Clean Energy Fund Quarterly Performance Report through June 30, 2022

Final Report | August 2022

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

Clean Energy Fund Quarterly Performance Report through June 30, 2022

August 29, 2022	Original Issue	

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Final Report

Prepared by:

New York State Energy Research and Development Authority

Albany, NY

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

- Market Development (MD)
- Innovation and Research (I&R)
- 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 I&R portfolios through June 30, 2022 (Figure 3). The September 9, 2021, PSC Order requires quarterly reporting for the MD and I&R 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 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 coincide 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, as noted in section 3 of this report, is expected to commence reporting summarized quarterly metrics in Q3 2022. Quarterly reporting for NY Green Bank is similarly provided within NYSERDA's quarterly scorecard and the CED, but also within a separately filed report.[3]

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1 Clean Energy Fund Performance Overview

The Clean Energy Fund (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.[4] The Climate Leadership and Community Protection Act (Climate Act), signed July 2019 and effective January 1, 2020, adopted this energy efficiency target and 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[5]
- 6,000 MW of Solar by 2025
- 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.

1.1 Progress toward Aggregate Clean Energy Fund Goals

Figures 1 and 2 present a comprehensive picture of progress against the CEF authorized budget and associated benefit targets reflecting all four CEF Portfolios (MD, I&R, NY-Sun, and NY Green Bank). Progress shown against each key performance metric represents results through June 30, 2022, and nets out overlap across portfolios where it is known to occur.

Figure 1 captures the status of CEF funding while Figure 2 depicts progress of the combined portfolios against the latest CEF ordered benefit targets. The summary of benefit progress reflects evaluated totals, incorporating verified gross acquired savings where evaluations have been completed and reflects gross savings values elsewhere. Indirect benefits from market transformation are included in acquired totals where they have been quantified through evaluation. Indirect benefits are also included in remaining plans, discounted by 50 percent, consistent with other plan filings to account for uncertainty in timing and potential overlap across the portfolio that has yet to be fully evaluated. Both figures should be viewed together to properly relate investments to results. In each of these visuals, combining expended/acquired with committed results demonstrates NYSERDA's progress toward CEF Targets, while adding in the remaining expected (planned) values serves to illustrate the full potential in NYSERDA's programmed portfolios.

Figure 1. Clean Energy Fund Portfolio Expected Investment versus Targets

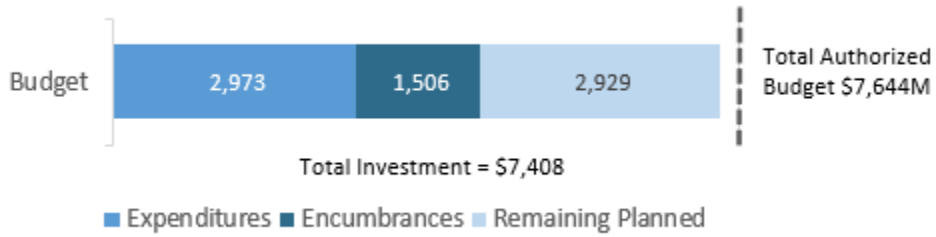


Figure 1 Supporting data		Total Authorized Budget	Budget Approved		Expended Funds		Encumbered Funds		Remaining Planned		Funding Not Yet Approved
			Current Total	% of Authorized	Current Total	% of Authorized	Current Total	% of Authorized	Total Balance	% of Authorized	
Market Development (MD)	Program Funds	$ 2,399.7 M	$ 2,315.7 M	98%	$ 876.3 M	37%	$ 637.9 M	27%	$ 801.5 M	34%	$ 57.0 M
	NYS Cost Recovery Fee		$ 27.0 M		$ 11.5 M		$ 0.0 M		$ 15.5 M		
Innovation & Research (IR)	Program Funds	$ 631.7 M	$ 504.3 M	81%	$ 173.8 M	28%	$ 138.5 M	22%	$ 192.0 M	31%	$ 121.6 M
	NYS Cost Recovery Fee		$ 5.7 M		$ 2.1 M		$ 0.0 M		$ 3.6 M		
MD and IR combined	Administration	$ 274.4 M	$ 255.5 M	93%	$ 151.9 M	55%	$ 0.0 M	0%	$ 103.6 M	38%	$ 18.9 M
	Evaluation	$ 124.2 M	$ 85.5 M	69%	$ 20.8 M	17%	$ 19.5 M	16%	$ 45.1 M	36%	$ 38.7 M
	MD and IR Total	**$ 3,430.0 M**	**$ 3,193.7 M**	**93%**	**$ 1,236.3 M**	**36%**	**$ 796.0 M**	**23%**	**$ 1,161.4 M**	**36%**	**$ 236.3 M**
NY-Sun	Program Funds	$ 3,162.8 M	$ 3,162.8 M	100%	$ 762.6 M	24%	$ 708.0 M	22%	$ 1,692.2 M	54%	$ 0.0 M
	NYS Cost Recovery Fee	$ 41.8 M	$ 41.8 M	100%	$ 7.2 M	17%	$ 0.0 M	0%	$ 34.6 M	83%	$ 0.0 M
	Administration	$ 58.8 M	$ 58.8 M	100%	$ 19.3 M	33%	$ 0.2 M	0%	$ 39.3 M	67%	$ 0.0 M
	Evaluation	$ 3.5 M	$ 3.5 M	100%	$ 0.5 M	13%	$ 1.5 M	44%	$ 1.5 M	43%	$ 0.0 M
	NY-Sun Total	**$ 3,266.8 M**	**$ 3,266.8 M**	100%	**$ 789.5 M**	**24%**	**$ 709.7 M**	**22%**	**$ 1,767.6 M**	**54%**	$ 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**	**$ 7,407.6 M**	**97%**	**$ 2,972.9 M**	**39%**	**$ 1,505.6 M**	**20%**	**$ 2,929.1 M**	**38%**	**$ 236.3 M**

- Authorized Funding per Order Approving Clean Energy Fund Modifications, issued and effective September 9, 2021 and inclusive of the approved of 10GW Distributed Solar Roadmap in April 2022.
- NY Sun totals shown here exclude $643 million in non-CEF NYSERDA funded solar projects.

Figure 2. Clean Energy Fund Portfolio Expected Benefits Versus Targets

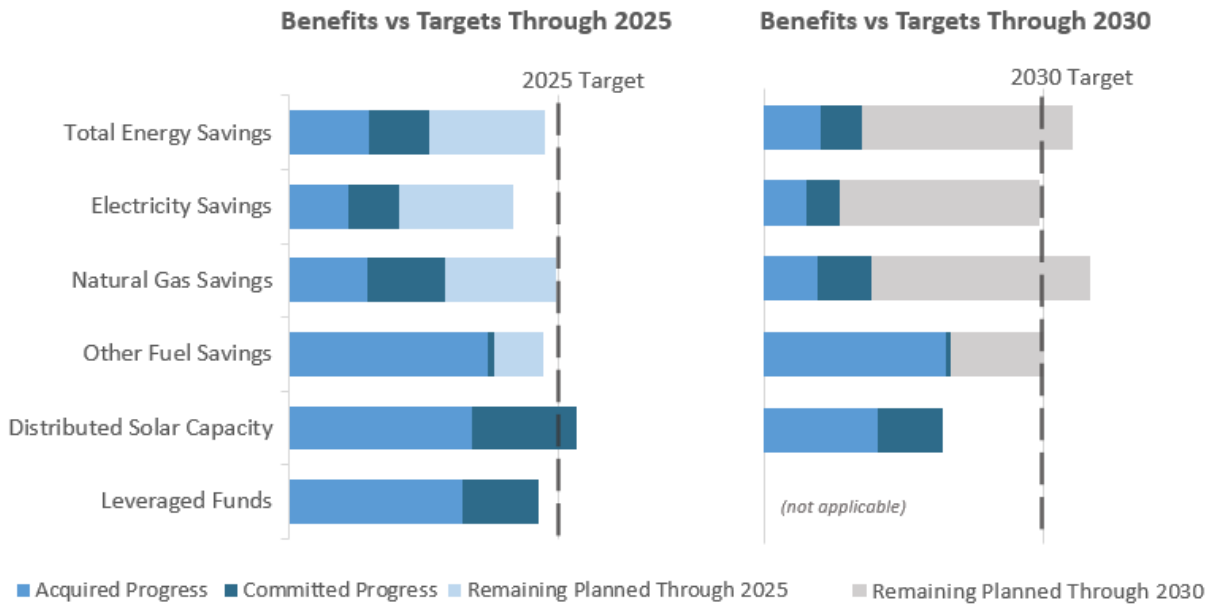


Figure 2 Supporting Data	Acquired Progress	Committed Progress	Remaining Planned Through 2025	Total Expected Through 2025	2025 Order Target	Remaining Planned Through 2030	Total Expected Through 2030	2030 Order Target
Total Energy Savings (MMBtu equivalent, millions)	15.9	11.7	22.7	50.3	53.0	59.9	87.5	79.0
Electricity Savings (MWh, millions)	1.5	1.2	2.8	5.6	6.7	7.1	9.9	10.0
Natural Gas Savings (MMBtu, millions)	7.3	7.2	10.2	24.8	25.0	29.9	44.5	38.0
Other Fuels Savings (MMBtu, millions)	11.1	0.3	2.7	14.1	15.0	5.6	17.1	17.0
Distributed Solar Capacity (Renewable MW)	4,087	2,305	-	6,392	6,000	-	6,392	10,000
Leveraged Funds ($ millions)	$12,911	$5,613	-	$18,524	$20,000	$772	$19,297	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)	27.6	→	55%	52%		32%	35%
Electricity Savings (MWh, millions)	2.7		49%	41%		28%	27%
Natural Gas Savings (MMBtu, millions)	14.5		59%	58%		33%	38%
Other Fuels Savings (MMBtu, millions)	11.4		81%	76%		67%	67%
Distributed Solar Capacity (Renewable MW)	6,392		100%	107%		100%	64%
Leveraged Funds ($ millions)	$18,524		100%	93%		96%	n/a

Table notes are on the next page

- Energy savings values are annual; Total Energy Savings measures the combined Electricity and Fuel savings net of usage; therefore, values will not sum to the total of individual electric and fuel savings values.
- CEF initiatives not dedicated to building energy efficiency (Electric Vehicles - Rebate, Combined Heat and Power, and Fuel Cells) have been excluded from progress and plans toward the first four energy saving targets shown above.
- Overlap where it is known or perceived to exist between portfolios has been removed from progress reported.
- Since the CEF launched in 2016 NYSERDA has maintained a single MMBtu Fuel Savings plan to forecast and measure performance for all fuel types. With the September 2021 CEF Order revision, NYSERDA is now required to break out reporting (and subsequently planning) of fuel savings for both natural gas and all other fuels (grouped). Until this planning can be fully implemented in each individual plan through NYSERDA's annual reforecast process that culminates in a filing of the Compiled Investment Plans, November 1, 2022, NYSERDA will estimate the plans for these two distinct fuel groups at the portfolio level for performance management and reporting purposes.
- Distributed Solar Capacity includes 1,011 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 $1,895 million acquired and $133M committed, consistent with overall reporting towards CEF distributed solar targets which include all solar statewide.
- Leveraged Funds Total Expected benefits values do not currently include any anticipated indirect impacts.
- Neither Distributed Solar or Leveraged Funds Total Expected Through 2025 and 2030 values include forward-looking estimates from NY Sun or NY Green Bank portfolios at this time.
- Benefits metrics that have not been given 2030 Targets in the Order are shown as "not applicable."

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

- Total Energy Savings (MMBtu equivalent) is a measure of NYSERDA effectiveness in building and delivering site energy efficiency savings, primarily through the combined MD/I&R portfolios, to meet the expected contribution toward overall NE:NY goals. Unlike the individual energy savings goals, this metric accounts for both savings and usage in the overall pursuit for net impact. NYSERDA maintains confidence in the ability of the CEF portfolio of initiatives to deliver the overall impact outlined by CEF 2030 Targets; however, the updated forecast of all MD/I&R initiatives illustrates NYSERDA's expectation that the delivery of benefits will continue to be impacted by current challenges facing the clean energy market today, specifically challenges with supply chain, skilled labor availability, and rising construction costs, all of which are delaying or slowing projects and contributing to NYSERDA's lower outlook for the 2025 timeframe. NYSERDA will continue to counter-balance this outcome with active and adaptive portfolio management, as well as new evaluations to quantify expected large amounts of indirect benefits that may not have been fully accounted for in its investment plans.
- Electricity savings MWh acquired and committed total has lagged the pace of fuel savings and the 2025 target but is still expected to reach the threshold established for 2030.
- Fuel Savings continues to show strong momentum to deliver on both 2025 and 2030 targets, of which significant savings are already considered acquired in the portfolio.

- Renewable energy capacity MW is dominated by NY-Sun contributions, which began in 2014 and is performing exceedingly well against the 2025 target, on a trajectory to achieve the target early. The portfolio is well positioned to achieve the new 2030 target of 10GW.
- Leveraged funding acquired and committed progress is outpacing other metrics due to some strong Innovation & Research returns through Q2 of 2022. The longer-term outlook for leveraged funding planned is expected to improve further over time as indirect impacts are better understood and incorporated.

The September 2021 CEF Order also included a target regarding equity for disadvantaged communities, specifically that 40 percent of the benefits of CEF investments would accrue to disadvantaged communities. At this time, NYSERDA is working along with other State agencies and stakeholders, including the Climate Justice Working Group, to establish a benefits/metrics framework and reporting system for the Climate Act disadvantaged community mandate. NYSERDA will follow and maintain consistency with this State-level framework for its reporting on the status of CEF investments and will begin including information on this CEF target once the framework is finalized and State-level reporting begins, which is slated for the coming year.

Additionally, NYSERDA is required to track and report other reference metrics outlined in Appendix C of the CEF Order. Carbon emissions reductions and bill savings 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)	4.4	2.5	6.8	9.0	14.0
Participant Bill Savings ($ millions)	$905	$612	$1,517	n/a	n/a

- Presentation of these metrics in Q2 2022 has been updated to reflect all the same inclusions/exclusions applied to Figures 1 and 2 above.
- Overlap where known or perceived between the four CEF portfolios and their reported benefits have been removed from these totals consistent with all other aggregate views of CEF reported progress in Figures 1 and 2.

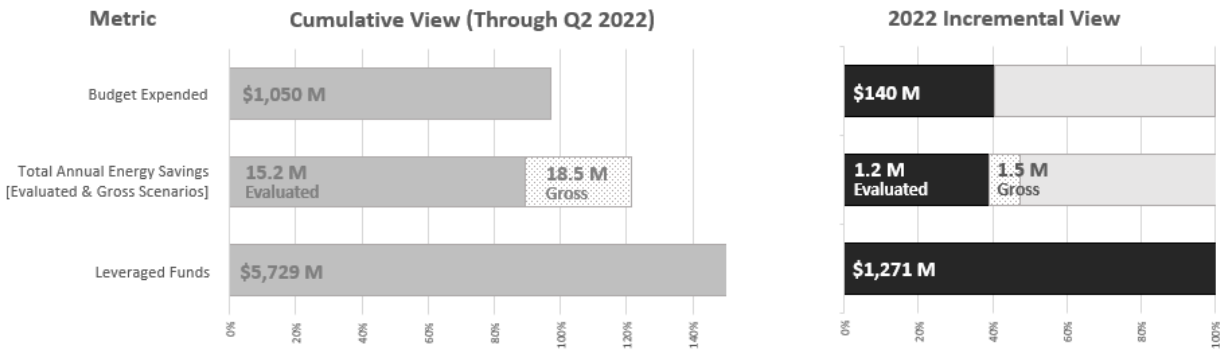
2 Market Development and Innovation & Research Performance

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 effort is now underway in preparation for the November 1 annual filing of CEF plans within the Compiled Investment Plans (CIP). Cumulative performance against currently approved plans remains the ultimate measure of success for delivering on the CEF benefits targets; however, NYSERDA also monitors incremental progress toward the current year goal to provide another viewpoint from which to assess performance, including how quickly funds are put to work in the market based on near-term expectations. Both cumulative and incremental values can be reviewed in granular detail for the portfolio and for each program and metric within the Clean Energy Dashboard. 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, as prescribed in the CEF Order. This update was a combination of the reforecast described above, an update to NYSERDA's contributing initiatives for the Statewide LMI Implementation Plan, and few other recent updates to MD/I&R initiative plans. NYSERDA will continue to make periodic CIP filings as initiatives require plan updates.

Figure 3 provides a high-level view of NYSERDA's MD and I&R portfolio performance to plan, measuring progress toward expended funding and acquired direct benefit plans through Q2 2022. These plans reflect the May 20 filing. Key points to interpret this figure include:

- The Cumulative View (through Q2 2022) represents years 2016–2021, plus two quarters of 2022; 100 percent in this view represents the cumulative *planned* amounts for that pro-rated timeframe.
- The 2022 Incremental View represents progress made in the current calendar year against the current calendar year plan, with an expectation that approximately 50 percent of the plan should be achieved at the end of the second quarter based on a simple assumption of linear progress during the year. There is no prorating by quarter in this view of performance. Note that the incremental goal for the current year reflects any under or over-performance to plan reported in Q4 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 I&R 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



A variety of performance trends have emerged this quarter, in large part reflecting the evaluated savings totals as studies conclude. Evaluation results from seven new studies have been incorporated this quarter, with measurement and verification continuing to further reduce the gross energy savings reported for the portfolio in aggregate. Some of the lower savings is likely attributable to delays impacting the construction market broadly, and this will be further understood through continuing study efforts. Several of the evaluation studies have follow-on analysis for subsequent years (more mature CEF operations) and NYSERDA anticipates realization rates will improve and close much of the gap noted above. NYSERDA will incorporate these Verified Gross Savings data into the forecast for the remaining program years that will be filed November 1, 2022.

Budget expenditures in 2022 continue to lag slightly behind the plan for the year. After careful review, NYSERDA maintains confidence that the majority of the expenditure gap currently present through Q2 will be eliminated by year end, though a few initiatives have noted challenges with advancing projects to completion and are expecting those delays to push expenditures into 2023.

NYSERDA acquired a sharp increase in leveraged funds in Q2 from the opening of a new Silicon-Carbide chip manufacturing facility, which was supported by the Power Electronics Manufacturing Consortium initiative.

As NYSERDA noted during the 2021 CEF review conducted by the PSC, strengthening the processes and tools used to effectively manage the portfolio has been a key focus of the organization. NYSERDA has taken steps to improve both process and tools, refining the focus of quarterly performance discussions and bolstering the annual planning process used to set expectations for the immediate year ahead as well as the longer-term view of individual initiative and collective portfolio goals. A more detailed assessment of the portfolio's top programs with energy saving impact can be found in the following section.

2.1 Top Energy Impact Initiative Performance Summary

In NYSERDA's MD portfolio, 15 key initiatives currently account for approximately 89 percent of the expected total energy saving benefits (represented by equivalent annual MMBtu) and 46 percent of the total approved budget. These initiatives warrant special attention due to the weight they carry in terms of the overall success of the CEF in delivering expected benefits and are characterized in greater detail in Table 2 that follows.

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

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

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
1	Energy Management Technology	98%	Gross: Evaluated:	82% 22%	Progress of expenditures continues to align well with plan through the first half of 2022. Gross energy savings progress is moderately under plan through Q2 as funding is expended 12-18 months prior to gross savings being acquired; the plan will be adjusted to better reflect the real lag being observed on projects. Acquired savings are not reported until the program collects full baseline data, with data collection efforts ongoing for all projects. A verified gross savings analysis significantly reduced energy performance from the gross values reported. A notable amount of this reduction is due to delayed installation of capital improvement measures and a longer-than-anticipated timeline for measure installations. An update to this study is underway to reassess performance.
2	Building Operations and Maintenance Partnerships	87%	Gross: Evaluated:	83% n/a	Progress of expenditures and benefits is lagging slightly behind plan through Q2. No new proposals were received by this quarter's due date, and no proposals approved in past quarters were signed by awardees (two projects remain out for signature). Covid-related project delays have continued with no projects completing this quarter. Seven projects are expected to be completed in Q3 2022.

Table 2 continued

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
3	Product and Appliance Standards	60%	Gross: Evaluated:	n/a n/a	Legislation to advance appliance standards in NYS was passed by the Legislature in June and signed by the Governor in July. NYSERDA's core work to implement standards by 1/1/23 is on track, despite a shortened implementation timeline. Commitments and expenditures will ramp up in the 2nd half of the year as the program is created and rolled out. Given the late date of passage and current resource levels, NYSERDA anticipates expenditures for 2022 will not reach the original plan. Specifically, compliance will not start until 2023, so expenditures in that area will be delayed. This initiative plan consists of indirect benefits only which will be reported in the future as measured by evaluation studies.
4	Electric Vehicles - Rebate	100%	Gross: Evaluated:	100% 66%	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 evaluation study to quantify indirect benefits of this program on additional EV sales will be completed and reflected in NYSERDA reporting soon.
5	Technical Services	104%	Gross: Evaluated:	163% n/a	The program is performing well on both budget and energy benefits. NYSERDA continues to see strong participation from each commercial, industrial, multifamily, and agriculture sectors served.
6	LMI Multifamily	84%	Gross: Evaluated:	69% 59%	There have been delays in acquiring energy savings due to construction delays in the Multifamily Performance Program and contract delays in the Direct Injection Program. Construction delays are largely caused by building owners deprioritizing energy efficiency retrofits as they face competing priorities and assess additional funding options. Construction costs have also increased causing projects to slow down or reduce scope. Technical Assistance has also had relatively low intake of projects resulting in reduced acquired savings to date. The lag behind energy and budget performance is expected as early expenditures support scope of work development, but savings are not acquired until construction is complete.
7	Industrial Transition	98%	Gross: Evaluated:	104% 98%	The program is performing well on both budget and energy benefits, noting that NYSERDA anticipates some level of attrition over time as open projects move to closure - either completion or cancellation. Prior gross savings analysis confirmed the energy performance of this program with a strong realization rate; a final assessment of performance is in scoping now.

Table 2 continued

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
8	Market Challenges	104%	Gross: Evaluated:	0% n/a	Progress of expenditures continues to perform well against the plan. To-date, all spending has been toward engineering studies, which do not claim energy benefits. Demonstration projects for C&I Carbon Challenge are anticipating expenditures and acquiring benefits later this year. Funding was added to the Empire Building Challenge in the recent Compiled Investment Plan (CIP) filing which will support a broader set of market stakeholders who will replicate and build upon the retrofit strategies for large buildings that are emerging from the initiative. The first projects funded under the Empire Building Challenge are in the very initial stages of implementation, and benefits are not expected to be acquired until 2024 at the earliest.
9	Energy Management Practices	94%	Gross: Evaluated:	104% 114%	Progress of budget expenditures and energy benefits continues to perform well through the first half of 2022. A verified gross savings analysis has confirmed the energy performance of this program with a strong realization rate. Ongoing evaluation studies will continue to analyze initiative performance.
10	Clean Energy Communities	114%	Gross: Evaluated:	140% 55%	Progress of expenditures and gross benefits reported continue trending favorably to plan through the first half of 2022. A verified gross savings analysis has reduced energy performance from the gross values reported. In large part, this reduction is attributed to time lag in full implementation of certain high impact actions including benchmarking. An update to this study is planned to in the near future to reassess performance. In addition, an evaluation study to quantify indirect benefits of this program will be completed and reflected in NYSERDA reporting soon.
11	New Construction - Market Rate	78%	Gross: Evaluated:	85% n/a	The program is on pace to exceed projections on new commitments for both open enrollment programs and our competitive programs. Both of the large competitive programs, Carbon Neutral Community for Economic Development and Buildings of Excellence, received extremely large response from the market and staff expectation is to be able to easily fully commit both programs in Q4. Supply chain issues and broader economic issues continue to hamper new construction market activity, materializing in the reported lag against plan for both expenditures and energy savings through Q2. A robust review of projects under contract was completed and high-risk projects unlikely to advance were closed. The remaining projects are expected to advance, but at a slower and rather unpredictable rate due the challenges noted above and other variables such as financial deal closings, code reviews and approvals, etc. NYSERDA expects single-family new construction evaluation results to be published in Q3 2022.

Table 2 continued

MMBtu Impact Rank	Initiative	Cumulative Progress (% Performance To Plan) Budget %	Savings Type	Energy %	Progress Narrative
12	P-12 Schools	106%	Gross: Evaluated:	221% 186%	Progress of budget expenditures and energy benefits continues its favorable trajectory early in 2022. A verified gross savings analysis has reduced electric energy performance from the gross savings values reported. This reduction is due, in large part, to the fact that this early evaluation covered installations over one to two years and the COVID-19 pandemic diverted participants' attention to safety and compliance with new health regulations. Realization rates for fuels will continue to be examined in the context of overarching program goals.
13	RetrofitNY - LMI	64%	Gross: Evaluated:	0% n/a	The first pilot project from round 1 is 95% complete, while the other two remain at the financing stage. One of these projects is being rebid due to substantial increases in development costs relative to those provided during design stage. Two pilot projects proceeded through design but construction cost increases (labor, in particular) proved to be major barriers to projects proceeding with carbon neutral scope. Despite pilot project attribution, the RetrofitNY initiative continues to entice new technologies and solution providers to the carbon neutral retrofit opportunity space. A recent NextGen HVAC challenge received 18 total concept proposals with 12 advancing to proposal stage.
14	Codes and Standards for Carbon Neutral Buildings	88%	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 will be ready on time this fall. Progress of expenditures shows a moderate lag to plan through the first half of 2022 due to delays in contracting for the two pilots and for updated code training offerings. All of those items are moving forward in Q3, but expenditures are anticipated to finish below 2022 plan as result of those delays. Initiative plan and progress to date consist of indirect benefits only, and through the initial study completed, indirect benefits measured exceeded plan for the period of study. An update study is underway and results will be reported soon.
15	REV Campus Challenge	116%	Gross: Evaluated:	100% 218%	Progress of budget expenditures and energy benefits is trending favorably through the first half of 2022. A verified gross savings analysis has confirmed the energy performance of this program with a strong realization rate. The very high realization rate suggests that program methods to account for acquired savings may be overly conservative and will be re-examined during the annual reforecast.

2.2 Quarterly Benefits Progress Versus Plan

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

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

Annual Benefits Metrics	**Evaluated Totals** (verified gross where evaluated; gross where not)								
Market Development Innovation & Research ** Direct Only **	**Planned Incremental Acquired Benefits in Current Year**	**Current Year Acquired Benefits Through Current Quarter**	**Cumulative Acquired Benefits Through Current Quarter**	**Committed Benefits as of Current Quarter** (Committed but not acquired)	**Total Progress as of Current Quarter** (Total Acquired + Committed)	**Total Expected Benefits Through 2025**	**Total Progress as % of Total Expected Benefits Thru 2025**	**Total Expected Benefits Through 2030**	**Total Progress as % of Total Expected Benefits Thru 2030**
Total Energy Savings (MMBtu)	4,608,104	1,243,463	15,190,090	10,895,971	26,086,061	34,387,667	76%	45,020,379	58%
Electricity Savings (MWh)	577,898	169,024	1,450,684	1,468,088	2,918,772	3,738,508	78%	4,519,669	65%
Total Fuel Savings (MMBtu)	3,580,814	880,392	19,207,684	7,554,316	26,762,000	32,166,070	83%	40,181,767	67%
Natural Gas Fuel Savings (MMBtu)	3,174,694	570,500	7,057,671	7,204,604	14,262,275	17,957,597	79%	25,135,691	57%
Other Fuel Savings (MMBtu)	406,120	309,892	12,150,014	349,711	12,499,725	14,208,472	88%	15,046,077	83%
Renewable Energy Generation (MWh)	208,738	12,960	234,628	62,881	297,509	1,269,573	23%	1,272,092	23%
Renewable Energy Capacity (MW)	113	10	515	2	516	1,047	49%	1,051	49%
Total Leveraged Funds ($M)	$937	$1,271	$5,729	$3,031	$8,760	$7,646	115%	$9,532	92%

- Verified savings as a percent of total reported savings varies by metric and includes electricity (59% verified), natural gas (72%), 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.
- As noted earlier in the report, fuel savings are currently only planned at the total fuels level; NYSERDA will be implementing new CEF Order requirements to break out reporting of natural gas and other fuels in 2022 with the annual refiling of plans due November 1.
- NYSERDA makes no claim to the environmental attributes or any New York Generation Attribute Tracking System (NYGATS) certificates that may be associated with these projects.

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

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

Market Development ** Indirect Only **	Cumulative Indirect Benefits Evaluated Through Previous Period	Indirect Benefits Evaluated in Current Reporting Period	Total Indirect Benefits Evaluated Through Current Reporting Period	Total Indirect Benefits Expected Through 2025	Total Indirect Benefits Evaluated as % of Total Expected Through 2025	Total Indirect Benefits Expected Through 2030	Total Indirect Benefits Evaluated as % of Total Expected Through 2030
Total Energy Savings (MMBtu equivalent)	1,011,624	-	1,011,624	18,432,040	5%	48,631,955	2%
Electricity Savings (MWh)	212,749	-	212,749	2,216,883	10%	5,718,747	4%
Total Fuel Savings (MMBtu)	288,215	-	288,215	11,567,144	2%	30,694,228	1%
Natural Gas Fuel Savings (MMBtu)	274,818	-	274,818	6,794,577	4%	19,331,349	1%
Other Fuel Savings (MMBtu)	13,397	-	13,397	4,772,567	0%	11,362,879	0%
Renewable Energy Generation (MWh)	478,683	-	478,683	365,751	131%	497,806	96%
Renewable Energy Capacity (MW)	58	-	58	301	19%	406	14%

- Indirect benefits are reported for the initiatives and specific time periods for which studies have concluded; these impacts will be added over time as additional studies conclude, regularly growing these evaluated totals.
- Cumulative Indirect Benefits Evaluated Through Previous Period reflects the total reported indirect benefits as of the period, but not necessarily all indirect savings anticipated through the reporting period, since additional studies will likely conclude for past periods and add to these overall figures. For the reporting period Q2 2022, no new studies concluded, therefore there are no new benefits reported.
- Indirect plans as represented in the "Total Expected" columns conservatively include only 50 percent of the estimated total indirect benefits from market transformation to avoid overlap in these values and to account for uncertainty associated with the forecasting and measurement of indirect benefits over time.
- Total Indirect Benefits Evaluated Through Current Reporting Period, Total Energy Savings updated to include Energy Usage which is not presented as its own metric on this table. Of reported Electricity Usage, 730 MWh is netted in the Total Energy Savings calculation.
- Indirect leveraged funding will be captured with future assessments.

2.3 Quarterly Budgets Progress Versus Plan

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

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

Market Development Focus Area | Initiative	Current Year Expenditures Plan	Current Year Expenditures Through Current Quarter	Encumbrances as of Current Quarter	Total Progress as of Current Quarter (Expended + Encumbered)	Total Expected Expenditures Through 2025	Total Progress as % of Total Expenditures Through 2025	Total Expected Expenditures Through 2030	Total Progress as % of Total Expenditures Through 2030
Clean Heat & Cooling								
Heat Pumps Phase 1 (2017)	$2,989,859	$1,904,028	$6,495,871	$57,328,895	$57,491,685	100%	$57,491,685	100%
Heat Pumps Phase 2 (2020)	$12,987,944	$5,677,033	$23,101,578	$37,253,750	$44,212,243	84%	$56,985,000	65%
Renewable Heat NY - Clean and Efficient Biomass Heating	$709,001	$373,734	$817,797	$13,424,356	$13,487,000	100%	$13,487,000	100%
Solar Thermal Transition	-	-	-	$287,513	$287,513	100%	$287,513	100%
Clean Heat & Cooling Total	**$16,686,804**	**$7,954,795**	**$30,415,246**	**$108,294,514**	**$115,478,441**	**94%**	**$128,251,198**	**84%**
Codes and Standards, & Other Multisector Initiatives								
Codes and Standards for Carbon Neutral Buildings	$7,275,000	$2,427,289	$9,201,155	$18,009,691	$42,753,020	42%	$57,000,000	32%
Information Products and Brokering	$450,000	$377,562	$1,335,607	$3,008,539	$5,500,000	55%	$5,500,000	55%
Market Characterization & Design Market Development	$7,231,585	$1,380,660	$8,274,614	$21,684,905	$30,219,957	72%	$30,452,510	71%
Product and Appliance Standards	$2,500,000	$549,492	$1,502,843	$2,831,035	$16,798,730	17%	$25,699,000	11%
REV Connect	$1,497,500	$152,495	$2,245,413	$6,378,829	$13,000,000	49%	$13,000,000	49%
Codes and Standards, & Other Multisector Initiatives Total	**$18,954,085**	**$4,887,498**	**$22,559,632**	**$51,912,999**	**$108,271,707**	**48%**	**$131,651,510**	**39%**
Commercial / Industrial / Agriculture								
Advancing Agricultural Energy Technologies	$300,000	-	$1,798,555	$2,089,603	$3,760,000	56%	$3,760,000	56%
Agriculture Transition	-	-	-	$3,598,821	$3,598,821	100%	$3,598,821	100%
Commercial Transition	$1,027,668	$460,480	$1,588,686	$12,534,446	$12,559,148	100%	$12,559,148	100%
Energy Management Practices	$4,124,913	$1,424,180	$8,042,888	$19,487,368	$25,960,538	75%	$28,876,778	67%
Energy Management Technology	$9,811,639	$5,985,438	$36,866,227	$74,211,144	$95,875,191	77%	$108,298,862	69%
Greenhouse Lighting and Systems Engineering	$1,025,928	$531,980	$2,143,810	$5,000,000	$5,000,000	100%	$5,000,000	100%
Industrial Transition	$5,314,928	$2,562,391	$7,112,549	$49,529,701	$55,381,114	89%	$55,381,114	89%
Market Challenges	$6,071,725	$1,557,445	$38,320,190	$49,748,088	$79,318,814	63%	$100,951,538	49%
P-12 Schools	$2,737,914	$667,092	$6,440,757	$11,905,723	$23,659,997	50%	$57,600,000	21%
Pay for Performance	$1,100,000	$130,197	$8,974,995	$10,533,447	$18,053,771	58%	$33,969,049	31%
Real Estate Tenant	$750,000	$636,769	$2,762,369	$15,124,976	$15,798,390	96%	$15,798,390	96%
REV Campus Challenge	$2,550,000	$1,604,698	$7,226,015	$17,835,160	$18,891,070	94%	$21,650,002	82%
Technical Services	$10,506,840	$4,564,842	$36,433,101	$56,298,219	$52,530,609	107%	$71,597,185	79%
Commercial / Industrial / Agriculture Total	**$45,321,555**	**$20,125,512**	**$157,710,142**	**$327,896,696**	**$410,387,463**	**80%**	**$519,040,887**	**63%**
Communities								
Clean Energy Communities	$5,986,360	$2,793,364	$13,339,503	$35,177,217	$52,459,612	67%	$81,271,963	43%
Community Energy Engagement	$195,471	$69,690	-	$4,388,546	$4,407,818	100%	$4,407,818	100%
Communities Total	**$6,181,831**	**$2,863,054**	**$13,339,503**	**$39,565,763**	**$56,867,430**	**70%**	**$85,679,781**	**46%**

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	$35,021	$2,156	$32,865	$212,147	$212,147	100%	$212,147	100%
Heat Pumps Phase 2 (2020)	$3,868,000	$1,415,570	$8,714,711	$13,987,905	$27,198,889	51%	$30,000,000	47%
LMI Multifamily	$14,614,972	$3,016,800	$42,940,366	$65,815,286	$142,036,679	46%	$164,190,126	40%
LMI Outreach & Engagement	$1,984,526	$976,953	$1,713,975	$3,898,276	$7,506,130	52%	$8,467,401	46%
LMI Pilots	$213,166	$298,433	$554,232	$852,665	$1,648,099	52%	$2,443,533	35%
Low Rise New Construction Transition - LMI	$650,000	$93,743	$1,176,485	$7,965,655	$8,120,376	98%	$8,120,376	98%
Multifamily New Construction Transition - LMI	$1,604,821	$351,127	$4,038,333	$8,402,953	$9,070,981	93%	$9,070,981	93%
New Construction - LMI	$7,708,671	$9,181,530	$83,359,956	$99,186,941	$73,507,240	135%	$123,831,362	80%
NYS Healthy Homes Value Based Payment Pilot	$2,149,780	$516,528	$1,573,327	$3,297,737	$9,791,294	34%	$9,791,294	34%
Regional Clean Energy Hubs	$4,652,223	$16,982	$31,256,626	$31,301,448	$32,921,931	95%	$42,000,000	75%
RetrofitNY - LMI	$5,240,869	$284,560	$2,120,351	$6,267,553	$26,110,984	24%	$30,503,499	21%
REVitalize	-	-	-	$291,424	$291,424	100%	$291,424	100%
Single Family - Low Income	$36,462,976	$28,705,431	$9,634,832	$209,714,074	$234,877,453	89%	$235,627,453	89%
Single Family - Moderate Income	$14,107,323	$10,193,748	$3,416,518	$90,941,006	$97,431,002	93%	$97,751,836	93%
Solar for All	$1,300,000	$16,332	$9,098,825	$12,591,047	$8,523,937	148%	$13,011,046	97%
Low-to-Moderate Income Total	**$94,592,348**	**$55,069,893**	**$199,631,402**	**$554,726,117**	**$679,248,566**	**82%**	**$775,312,478**	**72%**
Multifamily Residential								
Energy Management Technology	$1,500,000	$603,634	$3,025,912	$8,670,307	$13,283,522	65%	$14,099,239	61%
Market Challenges	$275,000	$878,464	$4,488,725	$6,017,910	$9,825,000	61%	$10,000,000	60%
Multifamily Low Carbon Pathways	$1,746,532	$113,726	$2,881,590	$3,229,022	$17,224,847	19%	$24,638,016	13%
Multifamily Market Rate Transition	-	-	-	$156,214	$156,214	100%	$156,214	100%
Technical Services	$2,732,647	$673,414	$10,489,040	$12,432,377	$16,241,258	77%	$25,749,999	48%
Multifamily Residential Total	**$6,254,179**	**$2,269,238**	**$20,885,267**	**$30,505,830**	**$56,730,841**	**54%**	**$74,643,468**	**41%**
New Construction								
Commercial New Construction Transition	$1,710,000	$326,171	$6,365,977	$14,671,334	$14,536,566	101%	$15,058,836	97%
Low Rise New Construction Transition - Market Rate	$245,000	$127,384	$373,084	$4,384,866	$4,381,285	100%	$4,381,285	100%
Multifamily New Construction Transition - Market Rate	$145,800	$117,141	$306,046	$1,609,629	$1,626,873	99%	$1,626,873	99%
New Construction - Market Rate	$7,798,401	$1,233,999	$68,414,878	$78,800,590	$82,389,925	96%	$142,150,505	55%
New Construction Total	**$9,899,201**	**$1,804,695**	**$75,459,985**	**$99,466,419**	**$102,934,649**	**97%**	**$163,217,499**	**61%**

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	$2,490,347	$502,128	$9,010,597	$13,705,779	$9,489,197	144%	$13,634,032	101%
Clean Energy Siting and Soft Cost Reduction	$877,461	$162,848	$1,254,378	$2,722,368	$6,598,269	41%	$8,795,000	31%
Combined Heat & Power Transition	$13,543,017	$2,833,087	$22,700,444	$56,749,858	$59,485,543	95%	$59,485,543	95%
Fuel Cells	$2,691,556	$5	$4,412,500	$7,199,144	$8,310,030	87%	$8,310,030	87%
Offshore Wind Master Plan	$5,227	$10,227	-	$4,965,882	$4,965,882	100%	$4,965,882	100%
Offshore Wind Pre-Development Activities	$930,000	$743,130	$342,809	$9,789,462	$9,865,411	99%	$9,865,411	99%
ORES Support	$3,700,000	$282,955	$2,510,482	$4,690,489	$9,000,000	52%	$9,000,000	52%
Reducing Barriers to Distributed Deployment	$1,050,000	$104,521	$3,532,762	$12,753,162	$14,148,714	90%	$15,450,000	83%
Small Wind Transition	$491,098	$230,404	$249,233	$3,572,906	$3,569,207	100%	$3,569,207	100%
Solar Plus Energy Storage	$30,114,500	$4,746,500	$30,649,771	$36,820,771	$40,000,000	92%	$40,000,000	92%
Renewables / Distributed Energy Resources (DER) Total	**$55,893,206**	**$9,615,805**	**$74,662,976**	**$152,969,821**	**$165,432,253**	**92%**	**$173,075,105**	**88%**
Single Family Residential								
Consumer Awareness	$866,454	$305,795	$611,970	$2,803,610	$2,803,610	100%	$2,803,610	100%
Heat Pumps Phase 2 (2020)	$1,865,000	$377,487	$1,592,732	$2,584,000	$11,183,096	23%	$12,000,000	22%
Pay for Performance	$1,360,000	$73,519	$7,733,734	$8,441,316	$11,950,313	71%	$21,787,660	39%
Residential	$8,786,009	$2,288,164	$5,930,276	$15,307,359	$47,713,945	32%	$49,641,366	31%
Single Family Market Rate Transition	-	$12,270	-	$23,528,340	$23,532,771	100%	$23,532,771	100%
Single Family Residential Total	**$12,877,463**	**$3,057,235**	**$15,868,712**	**$52,664,625**	**$97,183,735**	**54%**	**$109,765,407**	**48%**
Transportation								
Electric Vehicles - Rebate	$326,299	$182,623	$135,414	$39,500,000	$39,500,000	100%	$39,500,000	100%
EV Charging and Engagement	$435,000	-	-	-	$7,200,000	0%	$7,200,000	0%
Transportation Total	**$761,299**	**$182,623**	**$135,414**	**$39,500,000**	**$46,700,000**	**85%**	**$46,700,000**	**85%**
Workforce Development								
Building Operations and Maintenance Partnerships	$3,777,416	$792,663	$9,842,339	$18,700,736	$24,026,886	78%	$33,345,000	56%
Talent Pipeline	$10,281,906	$4,987,096	$17,355,754	$37,917,411	$69,077,358	55%	$75,000,000	51%
Workforce Development Total	**$14,059,322**	**$5,779,759**	**$27,198,093**	**$56,618,147**	**$93,104,244**	**61%**	**$108,345,000**	**52%**
NYS Cost Recovery Fee Market Development	$3,142,708	$1,351,325	-	$11,498,415	$22,937,748	50%	$27,006,438	43%
Total Market Development	**$284,624,001**	**$114,961,432**	**$637,866,372**	**$1,525,619,346**	**$1,955,277,077**	**78%**	**$2,342,688,771**	**65%**

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

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

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	$766,666	-	$9,500,000	$9,500,000	$10,000,000	95%	$10,000,000	95%
NextGen Buildings	$6,491,894	$1,444,666	$12,264,515	$19,820,124	$41,811,724	47%	$50,000,000	40%
Buildings Innovation Chapter Total	**$7,258,560**	**$1,444,666**	**$21,764,515**	**$29,320,124**	**$51,811,724**	**57%**	**$60,000,000**	**49%**
Clean Transportation Innovation								
Electric Vehicle Innovation	$2,620,000	$302,214	$3,672,252	$9,184,494	$27,846,503	33%	$31,850,000	29%
Public Transportation and Electrified Rail	$2,700,000	$1,034,039	$6,085,380	$10,477,890	$15,215,890	69%	$18,500,000	57%
Clean Transportation Innovation Total	**$5,320,000**	**$1,336,253**	**$9,757,632**	**$19,662,384**	**$43,062,393**	**46%**	**$50,350,000**	**39%**
Climate Resilience Innovation								
Market Characterization & Design Innovation & Research	$525,815	$39,475	$66,900	$582,727	$1,750,653	33%	$1,750,653	33%
Climate Resilience Innovation Total	**$525,815**	**$39,475**	**$66,900**	**$582,727**	**$1,750,653**	**33%**	**$1,750,653**	**33%**
Energy Focused Environmental Research								
Energy-Related Environmental Research	$6,200,000	$2,294,079	$15,412,984	$35,664,939	$39,806,740	90%	$47,800,000	75%
Energy Focused Environmental Research Total	**$6,200,000**	**$2,294,079**	**$15,412,984**	**$35,664,939**	**$39,806,740**	**90%**	**$47,800,000**	**75%**
Grid Modernization								
Future Grid Performance Challenge	$1,350,000	$3,667,555	$8,633,248	$12,300,803	$29,425,000	42%	$43,000,000	29%
Grid ClimateTech Ready Capital	$140,000	-	-	-	$6,540,000	0%	$9,000,000	0%
High Performing Electric Grid	$7,139,000	$3,304,109	$21,613,176	$54,891,482	$64,800,000	85%	$64,800,000	85%
Power Electronics Manufacturing Consortium	-	-	-	$16,694,490	$16,694,490	100%	$16,694,490	100%
Grid Modernization Chapter Total	**$8,629,000**	**$6,971,664**	**$30,246,424**	**$83,886,775**	**$117,459,490**	**71%**	**$133,494,490**	**63%**
Negative Emissions Technologies								
CarbonTech Development	$128,495	-	$4,875,000	$5,000,000	$5,113,980	98%	$5,113,980	98%
Natural Carbon Solutions	$2,875,000	-	-	-	$11,457,500	0%	$12,500,000	0%
Negative Emissions Technologies Total	**$3,003,495**	**-**	**$4,875,000**	**$5,000,000**	**$16,571,480**	**30%**	**$17,613,980**	**28%**
Renewables Optimization								
Energy Storage Technology and Product Development	$2,046,752	$956,608	$8,224,510	$16,080,459	$33,071,597	49%	$39,500,000	41%
National Offshore Wind Research & Development Consortium	$3,179,988	$3,068,587	$10,586,527	$20,115,466	$22,500,000	89%	$22,500,000	89%
Renewables Optimization Total	**$5,226,740**	**$4,025,195**	**$18,811,037**	**$36,195,925**	**$55,571,597**	**65%**	**$62,000,000**	**58%**
Technology to Market								
CarbonTech Development	$2,054,005	$350,000	$13,621,000	$14,146,000	$14,362,020	98%	$14,362,020	98%
Catalytic Capital for Climatetech	$4,659,439	$2,828,638	$2,252,885	$17,969,264	$19,360,229	93%	$19,360,229	93%
Climatetech Commercialization Support	$6,654,253	$3,105,742	$16,933,114	$42,553,606	$55,106,761	77%	$55,106,761	77%
Climatetech Expertise & Talent	$2,500,374	$1,414,489	$1,492,679	$7,448,795	$12,049,276	62%	$12,049,276	62%
Manufacturing Corps	$1,515,000	$1,122,309	$1,871,239	$13,096,872	$17,000,000	77%	$17,000,000	77%
Novel Business Models and Offerings	$1,590,777	$977,602	$1,426,465	$6,754,937	$13,442,354	50%	$13,442,354	50%
Technology to Market Total	**$18,973,848**	**$9,798,780**	**$37,597,382**	**$101,969,474**	**$131,320,640**	**78%**	**$131,320,640**	**78%**
NYS Cost Recovery Fee Innovation & Research	$615,604	$270,518	-	$2,068,148	$5,220,322	40%	$5,717,956	36%
Total Innovation and Research	**$55,753,062**	**$26,180,630**	**$138,531,874**	**$314,350,496**	**$462,575,039**	**68%**	**$510,047,719**	**62%**

3 NY-Sun Performance

NYSERDA expects to commence quarterly NY-Sun reporting per DPS Reporting Guidance in the third quarter of 2022. NY-Sun will continue reporting progress within each quarterly CEF scorecard filed which can ultimately be assessed in the Clean Energy Dashboard (CED) and associated Open NY data sets.

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 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 2022 Q2 reporting period, nine studies were finalized as presented in Table 7 below. 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 on NYSERDA's website.

Table 7. Evaluations Completed Q2 2022

Evaluated Program	Evaluation type	Evaluated program year(s)
Real Estate Tenant	Impact	2016 Q1 - 2020 Q4
P-12 Schools	Impact	2019 Q2 – 2021 Q2
REV Campus Challenge	Impact	2015 Q4 – 2020 Q1
Energy Management Practices	Impact	2018 Q1 – 2020 Q1
EmPower/Home Performance	Impact	2017 Q1 – 2019 Q1
Clean Transportation Market and Impact Evaluation	Impact and Market	2017 Q1 – 2020 Q4
Heat Pumps Phase 1	Impact	2017 Q1 – 2018 Q4
Residential ccASHP Building Electrification Study	Impact	2020-2021
Clean Energy Communities	Market	2018 Q1 – 2020 Q4

Depending on the research objectives, presentation of report findings and recommendations may vary by study. The status of each NYSERDA recommendation response is categorized as follows:

- Implemented: NYSERDA has incorporated the recommendation into its offering(s)
- Pending: NYSERDA is reviewing the recommendation for consideration
- Rejected: NYSERDA will not be implementing the recommendation

NYSERDA will continue to periodically review and track the status of recommendations from these studies moving forward, particularly for those deemed "pending."

The latest Compiled Investment Plans:

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

Clean Energy Fund Reports:

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

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

4.1 Commercial Tenant Impact Evaluation (Q1 2016 Q1 - Q4 2020)

Summary of Report Findings, Recommendations, and NYSERDA Response to Recommendations.

Key findings and associated recommendations from the Commercial Tenant Impact Evaluation include[11]:

1. Given the program intervention mainly provides audits/recommendations of measures that can be adopted in tenant spaces, the first question to address through the evaluation pertained to how these audits/recommendations were used. The evaluated estimate of the overall Measure Adoption Rate (MAR) for program kWh savings is 54% and for program MMBtu (all fuels) savings is 26%[12]. This is the "peak" of the cumulative MAR for which the evaluation collected sufficient data, through a self-report survey method, to reliably estimate MAR and is the value recommended for NYSERDA use in estimating impacts.
2. The evaluation discovered inaccuracies in some tenants' responses to the MAR Survey, with on-site M&V finding that some of the measures that tenants reported installed were either not installed or were installed at lower numbers than the reported total. The on-site M&V also found that additional spaces had been completed after basic or generic audits. This necessitated a correction factor, or MAR adjustment factor, of 76%.
    a. **Recommendation**: Increase program recognition among participants: Many participants were only aware of contractor names and unaware of program participation, reducing linkage of measure installation as an impact of the program's recommendation.
        - **NYSERDA Response to Recommendation**: Rejected. Program is closed. If NYSERDA should issue a similar program in the future, these will be considered.
    b. **Recommendation**: Participants reported a need to support tenants in implementing measure installation. Further study could identify opportunities for program support.
        - **NYSERDA Response to Recommendation:** Implemented. When eligible, tenants have been referred to relevant incentive programs for implementation of measures.
3. In general, program savings estimates were found to be reasonable estimates of savings. For installed measures in the Commercial Tenant Program, this evaluation found a VGS RR of 96% and 88% for program kWh and MMBTu savings, respectively. The first-year gross savings of 29,391,377 kWh, installed in 51,013,659 square feet of audited space, equates to 0.58 kWh per sq ft.

c. **Recommendation:** Ensure careful examination of hours and load calculations, as well as submitted projects from auditors with known estimation issue histories.

   - **NYSERDA Response to Recommendation:** Implemented: Technical reviewers have been made aware of these issues, as well as auditors.

4. For a subset of impact evaluated tenant spaces for which baseline energy consumption was available, verified gross savings as a percent of standard baseline tenant space electric consumption was found to be 4.8%. Baseline energy consumption was available for tenant spaces representing 25% of estimated savings for recommended measures.
5. In aggregate, the evaluation found that the program is moderately increasing MMBtu usage due to HVAC interactive effects (net increase of 4,014 MMBtu), primarily with lighting upgrades. As a tenant space-focused program, there are limited opportunities to save MMBtu as the major MMBtu-using end uses (heating and water heating) tend to be central systems outside of tenant space control.

   d. **Recommendation:** The program could estimate MMBtu usage increases with a MMBtu/kWh factor from this evaluation.

      - **NYSERDA Response to Recommendation:** Rejected. Given the evaluation confirmed very low opportunity to effectuate MMBtu fuel savings in tenant spaces, and the likelihood that a minor amount of ancillary MMBtu usage may continue to offset any savings, NYSERDA has made a managerial decision not to report/forecast MMBtu savings for this program. The overall effect of this program on MMBtu is not material nor cost-effective to pursue with the degree of precision needed to include in reporting and forecasting of benefits.

4.2 P-12 Schools Impact Evaluation (2019 – Q2 2021)

Summary of Report Findings, Recommendations, and NYSERDA Response to Recommendations.

Key findings and associated recommendations from the P-12 Schools Impact Evaluation include[13]:

1. This evaluation found a VGS RR of 68% and -26% for program kWh and MMBTu savings, respectively. The negative gas savings and associated RR are due to co-mingling of savings with usage due to HVAC interactive effects from lighting measures which represented the majority of the efficiency upgrades installed.[14] The contributing factors to the realization rates are as follows:

- The program is still in its early days and the evaluated savings calculated reflect installations over 1-2 years. The program should expect to see operational assessment measure savings in 5-10 years.
- The COVID-19 pandemic diverted the participants' attention toward safety and compliance with new health regulations, as such, energy efficiency was not a priority.
- Evaluated savings are based on the in-depth interviews and the data available. This method risks that some measures were not captured (potential low savings bias).
- Overall, participants find the program highly valuable in helping to plan capital projects, identify savings opportunities, and monitor progress.

a. **Recommendation:** The program should consider incentivizing schools to report installed energy efficiency projects.

   - **NYSERDA Response to Recommendation:** Rejected. The Program offer is closed. NYSERDA will consider whether funding is available to provide such an incentive in future similar offers.

b. **Recommendation:** The program should acquire permission from the customer and collect two years of pre-participation utility billing data at the time of enrollment.

   - **NYSERDA Response to Recommendation:** Rejected. The Program offer is closed. NYSERDA will consider this in future similar offers.

2. The evaluated savings of 6,934,063 kWh equates to 0.18 kWh/sq.ft. and 39.5 kWh/student. This reflects current progress made by early program adopters since they've had more time to plan and execute projects. The majority of participants are currently planning larger capital projects. Savings from these projects were not captured in this evaluation cycle. The program reported energy savings by estimating energy savings per building for each participating school and district. More than 95% of savings stem from lighting measures. The other 5% consists of HVAC controls (set-points and setbacks), weatherization, and window replacements. For districts and schools for which baseline energy consumption was available, verified gross savings as a percent of standard baseline electric consumption was found to be 2.8%.

   a. **Recommendation:** The program should track operational assessment recommendations to allow for Measure Adoption Rate (MAR) calculations and a more accurate evaluation.

      - **NYSERDA Response to Recommendation:** Implemented. The Program tracks operational assessment results.

   b. **Recommendation:** Evaluations should include participants enrolled for at least two years prior to the impact evaluation.

      - **NYSERDA Response to Recommendation:** Implemented. Program will review participant counts and timeframes with the evaluation team prior to engaging in an evaluation, to ensure that when there is a relevant population to conduct a statistically significant and informative evaluation.

4.3 REV Campus Challenge Impact Evaluation – (Q4 2015 – Q1 2020)

Summary of Report Findings, Recommendations, and NYSERDA Response to Recommendations.

Key findings and associated recommendations from the REV Campus Challenge Impact evaluation include[15]:

1. This evaluation finds a VGS RR of 204% and 230% for program kWh and MMBtu savings, respectively. The contributing factors to the realization rates are as follows:

   - Program reported savings do not have an explicitly defined timeframe and are a function of participation tier, not campus size. Larger projects, a higher level of influence, and a longer evaluation time frame than the program had assumed are likely drivers of the high realization rate.

- Since this was an evaluation of verified gross savings, savings from respondents that did not definitively assert program influence on decisions were still 100% associated with the program (potential high-savings bias).

a. **Recommendation:** The program should consider a per square foot or per baseline energy usage metric to scale program-reported savings more accurately.

- **NYSERDA Response to Recommendation:** Pending. The Program will consider this approach.

b. **Recommendation:** The program should consider acquiring permission from the customer and collecting two years of pre-participation utility billing data at the time of enrollment for campuses where this is feasible.

- **NYSERDA Response to Recommendation:** Pending. The Program anticipates nine additional colleges signing up to join REV Campus Challenge. Given the possible program cost of a change in process and to participation, this action may not be feasible at this time. This recommendation will be considered for future endeavors of a similar nature.

3. For campuses for which baseline energy consumption was available, verified gross savings as a percent of standard baseline was found to be 2.6%, and 1.4% for electric (kWh) and all other fuels (MMBtu), respectively. Evaluated savings are based on in-depth interviews and other available data. This approach presents a risk that some measures were not captured.

a. **Recommendation:** The program should consider incentivizing campuses to report installed energy efficiency measures.

- **NYSERDA Response to Recommendation:** Rejected. The Program does not have available funds to incentive this. This recommendation will be considered for future endeavors of a similar nature.

b. **Recommendation:** The program should consider collecting basic campus information upon sign-up such as baseline energy use, building area, and number of students.

- **NYSERDA Response to Recommendation:** Pending. The Program has historically asked for energy usage information in its annual survey. While useful for qualitative assessment, this data point was not received for a sufficient number of participants and in a manner that would facilitate impact evaluation. The Program will consider collecting this data for the remaining nine members. This recommendation will also be considered for future endeavors of a similar nature.

c. **Recommendation:** Questions focused on energy savings in market research surveys should be developed in tandem with impact evaluators.

- **NYSERDA Response to Recommendation:** Implemented. Current and future evaluations contain more defined and robust teaming and collaboration requirements between Market and Impact evaluators.

d. **Recommendation:** The program should consider adding a benchmarking component (within campuses and/or across campuses) to REV CC.

- **NYSERDA Response to Recommendation:** Rejected. The Program does not have available funds to offer this for free. Benchmarking is currently available as part of an energy study on a cost-shared basis. This recommendation will be considered for future endeavors of a similar nature.

4.4 Energy Management Practices Impact Evaluation (Q1 2018 – Q1 2020)

Summary of Report Findings, Recommendations, and NYSERDA Response to Recommendations.

Key findings from the Energy Management Practices Impact evaluation include[16]:

1. The evaluation estimated a verified gross savings realization rate (VGS RR) of 103% for Strategic Energy Management (SEM) electric savings and 151% for On-site Energy Manager (OsEM_. Together, the evaluation found the verified gross savings realization rate of 125% for the combined Energy Management Practices (EMP) programs. The verified savings relative to baseline were 4.4% for SEM electric impacts and 6.1% for OsEM electric impacts.
   a. The Impact Evaluation Team found that 69% of the sampled SEM (non-Wastewater Energy Coaching) electric savings were included as part of OsEM program savings (representing 39% of the OsEM program electric savings). The savings are likely influenced by OsEM program interventions, based on the timing of the impacts and the measures implemented. However, upon reviewing projects in the pipeline as well as completed projects outside of the sample set, it was discovered that this was an isolated circumstance whose effects will likely diminish over the course of the multi-phase impact evaluation. Therefore, these gross savings were verified for both programs, understanding overlap is not addressed at a program level.
2. The evaluation estimated a VGS RR of 101% for SEM natural gas savings and a VGS RR of 104% for OsEM. Together, the Impact Evaluation Team found the verified gross savings realization rate of 103% for the combined EMP programs. The verified savings relative to baseline was 3.5% for SEM natural gas impacts and 3.4% for OsEM natural gas impacts.
3. Project-level realization rates varied considerably for both programs, but the differences balanced when aggregated. The Impact Evaluation Team reviewed results from similar SEM programs in other jurisdictions and found that the verified savings relative to sites' baselines ranged from 1% to 8% for electric savings and 1% to 7% for natural gas savings. Savings from NYSERDA's SEM program are comparable to these results.
4. The evaluation calculated unit energy benefits (UEB) to assist in the calculation of indirect benefits from the EMP initiative. The UEB is the annual energy savings per end user resulting from implementing SEM and OsEM measures. UEB for SEM was 1.6 GWh and over 7,000 MMBtu. UEB for OsEM was 5.6 GWh and over 18,600 MMBtu.

Key recommendations from the Energy Management Practices Impact Evaluation include:

SEM

While the Impact Evaluation Team found the SEM program's verified gross savings realization rate to be 101%, there was significant variance in the overall project level realization rates. To help reduce variance and potential risk in future projects, the following recommendations are provided.

1. Continue to refine and improve modeling best practices and procedures and use them consistently.
   a. Where possible, identify and track dates (start and end) of any non-routine events (NREs). This may require more frequent model updates during the participation periods. The Impact Evaluation Team identified several potential NREs in the data used for this program. However, site contacts could not identify or pin down these events due to the significant time lapse between the event and this evaluation, so the Impact Evaluation Team did not make any non-routine adjustments (NRAs). It is noteworthy that some of those NREs appeared to have a significant, often negative, impact on the site's energy consumption and verified gross savings values. Had the Implementation Team better tracked and documented NREs, the verified gross savings likely would have been higher.
   b. Include additional energy driver variables where they make sense.
      - Heating degree days (HDD) and cooling degree days (CDD) often are improvements over average temperature. HDD and CDD better model the non-linear effects of heating and cooling systems.
      - Watch for scheduling variables (e.g., holidays) that can make a large impact on model accuracy.
   c. Watch for independent variables that:
      - Extend beyond 10% (or three standard deviations) of the max/min values seen in the baseline period. These values are generally not considered valid in the post-period.[17]
      - Meet statistical thresholds but don't have fundamentally correct underpinnings (e.g., production variables with negative coefficients)
   d. Natural gas and electric models should cover the same periods unless there is a good reason they cannot. The Impact Evaluation Team suggests documenting reasons for different natural gas and electric model periods.
      - The program should claim one year of savings starting after the participants modeling workshop.
      - **NYSERDA Response to Recommendation:** Accepted. In the current SEM program offering, not all participants will be undergoing energy modeling. Further, tracking NREs will not be possible within the scope of the program. However, where possible, the program will continue to refine and improve modeling practices per the specific list of recommendations provided.
2. Some improvements to model tracking and documentation would help improve the evaluation process.
   a. Models kept on file should match the claimed savings – several models were updated, but these models were slightly different than what was provided.

b. Where possible, track dates of large project implementations to explain model slope changes.

- **NYSERDA Response to Recommendation:** Accepted. In the current SEM program, not all participants will be undergoing energy modeling. However, where possible, the program will attempt to improve model tracking and documentation.

3. 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). This cycle's treasure hunts occurred in October and November when the heating and cooling systems were likely to be operating at their lowest levels. The Impact Evaluation Team does not believe this substantially impacted the sites evaluated for this report. These were industrial sites with more uniform energy consumption patterns around production than the weather.

   a. **NYSERDA Response to Recommendation:** Pending. SEM is exploring the possibility of treasure hunts aligned with heating and cooling seasons.

OsEM

Overall, the Impact Evaluation Team found the OsEM program to have a high realization rate. This is partially because the largest projects verified with IPMVP Option C showed significantly more savings at the sites than claimed.

The Impact Evaluation Team has the following recommendation:

1. Although it will add some additional burden on the program participants, the Impact Evaluation Team recommends better data collection on baseline conditions (e.g., leak data), to provide more confidence in results.

- There were many projects lacking documentation of the claimed measure. For instance, several measures included a simple statement indicating the calculation was based off spot measurements, and the only documentation was a comment in the cell stating that's where the value came from. A photograph of the spot metering or short-term meter logging would provide better documentation and higher confidence in the savings. Once the existing conditions have been changed, through leak remediation or system reconfiguration, the baseline conditions are lost and it is nearly impossible to judge the true performance of the measure.

   a. **NYSERDA Response to Recommendation:** Accepted. The program will recommend OsEMs collect comprehensive data on baseline conditions, but will not make it a requirement due to the burden it would put on them.

The Impact Evaluation Team also identified a barrier for On-Site Managers while conducting interviews:

1. Several managers mentioned corporate culture and upper leadership challenges as being primary barriers to success. The Impact Evaluation Team believes these energy managers are experienced with identifying and shepherding energy projects, but some may struggle navigating complex organizational and political structures to get the right buy-in and leadership necessary to move projects through. Several contacts mentioned this was their biggest challenge in their role.

4.5 Residential Retrofit Impact Evaluation (Q1 2017 - Q1 2019)

Summary of Report Findings, Recommendations, and NYSERDA Response to Recommendations.

Key findings from the Residential Retrofit Impact Evaluation include[18]:

1. This evaluation assessed both electric and gas consumption for NYSERDA's three single-family home retrofit programs: EmPower New York (low-income), Assisted Home Performance (moderate-income), and Home Performance (market rate). The impact evaluation team calculated the average home electric savings for the EmPower NY program to be 357 kWh/yr, which results in a realization rate of 62%. The average home electric savings for the Assisted Home Performance program are 238 kWh/yr, which results in a realization rate of 53%, and the average home electric savings for the Home Performance program are 295 kWh/yr, which results in a realization rate of 82%.
2. The average home natural gas savings for EmPower NY are 9.3 MMBtu/yr, which results in a realization rate of 73%. The average home gas savings for the Assisted home Performance program are 11.4 MMBtu/yr, resulting in a realization rate of 66%, and the average home gas savings for the Home Performance program are 5.4 MMBtu/yr, resulting in a realization rate of 45%.

Key recommendations from the study include:

1. **Recommendation:** 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.
    - **NYSERDA Response to Recommendation:** Pending. NYSERDA will release a mini-bid for the next residential retrofit program impact evaluation, including a statewide analysis encompassing the new EmPower+ Program, in Q3 2022. This evaluation study will include a process evaluation.
2. **Recommendation:** 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. Two suggested impact approaches include 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.

- **NYSERDA Response to Recommendation:** Pending. The next evaluation is in the scoping process, and these suggestions are being considered for the methodology.

3. **Recommendation:** 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.
   - **NYSERDA Response to Recommendation:** Pending. NYSERDA will include a delivered fuel analysis in the next impact evaluation.
4. **Recommendation:** 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.
   - **NYSERDA Response to Recommendation:** Pending. NYSERDA is working with utilities to improve the utility data requesting process, which will increase the responses to utility requests. NYSERDA will discuss the number of estimated reads with utilities in preparation for the next residential retrofit evaluation.

4.6 Clean Transportation Market and Impact Evaluation (2022)

Summary of Report Findings, Recommendations, and NYSERDA Response to Recommendations.

This study encompassed three volumes: EV-Rebate Market and Impact Evaluation; EV Innovation and Public Transportation and Electrified Rail Market Characterization Evaluation; and Market-Level and Cross-Cutting Insights. Key findings and associated recommendations from each volume are detailed below.[19]

EV Rebate Program Market and Impact Evaluation

EV Rebate Market Evaluation

The indirect impact analysis took a scenario-based approach to developing an estimate of indirect impacts. Across most scenarios, the program is expected to motivate the purchase of additional, non-rebated vehicles comparable with the numbers projected in the Transportation Focus Area Plan. Projected vehicle counts are combined with the VGS MMBtu estimates from the direct impact analysis to produce overall indirect savings. The CEF Investment Plan indirect impacts forecast represents approximately 260,000 additional vehicles from 2020 through 2030. This evaluation estimates that by 2030 there will be an additional 253,597 vehicles on the road due to program influence, using the assumption that in 2030, 80% of the market will be EVs.[20]

1. **Recommendation:** Update the EV rebate amount and eligibility to better target consumers that are less likely to purchase an EV in absence of significant subsidy. In the near term, consider ways to restrict eligible recipients to further reduce the rebate amount available for EVs with MSRP >$42,000.
    - **NYSERDA Response to Recommendation:** Pending. This recommendation is under review for feasibility of implementation.
2. **Recommendation:** NYSERDA should supplement standard information provided at dealerships, and online, with simple messaging comparing total cost of ownership between the EV and a similar 'average' new vehicle.
    - **NYSERDA Response to Recommendation:** Rejected. There is already a lot of information about electric vehicles. NYSERDA will not add anything novel to the readily available existing materials.
3. **Recommendation:** To improve upon NYSERDA's existing Electric Vehicle Calculator, NYSERDA should advertise this tool to all personal vehicle customers interested in purchasing a new vehicle, not just those explicitly interested in EVs; this may also include building in the opportunity to compare to specific non-EV vehicles. To address concerns about range anxiety, NYSERDA should also include reference to their Electric Vehicle Station Locator tool in their Electric Vehicle Calculator tool.
    - **NYSERDA Response to Recommendation:** Pending. This recommendation is under review for feasibility of implementation.
4. **Recommendation:** NYSERDA should coordinate with ongoing Federal efforts to increase the number of charging stations in geographies where drivers rely on street parking or larger, shared facilities for their "at home" parking, and improve the prominence of charging stations in public spaces. Increasing prominence of charging stations in public places through better signage and location provides an opportunity to inform non-EV drivers of the accessibility of charging stations in their community.
    - **NYSERDA Response to Recommendation:** Pending. This recommendation is under review for feasibility of implementation.

EV Rebate Impact Evaluation

For the EV rebate program, savings were calculated by comparing the efficiency of the rebated vehicle to the efficiency of a counterfactual vehicle that the customer would have purchased in absence of the rebate program. Further, since the VGS assessed both avoided gasoline and an increase in electricity of EVs, the VGS RR (72%) is applied to both gasoline MMBtu savings and kWh usage. The main reason the VGS RR varied from 100% was due to lower vehicle miles traveled as compared to the program assumptions.

1. **Recommendation:** NYSERDA should study future program influence levels to monitor the program influence trend as well as to attempt to better identify reasons behind changes. There was a slight upward trend in vehicle miles traveled (VMT) for vehicles purchased from 2017 through 2019. Year 2020 ended that trend with a decrease that may not be entirely due to COVID-related changes, as participants from all program years responded to the survey at the same time. This may be an anomaly, or the start of a downturn in VMT for participating vehicles. Tracking VMT can help NYSERDA's evaluators to better understand and quantify program influence.

- **NYSERDA Response to Recommendation:** Pending. This will be discussed for the next impact evaluation.

2. **Recommendation:** NYSERDA should include additional VMT questions in future studies, with the objective to determine whether program VMT is changing, why, and in what direction. This may include questions about how the household uses the program vehicle compared to their other vehicles and transportation alternatives.
   - **NYSERDA Response to Recommendation:** Rejected. This recommendation seems unlikely to improve data quality.
3. **Recommendation:** NYSERDA should conduct a persistence study, designed to gauge whether the rebated vehicles are still in New York, can be used to determine what percent of vehicles continue to benefit the state and what percent may have moved out of the jurisdiction. Such a study could consist of a very short survey (do you still own this vehicle, is the vehicle still in the state, how many miles per year) or, if the Department of Motor Vehicles allows it, it may be possible to submit the list of VINs and have the DMV verify whether the vehicle is still active and domiciled in the state. EValuateNY provides counts of EVs by vehicle age and county or other information that can help the evaluation team assess how many vehicles are purchased outside of the program.
   - **NYSERDA Response to Recommendation:** Pending. The program team supports this recommendation, but has not yet discussed how to implement this recommendation.

EV Innovation, Public Transportation, and Electrified Rail Market Characterization

A market evaluation was conducted on the EV Innovation, Public Transportation and Electrified Rail initiatives. The study sought to address key market indicators, such as the prevalence and availability of charging stations; an assessment of smart charging technologies and demonstrations of these technologies; and the investment in and commercialization of electrified transit in the state. Overall, NYSERDA funding was helpful according to most interviewees, and in most cases, grantees reported successful outcomes. However, several non-financial challenges to wider market adoption need to be addressed to improve funding outcomes. Establishing policy and regulation and identifying ways to improve information dissemination were highlighted as priorities for interviewees, areas where financial support cannot bridge the barriers to replication and broader commercialization.

When specifically looking at public charging stations, access to these stations is only available to ~4.6 percent of the average New York urban area's population. Expanding charging infrastructure to improve charging access remains a critical goal for NYSERDA's Clean Transportation Program.

1. **Recommendation:** NYSERDA should determine what role they can play to further support EV Innovation partners. For example, coordination with other actors to address non-financial barriers and disseminate project findings and best practices would support grantees in continuing their important innovation and outreach work after NYSERDA project funding runs out. NYSERDA already provides

some of this support, so if NYSERDA can take on even one additional role (e.g., developing procurement and proposal blueprints for transit agencies) the agency could provide significant additional value to the Clean Transportation EV Innovation Program and Public Transportation and Electrified Rail initiative.

   - **NYSERDA Response to Recommendation:** Pending. This recommendation is being considered on a number of different collaborations.

2. **Recommendation:** NYSERDA should streamline the pipeline of project growth and development by providing support for grantees to help them to move past the "funding cliff," where grantees may find it unclear how or with which funding source a successful project could be continued. This support is particularly needed for business models designed to benefit low-income customers, where the value comes from price subsidization (e.g., car sharing).

   - **NYSERDA Response to Recommendation:** Pending. The Tech to Market Team is working on this.

3. **Recommendation:** In future requests for proposals, NYSERDA should require applicants to submit a plan for data collection and monitoring efforts from stakeholder engagement (who did they engage with the project?) to project outcomes (how many customers were reached by educational outreach or ride-and-drive events?). Improved coordination and data tracking will improve resources for evaluation efforts such as this one, as well as NYSERDA's ability to learn from and evaluate funded project outcomes. For example, understanding how many and what type of customers were reached by engagement and outreach can inform NYSERDA's requirements for future requests for proposals.

   - **NYSERDA Response to Recommendation:** Pending. This will be implemented when the Clean Transportation team releases a new PON.

4. **Recommendation:** NYSERDA should consider a structured approach to fostering coordination between EV Innovation partners and utilities. A structured approach to coordination is especially needed around streamlining interconnection applications, which is important to planning and managing charging station infrastructure expansion.

   - **NYSERDA Response to Recommendation:** Implemented. The Clean Transportation has done this more frequently through their Clean Transportation Prizes than they have in the past.

5. **Recommendation:** NYSERDA should make available third-party planning or technical assistance to provide transit agencies with the help they need to make fleet replacement decisions or optimize routes to meet changing fuel needs. If NYSERDA is able to provide vehicle procurement and technical assistance for transition services for electric fleet operations, it would support transit operators in their planning and enable a faster rate of electric vehicle adoption among resource-limited transit agencies.

   - **NYSERDA Response to Recommendation:** Implemented. The Clean Transportation team has provided this kind of assistance to transit operators often.

4.7 Heat Pump Impact Evaluation (2016-2108)

Summary of Report Findings, Recommendations, and NYSERDA Response to Recommendations.

Key findings from the Heat Pump Impact Evaluation include.[21]

Realization Rates (RR). The Heat Pump Solar Thermal electricity RR is 20%; The Underutilized Products (ASHP) electricity RR is 79%, natural gas is 152%. All fossil fuels are reported as having a RR of 31%.[22]

Evaluated savings correlate with pre-existing system type and use. Phase 1 and Phase 2 results demonstrated that savings are most realized when heat pumps are used as the primary heating equipment. Customers that no longer use pre-existing heating equipment achieved a 40% higher RR than customers continuing to use legacy systems.

Evaluated savings correlate with climate zone. ASHP projects performed significantly better in upstate climate zones 5 and 6 as compared with downstate climate zone 4. Evaluators found that downstate ASHPs operated for fewer heating hours than upstate systems for two primary reasons: 1) higher likelihood of downstate customers using pre-existing heating systems, and 2) smaller conditioned square footage. Heating degree days for downstate customers are lower than for upstate customers, but weather was not as significant a factor as partial displacement frequency, customer usage patterns, and unit oversizing. GSHP projects in climate zone 5 achieved higher MMBtu savings than those in climate zone 6 by 43%.

Customers are adding cooling comfort to their lifestyle. The Phase 1 web survey observed that 25% of spaces with a program heat pump installed were adding cooling to previously uncooled space.23 For the 75% installed in spaces previously cooled with some type of compressor-based system, nearly four in every ten respondents in this study reported that they had decreased their cooling setpoint from the previous system, and the decrease was significant: an average of approximately 6 degrees. This change in temperature is a significant addition of cooling comfort that could reduce energy savings at the meter. Evaluation analysis models presume that setpoint adjustments would have been made to the baseline alternative system as well.

Key conclusions and associated recommendations from the study include:

1. **Evaluated ASHP savings fell short of program-reported estimates.** Program-rebated ASHP installations led to 62% lower evaluated MMBtu savings compared to program-reported values. The key contributors to the 38% RR for ASHPs are summarized in bullets below.
    - **Installed heat pumps provide less heating than assumed by the programs.** The primary driver of the ASHP RR is 56% lower annual heating output than assumed within program savings claims. Phase 2 metered data, extrapolated over a full year and correlated with installed equipment

capacities, led to 565 average annual full-load heating hours across the ASHP population of projects, of which over 99% involved DMSHPs. While the body of heat pump evaluation research is rapidly growing, other DMSHP studies in the Northeast have shown similar findings of approximately 450 annual full-load heating hours.[24] In the context of the current New York TRM heat pump savings algorithm, evaluated ASHP projects demonstrated a sizing ratio of approximately 0.3 on average as compared to a typical whole-home heating load. For GSHPs, evaluators determined weighted average FLHs of 2,325 (per installed capacity) or 2,099 (per tracked Manual J building heating load), whereas the program's savings calculator featured FLHs ranging from 2,230 to 2,604.

- **Contractors use sizing tools, but there is room for improvement.** Rightsizing is a point of emphasis in New York's energy code and heat pump programs. Rightsizing maximizes savings. Installers were found to use fairly standard means of sizing, usually Manual J (63%, including three of the four largest contractors) or manufacturer/industry tools (17%). Others rely on experience, pre-existing equipment size, or other tools. This leaves room for improvements, which could be a point of emphasis in contractor engagement.
- **A single deemed savings value is not appropriate for heat pump installations.** With ASHPs encompassing 90% of the evaluation population, their results had significant impacts on the program-level VGS realization rates. The programs assumed a single deemed savings value per outdoor unit for all ASHP installations, not accounting for unit size, baseline, displacement share, or climate. The programs' ASHP savings claims reflected oil offsets based on whole-home NEEP research, derated to account for displacement vs. replacement projects and an assumed 25% share of electric-to-HP projects. When the participant population consistently deviates from deemed assumptions, such as this program's high proportion of downstate installations and their lower annual heating loads, use of a deemed value contributes to significant variability in evaluation results.
  - **Recommendation:** Reflecting the above four conclusions, ASHP savings claims should be based on site-specific baseline fuel, system type if electric, unit size, location, and expected load displacement relative to size. This study's ductless mini-split heat pump systems results suggest a default displacement factor of 0.3 relative to total building heating load. The current version of the New York TRM[25] provides detailed guidance on estimating heating and cooling loads for partial- and full-displacement installations. Use of either a quasi-prescriptive calculator, or deemed savings options based on displacement fraction, would markedly improve savings estimates. Crucial to the success of this recommendation is contractor training and oversight to ensure that installed systems are right-sized and credibly characterized based on the portions of heating and cooling loads to be satisfied by the heat pumps. Based on the evaluators' review of its program manual, the Clean Heat Program requires administering utilities to abide by the current New York TRM. When an installation is not covered by a prescribed measure in the TRM, the program requires a custom track. [26]
- **Quantifying evaluated impacts by fuel proved difficult.** For all ASHP installations, the programs claimed all fossil fuel savings as oil, limiting the evaluators' ability to expand evaluation results from the sample to the population of projects. Among 86 ASHP projects in the evaluation sample, we found that program-rebated installations led to a diversity of savings by fuel, including natural gas (comprising 29% of total MMBtu savings across all fuels), fuel oils (36%), propane

(18%), and wood (5%). For GSHP installations, the program claimed a broader diversity of fuel-specific savings, though evaluators determined higher shares of natural gas and propane, and lower shares of fuel oils, than claimed.

  - **Recommendation:** Heat pump savings claims should distinguish among different displaced heating fuels as documented by the installation contractor. Fuel-specific impacts are critical for measuring program success versus statewide carbon emissions reduction goals. A single installation might displace more than one heating fuel; therefore, approved contractors should be trained to collect defensible information on pre-existing heating fuel types and shares. When feasible, utility-led programs should leverage historical natural gas consumption data at the participant address to corroborate the tracked estimates for pre-existing natural gas systems.

- **A minority of participating customers would have installed heat pumps regardless of the program.** For 15% of rebated ASHPs, customers indicated via in-person interviews that they would have installed heat pumps regardless of program intervention. Heat pump baselines reduce the achievable savings significantly, as heat pumps can satisfy heating loads much more efficiently than fossil fuel- or resistance-based systems. Due to complexities with establishing the influence of the programs on accelerating the heat pump market in New York, evaluators calculated gross impacts for such ASHP projects by considering the most reasonable, code-compliant fossil fuel-fired system as baseline. Evaluators acknowledge that these predecessor heat pump programs likely included early adopter participants whose decision-making might not be representative of future heat pump program participants.

  - **Recommendation:** For heat pump installations in new construction or end-of-life scenarios, savings should be informed by the customers' preferred alternative systems and fuel choices in the absence of the program. While accounting for program influence will continue to be a challenge, evaluators recommend that future heat pump installations comport with the guidance in the active New York TRM.[27] Eligible Program tracking databases should intake relevant site-specific variables and triangulate the most appropriate baseline against which new construction or end-of-life performance is measured.

- **Evaluators observed a small share of GSHP-to-GSHP installations.** During the evaluation planning process, evaluators identified that an additional 20 GSHP installations in the population involved replacement of existing GSHP systems. These projects were removed from the evaluation sampling frame. The New York TRM currently does not accommodate a GSHP baseline.[28]

  - **Recommendation:** GSHP-to-GSHP replacements should be considered as a prescribed scenario by the New York TRM Committee, as the team expects this to become more common as first generation GSHPs begin to reach their effective useful life. The Clean Heat Program does not appear to accommodate such a baseline, though new construction GSHP projects are required to be submitted through a custom track.

- **A majority of participants continued to use pre-existing HVAC systems.** The Phase 1 web survey found that approximately 75% of program participants continued to use pre-existing heating and cooling systems after heat pump installation. These partial displacement scenarios reduce the achievable savings as demonstrated by lower-than-expected outputs and full-load hours as described above.

- **Recommendation:** Program administrators should consider a tiered incentive approach that rewards full-displacement installations. Training and requiring approved contractors to credibly collect and track this information is crucial to the success of this recommendation.
- **Recommendation:** Programs should reward partial-displacement installations that include integrated controls that manage heat pump use with legacy systems. There may be limitations to the ability of controls on older pre-existing systems that will need to be acknowledged in such an effort. Based on the evaluators' review of its program manual, the Clean Heat Program has established nine installation categories with varying incentive structures and eligibility criteria that distinguish among system types, partial- and full-displacement installations, and inclusion of integrated controls.[29]
- **Recommendation:** Programs should educate eligible contractors and participating customers on the best practices for optimal heat pump usage, particularly for installations that supplement existing heating systems. Heat pump adoption and savings potential rely heavily on customer awareness of heat pump benefits and their ability to satisfy heat loads during extreme winter temperatures. The Clean Heat Program manual recommends continuous contractor training, and its website includes a list of educational resources for participating contractors.[30] It is unclear if or how the program administrators ensure that contractors review such resources.

2. **NYSERDA Response to Recommendations:** The NYS Joint Utilities, implementors of the current NYS Clean Heat Statewide Heat Pump (NYS Clean Heat) Program, and NYSERDA continually collaborate on enacting improvements through the NYS Clean Heat Program the Joint Management Committee. This collaboration includes incorporating lessons learned from NYSERDA's now closed ASHP and GSHP programs as well as implementing adjustments based on learnings from the current running of the NYS Clean Heat Program since its 2020 rollout. A review of the Recommendations made in the Heat Pump Impact Evaluation Final Report will be included in the ongoing collaboration efforts between NYSERDA and the NYS Joint Utilities to act upon where deemed relevant and appropriate.

4.8 Residential ccASHP Building Electrification Impact Evaluation (2020-2021)

Summary of Report Findings, Recommendations, and NYSERDA Response to Recommendations.

In 2020 and 2021, NYSERDA co-funded a cold climate Air Source Heat Pump (ccASHP) impact evaluation with Massachusetts Clean Energy Center and E4TheFuture.

Key findings from this study include[31]:

- Customers are generally very satisfied with ccASHP heating and cooling performance.
- Whole-home systems tend to be utilized more often than primary with backup systems.
- Whole-home systems tended to be more expensive to install than primary with backup systems.
- The overall average seasonal heating performance of 2.34 sCOP is in line with similar studies.
- On average, seasonal heating performance was similar between primary with backup and whole-home applications, but varied significantly by home and system type, influenced by many factors.

- Winter Peak demand impacts of wide-scale ccASHP adoption will likely occur during early morning hours, not during traditional utility peak periods.
- Whole-home applications with electric resistance elements will have the greatest electric grid impact during extreme cold periods.
- Heating season demand impacts will be greater than cooling demand impacts.
- Contractors reported installation costs, aesthetics, customer misconceptions, and building logistics as the top cited barriers to wide-scale ccASHP deployment.
- A customer's existing fuel type is an important factor to cost effectiveness. Natural gas customers will likely see overall utility bills increase by switching to electric ccASHP systems for heating due to the high cost of electricity relative to natural gas in the Northeast.

Key conclusions from this study include:

- Policymakers and utilities involved in the project sought to understand whether study results indicate a recommendation to focus on primary with backup vs. whole-home applications in ASHP programs and policies.
    - However, the study sample size (43 homes) is insufficient to draw statistically significant conclusions, and observations relevant to our research objectives should be considered as directional.
- With regard to the team's research objectives comparing primary with backup and whole- home systems: (1) Comfort differences reported by customers were minimal (2) Observed differences in seasonal heating efficiency were minimal (3) Electrical demand was higher for whole-home systems during cold periods.
- Study data does not suggest there are significant trends that would warrant policy/program decisions encouraging or discouraging whole-home systems based on concerns around customer comfort or system performance.
    - However, the observed difference in electrical grid impacts (particularly in the context of mass market adoption) may be a more important factor for policymakers and utilities to consider for informing policy and programmatic decisions.
- Cold snap periods were warmer and shorter than design conditions and did not reflect periods of prolonged extreme cold that could have greater impacts on customer comfort and grid demand. Further study with a larger sample during such a weather event may provide more definitive conclusions on comfort, performance, and grid impact issues that could influence policymakers and program administrators.

Key program and policy recommendations from this study include:

- **Recommendation**: Incentive levels. Based on the projects metered, most sites will not achieve a payback during the system lifetime based on the incentive received. Incentive levels have since increased substantially for many NY and MA sites, which may enable greater savings.

- **Recommendation**: Energy savings. Electric resistance and propane customers were most likely to see significant energy savings, as well as oil customers in NY. High electricity costs limit energy savings in MA. Utility rate structures (particularly in MA) with lower volumetric costs to reflect higher grid utilization may improve economics, though such structures may be inappropriate in the long term with increasing electrification and winter peak concerns.
    - **NYSERDA Response to Recommendations:** The NYS Joint Utilities, implementors of the current NYS Clean Heat Statewide Heat Pump (NYS Clean Heat) Program, and NYSERDA continually collaborate on enacting improvements to the NYS Clean Heat Program through the Joint Management Committee. This collaboration includes incorporating lessons learned from NYSERDA's now closed ASHP and GSHP programs as well as implementing adjustments based on learnings from the current running of the NYS Clean Heat Program since its 2020 rollout. A review of the Recommendations made in the Residential ccASHP Building Electrification Impact Evaluation will be included in the ongoing collaboration efforts between NYSERDA and the NYS Joint Utilities to act upon, where deemed relevant and appropriate.

4.9 Clean Energy Communities Market Evaluation (2018-2020)

Summary of Report Findings, Recommendations, and NYSERDA Response to Recommendations.

Key findings from the Clean Energy Communities Market Evaluation include: [32]

- **Finding 1:** The program has successfully reached a majority of communities (84%) and has high retention. Communities tend to complete multiple program-defined actions. Yet, small-sized communities are less active in the program and are less likely to say clean energy is a priority.
    - **Recommendation 1:** CEC program staff should consider research to understand whether enhanced support would result in greater program participation among small communities and if so, whether enhanced support could be provided cost-effectively.
        - **NYSERDA Response to Recommendation:** Implemented. The program team concurs with the recommendation to research and understand whether enhanced support would also result in greater participation from small communities at a cost-effective manner.
- **Finding 2:** Between Time 1 and Time 2, approximately 97 communities completed at least one High Impact Action indirectly, which represents 6% of the population. Two-thirds of actions completed indirectly were influenced by the program.
    - **Recommendation 2:** The market evaluation team recommends that NYSERDA continue the CEC program, as a majority of indirect actions are influenced by the program. The team also recommends continuing to measure program influence for indirectly completed actions to ensure the program gets credit for actions it inspired.
        - **NYSERDA Response to Recommendation**: Implemented. The program team will continue the program with an anticipated relaunch in 2023 after seeking feedback from participants, non-participants, and other community stakeholders.

- **Finding 3:** Whether clean energy is a priority for a municipality is not something that program interventions have appreciably influenced, as indicated by the stability of this metric.
    - **Recommendation 3:** The evaluation team recommends that this metric not be tracked, as currently defined, in future evaluation waves. The team does not believe that the lack of movement on this metric reflects an issue with program design or execution.
        - **NYSERDA Response to Recommendation:** Implemented. The program will no longer track the clean energy as a priority metric.

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

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

[5] Governor Hochul proposes expansion of distributed solar target (10GW by 2030) and energy storage target (6GW by 2030), both of which can be referenced in the 2022 State of the State Book https://www.governor.ny.gov/sites/default/files/2022-01/2022StateoftheStateBook.pdf

[6] If solicitations with upcoming due dates were factored into the total NYSERDA commitments in the Market Development Budgets and Spending table, an additional $49,186,593 or 67.5% 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 $73,680,607 or 76.5% of the total approved budget to date, would be included with total NYSERDA commitments.

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

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

[12] In this study, a very small amount of fuel savings were eclipsed by ancillary savings due to interactive effects. Given this finding, and the conclusion that this tenant-based intervention is not in a position to meaningfully impact fuel use in central, common areas, NYSERDA did not apply the MMBtu RR in its reporting and the program will cease reporting MMBtu savings going forward.

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

[14] Given these findings, NYSERDA did not apply the negative MMBtu RR to its reporting.

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

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

[17] Bonneville Power Association - MT&R Guidelines Rev 9.0, Page 18 (https://www.bpa.gov/EE/Policy/IManual/Documents/MTR-Reference-Guide-Rev9.pdf)

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

[19] The final study volumes will be posted on NYSERDA's website soon.

[20] A quantification of the indirect energy impacts from this assessment will be reported in the CEF Q3 2022 report.

[21] Final report will be posted to NYSERDA's website soon.

[22] In its reporting electric RR are applied to both electric savings and electric usage.

[23] The Phase 2 M&V sample showed a higher share of such customers with at least one *system* that cooled a previously uncooled space.

[24] Massachusetts and Rhode Island Electric and Gas Program Administrators. 2016. "Ductless Mini-Split Heat Pump Impact Evaluation." <http://www.ripuc.ri.gov/eventsactions/docket/4755-TRM-DMSHP%20Evaluation%20Report%2012-30-2016.pdf>

[25] New York State Joint Utilities, "New York TRM Version 9," effective January 2022. https://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/72c23decff52920a85257f1100671bdd/$FILE/NYS%20TRM%20V9.pdf

[26] New York State Joint Utilities, "NYS Clean Heat Statewide Heat Pump Program Manual Version 5," October 2021. https://saveenergy.ny.gov/NYScleanheat/assets/pdf/NYS-Clean-Heat-Program-Manual.pdf

[27] NY TRM Version 9, active at the time of this writing and referenced below, states that "The baselines used in [the ASHP] measure are determined by the type of equipment that would have been installed without the influence of the program supporting the installation of this measure."

[28] New York State Joint Utilities, "New York TRM Version 9," effective January 2022. https://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/72c23decff52920a85257f1100671bdd/$FILE/NYS%20TRM%20V9.pdf

[29] New York State Joint Utilities, "NYS Clean Heat Statewide Heat Pump Program Manual Version 5," October 2021. https://saveenergy.ny.gov/NYScleanheat/assets/pdf/NYS-Clean-Heat-Program-Manual.pdf

[30] https://saveenergy.ny.gov/NYScleanheat/resources/

[31] The final study will be posted to NYSERDA's website soon. A companion memo, which presents NYSERDA results in more depth will also be posted to NYSERDA's website soon.

[32] The final study will be posted on NYSERDA's website soon.

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

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New York State Energy Research and Development Authority

17 Columbia Circle
Albany, NY 12203-6399

toll free: 866-NYSERDA
local: 518-862-1090
fax: 518-862-1091

info@nyserda.ny.gov
nyserda.ny.gov