7 TBtu is reflective of CEF-specific efforts. An update to this evaluation is underway now with results anticipated Q1 2025.
11	New Construction – Market Rate	113%	Gross: Evaluated:	86% 86%	The initiative continues to perform well on both budget and energy benefits, with the greatest expenditure activity this quarter coming from the Building Cleaner Communities Competition (CNCED/BCCC) program and significant expenditures also coming from the New Construction-Commercial, New Construction-Housing, and Buildings of Excellence (BOE) programs as projects advance through construction stages toward completion. The next round of BCCC and BOE were launched in Q2 2024. A single- family competition, Building Better Homes, is set to launch in Q4 2024. An evaluation focusing on multifamily and commercial projects is underway now and future quarterly reports will detail results.
12	Clean Energy Communities	102%	Gross: Evaluated:	252% 101%	Progress of budget expenditures and energy benefits continues to trend favorably with 58% of the municipalities in the state participating in the program. With an upcoming October 1st deadline in which incentives are reduced, Clean Energy Communities has seen a surge of new high impact action program activity, and communities remain engaged in the program as they actively work toward grant thresholds. NYSERDA has confirmed the shift to indirect metrics through an independent third-party review and is currently undertaking an evaluation study, anticipated to be complete Q2 2025, confirming the indirect benefits for the program from 2019 through 2023.
13	Clean Green Campuses	96%	Gross: Evaluated:	47% 101%	All funding is now fully committed. As projects are completed, excess funding will be recommitted to complete a College Decarbonization Playbook underway and provide continued outreach support to the sector.
14	P-12 Schools	102%	Gross: Evaluated:	45% n/a	Acquired savings for 2024 will fall short of the target as two large projects experienced delays that should be resolved in 2025. An update to the impact evaluation is postponed until 2025 to allow more time for participants to implement measures.
15	Heat Pumps Phase 2 (2020)	91%	Gross: Evaluated:	n/a n/a	Progress of budget expenditures continues to trend favorably. This initiative forecasts all impacts as indirect savings and to date, NYSERDA has measured nearly 1 TBtu of equivalent energy savings covering period 2020 - 2022, considerably higher than the forecast savings for that same time period. The indirect benefits results will be updated in the Q4 2024 CEF Quarterly Report.

2.0 Quarterly Benefits Progress Versus Plan

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

The table that follows represents all 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. Note measurement and verification activities have reduced gross savings by approximately 3.0 TBtu through the third quarter.

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)	4,591,294	2,031,213	22,176,250	17,952,468	40,128,718	32,275,713	124%	47,399,541	85%
Electricity Savings (MWh)	627,022	159,001	2,206,568	1,345,888	3,552,456	3,448,239	103%	4,317,576	82%
Total Fuel Savings (MMBtu)	3,217,504	1,806,902	24,546,568	14,238,453	38,785,020	30,777,415	126%	43,166,218	90%
Natural Gas Fuel Savings (MMBtu)	2,816,674	1,539,004	11,370,389	13,663,612	25,034,001	16,871,974	148%	27,934,854	90%
Other Fuel Savings (MMBtu)	400,830	267,897	13,176,178	574,841	13,751,019	13,905,441	99%	15,231,364	90%
Renewable Energy Generation (MWh)	38,483	4,769	280,628	53,035	333,663	311,921	107%	313,321	106%
Renewable Energy Capacity (MW)	1	2	425	2	426	798	53%	2,593	16%
Total Leveraged Funds ($M)	$1,193	$231	$7,608	$3,724	$11,333	$9,586	118%	$13,120	86%

- Verified savings as a percent of total reported direct savings varies by metric and includes electricity (60% verified), natural gas (61%), 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. NYSERDA makes conservative estimates of indirect benefits, generally reflecting 50 percent of the remaining planned, anticipated achievement, accounting for uncertainty in timing and potential overlap across the portfolio that has yet to be fully evaluated.

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)	5,925,900	-	5,925,900	19,823,082	30%	49,756,084	12%
Electricity Savings (MWh)	658,736	-	658,736	2,363,152	28%	5,933,392	11%
Total Fuel Savings (MMBtu)	3,965,430	-	3,965,430	12,921,908	31%	31,544,482	13%
Natural Gas Fuel Savings (MMBtu)	3,156,410	-	3,156,410	7,642,361	41%	19,722,557	16%
Other Fuel Savings (MMBtu)	809,020	-	809,020	5,279,547	15%	11,821,925	7%
Renewable Energy Generation (MWh)	478,683	-	478,683	640,416	75%	1,014,280	47%
Renewable Energy Capacity (MW)	58	-	58	122	48%	270	21%

- 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.
- 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, 84,155 MWh is netted in the Total Energy Savings calculation.
- Indirect leveraged funding will be captured with future assessments.

2.1 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)	$1,579,931	$637,575	$1,950,192	$57,017,232	$57,341,685	99%	$57,491,685	99%
Heat Pumps Phase 2 (2020)	$9,074,502	$7,116,562	$20,306,795	$56,861,402	$45,955,175	124%	$61,197,218	93%
Renewable Heat NY - Clean and Efficient Biomass Heating	$256,728	$144,074	$85,251	$13,353,069	$13,410,575	100%	$13,410,575	100%
Solar Thermal Transition	-	-	-	$287,513	$287,513	100%	$287,513	100%
Clean Heat & Cooling Total	**$10,911,161**	**$7,898,211**	**$22,342,238**	**$127,519,216**	**$116,994,949**	**109%**	**$132,386,991**	**96%**
Codes and Standards, & Other Multisector Initiatives								
Codes and Standards for Carbon Neutral Buildings	$9,650,000	$4,358,408	$10,262,781	$30,776,351	$34,613,243	89%	$52,000,000	59%
Information Products and Brokering	$350,000	(128200)	$2,008,738	$4,313,699	$3,216,057	134%	$5,500,000	78%
Market Characterization & Design Market Development	$3,573,106	$1,428,025	$4,072,507	$23,428,294	$24,345,245	96%	$24,758,269	95%
Product and Appliance Standards	$4,525,000	$2,675,715	$6,064,646	$12,780,694	$13,574,991	94%	$20,699,000	62%
REV Connect	$2,800,000	$1,520,604	$3,050,779	$10,356,389	$10,740,000	96%	$13,000,000	80%
Codes and Standards, & Other Multisector Initiatives Total	**$20,898,106**	**$9,854,552**	**$25,459,450**	**$81,655,427**	**$86,489,537**	**94%**	**$115,957,269**	**70%**
Commercial / Industrial / Agriculture								
Advancing Agricultural Energy Technologies	$500,000	-	$1,297,760	$2,104,449	$2,104,449	100%	$2,104,449	100%
Agriculture Transition	-	-	-	$3,598,821	$3,598,821	100%	$3,598,821	100%
Clean Green Campuses	$2,350,000	$1,018,364	$6,638,370	$21,648,092	$18,436,772	117%	$21,650,002	100%
Commercial Transition	$80,000	$389,273	$56,517	$12,282,555	$12,261,797	100%	$12,424,397	99%
Energy Management Practices	$3,474,680	$3,134,763	$4,827,352	$24,033,218	$22,777,326	106%	$26,976,778	89%
Energy Management Technology	$8,698,116	$4,273,187	$27,968,748	$88,032,728	$79,191,678	111%	$108,298,861	81%
Greenhouse Lighting and Systems Engineering	$487,486	$238,789	$779,513	$5,000,000	$4,917,724	102%	$5,000,000	100%
Industrial Transition	$329,867	$255,109	$153,516	$45,182,274	$46,046,872	98%	$46,046,872	98%
Market Challenges	$23,208,869	$12,130,582	$78,609,232	$111,128,724	$68,048,118	163%	$130,132,457	85%
P-12 Schools	$2,950,000	$2,638,857	$34,054,245	$46,272,967	$18,637,406	248%	$57,600,000	80%
Pay for Performance	-	$4,824	$79,417	$1,779,034	$1,709,226	104%	$1,709,226	104%
Real Estate Tenant	$282,757	$291,967	$389,939	$14,690,862	$15,003,316	98%	$15,798,390	93%
Technical Services	$14,797,658	$10,920,816	$46,750,321	$93,892,760	$59,515,676	156%	$97,852,736	95%
Commercial / Industrial / Agriculture Total	**$57,159,432**	**$35,296,530**	**$201,604,931**	**$469,646,483**	**$352,249,181**	**133%**	**$529,192,988**	**89%**
Communities								
Clean Energy Communities	$9,111,101	$5,994,410	$24,634,707	$61,336,459	$48,245,638	127%	$66,271,963	93%
Community Energy Engagement	-	-	-	$4,388,546	$4,388,546	100%	$4,388,546	100%
Communities Total	**$9,111,101**	**$5,994,410**	**$24,634,707**	**$65,725,005**	**$52,634,184**	**125%**	**$70,660,509**	**93%**

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	$212,147	$212,147	100%	$212,147	100%
Heat Pumps Phase 2 (2020)	$5,305,840	$418,477	$2,928,168	$11,213,518	$19,581,902	57%	$30,000,000	37%
LMI Multifamily	$21,793,068	$12,437,697	$79,321,264	$134,846,696	$90,265,270	149%	$179,328,622	75%
LMI Outreach & Engagement	$1,864,482	$691,825	$1,499,176	$5,047,518	$7,418,473	68%	$8,467,401	60%
LMI Pilots	$397,717	$106,583	-	$852,665	$1,648,099	52%	$2,443,533	35%
Low Rise New Construction Transition - LMI	$375,000	$110,231	$424,552	$7,906,763	$7,920,376	100%	$7,920,376	100%
Multifamily New Construction Transition - LMI	$1,540,000	$206,134	$1,085,146	$7,804,175	$7,970,981	98%	$7,970,981	98%
New Construction - LMI	$12,041,800	$18,519,471	$65,578,268	$124,217,214	$68,100,606	182%	$135,131,363	92%
NYS Healthy Homes Value Based Payment Pilot	$4,159,810	$684,455	$652,087	$3,705,151	$9,791,294	38%	$9,791,294	38%
Regional Clean Energy Hubs	$14,698,862	$4,056,348	$30,354,431	$39,987,501	$36,062,733	111%	$47,000,000	85%
RetrofitNY - LMI	$700,000	$1,516,156	$2,465,878	$8,740,870	$7,772,759	112%	$8,918,410	98%
REVitalize	-	-	-	$291,424	$291,424	100%	$291,424	100%
Single Family - Low Income	-	$376,814	$795,749	$248,783,250	$249,028,568	100%	$249,028,568	100%
Single Family - Moderate Income	$3,450,000	$3,077,568	$529,958	$99,735,971	$102,751,836	97%	$102,751,836	97%
Solar for All	$1,348,048	$961,371	$6,194,581	$12,697,024	$8,360,581	152%	$13,011,046	98%
Low-to-Moderate Income Total	**$67,674,627**	**$43,163,131**	**$191,862,123**	**$706,041,886**	**$617,177,049**	**114%**	**$802,267,000**	**88%**
Multifamily Residential								
Energy Management Technology	$1,627,603	$1,046,094	$2,944,643	$10,706,272	$11,164,276	96%	$14,099,239	76%
Market Challenges	$2,986,634	$2,128,070	$5,021,098	$9,983,201	$9,680,748	103%	$13,300,000	75%
Multifamily Low Carbon Pathways	$4,173,801	$1,485,696	$10,162,463	$13,148,489	$10,540,699	125%	$19,670,380	67%
Multifamily Market Rate Transition	-	-	-	$156,214	$156,214	100%	$156,214	100%
Technical Services	$4,739,021	$4,418,700	$10,047,359	$23,002,607	$17,477,400	132%	$30,717,634	75%
Multifamily Residential Total	**$13,527,058**	**$9,078,560**	**$28,175,563**	**$56,996,783**	**$49,019,336**	**116%**	**$77,943,466**	**73%**
New Construction								
Commercial New Construction Transition	$1,570,000	$466,032	$2,233,543	$12,280,050	$12,453,705	99%	$12,645,983	97%
Low Rise New Construction Transition - Market Rate	$180,000	$189,086	$55,715	$4,352,053	$4,381,285	99%	$4,381,285	99%
Multifamily New Construction Transition - Market Rate	$170,000	$12,641	$155,937	$1,589,310	$1,626,873	98%	$1,626,873	98%
New Construction - Market Rate	$7,030,929	$7,183,727	$90,437,059	$119,845,915	$46,072,335	260%	$159,150,505	75%
New Construction Total	**$8,950,929**	**$7,851,486**	**$92,882,254**	**$138,067,327**	**$64,534,198**	**214%**	**$177,804,647**	**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	$4,460,000	$549,771	$6,586,312	$13,414,066	$11,840,829	113%	$13,388,516	100%
Clean Energy Siting and Soft Cost Reduction	$1,399,598	$554,782	$1,871,526	$5,200,427	$5,674,035	92%	$8,795,000	59%
Combined Heat & Power Transition	$9,510,500	$2,051,222	$13,317,062	$54,681,538	$56,056,729	98%	$56,056,729	98%
Fuel Cells	$1,706,250	-	$500,000	$4,786,644	$7,199,144	66%	$7,199,144	66%
Offshore Wind Master Plan	-	-	-	$4,965,882	$4,965,882	100%	$4,965,882	100%
Offshore Wind Pre-Development Activities	$170,000	-	$181,646	$9,715,747	$9,789,462	99%	$9,789,462	99%
ORES Support	$2,500,000	$127,571	$1,526,401	$4,304,117	$6,541,535	66%	$9,000,000	48%
Reducing Barriers to Distributed Deployment	$1,200,000	$443,070	$4,941,997	$14,958,736	$12,566,201	119%	$15,450,000	97%
Small Wind Transition	-	-	-	$3,323,673	$3,323,673	100%	$3,323,673	100%
Solar Plus Energy Storage	$10,424,500	$1,879,893	$4,924,500	$36,700,664	$36,820,772	100%	$36,820,772	100%
Renewables / Distributed Energy Resources (DER) Total	**$31,370,848**	**$5,606,310**	**$33,849,444**	**$152,051,494**	**$154,778,263**	**98%**	**$164,789,178**	**92%**
Single Family Residential								
Consumer Awareness	-	-	-	$2,251,671	$2,251,671	100%	$2,251,671	100%
Heat Pumps Phase 2 (2020)	$5,800,000	$1,582,043	$3,343,743	$8,097,745	$16,505,089	49%	$17,537,698	46%
Pay for Performance	-	-	-	$885,684	$886,553	100%	$886,553	100%
Residential	$17,225,086	$12,371,719	$8,230,881	$43,660,350	$53,300,174	82%	$56,998,862	77%
Single Family Market Rate Transition	-	-	-	$23,528,344	$23,528,344	100%	$23,528,344	100%
Single Family Residential Total	**$23,025,086**	**$13,953,762**	**$11,574,624**	**$78,423,794**	**$96,471,831**	**81%**	**$101,203,128**	**77%**
Transportation								
Electric Vehicles - Rebate	$84,388	$16,634	-	$39,406,074	$39,498,889	100%	$39,498,889	100%
EV Charging and Engagement	$2,900,000	$426,370	$427,329	$853,700	$5,325,000	16%	$7,200,000	12%
Transportation Total	**$2,984,388**	**$443,004**	**$427,329**	**$40,259,773**	**$44,823,889**	**90%**	**$46,698,889**	**86%**
Workforce Development								
Building Operations and Maintenance Partnerships	$3,367,669	$3,836,372	$10,128,955	$28,139,952	$22,568,513	125%	$33,345,000	84%
Talent Pipeline	$11,324,453	$7,410,310	$23,523,333	$63,928,905	$59,941,727	107%	$85,000,000	75%
Workforce Development Total	**$14,692,122**	**$11,246,682**	**$33,652,288**	**$92,068,858**	**$82,510,240**	**112%**	**$118,345,000**	**78%**
NYS Cost Recovery Fee Market Development	$2,946,820	$1,400,090	-	$16,490,319	$21,308,575	77%	$28,055,563	59%
Total Market Development	**$263,251,677**	**$151,786,728**	**$666,464,951**	**$2,024,946,364**	**$1,738,991,231**	**116%**	**$2,365,304,628**	**86%**

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	$2,600,000	$1,870,000	$6,459,160	$9,509,160	$7,525,000	126%	$10,000,000	95%
NextGen Buildings	$9,375,963	$2,853,683	$38,245,470	$54,554,486	$35,738,806	153%	$65,000,000	84%
Buildings Innovation Chapter Total	**$11,975,963**	**$4,723,683**	**$44,704,630**	**$64,063,646**	**$43,263,806**	**148%**	**$75,000,000**	**85%**
Clean Transportation Innovation								
Electric Vehicle Innovation	$7,100,000	$2,278,752	$12,998,876	$23,966,321	$24,804,240	97%	$31,850,000	75%
Public Transportation and Mobility	$2,900,000	$411,482	$3,249,599	$11,107,447	$15,086,837	74%	$22,500,000	49%
Clean Transportation Innovation Total	**$10,000,000**	**$2,690,235**	**$16,248,476**	**$35,073,768**	**$39,891,077**	**88%**	**$54,350,000**	**65%**
Climate Resilience Innovation								
Grid ClimateTech Ready Capital	$200,000	-	-	-	$2,400,000	0%	$12,000,000	0%
Hydrogen Innovation	$145,000	$71,071	(61543)	$171,366	$1,550,000	11%	$7,000,000	2%
Market Characterization & Design Innovation & Research	$318,287	$270,299	$108,287	$1,474,440	$1,750,653	84%	$1,750,653	84%
Climate Resilience Innovation Total	**$663,287**	**$341,370**	**$46,744**	**$1,645,806**	**$5,700,653**	**29%**	**$20,750,653**	**8%**
Energy Focused Environmental Research								
Energy-Related Environmental Research	$6,550,000	$2,702,920	$8,906,955	$41,435,274	$41,787,274	99%	$47,800,000	87%
Energy Focused Environmental Research Total	**$6,550,000**	**$2,702,920**	**$8,906,955**	**$41,435,274**	**$41,787,274**	**99%**	**$47,800,000**	**87%**
Gas Innovation								
Hydrogen Innovation	$1,920,000	$591,245	$8,682,792	$9,770,059	$6,112,891	160%	$24,800,000	39%
Long Duration Energy Storage	$3,000,000	$290,700	$13,881,065	$14,818,443	$10,140,000	146%	$17,000,000	87%
Utility Thermal Network Technical Support	$625,000	$273,017	$726,029	$1,047,802	$1,625,000	64%	$3,000,000	35%
Gas Innovation Total	**$5,545,000**	**$1,154,961**	**$23,289,886**	**$25,636,304**	**$17,877,891**	**143%**	**$44,800,000**	**57%**
Grid Modernization								
Future Grid Performance Challenge	$5,700,000	$5,875,721	$22,628,086	$38,167,442	$24,587,156	155%	$58,063,066	66%
Grid ClimateTech Ready Capital	$962,000	$312,319	$5,031,118	$5,459,357	$4,152,000	131%	$22,000,000	25%
High Performing Electric Grid	$5,000,000	$1,755,079	$13,282,416	$57,133,712	$52,300,156	109%	$64,800,000	88%
Power Electronics Manufacturing Consortium	-	-	-	$16,694,490	$16,694,490	100%	$16,694,490	100%
Grid Modernization Chapter Total	**$11,662,000**	**$7,943,119**	**$40,941,620**	**$117,455,001**	**$97,733,803**	**120%**	**$161,557,556**	**73%**
Negative Emissions Technologies								
CarbonTech Development	$1,608,494	-	$1,857,917	$5,000,000	$4,481,988	112%	$5,113,980	98%
Natural Carbon Solutions	$1,875,000	$577,606	$10,536,825	$11,429,967	$6,676,080	171%	$20,486,020	56%
Negative Emissions Technologies Total	**$3,483,494**	**$577,606**	**$12,394,742**	**$16,429,967**	**$11,158,068**	**147%**	**$25,600,000**	**64%**
Renewables Optimization								
Energy Storage Technology and Product Development	$4,070,000	$1,218,535	$18,348,009	$32,451,007	$23,655,370	137%	$39,500,000	82%
National Offshore Wind Research & Development Consortium	$2,311,000	$2,706,669	$2,799,462	$22,130,443	$21,570,000	103%	$22,500,000	98%
Renewables Optimization Total	**$6,381,000**	**$3,925,204**	**$21,147,471**	**$54,581,450**	**$45,225,370**	**121%**	**$62,000,000**	**88%**
Technology to Market								
CarbonTech Development	$2,879,005	$2,180,869	$5,442,931	$14,215,884	$10,653,010	133%	$14,362,020	99%
Catalytic Capital for Climatetech	$641,950	$400,933	$660,733	$18,544,957	$19,146,690	97%	$19,360,229	96%
Climatetech Commercialization Support	$7,601,618	$4,529,171	$12,708,380	$54,433,787	$50,017,997	109%	$54,927,913	99%
Climatetech Expertise & Talent	$521,000	$572,153	$4,022,947	$11,904,249	$9,452,523	126%	$12,049,276	99%
Manufacturing Corps	$500,000	$580,000	$2,985,996	$16,822,069	$14,810,139	114%	$17,058,959	99%
Novel Business Models and Offerings	$3,625,000	$504,636	$5,665,305	$13,384,141	$13,383,394	100%	$13,383,394	100%
Technology to Market Total	**$15,768,573**	**$8,767,762**	**$31,486,292**	**$129,305,087**	**$117,463,754**	**110%**	**$131,141,791**	**99%**
NYS Cost Recovery Fee Innovation & Research	$815,419	$339,277	-	$3,146,258	$4,694,096	67%	$6,890,475	46%
Total Innovation and Research	**$72,844,735**	**$33,166,136**	**$199,166,815**	**$488,772,562**	**$424,795,791**	**115%**	**$629,890,475**	**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 October 2024, NYSERDA announced that 6 GW of distributed solar had been successfully installed, marking the first completion of a Climate Act target.
- New York's national leadership in community solar continued, with 210 MW completed Q3 2024.
- There are approximately 3,344 MW of solar in development with NYSERDA awards. These projects are at an advanced stage of development and will contribute to the 10 GW by 2030 target.

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

3.0 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	499.0	40.9	539.9	21.1	561.0	527.0	106%
	Upstate - Nonresidential	148.9	12.8	161.8	27.0	188.8	279.0	68%
	Upstate - Commercial/Industrial	2,229.1	469.6	2,698.8	3,058.8	5,757.6	6,213.0	93%
	Con Ed - Residential	341.5	44.6	386.2	24.1	410.3	441.0	93%
	Con Ed - Nonresidential	160.6	43.4	204.0	173.4	377.4	735.0	51%
	Capacity Total	**3,496.8**	**611.4**	**4,108.2**	**3,304.5**	**7,412.7**	**8,312.6**	89%
Distributed Solar Energy Production (MWh)	Commercial/Industrial (Competitive)	136,193	-	136,193	-	136,193	n/a	
	Upstate - Residential	511,331	39,149	550,481	20,470	570,950		
	Upstate - Nonresidential	165,378	13,762	179,141	30,270	209,411		
	Upstate - Commercial/Industrial	2,744,250	653,206	3,397,456	4,065,493	7,462,950		
	Con Ed - Residential	355,462	44,384	399,846	24,463	424,310		
	Con Ed - Nonresidential	183,431	52,324	235,756	210,742	446,498		
	Production Total	**4,096,047**	**802,826**	**4,898,873**	**4,351,439**	**9,250,311**		

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	6.4	1.7	8.2	1.7	9.9
	Upstate - Nonresidential	0.9	0.7	1.5	1.4	2.9
	Upstate - Commercial/Industrial	56.2	69.9	126.1	465.5	591.6
	Con Ed - Residential	4.1	3.9	8.0	2.4	10.4
	Con Ed - Nonresidential	19.6	6.6	26.2	20.9	47.1
	Capacity Total	**87.2**	**82.8**	**170.0**	**491.9**	**661.9**
Distributed Solar Energy Production (MWh)	Upstate - Residential	6,842	1,679	8,521	1,708	10,229
	Upstate - Nonresidential	866	663	1,529	1,433	2,962
	Upstate - Commercial/Industrial	114,266	108,279	222,545	630,403	852,948
	Con Ed - Residential	4,381	4,063	8,444	2,580	11,024
	Con Ed - Nonresidential	22,960	8,609	31,569	25,621	57,191
	Production Total	**149,314**	**123,294**	**272,608**	**661,745**	**934,353**

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	593.4	16.9	610.3	39.5	649.8
	Non-NYSERDA Statewide Installations			1,288.6		1,288.6
	Capacity Total	**593.4**	**16.9**	**1,898.9**	**39.5**	**1,938.4**
Distributed Solar Energy Production (MWh)	NYSERDA (non-CEF) Installations	651,146	17,874	669,019	47,335	716,354
	Non-NYSERDA Statewide Installations			1,335,794		1,335,794
	Production Total	**651,146**	**17,874**	**2,004,813**	**47,335**	**2,052,148**

3.1 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 + Encumbered	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	$225,312,656	$7,896,715	$233,209,371	$4,372,308	$237,581,679		
Upstate - Nonresidential	$65,855,735	$4,104,651	$69,960,386	$8,923,689	$78,884,075		
Upstate - Commercial/Industrial	$486,451,159	$181,882,277	$668,333,436	$606,794,583	$1,275,128,019		
Con Ed - Residential	$104,795,724	$8,076,480	$112,872,204	$4,883,212	$117,755,416		
Con Ed - Nonresidential	$90,147,892	$29,389,593	$119,537,485	$118,380,966	$237,918,451		
MW Block Subtotal	**$1,021,179,431**	**$231,349,716**	**$1,252,529,147**	**$743,654,102**	**$1,996,183,249**	**$2,485,201,000**	71%
Solar Energy Equity Framework (SEEF) Adder	$24,586,715	$12,693,391	$37,280,106	$270,207,343	$307,487,450	$399,764,000	77%
Funds to Assist Transition to Prevailing Wage	$0	$0	$0	$104,329,963	$104,329,963	$238,725,000	44%
Consumer Education	$1,547,475	$1,658	$1,549,133	$1,950,867	$3,500,000	$6,500,000	54%
Implementation and Quality Assurance	$16,865,769	$1,862,508	$18,728,276	$4,659,410	$23,387,686	$32,600,000	72%
Administration	$24,587,896	$2,831,114	$27,419,010	$0	$27,419,010	$58,756,000	47%
Evaluation	$1,390,534	$160,902	$1,551,436	$475,794	$2,027,230	$3,500,000	58%
NYS Cost Recovery	$10,062,389	$2,079,796	$12,142,185	$0	$12,142,185	$41,800,000	29%
NY-Sun Total	**$1,100,220,209**	**$250,979,084**	**$1,351,199,293**	**$1,125,277,478**	**$2,476,476,771**	**$3,266,846,000**	76%

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

This table is a subset of budget and spending data reported in Table 10 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	$3,255,444	$2,663,382	$1,016,256	$365,969	$4,271,700	$3,029,351	$7,301,051
Upstate - Nonresidential	$749,881	$546,490	$846,723	$402,381	$1,596,605	$948,870	$2,545,475
Upstate - Commercial/Industrial	$10,157,861	$27,740,440	$253,216,727	$103,706,001	$263,374,588	$131,446,441	$394,821,029
Con Ed - Residential	$4,518,228	$1,562,194	$1,583,724	$536,772	$6,101,952	$2,098,966	$8,200,918
Con Ed - Nonresidential	$13,365,214	$13,086,975	$11,058,717	$12,725,691	$24,423,931	$25,812,666	$50,236,598
Technical Assistance and Implementation	$5,233,478	$0	$2,485,196	$0	$7,718,673	$0	$7,718,673
Total	**$37,280,106**	**$45,599,481**	**$270,207,343**	**$117,736,813**	**$307,487,450**	**$163,336,294**	**$470,823,744**

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	$395,334,094	$3,395,812	$398,729,906	$22,910,530	$421,640,436

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 Q3 2024 reporting period, six studies and case 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 Q3 2024

Evaluated Program	Evaluation type	Evaluated program year(s)
Regional Clean Energy Hubs	Market	Q3 2023-Q2 2023
Innovation and Research Product Development [multiple initiatives]	Impact	2016-2020
Single-Family Low- to Moderate-Income Heat Pump Demonstration Study (Pilot Period 2021-2022)	Impact	2021-2022
Smart Grid and Offshore Wind: Tagup	Case Study	2024
Workforce Development	Case Study	2024
Interconnection Technical Working Group	Case Study	2024

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.

4.0 Recommendation Tracking Updates

NYSERDA periodically reviews and tracks the status of recommendations that have been "pending" in quarterly CEF reports. As shown in Table 14, during Q3, the following NYSERDA responses to recommendations have been updated from "pending" since their presentation in these CEF quarterly reports, beginning with the 2021 Annual CEF Performance Report. For reference purposes, since early 2017, when NYSERDA began conducting CEF evaluations, 264 recommendations have been published. Of these, 206 have been implemented, 33 have been rejected and 25 are pending.

From the 2021 Annual CE Performance Report through the latest status review (Q3 2024), recommendation statuses from evaluation studies have been updated as follows:

- 13 recommendations are still pending.
- 7 recommendations have since been implemented, as detailed in Table 14.
- 1 recommendation has since been rejected, as detailed in Table 14.

Table 14. Summary of CEF Evaluation Study Recommendations through Q3 2024

Study Name	Published	Recommendation	New Status	Update
Agriculture Market Evaluation: Advancing Agriculture Energy Technologies (AAET), Agriculture Technical Services, and Greenhouse Lighting and Systems Engineering (GLASE) Consortium	12/2019	Agriculture Technical Services – Best Practices Initiative. NYSERDA should ensure that the already planned best practices guides include detailed and easy to understand information about how energy efficiency technologies lead to improved performance, operational and maintenance savings, and increased reliability, in addition to energy bill savings. NYSERDA could also consider developing case studies on specific farms and energy efficient technologies on those farms, specifically a case study on how particular technologies on a specific farm lead to improved performance, operational and maintenance savings, and increased reliability.	Implemented	Q3 2024: A case study highlighting successful technologies will be considered and scoped in the impact evaluation planned to commence in 2025. Previously implemented in Q1 2023: Best practice guides being developed include easy to understand information about energy efficiency and other benefits.
Energy Management Practices 2017-2020 Impact Evaluation Phase 1	8/2022	As the program shifts to commercial customers, consider, where possible, aligning the treasure hunts with cooling seasons and a heating season targeted mini-hunt (or vice versa).	Implemented	This will be implemented as part of Commercial SEM where feasible.

Residential Retrofit Impact Evaluation (Q1 2017 - Q1 2019)	8/2022	NYSERDA should consider conducting a process study of CEF-funded projects to examine the on-the-ground conditions that could be affecting the accuracy of savings models. The literature review identified the accuracy of the engineering models and their inputs to reflect real world situations, quality of measure installation, and end user behavior and occupancy changes as the potential drivers affecting ex ante savings. The process study could address a range of factors, including customer surveys and on-site visits to compare engineering and other assumptions versus actual conditions of the home, engineering model desk reviews to compare inputs used by contractors in the modeling software with the actual conditions of the home, in-depth interviews and ride-alongs with home performance contractors to understand the factors that inform their recommendations to participants as well as their installation practices, and pre- and post-metering and logging studies designed to update savings assumptions for specific measures. Such explorations seem most critical for households receiving natural gas measures.	Implemented	The current EmPower+ evaluation includes a process evaluation component, which includes interviews with program staff and implementers, a contractor survey, and a participant survey. The final report for this evaluation is expected in Q2 2025.
Residential Retrofit Impact Evaluation (Q1 2017 - Q1 2019)	8/2022	NYSERDA should consider conducting a more thorough impact evaluation drawing on multiple approaches to verify gross savings and estimate RRs. The results of the various approaches could be combined into a single RR through triangulation and, if needed, reliance on Delphi Panels or other similar structured expert consensus methods. Three suggested impact approaches	Implemented	The current EmPower+ evaluation includes several approaches to verify gross savings including billing analysis and engineering reviews. Site visits are possible if the billing analysis shows anomalous results that would need to be investigated onsite. A participant

		include 1) desktop verification of reported savings assumptions and their alignment with the TRM and program specific VGS Specifications, 2) independent third-party site visits that include visual inspections, metering, and testing to verify savings, and 3) the same surveys of customers mentioned above for the recommended process evaluation.		survey is also part of the evaluation. The final report for this evaluation is expected in Q2 2025.
Residential Retrofit Impact Evaluation (Q1 2017 - Q1 2019)	8/2022	NYSERDA should consider conducting a delivered fuels impact evaluation. This evaluation would require approaches to access delivered fuels consumption data, an approach that has proved challenging in the past. However, without such data, impact evaluations will continue to exclude a sizable portion of program participants and be unable to provide a full accounting of the energy savings associated with electrification.	Implemented	The current EmPower+ evaluation includes a delivered fuels impact evaluation. The final report for this evaluation is expected in Q2 2025.
Residential Retrofit Impact Evaluation (Q1 2017 - Q1 2019)	8/2022	NYSERDA should consider working with the utilities to ensure utility data is received and has few estimated reads. Utility data was not received from two utilities for this evaluation. Additionally, the utility data that was received for this evaluation included data with excessive estimated reads (more than nine estimated reads out of twelve reads yearly). A much larger percentage of homes would be included in this analysis if the utility data was complete. This would present a more realistic view of the program and increase statistical significance in the results.	Implemented	NYSERDA has been working closely with NYS utilities to receive more complete utility data. NYSERDA is also utilizing regular EDI requests to get more complete data.
Workforce Development Talent Pipeline Market Evaluation	9/2022	While the evidence indicates the Talent Pipeline intern and OJT hire activity is valuable to the participants and brings new workers into the clean energy	Implemented	This recommendation to review/update initiative metrics will be included in the scheduled 2025 market

		workforce, it is not clear that the cost and time of onboarding is the only or best measure of program impact. Other metrics that might be more appropriate for measuring progress could be centered on increasing the permanent placement rates or on targeting specific job areas (like installers), as well as tracking whether training developed is being leveraged outside of the NYSERDA program.		assessment update of Talent Pipeline.
New Construction Market and Impact Study	6/2023	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.	Rejected	The open enrollment single family home program has been closed and will not be reopened in the same capacity.

4.1 Regional Clean Energy Hubs Market Baseline (Q3 2022-Q2 2023)

Regional Clean Energy Hubs Market Evaluation and Baseline Customer Survey Report

Summary of Report Findings, Recommendations and NYSERDA Response to Recommendations

Key findings and associated recommendations from the RCEH study include[12]:

Finding 1: NYSERDA and the Hubs are laying a solid foundation upon which to build a culture of collaboration. Hubs indicated appreciation for the way that NYSERDA has embraced collaboration for the Regional Clean Energy Hubs (RCEH) Initiative more wholeheartedly than in other NYSERDA programs or campaigns. Hub Leadership and subcontractors alike discussed that they would like to hear from one another about best practices as the RCEH Initiative develops, especially with regard to Salesforce, braiding funding for wraparound services, and staying abreast of program changes.

Recommendation 1: NYSERDA should explore ways to effectively help Hubs share best practices to leverage expertise and lessons learned and identify opportunities to support Hub-to-Hub engagement and program development outside of regular meetings. NYSERDA could moderate a quarterly virtual lunch-and-learn or host

an annual moderated workshop to provide a venue for dedicated problem-solving or skill-sharing on a particular topic or range of topics. Encouraging Hub Teams to utilize each other as resources is a way to continue promoting a culture of collaboration and information-sharing.

NYSERDA Response to Recommendation 1: Implemented. To strengthen collaboration and coordination amongst the RCEH, NYSERDA currently hosts regular monthly Hub Leadership meetings, Hub Webinars, Hub All Staff Meetings, as well as a Salesforce Working Group and an Outreach Working Group. These convenings allow Hubs the space to stay up to date on program announcements, share insights gained from Hubs' on-the-ground regional engagement, and collectively develop strategies for reaching disadvantaged communities. NYSERDA, along with subset of Hub members, is organizing an annual Hub meeting where Hub Staff will meet in person for two days and focus on peer learning and strengthening their partnership networks. Additionally, the Hub Implementation Contractor has developed a Hubs-specific Teams site to facilitate real-time discussion via chat among Hubs, distribute program information, and gather feedback collaboratively.

Finding 2: NYSERDA's approach to communications has challenged Hubs through inconsistent or opaque messaging and lack of outreach to or support for organizations when programs change. Hub Leadership expressed concerns that they could not depend on NYSERDA for timely or accurate information, and more than one interviewee said that they were being careful to brand their Hub independently of NYSERDA, so as not to undermine their own hard-won credibility in their region's communities. Hub subcontractors also expressed frustration with the rapid rate of NYSERDA program turnover (counterproductive for participants from resource constrained households) and the lack of outreach from NYSERDA about changing consumer programs (or program names), indicating that their organizations were not part of the conversation to change the program, and they had to respond to the changes swiftly by educating themselves on the changes and reprinting the informational materials.

Recommendation 2*:* NYSERDA should work on improving communication practices between program staff and the Hubs; this should include clear messaging around program benefits to avoid confusing overpromises on incentive amounts or timelines, providing sufficient program resources (e.g., FTE) for large and multifaceted programs, and offering "listening sessions" with Hubs and organizations in their network prior to launching new programs (or new program branding). Waiting to confirm incentive amounts until confirmed within NYSERDA and providing some transparency about the cause and expected duration of delays may help Hubs to plan outreach activities around available resources. NYSERDA's vision for the Hubs is broad and decentralized, but NYSERDA support is still necessary – additional program staff may help NYSERDA to more efficiently connect the Hubs with the resources they need.

NYSERDA Response to Recommendation 2*:* Pending. In order to address concerns around communicating needs, NYSERDA is currently working on several tools to collect, organize, and manage feedback from the Hub Staff to facilitate communication between NYSERDA program staff and Hub staff. Collecting this feedback will allow NYSERDA to identify shared areas of improvement and opportunities for collaboration. For example, NYSERDA can record feedback heard from Hub staff at meetings or received via chat or email, which the Hub staff can then view to see how the feedback is addressed. This feedback tracker will also be available for public viewing to further improve communication and transparency. Feedback received on NYSERDA programs will be recorded in the feedback tracker and provided to the NYSERDA Program Teams in a timely manner for a response and potential solution. Once the NYSERDA Program Team has responded to the feedback provided, the Hub who provided the feedback will be notified and the feedback will be updated. Additionally, NYSERDA

is developing an anonymous feedback form and scheduling listening sessions for Hub Staff to provide suggestions or comments, which will be tracked in the feedback tracker. These tools will improve transparency, continue to build trust, and foster continuous improvement within the RCEH initiative and NYSERDA.

NYSERDA also continues to facilitate communication through the regularly scheduled Hubs meetings (Hub Leadership, Hub all Staff and Monthly Webinar meetings). NYSERDA Program Teams work with RCEH staff to provide Hub staff with program updates and trainings on NYSERDA and Non-NYSERDA programs through these meetings. Additionally, NYSERDA Program Teams are organizing working groups where they invite the Hubs to provide feedback on program design and development.

Hubs are also invited to participate in the Energy Equity Collaborative, a coordinated forum for community-based organizations and stakeholders that are representative of or principally serve Disadvantaged Communities, NYSERDA, and interagency partners to work together to address energy equity and climate justice issues and develop equitable programs.

Finding 3: DAC consumers are aware of energy efficiency and renewable energy generation and storage concepts but require evidence to make informed decisions about purchases. DAC consumer focus group participants and survey respondents both highlighted information as a barrier to making decisions about purchases. Some participants indicated that they did not believe that cost-reduction rebate programs really worked. Focus group participants indicated that more visual marketing or relatable forms of evidence, such as a well-packaged infographic comparing programs and showing savings over time, or featuring program reviews from other customers (e.g., customer reviews with stars and specific feedback) may better support their decision-making.

Recommendation 3*:* NYSERDA should develop case studies showing cost effectiveness for a realistic DAC household before/after installation, or over time, to help provide potential customers with a better idea about the extent of cost savings (or payback period) they can expect from clean energy or energy efficiency purchases. An effective case study would highlight a household's considerations in making the decision to purchase energy efficiency products or install renewable energy generation and storage technologies, and demonstrate realistic outcomes, like savings over time (if any). A case study could highlight the customer's perspective on comfort and other non-energy health benefits and provide a summary review of the product(s).

NYSERDA Response to Recommendation 3*:* Implemented. NYSERDA is currently working with the Hubs to develop customized case studies and testimonials as well as consumer facing materials on living in an energy efficient home.

Finding 4: Negative perceptions, misinformation, and lack of confidence about the reliability of renewable energy generation and storage technologies and energy efficiency products may prevent DAC consumers from participating in the clean energy economy. Some DAC consumer survey participants reported that they did not have confidence in the reliability of renewable energy generation and storage technologies or energy efficiency products. Some DAC consumer focus group participants also expressed concerns over electrification, specifically around possible service interruptions in an electricity grid powered by a renewable and distributed energy mix. Hub Leadership and subcontractors gave examples of fear-based campaigns from natural gas or fuel oil providers as misinformation they have been seeing in the marketplace that discourages their local residents from switching to fully electric appliances and home heating, ventilation, and cooling systems. While this feedback suggests real misinformation challenges around the clean energy transition, NYSERDA's experience

in addressing negative perceptions around, for example, wind energy in the North Country, may be able to support Hubs in countering customer misinformation.

Recommendation 4: NYSERDA should support Hubs by developing materials with talking points explaining the benefits of the clean energy economy, such as the role of battery storage in ensuring stability of electricity service, and framing educational materials around non-energy benefits such as health and comfort to reduce misunderstandings and negative perceptions about electrification. NYSERDA has past experience in addressing consumer reluctance to embrace solar PV and wind power that may be useful to Hubs as they work to address negative perceptions about grid reliability in the transition to a grid powered by renewable generation. Additionally, NYSERDA has long documented non-energy benefits in its evaluations and can use this information to help Hubs make a case to consumers for clean energy solutions.

NYSERDA Response to Recommendation 4: Pending. A Hub serves as the source for community members across the region to receive reliable and accurate information about clean energy programs and opportunities. As a team of non-profit organizations that come from the communities they serve, Hub Staff are actively attending, hosting and organizing community events to engage with communities. In addition, the Hubs are developing websites and marketing campaigns that speak in plain language about incentive and rebate programs, renewable energy generation and storage technologies and energy efficiency measures to debunk misinformation.

4.2 Innovation and Research Product Development Impact Evaluation (PY 2016-2020)

Summary of Report Findings, Recommendations and NYSERDA Response to Recommendations

Key findings and associated recommendations from the Innovation and Research Product Development Impact Evaluation include[13]:

Finding 1: NYSERDA invested $109M in product development projects that were completed between January 2016 and June 2020. This investment resulted in 38 successfully commercialized products that reported sales. This subset of 38 products received $13.79 million of the total funding. However, sales are not the only or even the best indicator of product development progress, since the theory of change is different among projects.

Recommendation 1: No recommendation.

NYSERDA Response to Recommendation: N/A

Finding 2: The total annual energy savings for 18 selected commercialized products is 1.36 million MMBtu based on sales through 2021. This energy savings translates to 165,462 $MTCO_2e$ of greenhouse gas reduction. Further, this 1.36 million MMBtu/year is comprised of electric savings of 289,710 MWh/year inventoried across seven products and 373,211 MMBtu/year from two projects that saved transportation fuel (gasoline and diesel). **Within NYS, the total annual energy savings is estimated to be 77,484 MMBtu, which translates to 9,927 $MTCO_2e$ of reduced greenhouse gas**.

Recommendation 2: Given the scale of impacts uncovered through this evaluation, future evaluations should continue to assess energy impact value from these projects.

NYSERDA Response to Recommendation: Pending. The NYSERDA Evaluation and Innovation and Research teams will consider future studies to evaluate the energy impacts from product development investments.

Finding 3: Many developers identified that NYSERDA's strengths come through both its engaged NYSERDA project managers and through the connectivity between NYSERDA funding opportunities. For instance, NYSERDA is helpful with making connections within industry – establishing partnerships, acquiring customers, and collaborating at conferences and with industry groups. Similarly, NYSERDA experts, through the Entrepreneurs-in-Residence and other expertise, provided critical assistance to help product development.

Recommendation 3: NYSERDA should continue to build on these strengths to enable more product developers to make the necessary connections with NYSERDA offerings that can promote collaboration and provide technical expertise. To enable a clearer funding path for continued project development, many developers cited an opportunity for NYSERDA to provide funding in phase-gates or through flexible contracting means to support continued successful research and development (R&D) efforts or pivot to more beneficial activities. Similarly, developers recommended that NYSERDA establish company Master Services Agreements to take a portion of the re-application burden out of subsequent funding opportunities. Finally, strong NYSERDA project manager support has helped developers to make key decisions and refine their approach as their R&D activities evolve, particularly in early stages of development.

NYSERDA Response to Recommendation: Implemented. The NYSERDA Innovation and Research team already follows this recommendation and will continue to do so.

Finding 4: NYSERDA incentivizes development of a wide variety of products, and product designs frequently change over the course of their development. In addition, it can be challenging for evaluators to obtain product information from product developer firms. Given these factors, evaluators face difficulties obtaining data needed to evaluate energy impacts of NYSERDA's product development support. Specifically, different products employ different technologies, access different markets, yield different benefits, and are developed by different firms; relatedly, obtaining usable documentation on competitor products and unit energy benefits to conduct impact evaluation across these products can be difficult for the evaluator to compile and analyze. In addition, since products oftentimes change during development - even if these details are documented during the product development project – product information may not be applicable by the time the product's impact is evaluated several years after project completion. Further, NYSERDA requires product developer firms to submit annual metrics collection surveys, and due to time constraints faced by some firms, some firms do not respond to the evaluator's data collection requests, further limiting the data the evaluator can collect.

Recommendation 4a: Define a process that enables Innovation and Research staff to establish and record key details about the product as will be needed to evaluate the product's impacts. This data could be

collected from the developer by the NYSERDA project manager or a contractor and distilled into a brief summary for more robust impact estimation and future evaluation. The necessary information could be collected as part of developer submissions, or a deliverable submitted by the product developer during the project. Furthermore, the Salesforce project records for these projects could be used to document the following information, included but not limited to:

1. Describe the disruptive potential of the product and the market it will disrupt.
2. Define a unit of sale of the product NYSERDA is funding for development.
3. Define the product, if any, that the incentivized product would displace or replace in the market, i.e. the competitor product, that would serve as the performance baseline for comparison of energy or other benefits.
4. Describe the specific benefits of the product in terms of energy, economic, waste, health, comfort and other impacts, estimating quantities of benefits where possible. The existing "Project Benefits" field in Salesforce could be used to address this need.

NYSERDA Response to Recommendation: Pending. NYSERDA Innovation and Research management adopts the recommendation, in so far as it can be added to the process of data collection through the project at the appropriate time to generate most valuable and consistent responses. Feedback will be collected at an appropriate time in the project timeline.

Recommendation 4b: Instead of interviewing Innovation and Research staff, NYSERDA should use a survey instrument adapted from the interview guide developed for this evaluation to better capture project manager knowledge of the products' relative impacts, disruptive potential, project successes, development progress and trajectory, anomalies in the sales data, and openness to being contacted to facilitate the evaluation. This survey could be sent to Innovation and Research project managers prior to in-depth file review activity or indirect impact methodology development to improve the efficiency and completeness of data collection.

NYSERDA Response to Recommendation*:* Pending. The outcome of more robust information (itemized in the recommendation) at project close may be more effectively collected directly from the developer through a data collection form. The requirement for completion of this form would be transparently communicated to project partners at the outset of project agreement.

Recommendation 4c: NYSERDA should consider requiring product developer firms to commit to supporting NYSERDA in evaluating their products, by way of an attestation signed at the time the NYSERDA investment is approved. NYSERDA already requires proposers to sign attestations when initiating a project, and an additional attestation committing the product developer to respond to an evaluator's survey outreach and interview attempts at a later date could increase the evaluator's chances of obtaining a response from the firm.

NYSERDA Response to Recommendation: Pending. NYSERDA product development contractors already agree as part of contracting that they will support evaluation efforts. However, Innovation and Research could clarify and expand on guidance to the product developer firms in their terms and conditions to clarify the

support they will be asked to provide later and what they will be asked report and could reinforce these requirements as part of project kickoff and closeout meetings.

4.3 Heat Pump Electrification Insights Impact Evaluation (Pilot Period 2021-2022)

Summary of Report Findings, Recommendations and NYSERDA Response to Recommendations

Finding: LMI customers are motivated to install heat pumps not only to save money, but also to improve their home comfort and to replace systems before burnout. In addition, many delivered fuel customers are meeting the majority of their heating and cooling needs with their new heat pumps. Most surveyed Pilot Program participants were motivated to install a heat pump to save money (heat pumps: 89%, 143 of 160; HPWHs: 83%, 42 of 51) and to improve home comfort with better cooling (85%, 140 of 165) or heating (82%, 131 of 161). In addition, most participants replaced their old heating and/or cooling systems before failure with their new heat pump (93%, 157 of 168). After installing the heat pump system, most participants with delivered fuel met their primary heating and cooling needs with their new heat pumps (69%, 108 of 156). However, a small subset of participants (31%, 49 of 156) still used their pre-existing heating and cooling systems because they either perceive them to be more economical than the heat pump (29%, 14 of 49) or believe that the pre-existing system would help them to remain comfortable (37%, 18 of 49).

Recommendation: Expand marketing and educational resources of heat pump technologies to further emphasize increased home comfort in addition to bill savings and proper equipment usage. These expanded marketing and educational resources targeting contractors and customers may include items such as: Contractor instructions and marketing assets, e.g., case studies; Fact sheets and contractor training that support contractors in identifying funding options to better support customer decision-making and capitalizing on their existing motivations; and Customer-facing resources explaining or demonstrating heat pump technologies, such as videos, infographics, or equipment tutorials, that are promoted on the NYSERDA website or social media.

NYSERDA Response to Recommendation: Pending. NYSERDA will consider developing marketing and educational materials with a focus on home comfort, bill savings and proper heat pump equipment usage, specifically in homes with delivered fuels.

Recommendation: Since surveyed customers were relatively new heat pump owners at the time of this evaluation, consider conducting follow-up research with Pilot Program participants to assess if and how they have changed their system usage over time and whether they have increased familiarity with heat pumps.

NYSERDA Response to Recommendation: Pending. NYSERDA Evaluation will consider future studies to evaluate the behaviors of the participants and their familiarity with the heat pump equipment installed through this Pilot.

Finding: Heat pumps and heat pump water heaters significantly displaced delivered fuels and lowered utility bills for LMI residents. The evaluated projects with liquid delivered fuels (63%, 259 of 413) have consistent displacement and annual cost savings, while those with wood-based delivered fuels (16%, 66 of 413) may have higher variability in displacement and lower cost savings.

Projects with liquid delivered fuels such as oil (33%, 137 of 413), propane (27%, 110 of 413), and/or kerosene (3%, 12 of 413) had relatively consistent fuel displacement (about 92 MMBtu annually), similar to what was estimated in the EmPCalc files (96% realization rate). Paired with winter 2022-2023 delivered fuel costs, the annual savings for these three fuel types for households that installed new Pilot Program equipment were all above $1,000 per year.

Recommendation: Consider prioritizing and marketing heat pump technologies to households that use fuel oil, propane, and kerosene for primary heating. Focusing on these fuels will maximize consistent fuel displacement and utility bill savings for the consumer.

NYSERDA Response to Recommendation: Implemented. NYSERDA continues to promote heat pump technologies to households, including LMI, that use fuel oil, propane, and kerosene for primary heating.

Finding: Current incentive mechanisms for needed envelope, weatherization, and ancillary electrification improvements in LMI households are not always sufficient to meet the heat pump eligibility requirements for participation in the Pilot Program.

During surveys and interviews, contractors expressed general satisfaction with the level of incentives offered for ccASHPs, GSHPs, and HPWHs. In addition, although satisfaction with the incentives for ancillary services (such as ductwork or electrical upgrades) was lower than that for heat pumps, contractors noted that if no funding had been available for ancillary services, some projects would not have been completed because this additional work often adds significant costs to heat pump installations (54%, 19 of 35). These costs are partially mitigated by precursor programs to the Pilot Program, such as EmPower+, which provides funding for envelope and weatherization improvements for eligible homes.

Contractors mentioned that their concerns with the ancillary services and envelope incentives are specific to LMI customers (60%, 13 of 22). These contractors said that they do not want to propose work that would result in any out-of-pocket costs for LMI customers and typically the need for ancillary and envelope upgrades in LMI homes can be more extensive than in market-rate housing, and more extensive than what is supported by EmPower+. Although contractors reported that LMI housing stock is generally in poor condition, they also acknowledged that needs vary greatly from home to home—while some homes may only need minor repairs or upgrades with little additional cost, others need significant repairs, which can lead to costs of tens of thousands of dollars before the home is eligible to receive a heat pump (60%, 6 of 10).

While retaining the standards for home envelope needs (to ensure they are “electrification-ready” before heat pumps are installed) can help customers save money and maintain comfort after a heat pump installation, it may be possible to refine the Pilot Program rules to add flexibility, such as increasing funding for homes with more severe issues or adding nuance to the restrictions based on home envelope quality. At the same time, contractors

understand that it can be difficult to establish different rules and different levels of funding for each home in a standardized incentive program.

Recommendation: Consider whether a future program focus is to reach LMI customers whose homes may need only modest improvements to be electrification-ready or to serve all LMI customer homes. If the program is intended to transform all LMI customer homes, then re-examine two key elements to the extent possible:

- Level of incentives both within the Pilot Program and from programs that support the program (EmPower+ and NYS Clean Heat).

- Eligibility requirements (in particular, airtightness) to ensure that those requirements reflect LMI market conditions.

NYSERDA Response to Recommendations: Implemented. NYSERDA continuously assesses the eligibility requirements and incentives available to serve households with particular emphasis on LMI.

Recommendation: Consider developing a single-point-of-contact concierge service to inform interested customers about available incentives (e.g., program, state, and federal) and connect them with contractors who can help implement necessary energy efficiency upgrades and installation of heat pump technologies.

NYSERDA Response to Recommendations: Implemented. Information on energy efficiency and heat pump incentives and programs is available via the Regional Clean Energy Hubs.

4.4 Tagup Case Study (2024)

Starting in 2017, NYSERDA funded a series of Smart Grid and Offshore Wind pilot demonstration projects with Tagup, a software engineering company that uses machine learning and artificial intelligence-based models to optimize operation and maintenance (O&M) of electric grids and wind energy systems by predicting equipment failure. The portfolio of NYSERDA-funded projects with Tagup includes:

- Low-Cost Transformer Modeling,
- Machine Learning Platform for Ratio Transformer Failure Prediction, and
- Survival Modeling for Offshore Wind Prognostics.

Through these projects, NYSERDA invested a total of $1.2 million for two smart grid projects ($918,406) and one offshore wind project ($308,425).[1] The offshore wind project was also supported by Massachusetts Clean Energy Center (MassCEC) and the National Offshore Wind Research and Development Consortium

[1] NYSERDA Salesforce data. November 2022.

(NOWRDC).[2] Tagup provided a total cost share of $1.3 million across both projects.[3] New York utilities Consolidated Edison (Con Ed) and National Grid, and offshore wind developers EDF Renewables and Pattern Energy provided in-kind support (e.g., historical equipment data and user feedback) for the pilot demonstrations.

Summary of Report Findings

Key findings from the Tagup Case Study include[14]

- **Product Development and Commercialization:** Tagup used its NYSERDA/utility pilots to refine and advance its software. Although utilities Consolidated Edison (Con Ed) and National Grid did not adopt Tagup's predictive analytics software after the pilot projects, these pilots led to Tagup's collaboration with an offshore wind developer in the UK, with support from NYSERDA, to pilot its software in an offshore wind project. Tagup then engaged with a Canadian renewable energy company, Pattern Energy, to model equipment failure/faults for onshore wind farms in the U.S. and Canada.

- **Project Continuation/Expansion:** Con Ed and National Grid both reported that their Tagup pilots catalyzed in-house efforts to develop custom predictive analytics. Con Ed reported obtaining approximately $3 million to move forward with its own modeling efforts using predictive analytics. The potential statewide ratepayer benefits could be substantial if New York utilities were to use predictive analytics across their territories.

- **Improved Operational Efficiency:** If Con Ed were to deploy predictive analytics across its service territory, it could realize millions of dollars in operational expenditure (OPEX) savings annually. Additionally, Con Ed's capital expenditure (CAPEX) savings could also be substantial (millions of dollars) if Con Ed deploys predictive analytics across its service territory. Tagup considers OPEX and CAPEX confidential and therefore specific dollar values are not reported here.

- **Improved Reliability:** Annual reliability benefits from predictive analytics were estimated across customer types. Within National Grid, annual reliability benefits are estimated to be up to $1.6 million total for all residential customers, $34 million total for all small commercial and industrial (C&I) customers and $43 million total for all medium and large C&I customers. Within Con Edison territory, the total annual reliability benefit could be nearly $6,700 total across all residential customers, $253,000 total for small C&I customers and $318,000 total across all medium and large C&I customers.

- **Improved Operational Safety:** Transformer failures are safety/liability risks for utilities -- a transformer explosion can seriously injure people or cause other damage. Predictive analytics could help avoid the risk of catastrophic transformer failure.

- **Public + Private Investment:** Tagup received $1.2 million from NYSERDA ($918,406 for Smart Grid and $308,425 for Offshore Wind). During this period, public and private non-NYSERDA investments contributing to Tagup company growth totaled another $8.1 million in investments to support Smart Grid (other investment is not reported for offshore wind).

[2] MassCEC provided cost-share funding.
[3] NYSERDA Salesforce data. November 2022.

4.5 Workforce Development Case Study (2024)

NYSERDA's Workforce Development (WFD) program facilitates the entry of new workers into the clean energy industry and provides the existing clean energy workforce with relevant training and continuing education opportunities. With eight funding opportunities (Program Opportunity Notices, or PONs), WFD supports a variety of workforce training and development projects within the clean energy industry. These PONs fall within two areas:

- **Buildings Operations and Maintenance Partnerships ("Partnerships"), which uses an "industry partnership" approach to promote skill and career development of maintenance and operation workers.** Partnerships projects leverage existing training infrastructure to develop on-the-job training for building operation and maintenance workers that align with clean energy needs. For example, WFD provided a three-day training for building operators at Prestige Management, Inc., a multi-family housing management company in New York City, in partnership with the Association for Energy Affordability. The training covered best practices for building management, the heating systems used in Prestige Management buildings, and the creation of an energy master plan to increase the energy efficiency of buildings.
- **The Talent Pipeline Program ("Talent Pipeline"), which uses a variety of mechanisms to attract and develop workers to meet New York State's clean energy needs.** Projects funded under Talent Pipeline focus on developing the emerging clean energy workforce through internships and subsidized employment, while also improving the existing workforce through various training opportunities. For example, Blocpower, a climate technology startup in Brooklyn, used NYSERDA WFD funding to train existing employees and hire interns to support their work. The firm hires unemployed workers from priority populations.

NYSERDA WFD has provided longstanding support, with over $118 million in funding provided over the period 2018-2025 with substantial investments occurring in the years prior as well.

Summary of Report Findings

Key findings from the WFD Case Study include:[15]

- Through March 31, 2024, **Partnerships projects have trained 5,703 workers** and impacted **3,012 buildings with 585 million square feet**.[16] 42% of Partnerships expenditures to date and 38% of committed funds have gone to disadvantaged communities (DACs).[17]
- The **Talent Pipeline Program has trained 23,943 new and existing workers** through March 31, 2024. About 12% of Talent Pipeline trainees were from priority populations[18] (which include, but are not limited to, low-income individuals) or were involved in a project focusing on disadvantaged communities.

Interviews with organizations that have received WFD funding highlighted several benefits:

- **Economic benefits for trainees** include decreased financial burden; skills development and certification; and career advancement.
- **Economic benefits for the NYS clean energy industry** include an increase in qualified clean energy workers and a stronger clean energy industry.
- **Economic benefits for building managers** include generally improved building operations and maintenance and operating cost savings.
- **Equity benefits** include skills development for disadvantaged workers, and improvements of buildings located in DACs and/or improvements of multifamily housing.

- **Environmental benefits** include increased awareness of environmental issues; anticipated energy efficiency benefits; and indirect environmental benefits from introducing workers to energy efficiency.

4.6 Interconnection Technical Working Group Case Study (2024)

The New York Interconnection Technical Working Group (ITWG) consists of distributed energy resource (DER) project developers, representatives of NY utilities, NYSERDA, and the New York State Department of Public Service (DPS).[19] This group meets regularly to create consensus-based solutions for potentially costly, complex, and time-consuming issues associated with connecting distributed energy resources (DERs) to the electric grid while maintaining grid safety and reliability. NYSERDA has supported this working group with financial resources for technical consultants as well as by serving as Co-Chair of the ITWG alongside DPS. NYSERDA has provided approximately $5 million in Smart Grid R&D funding for the ITWG since 2015.[20] Most of this amount was costs for technical support and studies addressing interconnection issues and development of new standards for the working group, which has carried out its activities with additional investments from the joint utilities and developers.

Per the ITWG's governance documents, its official mission is to "identify, discuss, and resolve technical barriers and challenges associated with the DER interconnection process and the Standardized Interconnection Requirements in New York State in an efficient and effective manner." The group, which first met in 2015, considers the following objectives to be the three main pillars of its work:

- Increasing grid DER hosting capacity[21]
- Reducing grid DER interconnection costs
- Reducing grid DER interconnection timelines

To meet the objectives identified above, the ITWG provides a platform and facilitation process to collaboratively address pressing technical, process, and other relevant issues regarding DER interconnection. Per the ITWG's process, stakeholders from both the developer and utility communities can raise issues they would like to discuss with representatives of each group. These topics are discussed among a small group consisting of the ITWG's co-chairs and the utility and developer liaisons during agenda-setting calls and may be presented to the larger working group if it is determined that there is value in more broadly discussing the topics in question.

Between 2016 and 2022, the ITWG worked on several topics related to the DER interconnection process. Approximately 60% of their time was focused on hosting capacity, with the remainder of the time spent on efforts to reduce the time and/or cost of interconnecting a DER project to the electric grid. A selection of the topics discussed by the ITWG is shown below:

- Anti-islanding protections (direct transfer trip, or DTT)[22]
- Shadow or voltage flicker[23]
- Interconnection hardware equipment costs
- Hosting capacity maps (by providing feedback to the utilities)
- Interactive Online Application Portal (IOAP) (by providing feedback to the utilities)

This case study highlights qualitative and quantitative findings regarding the effectiveness of the ITWG and the potential benefits flowing from the ITWG's efforts, including fostering consensus between DER project

developers and the utilities responsible for approving interconnection requests. It places these findings and the associated analysis against the backdrop of the Climate Leadership and Community Protection Act (Climate Act) signed into law in 2019 for New York State, which mandates the goal of 70 percent renewable energy generation by 2030 and 100% zero-emission electricity by 2040. Information for this case study was collected through interviews with NYSERDA, the DPS, the NY Solar Energy Industry Association (NYSEIA), National Grid, and several DER project developers; review of publicly available interconnection application and approval data provided by DPS (including application and interconnection study timelines as well as interconnection study and project costs); and supplementary research.

Summary of Report Findings

Key findings from the ITWG Case Study include:[24]

- The Interconnection Technical Working Group (ITWG) representatives reported that the ITWG's efforts have led to implementation of advanced technology and process improvements that have allowed more and larger distributed energy resource (DER) projects to be interconnected in New York State.
- Prior to the ITWG, a frequent cause of failed Coordinated Electric System Interconnection Review (CESIR) screenings was the way utilities analyzed voltage flicker. This issue was undertaken through the working group and a flicker analysis model was developed and adopted by the utilities which allowed larger projects to be approved by the utilities (from 2 MW to 5 MW).
- ITWG stakeholders reported that the ITWG's two engineering consultants, whose efforts in the working group are funded by NYSERDA, are "essential" and have been "very active and very helpful in resolving issues."
- Analysis of New York Department of Public Service (DPS) data revealed interconnection cost reductions on a per-kW basis for several utilities and on a per-project basis for one utility.
    - For example, National Grid's solar per-project costs fell from $20,000+ to approximately $8,000 (a 65% decline) while storage per-project costs fell from $20,000+ to approximately $9,000 (a 55% decline). These cost declines are likely the result of ITWG efforts, but they could have also resulted from expected learning and efficiency improvements within utilities that might have happened without the ITWG.
- The ITWG provides a valuable forum for strengthening developer-utility relationships, building shared understanding of interconnection processes, and expanding knowledge regarding interconnection challenges and solutions in New York.
- Knowledge sharing and greater understanding of utility and developer processes has translated to streamlined project design for developers and greater selectivity in the projects they submit for interconnection, thus reducing the risk of backlogs.

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 $111,994,750 or 91% 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 $46,593,247 or 85% of the total approved budget to date, would be included with total NYSERDA commitments. NYSERDA anticipates attrition over time.

[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 Q4 2024.

[13] The final study will be posted Q4 2024.

[14] The final study will be posted Q4 2024.

[15] The final study will be posted Q4 2024.

[16] The numbers of buildings and square footage include where operators have been trained and where they will be trained through the program based on contracted projects.

[17] Disadvantaged communities meet criteria established by the Climate Justice Working Group under the Climate Leadership and Community Protection Act. An explanation of the criteria is available at https://climate.ny.gov/Resources/Disadvantaged-Communities-Criteria.

[18] NYSERDA defines priority populations as veterans, individuals with disabilities, low-income individuals, incumbent or unemployed fossil fuel workers, previously incarcerated individuals, 16- to 24-year-olds who are enrolled in or have completed a comprehensive work preparedness training program, homeless individuals, and single parents. Definitions for Clean Energy Workforce Development and Training Terminology - NYSERDA

[19] Distributed energy resources (DERs) are defined as energy generation units that are located on the consumer's side of the electric meter. DERs can include solar photovoltaic (PV) arrays, wind power generating units, battery energy storage systems, and electric vehicles (EVs). Note that an energy-consuming unit, such as an EV, may be considered a DER if it offers flexible load control options and/or the ability to export power back to the grid under certain conditions. Some, but not all, DERs

generate renewable energy. DERs can range in size from small rooftop solar arrays (less than about 10 kW) to large multi-MW installations owned and operated by private operators.

[20] The $5 million includes annual funding of $50,000 for consultants EPRI and Pterra.

[21] "Hosting capacity" is defined as the amount of new production or consumption that can be connected to the grid without endangering the reliability or voltage quality for electric utility customers.

[22] Anti-islanding protections are measures designed to prevent an energized DER from unsafely back-feeding power to the grid during a power outage or other critical event, or from asynchronously reconnecting to the grid upon power being restored. Direct transfer trip (DTT) is a technology that prevents unsafe islanding conditions by automatically disconnecting a DER when a fault (an abnormal electrical current) is detected on a circuit and reconnecting the DER synchronously ("in sync") with the grid's operating frequency when it is safe to do so.

[23] Voltage variations that can arise from some DER projects and negatively impact power quality.

[24] The final study will be posted Q4 2024.

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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