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

Clean Energy Fund Investment Plan: Commercial Chapter

Portfolio: Market Development

Submitted by:

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4 Commercial

NYSERDA aims to enable business models in the Commercial sector that can broadly impact a diversity of buildings, owners, tenants and businesses. This work initially will focus on enabling both existing energy service companies and other types of entities that could provide energy efficiency as a combined offering, a service, or energy efficiency as by-product or an embedded offering in another service. NYSERDA will also seek to accelerate the deployment of smarter technology whether it's smart fixtures, equipment or building systems, or a comprehensive approach to a portfolio of buildings – taking advantage of the rapid development of smart devices streaming data to the internet and smarter applications for managing equipment and building services.

The Commercial strategy is anchored by decision-makers being able to more easily determine their options and have confidence in their investment decisions. NYSERDA's efforts in reducing soft costs and time frames and supporting credentialing, matchmaking and quality assurance in the marketplace will support increased investment opportunities and more affirmative investment decisions.

Initial initiatives described in this Chapter include: Commercial Real Estate Tenant which pursues energy efficiency in the commercial tenant segment; Real Time Energy Management which supports smart technology on a building or portfolio basis; and REV Campus Challenge, a segmentation strategy to use peer ratings, sharing, and supports to drive deeper energy efficiency and renewable energy in colleges and universities.

Projected additional initiatives under development include: an energy service company (ESCO) and Business Models initiative that will expand Performance Contracting and guaranteed energy savings in promising sectors, build stakeholder involvement from ESCOs and stimulate new business model proposals; Remote Audit that will explore technology and business models for identifying opportunities and converting projects; and an Energy Efficiency Co-Benefits initiative that will look at simple ways to compare the costs and benefits of an energy efficiency investment. NYSERDA also intends to include specific offerings in the retail and small business sectors as well as broaden its building analytics offering.

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

4.1 Real Estate Tenant

4.1.1 Overview

Present Situation	• New York State has the highest percentage of non-building owner (tenant) occupied space of any state and most of the tenant occupied space is concentrated in New York City.

	• In an individual commercial office building, somewhere between 40 to 60% percent of energy consumption is controlled by tenants and not the building's owners and managers. While heating, ventilation, and air conditioning (HVAC) and lighting are trending downward in energy use per square foot, tenant plug load is growing. • Energy is most often omitted from lease negotiations and not a priority in the space design process in part due to the split incentive between the tenant and the building owner. • The energy and non-energy benefits of energy efficiency improvements in tenant spaces are not well known and are overshadowed by the high cost of rent and other tenant expenses. • The split incentive issue between tenants and building owners and managers has been an ongoing barrier to incorporating clean energy technologies and practices in to tenant spaces. While the issue is well known, a solution has not been presented by the market.
Intervention Strategy	• NYSERDA will initiate this intervention with an offer to cost-share an energy modeling and package development process for tenant office space within New York State. This would help to drive energy efficiency efforts during the commercial tenant lease and build out process by demonstrating to tenants a cost-effective approach to energy efficient high performance office space as well as demonstrating to building owners and managers, brokers and architecture and engineering firms a cost- effective and replicable approach to delivering those spaces. • NYSERDA will also offer cost sharing on the development of new tools and resources that allow tenants greater visibility and manageability over their energy consumption, as well as tools that connect tenant level data with base building data. • For a visual representation of this strategy, please reference the flow chart entitled "Logic Model: Commercial Real Estate Tenant Initiative," which can be found in Appendix A.
Goals	• Build capacity, capability, and interest of architects and engineers to design and deliver above code energy efficiency in the commercial office space market. • Encourage building owners and managers to offer highly efficient office space as a value-added upsell during lease negotiations. • Stimulate demand for and investment in energy efficiency improvements in tenant spaces.
State Energy Plan/Clean Energy Standard Link	• The State Energy Plan identifies buildings as a major user of energy (~60%) and greenhouse gas (GHG) emissions in the State. Commercial office buildings account for 12% of this energy use. This strategy specifically addresses 7% of the total energy used in New York State. • The State Energy Plan also discusses the need to manage electricity demand to ensure efficient and reliable operation of the grid. This strategy is focused on the buildings which have the biggest impact on peak load and will enhance their ability to manage and reduce peak load.

4.1.2 Target Market Characterization

Target Market	The target market is commercial tenant space within Class A and B office buildings.
Market Participants	Architecture and Engineering (A&E) firms • Present space design options and energy efficiency improvements to tenant • Influence open space layout and perimeter vs interior enclosed space

	• Influence daylighting, lighting controls, and product selection (lighting design firms) Building Owners and Managers • Have knowledge of inventory of space to be turned over and timing of lease expirations. • Have leverage over the options presented to potential tenants and the associated pricing Real Estate Brokers • Present building and space options • Guide and influence the lease negotiation process • Educate tenants on energy efficient buildings and tenant spaces Commercial Real Estate (CRE) Tenants and Tenant Representatives • Demand energy efficiency improvements to base building systems • Demand high performing office space • Demand control over their energy usage and comfort within their space • Embrace opportunities for energy efficiency improvements Appraisers • Understand and evaluate energy efficiency improvements to base-building and tenant systems • Determine increase in building asset value due to improved tenant spaces Professional/Industry Associations • Advocate for different market participants and their needs • Trusted source of information and best practice sharing Energy Service Companies • Help A&E firms develop efficiency packages • Provide new energy saving technologies, tools, and software
Market Readiness	• Previous national demonstration projects conducted by the Natural Resources Defense Council (NRDC), have shown the economic benefits of high performing tenant spaces and have successfully engaged several industry leaders. Those projects which include some New York City (NYC) buildings, including NYSERDA's New York City office, have saved an average of 30% more energy than current code and $19,000 in annual energy bills. In the roll out of NRDC's work, NYSERDA funded five additional tenant spaces through its Technology & Market Development (T&MD) Funded Emerging Technology & Accelerated Commercialization (ETAC) initiative which will provide NYSERDA with more granular data to inform the overall strategy and approach to building capacity, capability and replicability of energy modeling. • An increasing amount of law firms, technology companies, and banks have corporate sustainability goals and see high performing office space as a necessity to recruit and retain new employees. • Energy-efficient improvements are often viewed as state-of-the art add-ons and as something that tenants use to showcase their space. • TenantStar, the federal initiative to benchmark energy consumption in tenant spaces, is currently under development and expected to launch in 2022. New York City is interested in being an early adopter of TenantStar and in preparation is working to launch a Landlord/Tenant Carbon Challenge in early 2017. NYSERDA is working with the City in its efforts to launch the Challenge and will target its members for participation in this strategy.
Customer Value	Developing tenant-specific efficiency options: • The building owner or tenant chooses to model one tenant office space, averaging 50,000 square feet and an 8 year lease. • The cost of an energy model and packaged energy efficiency options specific to one tenant space is approximately $50,000.

	• In the initial years of the strategy NYSERDA will provide up to 50% of the cost of modeling without a project cap. These levels will be adjusted based upon market response and reduced if there is strong uptake by the market. Cost of the extra investment by the tenant: • The incremental cost to choose and implement packaged energy efficiency options is approximately $54,000. • Implementation of packaged energy efficiency options is projected to save an average of $19,000 in annual energy bills. Value to the tenant using its tenant-specific package: • At $19,000 in annual energy bill savings, high performing tenant spaces can expect to have a 4.2 year simple payback which fits within the typical 8 year lease term. This payback is 5.5 years without NYSERDA cost-share. • High performing tenant spaces also offer quantifiable gains in image, controllability, productivity and asset value. Leveraging specific tenant options to other building tenants with a building specific package: • The additional cost of creating a building-specific package for any tenant in the previously modeled building is approximately $6,500. • In the initial years of the strategy NYSERDA will provide up to 100% of the cost of modeling without a project cap. These levels will be adjusted based upon market response and reduced if there is strong uptake by the market. Value to the tenant when building owners and managers offer tenant specific design based upon a building-specific package and spread costs across multiple tenants: • At $19,000 in annual energy bill savings, high performing tenant spaces can expect to have a 2.9 year simple payback which fits within the typical 8 year lease term. This payback would increase slightly to 3.2 years without NYSERDA cost-share. • High performing tenant spaces also offer to their tenants quantifiable gains in image, controllability, productivity and asset value Value to the A&E firms producing the energy models and packages • Firms can offer clients an additional service during the design process due to the enhanced skills and experience of their designers. • Allows designers to gain confidence in their ability to model and deliver energy savings. Value to the Building Owners and Managers • Allows building owners and managers to offer a new valued added options during the lease negotiation process. • Energy efficient tenant spaces allow base building systems to run more efficiently, lower operating costs, and potentially increase asset value.

4.1.3 Stakeholder/Market Engagement

Stakeholder/Market Engagement	• Voice of Customer data collection from one-on-one meetings with tenants, building owners and managers, architecture and engineering firms, and commercial real estate brokers.

	• NYSERDA will continue to work with stakeholder organizations and the commercial real estate market to inform, optimize and promote the strategy • NYSERDA will also utilize the Clean Energy Advisory Council (CEAC) as a way to engage with stakeholders, as appropriate. [1] • Engage key market partners to gather real-time feedback on the success of the strategy, remaining barriers, and market changes • Outreach: In –person meetings, webinars

4.1.4 Theory of Change

Market Barriers Addressed	• Split incentive issue between building owner and tenant for financing of energy efficiency measures • Rapid lease negotiations and construction timelines limits opportunities to encourage tenant efficiency during the tenant fit-out process • Lack of consideration of energy efficiency during lease negotiations and low prioritization of efficient equipment in designing tenant spaces • Lack of information on the energy and non-energy benefits of energy efficiency improvements in tenant spaces • Comparatively low cost of energy relative to other tenant expenses
Testable Hypotheses	• If a tenant is presented with a custom modelled package demonstrating the potential energy savings, incremental project cost, and return on investment, then they will be motivated to choose an energy efficient space design, change behaviors and office culture. • If new tenants are presented with building-specific packages, then they will not need to model their space and will also choose an energy efficient space design, change behaviors and office culture. • If data, case studies, and testimonials from key market actors are developed, then peers will have more confidence in the packages and savings and will replicate energy efficient space design, change behaviors and office culture without NYSERDA cost share.

Activities	• Conduct targeted outreach to key building owners and managers, architecture and engineering firms, and tenant representatives
	• Encourage increased capacity and capability of energy modeling to architecture and engineering firms
	  o Development and up to 50% cost-share of tenant specific, energy efficiency packages.
	  o Development and up to 100% cost-share of building specific, energy efficiency packages
	  o Target 180 buildings and 200 to 350 tenants
	• Augment existing market intelligence to better target and position the offering
	  o Gain a more precise understanding of the turn-over of leased commercial office space and
	  o Learn how best to introduce energy efficiency to the multiple market actors involved in a transaction
	  o Learn how best to expand stakeholder relationships beyond building owners and managers and large tenants
	• Provide training and educational support

[1] 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).

	• Adjust tools/packages to address unique values of different market segments
	• Analyze tenant space performance and billing data
	• Analyze building-specific packages for commonalities that could allow for standardization across space and building characteristics
	• Develop standardized office packages for the market sector
	• Validate, aggregate, and publish information on energy and non-energy benefits and best practices
	• Create tenant energy efficiency guidance manual
	  o Identify benefits of energy efficiency
	  o Provide technical guidance and calculations for energy savings
	  o Address energy efficiency measures specific to tenant office space
	• Create a data warehouse
	  o Collect tenant system level metrics to analyze trends in energy efficiency opportunities and tenant space design
	  o Share aggregated data with the market place to spur replication of package development, improve existing design and leasing tools, and inspire advancements in tenant level technologies
	• Develop supporting tools
	  o A tool that combines tenant level data (sub-meter and tenant system level) with whole building data
	  o Energy Efficiency add-ins for existing modeling/design software
	  o Templates for leasing contracts with performance bonus/expectations for energy savings for A&E firms

Key Milestones	<u>Milestone 1: Tenant Modeling Drives Implemented Energy Efficiency Measures (2016-2020)</u> • Tenants will incorporate energy efficiency measures from tenant-specific packages into their designs. Observed gains from NRDC, were 25-40% of energy saved above 2007 code; NYSERDA is projecting gains of 15-20% against the 2010 and 2012 code. The actual savings will be identified through measurement and verification (M&V). <u>Milestone 2: Building Modeling Drives Initial Wave of Replication (2018-2024)</u> • Building specific packages demonstrate replicability of tenant-specific model to the whole building for development of building-specific packages • Engagement with stakeholders involves all identified Market Actors • Secure commitments from building owners and managers and brokers to provide building-specific packages to new tenants with leasing materials • New tenants use building-specific energy efficiency packages (actual participation identified from results reported by building owner) • Projects demonstrate that building-specific packages can be used within the normal timeframe of the tenant fit-out process and do not slow-down the process • NYSERDA validates energy models, energy savings, incremental cost, and return on investment for tenant projects • NYSERDA confirms economic savings/value while presenting soft cost (i.e., productivity) opportunities as additional benefits to the market • NYSERDA gathers data on tenant productivity, satisfaction, and wellness through surveys created with each tenant's Corporate Social Responsibility and Human Resource teams • For buildings that offer tenant efficiency packages, 30% of new tenants use the package to implement energy efficiency measures that go above code <u>Milestone 3: Market Demand Drives second wave of replication (2020-2025)</u>

	• Market actors seek to develop tenant and/or building-specific packages for new participating buildings, initially with cost share • Tenants and architects and engineers realize the value of energy modeling and packages in the design process (measured by participation in the Intervention and training initiatives) • Building owners and managers, architects and engineers, and brokers incorporate package development into their existing business models • Tenants inquire about and demand energy efficiency in prospective spaces • Standardized packages developed for tenant office spaces, if significant commonalities are identified among building-specific packages <u>Milestone 4: Long Term Benefits to Building Owners and Managers (2020-2025)</u> • Building owners and managers attain lower operating costs and greater asset value
Goals Prior to Exit	• Architects and Engineers, and Brokers incorporate packages into existing business models and energy modeling and energy efficiency options are a standard service offering. • Class A Building Owners and Managers routinely meet tenant demand for energy efficiency above code and 20% of them, by square footage, present building-specific packages to prospective tenants during lease negotiations. • Penetration of methods and energy efficiency offerings into class B and C space will be an indicator that the modeling is efficient and precise and that tenants are acting on the packages. • An ever increasing number of tenants that are presented building-specific or standardized packages adopt energy efficiency measures, generating demand for energy efficiency office space. • NYSERDA cost-share for energy modeling and package development decreases as market uptake increases • The strategy will progress from offering cost-sharing for energy modelling to enable energy efficiency package development and offerings in the market to providing resources in the form of tools or technologies that help building owners and tenants manage energy resources and optimize the performance of tenant spaces.

4.1.5 Relationship to Utility/REV

Utility Role/Coordination Points	• NYSERDA has shared information and met with each of the investor owned utilities (IOUs) as well as with the Joint Utilities (JU) to discuss commercial initiatives, including CRE Tenant. The primary uptake of the initiative is likely in Con Edison territory. As this initiative gains traction with architecture and engineering firms, building owners and managers and tenants, it is expected to result in energy savings during tenant fit-outs and lease negotiations. Additional coordination is getting underway to provide a clear path for opportunities that are identified to seek out incentive support from IOU energy efficiency programs. Historically, given the nature of tenant fit-outs, projects were eligible for new construction incentives offered through NYSERDA and not the utilities. Therefore, this effort is also being closely coordinated with the evolution of new construction based strategies. • Sub metering efforts and potential tenant level system data are additional points of coordination planned with the IOUs. • 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	• While none of the investor owned utilities has a dedicated CRE Tenant initiative at this point in time, the target market in 2016-18 overlaps with utility key account initiatives. NYSERDA will coordinate with utilities on key accounts to optimize the overall impact of both NYSERDA and utility offerings and to avoid confusion and multiple outreach efforts. If successful with this initiative, NYSERDA foresees the potential for targeted tenant based efforts to be an integral part of utility offerings in the future and will adjust its initiative accordingly.

4.1.6 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	2019	2020	2021	2022	2023	2024	2025	Total
Incentives & Services	$521,642	$1,217,164	$1,738,806	$2,086,567	$2,434,328	$1,738,806	$1,043,284	$521,642	$347,761	-	$11,650,000
Tools, Training, and Replication	$140,833	$704,167	$845,000	$1,126,667	$1,408,333	$1,408,333	$1,408,333	$845,000	$563,333	-	$8,450,000
Implementation Support	$400,000	$200,000	$200,000	$400,000	$200,000	$400,000	$400,000	$800,000	$1,200,000	$1,200,000	$5,400,000
Total	$1,062,475	$2,121,331	$2,783,806	$3,613,234	$4,042,662	$3,547,139	$2,851,617	$2,166,642	$2,111,095	$1,200,000	$25,500,000

Table 2. Annual Expenditures Projection

Expenditures	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
Total	2%	4%	4%	5%	7%	10%	10%	11%	11%	11%	12%	13%	100%

4.1.7 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.

Table 3. Initiative Specific Metrics

Indicators[2]		**Baseline** (Before/ Current)	**2019** (Cumulative)
Activity/Outputs	Number of tenant spaces participating	0	480
	Number of buildings participating	0	150
	Square footage of participating tenant spaces	0	24,000,000
	Percent of energy saved above code (for participants)	0	15 - 20%
	Partner engagement: Number of CRE building owners and managers that offer building-specific packages	0	130
	Number of case studies developed	0	7
	Partner engagement: Number of brokers and A&E firms trained	0	20
	Partner engagement: Number of Brokers and A&E Firms that include in-depth energy models and package development in their standard practice	0	12
	Direct Cumulative Annual Energy Savings MWH in participant buildings/spaces	0	57,900

[2] 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.

	Direct Cumulative Annual Energy Savings MMBTU in participating buildings/spaces	0	99,200
Outcomes	**Package development** costs of building-specific package per square foot (SF)	$0.13/SF	$0.06/SF
	Market Engagement Number of Brokers and A&E Firms that include in-depth energy models and package development in their standard practice	TBD	14
	Percent of the total addressable square footage in NYS that is covered by a building-specific package	0	7%
	Tenant Spaces completed by the market without NYSERDA funding	TBD	145
	Percentage of Real Estate Broker firms trained on energy efficient space design and including energy in leasing dialogues with tenant	TBD	10%
	Percentage of Architecture and Engineering firms trained to better incorporate energy efficiency options into tenant space designs and providing packages as standard practice	TBD	10%

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 Impacts

Primary Metrics[3]		**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**TOTAL**
Energy Efficiency	MWh Annual	5,600	13,100	18,600	22,400	26,100	18,600	11,200	5,600	3,700	124,900
	MWh Lifetime	44,800	104,000	149,000	179,000	209,000	149,000	89,500	44,800	29,800	998,900
	MMBtu Annual	5,900	13,800	19,700	23,600	27,500	19,700	11,800	5,900	3,900	131,800
	MMBtu Lifetime	47,200	110,000	157,000	189,000	220,000	157,000	94,400	47,200	31,500	1,053,000
	MW	-	-	-	-	-	-	-	-	-	-
Renewable Energy	MWh Annual	-	-	-	-	-	-	-	-	-	-
	MWh Lifetime	-	-	-	-	-	-	-	-	-	-
	MW	-	-	-	-	-	-	-	-	-	-
CO2e Emission Reduction (metric tons) Annual		3,300	7,600	10,900	13,000	15,200	10,900	6,500	3,300	2,200	72,900
CO2e Emission Reduction (metric tons) Lifetime		26,000	61,000	87,000	104,000	122,000	87,000	52,000	26,000	17,000	582,000
Customer Bill Savings Annual ($ million)		$0.776	$1.81	$2.59	$3.11	$3.62	$2.59	$1.55	$0.776	$0.518	$17.34
Customer Bill Savings Lifetime ($ million)		$6.21	$14.5	$20.7	$24.8	$29.0	$20.7	$12.4	$6.21	$4.14	$138.7
Private Investment ($ million)		$0.544	$1.27	$1.81	$2.18	$2.54	$1.81	$1.09	$0.544	$0.363	$12.15

[3] 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.

Table 5. Annual Projected Initiative Participation

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Participants (Number of Tenant Office Spaces)	46	141	141	152	168	188	178	168	168	-	1,349

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 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	61,600	220,000	411,000
	MMBtu Cumulative Annual	65,000	232,000	433,000
Renewable Energy	MWh Cumulative Annual	-	-	-
	MW	-	-	-
CO2e Emission Reduction (metric tons) Cumulative Annual		20,900	74,700	139,000

4.1.8 Fuel Neutrality

Fuel Neutrality	NYSERDA intends to offer this program in a fuel neutral manner, offering cost-sharing to encourage more efficient use of all fuel types. It is anticipated that most tenant based savings will be electric in nature, however, to properly model the tenant space, all systems regardless of fuel type will need to be included in the model to provide an accurate picture of energy consumption. Additionally, building owners and managers who participate on a building–wide basis will need to assess other fuels as part of the optimization on a building-wide basis. The model is fuel neutral and will provide recommended energy saving measures regardless of fuel type. This will help develop the market at the scale needed to achieve New York State's clean energy goals. Offering the program on a fuel neutral basis will allow NYSERDA to achieve a ton of carbon savings at a cost of $350/metric ton, compared to a cost of $388/metric ton in an electric only scenario. The cost of modeling will not be significantly impacted whether the approach is fuel-neutral or electric only. Therefore potential electric efficiency reductions will remain the same but valuable potential fuel savings could be lost for the same funding.

4.1.9 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. <u>Test-Measure-Adjust Strategy</u> • Year 1-2: Test assumptions on the cost-effectiveness of converting a single tenant-specific energy model and package to an entire building-specific package. Assess the ability of energy modeling to fit within the tenant space design timeline. Evaluate the ability to extrapolate a single tenant-specific energy model and package to an entire building-specific package and the ability of energy modeling to fit within the tenant space design timeline. Test how building-specific packages can advise design without slowing down the leasing and fit-out process by a survey of current participants. Receive input from projects and Commercial Tenant stakeholders. Adjust program design if warranted. • Year 3: Test willingness of new tenants to use building-specific packages in lieu of custom tenant packages; survey to understand key decision points affecting the offering of tenant energy efficiency packages as a standard offering. Repeat Year 1-2 assessment. • Year 4-5: Aggregate and analyze data from NYSERDA-supported projects to verify realized energy savings above code and persistence of savings. Evaluate the ability of energy models to accurately predict energy savings for tenant spaces. Repeat Year 1-2 assessment. • Annually gather market characterization data from CRE real estate databases <u>CRE Tenant Strategy M&V</u> • Validate energy model predictions • Validate energy savings through one-year M&V and five-year utility bill analysis. • Compare the CRE Tenant participating tenant spaces energy saving between and across building system types, within portfolios and across Classes <u>Market Evaluation</u> • 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 soon following initiative approval and will provide additional insights that will allow NYSERDA to adjust the strategy. They include: volume and rate of turn-over of leased commercial office space, current use of building-specific above code energy efficiency approaches, real estate broker awareness and practices around incorporating energy efficiency into options into leasing dialogue, awareness and practices of architects and engineers regarding incorporating above code energy efficiency into tenant space designs, etc. • Regular (e.g., annual or biennial) updates to key performance indicators and measurement of market change, including: usefulness, uptake and outcomes of standardized efficiency packages; replication of commercial real estate building-specific packages into non-NYSERDA funded facilities; the models for replication; and the associated benefits. • Sources of data include intervention data, public and commercially available data, and primary data collection through surveys of key market actors. <u>Impact Evaluation/Field Verification</u> • 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. Evaluation M&V will rely heavily on the CRE data stream and analysis to validate program estimated savings. • Depending on the extent of replication identified in Market Evaluation, impacts will be examined for a sample of replication projects to ascertain the level of savings. • Data from Field Verification/Impact Evaluation can be used to help lend confidence in the market, especially among other end users.

4.2 Real Time Energy Management

4.2.1 Overview

Present Situation	Real Time Energy Management (RTEM) is the common name for the management of building energy consumption from a combination of building data collection systems (sensors, meters, equipment feeds), data analytics and building data information services. The market includes both vendors of systems and information service providers with many vendors providing both. RTEM is able to show building management the actual state of building performance at any point in time. RTEM is utilized to capture the discreet data such as set points, power loads, flow rates, temperature and humidity, and feed the information back to building operators with key insights about operations and systems that they then use to fine-tune the building energy system operations and identify capital projects. RTEM is an enabling technology/service, however, and not the direct source of energy reductions. The site-specific opportunities are a function of the individual building in its current physical condition and the manner in which it is operated. As such, there is wide variability in both the size of the opportunity and the degree to which the building managers needs to change how they operate the building. Since energy consumption is just one of many factors to be considered in operating a building, some opportunities may be discarded due to non-energy impacts, such as staffing, cost or tenant/occupant impact. Some installed systems have been abandoned or are underutilized due to site-specific issues and therefore have failed to produce economic returns. Furthermore, RTEM related services and technologies are advancing at a rate more rapid than most potential customers can keep up with, which leads to a significant knowledge and confidence gap in the market. Despite these challenges, demand for RTEM is projected to grow nationally 16% each year over the next five years. While this indicates a strong market for RTEM, the current market in NY State is only $10 million annually and therefore without intervention, RTEM does not represent significant energy and environmental impact potential within the CEF timeframe.
Intervention Strategy	The market is ripe for leveraging the value of RTEM and driving scale as the upfront costs are dropping and the potential sites for application of RTEM are growing both from a financial and technical perspective. This RTEM intervention strategy has four elements that build on NYSERDA's reputation as a source of objective and credible technical advice and information, in

	addition to catalyzing private investment through NYSERDA investment in focused areas of: • Assisting building owners in the identification of RTEM system and service that meet threshold qualifications. • Providing independent technical advisement to building owners that invest in RTEM. • Investing in RTEM systems and services to stimulate the current market and leverage the expected natural growth. • Gathering, analyzing and sharing learning and successes to further stimulate investor confidence and growth. For a visual representation of this strategy, please reference the flow chart entitled "Logic Model: Commercial Real Time Energy Management (RTEM)," which can be found in Appendix A.
Goals	• Leverage natural market growth by addressing upfront risk and downstream returns through an open enrollment offering and technical support in order to double the expected year over year growth rate of 16% to 32% for the next five years. • Improve the predictability of returns from RTEM investments by engaging in studies/pilots which provide replicable approaches and assessment tools. • Assist in the development of the capabilities and business models of the RTEM service vendor community through sharing of data, case studies, best practices and identification of qualifications.
State Energy Plan/Clean Energy Standard Link	• The State Energy Plan identifies buildings as a major user of energy (~60%) and GHG emissions in the State. This strategy further reduces energy consumption in buildings by 10-15% as a function of how buildings are operated above and beyond the efficiency of the installed equipment. This approach should apply to buildings accounting for 60% of energy usage. It specifically addresses 4% of the total energy used in New York State. • The State Energy Plan also discusses the need to manage electricity demand to ensure efficient and reliable operation of the grid. This strategy is focused on the buildings which have the biggest impact on peak load and will enhance their ability to manage and reduce peak load.

4.2.2 Target Market Characterization

Target Market Segment(s)	Initial target will be commercial sector verticals with significant existing penetration of Building Management Systems– Commercial Office, Retail, University/College, and Healthcare. These sectors also have large buildings or portfolios being centrally managed and therefore are more likely to have the human resources necessary to capitalize on the potential of RTEM. As the costs of RTEM systems drop and the technology supplants the need for an existing Building Management System, NYSERDA will expand its target market to include medium-sized commercial entities within these same verticals.
Market Participants	• RTEM system providers • RTEM service providers • ESCOs • Building owners/management firms • Building operators
Market Readiness	• Many end users currently employing RTEM have indicated that RTEM is ready for broader deployment.

	• RTEM system and service providers see specific opportunity in the target market segments that have been identified above. • Potential end users in the target market segments are receptive to the technology and its potential impact on energy consumption. Both end users and RTEM system and service providers have expressed interest in partnering with NYSERDA to help demonstrate and "de-risk" RTEM investments. • Both RTEM system and service providers have interested potential customers that are reluctant to invest due to the lack of independent technical advice to better understand their site-specific risks and opportunities. The risk includes both system design and post-installation application of the information to change building operations. • Current RTEM system and service providers have expressed an ability to meet increased market demand.
Customer Value	• Installing RTEM will provide the end-user with annual energy bill savings ranging from 5 to 25% across all fuels. • RTEM will help reduce operations and maintenance costs, in addition to energy bill savings by identifying the relationships between equipment settings and actual conditions as well as indicating when equipment performance is degrading. • Building owners/management firms can leverage the benefits of installing RTEM systems by applying the knowledge and operating methodologies learned across their portfolios. • NYSERDA's identification of qualifications and companies that meet those qualifications as well as provision of independent technical advice will reduce customer procurement time and costs. • Provision of post installation advice and training for building operators will accelerate the application of information obtained from RTEM and maximize the value obtained from the investment. • NYSERDA's investments in specific projects will decrease the payback period and increase the persistence of projects (e.g., decrease the risk of projects being abandoned or RTEM being under-utilized). This will help to build a library of learnings and successful case studies to further stimulate confidence and growth in the RTEM market.

4.2.3 Stakeholder/Market Engagement

Stakeholder/Market Engagement	Engagement To-Date: • Consulted with the New York Power Authority's (NYPA's) NY Energy Management Team, which is assisting state buildings in adopting Executive Order (EO) 88 guidelines through the deployment of RTEM, in order to capitalize on their expertise and incorporate lessons learned into this strategy. • U.S. Department of Energy (DOE) Better Buildings Team have launched the Energy Management Information Systems (EMIS) campaign of which RTEM is a component. NYSERDA has participated in this effort and utilized materials and data obtained from this effort to inform this strategy. • Consulted with NRDC, which has run a national RTEM pilot with buildings similar to NY buildings, in developing requirements for vendors and strategy. • Market Interviews with RTEM vendors and customers have informed this strategy. Further Engagement:

	• Launch of RTEM Qualified Vendors List in coordination and consultation with NYPA. • Continue engagement with industry experts and New York stakeholders to review progress and help guide evolution of RTEM strategy to maximize impact • Establish Peer-to-Peer Exchanges between and among current users of RTEM. • Periodically solicit the RTEM system and service providers for identification of both issues and new opportunities to improve results and expand the RTEM market. • Conduct regular on-site visits to buildings investing in RTEM to maintain an understanding of their experiences, needs, and challenges. Solicit suggestions for improving results and NYSERDA's role. • Conduct webinars for potential customers and the RTEM system and service providers to understand both supports available and learnings from installed RTEM projects and studies. • NYSERDA will also utilize the CEAC as a way to engage with stakeholders, as appropriate.

4.2.4 Theory of Change

Market Barriers Addressed	• **Customers uncertain of necessary vendor qualifications or best approach to procure:** Potential customers are often interested in the concept of RTEM and the potential benefits it could provide, but are unsure of how to identify a qualified vendor and select either the system or service provider that best meets their needs. • **Lack of unbiased information on qualifications and performance:** Lack of centralized third party independent information with regards to either qualifications or system performance compounds the issue and most customers ultimately do not invest in RTEM due to the lack of readily available and reliable information to assist them. • **Difficulty in assessing site-specific design requirements and associated cost:** Site-specific design often leads to the need to work through many options during the initial installation of meters and information technology (IT) equipment • **Difficulty in assessing site-specific return on investment:** Investment does not guarantee a return; the return comes from changing the method of operating the building and is impacted by the condition of the building and its operating characteristics prior to installation. • **Lack of persistence due to learning curve between receiving information and how best to apply it:** RTEM systems can provide a large volume of new information and point to many potential issues. Building owners without proper support or understanding have limited the use of the information and in extreme cases some have abandoned their systems.
Testable Hypotheses	• If NYSERDA provides incentives for RTEM systems and information services, it will accelerate the growth of the RTEM market in NYS, helping it to mature faster than currently forecasted. Current NY market estimated at $10 million and forecast to grow to $20 million in five years. NYSERDA is attempting to double year over year growth from 16% to 32% during this five year period. • If there is easy access to qualified vendors, a simplified implementation process, proof of energy savings, and demonstrated O&M benefits of RTEM then

	commercial customers will incorporate RTEM into their building operations without need for further NYSERDA incentives. • If NYSERDA provides education and focused vendor support for operators, the depth and persistence of energy savings will improve and RTEM will better inform future capital investments.

Activities	<u>Stimulate the market to invest in RTEM and enhance the success rate of these installations</u>:
	• Create a qualified vendor list for both systems and services.
	• Provide open enrollment incentives for RTEM systems/installation
	• Provide open enrollment incentives for RTEM service subscriptions/analytics
	• Provide independent expert RTEM advisory services and training.
	
	<u>Apply the knowledge and experience gained from initial installations to replicate success and build market confidence in RTEM investment</u>:
	• Create RTEM technical guidance documents of best practices
	• Incentivize pilot and demonstration projects that provide greater insight in to RTEM benefits by:
	  ○ targeting sectors that traditionally have not utilized RTEM
	  ○ monitoring data points not regularly trended to find deeper energy savings
	  ○ exploring RTEM applicability to load management on top of energy efficiency
	  ○ working more closely with service providers to learn about successful business models that could be replicated
	• Publish case studies
	• Establish peer-to-peer exchanges
	
	<u>Improve the effectiveness of this strategy and build assets to support its effectiveness</u>:
	• Enable the creation of an RTEM analytics training platform
	• Solicit ongoing market feedback from stakeholders, service providers and end users to confirm usefulness of intervention efforts
	• Establish data warehousing to collect project and system level RTEM performance metrics. Analyze trends in identified energy efficiency opportunities, persistence and common practices to share with the market place to spur replication.

Key Milestones	<u>Milestone 1: RTEM Program Designed and Offered to the Market (2016)</u> • Secure RTEM Advisor and begin development of market standards • Create and grow a list of qualified RTEM vendors • Stimulate interest and market activity with an open enrollment incentive offering • The program's criteria for qualification of vendors, hardware, and software is introduced to the market and used as a road map for new vendors with the goal of becoming the industry standard • A Technical Guidance Document is drafted and tested • A training platform for facility owners/operators is designed <u>Milestone 2: RTEM Market Growth through Incentives and Standardization (2016-2020)</u> • Incentives, Qualified Vendor Listing and Independent RTEM advisor services help convert prospective customers into committed and installed RTEM projects • NYSERDA market support and approach attract new RTEM vendors to the New York State market and increase business development investment of all RTEM vendors

	• RTEM Advisor supports gaps in market confidence and identifies market approaches to eliminating gaps • Peer to peer exchanges and RTEM advisor transfer learnings across the projects supported by NYSERDA and enhance success • Technical Guidance Document is published • NYSERDA in coordination with industry partners standardizes methodologies for calculating/analyzing costs and savings data • Training platform is available and used by facility owners/operators • Continuous input from industry experts and key stakeholders help with test/measure/adjust methods <u>Milestone 3: RTEM Market Transformation (2018-2021)</u> • NYSERDA direct supports are ratcheted downward as industry standardization is adopted and results of pilots/studies are shared broadly increasing customer confidence in the benefits and returns of RTEM. • Methods for capturing the potential benefits of RTEM for operations and maintenance of buildings are standardized and widely available. • Aggregated data sets and applications of RTEM data are robust enough to enable quick and proper evaluation of energy savings projects, thus removing the need for detailed, building specific energy audits to identify potential energy savings, thereby reducing customer acquisition and project costs • NYSERDA explores the utilization of its RTEM data set to advance efforts at demand reduction and peak load shaping as well as its use in predicting and optimizing investments in energy efficiency. <u>Milestone 4: End of Efforts and Post Intervention (2022 and beyond)</u> • RTEM is the standard for quality energy metrics, efficient building operations, and accessing behind-the-meter data • Qualified list and NYSERDA's continued support is rendered obsolete due to market standardization and acceptance • RTEM is integrated into standard Building Management Systems (BMS) offerings and widely applied in buildings without BMS.
Goals Prior to Exit	• The termination of this intervention will be based upon a significant reduction in both the upfront costs of RTEM design/installation and Return on Investment uncertainty associated with implementing RTEM in a specific vertical. NYSERDA will survey the market periodically to measure progress in these areas. NYSERDA plans to invest equal amounts in systems and information services for five years. If system costs drop faster than anticipated, NYSERDA will reduce or eliminate its incentives for system costs earlier than planned. • A market penetration rate of 30 - 40% in the 2,000 largest buildings in the target market sectors (Commercial Office, Retail, University/College, and Healthcare) should be significant enough to address the aims of this incentive investment and initial offerings. NYSERDA expects significant gains in the development of this technology and as both performance and per application cost reductions are achieved, NYSERDA will shift to exploring methods for driving its adoption in the next 8,000 largest buildings through the non-incentive supports in this strategy. • The strategy will progress from offering incentives through an open enrollment program to targeted pilots/studies to address knowledge gaps and standardization of methods to optimize returns, with continued support for qualified vendors, training, and guidance, eventually leading to replication of uptake without incentives.

4.2.5 Relationship to Utility/REV

Utility Role/Coordination Points	• NYSERDA has shared information and met with each of the IOUs as well as with the JU to discuss commercial initiatives, including RTEM. The likelihood of RTEM market activity in New York City and other dense urban environments led to additional discussions with Consolidated Edison and National Grid. As this new initiative gains traction with contractors and building operators, it is expected to result in energy savings based on building management and operational savings and also to help identify energy efficiency retrofit and infrastructure opportunities. Additional coordination is getting underway to provide a clear path for opportunities that are identified to seek out incentive support from IOU energy efficiency programs. • NYSERDA has held discussions and information sharing with NYPA regarding their efforts with NY Energy Manager, NYSERDA's planned approach to RTEM, supporting the RTEM market, and coordination in serving state buildings that may be eligible to participate in the Clean Energy Fund. • In addition to helping to identify energy efficiency retrofit and infrastructure opportunities, RTEM develops building specific load profiles. These profiles can serve as a basis for better informed and more flexible building operations that act as grid assets under Reforming the Energy Vision (REV) Pilots and innovative rates. The launch of REV pilots and rates benefits by customers who have the data and information to understand their load shape, and its potential for flexible response to price signals. • Continued collaboration will also be imperative as refinements and changes are made to related utility offerings under energy efficiency transition implementation plans (ETIPs) and REV. • 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	• NYPA's New York Energy Manager is promoting and installing RTEM across New York State buildings under EO 88 compliance. Some of those buildings pay into the System Benefits Charge (SBC) and are therefore eligible to participate in Clean Energy Fund initiatives. NYSERDA is carefully coordinating how the Open Enrollment incentive offering is handled to eliminate duplicative incentives and optimize the benefit to rate-payers. • While none of the investor owned utilities has an RTEM initiative at this point in time, the target market in 2016-18 overlaps with utility key account initiatives. As mentioned above, NYSERDA will coordinate with utilities on key accounts to optimize the overall impact of both NYSERDA and utility offerings and to avoid confusion and multiple outreach efforts. If successful with this initiative, NYSERDA foresees the potential for RTEM to be an integral part of utility offerings in the future and will adjust its initiative accordingly.

4.2.6 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

Commitment Budget	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Direct Incentives and Services	$1,613,942	$4,635,577	$6,455,769	$7,131,250	$8,069,712	$5,723,558	$2,438,942	$618,750	$412,500	$37,100,000
Tools, Training and Replication	$880,000	$586,667	$733,333	$733,333	$733,333	$733,333	$733,333	$733,333	$733,333	$6,600,000
Implementation Support	$567,568	$189,189	$454,054	$189,189	$454,054	$378,378	$189,189	$189,189	$189,189	$2,800,000
Total	$3,061,510	$5,411,433	$7,643,157	$8,053,773	$9,257,099	$6,835,269	$3,361,465	$1,541,273	$1,335,023	$46,500,000

Table 8. Annual Expenditures Projection

Expenditures	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total
Total	3%	9%	14%	16%	16%	14%	9%	5%	4%	3%	3%	3%	2%	100%

4.2.7 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

Indicators[4]		**Baseline** (Before/ Current)	**2019** (Cumulative)
Activity/Outputs	Number of buildings participating in incentive program	0	60
	Number of pilot/demonstration projects	0	15
	Number of qualified providers on NYSERDA list	0	40
	Extent of use of qualified provider list by the market (% increase in NY RTEM revenue by listed vendors)	0	65%
	Participation of building owners/managers in peer-to-peer exchanges (from incentive program).	0	40

[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.

	Number of comprehensive building specific data sets submitted to NYSERDA	0	40
	Number of downloads of RTEM technical guidance document	0	100
	Percent of RTEM providers using programmatic criteria & technical guidance document (as reported through annual survey)	0	75%
	Direct Cumulative Annual Energy Savings (MWH) for participants	0	146,700
	Direct Cumulative Annual Energy Savings (MMBTU) for participants	0	65,100
Outcomes	Awareness of RTEM among building owners/managers	TBD	40%
	Percent of RTEM projects that are a part of a larger building management portfolio	0	40%
	Persistence of RTEM service contracts (i.e., how many customers extend their subscription with an RTEM provider beyond 5 years)	TBD	60%
	Percent reduction in RTEM soft costs & operational costs	TBD	15%
	Percentage of RTEM projects that institute an energy efficiency goal	TBD	35%
	Size of market as indicated by vendor sales	$10 M	$20M
	Percent of decision-makers using RTEM data to assess operational risk (as reported through annual survey)	TBD	35%
	Number of BMS offerings with integrated RTEM	TBD	30%
	Percent of RTEM projects that use services for non-energy benefits (e.g., long-term asset management, capital investment strategies, risk mitigation analyses)	TBD	10%

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.

Table 10. Direct Impacts

Primary Metrics[5]		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	TOTAL
Energy Efficiency	MWh Annual	20,500	36,200	51,100	53,900	61,900	45,700	22,500	10,300	8,930		311,030
	MWh Lifetime	164,000	290,000	409,000	431,000	495,000	366,000	180,000	82,500	71,400		2,489,000
	MMBtu Annual	9,100	16,100	22,700	23,900	27,500	20,300	9,990	4,580	3,970		138,200
	MMBTU Lifetime	72,800	129,000	182,000	191,000	220,000	163,000	79,900	36,600	31,700		1,106,000
	MW	-	-	-	-	-	-	-	-	-	-	-
Renewable Energy	MWh Annual	-	-	-	-	-	-	-	-	-	-	-
	MWh Lifetime	-	-	-	-	-	-	-	-	-	-	-
	MW	-	-	-	-	-	-	-	-	-	-	-
CO2e Emission Reduction (metric tons) Annual		11,300	19,900	38,100	29,600	34,000	25,100	12,400	5,670	4,910	-	171,000
CO2e Emission Reduction (metric tons) Lifetime		90,000	159,000	225,000	237,000	272,000	201,000	98,900	45,300	39,300	-	1,368,000
Customer Bill Savings Annual		$2.77	$4.90	$6.92	$7.30	$8.39	$6.19	$3.05	$1.40	$1.21	-	$42.13
Customer Bill Savings Lifetime		$22.2	$39.2	$55.4	$58.4	$67.1	$49.5	$24.4	$11.2	$9.68	-	$337.0
Private Investment		$7.36	$25.2	$40.0	$49.9	$54.4	$53.4	$35.4	$17.1	$9.36	-	$297.50

Table 11. Annual Projected Initiative Participants

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Participants(Number of operators trained)	30	40	50	60	80	95	100	115	130	-	700

[5] Impacts are expressed on a commitment-year basis, and are incremental additions in each year. Assumes a 8-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.

Benefits shown in Table 12 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 12. Estimated Indirect Market Impact

Indirect Impact		2020	2025	2030
Energy Efficiency	MWh Cumulative Annual	340,000	1,450,000	1,590,000
	MMBtu Cumulative Annual	150,000	640,000	706,000
Renewable Energy	MWh Cumulative Annual	-	-	-
	MW	-	-	-
CO2e Emission Reduction (metric tons) Cumulative Annual		187,000	797,000	874,000

4.2.8 Fuel Neutrality

Fuel Neutrality	NYSERDA intends to offer this commercial program in a fuel neutral manner, offering incentives on RTEM systems and services that identify energy efficiency reduction opportunities for all applicable fuel sources that a customer may utilize (electric, natural gas, oil,). Offering the program on a fuel neutral basis will allow NYSERDA to achieve a ton of carbon savings at a cost of $271, compared to a cost of $284 in an electric only scenario[6].

4.2.9 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. <u>Test-Measure-Adjust Strategy</u> • Year 1: Reassess market requirements for Qualified Vendors List. Receive input from projects, industry experts, and other stakeholders • Year 2: Receive input from projects, industry experts, and other stakeholders • Year 3: Review market response to open enrollment incentives and execute scheduled incentive ramp-down. Analyze aggregated data from NYSERDA-supported projects to understand performance and market capabilities. Review training effectiveness. Repeat Year 1 Course Corrections.

[6] If the Program were to operate on a fuel neutral basis, program funds would identify both electric and natural gas efficiency opportunities. If the Program were only to support electric efficiency the magnitude of savings would increase with the budget (ie all the program funds could be used to identify electric efficiency opportunities)

	• Year 4: Assess the success of RTEM pilots/demonstrations and adjust as needed to achieve market transformation and emerging REV objectives. Repeat Year 1 Course Corrections. • Year 5: Review market response to open enrollment incentives and execute scheduled incentive ramp-down. Analyze aggregated data from NYSERDA-supported projects to understand performance and market capabilities. Review training effectiveness. Repeat Year 1 Course Corrections. <u>RTEM M&V Strategy</u> M&V will provide the following: o Validate data quality of meters, sensors and systems o Validate energy savings and determine independent variables that can identify correlation for predicted saving models o Compare the RTEM-related energy savings between and across building types, within large building portfolios and across market sectors <u>Market Evaluation</u> • 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: awareness of RTEM among owners, operators and providers, size of the current RTEM market, use of RTEM by decision makers to assess operational risk, use of RTEM to support broader energy efficiency goals, etc. • Regular (e.g., annual or biennial) and measurement of market change will occur once the program is underway. • Sources of data for market evaluation include the open enrollment program, pilot data, public and commercially available data, and primary data collection through surveys of key market actors. <u>Impact Evaluation/Field Verification</u> • Measurement and verification at a sample of pilot facilities, according to the IPMVP method(s) most appropriate given the improvements made. It is anticipated that operational, maintenance and capital improvement projects will occur. M&V for pilot facilities will rely heavily on the RTEM data stream to validate program estimated savings. • Depending on the extent of replication identified in Market Evaluation, field verification with a sample of replication projects will potentially occur in order to ascertain the level of savings and compare it to potential identified, if feasible. • Data from Field Verification/Impact Evaluation will be used to help lend confidence in the market, especially among other end users.

4.3 REV Campus Challenge

4.3.1 Overview

Present Situation	• Some colleges and universities in New York State have demonstrated leadership in adopting clean energy practices and technologies while others have not advanced as far.

	• Various clean energy initiatives, challenges, peer groups, conferences and events to increase and encourage participation in energy initiatives exist in the current higher education market, but with only moderate to minimal uptake and resulting impacts.
Intervention Strategy	• Drive the implementation of additional clean energy projects and strategies at institutions of higher education and their surrounding communities in the state of New York by leveraging existing national and local Clean Energy Challenges and peer based sustainability scorecards. We will identify and acknowledge achievement of leaders and support and track the progress of all institutions. • Of the approximately 250 higher education institutions in New York State some have made substantial progress in energy efficiency gains and others are struggling to begin. For colleges and universities that have taken action there is often little public recognition given for their adoption of clean energy projects, progress, and results. Recognition that does occur is limited in its distribution. Alternatively, colleges and universities embarking on their path to clean energy adoption would benefit from the lessons learned and knowledge transfer available from their peers. Increased recognition and a platform for peer exchange will stimulate knowledge of and implementation of clean energy projects in this sector. • In addition to recognizing accomplishments in clean energy, NYSERDA will work with the sector to identify gaps in available resources and provide solutions in the form of technical assistance, how to guides, competitions, or peer mentorship. This support will increase the rate at which clean energy technologies are adopted in the sector. • For a visual representation of this strategy, please reference the flow chart entitled "Logic Model: REV Campus Challenge," which can be found in Appendix A.
Goals	• To establish the value of and increase implementation of clean energy projects and strategies on campuses and within their surrounding communities in the State of New York. • Utilize higher education's capacity to conduct research and demonstrations, develop curricula and provide education and training to spur adoption and replication of innovative and successful clean energy projects both within and outside of institutions of higher education. • Engage students, faculty, and staff through the exchange of information within and among peer institutions • To generate an environment where campuses engage with surrounding communities to foster clean energy initiatives, and prospective students are more aware of an institution's commitment to clean energy/sustainability. This initiative called the REV Campus Challenge was launched in 2015 in conjunction with NYPA. Funding for the initiative to date has come from sources other than the CEF.
State Energy Plan/Clean Energy Standard Link	The REV Campus Challenge is part of the Sustainable and Resilient Communities efforts mentioned in the NYS Energy Plan. It is a joint NYSERDA-NYPA initiative and some participating institutions will receive funding directly from NYPA or other non-CEF sources such as Regional Greenhouse Gas Initiative (RGGI) proceeds.

4.3.2 Target Market Characterization

Target Market Segment(s)	The target market is all New York State higher education institutions, at all levels of clean energy progress. This strategy will challenge institutions that are committed to clean energy goals to make progress toward those goals, and engage and support

	institutions that have not yet set goals to take the necessary steps. REV Campus Challenge Member institutions will select one of three membership levels (Participant, Achiever, or Leader) illustrating their current progress toward clean energy goals. These membership levels will enable NYSERDA to more clearly identify and react to barriers to clean energy implementation, and encourage peer-to-peer exchange of best practices and lessons learned. Additional sources of funding such as NYPA and RGGI will provide direct support to institutions that are not eligible for CEF funds. The most effective strategy for driving impact is to have an open initiative in the market itself.
Market Participants	• Institutional decision-makers will be targeted, with focused efforts on engaging: facility/energy managers, sustainability directors/coordinators, deans/faculty engaged in curriculum development, workforce training, and community outreach, as well as finance and other high-level executives as appropriate. • Several other key stakeholders will be engaged and leveraged to assist in driving REV Campus Challenge Membership, scaling clean energy implementation and incorporation into classroom and community activities, and sharing project validation data to recognize Member institutions, such as: o Second Nature (supporting organization for the Climate Commitments) o Association for the Advancement of Sustainability in Higher Education (AASHE) o Commission on Independent Colleges and Universities (CICU) o State University of New York (SUNY) Administration o NYPA
Market Readiness	• The market currently offers a number of clean energy commitment opportunities and resources targeting institutions that enable tracking and reporting of energy and GHG reduction: o The Climate Commitments (Formerly the American College and University Presidents' Climate Commitment) o NYC Carbon Challenge o AASHE's Sustainability Tracking, Assessment & Rating System (STARS) o NYPA Build Smart (EO 88) o DOE EnergyStar Portfolio Manager o University of New Hampshire's Campus Climate Calculator • Research by NYSERDA indicates that: o <30% of NYS private institutions have completed a climate action plan o 52 NYS institutions have committed to the Carbon Commitment (formerly the American College & University Presidents Climate Commitment or ACUPCC) as of December 2015, but over half of them have not updated their climate action plans since 2010 or earlier • Institution-based peer groups have begun to emerge to create a space for sharing knowledge, best practices, and lessons learned such as those below. Research by NYSERDA indicates that only about 30% of NYS institutions take advantage of New York Coalition for Sustainability in Higher Education (NYCSHE) membership and its benefits. The REV Campus Challenge will partner with these groups to find ways to increase membership and enhance discussions and resource opportunities: o NYCSHE o New York Presidents for Climate Action (NYPCA)
Customer Value	Recognition for the implementation of clean energy projects and strategies increases understanding and demonstrates the direct value (energy savings, GHG reduction) and indirect value (student recruitment, improved community relations) of these projects, which in turn results in the scale-up of the adoption of clean energy projects and initiatives as a means of recruiting students, managing energy costs, and improving public relations.

	Projected Benefit to Customer include: • Direct benefits to institutions will be realized as energy savings from the implementation of clean energy projects, which will result in cost savings for the institution. • The implementation of clean energy projects will also result in the reduction or mitigation of GHG emissions, a critical value-add to those institutions with GHG reduction goals. • As many prospective students look for institutions actively engaged in sustainability and clean energy initiatives on campus, participation in the REV Campus Challenge and other available market opportunities will increase the institution's visibility with regards to clean energy initiatives and will help recruit prospective students. • The REV Campus Challenge expands on current market clean energy opportunities to include community engagement in clean energy initiatives as a strategic goal for member institutions. Greater engagement of the community will improve public relations and increase visibility of positive actions within the institution.

4.3.3 Stakeholder/Market Engagement

Stakeholder/Market Engagement	• June 2015 workshop to obtain feedback on REV Campus Challenge concept
	  ○ Approximately 70 representatives of Colleges and Universities attended
	  ○ Survey results indicated:
	  ▪ 76% of workshop attendees would recommend participation in the REV Campus Challenge to their institution. This included campuses that were already involved in national or local challenges.
	  ▪ 80% were interested in learning more about the REV Campus Challenge as it continued to develop
	• NYSERDA will continue to work with stakeholder organizations and the College and University market to inform, optimize and promote the strategy
	• NYSERDA will also utilize the CEAC as a way to engage with stakeholders, as appropriate.

4.3.4 Theory of Change

Market Barriers Addressed	• Lack of state-level recognition for clean energy projects and strategies • Lack of knowledge and resources needed to develop an initial college and university specific roadmap/energy master plan for improving energy efficiency and reducing GHG emissions • Lack of knowledge sharing and lessons learned among New York State institutions • Lack of coordination between campuses and communities in implementing clean energy projects • Lack of funding for clean energy projects and strategies
Testable Hypotheses	• If NYSERDA recognizes progress toward and achievement of NYS institutions' clean energy goals, then the adoption of clean energy projects and strategies on NYS campuses will increase. • If NYSERDA drives participation in existing clean energy commitment opportunities, resources and peer groups, then clean energy implementation on NYS campuses will accelerate as a result of improving knowledge sharing and demonstrating the value of clean energy projects and strategies.

	• If NYSERDA identifies gaps in the availability of needed resources and works with the market to fill the gap then institutions will have greater confidence in and improved understanding of the value of clean energy projects leading to a greater number of projects being implementation and accelerated progress toward achieving clean energy goals.
Activities	• **Market Segmentation and Identifying Barriers**: Obtain an understanding of how institutions view their peers and how this relates to needs associated with clean energy implementation through market segmentation as well as identifying barriers and gaps to clean energy implementation. • **Steering Committee**: A steering committee of key market partners to provide insights and feedback during strategy development and implementation was created to launch the REV Campus Challenge in 2015. This committee continues to be a valuable resource. • **REV Campus Challenge Membership**: Targeted outreach and communication to drive REV Campus Challenge membership and ascertain needs. • **REV Campus Challenge Website**: Utilize a REV Campus Challenge website to provide access to membership, as well as information on resources, case studies, and links to encourage knowledge building and sharing of best practices. • **Leverage Existing Events**: NYSERDA will leverage existing events such as conferences and sustainability working groups. • **Leverage Existing Funding**: NYSERDA will leverage existing funding available from NYSERDA and utilities. • **Funding Support and Competitions**: Provide targeted and limited funding support for exceptional college and university based clean energy and sustainability projects. • **Knowledge Transfer**: Encourage knowledge transfer and the sharing of ideas, best practices, and lessons learned; provide targeted resources and professional connections. • **Leverage Existing Market Resources**: Encourage participation in other local, regional, or national sustainability initiatives to leverage existing market resources. • **Recognition**: Provide recognition of progress toward and achievement of clean energy goals by REV Campus Challenge Members, setting these institutions apart from their peers while demonstrating the value of clean energy projects. Recognition will take the form of website updates, press releases, and other college and university identified valuable practices. • **REV Campus Challenge Member Impact**: Gather information on member GHG emission reductions and energy savings to demonstrate REV Campus Challenge Member impact.
Key Milestones	<u>Milestone 1: Launch and Leverage Existing Campus Leadership (2016-2019)</u> • 120 out of 250 institutions sign up to be REV Campus Challenge Members • Members make progress and receive recognition as demonstrated by new and revised planning, new commitments to sustainability goals and clean energy projects started and completed. <u>Milestone 2: Utilize Peer Recognition and Successes to Engage Additional Campuses (2020-2022)</u> • 140 out of 250 institutions sign up to be REV Campus Challenge Members

	• Members continue to make progress and receive recognition as demonstrated by new and revised planning, new commitments to sustainability goals and clean energy projects started and completed. • 15% more NYS institutions participate in clean energy commitment opportunities, conferences/events, peer groups, etc., building a strong support network • Annual/Semi-annual survey of Member institutions provides feedback on clean energy progress and changes in overall campus, student, and community mindset <u>Milestone 3: Utilize Peer Recognition and Successes to Drive Results beyond Participants (2022-2025)</u> • Members continue to make progress and receive recognition as demonstrated by new and revised planning, new commitments to sustainability goals and clean energy projects started and completed. • 25% more NYS institutions participate in clean energy commitment opportunities, conferences/events, peer groups, etc., building a strong support network • Annual/Semi-annual survey of all institutions state-wide provides feedback on clean energy progress and changes in overall campus, student, and community mindset
Goals Prior to Exit	• 60% of NYS institutions of higher education are REV Campus Challenge Members • 80% of all REV Campus Challenge Members have actualized road map/energy master plan for reducing GHG emissions. • Increase participation in peer groups (i.e. NYCSHE) by 30%

4.3.5 Relationship to Utility/REV

Utility Role/Coordination Points	• The REV Campus Challenge will be operated in close collaboration with NYPA, who has a vested interest in the clean energy commitments and progress of its energy users and of public institutions in general. Representatives from Con Edison, National Grid, and NYPA are on the REV Campus Challenge Steering Committee. REV Campus Challenge Members will be encouraged to look to NYSERDA, NYPA, and other utility programs for funding and support opportunities as they move to implement projects. NYSERDA will coordinate closely with utilities to ensure institutions are aware of programs and offerings that may be relevant to their clean energy goals. • In order to operate a statewide effort within the CEF order language, direct support for institutions not eligible to receive CEF funds will come from other sources such as NYPA and RGGI. NYSERDA will also utilize outside funding support to leverage the investment of rate payer funds. • 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	Utility prescriptive and custom incentive programs currently exist in and are available to the NYS College and University market.

4.3.6 Budgets & Expenditures

An annual commitment budget for all activities included in this chapter is shown in Table 13. The annual expenditure projection is included in Table 14. 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 13. Annual Market Development Budget Allocation – Commitment Basis

Commitment Budget	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Direct Incentives & Services	-	$2,000,000	$2,000,000	$1,500,000	$1,500,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$12,000,000
Tools, Training, and Replication	$247,826	$247,826	$275,362	$275,362	$275,362	$495,652	$495,652	$495,652	$495,652	$495,652	$3,800,000
Program Implementation	$256,667	$256,667	$256,667	$256,667	$256,667	$513,333	$513,333	$513,333	$513,333	$513,333	$3,850,000
Total	$504,493	$2,504,493	$2,532,029	$2,032,029	$2,032,029	$2,008,986	$2,008,986	$2,008,986	$2,008,986	$2,008,986	$19,650,000

Table 14. Annual Expenditures Projection

Expenditures	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total
Total	2%	5%	10%	10%	8%	10%	10%	10%	10%	10%	6%	6%	3%	100%

4.3.7 Progress and Performance Metrics

Table 15 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 15. Initiative Specific Metrics

Indicators[7]		Baseline (Before/ Current)	2019 (Cumulative)
Activity/Outputs	Number of REV Campus Challenge Members	0	120
	Number of NYS institutions participating in AASHE STARS	44 (21 with STARS rating)	60
	Percent increase in NYS institution attendance at existing clean energy events/conferences	TBD	20%
	Percent of all NYS institutions participating in REV Campus Challenge initiatives/competitions	0	25%

[7] 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.

	Percent of REV Campus Challenge Members collecting and reporting energy usage (as reported through annual survey)	0	25%
	Percent of REV Campus Challenge Members reporting new clean energy projects on campus (as reported through annual survey)	0	60%
	Percent of REV Campus Challenge Members reporting new clean energy curricula or curriculum integration (as reported through annual survey)	0	30%
	Percent of REV Campus Challenge Members reporting new or improved community partnerships to expand clean energy goals (as reported through annual survey)	0	25%
	Percent of REV Campus Challenge Members receiving recognition	0	30%
	Direct Cumulative Annual Energy Savings MWH for participants	0	42,500
	Direct Cumulative Annual Energy Savings MMBTU for participants	0	263,000
Outcomes	Percent of REV Campus Challenge Members with new or updated climate action plans, energy master plans, or GHG inventories	0	15%
	Percent of REV Campus Challenge Members with staff assigned to manage sustainability/clean energy goals (as reported through annual survey)	TBD	35%
	Percent of REV Campus Challenge Members reporting a greater understanding of clean energy opportunities on their campus (as reported through annual survey)	0	50%
	Percent of REV Campus Challenge Members reporting greater student engagement with clean energy initiatives (as reported through annual survey)	0	40%
	Percent of REV Campus Challenge Members reporting greater buy-in and support from management for clean energy projects and initiatives (as reported through annual survey)	0	50%
	Percent of REV Campus Challenge Members reporting improved community relations as a result of clean energy strategies (as reported through annual survey)	0	30%

Benefits shown in Table 16 and Table 17are 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 16. Direct Impacts

Primary Metrics[8]		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	TOTAL
Energy Efficiency	MWh Annual	-	15,400	15,400	11,600	11,600	7,720	7,720	7,720	7,720	7,720	92,630
	MWh Lifetime	-	232,000	232,000	174,000	174,000	116,000	116,000	116,000	116,000	116,000	1,389,000
	MMBtu Annual	-	95,700	95,700	71,800	71,800	47,900	47,900	47,900	47,900	47,900	574,300
	MMBtu Lifetime	-	1,440,000	1,440,000	1,080,000	1,080,000	718,000	718,000	718,000	718,000	718,000	8,614,000
	MW	-	-	-	-	-	-	-	-	-	-	-
Renewable Energy	MWh Annual	-	1,470	1,470	1,100	1,100	734	734	734	734	734	8,804
	MWh Lifetime	-	22,000	22,000	16,500	16,500	11,000	11,000	11,000	11,000	11,000	132,100
	MW	-	1	1	1	1	1	1	1	1	1	8
CO2e Emission Reduction (metric tons) Annual		-	14,000	14,000	10,500	10,500	6,990	6,990	6,990	6,990	6,990	83,830
CO2e Emission Reduction (metric tons) Lifetime		-	210,000	210,000	157,000	157,000	105,000	105,000	105,000	105,000	105,000	1,257,000
Customer Bill Savings Annual ($ million)		-	$2.58	$2.58	$1.94	$1.94	$1.29	$1.29	$1.29	$1.29	$1.29	$15.49
Customer Bill Savings Lifetime ($ million)		-	$38.7	$38.7	$29.0	$29.0	$19.4	$19.4	$19.4	$19.4	$19.4	$232.3
Private Investment ($ million)		-	$8.99	$9.10	$7.10	$7.10	$5.98	$5.98	$5.98	$5.98	$5.98	$62.21

Table 7. Annual Projected Initiative Participation

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Participants	40	30	30	20	10	5	5	5	3	2	150

Benefits shown in Table 18 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

[8] 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 due to rounding. Customer Bill Savings are calculated as direct energy bill savings realized by customers participating in NYSERDA's programs.

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 18. Estimated Indirect Market Impact

Indirect Impact		2020	2025	2030
Energy Efficiency	MWh Cumulative Annual	11,700	41,000	58,800
	MMBtu Cumulative Annual	72,500	254,000	365,000
Renewable Energy	MWh Cumulative Annual	1,170	3,870	3,870
	MW	1	3	3
CO2e Emission Reduction (metric tons) Cumulative Annual		10,600	37,100	52,300

4.3.8 Fuel Neutrality

Fuel Neutrality	NYSERDA intends to offer this strategy to engage NYS colleges and universities in a fuel neutral manner. This will help develop the market at the scale needed to achieve New York State's clean energy goals. Offering the strategy on a fuel neutral basis will allow NYSERDA to achieve a ton of carbon savings at a cost of $234, compared to a cost of $323 in an electric only scenario.[9]

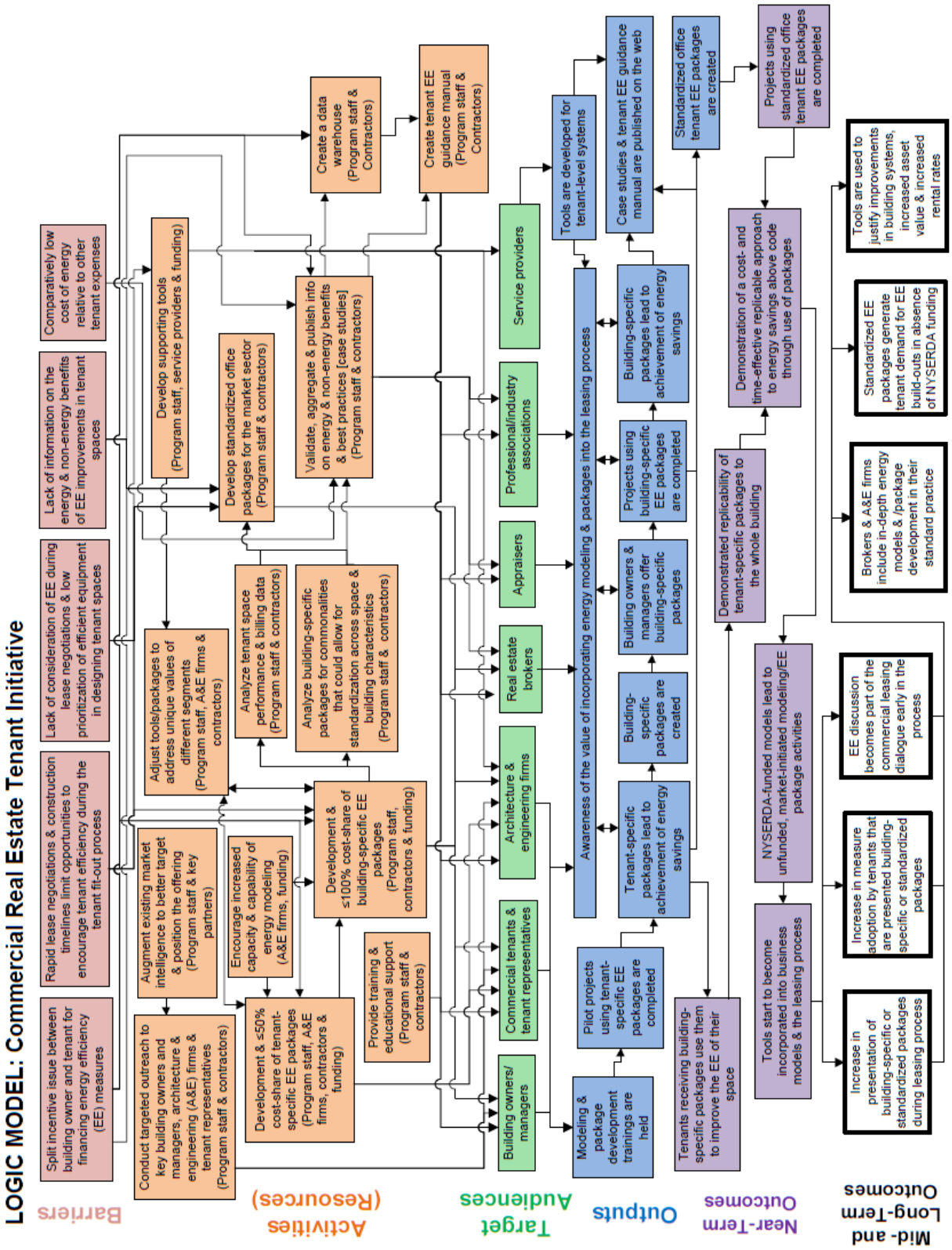
4.3.9 Performance Monitoring and Evaluation Plans

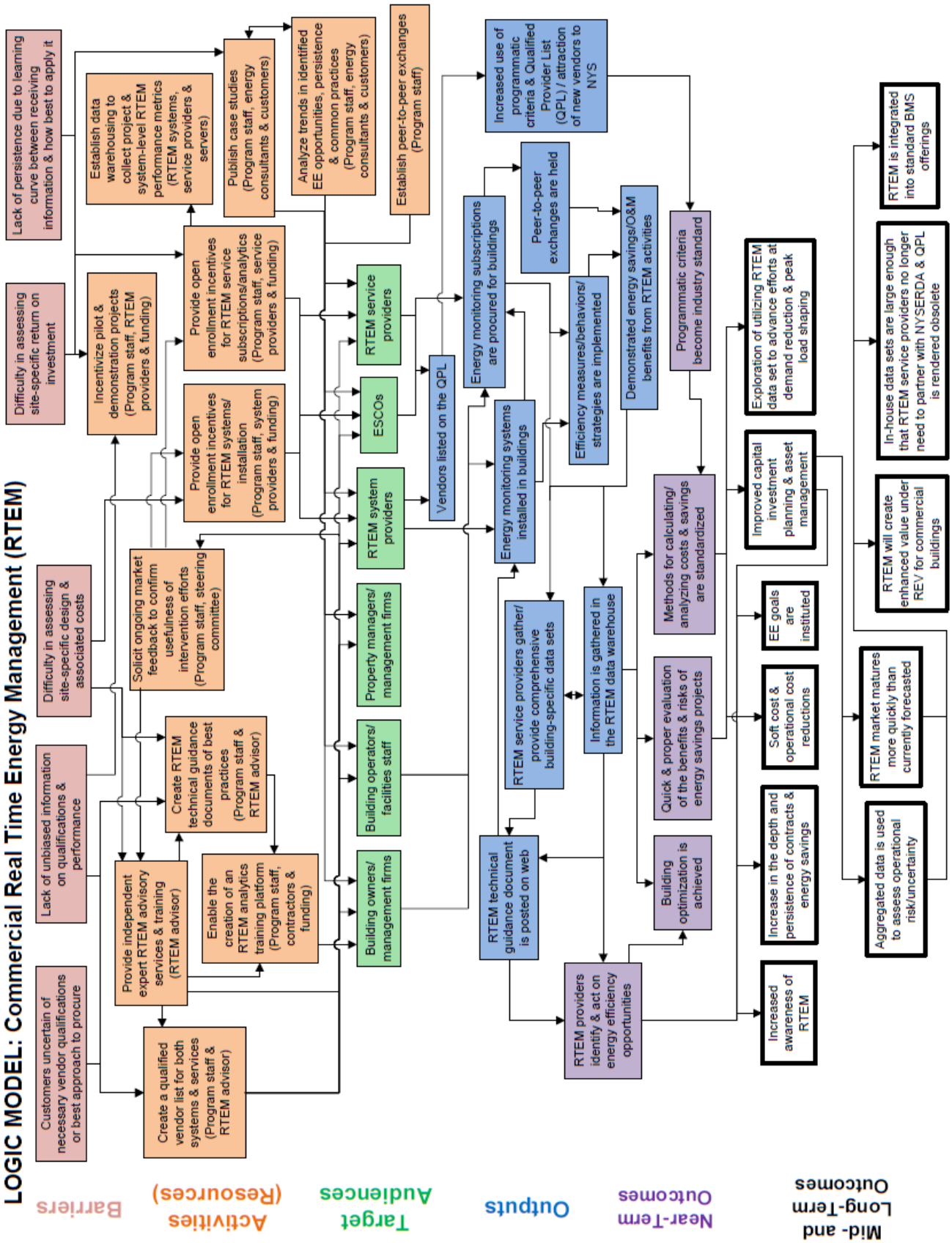
Performance Monitoring & Evaluation Plan	NYSERDA's approach to monitoring and assessing the effectiveness of the initiative and overall market development is described below. **<u>Test-Measure-Adjust Strategy</u>** The REV Campus Challenge will roll out a number of resources, competitions, and initiatives to address C&U market barriers to implementation and to accelerate adoption of clean energy projects on NYS campuses. Validate energy savings resulting from competitions and initiatives through project specific reporting and M&V tailored to the clean energy project. Energy baseline and progress data is publically available on those colleges and universities that are enrolled in AASHE STARS, the NYC Carbon Challenge or subject to EO 88. Data from these resources will be utilized to assist in documenting trends and validating energy consumption reduction. In addition, progress associated with this initiative will primarily be measured through a periodic (e.g., annual or semi-annual) survey of REV Campus Challenge Members. Data to be collected will include: "Has your institution – " • Reached any clean energy milestones or achieved any clean energy goals?

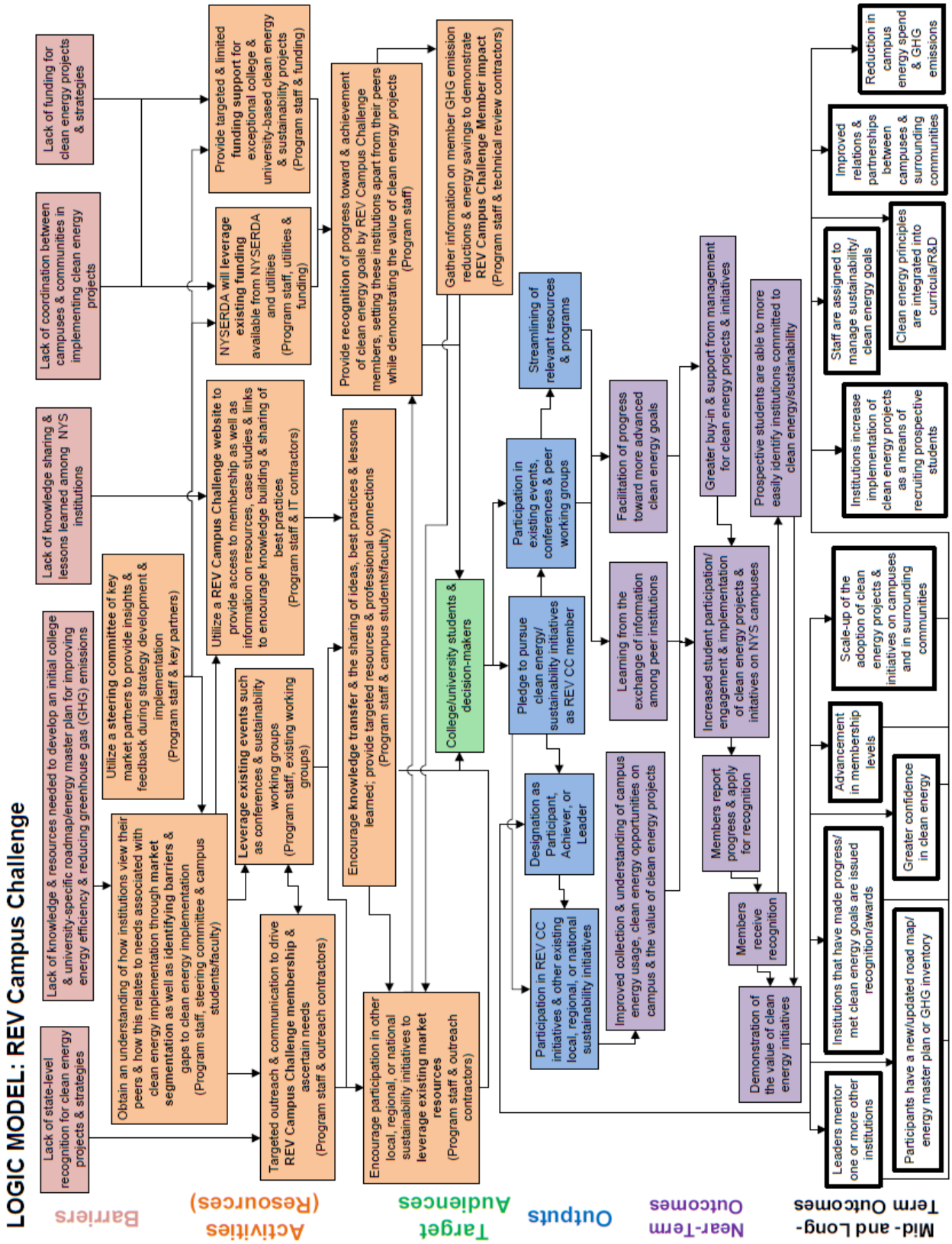
[9] Fuel neutral and electric only scenarios differ only in the assumed rates of implementation for electric and gas clean energy projects. The fuel neutral scenario assumes that, for active institutions, 65% of electric and gas clean energy projects will be implemented as a direct result of this strategy. The electric-only scenario assumes a higher implementation rate for electric projects (75%), but no gas projects resulting from this strategy.

	• Hired new staff whose primary objective is to make sustainability/clean energy progress on campus? • Joined a clean energy initiative/commitment (i.e. the Carbon Commitment, AASHE STARS, etc.)? • Completed an energy master plan, climate action plan, GHG inventory? • Updated an energy master plan, climate action plan, GHG inventory? • Implemented a clean energy project with the goal of obtaining recognition through the REV Campus Challenge? • Leveraged NYSERDA or utility energy programs? • Installed a renewable energy on campus? • Implemented a clean energy project with the intent of improving campus resiliency? Responses to the survey will indicate general market shifts toward clean energy and sustainability and changes to the status quo and will be used by NYSERDA to ascertain the effectiveness of the initiative and adjust activities accordingly. Should an institution respond that they have implemented a project with the intent of obtaining recognition through the REV Campus Challenge, NYSERDA will reach out directly to get more information on the impact of that project. **<u>Market Evaluation</u>** • Market Evaluation consist of the activities described above under Test-Measure-Adjust. Evaluators will work closely with program staff to collect this data routinely and assess the effectiveness of the initiative. **<u>Impact Evaluation/Field Verification</u>** • Evaluation M&V will be conducted for a sample of participating spaces/buildings, according to the IPMVP method(s) most appropriate given the improvements made. It is expected that Evaluation M&V will rely heavily on pre- and post- project energy usage data to validate program estimated 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: Commercial Real Time Energy Management (RTEM)
Barriers
Activities (Resources)
Target Audiences
Outputs
Near-Term Outcomes
Mid- and Long-Term Outcomes
Customers uncertain of necessary vendor qualifications or best approach to procure
Lack of unbiased information on qualifications & performance
Difficulty in assessing site-specific design & associated costs
Difficulty in assessing site-specific return on investment
Lack of persistence due to learning curve between receiving information & how best to apply it
Create a qualified vendor list for both systems & services (Program staff & RTEM advisor)
Provide independent expert RTEM advisory services & training (RTEM advisor)
Create RTEM technical guidance documents of best practices (Program staff & RTEM advisor)
Enable the creation of an RTEM analytics training platform (Program staff, contractors & funding)
Solicit ongoing market feedback to confirm usefulness of intervention efforts (Program staff, steering committee)
Incentivize pilot & demonstration projects (Program staff, RTEM providers & funding)
Establish data warehousing to collect project & system-level RTEM performance metrics (RTEM systems, service providers & servers)
Publish case studies (Program staff, energy consultants & customers)
Analyze trends in identified EE opportunities, persistence & common practices (Program staff, energy consultants & customers)
Establish peer-to-peer exchanges (Program staff)
Provide open enrollment incentives for RTEM service subscriptions/analytics (Program staff, service providers & funding)
Provide open enrollment incentives for RTEM systems/ installation (Program staff, system providers & funding)
Building owners/ management firms
Building operators/ facilities staff
Property managers/ management firms
RTEM system providers
ESCOs
RTEM service providers
Vendors listed on the QPL
RTEM technical guidance document is posted on web
RTEM service providers gather/ provide comprehensive building-specific data sets
Energy monitoring systems installed in buildings
Information is gathered in the RTEM data warehouse
RTEM providers identify & act on energy efficiency opportunities
Building optimization is achieved
Quick & proper evaluation of the benefits & risks of energy savings projects
Methods for calculating/ analyzing costs & savings are standardized
Energy monitoring subscriptions are procured for buildings
Efficiency measures/behaviors/ strategies are implemented
Peer-to-peer exchanges are held
Demonstrated energy savings/O&M benefits from RTEM activities
Programmatic criteria become industry standard
Increased use of programmatic criteria & Qualified Provider List (QPL) / attraction of new vendors to NYS
Increased awareness of RTEM
Increase in the depth and persistence of contracts & energy savings
Soft cost & operational cost reductions
EE goals are instituted
Improved capital investment planning & asset management
Exploration of utilizing RTEM data set to advance efforts at demand reduction & peak load shaping
Aggregated data is used to assess operational risk/uncertainty
RTEM market matures more quickly than currently forecasted
RTEM will create enhanced value under REV for commercial buildings
In-house data sets are large enough that RTEM service providers no longer need to partner with NYSERDA & QPL is rendered obsolete
RTEM is integrated into standard BMS offerings


LOGIC MODEL: REV Campus Challenge
Barriers
Activities (Resources)
Target Audiences
Outputs
Near-Term Outcomes
Mid- and Long-Term Outcomes
Lack of state-level recognition for clean energy projects & strategies
Lack of knowledge & resources needed to develop an initial college & university-specific roadmap/energy master plan for improving energy efficiency & reducing greenhouse gas (GHG) emissions
Lack of knowledge sharing & lessons learned among NYS institutions
Lack of coordination between campuses & communities in implementing clean energy projects
Lack of funding for clean energy projects & strategies
Obtain an understanding of how institutions view their peers & how this relates to needs associated with clean energy implementation through market segmentation as well as identifying barriers & gaps to clean energy implementation (Program staff, steering committee & campus students/faculty)
Utilize a steering committee of key market partners to provide insights & feedback during strategy development & implementation (Program staff & key partners)
Utilize a REV Campus Challenge website to provide access to membership as well as information on resources, case studies & links to encourage knowledge building & sharing of best practices (Program staff & IT contractors)
NYSERDA will leverage existing funding available from NYSERDA and utilities (Program staff, utilities & funding)
Provide targeted & limited funding support for exceptional college & university-based clean energy & sustainability projects (Program staff & funding)
Leverage existing events such as conferences & sustainability working groups (Program staff, existing working groups)
Targeted outreach & communication to drive REV Campus Challenge membership & ascertain needs (Program staff & outreach contractors)
Encourage knowledge transfer & the sharing of ideas, best practices & lessons learned; provide targeted resources & professional connections (Program staff & campus students/faculty)
Provide recognition of progress toward & achievement of clean energy goals by REV Campus Challenge members, setting these institutions apart from their peers while demonstrating the value of clean energy projects (Program staff)
Gather information on member GHG emission reductions & energy savings to demonstrate REV Campus Challenge Member impact (Program staff & technical review contractors)
Encourage participation in other local, regional, or national sustainability initiatives to leverage existing market resources (Program staff & outreach contractors)
College/university students & decision-makers
Pledge to pursue clean energy/ sustainability initiatives as REV CC member
Participation in existing events, conferences & peer working groups
Streamlining of relevant resources & programs
Designation as Participant, Achiever, or Leader
Participation in REV CC initiatives & other existing local, regional, or national sustainability initiatives
Improved collection & understanding of campus energy usage, clean energy opportunities on campus & the value of clean energy projects
Learning from the exchange of information among peer institutions
Facilitation of progress toward more advanced clean energy goals
Greater buy-in & support from management for clean energy projects & initiatives
Increased student participation/ engagement & implementation of clean energy projects & initatives on NYS campuses
Members report progress & apply for recognition
Members receive recognition
Demonstration of the value of clean energy initiatives
Prospective students are able to more easily identify institutions committed to clean energy/sustainability
Institutions increase implementation of clean energy projects as a means of recruiting prospective students
Staff are assigned to manage sustainability/ clean energy goals
Clean energy principles are integrated into curricula/R&D
Improved relations & partnerships between campuses & surrounding communities
Reduction in campus energy spend & GHG emissions
Scale-up of the adoption of clean energy projects & initiatives on campuses and in surrounding communities
Advancement in membership levels
Institutions that have made progress/ met clean energy goals are issued recognition/awards
Greater confidence in clean energy
Leaders mentor one or more other institutions
Participants have a new/updated road map/ energy master plan or GHG inventory