

Matter Number 16-00681, In the Matter of the Clean Energy Fund
Investment Plan

**Clean Energy Fund Investment Plan:
Workforce Development and Training
Chapter**

Portfolio: Market Development

Submitted by:

The New York State Energy Research and Development Authority

Revised June 8, 2018

Clean Energy Fund Investment Plan: Workforce Development and Training Chapter		
Revision Date	Description of Changes	Revision on Page(s)
August 18, 2016	Original Issue	Original Issue
September 9, 2016	Revised Table 3	10
September 15, 2017	Expanded eligibility, and increased funding to allow for additional solicitations. Tables 1-6 have been revised, and Milestones have been updated accordingly.	Multiple
November 1, 2017	Corrected chapter number.	Multiple
June 8, 2018	<u>Industry Partnerships</u> : Increased funding to allow for additional projects, revised Tables 1-6 and updated text and milestones accordingly. <u>Clean Technology and Energy Efficiency Talent Pipeline</u> : Original Issue	Multiple

16 Workforce Development and Training

The New York State Energy Research and Development Authority (NYSERDA) seeks to build on its long history of working in partnership with education and training systems to deliver the workforce skills employers need. With many of the state's most skilled employees approaching retirement age, an insufficient pipeline of skilled workers to fill the gap and technologies that are evolving rapidly, New York needs a readily available workforce that is skilled and adaptable. Many initiatives will target incumbent workers, but whenever possible, efforts will seek to identify future workforce needs and increase economic opportunity for unemployed and underemployed workers by developing and promoting middle-skill jobs.

In the first initiative described in this Chapter, NYSERDA is utilizing an Industry Partnership approach to workforce training (i.e., an ongoing dialogue among industry leaders on common workforce issues and opportunities). This approach is intended to: help identify worker skill needs; inform investments in skills and talent development; support career pathways; and develop the training infrastructure needed to better link supply and demand in the labor market. NYSERDA will initially focus this approach on building operations and maintenance. However, the initiative will also explore an industry partnership approach for other sectors or technologies. The initiative was modified in September 2017 to expand the eligibility of who can lead an industry partnership project, as well as adding funding for additional solicitations. Additional funding beyond the September 2017 revision was added in May 2018. The benefits have been increased and milestones have been updated accordingly to account for the additional funding.

The second initiative described in this chapter will create a Clean Energy and Energy Efficiency Talent Pipeline, a proactive approach to defining, attracting and developing the right mix of critical talent in a pool of internal and external candidates. Through increasing training capacity, incenting businesses to train new hires through on-the-job training, and an internship program, the initiative will ensure that New York has the skilled workers necessary to meet clean energy and energy efficiency business needs. Initial focus areas include, cleantech, energy efficiency, and offshore wind.

The Industry Partnership and Clean Energy and Energy Efficiency Talent Pipeline initiatives complement each other. Both initiatives are designed to address the skills gaps that employers are experiencing with both existing workers and for new hires. The Industry Partnership investment initiative is focused on a specific job category/function (building O&M) and spans several sectors (e.g. commercial, institutional, multifamily). In comparison, the Talent Pipeline initiative is a broader capacity building effort which will allow for greater flexibility to develop more varied industry collaborations tailored to specific technologies, sectors, or critical job functions across various supply chains. The Talent Pipeline initiative will leverage Industry Partnership convenings and other market dissemination channels to bring awareness, share lessons learned, encourage peer-to-peer exchange of best practices, and facilitate adaption and application of these approaches.

Program investments and activities will be informed via engagement with stakeholders and subject matter experts.

16.1 Industry Partnerships

<p>Present Situation</p>	<ul style="list-style-type: none"> • Commercial net energy use, including most large multifamily buildings, accounts for 25 percent of the total energy demand in New York State. According to the U.S. Department of Energy, building owners can save five to 20 percent on their energy bills annually by implementing operations and maintenance best practices¹. • Proper building operations and maintenance, quality training for operations and maintenance staff, and the creation of an energy efficiency culture for building owners and occupants are important components of operation and maintenance programs² but are often overlooked or undervalued. Facility equipment performance is directly linked to the capabilities of the individuals responsible for building operations. Proper training for operators increases the likelihood that equipment will function effectively and efficiently over its expected lifespan. • There are more than 120,000 people employed in building operations and maintenance-related occupations across New York State. Approximately 20 percent of the building operations and maintenance workforce is slated to retire over the next five years. This would result in more than 24,000 vacancies, which could lead to a significant skills shortage³. With starting wages for entry level maintenance and operations workers averaging \$17 per hour and boiler operators averaging \$32 per hour, there is a great potential to prepare low- and middle-income workers for clean energy jobs. • In addition to losses through retirement attrition, the industry is also faced with ongoing technological advancements that can have significant impacts on the workforce. As new and emerging clean energy technologies continue to gain prominence, there is a need to upgrade the skills of new and existing workers. Both employers and workers will benefit from the development of new clean energy skills. • NYSEDA has experience developing training and career pathways initiatives, including its on-the-job training program, which resulted in more than 600 job placements and job advancements. • Results from the building operations and maintenance solicitation indicate significant interest from building owners and managers in developing integrated and sustainable training mechanisms that can be replicated across large portfolios. Proposals target training activities in hospitals, universities, K-12 schools, commercial office buildings, and multifamily buildings. Activities include the development and deployment of in-house training strategies that will institutionalize best practices across organizations. • This effort will be coordinated with the Talent Pipeline initiative to ensure a consistent and complementary approach to workforce development in New York. The initiatives will work in tandem where possible to leverage market dissemination channels, share best practices, and facilitate adaptation and adoptions of successful approaches.
<p>Intervention Strategy</p>	<ul style="list-style-type: none"> • NYSEDA will leverage existing training infrastructure and focus on job skills and training that lead to job placement and career advancement through an “Industry

¹ Patterns and Trends New York State Energy Profiles: 1999-2013 Final Report October 2015: <http://www.nyserda.ny.gov/About/Publications/EA-Reports-and-Studies/Patterns-and-Trends>

² Energy Efficient Operations and Maintenance Practices in NYS Buildings, Columbia University School of International and Public Affairs, 2014

³ Building Operations and Maintenance: Maintenance and Repair Workers (108,832 workers in 2015, SOC 49-9071), Property, Real Estate, and Community Association Managers (10,477 workers in 2015, SOC 11-9141), and Boiler Operators (1,768 workers in 2015, SOC 51-8021). Total of 121,077 workers.

	<p>partnership” approach. This approach involves obtaining stakeholder input to help identify, implement, and replicate workforce development and training initiatives designed to match industry workforce needs with a supply of skilled workers.</p> <ul style="list-style-type: none"> • The industry partnership approach will identify workforce development and training needs for building operations and maintenance occupations across multiple sectors. NYSERDA will also assess the potential for follow-on industry partnerships in additional areas where labor market needs and workforce training gaps have been identified, such as but not limited to renewable thermal technologies (e.g., geothermal and solar thermal), smart grid and smart networks, and large-scale renewables. • NYSERDA will issue competitive solicitations targeting large entities with multiple buildings and sites to support development of on-the-job building operation and maintenance training initiatives. Employers will commit to replicating the results throughout their buildings. • Proposals could be submitted by an organization or by teams that include existing training entities, unions, etc. Examples of typical projects include: partnerships with training providers to update classroom training and the development of internal trainers to provide continuous, on-the-job training and sustainable, replicable models; development of internships, mentoring, or on-the-job training programs that can build skills, help new hires, and provide career advancement opportunities for supervisors/mentors; development of new curriculum or curriculum modules to support continuing education and pursuit of certifications; support for new certifications; or creation or updating of apprenticeships. • The strategy is designed to address common skills gaps and workforce training needs in an industry or sector, across industries or sectors, and related to a specific technology or occupation. While interventions are designed to be responsive to industry needs, existing workers will develop new skills that can result in new responsibilities and higher wages. • With guidance from industry, NYSERDA will also implement a minimum of six demonstrations to help make the business case for investing in training and for developing internal training mechanisms and career advancement for workers. Such demonstrations will also help identify opportunities for new industry partnerships that address common skills gaps and workforce needs in targeted areas. • Demonstrations will be used to show the isolated energy impacts associated with a skilled and/or credentialed workforce, information which is not readily available. • The results from the business case demonstrations will be disseminated through market channels to help support the development of more effective talent strategies for relevant occupations and to facilitate the adoption of an energy culture within facilities and across organizations. • For a visual representation of this strategy, please reference the flow chart entitled “Logic Model: Workforce Development and Training: Industry Partnerships,” which can be found in Appendix A.
<p>Goals</p>	<ul style="list-style-type: none"> • Demonstrate the value of training to employers of building workers. • Demonstrate the value of training to new and existing employees in terms of job placements, opportunities for low- and moderate-income workers, starting wages and wage increases, career paths and advancements, and attainment of certifications. • Train workers to meet the emerging technology demands of jobs in the clean energy sector. • Form industry partnerships to inform employer-driven workforce solutions, including: <ul style="list-style-type: none"> ○ Improved skills enhancement for existing workers; ○ Increased access to entry level jobs for disadvantaged (including workers from low- and moderate-income communities) New Yorkers; and

	<ul style="list-style-type: none"> ○ Increased energy savings and net operating income for building owners.
State Energy Plan/Clean Energy Standard Link	<p>This strategy contributes to the State Energy Plan goals for energy efficiency and emission reductions because well-trained workers will allow buildings to fully realize the energy savings potential of systems and equipment through proper maintenance and operation. The Energy Plan also directs the State to look for opportunities to leverage the Regional Economic Development Councils, to identify workforce needs and engage industry to help shape curriculum--particularly at the State University of New York (SUNY), City University of New York (CUNY), community colleges, and technical institutes--including short courses and incumbent worker retraining. This strategy encompasses jobs in energy efficiency, building retrofit, weatherization, site-based clean and renewable energy resources, power supply and demand, smart grid, codes and standards, manufacturing and operations, and professional services.</p>

16.1.1 Target Market Characterization

Target Market Segment(s)	<p>The initial target market is employers, managers, new hires and staff involved in building operations and maintenance across the commercial and multifamily building sectors. NYSERDA will seek to partner with large organizations and institutions with high potential for large scale energy savings as a result of training building operations and maintenance staff.</p>
Market Participants	<p>Market participants include:</p> <ul style="list-style-type: none"> • Colleges and universities • Healthcare institutions • Large commercial real estate firms • Public agencies with significant building space • NYC Department of Citywide Administrative Services (DCAS) • SUNY, Office of Facilities Management • CUNY, Building Performance Lab • New York City Housing Authority • NYC Mayor’s Office of Sustainability • NYC Small Business Services • NYS Department of Labor (DOL) • New York Power Authority (NYPA) • Training organizations, including, among others: <ul style="list-style-type: none"> ○ International Union of Operating Engineers (IUOE) Local 94 ○ International Brotherhood of Electrical Workers (IBEW) Local 3 ○ Service Employees International Union (SEIU) 32 BJ ○ Urban Green Council (NYC Chapter of the United States Green Building Council) ○ Solar One ○ Association for Energy Affordability ○ Association for Energy Engineers • Regional Economic Development Councils (REDCs) • Workforce Investment Boards (WIBs) • Job seekers including disadvantaged workers⁴
Market Readiness	<ul style="list-style-type: none"> • NYSERDA has worked with over 70 training partners over the past 10 years to develop state-of-the-art training facilities and programs to ensure there is an

⁴ Disadvantaged workers include, but are not limited to: those residing in low and moderate-income communities, underrepresented populations including women and people of color, and disconnected youth.

	<p>adequate training infrastructure and a skilled labor supply to support the clean energy economy. The industry partnership approach will allow NYSERDA to leverage past work and identify a comprehensive portfolio of NYSERDA initiatives to enhance the skills of clean energy workers to enable growth in identified markets.</p> <ul style="list-style-type: none"> • Industry is looking for more customized, site-specific and hands-on training to supplement classroom training. Such training can better prepare new workers and provide opportunities to advance the skills of existing workers. After extensive stakeholder interviews and surveys, building operations and maintenance was identified as an area for more concerted worker training beyond classroom training. • The level of retirements expected throughout the industry necessitates an influx of new entrants and increased skill levels for existing workers. • When combined with advanced technologies for energy and cost savings, these factors create an ideal opportunity to work with industry to address critical skills gaps and needs for building operators and maintenance staff. Initial feedback from industry partners, detailed in the Market Participants section, indicates that there is receptivity to the employer-driven approach to program planning. Feedback has been positive from employers as well as training providers.
Customer Value	<ul style="list-style-type: none"> • Properly managing and closely monitoring facilities can reduce energy use and associated utility costs, protect investments in equipment, improve building safety, and avert unnecessary service interruptions and the costs associated with equipment failures. • Investments in continuous workforce development and skill enhancement can lead to opportunities for professional development and advancement for entry and mid-level workers seeking careers in operations and maintenance occupations. These skills are transferrable throughout the industry and can also lead to increased wages over time.

16.1.2 Stakeholder/Market Engagement

Stakeholder/Market Engagement	<ul style="list-style-type: none"> • NYSERDA has conducted extensive outreach, including interviews, stakeholder meetings, and focus groups with more than 50 customers, as well as a survey that garnered an additional 48 responses. • Through its outreach, NYSERDA was able to engage with employers across a variety of market segments: solar electric; renewable thermal; existing trades (e.g., heating, ventilation and air conditioning, plumbing, carpentry, and weatherization) serving residential customers; equipment and component manufacturers; architects and engineers; investor-owned and private utilities; and building operations and maintenance staff serving multifamily and commercial buildings. • As a result of stakeholder input, building operations and maintenance quickly emerged as an initial focus area with the potential for a large impact in the near term: advancing skills for existing workers, better preparing new entrants to the workforce, and achieving energy efficiency and greenhouse gas reduction goals. • After several informal brainstorming sessions with stakeholders, an initial meeting of key industry partners took place in early June 2016. Dialogue with industry partners and stakeholders continued through 2018. • In response to the 2017 building operations and maintenance solicitation, NYSERDA spoke with more than 70 potential proposers about project concepts and ideas. Inquiries from potential applicants continue.
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	<ul style="list-style-type: none"> • NYSERDA will also coordinate with the workforce activities of other State agencies, such as NYPA, DOL, Empire State Development (ESD), and SUNY.
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16.1.3 Theory of Change

Market Barriers Addressed	<ul style="list-style-type: none"> • Shortage of skilled workers due to attrition from retirements: There is an opportunity for NYSERDA to assist industry partners to leverage existing training infrastructures, develop internal training systems to impact more buildings and workers, support entry-level workers, and advance the skills of existing workers. Career pathway development and career advancement for building operations and maintenance will be a priority. • Changing technology demands requiring upgraded skills for new and existing workers: The industry is faced with the integration of clean energy resources such as solar, geothermal, wind, storage technologies, micro-grids, smart meters and devices, network-connected systems, applications for managing equipment and building systems, and the availability of real-time data. These new technologies, devices, and systems will have significant impacts on building operations and maintenance and the workforce. There is a critical need to upgrade the skills of new and existing workers on a systematic and on-going basis. • Lack of information and tools needed to address skills gaps from the demand side: Most workforce interventions in New York State focus on the labor supply and are measured by the number of workers being trained or certified. New interventions demonstrated through this initiative will balance labor demand with supply. Recent industry-based efforts in the advanced manufacturing sector, have shown some of the most successful workforce interventions are those driven by regional employer demand⁵.
Testable Hypotheses	<ul style="list-style-type: none"> • If industry partners implement operations and maintenance best practices, then energy savings could exceed five percent within the first two years of implementation. • If industry partners institutionalize a culture of continuing professional development among operations and maintenance staff, then they can expect to see improved worker retention and knowledge transfer as aging workers approach retirement. • If NYSERDA isolates the impacts of a trained and workforce to prove the business case for training through the demonstrations, then other decision makers (property owners, employers, institutional administrators, etc.) will adopt similar strategies.
Activities	<ol style="list-style-type: none"> 1) Industry Partnerships to Identify Barriers and Skills - develop two to four regional industry partnerships of five to 10 employers to identify labor-related barriers and skills gaps based on labor market analysis <ol style="list-style-type: none"> a) Building operations and maintenance is the first industry partnership to be fully implemented. Convene industry partnership meetings and conduct voice of customer outreach to solicit input and find common skills and training gaps. b) With input from the industry partnership, identify the specific worker skills and talents needed by employers, which may be at any stage: hiring, technological modernization, or incumbent worker advancement. c) Explore opportunities to develop industry partnerships, where appropriate and through a modification to this plan or through an additional plan, in new

⁵ Groves Garrett and Woolsey, Lindsey. (2013) *Sector Strategies Coming of Age: Implications for State Workforce Policy Makers*. Ann Arbor, Michigan and Washington DC: Corporation for a Skilled Workforce, National Governors Association, and National Skills Coalition.

	<p>areas: renewable thermal, storage, zero energy homes, renewables including offshore wind, high efficiency HVAC technologies and systems, advanced residential clean energy technologies or smart grid technology applications.</p> <p>d) Facilitate the replication of successful training models and initiatives where applicable.</p> <p>2) Business Case Demonstrations - conduct six business case demonstrations to prove the impact and value of technical training.</p> <p>a) Evaluate technical training available in the market, utilizing an industry recognized evaluation model that goes beyond immediate reactions to training to measure the impacts of training.</p> <p>b) Present business case and evaluation findings in case studies and other tools for dissemination to others in the industry who may be considering an investment in workforce training and development.</p> <p>3) Identify Training Intervention to Address Skills and Barriers - work with industry partners to identify specific building operations and maintenance training needs and best practices to address barriers identified by the Industry Partnership. Interventions will be targeted at developing sustainable in-house training infrastructure and practices and will include but will not be limited to, the following:</p> <p>a) Train-the-trainer initiatives to develop internal capacity for knowledge transfer</p> <p>b) Partnerships with manufacturers to ensure that training providers have equipment that meets or exceeds industry standards</p> <p>c) Curriculum development</p> <p>d) On-the-job training, internships, and apprenticeship enhancement in support of career pathways</p> <p>4) Competitive Solicitations - Issue approximately five competitive solicitations by the end of 2021 (open to all eligible New York entities) in support of innovative approaches and interventions, as identified above, with entities with multiple buildings and sites). Two open enrollment solicitations have been issued to date, with four due dates for submission through May 2018 resulting in 17 projects. Additional projects will be solicited to develop workforce training initiatives that leverage existing resources while moving organizations toward a culture that promotes more routine training, including the advancement of skills for existing workers and the development of career pathways for new workers.</p> <p>a) Make contract awards – Award a total of approximately 67 contracts. Performance metrics may include but are not limited to: number of workers training, incumbent workers advanced or promoted, funds leveraged, new hires from LMI communities, and number of trainers trained.</p> <p>5) Curriculum Development - Where gaps are identified, invest in curriculum development and assess the need for new industry standards to address technological changes.</p> <p>6) Case Studies - Develop case studies to identify best practices and to illustrate career pathways in energy efficient building operations and maintenance. Templates- Work with industry partners to develop templates that identify interventions and combinations of interventions that can serve as a road map to advance skills and provide easy paths to entry-level jobs.</p> <p>7) Marketing Plan - Develop plan to market business demonstration and building operation and maintenance training project results and case studies. Plan will need to be tailored to the various sectors that can benefit from the results and lessons learned.</p>
Key Milestones	<p><u>Milestone 1 (2016)</u></p> <ul style="list-style-type: none"> • Convene industry partners for building operation and maintenance.

	<p><u>Milestone 2 (2016)</u></p> <ul style="list-style-type: none"> Identify employer champions, those who will help NYSERDA to lead the initiative, for building operations and maintenance. <p><u>Milestone 3 (2016)</u></p> <ul style="list-style-type: none"> Identify common labor-related barriers and potential training interventions. <p><u>Milestone 4 (2017-2018)</u></p> <ul style="list-style-type: none"> Identify and implement up to six business demonstrations. Collect performance data from demonstration sites for case studies and sharing results. <p><u>Milestone 5 (2017-2021)</u></p> <ul style="list-style-type: none"> Issue solicitations to support the development of building operations and maintenance training initiatives that address skills gaps and facilitate career paths. with multiple due dates as appropriate. <p><u>Milestone 6 (2018)</u></p> <ul style="list-style-type: none"> Identify one additional area (by sectors, industry or technology) to initiate industry partnership strategy to address workforce development and training needs to advance goals of CEF <p><u>Milestone 7 (2017-2018)</u></p> <ul style="list-style-type: none"> Data collected from demonstration sites to help demonstrate the business case for training. <p><u>Milestone 8 (2018-2020)</u></p> <ul style="list-style-type: none"> Develop and implement marketing plan to share results of business case demonstrations and building operations and maintenance project results. Share intervention templates with industry.
<p>Goals Prior to Exit</p>	<ul style="list-style-type: none"> Achievement of site-specific performance targets at business case demonstration sites. These may include the following: <ul style="list-style-type: none"> Energy savings/CO2 emissions reduced in buildings where on-site training is implemented Employee retention and/or reduced time to fill vacancies improved Training and skill enhancement institutionalized Trained worker wage increased, commensurate with skill enhancement New hires placed Employee turnover for trained workers reduced Career pathways better defined Tenant satisfaction/health/comfort improved Skills specific to technological barriers enhanced: <ul style="list-style-type: none"> Automated controls Network-connected systems Dissemination of best practices proving the return on investment for training and skill enhancement for workers. Improved coordination with Regional Economic Development Councils and Workforce Investment Board activities, including leveraging of funds where appropriate. Deploy an industry partnership model across other areas of the clean energy economy where justified by market readiness and strategic fit. Other areas may include: renewable thermal, storage, zero energy homes, renewables including offshore wind, high efficiency HVAC technologies and systems, advanced residential clean energy technologies or smart grid technology applications.

16.1.4 Relationship to Utility/REV

Utility Role/Coordination Points	<ul style="list-style-type: none"> • NYSERDA is coordinating sector strategy work with NYPA's training activities to share best practices and lessons learned and intends to engage other utilities through the stakeholder engagement process. • Many training partners already work closely with the utilities. Commercial building partners often have close relationships with their utilities and participate in energy efficiency incentive programs administered by their utilities. NYSERDA will seek to engage utility key account managers to help identify potential end users. • NYSERDA will also take advantage of the Clean Energy Advisory Council (CEAC) Clean Energy Implementation and Coordination Working Group to coordinate planning and implementation with the New York State utilities.
Utility Interventions in Target Market	<ul style="list-style-type: none"> • The industry partnership model leverages investments such as Build Smart NY, under which NYPA and SUNY implemented large scale energy efficiency upgrades at several SUNY campuses. The industry partnership model seeks to bolster these investments by improving worker skills so that systems are operated optimally in eligible buildings.

16.1.5 Budgets & Expenditures

An annual commitment budget for all activities included in this chapter is shown in Table 1. The annual expenditure projection is included in Table 2. Budgets and expenditures do not include Administration, Evaluation, or Cost Recovery Fee; these elements are addressed in the Budget Accounting and Benefits chapter filing. The budget as presented in the Budget Accounting and Benefits Chapter will serve as the basis for any subsequent reallocation request. The additional level of detail presented within the table below is intended for informational purposes only.

Table 1: Annual Market Development Budget Allocation – Commitment Basis

Commitment Budget	2016	2017	2018	2019	2020	2021	Total
Direct Incentives and Services	\$35,000	\$3,465,000	\$1,600,000	\$6,100,000	\$6,500,000	\$1,650,000	\$19,350,000
Tools, Training, and Replication	\$-	\$220,000	\$300,000	\$250,000	\$100,000	\$50,000	\$920,000
Implementation Support	\$175,000	\$50,000	\$50,000	\$400,000	\$350,000	\$50,000	\$1,075,000
Total	\$210,000	\$3,735,000	\$1,950,000	\$6,750,000	\$6,950,000	\$1,750,000	\$21,345,000

Table 2: Annual Expenditures Projection

Expenditures	2017	2018	2019	2020	2021	2022	2023	2024	Total
Total	2%	4%	10%	22%	21%	22%	14%	7%	100%

16.1.6 Progress and Performance Metrics

Table 3 provides program Activity/Output indicators representing measurable, quantifiable direct results of activities undertaken in the initiative. Outputs are a key way of regularly tracking progress, especially in the early stages of an initiative, before broader market changes are measurable. Outcome indicators can encompass near-term through longer-term changes in market conditions expected to result from the activities/outputs of an intervention. Outcome indicators will have a baseline value and progress will be measured periodically through Market Evaluation.

Table 3. Initiative Specific Metrics

Indicators ⁶		Baseline (Before/Current)	2019 (Cumulative)	2022 (Cumulative)
Activity/Outputs	Increase in number of workers trained	0	435	2,550
	Increase in the percent of trainees obtaining national certifications	0%	20%	30%
Outcomes	Increase number of staff qualified to train others	0	90	210
	Increase in number of industry partnerships	1	3	3
	Increase number of new curricula available	0	3	11
	Improve performance and efficiency of building systems	0%	5%	10%
	Number of incumbent workers advanced/promoted	0	108	250
	Number of individuals placed into paid internships/OJT/apprenticeships	0	136	210
	Number of disadvantaged (LMI) workers placed in building operations and maintenance jobs	0	35	45

In addition to the above outcomes, NYSERDA will also assess:

- Increased wages for trainees
- Improved employee retention
- Decreased time for employer to find and hire new talent with the appropriate skills.

⁶ A 0 (zero) denotes that the actual value is currently believed to be zero for baseline/market metrics.

Benefits shown in Table 4 and Table 5 are direct, near term benefits associated with this initiative's projects. These benefits will be quantified and reported on a quarterly basis and will be validated through later evaluation.

Table 4. Direct Impacts⁷

Primary Metrics		2017	2018	2019	2020	2021	TOTAL
Energy Efficiency	MWh Annual	55,200	30,100	100,000	115,000	35,100	336,000
	MWh Lifetime	441,000	241,000	802,000	923,000	281,000	2,688,000
	MMBTu Annual	365,000	199,000	664,000	764,000	232,000	2,225,000
	MMBTU Lifetime	2,920,000	1,590,000	5,310,000	6,110,000	1,860,000	17,800,000
	MW	-	-	-	-	-	-
Renewable Energy	MWh Annual	-	-	-	-	-	-
	MWh Lifetime	-	-	-	-	-	-
	MW	-	-	-	-	-	-
CO ₂ e Emission Reduction (metric tons) Annual		48,400	26,400	88,000	101,000	30,800	294,800
CO ₂ e Emission Reduction (metric tons) Lifetime		387,000	211,000	704,000	810,000	246,000	2,359,000
Customer Bill Savings Annual (\$ million)		\$9.35	\$ 5.1	\$17	\$19.6	\$5.95	\$56.97
Customer Bill Savings Lifetime (\$ million)		\$74.8	\$40.8	\$136	\$156	\$47.6	\$455.8
Private Investment (\$ million)		\$4.59	\$3	\$5.25	\$5.85	\$3.23	\$ 21.92

Table 5. Annual Projected Initiative Participation

	2017	2018	2019	2020	2021	Total
Participants ⁸	11	6	20	23	7	67

Benefits shown in Table 6 represent the estimated indirect market effects expected to accrue over the longer term as a result of this investment and follow on market activity. The indirect benefits that accrue from this investment will be quantified and reported based on periodic Market Evaluation studies to validate these forecasted values. Market Evaluation may occur within one year (-/+) of the years noted in the table and projected future indirect benefits and/or budgets necessary to achieve them may be updated based on the results of market evaluation. Indirect

⁷ Impacts are expressed on a commitment-year basis, and are incremental additions in each year. Assumes an 8-year measure life. Benefits are rounded to three significant figures. Totals may not sum due to rounding. Customer Bill Savings are calculated as direct energy bill savings realized by customers participating in NYSERDA's programs.

⁸ Participants are defined as contracts with employers.

impact across NYSERDA initiatives may not be additive due to multiple initiatives operating within market sectors. The values presented below are not discounted, however NYSERDA has applied a discount of 50% to the overall portfolio values in the Budget Accounting and Benefits chapter.

Table 6. Estimated Indirect Market Impact

Indirect Impact		2020	2025	2030
Energy Efficiency	MWh Cumulative Annual	264,000	1,440,000	2,740,000
	MMBtu Cumulative Annual	1,750,000	8,910,000	18,200,000
Renewable Energy	MWh Cumulative Annual			
	MW			
CO2e Emission Reduction (metric tons) Cumulative Annual		232,000	1,230,000	2,410,000

16.1.7 Fuel Neutrality

Fuel Neutrality	<ul style="list-style-type: none"> NYSERDA intends to offer this initiative in a fuel neutral manner to encourage more efficient use of all fuel types. Offering the initiative on a fuel neutral basis will allow NYSERDA to achieve savings at a cost of \$72 per ton of carbon, compared to a cost of \$121 per ton of carbon in an electric only scenario.
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16.1.8 Performance Monitoring and Evaluation Plans

Performance Monitoring & Evaluation Plan	<p>NYSERDA’s approach to monitoring and assessing the effectiveness of the initiative and overall market development is described below.</p> <p><u>Test-Measure-Adjust Strategy</u></p> <ul style="list-style-type: none"> Annual starting 2017: reporting on building and maintenance industry partnership approach to test if optimizing operation and maintenance strategies to keep building equipment and systems operating efficiently reduces the risk of early equipment failure, unscheduled down time, high utility costs, and tenant complaints and turnover. Assess and validate the sector partnership approach and adjust the program design or activity as needed. Annual starting 2018: Impacts of efficient building operation on a facility’s net operating income and overall value will be captured via annual reporting. Additionally, impacts on energy efficiency and emission reductions due to well-trained workers better maintaining and operating energy efficient systems will be assessed. Annually starting 2017: Test to see if business case demonstrations have proven the business case for investing in training and for developing internal training mechanisms and career advancement for workers in occupations in this sector in a wide range of markets. Adjust the program design or specific activity as needed. 2019: Assess if business case demonstrations have supported the development of more effective talent strategies and facilitates the adoption of an energy culture within facilities and across organizations.
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	<p><u>Market Evaluation</u></p> <ul style="list-style-type: none"> • Market Evaluation will draw on the logic model and will include baseline and longitudinal measurement of key indicators of programmatic and broader market success. • Baseline measurements of key market indicators will occur within one year following initiative approval and will provide additional insights that will allow NYSERDA to adjust the strategy. These include but are not limited to: increased wages for trainees, increase in number of workers trained, and employee retention. • Regular (e.g., annual or biennial) updates to key performance indicators and measurement of market change, including but not limited to: number of incumbent workers advanced/promoted, of industry partnerships established, number of workers who participate in an internship or apprenticeship, and disadvantaged workers (LMI) entering building operations and maintenance careers. • Sources of data include intervention data, public and commercially available data, and primary data collection through surveys of key market actors. <p><u>Impact Evaluation/Field Verification</u></p> <ul style="list-style-type: none"> • Evaluation M&V will be conducted for a sample of participating spaces/buildings, according to the International Performance Measurement & Verification Protocol (IPMVP) method(s) most appropriate given the improvements made. Data from Field Verification/Impact Evaluation can be used to help lend confidence in the market, especially among other end users.
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16.2 Clean Technology and Energy Efficiency Talent Pipeline

16.2.1 Overview

<p>Present Situation</p>	<ul style="list-style-type: none"> • In the 2017 NY Clean Industry Report,⁹ 75% of clean energy firms surveyed reported overall hiring difficulty over the past 12 months, with 25% of firms indicating that hiring had been very difficult. The most difficult positions to fill included engineers (41%), installers/technicians (24%), and sales positions (21%). The highest reported deficiencies for open positions were for occupation-specific skills (37%) and relevant prior experience (29%). • Firms across the state report experiencing a shortage of qualified candidates to fill entry level and advanced positions, a gap in skills in trained workers as hiring requirements (credentials and experience) have changed and increased, and obsolete training curriculum that is not keeping up with changing business needs. Gaps are seen in both technical training and hands-on experience. • Difficulty in finding qualified applicants is impeding economic growth. It is common practice for employers to spend six to twelve months and thousands of dollars to recruit, train and retain workers, leading to: <ul style="list-style-type: none"> ○ Reduced profits ○ Lost business opportunities especially related to new technologies/innovation ○ Vacancies that are open for longer periods of time ○ Adverse impacts on the performance of existing workers due to longer vacancies ○ Higher turnover rates ○ Negative impacts on customer service ○ Longer times to full productivity for new hires ○ Higher soft costs for completing energy efficiency projects • A talent pipeline, a proactive approach to defining, attracting and developing the right mix of critical talent in a pool of internal and external candidates, can help support and grow businesses throughout the supply chain. • This effort will be coordinated with the Industry Partnership initiative to ensure a consistent and complementary approach to workforce development in New York. The initiatives will operate in tandem where possible to leverage market dissemination channels, share best practices, and facilitate adaptation and adoption of successful approaches.
<p>Intervention Strategy</p>	<ul style="list-style-type: none"> • NYSERDA will create a talent pipeline to ensure that NYS clean technology (cleantech) and energy efficiency businesses have a robust supply of new and existing workers with the required occupational skills, credentials and experience. This will ensure workers are trained to provide the professional services (including A&E and research) and technical skills necessary to design, manufacture, specify, sell, distribute, install, operate, maintain, repair, and inspect clean energy technology and systems. Initial focus areas include: <ul style="list-style-type: none"> ○ Offshore wind (OSW) ○ Energy efficiency ○ Cleantech companies, including startups • Activities will focus on expanding training infrastructure and capacity and offsetting the cost of hiring and training new workers, which can lead to soft

⁹ New York Clean Energy Industry Report, 2017, NYSERDA. <https://www.nyserda.ny.gov/-/media/Files/Publications/Clean-energy-industry/2017-clean-energy-industry-report.pdf>

	<p>cost reductions by decreasing the time and costs associated with getting a worker to full productivity.</p> <ul style="list-style-type: none"> • For a visual representation of this strategy, please reference the flow chart entitled “Logic Model: Clean Technology and Energy Efficiency Talent Pipeline,” which can be found in Appendix A.
Goals	<ul style="list-style-type: none"> • Support the development of new curriculum and new training programs, informed by cleantech and energy efficiency business needs, that feature hands-on work experience. • Increase the energy efficiency content of existing training. • Support businesses, including startups, looking to hire new cleantech and energy efficiency workers through internships, on-the-job training (OJT) and apprenticeships. • Support training for an estimated 3,500 OSW jobs that will be created in NYS by 2030. • Address the need for new skills for existing workers throughout the OSW supply chain.
State Energy Plan/Clean Energy Standard Link	<ul style="list-style-type: none"> • The State Energy Plan highlights the importance of energy efficiency and calls on NYSERDA to “seek to address the diverse set of remaining barriers with new programs and strategies that unlock the potential of energy efficiency to reduce operating costs, spur investment, and create jobs throughout the State.” This initiative will address barriers related to workforce development, enabling increased installations of energy efficiency and renewable energy. • The State Energy Plan also directs New York to look for opportunities to leverage the Regional Economic Development Councils, to identify workforce needs, and engage the Workforce Development and Training sector to help shape curriculum--particularly at the State University of New York (SUNY), City University of New York (CUNY), community colleges, and technical institutes--including short courses and incumbent worker retraining.

16.2.2 Target Market Characterization

Target Market Segment(s)	<p>Initial focus areas will include offshore wind, energy efficiency, and cleantech. Efforts will target businesses and training providers serving the focus areas. Workers include professionals and practitioners along the clean energy value chain that provide cleantech and energy efficiency related services and solutions including, but not limited to, professional services (architecture, engineering, R&D and other related services), audits, system installation, sales and distribution, inspections, manufacturing, and operation and maintenance.</p>
Market Participants	<p>Market participants include:</p> <ul style="list-style-type: none"> • Clean energy businesses seeking to expand capacity or meet demand, including cleantech startups. • Businesses seeking to expand or evolve to include clean energy products and services. • Clean energy training providers, including unions, seeking to expand or add new clean energy content or training. • New and existing workers looking to obtain, retain, or upgrade skills. • Community-based organizations. • Disadvantaged, displaced, and dislocated workers and veterans.
Market Readiness	<ul style="list-style-type: none"> • For OSW, extensive work with pertinent constituencies has confirmed that there are skills gaps in NYS for this industry, which is just beginning in NYS. While workers are not likely to be needed until 2022-2024, planning for recruitment and training infrastructure can begin as soon as 2019.

	<ul style="list-style-type: none"> • NYSERDA has worked with over 70 training providers to develop training programs in wind, solar, clean energy heating and cooling, energy efficiency and other technology areas. NYSERDA also worked with the Green Jobs Green NY Workforce Working Group to continue collaboration among clean energy businesses and training providers for continued market insights. This work has confirmed that the strategies proposed in this plan, while needing updating for current market conditions and evolving technologies, are an effective means of building the pool of skilled talent that clean energy employers seek.
Customer Value	<ul style="list-style-type: none"> • Businesses value profitability, skilled workers, having a competitive edge and increasing productivity. • Training providers value support in developing training content (curricula) and infrastructure (equipment, trainers) that will match business demand for new skills. • Workers value professional development and career advancement, learning by doing and earning while they learn, jobs paying a family wage that utilize their skills, contributing to a clean energy future, and job security. • Consumers value cost effective, reliable solutions and a better trained workforce can reduce labor-related costs, reduce installation and maintenance errors, and reduce callbacks.

16.2.3 Stakeholder/Market Engagement

Stakeholder/Market Engagement	<ul style="list-style-type: none"> • NYSERDA has convened many stakeholder sessions to obtain input on OSW and has completed an assessment of training needs as part of OSW Master Plan. Technical working groups are also being formed, including a group related to jobs and training. Once formed, the technical working group will be leveraged to gather additional input on OSW needs. • NYSERDA has engaged extensively with the New York State Department of Labor, unions, HVAC, renewable heating and cooling and other energy efficiency service providers who have indicated that they are having difficulty finding workers with the right skills (professional and technical) and practical experience. They noted that it takes months and thousands of dollars to recruit, hire and train a new worker. Additional engagement will be ongoing to assist in the development of solicitations and intervention testing. • Cleantech companies indicated through interviews that they are facing difficulty hiring new workers and workers with some experience. Cleantech startups indicated that training is needed to address the shortage of experienced, high-skilled individuals that can provide much needed guidance and mentorship to less experienced individuals. Additional stakeholder engagement will be conducted to test interventions to determine the best approach to meet the cleantech startup needs.
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16.2.4 Theory of Change

Market Barriers Addressed	<ul style="list-style-type: none"> • Insufficient supply of skilled workers. In addition to the expected growth of clean energy business, large numbers of skilled workers are expected to retire, exacerbating an existing shortage of workers with the required skills and relevant experience to work in clean energy jobs. NYSERDA programs will focus on building the infrastructure to train more workers on cleantech and energy efficiency. • Training programs are not aligned with business needs. Due to high costs to update training programs and provide practical experience, curricula are not keeping pace with innovations in the clean energy space. Financial support for new curriculum and practical experience driven by business needs will address training gaps.
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	<ul style="list-style-type: none"> • Business risk aversion. There are costs and risks for both businesses and training partners associated with developing partnerships to expand and improve curriculum and facilitate opportunities for internships, apprenticeships and job placements. Wage support through OJT and an internship program will reduce risks to businesses. • High costs to hire workers. Data has shown that 60% of employers have vacancies that last up to three months, and that it can take 6-12 months and an estimated \$15,000¹⁰ to bring a new hire up to full productivity if they do not have the right skills. The OTJ training and internships will help offset the costs of hiring workers and result in reducing soft costs associated with energy efficiency work.
<p>Testable Hypotheses</p>	<ul style="list-style-type: none"> • If NYSERDA supports business-driven skills training in the highest need markets and increases the State’s training capacity, cleantech and energy efficiency businesses, and startups will spend less time filling open positions and bringing workers to full productivity (new and existing workers). • If businesses have access to workers with the right skills, then overall soft costs for energy efficiency projects will go down. • If soft costs are reduced, then businesses will expand cleantech and energy efficiency sales and services, increasing career opportunities for workers, and reducing costs for energy efficiency services.
<p>Activities</p>	<p><u>Expand Training Infrastructure</u> NYSERDA will partner with training organizations to expand training capacity in New York State, enabling training entities to update training content to prepare workers for clean technologies,¹¹ increase the number of people they are able to train, and increase access to practical experience. The training efforts will be employer-led and based on the occupational skills new hires and existing workers need to support business demands. NYSERDA will:</p> <ul style="list-style-type: none"> • Issue competitive solicitations to select training providers. Training providers may include colleges and universities, trade associations, unions, technical high schools and Boards of Cooperative Educational Services (BOCES). • Training activities will incorporate job preparation and job placement initiatives. The solicitations will provide funding to training providers for a variety of activities, including curriculum development, training trainers, equipment purchases, and business partnerships to offer internships, pre-apprenticeships, and apprenticeships. • NYSERDA will also utilize the competitive solicitation to select and provide financial support to business-facing intermediaries, such as community-based organizations, who work closely with clean energy businesses, training providers, and potential employees to better prepare workers for new clean energy job openings. <p><u>Offset the cost of hiring and training new workers</u> Provide businesses with incentives to hire and train new workers, reducing the time needed to get workers to full productivity and improve job retention. NYSERDA will:</p> <ul style="list-style-type: none"> • Issue an open enrollment program for which clean energy businesses are eligible to apply for funding to offset the cost to hire new workers through OJT. The program will initially focus on cleantech and energy efficiency, with a separate OSW effort launching later. If other areas in need of OJT support are identified, NYSERDA will assess whether the open enrollment program should be expanded. • Develop and implement an internship program to match college and technical high school students with businesses. The internship program will be an open enrollment application program for businesses to apply for funding for interns hired through the

¹⁰ CareerBuilder

¹¹ Initial focus areas include offshore wind, cleantech, and energy efficiency. However, NYSERDA will consider other clean technology areas if the need arises.

	program. Eligible student resumes will be submitted to NYSERDA and made available to businesses.
Key Milestones	<p><u>Milestone 1 (2018)</u></p> <ul style="list-style-type: none"> Issue clean energy training infrastructure and capacity building solicitation, Round 1 <p><u>Milestone 2 (2018)</u></p> <ul style="list-style-type: none"> Issue open enrollment OJT program <p><u>Milestone 3 (2018)</u></p> <ul style="list-style-type: none"> Issue open enrollment internship program <p><u>Milestone 4 (2020)</u></p> <ul style="list-style-type: none"> Issue clean energy training infrastructure and capacity building solicitation, Round 2 <p><u>Milestone 5 (2020)</u></p> <ul style="list-style-type: none"> Revise and reissue OJT and internship PONs <p><u>Milestone 6 (2021)</u></p> <ul style="list-style-type: none"> Issue clean energy training infrastructure and capacity building solicitation, Round 3, focused on OSW <p><u>Milestone 7 (2021)</u></p> <ul style="list-style-type: none"> Issue open enrollment OJT program focused on OSW
Goals Prior to Exit	<ul style="list-style-type: none"> Clean energy content routinely integrated into relevant course curricula for degree and certificate programs. Expansion of training closely coordinated with clean energy industry needs. Internships become a more common feature of degree programs. Reduced risk associated with recruiting and onboarding new hires for clean energy work and improvements in employee retention.

16.2.5 Relationship to Utility/REV

Utility Role/Coordination Points	<ul style="list-style-type: none"> NYSERDA is working with NYPA to coordinate training activities where possible and to share best practices and lessons learned. NYSERDA is also working with Con Edison on a training demonstration for contractors working on steam distribution systems in multifamily buildings. NYSERDA will continue to engage utilities through the stakeholder engagement process. Many training partners work closely with the utilities. Commercial and industrial partners have good relationships with the utilities and many participate in utility energy efficiency programs.
Utility Interventions in Target Market	<ul style="list-style-type: none"> While utilities do not have direct workforce development efforts in the market, NYSERDA’s current workforce training activities are helping businesses optimize the performance of their energy technologies and systems, including new technologies supported through investor-owned utility and NYPA programs.

16.2.6 Budgets & Expenditures

An annual commitment budget for all activities included in this chapter is shown in Table 7. The annual expenditure projection is included in Table 8. Budgets and expenditures do not include Administration, Evaluation, or Cost Recovery Fee; these elements are addressed in the Budget

Accounting and Benefits chapter filing. The budget as presented in the Budget Accounting and Benefits Chapter will serve as the basis for any subsequent reallocation request. The additional level of detail presented within the table below is intended for informational purposes only.

Table 7: Annual Market Development Budget Allocation – Commitment Basis

Budget	2018	2019	2020	2021	2022	2023	2024	2025	Total
Direct Incentives and Services	\$700,000	\$8,400,000	\$9,000,000	\$10,900,000	\$10,500,000	\$2,500,000	\$1,500,000	\$1,500,000	\$45,000,000
Implementation Support	\$300,000	\$600,000	\$500,000	\$350,000	\$200,000	\$50,000	\$-	\$-	\$2,000,000
Total	\$1,000,000	\$9,000,000	\$9,500,000	\$11,250,000	\$10,700,000	\$2,550,000	\$1,500,000	\$1,500,000	\$47,000,000

Table 8: Annual Expenditures Projection

Expenditures	2019	2020	2021	2022	2023	2024	2025	2026	Total
Total	3%	8%	14%	20%	24%	17%	12%	3%	100%

16.2.7 Progress and Performance Metrics

Table 9 provides program Activity/Output indicators representing measurable, quantifiable direct results of activities undertaken in the initiative. Outputs are a key way of regularly tracking progress, especially in the early stages of an initiative, before broader market changes are measurable. Outcome indicators can encompass near-term through longer-term changes in market conditions expected to result from the activities/outputs of an intervention. Outcome indicators will have a baseline value and progress will be measured periodically through Market Evaluation.

Table 9. Initiative Specific Metrics

Indicators¹²		Baseline	2022 (Cumulative)
Activity/Outputs	Students placed in internships by training providers as part of training through this initiative	0	600
	Interns hired directly by businesses through Internship Program ¹³	0	700
	New hires through OJT Program	0	1,500

¹² NYSERDA will update the information in this table as the information becomes available. A 0 (zero) denotes that the actual value is currently believed to be zero for baseline/market metrics.

¹³ Interns hired directly by business through the Internship Program will be separate and unique from students placed in internships by training providers.

	Total workers trained through this initiative	0	10,000
	Curriculum developed or modified through this initiative	0	9
	Number of trainers trained through this initiative	0	90
Near-Term Outcomes	Reduced time to hire and train new workers	0	20%
	Reduced cost to recruit and hire new workers	0	30%
Mid-and Long-Term Outputs	Decreased time for new workers to reach full productivity (i.e. work independently, fewer errors, increased job retention)	0	20%
	Create new businesses and training provider partnerships through this initiative	0	25

Benefits shown in Table 10 and Table 11 are direct, near term benefits associated with this initiative’s projects. These benefits will be quantified and reported on a quarterly basis and will be validated through later evaluation. Due to the upstream nature of the training activities related to building a talent pipeline in several focus areas, estimating energy savings impacts at this stage is difficult because activities are focused on training and preparing people for jobs or responsibilities that are not yet defined or may change over time. Therefore, while these energy benefits cannot be accurately forecast, they will be assessed and reported as the initiative moves forward.

Table 10. Direct Impacts

Primary Metrics ¹⁴		2018	2019	2020	2021	2022	2023	2024	2025	TOTAL
Energy Efficiency	MWh Annual									
	MWh Lifetime									
	MMBtu Annual									

¹⁴ Impacts are expressed on a commitment-year basis and are incremental additions in each year. Totals may not sum due to rounding.

	MMBtu Lifetime									
	MW									
Renewable Energy	MWh Annual									
	MWh Lifetime									
	MW									
CO2e Emission Reduction (metric tons) Annual										
CO2e Emission Reduction (metric tons) Lifetime										
Customer Bill Savings Annual (\$ million)										
Customer Bill Savings Lifetime (\$ million)										
Private Investment (\$ million)		\$0.03	\$1.23	\$8.65	\$12.88	\$15.18	\$15.00	\$11.90	\$3.87	\$68.64

Table 11. Annual Projected Initiative Participation

Additional Performance Tracking Metrics	2018	2019	2020	2021	2022	2023	2024	2025	Total
Participants ¹⁵	29	390	2,375	3,475	5,875	6,525	4,929	1,575	25,173

16.2.8 Fuel Neutrality

Fuel Neutrality	<ul style="list-style-type: none"> • NYSERDA will offer this initiative in a fuel neutral manner to encourage training on technologies and practices supported by all fuel types.
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16.2.9 Performance Monitoring and Evaluation Plans

Performance Monitoring & Evaluation Plan	<p>NYSERDA’s approach to monitoring and assessing the effectiveness of the initiative and overall market development is described below.</p> <p><u>Test-Measure-Adjust Strategy</u></p> <ul style="list-style-type: none"> • Annually starting in 2019 (or one year after each program begins), NYSERDA will collect data on numbers trained, partners engaged, internships, job placements, size of hiring pool, numbers of businesses participating in OJT, number hired for OJT, and reports on reduced hiring time. The data will be used
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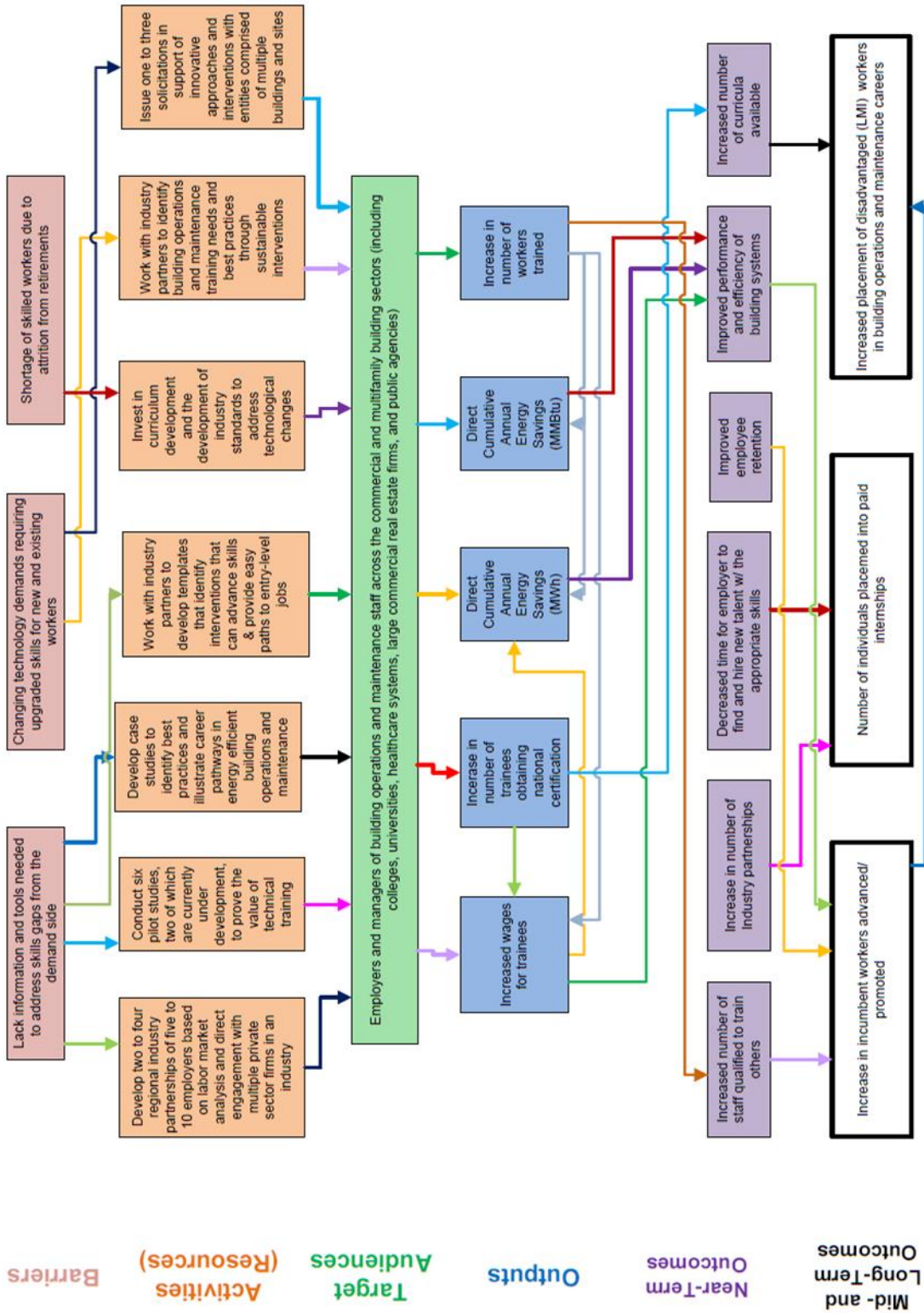
¹⁵ Participants will include professionals and practitioners that provide cleantech and energy efficiency related services and solutions including, professional services (architecture, engineering, R&D and other related services), audits, system installation, sales and distribution, installation, commissioning, inspections, manufacturing, operation and maintenance.

	<p>to assess and validate the capacity-building approach and adjust the program design or activity as needed.</p> <ul style="list-style-type: none"> • Annually starting in 2020, the impacts of capacity-building approaches on clean energy businesses will be captured via annual reporting and through surveys and interviews conducted for the 2018 update to the Clean Energy Industry Report. <p><u>Market Evaluation</u></p> <ul style="list-style-type: none"> • Market evaluation will leverage data from the 2017 New York Clean Energy Industry Report, as well as the 2018 update to the report, that focuses on the size, scope and potential growth of the State’s clean energy economy. • Market Evaluation will draw on the logic model and will include baseline and longitudinal measurement of key indicators of programmatic and broader market success. • Baseline measurements of key market indicators will occur as needed within one year following initiative launch to align with several solicitations that will focus on expanding training infrastructure/capacity and offsetting the cost of hiring and training new workers. These baseline measurements will provide additional insights that will allow NYSERDA to adjust the strategy. NYSERDA will not baseline indicators that list a zero as the baseline value but may baseline other indicators to help inform the strategy. • Market evaluation activities will focus on the effectiveness of training efforts and associated trainee learning; the Kirkpatrick Model¹⁶ serves as a methodology to conduct such assessments and will be incorporated into the evaluation. • Regular (e.g., annual or biennial) updates to key performance indicators and measurement of market change, including but not limited to: decreasing the time for a new worker to reach full productivity including the impact on soft costs and creating new businesses and training provider partnerships through this initiative. • Sources of data include intervention data, public and commercially available data, and primary data collection through surveys of key market actors.
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¹⁶ The four levels of the Kirkpatrick Model are Level 1: Reaction – the degree to which participants find the training favorable, engaging and relevant to their jobs; Level 2: Learning – the degree to which participants acquire the intended knowledge, skills, attitude, confidence and commitment based on their participation in the training; Level 3: Behavior – the degree to which participants apply what they learned during training when they are back on the job; and Level 4: Results – the degree to which targeted outcomes occur as a result of the training and the support and accountability package (<https://www.kirkpatrickpartners.com/Our-Philosophy/The-Kirkpatrick-Model>). In the past, NYSERDA has evaluated Workforce Development activities using an adapted version of this model.

Appendix A – Logic Models

LOGIC MODEL: Workforce Development and Training: Industry Partnerships



LOGIC MODEL: Clean Technology and Energy Efficiency Talent Pipeline

