

# **Clean Energy Fund Workforce Development (WFD) Program**

## **Market Assessment and Impact Evaluation**

### **Executive Summary**

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## Notice

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# 1 Executive Summary

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The New York State Energy Research and Development Authority (NYSERDA) created the Workforce Development and Training (WFD) initiative, funded by NYSERDA's Clean Energy Fund, to deliver needed clean energy workforce skills to employers. NYSERDA is currently focusing one of its WFD initiative efforts in the area of building operations and maintenance (O&M) as well as more broadly by creating a workforce pipeline for the clean energy industry. This executive summary documents evaluation findings, conclusions, and recommendations for the two programs that constitute the WFD initiative: the Building O&M (BOM) and Talent Pipeline Programs.

## 1.1 BOM and Talent Pipeline Goals and Objectives

**The BOM Program** helps employers and building owners implement workforce development and training, such as hands-on training, curriculum development, coaching/mentoring, train-the-trainer, and other activities designed to help build the technical skills of O&M staff and reduce facility energy use.

**The Talent Pipeline Program** is designed to create a workforce pipeline to ensure that New York State clean energy businesses have a robust supply of new and existing workers with the requisite skills and experiences. The Clean Energy Fund Investment Plan (referred to as the "IP") notes two main activities for this initiative:

**Expand training infrastructure.** This initiative partners with traditional education providers (e.g., higher education, unions, certification programs, private training providers) to expand their curriculums, career pathway training or other services to meet the needs of clean energy employers.

**Offset costs of hiring and training new workers.** This aspect of the initiative offers wage reimbursement for qualifying interns and new hires in qualifying businesses of the clean energy sector.

The objectives of these activities are to: 1) expand training infrastructure to support the growing and unique needs of the clean energy sector; 2) foster relevant and effective training that can be replicable and sustained after NYSERDA funding; 3) offset or reduce the cost, risk and timeline of hiring and training new workers.

For each program, the IP has established output and outcome metrics to track progress toward the Program's goals over time. The evaluation focused on assessing primarily the outcome metrics, which are metrics of change in the market that the Program is trying to achieve, and direct and indirect impacts.

## 1.2 Summary of Approach

### 1.2.1 BOM and Talent Pipeline Outcome Indicator Assessment

The outcome indicators, which are outlined in the IP and in the findings’ tables below, are assessed by this evaluation. The Evaluation Team reviewed program documentation, such as the program IP and PONs, and acquired program tracking data. Survey instruments were prepared to meet the data collection objectives with input, review, and final approval by NYSERDA staff. Six surveys were deployed, targeting five populations.

1. **BOM participant and non-participant employers/building managers of O&M staff.** These surveys focused on gathering data on BOM outcome metrics as well as assessing building O&M aspects of training and benefits.
2. **BOM participant training providers.** These surveys focused on assessing building O&M training.
3. **Talent Pipeline participant and non-participant clean energy businesses.** Employer surveys focused on current and future staffing needs, the time and expense related to hiring, and their experience with interns and new hires.
4. **Talent Pipeline participant and non-participant training providers.** Trainer surveys focused on inventorying the trainers’ course offerings and training modalities and their experience with the program.
5. **Pipeline Trainees.** Trainee surveys focused on their satisfaction with the Talent Pipeline-funded training and its impact on their knowledge and career.

Table 1-1 summarizes the key metrics of each survey.

**Table 1-1. Primary Data Collection Summary**

Groups	Population (Source)	Target	Number of Completed Surveys	Confidence/Precision	Data Collection Approach
BOM Participants – i.e., their O&M staff received BOM-funded training	~38 + 1 representing 109 school districts (Program Data)	~20 + 42 with school districts	14 + 32 <sup>a</sup> with O&M staff from school districts	85% / 15%	Telephone and web school survey
BOM Non-participants – i.e., no BOM-funded training	~3,300 (TradePress Media list of NY organizations with building O&M staff)	70	72	90% / 10%	Telephone survey
BOM Trainers	~13 (Program Data)	13	8	85% / 15%	Telephone survey
Talent Pipeline Participant Businesses – i.e., received on-the-job	~250 (Program Data)	64	64	90% / 10%	Email, web survey

Groups	Population (Source)	Target	Number of Completed Surveys	Confidence/Precision	Data Collection Approach
(OJT) and/or intern wage reimbursement					
Talent Pipeline Non-participant Cleantech Businesses – i.e., no reimbursement from NYSERDA	~6,000 (DataAxle for business with relevant clean energy NAICs)	66	66	90% / 10%	Mixed-mode: email/web & telephone survey
Talent Pipeline Participant Training Providers – i.e., received funding from NYSERDA	24 (Program Tracking)	18	19	90% / 10%	Mixed-mode: email/online & telephone survey
Talent Pipeline Non-Participant Training Providers – i.e., no funding from NYSERDA	~130 (DataAxle for business with relevant clean energy NAICs)	44	25	90% / 15%	Mixed-mode: email/online & telephone survey
Talent Pipeline Trainees – those who attended NYSERDA-funded training	~400 (Trainer data)	58	26	90% / 15%	Email / online survey

<sup>a</sup> The responses to this survey were summed (or averaged) and counted as responses for one participant since this group was represented under one contract with NYSERDA.

Data was collected from August 2021 through January 2022.

**1.2.2 BOM Impact Evaluation Analysis**

The impact evaluation planned to evaluate the nine projects reported as “Complete” in the Scorecard<sup>1</sup> to determine program impacts. These projects represent about 5% of the WFD savings pipeline including Completed and Encumbered projects. Four additional projects classified as “Encumbered” in the Scorecard (of 44) were intended to provide insights into the “savings fraction” assumption used by Staff to estimate ex ante savings. The savings fraction is the portion of the baseline energy consumption that is expected to be saved due to the program intervention.

However, the impact of COVID was profound, interrupting planned training, changing building occupancy patterns, and refocusing O&M staff from energy efficiency to operating buildings in response to COVID (shutting down operations, increasing ventilation, and managing with reduced staff due to illness, job cuts, and staff attrition). Training extended into the second year of the performance period at

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<sup>1</sup> NYSERDA’s Clean Energy Fund Report (known as the “Scorecard”), reporting through September 30, 2021

most sites and the full benefit of the training may not have been realized until a subsequent third year. However, it was untenable to analyze a third year because of overlap with COVID lockdown.

There was additional uncertainty at some projects where there was limited information in the project files and where the evaluation team was unsuccessful at recruiting knowledgeable staff about actions taken by trained staff or capturing non-routine events. In some cases, training had been completed two or more years earlier and the specific actions and changes in the buildings could not be recalled. In some cases, the number and complexity of the sites made inventorying changes an onerous task not amenable to an interview.

While the initial plan had been to use all nine completed projects to compute the Verified Gross Savings (VGS) and the Verified Gross Savings Realization Rate (VGSRR), the final analysis included four projects where a) the training had been substantially completed by early 2019; b) billing data was available; c) there was corroborating engineering evidence for the billing results; and d) the projects was noted as Complete in the Scorecard. A fifth “Complete” project was included to ensure as representative a sample as possible and because the program-funded activity savings outcome was conclusive and not uncertain. These five projects account for 36% of the CEF reported electricity and contributing natural gas savings for Completed projects. While this approach mitigates some of the uncertainty introduced by COVID and led to inclusion of more corroborating evidence, it does introduce a potential selection bias.

The primary method of determining savings for four of the included sites was a billing analysis (the fifth conclusively had zero savings). The BOM Program is intended to change individual staff and organizational behavior and, as such, is a behavioral program, and the best practice method of evaluation is billing analysis. The billing analysis focused on estimating the per-project first year energy savings. The team conducted a billing analysis using consumption data provided in the BOM Report or using utility-provided monthly billing data when available or in some cases both.

The team also corroborated the billing savings by gathering evidence of actions taken by the trainees to reduce energy use in the facilities. This evidence came from interviews of project staff, Opportunity Logs (compilations of identified and installed energy efficiency measures (ECMs) identified by trainees), and audit reports included in the project files

A secondary goal of the evaluation was to establish an average savings fraction for estimating encumbered ex ante savings. This analysis was intended to include projects that were typical of the program’s current delivery. However, savings fractions findings were inconclusive due to the uncertainty of the findings, especially the later more typical projects that experienced more significant COVID overlap

### 1.3 BOM Key Findings, Conclusions, and Recommendations

This section presents findings from the completed market surveys of participating and non-participating BOM customers and the impact results.

#### 1.3.1 IP BOM Outcomes Assessment Summary

The IP identifies measurable, quantifiable direct results of activities undertaken in the Program. Outputs track progress based on program production values, which program staff tracks, while outcome indicators are intended to capture changes in the market. Table 1-2 summarizes the IP outcome metrics that the evaluation examined, their 2025 goals, and the evaluated progress to date. This report is based on data gathered in 2021, nominally four years through the period ending in the target year of 2025.

**Table 1-2. Summary of BOM Progress toward IP goals**

Outcome Indicators	2016 Baseline (Prior Study) <sup>a</sup>	2020 or 2021 Evaluated <sup>a</sup>	2025 Target (cumulative)	Source
Increase number of staff qualified to train others (Pct of O&M staff qualified to train others)	4,322 (2.4%)	No sig. change from baseline (compared 2021 estimate)	446	Building Manager Surveys
Increase number of organizations developing new curricula in the market (Pct of organizations developing/modifying curricula)	370 organizations	<b>Increased</b> from baseline 833 organizations (23%, 2021 estimate) (70 or 8% of 833 used new/ modified curricula funded by BOM)	446	Trainer & Building Manager Surveys
Improve performance and efficiency of building systems	0%	<i>Program staff tracks; provided impact results to inform this metric: Electric savings 1.2% and Thermal 2.3%</i>	Not specified past 2024 (in 2024: 7%)	Impact Evaluation
Increase sq. ft. of buildings whose owners invest in training infrastructure without NYSERDA funds in the market	0%	About 6 million sq. ft.	125 million sq. ft.	Building Manager Survey (Input for indirect savings)

<sup>a</sup> 2016 and 2020/2021 are dates of market and program data assessed in these studies. That is, the baseline findings were based on 2016 data and published in 2018. The follow-up study findings were based on 2020/2021 data and published in 2022.

In addition to outcome indicator findings, the team provides several additional findings below that inform the results referenced above.

1. The participating organizations trained a significantly higher proportion (76%) of their O&M staff than non-participants (34%), on average. This indicates that BOM likely accelerated training of O&M staff among participants.



2. Interviews with building managers (especially those serving the educational sector) revealed that the COVID-19 pandemic somewhat to significantly redirected O&M staff toward implementing safety protocols or in idling buildings, which likely led to some level of layoffs or freeze in bringing on new staff. The internship assessment, in particular, supports this asserting. In 2019 (the pre-COVID-19 pandemic period), there were nearly twice as many internships than in 2020 (the COVID-19 pandemic period) among non-participants. This could indicate that COVID-19 had a dampening effect on internships and that impact may have limited the Program’s ability to encourage O&M internship placements in the market. Even BOM program staff noted that BOM started to gain traction; however, the COVID-19 pandemic changed priorities for many organizations.
3. Program enrollments showed a steady increase in encumbered savings in 2019. In 2020, or the first COVID-19 pandemic year, the encumbered savings declined by one-third. Enrollments have partially rebounded in 2021. With only three years remaining, it would appear the program might be at risk of not meeting its 2024 goals, since several outcome indicators have not changed since the baseline in the desired direction. However, the BOM Program has a significant backlog, with about twenty times the savings in the encumbered stage as in the completed stage. Presuming the program has sufficient implementation capacity, it has the customer demand to meet its outcome goals, even with significant attrition of the projects in the pipeline.

Also note that the non-participant sample (which represents the market) was designed to capture the market movement pertaining to the outcome indicators reference above (or a moderate effect or change from the baseline).

### **1.3.2 Market Assessment Conclusions and Recommendations**

The findings summarized above lead to the following conclusions and recommendations.

#### **Conclusion 1: The partnership approach appears to be a very successful element of the Program.**

Developing industry partnerships or engagement between training providers and the organizations receiving the training appears to be working well. One of the contracts leveraged an association to recruit 109 member locations, which resulted in 109 partnerships. Another four BOM-funded training providers developed partnerships with multiple building O&M organizations, which resulted in training 27 organizations, or 27 partnerships. Further, 21% of non-participating organizations and all participant organizations (which are about 2% of the market) worked with or without trainers to develop new or modified curricula. This proportion in the market that exposed their O&M staff to new or modified

curricula is significantly higher than the percent from the baseline. It appears that the BOM-funded training contributed to that growth.

- **Recommendation:** The success of the association approach suggests the Program should continue to reach out to other trade organizations as a fruitful source of participants.

**Response to Recommendation:** Implemented. Program is continuing and will continue to reach out to other trade organizations to promote participation. An outreach contractor has been retained to increase program education and outreach.

**Conclusion 2: The BOM accelerated O&M training among participating organizations.** The participating organizations trained a significantly higher proportion of their O&M staff (76%) than non-participants (34%), on average. This indicates BOM accelerated training of O&M staff among participants.

**Conclusion 3: The COVID-19 pandemic had a strong impact on the sectors often served by BOM,** such as education (both K-12 and higher education) and offices. Participating university and K-12 organizations explained that New York universities and K-12 schools were shut down for a minimum of three months to over a year from the onset of the pandemic. Office vacancies are at a 40-year high even as COVID-19 cases decline. Furthermore, the BOM enrollments exhibited a steep decline in encumbered savings in 2020 and have not yet rebounded to pre-pandemic levels. When asked about the COVID-19 pandemic effect, participating organizations reported several different types of impacts: 1) delaying or canceling hands-on or in-person training; 2) experiencing higher than usual staff turnover due to early retirements as well as difficulty in competing with the unemployment benefits for certain types of O&M staff; and 3) needing to freeze hiring and promotions. The non-participating organizations noted COVID-19 challenges as well, but at a much lower rate.

**Conclusion 4: There is evidence of the market change the program is aiming to accomplish.** The partnership approach discussed above (based on item #2 above) points to program success. That is, the BOM-funded partnerships appear to be accelerating infusion of new and modified curricula/knowledge in the O&M building sector. The impact evaluation has also identified indirect annual savings associated with the BOM, which is analogous to program spillover. The BOM enrollment pipeline of training projects shows a huge backlog (due to COVID-19), indicating a strong demand for the program. Further, the COVID-19 impacts are abating, increasing the probability that the pre-encumbered projects will be completed and thus the program benefits may become more notable and detectable in the market in the near future.

**Conclusion 5: In reviewing the initiative logic model, several of the program market and output indicators need re-assessment.**

Specifically:

1. There is a sub-metric for “Increase in number of workers trained” output indicator noting an “electrification” goal of 1,000 workers. The electrification goal may not be appropriate for BOM because the training is focused on the existing conditions of the buildings served by the staff. There is little building management value (and no savings) in training staff in systems that are not present in the buildings.

- **Recommendation:** Re-assess the need for the electrification target.

*Response to Recommendation:* Pending. Program will work with NYSERDA management and DPS staff to revisit the electrification target in BOM.

2. The BOM logic model in the IP indicated the Program will develop and increase the number of new partnerships and also improve employee retention. Although the team gathered or examined data on these outcomes, there were no metrics listed in the IP measuring these particular logic model outcomes. The partnership and employee retention metrics are relevant to the existing workforce, which is BOM’s main target audience.

- **Recommendation:** The logic model should be re-visited to assess the importance of either keeping or de-emphasizing the employee retention outcome (if there is no metric for it in the IP) or alternatively include that metric in the IP.

*Response to Recommendation:* Implemented. The outcomes of “new partnerships” and “employee retention” were removed from the most recent version of the BOM logic model because these outcomes were no longer the best indicators for this initiative. These and other metrics may be of interest to program staff as initiative objectives but were deemed less applicable as program metrics of success.

3. A few metrics and outcomes relevant to new workforce are not applicable to BOM since BOM focuses on training strategies for the existing workforce. The latest IP eliminated the non-applicable metrics.

- **Recommendation:** The BOM logic model should also eliminate outcomes that are not applicable to an existing (versus new) workforce including: 1) the time needed for employer to find and train new talent, 2) individuals placed into paid internships/apprenticeships, and 3) placement of

disadvantaged workers in O&M careers. These outcomes are relevant for the Talent Pipeline and are included in that logic model.

**Response to Recommendation:** Implemented. These outcomes were removed as part of the updated Compiled Investment Plan, dated May 20, 2022.

### 1.3.3 Impact Findings

The evaluation has confirmed positive changes, in terms of energy savings, on average across all nine complete projects. However, some of the projects were profoundly impacted by COVID (compromising the billing analysis results) and had no basis for estimating savings through an engineering approach. Because of the inconclusive results of some projects, the VGRSS was derived using evaluated results from five of the nine projects where the billing analysis results were not impacted by COVID and where there was corroboration of energy reduction actions taken by the staff.

Table 1-3a and 1-3b presents the Direct Impact Reporting Table with the evaluated VGSRR. The VGSRR is intended to apply to all the acquired savings reported in the Scorecard. The poor relative precision reflects the significant variation in evaluated savings from reported savings and the small sample sizes. There is also additional uncertainty introduced by selection bias that is not reflected in the precision outcome and that cannot be reliably estimated.

**Table 1-3a. Direct Impact Reporting Table 1**

Type (VGSRR/APRR)	Effective from date (Year Quarter)	Effective until date (Year Quarter)	Electricity Savings Annual MWh (Realization Rate)	Natural Gas Savings Annual MMBtu (Realization Rate)
VGSRR	Q1-2017	2027-Q4	120%	125%

**Table 1-3b. Direct Impact Reporting Table 2**

Parameter (Description of strata)	Realization Rate Analysis Type - Weighted/Unweighted	Realization Rate - by Strata	Confidence Interval/ Relative Precision (by strata)	Sample Size (n) (by strata)	Population Size (N) (by strata)
Program, Complete projects in the Scorecard as of September 30, 2021	Unweighted	Program	±70% (Electric) ±272% (Gas) at the 90% confidence level	5	9

Table 1-4 presents the program verified gross savings of the completed projects calculated by applying the VGSRR to the savings reported in the Scorecard for Completed projects.

**Table 1-4 Program Verified Gross Savings of Completed Projects**

	Electricity (MWh)	Contributing Natural Gas (MMBTU)
Scorecard reported annual savings for completed projects	13,141	116,028
VGSRR	120%	125%
Verified Gross Savings	15,720	145,083
Relative precision at 90% confidence	±70%	±272%

### 1.3.4 Impact Evaluation Conclusions and Recommendations

The findings summarized above lead to the following conclusions and recommendations.

**Conclusion 1: There is uncertainty in the estimates of savings.** The billing analysis relied on six-month data intervals provided through the BOM Program about half of the time and monthly billing data for the balance. The project files rarely noted non-routine events which is critical in these dynamic properties.

The corroboration of savings was significantly hampered by the lack of supporting information in the project files for some of the projects. Detailed training curricula and related materials can be used to identify the kinds of actions staff were trained to conduct; however, these documents were not routinely included in the project files. A record or log of actions taken by staff during the two-year post period can be used to identify specific measures implemented by staff, but this type of information was not routinely included in the files.

- Recommendation 1:** Acquire billing release and account data with regular utility billing updates. At project initiation, obtain program billing release and account numbers for all delivered fuels for all buildings participating in the program. NYSERDA should test and confirm the accounts by requesting the historical data for all accounts from the applicable utilities. Accounts that fail to be acquired can be cross-checked and corrected with the participant while NYSERDA has leverage. NYSERDA should request updates of billing data via EDI every six to twelve months as the project proceeds through the performance period. At this stage, only a confirmation of utility data received is required, not a detailed analysis.

**Response to recommendation 1:** Implemented. Program staff and evaluation have already begun the process of getting the utility bills collected. Staff will collect the release forms and provide them to evaluation. Evaluation will then add the WFD projects to the python program created for collecting EDI data. The data will be collected every 6 months.

- **Recommendation 2:** Report usage in monthly intervals in the BOM Report. Capturing billing data continuously improves the availability of billing data, however, the BOM Report has its own value and should continue. The BOM Report includes unregulated fuels, which can be significant energy streams; it provides a cross-check to the utility billing data; and it allows the participant to observe progress. However, the current BOM design aggregates billing data into six-month intervals aggregated across the portfolio, which degrades the billing analysis. Monthly intervals by building will markedly improve the reliability of the analysis. Properties are billed by energy providers, so it is reasonable to ask for the monthly resolution and it was not uncommon to see monthly data included as a tab in the BOM Report. The Program can still maintain a six-month interval for providing updated data, however, the resolution of the data in the spreadsheet should be at the same resolution as the source billing data.

*Response to Recommendation 2:* Implemented. With the transition to the collection of utility data release forms and the regular pulls of monthly utility data in coordination with the NYSERDA Evaluation team, projects will no longer be required to submit the compiled 6-month data metrics as part of the BOM reporting process.

- **Recommendation 3:** Include a more expansive (and required) non-routine event log in the BOM Report. The BOM Report does include a section for reporting non-routine events, however, it was rarely used. In these dynamic properties, something is always changing, although it is not possible nor necessary to track every change in the facility. However, the BOM Report could be modified to request input by building if undergone significant changes during the reporting period, such as “No longer in the portfolio,” “Percent under major renovation,” or “Percent repurposed.”

*Response to Recommendation 3:* Implemented. The Program is collecting information with quarterly reports to identify any changes in the building list included in the project. The Program will update the data requested in the quarterly reports to encourage participants to provide a greater level of detail about major physical or operational changes occurring in the impacted buildings.

- **Recommendation 4:** Include a detailed description of the training curricula and its content in the project file. The training curricula provides a basis for corroborating engineering estimates of savings by identifying the types of actions staff were trained to do.

The program reporting should also include regular reporting of the energy reduction actions taken by trained staff (sometimes referred to as an Opportunity Log). This record of actions forms a

basis for corroborating engineering estimates, but it also can help focus and motivate trained staff to identify and implement measures.

**Response to Recommendation 4:** Implemented. Participants for active projects are required by their contractual Scope of Work to submit detailed descriptions of training content, including curricula as well as electronic versions of training materials, as a deliverable to NYSERDA, so this information will be available for future engineering analyses.

Regarding part 2 of this recommendation, proposers structure their training programs in different ways to best meet the needs of the particular building owner/portfolio manager customer. In some cases, incorporating the tracking of completed actions is a valuable part of the training effort, but in other cases, factors such as the organizational structure, existing activity tracking strategies already employed, use of outside consultants for various services, etc., may result in this type of deliverable not being a good fit for a project. NYSERDA will recommend this as a valuable project activity and one that may leverage existing tracking systems already used by facilities to track their activities. NYSERDA will not collect individual maintenance logs for each building for each project, however, participants will be notified that this information should be made available upon request.

- **Recommendation 5:** Require program participants to continue to meet program reporting requirements for at least one year after the conclusion of training. While the benefits of training may begin to accrue from the first day of training, the full benefits may not appear until after training has been completed and put into action.

**Response to recommendation 5:** With the new process to collect utility data via data release authorizations and the EDI tool, evaluation staff will be able to access data for at least one year after the conclusion of the training.

**Conclusion 2: The evaluation has confirmed positive changes in terms of energy savings, across all the projects** and robust average savings for the five sites included in the VGSRR. However, the small sample size and highly variable results led to poor precisions. There is also uncertainty introduced by the non-random selection of projects for inclusion that is not reflected in the precision. While the findings do not meet the precision targets, they reflect the best available data for this set of projects, especially given the impact of COVID and the limitation of collecting information from 2018 and 2019.

- **Recommendation 1:** Apply the VGRRs identified as 120 percent for electric (MWH) and 125 percent for natural gas (MMBTU) to report verified gross savings.

**Response to Recommendation 1:** Implemented. The savings have been applied to the VGRRs.

- **Recommendation 2:** Improving the certainty of the results will require additional documentation corroborating the impacts of the training as recommended above. Since it is unrealistic to expect that these varied and sometimes subtle actions can be recalled accurately years later, it is also recommended that the necessary corroborating project data is collected and undergoes a quality assurance review at regular intervals soon after the reporting period has concluded. The BOM program may be a good candidate for a ‘real time’ or embedded evaluation approach, where the evaluator collects some of the required data directly from the customers and conducts primary research of in-progress projects at regular intervals. The evaluator, for example, could collect the billing data and add follow-up questions about apparent non-routine events observed in recent billing data or confirm actions noted in an Opportunity Log.

**Response to Recommendation 2:** Implemented. The evaluation team is conducting a “real time” evaluation as recommended. As a part of this, the evaluation team will also be collecting EDI data for the program on a regular basis (6-month intervals).

**Conclusion 3: It appears the savings estimates are not updated when the project is complete with readily available baseline annual usage from the BOM Report.** Project savings are estimated early in the customer enrollment as a function of the participant’s reported energy bills (in dollars), conversion of bills (in dollars) to energy use, and a saving fraction assumption proposed by the contractor. In the current estimates, annual usage that is factored into the estimate of the project savings understates the actual electric usage by about 40%. Neither the gas nor electric actual annual usage corresponds well to the annual usage assumed by NYSERDA in the initial estimates of savings. As another issue, some of the projects did not report district steam or fuel oil impacts, even though they are included in the BOM Report, and the training activity will impact these streams.

- **Recommendation 1:** Revise project savings prior to reporting as Complete in the Scorecard. Prior to closing a project and reporting the savings as Complete in the Scorecard, the energy use should be updated with the BOM Report annual baseline usage.

**Response to Recommendation 1:** Implemented. Program will review the data available at the time of closing the project and adjust reported savings if it can be concluded that energy data submitted during the course of the project provides a more accurate value to report.

- **Recommendation 2:** Report all savings streams. The program did not report all the fuels noted in the BOM Report. Utility provided district steam and fuel oil should be reported in the Scorecard in the appropriate columns. Energy imported from a non-utility provider, such as steam or hot water, can be converted to equivalent natural gas.



**Response to Recommendation 2:** Program will review the data available at the time of closing the project and adjust reported savings if it can be concluded that energy data submitted during the course of the project provides a more accurate value to report.

## **1.4 Talent Pipeline Key Findings, Conclusions, and Recommendations**

This section presents the results and findings from the completed market surveys of participating and non-participating Talent Pipeline customers.

### **1.4.1 IP Talent Pipeline Outcomes Assessment Summary**

The IP identifies measurable, quantifiable direct results of activities undertaken in the initiative. Outputs track progress based on Program production values, which Program staff tracks, while outcome indicators are intended to capture changes in the market. Table 1-4 summarizes the IP outcome metrics that the evaluation examined, their 2022 goals, and the evaluated progress to date. This report is based on data gathered in 2021, nominally three years through the period ending in the target year of 2022.

Also note the Evaluation Team considered 2018 as the baseline year. In 2018, the Program had not yet developed contracts with the training providers (the first contracts started in 2019, under PON 3981). The Program also began the OJT and/or intern wage reimbursement (PON 3982 and 4000) in November/December of 2018. Further, selecting 2021 (the year of this study) as the baseline would have been problematic due to the COVID-19 pandemic effects lingering on the market in 2021. The team opted to collect information on the Program for 2018 (pre-pandemic and pre-program period) and 2021.

Note that survey data in particular (i.e., asking respondents to report on certain metrics for the year 2018) can be prone to recall bias. The team attempted to mitigate this risk by asking respondents to consult their workforce records when reporting the 2018 information.

Also note that the surveyed non-participants represented the clean energy population the Talent Pipeline Program was targeting.

**Table 1-4. Summary of Talent Pipeline Progress toward IP goals**

<b>Outcome Indicators</b>	<b>2018 Baseline</b>	<b>2021 Evaluated Result</b>	<b>2022 Target (Cumulative)</b>	<b>Source</b>
<b>Reduced cost to recruit and hire [and train]</b>	Recruit/Hire: \$4,812 (mean, non-part. sample, representative of market)	\$6,433 (mean, non-part. sample, no inflation adj.) \$5,891 (mean, adj. for inflation) <b>Increase</b> of 34% no inflation adj. (Sig. compared to baseline) <b>Increase</b> of 22% adj. for inflation (Sig.) <b>Inflation only partially explains the increase.</b>	n/a	Clean energy business surveys
	Train: \$7,744 (mean, non-part. sample)	\$9,457 (mean, non-part. sample, no inflation adj.) \$8,642 (mean, adj. for inflation) <b>Increase</b> of 22% no inflation adj. (Sig. compared to baseline) <b>Increase</b> of 12% adj. for inflation (No Sig.) <b>Inflation fully explains the increase.</b>		
	Participant costs did not change from baseline adj. or non-adj. for inflation ( <b>Positive</b> findings for the program since in the market costs increased.)		30% reduction	Clean energy business surveys
<b>Reduced time to hire and train</b>	Recruit/Hire: 6 months (mean, non-part. sample)	No evidence of change for both participants and non-participants	This metric is no longer present in the latest Talent Pipeline IP	Clean energy business surveys
	Train: 6 months (mean, non-part. sample)	The time to train a new hire decreased since baseline by 19% among participants ( <b>Positive</b> finding for the program). No evidence of change for non-participants.		
<b>Reduced time to reach full productivity in the market</b>	Time to train: 6 months (mean, non-part. sample)	No evidence of change.	n/a	Clean energy business surveys
	Participants took 19% less time than in baseline to be trained to the adequate level of skill (or from 7 to 6 months, on average) (Sig. and <b>positive</b> finding for the program.)		20% reduction	Clean energy business surveys
<b>Number of business/ trainer partnerships</b>	0 (By definition, prior to the program)	60 Close to the goal	65	Tracking data

This table indicates that NYSERDA is unlikely to meet its 2022 targets on Program market outcomes. However, the Program does benefit participants, which is a small subset of the market. The 1,609 subsidized employees (subsidized via PON 3982 and 4000) together with 3,468 trained individuals

(trained by those who received the PON 3981 funds) account for about 3% of the New York clean energy workforce. The positive findings for participants referenced above do suggest that the Program effect on the market is likely small, since the workforce reach of those subprograms is small. Yet the target in the IP (i.e., the percent change in the market indicators referenced in Table 1-4) implies that the Program's effect on the market will be moderate rather than small (e.g., 20% reduction in time to hire and train). The non-participant sample (which represents the market) was designed to detect moderate rather than small effects. Therefore, for those non-participant results indicating no statistically significant change pertaining to indicators of interest, there is no statistically significant evidence of moderate change (whether positive or negative) in relevant indicators over time.

Also note that the initiative is working against an unprecedented labor disruption due to the COVID-19 pandemic. The COVID-19 pandemic has simultaneously reduced the number of jobs and created a tighter labor market in 2020 and 2021, as well as impacting inflation, potentially overwhelming the impact of a targeted workforce effort.

#### **1.4.2 Value and Satisfaction with the Program**

Participating employers, trainers, and trainees reported that the program provided valuable services and were satisfied with the delivery. The following are select findings presented for each group.

**Employers.** Participating employers indicated that without the NYSERDA-funded wage supports, they likely would not have been able to hire interns or OJT hires and, to a lesser extent, find them. Of the new OJT hires, about two-thirds of OJT hires stayed on in permanent positions. OJT employees were not hired for a variety of reasons, including offers from other companies and, more rarely, the unsuitability of the candidate. Interns often left the employer to complete their education, which was expected per program staff feedback.

Employers are struggling to find new hires and are often disappointed in their skill level and ability to execute the work without extensive in-house training. The shortage appears more acute for field installation staff than for professionals. Onboarding a new hire is an expensive and lengthy process.

**Trainers.** Participating trainers offered curricula across the clean energy spectrum in over fifteen distinct technical areas, and they developed over a hundred new or revised curricula to service the range. Trainers highly valued the Talent Pipeline's funding support for curriculum development, which is the core Talent Pipeline program activity related to trainers. The most common mode of training was online courses (offered by 79% of the responders), with in-class and hands-on training each offered by 13% of the responders along with other modes. The trainers also commonly noted adjusting the training for virtual delivery as they had to pivot their training plans to virtual execution in response to the COVID-19

pandemic. This implies that virtual training is more prevalent now due to the influence of COVID-19. It is unclear how training delivery will change as the pandemic effects abate.

**Trainees.** In general, surveyed trainees reported that the curricula improved their skills and prepared them for the jobs they were seeking or performing. About 63% of trainees have applied skills and knowledge obtained through the training on the job at varying degrees, with 17% of them using the skills daily.

The most common goal that trainees hoped to achieve through the Talent Pipeline–sponsored training was improving their skills and knowledge – 83% of trainees aimed to achieve this goal, and 79% of trainees felt that the training helped them achieve that goal.

### **1.4.3 Conclusions and Recommendations**

Based on the initiative’s findings presented above, the Evaluation Team offers the following conclusions and recommendations.

**Conclusion 1: Program positively impacted participants despite labor disruption due to the COVID-19 pandemic.** The sponsored interns and OJT hires are the one activity by which the Talent Pipeline is introducing new workers into the clean energy sector. The program is also subsidizing placement of interns and training of individuals or students for placement into a clean energy job. The measure of the market response to the new workers is through, lower costs to hire and train workers. Participant research offer evidence that the program likely had a small and positive effect on the market. Participating organizations, which employ about 3% of the total clean energy workforce in New York, have seen: 1) reduction in time to train new hires since participating in the program (or since 2018) and 2) no increase in the cost to recruit and train new hires when in the market (or among non-participants) the cost to recruit and train had significantly increased since 2018. Participants also noted that the program was generally influential in helping them bring on interns and OJT new hires.

Note that the non-participant market research showed no evidence of reduction in time and cost to hire and train new staff. When controlling for inflation, the cost to recruit and train (the program market outcome indicators noted in the IP for Talent Pipeline) increased by 22% and 12% respectively (for training) from 2018 to 2021 among non-participating clean energy employers (a group representing the market). The increase in the cost to recruit was significant whether adjusted or not adjusted for inflation, indicating other factors besides inflation affected this cost. The increase in the cost to train was only significant when cost was not adjusted for inflation, which meant inflation (or controlling for inflation) fully explained the increase. Inflation (which is partly a function of COVID-19 pandemic effects) likely limited the program’s ability to impact the market. The time to recruit and train has held steady from 2018 to 2021 among the same group – i.e., no market movement observed.

It is also important to note that the initiative is working against an unprecedented labor disruption due to COVID-19. COVID-19 has simultaneously reduced the number of jobs and created a tighter labor market in 2020 and 2021, as well as affected the broader economy (e.g., inflation), potentially overwhelming the impact of a targeted workforce effort.

**Conclusion 2: A notable proportion of program supported workforce do not end up in a clean energy job after training or OJT wage support concludes.** About half of the trainees were no longer working in the areas where they trained after twelve months. A notable proportion of the OJT hires (35%) do not become permanent hires. Reasons vary but include returning to school, relocating, and taking a job elsewhere. Program sponsorships will include a natural attrition rate that should be considered when setting goals and budgets.

- **Recommendation 1:** The Talent Pipeline’s sponsorship of interns and OJT hires was highly valued by the participants and was successful at introducing workers into the clean energy workforce. The Program could consider doubling or tripling the number of individual placements to account for natural attrition.

*Response to Recommendation 1:* Rejected. Increasing placements directly corresponds with an increased cost in program incentive budgets. The Program has been adding supplemental non-CEF funding to support the hiring of additional interns and OJT hires to support the market, however significant additional funding is needed to double or triple the number of placements/new hires.

- **Recommendation 2:** The program might also consider increasing the number of OJT hires. This would help in two ways. First, the OJT hires have high retention rate compared those that are trained, bringing more workers online quicker. Secondly, since most employers identified a shortage of installers, increasing the OJT hires would more directly increase the installer pool.

*Response to Recommendation 2:* Rejected. Increasing placements directly corresponds with an increased cost in program incentive budgets. The Program has been adding supplemental non-CEF funding to support the hiring of additional OJT hires to support the market.

- **Recommendation 3:** While the evidence indicates the Talent Pipeline intern and OJT hire activity is valuable to the participants and brings new workers into the clean energy workforce, it is not clear that the cost and time of onboarding is the only or best measure of program impact. As New York has seen, especially after the COVID-19 pandemic, hiring and training metrics are sensitive to larger economic forces, which reduces their reliability as an indicator of program progress. In addition, one program goal is to develop new training programs that can be sustained

after NYSERDA program concludes. Other metrics that might be more appropriate for measuring progress could be centered on increasing the permanent placement rates or on targeting specific job areas (like installers), as well as tracking whether training developed is being leveraged outside of the NYSERDA program.

**Response to Recommendation 3:** Pending. Staff will further evaluate this recommendation.

**Conclusion 3: There is need for increased field training.** From the perspective of the trainees, the training largely met their goals to expand their industry knowledge and their career opportunities, and they were highly satisfied with the training. However, in the participant and non-participant market employer surveys, responders were vocal about the state of training and the preparedness of hires. While somewhat anecdotal, since training assessment was not an objective of the employer survey, a consistent message came through the open responses in the surveys. Employers report that new hires, especially in installation (or jobs that require hands-on knowledge), are not being adequately prepared by the existing education and training systems.

Additionally, both employers and trainers noted that the current level of hands-on training is not adequate and they expressed the desire to see hands-on training opportunities increase. In the trainer surveys, only 13% of the providers noted that their curricula include hands-on training. It appears that COVID-19 caused a simultaneous pivot toward online training, per trainer open-ended feedback, while also limiting the feasibility of hands-on training to be added into a modified curriculum. Training providers identified training equipment as their highest priority for funding, which typically refers to hands-on learning apparatus.

As a final observation on trainers, few if any of the training organizations appear to be technical high schools, which are a recognized source of new hire tradespeople.

- **Recommendation 1:** The Talent Pipeline should continue to encourage hands-on components in trainer curricula, expanding trainee exposure to this learning modality. Excluding career type of training (e.g., internships), hands-on training should be incorporated into curriculum, and not reserved for a few specialized “training labs.” The hands-on component is especially important for installers.

**Response to Recommendation 1:** Implemented. As the severity of the COVID-19 pandemic has eased, training partners have been eager to return to in-person, hands-on training for new worker training and have been doing so in many cases. NYSERDA will continue to encourage hands-on training as it was a key element of training models, by design, pre-COVID-19.

- **Recommendation 2:** The Talent Pipeline should encourage hands-on components in partnership with technical high schools. These schools would likely welcome an injection of clean energy optimism and opportunity for their students. Technical/vocational high schools are a primary starting point for a career in the trades, and thus an important resource for clean energy new hires. The school facilities could also be a resource for the hands-on component of the training for other training providers. One final benefit is that technical/vocational trade school graduates may be more likely to stay local, increasing the job retention rate.

***Response to Recommendation 2:*** Implemented. NYSERDA has started several new training projects with technical high schools and will continue to promote the funding opportunities to this category. Additionally, NYSERDA is coordinating its Workforce and P-12 Schools activities to integrate clean energy education and awareness in high schools located in disadvantaged communities.

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