

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

CLEAN ENERGY FUND PROPOSAL

Submitted by the New York State Energy Research and
Development Authority

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TABLE OF CONTENTS

I.	Executive Summary	5
II.	Introduction	8
III.	Background	10
	Today's Challenges	10
	GHG Emissions	10
	Threatened Grid Resiliency	12
	Energy Costs.....	12
	Coordination with U.S. EPA's Clean Power Plan (Section 111d of Clean Air Act)	12
	Innovation on the Sidelines.....	13
	Transition from Resource Acquisition to Market Animation.....	14
	CEF and REV	15
	Before and After	16
IV.	Goals	18
V.	Proposed Program Strategies	19
	Market Development Activities	21
	Residential Single Family.....	25
	Residential Multifamily	26
	LMI Residential	26
	Commercial.....	28
	Industrial	29
	Local Governments as Partners	29
	Grid-Tied Renewables.....	30
	Customer-Sited Renewables	33
	Technology and Business Innovation Activities.....	33
	Portfolio Characterization and Management	35
	Innovation Synergies with REV.....	36
	New York Green Bank	36
	NY-Sun	38
	Illustrative Entity Roles Across Portfolios	39
VI.	Fuel Neutrality	41
VII.	Budgets and Benefits	42

Overall Program Authorization for 2016-2025.....	42
Proposed CEF Collections Cap for 2016-2025.....	44
Anticipated CEF expenditures for 2016-2025.....	46
CEF Portfolio Benefits	47
Administration and Evaluation Costs of the CEF	49
Bill-As-You-Go Approach	50
VIII. Evaluation	50
Field Verification & Program Evaluation.....	51
Process Evaluation	51
Impact Evaluation.....	51
Market Research & Transformation Studies.....	52
Market Effects/Transformation Evaluation.....	52
Baseline/Potential Studies.....	53
Top-Down Macro-Level Consumption Studies.....	53
IX. Reallocation of Existing Funds	53
X. Conclusion.....	54
Appendix A: Market Research and Stakeholder Engagement.....	57
Appendix B: Barriers, Decision Points, and Potential Market Development Program Strategies by Sector.....	59
Residential Single Family.....	59
Barriers and Decision Points.....	59
Program Strategies.....	61
Residential Multifamily.....	62
Barriers and Decision Points.....	62
Program Strategies.....	64
LMI Residential (Single Family and Multifamily)	65
Barriers and Decision Points.....	65
Program Strategies.....	67
Commercial.....	68
Barriers and Decision Points.....	69
Program Strategies.....	70
Industrial	71
Barriers and Decision Points.....	71

Program Strategies.....	72
Appendix C: Customer-Sited Renewables.....	74
Customer-Sited Renewable Electric (excluding solar PV and Solar Thermal)	74
Renewable Thermal	75
Clean Biomass-Based Heating	75
Solar Thermal	75
Heat Pumps.....	76
Barriers.....	77
Potential Future Strategies.....	77
Appendix D: Technology and Business Innovation Activities.....	78
Strategic Investment methodology.....	78
Stall Points.....	79
Investment Approaches.....	79
Direct Support for Cleantech Businesses	80
Technology-to-Market Pathways to Stimulate Entrepreneurial Activity	80
Tangible Multi-Use Facilities & Resources	80
Engagement of Mid-Market Suppliers and Strategic Industrial Partnerships.....	81
Strategic Priorities and Target Areas.....	81
Historical Performance of NYSERDA’s Innovation Investments	84
Appendix E: Stakeholder Participation	86

I. EXECUTIVE SUMMARY

Pursuant to the Order Commencing Proceeding (“CEF Order”) issued on May 8, 2014 by the New York State Public Service Commission (“Commission”), the New York State Energy Research and Development Authority (“NYSERDA”) files this Clean Energy Fund (“CEF”) Proposal (“CEF Proposal” or “Proposal”) seeking a 10-year program that will work in coordination with other State efforts to advance cleaner, more resilient, and more affordable energy infrastructure. In its CEF Order the Commission stated its intent that the CEF ensure the delivery and continuity of clean energy programs for the State’s energy consumers, enhance program efficiency, and manage the transition of NYSEDA’s program approaches to better align with the market outcomes envisioned through the Reforming the Energy Vision (“REV”) proceeding. This CEF Proposal has been designed to support and effectuate those guiding principles.

The CEF is designed to pursue three long-term outcomes. First, the CEF seeks to achieve greater levels of scale for clean energy in the State economy. Second, the CEF will be oriented to achieve scale, not only through the investment of public funds, but to foster new investment opportunities to attract private capital to invest in clean energy in New York. Initiatives oriented for scale and private capital attraction will then result in the third desired outcome: significant reduction in greenhouse gas (GHG) emissions from New York’s energy sector. To achieve these long-term outcomes the CEF’s theme is “market transformation,” and the CEF will employ approaches that will enable the entire clean energy supply chain – from technology developers to equipment wholesalers to financial institutions to building managers and construction contractors as well as to energy consumers seeking clean energy options – to create a new, integrated, self-sustaining clean energy market.

At the same time, NYSEDA recognizes that high overall energy costs in New York State create a cost burden on all customer classes - residential, commercial, and industrial. As requested in the CEF Order, NYSEDA proposes that the CEF, which will replace the current System Benefits Charge (SBC), Energy Efficiency Portfolio Standard (EEPS), and Renewable Portfolio Standard (RPS), be funded by establishing a cap on collections from ratepayers, starting in 2016 with an immediate \$225 million reduction from the 2015 collections level, from \$925 million to \$700 million. This reduction is possible, even as existing program obligations continue for several years through the start of the CEF, provided that NYSEDA is able to utilize its existing unexpended balance of program funds to meet costs of current initiatives. NYSEDA proposes that the \$700 million cap be sustained for 3 years, with subsequent step-downs as current program obligations are satisfied. In the latter-half of the CEF, after the NYGB and NY-Sun initiative are funded, the collections cap is reduced to \$400 million per year, resulting in a sustained 57% reduction from current levels. These proposed collections cap and use of unexpended balances to meet current and new program activity are mechanisms that are aimed to alleviate cost burdens on consumers.¹

¹ See Petition of Multiple Intervenors for Expeditious Relief from Existing Surcharges, June 2, 2014; Case 10-M-0457 In the Matter of the Systems Benefit Charge IV, Case 07-M-0548 Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard, Case 03-E-0188 Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard, file June 2, 2014.

As market transformation and GHG emissions reductions goals are both long-term outcomes, NYSERDA is requesting a 10-year program authorization that will invest \$5 billion in New York's clean energy economy through 2025. This investment will be made across four program portfolios:

- Market Development, which will align with REV to reduce barriers, animate consumer demand for clean energy, and enable the private markets to provide the new products and services sought by an animated consumer market;
- Technology and Business Innovation, which will catalyze the development of innovative clean energy solutions, while growing New York's cleantech sector and accelerating the development and introduction of the new technologies that will be needed to foster increased levels of GHG reductions;
- New York Green Bank (NYGB), which seeks market transformation in the financial sector, leveraging public investments and reaching new markets for clean energy services; and
- New York Sun (NY-Sun), which seeks to create a robust and self-sustaining solar market in New York for solar photovoltaic (PV) technologies, and build a program approach for other clean technologies.

Nimble and targeted investments within these broad categories will work to transform the clean energy market to one that encourages and promotes the adoption of clean energy technologies and practices. This concerted effort will place New York at the forefront of states in the effort to achieve meaningful GHG reductions while moving the clean energy economy from an idea to a market reality.

As that transformation progresses, private market investment will incrementally take the place of ratepayer funding. The strategies and initiatives implemented through the CEF will ultimately support overall reductions in consumer bills, both through the impacts of clean energy at homes and businesses, and in conjunction with the REV proceeding, that will, among other efforts, seek lower-cost alternatives to transmission and distribution infrastructure needs through targeted energy efficiency and clean distributed generation alternatives.

This CEF Proposal identifies new directions and opportunities for NYSERDA to pursue in a complementary role to REV to advance the previously stated long-term outcomes. New York's regulatory and programmatic redesign will accelerate and expand investment in clean energy technologies. NYSERDA proposes that, upon a Commission Order in response to this proposal, NYSERDA will create and submit an initial Program Investment Plan for approval by Department of Public Service (DPS) Staff that will detail metrics and program strategies and approaches, identifying specific initiatives for each of the Market Development and Technology and Business Innovation portfolios. These portfolios will be used as benchmarks to demonstrate advancement towards long-term statewide goals. The NYGB and NY-Sun portfolios have previously submitted business plans and/or program investment plans detailing the respective strategies for these portfolios.

Key to the success of market transformation approaches is the ability of State initiatives to be immediately responsive to market dynamics, needs and conditions as they arise. For the CEF to

capture emerging opportunities, NYSERDA will require and requests that the Commission grant greater levels of flexibility to move funds within each of the CEF portfolios, as well as between the Technology and Business Innovation and Market Development Portfolios. In addition, NYSERDA also requests that the Commission allow investments to be pursued on a fuel neutral basis. Research demonstrates that energy consumers approach solutions to their energy needs holistically, looking for bill reductions and clean energy options that meet both electricity and on-site fuel uses, whether natural gas, heating oil, other fuels or combinations of fuels. While NYSERDA has had limited ability to utilize multiple funding sources to reach a range of consumer needs, this past approach has not met all customer needs, and has left some GHG emissions reductions opportunities unrealized. A fuel neutral approach, crediting all public CEF dollars with achieving the portfolio's emissions reductions progress, would better maximize the GHG emissions reduction productivity of public dollars spent on clean energy initiatives.

To inform this CEF proposal, NYSERDA engaged in extensive stakeholder outreach through six in-person sessions and through written submissions, as discussed in Appendix A. Upon approval of the CEF, NYSERDA envisions a new series of stakeholder engagements in the creation of more detailed Strategy and Investment Plans for the Market Development and Technology and Business Innovation portfolios. NYSERDA will convene stakeholders in each of the individual sectors to help define final strategies for implementation, based on the new roles NYSERDA will assume, and will prioritize those that will be most effective at overcoming market barriers. Potential strategies are identified in Section V and Appendix B; however the strategies selected for implementation will not be limited to those identified here. In addition, as available, new market intelligence activities will also inform strategy and initiative design. Market intelligence will utilize market actor direct knowledge of conditions and barriers (e.g., NYGB's experience in engaging private sector financial institutions), targeted market research in particular sectors, characterization studies, and sector technology baseline studies that will help to quantify the opportunity for new initiatives.

To maintain broad and effective stakeholder engagement as an input into a new and more dynamic portfolio, NYSERDA recommends the creation of new Advisory Groups to help inform the evolution of the CEF portfolio. NYSERDA's current Advisory Group for the SBC-funded Technology & Market Development (T&MD) portfolio has been successful in providing technical expertise, insights and direction, and has enhanced the T&MD program performance and design. New Advisory Groups targeted for each of the Market Development and the Innovation portfolios could be designed to build on the success of the T&MD Advisory Group. As with the T&MD Advisory Group, new advisory groups will seek to include national expertise in clean energy market needs, technology research and development, consumer trends, and policy and program best practices, as well as New York-based expertise about local clean energy markets and policy. The advisory groups could meet on an annual or semi-annual basis, and convene with focused agendas to target sectors or activities as necessary.

To help with the metrics calculations, NYSERDA also proposes new approaches for evaluation activities that will be oriented to measure the effects of market transformation initiatives on the economy generally, and also help to better inform on the effects of multiple program strategies aimed at accelerating and promoting the scale of energy efficiency and clean energy in the State

economy. NYSERDA proposes that this new Program Investment Plan be submitted within 120 days after a Commission Order. This time will allow for adequate engagement with stakeholders, as well as coordination with the utilities on REV filings.

In addition, in accordance with the CEF Order's directive to ensure the continuity of programs and foster an orderly transition from the Energy Efficiency Portfolio Standard (EEPS) portfolio into the new CEF, NYSERDA herein submits a request to Reallocate Funds to maintain valuable energy efficiency services for various customer sectors during the transition for existing programs into 2015.

II. INTRODUCTION

The New York State Energy Research and Development Authority (NYSERDA) files this CEF proposal with the Commission as part of a comprehensive strategy to build a cleaner, more resilient, and affordable energy infrastructure for New York State. The CEF complements other New York State initiatives, particularly the changes proposed in the REV proceeding, by refocusing NYSERDA's strategic priorities in the energy marketplace through the deployment of new and redesigned programs. While REV redirects the market by creating rules that reward investment in a cleaner, more resilient and affordable energy system, the CEF will engage with the many market actors so they are best able to provide the clean, resilient and bill-reducing technologies that consumers will be able to choose through REV. These key initiatives, alongside other State policies and programs, will work together as REV creates the regulatory infrastructure and the CEF helps transition to the new marketplace that REV intends to create.

NYSERDA has had considerable success in delivering on its mission of advancing innovative energy solutions in New York, primarily through its implementation of programs supported by the SBC, including EEPS, the RPS and T&MD programs. The CEF, as an integral part of New York State's evolving energy policy, responds to the recognition that the State's current approaches alone will likely not realize the environmental, economic development, and affordability goals and policy objectives stated in the draft 2014 State Energy Plan: a pathway to 80% GHG emissions reductions by 2050, at-scale investments from the private sector in the clean energy economy, supporting overall State economic development and lower electricity bills. The simultaneous achievement of these objectives will be a complicated endeavor and will require a different approach to the market to spur breakthroughs in clean energy technologies, dramatic cost reductions, and new business models to turn our public challenges into private sector opportunities.

In the CEF Order the Commission stated its intent to ensure the delivery continuity of the State's clean energy programs while evolving them to enhance program efficiency and aligning them with market conditions and the REV vision. The CEF Order outlines a series of issues and changes that are intended to reshape the State's clean energy programs to reflect a single, consistent paradigm.²

² Case 14-M-009, Proceeding on Motion of the Commission to Consider a Clean Energy Fund, *Order Commencing Proceeding*, (issued and effective May 8, 2014).

The principles and objectives that form the foundation of that paradigm include:

- Establishing a transparent upper limit on contributions from ratepayers;
- Refocus on market and technology transformative strategies;
- Provide temporary interventions and support to overcome specific barriers;
- Animate consumer demand for clean energy options and support clean energy businesses that will meet these consumer demands;
- Facilitate greater penetration of clean and efficient technologies; and
- Continue to provide access to clean energy for market segments, including low-income customers, which may not otherwise benefit from the new market activity.

Guided by these principles, the CEF will help New York realize the modern and smart energy system envisioned in the REV proceeding, by: (1) driving "upstream" large-scale industry transformation, (2) catalyzing new business opportunities and private investment, and (3) enabling markets for new products and services that customers value. The CEF will reframe current approaches to technology research and development, energy efficiency and distributed generation programs through a more strategic approach that targets specific barriers identified in the market, moving away from a primary focus on cost barriers that has been the prevailing concern of EEPS and RPS. In so doing, the CEF will enable greater scale and penetration for the clean energy activities envisioned under REV by bridging financing, technology, information, income and other market gaps that currently limit widespread deployment of clean energy.

The CEF's success will be apparent in the appearance of: (1) a more dynamic "supply side" of clean energy service providers, including energy service companies, financing institutions, product suppliers, and contractors/installers who develop new models for providing energy services and solutions to consumers, (2) a better informed "demand side" customer base that seeks innovative energy services and effective energy solutions, and (3) a flourishing clean energy market leading to clean energy investments at greater scale and impact.

The CEF investments will be designed to create a future that is more sustainable. It sets a 10-year time horizon to provide the needed commitment to achieve clean energy market scale and GHG emissions reductions. It fully funds NY-Sun to achieve a self-sustaining market for solar PV. It makes available the remaining capital to fund the \$1 billion NYGB, to transform markets for clean energy financing, and produce recurring investments in the clean energy economy. It employs Market Development strategies, in concert with the new structures under REV, to accelerate the deployment of energy efficiency and distributed energy resources. It fosters the Innovation necessary to develop and test the technologies and practices needed to feed the pipeline, while supporting New York businesses engaged in the clean energy economy.

These efforts - under the CEF and more broadly through the State's comprehensive energy strategy - will set New York State on a realistic path to achieving its long-term environmental and economic development goals, including an 80% reduction in GHG emissions from 2010 levels by 2050. Success will lead to lower energy bills for all New Yorkers compared to what they would have been

absent intervention, a cleaner and more resilient energy system, and a more reliable electricity network.

III. BACKGROUND

New York's traditional regulatory and programmatic approaches to energy policy do not promote the opportunities that exist in the current market, nor are they equipped to wrestle with the scale of today's challenges. At the same time, innovation is sitting on the sidelines. The CEF's proposed approach and interactions with other policy instruments and energy agencies aim to catalyze a fundamental change in New York's energy infrastructure.

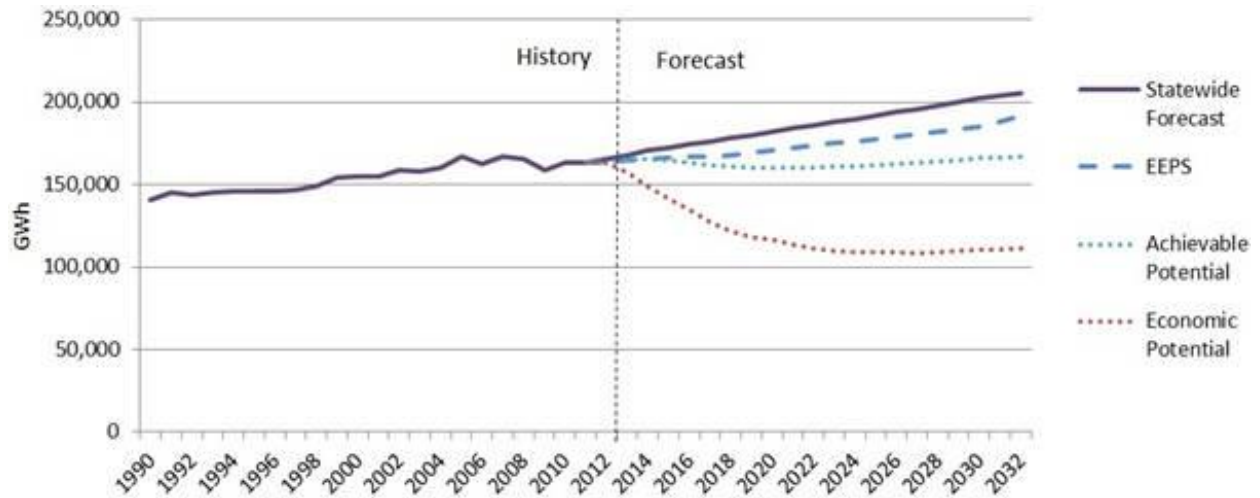
TODAY'S CHALLENGES

GHG EMISSIONS

The CEF is designed to help the state achieve its goals of reducing GHG emissions 40% by 2030 and 80% by 2050. New York's energy sector is responsible for nearly 90% of current GHG emissions. New York has attained substantial reductions in GHG emissions over the previous ten years through implementation of EEPS and the RPS; however these approaches will not be sufficient going forward due to the scale of reductions required. According to the Energy Efficiency and Renewable Energy Potential Study of New York State, achieving the carbon reduction goals stated in the State Energy Plan would require nearly \$150 billion of cumulative investment in energy efficiency and renewables by 2030.³ That level of investment can only be achieved if the State works in concert with the private sector. As illustrated in Figure 1, a continuation of EEPS in its current form would leave vast untapped potential for energy efficiency investments that are both economically and environmentally advantageous. In order to better assure that we can capitalize on that untapped potential energy savings, new strategies are required by addressing market barriers.

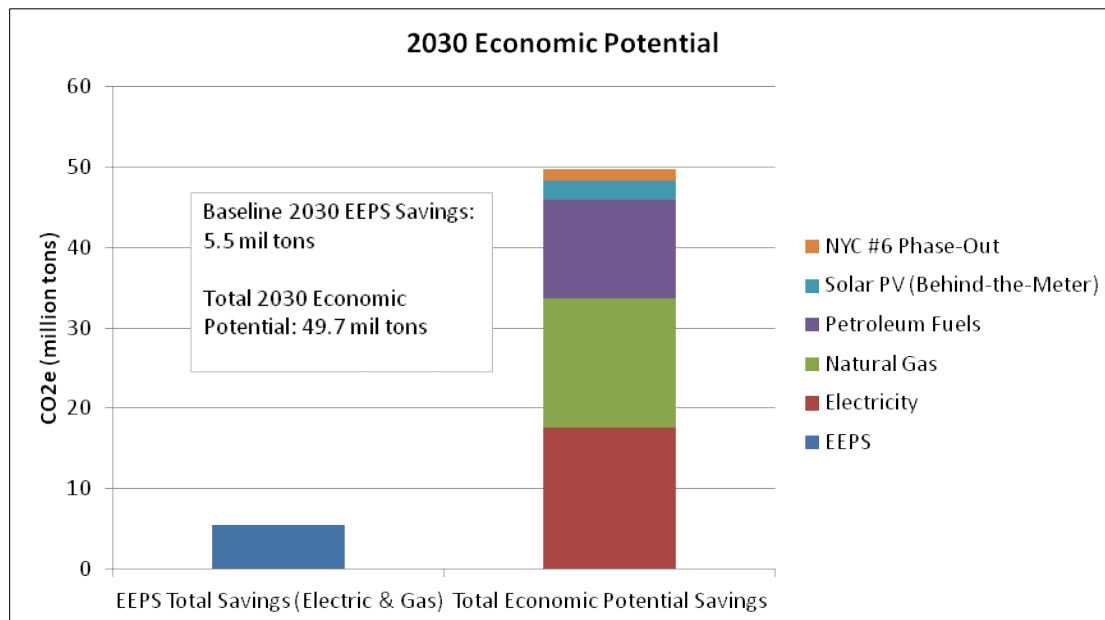
³ <https://www.nyserda.ny.gov/Energy-Data-and-Prices-Planning-and-Policy/Energy-Prices-Data-and-Reports/EA-Reports-and-Studies/EERE-Potential-Studies.aspx>

Figure 1: Forecast of business as usual vs. alternative strategies and potential, in potential GWh savings



The economic potential - that is the amount of GHG emissions savings that can be achieved by rational investments - is an order of magnitude higher than the current EEPS trajectory. The State's clean and affordable energy goals call for this full potential to be achieved - as swiftly, surely, and rapidly as possible, and within the bounds of improved affordability.

Figure 2: Forecast of business as usual vs. alternative strategies and potential, in potential GHG emissions savings



Renewable energy sources face a similar challenge. The Energy Efficiency and Renewable Energy Potential Study of New York State estimates that renewable energy resources (bioenergy, hydro, wind, and solar) have an economic potential to avoid approximately 13.51 million tons of carbon dioxide equivalent.⁴ However, significant operational, regulatory and market issues and constraints must be addressed for this potential to be achieved.

THREATENED GRID RESILIENCY

While New York seeks to mitigate climate change through reductions in GHG emissions, it must also take measures to adapt to some of its immediate consequences. Extreme weather events such as Super Storm Sandy, Hurricane Irene and Tropical Storm Lee increasingly threaten service reliability. In the wake of these storms, some New Yorkers were left in the dark for as much as two weeks. Furthermore, aging infrastructure threatens energy service reliability even apart from extreme weather events. The CEF will work synergistically with the REV proceeding and other State resiliency efforts to promote clean, distributed energy resources that strengthen the grid and improve reliability for all New Yorkers.

ENERGY COSTS

Even as New York faces environmental and system reliability threats, high overall energy costs in New York State create a financial burden on all customer classes - residential, commercial, and industrial. Transmission and distribution costs are a primary driver, costs which are necessary to maintain reliability with an aging infrastructure and build resiliency to better withstand against more frequent and severe weather events. These costs are projected to amount to \$30 billion of necessary transmission and distribution investment over the coming decade, compared to just \$17 billion over the past ten years. Accelerated deployment of energy efficiency, demand response, and distributed generation are essential components of a comprehensive strategy to achieve energy bill reductions.

COORDINATION WITH U.S. EPA'S CLEAN POWER PLAN (SECTION 111D OF CLEAN AIR ACT)

New York State has been actively implementing and seeking policies and mechanisms designed to address GHG emissions originating from New York based generation sources. Among these activities, New York is a founding member of the Regional Greenhouse Gas Initiative (RGGI), a regional program in which 9 states in the Northeast have collectively capped the level of emissions from power plants, and which requires emitting facilities to acquire and hold emissions allowances to demonstrate compliance with the regulatory program. Proceeds from these auctions are invested in clean energy activities. RGGI has proven successful, and emissions in the power generation sector have significantly reduced since the onset of the program.

⁴ Volume 3, Energy Efficiency and Renewable Energy Potential Study of New York State (<https://www.nyserda.ny.gov/Energy-Data-and-Prices-Planning-and-Policy/Energy-Prices-Data-and-Reports/EA-Reports-and-Studies/EERE-Potential-Studies.aspx>).

Pursuant to its authority in Section 111(d) of the Clean Air Act, the U.S. Environmental Protection Agency (“EPA”) recently issued Proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units (“Clean Power Plan”), which would establish carbon dioxide (CO₂) emission guidelines for existing electric power plants. These guidelines create an emissions standard, as well as a methodology to be applied on a state-by-state basis, which results in an allowed emissions rate for power plants that are covered by 111(d). The EPA proposal also includes explicit recognition for and acceptance of regional and mass-based, market-trading programs that are proven to be equivalent to the region’s collective state-specific carbon intensity targets developed by EPA.

Concurrent with the submission of this CEF Proposal, New York is evaluating the application of the EPA methodology as it applies to the existing generation fleet in New York, taking account of activities already underway in New York to reduce GHGs in the power generation sector (including RGGI). New York is also conducting analysis to determine whether to submit comments to the EPA regarding the assumptions to and impacts of the proposed methodology on New York, and for possible recommended changes to the methodology.

As the EPA process advances, New York will further consider options for ultimate implementation of any final 111(d) requirements, and how such requirements will support a more comprehensive State strategy for GHG emissions reductions from all sectors of the economy. As 111(d) focuses on a single sub-sector of the economy, the State will balance future strategies to comply with any new EPA requirements in a manner that continues to advance State energy policies, such as emissions reductions across all energy uses and fuel inputs supporting the economy, as well as strategies that attract private capital to an expanding clean energy economy. To help with this determination, the State will need to consider the role of RGGI as a potential compliance mechanism for 111(d), as well as new and/or alternate opportunities for clean energy that may facilitate meeting the goals of the federal program and that advance progress towards overall statewide emissions reductions goals. Future activities of the CEF will likely be impacted by any final determination and implementation strategy for 111(d).

INNOVATION ON THE SIDELINES

Against the backdrop of the State's ever-increasing challenges, advancements in clean energy technologies provide the public and private sectors with new opportunities for win-win investments that contribute to the achievement of both our environmental and economic development goals. As two illustrative examples, the home automation sector and third-party lease models for distributed generation are quickly transforming customers’ interactions with their energy use.

The home automation sector has seen tremendous growth and consumer acceptance in the past two years. Major market participants like Google, Best Buy, Honeywell, Samsung, and Apple recently introduced versions of a home energy management system and/or smart thermostat and are vying to gain traction in the increasingly competitive field of home connectivity. Energy savings, while often an ancillary benefit of these products, are achievable through application of this technology. Market interventions that take advantage of innovations in this sector could address

the market gaps to increased adoption, as the barriers may have less to do with high upfront costs and more to do with the potential lack of consumer demand, issues around access to and transparency of utility data, restrictive interconnection and advanced metering rules, and other “soft” costs.

Historically, high upfront capital costs for solar or wind dampened interest at the consumer level -- it was easier and cheaper to continue purchasing power from the central power grid. However, this dynamic has changed in the past decade with the advent of the clean energy power purchase agreement (PPA) and third-party lease models through which the PV industry has realized unprecedented gains. In just the last two years, residential solar projects in New York have quadrupled in installed capacity, thanks in large part to the availability of no money down leased systems. While the availability of diverse ownership options is and will continue to be important, PPAs and third-party lease models have clearly helped drive these enormous gains. More recently, the PPA/lease model has become available in the distributed wind sector. Looking forward, analogous innovations in financing new products are taking hold in other renewable sectors, such as solar heating. As leases, PPAs and other financing mechanisms chip away at the issue of clean energy’s high up-front price tag; the focus of the CEF can shift to addressing customer acquisition, installation, permitting, and other soft costs.

Innovation around home automation and third-party lease models for distributed generation present examples where the private sector can work in tandem with the State —driving towards a more distributed, sustainable and reliable power grid. In order to take advantage of such opportunities, the CEF will transition away from a resource acquisition model to one focused on market animation. The new CEF focus will require a flexible and diverse approach from administrators.

TRANSITION FROM RESOURCE ACQUISITION TO MARKET ANIMATION

The CEF strategies are best understood when assessed alongside other state energy policies and programs. The CEF will serve as an integral part of a much larger policy framework that includes REV, RGGI, NYPA’s new suite of clean energy activities, and others. This comprehensive statewide energy policy aims to leverage the collective resources of all energy programs to accelerate deployment of clean energy, stimulate greater levels of total clean energy investment, and realize greenhouse gas emissions reductions goals. That is, the CEF will become a stronger policy mechanism as it works alongside these complimentary activities.

To catalyze this new direction, Reforming Energy Vision (REV) will create the platform for an expanded clean energy market, open to a diverse array of market actors, including utilities, ESCOs, governments, non-profit institutions, and customers. REV will establish the regulatory infrastructure that will provide more choices for customers through more effective price signals, assisting utilities to improve system efficiency, appropriately valuing distributed generation and energy efficiency, and ultimately reducing energy bills.

The CEF, will work alongside REV as it targets the “upstream” supply chain, ensuring that the market is ready to provide the products and services that an animated consumer market will be demanding from REV.

NYPA programs will reach the extensive state facilities and municipal buildings market, providing a \$200 million per year “lead by example” platform, BuildSmart New York, which commits to reduce energy consumption in New York State buildings by 20% by 2020. This platform will also be designed for the private market to learn the benefits of clean energy and begin to identify opportunities for their own homes and businesses. Further, an additional \$22.5 million per year research and development initiative will advance grid infrastructure improvements, further demonstrating the transition to a smart grid as envisioned by REV.

To deploy these resources strategically, NYPA will continue to offer low-cost clean energy financing as well as a new suite of energy consulting and advisory services to municipal and other customers depending on particular areas of community need and priorities. For instance, depending on community need, NYPA could offer training and capacity development to city officials, data warehouse and tracking services, contract advisory services, or technical support for renewable and energy efficiency projects. These more diverse and flexible NYPA services to localities will help ensure that New York’s communities become more energy literate and drive clean energy practices that are tailored to a community’s strengths and needs.

CEF AND REV

The CEF is designed to work synergistically with REV. According to the REV proposal:

Creating animated Distributed Service Platform (DSP) markets as envisioned in REV implies that customers will increasingly: 1) be aware of and adopt Distributed Energy Resources (DER) technologies and services; and 2) use DER technologies in such a manner as to optimize their value to the grid and to the customer.

Here, the State has a central role to play—through the administration of the CEF—in order to ensure that REV markets work properly and, critically, to drive large-scale industry transformation “upstream” of individual utility service territories. Through the CEF, NYSERDA will act as a market-maker, stimulator, and aggregator of clean energy demand, both in market-ready sectors as well as in promising areas of the market that need public investment as a bridge to market readiness or among populations that the market is unlikely to serve, such as rural or low- to moderate-income communities.

The CEF’s portfolio will aggregate and build markets for participation in the REV construct. The CEF will help to stimulate demand in clean energy technologies and support the private sector actors that are crucial to the effective operation of animated DSP markets. While it is expected that utilities under REV will need to address the very specific system needs of their service territory through investments oriented towards projects, the CEF will have many initiatives that work across utility service territories to build markets and advance greater scalability.

BEFORE AND AFTER

The CEF offers the opportunity for programmatic changes that provide the clean energy industry with greater transparency, standardization and predictability. Tables 1, 2, 3, and 4 depict the differences between the historic and redesigned program approaches employed in these areas.

Table 1: Before and After NY-Sun

Prior to the NY-Sun Program	After the NY-Sun Program
Uncertain. Year to year funding changes.	Certain. \$1 billion commitment over the next decade.
Inconsistent. Varying program rules by region.	Uniform. Statewide program with standardized rules.
Unpredictable. Program trying to determine the appropriate incentive levels on an ad-hoc basis.	Predictable. Straightforward and transparent incentive changes triggered by market volume.
Confusing. Incentive adjustments occurring with little or no prior notice.	Customer Friendly. Installers able to better present cost estimates with known project incentives.
Caps. Contractors limited to a certain number of projects and incentives per month.	Open. Caps removed to support best-in-class businesses and create a “race to the top” environment that is good for consumers.
Limited funding to address market barriers. A few pilot initiatives to reduce soft costs of solar.	Comprehensive effort to reduce soft costs. Initiatives such as Community Solar, K-Solar and expanded streamlined permitting.

Table 2: Before and After New York Green Bank

	Before NYGB	After NYGB
Clean Energy Markets	Many Projects Not Implemented. Economically and technically feasible clean energy projects are not completed because of lack of access to needed capital.	Increasing Availability of Capital. NYGB works with private sector to address real-time market needs to alleviate existing gaps and barriers with an emphasis on scale and ability to replicate, deployment opportunities are maximized.
Private Sector Participation	Certain Classes of Feasible Projects Shut-Out of Commercial Market Participation. Commercial markets focused on utility-scale, grid-connected generation projects, with limited focus on distributed resources or efficiency projects just outside of current lending scope (e.g., those of smaller size, involving less familiar structures, credits and counterparties etc.).	Successful Partnerships Lead to Expanded Market for Financing Opportunities. Mobilizing and leveraging private sector investments alongside NYGB funds produces greater capital availability to be deployed across larger numbers, types and locations of projects than would otherwise be the case, as NYGB acts to “crowd in” the private sector.
Efficient Use of Public Dollars	Focus on Government-Driven Grants & Subsidies. Public monies typically deployed as one time grants or subsidies through pre-determined programs, without addressing specific market gaps and barriers through a holistic, systematic approach.	Transition to Market-Based Investments and Multiple Deployments for Each Dollar. NYGB achieving greater impact for each NYGB dollar invested by leveraging funds and institutional capabilities of its clients and partners. Generating fees at commercial rates and obtaining repayment of investments allows NYGB to be self-sustaining and recycle capital through successive investments. All achieved through NYGB’s focus on wholesale markets, proven technologies and employing existing financing tools and structures in innovative ways.

Table 3: Before and After Market Development

Before	After
Subsidies First. Focused primarily on offsetting the upfront costs of clean energy technologies.	Diversified Approach. Arsenal of interventions as diverse as the barriers facing clean energy.
Limited Market Scale. Sprinkling of public support across the state with an overreliance on grants.	Roadmap to Scale. Programs designed to create self-sustaining industries.
Siloed Programs. Designed around specific technologies with little interaction between them.	Customer-Driven. Purposeful programs to tackle barriers and build off one another with holistic solutions.
Burdensome Restrictions. Onerous cost-effectiveness testing and eligible fuel constraints.	Flexible Approach. Strategies aligned with how investments are made in the market.

Table 4: Before and After Technology and Business Innovation

Before	After
Technology Focus. Focused primarily on technology performance.	Path-to-Market Focus. Integrated focus on technology and business development.
Project Performance. Focused on the performance of individual projects in individual energy sectors.	Portfolio Performance. Focused on delivering an optimized portfolio of projects.
Broad Areas of Investment. Projects covered a very broad range of energy technologies in an attempt to stimulate a cleantech sector in New York.	Strategic Focus on GHG Emissions Reduction Potential. Invest in projects that can deliver the most GHG emissions reduction for New York as a primary goal, while also growing a cleantech sector.

IV. GOALS

As the Commission considers the CEF, the critical focus must be on outcomes, including the primary outcomes of GHG emissions reductions and private investment in New York’s clean energy industry. Outcomes serve as long-term goals to attain, and program strategies will be oriented towards measurable outputs (such as kilowatt-hour energy saved or produced) that advance stated long-term outcomes. Some current programs have sacrificed long-term policy goals for the achievement of near-term program outputs. Inherent in a focus on outcomes is the need for flexibility. Absent flexibility, programs will not be able to adapt to market conditions as they emerge. Also, flexibility allows programs to adjust the allocation of resources in response to evidence and assessments on the program ability to achieve the outputs (or metrics) that have been estimated for that initiative.

The CEF must also be considered in the context of broader State energy policy. This broader policy identifies multiple goals that can be realized by engaging in clean energy activities, and includes energy goals such as reliability, resilience, and affordability; environmental goals such as emissions reductions; and economic goals such as job creation and support and improved gross domestic product. Within this framework, the goal of the CEF will be to advance the key outcomes of GHG emissions reductions and clean energy private investment, in a manner that also supports energy affordability, increased economic development, and transition to self-sustaining markets.

In order to assure accountability, the CEF will develop defined strategies and target metrics in its Program Investment Plan. The CEF will measure its progress on those metrics, make appropriate adjustments as the effectiveness of each strategy is learned, and account for the impacts from public funds and the leveraged private investment. In addition to such metrics meeting the needs of the CEF, they will also contribute to broader achievements intended to advance statewide continuation of energy efficiency and renewable energy progress made in the past, which include future energy efficiency and renewable energy goals to be finalized in the State Energy Plan, alongside all clean energy programs from state-sponsored activities.⁵ To this end, NYSERDA will track the

⁵ NYSERDA appreciates the comments from some stakeholders concerning the need for energy efficiency and renewable energy targets in order to both ensure continued levels of commitment to these resources over time, as well as to provide a market signal of the general magnitude and size of the market that is to be

contribution of the CEF toward the new State Energy Plan energy efficiency and renewable energy goals, using the following metrics as benchmarks of progress:

- Reduced total GHG emissions;
- Accelerated growth in the State's clean energy economy, measured by total public and private investment in clean energy technologies and solutions;
- Energy savings due to reduced energy use, as measured by reductions in customer energy bills;
- Improved statewide energy efficiency, measured by the total increase in energy efficiency from 2010 levels; and
- Increased fuel diversity, measured by the overall proportion of renewables in the electricity mix.

As programs are developed in future Program Investment Plans, metrics associated with the goals for individual programs, strategies and interventions will be defined. These metrics will provide benchmarks for program progress and success, and milestones or indicators for needed program adjustments and/or new directions. A more dynamic design for program implementation will be used to demonstrate how the portfolio is responsive to market conditions, and how the use of metrics in that dynamic program implementation will inform future program design.

To support the long-term outcomes approach to measuring progress, NYSERDA recommends a 10-year commitment and budget for the CEF. To demonstrate interim progress on CEF initiatives, in addition to regular, periodic reporting of program progress, NYSERDA recommends a formal 3-year review cycle. NYSERDA will develop and provide to the Commission annual Program Investment Plans delineating anticipated activities, budgets, outcomes, and metrics. Additionally, these annual updates will provide an understanding of the successes realized by various CEF approaches, changes to the portfolio over time as informed by evaluation, and calibrations needed in the overall portfolio for continued progress. NYSERDA further describes this 10-year funding proposal in Section VII, Budgets.

V. PROPOSED PROGRAM STRATEGIES

NYSERDA proposes four main portfolios of activity within the CEF: Market Development, Technology and Business Innovation, the NYGB, and NY-Sun. The Market Development portfolio will principally include activities facilitating the market for on-site, behind-the-meter clean energy including: energy efficiency, on-site distributed generation, renewable thermal, as well as storage, micro-grids and other supporting energy technologies. The Market Development Portfolio also includes proposals for potential NYSERDA activities in support of grid-tied renewables. The Technology and Business Innovation portfolio will include activities such as technology research and development, commercialization of new technologies and innovative business models, and

pursued. NYSERDA considers that such targets, specifically for EEPS and RPS, should be an active point of consideration in the development of the Final 2014 State Energy Plan.

support for emerging businesses developing clean energy products and services in New York State. Additionally, as a single comprehensive CEF going forward, the market development activity is intended to supersede the final year (calendar 2016) of the current T&MD portfolio. NYSERDA's new approach will seek to spur demand and enable scale by reducing friction and market barriers, catalyzing markets through "bridge" incentives, and by influencing changes in policies, codes, and regulations.

Additionally, NYSERDA will adopt a new approach to program design and implementation. Current programs are generally implemented through a highly-structured approach to incentives and market engagement. This approach has been successful in moving individual projects through the programs, and has provided an ability to track and monitor individual projects for their energy results. As NYSERDA transitions to new roles with different market engagements, this structured program approach will need to evolve to a more dynamic program implementation model. New program models will be specifically designed to support initiatives in each of the Market Development and Technology and Business Innovation portfolios.

NYSERDA's new clean energy market approach will also be supported by on-going market and energy-related environmental research as well as workforce and economic development efforts. Market research will help ensure that NYSERDA remains aware of current market and institutional barriers to clean energy technology and product adoption, and the most effective market interventions to spur demand and enable scale. Likewise, energy-related environmental research will provide the foundation for ensuring that New York State meets its clean energy goals by guiding cost-effective greenhouse gas mitigation and climate adaptation strategies. Environmental research and analysis informs state and federal energy and environmental policies, provides environmental accountability, examines the health and ecological co-benefits of alternative energy and technology solutions, and guides emerging energy technologies and systems, thereby facilitating their entry into New York State's generation mix and contributing to the diversification of energy resources.

Workforce and economic development efforts will work to ensure that appropriately skilled and trained professionals are available in sufficient numbers within the State to service the clean energy economy. For the Technology and Business Innovation portfolio, a shift to incorporate some investments along a more strategic approach will be designed to foster accelerated adoption of new technologies, strategies and business models by both the investment community and the energy market, particularly those technologies, strategies and business models that project to success under the offerings and opportunities of the REV Distributed System Platforms.

The identification of "stall points" in the progress of a technology or business along the innovation cycle will also provide an interim assessment point to determine future support and direction. The Market Development "test-measure-adjust" approach and the Technology and Business Innovation approach to program design will provide a more dynamic set of activities and initiatives that will be able to be more responsive to market evolution in the interim periods between Commission portfolio reviews and new directions.

In order to be responsive and adaptable to the market and deliver the greatest impact, NYSERDA will require flexibility to adjust activities within these two portfolios of activity in response to evolving circumstances, as identified in the CEF Order. Accordingly, NYSERDA will develop new tools to calculate the relative opportunities that exist within the various disciplines (efficiency, on-site generation, renewables, R&D), thereby quantifying the potential benefits for initiatives across these disciplines. NYSERDA will be in a position to inform decisions to invest funds across the portfolio and provide evidence to support decisions on funding flexibility needed to capture market opportunity.

The NYGB and NY-Sun are on previously established, independent, yet related paths as compared to the remaining portfolios. The establishment of the NYGB and initial capitalization of \$165.6 Million was approved by the Commission in December, 2013, along with \$52.9 of RGGI funding. This initial capitalization was accompanied by an acknowledgement that NYSERDA would request or reallocate additional funding in the future in order to fully capitalize the NYGB at \$1 billion.⁶ A program authorization request to capitalize the remaining NYGB funding is anticipated via a petition in Fall 2014. Similarly, continuation of NY-Sun from 2016 through 2023 was authorized by the Commission in April, 2014, when \$960,556,000 was allocated to fund, implement and administer the initiative.⁷ These amounts are reflected in the Budgets; the discussions of the NYGB and NY-Sun are limited to overviews of the initiatives and discourse related to the alignment with CEF principles, goals, and other program areas.

MARKET DEVELOPMENT ACTIVITIES

NYSERDA supports the directional shift in the Department of Public Service (DPS) REV Straw Proposal which calls for utilities to engage more comprehensively in DER, including energy efficiency, and to take primary responsibility for assuring deployment of these technologies within their service territories mainly through resource acquisition and procurement approaches.⁸ While this shift is necessary and appropriate, resource acquisition programs alone will not be sufficient to meet the State's broader energy policy goals. As noted in this Proposal, the market for energy efficiency, as for several other behind-the-meter solutions, is not yet fully enabled. In this context, the effective deployment of public, ratepayer funds shifts to funding the preconditions for adoption. A government agency, like NYSERDA, is best positioned to operate more upstream and work to enable more regional-scale market interventions and transformations, to take more risk, to adopt a longer-term strategy, and to target market transformation. Public ratepayer funds will also be used to support clean energy among segments (such as lower income populations) that the market will not likely serve readily, for reasons of both equity and the attainment of the State's climate and energy goals.

⁶ Case 13-M-0412, Initial Capitalization for the New York Green Bank, Order Establishing New York Green Bank and Providing Initial Capitalization (issued December 19, 2013).

⁷ Case 03-E-0188, Retail Renewable Portfolio Standard, Order Authorizing Funding and Implementation of the Solar MW Block Programs (issued April 24, 2014).

⁸ Case 14-M-0101, Developing the REV Market in New York: DPS Staff Straw Proposal on Track 1 Issues, August 22, 2014, page 15.

NYSERDA has had considerable success in delivering on its mission of advancing innovative energy solutions in New York. Looking forward however, NYSERDA must and will reframe its approach to driving impact in its mission to accelerate the adoption of energy efficiency and distributed generation/renewable energy in the marketplace. New strategies are necessary to better leverage public investment, catalyze market opportunities, and spur increased levels of private investment in clean energy to help achieve the State's energy objectives.

While many clean energy technologies are now cost competitive, they are not happening on the scale. This implies that the main barrier is not wholly monetary, and indicates that direct grants and incentives are not always the most effective means to spur adoption. Instead, there is evidence that non-monetary barriers, such as burdensome and misaligned permitting and approval processes, are responsible for slow market response. In addition, uneven and limited consumer awareness, a lack of trust in technology performance by customers and financial institutions, and inertia present significant, though addressable drag on otherwise rational decision making.

Accordingly, NYSERDA will focus on support to overcome barriers that will unlock the most significant potential for market and technology transformation. These are barriers that (a) are unresolved, (b) receive insufficient focus from other market actors, and (c) have high-potential to accelerate adoption if resolved. Important to note is that as REV seeks to incent utility activity that resolve system constraints and are designed to improve system efficiency, this particular function for distributed energy resources ("DER") will not broadly move markets for clean energy. New CEF approaches will be similarly targeted in the marketplace, advancing activities designed to galvanize upstream supply chains which may not address downstream cost barriers that consumers otherwise face.

Therefore, to ensure that all market barriers, upstream and down are addressed, the efforts of NYSERDA and the utilities need to be synergistic and collaborative. NYSERDA should assist the utilities in identifying market barriers that need to be addressed in the preparation of their REV proposals so that broad market DER opportunities are captured alongside focused DER that is designed for system efficiency improvements. NYSERDA will then work with the utilities to smoothly transition incentive activities in a manner that provides market stability while affording the utilities the best prospects for success. This engagement will be particularly important as the CEF is developed and refines program strategies and investment plans that provide coordinated services to the marketplace to achieve the greatest outcome. In addition, utilities can leverage CEF investments, which will build awareness for clean energy, generate consumer demand, drive down soft costs, and reveal the value for clean energy from a customer's perspective.

Taken together, the combined CEF and REV will position the state and utilities to drive the maximum level of clean energy while lowering the cost to ratepayers. Added to this, the NYGB will address financing barriers and provide new lending products that should ease consumer decision-making. It is anticipated that the combination of these strategies, focused on sub-sectors with the highest clean energy potential, will accelerate the desired market scale for the entire CEF portfolio.

Understanding that a focus on upstream activities may not address all market barriers, NYSERDA will manage opportunities in the context of a comprehensive portfolio. Specifically NYSERDA will:

- Prioritize market segments, end-uses, and approaches with the greatest potential to unlock energy efficiency and distributed generation/renewable energy adoption;
- Within those segments, direct intervention at specific and evidence-based barriers to adoption;
- Target new interventions at high-potential events and decision points in the lifecycle of a building (i.e. building acquisition, renovation, refinancing) in order to more easily incorporate and embed energy efficiency and distributed generation/renewable energy into ongoing capital planning processes and ownership events.

NYSERDA will seek to address, among others, the following barriers currently facing clean energy technologies:

- Financial impediments, such as issues of first cost, and of workable financing, compounded by debt aversion on the part of many customers;
- Fear of performance that the technology or the installation will not deliver as promised;
- Lack of prioritization or attention by customers to energy performance;
- Frustration and annoyance with even small energy projects;
- Lack of awareness of the benefits of superior energy performance, such as economic, health, safety, resiliency;
- Lack of “solution providers” that can make opaque and complex projects straightforward for the customer;
- "Soft costs" that are too high, in the absence of inexpensive, robust tools and methodologies, including clear and publicly accessible data sets;
- Inconsistent, weak or lightly enforced State or municipal-level building codes and regulations.

Many market barriers and energy solutions are time sensitive. At one extreme, integrating energy solutions into new construction is the most straightforward approach. At the other extreme, stand-alone energy projects are difficult for customers to say yes to and to implement - for reasons of disruption, heightened cost, and low prioritization. Synchronizing the energy project with other events, such as refinancing, sale of building, renovation/remodeling, and tenant change-over offers the chance to sidestep the challenges of stand-alone projects.

NYSERDA will stimulate market solutions that overcome these persistent barriers to clean energy adoption by engaging in three primary roles:

1. Enabling solutions for other market actors:
 - Coordinating and facilitating market transactions where immature or fragmented market conditions prevent transactions today, and increase the ease of customer acquisition (including targeting, aggregation, and enabling new solutions integrators and new “marketplaces”);
 - Aggregating, certifying, and sharing information where opacity, fragmentation, or complexity prevents adoption (including useful credible usage information,

successful providers, credible track records, best practices and operational approaches, etc.), and potentially developing new useful asset ratings;

- Working with local government and private partners to reduce EE and DG/RE project costs by streamlining, standardizing and clarifying market rules and tackling financing and soft costs (standardizing permits and inspections, standardizing contracts, tested tools and methodologies, tech-enabling assessments and M&V, etc.);
- Creating awareness and a predisposition among customers to decide to invest in clean energy, through education, outreach and marketing activities aimed at decision-makers, through credible and objective analyses documenting the costs and benefits of clean energy measures from a customer perspective, and through demonstration projects that provide tangible evidence of success.
- Providing direct financial incentives to directly stimulate more robust demand and ensure there is adequate supply to meet latent demand, NYSERDA will continue to provide incentives to end users and/or suppliers where necessary, and in doing so will aim to use market-mobilizing mechanisms (e.g., auctions, step-downs). There are three situations when incentives are most appropriate:
 - 1) As a temporary bridge to an incentive-free market solution;
 - 2) Where the incentive creates public accessible infrastructure (e.g., a "pilot", or a beta-version);
 - 3) Where market gaps occur even in efficient markets and a subsidy may be necessary (e.g. Low/Moderate Income (LMI), rural).

2. Driving policy. Continue to lead on policies such as building codes, mandates, appliances standards, state legislative initiatives, and local laws - partnering with all levels of government, as they represent significant opportunities for leverage and impact.

NYSERDA will focus and organize its market development activities on 5 sectors:

- Residential Single Family
- Residential Multifamily
- LMI Residential
- Commercial
- Industrial

Outlined below are the high level strategic objectives for each sector, including a summary of the specific barriers and decision points that would unlock the most potential. Further details on the barriers and decision points, as well as illustrative program strategies for each sector can be found in Appendix B. Specific program strategies will be included in a future Program Investment Plan filing to the Commission.

RESIDENTIAL SINGLE FAMILY

NYSERDA's market research in the residential single family sector was guided by activities within the sector with the highest economic energy efficiency potential, which included thermal comfort, water heating, space heating, and lighting. The primary barriers identified to realizing that potential include: (1) limited information/awareness and trust in savings, (2) real estate market not properly valuing energy efficiency, (3) limited experience/knowledge in key supply segments, (4) high ratio of soft costs to project costs, a function of small project size, and (5) inertia and low homeowner "attention share" to energy performance, i.e. limited interest in spending time on energy decisions. Further, the research identifies key consumer decision points that represent the greatest opportunities to intervene to overcome associated barriers, including home transactions, remodeling, refinancing, and system replacement/failure. These decision points offer the chance to incorporate distributed energy resources decisions into non-energy events and so make homeowners more likely to consider energy efficiency and distributed generation.

The following high-level strategic objectives will be pursued to drive significant and sustainable impact on energy use practices in the residential single family sector:

- Engage all sides of the homeowner transaction to further embed home energy performance into the value of a home during a sale. This entails efforts to incorporate energy considerations into regular home sales/purchase channels to leverage the actions of existing players and processes (e.g., realtors and appraisers, property listing websites, mortgage property appraisals/reports etc).
- Change the mindset on energy efficiency and distributed generation among residents by driving widespread awareness of the impact on energy use and costs that can be achieved via behavioral changes and the installation of often simple technologies. Increase demand by associating clean and efficient technologies with increased comfort, convenience, reliability, aesthetics and safety.
- Improve transparency and awareness by offering compelling, user-friendly information for repair vs. replace decisions, retail purchases, and similar decisions.
- Help service providers enhance their capabilities and grow energy efficiency and distributed generation business by driving down soft costs through supporting demand generation efforts, training and tools to further improve business models and workforce skills, and by enabling integration across service categories (HVAC, insulation, building envelope and on-site generation, such as PV)..
- Better integrate energy offerings into products/services that consumers consider more frequently than energy products (e.g., home automation, roof repairs, landscaping). Work with manufacturers and service providers outside of the energy supply chain to increase adoption of these products given their potential to expand energy savings in the home.
- Drive the new home construction market towards the next frontier of efficiency (e.g., Net Zero homes) by generating end-user demand and demonstrating the societal and business case to end-users, builders and the architectural community.

RESIDENTIAL MULTIFAMILY

NYSERDA's market research in the residential multi-family sector was guided by activities within the sector with the highest economic energy efficiency potential, which included thermal comfort, water heating, and space heating and cooling. The primary barriers identified to realizing that potential include: (1) limited tenant awareness and trust in savings, (2) building owner hesitancy to take on additional debt to fund capital projects, and (3) split incentives, e.g., building owner pays for retrofit but cannot recover savings from reduced energy use that accrue to the tenant. Further, the research identifies the key consumer decision points that represent the greatest opportunities to intervene to overcome associated barriers, including when there are whole building and unit purchase/sale transactions, change in tenant occupancy/rental (which can often be paired with a remodel), building refinancing, and system replacement/failure. These decision points offer the chance to incorporate distributed energy resources decisions into non-energy events and therefore make building owners and tenants more likely to consider energy efficiency and distributed generation.

The following high-level strategic objectives will be pursued to drive significant and sustainable impact on energy use practices in the residential multifamily sector:

- Link better economic results with improved building energy performance in order to change decision making for building owners/landlords. Clearly and simply demonstrate the business case for improved cost flow resulting from energy efficiency. Create transparency by offering easy to interpret building energy performance ratings.
- Provide tenants with information that makes salient the benefits of renting in more efficient buildings. Create a positive public perception of the favorable externalities to drive demand. Leverage innovative marketing strategies, tools, social norming/behavioral insights to influence opinions and decisions (e.g., publicly available apartment/condo building ratings, web based ad campaigns, post participant lists in common spaces).
- Accelerate the move to Net-Zero in new multifamily buildings by engaging engineers, architects and designers early to ensure vanguard projects succeed, and by supporting marketing efforts to communicate the benefits of these buildings. Build structure for information sharing among early adopters of these projects (e.g., forum to share best practices and business case examples).
- Reduce soft costs by building platforms and market infrastructure for multi-family service providers (e.g., contractors, software providers) with improved data/analytics to target potential customers (both unit owners and building managers) and deliver a compelling business case in order to close deals.

LMI RESIDENTIAL

NYSERDA's market research in the residential LMI sector focused on activities within the sector with the highest economic energy efficiency potential and the opportunity to target a combination of energy savings, health, and safety benefits, which included thermal comfort and space heating. The primary barriers identified to realizing that potential include: (1) lack of available capital for both residents (who are having difficulty paying utility bills) and building owners (who are hesitant

to take on additional debt), (2) lack of awareness among LMI residents and/or skepticism about the ability to deliver on performance among residents and building owners, and (3) lack of coordination across LMI focused programs and organizations. Further, the research identifies key consumer decision points that represent the greatest opportunity to intervene to overcome associated barriers, including change in occupancy, new construction, equipment failure, and building refinancing (which often coincides with substantial capital and deferred maintenance projects in this sector).

The following high-level strategic objectives will be pursued to drive significant and sustainable impact on energy use practices in the LMI sector:

- Provide direct end-user incentives to increase energy efficiency and distributed generation adoption;
- Fully integrate administration and delivery of the portfolio of New York State programs designed to assist LMI consumers (e.g., NYSERDA's EmPower Program, Division of Housing and Community Renewal (HCR) Weatherization Assistance Program (WAP), Home Energy Assistance Program (HEAP), United States Department of Housing and Urban Development (HUD)). Take advantage of complementary outreach efforts and information sharing opportunities, and reduce unnecessary duplication;
- Help service providers enhance capabilities to better serve LMI customers by minimizing supplier soft costs such as customer acquisition (e.g., through targeted audit improvement and targeted outreach) and combining energy retrofits with other public and private LMI initiatives to promote health and safety, arrears reduction, affordability (e.g., incentivize roof repairs with high insulation);
- Drive education and awareness on the low cost steps and behaviors LMI residents and building owners can take to save on utility bills. Leverage social norming/ behavioral insights to influence decisions (e.g., community based outreach). Minimize consumer pain/friction through easy-to-use tools to choose providers and widespread access to efficient products, and help consumers avoid or reduce the need to take on debt. Benchmark and track energy and water use for public housing;
- Educate and convince affordable housing property owners/managers and their tenants of the financial benefits of energy efficiency investments (e.g., demonstration projects with performance guarantees). Facilitate on-site training for building managers. Target landlords with portfolios of multiple affordable housing properties to drive scale. Facilitate execution of deep energy retrofit projects (potentially incorporating both efficiency and distributed generation measures) at points of refinancing/recapitalization;
- Drive greater penetration of clean energy attributes in new affordable housing projects by providing technical support and advocacy for the benefits of clean/efficient building technologies (e.g., coordinate with New York City Housing Authority (NYCHA) on new building designs in NYC);
- Leverage resources like the "Center for Active Design" to drive innovation in housing development. Encourage owners or funders of affordable housing to implement high-efficiency standards, and provide technical assistance to developers to ensure they can achieve it at reasonable costs.

COMMERCIAL

NYSERDA's market research in the commercial sector focused on cooling, lighting, and water heating, the activities within the sector with the highest economic energy efficiency potential. The primary barriers identified in realizing that potential include: (1) concerns that aesthetics and comfort will be sacrificed to adopt energy efficiency and distributed generation, (2) skepticism about ability of technology to deliver savings, (3) lack of awareness of energy efficiency and distributed generation opportunities, and (4) commercial leasing rates not properly accounting for improved economics. Further, the research identified the key consumer decision points that represent the greatest opportunities to intervene to overcome associated barriers, including building purchase/sale, building refinancing/remodeling, pre-emptive replacement/upgrades, change in tenant occupancy, and new building construction. Commercial buildings, particularly retail establishments, often operate through centralized decision making for portfolios of buildings, making this larger decision making process a key decision point to target.

The following high-level strategic objectives will be pursued to drive significant and sustainable impact on energy use practices in the commercial sector:

- Make it simple to view the projected energy costs of a commercial building by ensuring the availability of continuous supporting data and training on how to act on it. Build a network of peer-to-peer advising that diffuses best practices and case examples among market players. Integrate this information into key decision making processes (e.g., refinancing, capital planning, building purchase);
- Seek opportunities to drive change through joint partnerships with other economically important states (e.g., California) in order to create a "case for change" that convinces multi-state, highly centralized organizations (e.g., national retailers);
- Guide end user organizations to operate at a higher efficiency level regardless of additional investment through training building managers in best practices, providing (declining) incentives to demonstrate the value of effective building managers operating efficient building management systems, and connecting experienced and inexperienced market actors to increase diffusion of behavioral best practices;
- Move the state-of-the-art standard forward through partnerships with select leading-edge institutions to build and rehabilitate "prototype" facilities demonstrating Net-Zero/deep energy level savings, potentially through projects combining efficiency with distributed generation technologies;
- Reduce soft costs through initiatives like building platforms that offer service providers (e.g., Energy Service Companies (ESCOs)) improved data & analytics to target and convert decision-makers, reducing audit costs through leveraging data, and reducing installation costs (and improving quality) through training and the dispersion of best practices in the market.

INDUSTRIAL

NYSERDA's market research in the industrial sector focused on the activities within the sector with the highest economic energy efficiency potential, which included process efficiency improvements and areas that feed into processes (e.g., steam generators, compressed gas). The primary barriers identified to realizing that potential include: (1) risk aversion in decision makers, (2) lack of expertise in energy management, (3) lack of understanding and/or trust in the ability of energy efficiency and distributed generation technology to deliver, and (4) restrictive regulations and codes. Further, the research identified the key consumer decision points that represent the greatest opportunities to intervene to overcome associated barriers, including those that are already central to industrial firms, such as: new product introductions, planned process improvements, annual budgeting decisions and equipment failures.

The following high-level strategic objectives will be pursued to drive significant and sustainable impact on energy use practices in the industrial sector including, data-centers:

- Accelerate growth in process efficiency by partnering with the Department of Energy, advanced industrial service providers and leading edge industrial firms to push state-of-the-art process efficiency forward, and thereby demonstrate the value to less efficiency-oriented firms;
- Educate industrial and data center decision makers on the value of energy management as a permanent, continuous, and embedded core mission – as fundamental as any other aspect of cost and operations management. Providing prominence to forums for sharing best practices in managing energy at the centralized and plant-specific decision-maker level will place effective energy management at the forefront of the conversation on cost-competitiveness. Leverage partnerships using International Organization for Standardization (ISO) 50001 and United States Department of Energy (DOE)'s Better Plants and Industrial Technologies Programs;
- Enable the emergence of a solution provider base with resources and support to assist industrial companies in executing a long term energy management strategy by providing targeted training courses for facility-level managers and engineers, teaching skills in assessing energy performance/opportunities, setting and achieving performance goals, creating and implementing action plans, and best practices in continuous commissioning to reduce maintenance and energy costs;
- Serve as a match-maker between supply and demand for technical talent through direct assistance, sub-contracting engineering consulting firms, and through academic networks (e.g., Ph.D grad students in the State University of New York (SUNY) schools). Provide low-cost technical support to aid industrial firms seeking energy efficiency.

LOCAL GOVERNMENTS AS PARTNERS

In furtherance of NYSERDA's approach to stimulating the market, NYSERDA, in close collaboration with New York Power Authority (NYPA) and other state agencies, will develop an effective and comprehensive partnership to better engage with local governments. Local governments are in a position to play a critical role in affecting energy choices in their communities, both as a customer

themselves, and as a channel for the deployment of clean energy technologies across homes, businesses, and community institutions. In managing their own energy demand and procurement, municipalities can lead their communities by example in demonstrating the economic benefits of energy efficiency and renewable energy and the role innovative partnerships with the private sector can play to advance these efforts. However, as municipal energy consumption is typically a small fraction of citywide usage, the State must also engage local governments as a channel to drive clean energy deployment in other sectors. Additionally, local governments are in a position to promote and implement a wide range of demand-accelerating and soft cost reducing measures including: project aggregation, standardized permitting and inspections, Property Assessed Clean Energy (PACE) financing, and zoning. Local governments are already important partners in multiple NYS energy initiatives, including the Five Cities Energy Master Planning initiative, Cleaner Greener Communities, Renewable Heat NY, Power Up Long Island, and NY Prize.

Local governments often lack awareness and the capacity to act. NYSERDA's approach, again in close collaboration with NYPA and others will address:

- Education and outreach, including training of local officials in key roles and general awareness of clean energy opportunities;
- Tools, including model regulations and standards, benchmarks and best practices, portals to ease the selection process for clean energy options, and model competitive offering instruments, such as RFPs;
- Accessibility and ease of use of State support and resources;
- Technical assistance, including assistance to enable effective engagement with their utility.

GRID-TIED RENEWABLES

Further investments in grid-tied renewable capacity will be necessary if New York is to achieve the objective of the 2014 draft State Energy Plan to reduce the intensity of its carbon emissions from the energy sector by 50 percent by 2030, and to address U.S. EPA's Clean Power Plan which is likely to require greater reliance on renewable energy generation capacity. In addition, a diverse mix of fuel resources for electric generation helps to protect consumers from price volatility and to preserve the reliability of the electric grid. As such, this area remains a priority for New York State policy.

Historically, the bulk of the energy credited to the 2015 RPS program target (approximately 10 million MWh) has been obtained through competitive solicitations in the Main Tier of the RPS program, which primarily awards contracts to grid-tied renewables. NYSERDA has conducted eight sealed, pay-as-bid auction Main Tier solicitations resulting in approximately 4.6 million MWh of contracted annual renewable energy generation. NYSERDA pays a fixed production incentive to renewable generators in exchange for all rights and claims to the RPS attributes (or RECs)

associated with each MWh of renewable electricity generated and delivered for end use in New York.⁹

Commission Orders and the REV DPS Staff Straw Proposal

The Commission's July 2, 2014 Order "Order Authorizing Modifications to the Main Tier Solicitation Contract Term" (July Order), authorized NYSERDA to offer REC-only contract terms of up to 20 years instead of the then-current 10 year term, and directed NYSERDA to conduct an immediate 2014 solicitation and at least one in 2015 under this construct. NYSERDA released the 9th Main Tier Solicitation on July 28, 2014 offering contract terms of up to 20 years for fixed price RPS attributes. The July Order also noted that the REV and CEF proceedings were the proper venue to examine the future of the RPS program beyond 2015, including the use of alternative incentive mechanisms.

The environmental and development community have suggested that New York consider fundamental changes to the Main Tier RPS program, including a mechanism to address the unbounded commodity market risk presented under the current design. Potential bidders have noted that the REC-only nature of the agreements exposes developers to difficult-to-hedge energy price risk and is not in alignment with the financing requirements of utility-scale renewable projects. Analysis conducted by NYSERDA suggests that bundled contracts would produce levelized cost savings of approximately \$6-\$8/MWh compared to REC-only contracts of equivalent duration, and would improve the likelihood of financing for these projects. Any preference among these options depends on the best fit within New York's market structure and the overall REV construct.

The regulatory reform and energy utility rule changes enacted through the REV proceeding will impact the existing process for procuring and contracting for Grid-Tied Renewables. The REV Straw Proposal notes that continued low natural gas prices, financing and hedging difficulties, and continuing uncertainties surrounding the stop/start nature of federal renewable energy tax credits and grants have disrupted the renewable energy market and driven up ratepayer premiums to develop renewable energy. To address some of these concerns, the REV Straw Proposal recommends that the REC-only program approach should transition to bundled contracts for energy and RECs from competitively selected projects. NYSERDA supports exploring moving away from REC-only contracts as a means to attract additional renewable energy projects to New York.

Given the complexity of the topic, NYSERDA agrees that a separate forum is the most appropriate place for further deliberations on the matter and suggests that an independent proceeding be launched. NYSERDA further recommends that the Commission issue near-term direction as to the

⁹ In contrast, nearly all other state RPS programs consist of utility compliance programs under which utilities acquire energy and RECs through long-term contracts. In competitive markets like New York's, these RPS programs require load-serving entities (competitive ESCOs) and utilities (acting in their role as generation service provider of last resort) to meet annual targets; these RPS targets are frequently complemented by long-term procurement policies under which utilities acquire energy and RECs through long-term contracts to enable project financing, while reselling their purchases into the energy and REC markets (or using the RECs to satisfy their own RPS compliance obligations).

forum for future deliberations, with a goal of establishing a new construct by early 2015 for implementation by early 2016.

NYSERDA's Potential Roles in Enabling the Development of Grid-Tied Renewable Generation

In addition to the management of existing contracts and various possible roles surrounding future procurement, consultation and/or contracting, NYSERDA proposes refocusing its efforts through the CEF to building demand, enabling markets and taking other actions to sustain and expand progress made to date in renewable deployment, and breaking down barriers to development of the next frontier of renewable technologies. This refreshed program emphasis would include work in the following areas to:

- Enable the emergence of a more sophisticated market, and bring together willing buyers and sellers of renewable energy. Various initiatives that will evolve over time might include:
 - Establishment of the New York Generation Attribute Tracking System to foster a transparent trading market and reporting platform;
 - Developmental work to support the emergence of commercially-ready approaches to capturing the "value of renewables" attributes such as increased fuel diversity, energy price volatility reduction, long-term price and supply assurance.
- Support the development of remaining renewable sites and increase production from existing sites by:
 - Providing technical assistance to developers of smaller scale and community renewable projects in the areas of permitting, interconnection, siting, and pursuing opportunities to align the NYISO interconnection queue process with the Article 10 process, and;
 - Re-evaluating early prospecting work to determine the best remaining sites for onshore wind projects including co-location with existing generators.

Off-Shore Wind (OSW)

New York is committed to exploring the development of its abundant off shore wind resources in a manner that is sensitive to the interests of ocean users and the environment. In partnership with Department of State (DOS) and NYPA, NYSERDA will continue to work with industry, federal regulators and public sector interests to address the technical, physical and financial risks and ensure that appropriate decisions regarding development can be made by the State's leadership in the coming years to maximize the energy, climate, and economic value for the State.

NYSERDA will continue research and development efforts on critical areas such as OSW cost reduction, specifically focusing on initiatives and investments by New York and/or other states that have the potential to meaningfully reduce the cost of this resource such as: siting, pre-development, market visibility, financing structures, construction/O&M cost reduction, and transmission. The

goal will be to support the development of a market that has the scale necessary to drive innovation and reduce delivered costs.

NYSERDA will also engage in targeted research and outreach initiatives to address market barriers for all OSW stakeholders throughout the Atlantic Bight. NYSERDA will work with DOS to update the “New York Offshore Winds Atlantic Ocean Study” and support the stakeholder engagement process coordinated by DOS and the U.S. Bureau of Ocean Energy Management to establish Wind Energy Areas that account for the needs of ocean users and protect the ocean environment in general.

CUSTOMER-SITED RENEWABLES

NYSERDA will strive to create integrated energy efficiency and renewable energy/distributed generation markets. Holistic strategies will be developed where possible, but some renewable technologies still require incentive approaches (which will follow the guidelines outlined above). See Appendix C for more detail on these technology-specific interventions.

Consistent with CEF strategies, NYSERDA will direct its interventions at specific barriers to adoption. NYSERDA will explore three strategic market development roles to advance customer-sited renewable energy:

- Providing direct financial incentives where needed to stimulate demand as a temporary bridge to a market solution;
- Working with private and public partners to reduce soft-costs, standardize product offerings, document and create awareness of system performance and system integration with other on-site clean energy measures, develop a quality service-provider base, and explore financing and new business model options, and;
- Working with municipal and local government partners to advance permitting and siting practices that can encourage customer-sited renewable technology.

In addition, as part of NYSERDA’s Innovation mission, we will explore working with private partners and academia in New York to advance technological innovation that could drive down the costs of these systems. Where critical industrial assets exist, we will seek to develop a manufacturing/supply chain in New York, thereby providing economic development opportunities for New Yorkers.

TECHNOLOGY AND BUSINESS INNOVATION ACTIVITIES

The energy sector, both public and private, has under-invested in research and development (R&D) for decades.¹⁰ On the policy front, the clean energy sector has experienced highly disruptive booms and busts related to vacillating and uncertain subsidies. Subsidy reform alone will not be enough to put the country on a path to a vibrant, subsidy-free clean energy market at a scale necessary to address state and national energy and environmental challenges.¹¹ Substantial increases in energy research and development and effective models that mobilize private capital are needed to create a

¹⁰ Nemet and Kammen, “U.S. Energy Research and Development: Declining Investment, Increasing Need, and the Feasibility of Expansion,” *Energy Policy*, 2007

¹¹ The Breakthrough Institute. 2011. *Bridging the Clean Energy Valleys of Death*

sustainable clean energy system that addresses our enormous energy and environmental challenges, and our equally significant energy opportunities – findings that are supported by a number of notable organizations including the McKinsey Global Institute, the United Nations, and the Center for American Progress.¹²

Historically, NYSERDA’s innovation investments have provided support across a wide spectrum of technologies, business types, phases of development, and business models. A conscious effort has been made to not be overly prescriptive in how resources are allocated across these categories in order to allow for maximum flexibility as nascent technologies, markets, approaches, and paths to market grew from concept to reality. This approach has been successful at identifying and advancing promising innovations, and many investments have since yielded substantial economic, energy, and environmental benefits.¹³ For instance, each dollar invested in product development has resulted in:

- Leveraging of \$4.6 of outside investment;
- \$11 in commercial revenue from the sale of newly introduced clean energy products;
- An increase in gross state product by \$8.9.¹⁴

Additionally, for every \$1 million in product development investment a new revenue-generating clean energy product has been commercialized and launched.

Going forward under the framing of the “80 by 50” imperative, recent changes in the regulatory landscape (i.e., REV), and in an environment of limited private and public capital, NYSERDA has refined its approach to spur cleantech innovation at the level/scale needed. This approach will: (1) focus on high impact strategic priorities (e.g., GHG emissions reduction potential) while maintaining an ability to pivot to emerging opportunities, (2) embrace a stronger path-to-market focus for investments in cleantech innovation, and (3) employ rigorous portfolio management. This cohesive approach builds upon past successes and the development of best practices, applies lessons learned to identify and capture opportunities, and addresses pressing energy and environmental issues facing the state.

The approach will leverage private capital and stimulate investment in the emerging cleantech sector in New York. The approach will also focus investments on an established set of strategic priorities that can help achieve long-term State Energy Plan Goals (primarily GHG emissions reduction but also system efficiency and resiliency, economic development). The strategic priorities include:

¹² Findings supported by a number of organizations including: (1) The United Nation’s Secretary-General’s Advisory Group on Energy and Climate Change, Energy for a Sustainable Future Report & Recommendations, 2010; (2) McKinsey Global Institute, Resource Revolution: Meeting the World’s Energy, Materials, Food, and Water Needs, 2011; (3) Energy Future Coalition, Challenge and Opportunity: Charting a New Energy Future; and (4) Center for American Progress, Out of the Running, 2010.

¹³ “NYSERDA Research & Development: Impacts, Challenges and Opportunities”, <https://www.nysERDA.ny.gov/Energy-Innovation-and-Business-Development/Research-and-Development.aspx>, 2013

¹⁴ See Appendix A for additional detail on historical NYSERDA R&D outcomes.

- Improved building performance;
- Energy system resiliency;
- Renewable and DER integration;
- Clean Transport;
- Digital/tech-enabled energy solutions.

In addition to the technology/market priorities listed above (and detailed in Appendix D), NYSERDA will support critical energy-related environmental research that is needed to better understand and mitigate the environmental impacts of emerging and existing energy technologies.

Investment Approaches to support the path to market will include:

- Directly Supporting Cleantech Businesses
 - Support R&D at various stages, including early-stage transformative opportunities, technology demonstrations, and later stages of commercialization
 - Catalyze strategic business partnerships along the commercialization supply chain
- Building Entrepreneurial Capacity
 - Continue to build the entrepreneurial capacity for cleantech innovation in New York
- Public good, multi-user resources
 - Develop cleantech assets that can assist and attract multiple companies and other stakeholders, such as testing and commercialization resources
- Continued discipline in managing projects/investments
 - Develop business readiness of a potential partner in addition to a project's technical merit to increase probability of successful commercial outcomes

PORTFOLIO CHARACTERIZATION AND MANAGEMENT

NYSERDA will expand its capabilities and emphasis on continuous improvement of the Innovation Program's operations and overall portfolio performance. This will be done in part by better characterizing both the composition and performance of the portfolio. Periodically, efforts will be made to adjust the composition of the portfolio on the basis of performance and new market insights, trends, needs, and policy imperatives.

NYSERDA will manage the R&D investments at a portfolio level, ensuring that there are some higher-risk/higher payoff investments as well as nearer-term commercialization efforts. We will apply some standard metrics to measure progress where possible (e.g., advancement in Commercialization Readiness Level/Investment Readiness Level). We will also seek to characterize aggregate performance of the portfolio using standard metrics where possible (e.g., NYSERDA \$ invested per GHG emissions reduction potential, NYSERDA \$ invested per \$ commercial revenue realized). This will provide a benchmark to help assess the relative value proposition of new potential investments.

INNOVATION SYNERGIES WITH REV

Current ratepayer-funded clean energy programs have been operating in the context of State policy goals, established regulatory constructs, and current market conditions. Aligning these efforts¹⁵ with REV goals and outcomes will reduce confusion and overcome barriers in ways that maximize scale, replication, and system benefits at reduced ratepayer costs. Achieving long-term clean energy goals will require a scaling up of efforts to improve end-to-end system efficiency (e.g., DER, grid, and building performance) and development of new customer-to-generator-to-utility transaction models. Increasing resiliency will require expanded options to island portions of the grid using DER and advanced controls (e.g., microgrids). These efforts are expected to be increasingly dependent not only on regulatory reforms through REV (e.g., implementation of time-sensitive rate options, utility planning model evolution, alternative regulation of community microgrids), but on technology evolution and adoption (e.g., automated distribution system controls; communication protocols and data analytics; digital microgrid controls, asynchronous inverters) that will be supported through CEF strategic program priorities.

Carefully identifying the strategies and outcomes that induce “no regrets” investment decisions by all energy market actors can bridge to a future where societal benefits are appropriately monetized, and dynamic rate choices and customer engagement become the norm. For example, next generation investments could include technology and business practices that prepare the distribution network to accommodate customer generation through two way-power and information flows. Such technologies include advanced sensing capability, controls, models, communications, web-based planning and operating systems, and other devices and mechanisms. Developing such capability in turn invites market participants and investment, lessening needs for public subsidies.

Investments made in advancing the strategic priorities are not only compatible with, but necessary to, assuring market reforms under REV are successful and State Energy Plan goals are achieved.

NEW YORK GREEN BANK

NYGB is a state-sponsored specialized financial entity working in partnership with the private sector to increase investments into New York’s clean energy markets. Designed to address gaps and barriers in clean energy financing markets – and to transform those markets as part of an integrated strategic energy plan in New York State – NYGB represents an innovative business model at the forefront of the trend of comparable institutions nationally and internationally. NYGB was announced by Governor Andrew M. Cuomo in the State of the State Address in January 2013. It received initial capitalization pursuant to a Commission Order issued on December 19, 2013¹⁶.

¹⁵ Efforts include research, development, demonstration and deployment of emerging technology and market development activities to “feed the pipeline” of clean DER technologies, enabling technology platforms and business models.

¹⁶ “Order Establishing New York Green Bank and Providing Initial Capitalization”, issued and effective December 19, 2013 in response to “Petition of the New York State Energy Research and Development Authority to provide Initial Capitalization for the New York Green Bank” filed September 9, 2013. Case 13-M-0412.

NYGB's mission is "to accelerate clean energy deployment in New York State by working in partnership with the private sector to transform financing markets." The key elements of this mission are partnering with private sector participants, implementing structures that overcome barriers and address gaps in current clean energy financing markets, and transforming those markets by enabling greater scale, new and expanded asset classes and liquidity. These factors will combine to motivate faster and more extensive implementation of clean energy assets within New York State, fostering greater energy choices, reduced environmental impacts and more green energy advantages per public dollar spent for the benefit of all New Yorkers.

In order to carry out its mission, NYGB utilizes a variety of approaches and transaction structures that are market-focused and responsive. Rather than compete with its private sector clients and partners, NYGB looks to draw them in to the marketplace, with its investments having an additionality requirement.

NYGB's focus is on proven clean energy technologies including renewable energy and energy efficiency. NYGB issued an open investment solicitation in February 2014 and continues to receive submissions and significant ongoing interest from potential clients and partners. The solicitation specifically describes the types of transactions and investments which NYGB will consider, as well as its evaluation framework¹⁷. All NYGB potential investments must meet certain minimum investment criteria including:

- Transactions have expected financial returns such that the revenues of NYGB on a portfolio basis exceed expected portfolio losses;
- Transactions are expected to contribute to financial market transformation in terms of:
 - Scale;
 - Improved private sector participation;
 - Level of awareness and confidence in clean energy investments; and/or
 - Other aspects of market transformation; and
- Transactions have the potential for energy savings and/or clean energy generation that will contribute to GHG emissions reductions in support of New York's clean energy policies.

NYGB operates in wholesale, not retail, financial markets. It does not provide grants or subsidies, but instead adopts commercial credit underwriting approaches. NYGB products are priced to reflect risk, capital structure position, internal portfolio return needs and market pricing for comparable transactions. NYGB also takes into account the difference between current market rates and commercial expectations of rates at a point when the applicable markets are expected to be more liquid.

Fundamental to the establishment of NYGB is that it be self-sustaining beyond its \$1 billion targeted capitalization and provide greater leverage for public dollars in the deployment of clean energy in New York State, with all the corresponding benefits. Central to achievement of these objectives is NYGB's ability to efficiently recycle funds. Unlike a pool of public funds that is dispensed once to

¹⁷ "Clean Energy Financing Arrangements – Request for Proposals (RFP) No. 1", posted on www.greenbank.ny.gov.

qualifying projects as non-refundable grants or subsidies, funds entrusted to NYGB are disbursed under commercial arrangements generating investment income and requiring repayment in accordance with agreed terms for each product and client/partner project. This means that as each dollar from NYGB cycles through successive investments, those dollars will continue to generate additional benefits from new projects. Further, as the commercial markets expand into and increasingly accommodate clean energy finance needs previously supported by NYGB, the multiplier effect on NYGB's investments will continue.

All of NYGB's key objectives and methods of operation align closely with the overarching goals of the CEF, including:

- The priority of clean energy outcomes (including GHG reductions) and market transformation;
- The singular focus on upstream action (i.e., the NYGB operates in wholesale markets to facilitate retail lending in clean energy sector by the NYGB partners);
- The leveraging of public-private partnership resources and approaches to mobilize and recycle capital through successive clean energy investments in the state, and a continual emphasis on pushing outward the frontiers of commercial market participation;
- Being self-sustaining based on full capitalization of \$1 billion; and
- Entering into investments and transactions upon commercial terms.

NYGB as a division of NYSERDA also represents a seamless complement to NYSERDA's ongoing activities under the CEF by focusing on accelerating clean energy deployment in the state through action in the wholesale financing markets; while NYSERDA's other main initiatives will be active in other segments through the Market Development, Technology and Business Innovation, Grid Tied Renewables and NY-Sun initiatives. It should be noted that projects and transactions that are eligible for NYGB investment are not precluded from separately seeking and obtaining grants, subsidies or other available incentives for which they may be independently qualified from NYSERDA or other state, federal and/or utility sources.

To synchronize with the mission of the CEF to provide comprehensive support for all clean energy activities, the NYGB is included herein as a component of the overall CEF. A program authorization request to capitalize the remaining NYGB funding is anticipated via a petition in Fall 2014.

Further details with respect to NYGB's business plan, metrics, reporting and evaluation, as well as other relevant public filings may be found at www.greenbank.ny.gov.

NY-SUN

NY-Sun is an initiative established by Governor Andrew M. Cuomo in 2012 to develop a sustainable and subsidy-free solar PV industry in New York State. NY-Sun provides a model approach to new interventions for the CEF, in its attention to taking a comprehensive approach to overcoming the several barriers facing consumers as they consider whether PV provides an appropriate energy option for their needs. Facets of NY-Sun include a declining incentive program approach, augmented consumer education, new initiatives to improve access to PV including Community

Solar NY, K-Solar and focused approaches for LMI households, as well as expanded workforce training for a growing market, and reduction of other “soft” costs of installation.

By Order issued April 24, 2014, the Commission authorized NYSERDA to allocate up to \$960,556,000 for the continuation of the solar electric incentive programs, extending from 2016 through 2023. The Commission also approved the design criteria advanced by NYSERDA for the Megawatt Block approach for the incentive program for systems less than 200 kilowatts.¹⁸ To synchronize with the mission of the CEF to provide comprehensive support for all clean energy activities, the previously-authorized support for the incentive programs for NY-Sun is included herein as a component of the overall CEF proposed budget and program authorization request.

The CEF will compliment the goals of NY-Sun, as it will support efforts to reduce solar soft-costs, build demand, and support consumer education so that we can ensure successful development of a vibrant subsidy-free solar market in New York.

The MW Block incentive program also follows the new program construct proposed in the CEF that future program incentives will be structured as a temporary support leading to incentive-free market sustainability. Through the MW Block approach, the NY-Sun incentive program has been designed to drive market penetration on a large-scale basis, allocating MWs to specific regions of the State, breaking those regional MW targets into blocks to which incentives are assigned and awarding incentives based upon the block in effect at the time. As the blocks are filled, incentives decline. This approach enables a self-sustaining industry in the long run.

The MW Block approach also provides certainty and transparency regarding incentive levels to the industry, accounts for regional market differences, provides a clear signal to industry that New York intends to eliminate cash incentives in a reasonable timeframe, and allows for the elimination of those incentives sooner in regions where the market conditions can support it, based on market penetration, demand, and payback.

Additional information regarding NY-Sun can be found on the web site, <http://ny-sun.ny.gov/>.

ILLUSTRATIVE ENTITY ROLES ACROSS PORTFOLIOS

Through its CEF programs NYSERDA will work synergistically with the market and the utilities under the REV construct to overcome barriers and address opportunities to achieve greater levels of penetration of energy efficiency and distributed generation. An example of this integrated approach is illustrated in Table 5 which describes the roles in terms of the residential energy efficiency and distributed solar markets.

¹⁸ Case 03-E-0188; Order Authorizing Funding and implementation of the Solar Photovoltaic MW Block Programs, issued and effective April 24, 2014.

Table 5: Illustrative Roles

	Residential Energy Efficiency	Distributed Solar
Market Role	<ul style="list-style-type: none"> • Building owner is willing to prioritize investment in energy efficiency due to increased demand by renters • ESCO offers innovative financing solutions to eliminate upfront project costs for a customer through an “energy efficiency power purchase agreement” or loan with guaranteed guaranteed energy savings that exceed payments. • Home automation entrepreneur develops aggregated demand response platform 	<ul style="list-style-type: none"> • ESCO offers innovative solutions to eliminate upfront project costs (power purchase agreement or solar loan)
Utility Role	<ul style="list-style-type: none"> • Utility identifies areas of system constraint where EE is a lower-cost alternative to infrastructure upgrades, provides incentives reflective of value • Utility provides marketing/technical support 	<ul style="list-style-type: none"> • Utility identifies areas of system constraint where PV is a lower-cost alternative to infrastructure upgrades, provides incentives reflective of value • Utility provides marketing/technical support • Utility streamlines engineering approvals
NYSERDA	<ul style="list-style-type: none"> • “One-stop shop” NYSERDA-supported) helps target interest, assembles demand, provides technical assistance to initiate the project • NYSERDA stimulates tenant demand through building energy ratings (with local government) and apartment energy ratings (with local MLS) • NYSERDA enables customer-useful data base that provides valuable information for customer acquisition, successful models, benchmarks, etc • NYSERDA supports innovation in tech-enabled tools (audit, energy modeling, M&V) to reduce project costs • NYSERDA provides targeted support to LMI residents • NYGB helps introduce private capital providers into the energy efficiency market 	<ul style="list-style-type: none"> • Community aggregator (NYSERDA-supported) arouses interest, assembles demand, provides technical assistance to initiate the project • NYSERDA supports streamlining of municipal permitting for projects • NYSERDA lowers soft costs for installers by releasing community specific targeting, benchmarking, and project performance data • K-Solar (NYPA) develops neighborhood interest in solar • NY-Sun provides incentives in line with MW Block program • NYSERDA provides targeted support to LMI residents • NYGB helps introduce private capital providers into the solar market • NYSERDA supports innovation to reduce balance-of-system costs (e.g., plug-and-play solar, new mounting systems) and increase system resiliency (e.g, integrated energy storage packages)

VI. FUEL NEUTRALITY

A fuel neutral approach is needed in order to achieve the long-term GHG emission reduction outcome of the CEF portfolio. As such, program strategies must be allowed to capture all efficiency opportunities as they exist, in the pursuit of GHG emissions reductions derived across various fuel uses. Fuel neutrality is the lynch-pin to providing truly customer-centric clean energy programs. To attract private investment at levels needed to achieve the dramatic scale-up of the clean energy markets, program design must be aligned with how energy consumers approach their energy uses, energy costs, and energy choices. Support for this position was voiced in the Stakeholder Roundtables where the feedback was overwhelmingly of the view that fuel neutrality is critically important to scaling up impact and making clean energy choices easier for consumers. In developing the program strategies outlined in the CEF proposal, NYSERDA assumes a fuel neutral approach and requests Commission approval of such an approach.

Approximately 18 percent of commercial energy consumption, 35 percent of industrial energy consumption, and 34 percent of household heating consumption is derived from fuels other than electricity and natural gas.¹⁹ This consumption is responsible for 21% of residential GHG emissions 18% of commercial emissions, and 43% of industrial emissions.²⁰ In many cases, the use of petroleum and other fuels is necessary as natural gas service is not universally available. Currently, opportunities are limited for those customers to address first cost barriers to achieve energy and bill savings, improve comfort and quality of life, as well as contribute to environmental benefits. Low income households, in particular, could benefit from significant reductions in heating costs, lowering their overall energy burden and enabling them to better manage their budgets and meet utility bill obligations. A fuel neutral policy approach could thereby satisfy other utility policy needs.

A fuel neutral source of funding will:

- Allow programs to incentivize whole building savings;
- Enable tracking and reporting on the effects of all on-site clean energy opportunities;
- Capture interactive savings effects, and;
- Allow clean energy service providers to offer truly comprehensive programs that provide additional value to consumers and result in fewer lost opportunities for energy savings. New services packages that allow the customer to target energy cost reductions across all energy uses should result in reduced program costs and increased savings to utility customers, as well as more attractive business opportunities for vendors.

Given the foregoing policy and market imperatives, fuel neutrality in program delivery must also apply to utility energy efficiency programs. Success of the customer-facing incentive programs that utilities will continue to deliver will be critically important if the customer-based valuation policy objectives as outlined in REV are to be fully realized. Consideration will be necessary regarding the allocation of energy savings produced by utility energy efficiency programs but attributable to fuels

¹⁹ Patterns and Trends New York State Energy Profiles: 1997-2011, NYSERDA, June 2013.

²⁰ GHG IF Report

that are not distributed by utilities -- those savings could support future environmental performance targets should the REV proceeding advance such an outcome.

NYSERDA believes that the more effective collection mechanism to support a fuel neutral approach is to reduce the surcharge on natural gas customers over time, ultimately eliminating the natural gas surcharge and collecting the entirety of clean energy funding from electric customers. As all electric customers in New York State use heating systems, this approach is the most equitable as it will minimize cross-subsidy arguments for efficiency programs that are funded by a single fuel, and provide the greatest options to all customers, irrespective of that customer's access to any single heating fuel. Clean energy programs would be in a position to address all of the renewable energy and energy efficiency needs of the electric customer, benefitting the customer by reducing their energy consumption overall – not just their electricity consumption. This is critically important for residential ratepayers, as heating load typically represents a significant portion of their total energy expenses.

As the funding approach for fuel neutral programs is developed, care must be taken to avoid the disqualification of customers who contribute to the SBC through a natural gas bill, but do not pay an electric SBC, including gas customers of National Grid on Long Island, certain NYPA electric customers, some customers of certain municipal electric service providers, and certain other customers. NYSERDA proposes to address this issue by establishing a truly statewide clean energy portfolio, founded on the same societal benefits and outcomes as the CEF, and providing equivalent opportunities for customers who are in the same market as those who pay the SBC on their electric bills. To effectuate this "Statewide" CEF, NYSERDA will supplement the clean energy surcharge-funded programs with additional Regional Greenhouse Gas Initiative funds.

NYSERDA will also collaborate with the Long Island Power Authority and New York Power Authority on program offerings to ensure whole-building, fuel-neutral, customer-centric program models are implemented for their respective customer bases. A single CEF that could address electric and heating needs of all New York customers would simplify participation in the programs and allow the State energy agencies to partner in providing a customer-centric program portfolio to all New York energy consumers, thereby providing the greatest opportunity for success in achieving the societal outcomes of the CEF. This approach is also consistent with the move to a more upstream, market development focus (rather than individual projects) where it is most effective to address markets on a more statewide aggregated basis, without regard to fuel type.

VII. BUDGETS AND BENEFITS

OVERALL PROGRAM AUTHORIZATION FOR 2016-2025

The Commission's CEF Order directed NYSERDA to develop a budget proposal for the CEF. NYSERDA herein proposes a 10-year budget, broken into two 5-year cycles. NYSERDA is proposing a 10-year budget because this time frame will provide a consistent signal to the marketplace that will facilitate the CEF's realization of its desired long-term outcomes of market transformation,

private capital leverage, and GHG emissions reductions. Consistent with the principles listed in the CEF Order, this proposed budget recommends continued investment in clean energy programs, a cap on total ratepayer contributions for those programs, a restructuring of those programs to make them more customer-centric, strategic and impactful, and a transition from almost entirely ratepayer funded programs to more market- and tariff-based activities.

The CEF will shift investment strategies to meet the State's environmental commitment, while simultaneously managing costs to ratepayers by using strategies that mobilize private capital to further advance progress towards the public policy goals. As the CEF is successful in mobilizing private capital over time, greater environmental benefits are realized for every dollar of public funds invested. In addition, as the CEF realizes success in fostering interest from upstream market actors and educating consumers about clean energy opportunities, utility programs will be able to attract greater numbers of consumers to their programs. Carefully coordinated, the CEF dollars will influence greater levels of energy savings, thereby increasing the environmental benefits from the investments. When combined with a fuel neutral approach, the collective funds will more effectively achieve GHG emissions reductions. Thus, while the overall budget will reduce over time, it is designed to support new program approaches that maximize total benefits (energy saved, renewable energy created, reduced overall GHG emissions) for the dollars invested. Adding flexibility to the CEF will also enable initiatives to evolve and adapt to changing market conditions. As such, the initiatives can continue to capture energy and environmental benefits under variable market conditions.

This budget approach also resolves key issues identified in the Petition filed by Multiple Intervenors (see footnote 1), particularly concerning cash balances held by NYSERDA. This budget proposal accounts for the use of the cash balance in meeting current and future program obligations, and allows for a reduction in near-term collections for new programs, while utilizing the cash balance to meet certain operating costs. With the exception of RPS contracts that will extend until their respective expirations, the proposed budget eliminates the cash balance in three years.

As acknowledged in the CEF Order, the transition to a more market-driven clean energy economy will require time. NYSERDA anticipates that the first 5-year cycle (2016-2020) will be a period of transition, during which older programs are phased out and new programs are launched. Experience during the 2016-2020 timeframe of developing and deploying new programs, testing their effectiveness and their ability to better leverage the flow of private sector funds, will help inform future funding allocations and decision-making.

In the budget out-years of 2021-2025, the program strategies and program testing approaches will have significantly matured, and the capital attraction and GHG emissions reductions impacts should be greater than those realized in the initial 5-year transition period. In addition, the impact of other CEF initiatives, notably NY-Sun and NYGB, will also begin to demonstrate higher value in terms of the market conditioning and ability to leverage private investment and potential for capital recycling.

To ensure continued effectiveness of the Market Development and Technology and Business Innovation portfolios over time, NYSERDA recommends that the portfolios be reviewed every 3 years to measure the advances made according to program metrics and indicators, and adjustment of individual components of the portfolios as needed to meet the emergent market conditions.

The annual requests for program authorization for the Market Development portfolio and the Business and Technology Innovation portfolio are detailed in Table 6. As mentioned previously, the NYGB and NY-Sun program budgets are on previously established paths, independent of this CEF authorization request. While authorizations for the NYGB and NY-Sun are not requested in this venue,²¹ funds that may ultimately support these activities are accounted for in the overall CEF. These external program authorizations will determine the level of activity in each of these key portfolios. Additionally, the total collections cap and expenditures schedule will identify the annual collections requirements needed to support this CEF program authorization, as well as to support those obligations previously incurred under the existing EEPS, RPS and SBC programs that extend beyond 2015.

Table 6: Funding Requests (in Millions)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Request for Program Authorization											
Market Development Programs	\$265	\$265	\$265	\$265	\$265	\$240	\$240	\$240	\$240	\$240	\$2,525
Innovation Programs	\$68	\$68	\$68	\$68	\$68	\$68	\$68	\$68	\$68	\$68	\$679
Other Initiatives Included in Proposed CEF Budget											
NY-Sun	\$120	\$120	\$120	\$120	\$120	\$120	\$120	\$120	\$-	\$-	\$960
NYGB ²² (including \$195M in 2015)	\$195	\$195	\$195	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$782
Total	\$648	\$648	\$648	\$453	\$453	\$428	\$428	\$428	\$308	\$308	\$4946

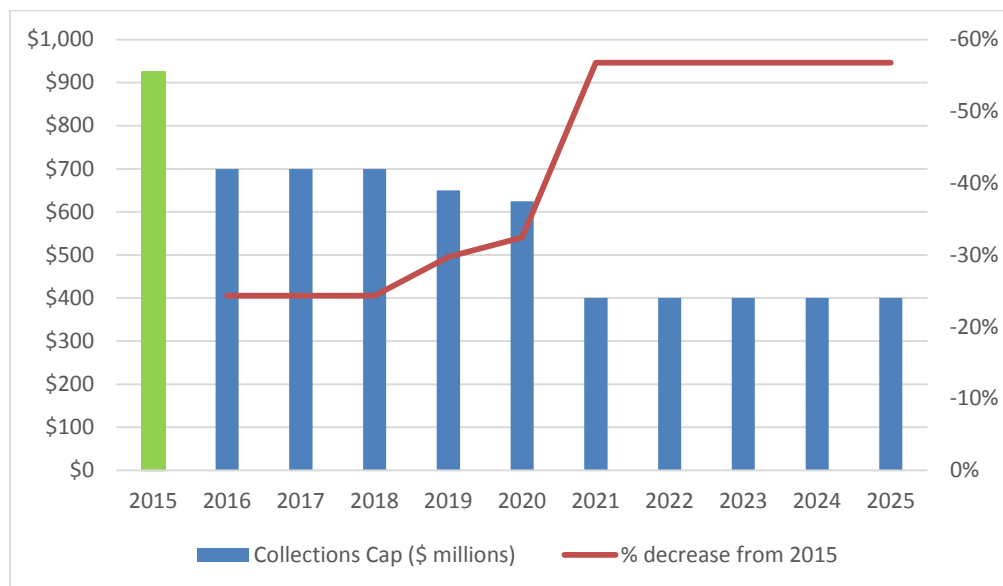
PROPOSED CEF COLLECTIONS CAP FOR 2016-2025

The proposed CEF collection cap reduces ratepayer collections substantially. This collections level will provide an immediate reduction in ratepayer collections of \$225 million to \$700 million, sustained over 3 years and then dropping to \$650 million in 2019. By 2020, total annual ratepayer collections will be reduced by 32% from current levels, to approximately \$625 million; by 2021 and continuing through 2025, overall collections are proposed at a level of \$400 million, or a reduction of 57% from current levels. To fully realize the program impacts and expenditure schedule for authorized programs through 2025, collections in the amount of \$400 million in 2026 and \$174 million in 2027 are also necessary.

²¹ NY-Sun program authorizations were previously provided in the April 2014 Order. A program authorization request to capitalize the remaining NYGB funding is anticipated via a petition in Fall 2014.

²² Actual annual capitalization values are \$195.375 million for 2015 through 2018. Funding for 2015 has been included in the total in anticipation of a Fall 2014 petition seeking \$781.5 million to fully capitalize the NYGB.

Figure 3: Proposed 2016-2025 CEF Collections Cap



This proposed collections cap will provide sufficient funds for annual CEF expenditure budgets that account for all previous obligations for energy efficiency, renewable energy, and clean energy innovation initiatives. As such, the budget accounts for funding one more solicitation each in both 2014 and 2015 for the RPS Main Tier, anticipated to result in \$400 million in new contract obligations over the next 20 years. This cap also allows the State to meet its commitment to fully fund both NY-Sun, and provides additional funding to the NYGB. This budget also accounts for new CEF Market Development and Technology and Business Innovation Portfolios, as well as a fully capitalized NYGB.

The Commission’s previous approved collections for NYSERDA’s activities funded through EEPS during the period 2012-2015 (“EEPS2”), T&MD (“SBC4”, from 2012-2016), and RPS included collections which were scheduled for 2016 and beyond to fund these program activities. In total, for the period 2016-2024, these previous approved collections total \$2.092 billion (\$1.453 billion for RPS and \$639 million for EEPS2/T&MD). The proposed collection schedule for the period 2016-2025 includes continuation of these collections plus \$3.857 billion in new collections to fund the new program authorizations.

Meeting the obligations outlined herein is possible, in part, by the use and elimination of NYSERDA’s existing cash balance of ratepayer funds, and some repurposing and transitioning of previously authorized funding. This cash balance has accumulated as the result of the retention of funds locked in committed projects which are not yet fully implemented, as well as a slower than predicted uptake in some programs. Programs that are structured along performance payment schedules require NYSERDA to retain amounts committed to program activity as contract obligations, which are ultimately paid as projects approach completion. For large projects in the Commercial or Industrial sectors especially, such projects can take several years to complete. Other funds in the cash balance were authorized by previous Commission action, but currently remain uncommitted to specific projects. Use of the cash balance to continue to meet existing obligations,

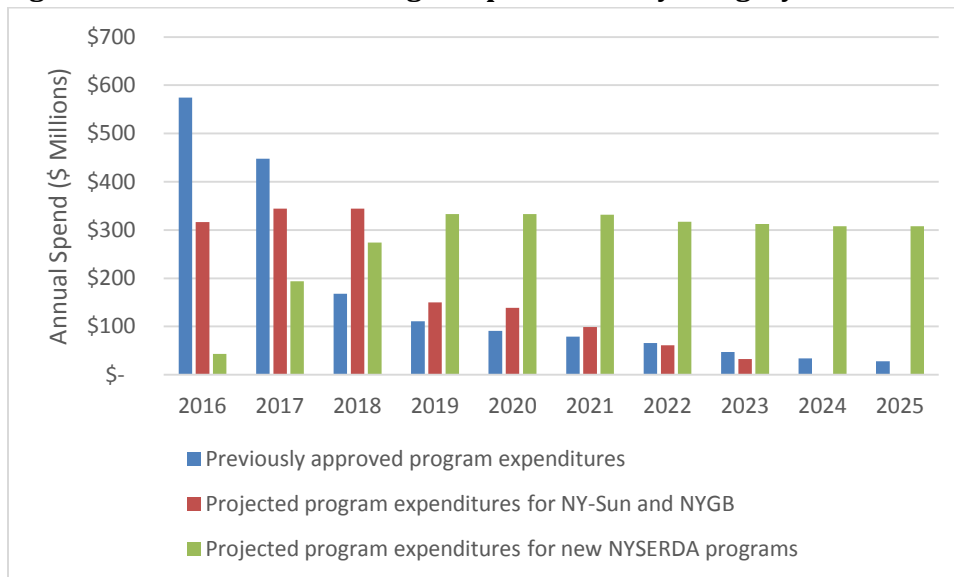
as well as new portfolio goals, enables a reduced cap on ratepayer collections while the transition to new portfolios, whether in CEF or REV, is underway.

Similarly, the proposed budget assumes that starting in 2016 (after the 2014-2015 Main Tier solicitations mentioned above), NYSERDA’s role in supporting future new large scale renewable energy will shift to one focused on market development and technology R&D. These activities are accounted for in the proposed market development and innovation program authorizations. As stated in the Staff Straw Proposal, support for commercial large-scale renewable projects is expected to shift to a new contract model. NYSERDA recommends the Commission initiate a forum or proceeding in the near future, so that mechanisms for new large-scale renewable energy support can be in place for new market activity in 2016.

ANTICIPATED CEF EXPENDITURES FOR 2016-2025

While Table 6 above illustrates annual program authorizations, these authorizations do not represent expenditures, given the time lag that occurs between the commitment of funds to a project and completion of the project when funds are paid. Some programs, notably within the new Technology and Business Innovation portfolio, will retain longer project lifecycles. Based on assumptions for new program lifecycles, annual CEF portfolio expenditures can be scheduled to reflect the level of annual program activity based on the authorized budget.

Figure 4: Overview of CEF budget expenditures by category



To further illustrate this cash flow approach to program support, three categories of anticipated CEF expenditures exist, as shown in the graphic above. The first category represents previously approved but not fully expended program expenditures and includes remaining anticipated committed expenditures from existing programs: SBC 3 and 4, EEPS and RPS contract obligations that will extend until 2035. These expenditures are the highest in 2016 but decline as a percentage of overall CEF expenditures by 2020 as those obligations begin to expire.

The second category of expenditures represents anticipated expenses for NY-Sun and funding of the NYGB. The Commission authorized NY-Sun in April 2014 at \$960 million through 2023. The Commission also approved the establishment of the NYGB in December 2013, with an acknowledgement that the NYGB would be fully capitalized at \$1 billion. The aggregate annual expenditures listed for NY-Sun and the NYGB, shown above, represent the best estimate of when those funds will be needed. The expenditures are “front loaded” as the NYGB is proposed to achieve full capitalization by 2018, and NY-Sun is projected to continue relatively even levels of expenditure into the latter years of the 2016-2020 timeframe.

The third category of expenditures represents new program activity for NYSERDA as approved for the CEF. Expenditures on the new portfolio are relatively low in 2016, as NYSERDA transitions its program approaches. Table 7 illustrates anticipated cash expenditures needed to meet program activity. Note that in certain years where total expenditures exceed the collections cap, the existing cash balance will be used to cover the expenditure gap.

Table 7: Projected Annual Program Expenditures (in millions)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Previously approved program expenditures											
Subtotal Projected program expenditures for already launched initiatives	\$574	\$448	\$168	\$111	\$91	\$79	\$66	\$47	\$34	\$28	\$1,646
Projected program expenditures for already launched initiatives											
NY-Sun	\$121	\$149	\$149	\$150	\$139	\$99	\$61	\$33	\$-	\$-	\$901
NYGB	\$195	\$195	\$195	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$586
Subtotal	\$316	\$344	\$344	\$150	\$139	\$99	\$61	\$33	\$-	\$-	\$1,487
Projected Program expenditures for new NYSERDA Program											
Market Development	\$43	\$181	\$234	\$265	\$265	\$264	\$250	\$245	\$240	\$240	\$2,225
Innovation Programs	\$-	\$14	\$41	\$68	\$68	\$68	\$68	\$68	\$68	\$68	\$530
Subtotal	\$43	\$194	\$274	\$333	\$333	\$332	\$317	\$312	\$308	\$308	\$2,755
Total Anticipated Program Expenditures	\$934	\$986	\$787	\$594	\$563	\$510	\$444	\$392	\$342	\$336	\$5,314

CEF PORTFOLIO BENEFITS

To estimate potential benefits for the Market Development portfolio, NYSERDA used historical sector-based funding allocations, applying benefit assumptions learned through the market research conducted as part of the CEF. This portfolio was assessed in terms of aggregated lifetime electric, gas and oil savings that would be generated, as well as how many tons of GHG emissions

would be reduced. Similarly, a bill impact estimate was calculated, looking at reduced demand for electricity, peak coincidence, and avoided transmission and distribution infrastructure. The lifetime benefit results for this portfolio are significant, with 181 Million MWh saved, 55 Million MWh of renewable energy produced, 618 Million MMBtu of oil and gas consumption avoided, and 57 Million tons of GHG reduced.²³ Total bill savings for customers could exceed \$4 billion over the lifetime of the measures.

In addition, NY-Sun portfolio benefits were assessed for renewable energy produced, GHG emissions avoided, and consumer bill savings.

Table 8: Economic and Environmental Benefits from Market Development and NY-Sun Portfolios 2016-2025

	Lifetime Benefits				
	Electric Savings [Million MWh]	Renewable Energy Production [Million MWh]	Oil/Gas Savings [Million MMBtu]	Emissions Reduced [Million Tons CO2]	Electric Bill Savings [\$]
Market Development	180	15-20	620	45	\$3,400
NY-Sun		35-40		10	\$600
Total	180	55	620	55	\$4,000

One of the benefits of the NYGB is its ability to drive value for ratepayers by continuously leveraging multiples of private capital while preserving its capital base for redeployment as investments mature. This capital recycling effect affords the State an ability to significantly stretch its scarce public resources available to invest in the clean energy economy. In addition to driving value by leveraging private capital, the NYGB will deliver much needed market transformation in the finance sector by building a track record of successful clean energy investments which will in turn attract additional market actors to the space who are expected to deliver innovative finance products and broader market access to these products. This market transformation will enable the transition to a formal, standardized, scalable, and more predictable clean energy financing market with lower transaction and capital costs resulting in a reduced need for state/ratepayer funded incentives. Finally, the clean energy associated with NYGB investments will generate public benefits, such as a cleaner environment, a more resilient energy system, economic benefits (e.g. creation of well-paying jobs), and lowered costs of energy.

The Technology and Business Innovation function of the CEF will emphasize the needs of the marketplace and expand the capacity for innovation statewide. This renewed vision for supporting and advancing the development of cutting edge clean energy technologies builds upon past successes and the development of best practices. CEF Innovation investments are expected to maintain and even surpass the historical performance of NYSERDA's Research and Development

²³ To support a statewide portfolio, the benefits were calculated assuming \$25 million annually in RGGI funds in addition to the program authorization request included in this Proposal.

programs, which have helped to mobilize private capital (\$3.7 for each dollar of NYSERDA investment), advance innovations to market entry (25% commercialization rate), produce significant commercial revenue (\$11 for every dollar of NYSERDA investment in product development), and improve the environment and economy of New York State (see Appendix D for the historical performance of NYSERDA's Research and Development investments). These newly commercialized clean energy products selling in the economy will deliver GHG reduction savings for New York that will continue well beyond the initial NYSERDA R&D investment.

ADMINISTRATION AND EVALUATION COSTS OF THE CEF

For its EEPS and SBC/T&MD program budgets, the Commission has traditionally set capped levels for NYSERDA's administration costs, including all salary and overhead costs, as well as a capped budget for Program Evaluation. Currently, the EEPS and T&MD portfolios set NYSERDA's administration budget at 8% of total authorized funds and the Program Evaluation budget at 5% of total authorized funds. For the CEF, NYSERDA recommends a different approach to the accounting of administrative costs. For Program Evaluation, NYSERDA recommends this budget remain at a capped percentage of authorized cost, which could potentially be decreased somewhat from the current 5% budget. The CEF envisions a shift from relatively intense and costly project-based measurement and verification and net-to-gross evaluation activity within multiple programs, toward a higher-level market based evaluation of impacts which may cut across multiple interventions within a market or sector. Though this type of market based approach needs to be adequately resourced to understand market change and impact over time, some economies are anticipated in making this shift.

The administrative budget includes those direct and indirect costs for NYSERDA staff salaries, fringe benefits, and other operating costs. In the past, NYSERDA's program portfolios maintained relatively predictable levels of staff resources to advance program outputs. These resources allowed for a more predictable estimate of salary costs as new portfolios were in development. As the future of CEF initiatives envisions a different and dynamic program construct, it is difficult to estimate the staff resources associated with the new initiatives at this time. Thus NYSERDA requests that in a subsequent "Program Investment Plan" filing with the Commission, it will identify and allocate administrative costs necessary to achieve the desired initiative outcomes, within the total budget levels requested here.

NYSERDA also requests authorization to use a portion of the CEF funding to fund a proportionate share of the annual New York State Cost Recovery Fee (CRF) assessed to NYSERDA under Section 2975 of the Public Authorities Law. The CRF is assessed by the Director of the Division of the Budget and is allocated as an overhead cost across NYSERDA's program activities in proportion to its total annual expenses. For the past three fiscal years, the CRF assessment has averaged about 2.2% of NYSERDA's annual expenses. However, the amount of CEF funding required to fund this cost during the period 2016-2025 will be dependent on the annual amount assessed to NYSERDA and the annual CEF expenses as a percentage of total expenses.

BILL-AS-YOU-GO APPROACH

Given the experience with the accumulation of unexpended cash balances and the limited success of previously adopted measures to help balance collections and expenditures, NYSERDA proposes to change the way in which it receives funds to support future activities in the CEF, referred to as “Bill-As-You-Go.” In the past, SBC funds (supporting EEPS, RPS and T&MD programs) were transferred to NYSERDA from each utility in fixed quarterly amounts based on annual collections approved by the Commission. As previously discussed, the time lag between program activity and the commitment and expenditure of funds resulted in unexpended fund balances.

NYSERDA proposes to use a different funding approach in the CEF to minimize these unexpended balances going forward. NYSERDA recommends that the Commission authorize NYSERDA and each utility to enter into new funding agreement, wherein NYSERDA will receive an initial payment equal to 25% of the first year’s authorized collections, and which represents an advance intended to cover three months of expenditures. NYSERDA will then submit reimbursement requests to each utility at the end of each calendar quarter, representing that utility’s proportionate share of actual expenditures realized during the preceding three months. This request can be required to be payable within 14 days of submission, and also be subject to the maximum collections funding amount authorized in the CEF Order. In adopting this Bill-As-You-Go method, NYSERDA will maintain sufficient funding to meet its projected near-term expenditures, while avoiding accumulation of unreasonable levels of unexpended funds. CEF surcharge collections from customers not yet transferred to NYSERDA will be held by the utility, using customary approaches approved by the Department for the calculation of carrying charges and the segregation and reporting of such funding.

VIII. EVALUATION

The overarching goals of evaluation are to provide objective and credible information that supports optimum program operation and outcomes, and program accountability. NYSERDA proposes an evaluation strategy that will provide greater value by: 1) conducting a larger number of smaller more targeted studies to provide program-related information sooner, and 2) developing market information more broadly over time.

The evaluation function and tools will support a “test-measure-adjust” approach which will likely involve piloting new intervention strategies and collecting data to inform decisions about broader implementation. Evaluation results will be available more timely to inform (and potentially modify) program delivery, though as a result may be less comprehensive than evaluation studies historically conducted by NYSERDA have been. Market studies will provide an ability to broadly track markets and the impact of market transformation.

As NYSERDA moves away from directly incenting projects and into relationships with market intermediaries and manufacturers, both reporting and evaluation need to be sculpted by the relationships and the market. To support evaluation design and other information needs, as CEF

interventions are finalized, a standard profile (the “Intervention Profile”) will be populated with summary information, plans and methods about each intervention including:

- Market objectives and barriers being addressed;
- Most useful energy and environmental metrics;
- Plan for collecting associated requisite data; and
- Proposed method of outcome/impact evaluation by NYSERDA.

The Intervention Profile will serve a number of purposes including:

- Helping to align market evaluation to address the most pertinent indicators of market change in baseline and follow-up studies;
- Providing an early indication of the types of market change/transformation anticipated prior to actual market evaluation;
- Helping to assess the level of expected outcome/impact evaluation that will be needed and possible approaches; and
- Helping to operationalize the necessary data collection/tracking.

Information collected according to the Intervention Profiles will be aggregated and the anonymized/aggregated data included in Quarterly Reports delivered to DPS. To ensure independent review and accountability, evaluation activities will be largely undertaken by expert, third party contractors in consultation with NYSERDA and DPS.

FIELD VERIFICATION & PROGRAM EVALUATION

PROCESS EVALUATION

Process evaluation principally addresses the goal of providing information to support program operations. This type of evaluation is mainly informative in nature and conducted early in the program cycle or during program cycle when changes are made. Issues examined in process evaluation include, but may not be limited to: program efficiency and effectiveness, satisfaction and barriers to participation. Process evaluation results in actionable recommendations to improve programs.

Going forward, process evaluation will include significantly more focused/targeted or phased evaluations in an effort to provide better and timelier information to serve the needs of program development and modification. Not only is this important for existing programs, but it will be critical to developing programs such as the new CEF offerings.

IMPACT EVALUATION

Impact evaluation provides information to help programs understand their actual impact and improve energy impact estimates, and is also looked to by external parties as a program accountability mechanism. Impact evaluation provides a rigorous assessment of the energy impacts due to the program and also addresses economic and environmental and other non-energy benefits.

This area of evaluation has historically accounted for the majority of evaluation spending. Evaluation contractors use pre- and post- analysis of energy consumption, direct metering and monitoring of equipment, building modeling and simulation and a host of other methods to determine the actual energy impacts realized for supported projects. Analyses are most typically done retrospectively on a representative sample. However, some pre-retrofit evaluation reviews have been instituted for programs/projects with challenging baseline determination issues, and some real time assessments have been made of free-ridership/program influence.

NYSERDA proposes to make several modifications to its impact evaluation strategy: 1) reduce the cycle time and retrospective focus, conducting more “real time” assessments to provide timely information that will support mid-course adjustments to active programs, 2) shift toward a market transformation/market effects evaluation framework, where appropriate, rather than a net-to-gross driven framework, and 3) provide additional data for assessment of clean energy policy by potentially conducting top-down, macro level analyses of energy consumption changes in the state.

MARKET RESEARCH & TRANSFORMATION STUDIES

MARKET EFFECTS/TRANSFORMATION EVALUATION

Market evaluation provides information to support program operations and accountability. Market evaluation serves to characterize and assess target markets for existing programs or help inform new program developments. Market evaluation relies on primary and secondary data to define key characteristics of market segments and establish baselines and conduct longitudinal measurements/tracking of certain key indicators the program expects to influence (e.g., awareness, knowledge, behaviors, practices). NYSERDA has engaged in market evaluation for more than a decade and expects that this body of data will help establish baselines and move forward with a market transformation evaluation framework.

Under the new CEF construct, market evaluation will reinvigorate deliberate and robust longitudinal indicator tracking to create value-added market intelligence and enable an understanding of progress being made in affecting markets via the selected interventions. It is expected that future studies will focus more broadly on the market level, addressing multiple programs, and will be done more regularly and frequently in order to capture time series information. With the broader study focus and more frequent study timeframe, decisions will need to be made about what key markets and impact areas to focus on with the limited resources available. Within this new model, statewide market effects (including energy impacts where possible) will be the only feasible outcome of the analysis; program, utility territory or program administrator level information will generally not be discernible.

While general evaluation areas and objectives can be identified, it is not possible at this time to outline specific approaches and schedules for all elements of future evaluations. Evaluation plans must align to the specific market intervention activities and pace, and will therefore be further developed as more information becomes available on specific market support provided and investments made. The Intervention Profiles described earlier will set the stage for this next step of decision making and planning.

BASELINE/POTENTIAL STUDIES

NYSERDA is currently conducting the State's first Residential baseline study and is embarking on the State's first Commercial baseline study. These are very large, comprehensive, multi-year efforts that are expected to provide information that will be useful on numerous fronts including many uses within program planning and program evaluation. From an evaluation standpoint, the studies will help establish credible baselines against which to assess realized savings and, if updated routinely, will also provide data that is needed to assess market transformation.

Regardless of the number of programs or the make-up of programs, it is anticipated that future follow-on studies will be needed in the Residential and Commercial sectors. While it is not expected that the same magnitude of study would be repeated every 2-4 years, some level of targeted follow up data collection and analysis will be required to keep the information useful. Further, similar baseline needs have been identified for the Industrial and other sectors. The weight of these needs should be considered and future studies implemented, if warranted.

TOP-DOWN MACRO-LEVEL CONSUMPTION STUDIES

By adding regular top-down econometric, macro-consumption studies of energy use, evaluators can provide information to assess the collective impact of energy programs/policies on usage by major sector. A macro-level approach is now feasible given the volume of clean energy program activity in the State and will help fill an identified gap in current information that is gleaned from individual program-level or even some market-based evaluations. This type of study approach has been piloted in California and is worthy of further consideration and possible implementation in New York.

IX. REALLOCATION OF EXISTING FUNDS

In its CEF Order, the Commission stated its intent that the CEF should provide for a smooth transition of the State's clean energy programs into 2016. In preparing this CEF Proposal and making program projections for year 2015, NYSERDA has identified the need to reallocate funds between certain existing EEPS programs and from uncommitted SBC funds²⁴ to ensure that the transition to the CEF will preserve services to consumers in certain sectors, as well as avoid program interruptions and market dislocations.

²⁴ The Commission's October 24, 2011 System-Benefits Charge IV Order provided that NYSERDA may propose allocations of uncommitted SBC funds. Case 10-M-0457; In the Matter of the System-Benefits Charge IV; Order Continuing the System-Benefits Charge and Approving an Operating Plan for a Technology and Market Development Portfolio of System Benefits Charge Funded Programs, issued and effective October 24, 2011.

NYSERDA requests to reallocate a total of \$37 million, comprising \$2,240,753 from EEPS1 (Gas) and \$34,759,247 from SBC3, to the following EEPS2 (Gas) programs in the following amounts:

Industrial Process:	\$13,000,000
MPP Market Rate:	\$2,500,000
MPP Low Income:	\$7,500,000
Assisted Home Performance	
with Energy Star:	\$3,000,000
<u>Empower:</u>	<u>\$11,000,000</u>
Total Reallocation Request:	\$37,000,000

Absent Commission approval of this reallocation request, the named programs will close. These transfers will allow for the continuation of these programs into 2015, pending determinations as to which programs are to extend into the post-EEPS period. The majority of the funds for which reallocation is requested are to serve the low-income sectors that the CEF Order directs NYSERDA to serve on a going forward basis. The DPS REV Straw Proposal recommends that the utilities serve as the DSPs, and that each DSP should file an Energy Efficiency Transition Implementation Plan (ETIP) by March 31, 2015. The ETIPs will describe how the utility intends to procure energy efficiency, beginning in 2016. Once the ETIPs are filed, stakeholder comment is considered, and individual plans are approved, both NYSERDA and the DSPs will be in a position to implement continuations, transfers, and wind-downs in an orchestrated manner.

NYSERDA also intends to file a separate notice and request for additional reallocations of EEPS2(Electric) and EEPS2(Gas) funds, under the procedures set forth in Energy Efficiency Guidance documents EE-06 and EE-07. Guidance document EE-06 allows the transfer of budgeted funds and targets within a customer sector upon notice to the Director of the Office of Energy Efficiency and the Environment (OEEE). Guidance document EE-07 requires that requests for transfers of funds and targets between customer sectors be approved by the Director, and that such transfers may not exceed 10% of the program administrator's total approved electric portfolio budget.

Given the relative unpredictability of future demand for services under the various programs that are expected to continue into or through 2015, and the anticipated need for expeditious additional reallocations during the course of the transition, NYSERDA requests that the Commission issue an order directing the issuance of new guidance authorizing the Director of OEEE to approve all transfers of existing SBC and EEPS funds through December 31, 2015.

X. CONCLUSION

As stated herein, NYSERDA respectfully requests a Commission order that:

- Establishes the goals of the CEF as long-term GHG emissions reductions and clean energy private investment, in a manner that also supports energy affordability, increased economic development, and transition to self-sustaining markets for clean energy technologies.
- Endorses the following metrics from which the CEF can benchmark progress towards those stated goals, as appropriate, including:
 - Reduced total GHG emissions;
 - Accelerated growth in the State’s clean energy economy, measured by total public and private investment in clean energy technologies and solutions;
 - Energy savings due to reduced energy use, as measured by reductions in customer energy bills;
 - Improved statewide energy efficiency, measured by the total increase in energy efficiency from 2010 levels; and
 - Increased fuel diversity, measured by the overall proportion of renewables in the electricity mix.
- Provides a 10-year commitment and budget for the CEF.
 - Approves the strategic direction identified for the 4 portfolios detailed in the CEF Proposal;
 - Authorizes approximately \$5 Billion in total new CEF activity through 2025. This authorization includes a total of approximately \$3.2 billion for the Market Development and Technology and Business Innovation portfolios, initiated with approximately \$2.5 billion for Market Development and approximately \$0.7 billion for Innovation. Funding for 2016 through 2023 for NY-Sun has been authorized in previous a Commission Order, and a request for NYGB capitalization is forthcoming in a separate funding authorization via a petition in the Fall 2014.
 - Approves flexibility in the Market Development and Technology and Business Innovation portfolios, providing NYSERDA the ability to reallocate funds within each portfolio and between these 2 portfolios where market engagement warrants, to improve the portfolios, and to capture emerging opportunities as market conditions evolve.
- Establishes new ratepayer collections caps to support the CEF through 2025.
 - Lowers total collections in 2016 to \$700 million, and sustains this annual collections level for 3 years through 2018. Further lowers collections in 2019 to \$650 million, and in 2020 to \$625 million. For the years 2020 through 2025, the collections cap would be established at \$400 million per year. To fully realize the program impacts and anticipated expenditure schedule for the fully authorized CEF, collections in the amount of \$400 million in 2026 and \$174 million in 2027 are necessary.
 - Authorizes the use of existing unexpended fund balances to meet currently authorized program activity for SBC, EEPS, RPS and T&MD programs, and apply to new CEF program activity.
 - Authorizes use of collections starting in 2016 for new CEF programmatic activities, as well as to cover existing program expenditures.
 - Authorizes NYSERDA to engage with utilities to institute a “Bill-As-You-Go” approach to ratepayer collections funds transfer.

- Establishes a forum/proceeding to develop the State’s policy for grid-tied renewables, with a goal of having a construct in place by 2016.
- Directs NYSERDA to develop, with external input from stakeholders, a Program Investment Plan for the Market Development and Technology and Business Innovation portfolios, to be submitted to the DPS Office of Energy Efficiency and Environment.
- Authorizes NYSERDA to convene Advisory Groups for the Market Development and Technology and Business Innovation portfolios, in a manner that will inform the evolution of the CEF portfolio over time.
- Authorizes the use of all funds collected through the CEF to be applied on a fuel neutral and statewide basis.
- Approves the reallocation of funds, as stated earlier in this proposal, to move \$37 million of EEPS1(Gas) and SBC3 funds to support the continuation of identified EEPS(Gas) programs, in order to maintain valuable energy efficiency services for various customer sectors for existing programs into 2015 and foster an orderly transition from the EEPS portfolio into the new CEF.
- Establishes a 3-year review cycle for the Market Development and Technology and Business Innovation portfolios, which would demonstrate interim progress on CEF initiatives and benchmarks of progress towards goals.
 - Authorizes the submission of periodic reports that show program progress and recommend portfolio adjustments as needed.
 - Authorizes an Evaluation program, in part oriented to measure the effects of market transformation initiatives on the economy generally and also help to better inform on the effects of multiple program strategies aimed at accelerating and promoting the scale of energy efficiency and clean energy in the State economy.

Appendix A: Market Research and Stakeholder Engagement

In the formation of this CEF Proposal, NYSERDA conducted extensive market research to determine how best to engage with market actors to advance clean energy innovation and adoption. This market research built on relevant research and analysis conducted to-date, including program evaluation reports, market characterization studies, and other secondary market research. Primary market research consisted of direct engagements (interviews and or workshops) with more than 215 market participants and experts including ESCOs, end-users, capital providers (commercial and venture), technology providers, subject matter experts, and similar entities. In addition, the market research included a robust review of end user perspectives through a survey of more than 1,500 participants in the residential sector (owners, renters, various income levels, dispersed geographies, etc.), 400 participants from the commercial sector (office, retail, education, etc), and more than 100 industrial participants.

For Market Development portfolio activities, the research first determined the sectors and end-uses (i.e. residential single family heating) with the greatest potential, and then identified key barriers within those sectors preventing optimal deployment of energy efficiency and distributed generation, as well as the decision points where these barriers manifest. This approach established a specific and concrete set of barriers and decision points to target. Specific intervention ideas were then generated to address the barriers and decision-points with the greatest potential. Further market interviews, as well as a concept-testing survey to residential and commercial respondents, were then used to test and refine priority ideas. These intervention concepts were then synthesized to articulate a strategy for how NYSERDA can drive impact in each sector. The findings from this market research effort are reflected in the sector-specific market barriers and strategies to overcome those barriers described in the Market Development Activities portion of Section V.

Additional market research (including market interviews) was also conducted for the Technology and Business Innovation portfolio. This research focused on gathering insights on key points in the commercialization lifecycle where NYSERDA support would be valued, potential tactics to address these stall points, and potential strategic priority areas. The market interviews were also used for hypothesis testing on these components of the portfolio. The findings from this market research effort are reflected in the Technology and Business Innovation Activities Portion of section V

In addition to this targeted market research, NYSERDA engaged with stakeholders more broadly through six roundtable sessions framed around four specific topics: demand-side resources (including energy efficiency and on-site clean energy generation); supply-side resources (large-scale generation); technology and business innovation; and policy.²⁵ These sessions provided a forum to discuss and share perspectives, and for NYSERDA to gain an understanding of the perspectives of various market actors and to identify items to consider in its development of the CEF Proposal. The sessions were also intended to help prepare the markets and stakeholders for the transition anticipated under the new CEF. For those unable to attend the stakeholder

²⁵ Four roundtable sessions were held in Albany, one on each of the four topics, and duplicate sessions on the topics of demand-side resources and policy were held in New York City.

roundtable sessions in person, NYSERDA also accepted written comments via a dedicated email address.

This process engaged a broad representation of stakeholders across a variety of interests, including utilities, consumer interest groups, environmental organizations, energy service companies, universities and laboratories, electricity generators and developers, trade groups, and governmental entities. Comments received through this process were generally supportive of the new approaches outlined in the CEF. Building on this successful stakeholder input process and to aid in the public comment process, NYSERDA will work with DPS to schedule a public technical conference to explain the CEF proposal to all interested parties and to provide an opportunity for stakeholders to ask clarifying questions.

Appendix B: Barriers, Decision Points, and Potential Market Development Program Strategies by Sector

Each sector (residential single family, residential multifamily, low-to-moderate income, commercial and industrial) has different key barriers and decision points, and consequently different potential program strategies. Results from market research detailing this information for each sector are described in Appendix B, along with illustrative program strategies. Specific program strategies will be included in a future Program Investment Plan filing to the Commission.

RESIDENTIAL SINGLE FAMILY

The Potential Study identified the following 2030 economic potential savings in the residential single family sector:²⁶

Table B-1: Residential Single Family Potential

	Electric Savings (GWh)	Natural Gas Savings (BBtu)	Petroleum Fuels Savings (BBtu)
Lighting	3,738	-	-
Water Heating	2,175	52,366	34,564
Thermal Comfort	4,735	45,431	15,443
Appliances and Plug Loads	5,064	-	-
Refrigeration	2,813	-	-
Total	18,525	97,797	50,007

BARRIERS AND DECISION POINTS

NYSERDA's market research in the residential single-family sector revealed the following primary end-user barriers, which constrain customer adoption and have the potential to unlock the largest amount of energy/GHG emissions savings:

- Lack of attention to and awareness of clean/efficient options. Residents do not naturally focus on energy performance of the home, are not fully informed of the direct benefits these technologies (and behavioral changes) can have on a home's comfort and energy costs, and may even have concerns about the potential negative impacts such projects may have on the aesthetics and comfort of the home.
- Capital and financing constraints to cover up-front costs, despite attractive economics of energy efficiency and distributed generation investments. Where financing may seem to make economic sense, residents are cautious in taking on additional debt, or prefer to invest in more tangible property improvements (e.g., kitchen remodel, pool).

²⁶ The total potential for the residential single family sector includes the LMI sector. Low income is defined as up to 60% of the state median income level (e.g., up to \$50K for four person household), Moderate income is defined as the band from 60% up to 80% of state median income (e.g., up to \$67K for four person household).

- Doubts that energy efficiency and distributed generation investments will generate the required benefits, in terms of cost savings or increased property value. This is due to both expectations about the preferences of potential future homebuyers, and concerns that efficiency and distributed generation are not reflected in real estate appraisals or by the real estate industry generally.
- Lack of attention to and awareness of behavioral and operational choices.
- Lack of trust in the manufacturers' and service providers' performance of EE improvements and DG/RE technology implementation, especially with regard to the magnitude of disruption and the risk that anticipated energy savings will not be fully realized.

Primary supply side barriers, which impede the ability of market actors to offer economic and compelling solutions include:

- Challenges of customer acquisition, given that small buildings generally imply correspondingly small projects for installers and contractors. As a result, customer acquisition and project development costs can comprise a disproportionately large fraction of costs.
- Paucity of service providers who can coordinate an integrated energy project (insulation, HVAC, DG, etc).
- Uneven knowledge of clean / efficient options and trade-offs by service providers and retail stores, who are generally not very capable of marketing such options to customers
- Supply chain limitations in product offerings result in a limited supply of efficient products for many equipment / technology categories; and many contractors, distributors and retailers do not trust there is sufficient demand for these products in order to take the inventory risk.
- Uncertain quality of project design, installation, operations and maintenance techniques and quality assurance processes
- Limitations on access to capital because Banks/lenders rarely incorporate energy savings projections into underwriting models due to risk aversion and concern with underperformance of energy savings projections (and lack of track record).

NYSERDA market research identified a series of decisions points with the greatest potential to influence clean energy choices, by embedding energy projects into a key points in the real estate life cycle when residents have access to capital and are examining the value of their home.

- During a home sale, both the buyer and seller are carefully considering the value, durability and overall attractiveness of a home. By figuring out how to exert influence on the relevant stakeholders (homeowners, real estate agents, etc.) NYSERDA could make energy performance a more important component to this process.
- At the point equipment failure or underperformance there is typically a very small window of opportunity to influence a repair/replacement decision. By specifically targeting this decision point, NYSERDA can work to educate the customers on the availability and benefits of high efficiency offerings and create maximum impact in the short timeframe.

- During a home remodeling. NYSERDA can leverage this opportunity to further embed energy performance into remodeling decisions, at a point where homeowners have access to financing and are investing in the improvement of their home.

In addition to key decision events, everyday energy decisions by homeowners (e.g., turning off lights, thermostat setting, closing windows) also represent meaningful savings opportunities for NYSERDA to pursue along with the approach of targeting stand alone clean energy projects.

PROGRAM STRATEGIES

NYSERDA would respond to these market barriers and list of potentially impactful decision points, by providing programs that address them head-on, summarized under NYSERDA's three major categories of strategic market intervention, as follows:

1. Enabling solutions for other market actors.
 - Focus on market coordination through mechanisms such as community aggregation projects facilitated by community and municipal organizations; and similar entities that have an ability to influence end users.
 - Stimulate a homeowner "trusted recommendation" forum that connects residents with high quality service providers to among other things, helps providers reduce customer acquisition costs.
 - Stimulate development of valid and effective "track records" to increase confidence in projected cost-benefits of clean energy projects.
 - Facilitate the usage of home energy ratings;
 - Assure training/education to those in the ecosystem (e.g., educating home appraisers and real estate professionals/realtors of the energy efficiency and distributed generation impact on home value/training inspectors to conduct audits)
 - Encourage providers to enhance their capabilities and grow EE / DG businesses by providing training and tools to further improve business models and workforce skills, and by enabling integration across service categories (e.g., HVAC, insulation, building envelope and on-site generation, such as PV)
2. Providing direct financial incentives with an explicit focus on motivating service providers and product suppliers to capture latent demand and, where needed, and to build nascent markets that offer high carbon reduction potential.
 - Invest in market actor enabling initiatives, consistent with the "bridge" model, where incentives are used to build demand and infrastructure to a point where incentives are no longer needed.
 - Incentivize suppliers (i.e., retailers, distributors, contractors) to increase the proportion of high-efficiency products in their inventory, expecting to wind down those incentives over time as they see a demonstrated demand for these products.
 - Assure investments in accelerated development, demonstration and piloting of more streamlined, tech-enabled auditing and M&V processes.

- Continue to support the renewable thermal industry, with incentives to enable the market to develop, attract providers, and build the infrastructure and approach the scale necessary to create a self-sufficient market.
 - Incentivize builders, architects and designers to build demand for, and develop, Net Zero homes.
3. Serving as a policy advocate to improve codes, standards and mandates
- Greater access to better finance mechanisms such as on-bill recovery with a broader lender base and Residential Property Assessed Clean Energy structures.
 - Work with municipalities to upgrade single family building codes and support the enforcement of existing codes.
 - Continue and reinforce support for standardized permitting and inspection forms and processes for solar electric projects, and expand these efforts to address other technologies/measures (e.g., solar thermal, home efficiency projects).
 - Work to increase access to and availability of finance options and repayment mechanisms.

RESIDENTIAL MULTIFAMILY

The Potential Study identified the following 2030 economic potential savings in the residential multifamily sector²⁷:

Table B-2: Residential Multifamily Potential

	Electric Savings (GWh)	Natural Gas Savings (BBtu)	Petroleum Fuels Savings (BBtu)
Lighting	2,023	-	-
Water Heating	1,182	27,220	15,443
Thermal Comfort	2,560	23,648	6,851
Appliances and Plug Loads	2,738	-	-
Refrigeration	1,525	-	-
Total	10,028	50,868	22,294

BARRIERS AND DECISION POINTS

NYSERDA's market research in the residential multi-family sector revealed the following primary end-use barriers, which constrain customer adoption and have the potential to unlock the largest amount of potential energy/GHG emissions savings:

- Tenants and building managers do not naturally focus on energy performance and lack awareness of clean / efficient options for their apartments / buildings and are not fully

²⁷ Economic potential for building common spaces is included in the commercial sector.

informed of the potential benefits for the comfort of their units, their energy costs, and the environment²⁸

- Coordination issues between tenants and building owners, which affect ability deal with interaction effects of building-level and apartment-level energy solutions
- Potential renters /apartment buyers have limited economic incentives for high efficiency units as the economic savings potential is often too small to shift decisions, and do not sufficiently value efficiency for non-financial reasons (e.g., comfort, aesthetics, environmental or technology interests)
- Lack of trust in the manufacturers and service providers performance of EE improvements and DG/RE technologies, especially with regard to the magnitude of disruption and the risk of not fully realizing the expected savings.
- Split incentives in non-master-metered buildings prevent building owners / managers from investing in efficiency or clean DG measures since they are unable to fully monetize utility bill savings from current / potential apartment tenants
- Capital and financing constraints to cover up-front costs, despite attractive economics of energy efficiency and distributed generation investments. Building owners are often highly-leveraged and are hesitant to take on additional debt, and have competing priorities for investment in more proven and visible and proven property improvements (e.g., marble floors in lobby, new unit appliances).

Primary supply side barriers, which impede the ability of market actors to offer economic and compelling solutions include:

- Lack of credible track-record: service providers lack proof points for customers of successfully converting energy savings to higher net operating income (e.g., better cash-flow in the multifamily building).
- Information barriers: Auditors/installers do not fully tailor solutions to the capabilities/technical sophistication of building management so building operators need additional training to utilize advanced building controls. Consequently, many systems go underutilized due to overworked superintendents and building managers.
- Implementation and execution failures: Limitations of energy modeling software lead to energy audit bias and errors. Improper installation and unexpected O&M problems limit the EE savings produced for multifamily buildings.

NYSERDA market research identified a series of key decisions points with the greatest potential to influence clean energy choices:

- A significant point is a building change of ownership, as both building buyers and sellers are closely analyzing the potential financial and operational performance of a building during the transaction. NYSERDA can utilize energy performance as a strong metric to assess the

²⁸ An additional element of awareness is that tenants (as well as building managers) have expressed concerns that they see potential drawbacks of clean / efficient options for the aesthetics and comfort of their apartments (e.g., assume A/C units can't cool an apartment as well as regular systems).

health of a building and provide an indicator on the ongoing operating costs, which can encourage the inclusion of energy considerations in the transaction

- Refinancing provides the opportunity for NYSERDA to embed energy decisions into a well-defined process in which building owners have access to capital and are examining the value of their assets.
- Change in building occupancy, as tenant / owner turnover provides an opportunity for NYSERDA to encourage building owners to make improvements while an apartment is temporarily vacant, which allows for more substantial changes such as gut-renovation and interior/appliance upgrades
- Remodeling (whole building or individual units). Building managers pursuing a renovation project are investing with the objective of increasing the net operating income of the property. The opportunity exists for NYSERDA to further embed energy performance into these decisions, especially at a point where building managers have access to finance and are investing in the improvement of their building(s).

In addition to the decision points noted above, there are other opportunities to intervene that may not be as large in terms of GHG emissions/energy savings potential or as frequent but also offer opportunities. Those include failure or underperformance of equipment/appliance(s) and code compliance inspections.

PROGRAM STRATEGIES

NYSERDA would engage in its three strategic roles in this sector with an evolving market-responsive and evidence-based portfolio of interventions, with an initial approach including:

1. Enabling solutions for other market actors
 - Stimulate aggregation/one-stop-shop approaches that pre-develop building-wide clean energy projects
 - Stimulate a “trusted recommendation” forum that targets information for both tenants and building managers
 - Enable and Power Purchase Agreements (PPAs) for tenants lacking access to systems directly installed on their premises
 - Stimulate development of valid and effective "track records" to increase confidence in projected cost-benefits of clean energy projects
 - Demonstrate/develop real-time energy management approaches to stimulate adoption at scale of improved operations/continuous commissioning, etc
 - Supporting the emergence of MF building ratings and apartment ratings
 - Facilitate training/ education to appraisers and real estate professionals/realtors of the energy efficiency and distributed generation impact on building and unit value, training closing inspectors to conduct audits

2. Providing direct financial incentives with an explicit focus on motivating service providers and product suppliers to capture latent demand and, where needed, and to build nascent markets that offer high carbon reduction potential
 - Potentially incentivize suppliers (i.e., retailers, distributors, contractors) to increase the proportion of high-efficiency products in their inventory, expecting to wind down those incentives over time as they see a demonstrated demand for these products
 - Provide financial incentives directly to multifamily property auditors so they can develop and pilot more lean / tech-enabled auditing processes
 - Invest in design approaches, methodologies and tools for architects, designers and engineers to build demand for, and develop Net Zero multifamily buildings.
3. Serving as a policy advocate to improve codes, standards and mandates
 - Work with municipalities to upgrade MF building codes and supporting the enforcement of existing codes.
 - Lead efforts to facilitate regulatory changes required to enable solar electric power purchase agreements (PPAs) for multifamily tenants through PPA-at-a-distance arrangements (Massachusetts model)

LMI RESIDENTIAL (SINGLE FAMILY AND MULTIFAMILY)

Approximately 2.2 million of NYS households have incomes at or below 60% of the State Median Income (SMI), while nearly 700,000 households have incomes between 60% and 80% of the SMI. This market segment represents nearly 40% of all New York households, an indication that the LMI sector is a substantial customer base to be served.²⁹ As a subset of the Residential Single Family and Multifamily sectors, the achievable energy savings potential of the Low / Moderate income segment is most concentrated in the end-uses of thermal comfort (e.g., shell/envelope) and space heating. Both of these end-uses present the opportunity to target the combination of energy savings, health and safety benefits. These findings guided NYSERDA to focus its market research in the LMI sector on key barriers and decision points for these main end uses, due to the higher savings potential.

Of note in this sector is the heightened value that energy performance improvement can offer to these buildings and residents. If the considerable barriers can be surmounted, the economic and quality of life rewards available through improved living conditions and through improved energy costs matter here more than in most sectors

BARRIERS AND DECISION POINTS

NYSERDA's market research in the LMI residential sector area reveal the following LMI-specific primary end user barriers³⁰ to address in order to attain the available economic potential:

²⁹ ACS 2012 5 year estimate

³⁰ In addition to the barriers listed here, several barriers identified in the market rate residential single family and residential multifamily sections are also applicable to LMI.

- Affordable buildings are financially stressed and experience capital and financing constraints to cover up-front costs of energy efficiency and distributed generation investments. If capital is available, building owners (large and small) are often hesitant to take on additional debt to fund EE and DG/RE investments, and often prioritize seemingly more pressing investment needs (e.g., health and safety issues from under-maintained buildings).
- LMI residents are financially stressed, and lack the capital or willingness to take on debt to cover energy efficiency and distributed generation investments, despite the attractive economic value of these investments.
- Split incentives in sub-metered LMI multifamily buildings prevent building owners/managers from investing in efficiency or clean DG measures since they are unable to fully monetize utility bill savings from current/potential tenants. In master metered buildings (common in public housing), agency issues prevent building owners from trusting that tenant actions/behaviors will allow them to recoup efficiency investments.

Primary supply side barriers, which impede the ability of market actors to offer economic and compelling solutions include:

- Lack of an integrated, "one-stop" solution to pre-develop clean energy projects and to navigate the cumbersome and uncoordinated affordable building resources and requirements
- Building managers and local municipalities lack awareness of building codes and / or fail to enforce codes which significantly decreases the efficiency of affordable and public housing units.
- Various New York State low-income programs target the same segment of residents but lack coordination across programs and duplicate infrastructure / outreach costs
- Policy constraints such as rent / utility allowance caps preclude and/or limit owners'/manager's ability to recoup cost savings after they make an EE investment.
- Local or funding authority regulations related to new construction of affordable housing may limit the business model opportunities for developers, who may otherwise be interested in exploring innovative and energy-saving design options.

Community development barriers include³¹

- Employment is inhibited by unpredictable volume of local work or availability of incentives to stimulate volume.
- There is a lack of affordable training opportunities that are delivered locally, and allow the trainee to maintain other employment in the process.
- EE and DG/RE services providers often avoid disadvantaged communities based on the expectation that return on their marketing investment will be low.

³¹ A program to effectively serve low-income households needs to have a holistic approach, which includes not only reducing household expenses, but also providing opportunity to increase income. Clean energy sector jobs provide good wages and have tremendous growth potential. However, residents of disadvantaged communities often lack access to, or are not adequately prepared for, these jobs.

NYSERDA market research identified a series of key decisions points with the greatest potential to influence clean energy choices³²:

- One key decision point is at the time of a building change in occupancy. This turnover provides an opportunity for NYSERDA to encourage building owners to make improvements while the apartment is temporarily vacant, which allows for more substantial changes such as gut-renovation and interior/appliance upgrades.
- A second key decision point is at the point equipment failure or underperformance. In these situations, there is typically a very small window of opportunity to influence a repair/replacement decision. This is especially true of failures during a no-heat situation or disaster response where rapid replacement trumps appropriate sizing, opportunities for greater efficiency, or placement of replacement equipment. By specifically addressing this decision point, NYSERDA can work to educate the customers on the availability and benefits of high efficiency offerings and create maximum impact in the short timeframe
- Third, building refinancing is an important point to consider. Refinancing provides the opportunity for NYSERDA to embed energy decisions into a well-defined process in which building owners have access to capital and are examining the value of their assets.

In addition to the main decision points noted above, there are other opportunities to intervene that may not be as large or as frequent but also hold out potential, including code compliance inspections.

Of special note in the LMI sector is the moment of new home/building construction. While new construction only represents a small portion of New York State's building stock, a significant amount of the new construction taking place is for affordable/public housing, and, this event represents the best opportunity for NYSERDA to drive very deep energy savings measures at a much lower cost than with existing buildings. Failure to do so at the point of construction essentially eliminates opportunities to achieve savings for the next 15-20 years. This is also particularly relevant in New York City given the recent push to develop approximately 200,000 units of affordable housing.

PROGRAM STRATEGIES

NYSERDA would engage in its three strategic roles in this sector with an evolving market-responsive and evidence-based portfolio of interventions, with an initial approach including:

1. Enable solutions for other market actors
 - Assure coordinated and facilitated market transactions activities, with focus on market coordination through ensuring integration (1) across key low income focused NYS and federal programs / organizations (e.g., HEAP, Office of Temporary

³² These decision points are also important in the residential single family and multifamily sectors, but are key for the LMI sector.

and Disability Assistance(OTDA), HUD, WAP/HCR, EmPower, Office of the Aging, DOS, Department of Labor (DOL)) to coordinate outreach and streamline participant engagement and (2) across the affordable housing ecosystem (e.g., HUD, HCR, NYC Department of Housing Development and Preservation (HPD), NYCHA)

- Ensure aggregated, certified, and shared information, with a focus on being a trainer / educator targeting LMI residents with education and awareness campaigns on behaviors and low-cost actions to save energy
2. Continue providing direct financial subsidies to fill gaps in the market
 - Deploy end user incentives in a tiered approach for current LMI initiatives in order to extend scope of impact
 3. Serving as a policy advocate to improve codes, standards and mandates
 - Coordinate with NYS and local agencies that support low-income populations to demonstrate that clean energy investments can succeed in accordance with current regulatory environment and budget, and advocate for improvements to unreasonable restrictions
 - Advocate for required energy efficiency standards for publicly funded housing (e.g., Section 8 / Housing Choice Vouchers)

COMMERCIAL

The Potential Study identified the following 2030 economic potential savings in the commercial sector³³:

Table B-3: Commercial Potential

	Electric Savings (GWh)	Natural Gas Savings (BBtu)	Petroleum Fuels Savings (BBtu)
Indoor Lighting	22,464	-	-
Cooling	14,640	1,700	-
Ventilation	7,428	-	-
Refrigeration	6,405	-	-
Office Equipment	4,282	-	-
Outdoor Lighting	2,537	-	-
Space Heating	417	64,194	23,595
Water Heating	369	64,697	21,384
Food Preparation	7	6,202	130
Total	58,550	136,793	45,109

³³ Includes economic potential from multifamily commercial spaces, which generally refers to the common spaces in multifamily buildings. (Electric Potential 88 GWh, Natural Gas Potential 28,987 BBtu, and Petroleum Potential 7,814 BBtu)

BARRIERS AND DECISION POINTS

NYSERDA's market research in the commercial sector revealed the following primary end-use barriers, which constrain customer adoption:

- Building owners and managers often do not trust that they will realize value from the investment and furthermore, shared with other sectors, there's the perception that such investments provide low value-added features.
- The time and attention of tenants and building owners are generally focused on other areas of their business such as tenant appeal, based on building aesthetics and comfort leading to a lack of attention to clean energy options as well as building systems/controls optimization.
- Commercial tenants focus mainly on operating their business, and tenant spaces energy performance rarely can claim their attention.
- Further, commercial tenants often assume that energy investments in their space cannot pay off within their lease terms.

Additionally, for the office and retail sub-sectors the following barriers persist:

- An owner-tenant agency issue is present in many cases, leading to confusion in decision making responsibilities and processes.
- Office building owners are often uncertain of the length of control they have over the building and its assets, which challenges payback period requirements.
- Many tenants do not pay for energy directly or are not sub-metered, and the owner passes along energy costs to those tenants; this split incentive issue prevents either party from taking action to improve efficiency.
- Among national retail chains, decisions are often undertaken on a national level, limiting the ability to influence change at locally-based operations.
- Investments that do not directly generate revenue through increased sales are often de-valued.

Primary supply side barriers, which impede the ability of market actors and service providers to offer economic and compelling solutions include:

- Lack of objective, proven data and access to it: Many market actors lack basic energy performance data (heating systems, fuel expenses, and benchmarked energy performance) and insight on the quality or accuracy of the data, making it more difficult to make the case for efficiency amongst business-oriented decision makers.
- Soft costs for distributed generation installations: Installers are often deterred by the significant engineering costs in initial property siting, and installers are unaware of optimal areas to install and supply distributed generation assets.

- Policies may interfere with clean energy deployment: Overly restrictive standby tariffs, burdensome monitoring and evaluation requirements and other policies can hinder clean energy deployment of otherwise make sense in the commercial space.

NYSERDA market research identified a series of key decisions points with the greatest potential to influence clean energy choices.

- Engagement with the office sector should focus mostly on building level decisions by working with large management groups and portfolio owners to identify and act on savings opportunities.
- For the retail sector, engagement with centralized decision makers is extremely important as most of the highest-impact efficiency gains are deep retrofits and likely require centralized support.
- For other sectors such as universities, schools, and hospitals, decisions often get made at the beginning of capital planning cycles or as a result of sustainability campaigns, providing an opportunity to incorporate clean energy projects into those plans.
- Across areas within the commercial sector, interesting intervention opportunities occur:
 - At the time of remodeling/fit-out, often triggered by change in occupancy
 - During pre-emptive equipment replacement
 - During the planning stages for new building construction or expansion

PROGRAM STRATEGIES

NYSERDA would engage in its three strategic roles in this sector with an evolving market-responsive and evidence-based portfolio of interventions, with an initial approach including:

1. Enabling solutions for other market actors
 - Creating a commercial sector “Clean Energy Marketplace” forum, targeting information that helps connects end users with the market and allows for providers to realize reduced customer acquisition costs.
 - Work with ESCOs to streamline their approach into this market, enabling integrated solutions and performance contracting to expanded areas in the market such as mid and smaller sized projects.
 - Stimulate further demand for and standardize performance contracting to reach untapped areas in the commercial market (mid/small buildings/businesses)
 - Stimulate standardization and tech-enablement of audits, assessments, modeling, benchmarking and M&V,
 - Stimulate development of valid and effective "track records" to increase confidence in projected cost-benefits of clean energy projects
 - Facilitate greater deployment of advanced control and management technology and analytic methods such as: continuous commissioning and flexible load technologies

through standardization in sub-metering and smart controls, and increased use of BMS tools.

- Invest in design approaches, methodologies and tools for architects, designers and engineers to create more Net Zero commercial buildings
 - Enable the development of innovative business models such a "green leases" to, among other things, help address split incentive issues
2. Providing direct financial incentives in targeted and high-leverage ways
 - Engage architects, designers and engineers very early in the process to increase Net-Zero design in new commercial buildings while enhancing building owner and tenant demand for deep energy savings or Net-Zero buildings
 3. Serving as a policy advocate to improve codes, standards and mandates
 - Particular emphasis on expanding existing financing platforms (e.g., C-PACE) to better leverage funding for commercial improvement projects
 - Improve compliance with energy regulatory codes in commercial buildings
 - Continue to develop opportunities around "green leases" which can address split incentive issues

INDUSTRIAL

The Potential Study identified the following 2030 economic potential savings in the industrial sector:

Table B-4: Industrial Potential

	Electric Savings (GWh)	Natural Gas Savings (BBtu)	Petroleum Fuels Savings (BBtu)
Process	2,827	9,906	1,355
Other	1,002	-	-
Lighting	924	-	-
Boiler	-	25,100	1,181
HVAC	-	666	23
Total	4,753	35,672	2,560

BARRIERS AND DECISION POINTS

NYSERDA's market research in the industrial sector revealed the following primary end-use barriers, which constrain customer adoption:

- High opportunity costs of facility / system downtime related the installation and operating risk associated with new technologies.

- Manager and front-line staff are also time constrained and the attendance of training programs during work week is costly, as their attendance at the production line is critical.
- Risk aversion of decision makers as well as overestimating risk levels limits their ability to take on risk (e.g., operating risk of DG, installation risk/downtime for EE) and financial burdens (e.g., upfront costs) due to intense internal and external competition in the manufacturing sector.
- Lack of confidence and trust in ability of process efficiency improvements to deliver on energy savings and maintain level of quality desired in end products, a key outcome for industrial and manufacturing firms.
- Energy and sustainability are not a part of the core business function and focus despite its status as a large portion of the operating budget. DG and EE technology investments are not integrated into many firms' capital expansion plans
- Current program structures limit efficacy by imposing strict limits on the types of fuels eligible for efficiency work.

Primary supply side barriers, which impede the ability of market actors and service providers to offer economic and compelling solutions include:

- Operating risks: service providers have been unable to convince risk-averse industrial customers that concern over potential failure of DG solutions is overstated.
- Lack of vendor capabilities and speed: Insufficient 3rd party vendors to offer integrated solutions: design and build solutions, provide O&M, and possibly hold title of the energy efficiency asset for depreciation/tax/accounting purposes, and design specifications prevent customized equipment from being built in time for capital expansion or plant improvement. Vendors also lack financing resources for high CAPEX items (e.g., robust battery backup system).
- Limited technology credibility: Inconsistent quality verification for equipment and installers leads to decision maker confusion and doubt in credibility of new input machinery (e.g., efficient gas compressors).
- Restrictive regulations and codes: State standards and codes discourage deployment of CHP and efficiency appropriate to industrial firms in many cases.

NYSERDA market research identified a series of key decisions points with the greatest potential to influence clean energy choices in the industrial sector, including:

- Expansion or new product introduction
- Planned process improvements and plant maintenance intervals
- Annual strategic or capital review process
- Equipment failure

PROGRAM STRATEGIES

NYSERDA would engage in its three strategic roles in this sector with an evolving market-responsive and evidence-based portfolio of interventions, with an initial approach including:

1. Enabling solutions for other market actors
 - Coordinate technology providers and utilities to increase deployment and standardization in sub-metering and smart controls, increase decision maker's understanding of flexible load technologies
 - Work with ESCOs to streamline their approach into this market , enabling integrated solutions
 - Stimulate development of valid and effective "track records" of process improvement projects to increase confidence in projected cost-benefits of clean energy projects and performance experiences - recognizing that site-specific circumstances may vary more in this sector than in others
 - Support training and education for industrial facility/energy managers to engage in long-term/holistic energy management process
 - Support adoption of and engagement in practice- and technology improvement initiatives like ISO 50001 and DOE Better Plant Program

2. Providing direct financial incentives via risk sharing
 - Tiered incentives and technical support to catalyze investment in the next generation/new applications of technology and invest in similar initiatives, consistent with the goal of building a sustainable market.

3. Serving as a policy advocate to improve codes, standards and mandates
 - Advocate for policy / regulatory changes to reduce the market, structural and pricing barriers currently challenging CHP penetration in NYS industrial facilities (e.g., work with utilities and regulators to explore the expansion of the standby tariff structure to all customers).

Appendix C: Customer-Sited Renewables

New York State programs to support customer-sited renewable energy have focused primarily on electricity under the auspices of the RPS. These RPS customer-sited programs have invested in PV, wind, anaerobic digesters, fuel cells, and more recently solar thermal (the latter of which has been focused primarily on displacing electricity). The largest of these customer-sited initiatives – and the one with the most rapid growth in consumer uptake and rapid decline in price – has been PV. This PV initiative has moved successfully into the next phase of market development through the NY-Sun program which lays out a path to an economically sustainable market no longer requiring ratepayer subsidies (see p. --)

The aggressive GHG reduction goals outlined in the draft State Energy Plan, combined with a focus on customer choice and value, compel us to take a fresh look at new strategies to spur market growth in a range of renewable electric and thermal technologies. Heating and cooling is the single largest source of GHG emissions for Residential and Commercial consumers in New York. If we are to approach net-zero energy buildings, we will need to address both renewable thermal (i.e. heating and cooling) options as well as renewable electric options for consumers. Renewable thermal technologies can displace fossil fuel and help mitigate the price volatility impacts of fossil fuels. This impact of price volatility/price spikes was felt by many customers in New York State during the cold spell this past winter (aka Polar Vortex).

The goal of these customer-sited renewable initiatives, consistent with the high-level strategy articulated in the CEF proposal, is to develop self-sustaining markets with strong customer demand and a vibrant marketplace of service providers – ultimately independent of public subsidies.

CUSTOMER-SITED RENEWABLE ELECTRIC (EXCLUDING SOLAR PV AND SOLAR THERMAL)

Through the State's RPS program, 23 MW of non-solar PV or solar thermal customer-sited renewable electric systems have been developed in New York, with approximately \$55 million of public funding leveraged at least 1:1 with private funding. These systems include small on-site wind; anaerobic digesters (ADG) on farms, wastewater treatment plants, and industrial sites; and fuel cells.³⁴ These systems generally have a considerably higher capacity factor than solar and some (e.g., ADG) can serve to meet base load power, providing a relatively unique attribute for renewable energy. The RPS customer-sited program commenced in 2007 and has focused on reducing the cost of these systems through capital cost buy-downs and performance payments. Complimentary efforts under NYSERDA's SBC Programs supported some very limited workforce development, case studies, reduction of soft costs, and in some cases (e.g., ADG) outreach and education to targeted sectors.

³⁴ New York State Renewable Portfolio Standard Annual Report, March 2014, as updated through August 2014.

While several of these technologies have seen some incremental improvement in performance/cost in recent years, the fundamental market dynamics of these technologies have not experienced significant changes. It is notable that fuel cell, ADG and on-site wind projects all successfully completed and were awarded contracts under the 8th Main Tier RPS solicitation. Although this result is indicative of the increasing cost-competitiveness of these resource types; since these systems were primarily behind the meter installations with different revenue characteristics than grid-tied renewable resources, it cannot be concluded that the resources are on equal financial footing at this time. To ensure an equitable and clear demarcation between programs and approaches, customer-sited or net metered projects would not be considered eligible for the new "grid tied renewables" procurement approach described above.

There are a few developments underway that could open up new opportunities for these technologies. These include: emerging fuel cell technical innovations; new markets/business models for digesters to treat the growing food processing industry in New York State; the emergence of lease/PPA models; and the potential for larger scale systems to improve economics.

RENEWABLE THERMAL

Primary opportunities in renewable thermal systems include biothermal, solar thermal and heat pumps (ground-source/air source).

CLEAN BIOMASS-BASED HEATING

NYSERDA has supported R&D and early market development in biothermal technology for over a decade. This has laid the platform for the launch of a major initiative in clean biomass-based heating, announced this summer by the Governor through "*Renewable Heat NY*". Under this Initiative, we will be promoting the highest efficiency class of technologies. The goal of *Renewable Heat NY* is to address barriers and stimulate a self-sustaining private-sector market for advanced technology wood heating equipment and feedstock supply/infrastructure that is cost-effective and environmentally sound. The comprehensive multiyear effort will provide some financial incentives to build demand and create demonstration sites; develop a supply chain in New York from wood feedstock through equipment; build a skilled workforce; support targeted R&D to continue to improve the technology; increase consumer awareness of options/costs; explore financing services; and work to update building codes.

SOLAR THERMAL

The New York solar thermal industry developed a roadmap in 2010 which presented recommendations to develop the solar thermal market in New York.³⁵ These recommendations included: an educational campaign, financial incentives, development of a manufacturer base in New York, R&D to improve performance of the core technology, and streamline permitting. Shortly

³⁵ New York Solar Thermal Roadmap, Directions for New York State's Renewable Energy Independent Future, New York Solar Thermal Consortium.

after that, the State’s RPS program was expanded to include solar thermal systems and a small consumer information program has been launched by NYSERDA. The initiative has been supplemented with some RGGI funding to allow for inclusion of solar thermal systems to replace petroleum. Since program launch, 4 MW of solar thermal systems have been developed with approximately \$7M of public funds, plus approximately equal private funds. The industry has been struggling for a number years, and has not garnered the consumer and policy attention that solar PV has, although in several applications the economics of solar thermal can be quite strong. NYSERDA has recently commenced discussions with the industry to chart a path forward to a more vibrant solar thermal market consistent with the goals and strategies of the CEF. The Energy Efficiency and Renewable Energy Potential Study of New York State suggests that as much as 70 Tbtu and 928 GWh in economical energy savings can be realized through solar thermal.

HEAT PUMPS

These technologies present significant opportunities to reduce on-site fossil fuel use and save customers money. NYSERDA proposes to include these technologies as part of the CEF. Preliminary market analysis conducted by NYSERDA suggests that the following economical energy savings can be realized through air source heat pumps:

Table C-1: Residential Heat Pump Economic Potential

	Electric Potential (GWh)	Natural Gas Potential (Bbtu)	Petroleum Potential (Bbtu)
Space Heating	(5,469)	-	85,435
Water Heating	(503)	-	13,240
Total	(5,972)	-	98,675

Note: Negative values indicate an increase in fuel usage

Table C-2: Commercial Heat Pump Economic Potential

	Electric Potential (GWh)	Natural Gas Potential (Bbtu)	Petroleum Potential (Bbtu)
Space Heating	(3,133)	9,071	30,601
Water Heating	(456)	-	7,044
Total	(3,589)	9,071	37,645

Note: Negative values indicate an increase in fuel usage

While these technologies are often characterized as “renewable” by virtue of their thermal source, their economics are in many ways closer to other energy efficient technologies, with comparable barriers. NYSERDA will explore the integration of these technologies to create more low-carbon fuel efficient buildings.

BARRIERS

NYSERDA's work in renewable electric/thermal technologies³⁶ including interaction with stakeholders, service providers and users, combined with recent regional market analysis done,³⁷ suggest that the following barriers need to be addressed to grow markets in non-PV customer-sited renewable technologies:

- Higher capital costs relative to alternatives/Limited access to financing
- Challenges associated with permitting, siting and interconnection
- Limited "reference cases" in terms of performance
- Nascent service supply network

Each of the technologies above is limited to some degree by one or more of these barriers.

POTENTIAL FUTURE STRATEGIES

NYSERDA will prioritize the applications above with the greatest GHG emissions reduction potential, customer benefits, and market growth potential. This will be recalibrated over time based on observed market trends. NYSERDA will direct its interventions at specific barriers to adoption. NYSERDA will explore three strategic market development roles in this sector:

- Providing direct financial incentives where needed, likely in a step down function over time. This will be done to stimulate demand as a temporary bridge to a market solution.
- Enabling solutions for other market actors. This will focus on working with private and public partners to reduce soft-costs, standardize product offerings, document and create awareness of system performance and system integration with other on-site clean energy measures, develop a quality service-provider base, and explore financing and new business model options.
- Serving as a Policy Advocate. NYSERDA will work with municipal and local government partners to advance permitting and siting practices that can encourage customer-sited renewable technology.

In addition, as part of NYSERDA's Innovation mission (see Section V), we will explore working with private partners and academia in New York to advance technological innovation that could drive down costs of these systems. Where critical industrial assets exist, we will seek to develop a manufacturing/supply chain in New York, thereby providing economic development opportunities for New Yorkers.

³⁶ See also "New York State Renewable Portfolio Standard, Customer-Sited Tier Program, Market Evaluation, program Expectations and funding considerations, NYSERDA, August 22, 2013.

³⁷ Navigant Consulting, Inc., Commonwealth Accelerated Renewable Thermal Strategy, January 2014.

Appendix D: Technology and Business Innovation Activities

STRATEGIC INVESTMENT METHODOLOGY

Targeting the majority of program expenditures toward the advancement of specific strategic priorities that are consistent with the 2014 draft State Energy Plan will maximize impact and mobilization of private sector market actors. The portfolio will be balanced, with investments that include: varying times-to-market and associated risk and reward; incremental and disruptive innovations; multiple technology areas that offer solutions for market needs and leverage native assets; and investments that directly support individual companies as well as those that will grow the State's capacity for innovation more generally. NYSERDA will invest not only in near-market-ready opportunities that are likely to yield incremental benefits in a relatively short period of time (2 – 5 years), but also in areas that present an opportunity for more transformative change. The latter carries with it higher risk (which must be carefully managed) and longer times to market (5 – 10+ years), but also the opportunity for the type of transformative innovation that will be vital to New York State in achieving its long term energy and environmental goals. The portfolio will also include a comparatively smaller share of investments in areas not identified as strategic priorities, in order to preserve NYSERDA's ability to scout for and respond to emerging trends, immediate needs, and/or policy imperatives. The approach will:

- Focus investments on an established set of strategic priorities that can help achieve long-term goals (primarily GHG emissions reduction but also system efficiency and resiliency, economic development)
- Leverage private capital and stimulate investment in the emerging cleantech sector in New York.
- Consider business readiness of a potential partner in addition to a project's technical merit to increase probability of successful commercial outcomes
- Leverage specific market intelligence including the voice-of-the customer and other NYSERDA market development feedback
- Support R&D at various stages, including early-stage transformative opportunities and on the later stages of commercialization
- Support R&D for clean energy products as well as for their innovative cost-effective methods of mass production
- Continue to build the entrepreneurial capacity for cleantech innovation in New York and develop cleantech assets that can assist and attract multiple companies and other stakeholders
- Formalize a disciplined investment decision making process, including portfolio balancing and risk management, both for one-to-one assistance and more holistic innovation support.

In addition to the guidelines above, the investment and program design process will also weigh the broad environmental impacts of each program tactic and the portfolio as a whole. This includes examining the implications of various energy choices, trends, and impacts beyond GHG emissions, at state and regional levels, and will, to the extent possible, quantify the costs and value of reducing those impacts so that they can be considered when evaluating various strategic opportunities,

program strategies, and individual investment tactics.

The bulk of NYSERDA technology and business innovation investments will fall within priorities determined to have particular strategic value to New York State. These priorities will be articulated at the level of broad industry sector (e.g., High-Performance Buildings) and also at industry segment (e.g., Commercial Office Buildings) or verticals (e.g., Building Envelope). All strategic priorities will have clear links to the State Energy Plan, the REV proceeding, and other key related State policy needs. Beyond this, several criteria will be weighed when evaluating potential areas for priority status, including potential synergies with the CEF's market development programs, utilization of native assets, and market potential. Factors to be considered will include alignment with New York's market needs, (e.g., applicability to a dense urban area), resiliency impacts, State-specific energy trends (such as high fuel oil use), and related environmental implications. The assessment of New York State assets will look at state resources, including existing business strengths, intellectual capital and natural resources. Market potential includes an evaluation of the addressable market for technologies in the U.S. and New York State, as well as areas where large gaps exist between technical and economic potential, which is indicative of unresolved engineering and cost related barriers.

STALL POINTS

There are three critical stall points at which NYSERDA's assistance can be of particular value. At these critical junctures, companies value not only NYSERDA's financial investment, but also technical expertise, market knowledge, endorsement, and ability to bring critical parties to the table (e.g., utilities, early adopters, codes/standards-setters).

The first stall point is at the stage of company formation that is generally considered too early for investment by private investors, technical and business risk is at its highest, and the movement of intellectual property out of a research setting has stagnated. The second occurs as a company begins or is engaged in product development and requires an infusion of working capital to support early growth. The third is at the point of first/early commercial use where the business has interest from initial customers, but lacks a critical internal capability or has failed to meet one or more market-related or regulatory requirements, such as a required certification, market presence and scale required by early customers, and/or access to a sufficient amount of affordable working capital for scale-up. Using the investment approaches described, NYSERDA will develop programs and interventions that target these stall points.

INVESTMENT APPROACHES

NYSERDA has developed a set of approaches that will meet the specific needs and failure mechanisms of companies and that help to build the overall capacity for innovation statewide. The former is required in order to allow for companies to complete key technical and business related tasks in today's current funding environment where investor risk aversion is high and securing working capital is extremely difficult; and the latter is essential in that supporting the organic growth of the sector (both regionally and statewide) can have tremendous long-term value and deeper impact than one-to-one assistance. Successes by innovators and companies attract talent

and financial resources to those areas, which in turn provide for and facilitate subsequent successes.

DIRECT SUPPORT FOR CLEANTECH BUSINESSES

As a companion to broader, entrepreneurial infrastructure building programs, mechanisms are necessary to provide more direct support to businesses. These tools will include educational resources to help early-stage businesses navigate the commercialization process, mentorship/coaching programs and project specific activities to address more complicated product development and manufacturing challenges. NYSERDA will continue to have an important role in providing direct financial support to early stage clean energy companies. This support, in the form of non-dilutive capital or other vehicle, will allow companies to conduct and complete key technology and business development tasks: establishing technical & business feasibility, conducting product and manufacturability development and market testing, and demonstrating innovations in their relevant operational environments and achieving key commercialization milestones. A significant objective of this type of support is to help mobilize private capital, and a greater emphasis will be placed on engaging and involving outside investors in the development and growth of NYS clean energy companies. Emphasis will also be placed on providing support to companies in a timely fashion at crucial moments of need, and in a way that provides for the continuity of company operations. However, in doing so, NYSERDA will phase projects and tie support to performance. Receipt of NYSERDA funding will only occur after completion of technical and business milestones identified and agreed to by both parties.

TECHNOLOGY-TO-MARKET PATHWAYS TO STIMULATE ENTREPRENEURIAL ACTIVITY

The Technology-to-Market Pathway serves two purposes: 1) to create a continuum of programs for clean energy technology companies that accelerate their commercial readiness; and, 2) to create scalable and replicable models of programs that the private and institutional sector will ultimately sustain. The core activity of these types of investments are a series of programs designed to capture innovative and entrepreneurial activity in the state at the invention stage, direct it towards the development of solutions to meet market defined clean energy technology needs/opportunities, and provide the support infrastructure and mentorship necessary to build entrepreneurial and management skills to increase the likelihood of the commercial success of the ventures. The State's agencies and authorities will also be tapped to serve as proving grounds for field testing new solutions (e.g., OGS, Corrections, SUNY, and Department of Transportation).

TANGIBLE MULTI-USE FACILITIES & RESOURCES

The establishment of product testing and certification facilities and design assistance centers are examples of the critical multi-use infrastructure necessary to bring new clean energy technologies to market. Bringing a new technology to market requires the ability to develop, test and certify the performance of the technology against expected customer and industry standards, and the ability to rapidly prototype and scale manufacturing. By investing in test method development and the

establishment and early operation of the facilities, NYSERDA is creating long-lasting independently operated resources that provide value across a wide spectrum of business types and stages of development. Partnering with established large companies having underutilized research and manufacturing capabilities will also enable the State to create a network that leverages existing capability to grow new organizations.

ENGAGEMENT OF MID-MARKET SUPPLIERS AND STRATEGIC INDUSTRIAL PARTNERSHIPS

Clean energy technologies can reach a final customer through a variety of paths. In many cases there are businesses along the value-chain that are critical to the success of the movement of the new technology to the hands of the customer. An important objective of these investments is to catalyze partnerships between early stage cleantech companies and established companies in the market. The arrangement could include, for example, the established company serving as first significant customer of the product or as a strategic partner who could provide access to an existing market presence, brand identity & credibility, and supply chain and channels to market. These approaches will be applied across each “stall point” described above as appropriate given the needs and challenges consistent with each. For instance, tech clusters that explicitly engage and bring together stakeholders like innovators, investors, academia, and established corporate entities have shown to be particularly useful at the company formation stage; programs that provide non-dilutive working capital and technical & business assistance to pre-revenue companies target the second stall point; and “bankability programs”, which provide assistance to commercially ready nascent technologies to reduce barriers to entry, such as certification assistance and testing facilities have shown to be helpful for companies in the first/early commercial use stage.

STRATEGIC PRIORITIES AND TARGET AREAS

Five initial strategic priorities have been identified that will inform the majority of initial program development and investment planning. These areas will be reviewed annually. The priorities identified are interrelated and the solutions that are developed as part of new programs and projects will often relate across multiple areas. Identification of the priorities resulted from an analysis of New York State needs, native assets, and market size; and is informed by intelligence and project outcomes gathered by program staff over the preceding several years.

- (1) **High-Performance Buildings:** New York’s building stock accounts for 55% of energy consumption and 50% of direct and associated upstream GHG emissions in NYS.³⁸ Accordingly, investments in this area are essential to drive the deeper energy retrofits and net zero energy new construction practices that will be needed to achieve the State’s 80 by 50 objective. These investments will enable greater energy efficiency, explore the potential synergies of combining efficiency with various distributed energy

³⁸ For GHG, includes emissions directly attributed to on-site combustion of fossil fuels and those indirect emissions associated with utility generation of electricity consumed by buildings. 2011 New York State Energy Fast Facts: <https://www.nyserderda.ny.gov/Energy-Data-and-Prices-Planning-and-Policy/Energy-Prices-Data-and-Reports/EA-Reports-and-Studies/Patterns-and-Trends.aspx>

resources (e.g., building specific CHP and/or renewable thermal technologies), and reduce emissions intensity. Sample target areas included are space heating and cooling, and building control systems. An analysis of market potential, based on the NYS Potential Study, as well as analysis of EIA data for the nation as a whole, identified space heating in commercial and residential buildings as the greatest area for potential energy savings. Additionally, NYS has high fuel oil usage, which is a State-specific issue that requires additional focus.

- (2) **Energy System Resiliency:** In the aftermath of recent severe weather events, resiliency (and reliability) came to the fore as critical in the planning and management of NYS's energy infrastructure. System interdependency issues such as electricity, liquid fuels, and communications and resiliency requirements have been identified and reinforced as vitally important through a number of commissions and reports.³⁹ New York's coastline – low-lying, heavily populated, worth billions of dollars, and locus of millions of jobs – requires a continued focus on resiliency efforts. Target areas within the electric transmission and distribution system include automated islanding to restrict electric service disruptions from propagating, facilitating operation of distributed generation resources when the grid is down and enabling critical public health and safety facilities to maintain operation during a grid outage. Additional focus areas include distributed generation technologies like micro-grids and individual-building-scale CHP, black-start/storage technologies for PV and other systems that use inverters, and addressing resiliency issues related to the interdependencies between the energy and telecommunications sectors. Emphasis will also be placed on behind-the-meter resiliency that will allow residents to remain in their homes for a longer period of time in the aftermath of such severe events. These areas in particular require extensive coordination with the utilities. NYSERDA will shift its focus over time depending on state needs and investments of other market players, focusing on opportunity areas where there are gaps.
- (3) **Renewable and Distributed Energy Resource Integration:** An internal NYSERDA analysis has determined that if NYS is to reach its goal of 50% reduction in GHG emission intensity by 2030, then 60% of the energy mix at that point in time will need to be resources other than traditional utility-scale fossil fuel central generation assets.⁴⁰ The primary goal of this priority is catalyzing new solutions to enable a low-carbon distributed system platform framework and competitive renewables – at scale. Existing hydro and other resources, including supply-side renewables, will contribute to the replacement of traditional generation, but greater deployment of distributed generation will be required, including solar PV and solar thermal, wind, biomass, demand response, energy storage, anaerobic digestion, district heating systems and CHP. Specific innovation target areas include renewable generation market acceleration by reducing costs and increasing performance of renewable technologies, grid-friendly renewable

³⁹ NYS 2100 Commission Report <http://www.governor.ny.gov/assets/documents/NYS2100.pdf>; Responding to Climate Change in New York State <http://www.nyserda.ny.gov/climaid>; planNYC A Stronger More Resilient New York <http://www.nyc.gov/html/sirr/html/report/report.shtml>

⁴⁰ Internal NYSERDA post analysis of NYS Efficiency and Renewable Energy Potential Study

and distributed energy technology (with a focus on solutions such as smart inverters and site identification tools), CHP acceleration (focusing on solutions such as site identification tools, the integration and interoperability of disparate resources and components into cohesive systems, and automated demand response (with an emphasis on solutions such as building management systems that incorporate external signals and small-scale ancillary services programs). Storage will play an increasingly important role as well in incorporating the increased DER into the grid, and reducing the impact of intermittency and peak loads.

- (4) **Digital Energy Solutions:** The scale, use, and importance of information technology has grown rapidly in the past 10 to 20 years, to the point that consumers and businesses rely heavily on information technology (IT) to complete most tasks throughout their day (communications, banking and financial transactions, healthcare, supply-chain management, human resources, etc.) . In many areas and applications, data can or soon will be considered a commodity upon which new businesses and models will be developed. Do to these facts, solutions developed as part of this strategic priority will have broad application to all other areas. Potential strategic topics include: energy market management (e.g., maps of the NYS grid, 15-minute data access); T&D efficiency solutions (including conservation voltage reduction technologies (CVRs) to manage and improve system efficiencies [i.e. Volt/VAR]); operations optimization (e.g., advanced monitoring and diagnostics, forecasting apps, and integrated system models); and consumer comfort and efficiency (e.g., aggregation, ride share, and home comfort apps). Other potential topics include solutions to increase production and efficiency from clean power generation facilities, the provision of energy system information to a variety of innovators and market actors, and solutions to increase efficiency of industrial processes.
- (5) **Advanced Sustainable Transportation:** 40% of NYS GHG emissions come from the transportation sector; improving the efficiency of this sector is essential to the State reaching its energy and environmental goals. Today's transportation modes and electric grid are increasingly interconnected and a comprehensive integrated approach is necessary to ensure that the system as a whole becomes more efficient and reduces emissions. Reducing vehicle miles traveled (VMT) through transportation demand management or mode shifting to public transportation, while improving the performance and efficiency of public transportation, can provide some of the most cost-effective reductions in GHG emissions and energy use. Much of this improvement will come from accelerated electrification of the transportation sector which can enable simultaneous innovative improvements to the electric grid, building energy management, and resiliency through vehicle based energy storage, vehicle to building (V2B) and grid (V2G) power transfer. For example, energy efficiency improvement to the New York City subway system, which averages 500MW of traction power during peak periods, could also provide congestion relief to the NYC distribution system. By highly leveraging the CEF with other available State and Federal funding, NYSERDA will support the development, validation, and commercialization of products and services that provide sustainable energy improvements. Target areas include: electric

transportation including rail and plug-in vehicle infrastructure, H2, electric and hybrid heavy duty vehicles, idle reduction, freight transport efficiency, and transportation demand management.

In addition to the technology/market priorities identified above, NYSERDA will support critical energy-related environmental research that is needed to better understand and mitigate the environmental impacts of emerging and existing energy technologies.

Given that the marketplace for clean energy is rapidly changing, NYSERDA will need to remain nimble. As such, a portion of the portfolio will include investments in opportunities that arise from additional market insights or energy and environmental policy directives outside of the initial strategic investment planning process. For opportunities of this type, one or more of the following characteristics must be present:

- High NYS Value– the opportunity has exceptionally strong value for New York and is compatible with the mission of NYSERDA.
- Special Capabilities – the opportunity is presented by a party with exceptional, relevant experience, and expertise
- Uniqueness – the opportunity is unique by virtue of location, high visibility, probability of success, or synergistic outcome with existing investments

HISTORICAL PERFORMANCE OF NYSERDA’S INNOVATION INVESTMENTS

NYSERDA has recently completed an analysis of research and development investments covering the period between 1996 and 2012. This analysis compiled expenditure and outcome data over the period to determine what impact those investments had on the recipient company and the statewide economy. Sample results from that study are presented in Tables D-1, D-2 and D-3, and present several metrics that would be tracked going forward.

Table D-1: Leverage Ratio

R&D Project Type	Leverage Ratio
Scientific Research & Analysis	2.4
Technology Development & Demonstration	4.6
Cleantech Business Development	3.0
Total	3.7

Table D-1 shows how many outside dollars were leveraged for each dollar of NYSERDA investment. This includes company cost sharing, other grants won, and private investment.

Table D-2 Commercialization Rate

No. of Product Development Projects	No. Resulting in Commercial Revenue	Commercialization Rate
683	173	25.3%

Of 683 product development investments made since 1996, 25% of those projects have resulted in non-negligible commercial revenue.

Table D-3: Product Sales

Total Commercial Revenue	Total Investment Expenditures	Revenue Ratio
\$2,059 million	\$182 million	11.3

Products that have been commercialized following NYSERDA Product Development support have generated over \$2 billion in revenue at a cost of \$182 million to NYSERDA. This produces a “revenue ratio” of ~11. Over the period, NYSERDA grantees have on average generated over \$12 million in commercial revenue per. Additionally, the *net* benefit (factoring in the Systems Benefit Charge Assessment impact) to New York State’s economy has been an increase in Gross State Product of \$8.90 for every dollar invested.

Appendix E: Stakeholder Participation

The following organizations have provided input to NYSERDA that was considered in the development of this Proposal:

Advanced Energy Economy Institute
Alliance for Clean Energy New York
American Lung Association in New York
Apex Clean Energy
Association for Energy Affordability
Binghamton Regional Sustainability Coalition
BloomEnergy Corporation
Brookfield Renewable Energy Group
Brookfield Renewable Power
Business Council
Cattaragus Community Action
Central Hudson
Citizens Campaign for the Environment
City of New York
City University of New York
Climate Change Mitigation Technologies LLC
CodeGreen Solutions, Inc.
Community Power Network of New York State
Conservation Services Group
Consolidated Edison
Constellation Energy
Consumer Power Advocates
Cornell University
Cornell University; College of Agriculture and Life Sciences
Customized Energy Solutions
Distributed Wind Energy Association
EarthKind Energy
EDP Renewables, North America
Efficiency First -- New York
Empire State Development
Enel Green Power North America
Energy Technology Savings LLC
Environmental Advocates of New York
Environmental Defense Fund
EverPower Wind Holdings, Inc.
FuelCell Energy
Guarini Center, NYU School of Law
Honeywell

Hudson Solar
Independent Power Producers of New York, Inc
International Brotherhood of Electrical Workers
Invenergy LLC
LI Green
Multiple Intervenors
National Fuel Gas Distribution Corporation
National Grid
Natural Resources Defense Council
New England Clean Energy Council
New York Biomass Energy Alliance
New York City Environmental Protection
New York Farm Bureau
New York Geothermal Energy Organization
New York Oil Heating Association, Inc
New York Oil Heating Association, Inc. and the Oil Heat Association of Long Island, Inc.
New York Public Interest Research Group
New York State Community Action Association
New York State Department of Public Service
New York State Electric and Gas / Rochester Gas and Electric
New York State Homes and Community Renewal
New York State Office of Temporary and Disability Assistance
New York State Weatherization Directors' Association
New York Water Environment Association
NextEra Energy Resources LLC
Northeast Clean Heat & Power Initiative
Northeast Energy Efficiency Partnerships
NRG Energy, Inc.
Oil Heat Institute of Long Island, Inc.
OPower
Orange and Rockland
Pace Energy and Climate Center
PosiGen
PSEG Long Island
ReEnergy Holdings LLC
Renewable Energy Long Island
Renewable Energy New England
Sealed
Sierra Club
SmartWatt Energy, Inc
Solar Energy Industries Association
SRA International
Suffolk County

SUNY Purchase College
TechNet
The Nature Conservancy
The New York Energy Efficiency Coalition
TRC
Vermont Energy Investment Corporation
Walmart Stores, Inc