Case 14-M-0094, Proceeding on Motion of the Commission to Consider a Clean Energy Fund

Clean Energy Fund Investment Plan: Industrial Chapter

Portfolio: Market Development

Submitted by:

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5 Industrial

NYSERDA aims to address energy efficiency opportunities in the industrial sector that focus on process efficiency improvements. Acceleration of activity in the Industrial sector requires decision-makers to be able to more easily determine their options and have confidence in their investment decisions. Initiatives will aim to overcome barriers impeding progress including: risk aversion by facility managers and decision makers that energy efficiency could disrupt industrial processes, lack of in-house expertise in energy management, lack of trust in the energy efficiency technology to deliver the intended benefits for the company, and a lack of attractive service offerings to say "yes" to as suppliers often lack scale and a ready market for which to develop more compelling offerings and cost and finance sensitivity.

The first initiative described in this Chapter is Continuous Energy Improvement, which aims to integrate the adoption of energy efficiency and clean energy into companies' core business processes. Programming and resources provided will focus on identifying areas for improvement, driving managerial and corporate behavioral changes with respect to energy, developing the mechanisms to track energy optimization efforts versus other business investment opportunities, and allowing companies to become accustomed to energy management with minimal risk.

Projected additional initiatives under development include: Credible Measurement and Verification, which aims to facilitate the use of credible measurement & verification services by providing tools and resources; a Green Data Center Consortium to provide a platform to educate both information technology and facilities staff on how to apply energy efficiency best practices to their data centers while achieving reliability; and, an Industrial Best Practices and Emerging Technologies initiative.

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

5.1 Continuous Energy Improvement

5.1.1 Overview

Present Situation	• Industrial energy use represents 7.4%[1] of total energy use (across all sectors) in the state and 4% of electric economic energy efficiency potential, 11% of natural gas economic energy efficiency potential, and 2% of petroleum fuels economic energy efficiency potential. • Energy is one of the largest operational costs for manufacturers, sometimes exceeded only by raw material and labor costs. Investing in process and energy efficiency projects can help lower those energy costs, and improve a company's bottom line and overall competitiveness. Addressing the industrial sector's energy management requires a range of solutions designed to help

[1] NYSERDA Patterns & Trends 2013 report (published Oct 2015).

	manufacturers of various levels of sophistication improve their energy efficiency. • While a full-time On-site Energy Manager would afford a manufacturer with the dedicated focus and expertise to pursue and implement energy efficiency projects, many industrial organizations lack awareness of the costs and benefits of dedicating a fulltime energy manager staff member relative to other business investment opportunities. • Strategic Energy Management (SEM) – a continuous improvement approach to reducing energy intensity over time, characterized by demonstrated customer commitment, planning and implementation, and systematic measurement – provides the opportunity to achieve systematic energy savings. Yet currently in New York there are limited resources, both internal to industrial facilities and in the external market, that are able to support this approach, despite the growing interest in pursuing it. • The number of SEM programs offered by program administrators across the United States and Canada grew rapidly from 7 in 2011 to 21 in 2014, demonstrating interest by the industrial sector. Currently, there are three strategic energy management programs in the Northeast region. Discussions with market actors have indicated that New York State's involvement in offering SEM could push adoption of this strategy within industrial facilities in the state and expand the market in the region for service providers.
Intervention Strategy	• This Continuous Energy Improvement initiative will look to address both the interest in On-site Energy Managers and the availability of Strategic Energy Management resources. Sponsoring On-site Energy Managers who support project identification, implementation, and clearly demonstrate the value proposition of process and energy efficiency projects, and implementing SEM which promotes operational, organizational and behavioral changes resulting in energy efficiency gains on a continuing basis, would allow industrial facilities to better manage their energy. • The On-site Energy Manager component of this initiative will also promote the development of a pool of experts needed to support SEM and achieve continuous energy efficiency. Having On-site Energy Manager resources, whether contracted or permanent staff, will be critical not only to the broader adoption of SEM but also to support the introduction of Self Direct utility programs in 2017. • Through this initiative, NYSERDA intends to prove the business case for integrating energy efficiency as a core business practice and applying the principles of continuous improvement to energy management, fostering substantial, long-term savings. • Industrial customers may opt to accomplish this with the support of a dedicated On-site Energy Manager or through a structured series of 'learn by doing' Strategic Energy Management cohort training. • Over the next two to three years, NYSERDA will conduct multiple pilots, each with approximately 10-15 large and medium industrial facilities, to guide manufacturers through the process of establishing and implementing an SEM system or to match manufacturers with a cost-shared On-site Energy Manager to prove the business case for this dedicated resource. • The data from these pilots will be disseminated to the market along with training and developed tools to support integration of continuous energy improvement and increased adoption of an energy culture within industrial facilities. • For a visual representation of this strategy, please reference the flow charts entitled "Logic Model: On-site Energy Manager" and "Logic Model: Industrial Strategic Energy Management," which can be found in Appendix A.

Goals	• The value of an On-site Energy Manager role in industrial facilities will become standardized, fostering the emergence of an on-site energy manager provider market which will gain traction and become self-sustaining. • Build the market demand for SEM through pilot cohorts and follow up information illustrating the value of SEM. • Provide training to and develop partnerships with consulting firms and other relevant market actors to grow the market supply of industrial SEM trainers. • Ultimately, SEM will be a key factor for staying competitive in the industrial sector due to the volume of energy and cost savings achievable by facilities.
State Energy Plan/Clean Energy Standard Link	This strategy contributes to NYS Energy Plan goals for energy efficiency and emission reductions through program participants implementing energy efficiency and productivity projects as well as behavioral and operational changes.

5.1.2 Target Market Characterization

Target Market Segment(s)	• In New York there are approximately 820 large and 1910 medium industrial facilities. • Large industrial firms' annual energy expenditures exceed $1M, medium industrial customers' annual energy expenditures between $500,000 to $1M, small industrial customers' annual energy expenditures $500,000 and below. • The target market is industrial facilities in NYS with high energy intensity (i.e., high energy associated with a process relative to the output of the process) and high energy costs relative to other business costs. • Likely pilot participants are industrial sites whose organization and management are poised to support a structured, long-term management plan to influence operational, organizational, and behavioral changes resulting in continual improvements in energy performance.
Market Participants	• Critical Staff: facility and process engineers, production and plant managers, operations and maintenance managers, energy managers, and C-suite executives • Multiple industrial decision-makers: facility, production, managerial, On-site Energy Managers • Energy-focused Process consultants • Utility Companies • Manufacturing Groups
Market Readiness	<u>On-Site Energy Manager</u> • Early adopters include the largest manufacturers in New York which often have dedicated energy managers, or manufacturers which are provided similar resources through corporate energy teams. Other companies may have employees who address energy or sustainability as part of a larger role. • Service providers are ready and willing to provide on-site services and have capabilities that can be leveraged. <u>Strategic Energy Management</u> • National industrial market leaders and large corporations with aggressive energy goals have begun to implement SEM in various forms, including EPA's Energy Star for Energy Management, ISO 50001, and DOE's Superior Energy Performance. • Interest for further growth of SEM is evidenced by the 2015 American Council for an Energy-Efficient Economy (ACEEE) Summer Study on Energy Efficiency in Industry conference where over 200 papers focusing on SEM topics were submitted, and an entire track was devoted to SEM.

	• SEM is scalable and applicable to a broad range of manufacturing facilities regardless of size or industry because it is a management system and is not limited to any piece of equipment or process. • Information obtained from SEM working groups and the Consortium for Energy Efficiency's 2014 SEM Program Case Studies Report indicate that service providers assist in the delivery of SEM programs across the United States and Canada. These companies have gained experience leading and managing strategic energy management programs and are able to provide support to this strategy in New York. Voice of Customer discussions also indicate that once the state of New York provides an SEM offering to the marketplace, it will develop and bolster the service provider network for strategic energy management on the east coast. • There are existing tools in the market that can assist and guide this strategy that include: o DOE eGuide o DOE Energy Management Guidelines o The US EPA's ENERGY STAR Guidelines for Energy o EPA: Small and Medium Sized Manufacturer Energy Guide o DOE - EnergyPlus o Energy Star Portfolio Manager o EPA's Energy Use Assessment Tool o CEE: SEM Minimum Elements guide
Customer Value	Industrial facilities operate in a highly competitive environment with tight margins. Particularly in energy-intensive industrial sectors, effective management of energy expenditures is crucial to remaining profitable and competitive. Projected benefits to the customer of a dedicated On-site Energy Manager resource include: • Estimated annual cost of fully burdened, full time On-site Energy Manager to hire permanently or contract is approximately $250,000 • Under this risk reduction pilot NYSERDA would provide a cost share of up to 75% of one-year's cost of an energy manager or $187,500 for a net $62,500 cost to customer • Pilot annual energy savings range minimally from $80,000 to $210,000 for medium and large sites, respectively, based upon average EEPS2 Industrial and Process Efficiency electric and natural gas project savings. This yields paybacks of less than 2 years without NYSERDA pilot cost-share and less than 1 year with NYSERDA pilot cost-share. Lifetime savings are $1,200,000 to $3,150,000, medium and large respectively. • Other non-energy benefits from production improvements (scrap reduction, process time improvements, sustainability measures like water savings, etc.) may be substantial for industrial facilities and further improve the cost justification/value proposition of these initiatives. Projected benefits to the customer of implementing a Strategic Energy Management system include: • Participants, on average, will reduce their overall electric energy consumption by 4 percent during the first year of SEM implementation. • Estimated cost of an individual industrial facility hiring a consultant to provide training, guidance, and support for SEM is approximately $40,000 per year. Assumed costs for one year of SEM guidance and project implementation, without NYSERDA's involvement is estimated to be $470,000 ($40,000 consultant cost plus an estimated $430,000 to implement energy related capital and/or operational & maintenance projects). Based on a 4% energy reduction,

	the customer would realize roughly $160,000 in energy savings, resulting in a simple payback of 2.9 years. Facilities participating in NYSERDA's SEM cohorts, where NYSERDA provides the consultant, would have a simple payback of 2.7 years. • Other benefits resulting from production improvements (scrap reduction, process time improvements, etc.) improve cost justification • Additional benefits include peer to peer exchange of best practices, and building and sustaining a culture of energy efficiency within organizations

5.1.3 Stakeholder/Market Engagement

Stakeholder/Market Engagement	• NYSERDA's strategic assessment work confirmed both On-site Energy Manager and Strategic Energy Management as intervention opportunities. The effort found that in order to have the maximum impact on the Industrial Sector, industrial decision makers need to be educated on the value of energy management as part of their core mission; energy management is as fundamental as any other aspect of cost and operations management. It also suggested that NYSERDA could subsidize a temporary energy-manager-for-hire program for customers that lack sufficient internal resources (time or expertise) to support the identification and implementation of potential efficiency or process improvement projects and to help develop long-term energy plans for the facility. • American Council for an Energy Efficient Economy (ACEEE) 2013 white paper entitled, *Onsite Energy Manager Pilot Programs: A Survey of Practices and Lessons Learned,* informed this strategy. • Voice of customer from Industrial Stakeholder meetings, Best Practice Forums, and one-on-one meetings with industrial customers and stakeholder organizations informed this strategy. • NYSERDA hosted a Best Practice event focusing on SEM concepts called Industrial Continuous Energy Management Conference on 11/12/15. A total of 43 external individuals, representing 30 different organizations, attended this event • NYSERDA continues to work with stakeholder organizations and the Industrial market to promote and inform these strategies. NYSERDA participates in the Consortium for Energy Efficiency's Industrial SEM Committee and the Northeast Regional Continuous Energy Improvement Discussion Group. These groups contain regional and national program administrators, government agencies, utility companies, and trade associations. Discussions within these groups include program design, new ideas, emerging technologies and trends, establishing common SEM definitions and components, and sharing lessons learned. These forums allow NYSERDA to integrate learnings from other market actors into this strategy and subsequent market transfer. • NYSERDA will also utilize the Clean Energy Advisory Council (CEAC) as a way to engage with stakeholders, as appropriate.[2]

[2] The Clean Energy Advisory Council was established by the Public Service Commission through an Order in the Clean Energy Fund Proceeding (Case 14-M-0094. et al, Proceeding on Motion of the Commission to Consider a Clean Energy Fund, Order Authorizing the Clean Energy Fund Framework, filed January 21, 2016).

5.1.4 Theory of Change

Market Barriers Addressed	<u>On Site Energy Manager</u> • Lack of awareness of the benefits of an On-site Energy Manager • Limited access to internal capital and resources necessary to fund a dedicated On-site Energy Manager position • Facilities lack manpower or technical expertise to address energy efficiency projects or the energy aspect of process improvement projects • Lack of educated on-site resources with expertise in energy efficiency as it relates to process efficiency • Risk aversion related to facility down time • Limited number of qualified service providers • Staffing and operating cost constraints • Limited understanding of the energy embedded in the manufacturing process <u>Strategic Energy Management</u> • Lack of standardization in SEM • Difficulty in obtaining executive support due to lack of awareness of SEM benefits • Lack of expertise within facilities • Staffing and operating cost constraints • Limited understanding of the energy embedded in the manufacturing process • Limited number of SEM qualified service providers • Lack of sophistication with energy metering and tracking
Testable Hypotheses	<u>On-Site Energy Manager</u> If a dedicated, on-site resource/expert, focused on process efficiency and energy optimization, is put into place at a facility through NYSERDA's support, then: • Cost savings (as a result of process and energy efficiency initiatives) will justify the long-term funding of this function within the organization. • An On-site Energy Manager can influence corporate behavior to continually identify and implement process efficiency and energy optimization measures that are attractive investments to industrial facilities. • Adoption of an energy culture is accelerated by transferring knowledge and increasing confidence that energy improvements will not disrupt process and are aligned with the organization's core mission. <u>Strategic Energy Management</u> • Customers that implement SEM frameworks are able to build strong energy cultures and sustain significant energy reductions over the long term. If an energy champion can influence corporate behavior through the transfer of knowledge to the energy team, then facilities will be able to continually identify and implement process efficiency and energy optimization measures that are attractive investments for their facility. • If data, case studies, and testimonials from industrial pilot cohorts are developed and disseminated through Best Practice Workshops and other outlets, and more consulting firms offer strategic energy management services, then facilities will trust and adopt strategic energy management. • If facilities adopt a strategic energy management system, then they will be able to comprehensively and systematically improve their energy performance and achieve greater savings than through an ad hoc project approach.
Activities	<u>On-Site Energy Manager pilots:</u> • Conduct outreach to educate industrials on the value of On-site Energy Manager and promote program participation

	• Conduct energy assessments of existing conditions, determine baseline and performance score card • Establish an energy team: includes staff from various business units • Energy accounting and analysis: Develop performance metrics for energy and productivity initiatives • Integrate energy conservation and productivity initiatives into company business model • Review progress reports on energy and productivity projects • Develop case studies and value propositions for replication through Best Practice Workshops and other outlets • Develop a road map for decision makers and facility staff for on-boarding the role • Creation of a list of qualified energy-focused process consultants from which on-site energy management expertise can be sought or matched with facilities <u>Strategic Energy Management pilots:</u> • Conduct outreach to educate on the value of SEM and promote program participation • Organize cohort training sessions and develop materials • Organize cohort network to promote peer or peer exchange • Lead cohort through SEM training and implementation of SEM activities • Review deliverables from SEM key milestone activities to ensure SEM adoption and energy savings • Review progress reports on energy and productivity projects • Develop case studies and value propositions for replication through Best Practice Workshops and other outlets • Develop and disseminate templates and resources for SEM • Establish and coordinate qualified consultant pool with participants • Develop SEM training programs

Key Milestones	<u>On-Site Energy Manager pilots:</u>
	
	<u>Milestone 1 (Years 1 and 2)</u>
	• List of qualified energy-focused process consultants from which On-site Energy Management expertise can be sought and/or matched with industrial facilities
	• C-suite executive buy-in and engagement which provides momentum for energy planning and management activities at industrial sites
	
	<u>Milestone 2 (Years 1 and 2)</u>
	• Industrial end user commitment to energy goal creation and realization is key to successful On-site Energy Manager engagements
	• Robust tracking and reporting of energy and non-energy benefits of the On-site Energy manager role
	
	<u>Milestone 3 (Years 2 and 3)</u>
	• A credible business case that proves the benefits of on-site energy management in industrial facilities
	  o Large sites will save at least 1,200 MWh and 15,000 MMBtu annually
	  o Medium sites will save at least 500 MWh and 5,000 MMBtu annually
	• Business case content for consultant marketing plans which address this need in the industrial market
	
	<u>Milestone 4 (Year 3)</u>

	• Long-term energy resource(s) dedicated to energy management, without NYSERDA support (e.g., manufacturer hires energy manager function in-house; continues contracting with On-Site Energy Manager consultant; or contracts with a new consultant)
	• Transition of knowledge and tools from pilot On-site Energy Managers to long-term energy resource
	• Successful dissemination of training, road maps, case studies, and vetted consultant lists creates both supply for On-site Energy Manager by qualified technical consultants and demand for the role at industrial sites.
	
	<u>Strategic Energy Management pilots:</u>
	
	<u>Milestone 1 (Years 1 and 2)</u>
	• Facilities understand how energy intensity is embedded in their process and have integrated energy management into their organizational culture.
	  o Facilities possess knowledge of SEM (have an energy map, identified goals and metrics, and have developed a project register identifying projects and an action plan for project implementation) and have a system for monitoring, tracking, and making decisions based on their energy use.
	
	<u>Milestone 2 (Years 2 and beyond)</u>
	• Facility executives value and adopt SEM due to organizational change and systematic energy management that enables them to identify attractive investments for their facility.
	  o Continuation of energy champion and team beyond the cohort (for participating facilities) or the adoption of an energy champion and/or team (for new facilities).
	  o Executive support to implement energy-related projects.
	
	<u>Milestone 3 (Years 3 and beyond)</u>
	• Market Actors seek out developed information and standardized tools as well as contractor support to implement and adopt SEM.
	  o Tracked inquiries and dissemination of case studies, training, SEM resources, and vetted consultant lists.
	
	<u>Milestone 4 (Years 2 and beyond)</u>
	• SEM replaces the ad-hoc energy project approach resulting in deeper and continuous energy savings and energy decision-making at industrial facilities
	  o Critical staff can express how the energy measures they've implemented have affected their bottom line.
	  o Facilities realize 3-5% reductions in their energy consumption annually
	  ▪ For large industrial facilities, this equates to approximately 1,200 MWh, 8,500 MMBtu Natural Gas, 500 MMBtu Oil, and $160,000 in energy savings per participant in the first year

Goals Prior to Exit	• Cost savings (energy combined with other benefits) as a result of On-site Energy Manager activities are greater than the cost of on-site manager or services, thereby justifying the hiring or contracting of an energy manager. • Each year, an additional 10-15 new on-site energy managers or services begin in industrial facilities, without direct NYSERDA support, resulting in an increase of 0.5% market penetration of large and medium industrial facilities each year. • Resources to support SEM, including case studies, trainings, a consultant list, and supporting documents which will be updated and maintained as needed, are fit to use and available to the public.

	• 90% of participants in the pilot have demonstrated adoption of the training and activities resulting in cost and energy savings from capital improvement projects, operations and maintenance measures, behavioral changes, and employee engagement. • Each year an additional 5-10 new facilities undergo SEM as a result of the information and tools disseminated into the marketplace. • Replication tools are fit for use and available to the market through Best Practice Workshops and other outlets.

5.1.5 Relationship to Utility/REV

Utility Role/Coordination Points	• As industrial customers establish a better understanding of how energy is an integral component of their manufacturing process through efforts such as dedicating an On-site Energy Manager resource and/or incorporating SEM activities at their facility, they can improve the ability to control a facilities energy usage. Through new innovative rates in REV, facilities may be able to embark on greater energy efficiency and process improvements, establish plans for demand response activities to reduce peak without effecting production, and expand to implement distributed energy generation. • Utilities have established relationships with key accounts who may serve to be ideal candidates for pilot participation. NYSERDA has and will continue to collaborate with utilities on industrial initiatives on how to maximize information exchange. By sharing pilot case studies, tools available and results On-site Energy Manager and SEM with utilities, utilities can be an avenue to help disseminate information leading their customers to achieve deeper energy savings and control costs. • NYSERDA will also take advantage of the CEAC Clean Energy Implementation and Coordination Working Group to coordinate planning and implementation with the New York State utilities.
Utility Interventions in Target Market	• NYSERDA will coordinate with utilities as industrial customers may take advantage of investor owned utility prescriptive or custom incentive programs for energy efficiency improvements. • On-site energy manager and SEM pilots will support the launch of the utility self-direct programs in 2017. Larger industrial customers will have the option of participating in the self-direct program. If they elect to do so, facilities will need to commit to a level of savings along with an estimated portfolio savings plan. This commitment by the facility will require an energy manager/team to manage the effort.

5.1.6 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	Total
On-Site Energy Manager	Direct Incentives and Services	$2,340,000	$2,930,000	$590,000	$5,860,000
	Implementation Support	$212,000	$212,000	$47,000	$471,000
	Tools, Training, and Replication	$125,000	$300,000	$379,000	$804,000
	Sub-Total	$2,677,000	$3,442,000	$1,016,000	$7,135,000
Strategic Energy Management[3]	Direct Incentives and Services	$1,312,500	-	-	$1,312,500
	Implementation Support	$533,239	-	-	$533,239
	Tools, Training, and Replication	$1,000,000	-	-	$1,000,000
	Sub-Total	$2,845,739	-	-	$2,845,739
Total		$5,522,739	$3,442,000	$1,016,000	$9,980,739

Table 2. Annual Expenditures Projection

Expenditures	2016	2017	2018	2019	2020	Total
Total	18%	42%	27%	10%	2%	100%

5.1.7 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.

[3] NYSERDA's commitment of funds in this case is to an implementer who will distribute funding or assistance to customers on NYSERDA's behalf over a longer period of time than is evident from the committed budget and benefits shown in this plan. NYSERDA will monitor performance and report actual progress.

Table 3. Initiative Specific Metrics

Indicators[4]		Baseline (Before/ Current)	2019 (Cumulative)
On-site Energy Manager			
Activity/Outputs	Number of energy management plans with energy reduction target developed	0	30
	Number of energy efficiency projects identified and completed during pilot engagement (likely starts with low/no cost and Operations & Maintenance type measures)	0	30
	Number of case studies/testimonials from pilot participants	0	30
	Direct Cumulative Annual Energy Savings (MWH) for participants	0	42,000 MWh
	Direct Cumulative Annual Energy Savings (MMBTU) for participants	0	500,000 MMBtu
Outcomes	Number of energy managers hired/retained within pilot facilities	0	20
	Market penetration of On-site Energy Managers: % of the addressable market participating in this strategy	TBD	1.5%
	Number of projects implemented involving more complex CapEx and process improvements	TBD	40
	Number of industrial plants (beyond pilot participants) adopting On-site Energy Manager role	TBD	30-45 (10 – 15 per year)
SEM			
Activity/Output	Number of qualified SEM consultant firms	0	5
	Number of C-suite executives who engage in SEM	0	18
	Number of facilities providing internal SEM staff trainings	0	18
	Number of facilities evaluating projects using an SEM energy intensity metric	0	18
	Number of requests for standardized SEM resources	0	7
	Direct Cumulative Annual Energy Savings (MWH) for participants	0	17,116 MWh
	Direct Cumulative Annual Energy Savings (MMBTU) for participants	0	102,184 MMBtu
Outcomes	Number of energy teams maintained beyond the cohort (indicating executive support for SEM)	0	18
	Number of facilities that have adopted a system for monitoring, tracking, and making decisions based on their energy use to assist with their SEM activities	TBD	18
	Number of industrial facilities (beyond pilot participants) that have adopted SEM	TBD	9

[4] TBD denotes that NYSERDA requires more data in order to quantify baseline/market metrics to the degree needed to measure against in the future. A 0 (zero) denotes that the actual value is currently believed to be zero for baseline/market metrics.

Benefits shown in shown in Tables 4 through Table 6 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 Impacts (On-Site Energy Manager)

Primary Metrics[5]		**2016**	**2017**	**2018**	**TOTAL**
Energy Efficiency	MWh Annual	15,000	15,000	12,000	42,000
	MWh Lifetime	225,000	225,000	180,000	630,000
	MMBTu Annual	175,000	175,000	150,000	500,000
	MMBTU Lifetime	2,630,000	2,630,000	2,250,000	7,500,000
	MW	-	-	-	-
Renewable Energy	MWh Annual	-	-	-	-
	MWh Lifetime	-	-	-	-
	MW	-	-	-	-
CO2e Emission Reduction (metric tons) Annual		17,800	17,800	14,800	50,400
CO2e Emission Reduction (metric tons) Lifetime		267,000	267,000	222,000	756,000
Customer Bill Savings Annual ($ million)		$2.76	$2.76	$2.29	$7.81
Customer Bill Savings Lifetime ($ million)		$41.3	$41.3	$34.4	$117
Private Investment ($ million)		$20.2	$20.2	$15.4	$55.8

Table 5. Direct Impacts (Strategic Energy Management)[6]

Primary Metrics[7]		**2016**	**2017**	**2018**	**TOTAL**
Energy Efficiency	MWh Annual	34,500	-	-	34,500
	MWh Lifetime	518,000	-	-	518,000
	MMBTu Annual	267,000	-	-	267,000
	MMBTU Lifetime	4,000,000	-	-	4,000,000
	MW	-	-	-	-
Renewable Energy	MWh Annual	-	-	-	-
	MWh Lifetime	-	-	-	-
	MW	-	-	-	-
CO2e Emission Reduction (metric tons) Annual		33,200	-	-	-
CO2e Emission Reduction (metric tons) Lifetime		498,000	-	-	498,000
Customer Bill Savings Annual ($ million)		$5.180	-	-	$5.180
Customer Bill Savings Lifetime ($ million)		$77.7	-	-	$77.7
Private Investment ($ million)		$54.6	-	-	$54.6

[5] Impacts are expressed on a commitment-year basis, and are incremental additions in each year. Assumes a 15-year measure life. Benefits are rounded to three significant figures. Totals may not sum. Customer Bill Savings are calculated as direct energy bill savings realized by customers participating in NYSERDA's programs. Private investment includes the facility cost-share for the On-site Energy Manager plus the estimated cost to implement energy related capital projects.

[6] NYSERDA's commitment of funds in this case is to an implementer who will distribute funding or assistance to customers on NYSERDA's behalf over a longer period of time than is evident from the committed budget and benefits shown in this plan. NYSERDA will monitor performance and report actual progress.

[7] Impacts are expressed on a commitment-year basis, and are incremental additions in each year. Assumes a 15-year measure life. Benefits are rounded to three significant figures. Totals may not sum. Customer Bill Savings are calculated as direct energy bill savings realized by customers participating in NYSERDA's programs.

Table 6. Annual Projected Initiative Participation

		2016	2017	2018	Total
Participants	On-Site Energy Manager	15	15	10	40
	Strategic Energy Management		10	10	20
	Total	15	25	20	60

Benefits shown in Tables 7 and 8 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 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 7: Estimated Indirect Market Impact (On-Site Energy Manager)

		2020	2025	2030
Energy Efficiency	MWh Cumulative Annual	30,000	105,000	180,000
	MMBTu Cumulative Annual	375,000	1,310,000	2,250,000
Renewable Energy	MWh Cumulative Annual	-	-	-
	MW	-	-	-
CO2e Emission Reduction (metric tons) Annual		37,000	129,000	222,000

Table 8: Estimated Indirect Market Impact (Strategic Energy Management)

		2020	2025	2030
Energy Efficiency	MWh Cumulative Annual	9,270	32,500	55,600
	MMBTu Cumulative Annual	71,600	322,000	430,000
Renewable Energy	MWh Cumulative Annual	-	-	-
	MW	-	-	-
CO2e Emission Reduction (metric tons) Annual		8,770	34,600	52,600

5.1.8 Fuel Neutrality

Fuel Neutrality	• NYSERDA intends to offer SEM and On-site Energy Manager components of the Continuous Energy Improvement initiative in a fuel neutral manner to encourage

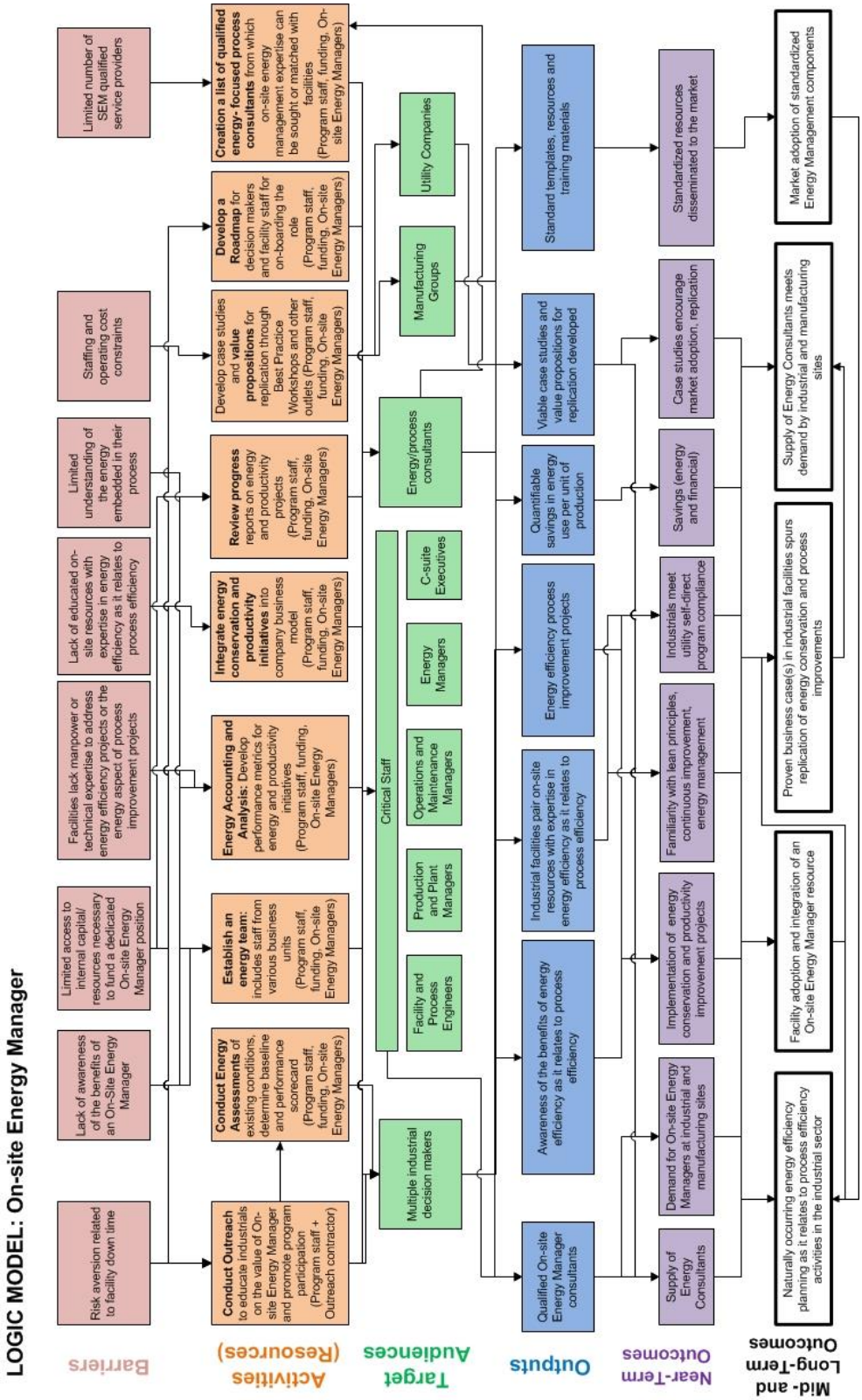
	more efficient use of all fuel types. This will help develop the market at the scale needed to achieve New York State's clean energy goals. • Offering On-site Energy Manager on a fuel neutral basis will allow NYSERDA to achieve savings at a cost of $142 per ton of carbon, compared to a cost of $323 per ton of carbon in an electric only scenario. • Offering SEM on a fuel neutral basis will allow NYSERDA to achieve savings at a cost of $87 per ton of carbon, compared to a cost of $157 per ton of carbon in an electric only scenario.

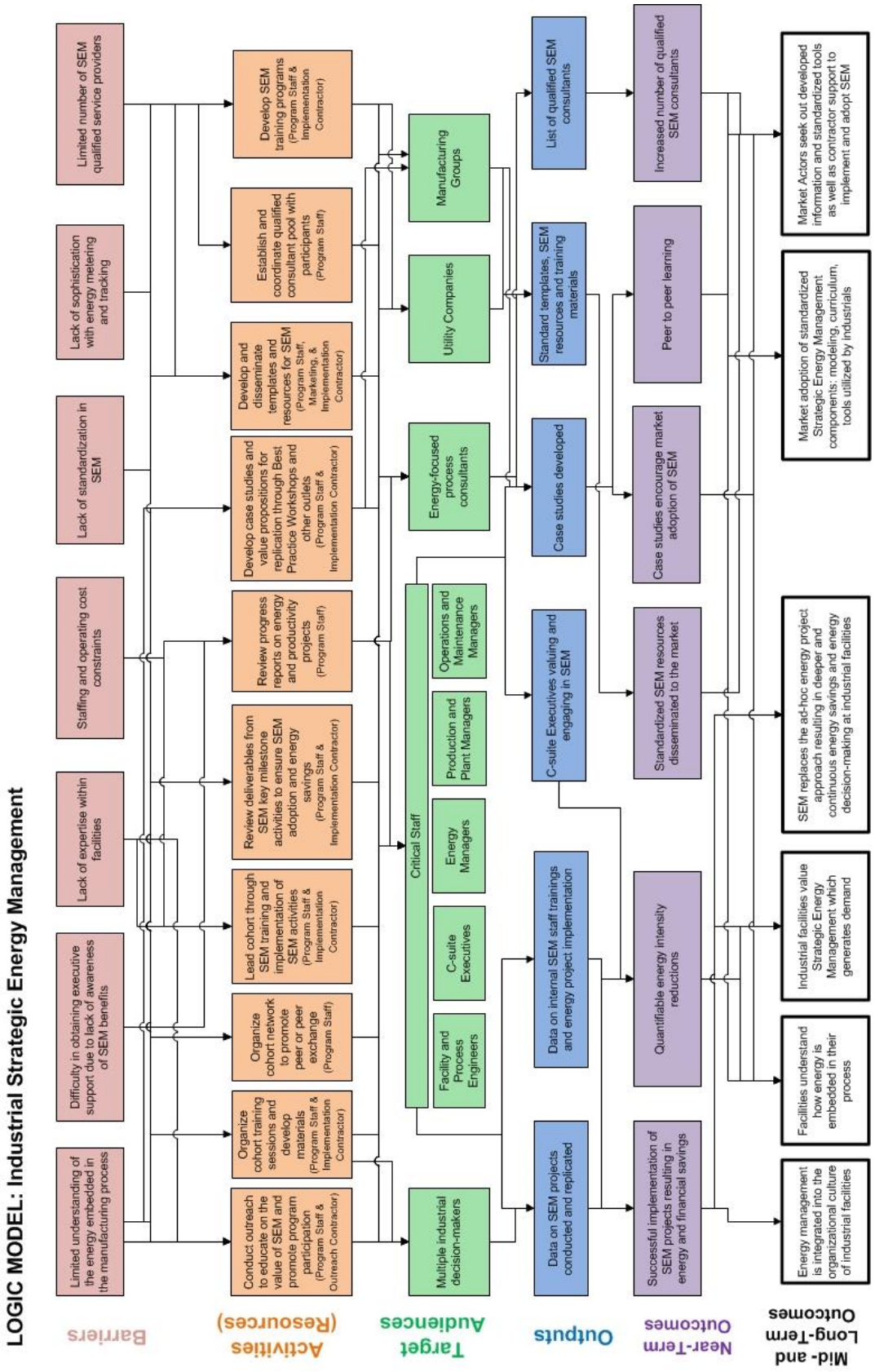
5.1.9 Performance Monitoring and Evaluation Plans

Performance Monitoring & Evaluation Plan	NYSERDA's approach to monitoring and assessing the effectiveness of the initiative and overall market development is described below. Routine reporting on energy savings to date, project lists developed, and progress against identified annual energy savings goals will be collected and reviewed. Redirecting (as needed) will ensure continued progress against goals. **<u>Test-Measure-Adjust Strategy – On-site Energy Manager</u>** • Year 1: Monitor market demand for On-Site Energy Managers at industrial and manufacturing facilities. Review and analyze early energy assessments and performance scorecard of pilot participants. Assess requirements for pilot participants. Receive input from pilot participants- both end-user and on-site energy managers, Consortium for Energy Efficiency's Industrial SEM Committee and the Northeast Regional Continuous Energy Improvement Discussion Group, and other stakeholders. Review energy and productivity reports, continue to monitor market demand for services. • Year 2: Repeat Year 1 actions. • Year 3: Repeat Year 1 actions. Assess market uptake of standardized documentation, effectiveness of training materials. **<u>Test-Measure-Adjust Strategy – Strategic Energy Management</u>** • Year 1: Assess requirements for cohort participants. Receive input from cohort participants, Consortium for Energy Efficiency's Industrial SEM Committee and the Northeast Regional Continuous Energy Improvement Discussion Group, and other stakeholders. Analyze data from cohort participants to understand performance and market capabilities. • Year 2: Repeat Year 1 actions. • Year 3: Repeat Year 1 actions. Assess market uptake of standardized documentation and training effectiveness. Assess the need to continue SEM pilots. **<u>Market Evaluation</u>** • Market Evaluation will be done in a coordinated manner for On-site Energy Manager and Strategic Energy Management. • Market Evaluation will be aligned with the logic model and will include baseline and longitudinal measurement of key indicators of programmatic and broader market success. • Baseline measurements of key performance indicators will occur soon following initiative approval and will address indicators including: ○ For On-site Energy Management current market penetration of On-site Energy Managers, current state of service provider knowledge and experience in providing these services, etc.

	○ For Strategic Energy Manager, the current market penetration of SEM, current state of facility knowledge and experience in SEM practices, etc. • Regular (e.g., annual or biennial) and measurement of market change will occur once the program is underway and will provide follow up measurement to these baseline indicators as well as assess level of replication of strategic energy management practices and on-site energy managers into non-pilot facilities, the models for replication, and the associated benefits. • Sources of data for market evaluation include intervention data, public and commercially available data, and primary data collection through surveys of key market actors. **<u>Impact Evaluation/Field Verification</u>** • Impact Evaluation/Field Verification will also be coordinated for the two components of this overall Continuous Energy Improvement strategy. • As projects mature and measures are installed or process improvements implemented, measurement and verification will be conducted at the pilot facilities in order to verify energy savings. This verification will be conducted according to the International Performance Measurement & Verification Protocol (IPMVP) method(s) most appropriate given the improvements made. • Depending on the extent of replication identified in Market Evaluation, impact evaluation will quantify the level of benefits, including energy savings. • Data from Field Verification/Impact Evaluation can be used to help lend confidence in the market, especially among other end users.

Appendix A – Logic Models




LOGIC MODEL: Industrial Strategic Energy Management
Barriers
Activities (Resources)
Target Audiences
Outputs
Near-Term Outcomes
Mid- and Long-Term Outcomes
Limited understanding of the energy embedded in the manufacturing process
Difficulty in obtaining executive support due to lack of awareness of SEM benefits
Lack of expertise within facilities
Staffing and operating cost constraints
Lack of standardization in SEM
Lack of sophistication with energy metering and tracking
Limited number of SEM qualified service providers
Conduct outreach to educate on the value of SEM and promote program participation (Program Staff & Outreach Contractor)
Organize cohort training sessions and develop materials (Program Staff & Implementation Contractor)
Organize cohort network to promote peer or peer exchange (Program Staff)
Lead cohort through SEM training and implementation of SEM activities (Program Staff & Implementation Contractor)
Review deliverables from SEM key milestone activities to ensure SEM adoption and energy savings (Program Staff & Implementation Contractor)
Review progress reports on energy and productivity projects (Program Staff)
Develop case studies and value propositions for replication through Best Practice Workshops and other outlets (Program Staff & Implementation Contractor)
Develop and disseminate templates and resources for SEM (Program Staff, Marketing, & Implementation Contractor)
Establish and coordinate qualified consultant pool with participants (Program Staff)
Develop SEM training programs (Program Staff & Implementation Contractor)
Critical Staff
Facility and Process Engineers
C-suite Executives
Energy Managers
Production and Plant Managers
Operations and Maintenance Managers
Energy-focused process consultants
Utility Companies
Manufacturing Groups
Multiple industrial decision-makers
Data on SEM projects conducted and replicated
Data on internal SEM staff trainings and energy project implementation
C-suite Executives valuing and engaging in SEM
Case studies developed
Standard templates, SEM resources and training materials
List of qualified SEM consultants
Successful implementation of SEM projects resulting in energy and financial savings
Quantifiable energy intensity reductions
Standardized SEM resources disseminated to the market
Case studies encourage market adoption of SEM
Peer to peer learning
Increased number of qualified SEM consultants
Energy management is integrated into the organizational culture of industrial facilities
Facilities understand how energy is embedded in their process
Industrial facilities value Strategic Energy Management which generates demand
SEM replaces the ad-hoc energy project approach resulting in deeper and continuous energy savings and energy decision-making at industrial facilities
Market adoption of standardized Strategic Energy Management components: modeling, curriculum, tools utilized by industrials
Market Actors seek out developed information and standardized tools as well as contractor support to implement and adopt SEM