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

Clean Energy Fund Information Supplement

Submitted by the New York State Energy Research and Development Authority

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Acronyms

A&E: Architecture and Engineering

ACCA: Air Conditioning Contractors of America

ADG: Anaerobic Digester Gas

AMI: Area Median Income

ANSI: American National Standards Institute

BOEM: United States Department of Interior - Bureau of Ocean Energy Management

BPI: Building Performance Institute

CEE: Consortium for Energy Efficiency

CEF: Clean Energy Fund

CFA: Consolidated Funding Application

CHP: Combined Heat and Power

CO_2: Carbon Dioxide

C-PACE: Commercial Property Assessed Clean Energy

CST: Customer Sited Tier

DER: Distributed Energy Resource

DG: Distributed Generation

DOE: United States Department of Energy

DOT: New York State Department of Transportation

DPS: New York State Department of Public Service

DSP: Distributed System Platform

ECM: Energy Conservation Measure

EEPS: Energy Efficiency Portfolio Standard

EMaaS: Energy Management as a Service

ESCO: Energy Services Company

ETAC: Emerging Technology/Accelerate Commercialization

EV: Electric Vehicle

FY: Fiscal Year

GESPC: Guaranteed Energy Savings Performance Contracting

GHG: Greenhouse Gas

GJGNY: Green Jobs Green New York

GWh: Gigawatt Hour

HCR: New York State Homes and Community Renewal

HEAP: Home Energy Assistance Program

HES: Home Energy Score

HPwES: Home Performance with ENERGY STAR

HUD: United States Department of Housing and Urban Renewal

HVAC: Heating, Ventilation and Air Conditioning

ICP: Investor Confidence Project

IP: Intellectual Property

IPE: Industrial Process Efficiency Program

IRC: Investment & Risk Committee

IT: Information Technology

ITS: Intelligent Transportation System

KWh: Kilowatt Hour

LBML: Lawrence Berkley National Laboratory

LED: Light Emitting Diode

LIFE: Low Income Energy Forum

LIHTC: Low-Income Housing Tax Credit

LIPA: Long Island Power Authority

LMI: Low-Moderate Income

LSR: Large-Scale Renewable

M&V: Measurement and Verification

MLS: Multiple Listing Service

MPP: Multifamily Performance Program

MTA: Metropolitan Transit Authority

NGO: Non-governmental Organization

NRDC: National Resource Defense Council

NRF: National Retail Federation

NY-BEST: New York Battery and Energy Storage Technology Consortium

NYCHA: New York City Housing Authority

NYCHPD: New York City Housing Preservation and Development

NYGATS: New York Generation Attribute Tracking System

NYGB: NY Green Bank

NYISO: New York Independent System Operator

NYPA: New York Power Authority

NYSCP: New York State Community Partnership

O&M: Operation and Maintenance

OSW: Offshore Wind

OTDA: Office of Temporary and Disability Assistance

PACE: Property Assessed Clean Energy

PNA: Physical Needs Assessment

POCC: Proof of Concept Center

PPA: Power Purchase Agreement

PSC: New York State Public Service Commission

R&D: Research and Development

REV: Reforming the Energy Vision

RFP: Request for Proposal

RGGI: Regional Greenhouse Gas Initiative

RILA: Retail Industry Leaders Association

ROI: Return on Investment

RPS: Renewable Portfolio Standard

RTEM: Real Time Energy Management

SBC: Systems Benefit Charge

SEM: Strategic Energy Management

SMI: State Median Income

STEM: Science, Technology, Engineering and Math

T&D: Transmission and Distribution

T&MD: Technology and Market Development

TBTU: Trillion British Thermal Units

TDM: Transportation Demand Management

WAP: Weatherization Assistance Program

WEA: Wind Energy Area

1 Summary

Pursuant to the Notice Soliciting Comments issued on November 6, 2014 ("November 6 Notice") 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") Information Supplement. This CEF Information Supplement includes both material from NYSERDA's original CEF Proposal filed with the Commission on September 23, 2014 and supplemental information on budgets, strategies, and initiatives, in accordance with the November 6, 2014 Notice. As such, this CEF Information Supplement completes and replaces the CEF Proposal.

In the CEF Proposal and this Information Supplement, NYSERDA seeks a 10-year funding commitment to work in coordination with other New York State policies in support of Governor Andrew M. Cuomo's Reforming the Energy Vision (REV) strategy. In its CEF Order[1] the Commission stated its intent to ensure the delivery and continuity of clean energy programs for New York's energy consumers, enhance program efficiency, and manage the transition of NYSERDA's program approaches to better align with the market outcomes envisioned through the Commission's REV Regulatory Proceeding.[2] The Commission further directed NYSERDA to orient its portfolios to "refocus on market and technology transformative strategies."[3] This CEF Information Supplement is designed to support and effectuate those guiding principles.

1.1 Introduction

In 2014, Governor Andrew M. Cuomo launched the REV strategy to build a cleaner, more resilient and affordable energy system. NYSERDA's CEF is a critical pillar to support the mission of REV, and is designed to complement the other initiatives championed by New York State, including the Commission's REV Regulatory Proceeding.

Today's energy system is not well-designed to address and overcome the type and magnitude of New York's economic and environmental challenges. Households pay well above the national average in annual energy costs and face some of the highest electricity rates in the country. Since 2010, New York has endured 11 presidentially declared natural disasters, including Sandy, Irene, and Lee. Additionally, technology advancements, consumer trends, and global energy markets are challenging the current centralized utility model. New York's current regulatory framework,

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[1] Case 14-M-0094 - Proceeding on Motion of the Commission to Consider a Clean Energy Fund. *Order Commencing Proceeding*, issued and effective May 8, 2014.

[2] The Commission commenced a Reforming the Energy Vision proceeding ("REV Regulatory Proceeding") to reform New York's energy industry and regulatory practices. It is intended to align electric utility practices and the Commission's regulatory model with technological advances that have created alternatives to traditional solutions to meeting electricity demand. See: Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision. *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued and effective February 25, 2015.

[3] Case 14-M-0094 - Proceeding on Motion of the Commission to Consider a Clean Energy Fund. *Order Commencing Proceeding*, issued and effective May 8, 2014, page 7.

agency programs, and policies are not designed to address these pressing issues. Although difficult, these challenges can and must be addressed.

Clean energy provides an enormous economic opportunity for New York. REV will stimulate a vibrant private sector market to provide clean energy solutions to communities and individual customers throughout the state and generate bill and emissions saving. Technological advances and greater investment in energy efficiency, renewables, and other clean technologies means new businesses, new jobs, and local economic development from Long Island to Buffalo. NYSERDA's CEF will help enable the full realization and maximization of the economic opportunity presented by REV.

NYSERDA has had considerable success in delivering on its mission of advancing innovative energy solutions, primarily through its implementation of programs supported by the System Benefits Charge (SBC), including the Energy Efficiency Portfolio Standard (EEPS), Renewable Portfolio Standard (RPS), and Technology & Market Development (T&MD) program. While NYSERDA has achieved strong results and created a foundation upon which to build, more innovative, impactful and self sustaining approaches are needed.

Through the CEF, NYSERDA seeks to build on this success and momentum to meet evolving market and customer needs. NYSERDA has designed the CEF to pursue three long-term outcomes: thriving and self-sustaining clean energy industries able to operate without subsidies; greater levels of private capital invested in clean energy and jobs in New York; and significant reductions in greenhouse gas (GHG) emissions from the state's energy sector.

As market transformation and GHG emissions reductions goals are both long-term outcomes, NYSERDA is requesting a 10-year program authorization of approximately $5 billion in new strategic investment through 2025. This investment will be made across four program portfolios:

- Market Development, which will align with the REV Regulatory Proceeding and evolving utility strategies to reduce barriers, animate consumer demand for clean energy, and enable the private markets to provide the new products and services sought by an engaged consumer market;
- Innovation and Research, 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;
- NY Green Bank (NYGB), which seeks market transformation in the financial sector, leveraging public investments with private capital in a self sustaining manner while reaching new markets for clean energy services; and
- NY-Sun, which seeks to create a robust and self-sustaining solar market in New York for solar electric technologies, and to build a program approach for other clean technologies to follow.

1.2 Background

From 1999 through 2014, NYSERDA has achieved savings of 6,901 GWh of electricity and 12.1 MMBTU of fossil fuel energy through energy efficiency, saving New Yorkers over $7.9 billion in cumulative energy bills. For every $1 in energy efficiency investments made by NYSERDA, $3 in energy bill savings was realized by customers participating in NYSERDA's programs. [4] Looking forward, as customer and technology trends evolve, NYSERDA can achieve even greater impact through new, more cost-effective initiatives, while reducing overall ratepayer surcharges.

This CEF Information Supplement identifies new directions and opportunities for NYSERDA. These new directions and opportunities will be complementary to the REV Regulatory Proceeding, and will drive toward the previously stated long-term outcomes. New York's regulatory and programmatic redesign will accelerate and expand investment in clean energy technologies. NYSERDA proposes to create and submit to Department of Public Service (DPS) Staff an initial Investment Plan, which would detail metrics and identify specific initiatives for the Market Development and Innovation and Research 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 investment plans detailing the respective strategies for those 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 and to the emergent success of CEF strategies. For the CEF to capture emerging opportunities, NYSERDA will require the ability to - and requests that the Commission grant greater levels of flexibility - to move funds within each of the CEF portfolios, as well as between the Innovation and Research and Market Development portfolios.

In addition, NYSERDA requests that the Commission allow investments to be pursued on a "fuel neutral" basis, that is, clean energy investments could be made based on overall public benefits without regard for specific fuel type. Feedback received through the public outreach process revealed that there is an accepted understanding that consumers seek solutions to their energy needs holistically, that is 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 in the past had limited ability to utilize multiple funding sources to reach a range of consumer needs, this approach has not met all customer needs and has left some GHG emissions reduction opportunities unrealized. A fuel neutral approach, crediting all public CEF dollars with achieving the portfolios' emissions reduction progress, would better optimize the GHG emissions reduction productivity of public dollars spent on clean energy initiatives. Fuel neutrality will also likely provide benefits on a larger systems basis; the State's primary energy systems – electricity, natural gas and fuel oil – have demonstrated a growing interdependence in the past years. Record-cold winters have resulted in prolonged interruption calls to natural gas service,

[4] NYSERDA, "Operations and Accomplishments and Mission Statement and Performance Measurement Annual Report: Fiscal Year Ended March 31, 2015", June, 2015, pp. 5-6.

requiring interruptible customers to turn to fuel oil to maintain operations. While designed for interruptions of limited durations, the past winters have resulted in weeks-long interruptions, placing unsupportable pressure on the fuel oil supply chain. Increases in demand result in increased fuel oil costs for customers who depend on that fuel for heating purposes; given that interruptions are intended to provide a degree of price modification for natural gas customers, resultant price increases to fuel oil customers due to natural gas interruptions result in a degree of cross-subsidy for natural gas customers by fuel oil customers. Moreover, in part because fuel oil has become a more costly fuel options for power plants than natural gas, electric customers may also experience price increases in zones where dual fuel facilities may now set the clearing price for wholesale energy markets. Fuel neutral clean energy strategies will be able to provide a degree of relief to each of these energy systems, potentially reducing the effects or impacts of system interruptions, and improving the resiliency of fuel availability when interruptions become necessary.

To inform this CEF Information Supplement, NYSERDA engaged in extensive stakeholder outreach and market research.[5] Six in-person stakeholder sessions were held in Albany and New York City and written submissions were accepted, prior to submission of its original CEF Proposal and market research was conducted to identify market segments, the potential for clean energy market applications within those segments, and economic studies related to those applications. Since that time, NYSERDA has also engaged in a series of stakeholder engagements in the creation of more detailed strategies and initiatives for the Market Development and Innovation and Research portfolios, convening stakeholders in the individual sectors (including business, real estate, environmental, and low-to-moderate income (LMI) groups) to help define new initiatives for implementation. Going forward, as available, NYSERDA will conduct additional market intelligence activities to continually inform strategy and initiative design.

To maintain broad and effective stakeholder engagement as an input into new and more dynamic portfolios, NYSERDA recommends the creation of two new Advisory Groups to help inform the evolution of the CEF portfolios. NYSERDA's current Advisory Group for the SBC-funded 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 to each of the Market Development and the Innovation and Research portfolios could be designed to replace and 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.

[5] See for example, McKinsey & Company, "Unlocking Energy Efficiency in the U.S. Economy", July, 2009; and American Council for an Energy-Efficient Economy, "Overcoming Market Barriers and Using Market Forces to Advance Energy Efficiency", March, 2013.

1.3 Primary Outcomes

The CEF, as proposed, is structured to achieve greater and self sustaining impact over current NYSERDA program approaches; this is necessary given long-term public policy objectives that require meaningfully increased scale of clean energy in New York. To ensure that the Commission and all stakeholders remain informed of the returns realized from the public investments, under the CEF NYSERDA will manage the portfolios to advance four primary outcomes:

- GHG emissions reductions;
- Customer bill savings;
- Energy efficiency and clean energy generation; and
- Mobilization of private sector capital.

NYSERDA proposes to establish these four outcomes as the key metrics for the CEF.

1.4 Clean Energy Fund Portfolios

NYSERDA proposes four main portfolios of activity within the CEF: Market Development, Innovation and Research, NYGB and NY-Sun.[6] NYSERDA has designed these portfolios to complement the other pillars of the State's energy agenda: the REV Regulatory Proceeding, and the Energy Highway and "lead by example" initiatives advanced by the New York Power Authority (NYPA). NYSERDA aims to 1) lay the groundwork for clean energy developments flowing from the Commission's REV Regulatory Proceeding and from the evolution of utility strategies; and 2) to supplement REV and utility strategies with clean energy solutions in sectors where they do not reach.

The CEF will primarily target the "upstream" supply chain, ensuring that the market is ready to provide the products and services that an animated consumer market will demand as a result of REV. Through the CEF, NYSERDA will also act as a market-enabler, stimulator, and aggregator of clean energy demand, both in market-ready sectors, as well as in promising areas that need public investment as a bridge to market readiness or among otherwise underserved populations, such as rural or LMI communities.

NYSERDA's transition from previous authorized programs to new initiatives will be measured, disciplined, and grounded in validated learning. Changes to previous authorized programs will aim to accentuate attributes that drove their success in accelerating the deployment of clean energy, but take into account advances in the regulatory framework and state of the market. Attributes that will persist include technical assistance, quality assurance, verification, and offsetting soft costs

[6] This document focuses on the new strategies and proposed initiatives for the Market Development and Innovation and Research portfolios. NYGB and NY-Sun are not discussed at length as they have already been authorized and launched.

through incentives. NYSERDA's introduction of new initiatives will be guided by the following principles:

- Build on the progress of those in the market that are accelerating the adoption of clean energy;
- Only scale investments in initiatives once there is evidence that the investment will yield measurable impact and benefit; and
- Continuously test, measure and adjust.

The approach aims to deploy as many initiatives as possible that are likely to yield the greatest impact on the four primary CEF outcomes and accelerate the work of market players, independent of whether they are previously authorized programs or new initiatives. Existing programs that are delivering progress are generally planned to continue in transition mode, possibly with adjustments to accentuate the attributes that most contribute to their success.

1.4.1 Market Development

The proposed Market Development portfolio will focus on facilitating the market for on-site, behind-the-meter clean energy solutions including energy efficiency, distributed generation, renewable thermal, and energy storage. The Market Development portfolio will also include activities to facilitate Large-Scale Renewables (LSRs), in addition to any role(s) or activities NYSERDA may assume under successor programs to the RPS Main Tier program, which has historically provided direct individual project support.

A core premise of the CEF is the recognition that, in the absence of a fully functioning market, initiatives are needed to spur solutions and innovations that accelerate the transition to market mechanisms. NYSERDA's new approach recognizes that different clean energy solutions face different barriers. For some clean energy technologies, high hard costs (e.g., manufacturing and equipment costs) lead to poor economics that dampen demand. For other clean energy technologies, high soft costs (e.g., customer acquisition, permitting, and financing costs) stand in the way of greater scale. Many other solutions are cost competitive today, yet remain under-deployed. This implies that the main barrier to increased penetration of clean energy may not be wholly financial, and indicates that direct grants and incentives may not always be the most effective means to spur adoption when solely aimed at overcoming financial barriers. Non-monetary barriers can include, but are not limited to:

- Burdensome permitting and local approval processes;
- Limited and uneven consumer awareness;
- Lack of trust in technology performance by customers and financial institutions;
- Inertia, capacity and implementation constraints; and
- Limited access to financing.

These barriers are unresolved, receive insufficient focus from other market actors, increase soft costs, impeded self sustaining markets, and are high-potential opportunities to accelerate adoption if resolved. The Market Development portfolio will aim to address the diverse barriers to clean

energy deployment. Bridge incentives will be deployed alongside new techniques that spur self-sustaining clean energy markets and seek to mobilize capital to create the greatest opportunity for market penetration of energy efficiency and distributed generation. Fundamentally, the initiatives described in the Market Development portfolio employ the following strategies to reduce soft costs and other non-monetary barriers.

1. **Provide information, data, and education** for customers and service providers to raise awareness and demand, reduce customer acquisition costs, train clean energy workforces, and improve customer confidence.
    - New Initiative Example: Online platform for the dissemination of residential energy efficiency project data as a device to foster education, consumer confidence and investment opportunity designed to increase participation in clean energy activities.

2. **Offer technical assistance**, and provide **standardized and simple, robust tools** for clean energy partners, including service providers, contractors, and energy-decision makers such as code officials and local government leaders to lower soft costs and address implementation constraints.
    - New Initiative Example: Provision of model renewable energy permitting templates or policy ordinances for municipalities across the state.

3. **Provide quality assurance** for proposed clean energy solutions and deliver performance validation, monitoring, and verification of new clean energy technologies to improve customer confidence.
    - New Initiative Example: Certification of products and services in the commercial energy efficiency space.

4. **Pilot, demonstrate, and replicate** new technologies and business models to advance innovative, scalable, and cost-effective solutions.
    - New Initiative Example: Partner with large commercial portfolio owners and receptive tenants, service providers, industry trade and research associations, and governmental organizations to pilot standardized tenant energy efficiency packages.

5. **Enable aggregation** of different customer types (e.g. residences, municipalities, businesses, real estate portfolios) to reduce costs through economies of scale and leverage peer pressure to break through inertia.
    - New Initiative Example: Build market demand for deep-energy retrofits by aggregating similar buildings in New York's affordable housing stock.[7]

To aid in the design and development of these new initiatives, NYSERDA has partnered with experts in behavioral science. Building off of behavioral science research and running controlled

[7] Deep energy retrofits are defined here as substantially renovated buildings with total annual energy use and costs at least 40% less than an identical building built to code.

experiments will help NYSERDA ensure it targets the right market gaps with the right interventions to deliver the greatest impact.

1.4.2 Innovation and Research

The Innovation and Research portfolio will focus on Technology and Business Innovation with a goal of accelerating and catalyzing the most valuable innovations that will create low-GHG solutions, system and customer benefits, and a vibrant clean energy industry in New York. The Innovation and Research portfolio will also support energy-related environmental research that provides objective information on the environmental impacts of energy technologies, helping to inform policy making and identify strategies to mitigate environmental impacts.

In delivering the Technology and Business Innovation programs, NYSERDA will be strategic, focused and capital efficient, addressing pressing needs and opportunities in New York. In particular, investments will complement the REV regulatory proceeding by advancing new clean energy solutions for a distributed energy system. The programs will address key points where commercialization can stall and the private sector is less likely to fill gaps, paying careful attention to the path to the market for new innovations. Given the nature and pace of innovation, NYSERDA will need to remain nimble in this area as market, technology and business conditions change rapidly.

As currently envisioned, NYSERDA will focus its Innovation programs on the following areas:

1. **Smart Grid Systems** – accelerating the evolution to a smarter more *integrated* grid that enables new value-added services in pursuit of a clean, reliable and affordable energy system, enabling the REV transformation.
    - New Focus Area Example: develop and test technologies and systems to support microgrids and address barriers identified through NYPrize

2. **Renewables and DER Integration -** accelerating market adoption and realization of grid and consumer benefits from distributed and renewable resources.
    - New Focus Area Example: develop advanced energy storage application analytics to enable improved definition of system performance, improved matching of product specifications and applications, and a reduction of energy storage costs.

3. **Buildings Innovations -** Creating technologies and systems that can enable zero net energy buildings, deep energy efficiency retrofits, and smart buildings − providing value and comfort to occupants and owners.
    - New Focus Area Example: advance digital solutions, wireless sensors and control technologies to enable a range of low-cost efficiency and building-grid control strategies.

4. **Transportation -** Accelerating the movement toward an efficient, low-GHG emissions transportation system - enhancing the quality of life in communities across New York.

- New Focus Area Example: develop and demonstrate technologies to reduce electric traction power consumption of the NYC electric rail transit system.

5. **Innovation Capacity & Business Development -** creating a vibrant, self-sustaining cleantech innovation ecosystem will accelerate the pace and scale of clean energy innovation in NY and make NY the place for innovation.
    - New Focus Area Example: create a corporate strategic partnership program to connect small cleantech companies with potential corporate partners/investors to increase access to capital and market channels for accelerated commercialization.

While NYSERDA will principally focus on the strategic areas above, an opportunistic element of the portfolio will be used to support other promising technologies and solutions that offer unique but similarly impactful opportunities to New York. The Innovation programs will focus on employing the following tactical approaches to support investments within the portfolio:

- Direct support for cleantech businesses and technology demonstrations (in a phased, disciplined, and leveraged approach).
- Development of entrepreneurial capacity for cleantech innovation (advancing scalable model initiatives that the private/institutional sector can ultimately sustain).
- Creation of tangible multi-use facilities and resources to address commercialization barriers and make NY the place for cleantech innovation.
- Engagement with investors and companies along the supply and value chain to facilitate commercialization partnerships.

1.4.3 NY Green Bank and NY-Sun

The NYGB and NY-Sun portfolios are on previously-established paths. Both have already received Commission authorization and launched, however are included herein as the Commission has not yet established a collection schedule to support either the authorized NY-Sun budget or the full capitalization of NYGB. Furthermore, the proposed capitalization schedule for NYGB is adjusted in this Information Supplement from what was previously petitioned in order to provide part of the required overall reduction in CEF ratepayer collections sought, while continuing to support the business and growth of NYGB. Accompanying this capitalization schedule adjustment is a request for authorization to obtain an external borrowing facility to provide the necessary liquidity and the certainty of sufficient available capital that is critical for private sector engagement.

NYGB, a division of NYSERDA, is a state-sponsored specialty finance entity working in partnership with the private sector to increase investments into New York's clean energy markets. Designed to address market barriers and financing gaps in clean energy financing markets – and to transform those markets as part of the integrated REV plan –NYGB represents an innovative business model at the forefront 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, 2013.[8]

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 NYGB's mission are partnering with private sector participants, implementing structures that overcome market barriers and address financing gaps in current clean energy financing markets, and transforming those markets by enabling greater scale, new and expanded asset classes and increased liquidity. These factors combine to motivate faster and more extensive implementation of clean energy investments within New York State, fostering greater energy choices, reduced environmental impacts and more green energy benefits per public dollar spent for all New Yorkers.

NY-Sun was established in 2012 to develop a sustainable and subsidy-free solar electric industry in New York State. NY-Sun embraces many of the strategies described above in the Market Development section. It takes a comprehensive approach to overcoming the several barriers facing consumers as they consider whether solar electric 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 solar electric 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.

NY-Sun is an early and clear example of the principles of the CEF, as it capitalizes on a market that is ready to engage, focuses on soft costs, and there is a clear, evidenced line of sight to subsidy-independence. NY-Sun will support efforts to reduce solar soft-costs, build demand, and support consumer education in order to ensure successful development of a vibrant subsidy-free solar market in New York.

1.5 Budget

NYSERDA is proposing a 10-year budget because this time frame will provide stability and a consistent signal to the marketplace that will facilitate the realization of the State's 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 initiatives, a cap on total ratepayer contributions for those initiatives, a restructuring of those initiatives 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.

This budget approach also resolves key issues identified in the petition filed by Multiple Interveners,[9] particularly concerning cash balances held by NYSERDA. This budget proposal

[8] Case 13-M-0412 Petition of New York State Energy Research and Development Authority to Provide Initial Capitalization for the New York Green Bank. *Order Establishing New York Green Bank and Providing Initial Capitalization*, issued and effective December 19, 2013.

accounts for the use of the cash balances in meeting current and future program and initiative obligations, and allows for a reduction in near-term collections for new initiatives while utilizing the cash balances to meet program expenditures. With the exception of RPS contracts that will extend until their respective expirations, the proposed budget substantially reduces the cash balances in three years.

The total program authorization requested, and the amounts anticipated to be committed by year, are detailed in Table S-1.[10]

Table S-1: Program Authorization Requests ($ millions)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Request for Program Authorization											
Market Development	$356.6	$298.2	$265.2	$256.2	$256.2	$256.2	$256.2	$256.2	$256.2	$256.2	$2,713.4
Innovation and Research	$66.4	$73.8	$73.8	$71.8	$71.8	$71.8	$71.8	$71.8	$71.8	$71.8	$716.6
2016 Main Tier Solicitation	$150.0										$150.0
Other Initiatives Included in Proposed CEF Budget											
NY-Sun[1] (including $129M in 2015)	$185.0	$148.2	$129.9	$137.4	$91.1	$67.6	$43.9	$20.7	$6.5	$1.3	$960.6
NYGB[2] (including $150M in 2015)	$30.0	$30.0	$30.0	$30.0	$30.0	$30.0	$112.9	$112.9	$112.9	$112.9	$781.5
Total	$788.0	$550.2	$498.9	$495.4	$449.1	$425.6	$484.8	$461.6	$447.4	$442.2	$5,322.1

[1] NY-Sun program authorizations were previously provided in the April 2014 Order.
[2] Total remaining capitalization is consistent with the Petition for $781.5 Million Balance of Capital filed October 30, 2014 (Case 13-M-0412). However, the annual capitalization installments have been revised and will be supplemented with a proposed external borrowing facility (see Section 10.3.1).

The estimated annual expenditures and current cash balances were used to develop the annual collections requirements needed to support this CEF program authorization, as well as to support those obligations previously incurred obligations under the existing EEPS, RPS and SBC programs that extend beyond 2015. The proposed CEF collection cap reduces ratepayer collections substantially. This collections level will provide an immediate reduction in ratepayer collections of $91.1 million from 2015 ($676.1 million) to 2016 ($585 million). NYSERDA has proposed annual collections after 2016 that decline each year. During the period 2016-2025, total NYSERDA collections would be reduced $1.5 billion.

[9] See 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, Petition of Multiple Intervenors for Expeditious Relief from Existing Surcharges, filed June 2, 2014.
[10] Program authorization is used herein to refer to the level of funding that is allocated for new activity in a given year.

The proposed collections cap for the CEF consists of both Previously Authorized Collections as well as new or "Incremental" collections. The Previously Authorized Collections and proposed Incremental Collections are depicted in Figure S-1 below, and demonstrate the relative contribution of each to Total Collections for each year.

Figure S-1: Proposed CEF Collections

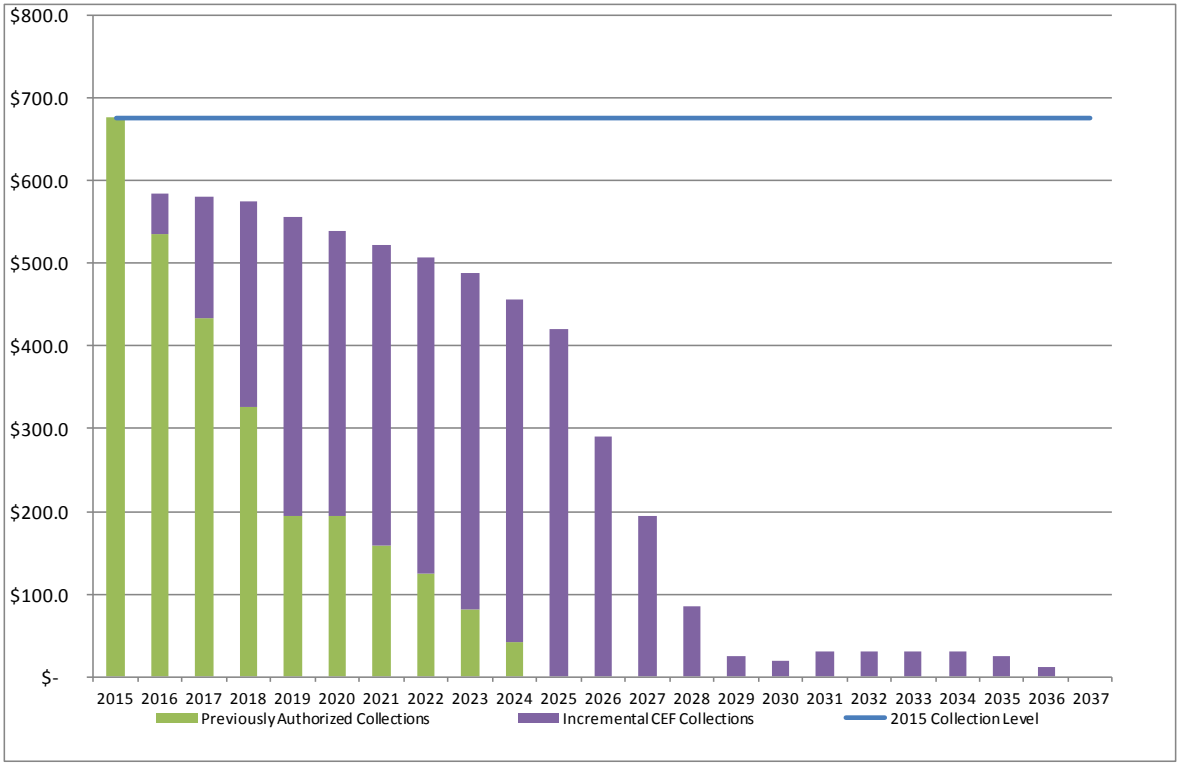
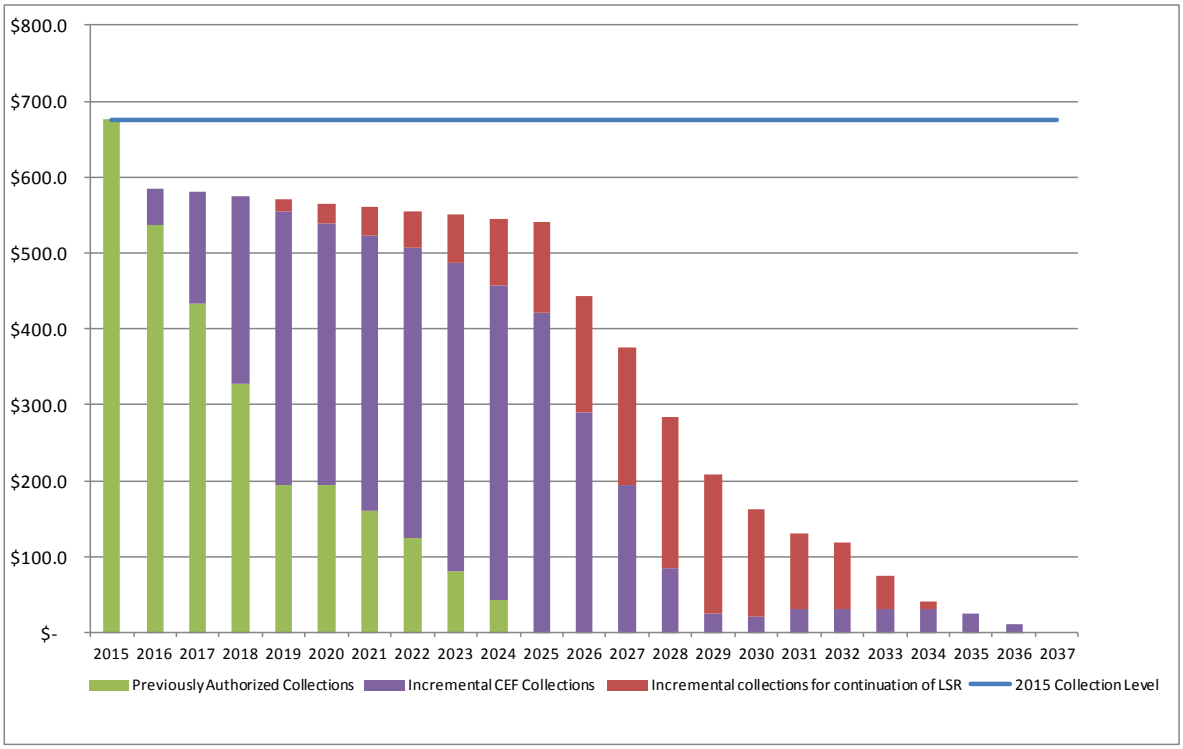


Figure S-2 demonstrates the possible impacts on total collections for additional collections to support premium costs for LSR procurements from 2017-2026, using assumptions from the base case scenario in the NYSERDA LSR options paper entitled "Large-Scale Renewable Energy Development in New York: Options and Assessment", filed on June 1, 2015 for public comment.[11] These collections are not part of this request, but are presented here so that the collections requested herein can be considered in the context of additional possible authorizations for continued support of LSR. The figure shows that NYSERDA's proposed collections plus these additional collections, if authorized, would still support an annual decrease in total collections.

[11] NYSERDA, "Large-Scale Renewable Energy Development in New York: Options and Assessment", June 1, 2015, p. 110.

Figure S-2: Proposed CEF Collections, also accounting for Large-Scale Renewables as set out in Options Paper



The CEF evolution in program strategies will manage costs to ratepayers by: engaging markets, investing to improve the underlying economics of clean energy investments, and by mobilizing private capital to further advance progress towards the public policy goals. As the CEF initiatives take hold, greater energy and environmental benefits are realized for every dollar of public funds invested. Carefully coordinated, the CEF dollars will influence greater levels of energy savings, thereby increasing the environmental benefits from the investments

1.6 Benefits

The CEF, as proposed, is structured to achieve greater impact over current NYSERDA program approaches, and is driven by long-term public policy outcomes that require increased scale of clean energy activity in New York. Through continuous management of the portfolios and real-time assessment of individual initiatives to advance identified indicators of progress, the CEF will assess and make investments that provide optimal contributions toward advancing the State's environmental and economic goals, and which result in greater impact and greater scale.

In order to be responsive and adaptable to the market and deliver the greatest impact, NYSERDA will require flexibility to adjust initiatives within the Market Development and Innovation and Research portfolios. Accordingly, NYSERDA will periodically assess the relative opportunities and potential benefits that exist within the various disciplines (efficiency, on-site generation,

renewables, research and development (R&D). This periodic assessment will be used to inform decisions to prioritize (and reprioritize) the allocation of funds within and across the two portfolios needed to capture market opportunity and deliver value.

Over the life of the CEF, NYSERDA will estimate and report on CEF portfolios' achievements using these metrics on a long-range basis. NYSERDA will establish portfolio management structures to ensure that current strategies are making adequate progress toward long-range outcomes. To ensure metrics are established transparently and meaningfully, long-range outcomes will be estimated on both a 10-year basis for the total CEF and on a three year basis. The three year basis will be the focus of annual updates to the portfolios via the Investment Plan.

Estimates for the cumulative 10-year CEF benefits are presented in Table S-2.[12] Emissions reductions, energy metrics, and bill savings are measured on a 'lifetime' basis to account for the repeating benefits that are realized year-after-year from the implementation of clean energy activity. Progress reports will reflect annual metrics achievements, indicating both incremental and cumulative achievements. Three year CEF benefits are presented in Chapter 12, both lifetime and first year cumulative achievements"

Table S-2: Estimated 10-Year CEF Lifetime Benefits

	Lifetime Benefits in Millions					
Portfolio	**MWh**	**MMBTU**	**CO2 (tons)**	**Bill Savings**	**Private Investment**	**Leverage Ratio**
Market Development	137	491	76	$ 20,412	$ 8,875	4.23
Innovation and Research	*	*	*	*	$ 3,265	5.00
NY-Sun	88	NA	28	$ 12,810	$ 9,216	9.60
NY Green Bank	*	*	*	*	$ 8,000	8.00

* Energy and other benefits for the Innovation and Research and NYGB portfolios will be measured and tracked over the 10 years of the CEF. The NYGB performance accounting will be separately identified and quantified through the NYGB procedures and business plans.

Estimates for the cumulative 10-year Market Development portfolio are presented in Table S-3.

[12] A different methodology for calculating carbon benefits has been adopted here, as compared to that reflected in the CEF Proposal filed in September. The carbon benefits are now estimated using standard factors to convert electricity, natural gas, and petroleum savings into carbon (625 lbs/MWh, 117 lbs/MMBTU, 162 lbs/MMBTU respectively). Additionally, a different methodology has been adopted to estimate bill savings, which are now based on avoided retail rates, not wholesale energy prices as used in the CEF Proposal. Additionally, bill savings estimates now include natural gas and petroleum bill savings, as compared to electric only savings reflected in the CEF Proposal.

Table S-3: Estimated 10-Year CEF Lifetime Market Development Benefits

	Lifetime Benefits in Millions					
Sector	**MWh**	**MMBTU**	**CO2 (tons)**	**Bill Savings**	**Private Investment**	**Leverage Ratio**
Low-Moderate Income	21	65	11	$3,844	$221	0.3
Residential Single Family	10	33	5	$2,003	$1,584	8.7
Residential Multifamily	7	26	4	$1,094	$359	4.9
Commercial	56	188	30	$8,264	$3,786	6.4
Industrial	28	94	15	$3,062	$1,205	4.4
Renewable Thermal	1	55	5	$83	$-	-
Codes	1	10	1	$215	$94	2.0
Products	1	19	2	$261	$862	13.2
On-Site Power	12	(0.1)	4	$1,584	$764	3.4
Total	**137**	**490**	**76**	**$20,412**	**$8,875**	**4.2**

In order to provide a comparison, benefits for the market-rate sectors of the existing NYSERDA EEPS portfolio were calculated and compared against the equivalent CEF market-rate sectors.[13] The EEPS calculation resulted in 191 trillion British thermal units (TBTU) of clean energy (including 57 million MWh), 34 million tons of GHG emissions reductions and a ratio of 4.6 for private leverage invested. By comparison, the estimated CEF achievements are 341 TBTU of clean energy (including 101 million MWh), 54 million tons of GHG emissions reductions and a ratio of 6.3 for private leverage invested. The CEF is therefore designed to achieve 79% more energy savings and 57% more GHG emissions reductions from current programs for these key sectors.

To ensure that the Commission and stakeholders are apprised of the near-term perspectives and opportunities for the Market Development and Innovation and Research portfolios, NYSERDA will submit an annual Investment Plan, which will include a rolling three year budget projection as well as an estimate of benefits based on the three year budget allocation for these components of the CEF.[14] The Investment Plan will provide detailed information of both the initiatives to be adopted and the outputs anticipated as a result of implementing those initiatives.

Milestones will be developed to allow NYSERDA to track and report whether any individual initiative is making the quality of progress on the required timeline to achieve success. Upon receiving results from near-term assessment of any initiative (known as the Test-Measure-Adjust

[13] For purposes of this comparative analysis, "market rate" program include: Single Family, Multifamily, Commercial, and Industrial. As part of the research and analysis conducted for NYSERDA's Corporate Strategy Assessment, $/MWh and $/MMBTU factors were calculated based on 2013 EEPS data. These factors were applied to the 10 year CEF budget to determine what that level of investment would generate using a historic approach.

[14] NY-Sun and NYGB will continue to file and update separate operating plans and other progress reports as required through separate Order from the Commission. As such, it is envisioned that Investment Plans will comprise the Market Development and Innovation portfolios.

process), future initiative support will then be diagnosed, and remedies to either cure initiative deficiencies (including discontinuing components or all of an initiative) or capitalize on identified opportunities, will be pursued. Initiative expectations and Test-Measure-Adjust assessments will be reported in the Investment Plan.

1.7 Evaluation, Reporting, and Transparency

The overarching objectives of NYSERDA's CEF evaluation and reporting strategy are to provide objective and credible information that supports accountability as well as optimum initiative operation and outcomes. NYSERDA will provide the tracking and monitoring necessary to assess its overall performance including reduced energy use and associated dollar savings, emission reductions, investment in clean energy and market penetration of clean energy technologies. This includes identifying the outcomes and impact associated with CEF initiatives on the broader market, as well as understanding all-inclusive changes within New York State. Evaluation will be a key tool to continually test, measure, and adjust the approaches used to engage the market under the CEF. NYSERDA will use the Test-Measure-Adjust platform to identify the effectiveness of pilots and decide whether and how to scale them up, and to continually assess the effectiveness of initiatives beyond the pilot state. The evaluation approach will combine quick-cycle feedback activities along with long term tracking and accountability. A quick feedback cycle will provide actionable recommendations to refine NYSERDA's strategy and rebalance its portfolios.

NYSERDA will publish regular reporting on CEF investments, outputs and outcomes. Evaluation studies will be made publicly available, including details on the methodology. Data sets gathered through Evaluation will also be shared with the market.

Additionally, NYSERDA will focus on establishing a market oriented approach to its initiatives, administrative procedures, and contracting to facilitate its engagement with the market. NYSERDA has already launched a concerted effort to revamp its organization, business processes, and systems to become more responsive to partners and customers, adaptable, easy to navigate, streamlined, and technology-enabled. NYSERDA will continue to advance improvements in its operations in order to expand the impact of existing programs, enable new initiatives, improve customer and partner interfaces, reduce cycle times, improve efficiency, manage risk, and reduce cost.

2 Introduction

In its May 8, 2014 Order[15] commencing the Clean Energy Fund (CEF) proceeding, the New York State Public Service Commission (PSC) noted that NYSERDA's CEF Proposal "should refocus on market and technology transformative strategies designed to provide temporary intervention and support to overcome specific barriers and produce self-sustaining results." In response, NYSERDA filed its CEF Proposal on September 23, 2014. In its Proposal, NYSERDA provided information regarding the four portfolios of activity that would constitute the CEF: Market Development; Innovation and Research; the New York Green Bank (NYGB) and the NY Sun program. In addition, the Proposal advanced both (i) budget and benefit information regarding the proposed Market Development and Innovation and Research portfolios and (ii) an initial request for Commission approval to implement these portfolios on a fuel neutral basis.[16]

Pursuant to the Notice Soliciting Comments issued by the Commission on November 6, 2014 (the "November 6 Notice"), NYSERDA files this CEF Information Supplement. In accordance with the November 6 Notice, this CEF Information Supplement is intended to both replace the CEF Proposal and provide additional information which will help stakeholders gain a greater understanding of the CEF, thereby enhancing stakeholder participation in the public comment process.

As such, this CEF Information Supplement includes material from NYSERDA's original CEF Proposal as well as supplemental information regarding proposed:

- Budgets, expenditures and collections
- Strategies, including:
    - Transition schedules away from currently authorized programs
    - New initiatives and the budgets and benefits associated with new portfolios
- Additional information on portfolio change management approaches and the process for selecting, maintaining, and assessing the performance of initiatives
- Options for the large-scale renewable (LSR) program beginning in 2016

Further, an additional request seeking PSC approval for a revised capitalization schedule, an external borrowing facility, and costs associated with administration of NYGB is included in this CEF Information Supplement.

The CEF is the next evolution of state clean energy programs and is part of a strategy to build a cleaner, more resilient, and affordable energy infrastructure for New York State.[17] The CEF is a key pillar of Governor Andrew M. Cuomo's Reforming the Energy Vision (REV) strategy, which refocuses NYSERDA's strategic priorities in the energy marketplace through the deployment of new

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[15] Case 14-M-0094 - Proceeding on Motion of the Commission to Consider a Clean Energy Fund, *Order Commencing Proceeding*, issued and effective May 8, 2014.

[16] "Fuel neutral" is used herein to describe clean energy investments that are made to realize overall public benefits without regard for specific fuel type.

[17] 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.

and redesigned programs and initiatives. While the REV Regulatory Proceeding, a complementary REV pillar, redirects the market by creating rules that facilitate and 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 a REV-enabled marketplace. These two key pillars, alongside the third - New York Power Authority's (NYPA's) 'lead by example' approach to clean energy expansion - will work together to transition to the new clean energy marketplace that REV seeks to enable.

NYSERDA has past success in delivering on its mission of advancing innovative energy solutions, primarily through its implementation of programs supported by the System Benefits Charge (SBC), including Energy Efficiency Portfolio Standard (EEPS), Renewable Portfolio Standard (RPS), and Technology and Market Development (T&MD). From 1999 through 2014, NYSERDA has achieved savings of 6,901 GWh of electricity and 12.1 MMBTU of fossil fuel energy through energy efficiency, saving New Yorkers over $7.9 billion in cumulative energy bills. For every $1 in energy efficiency investments made by NYSERDA, $3 in energy bill savings was realized by customers participating in NYSERDA's programs. [18] While these programs have achieved strong results and created a foundation upon which to build, more action and new approaches are needed to advance new long-range policy goals, as stated in the 2015 New York State Energy Plan[19] (the "2015 State Energy Plan"):

- Achieving 40% greenhouse gas (GHG) emissions reductions by 2030 in the energy sector;
- Meeting 50% of electricity demand by 2030 with renewable energy; and
- Realizing 600 TBtu of energy efficiency by 2030.

The CEF will serve as an integral component in advancing these goals. It will spur breakthroughs in clean energy technologies, achieve dramatic cost reductions, and generate new business models that will turn our public challenges into private sector opportunities, resulting in at-scale investments from the private sector in the clean energy economy, use of technology innovation to achieve energy and environmental objectives, and additional value to consumers through a range of new services and lower electricity bills.

In the CEF Order, the Commission stated its intent to ensure the continuity of delivery of the State's clean energy programs while evolving them to enhance program efficiency and aligning them with market conditions and the REV Regulatory Proceeding. The CEF Order outlines a series of issues and changes that are intended to reshape the State's clean energy programs to reflect a consistent paradigm.[20]

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[18] NYSERDA, "Operations and Accomplishments and Mission Statement and Performance Measurement Annual Report: Fiscal Year Ended March 31, 2015", June, 2015, pp. 5-6.

[19] See http://energyplan.ny.gov/.

[20] 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 that form the foundation of that paradigm include:

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

Guided by these principles, NYSERDA believes the CEF will help New York realize the modern and smart energy system envisioned under REV by driving large-scale industry transformation through enabling markets for new customer-valued products and services, which will present new business opportunities for private investment. The CEF will reframe current approaches to technology research and development, energy efficiency and distributed generation initiatives 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 (i.e., increased deployment, market activity, and impact) 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 proposed CEF initiatives will enable NYSERDA to achieve its goals for the CEF to: (i) reduce GHG emissions, (ii) accelerate growth in the State's clean energy economy through increased private investment in clean energy, (iii) increase statewide deployment of energy efficiency and renewable energy, and (iv) provide customers the opportunity for energy bill savings.

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 (or improve existing models) for delivering and financing energy services and solutions to consumers, and (2) a better informed "demand side" customer base that seeks innovative energy services and effective energy solutions, which collectively catalyze flourishing clean energy markets leading to clean energy investments at greater scale and impact.

The strategies and initiatives proposed herein were informed by multiple streams of research, analysis, and market engagement. NYSERDA conducted extensive market research to identify market segments and the potential for clean energy market applications within those segments, and undertook economic potential studies related to those applications. NYSERDA conducted individual interviews with over 200 market stakeholders, and commissioned a survey of over 2000 residential, commercial, and industrial customers. Additional information on the market research, and stakeholder participants can be found in Appendices A and B respectively. NYSERDA used the

market research to inform the Market Development portfolio, by identifying key barriers and decision points, and developing intervention concepts, and initiatives to achieve greater impact.[21] The proposed Innovation and Research portfolio was also informed by the research, which helped to identify key points in technology commercialization life cycles, and formulate potential strategic priority areas. These results were advanced to participants in the proceeding at the January 14, 2015 public CEF Forum, where stakeholders were provided an opportunity to ask clarifying questions on the information presented and offer comments and feedback for NYSERDA consideration. Additional information has also been gathered through meetings with various stakeholder interests over the last several months, including business, real estate, environmental and low-to-moderate income groups.

NYSERDA's findings from this work reveal barriers that interfere with adoption at scale of clean energy technologies, including but not limited to:

- Financial impediments, such as issues of higher cost of advanced equipment and lack of workable financing, compounded by debt aversion on the part of many customers
- Reticence to invest because of concern that the technology or the installation will not perform as promised
- Lack of prioritization or attention by customers to energy performance
- Lack of awareness of all of the benefits of superior energy performance, such as economic, health, safety, and resiliency
- Lack of solution providers that can make opaque and complex projects straightforward for the customer
- Soft costs[22] that are too high, in the absence of inexpensive, robust tools and methodologies, including clear and publicly accessible data sets
- Unrealized opportunity to take advantage of policy drivers, including municipal-level laws, building codes and regulations

The new strategies and initiatives NYSERDA describes in this CEF Information Supplement are fashioned to address these obstacles and leverage greater private investment, consistent with the intent of the REV Regulatory Proceeding.[23]

NYSERDA recognizes, in a point supported by multiple comments in NYSERDA's stakeholder engagement process, that a too abrupt evolution to new initiatives could potentially disrupt good and valuable progress being made by partners toward the State's energy goals. Accordingly, NYSERDA proposes a transition strategy in Section 6 that provides scope for adjustment. NYSERDA's transition from previous authorized programs to new initiatives will be measured,

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[21] See Appendix C for additional detail.

[22] NYSERDA defines 'soft costs' in this document as non-hardware expenses, including: customer acquisition and other business costs; system design and engineering; financing and contracting; permitting, interconnection, and inspection; installation labor; and operations and maintenance. They are generally driven by institutional, process, and market-maturity factors.

[23] Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision. *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued and effective February 25, 2015, page 76.

disciplined, and grounded in validated learning and market responses. Changes to previous authorized programs will aim to accentuate attributes that drove their success in accelerating the deployment of clean energy, but take into account advances in the regulatory framework and state of the market.

NYSERDA proposes an annual Investment Plan to provide more detailed information on the following year's initiatives to DPS staff. The annual Investment Plan will delineate anticipated initiatives, 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 continuous feedback from stakeholders, and calibrations needed in the overall portfolio for continued progress.

To provide the needed commitment to achieve clean energy market scale and 40% in GHG emissions reductions by 2030, NYSERDA recommends a 10-year commitment and budget for the CEF. NYSERDA further describes this 10-year funding proposal in Section 12. To demonstrate interim progress on CEF initiatives, in addition to regular, periodic reporting of progress, NYSERDA recommends a formal three year review cycle. NYSERDA will deploy initiatives in a "test, measure, adjust" approach that offers the flexibility to enter a market where gaps may exist, and pull out when the market is able to operate on its own.

This Information Supplement also provides additional information on the anticipated benefits of the CEF. The benefit assessment focuses on the Market Development portfolio; additional benefits are anticipated for the Innovation and Research portfolio, however they are highly dependent on the projects supported and therefore difficult to accurately estimate.

It is critical to acknowledge that the Market Development portfolio is still in formative stages and the benefits presented are not necessarily reflective of all market engagements that the CEF will support over the proposed 10-year authorization period. Benefits calculated measure only the impacts of early stage initiatives and it is envisioned that future initiatives will be designed to have increasingly greater impact, as the market matures over the life of the CEF. This will be possible due to increased use of data analytics as those systems are developed, a better understanding of scaled market dynamics, continuous market research, and continuous engagement with stakeholders and market participants.

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 electric. It makes available the remaining capital to fund 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 the REV Regulatory Proceeding, 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 REV – 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.

3 Background

New York's traditional regulatory and programmatic approaches to energy policy do not fully capitalize on 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.

3.1 Today's Challenges

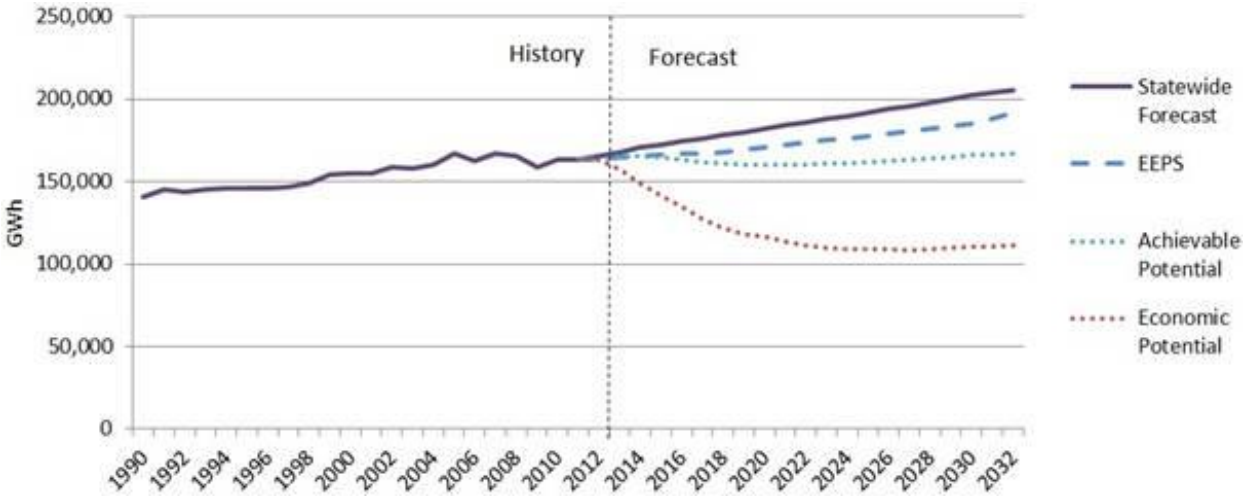
3.1.1 GHG Emissions

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.[24] 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.[25] 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 (in GWh) investments that are both economically and environmentally advantageous. In order to better capitalize on that untapped potential energy savings, new strategies and initiatives are required to address market barriers.

[24] See New York State Greenhouse Gas Inventory and Forecast, p S-2 (http://www.nyserda.ny.gov/-/media/Files/EDPPP/Energy-Prices/Energy-Statistics/greenhouse-gas-inventory.pdf)

[25] 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)

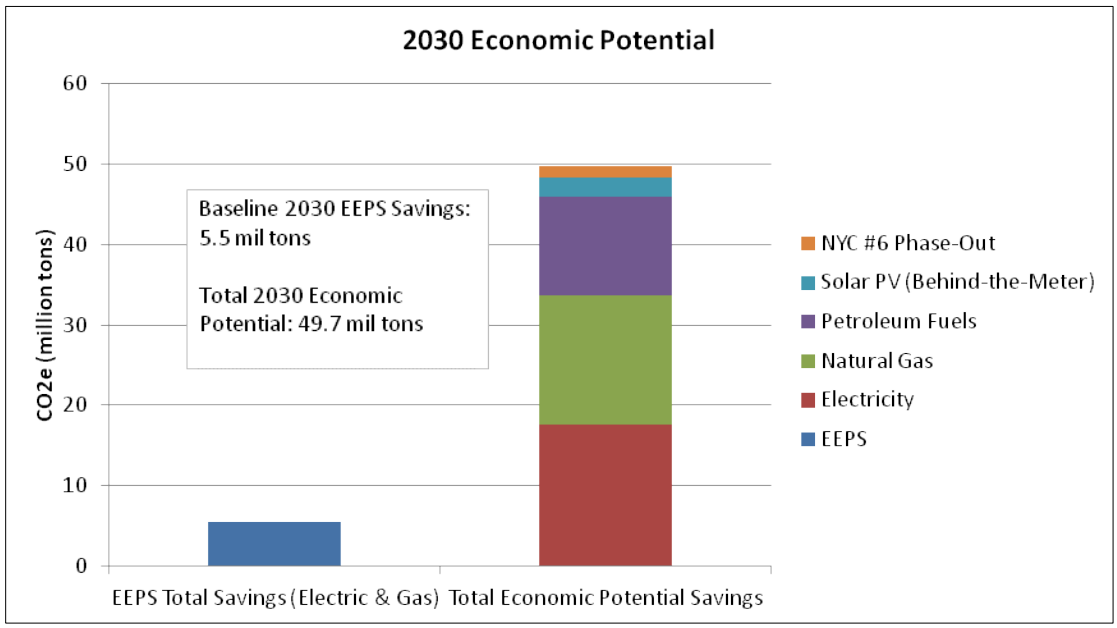
Figure 1: Forecast of business as usual vs. alternative strategies and potential, in potential Gigwatt hour (GWh) savings



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 as illustrated in Figure 2. 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.[26]

[26] GWh values in Figure 1 represent consumption values, and the statewide forecast represents the baseline case without EEPS. Economic Potential represents the level of total energy savings that could occur with adoption of all cost effective technologies in the absence of market barriers. Technologies are defined as cost-effective if the present value of the benefits exceeds the present value of the costs over the technology's useful life. Achievable Potential is a subset of the economic potential, and represents the energy savings that are possible in the context of current market barriers and today's best-in-class programs to overcome them (i.e. current marketing, technical assistance, and financing approaches). This level of energy savings could be surpassed if new and innovative policies can be developed to overcome these market barriers.

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 13.5 million tons of carbon dioxide equivalent.[27] However, significant operational, regulatory and market issues and constraints must be addressed for this potential to be achieved.

3.1.2 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 Regulatory Proceeding and other State resiliency efforts to promote clean, distributed energy resources that strengthen the grid and improve reliability for all New Yorkers.

3.1.3 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

[27] 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).

industrial. Transmission and distribution costs are a primary driver - costs that are necessary to maintain reliability given the State's aging infrastructure, and build resiliency to better withstand 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 in light of the need for increased infrastructure investment.

3.1.4 Coordination with United States Environmental Protection Agency 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 been significantly reduced since the onset of the program.

Pursuant to its authority in Section 111(d) of the Clean Air Act, the United States Environmental Protection Agency (EPA) issued Proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units ("Clean Power Plan"), which would establish carbon dioxide (CO_2) 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. New York has submitted comments to EPA regarding the proposed rulemaking. EPA currently estimates that a final rule will be released mid-summer 2015.

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 initiatives 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, as well as initiatives 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).

3.2 Innovation on the Sidelines

In the past two decades our society has seen an explosion of innovation, primarily enabled by information technology. While in some instances new products and services are working their way into the energy system, innovation remains largely on the sidelines in the energy industry. The reasons for this are manifold, ranging from inadequate upside potential in the regulated utility industry (something REV regulatory reform is trying to address); inability of private entities to capture the value of the investment due to long and uncertain development times and/or complicated customer value propositions (e.g., energy storage systems); and barriers to product adoption resulting in uncertain and potentially limited revenue (e.g., building technology). To add to this, public funding nationally for R&D has vacillated significantly over the years, creating more uncertainty in what could otherwise be risk-sharing public-private investments to stimulate innovation.

At this same time, innovation is desperately needed to address the challenges before us ranging from an aging energy infrastructure, an urgent need to de-carbonize our energy system, increasingly challenging weather events stressing our systems resiliency, and persistently high electricity costs.

Technology innovation offers the potential of improved functionality, economics, and value; however this potential remains incompletely due to the slow pace of adoption. Delays in market scaling lead to delays in innovative technologies reaching the market, and delays in adoption mean delays in the realization of benefits. Many of the barriers to the adoption of innovative clean energy technologies are the same barriers that impede uptake of innovative clean energy solutions more broadly: high soft costs, uncertain value capture, and low demand.

For example, while battery and energy systems are coming down in cost, these technologies are struggling to penetrate the market. In order to realize the full benefits of batteries (improved system efficiency, greater use of renewables, improved resiliency etc.), both hard and soft costs will need to be reduced, and individual customer and system benefits will need to be monetized to enable value capture. Market structures and price signals will need to reflect this value. These barriers not only prevent penetration of currently available energy storage solutions, they also impede private investment in development of new and improved battery technology (including new chemistries, new materials, new packaging).

The combined heat and power (CHP) marketplace provides another illustrative example. Adoption of CHP has been hindered by uncertainty in performance and unpredictable and sometimes lengthy permitting and installation processes, all of this creates high soft costs including difficulty in acquiring customers. While New York has made great progress in partnering with the private sector to develop modular/packaged CHP appliances, the CHP purchase and installation process will need to be streamlined further if this technology is to achieve its full market potential and the associated efficiency and resiliency benefits.

The new CEF focus will address these barriers to clean energy adoption and innovation and will share the risk of advancing new and improved clean energy solutions. Combined with the other

elements of REV, these portfolios will make New York the place for energy innovation for many years to come.

3.3 Shift to Market Transformation

The CEF strategies and initiatives are best understood when assessed alongside other state energy policies and initiatives. The CEF will serve as an integral part of the much larger REV policy framework that includes the REV Regulatory Proceeding, 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 initiatives 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, the REV Regulatory Proceeding will create the platform for an expanded clean energy market, open to a diverse array of market actors, including utilities, Energy Service Companies (ESCOs), governments, non-profit institutions, and customers. The REV Regulatory Proceeding 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 is designed to complement other pillars of the State's energy agenda, including the REV Regulatory Proceeding, and Energy Highway and "lead by example" initiatives advanced by NYPA. It aims to 1) lay the groundwork for clean energy developments flowing from the PSC's REV Regulatory Proceeding and from the evolution of utility strategies; and 2) to supplement those developments in sectors where they do not reach with environmentally and economically valuable clean energy solutions. The CEF will target the "upstream" supply chain, ensuring that the market is ready to provide the products and services that an animated consumer market will be demanding as a result of REV. Through the CEF, NYSERDA will also act as a market-enabler and stimulator, facilitating aggregation 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-moderate income (LMI) communities. This will be done in closer coordination with the utilities, whom have also been directed by the PSC to develop initiatives that serve the goal of increasing market penetration of clean energy and catalyzing a "mature, well functioning, and self-sustaining clean energy market."[28] NYSERDA will engage with the utilities, NYPA, and LIPA as planning and implementation partners, ensuring resources are used efficiently across all parties and the most synergistic outcomes are from the market are harnessed. Partner efforts will include collaboration on transitions, joint strategy planning, strategy execution and co-investing, and sharing market

[28] Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision. *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued and effective February 25, 2015, page 78.

insights and best practices to inform initiative and strategy planning. Specific partnership opportunities are:

- REV induced activities that foster co-development, pilots, or testing new initiatives;
- Consumer outreach, education and marketing; and
- Quality control and performance standards of industry actors to further industry consistency.

NYSERDA proposes four main portfolios of activity within the CEF: Market Development, Innovation and Research, NYGB and NY-Sun. This document focuses on the new strategies and proposed initiatives for the Market Development and Innovation and Research portfolios. NYGB and NY-Sun are not discussed at length as they have already been authorized and launched.

The CEF's will aggregate and build markets for participation in the REV regulatory construct. The CEF will help to stimulate demand for clean energy technologies and support the private sector actors that are crucial to the effective operation of animated distributed system platform (DSP) markets.[29] While it is expected that under the REV environment utilities will need to address the very specific system needs of their respective service territories through investments oriented towards individual projects, the CEF will have many initiatives that work across utility service territories to build broader markets and advance greater scalability in the transition to more market based approaches, as envisioned under REV.[30]

NYPA programs will support REV and complement the CEF, reaching 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 to enable the private sector to learn the benefits of clean energy and begin to identify opportunities for their own homes and businesses. Further, NYPA will lead an additional $22.5 million research and development initiative to advance bulk system infrastructure improvements, complementing NYSERDA's behind the meter technology applications and 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.

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[29] Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision. *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued and effective February 25, 2015, page 12.

[30] Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision. *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued and effective February 25, 2015, page 75.

3.3.1 Before and After

The CEF offers the opportunity for programmatic changes that will 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 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**. Initiatives designed to create self-sustaining industries.
Program Silos. Designed around specific technologies with little interaction between them.	**Customer-Driven**. Purposeful initiatives 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 2: Before and After Technology and Business Innovation

Before	After
Technology Focus. Focused primarily on technology performance.	**Path-to-Market Focus**. Integrated focus on technology, business development and commercialization.
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.

Table 3: Before and After NY Green Bank

	Before NYGB	After NYGB
Clean Energy Markets	**Many Projects Not Readily Financeable**. 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 barriers and gaps with an emphasis on scale and ability to replicate. As such, 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, lesser deployed scale, 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.
Asset Classes & Liquidity	**Existing Slate of Investment Opportunities Precludes Participation by Some Private Capital Sources and End Users.** Asset classes reflect commercial market focus on utility-scale and/or high FICO residential roofing or other investment grade clean energy projects, limiting new investor types interested in exposure to distributed generation and efficiency assets. Concentration on highest credits hampers access to clean energy solutions for large proportion of NYS end users.	**New Types of Investments and New Investors Materially Increase Private Investment in NYS Clean Energy Sector.** NYGB and its clients and partners effectively drive the creation of new opportunities to invest and attract new sources of capital. This supports material expansion of clean energy financing markets in NYS through structured transactions involving less understood counterparty credits, bringing new players into transactions, creating structures allowing for aggregation of creditworthy projects into portfolios supporting resale and/or securitization (including standardization).

	Before NYGB	After NYGB
Efficient Use of Public Dollars to Address Financing Gaps	**Focus on Government-Driven Grants & Subsidies.** Public monies may be deployed as one-time grants or subsidies through pre-determined programs, without addressing specific market barriers and financing gaps through a holistic, systematic approach.	**Transition to Market-Based Investments and Multiple Deployments for Each Dollar.** NYGB seeks to achieve 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.

Table 4: 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.

4 Goals

As the Commission considers the CEF, the critical focus must be on long-term outcomes, including primarily GHG emissions reductions and increased private investment in New York's clean energy industry. Outcomes serve as long-term goals to attain, and initiatives 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 (i.e. 80 by 50) for the achievement of near-term program outputs (i.e., first year energy savings). Inherent in a focus on outcomes is the need for flexibility. Absent flexibility, programs and initiatives will not be able to adapt to market conditions as they emerge. Flexibility allows programs and initiatives to adjust the allocation of resources in response to evidence and assessments on the ability to achieve the outputs (or metrics) that have been estimated for that initiative.

The CEF must also be considered in the context of State energy policy and goals. In order to assure accountability, the CEF will develop defined initiatives and target metrics in its Investment Plan. The CEF will measure its progress on those metrics, make appropriate adjustments as the effectiveness of each initiative 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. The 2015 State Energy Plan identified three long-term goals for clean energy achievements by 2030, including reduction of GHG emissions by 40% from 1990 levels, renewable energy providing 50% of electricity generated for consumption, and 600 TBtu of increased energy efficiency throughout the State's economy. To this end, NYSERDA will track the contribution of the CEF toward the 2015 State Energy Plan energy and environmental goals:

- Total GHG emissions reductions, as measured in tons of CO2e reduced;
- Affordability, as measured by reductions in customer energy bills;
- Statewide penetration and scale of energy efficiency and clean energy, measured by the total increase in energy efficiency savings and renewable energy generation (MW, MWh, and MMBTU); and
- Growth in the State's clean energy economy, as measured by total public and private investment in clean energy technologies and solutions.

As initiatives are developed in future Investment Plans, outputs associated with the impacts anticipated for individual initiatives will be defined and refined. These output metrics will provide near-term benchmarks for initiative progress and success, and serve as milestones or indicators for needed initiative adjustments and/or new directions. A more dynamic and responsive design for initiative evaluation (see the "Test-Measure-Adjust" discussion in Section 9) will be used to demonstrate how the initiatives are responsive to market conditions, and how the use of metrics in that dynamic initiative evaluation will inform future initiative design.

5 Portfolios and Proposed Initiatives

NYSERDA proposes four main portfolios of activity within the CEF: Market Development, Innovation and Research, 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 NYSERDA activities in support of LSR (beyond and outside of the potential LSR funding options described in the Large-Scale Renewables Options Paper[31]). The Innovation and Research portfolio will include activities such as technology research and development, commercialization of new technologies and innovative business models, and support for emerging businesses developing clean energy products and services in New York State.

NYSERDA's new approach to market development 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. A core premise for the CEF is the recognition that, in the absence of a fully functioning market, strategies are needed to spur solutions and innovations that accelerate the transition to market-based mechanisms. NYSERDA's new approach recognizes different clean energy solutions face different barriers. For some clean energy technologies, high hard costs (e.g. manufacturing and equipment costs) lead to poor economics that dampen demand. For other clean energy technologies, high soft costs (e.g. customer acquisition, installation, and financing costs) stand in the way of greater scale. Many other solutions are cost-competitive today, yet remain under-deployed. This implies that the main barrier to increased penetration of clean energy may not be wholly financial, and indicates that direct grants and incentives may not always be the most effective means to spur adoption.

The Market Development portfolio will aim to address the diverse barriers to clean energy deployment. Bridge incentives will be deployed alongside new techniques that spur self-sustaining clean energy markets and seek to mobilize capital to create the greatest opportunity for market penetration of energy efficiency and distributed generation.

Additionally, NYSERDA will adopt a new approach to initiative design and implementation. Current programs are generally implemented through a highly prescriptive and unchanging approach to incentives and market engagement. This approach has been successful in moving individual projects through the programs, buying down the costs of individual projects, and tracking and monitoring individual projects for their energy results. As NYSERDA transitions to new roles with different market engagements, its portfolio management approach will need to evolve to a more dynamic model – "Test-Measure-Adjust" approach – so that funds can be deployed to the most promising and impactful initiatives. New models will be specifically designed to support initiatives in each of the Market Development and Innovation and Research portfolios.

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[31] NYSERDA, "Large-Scale Renewable Energy Deployment in New York: Options and Assessment," June 1, 2015. http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={26BD68A2-48DA-4FE2-87B1-687BEC1C629D}.

For the Innovation and Research portfolio, a shift to incorporate 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 coming REV distributed service providers (DSPs).

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 Innovation and Research "stall point" assessment approach to initiative 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 in response to evolving circumstances and market conditions. Accordingly, NYSERDA will periodically assess the relative opportunities and potential benefits that exist within the various disciplines (efficiency, on-site generation, renewables, R&D). This periodic assessment will be used to inform decisions to prioritize (and reprioritize) the allocation of funds within and across the two portfolios needed to capture market opportunity and deliver value.

Besides Market Development and Innovation and Research, CEF includes NYGB and NY-Sun. NYGB and NY-Sun are on previously established, independent, yet related paths as compared to the remaining portfolios. The establishment of 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 NYGB at $1 billion.[32] A program authorization request to capitalize the remaining NYGB funding was filed in October 2014; this request is modified in Section 10 of this filing. 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.[33] These amounts are reflected in the CEF budget described in Section 12.

[32] 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).

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

6 Market Development Initiatives and Evolution of Previously Authorized Programs

NYSERDA has had considerable success in delivering on its mission of advancing innovative energy solutions in New York. Looking forward however, NYSERDA 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. In the CEF, NYSERDA will help to catalyze market-based solutions that customers want and value. This will require working closely and effectively with market actors and other entities, enabling them to develop effective and self-sustaining solutions that ultimately will not require continued government intervention or utility ratepayer support.

A core premise of the CEF is the recognition that, in the absence of a fully functioning market, strategies are needed to spur solutions and innovations that accelerate the transition to market-based mechanisms. NYSERDA's new approach recognizes that different clean energy solutions face different barriers. For some clean energy technologies, high hard costs (e.g., manufacturing and equipment costs) lead to poor economics that dampen demand. For other clean energy technologies, high soft costs (e.g., customer acquisition, permitting, and financing costs) stand in the way of greater scale. Many other solutions are cost-competitive today, yet remain under-deployed. This implies that the main barrier to increased penetration of clean energy may not be wholly financial, and indicates that direct grants and incentives may not always be the most effective means to spur adoption when solely aimed at overcoming financial barriers. Non-monetary barriers can include, but are not limited to:

- Burdensome permitting and local approval processes;
- Limited and uneven consumer awareness;
- Lack of trust in technology performance by customers and financial institutions;
- Inertia, capacity and implementation constraints; and
- Limited access to financing.

These barriers are unresolved, receive insufficient focus from other market actors, increase soft costs, impeded self sustaining markets, and are high-potential opportunities to accelerate adoption if resolved. The Market Development portfolio will aim to address the diverse barriers to clean energy deployment. Bridge incentives will be deployed alongside new techniques that spur self-sustaining clean energy markets and seek to mobilize capital to create the greatest opportunity for market penetration of energy efficiency and distributed generation. Fundamentally, the initiatives described in the Market Development portfolio employ the following strategies to reduce soft costs and other non-monetary barriers.

1. **Provide information, data, and education** for customers and service providers to raise awareness and demand, reduce customer acquisition costs, train clean energy workforces, and improve customer confidence.
    - New Initiative Example: Online platform for the dissemination of residential energy efficiency project data as a device to foster education, consumer confidence and investment opportunity designed to increase participation in clean energy activities.

2. **Offer technical assistance**, and provide **standardized and simple, robust tools** for clean energy partners, including service providers, contractors, and energy-decision makers such as code officials and local government leaders to lower soft costs and address implementation constraints.
    - New Initiative Example: Provision of model renewable energy permitting templates or policy ordinances for municipalities across the state.

3. **Provide quality assurance** for proposed clean energy solutions and deliver performance validation, monitoring, and verification of new clean energy technologies to improve customer confidence.
    - New Initiative Example: Certification of products and services in the commercial energy efficiency space.

4. **Pilot, demonstrate, and replicate** new technologies and business models to advance innovative, scalable, and cost-effective solutions.
    - New Initiative Example: Partner with large commercial portfolio owners and receptive tenants, service providers, industry trade and research associations, and governmental organizations to pilot standardized tenant energy efficiency packages.

5. **Enable aggregation** of different customer types (e.g. residences, municipalities, businesses, real estate portfolios) to reduce costs through economies of scale and leverage peer pressure to break through inertia.
    - New Initiative Example: Build market demand for deep-energy retrofits by aggregating similar buildings in New York's affordable housing stock.[34]

To aid in the design and development of these new strategies, NYSERDA has partnered with experts in behavioral science. Building off of behavioral science research and running controlled experiments will help NYSERDA ensure it targets the right market gaps with the right interventions to deliver the greatest impact.

Taken together, CEF and the REV regulatory proceeding will position the state and utilities to drive the maximum level of clean energy penetration while lowering costs to ratepayers. Added to this, NYGB will address market barriers and financing gaps and provide new lending products that

[34] Deep energy retrofits are defined here as substantially renovated buildings with total annual energy use and costs at least 40% less than an identical building built to code.

should ease consumer decision-making. It is anticipated that the combination of these market development strategies, focused on sub-sectors with the highest clean energy potential, will accelerate the desired market scale for the entire CEF.

Understanding its activities may not be sufficient to address all market barriers, NYSERDA will also be guided by the following additional considerations to ensure it maximizes all of the tools at its disposal:

- Prioritizing market segments, end-uses, and approaches with the greatest potential to unlock energy efficiency and distributed generation/renewable energy adoption;
- Directing interventions at evidence-based barriers to adoption;
- Building on the progress of those in the market that are accelerating the adoption of clean energy;
- Scaling investments in initiatives only once there is evidence that the investment will yield measurable impact and benefit;
- Targeting new interventions at high-potential events and decision points in making clean energy investments) in order to more easily incorporate and embed energy efficiency and distributed generation/renewable energy into ongoing capital planning processes and ownership events; and
- Continuously test, measure, adjust.

NYSERDA anticipates evolving its portfolio of strategies and initiatives as technology and business innovation advances novel solutions, as strategies succeed and NYSERDA can step back, or as strategies require review and redesign. Accordingly, NYSERDA will give priority to opportunities where targeted interventions meaningfully accelerate traction already being made by partners and solutions in order to best progress naturally occurring adoption and to prepare the ground for REV.

Outlined in the sub-sections below are the summaries of specific barriers and decision points that would unlock the most potential, along with proposed initiatives for the sectors. Further details on the barriers and decision points can be found in Appendix C.

Evolution of Previously Authorized Programs

In response to stakeholder feedback (both in written comments and at the CEF forum) which identified the need for sufficient time for the market to adapt to the upcoming changes, NYSERDA is planning a multi-year transition from previous authorized programs to new initiatives. The transition will be measured, disciplined, and grounded in validated learning. Changes to previous authorized programs will aim to accentuate attributes that drove their success in accelerating the deployment of clean energy, but take into account advances in the regulatory framework and state of the market. The transition approach for the CEF aims to deploy as many resources as possible to initiatives that are likely to yield the greatest impact and accelerate the work of partners, whether through previous authorized programs or new initiatives. A high-level description of the proposed changes to the previous authorized programs are provided in Sector-based (i.e., Commercial, Industrial, Agriculture, etc.) sections that follow.

NYSERDA anticipates a continued role for incentives as part of the CEF to aid in an orderly and smooth transition while new solutions anticipated under REV, as well as new initiatives being designed and launched under the CEF, begin to take hold. The role of incentives will continue as an important element within the Market Development portfolio to provide a bridge to self-sustaining markets. NYSERDA will monitor the use of incentives to ensure that barriers are being addressed constructively and strategically, and will adjust the incentives as needed in a market-responsive and performance driven manner.

As part of the transition to the CEF, and in support of the evolution of utility initiatives under REV, NYSERDA will seek to work with utilities and DPS to eliminate overlaps and competing offers in the market, minimize market disruption through an organized, timely and smooth ramp down of previous authorized programs, and through evolution of NYSERDA initiatives as emergent utility programs launch.

To optimize the use of limited ratepayer funding proposed to transitioning programs, NYSERDA will make adjustments to incentive levels, the mix of eligible measures, incentive caps for technologies and strategies, as well as adjustment to open enrollment programmatic approaches. These details will be described in the Investment Plan expected to be submitted following a Commission Order on this CEF Information Supplement.

A complete picture and summary, including timing elements, for all new initiatives as well as existing program transitions can be found in Appendix G.

6.1 Commercial

NYSERDA's market research reveals that cooling, lighting, and water heating are the opportunities within the commercial sector with the highest economic energy efficiency potential. The primary barriers identified in realizing that potential include: (1) concerns that the primary objectives of commercial building managers (occupancy, sales, tenant satisfaction and comfort, aesthetics, etc) will suffer as a result of energy efficiency and distributed generation adoption, (2) within tenant spaces, limited awareness that energy improvements can be feasible, economic, and valuable, (3) disinclination to take on complicated projects with insufficient confidence in projected savings, (4) inertia and lack of awareness of potential value of energy efficiency and distributed generation, (4) lack of attractive service offerings that are easy to say "yes" to, often as suppliers lack scale and a ready market for which to develop more compelling offerings, (6) commercial leasing rates not properly accounting for improved economics, and (7) cost and finance sensitivity.

Further, NYSERDA's market research reveals that key consumer decision points that can represent the greatest opportunities to intervene to overcome these barriers include 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.

NYSERDA's Commercial sector behind-the-meter market development activities will focus on the following strategies, many of which are common to the CEF's overall approach:

- Strengthening clean energy partners with technical assistance in the form of standardized practices, tools, and methods
- Piloting and demonstrating the efficacy of these new tools and potential business model use cases
- Raising awareness through the promotion of said tools and methods as well as targeted outreach to building owners and other market actors
- Investing in quality assurance through certification processes and vetting of service providers
- Aggregation of project portfolios and identification of opportunities to spur replication and scale

Under the CEF, Commercial initiatives will also use investments and incentives to mitigate the upfront risk of developing projects utilizing promising but less proven technologies, as a tool to assist with targeted penetration in the mid-market, and to incent owners to invest in deeper savings with longer paybacks. The current Flex-Tech technical studies, Emerging Technology/Accelerated Commercialization (ETAC) pilots and Business Partners programs will be integrated with the Existing Facilities Program to address this sector.

More details on specific initiatives and approaches that fall under these Commercial market-development strategies are enumerated below.

6.1.1 New Initiatives

From 2016-2018, NYSERDA intends to explore the following specific initiatives:

- Real Time Energy Management
- Standard Tools and Resources Development (e.g. standard energy efficiency packages, remote auditing tools, project pay-back and cost benefit analysis tools, and combined purchasing packages)
- Soft Cost Reduction Efforts including facilitation of data sharing, customer demand, and skills development
- Targeting information and awareness efforts, e.g. around expanding performance contracting models
- Commercial Real Estate Tenant Efficiency Initiatives
- Aggregation and Replication Strategies in opportune Commercial sectors, including the retail sector and higher education
- Financing

Additional detail is provided on these proposed initiatives below. Information on the cumulative benefits of these initiatives is presented in Section 12.

Real Time Energy Management (RTEM)

RTEM uses comprehensive data monitoring and metering analytics to identify where, when, and how energy is being used in a building. This enables energy efficiency by providing data and recommendations to inform and verify building optimization and behavioral adjustments, as well as guide future capital investments. RTEM has the potential to reduce energy usage by 5 - 15%. The intelligence of the installed equipment controls and provided level of maintenance of the building have a significant impact on the achievability and persistence of savings.

NYSERDA will initially partner with large portfolio owners in key building segments (for example; commercial real estate, medical centers, and colleges/universities), service providers, industry trade and research associations, and governmental organizations to bring together the RTEM market actors with the market segments with the greatest potential.

NYSERDA will develop and conduct a set of replicable pilot studies of key building types in 2016-2018. In addition to the direct technical and financial support provided to the participants, NYSERDA will acquire building data for analysis and conduct exhaustive measurement and verification (M&V) and persistence studies to provide both deep insights into the technical/operational underpinnings of RTEM and to develop credible models and case studies to support a clear value proposition for owners of similar buildings.

Incentives will be used to buy down the soft costs associated with developing building specific RTEM solutions and to support the persistence of savings through ongoing technical services to support the training and development of building operations, planning & maintenance staff. After the initial three years of activity, the role of incentives will continue as needed to support market expansion and entry into new market segments.

During the initial years, NYSERDA will, in coordination with NYPA, identify qualified service providers of RTEM and attract key players to the NY market. NYSERDA will engage in pertinent trade associations and with key market actors to support the standardization of data/information, credentials/certifications and project development/modeling to drive down soft costs and support market confidence.

In addition, NYSERDA proposes to accelerate market adoption of RTEM by:

- Mapping and sharing the universe of qualified service providers, such as current RTEM service providers and market actors looking to enter the market (ESCOs and energy software providers)
- Publishing the results of the pilots including technical data and case studies, identifying and share best practices from all relevant sources NY state and elsewhere
- Develop and support data analytics training for facility operators and managers, to educate building staff on how to use the data collected from the RTEM system to identify operational stray, allowing them to identify specific solutions to ensure continuous energy savings, and to track the results;

- Develop an advisory panel of national and regional experts in the fields of RTEM/continuous commissioning technologies
- Promote RTEM with sector-specific industry associations
- Coordinate with related utility activities in this area under REV

Standard Tools and Resources Development

Energy Efficiency Packages

Utilities already serve some of these customers with their direct install programs. NYSERDA will leverage knowledge gained from these programs and existing NYSERDA project data to develop optimized sets of measures or "packages" for the most common and promising building types. Packages would vary based on type and age of buildings along with typical energy use in high potential and somewhat homogenous market segments such as restaurants, regional chain stores, and mid/small commercial office buildings.

Promotion of these standardized packages with predictable benefits by NYSERDA would make it easier for contractors to market efficiency services and reduce sales times as well as simplify the decisions that need to be weighed by an end user considering energy efficiency investment. This would build market confidence, reduce customer acquisition costs, and drive scale.

NYSERDA will partner with utilities, energy service providers, and industry trade and research associations to develop these standard packages.

NYSERDA will develop and conduct a set of replicable pilot studies of key building types and market segments in 2016-2018. In addition to the direct technical and financial support provided to the participants, NYSERDA will acquire building data for analysis and conduct exhaustive M&V studies to provide deep insights into package design and performance and then produce case studies and share detailed data with the industry to support their wide spread adoption. In addition, NYSERDA would test the market appeal of standard packages and assess whether this approach credibly delivers high performance efficiency solutions at a lower aggregate cost.

Incentives will be used to buy down the costs associated with developing standard packages and to ensure a sufficient sample size in each of the targeted building types and market segments. After the packages are developed, the role of incentives would be focused upstream to encourage aggregation and other approaches to achieve scale and support market expansion.

In addition to these standard packages, and in recognition that many of the midsized and smaller commercial customers receive little attention from the ESCO community, NYSERDA will develop several soft cost reduction tools and methods to simplify and quantify the benefits and payback of energy efficiency projects and shrink the time and cost of getting to an investment decision.

Remote Auditing and Related Information Assets

Using online tools to collect readily available building and energy usage data and screen buildings for energy efficiency potential is an area of active exploration for both NYSERDA and utilities. Once initial data is collected, buildings with promising opportunities are then subjected to additional

data collection and potential analysis. This approach has promise in both finding the greatest energy efficiency potential and lowering both customer acquisition and project development costs.

Promotion of remote auditing tools by NYSERDA in combination with access to energy consumption data and existing building data bases would provide opportunities for both assessing market potential and developing focused market outreach, leading to greater market uptake. NYSERDA will partner with utilities, technical experts, energy service providers, and industry trade and research associations as well as governmental organizations to develop and then expand the reach of remote auditing.

In conjunction with firms with promising remote auditing capabilities, NYSERDA will develop and conduct a set of replicable pilot studies of key building types and market segments in 2016-2018. NYSERDA will acquire models/algorithms as well as building data for analysis and then produce case studies and share detailed data with the industry to support their wide spread adoption. In addition, NYSERDA would assess whether this approach credibly delivers high performance efficiency solutions at a lower aggregate cost.

Incentives will be used to buy down the costs associated with developing remote auditing tools and to ensure a sufficient sample size in each of the targeted building types and market segments. Incentives may then be re-directed toward other market-development initiatives in the Commercial sector, for instance toward aggregation of commercial customers interested in taking advantage of this tool. NYSERDA will support the standardization of data associated with remote auditing and develop approaches to vet software, vendors and build confidence in credible tools and approaches.

Energy Efficiency Payback and Co-Benefits Analysis

The assessment of the direct, operating expense, and indirect economic benefits of energy efficiency investments such as productivity can be difficult to quantify. NYSERDA will develop interactive financial payback calculators for the most common energy efficiency measures, packages and building types. NYSERDA will explore the capability to include non-energy and core-business benefits to support a complete cost benefit analysis to guide investment decisions.

Approaches to support this would include sponsoring a tool development competition, sharing NYSERDA's project data to develop and test algorithms and dissemination of the tools that show promise. NYSERDA will also pursue targeted pilots to support the adoption of tools and support research to monetize the benefits that are more difficult to quantify, but could leverage investment decisions, such as health and productivity benefits.

NYSERDA will partner with financial and technical experts, energy service providers, and industry trade and research associations to develop and then expand the use of energy efficiency benefit calculators.

NYSERDA would sponsor a tool development competition in 2016-2017. NYSERDA will share existing project data sets and other information assets useful in testing models/algorithms. NYSERDA would then acquire and share the models/algorithms as well as building data for analysis and then produce case studies and share detailed data with the industry to support their wide spread adoption.

Combined Service and Energy Purchase Packages

Energy Service Companies providing energy commodities to customers have the unique opportunity to leverage the economic opportunities in use patterns and load shapes in the development of combined energy commodity and energy efficiency packages. Integrating energy services and commodity sales has the potential to decrease acquisition costs.

NYSERDA will partner with utilities, energy service providers, and industry trade and research associations as well as DPS to develop and then expand the availability of integrated packages as a resource for this market.

NYSERDA will also pilot new and underutilized business models that demonstrate market value and help customers understand the relative value and optimal use of these integrated offerings. In addition, NYSERDA will research existing aggregated commodity models (e.g. those introduced by Erie County and the New York State Office of General Services) to evaluate the opportunity to utilize these frameworks for the implementation of aggregated energy service models under the CEF.

NYSERDA will develop case studies to promote promising and successful models and approaches.

Financing Standards, Tools, and Protocols

Starting in 2016, NYSERDA proposes to develop commercial financing strategies that will empower customers to invest in clean energy projects via market-rate, long-term self-sustaining financing solutions. These strategies will include efforts to support standards, such as the Environmental Defense Fund's Investor Confidence Project (ICP) Energy Performance Protocols.[35] These protocols are an amalgam of industry best practices, existing standards, and documentation that has been developed in order to create the data necessary to enable underwriting or managing of energy performance risk. Each of the protocols creates a standard set of documentation that will help standardize project performance underwriting leading to better data on performance, and a more efficient marketplace with less duplicative engineering and lower transaction costs. This will lead to an increase in deal flow and more transparent and efficient market.

NYSERDA will also develop and implement solutions to support the increased use of commercial Property Assessed Clean Energy (C-PACE) financing. C-PACE allows building owners to finance clean energy improvements through a voluntary assessment on their property tax bill through a participating municipality as authorized by Article 5-L of the General Municipal Law. As a result of the security of the assessment feature, this financing structure can be offered at competitive interest rates and also can address split incentive issues. C-PACE provides a promising, yet underutilized tool to provide necessary capital for clean energy projects in commercial buildings. A number of states and local governments have implemented C-PACE financing initiatives. In New York, the Energy Improvement Corporation, a local development corporation (Bedford, NY), has developed and is implementing the Energize NY Benefit Finance Program, offering C-PACE financing through more than a dozen participating municipalities with capital being provided through financing arrangements with Bank of America, Merrill Lynch, and First Niagara Bank.

[35] Information on the Energy Performance Protocols can be found at: http://www.eeperformance.org/protocols.html.

NYSERDA will promote existing financing options through the private market and other state entities, and will develop the tools and infrastructure required to expand the use of C-PACE financing. Specific activities for developing C-PACE include:

- Outreach to customers, key stakeholders and interest groups (including local governments to participate in offering C-PACE to their constituents);
- Periodic and targeted training sessions for contractors, installers, and other third party entities; and
- Facilitating the identification of a pipeline of qualifying projects, and providing bridge funding for verification services such as the ICP Energy Performance Protocols.

Other Tools and Resources

NYSERDA will also support development of tools and resources that energy service companies and other entities can use to design projects, and help customers develop and implement energy efficiency plans. These tools and resources, several of which will be available starting in 2016, will enable energy service companies and other entities to differentiate their business models within the marketplace, make it easier to demonstrate the value of clean energy solutions, increase customer confidence in project benefits, improve project performance, streamline the procurement of energy services, and help integrate energy efficiency information into the decision making processes for buyers and sellers. The tools will help decrease administrative and soft costs while optimizing energy savings.

Other tools and resources will include:

- National Standard Technical Tools, Guides and Check-lists
- Marketing Resources and Information
- Standardized Contracts and Request for Proposals that building owners can use to procure efficiency services from Business partners

Strategic Energy Planning Platform Pilot geared at targeting heating, ventilation, and air conditioning (HVAC) contractors and distributors specifically. The pilot will encourage building owners to view their HVAC equipment as a long term investment in the overall operation of the building and to incorporate ongoing maintenance and replacement in capital planning decisions.

Soft Cost Reduction Efforts

Expanding Access to Data and Information

NYSERDA will facilitate the use of data in targeting opportunities for improved efficiency interventions. Aggregated data sources (e.g. NYSERDA program data, demonstration projects, building benchmarking and audit data) will be used to develop and test approaches to segment New York's commercial building stock, identifying building types most in need of improvements, as well as the improvements that will drive significant, cost-effective energy impacts. NYSERDA will position what is learned from these efforts to then be used by diverse market actors to strategize and create targeted improvement packages for customers, services providers and efficiency initiatives.

Skills Development

Utilizing NYSERDA's Workforce Development initiatives and existing industry resources, NYSERDA will support the development of technical and sales training for the network of qualified energy service companies and other entities which will be delivered through established training organizations, industry associations and technical experts starting in 2016. The technical training will focus on quality and efficient design practices, and maintenance, repair and replacement services for energy products in commercial and industrial buildings. The sales strategy training will enable qualified energy service companies and other entities to more effectively sell their technology and clean energy services to customers. Having a larger percentage of qualified energy service companies and other entities trained in this manner increases the likelihood that energy savings associated with the services that they provide to their customers will occur. The trainings will utilize online, in-person, and hands-on components, as well as the creation of tool-kits to distribute the information to service providers.[36] NYSERDA proposes to sponsor skills development in this area because such trainings are not currently offered by others. The long term goal is to imbed energy efficiency training in academic institutions or trade organizations that qualified energy service companies and other entities look to for professional development.

Referral Services for Demand Generation

NYSERDA will establish a referral service that allows building owners and managers to more readily tap the network of qualified, competent service providers for projects across various end-use technologies. For example, a lighting contractor performing a lighting project will be encouraged to also discuss HVAC needs with their customer and provide information on participating HVAC contractors. In addition to the referral service, demand for the high efficiency services provided by qualified energy service companies and other entities will be driven by educating the end-use market (i.e. building owners), working with national retail chains, and coordinating with the utilities.

Strengthening Clean Energy Service Companies

Performance Contracting Model Expansion

In certain sectors, such as government, performance contracting is the primary approach to developing, financing and building comprehensive energy efficiency projects which include all or most cost-effective and technically feasible clean energy investments at a building, on a campus or in a portfolio. Comprehensive retrofits minimize lost opportunities by combining highly cost-effective improvements with less cost-effective improvements to create a package of improvements that is, in its entirety, cost-effective to pursue. Types of and considerations for performance contracting solutions include:

- **Guaranteed Energy Savings Performance Contracting (GESPC)** - where an ESCO identifies, finances, implements and guarantees savings from cost-effective energy

[36] Activities will be coordinated with Workforce Development initiatives described in Section 6.10.2.

efficiency measures for end users, who then pay for these services using the energy cost savings achieved over the course of the agreement. This reduces the risk associated with comprehensive projects and increases consumer confidence in the savings potential.

- **Potential for Project Aggregation** – the relative cost of project development and related energy savings potential of small and medium sized buildings has limited the feasibility of performance contracting type approaches in the mid-tier of the building owner market. Aggregation has the double advantage of reducing per project soft costs and spreading risk across a portfolio. Energy efficiency projects done at multiple sites that otherwise would not be viable candidates for a performance contract on their own, may be combined into a single performance contract.
- **Ability to demonstrate new GESPC business models -** GESPC has seen limited penetration in most for profit, private sector commercial building market segments (e.g. commercial real estate) due to a variety of factors including contract term and the cost to customers for the ESCO to assume the performance risk. Our efforts will be to facilitate the development of alternative approaches to developing, contracting, guaranteeing and financing performance projects in ways that penetrate the private, commercial market and to support replicable pilots.

In light of the above considerations, NYSERDA will partner with financial and technical experts, energy service providers, and industry trade and research associations as well as governmental organizations to develop new models and opportunities for performance contracting.

In conjunction with firms with promising performance contracting business models and approaches, NYSERDA will develop and conduct a set of replicable pilot studies in 2016-2018. NYSERDA will then produce case studies and share detailed data with the industry to support their wide spread adoption. In addition, NYSERDA would assess whether this approach credibly delivers high performance efficiency solutions at a lower aggregate cost.

Incentives will be used to buy down the costs and risks associated with developing new business models and approaches and to ensure a sufficient sample size to adequately test models and approaches in the field .

Commercial Real Estate Tenant Efficiency Initiatives

Our Commercial Real Estate Tenant Efficiency initiatives seek to stimulate investment in energy efficiency improvements in commercial tenant spaces by creating both the demand for the benefits of energy efficient spaces and the capability to deliver energy efficiency within the construct of the typical leasing negotiation process and subsequent tenant occupancy. The two primary initiatives are the Leasing Initiative and the Building Labeling/Asset Scoring Initiative.

In our Leasing Initiative, NYSERDA will initially partner with large commercial portfolio owners and receptive tenants, service providers, industry trade and research associations, and governmental organizations to build upon existing interest in standardizing tenant energy efficiency packages.

NYSERDA will develop and conduct a set of replicable pilot studies of key building and tenant types in 2016-2018. In addition to the direct technical and financial support provided to the participants, NYSERDA will acquire building, cost and market data to provide insights into the development of credible models and case studies to support a clear value proposition for owners of similar buildings as well as the tenant community. NYSERDA will also participate in promising national efforts such as the Natural Resources Defense Council (NRDC)'s High Performance Tenant Demonstration effort and share the best practices that are developed in such efforts.

During the initial years, NYSERDA will target building owners and managers, architecture and engineering firms, brokers, and tenants and seek to influence the way that the value of energy efficiency is perceived during the leasing process and continued tenant occupancy. NYSERDA will test different intervention methods while building relationships and a greater understanding of the market.

NYSERDA will encourage building owners to adopt policies and practices that require that architectural and engineering firms provide efficiency options to new tenants during times of lease turnover, lease renewal, remodeling, and building turnover. The initiative will seek to further influence architecture and engineering firms through ongoing education and accreditation/credentialing, ensuring that more market actors are proficient in energy analysis and reducing development costs. Training and education will also play a key role for tenants to ensure that returns on investment (ROIs) are achieved and energy performance is maintained after the tenant begins occupancy. Training will be accomplished in partnership with existing building training programs in the state, as well as leading trade associations.

The Building Labeling/Asset Scoring initiative will promote the development and promotion of a labeling system and/or an asset scoring tool for buildings that identifies those that are high-performing. The purpose is to transform the energy consumption data and characteristics of New York's building stock into a format that is easy to understand, recognizable and supports comparison of similar classes of buildings.

Combined with promotion of research and supporting data to communicate the environmental, health and productivity benefits of energy efficient buildings, this will help build consumer demand for efficient buildings, helping energy efficient companies gain a competitive edge.

Collectively, these Commercial Real Estate Tenant Efficiency initiatives serve as a vehicle for market forces to reduce energy use per square foot, while driving value for tenants and owners.

Aggregation and Replication Initiatives

The Commercial sector provides a significant opportunity to aggregate portfolios of projects with similar building characteristics – from national big box chains to grocery stores to the hospitality and higher education sectors – in order to replicate and scale clean energy penetration. Strategically, NYSERDA's interventions in this sector will focus upstream of the buildings themselves, where portfolio-wide investment decisions are made and with a primary focus on those businesses that operate across utility service territory.

National and Regional Retail Sector

Beginning in 2016, NYSERDA will work with industry representatives such as the Retail Industry Leaders Association (RILA), the National Retail Federation (NRF), the Retail Council of NYS and the Business Council of NYS to focus efforts to encourage national retail chains' decision-making to prioritize energy efficiency and renewable energy investments by:

- Working with retailers and their architecture and engineering (A&E) firms to **create or improve clean energy templates for new stores, major renovations and retrofits that can be easily replicated.** The templates will be created to maximize the incorporation of cost-effective clean energy improvements. Based on the templates, retailers can build, renovate and retrofit to a high standard with confidence in energy performance and return on investment. The templates will also reduce costs associated with site specific analysis and design. While the commercial existing buildings team will hold the relationship, NYSERDA will work collaboratively with each retail team and other relevant NYSERDA teams to identify and offer integrated initiatives, for example New Construction (see Section 6.7) transportation, and renewables.
- **Facilitating the development of portfolio wide clean energy benchmarking and planning.** Following New York State's leadership under Build Smart NY,[37] NYSERDA will work with retailers to benchmark energy productivity across their entire NY portfolio of stores. Energy productivity benchmarks will be developed based on core business objectives and metrics (e.g. sales) and used to prioritize clean energy investments.
- **Providing a statewide point of coordination with efficiency programs run by the investor owned utilities.** To support statewide initiatives that transcend utility service territory boundaries, NYSERDA will work to ensure that opportunities for New York retailers that have stores in multiple utility territories are well coordinated with the utilities by convening a National and Regional Retail joint utility working group.
- Leveraging beyond building opportunities such as transportation and residential appliances to synergize with corporate mission and maximize benefit. National and Regional Retailers have a bigger interest and role to play in energy efficiency than just the buildings they own and operate. Retailers transport goods and sell products to consumers. Through the CEF, NYSERDA will synergize these roles to ensure maximum benefit.

Colleges and Universities

Starting in 2016, NYSERDA proposes to provide colleges and universities with similar standard tools and resources as will be developed for the rest of the Commercial market, and will adapt their use for this sub-sector given the aggregation and replication potential it promises. Approaches specifically tailored toward the higher education market that will take advantage of these tools include:

- Initiating a college and university challenge to encourage and recognize the New York institutions of higher learning that are taking clean energy ideas from the classroom and

[37] For more information on Build Smart NY please visit http://www.buildsmart.ny.gov/.

putting them to work, both on campus and in their communities. The REV Campus Challenge will identify universities and community colleges that have made the greatest strides along a number of criteria and streamline and package the relevant set of resources NYS offers to help them succeed. The objective of the Challenge is to recognize and obtain commitments from New York institutions of higher learning to accelerate the implementation of comprehensive and innovative clean energy projects that will improve campus efficiency and reduce GHG emissions, incorporate sustainability and clean energy in to curriculum and relevant research and developments efforts, and increase and promote community involvement and adoption of clean energy initiatives. The Challenge will be underway in 2016 and established in close coordination with NYPA.

- Creating a peer exchange to discuss best practices and reduce the cost of on-campus investment. NYSERDA will encourage the publication and dissemination of best practices, operations and maintenance manuals, and other project development and management tools that would increase the sharing of applied knowledge both within and outside the sector.
- Leveraging clean energy leadership to test and pilot promising technologies and approaches to operations and maintenance of campus buildings
- Facilitating the development and use of novel approaches, such as on-campus or university-level revolving funds, for clean energy investments to reduce competition for capital

6.1.2 Evolution of Previously Authorized Commercial Programs

NYSERDA intends to transition to the above initiatives in a market- and progress-responsive manner so as to not disrupt progress that is being made and in recognition that incentives may remain necessary and that changes must be grounded in validated learning. Programs and activities that NYSERDA intends to transition away from include:

- Incentives for pre-qualified measures. Beginning January 1, 2016, NYSERDA will no longer offer support for pre-qualified measures. This will reduce overlap between NYSERDA's efforts and the programs currently offered by utilities.
- The Existing Facilities, Flex-Tech and Green Jobs Green NY (GJGNY) small commercial audit programs will be combined into a single offering in the Commercial Sector: Incentives will continue to be available under the CEF for both hard cost and soft cost reduction and will include technical services. NYSERDA will focus incentives on less mature but promising technologies, high project development costs, and long payback periods.
- Demand Management Program with Con-Ed: The program is expected to meet its intended objectives in 2015 and NYSERDA does not anticipate a renewal of this joint approach to resource acquisition under the CEF.
- New Construction Program: NYSERDA will continue to support and influence new construction and major renovation projects through cost-shared technical assistance and limited performance-based incentives into the CEF. During this timeframe, the focus will continue to evolve towards design and systems approaches that support deeper energy

savings and zero net energy performance. See Section 6.7 for additional detail on future Commercial New Construction initiatives.

To best optimize funding and reduce areas of major overlap with utility programs, NYSERDA will consider changes to these programs such as reducing incentive levels for the shorter payback measures, moving from open enrollment to a more targeted structure such as an auction, and similar program design changes. Details on these programs will be included in the Investment Plan expected to be filed following a PSC Order on this CEF Information Supplement.

6.2 Industrial

Energy efficiency and distributed generation opportunities within the industrial sector are focused on the activities within the sector with process efficiency improvements and unit operations that feed into processes (e.g., steam generators, compressed gas). The primary barriers identified to realizing that potential for energy efficiency and distributed generation include: (1) risk aversion by decision makers out of concern that the energy efficiency and distributed generation projects could disrupt core industrial processes and economics, (2) lack of in-house expertise in energy management, (3) lack of understanding and/or trust in the ability of energy efficiency and distributed generation technology to deliver, (4) lack of attractive service offerings that are easy to say "yes" to, often as suppliers lack scale and a ready market for which to develop more compelling offerings, and (5) cost and finance sensitivity.

Key consumer decision points that represent the greatest opportunities to intervene to overcome associated barriers include new product introductions, planned process improvements, annual budgeting decisions and equipment failures.

Under the CEF, Industrial initiatives will focus on the following strategies, in alignment with the CEF's overall approach, while persisting open-enrollment incentives that encourage process efficiency until industrial businesses can take advantage of self-direct programs anticipated under REV beginning in 2017:[38]

- Strengthening clean energy partners by providing technical assistance, training, and matchmaking functions
- Developing common toolkits and best practices to advancing technologies
- Piloting and demonstrating the use of new clean energy business processes and additional clean energy capacity resources
- Quality Assurance

[38]Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued and effective February 25, 2015.

Taken together, these proposed strategies will offer support and resources to help make the utility program successful. More details on the specific initiatives and approaches that fall within the above market-development strategies are enumerated below.

6.2.1 New Initiatives

From 2016-2018, NYSERDA intends to build and execute the following specific initiatives:

- Strategic Energy Management
- On-site Energy Management and Engineer on Demand resources
- Advanced Science and Technology
- Data Centers
- Reducing Technical Risk of Energy Efficiency Upgrades
- Credible Measurement and Verification Services

Additional information on the initiatives can be found below. The cumulative benefits of these initiatives are presented in Section 12.

Piloting and Demonstrating New Business Models and Processes

Strategic Energy Management

NYSERDA proposes conducting a Strategic Energy Management[39] (SEM) cohort pilot in 2016 to accelerate the adoption of a systematic, lasting, business process that integrates clean energy into a company's core business process. Linking energy efficiency and clean energy to core business processes connects the facilities' energy use to their bottom line and provides a holistic approach to energy management, resulting in energy savings in the industrial sector. The cohort pilot will include medium to large manufacturing companies who are committed to creating and executing a sustainable business process to manage energy use. NYSERDA funding will support the organization and oversight of the cohort, bringing committed customers and technical experts together at regular intervals for progressive SEM training modules in energy management planning and implementation, and systematic monitoring, tracking and performance reporting.

As technical expertise and demand for SEM builds in the marketplace, NYSERDA also plans to offer matchmaking services in 2017 to industrial customers who seek technical assistance in implementing SEM, as well as publishing and promoting information on SEM project best practices and results, both from NYSERDA customers and other states/regions. To further enable SEM,

[39] SEM can take many forms and has multiple good models, including ISO50001, DOE-Better Plants® (which includes ISO50001 certification), ENERGY STAR® Energy Management Guidelines, High Performance Energy Management System (Bonneville Power Authority), and Corporate Strategic Energy Management (Energy Trust of Oregon).

NYSERDA will facilitate industrial customer participation in partnerships with the Department of Energy (DOE), including the Better Plants®[40] program.

On-Site Energy Management and Engineer on Demand Resources

NYSERDA proposes to provide funding for technical assistance via an on-site energy manager dedicated to process efficiency and energy optimization in industrial facilities who are willing to commit to single or multi-year, energy related performance goals, milestones and deliverables. Facilities who meet the participation criteria will be matched with an experienced and vetted energy manager. Funding for the Phase 1 pilot will help offset a portion of the costs of an energy manager, whose scope of work may include identifying areas for improvement, driving managerial and corporate behavioral changes with respect to energy, and developing the mechanisms to track energy optimization efforts versus other business investment opportunities, allowing companies to become accustomed to energy management with minimal risk. To support the Phase 2 broader adoption of an energy management business process, the energy manager will also develop materials for publication and training of employees and outside consultants so that industrial companies are enabled to continue the function on their own in 2017 and beyond. This technical resource will provide quality assurance in clean energy investments, as well as demonstrate the benefit of permanently creating such a role, including being better able to address opportunities for productivity improvements that reduce energy use.

An "Engineer on Demand" technical resources will also be available, on an as needed basis, for companies engaged in Lean, 6-Sigma, Total Quality Management (TQM) or other continuous improvement activities to address energy as a component of process efficiency improvement. Qualified facilities may seek cost-shared support for an experienced Engineer-on-Demand to train, plan, or participate in activities such as Kaizen events, energy mapping, baseline evaluations or deployment of short term meters/loggers to determine where in a process the energy is being used and what areas to target for improvement. Case studies and other tools will be created and maintained in a public repository for use and reference as well as matchmaking for customers and trained process partners.

Strengthening Clean Energy Partners through Technical Assistance and Standardized Tools

Education, Training, and Technical Assistance for Advanced Science and Technology

Investment in advanced technology is key to achieving energy goals at NYS industrial manufacturers and data centers, where the vast majority of energy usage is tied to process technology. NYSERDA proposes to facilitate implementation of the latest equipment and techniques relating to process and energy efficiency by providing technical support, education, training, and resources resulting in increased customer confidence.

[40] DOE's Better Plants Program operates on participants pledging to reduce energy intensity by 25% over a ten year period; NYSERDA will facilitate NYS participants' achieving their energy intensity reduction goals and identifying the associated GHG emissions improvements. NYSERDA would also work to facilitate participation in their recently announced initiative to improve the energy management within supply chains.

For instance, NYSERDA will host Best Practice Forums and Emerging Technology Forums that will bring together manufacturers and data center operators at conferences featuring in-depth energy efficiency training, resources, and peer-to-peer knowledge exchanges. These forums will invite subject matter experts to present on advanced practices and technologies, and highlight process efficiency opportunities for manufacturers and data centers to modernize their operations. The events will also facilitate peer-to-peer discussions through roundtables and presentations by fellow manufacturers.

Additionally, process efficiency resources and tools will be researched and developed to create industry-specific Best Practice Toolkits. These toolkits will be made available in an online-clearing house. NYSERDA will also leverage and incorporate existing tools available from partners like the US DOE. From plant engineers and operators to financial decision-makers and managers, customers will have access to self-help checklists, engineering and financial tools, case studies, articles, and presentations that are specific to their industries. The information available will not only enable customers to identify and implement technical projects with confidence, but also have the tools to adequately value and prove business cases internally.

NYSERDA will also continue to work with partners who support advanced science and technology efforts such as NYPA as they explore the development of a Western New York Energy Productivity Resource Center, which once established will serve to educate mid to small market industrial companies from creating vision at the CEO/CFO level, to providing tools for plant managers to make informed energy decision; to ensuring that architects, and design engineers are knowledgeable on the implementation of advanced technologies and systems relating to energy efficiency and industrial production. The center will provide resources such as assessment tools, calculators, consulting services, seminars and workshops.

<u>Education, Training, and Technical Assistance to Spur Clean Energy at Data Centers</u>
In 2016, NYSERDA will sponsor a Green Data Center Consortium to serve as a forum to exchange data center information and ideas, as well as a platform to educate both information technology (IT) and facilities staff on how to holistically apply energy efficiency best practices to their data centers while achieving other organizational goals (e.g. reliability). The funding for the consortium activities, administered by industry experts, will support in-person trainings, hands-on workshops and demonstrations, and webinars. These trainings will empower IT and facilities staff to make better decisions when implementing efficiency improvements in data centers.

Accessibility to test these best practices in a live data center environment will also provide participants the quality assurance required to implement new technology and manage existing equipment at their own sites. Consortium partners are expected to include institutes of higher learning, professional data center organizations, and small and mid-tier data centers. Once the consortium has been established and acknowledged in its own right as a valued technical and training resource, this self-sustaining initiative will also publish papers and materials for all NYS data center managers to access.

NYSERDA proposes to conduct a Data Center Metrics Pilot in 2017. The goal of this initiative is to create sector-specific metrics that allow organizations to measure the amount of useful work their

data center can produce with a given amount of energy. By measuring the productivity of their data center, data center managers will be better able to manage their resources with the goal of reducing energy consumption and GHG emissions through more efficient and productive use of energy. Organizations across sectors (healthcare, financial, academic, telecommunication, etc) have different business outputs and may require unique metrics. During the pilot, NYSERDA will fund the collaboration of customer representatives for each of the selected sectors and technical expertise through experienced data center consultants and vendors to develop a standardized approach, on how to identify and implement sector relevant metrics. Representative companies will then test and evaluate the validity and usability of the metrics. NYSERDA will develop reports and case studies to serve as a guide for the marketplace and, along with respected data center organizations and stakeholder groups, promote the widespread adoption of the framework and sector metrics through papers, technical conferences, seminars and webinars. Data center managers can then use these tools to track productivity and continuously drive improvements in their data centers in 2018 and beyond.

Providing Standardized Tools to Reduce Technical Risk of Energy Efficiency

NYSERDA proposes to develop mechanisms for industrial and data center customers to help mitigate the technical risk of implementing changes to the manufacturing process that improve facility output, reliability, and productivity. Reducing the technical risk of changes to the manufacturing process will improve the confidence of this sector in the benefits of energy efficiency improvements, increasing the likelihood that they will be implemented and thereby increasing energy savings. In 2017, NYSERDA will work with data center equipment vendors to standardize the efficiency information provided on technical specification sheets to include accurate energy use performance information. The specification sheets, and therefore comparison of energy use performance for similar equipment solutions, will be made available to the data center community. This standardization will allow customers to make informed decisions regarding the energy use of equipment at the point of purchase.

Providing On-Demand Technical Assistance

NYSERDA will facilitate an energy graduate mentoring initiative during 2017, to develop in-house expertise in energy at manufacturing facilities currently lacking personnel, internal expertise, or a focus on sustainability. NYSERDA will help NYS manufacturing facilities develop new energy engineer hires through training and mentoring. Quality assurance and support will be provided by vetted energy expert mentors during the new hire apprenticeship period. A successful mentor relationship will encourage adoption of an energy management plan and creation of an energy engineer position in the manufacturing facility. This initiative will be implemented via established criteria, site specific scopes of work, and metrics data collection.

To aid this effort, a directory of National Process Consultants that was created under a previous NYSERDA held DOE Advanced Manufacturing Office grant project will be updated and offered to the market as an online clearing house resource to connect manufactures with process-side efficiency experts that can provide the above expertise.

Quality Assurance

Credible M&V Services

NYSERDA proposes to provide quality assurance to the market and facilitate the use of credible M&V services by providing tools and resources for implementing M&V beginning in 2016. Specific activities will include providing face-to-face quality assurance trainings with customers and consultants, creating on-line short courses, matching customers and consultants with a qualified list of M&V contractors, and providing a standardized set of protocols and methods for specific processes or measures. Lists of these vetted energy engineers will be available as well as white papers and case studies of successful projects. Increasing the use of M&V will help reduce the uncertainty associated with determining process and energy efficiency savings and encourage the widespread adoption of M&V to make efficiency investments more reliable and profitable. This will create market demand for M&V services from credible consultants.

6.2.2 Evolution of Previously Authorized Industrial Programs

NYSERDA intends to transition to the above initiatives in a market and progress responsive manner so as to not disrupt progress being made, ensure that successful attributes are built upon, and in recognition that incentives remain necessary to continue progress prior to the institution of the utilities' self-direct programs.

The Industrial and Process Efficiency Program (IPE) will be available under the CEF to reduce market disruptions, and to help ensure continued investment in energy efficiency and process efficiency projects. The goal of the incentives will be to continue energy efficiency and productivity improvements; maintain work with industrial firms to provide technical assistance, quality assurance, and energy reduction verification for projects and complement the initiatives described above in section 6.2.

NYSERDA, in partnership with utilities, will work to address gaps in the market subsequent to the institution of self-direct programs provided by the utilities. Details on the modified program(s) will be included in the Investment Plan expected to be filed following a PSC Order on this CEF Information Supplement.

6.3 Agriculture

Energy efficiency and distributed generation opportunities in the agricultural sector are focused on farm management best practices and strengthening relationships with farm partners. The primary barriers inhibiting energy efficiency and distributed generation implementation include: (1) risk aversion by decision makers out of concern that the energy efficiency and distributed generation projects could disrupt core agricultural processes and economics, (2) lack of in-house expertise and time in energy management, (3) lack of understanding and/or trust in the ability of energy efficiency and distributed generation technology to deliver, (4) lack of attractive service offerings that are easy to say "yes" to, often as suppliers lack scale and a ready market for which to develop more compelling offerings, and (5) cost and finance sensitivity.

The multi-billion dollar agriculture industry in New York is diverse in farm types and includes commercial businesses like dairies, greenhouses, orchards, vegetables, vineyards, poultry farms, and others. To address this vital sector, under the CEF, NYSERDA's agriculture initiatives will focus on:

- Strengthening farm partners through technical assistance, education and outreach to farmers about energy and other GHG-mitigating best management practices
- Piloting and demonstrating the use of new technologies by evaluating compatibility and benefits of both existing and promising new farm systems and efficient controlled agriculture technologies
- Developing simple and robust tools and resources to assist with on-farm operations
- Exploring the potential of aggregating agriculturally-based technology solutions for matchmaking purposes between suppliers and investors

In addition to pursuing these approaches, NYSERDA will also work with the New York State Department of Agriculture and Markets to create a Clean Energy for Agriculture Task Force that will focus on advancing renewable energy technologies and energy efficiency process and system improvements on farms across NYS.[41] The Clean Energy for Agriculture Task Force will identify clean energy benefits and barriers and develop collaborative initiatives for achieving these benefits. The Task Force will also work to examine the need for incentives to overcome barriers to adoption for farms.

Throughout the implementation of the above mentioned initiatives, NYSERDA will commit to reducing the complexity in accessing its programs by working with staff and stakeholders to identify ways to improve the customer experience by streamlining its processes. Additional details on the specific initiatives that fall within these market-development strategies for the Agricultural sector are below.[42] The cumulative benefits of these initiatives are presented in Section 12.

6.3.1 New Initiatives

From 2016-2018, NYSERDA intends to explore the following opportunities:

- Technical Assistance for Farm Management Best Practices
- Technical Assistance for Controlled Environmental Agriculture
- Development of On-site Farm Management Tool
- Pilot and Demonstration Projects for Advancing New Technologies

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[41] The Clean Energy for Agriculture Task Force is a joint effort of NYSERDA and the New York State Department of Agriculture and Markets and builds on the Renewable Energy for Agriculture Task Force set forth at the Second Yogurt Summit. (http://www.nyserda.ny.gov/About/Newsroom/2014-Announcements/2014-10-15-Governor-Cuomo-Highlights-the-2014-New-York-State-Yogurt-Summit). The Task Force is comprised of state and industry representatives and will advise the Governor on clean energy opportunities and develop a strategic plan for implementing these opportunities consistent with the goals of the Clean Energy Fund.

[42] Additional details on anaerobic digestion initiatives are included at Section 6.9.2 On-Site Power Production.

Strengthening Farm Partners with Technical Assistance, Education, and Outreach

Technical Assistance for Farm Management Best Practices

NYSERDA proposes to provide farm education and outreach to build implementation capacity for farm energy management best practices. To initiate the effort, NYSERDA will engage with and support technical consultants with agriculture-sector knowledge to facilitate the identification, compilation, development and use of energy-related farm management best practices. Technical assistance results from recent and future farm energy studies within the agriculture sector will provide valuable insight on the efficacy of existing and planned initiatives. NYSERDA will work through entities such as Cornell Cooperative Extension[43] and the Department of Agriculture and Markets to connect to the agriculture community at the local level. These entities offer farm management best practices that complement NYSERDA's effort, and NYSERDA will work with them to leverage their respective expertise to create a comprehensive best practices portfolio. Workshops, fact sheets and other resources will be developed as outreach tools. Local outreach networks will be provided with resources and training to incorporate clean energy in their existing outreach roles. Community workshops and farm site visits will also be supported through this effort. Best practices will initially focus on dairy farms; progress will be assessed and adjusted as necessary to ensure that benefits are being realized. Once farms realize the multiple benefits of more efficient operations and other energy-related best practices, farms may look for additional or new approaches on their own, perpetuating the implementation and evolution of farm management best practices. NYSERDA plans to roll out this initiative in 2016.

Technical Assistance for Controlled Environmental Agriculture

NYSERDA will work to advance energy efficiency and productivity in the area of controlled environmental agriculture. Specific actions will include: providing technical assistance, identifying solutions to key barriers such as efficient greenhouse designs and operations; reducing costs associated with development of business plans and permitting; and matchmaking between business experts, growers, mid-market suppliers and entrepreneurs.

NYSERDA will also seek to initiate new business opportunities in the consulting space for custom designs which could integrate with software that manages the controlled environmental agriculture systems (heating, cooling, lighting, water use, ventilation, curtains, and other). NYSERDA will begin planning and coordinating this initiative in 2016 with roll out in 2017.

Development of Standardized Tools and Resources

On-Site Farm Management Tool

To further support the use of best practices and help farms identify and implement energy and GHG reduction opportunities, NYSERDA will work to pilot an on-site farm management tool. The tool will initially focus on dairy farms and expand to other subsectors. The farm management tool will leverage technical assistance work and be developed in conjunction with consultants and entities familiar with other agriculture management tools and practices. NYSERDA will provide training on

[43] http://www.cce.cornell.edu/Pages/Default.aspx

the benefits of the tool and incorporate the information into education and outreach efforts. The tool is expected to be implemented after the best management practices education and outreach has gained traction, starting in 2018.

Piloting and Demonstrating New Technologies

Technology Advancement Pilots

NYSERDA will work to facilitate agricultural customer investment in advanced clean energy technologies by better understanding agricultural customers' barriers to adoption, which could include upfront costs, permitting issues, or a lack of access to financing. NYSERDA will also work to increase the availability of advanced agricultural clean energy products and services upstream of end-users, i.e., with agriculture equipment vendors. To achieve this goal NYSERDA proposes to provide incentives to conduct pilots, utilizing the appropriate farm sites and technical assistance resource teams, to demonstrate and document the value proposition of technologies for targeted energy use on farms (e.g. milk cooling, cow cooling, efficient ventilation, greenhouse lighting, and tractor efficiencies). Installation barriers, energy, economic and environmental metrics, compatibility among systems, reliability, and ease of operations will be evaluated during the pilots.

Knowledgeable agriculture-sector outreach contractors will be engaged to educate vendors, technical assistance providers, consultants, farm associations, farms and others on the benefits of advanced technologies and practices. This education will aid in consumer decision-making by improving access to objective data on the value of clean energy technology. Promising advanced technologies and practices will be become part of the Farm Management Best Practices. This initiative will be put into practice in 2017.

6.3.2 Evolution of Previously Authorized Agriculture Programs

NYSERDA intends to transition to the above initiatives in a market- and progress-responsive manner so as to not disrupt progress that is being made, build upon successful existing program attributes, and in recognition that financial support may remain necessary. NYSERDA intends to preserve existing incentives programs at the current levels for a minimum of two years. In addition to new CEF initiatives discussed above, a transition program to provide objective, technical information will be made available to the agriculture market. Farm energy audits will be offered to farms and producers to assess their energy use, recommend efficiency and productivity upgrades and/or their capacity to consider renewable energy production. Farmers and producers will have the ability to determine the level of technical assistance they require to make efficiency and productivity upgrades. State, utility or federal incentive programs would be referenced for any eligible recommendations. It is anticipated this program will serve as a transition vehicle as the CEF and REV offerings become available to the agriculture sector. Further details on the program will be included in the Investment Plan expected to be filed following a PSC Order on this CEF Information Supplement.

6.4 Multifamily

NYSERDA's market research in the residential multi-family sector revealed that thermal comfort, water heating, and space heating and cooling are the target areas with the greatest energy improvement potential. 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.

NYSERDA proposes to enable the creation of a multifamily marketplace wherein building energy performance is more widely recognized as an asset and the process to improve performance becomes simpler and more routine. NYSERDA will foster an environment in which residents consider the energy performance and environmental impact of the buildings in which they live, owners are motivated to continuously improve the performance of their buildings, and qualified energy professionals interested in servicing multifamily buildings are abundant and easily identified by building owners. This will be achieved through activities that will increase demand, lower known barriers, and create unprecedented opportunities for multifamily buildings and the skilled workforce that services them.

NYSERDA multifamily activities will transition away from providing principally open enrollment incentives to focus on the following strategies that are consistent with the overall CEF approach, including:

- Information, Awareness, and Demand
- Standardized and Simple Tools and Resources
- Strengthening Clean Energy Partners
- Encouraging Mid-market Engagement and Aggregation

More details on the specific initiatives that fall within these strategies can be found below.

6.4.1 New Initiatives

From 2016-2018, NYSERDA intends to pursue the following initiatives:

- Implementing a ubiquitous building performance label
- Building the capacity of and driving demand toward trusted Clean Energy Partners through vetting and certification measures
- Enhancing service provider capacity through strategic technical assistance and through promoting the development and adoption of new business models

- Promoting quality control processes to ensure market best practices and standards
- Accelerating scale and adoption of innovative retrofit techniques
- Supporting financing strategies catering to both market rate and low-to-moderate income buildings
- Providing marketplace solutions to address mid-market buildings

Additional information on the initiatives can be found below. The cumulative benefits of these initiatives are presented in Section 12.[44]

Information, Awareness, and Demand

Communications Toolkit

In order to scale the number of high performance buildings in New York State, building owners and managers must be able to see the value of energy efficiency in building assets and in the eyes of their prospective tenants. A lack of demand for high performance buildings has been a significant barrier to its broader adoption despite the many benefits energy efficiency bestows upon building owners. It is therefore necessary to more specifically target tenants and residents, in addition to the more traditional audiences of building owners and managers, with NYSERDA's initiatives. This effort will strive to create greater awareness and understanding of the benefits of high performance housing with the goal of increasing demand for such housing. Building owners and developers have indicated that they will provide whatever building features residents demand. If a preference can be developed among tenants to choose to live in energy-efficient multifamily buildings, it stands to reason that building owners, developers and managers will be motivated to provide them. In order to understand how to develop that preference, NYSERDA will test various communications interventions to develop a comprehensive communications toolkit designed to promote the benefits of energy efficiency and high performance buildings in language and values that resonate with a variety of target audiences. This toolkit will be made available to any and all actors in the clean energy economy including manufacturers, real estate professionals, management companies, utilities, municipalities, service providers, and others. The overall effect will be a consistent message that seeks to inform and educate residents in an effort to increase demand for high performance housing.

To inform the development of the communications toolkit, starting in 2015, NYSERDA will commence conducting research to better understand how renters, tenants, owners, and managers relate to energy efficiency and high performance buildings. NYSERDA will draw upon lessons from successful social change campaigns and marry them with demographics, market research, and stakeholder input specific to New York State. A variety of stakeholders will be engaged to understand how they currently communicate the benefits of clean energy to their customers and how effective they feel that communication is. The outcome of these activities will be a full assessment of the perceived benefits and experienced barriers related to energy efficiency across a wide cross-section of market segments and an action plan for subsequent communications pilots.

[44] Please see Section 6.7 for a discussion of Multifamily New Construction initiatives and 6.6 for LMI.

NYSERDA will also develop test communications initiatives to pilot in key markets and to key demographics across the State. NYSERDA will provide direct financial support to stakeholders who participate in these pilots to help test and measure the effectiveness of these communications initiatives. The pilots will help refine or adjust the communications initiatives into a final toolkit that will be made available to all stakeholders. NYSERDA will provide both technical and marketing assistance, as well as financial support, to assist entities in adopting the communications toolkit.

Building Energy Performance Labeling

Another significant barrier to the adoption of energy efficiency at scale is the opacity of building performance. Building owners and consumers have no readily available way to assess how well or poorly a building performs and how that performance may impact operations, assets, and rents. This lack of information prohibits market actors from making fully informed decisions whether related to choosing where to live, valuing a property, comparing multiple listings, or providing financing to a property. Recent local benchmarking and disclosure laws have begun to address this lack of information and demonstrate that a statewide, ubiquitous labeling mechanism is warranted. To this end, NYSERDA proposes to create and support the administration of a building energy performance label to measure and ultimately publicize the energy performance of multifamily buildings.

This development process will commence in 2015 by convening a national working group of individuals and organizations involved in building rating systems and labels. Throughout 2016, NYSERDA proposes to pilot the recommendations from this national working group to learn which types of labels are most easily interpreted by residents, managers, owners, and real estate professionals while accurately reflecting a building's performance. These pilots will include direct financial and technical assistance to cover the costs and effort incurred by early adopters and administrators of the label. The results of these pilots will inform NYSERDA as it collaborates and leverages its relationships with multifamily building owners, managers and municipalities to institute the initial roll-out and early adoption of the label. NYSERDA will also begin publicizing and promoting the label and its value to consumers beginning in 2017. As awareness and demand for energy efficient buildings increases, the label will make it easier for all market actors to understand building performance while also motivating owners to improve it.

Standardized, Simple Tools and Resources

Standardized Retrofit Packages

When assessing the energy needs of any given multifamily building, service providers can incur significant costs in simply collecting data about the building's energy use, assessing the characteristics and performance of the various building systems, and modeling and projecting the impact of improvements to the building. These soft costs related to improving a building's performance can be a hindrance to greater adoption of energy efficiency in the multifamily sector, particularly in smaller buildings or within smaller management portfolios. NYSERDA is exploring ways to help simplify the analysis of buildings and thereby reduce these soft costs.

One example of this is the "standardized retrofit package." There are already efforts underway in New York City to analyze the energy assessment data from Local Law 84 and identify consistently

recommended improvements by various building types. In 2016, NYSERDA proposes to build upon that analysis and will explore piloting a project to develop and support a simple replicable model that identifies a package of measures that delivers consistent energy savings across multiple buildings within a given building type. For example, one package could include low/no cost measures, such as benchmarking, energy audit, retro-commissioning, and manager/operator training and a second package of measures could require some level of capital investment, potentially paired with a financing option. The first package would be relatively straightforward to implement, result in some savings (through retrocommissioning and training), and put those buildings in a good position to subsequently undertake the capital measure package. This strategic approach to standardization has the potential to be particularly applicable to the smaller building segment by reducing soft costs and driving greater penetration of clean energy in a segment of the multifamily sector that is costly to serve with custom solutions. If effective in this initial pilot, NYSERDA will expand the concept to a wider variety of building types. The results of these efforts will be shared with service providers and contractors to provide them information to use with their customers when proposing energy efficiency upgrades to their building that will not need to rely on extensive data collection and modeling efforts.

Energy Efficiency Retrofit Calculators

NYSERDA will support the development of a variety of tools to help reduce soft costs associated with time, mechanics, and trust issues related to energy efficiency projects and make them available to industry professionals such as service providers, installation contractors, utilities, and ESCOs. Specific actions will include supporting the development of tools such as Clean Market's "Building Energy Efficiency Retrofit Investment Model" that could potentially help service providers sell projects.

Zoning and Permitting Tools

Oftentimes, there are numerous barriers at the municipal level that hinder owners' and developers' efforts to improve their buildings, such as permitting and zoning. NYSERDA proposes to support and facilitate the development of tools and infrastructure that will assist with navigating these institutions and thereby simplify the processes for improving building performance. NYSERDA proposes working with municipalities to adopt best-practices toolkits to reduce the costs associated with permitting, licensing, and inspections, which may include information such as standardized solicitation or contract templates, guidance on reviewing proposals and selecting energy service professionals, case studies from other municipalities, and guidance on setting up websites to connect building owners to energy professionals. NYSERDA will also work with municipalities to create opportunities for energy efficiency retrofits, such as benchmarking support.

Financing and Physical Needs Assessment Tools

NYSERDA will also work with building owners and managers, financial institutions, NYGB, and community financing organizations to assess existing financing mechanisms (including multifamily power purchase agreements, PACE, third-party on-bill financing, and energy efficiency lines of credit) in order to develop a deep understanding of which platforms are the most successful and identify areas of the market that need to be addressed. NYSERDA will then work to promote

financing best practices and approaches, such as Green Physical Needs Assessments,[45] and/or develop pilot mechanisms to address underserved aspects of the market. Financing mechanisms will also be investigated that can seamlessly supplant certain market rate incentives to reduce disruption in the marketplace.

Strengthening Clean Energy Partners

Network of Qualified Clean Energy Partners

Addressing the energy needs of a property can be a daunting task for even the most motivated of building owners. At its core an energy efficiency project is typically a capital improvement project and can be just as complex. The easiest way to reduce this complexity and simplify the experience is to work with qualified, trained professionals. Yet building owners frequently cite a lack of qualified professionals or difficulty in finding them as major obstacles to pursuing energy efficiency projects. Even when qualified professionals are engaged, many building owners remain skeptical that proposed energy savings will materialize. To address these issues, NYSERDA proposes developing a quality standard for energy professionals through a network of Clean Energy Partners. The network will serve the energy performance needs of multifamily buildings, both by utilizing existing partners and enabling new market actors to engage in the multifamily building space. Planned activities are proposed to begin in 2015 and include first assessing the professions and job titles (e.g. energy consultants, building analysts, installers, construction managers, architects, engineers, etc.) crucial to ensuring a successful clean energy project and then identifying the key skills and knowledge that differentiate these professionals as Clean Energy Partners. NYSERDA will then work to encourage consumers to use these qualified providers, including leveraging a trusted recommendation forum that provides performance data and other metrics on Clean Energy Partners for matchmaking between building owners and service providers.

Performance Validation and Quality Assurance

Energy professionals experience challenges associated with validating the energy savings claims they make to their customers. Many building owners are still skeptical that savings will materialize or that they will realize the return on their investments. In 2016, NYSERDA proposes to initiate a variety of initiatives that will focus on better supporting energy professionals as they seek to justify their energy projections. Specific actions will include:

- Expanding the set of case studies of actual, successful projects
- Supporting the development of a forum through which building owners can share their experiences directly with one another
- Release of NYSERDA datasets of energy efficiency projects
- Establishment of more formal industry standards like the Environmental Defense Fund ICP

[45] A green physical needs assessment (PNA) is a standard physical needs assessment, typically conducted during a regulated building's refinancing to identify needed capital improvements, combined with a comprehensive energy assessment to also identify improvements that might save the building energy. A green PNA is used to take advantage of a building's refinancing as an opportunity to make energy efficient capital improvements to a property.

NYSERDA will also provide incentives and support for professionals to attend trainings (e.g. customer acquisition and conversion education, streamlined building analysis and modeling, project development and management skills, etc.).

Support of New Business Models and Services

Many energy professionals are also interested in exploring new business models and providing their customers new services. One example of this is the concept of a "continuous energy manager" that can work with building owners to perform on-going, or continuous, equipment commissioning, system optimization and the incorporation of energy efficiency into future capital improvement projects. NYSERDA proposes to begin designing a variety of support mechanisms in 2015 for implementation in 2016. These mechanisms may include direct financial support to develop new business activities or structures, retrain staff, or create standardized contracts as well as direct technical assistance in the form of legal or marketing support. NYSERDA proposes rewarding energy professionals that develop effective and innovative business models and helping disseminate new models, approaches, and services throughout the Partner network.

Aggregation

Mid-Market Engagement

The soft costs associated with working with energy professionals tend to comprise a greater proportion of overall project costs for smaller buildings. These mid-market buildings tend to be less profitable from the perspective of service providers and their building managers generally have less bandwidth and experience to undertake deep retrofit projects. In combination these barriers make the adoption of energy efficiency in the mid-market segment particularly challenging. Any initiatives that help to reduce soft cost like those described above will benefit smaller building owners in particular. Under the CEF, NYSERDA will also explore project aggregation strategies targeted specifically towards this sub-segment. NYSERDA proposes to assess the potential of project, municipal and financing aggregation mechanisms in 2015. Pilot projects will be initiated in 2016 and 2017 to explore the effectiveness of aggregation approaches to increase project uptake and reduce soft costs in the mid-market building segment.

6.4.2 Evolution of Previously Authorized Multifamily Programs

In an effort to better align its more traditional programmatic approach with the CEF initiatives described above, NYSERDA intends to make revisions to its current suite of multifamily programs. These revisions will help to support the new initiatives that address a wider variety of barriers and more effectively animate the market or support new market approaches while seeking to minimize disruption during this transition period. These changes are in recognition that incentives will remain necessary as transition vehicles but will be managed in a market- and progress-responsive manner. Program revisions that NYSERDA proposes include:

- Multifamily Performance Program (MPP): NYSERDA is committed to streamlining and simplifying MPP in an effort to increase its utility to a greater number of building owners

performing a wider variety of improvements to their buildings. To this end, NYSERDA will work with various stakeholders in 2015 to discuss specific ways to improve MPP including:

- Removing the requirement to conduct a comprehensive, whole-building audit and achieve a minimum of 15% energy savings,
- Developing an incentive structure that will support any level of building improvements but will encourage more comprehensive projects, and
- Streamlining the oversight and quality control processes to allow projects to pursue their goals more quickly.

Incentives will remain available through 2017 in the market rate component of MPP, which will protect previous gains made in the multifamily sector while supporting those projects that strive to pursue the most energy savings. As the CEF initiatives presented previously begin to make gains and reduce the many barriers preventing building owners from pursuing energy projects on their own merit, the program will reassess the purpose and application of direct incentive support. NYSERDA will also work more closely with utilities as they continue to provide and refine their multifamily programs. This collaboration will focus on more seamlessly promoting the collective utility/NYSERDA multifamily initiatives with the intent to eliminate any programmatic overlap, market confusion or uncertainty.

- GJGNY Financing: The financing offered through this program will transition to a greater variety of financial solutions as developed and piloted through the multifamily sector CEF financing strategies as described above. As those solutions demonstrate viability, MPP will leverage and promote those options to participating building owners.
- Advanced Submetering Program: The program will close under the CEF. Again, NYSERDA will work with the utilities that are interested in pursuing submetering programs as part of their REV offerings to share the experience, contacts, and lessons learned through the administration of this program.

6.5 Residential

NYSERDA's market research in the residential single family sector revealed that thermal comfort, water heating, space heating, and lighting represent the economic energy efficiency opportunities with the largest potential within the sector. The primary barriers identified to realizing that potential include: (1) inertia and lack of awareness of the potential value of energy efficiency and distributed generation, (2) disinclination to take on complicated projects with insufficient confidence in projected savings, (3) lack of attractive service offerings that are easy to say "yes" to, often as suppliers lack scale and a ready market for which to develop more compelling offerings, compounded by the economic challenge of customer acquisition costs that are high relative to project potential, and (4) cost and finance sensitivity.

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.

Under the CEF, Residential initiatives will transition away from relying on open enrollment incentives as the primary driver for the installation and sale of energy efficiency measures to focus on the following strategies in line with the CEF's overall approach, including:

- Information, Awareness, and Demand; enhancing consumer confidence and establishing value propositions
- Development of Standardized Tools and Resources
- Strengthening clean energy partners by providing technical assistance and training to make use of new tools and skills
- Piloting and demonstrating emerging and underutilized technologies that improve building performance to drive widespread adoption.

While NYSERDA will seek to enable whole- house energy upgrade projects without incentives in the future, NYSERDA will initially continue to provide incentives to maintain progress made to date and enable development of new business models for high performing contractors

More detail on the specific initiatives that fall under these market-development strategies for the Residential sector is provided below.

6.5.1 New Initiatives

From 2016-2018, NYSERDA intends to explore the following initiatives:

- Incorporating the value of energy efficiency into homes, particularly as it relates to home resale
- Providing no- and low-cost energy saving tips
- Sponsoring public forums to share best practices and home energy improvement data
- Supporting the development of an on-line communications platform
- Supporting the development and use of product, data and building performance standards
- Developing and testing standard building energy efficiency packages
- Increasing access to efficiency financing products
- Supporting the HPwES contractor network while also encouraging more single-trade and other home renovation contractors to undertake energy efficiency work
- Leveraging partnerships throughout the community and business sectors to increase availability of, demand for, and access to energy services.
- Demonstrating new technologies, such as an efficiency meter, to support widespread adoption

The cumulative benefits of these initiatives are presented in Section 12.

Information, Awareness, and Demand

Incorporating the Value of Energy Efficiency into Homes
NYSERDA proposes to encourage demand for energy efficiency by providing more information on the value proposition of clean energy. Specific activities will include incorporating the value of

energy efficiency into homes at the time of sale. Steps to achieve this goal will begin in 2015, and will include testing the effectiveness of a home efficiency rating score, piloting a home performance certificate that is issued upon completion of a home performance project in a home, incorporating this information in Multiple Listing Service (MLS) real estate listings, and working with the real estate sector to help both buyers and sellers understand the value and opportunities associated with energy efficiency information at the time of sale. This will also lead to efforts to value energy efficiency in mortgage underwriting, encouraging preferential mortgage rates and underwriting standards for efficient homes, and working with the insurance industry to consider the benefits of energy efficiency in insurance rates.

No and Low-cost Energy Saving Tips

There are a variety of tools that can make information and education more accessible to consumers and help drive demand for clean energy products and services. NYSERDA proposes to provide compelling, user-friendly information on topics such as no-cost or low-cost tips for reducing energy consumption; decision-making guides for retail purchases and equipment repair vs. replace decisions; and benefits and costs of energy management and distributed generation systems. This information will enhance NYSERDA's existing web site starting in 2015, and is geared at increasing transparency and awareness about clean energy, increasing the likelihood that consumers will factor it into their decision making process.

Public Forums to Share Best Practices and Home Energy Improvement Data

NYSERDA will also work to enable the sharing of data relevant to the level of home energy improvement activity taking place within a community, and the performance of improvements. NYSERDA will develop case studies on an on-going basis of actual homes that have undergone energy efficiency improvements, describing not only the energy benefits, but also non-energy benefits related to health, comfort and safety experienced by those homeowners. NYSERDA also proposes to organize and host public forums to get trusted community representatives and contractors in front of local consumers, enabling an exchange of information about energy efficiency upgrades and the benefits to homeowners and the community.

On-line Communications Platform

NYSERDA also intends to explore the value and feasibility of developing or expanding on-line forums that provide information to consumers about home improvements and connect them with high-quality service providers as well as easy-to-understand information that can aid in decision making. While many such sites exist, they do not currently address energy efficiency as a type of improvement, or in all cases, address the quality of the work performed by the contractors listed. This information will help to increase customer confidence in a contractor's ability to execute effective energy projects, increasing the likelihood that the project will move forward. NYSERDA also proposes to explore the value of developing an on-line planning tool for homeowners that can upload information from a home energy audit, and help the homeowner prioritize and plan a number of home improvements over time. This platform would also identify opportunities for the homeowner to save money on the home improvements by linking to manufacturer or utility rebates and other incentive information. These activities will begin in 2015 and private sector partners will be sought, with a goal of launching information through on-line resources no later than 2017.

Development of Standardized Tools and Resources

Product, Data and Building Performance Standards

Standardization in the Residential sector enables better and more consistent performance of energy improvements, improved reliability of information, and a more rapid expansion of the market. Standardization may also be used to simplify the decision-making process for homeowners seeking to improve the efficiency of their home. Examples of standardization in the Residential market include ENERGY STAR appliances and Home Energy Scores or certifications. NYSERDA will continue to support on-going development and use of standards, including the following:

- Product and quality installation standards and criteria, such as those of the ENERGY STAR program, Consortium for Energy Efficiency (CEE), American National Standards Institute (ANSI), Air Conditioning Contractors of America (ACCA) and Building Performance Institute (BPI), to ensure high levels of home, equipment and material performance;
- Data communication standards (HPXML) to enable seamless data transfer between contractor tools and automation of processes supporting project development, such as calculating payback times and cost-effectiveness of improvements, and
- Building performance standards and criteria, such as the U.S. DOE Home Energy Score (HES) and BPI 2101S (a standard for a Certificate of Completion for residential energy efficiency upgrades).

Building Energy Efficiency Packages

Similar to interventions in the Commercial and Industrial sectors, NYSERDA will also develop and test standard energy efficiency "packages" in the residential sector. NYSERDA will use two existing large-scale projects as a launching point in 2015, exploring the degree to which this approach credibly delivers high performance efficiency solutions at a lower aggregate cost and greater ease. NYSERDA will also leverage existing data resources to identify up to 15 home categories to determine what set of measures or "packages" are typical for each category. This research is expected to begin in 2015, and will be followed by a pilot testing the appeal and performance of these packages, assessing to what degree the approach can be successfully used by home performance contractors, demand aggregators, HVAC firms, insulation and air sealing contractors, and ESCOs to grow their businesses. In addition, these packages could be used by utilities to drive scale across their systems or be strategically deployed in geographically targeted zones for system efficiency needs.

Increase Access to Efficiency Financing Products

NYSERDA will also encourage the entry of multiple private financial products into the market to increase access to financing for efficiency projects and drive down contractor "soft costs" (such as administrative burdens associated with current lending products offered through the program), improving the customer business case. Work in this area will also eventually lead to efforts to engage real estate professionals and others related to home sale transactions, once demand for energy efficient homes and confidence in energy savings is demonstrated. Work on pilots is expected to continue through 2017, with statewide implementation of successful approaches in 2018.

Strengthening Clean Energy Partners

Supporting Current Partners and Building Solutions Around New Market Segments

Investments will continue under the CEF to support the HPwES market and contractor base; however efforts will also be made to work more aggressively with the segment of the residential market not interested in more comprehensive energy savings, including single trade businesses such as insulation companies and HVAC firms, and related contractors who engage with consumers on a regular basis. For example, HVAC contractors touch approximately 40% (>2.2 million interactions/year) of existing one-to-four family homes in NYS on an annual basis, and on these more routine service visits, renovations and equipment replacements are an opportunity for encouraging additional energy efficiency improvements. In addition, home renovation contractors installing new kitchens or bathrooms, or those building an addition, represent opportunities to introduce energy efficiency into the scope of work. NYSERDA will promote the growth of both comprehensive services, as well as enhanced energy efficiency services through the single trade and home renovation sectors of the market, to enable additional clean energy opportunities wherever customer interactions occur. Specific activities will include the following:

- Providing technical support resources at the community level, and ensuring that available training options are high quality through continuing accreditation of training organizations and effectiveness evaluation of training programs. (This work will be done in coordination with NYSERDA's Workforce Development efforts, described in section 6.10.2)
- Fostering conditions that encourage the use of technology-enabled auditing, modeling, and M&V, making it simpler and more cost effective to identify and verify energy savings opportunities. Different audit approaches and tools would be piloted on an ongoing basis to identify the most effective options.
- Exploring a pilot to deploy an efficiency meter[46] as an opportunity to aggregate savings from a number of projects completed by a contractor or group of contractors in a utility service territory, establishing a value for such aggregated savings. This pilot is envisioned to start in 2015, and as soon as 2017, be performed in collaboration with a utility to support new business models under REV.
- Expanding the service delivery infrastructure to include home inspectors, energy raters, home auditors and others who will be trained starting in 2016 to provide a home energy rating for homeowners seeking to include energy performance information in their real estate listing.
- Encouraging alternate business models and approaches, including encouraging single trade contractors, energy service companies providing commodity options and distributed energy resource providers to pursue energy efficiency upgrades.
- Exploring the business case for performance contracting in the residential sector, by leveraging standardized modeling, benchmarking, and M&V, exploring options to support

[46] An efficiency meter would work by aggregating the savings from a number of projects accomplished by the same contractor or group of contractors, measuring the savings, which could be the basis for system efficiency decision making and/or resource acquisition activities by utilities.

performance guarantees for contractors, and encouraging more financing options. This initiative is expected to be enhanced by successful demonstration of the efficiency meter.

Leveraging Partnerships

NYSERDA proposes to work with trusted partners in local communities to provide access to information about energy efficiency and renewable energy improvements in homes and neighborhoods. As demonstrated in GJGNY, resources within the community, such as local not-for-profit organizations, can promote and support aggregation projects throughout the community, replicating the process across numerous employers and organizations, with NYSERDA's support. Other potential high-leverage partners and the resources they can provide include:

- Manufacturers, distributors, and professional trade organizations, to encourage the installation of high efficiency equipment and encourage HVAC and other equipment or material installers to present or provide additional efficiency upgrades. These upstream partners are in a position to benefit from the high quality installation of high efficiency equipment and products, as satisfied consumers will realize the benefits of high performance.
- Home improvement and department stores, as consumer demand for services increases, to increase the scale of energy efficiency work done in the residential sector, as these stores encourage their contractor networks to obtain the training and tools necessary to perform energy efficiency work.
- Local governments and institutions, such as Chambers of Commerce and other local not-for-profit organizations, to help provide additional outreach to engage contractors, particularly those who may be difficult to reach otherwise.
- Insurers, to provide a rate discount for homes that have achieved certain energy efficiency scores or have accomplished certain energy efficiency work (e.g. an energy efficient home will not have ice dams that often result in damage to the home that insurers pay to remedy).

6.5.2 Evolution of Previously Authorized Residential Programs

NYSERDA intends to focus on initiatives that address a wider variety of barriers and more effectively animate the market or support new market approaches, as described above. As consumer demand increases in a more natural manner, soft costs of doing business are reduced, and a more competitive market emerges, incentives that have traditionally been offered to reduce first costs will have less impact on the market. NYSERDA will measure and validate these changes, gradually reducing and eliminating incentives over time. In doing so, caution will be given so as to not disrupt progress that is being made, to build on successful program attributes, and in recognition that incentives may remain necessary, particularly as transition vehicles.

Activities that NYSERDA intends to transition away from over time include subsidized audits, advertising, and consumer and contractor incentives. These types of financial interventions will no longer be needed as customer acquisition costs of energy efficiency projects are reduced, industry stakeholders (including manufacturers) become the primary source of consumer marketing and more competitive, private sector financing options enter the market. To provide adequate time for

contractors and builders to adapt and for the new initiatives under the CEF to take hold, many of these incentives will be available into the CEF. Building towards the start of the CEF in 2016, NYSERDA will consider, in partnership with partners, appropriate incentive structures over the transition. Details on these programs will be included in the Investment Plan expected to be filed following a PSC Order on this CEF Information Supplement.

6.6 Low-to-Moderate Income

Of the 7.2 million households in New York, an estimated 2.9 million – roughly 40% of the households in the state – have an annual income that is less than 80% of the State Median Income (SMI); nearly 2.3 million of these households have incomes below 60% of the SMI.[47] Many of these households spend a disproportionate share of their annual income on energy bills,[48] relative to higher income New Yorkers.

If New York State is to meet its ambitious clean energy, environmental, and affordability goals, it must enhance access to and uptake of renewable and energy efficiency solutions for LMI households and communities. For the purpose of targeting CEF investments and maintaining alignment with other state and federal energy and housing programs, NYSERDA defines the low-income market segment as households with annual incomes at or below 60% of the SMI, and the moderate-income market segment as households with an annual income below 80% of the Area Median Income (AMI), or SMI, whichever is greater.[49]

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 and/or skepticism about the ability to deliver on performance among residents and building owners, and (3) lack of coordination across state-sponsored LMI focused initiatives and community and financial organizations. Importantly, the research also identifies key consumer decision points that represent the greatest opportunity to intervene to overcome associated barriers, including change in occupancy, new construction, , and building refinancing (which often coincides with substantial capital and deferred maintenance projects in this sector, particularly in affordable housing developments).

In recognition of the unique barriers faced by the LMI sector in accessing clean energy products and services from the marketplace, NYSERDA proposes to continue many of the current LMI

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[47] 2013 American Community Survey

[48] According to the 2014 Home Energy Affordability Gap, by Fisher, Sheehan, and Colton, many low-income New Yorkers face energy burdens that exceed 30% of their annual income.

[49] The Weatherization Assistance Program (WAP), Home Energy Assistance Program (HEAP), and utility bill payment assistance programs have established an income eligibility threshold of 60% of the SMI, while eligibility for housing assistance under the United States Department of Housing and Urban Development (HUD) extends to 80% of the SMI or AMI.

activities, including existing residential and multifamily low income incentives; technical assistance and quality assurance; workforce development efforts; education, outreach, and awareness;, and support for communities. While these activities will be maintained and in some instances enhanced, NYSERDA recognizes that they alone will not be sufficient to meet the state's broader objectives for low and moderate income energy customers. The thrust of new strategies, consistent with the overall CEF approach, will be aimed toward:

- Enhancing statewide coordination on LMI-specific initiatives and opportunities to expanding the reach of LMI initiatives and households served
- Leveraging information and data to conduct targeted outreach
- Strengthening clean energy partners in the LMI sector
- Aggregating and simplifying access to programs with new tools and resources
- Piloting and demonstrating the efficacy of clean energy and affordability solutions tailored to address the particular needs of LMI customers and communities

More details on the specifics of these strategies are enumerated below.

6.6.1 Continued and New Initiatives

As part of the CEF, NYSERDA intends to execute the following initiatives in the LMI segment of the residential market:

- Continued financial support for homeowners, renters, and affordable multifamily building owners through a combination of incentives and low-interest financing
- Continued support for the construction of high performance affordable housing through incentives and technical assistance
- Greater statewide coordination and alignment of programs with other agencies, including New York State Homes and Community Renewal (HCR) and the Office of Temporary and Disability Assistance (OTDA)
- Providing tools and resources to streamline access to LMI-oriented programs and financing opportunities, such as an Energy Efficiency Clearinghouse for affordable housing developers
- Fostering LMI Solar initiatives that increase affordability of solar for LMI customers, including Community Solar opportunities (described in Section 6.10.1, Communities)
- Providing technical assistance and support activities to embed clean energy solutions upstream of LMI customers, for instance by working close with HCR on policy processes in the affordable housing sector
- Pursuing innovative pilot and demonstration projects, that leverage aggregation to spur deep energy retrofits in the affordable housing developments
- New LMI-sector workforce development and training initiatives

In addition to the initiatives that will be implemented specifically for the LMI market, NYSERDA expects that the initiatives implemented for the residential and multifamily sectors will have a positive impact on the state's LMI population. For example, in the multifamily sector, the building labeling initiatives will increase awareness and demand for energy efficient buildings across

income levels, creating an economic incentive for all building owners, including in the LMI sector, to improve building performance. Likewise, in the residential sector, home energy scores could influence renter occupancy levels among lower income families and individuals seeking to reduce expenses. In the single family and multifamily areas, NYSERDA's investments in tools, resources, and expanding contractor capacities and business models will have positive impacts on those businesses who serve the LMI sector, thus driving down soft costs and increasing the quality of work done across all areas of the residential sector.

The cumulative benefits of these initiatives are presented in Section 12.

Financial Support

NYSERDA proposes to continue to offer incentives for energy efficiency and clean energy adoption in the LMI sector, where ongoing cost barriers exist to adoption and market-based solutions are not available or will take longer to develop. Incentives will continue to be provided for energy efficient projects in existing residential and multifamily low-income buildings and for affordable new construction. In addition, the low-interest financing options for energy efficiency and solar electric in the LMI sector that originated under GJGNY will continue to be available, as will free and reduced cost audits.[50]

For existing homes, NYSERDA proposes to continue to make incentives available to single family LMI households through an alignment of the EmPower NY and Assisted Home Performance with ENERGY STAR programs,[51] providing certain energy efficiency services at no cost to homeowners and renters with annual incomes at or below 60% of the SMI, and providing incentives, including low-interest financing, for energy efficiency upgrades for homeowners with incomes at or below 80% of the AMI. For multifamily buildings, NYSERDA will explore the restructure of LMI incentives including the provision of financial support for all levels of performance improvements in existing buildings (eliminating the 15% minimum reduction requirement and the requirement that building owners conduct comprehensive, whole building audits and retrofits) and providing increasing levels of incentives for greater consumption reductions to encourage comprehensive improvements. Incentives for developers and builders of affordable new construction projects will be continued, to help offset the costs associated with achieving high levels of energy performance in new buildings.

As described in more detail in the Evolution of Previously Authorized LMI Programs section, LMI incentive offerings will be administered with the goal of streamlining design and delivery to maximize the impact of available funding and expand the reach of services.

Increased Coordination

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[50] In May 2015, NYSERDA convened a working group comprised of community-based organizations, contractors, and installers to consider options for expanding access to low-interest financing for LMI consumers.

[51] EmPower New York provides comprehensive energy efficiency services and in-home energy education, at no cost to the recipient, to households with annual incomes at or below 60% of the SMI. Through the Assisted Home Performance with ENERGY STAR program, homeowners with annual incomes at or below 80% of SMI or AMI are eligible for a partial incentive on the cost of whole-house energy efficiency upgrades.

NYSERDA will coordinate with state, federal and private entities to develop comprehensive improvements to policies and programs that affect LMI customers. Where possible, NYSERDA will also provide technical assistance to help embed energy performance into other state programs. NYSERDA proposes to pursue greater coordination and better serve LMI customers and communities by working with:

- HCR to increase coordination between NYSERDA and HCR efficiency programs, including NYSERDA's EmPower NY and Assisted Home Performance with ENERGY STAR programs and HCR's WAP. The increased coordination among these programs will better serve LMI customers and potentially expand the penetration of efficiency measures in LMI communities.
- HCR to coordinate more closely on exploring systematic improvements to policies and processes that will ensure the benefits of clean energy are embedded upstream of tenants and building owners. These processes include the Low-Income Housing Tax Credit (LIHTC) allocation process (for instance by evolving energy efficiency requirements in the state's Qualified Allocation Plan), streamlining eligibility requirements for Consolidated Funding Application (CFA) funding, and the development of a Green Physical Needs Assessment (PNA) that will standardize building owner approaches to incorporating clean energy measures into affordable housing developments at time of re-financing and re-capitalization.[52]
- OTDA to maximize the reach of HEAP[53] funds through increased consumer education and targeted efficiency services
- HCR, New York City Housing Authority (NYCHA), New York City Housing Preservation and Development (NYC HPD), NYPA, and HUD on increasing energy performance, clean energy options, and private capital in affordable housing efforts
- Local government and/or applicable state and federal affordable housing program administrators to increase the energy efficiency for low-income rental housing (e.g.: Housing Choice Voucher program)
- Non-governmental Organizations (NGOs) on consumer/community education and outreach, in addition to possible aggregation pilots that would scale clean energy deployment in LMI neighborhoods and potentially make such pilots attractive to third-party financing partners
- Utilities to expand/enhance their impact on LMI consumers, to ensure NYSERDA activities compliment REV activities, and to refer payment troubled consumers for energy efficiency services

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[52] The DOE WAP effort provides grants to states, territories, and some Indian tribes to improve the energy efficiency of the homes of low-income families. These governments, in turn, contract with local governments and nonprofit agencies to provide weatherization services using the latest technologies for home energy upgrades. The LIHTC program issues tax credits for the acquisition, rehabilitation, or new construction of rental housing targeted to lower-income households. For more information on Green Physical Needs Assessments visit http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/capfund/gpnatool, and for more information on the CFA please visit https://apps.cio.ny.gov/apps/cfa/.

[53] HEAP is a federally funded program that assists low-income New Yorkers with the cost of heating their homes. HEAP also offers an emergency benefit for households in a heat or heat related energy emergency.

- Multiple state agencies to develop the means to improve the eligibility screening process and streamline access to multiple services/programs
- Philanthropic organizations to explore the development of resources that will increase availability of energy efficiency and clean energy options for LMI consumers and communities

NYSERDA will begin coordination with partners beginning in 2015 and will continue to explore additional opportunities to reduce administrative barriers and program complexity, increase the impact and reach of LMI energy programs, and improve access to energy products and services for customers through regular engagement with partners from federal, state, and local government; the private sector; utilities; and communities.

Development of Tools and Resources

Technical Assistance and Quality Assurance

NYSERDA will provide technical assistance to contractors, builders, installers, and developers to improve the energy performance of existing and affordable new construction projects. Technical assistance may take the form of case studies or technical papers for contractors, builders, and installers; operations training; development of owner's manuals and guides for multifamily buildings; and tenant education materials.

In addition, the quality of work performed through NYSERDA program offerings will be ensured through a comprehensive quality assurance and contractor scoring protocol. The quality assurance effort will enhance customer confidence; highlight areas to improve contractor, installer, and builder technical skills; and provide a layer of consumer protection.

Energy Efficiency Clearinghouse for Multifamily Affordable Housing

NYSERDA proposes to begin working with other entities such as housing regulators, utilities, and financial institutions to create “one-stop shop” platforms in markets or regions throughout New York State in 2015. These entities will assist building owners by: i) aggregating utility and state incentive programs and other resources designed to spur adoption of clean energy measures in affordable multifamily buildings; ii) connecting owners and developers to financing opportunities for building retrofits; and iii) working hand-in-hand with owners to pursue those opportunities that best meet their specific needs and projects. This resource may also evolve to include solar and other renewable generation opportunities in addition to efficiency programs.

Green Physical Needs Assessment

In conjunction with HCR, HPD, and other stakeholders, NYSERDA will explore the development of a Green PNA Tool, which will standardize energy assessments in buildings when they undergo evaluations for other capital improvements and upgrades. The Green PNA will illuminate energy savings and efficiency opportunities to building owners and projects developers at the most opportune times, i.e. when the project is being re-financing or re-capitalized.

Pilots and Demonstration Projects

Demand Aggregation

NYSERDA proposes to explore models of demand aggregation such as that used in the Netherlands' "Transition Zero" initiative[54] that harness market forces to motivate the construction and energy industry to develop deep energy solutions that meet criteria set by building owners and management companies. This model would bring robust energy, environmental, and health benefits to residents of LMI communities and would be particularly applicable in the multifamily affordable housing sector, where aging and like building stock may have similar capital improvement needs. These models will be piloted in 2016 and 2017.

Demonstrations to Increase Energy Affordability

As the CEF and REV unfold, NYSERDA also plans to support pilot and demonstration activities that advance solutions for increasing energy affordability for LMI consumers, directly or through other actors (i.e. utilities, developers, vendors, human service providers, etc.).

Information, Awareness, and Demand

Education and Outreach Efforts

NYSERDA will conduct consumer education and outreach efforts, including energy efficiency and financial management workshops and in-home education, targeted specifically at LMI consumers to increase their awareness and influence their energy use behaviors. In addition, education and awareness activities will be directed towards affordable housing developers, builders, and landlords to make the case for clean energy improvements. These awareness efforts will leverage other state partners, including housing regulators, and trusted local intermediaries where possible. The Low-Income Forum on Energy (LIFE) will also continue to be a vehicle to drive awareness through activities (meetings, conferences, webinars, & newsletters) on topics such as best practices, emerging energy issues, energy efficiency/assistance programs, and consumer protections.

Leveraging Community-Based Organizations

NYSERDA will also work with communities to explore opportunities to increase outreach, awareness, and adoption of energy efficiency and clean energy solutions among low to moderate income consumers. Community based organizations will be used to drive demand, educate consumers and provide feedback to NYSERDA on the needs of the LMI community and how to most cost effectively serve these consumers. Community based organizations are in a unique position to understand and communicate the level of need in the community and assist NYSERDA in effective targeting of services. Community-based organizations are also, in many cases, able to bring multiple programs serving the LMI sector together to maximize the effectiveness of work being accomplished in homes. NYSERDA will explore lessons learned from various community-based outreach functions, including those of GJGNY, to better define best practices, and identify characteristics of organizations that have achieved success in cost-effectively facilitating energy services for LMI households. This information will be used to support the selection of community-

[54] More information on this initiative can be found here: http://energiesprong.nl/transitionzero/

based organizations through a competitive process to provide outreach services to LMI communities.

Strengthening Clean Energy Partners

NYSERDA proposes to leverage workforce development and training opportunities to serve the LMI community, with a focus on job placement and exploring opportunities for disadvantaged or displaced workers. LMI focused workforce development activities include:

- Assessing labor market information to identify areas where lack of skilled labor is an impediment to industry growth - whether this includes skill enhancement for incumbent workers or entry level technical training for new or transitioning entrants to the workforce
- Clearly defining career pathways for those seeking to enter the clean energy workforce and focuses on promoting career opportunities within communities who might not otherwise be served
- Improved mechanisms to help businesses connect with the right workers in targeted LMI communities
- Coordination with the New York State Department of Labor (DOL) to support innovative approaches to employer-driven workforce development opportunities for disadvantaged workers
- Facilitating connections between training organizations and employers in order to provide existing workers with new skills and attract candidates for training and apprenticeships for careers to support REV and the CEF such that all New Yorkers may access the good paying jobs that emerge as the clean energy economy expands
- Acting as an information resource and trusted objective source to educate consumers about the importance of trained and certified practitioners and accredited businesses on quality assurance and consumer satisfaction and protection

LMI Solar

Over the course of NY-Sun, LMI Solar efforts will prioritize increasing the proportion of LMI customers that are served by the mainstream solar industry, while addressing specific barriers to accessing solar faced by many LMI customers. Strategies to increase access to solar for LMI households include a targeted additional incentive for projects that incorporate efficiency and provide direct benefits to LMI customers; support for LMI solar financing strategies, and efforts to reduce soft costs associated with LMI solar projects through partnerships and stakeholder education.

Throughout, LMI Solar initiatives will be closely coordinated with other efforts focused on LMI customers and communities. NYSERDA will also provide technical assistance to local governments and affordable housing providers to address gaps in knowledge and technical capacity that limit adoption of solar for LMI residents. In addition, NYSERDA will explore opportunities for leveraging funding to address issues such as roof repair and structural deficiencies that may inhibit the ability to install solar electric systems. LMI Solar interventions will be designed and evaluated based on the direct benefits to LMI customers and will include quality assurance protocols to ensure that

installations perform as intended. NYSERDA's LMI solar efforts will take advantage of aggregation models such as Solarize, potential regulatory changes such as Community Net Metering and REV demonstration project opportunities, and opportunities to leverage philanthropic funding.

6.6.2 Evolution of Previously Authorized LMI Programs

As NYSERDA transitions to the CEF, current efforts directed towards low and moderate income customers will be assessed and modified where necessary to increase impact, operational efficiencies, and leverage with LMI focused initiatives administered by other entities. As discussed above, these efforts will also be complemented with new initiatives to improve affordability and access to clean energy options.

The core programmatic elements developed under GJGNY will continue to be funded and prioritized under the CEF. NYSERDA will continue to fund low and no-cost home energy assessments and workforce development efforts, and will continue to offer low-interest financing options for LMI customers.

As discussed above, NYSERDA will explore closer alignment of the LMI energy efficiency efforts to streamline delivery, reduce overhead costs, and expand the number of units served. For example, alternatives to the current residential single family incentive structures offered under the Assisted Home Performance with Energy Star and EmPower NY programs (e.g. providing a maximum dollar amount towards measures instead of a covering a percentage of costs) will be explored to maximize the value of the program. NYSERDA also plans to explore the restructure of LMI multifamily incentives. Potential changes include providing financial support for all levels of performance improvements in existing buildings (eliminating the 15% minimum reduction requirement and the requirement that building owners conduct comprehensive, whole building audits and retrofits) and providing increasing levels of incentives for greater consumption reductions to encourage comprehensive improvements.

NYSERDA also intends to explore coordination with utilities, other LMI focused energy and housing programs, and other actors to increase energy affordability and clean energy options for LMI consumers. Program details will be provided in the Investment Plan expected to be filed with the Commission following a PSC Order on this CEF Information Supplement.

6.7 New Construction

The statewide new construction and substantial renovation market is projected to be approximately 60 million square feet of commercial space[55] and 20,000 dwelling units[56] per year from 2015-2018.[57] Deep energy saving projects currently represent less than 2.5% of that market,

[55] Including multi-family new construction more than four stories
[56] Including single and multifamily construction four stories or less
[57] Estimate based on Dodge McGraw-Hill Construction Starts forecasts for New York State, which includes new construction and substantial renovations, and US Census Residential New Construction Building Permits Survey

creating a major opportunity for enhanced energy savings.[58] Going forward, NYSERDA proposes to pursue activities that focus on driving deep energy savings and zero net energy performance in new buildings and substantial renovations.[59] Under the CEF, New Construction initiatives will transition away from relying as heavily on open enrollment incentives to focus on the following strategies, in line with the overall CEF approach:

- Increasing Information on, awareness of, and demand for deep energy savings and zero net energy construction
- Strengthening the capacity of clean energy partners in the building design and construction sectors
- Providing technical assistance and developing standardized tools, templates, practices, and methods for practitioners; ensuring quality assurance through performance validation and M & V
- Piloting and Demonstrating deep-energy savings methods to encourage replication

Importantly, NYSERDA plans to continue targeted incentives for owners, developers, and builders as a bridge to help overcome initial cost and risk barriers for design and construction related to building deep energy saving and zero net energy buildings. The support will enable participation in key conversations with decision makers early enough in the design and construction process to influence the results, and support more advanced technologies, designs or deep energy saving performance based outcomes. NYSERDA will develop a plan to reduce and eliminate this financial support over time as particular owners, developers, and builders become proficient in creating self sustaining business models.[60]

Through these strategies, NYSERDA will facilitate a new construction market in New York State where residential and commercial building owners, occupants, and developers routinely demand and the construction community routinely delivers successful deep energy saving and zero net energy performance buildings.

More details on the specific initiatives that fall within these strategies are provided below. The cumulative benefits of these initiatives are presented in Section 12.

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for New York State, which includes new construction but does not include substantial renovations. Mobile home construction is not included.

[58] The estimated penetration of deep energy savings projects for the commercial market is based on NYSERDA New Construction Program data showing that projects that are at least 40% more efficient than energy code requirements, represent 3% of program activity based on square footage, and the "Phase One Process Evaluation and Market Evaluation of the NYSERDA New Construction Program Final Report" (Navigant Consulting, April 2014) findings that the Program accounts for 37% of new construction activity based on square footage in the State outside of Long Island. For the residential sector, program activity indicates a project pipeline anticipated to be completed within the next 12 to 18 months representing roughly 350 dwelling units targeting net zero energy performance. The 350 dwelling units represent roughly 2% of the 20,000 dwelling units a year of New Construction Building Permits for New York State estimated from the US Census.

[59] While the strategies and opportunities are described in terms of individual buildings, it is recognized that it may make sense to pursue some of the activities targeting multiple buildings, such as campuses and districts.

[60] Indicators for reducing financial support could include reductions in incremental costs, changes in market penetration and changes in code.

6.7.1 New Initiatives

From 2016-2018, NYSERDA intends to explore the following initiatives:

- Creating a NY Zero Net Energy for New Construction in Buildings Road map identifying key actions, value propositions, and deliverables required to accelerate engagement in deep energy savings and zero net energy performance
- Expanding design and construction capacity with viable business solutions including standardized modeling tools, technical assistance and training
- Piloting strategies for achieving deep energy savings and zero net energy performance to mitigate risk and identify replicable solutions
- Supporting replicable deep energy savings and zero net energy building demonstrations to increase market confidence
- Reducing soft cost with best-in-class building templates, performance validations, and M&V
- Supporting next generation HVAC equipment (e.g., smart technology, integration between systems)
- Integrating renewable and hybrid (renewable plus mechanical) energy sources to minimize energy use, for example daylighting, natural ventilation, solar electric, solar thermal, heat recovery, or ground-source heat pumps
- Supporting "smart buildings" by conducting pilots to demonstrate viable performance solutions and models and supporting the development of standards
- Increasing market awareness and demand through information clearinghouse strategies with trusted market partners
- Fostering a supportive market infrastructure through policies such as high performance design guidelines or advances in the energy code

Information, Awareness, and Demand

Zero Net Energy Road Map

Zero Net Energy initiatives are promising and necessary; however, challenges exist, including solution readiness and industry capacity. Within the last five years, zero net energy and very low energy use buildings, including passive houses, have moved beyond the realm of the small, proof-of-concept demonstration projects by universities, non-profits, and early adopters among home builders to include many common building types and sizes, including the affordable housing sector.[61] Nationally, there are now 160 zero net energy verified or emerging commercial projects[62] and 370 zero net energy ready homes.[63] In New York State, there are 7 zero net energy verified or

[61] Building types now include office, primary and secondary school, retail, multifamily, public assembly/community center, warehouse, library, mixed use, districts and residential. While some are still under 10,000 square feet, more than a quarter of the commercial projects are 25,000 SF or larger.

[62] New Buildings Institute "2014 Getting to Zero Status Update," January 2014.

[63] Kris Hudson, "Builders' New Power Play: Net-Zero Homes" Wall Street Journal, January 20, 2015. (http://www.wsj.com/articles/builders-new-power-play-net-zero-homes-1421794129)

emerging commercial projects[64] and 26 zero net energy homes.[65] While this represents real progress, what is not clear is how to move most effectively from this initial stage to a more robust market where more varied building types and customer segments receive the benefits of zero net energy ready buildings.

Development of a zero net energy roadmap would help to identify such a path to improved solutions and scale. Starting in late 2015 or early 2016, NYSERDA proposes developing a New York State-specific roadmap that identifies a sequence of key actions to increase the level of market adoption and scalable, sustained engagement in deep energy savings projects. The roadmap will be used to inform and update the new initiatives proposed in this document. In support of the roadmap NYSERDA will convene stakeholders (including practitioners or professional and trade association representatives for: architects, engineers, and other building design participants; builders; contractors; developers; schools; colleges and universities; commercial real estate; retail; manufacturers of building systems and products; national, state and local environmental, high performance building, or community advocacy organizations; federal, state and municipal agencies involved with energy, housing, and building construction; utilities; and renewable energy professionals) to identify market drivers, gaps, barriers and New initiatives, building off market research findings.[66] The road map will identify specific technology, market, and policy interventions (e.g. techniques, cost reductions, and business models), milestones, timelines, partners, coordination and leveraging opportunities that are needed to scale-up activity and encourage widespread adoption. The roadmap will address multiple building sectors, including commercial, residential, and multifamily, and applicable energy code activities.

Information Resources

NYSERDA will partner with professional associations, community-based associations, industry associations, the US DOE, zero net energy and sustainability advocacy organizations and other market participants to broadly disseminate information to increase awareness of, recognition for, demand for, and knowledge on how to cost effectively achieve very low and zero net energy buildings. The focus of these information clearinghouse activities will be threefold: 1) gathering market insights from targeted sectors and subsectors on key values, benefits, barriers, and decision-making criteria that need to be addressed for driving activity, 2) creating credible, easy to grasp information that addresses the needs and barriers, and 3) broadly delivering the information through trusted market partners and other vehicles.[67] Examples of credible information include:

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[64] New Buildings Institute "2014 Getting to Zero Status Update," January 2014.

[65] NYSERDA Low-Rise Residential New Construction program database. Represents installed projects with a Home Energy Rating System score of 10 or less.

[66] Based on findings in the "Phase One Process Evaluation and Market Evaluation of the NYSERDA New Construction Program Final Report" (Navigant Consulting, April 2014), barriers to net zero energy for the commercial sector include: low awareness, low understanding, no clear definition, skepticism towards energy savings estimates, perceived high costs, and unproven non-energy benefits. Related to advanced technologies, barriers include: financing, uncertain financial returns, concerns about whether facilities staff can properly use advanced technologies, and failures/mixed reports on systems meeting energy savings expectations. Many people are under the mistaken impression that advanced technologies are needed to achieve net-zero energy buildings.

[67] NYSERDA will coordinate these efforts with its other initiatives targeting the commercial, residential and multifamily building sectors. For example, as part of the low income multifamily initiatives, NYSERDA proposes to begin working with other entities such as housing regulators, utilities, and financial institutions to create "one-stop

sector-specific messaging on the benefits of deep energy and zero net energy performance construction; guidance on monetizing deep energy savings and zero net energy strategies; guidance on strategies to ensure ongoing building performance; voluntary platforms and definitions for deep energy and zero net energy that work in the market[68] and also deliver societal benefits; results of demonstration and pilot projects; aggregated project data; best practice protocols; and matchmaking services among building owners, managers and developers, and service providers.

As a component of this initiative NYSERDA will facilitate the development of a "champion's network," engaging those who have successfully executed deep energy savings projects and supporting them where necessary so they can share their experiences with others. Examples of information delivery vehicles include: in-person events such as sector-based professional association meetings or home shows, articles for trade magazines, and social media. Altogether, the information will provide the market with the necessary confidence to move forward on deep energy savings projects. Later in 2015 NYSERDA plans to start building on the initial market insights gathered through its market research with more targeted activities. Other activities will start in 2016, with the majority of the work continuing in future years.

Strengthening Capacity of Clean Energy Partners

Information, Tools and Technical Assistance for the Design and Construction Communities
NYSERDA proposes to engage the architectural, engineering, construction and other supporting communities to develop and strengthen their capacity to create and deliver deep energy savings and zero net energy performance buildings. Through direct project engagement, information sharing forums and partnership efforts, NYSERDA will provide information, tools, and technical assistance. Specific examples of such support include:

- Providing technical guidance reference materials to designers, builders, and others (i.e. best practices, how-to guides on building strategies)
- Providing performance information, guidance on, and targeted support for advanced technologies, products, systems, and strategies
- Providing guidance on effective business models for delivering deep energy savings or zero net energy services for design, performance validation, quality assurance, or other construction aspects
- Facilitating deep energy savings and zero net energy forums to share information;
- Facilitating matchmaking services among design teams, builders, contractors commissioning agents, home energy raters and other market to accelerate exchange of

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shop" entities in markets throughout New York State. We envision that the "one-stop" shops will be able to handle the informational clearinghouse function for disseminating information on very low and net zero energy new construction for its audience.

[68] While the overarching definition of a net-zero energy building as "a building where the energy needs, as a result of the incorporated efficiency strategies, can be supplied with renewable energy technologies", is unlikely to change, as scale increases from the nascent market of today, there may be a need to revisit inherent definitional boundary issues, e.g., site versus source accounting, remote versus onsite metering, or campus versus single building projects.

experience and ideas related to achieving deep energy savings and zero net energy buildings
- Engaging software developers to create more responsive, transparent, and accessible modeling software and tools that yield more reliable, standardized outcomes
- Promoting quality assurance processes to ensure compliance with market best practices and standards
- Promoting quality control processes to ensure that building energy performance meets project goals
- Delivering technical training and direct support to design professionals, builders, home energy raters, commissioning agents, and others to increase skills and adoption of higher performance equipment, systems, construction practices, and better verification practices
- Gathering market insights on barriers and benefits such as key costs, project approaches, project drivers, and decision criteria that need to be addressed for driving activity in order to better understand and prioritize them
- Encouraging best practices in the form of project team support for development of owner's manuals, and tenant education
- Training real estate agents and brokers on understanding and using asset values or other proxies for deep energy savings or zero net energy performance in real estate appraisal and sales tools

Training and technical assistance are anticipated to continue in the CEF, supported by incentives to help bridge the resultant services until the market is ready to support them. The training and technical assistance are essential to increasing the capacity of the design and construction community while reducing soft-costs and even capital project costs. The increased use products, such as Open Studio, provide a platform to aggregate and share data (e.g., results of building energy models and recommendations) to identify trends, best practices, effective strategies, and new product needs. During the CEF transition, NYSERDA also proposes to continue to provide performance based incentives for new construction projects; however the performance level requirements will be increased in anticipation of the code updates in 2016.

<u>Leveraging Partnerships to Increase Scale</u>

NYSERDA will partner with municipal, county, state or other organizations to help develop and support policies that foster the market in supplying sustainable and zero net energy buildings. Examples of potential activities include:

- Working with NYS HCR, NYCHA, NYC HPD, NYPA, and HUD on increasing energy performance, clean energy options, and private capital in affordable housing new construction[69] (as detailed in LMI section 6.6.1).
- Providing technical assistance to help embed deep energy savings energy performance criteria into state, city, district, campus, franchise, or developer requirements, such as new construction design guidelines, HCR and HPD's Unified Funding Application and/or

[69] Note that this is a coordinated effort with the Low Income initiatives for Multifamily, and also described in that section.

Qualified Allocation Plans for affordable housing, zero net energy design guidelines, sustainability criteria or zoning guidelines.
- Sharing results from pilots or capacity building efforts for the design and construction community with NYS Department of State (DOS) and others to inform proposals on how to advance requirements in future codes and standards.

NYSERDA will begin coordination with the identified multifamily housing partners beginning in 2015 and will continue to explore additional opportunities through regular engagement with its partners and market relationships.

Pilot and Demonstration Projects

Deep Energy and Zero Net Energy New Construction Pilots

NYSERDA also proposes to implement pilot and replicable demonstration projects, with the first activities being launched in 2016. The pilots will work with market partners to test deep energy savings and zero net energy business solutions, from economic, risk of performance, and delivery of benefits perspectives. The demonstration projects will support and drive a limited number of deep energy savings and zero net energy projects across key building typologies and New York State climate zones. Pilots and demonstrations will assess models and approaches for supporting building design, construction, and initial start-up on deep energy and zero net energy new construction or substantial renovation projects, including but not limited to: integrated project delivery; performance validation; advanced and emerging heating, ventilation, air conditioning, lighting, control, and building envelope systems; integration of renewables (both thermal and electric); and smart buildings.

The results of these pilots will be shared with the marketplace through related activities in the New Construction market-development sector, for instance through the aforementioned Information Resource or disseminated to the design and construction communities via capacity building activities. This will help reduce risk, increase customer confidence, and enable owners, design teams and other market actors to adopt new approaches into their standard practices. Subject to the outcome of the Zero Net Energy Roadmap initiative, specific pilot and demonstration projects will work with building owners or developers and their construction project teams, and other relevant stakeholder partners,[70] and target:

- Integrated design protocols, to test whether or not integrated design can be successfully delivered (e.g., in term of costs, benefits, depth of energy savings achieved) for a range of projects (e.g., small to large buildings, simple to complex systems, etc.), and if so to identify key elements and skill sets, document best practices, and create one or more simple, easy to execute model integrated design protocols to help teams deliver deep savings projects faster and more cost effectively.

[70] The stakeholder partners mentioned for this initiative are essentially the same list of stakeholders identified for the Zero Net Energy road map initiative.

- Performance validation, which works to ensure that actual building energy performance meets the energy performance goal of the building as it was designed. NYSERDA's goal is to prove the approach or approaches that work for varying building typologies and to develop replicable, viable business models for market actors to utilize going forward.
- Replicable best-in-class building templates for chains/franchises, by supporting one or more retail establishments on a cost effective, deep energy or zero net energy building in exchange for their commitment to incorporate successful results into their other locations.
- Demonstrations for replicable Zero Net buildings targeting key building types (e.g., K-12, Colleges & Universities, Offices) across climate zones, by supporting a small number of projects in the near term, with a focus on pragmatic results, to gather and create credible information on the costs and benefits, including but not limited to cost effectiveness, performance, and replicability.
- Pilots working with the financing market, appraisers and others to incorporate asset values or other proxies for deep energy savings or zero net energy performance into real estate appraisals, mortgage underwriting, interest rates, and other aspects of financing and sales tools.

6.8 Codes

Codes have been recognized as an important strategy for cost effectively reducing energy use and resultant carbon emissions.[71] While the actions of early adopters, informational programs, and financial support often can persuade many in the market to act, codes set new required minimum standards, thereby broadening adoption to the rest of the market. To maximize the effectiveness of codes, NYSERDA activities will focus on strengthening compliance and enforcement of existing codes and on advancing adoption of codes with higher performance goals. While activities will focus on the energy code, activities also will focus on other code requirements related to solar electric, combined heat and power, batteries, and other clean energy technologies.

Although Energy Codes establish the minimum level of performance required of newly-constructed and substantially- rehabilitated buildings, NYSERDA's compliance studies have established the prevalence of non-compliance in new construction activities statewide.[72] NYSERDA's efforts, which have focused on strengthening compliance and advancing adoption of codes with higher performance goals, will continue to be expanded and refined to improve compliance rates in an environment of increasingly stringent performance requirements.

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[71] American Council for an Energy-Efficient Economy. "Comments of the American Council for an Energy-Efficient Economy (ACEEE) on the Environmental Protection Agency's Proposed Clean Power Plan." November 2104. American Council for an Energy-Efficient Economy. "Advanced Building Energy Codes Policy Brief." July 24, 2014.

[72] Vermont Energy Investment Corporation. "New York State Energy Code Compliance Study." January 2012. http://www.nyserda.ny.gov/Cleantech-and-Innovation/EA-Reports-and-Studies/Energy-Efficiency-Services-Reports.

In support of the mandatory adoption of future Energy Codes that will culminate in a Zero Net Energy code by no later than 2025[73], NYSERDA will work to accelerate compliance by providing technical tools and training and targeted support to municipalities, code officials, design professionals, and other construction industry stakeholders. In addition, NYSERDA will expand efforts to engage building owners, communities, and decision-makers in order to reinforce the link between code compliance and energy efficiency, safety, and durability and resiliency, all essential elements in the design and construction of better buildings.[74] Under the CEF, NYSERDA will advance codes through the following strategies in alignment with the overall CEF approach:

- Strengthening Partnerships
- Supporting Code-related Technical Assistance, Training and Tools
- Leveraging Information, Data, and Awareness

More information on the specific initiatives within these areas is provided below. The cumulative benefits of these initiatives are presented in Section 12.

6.8.1 New Initiatives

From 2016-2018, NYSERDA intends to explore the following actions and initiatives:

- Strengthening organizational partnerships with municipalities and with key professional membership organizations and national entities involved in the Energy Code, including encouraging their participation in the development of code strategies applicable to the New York State Roadmap for Zero Net Energy for New Construction in Buildings (Zero Net Energy Roadmap).
- Developing the NY Stretch Code, a model code intended for voluntary adoption, coordinated with the Zero Net Energy Roadmap
- Developing and delivering technical assistance, training, tools, guides and other resources to support code officials and others, including efforts that systematize an expanded role for third party energy specialists in the design and enforcement processes
- Building Information and Awareness through technical studies, data analysis, database development, and dissemination through expanded outreach and engagement efforts

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[73] As a part of its "Multi-Year Program Plan- Building Regulatory Programs" published in 2010, US DOE identified that one of DOE's ultimate goals for codes is for "... net-zero energy buildings to be cost-effective alternatives to traditional construction by 2025 which means that net zero energy buildings should be required in codes by about the same time." National model energy codes are updated every three years. New York State's current goal is to update codes in New York within 18 months of the updated national model codes. It is projected that only five code cycles exist beyond the current code to the statewide minimum code that establishes Net Zero Energy as its baseline

[74] While it is commonly assumed that all New York State construction efforts are safe, durable, resilient, and in full compliance with the state's codes, NYSERDA studies relative to Energy Code compliance confirm that these goals and requirements are not met. The 2012 New York Energy Code Compliance Study, prepared by the Vermont Energy Investment Corporation, presented an average rate of compliance of only 64%, indicating that substantial reductions in energy use are available through fuller implementation of the Energy Code.

Strengthening Organizational Partnerships

Strong partnerships with municipalities and the construction community of practice are critical to ensuring that NYSERDA's activities resonate with the market. NYSERDA will work with each of its partners to: 1) generate a common understanding of the most critical barriers for their community that prevent the code from being fully embraced and implemented into construction projects; 2) identify and test meaningful solutions; and 3) provide support for the dissemination of solutions to their constituents. Depending on the specific partner, activities could be focused on improving code compliance, improving enforcement, or further advancing the code.

Community of Practice Support

NYSERDA will strengthen organizational partnerships with members of its Community of Practice (Architects, Engineers, Code Officials, Construction Managers, Energy Professionals, and Builders/Contractors) to increase the knowledge and awareness of codes and to elevate energy efficiency to a priority as represented by their respective activities. This effort will include supporting the New York State Department of State with technical and regulatory assistance required for the adoption of future codes, working with academia to support educational programs influencing next-generation practitioners, and supporting energy-focused efforts undertaken by partnering organizations, such as awareness campaigns and increased acceptance of third party energy specialists within the design and enforcement processes. Early on, NYSERDA will work with these partners to ensure that the code initiatives are integral to the Zero Net Energy Roadmap.[75]

Municipal Partnership Support

NYSERDA will encourage and support under-resourced communities charged with code enforcement at a period of rapid change in code complexity and performance requirements. To improve compliance and enforcement, NYSERDA will pursue activities such as supporting an expanded role for third party energy specialists in building permit application review and required inspections, and providing targeted support to municipal code officials from plan review through inspection. Through parallel efforts aimed at elected municipal officials, NYSERDA will encourage improvements in personnel and capacity (staff and skills), and improved data management, including testing new solutions and approaches that will yield improved code compliance and enforcement. NYSERDA will work with municipalities to ensure that local priorities are considered in the development of the NY Stretch code, to promote its voluntary adoption, and to assist in implementation.

Model Codes and Code-Related Technical Assistance, Training, and Tools

Code advancement is critical to locking in energy savings and the resultant greenhouse gas emission reductions across the broad spectrum of construction activity in the State. Advanced and enforceable energy codes have been identified as a critical tool that municipal officials can use to encourage greater community-wide energy efficiency and clean energy projects.

[75] For additional information on the roadmap activity, please see the Zero Net Energy Road Map initiative description in Section 2.1.4

Code Advancement and Development of a Model NY Stretch Code

A stretch code is a voluntary addition to the State's minimum and mandatory building and energy codes. Stretch codes define more stringent energy and green construction practices that a municipality can choose whether or not to adopt. Stretch code requirements are typically one cycle ahead of the baseline state energy code. A stretch code can help to: signal and prepare the construction market as to what may be coming in future codes, particularly when multiple communities adopt the same requirements; provide municipalities a vetted, well-coordinated, ready-made model code in regulatory language, thereby reducing resources needed to create and adopt it; and reduce resistance to the next round of advances for a statewide code. NYSERDA will engage municipal officials and promote the NY Stretch code in conjunction with the market-enabling Communities' efforts (see Section 6.10.1).

NYSERDA will work with its Community of Practice partners and municipal officials to test new solutions and approaches for code advancement. NYSERDA's efforts will include:

- Continued efforts to develop and implement the NY Stretch code, requiring investigation of legal, land use, administrative, technical, and community policies and interests
- Work with the United States Department of Energy, New York State Department of State, and regional organizations to author and promote future minimum codes
- Undertaking technical studies that support future code needs

Developing Training and Tools to Support Code Practitioners

The market is currently ill-prepared for the safety and durability issues of tighter buildings and the advances in stringency embodied in current and future codes. From NYSERDA's code compliance studies, and input from those involved in design, enforcement, and construction, the most commonly cited barriers to compliance and enforcement include: lack of knowledge on implementation of the requirements; lack of staff and time for enforcement; lack of understanding or belief in the benefits; the codes' complexity and lack of transparency; and the cost of full compliance viewed as competitive disadvantage.

As codes and compliance become increasingly complex and performance-driven, the market must be educated, trained, and provided with tools to implement and enforce new requirements. NYSERDA will work with organizational and training partners and others to develop and disseminate training and tools tailored to the specific needs of members of its Community of Practice, and to support the advancement of expanded roles for third party energy specialists. Generally, the training and tools will help improve compliance by: improving accessibility to and usability of the code; improving knowledge and skills to achieve better buildings; and providing feedback to clarify gaps or shortfalls in current techniques. Examples of needed tools include a code commentary with background and explanatory information on specific provisions, a technical guide for small scale solar electric installations, and separate instruction manuals for code officials and design professionals. Anticipated code-related technical training topics cover a wide range, as diverse as basic building science and high performance building design. Dissemination activities will target improving the quality of instruction and enhancing electronic access to such training opportunities and tools.

The expanded role of third-party energy specialists builds upon the frameworks established in the codes for third-party and special inspections and in energy-efficient home performance (i.e., US EPA's Energy Star Homes and US DOE's Zero-Ready Homes) for home energy raters. In both frameworks, the specialist helps assure and document compliance with specific performance requirements through testing and inspections. Similarly, within the architectural design process, it is typical for larger and more complex high performance buildings to have specialized code consultants as part of the design team.

Given the heightened safety and durability concerns of tighter buildings, and the lack of staff and time for enforcement, the idea of an expanded third-party energy specialist is gaining traction. The expanded third party energy specialist would be retained by the owner, the design and construction team, or the municipality. The specialist would function in a broader code capacity in the design-through-construction process to ensure that the envelope and energy systems are coordinated and to test and document workmanship and conformance with design details and code requirements. The expansion would further raise the quality and performance of buildings and bring the expertise to projects residing within the bookends defined by high performance small and large buildings.

NYSERDA will work with its organizational and municipal partners to pilot various aspects of an expanded third-party energy specialist role to identify the most promising business structures and construction project typologies for integrating and expanding its activity within the construction market. Pilot activities will test the services to be included, the benefits delivered (increased performance, time saved, etc.), costs, and the expanded skill sets needed for this key market player. The work will include training of raters and others interested in serving this expanded market role to increase their knowledge base.

Information and Awareness

Evaluation of Code Compliance, Construction Activity, and Code-related trends

No centralized or standard data collection associated with energy code compliance exists from which to aggregate data and evaluate and project statewide construction activity, enforcement, and key compliance issues. NYSERDA will work with municipal officials, code enforcement officials and their professional organization to understand regional and statewide compliance, construction trends and patterns. Knowledge gained will be used to shape future training and code advancement efforts and to promote increased municipal acceptance of future code and enforcement measures.

Pilot efforts that test and measure new concepts will be made available through a competitive selection process with a focus on replicable best practices.

Data and results generated will be used to design target training reflecting statewide and regional projected types and scale of construction, and the most common deficiencies that can be resolved through NYSERDA initiatives targeting better building design and enforcement.

6.9 Emerging Technologies

New targeted initiatives as well as evolutions of current programs will be necessary to increase the penetration of distributed energy resources (DER), particularly in the context of the REV proceeding and the expansion of energy markets, technologies, and services. Targeted approaches will encourage the deployment of emerging DER, including energy storage, CHP, renewable thermal technology applications and high efficiency products such as geothermal heat pumps, and home energy management systems. The cumulative benefits of these initiatives are presented in Section 12.

6.9.1 Energy Storage

Energy storage (including electrochemical, thermal, and mechanical systems) will be a key enabling technology to achieve New York State's goal for an 80% GHG reduction by 2050. Storage distributed throughout the electric system can reduce the intermittency of solar electric and wind, helping these resources to serve as flexible assets when needed. It can avoid the need for new transmission and distribution infrastructure, increase system efficiency and resiliency, and reduce the requirement for additional fossil fuel plants to meet periods of peak electric demand, which occur infrequently.[76] Storage can integrate with demand response and energy efficiency measures within buildings to achieve greater energy savings without sacrificing occupant comfort. It can also reduce fossil fuel use in large and small vehicles by recapturing energy generated during braking, increasing fuel efficiency, and enabling greater electrification within the transportation system, which could promote wider adoption of electric vehicles and charging infrastructure, further reducing transportation-related greenhouse gas emissions.

Energy storage is also a significant growth sector in New York State's economy, as has been evidenced by the rapid membership growth in the New York Battery and Energy Storage Technology Consortium (NY-BEST). Established in 2010 with seed funding from NYSERDA, this independent consortium has grown to over 140 companies, system developers, and research organizations. NY-BEST plays a key role acting as an authoritative resource for the energy storage industry, facilitating partnerships, providing access to testing and prototyping services, and promoting New York's assets. An economic impact study prepared by NY-BEST in 2012 identified that the energy storage sector employed nearly 3,000 in New York State, with almost $600 million in global sales annually. Multiple studies have also shown significant growth projections in this industry. [77]

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[76] Average electric system load is approximately 18 GW, yet the system is built to reliably meet well over 30 GW of demand that arise only 60 hours per year.

[77] The NY-BEST Economic Impact Study prepared in 2012 indicated revenues for New York firms reaching $2.5 billion by 2020 with up to 10,000 jobs. A number of worldwide market projections reinforce the massive growth potential in energy storage including a January 2015 Citibank prediction that the global market for storage would comprise 240 GW worth $400 billion annually by 2030. http://www.ny-best.org/sites/default/files/type-page/4254/attachments/2012%2010%2005%20NY%20BEST%20Final%20Report%20%282%29.pdf, and http://cleantechnica.com/2015/02/05/citigroup-report-240-gw-global-battery-storage-market-2030/

NYSERDA's energy storage approach will help to achieve New York State's goal of building a cleaner, more resilient, and affordable energy system for all New Yorkers by:

- Enabling New York's renewable generation resources to be available when needed – including but not limited to instances when the energy grid is affected by power outages or extreme weather events – by incorporating distributed energy storage where economically feasible at customer locations and throughout the transmission, distribution and delivery systems.[78]
- Increasing the overall capacity utilization of the electric system (currently 55%), reducing and shifting peak loads, and augmenting traditional transmission, distribution and delivery system capital upgrades with more flexible options to meet demand growth needs.[79]
- Enabling, in conjunction with the REV regulatory proceeding, the benefits to the electric system of distributed energy storage solutions to be monetized, thereby reducing costs incurred by storage installers and other market actors.

Despite these advantages, certain forms of distributed storage have been slow to develop due to: (1) the inability to monetize benefits beyond those provided to the system owner, (2) high upfront costs including significant soft costs, and (3) market uncertainty caused by lack of safety and performance confidence and large numbers of different technologies. The February 26, 2015 REV Order recognized many of these constraints and provided a number of important directives that over time will pave a path for greater adoption of storage technology. First, utilities may now own storage when it is integrated into their distribution system architecture. Second, tariff design is expected to monetize the system value derived from DER, including energy storage. Third, the DSP) provider must make system data available at a degree of granularity that facilitates market participation.

Under the CEF, NYSERDA proposes to implement a coordinated suite of intervention strategies supporting the above directives and the REV regulatory proceeding that target key barriers limiting energy storage adoption in three key sectors: i) customer-sited (behind-the-meter), ii)transmission and distribution, and iii) the transportation system. Principally, these strategies include the following, consistent with the overall CEF approach:

- Supporting Pilot and Demonstration Projects of advanced storage technologies
- Developing Standardized Processes and Simple Tools to support storage implementation and reduce soft costs
- Quality Assurance through information and data Sharing to develop use cases and best practices

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[78] Storage integrated within transmission, distribution, and retail (behind-the-meter) applications along with automated response and control systems will permit renewable resources to be deployed when needed without the need for additional peaker plants (less efficient central generating facilities used infrequently for meeting peak electric demand).

[79] Flattening electric use during the 100 hours of greatest peak demand statewide could save between $1.2 billion and $1.7 billion per year according to PSC estimates. Flexible solutions could include alternatives to traditional wires and transformers including new business models with energy storage, demand response and energy efficiency measures.

More details on specific initiatives designed to encourage increased penetration of this valuable energy resource are provided below.

6.9.1.1 New Initiatives

Recognizing the significant role that energy storage will play in achieving the State's energy and environmental objectives, a dedicated energy storage team has been created at NYSERDA to oversee the Authority's new initiatives. This includes both technology development and market deployment activities. New initiatives targeting barriers within the aforementioned three key sectors (customer-sited storage, transmission and distribution, and transportation) are described below. These strategies and initiative design will be developed with the guidance of an Energy Storage Steering Committee that will be created, as well through a comprehensive series of meetings and workshops in summer/fall 2015 with stakeholders from throughout the energy storage sector.

With the guidance of these groups, from 2016-2018, NYSERDA intends to explore the following initiatives:

- Quantifying and monetizing of value of storage technology through pilots and demonstration projects
- Developing streamlined permitting and interconnection processes and standardized tools to reduce storage-related soft costs
- Providing standardized catalogues of storage products to ensure quality and market confidence in performance
- Characterizing and improving battery safety and performance

Pilot and Demonstration Projects

Quantifying and Monetizing Value of Storage Projects
NYSERDA proposes to work with the utilities, New York Independent System Operator (NYISO) and other stakeholders to validate alternatives to traditional transmission and distribution (T&D) infrastructure including quantifying, validating and monetizing the value storage can provide beyond the system owner. Specifically, this will include supporting advanced demonstrations and pilots, independent measurement and validation of battery and storage performance, developing granular modeling and forecasting tools, and demonstrating use cases. Depending on the rollout of tariff design to monetize these benefits under the REV regulatory proceeding, bridge incentives could be considered as an intermediary step to monetize system-wide value. Appendix D presents two sample use cases for energy storage and indicates those benefits that are currently monetized.

Standardized Processes and Simple Tools

Storage Soft Cost Reduction Strategy via Standardized Interconnection and Tools Development
In general, energy storage hardware costs continue to decline. For example, the cost of lithium-ion cells has decreased approximately 8% in each of the past few years and McKinsey predicts could

decrease by an additional 20% per year through 2025 as manufacturers scale production. NYSERDA's product development support will focus on integrated product offerings that incorporate storage hardware with renewable energy systems and building management systems to maximize the value of these applications.

In addition, NYSERDA proposes establishing a new targeted initiative to reduce soft costs associated with stationary storage systems. In some cases, these soft costs comprise 25% or more of total installed cost. NYSERDA will work with utilities, regulators and code officials to streamline permitting, standardize interconnection requirements, and develop tools that use interval data to allow customers and developers to pre-screen best-fit opportunities. NYSERDA also proposes working with utilities, ESCOs, and the financial sector to develop and test new financial and ownership models. These could include retail bundling of renewables with energy storage, leasing, Power Purchase Agreements (PPAs), and aggregation. Many of these business models are expected to be tested as part of the REV demonstration project process.

Quality Assurance

Catalogue of Product Offerings and Suggested Use Cases
The large variety of different storage technologies (chemical, mechanical, thermal) and extensive numbers of battery chemistries, coupled with the lack of safety and performance certainty, has created barriers to adoption. Through independent measurement and validation, a catalogue of standardized product offerings for typical use cases (e.g., customer demand management in commercial and multifamily buildings) will be created to reduce design and engineering cost and help with customer engagement. Use cases will be developed and publicized, and a publicly-accessible platform will present aggregated performance data for deployed systems, which could also begin illuminating different storage technologies and their optimal use cases.

Battery Safety and Performance Program
NYSERDA also proposes to establish a robust battery safety and performance program that provides independent testing and guidance to system developers, first responders, and code officials to accelerate adoption of safe and effective systems. In addition, NYSERDA will participate in national safety standards discussions so that New York State interests are included.
A guiding principle underlying NYSERDA's energy storage approach will be integration, both in terms of systems and models, so that technology development, business models, and policy objectives are in alignment to enable mass deployment.

6.9.2 On-Site Power Production

On-site power production, also known as Distributed Generation (DG), involves the self-production of electricity at or near its point of use. On-site power production can be designed to serve the needs of an individual building, or the needs of a cluster of buildings in a configuration referred to as a microgrid (please see section 8.2.3.1 for details of NYSERDA's planned efforts in support of microgrids). New York State is experiencing great adoption of on-site power by building owners who value the economic savings, enhanced energy resiliency, and reduction in carbon emissions.

NYSERDA will continue to support greater adoption of a wide variety of DG technologies. NYSERDA will support Combined Heat and Power (CHP, also known as cogeneration), which pairs generation with supplemental equipment to recover byproduct heat. NYSERDA will work to align the sale of CHP as a packaged solution to meet the purchasing habits of customers in maturing markets who seek a comprehensive product as opposed to a grouping of system components, to better spur customer adoption. Additionally, NYSERDA will work to increase the production and use of Anaerobic Digester Biogas (ADG) – in particular in the agricultural/dairy sector and at wastewater treatment plants – continue to support early fuel cell adopters in efforts to prove the technology's value proposition, and support small wind projects which help demonstrate that technology's path to cost-competitiveness. NYSERDA will also continue to work to reduce balance of system costs associated with solar electric power, in line with related initiatives described further in the Communities (6.10.1), LMI (6.6), and NY-Sun (11) sections.

Principally, market development strategies for On-Site Power Production include the following, many of which are common to the overall CEF approach:

- Information, Data, and Awareness
- Technical Assistance and Providing Simple, Robust Tools
- Targeted Soft Cost Reduction Strategies and Aggregation

More details on specific initiatives around different types of On-Site Power Production technologies are enumerated below. Activities for On-Site Power Production are divided into two categories: CHP and Emerging On-Site Power Technologies, including Fuel Cells, On-Site Wind, and ADG.

6.9.2.1 New Initiatives

CHP

Market support for CHP is expected to be provided by new market and rate structures under the REV regulatory proceeding, as well as revised standby electric tariffs[80] and rates. The development of revised standby rates that are based on sharing the necessary backup utility infrastructure across multiple customers should lower the cost to provide service and customer fees. These changes will improve the economics of CHP, but may not all be available at the start f 2016. Therefore, NYSERDA proposes to continue providing CHP incentives on a temporary basis, supporting the market as costs decline and customers become more familiar with CHP. In parallel to the incentive offerings, NYSERDA will put in place a renewed focus on soft-cost reductions and customer risk mitigation initiatives.

Under the CEF, CHP initiatives will focus on:

[80] Standby tariffs are applied to distributed generation customers because the grid routinely serves some of their needs, but is also standing by to instantaneously ramp-up to serve their entire need in case the customer's self-generation equipment shuts down unexpectedly. The pricing structure of the current standby tariff imposes a fee for this worst case scenario, which is determined based on the cost to the utility to furnish and maintain infrastructure to definitively serve that worst case need for that particular customer (as opposed to being based on the probability of needing to serve that worst case need for that particular customer), leading to higher costs.

- Establishing information platforms and data channels to increase knowledge of CHP-related issues and simplify CHP Purchases and
- Providing technical assistance and active market education to CHP market actors
- Providing tools and resources that will simplify CHP Purchases and improving CHP value propositions
- Exploring Hybrid Solutions

Information, Data, Education, and Awareness

Communications Platforms and Educational Activities

Under the CEF, NYSERDA proposes a number of activities that will enhance communications, outreach and education and spur greater awareness of CHP opportunities. These could include the creation of a single CHP interface to provide NYSERDA offerings to the entire range of CHP sizes, for example, or the establishment of a CHP Interconnection Forum. Additionally, NYSERDA proposes to facilitate utility mapping of locations where natural gas is readily available and electric interconnection is not constrained, which will allow better targeting of CHP deployment. All of these activities will be supported by provision of active market education.

Simplifying the CHP Purchase

NYSERDA proposes to simplify the CHP purchase by focusing on transitioning the buying habits of customers away from more-expensive customized solutions and towards less-expensive standardized solutions, enabling projects that are economical in the absence of incentives. To achieve this, beginning in 2016, NYSERDA will identify and promote market features that mimic the proven structures of markets which serve other standardized products (such as the way a shopper buys an automobile). This will empower customers to comparison shop, re-align the marketplace to emphasize solutions as opposed to technologies, and promote solutions that can quickly become economically compelling for customers in the absence of incentives.

Potential methods to achieve these objectives include the following tactics:

- Vetting and endorsing a compilation of packaged CHP solutions (presented as products)
- Simplifying the mechanisms for comparison shopping by hosting a series of CHP Expos which feature NYSERDA-endorsed solution providers
- Motivating vendors and customers to establish long-term relationships, including by providing guidance on fair and equitable relationships between vendors and customers, such as disclosure and appropriateness of terms and conditions for transactions (i.e. for buy, lease, or power purchase agreements, and components of pricing structures for maintenance agreements). These long-term partnerships will yield more successful projects
- Providing incentives (declining over time) as a temporary bridge to enable the development of market infrastructure and overcome customer trust barriers.

Technical Assistance and Tools Development

Building Capacity of Technical Assistance Resources

NYSERDA also proposes a number of activities meant to engender more robust technical assistance and tools development for the CHP market. In addition to providing ongoing general technical assistance, NYSERDA will enable the creation of a DG/CHP ombudsman, provide operations and maintenance support to CHP installations, and facilitate a DG Soft Cost Team to leverage and promote gains involving one type of DG technology across all types of DG technologies, including CHP.

Tools and Methods to Improve the CHP Value Proposition

NYSERDA proposes to expand efforts to monetize the financial value of CHP, particularly its resiliency and demand response benefits. NYSERDA will also provide tools and resources to CHP providers and host buildings, including matchmaking services for technical assistance needs (e.g. feasibility studies), data analytics to discover high value customer prospects, real-time data display, and model terms and conditions for contracts. NYSERDA also plans to encourage each utility company to establish a CHP ombudsperson to serve as an additional resource. These efforts will ramp-up in 2016 and reduce soft-costs and thereby improve the value proposition of projects and thus spur market uptake.

Tools and Methods to Explore Hybrid Solutions

Beginning in 2017, NYSERDA also will explore hybrid DG solutions that can optimize the achievement of multiple objectives. For example, a solution containing a CHP system integrated with a solar electric system can achieve robust reduction of greenhouse gases while also providing around-the-clock reliability and resiliency enhancements. Over time, NYSERDA will compile case studies of various hybrid designs and use data analytics to identify trends, with the intent to devise simplified guidance to assist customers and project developers with easily identifying the right configuration for their needs. Projects thus guided can reduce their engineering expenses and will be more likely to perform as intended.

Emerging On-site Power Technologies (ADG, Fuel Cells and Small Wind)

Several emerging technologies have received many years of incentive support but, for various reasons, continue to have very low penetration in the marketplace and relatively high costs. For example, there are currently a very limited number of vendors for commercially available fuel cells and fuel cells remain significantly more expensive than comparable commercially available solutions, such as engine and microturbine-based generators. Likewise, NYSERDA's experience with small wind turbines over the past eight years confirms the persistence of a long time horizon until these solutions approach cost-competitiveness. Additionally, the adoption of NYSERDA's Anaerobic Digester Gas-to-Electricity program has progressed slowly despite multiple potential applications and business model solutions. Over the last several years, customer demand for the program has not been adequate to commit the planned RPS Customer-Sited Tier (CST) incentive budgets allocated for these technologies, even with the RPS CST subsidizing 50% of the total system cost. And for several of these technologies (e.g., small wind systems and ADG), total system costs have not come down over time.

More-effective approaches are needed to help these markets improve their value propositions, with the ultimate goal of discovering adequate revenues from marketplace sources in lieu of NYSERDA

incentive programs. Extensive stakeholder engagement and review of best practices will be necessary to pinpoint meaningful and workable approaches and techniques. This dialogue will occur throughout the remainder of 2015 and in 2016, as needed, and in particular will engage the Clean Energy for Agriculture Task Force and other organized groups and individual stakeholders. Roll-out of new-style initiatives would then occur in 2017 or earlier as winning approaches and associated project selection criteria (if applicable) are confirmed.

In order to provide market stability and bridge until then, the general features of the current program structures (rolling admission first-come-first-served incentives) for Small Wind and Fuel Cells will persist until 12/31/2016 and for ADG until 12/31/2017. The budget level will be commensurate with the recent historic actual uptake by these markets, and each individual technology will begin 2016 with a specifically-allocated budget amount. As the end of 2016 approaches, uncommitted funds from the budget of any of these specific technologies could be reallocated to any other of these specific technologies to meet actual waitlisted demand.

NYSERDA proposes to focus in 2017 (or earlier, as winning approaches are confirmed) on initiatives and pioneering projects that offer the prospect of reducing soft costs, improving performance and value, and developing and demonstrating sustainable business models through demonstration projects and through various types of analysis (one such example to be considered is comprehensive economic modeling of a range of scenarios).

- Specifically, budgets for new initiatives around emerging on-site power technologies would be available to:
- Raise awareness and education by convening stakeholders and disseminating best practice and value-enhancement studies (e.g. with wastewater treatment facilities)
- Help coordinate standard processes or streamlining among permitting authorities to assist with cost-competitiveness
- Pilot and demonstrate a variety of high-value early-adopter projects which compensate for the high costs of technologies within this category.
- Develop aggregation and other soft cost reduction strategies for anaerobic digestion and other on-site power production technologies through reduced operating costs and new business models.

Information and Awareness Building

Wastewater Treatment Facilities Outreach and Match-making

Working with the leaders of the state's largest wastewater treatment facilities, NYSERDA will explore models to support their transition toward net energy neutral water resource recovery facilities. NYSERDA will work with these leaders, as well as private partners (including financial and project development service providers), regulators and the agricultural, food processing and source separated food-waste management sectors, to develop and spur market adoption of innovative and replicable solutions. These solutions will include outlining paths forward for biogas production and use, opportunities to deliver operational and energy productivity gains and means by which facilities can generate additional revenue streams through ADG installations. NYSERDA

can play a critical match-making role among public and private actors in this sector to mitigate regulatory, feedstock, and economic risks.

Anaerobic Digestion Information and Market Studies

Beginning in 2016 NYSERDA also proposes to focus on collecting and sharing information that will enable those interested in pursuing ADG to make informed decisions, such as resource characterization of the regional availability of food waste for use as a feedstock in digesters, and the validation of value propositions regarding the use of biocultures and nutrient additives to enhance the performance of digesters.

Pilots and Demonstrations

Targeting High-value Early Adopter Projects

NYSERDA will pilot approaches that identify and target high value early adopters of emerging on-site power products. For example, NYSERDA could seek to identify unique customers where standard on-site power systems are too loud for the space, and therefore, a run-silent fuel cell is the only technically feasible option. Additionally, NYSERDA will seek to identify scenarios where small wind turbines provide compelling solutions to recurring problems (such as integration of small wind turbines with solar electric and battery storage, in order to provide predictable and controllable power output), or advance a zero net energy initiatives for a particular customer class.

Soft Cost Reduction Strategies

Realizing Reduced Operating Costs and Expanding Revenue Streams

In the ADG sector, NYSERDA will also work to transform waste management into a positive economic value by making interventions to foster a market for ADG that is not as dependent upon state subsidies by reducing operating costs and exploring opportunities for new revenue streams. These interventions will focus on reducing operating costs for entities like dairy farms, waste management, and food processing facilities while simultaneously reducing GHG emissions. Initiatives will work to ensure that adopters of ADG technology realize the synergistic benefits of energy efficiency coupled with renewable on-site power production, and that further economic potential is realized by maximizing the commercial viability of products (e.g. fertilizer or animal bedding materials) created by ADG processes.

New Business Model Development

As part of the transition that takes root in 2017, NYSERDA proposes to provide ADG incentives on a temporary basis specifically to those pioneering projects that help demonstrate a path to cost-competitiveness for this technology, including options for consideration such as coupling ADG with other on-farm compatible value-added ventures (for example controlled environment agriculture greenhouses). To further spur discovery and validation of cost-competitive solutions, particularly within the dairy farm and allied sectors (such as fluid milk, cheese, and yogurt producers), efforts will focus on activities to encourage new business models such as skilled third-party on-farm turnkey solutions of build/own/operate/maintain and/or aggregation of projects to attract lower-cost financing and subsequent reduced project costs, and (via collaborative marketing) increasing

the value of products produced by these projects (e.g., exportable green power, animation of voluntary markets to purchase "cow power" attributes and/or commodities, animal bedding materials, nutrient-rich fertilizer, digestate byproducts, etc).

Business model improvements that might be determined to be sustainable and suitable for demonstration support might include model public-private partnerships, lease financing options, integration into microgrids, templates for standardized repeatable designs and associated contractual terms and conditions, and demonstrations of how different revenue streams from digester installations can be monetized. NYSERDA will focus on providing consultative services to assist farms at challenging points in the ADG development process. If fuel neutrality is granted, NYSERDA proposes to expand project support to include ADG-to-Heat projects and/or ADG-to-Transportation Fuel projects, in addition to ADG-to-Electricity projects.

Regulatory Interventions

Finally, NYSERDA will explore (in the context of the REV regulatory proceeding) whether there are opportunities to build self-sustaining markets for digesters via regulatory changes, for example related to interconnection costs. Many of the above identified interventions on behalf of ADG technology will be refined and pursued through the Clean Energy for Agriculture Task Force (see Agriculture section 6.3), jointly managed by NYSERDA and the Department of Agriculture and Markets.

In all of these emerging on-site power areas, NYSERDA will work with industry and stakeholders to refine approaches based on marketplace feedback and lessons learned.

Solar Balance of System Cost Reduction

NYSERDA will continue to pursue approaches designed to reduce the non-module costs of solar installations in New York State. In addition to the customer aggregation and other community-based strategies described in the Community Solar section, NYSERDA plans to target costs associated with solar purchasing, installation, permitting, and interconnection.

NYSERDA will work with utilities, regulators, and the New York Power Authority to address the continued growth in the number and complexity of interconnection applications for distributed solar electric by standardizing data, processes, and requirements. NYSERDA will support efforts by the NYS Department of Public Service to adopt an online DER interconnection portal as described in REV Orders. The portal will streamline the application process and reduce uncertainty around interconnection status.

NYSERDA will continue to assist local jurisdictions as they adapt to significantly increased volumes of distributed solar electric projects including by supporting further development and adoption of the unified solar permit. NYSERDA will also assist in the adoption of streamlined business practices by solar developers and other market participants through dissemination of best practices and tools. NYSERDA will also consider innovation projects that demonstrate new approaches for reducing balance of system costs.

6.9.2.2 Evolution of Previously Authorized On-Site Power Production Programs

NYSERDA intends to give ADG, Small Wind, and Fuel Cells one more year of traditional incentives (throughout 2016, while gathering stakeholder feedback) before these programs transition away from relying principally on incentives (i.e., standard offer-type first-come-first-served programs) in favor of transitioning to a selection process to source and support projects and strategies that offer some potential for cost reductions and/or unique value demonstration. To maximize the success of these approaches, NYSERDA will periodically assess market progress and adjust initiatives accordingly, with input from industry and stakeholders. These market transformation approaches align with the principles of the CEF to focus on new initiatives that address a wider variety of barriers and more effectively animate the market or support new market approaches, as described above. In doing so, caution will be taken so as to not disrupt progress that is being made and in recognition that incentives may remain necessary, particularly as transition vehicles. However, these transitions will be managed in a market- and progress-responsive manner. Programs and activities that NYSERDA intends to transition away from include:

- **CHP:** NYSERDA will eventually transition away from relying principally on incentives for CHP. Incentives will remain in place for all CHP programs under the CEF with gradually declining budgets and incentive rates. CHP incentives may transition sooner depending on REV activities (e.g., as REV provides alternative sources for, and adequate levels of, project revenues). These strategies are in recognition that REV will create market structures and tariffs where CHP should flourish, and a temporary bridge is essential to retain a meaningful scale of market activity in the meantime. The transition from these bridge funds to the REV construct will be responsive to market progress and stakeholder needs.
- **ADG:** Continue the current-style of incentive program through 12/31/2017. Thereafter, funding will continue into the CEF with an emphasis on pioneering projects that help demonstrate a path to cost-competitiveness, and NYSERDA will ramp-up efforts for discovery and dissemination of value-enhancing best practices including dissemination via technology transfer and as-needed workforce development features.
- **On-Site Wind:** Continue the current-style of incentive program through 12/31/2016. Thereafter, funding will continue into the CEF with an emphasis on pioneering projects that help small on-site wind turbines demonstrate a path to cost-competitiveness. NYSERDA will honor existing 2015 commitments and it's newly created 2016 commitment of dedicated, first-come-first-served funding to the marketplace but thereafter in the CEF each individual small wind project will need to demonstrate a compelling project-specific market-transformative case.
- **Fuel cells:** Continue the current-style of incentive program through 12/31/2016. Thereafter, NYSERDA will transition away from open enrollment incentives for fuel cells under the CEF and will begin providing support to scout and demonstrate niche applications where fuel cells provide greater and/or unique value relative to other energy options. NYSERDA will continue to explore opportunities to invest in promising technology innovations that offer the prospect of significant cost reduction and value enhancements.

6.9.3 Renewable Thermal

Renewable thermal technologies can reduce energy bills, reduce reliance on fossil fuels, and develop local sustainable heating markets. To obtain these benefits, under the CEF NYSERDA will work to enable a self-sustaining market for solar thermal, biomass heating and geothermal and air source heat pump technologies. While initially focused on these technologies, NYSERDA will continue to explore opportunities across the spectrum of renewable thermal. NYSERDA will work to promote the installation of the highest efficiency class of technologies, create a well trained workforce to install and maintain renewable thermal technologies, increase available financing, raise consumer knowledge and awareness, and drive necessary policy changes. These energy solutions will be a critical part of zero net energy heating and cooling options for New Yorkers.

Principally, under the CEF NYSERDA will implement the following market-development strategies in the Renewable Thermal sector, in line with the overall CEF approach:

- Strengthening Clean Energy Partners
- Providing guidance and tools designed to simplify processes
- Leveraging educational and outreach to raise stakeholder awareness and provide market information
- Aggregation
- Quality Assurance, via energy monitoring and performance validation

These activities will expand from areas where NYSERDA is already active, such as biomass and solar thermal, to additional renewable thermal sources, such as heat pumps, after planning tasks are completed. NYSERDA will also continue end-user incentives in the Renewable Thermal sector as it continues its transition to the above approaches. Additional details on the specific initiatives that fall under these strategies are enumerated below.

6.9.3.1 New Initiatives

CEF Renewable Thermal activities will focus initially on stakeholder outreach and market characterization for new areas (e.g., ground/air source heat pumps). In designing new interventions to develop these renewable thermal markets, NYSERDA will draw upon best practices in the U.S. and in Europe. NYSERDA will explore potential regional collaboration as an approach to accelerate market development of cold climate renewable thermal solutions. Across all renewable thermal technologies, NYSERDA proposes to take a fuel neutral approach, supporting those solutions that provide the greatest value to the customer.

From 2016-2018, NYSERDA intends to explore the following opportunities in the solar thermal space:

- Enabling new private market financing models, including but not limited to PPAs[81]

[81] The term "Power Purchase Agreements" is used by the solar thermal industry to represent what are more specifically called Heat Purchase Agreements.

- Providing guidance to towns and municipalities to achieve a more streamlined permitting review process
- Expanding the application of technology to include space heating
- Providing workforce development
- Educating consumer
- Supporting customer aggregation models, including but not limited to the Solarize model for solar thermal[82]
- Facilitating data monitoring and M&V to address performance uncertainties.

From 2016-2018, NYSERDA intends to expand activities already underway through Renewable Heat NY to address the biomass market. This will be accomplished by:

- Continuing with incentive support to stimulate market development,
- Exploring and establishing appropriate financing mechanisms,
- Enabling new business models for distributed biomass heat systems
- Leveraging educational and outreach to raise stakeholder awareness and provide market information
- Developing tools and resources to enable faster customer acquisition and reduce soft costs.

NYSERDA will also engage manufacturers and fuel suppliers to expand equipment and fuel delivery capacity to better meet growing consumer demand. NYSERDA will also conduct workforce development activities to ensure a well-equipped labor force. As the market develops and matures over time, NYSERDA would expect to gradually reduce incentives.

For both geothermal and air source heat pumps, NYSERDA proposes to develop and update tools and resources to reduce soft costs and improve market understanding of the benefits of these technologies. NYSERDA will also explore the potential to provide incentives for such technologies in both the residential and commercial space as a bridge to an economically sustainable market. While these technologies can provide a substantial net energy savings and net GHG saving, they can increase electric consumption. Such increase in electric consumption will need to be managed to occur off-peak to ensure it does not conflict with other interventions designed to increase the capacity utilization of the energy system. These technologies may provide some unique opportunities for new utility business models envisioned by the REV proceeding. NYSERDA will explore this potential REV integration as part of this initiative, transferring activities to the utilities where appropriate.

There are also some additional technologies that will be evaluated for inclusion within the renewable thermal program area in the future. Potential technologies may include, but not be limited to: hydro-thermal, and hybrid systems, such as a solar and geothermal integrated system (particularly within the context of zero net energy buildings and homes).

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[82] Solarize campaigns are locally-organized community outreach efforts aimed at getting a critical mass of area homes and businesses to install solar. Solarize campaigns bring together widespread community outreach and education, competitive installer selection, and a limited-time offer to bring more customers to solar and provide significant cost savings.

6.9.4 Products and Integrated Systems

NYSERDA will work to increase the supply of and demand for emerging or underutilized high-efficiency products and systems that offer greenhouse gas emission-reduction potential. This effort is designed to ensure that high efficiency products and systems are available in the distribution chain at the point in time when customers and contractors are making design and purchasing decisions. Strategies will demonstrate and verify energy savings potential for new and emerging technologies and educate contractors, installers, system integrators and retail staff about the high efficiency products and integrated systems available in the marketplace.

Examples of residential products that would be targeted initially under the CEF support new construction and existing home retrofit activities and include: heat pump water heaters, advanced lighting fixtures and controls, high-efficiency HVAC systems, including condensing boilers and ductless mini-splits, and home energy management systems. Focus areas in the commercial sector would include products that improve the energy performance of buildings, including supporting advanced controllable loads, and system automation, energy storage, demand response, light emitting diode (LED) lighting fixtures and advanced roof top units (RTUs) with automated fault detection, diagnostics, and optimization.

While these promising technologies and systems will be the initial areas of focus NYSERDA will be conducting comprehensive market research across all sectors starting in the fall of 2015, which may result in additional products targeted for early focus in the CEF. On an ongoing basis, NYSERDA will identify promising underutilized and emerging products and integrated systems and their associated barriers to adoption and potential energy savings. Using this information, NYSERDA will develop initiatives to overcome barriers specific to those products and technologies, which will be continuously refined to reflect current market needs and conditions.[83] This research and planning will be done in close coordination with other NYSERDA market development initiatives across sectors to leverage similar approaches and coordinate with common retailers, distributors, buying groups and manufacturers.

In general, market-development strategies for these promising technologies and products will fall under the following approaches, consistent with the overall aims of the CEF and sector strategies:

- Information, Awareness, and Demand, e.g. via match-making or capacity building functions
- Technical Assistance, e.g. through trainings,
- Pilot and Demonstration projects

6.9.4.1 New Initiatives

NYSERDA proposes to work with retailers, distributors, buying groups and manufacturers to influence the supply and accelerate the rate of market adoption of emerging and underutilized high-efficiency products, technologies, and associated business models and use cases that provide

[83] This would include working with CEE, NEEP, and EPRI to identify products/technologies with promising potential.

significant energy efficiency and greenhouse gas reduction potential. This focus will serve as a pathway for technologies and services that are developed and tested in New York or elsewhere by bridging Innovation and Research portfolio initiatives, discussed in Section 8 of this document, with Market Development portfolio initiatives, allowing new technologies to reach commercial viability and broader deployment. Initiatives will also leverage a network of qualified energy service companies and other entities, providing a mechanism to introduce technologies and services validated through emerging technology activities efforts across sectors to reach the end-user market. The initiatives described below will be ongoing, beginning in 2016 in the CEF.

Initial target focus areas are expected to evolve as NYSERDA gathers market insights from programmatic experiences, research and input from the marketplace. Currently, initial target areas include:

- Technologies or approaches that integrate automation, scheduling, and controls with load management (i.e., demand response, demand management, energy storage, home energy management systems)
- Building or energy system-focused technologies and approaches that offer energy data analytics and performance information
- Systems approaches to achieve deep energy savings, resulting in a significant decrease in energy use intensity that include advanced lighting systems and controls, advanced domestic hot water heater technologies, high-efficiency heating, ventilation and air conditioning (HVAC) systems, etc.

From 2016-2018, NYSERDA intends to explore the following actions and initiatives:

- Increase awareness and influence consumer decisions, cooperatively with vendors
- Increase product availability and capacity in related services (installation, aftermarket, etc.)
- Coordinate with utilities
- Pilot and Demonstrate underutilized and emerging technologies
- Matchmaking
- Serve as a trusted information resource

The initiatives are described in further detail below.

Technical Assistance Provision

Training and Education for Manufacturer and Vendor Sales Staff

While many consumers perform research on products prior to purchasing, they are still highly influenced by sales staff and other information found at the point of sale. To take advantage of this decision point, NYSERDA proposes to continue to work with manufacturers and vendors to develop and update on-line trainings for sales staff on the ENERGY STAR label and specific high-efficiency products, including information on the value proposition and life-cycle cost. NYSERDA will update the training as more products enter the marketplace, and continue to make it available to retailers, distributors and others. This is particularly important for high-turnover industries such as retail

sales. In addition, NYSERDA proposes to work with manufacturers and vendors to continue to make educational materials available for retailers to use at the point-of-sale, including signage, booklets, and interactive displays. Finally, NYSERDA will work with retailers, distributors and manufacturers to hold public events and promotions to educate consumers and contractors on the benefits of high-efficiency products.

Information, Awareness and Demand

Increase Product Availability and Capacity for Aftermarket Products and Services

One of the biggest challenges to new products is earning "shelf space", "warehouse space", or "space in service vehicles" early in their sales cycle. Space is expensive, for the most part, and reserved for products with high sales volumes. Introductory products, especially those with a higher price point and for which the benefits are not well-understood, may need support to maintain a market presence until sales volumes increase. NYSERDA proposes to pursue this objective by facilitating relationships between manufacturers, retailers, distributors, builders, installers, buying groups, and ESCOs to identify opportunities to increase the availability, affordability, and recognition of the targeted products and related services. NYSERDA will work with manufacturers, distributors, and/or retailers to provide financial support where needed, exploring the potential for incentives based on stocking patterns and market share of products, as well as exploring financing, or warranty offers.[84] Any financial support provided will act as a bridge to a self-sustaining market, and decline over time. These approaches will work to increase awareness and acceptance of targeted products and to ensure quality products are stocked and available for aftermarket installation and related services. NYSERDA will also explore the potential for a competitive solicitation to identify creative opportunities to increase the sales or market share of targeted products.

NYSERDA proposes playing a matchmaking role in the emerging technology space, assisting manufacturers, vendors, ESCOs and other project developers in finding customer sites and informing building owners about available emerging technologies. NYSERDA will share vetted information on technologies and services with building owners to encourage participation. Additionally, NYSERDA proposes to work with developers to identify the best growth opportunities for their technology to target, increasing the odds that the new technology will be implemented successfully. NYSERDA will also help to identify opportunities for state facility managers interested in leading by example by using their buildings and systems as proving ground for new and emerging technology solutions.

Serve as a Trusted Information Resource

NYSERDA proposes to serve as an educator—a trusted and objective information source for consumers and industry about targeted products in all sectors. This includes educating distributors,

[84] Shelf-stocking incentives encourage high-volume retailers and distributors to have more of the targeted product inventory both on display and in warehouses to limit the amount of inefficient products sold. These upstream incentive models influences the stocking and inventory, which ultimately influences what consumers purchase. Warranty incentives cover the cost of the product in the event of product failure, reducing some of the risk to the consumer to increase purchases.

building owners, builders, contractors and home realty stakeholders on the comfort, savings and environmental value of the targeted products; creating and delivering key education and outreach materials for use at open houses, home shows, model home events, and events relevant to the commercial sector; and providing case studies, technical reference materials, and consumer information. Based on the target audience, these materials will be disseminated through a variety of methods including the NYSERDA website, meetings/conferences, trade shows, e-mail blasts, any regional/statewide education and outreach efforts, and other federal and regional partnerships.

NYSERDA will also collaborate with product manufacturers and project developers to share demonstration project results with building owners, managers, and the consulting community via case studies, primers, and webinars. The developers will be able to combine results from demonstrations in New York with data from demonstrations elsewhere in order to expand information on product and service performance. NYSERDA will continue to collaborate with NYPA to share information from the organizations' respective emerging technologies efforts. This information provides credible third-party validation of the technology, backs up manufacturers' sales claims, and supports replication of successful demonstrations, accelerating market acceptance. Introducing and educating qualified energy service companies and other entities who work on behalf of utility programs to prove emerging technologies and strategies will also help increase market uptake for a technology after successful demonstrations.

Coordinate with Utilities

NYSERDA will work closely with the utilities to coordinate and leverage any opportunities that increase the supply of and demand for more efficient products. NYSERDA will work closely with utilities to leverage utility initiatives such as rebates or product buy-downs at the point of sale. NYSERDA demonstrations, sales staff training, and consumer events at retail locations can be aligned with utility initiatives. For example, if utilities decide to provide rebates for light-emitting diode (LED) lamps and fixtures for residential customers, NYSERDA can help sponsor consumer events with lighting retailers while training sales staff or providing them with educational tools on lighting technologies and applications.

Pilot and Demonstration Projects

Prioritizing Underutilized and Emerging Technologies and Integrated Energy Systems

NYSERDA proposes to continue facilitating multisite demonstration projects in priority target emerging technology areas by offering temporary incentives designed to prove out a technology and validate its performance in the marketplace. This initiative will reduce risk and make it feasible for product and service developers, including manufacturers, vendors, and ESCOs, to partner with building owners and managers willing to demonstrate emerging technologies at two or more sites. These early adopters will serve as a proving ground for commercially-available but under-used technologies and services. These demonstrations will increase awareness of the products among the distribution channel and consumers, and pave the way to more widespread deployment. The developers will be able to combine results from demonstrations in New York with data from demonstrations elsewhere in order to expand information on product and service performance. The initiative will be closely coordinated with existing homes and buildings, new construction, and

technical training efforts to ensure system considerations are addressed, and to familiarize contractors and installers with the technology and practices.

6.9.4.2 Evolution of Previously Authorized Products Programs

NYSERDA intends to transition away from certain activities that do not align with the principles of the CEF to focus on new initiatives that address a wider variety of barriers and more effectively animate the market or support new market approaches, which were described above. Programs and activities that NYSERDA intends to transition away from include product buy downs, which NYSERDA will eliminate in 2015,[85] as offering widespread buy-downs on a range of products and appliances limits NYSERDA's return-on-investment.

6.10 Market Enabling Strategies

The market enabling strategies outlined below offer significant benefits that cross sectors. These strategies drive greater clean energy market adoption by working with or enabling new partners and increasing standards and capacity. The benefits of these strategies are presented in Section 12.

6.10.1 Communities

In furtherance of NYSERDA's approach to stimulating the market, NYSERDA, in close collaboration with 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 by: aggregating projects, standardizing permitting and inspections, enabling innovative financing mechanisms such as PACE financing, and updating zoning and land use codes. Local governments are already important partners in multiple NYS energy initiatives, including NYPA's Five Cities Energy Master Planning initiative, Cleaner Greener Communities, Renewable Heat NY, Power Up Long Island, and NY Prize.

Under the CEF, community activities will focus on creating the New York State Community Partnership (NYSCP). The NYSCP will design and provide clean energy resources, programs and other services that resonate with local leaders based on the impact certain actions have on economic development, GHG emissions reductions, and energy cost savings, as well as locally

[85] Buy-downs are incentives to a manufacturer or retailer for a particular high-efficiency product or appliance that gets passed along to the customer through reduced price.

identified priorities and needs. By working closely with local partners and market actors, the NYSCP will leverage whole-community involvement in clean energy deployment, scaling the penetration of cost-effective and high impact energy action across the state.

In addition, NYSERDA will seek to use community-based approaches more effectively to support outreach, enrollment and education. For instance, NYSERDA will tap the power of organizations already working effectively within the region. Community-based organizations can host educational events and organize volunteers to promote and provide access to energy efficiency services, particularly for low-to-moderate income households within their community. These groups can also host job fairs or otherwise connect individuals to training and employment opportunities, again with an emphasis on developing these workforce development initiatives for underserved communities or individuals. NYSERDA proposes to develop tools to assist organizations in generating leads, delivering information, and providing education to change energy behavior in the community.

Principally, NYSERDA's market-enabling approach to Communities will adapt many of the strategies common to the overall thrust of the CEF including:

- Leveraging easily accessible information to raise awareness and increase market demand (e.g. through Summits)
- Strengthening Clean Energy Partners by providing technical assistance and standardized tools and resources;
- Enabling Aggregation; and
- Flexible levels of support for pilot and demonstrations projects.

NYSERDA will maintain a flexible source of funding to support new pilot strategies as identified by program administrators or ideas generated in the market. Market participants will have the ability to come to NYSERDA for support without trying to fit their well thought-out strategies into a currently available solicitation.

6.10.1.1 New Initiatives

From 2016-2018, NYSERDA intends to explore the following initiatives:

- Developing on-line Communications and Resource Platform
- Providing standard packages of tools and resources, e.g. streamlined permitting processes, sample policy ordinances, or model codes and local laws tailored to community contexts
- Fostering peer-to-peer networking and idea sharing through community summits
- Community Recognition and Certification
- Sponsoring Community Competitions
- Empowering trusted local partners through technical assistance and local engagement
- Engaging Low-to-Moderate Income Customers
- Building Capacity in the Higher Education Sector
- Providing flexible funding opportunities for advanced local actions
- Enabling Community Aggregation and Other Demand Generation Activities

Additional information on these initiatives can be found below.

Leveraging Information, Awareness and Recognition

On-Line Communications and Resource Platform

NYSERDA proposes to serve (through the NYSCP) municipalities and communities across the state via an online platform that will act as the centralized hub for local access and information on clean energy initiatives, services, and offerings. The resource portal, developed in close collaboration with NYPA, will provide a simplified menu of actions, tools, initiatives, and related funding opportunities tailored to community needs and characteristics (e.g., urban, suburban and rural). Consolidation of these initiatives and resources will reduce information overload, demonstrate a clear path forward on energy action for communities, and reduce confusion around high impact actions and State-sponsored resources available to support them.

Initial menu items will include enabling tools, such as model electric vehicle parking ordinances, PACE financing guides, and standardized solar and electrical vehicle charging station permits. The NYSCP will develop supporting materials for each of these tools that clearly communicate the anticipated impact of each action on community priorities, including economic development, greenhouse gas emissions, and energy cost savings.

The portal will also contain resources such as an asset mapping interface and a platform for the exchange of information and best practices among municipal energy decision makers (i.e. City Managers) and private service providers, such as ESCOs. Information provided via the portal will enable municipal and community leaders, as well as local market participants, to target resources and action effectively, accelerating decision making processes and deployment. As part of the asset mapping and data access effort, NYSERDA shall work with utilities and additional parties to develop a process that will facilitate the acquisition of community-level energy data to inform action and build the value proposition for energy improvements. Access to this data equips communities with the knowledge to target their most energy-intensive sectors, benchmark efforts with comparable communities, and track success over time. This work will coordinate and build upon existing efforts, including NY Prize, Climate Science Clearinghouse and Climate Smart Communities.[86]

The online platform of energy tools and resources provided by the state and developed through the NYSCP will work with the digital marketplace for energy products and services discussed in the DPS REV Track 1 Order. The enabling tools, policy guidance, and data provided to communities via the NYSCP portal will increase local energy literacy, inform the procurement choices they make, and facilitate their access to the digital energy marketplace created by REV. The online platform doubles as a tool for the NYSCP to track community interest in certain offerings and can highlight resource gaps where additional research or assistance is needed. It also allows the NYSCP to adjust offerings based on fluctuating demand for these services.

[86] NY Prize data includes existing distributed generation installations and electricity use 'hot spots', the Climate Science Clearinghouse describes community characteristics (i.e. vulnerability, climate information) and the Climate Smart Communities program provides community-level energy consumption by sector.

The successful implementation of a centralized portal is contingent upon its being used by its intended audience and its ability to increase the penetration of clean energy into the local community. Consequently, a unified community outreach and stakeholder engagement effort will accompany portal development, with staff of the NYSCP working in close collaboration with local partners to conduct outreach and education activities that support adoption of menu items. This outreach and stakeholder engagement will leverage existing local institutions and community organizations to channel state resources in ways that best take advantage of existing local energy activity. The emphasis on local-level stakeholder engagement ensures that 1) state resources are targeted intelligently; 2) local capacity and know-how is built from the ground-up, and 3) municipalities and communities are utilized as channels to increase market uptake of clean energy solutions.

Community Summits

The NYSCP will convene a series of local government and community-oriented summits across different subsets of energy decision makers – from mayors to school district superintendents to wastewater treatment plant operators – sharing best-practices across communities in order to support the scaling of state-wide clean energy deployment. The state will play a crucial convening role as a matchmaker between these decision makers and private sector stakeholders, project developers, and community based organizations to better identify local opportunities and to make connections to specific technical assistance providers who can help meet community needs.

In addition, these Summits (and other related technical assistance provided to municipalities and communities) represent an opportunity to educate and raise awareness in local jurisdictions around the REV regulatory proceeding and the ways in which communities can take greater control over their energy choices. By connecting education and awareness efforts with the energy planning and technical assistance provided by trusted local partners, the NYSCP will encourage greater community participation in the REV enabled future, for instance by helping communities identify appropriate opportunities for REV demonstration projects. In addition, the NYSCP will work directly with local organizations working in clean energy and sustainability sectors to train them and help build their capacity to take on a leading role going forward, in particular with respect to hosting future summits and facilitating peer exchange.

Community Recognition and Certification

NYSERDA also proposes to support efforts that provide recognition to early adopter and showcase communities that undertake innovative energy initiatives and projects. By implementing certain actions and executing particular projects, for example, communities can earn points toward recognition as a Certified Climate Smart Community. Certifications and recognition will stimulate competition among communities and will motivate decision makers to take ever more advanced and ambitious steps toward a cleaner energy future, particularly when paired with additional funding incentives as outlined above. The existing Climate Smart Communities certification program will be made more accessible and easier to use as a component of the NYSCP Communication and Resource Platform.

Competitions

NYSERDA also proposes to pursue competitions to test different approaches to encouraging clean

energy action by communities. For instance, building on the aforementioned performance incentive structure and framework for advanced local action on clean energy deployment, the NYSCP will sponsor a series of innovative competitions. Through these, community stakeholders, such as residents and business owners, will be challenged to pilot and bring to scale leading edge energy technologies and solutions. Dedicated funding and support will be available, for example, to stimulate energy and sustainability competitions, potentially modeled after the solution-agnostic X Prize Competition. Rather than stipulating how a community should work toward goals, this style of competition challenges all market players, including community leaders, private residents, businesses, and service providers, to create, design, and implement unique, cost-effective strategies that inform future efforts across the state.

Replication

The success of the existing Communities initiatives have been largely based on lifting up early adopters with targeted technical assistance and using their successes to motivate others to emulate. Following that model, the NYSCP will work closely with communities that lead by example and demonstrate benefits associated with certain tools and resources provided through the NYSCP actions. The Community Summits will provide a forum for these leading-edge communities, who have implemented actions and seen the benefits first hand, to share their successes with colleagues who stand to benefit from similar action. The NYSCP will disseminate this information through the online portal and through the technical assistance providers and local partners, but informal peer-to-peer idea sharing will go much further in achieving statewide scale. To ensure that communities will be able to learn from each other indefinitely, part of the NYSCP initiative is to build capacity in and leverage a network of locally- and regionally-based self-sustaining organizations to continue the outreach, community summits, and other local engagement initiatives initially implemented by NYSERDA. Finally, implementing a recognition initiative and deploying long term energy and sustainability community competitions will ensure that momentum is maintained, even after the NYSCP transitions most outreach and technical assistance activities to local or other private organizations.

Providing Technical Assistance, Capacity Building, and Resources

Empowering Trusted Local Engagement

NYSERDA will work with the NYSCP and through trusted local partners to offer municipalities and communities the support framework, policy expertise, match-making, technical assistance and knowledge that they need to take advantage of resources and to execute projects. NYSERDA shall identify these local partners based on their ability to identify opportunities, market initiatives, the aforementioned tools and resources, and their ability to assist with project implementation. Local partners could include regionally or locally-based climate and energy consultants, constituency or community-based organizations, environmental or economic development agencies, governmental entities, or other organizations with strong relationships in the area.

Engaging Low-to-Moderate Income Customers

An important component of serving communities is penetrating LMI neighborhoods and households to ensure all New Yorkers have access to energy efficiency and renewable energy resources. NYSERDA will work with communities to explore opportunities to increase outreach,

awareness, and adoption of energy efficiency and clean energy solutions amongst low-to-moderate income consumers and other disadvantaged individuals. More specifically, locally based networks will be utilized to drive demand, educate consumers and provide feedback to NYSERDA on the needs of the LMI community and how to most cost-effectively serve these consumers. Community-based approaches using local organizations more effectively will be sought to support outreach and sustainable community development, promote end user action, and enable scale. For instance, NYSERDA will tap the power of communities by enabling community aggregation projects (such as those mentioned below) facilitated by local networks (i.e. not-for-profits, local governments, private industry, schools, clubs, etc.) already working effectively within the region. Efforts shall include access to services such as energy assessments, installation services, low interesting financing, and pathways to training for various green-collar careers. These locally based networks are in a unique position to reach consumers in need and will be able to communicate the level of need in the community, in addition to the impacts of LMI initiatives back to NYSERDA.

Building Capacity in the Higher Education Sector

NYSERDA will build capacity in communities to undertake advanced climate actions by linking communities with local colleges and universities that have expertise in these areas. Through this partnership program, NYSERDA will foster relationships and work directly with colleges and universities to build a self-sustaining initiative within each school to provide student and faculty support to certain communities. This will help address local government staffing, technical knowledge, and financial barriers, while also providing valuable work experience for the students. This effort will also work closely with and through the state's REV Campus Challenge, which will recognize the New York institutions of higher learning leading in on-campus sustainability, clean energy curricula and R&D, and community engagement around clean energy, and package resources to help participants succeed.

Funding for Advanced Actions

NYSERDA will allocate dedicated performance incentives to communities choosing to pursue such advanced and high impact local clean energy projects and solutions, such as implementing stretch building codes, adopting local benchmarking and disclosure laws, or installing advanced electric vehicle infrastructure. The NYSCP shall develop and test a flexible funding pilot for these allocations based on "tracks" of actions, whereby a community can access funding to help implement certain actions if they have completed other, defined priority actions in preparation. The tracks may vary from year to year based on state identified needs.

The combination of technical assistance and dedicated funding will provide the necessary support to enable communities to undertake high priority projects. One of the key aims of this support structure is to help build the capacity needed for local governments and communities to take future action on their own. As part of this effort, the NYSCP will leverage best practices and lessons learned from NYPA's Five Cities Energy Master Plans model to provide larger communities with the additional capacity and potentially in-house technical expertise required to undertake comprehensive energy planning and project implementation, possibly with philanthropic assistance.

Aggregation

Enabling Community Solar and Other Demand Aggregation Activities

The NYSCP will support initiatives that encourage collaborative community group purchasing, as well as other forms of local aggregation or demand generation. For example, as a component of NY-Sun, Community Solar NY will deploy a range of local and community-based initiatives to help achieve the program goals of the wider NY-Sun initiative. NY-Sun will leverage NYSERDA's power to set best practices and convene market actors, and will facilitate community projects through incentives and technical assistance. Community Solar NY is initially focusing on aggregation models, generally branded as "Solarize" campaigns. Leveraging NYPA's K-Solar Program, these campaigns are working with schools receiving solar assessments and procurement support to act as community education hubs for clean energy. Program offerings will evolve to include and support new models, such as those potentially enabled by community net metering or community choice aggregation. Community Solar NY will be closely coordinated with NYSERDA's overall community and local government program area, and will use practitioner networks, stakeholder engagement processes, program data, and case studies to ensure that activities build off of and complement one another. For instance, future activities might utilize community solar networks or best practices to build consortiums of communities to aggregate municipal streetlight purchases for LED retrofits, or even bulk purchasing of low-carbon home heating fuel for LMI communities.

Quality Assurance

The NYSCP will provide communities with easy to use tools and calculators capable of showing the benefits associated with actions prior to a community making a commitment to implement or invest limited resources. This will help ensure that communities see a positive return on their investment and feel comfortable making time and resource investments in the clean energy economy and in state programs. The NYSCP will also sponsor higher level state-led assessments of actions to provide cost savings and other benefit estimates up front without project-specific inputs. For example, standardized benefits associated with menu items and Climate Smart Communities Certification actions will be quantified, showing the relative benefit of different actions in key areas, such as cost savings, job creation, and greenhouse gas reduction potential. This assessment will include data generated from measurement and verification activities associated with completed projects and actions. NYSERDA will back-up high level estimates with specific case studies and other documentation from similar participating communities, including an interactive, searchable database and map of early adopters. In addition, NYSERDA will use data collected through the online platform to understand which initiatives and what types of assistance are most impactful and resonating in certain communities. Identifying these trends allows NYSERDA to continually adjust initiative offerings to align with current community demand.

6.10.2 Workforce Development

In order to more effectively support clean energy markets and NYSERDA's market-development initiatives, NYSERDA will take a strategic, targeted approach toward workforce development and training initiatives by focusing on hiring, job skills, and training that can accelerate the growth of

clean energy businesses. Workforce development approaches will also support community based activities to assist disadvantaged or displaced workers wherever possible.

With these approaches in mind, under the CEF NYSERDA will:

- Focus on businesses' need for labor and job placement outcomes
- Explore career pathways opportunities and apprenticeship models, and developing clean energy training curricula
- Target training where availability of skilled labor is a constraint to growth in specific clean energy markets
- Provide technical training where new skills are essential to overcoming identified barriers
- Serve as a trusted information source by connecting training organizations with clean energy businesses and equipment manufacturers
- Provide quality assurance by supporting certification initiatives and promoting certified practitioners
- Work with community-based entities to position and prepare New Yorkers for jobs related to clean energy

Through workforce development and training strategies, NYSERDA will help ensure quality design, installation, inspection, permitting, operation and maintenance (O&M), and sales of clean energy technologies. NYSERDA will also work to ensure that advances in technical training become more self-sustaining. Training strategies will be informed by business needs in order to better ensure they lead to placements and career advancement for participants.

6.10.2.1 New Initiatives

From 2016-2018, NYSERDA intends to explore the following initiatives:

- Workforce Development
- Technical Training
- Trusted Information Source

Workforce Development

NYSERDA proposes to focus workforce development initiatives on opportunities where the availability of skilled labor is a constraint to business growth and thus where NYSERDA's interventions will have the greatest impact on successful job placement and advancement. NYSERDA will work closely with real estate and clean energy businesses, trade associations, unions and the NYS DOL in 2016 to assess skill needs, barriers, and companies that would benefit from investing in workforce development solutions. This work will include sector-based interviews, data review, and industry analysis. Changes to emerging technologies, employer education needs, and market gaps over time will inform how NYSERDA's investments evolve.

NYSERDA will also focus support on employment opportunities in LMI communities and for disadvantaged or underserved individuals. Approaches will help employers institute long-term

career pathways for emerging workers. Career pathway strategies will include the development of internships, apprenticeships and job mentoring, as well as tuition support for LMI individuals. NYSERDA will also work to build or support curricula development for use in vocational schools, community colleges, or other institutions in support of these career pathways. Importantly, NYSERDA will work with industry to develop job task analyses that will inform curriculum and courses. Through these initiatives, NYSERDA will support more robust career pathways that will continuously strengthen job placement opportunities, upgrade worker skills, and enable workers to access family-sustaining wages.

Technical Training

NYSERDA will prioritize provision of technical trainings where they are essential to overcoming specific barriers and where they will help build a labor force that is able navigate the soft-cost-related processes – e.g. design, permitting and installation – of renewable energy systems and emerging technologies that are the focal points of CEF.

NYSERDA will support on-site training – in conjunction with training partners, unions or building trade associations – for activities such as building operation, commissioning, design, and auditing, particularly as buildings get "smarter" and new technologies provide new opportunities for improving performance. For example, NYSERDA will provide building operators with the training they will need to use and evaluate the data collected by RTEM systems, to optimize building energy performance and processes. NYSERDA proposes to concentrate training initiatives on reducing the soft costs associated with technology design, review, approval, installation, operation and maintenance. It will do so in particular for targeted technologies such as solar thermal, bioheat, solar electric, smart buildings, microgrids, battery storage systems and zero net energy homes, which are focal points of the first two years of the CEF.

NYSERDA also proposes to focus initial training initiatives on reducing the risk early adopters, such as manufacturers and data centers, will face with new technologies and processes. For example, NYSERDA will work with manufacturers to provide training on best practices and emerging technologies, leveraging project demonstration sites as a training "laboratory" wherever possible.

NYSERDA will work with community-based programs and groups to address specific training needs of, for example, code officials, inspectors, appraisers, and first responders. NYSERDA will develop specialized training infrastructure (e.g. curriculum, equipment, trainers) for these audiences and seek to target areas where knowledge gaps exist. In all sectors, workforce training gaps will be evaluated in terms of expanding the pool of qualified practitioners in response to increased market demand for services.

Trusted Information Source

NYSERDA will also serve as a trusted information source to encourage self-sustaining clean energy workforce development activities. NYSERDA will serve as an information resource, educating consumers about the importance of trained practitioners, supporting certification, promoting certified practitioners, and sharing training best practices. In addition, NYSERDA will act as a matchmaker, connecting training organizations with clean energy businesses and equipment

manufacturers to facilitate the development of job task analyses, skills training, internships, apprenticeships and job placement. NYSERDA has developed successful models where community colleges have partnered with solar installation companies to develop curriculum and deliver training in the classroom and on job sites while utilizing training equipment donated by manufacturers. Manufacturers benefit by having access to college training facilities for their own training and from introducing students to their equipment in the classroom. These models can be replicated and provide excellent opportunities for classroom training to include hands-on experience that can lead to an internship and, ultimately, a job.

Metrics for workforce development initiatives will include measures such as job placement figures, upgraded worker skills, and associated increases in salary.

6.10.2.2 Evolution of Previously Authorized Workforce Development Programs

NYSERDA intends to focus on initiatives that address business needs more effectively. NYSERDA will evolve its focus from maximizing the number of trained individuals to the number of people placed or advanced in jobs. NYSERDA will continue its efforts in developing career pathways that include tuition support and coordination with NYS DOL for other wrap around services for disadvantage workers, consistent with the GJGNY program. Training initiatives that broadly provide tuition incentives for clean energy courses currently readily available in the market will be phased out in the initial years of the CEF. Similarly, reimbursements for certification exam fees for individuals (except for LMI individuals) and training program and company accreditations will also be phased out in the initial years of the CEF.

7 Large-Scale Renewables

Large-scale renewables can deliver numerous benefits to residents and businesses alike. Immediate benefits can include economic development and jobs for communities across the state, greater stability in customer bills, cleaner air, reduced carbon emissions, and improved reliability of the electric grid. The benefits of LSR can be enhanced when complemented by flexible distributed energy resources, such as demand response and energy storage, that will be developed at increasing scale under REV.

NYSERDA's objectives for LSR under the CEF are to promote the development of these valuable resources through a multi-faceted market development approach which focuses on enabling additional penetration of technologies currently installed in New York while also supporting the development of new renewable resources and projects. In addition, NYSERDA is committed to supporting an orderly transition from its current role as the administrator of the RPS Main Tier program, which has historically supported large-scale renewable resources, and to actively engage in any role(s) that NYSERDA assumes under successor programs.

7.1 Extension and Transition from Current Main Tier Program

Since 2004, NYSERDA has supported LSR through RPS Main Tier solicitations, which have enabled nearly 1,900 MW of renewable generation capacity to be constructed and has proven to deliver benefits which far exceed the costs.[87] While this program has made meaningful progress, NYSERDA analysis and stakeholder feedback suggest that changes in the current approach are warranted to take changing market conditions into account and to achieve the State's core policy objectives described below.

A February 26, 2015 Commission Order[88] (February Order) affirmed the criticality of large-scale renewables to meeting New York's GHG emissions objectives, state energy goals and proposed federal requirements, and confirmed that the current Main Tier procurement approach should be reconsidered in light of these objectives and the multitude of changes that the implementation of REV will bring. Through the February Order, the Commission elected to establish an LSR track under the REV Regulatory Procedure to target this area of decision-making. The Commission also instructed DPS staff to work with NYSERDA to develop and file an LSR options paper to be issued

[87] In support of a 2013 Main Tier evaluation, NYSERDA conducted an evaluation of the benefits and costs of the portfolio of Main Tier resources as of December 31, 2012 (see: NYSERDA, "NYSERDA Renewable Portfolio Standard Main Tier 2013 Program Review - Final Report," September, 2013.). This analysis of quantifiable impacts demonstrated that public investment through the RPS Main Tier resulted in a positive impact on the State's economy and the environment. Under a base CO_2 value assumption of $15 per ton, a statewide benefit-cost analysis showed an additional net benefit of approximately $1.6 billion, with a benefit to cost ratio of approximately 5 to 1.

[88] Case 14-M-0101; Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued and effective February 26, 2015.

for public comment no later than June 1, 2015. NYSERDA conducted a detailed study to support the public comment and Commission decision-making process; and on June 1, 2015 filed an LSR options paper entitled "Large-Scale Renewable Energy Development in New York: Options and Assessment", to outline proposed design principles for supporting LSR, share key findings from evaluation and analysis of a variety of different options, and advance key questions for public comment.[89] Through the filing of the paper and subsequent opportunities for public comment, proposed approaches will be fully vetted. To this end, a new proceeding associated with LSR was established by the Commission, a technical conference was scheduled and several comment opportunities were offered in an associated Notice.[90]

The State's energy policy objectives articulated through the REV Regulatory Proceeding and the 2014 Draft State Energy Plan provided direction for the LSR options paper. With respect to LSR, the most notable of these core policy objectives are: maximizing customer benefits at the lowest possible cost, promoting competition, and animating voluntary markets for renewables to complement public investments. The paper found that these objectives will be best accomplished through a combination of near- and long-term steps that leverage existing programs and authority, provide greater revenue certainty for project developers, advance new contracting and ownership models for renewables, and create new opportunities for large end-users to buy the renewable energy products on their own.

As part of the submission, NYSERDA proposed a long-term commitment to the next generation of large-scale renewables through a $1.5 billion public investment over ten years, which is comparable to the level of investment made over the past decade to LSR through the existing RPS.

Over the course of its analysis, NYSERDA examined a range of potential policies, frameworks, and financing structures to support LSR. Based on the analysis of these options, NYSERDA recommended the following program design principles for consideration through public comment:

- Bundled PPAs to reduce costs and electricity price volatility;
- Flexible procurements to increase competition and ensure the selection of the lowest-cost projects;
- Centralized project solicitation/evaluation by a third-party;
- Procurements based on planned budgets, system needs, and other considerations;
- New mechanisms to facilitate voluntary market activity;
- Securitization to lower the cost of project debt; and
- Long-term budget commitment to stimulate greater investment in New York and put LSR on a path to grid-parity, while enabling significant reductions in overall collections.

[89] Case 15-E-0302 In the Matter of Implementation of Large-Scale Renewable Program, *Large-Scale Renewable Energy Development in New York: Options and Assessments*, June 1, 2015.

[90] Case 15-E-0302 - In the Matter of the Implementation of a Large-Scale Renewable Program, Notice Instituting Proceeding, Soliciting Comments and Providing for Technical Conference, issued June 1, 2015.

The new strategies and commitment will enable New York to make meaningful progress towards the State's clean energy goals at the lowest possible cost, while setting large-scale renewables on a path to a subsidy-free market.

To maintain market momentum as New York finalizes its new approach to support LSR through the new proceeding discussed above, the February Order also instructed NYSERDA to issue not only a 2015 Main Tier solicitation in the near-term[91] but also, through the CEF, budget and plan for a 2016 Main Tier solicitation while the Commission deliberates LSR issues. NYSERDA has developed a CEF budget scenario that would extend the RPS Main Tier by providing funding for NYSERDA to issue one additional solicitation in 2016. The issuance of a 2016 Main Tier solicitation will ensure that a market gap will not ensue while the replacement program is developed and implemented. The budget for this 2016 solicitation will be $150 million dollars. Section 12 provides additional details on the implications of this budgetary commitment and the intersection of this commitment with overall CEF budgets and future LSR budgetary modeling as described in the recently-filed LSR options paper "Large-Scale Renewable Energy Development in New York: Options and Assessment."

7.2 Large-Scale Renewables Market Development Approach

NYSERDA has identified critical market development roles that it proposes to assume to sustain and expand the progress made to date in enabling the increased penetration of LSR in New York, as well as supporting the State's next frontier of renewable resources and technologies, including offshore wind. This refreshed focus will include:

- Facilitating New York's renewables voluntary market to build demand for LSR
- Providing technical and pre-development assistance to reduce soft costs
- Developing appropriate energy market valuation and compensation for LSR
- Enabling the development of the next generation of renewable technologies, including offshore wind

These activities are discussed in more detail below.

7.2.1 Voluntary Market Facilitator

NYSERDA proposes to assist and build the voluntary market for the purchase of renewable energy by bringing together buyers (municipalities, industrial and commercial customers, and retailers serving residential customers, small businesses, non-profits, etc) and sellers of renewable energy. NYSERDA will also develop and implement the New York Generation Attribute Tracking System

[91] The 10th Main Tier solicitation was issued on April 7, 2015. http://www.nyserda.ny.gov/-/media/Files/FO/Current%20Funding%20Opportunities/RFP%203084/3084summary.pdf

(NYGATS)[92] to foster a transparent trading market and reporting platform for the attributes associated with renewable energy generation. The launch of NYGATS for public use is anticipated in 2016. NYSERDA will also establish a renewables bulletin board or other exchange for communication regarding possible business relationships and contract terms. Both new and existing (i.e. those with expiring Main Tier or Maintenance resource contracts) LSR generators will benefit from an open marketplace through which to contract in the voluntary market. The result is expected to be an increased penetration of voluntary market transactions in the State.

7.2.2 Reduce Soft Costs through Technical and Pre-Development Assistance

NYSERDA will support the development of financing and siting tools which can be used by developers of smaller-scale and community renewable projects. NYSERDA will provide technical assistance to the developers of these renewable projects in the areas of permitting, interconnection, siting, and financing considerations, and pursue opportunities to align the NYISO interconnection queue process[93] with the Article 10 siting process.[94]

As siting challenges mount with increased penetration and existing LSR reach the end of their useful lives, NYSERDA can play a key role in facilitating the development of remaining renewable sites and increasing production from existing sites. This role will include identifying the potential for increasing energy output from or repowering existing facilities. NYSERDA will also re-evaluate early prospecting work to determine the best remaining sites for onshore wind projects, including co-location with existing generators. Additionally, NYSERDA will identify and address barriers to the development of innovative LSR by conducting site and regional-level assessments, validating enabling technologies, and engaging in other activities to create a pipeline of clean resources available to New York. Finally, NYSERDA will work with our partners at the New York State Department of Environmental Conservation to ensure the availability of an ongoing supply of cost-effective, sustainably-harvested biomass feedstock to achieve New York's environmental and energy objectives.

7.2.3 Market Mechanism Developer

NYSERDA proposes to analyze and quantify the value of grid tied renewables (e.g. increased fuel diversity, energy price volatility reduction, long-term price and supply assurance) and develop market-based mechanisms to compensate generators for this value. NYSERDA will also engage in

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[92] The NYS Public Authorities Law directed NYSERDA to establish a tracking system (NYGATS) that records generation attribute information for electricity generated within the state, and generation attribute information for electricity imported to and consumed in the state.

[93] The NYISO Standard Large Facility Interconnection Procedures, contained in Attachment X of the NYISO Open Access Transmission Tariff, apply to Generating Facilities that exceed 20 MW. See http://www.nyiso.com/public/markets_operations/services/planning/planning_resources/index.jsp

[94] Article 10 provides for the siting review of new and repowered or modified major electric generating facilities in New York State by the Board on Electric Generation Siting and the Environment (Siting Board) in a unified proceeding instead of requiring a developer or owner of such a facility to apply for numerous state and local permits. See https://www3.dps.ny.gov/W/PSCWeb.nsf/All/D12E078BF7A746FF85257A70004EF402?OpenDocument

developmental work to support the emergence of commercially-ready approaches as technologies mature to capturing this value.

NYSERDA will also work to spur connections between the finance and development community, particularly for developers of smaller-scale projects where these business connections can be difficult to arrange and complicated to navigate. To improve project economics and reduce costs, NYSERDA will also explore, in consultation or in coordination with the NY Green Bank, the development of a state financing entity which can provide lower cost financing to project developers.

7.2.4 Offshore Wind

While the economic potential for additional land-based wind, hydroelectric and biomass generation upstate is material and near-term pursuit of its development is essential to keep New York on a trajectory to achieve its long term GHG reduction goals, New York also possesses additional native renewable resources which have not been previously installed in the State, including offshore wind (OSW). New York's OSW resources possess the substantial potential for production of zero-emission electricity; the Atlantic Ocean wind resources offshore New York have a been shown to have a technical potential range of up to 38 GW.[95]

Over the past decade, New York State has assembled important public information for proposed projects in Lakes Erie and Ontario, and in the Atlantic Ocean south of New York City and Long Island. NYPA, on behalf of a collaborative partnership with Consolidated Edison Company of New York and the Long Island Power Authority (LIPA), has applied for a lease from the federal Department of Interior - Bureau of Ocean Energy Management – (BOEM) to assess a potential Atlantic Ocean OSW project site for its development potential. In addition, in 2013 the DOS published the Offshore Atlantic Ocean Study[96] which is aiding DOS's ongoing efforts with other New York State and federal government agencies to plan for potential OSW development activities, leading to the eventual establishment of Wind Energy Areas (WEAs)[97] throughout the Mid-Atlantic Bight.

Recently, the University of Delaware's Special Initiative on Offshore Wind published a study[98] identifying potential strategies to drive further OSW cost reduction in New York. The study found that ongoing technology and industry advances combined with actions New York could take, independently or with other states, could lower costs for OSW power as much as 50 percent and bring the clean-energy source closer to realizing its potential for delivering utility-scale renewable electric generation to New York City and nearby areas such as Long Island. This report also found that the single most impactful action New York could take to lower the costs of OSW would be to help develop a market of scale, rather than supporting OSW on a project by project basis.

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[95] NREL. *Assessment of Offshore Wind Energy Resources for the United States.* Golden, Colorado: National Renewable Energy Laboratory, 2010.

[96] http://docs.dos.ny.gov/communitieswaterfronts/ocean_docs/NYSDOS_Offshore_Atlantic_Ocean_Study.pdf

[97] Wind Energy Areas are physical sites identified by the Bureau of Ocean Energy Management that are deemed suitable for offshore wind energy leasing through a collaborative, consultative and analytical process.

[98] http://www.ceoe.udel.edu/File%20Library/About/SIOW/New-York-Offshore-Wind-Cost-Reduction-Study-ff8-2.pdf

This planning work has set the stage for the next phase of New York's active long-term development of this vast and vital renewable resource. Exploiting this potential is challenged by lack of development and operational infrastructure, similar to challenges faced by land-based wind over a decade ago. NYSERDA expects the OSW commercialization process will be similar to that taken to develop a land-based wind industry, including conducting various site and resource-specific assessments (*e.g.,* geophysical, meteorological, biological, energy production and cross-cutting environmental research), assessing project engineering and economic viability, conducting assessments and engaging in cost-reduction activities (focused on the manufacturing/supply chain and service mechanisms for offshore components), shortening development cycle time, and reducing regulatory and business risks.

New York has stated its intention to work toward a meaningful long-term commitment to develop the OSW resource to maximize the energy, climate, and economic value for the State. Through the CEF, NYSERDA will have a critical and distinct role and proposes to focus on strategies and investments that have the potential to meaningfully reduce the cost of this resource. Specifically, NYSERDA proposes to initiate multistate collaboration to enhance the attractiveness of OSW to developers, achieve economies of scale in the supply chain, and improve overall economics. As discussed in the LSR options paper, NYSERDA also proposes to explore establishing a financing entity or mechanism that can provide low-cost financing at the scale needed to advance OSW development in the New York State region Atlantic Ocean waters. NYSERDA will also support the DOS in building upon the foundation of the Offshore Atlantic Ocean Study,[99] as well as expanding upon the DOS-initiated stakeholder engagement process that addresses public and private interests in New York State Atlantic Ocean waters and considers multiple uses of the ocean in developing an appropriate siting policy.

NYSERDA will follow on these efforts with targeted infrastructure research and outreach strategies coordinated among NYS entities, continue involvement in Federal (DOE, BOEM) collaboration on joint efforts to study OSW in the New York region of the Mid-Atlantic Bight, and conduct wildlife surveys and research on human uses to address other uncertainties in environmental conditions and siting information needs that will reduce market barriers for all OSW stakeholders. Consistent with the overriding themes of the CEF, NYSERDA's role for OSW will be one of a market enabler where NYSERDA can facilitate more coordinated regional-scale market interventions as described above.

[99] http://docs.dos.ny.gov/communitieswaterfronts/ocean_docs/NYSDOS_Offshore_Atlantic_Ocean_Study.pdf

8 Innovation and Research

8.1 Energy-Related Environmental Research

Energy related activities are responsible for numerous adverse environmental and economic impacts in New York State, including climate change, human morbidity and mortality from poor air quality, degradation of lakes, streams, forests, and buildings from acid deposition, elevated levels of mercury in fish and other wildlife, and habitat modifications from alternative energy development. Local, state and federal efforts have resulted in environmental improvements, but New York's economy, vulnerable populations and sensitive ecosystems continue to be affected. A robust, comprehensive energy-related environmental research approach is needed to guide cost-effective greenhouse gas mitigation and climate adaptation strategies, inform state and federal energy and environmental policies, examine the health and ecological co-benefits of alternative energy and technology solutions, and guide emerging energy technologies and systems, thereby facilitating their entry into New York State's energy mix and contributing to the diversification of energy resources.

Based on scientific objectivity and using a stakeholder-driven framework, the research agenda will continue to develop and integrate an evolving energy–environmental landscape that identifies information gaps and research needs. Research efforts will also be designed to consider the broader, evolving energy and environmental policy context, including increased reliance on market-based environmental protection strategies, increased need to evaluate real-world effectiveness of energy and environmental policies (i.e., "environmental accountability"), increased sensitivity to pollution hot spot concerns and environmental justice, scarcity of resources for adequate long-term monitoring programs, and the need for coherent multi-pollutant policies and programs.

Energy-Related Environmental Research will work to:

- Enhance the understanding of the environmental impacts of current and emerging energy technologies, systems, and pollution control technologies; and identify barriers and opportunities related to the implementation of alternative energy technologies;
- Evaluate the effectiveness of energy-related environmental protection strategies for climate-forcing agents, acid deposition, mercury, ozone and co-pollutants, and particulate matter to support the regulatory responsibilities of New York State agencies;
- Provide energy-related environmental accountability through analysis of long-term monitoring records and modeling;
- Enhance the understanding of the source types, source regions, and specific pollution components contributing to major energy-related environmental problems in New York State;
- Provide insight on the relative contribution of fuel combustion in various sectors (e.g., electricity production, heating, transportation) to the state's environmental challenges;

Prioritize opportunities for mitigation and identify cross-sector, potentially market-based pollution control, strategies;
- Help identify more environmentally friendly options for cleantech companies;
- Foster collaborative, interdisciplinary research to better use limited resources available for research; and,

8.2 Technology and Business Innovation

8.2.1 Objectives

The energy sector, both public and private, has under-invested in research and development (R&D) for decades.[100] Substantial increases in energy research and development and effective models that mobilize private capital are needed to create a sustainable clean energy system that addresses our enormous energy and environmental challenges, and our equally significant energy opportunities.[101]

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.[102] For instance, each dollar invested in product development has resulted in:

- Leveraging of $5 of outside investment;
- $13 in commercial revenue from the sale of newly introduced clean energy products;
- An increase in gross state product by $11.[103]

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

Technology and business innovation efforts will include activities such as technology research and development, commercialization of new technologies and innovative business models, and support for emerging businesses developing clean energy products and services in New York State.

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[100] Nemet and Kammen, "U.S. Energy Research and Development: Declining Investment, Increasing Need, and the Feasibility of Expansion," Energy Policy, 2007

[101] Findings supported by a number of organizations including: (1) The United Nations 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.

[102] See Appendix E for additional detail on historical NYSERDA R&D outcomes.

[103] See Appendix E for additional detail on historical NYSERDA R&D outcomes.

NYSERDA proposes to refine its approach to cleantech innovation to better drive the scale of clean energy required to achieve the objectives of REV. NYSERDA proposes to maintain historic levels of investment in innovation while: (1) focusing on high impact strategic priorities while maintaining an ability to pivot to emerging opportunities, (2) embracing a stronger technology-to-market focus to drive cleantech innovations towards market entry, and (3) employing rigorous portfolio management. NYSERDA will build upon past successes and best practices, apply lessons learned to identify and capture better opportunities, and address pressing energy and environmental issues facing the State.

Through its technology & business innovation investments NYSERDA will accelerate the pace of innovation, help move NYS to a cleaner, more efficient, more distributed energy system, and drive cleantech business growth in the State. The innovation initiatives NYSERDA proposes will work to reduce greenhouse gas emissions and other negative environmental impacts, mobilize private capital and spur economic development, build innovation capacity, increase system resiliency, and reduce technical and economic barriers to clean energy.

8.2.2 Investment Approach

NYSERDA proposes to act as a catalyst in the clean energy marketplace, investing to facilitate the development, commercialization, market entry, and deployment of innovative clean energy solutions. Rather than focusing on technologies in isolation, NYSERDA will help innovators build businesses that deliver needed products and services, while also enabling a vibrant investment, service and technology development community that identifies problems, develops solutions, and attracts innovators, companies, private investors, and other key elements necessary to bring clean energy businesses to scale. The refined investment approach will place a greater importance on collecting and leveraging market intelligence (i.e. engaging developers, listening to customers) to identify barriers and opportunities, and will focus on opportunities where the State has an ability to affect change.

As part of a refined innovation approach, NYSERDA proposes to be more strategic, focused, and capital efficient. NYSERDA will commit the majority of its innovation resources and support to opportunity areas that have the greatest potential for significant energy and environmental impacts. Resources, both capital and staff time, will focus primarily on initiating projects and driving outcomes within identified focus areas. However, NYSERDA proposes to maintain the flexibility to pursue ideas with merit that may not fit into a defined focus area. In either case, NYSERDA will invest in those opportunities that represent the best combination of need, market potential, and probability of success (i.e., where New York possesses the technical, academic, and industrial infrastructure and assets necessary to address the opportunity). NYSERDA will manage projects and the overall portfolio to advance both technical and business readiness, help establish self-sustaining programs and institutions in the State that provide innovators with key resources, facilitate engagement among early stage innovators, established companies, and other key stakeholders, and leverage data to better manage projects and the innovation portfolio as a whole.

In addition to focusing on high opportunity areas, NYSERDA proposes to focus support at key points where commercialization can stall and the private sector is less likely to offer support. NYSERDA will focus on providing support at: (1) the company's formation; (2) its first capital raise; and, (3) its first customer sale. NYSERDA proposes to pursue innovation investments using a mix of strategies, including direct investment that emphasizes technical and business readiness. Other tactics will build entrepreneurial capacity for cleantech innovation by developing scalable model initiatives that the private or institutional sectors can ultimately sustain. A key tactic will include creating tangible, multi-use facilities and resources that can provide benefit to multiple clean energy companies and markets (e.g., the Intertek Center for Evaluation of Clean Energy Technology Inc.[104]). Lastly, NYSERDA will engage with investors and mid-market stakeholders and support business-to-business commercialization partnerships, focused on creating value throughout the supply chain, and ultimately accelerating clean energy innovation and commercialization.

8.2.3 Strategic Priorities

NYSERDA proposes five initial strategic priority areas:

- Smart Grid Systems
- Renewables & DER Integration
- Building Innovations
- Clean Transportation
- Innovation Capacity and Business Development

NYSERDA identified these five priority areas by mapping NYS needs and the policy objectives of REV with technical opportunities, existing clean energy assets in the state (i.e. universities, active startups, established corporations, manufacturers, etc.), and potential clusters (areas with existing science and technical activity) to identify areas with strategic importance and the greatest opportunity for energy and environmental benefits.[105] In addition to these areas, NYSERDA will also support other critical crosscutting work related to better understanding the environmental impacts of energy systems.

8.2.3.1 Smart Grid Systems

NYSERDA will work to accelerate the evolution to a smarter, more integrated electric grid. This will be achieved by supporting the development and application of digital processing and communications technologies making data capture, diagnostics and automated control actions central to the grid's management. Such a grid is expected to be more efficient, sustainable, reliable, resilient, and affordable, supporting the transformational goals outlined in the REV strategy. A more refined understanding of system conditions in real time made possible by innovative technologies will enable a better understanding of the need for and value of various services or products desired by the system operator and the market (e.g. , demand response, voltage controls, quick switching of

[104] http://www.intertek.com/energy/renewable/cecet/

[105] There is overlap in these market segments as they relate to an integrated grid/energy system. There are also many technology solutions that cut across these areas (e.g. digital solutions, advanced materials, advanced analytics).

customer groups). As the REV process proceeds and utilities pursue more innovative grid solutions, NYSERDA will monitor market needs and evolve its investment strategies accordingly.

Transmission and Distribution Systems

NYSERDA proposes to focus smart grid strategies on two key areas, the first of which will support the advancement of a range of technologies designed to improve system efficiency, resiliency, and the development of the distributed system platform envisioned in REV. Currently, T&D system losses can approach 10%, with significant losses occurring in the distribution system, and system resiliency is increasingly challenged by storm events. NYSERDA proposes to address these issues through the development and validation of new technologies to advance the capacity to sense real time conditions, effectively communicate and transfer data between devices and operators, conduct diagnostics on such data and use this intelligence to execute control decisions. Additional emphasis will be placed on developing technologies necessary to increase the connectivity of DER. The expected outcome of this activity is increased asset utilization, improved customer service, increased system-wide efficiency, reduced energy consumption and costs, increased service options for consumers and an improved environment.

As an illustrative example of this type of work, NYSERDA is currently working with Orange & Rockland and Central Hudson Gas & Electric on the development and application of advanced models to manage complex distribution circuits. Each distribution system element (wire, transformer, switch, etc.) has operating characteristics and functions that are now being modeled spatially and digitally. These devices can communicate directly with each other and the system operator and on the basis of data exchanged between them on system conditions, diagnose system problems and operate automatically to relieve stressed conditions, swap supply between circuits, conserve voltage, and conduct other system operations to minimize customer impacts and support accelerated restoration when necessary.

Investment tactics may include direct investment in companies and products, pilot-scale field testing, and the sharing and effective leveraging of acquired knowledge on technology performance and operating experiences. The work to develop a more integrated, efficient grid will continue to involve close collaboration with the utilities and vendors. NYSERDA's efforts in this area are expected to increase system-wide throughput of power, enable DER connectivity to network systems, validate the use of model-centric control systems, and produce technologies needed to enable the smart system operations and market mechanisms necessary to satisfy REV objectives. Progress indicators include intellectual property (IP) created (patents etc.), performance validation (confirmation that the technology performed as intended) and replication, external investments, number of commercialized innovations, accelerated changes to standards, and utility/regulator adoption.

Community Grids

The second area of emphasis will be supporting the development of community grids.[106] Communities continue to remain vulnerable to storms, and customers in general have historically not been connected or engaged in decisions on power system planning or operations that in reality have a direct bearing on community welfare. NYSERDA proposes to promote customer and third-party engagement in the development of community microgrids to improve local distribution system performance and resiliency, both under normal operating circumstances and during times of electrical grid outages. Specific actions will include developing and testing technologies to support microgrids and implementation of the NY Prize Community Grid Competition, a multi-stage microgrid design and build competition. The NY Prize competition will introduce communities to the concept of microgrids as a possible means of building resiliency to service disruption from storms while instilling in these communities a greater sense of ownership about energy choices. The competition is also expected to create opportunities to test-drive REV principles and smart grid technologies in over 30 communities across the State, representing each utility service territory.

Overall, NYSERDA will work to develop technology and business model solutions to realize the energy, environmental and resiliency benefits of microgrids in support of overall REV objectives. The NY-Prize competition is expected to result in the study of project feasibility in over 25 communities, completed engineering design and commercial plans at 10 or more promising locations, and building and operating systems in at least 5 communities. The potential benefits will include documenting microgrid performance, testing and validating REV principles, and identifying and addressing barriers. Progress indicators include the number of participating communities, the mix and type of customers involved, technology performance validation, verified resiliency and degree of private sector investment.

Certain efforts within the Smart Grid Systems focus area are expected to be strongly correlated with those of Building Innovations and Renewables & DER Integration, requiring some degree of integration across all three focus areas.

The proposed smart grid innovation efforts described will:

- De-risk technologies that can lead to an increase in the efficiency of grid systems
- Support NYPrize and expand the use of distributed energy resources
- Increase system intelligence to predict failures and disruptions and reduce outages
- Accelerate the development and adoption of advanced technology/controls at the distribution level, leading to consumer savings
- Increase ability to deliver grid-scale renewable energy through the transmission system to the State's load centers

[106] The grids will be comprised of multiple, uniquely owned and controlled buildings that together can operate independently of the grid and include at least one facility providing a critical service to the public.

8.2.3.2 Renewables and DER Integration

The current penetration of large-scale renewables and DER is limited but growing rapidly. These technologies have high technical potential,[107] but performance and market barriers such as low capacity factors, high balance-of-system costs, and operations & maintenance requirements are preventing full realization of their benefits. Through strategies that improve technology performance, reduce costs, and improve integration with the grid, NYSERDA will work to accelerate market adoption and increase recognition of the benefits of distributed and renewable resources. This will improve the economics of DER and renewable resources by addressing technical and market barriers, thereby enabling increased penetration and associated benefits (including reduction of GHG emissions, improved resiliency, increased consumer options), and facilitating achievement of REV goals. NYSERDA proposes to pursue four key areas in renewable and DER integration.

DER Performance Improvement

NYSERDA will work to improve the performance of DER and renewable resources to maximize the amount of energy and value that the physical asset can provide. NYSERDA proposes to invest in solutions to optimize renewable energy, such as advanced analytics, materials and modeling, sensors and diagnostics, and improved siting and design, thereby increasing the value of an asset without needing to change the fundamental energy conversion processes. For example, potential improvements for wind include adjusting for "wakes" (the impact a turbine can have on others downwind) in siting and design, structural improvements allowing a larger swept blade area and energy production at low wind speeds, blade performance improvements, and a reduction in maintenance outages. Potential improvements for solar could include increased use of bi-facial cells, increased energy capture by making use of anti-reflective coatings, and reduced performance degradation.

Specific actions to pursue these opportunities will include technology innovations, conducting pilot demonstrations and validations, and standards development. NYSERDA's proposed investment approach will leverage direct investment in companies, consortia-testing center support, and pilot scale field testing. Potential benefits of this work are a 10% increase in solar electric and a 30% increase in wind energy production per unit cost, potentially increasing the amount of generation that is technically possible to economically possible by over 4,000 GWh for solar electric and by 3,600 GWh for wind by 2030.

DER Integration

NYSERDA also proposes to pursue improved integration of renewables resources with the electric system, consistent with the goals of REV Currently, intermittency of electricity production and lack of interoperability between the grid, DER, storage, and customers hinders the state's ability to capture the full value of DER and renewables. To address this issue, NYSERDA will initially focus on

[107] The potential of renewables resources has been documented recently by NYSERDA through work with Optimal Energy and the potential of DER has been documented recently by the NYISO with work by DNV-KEMA.

integrating energy storage with solar electric and other DER, improving DER-enabled resiliency, improving DER islanding capacity (the capability for standalone operation when the grid is down), advancing grid and building interactive inverters ("smart" inverters that communicate with and can be controlled in conjunction with external sources such as the grid and building management systems), and increasing the value of intermittent renewables through improved power quality and capacity firming (which will allow a predictable amount of power to be provided independent of renewables intermittency and variability).

Specific actions to pursue these opportunities will include validating hypotheses, direct investment in companies, field testing and pilot demonstrations, standards development, technology transfer and information dissemination.

Enabling Technologies – Energy Storage

NYSERDA also proposes to advance enabling technologies and innovative business models that improve the value proposition and accelerate the adoption of renewable generation technologies. Currently there is poor understanding of the performance requirements of energy storage products for specific applications and duty cycles. Increasing this understanding will lead to improved products and system designs that have greater value and achieve increased market penetration. NYSERDA proposes to initially focus investments in energy storage application analytics, which will enable an improved definition of system performance and value, improve the matching of product specification and applications, and reduce balance of system costs (particularly for installation). NYSERDA also proposes to explore a catalog approach, which would develop standardized product offerings, optimized for specific applications or load profiles, which could be manufactured in volume.

NYSERDA will pursue these opportunities through direct company investments, product development, wide scale pilots for technologies and business models, and working with consortia (i.e. NY-BEST), developers, and end-users to support the characterization of applications having a high levels of replicability. These efforts will develop standardized energy storage products that are economic and can scale in the market, leading to a self-sustaining battery storage industry in NYS, and which will ultimately enable increased deployment of more DER and load flexibility.

Water Resource Recovery Facilities

NYSERDA also proposes to address indigenous renewable resources that are currently underutilized, initially focusing on water resource recovery facilities. Wastewater treatment facilities currently consume 1.5% of New York's power, [108]and energy use is likely to increase due to upcoming nutrient removal mandates, as current approaches are energy intensive.

NYSERDA will pursue innovation and investment in these facilities to make them zero net energy. NYSERDA proposes to provide focused outreach and technical assistance to up to 78 plants representing 90% of the States wastewater treatment capacity to encourage full implementation of

[108] Statewide Assessment of Energy Use by the Municipal Water And Wastewater Sector, Final Report 09-17, November 2008, New York State Energy Research and Development Authority

best practices for energy efficient operations, encourage maximum implementation of on-site energy generation, assess technical potential, assess public-private partnership opportunities, and demonstrate pioneering technologies to achieve significant reduction of energy use. NYSERDA will also support an energy net neutrality mentoring effort which will provide experts and consulting services to facilities to assist them in implementing more advanced energy measures.

8.2.3.3 Building Innovations

Buildings are major users of energy in NYS and the building stock is largely made up of inefficient older buildings, many of which will still be in use in 2030. Additionally, the investment in R&D for building technologies lags other industries. Taken together, these factors create a large addressable market potential for buildings innovation. To address this opportunity, NYSERDA will work to create technologies and systems that can enable zero net energy buildings, deep energy efficiency retrofits, and smart buildings, providing value and comfort to occupants and owners.

Next Generation Heating, Ventilation, & Air Conditioning

NYSERDA proposes to pursue buildings innovation initiatives in two key areas, the first of which is Next Generation HVAC. HVAC systems account for the largest proportion of energy use in buildings. In addition to being a key driver of energy use, heating is heavily dependent on fossil fuels, cooling demands of buildings have a large impact on system peak and reliability, and current vapor compression refrigerants can be harmful to the environment. In order to drive towards higher performance and zero net energy buildings, NYSERDA proposes to address this high potential area by investing in alternative cooling technologies, including techniques for separate humidity and temperature control, cold climate heat pumps, integrated HVAC systems (i.e. renewables and storage paired with conventional systems), and intelligent HVAC systems with more advanced controls.

NYSERDA proposes to approach this focus area through direct investment in companies, pilot demonstrations, strategic partnerships, technology specific challenges, including prize offers, and market development coordination. Indicators of progress towards next generation HVAC include IP created, successful field tests, commercialized products and services and validated ROI and value propositions. Improved HVAC systems could lead to a 5-10% penetration of non-compressor based cooling technologies in commercial buildings, energy savings of 15-30%, and substantial demand reduction by 2030.

Smart Buildings

NYSERDA will also work to increase the number of smart buildings by leveraging digital solutions that can enable a range of building efficiency improvements and new products. Smart buildings are a key element of microgrids and the dynamic demand model envisioned in REV. Smart buildings strengthen resiliency by enabling buildings to adapt to internal and external requirements, and allow for optimization of resources, including renewables, on-site generation, and storage. Despite the benefits, smart buildings currently face low market penetration, underutilization of capabilities, and higher system costs.

To overcome these limitations, NYSERDA proposes to invest in advanced wireless sensor and control systems. These systems will enable data analytics, advanced algorithms, energy management as a service (EMaaS), demand response, transactive energy (transactions based on the information and value of energy), building standards development, real time energy monitoring (to avoid deterioration in building performance), and the expansion of smart equipment. Investments in these areas provide for interactions among the building subsystems, building and power grid, allowing for decisions that optimize energy performance (lower cost), minimize environmental impacts and improve resiliency.

NYSERDA proposes to pursue this focus area through direct investment in companies, establishment of a building consortium, university and research centers participation and stakeholder engagement. Through smart building initiatives, NYSERDA can accelerate building-grid integration in support of REV objectives, driving potential energy savings of 15%, which could translate to $1 billion in energy cost savings and 10-12 million tons of carbon reduction. Indicators of progress will include cost effective products and services developed and commercialized, consortium and research center participation, standards adapted, MW of Demand Response enabled and delivered through innovative approaches, and market penetration of Smart Buildings.

Efforts within Building Innovations will be integrated and coordinated with the activities in Smart Grid Systems, Renewables & DER Integration, and Energy Storage and will leverage NYSERDA's investments in Innovation Capacity and Business Development.

Secondary Opportunities

In addition to the two main focus areas, NYSERDA will explore opportunities for high impact investments in two secondary areas. Building envelopes present a large opportunity for efficiency and carbon reduction in both new and existing buildings, but NYS faces challenges with regard to materials and labor costs and resource constraints. The US DOE completed a Windows and Building Envelope R&D Road Map for Emerging Technologies in February 2014,[109] and NYSERDA proposes to monitor and engage with DOE regarding opportunities to partner in this area. There are also continued opportunities for advancement in lighting, including solids state lighting and controls. NYSERDA proposes to work with stakeholders in the lighting space on targeted high potential opportunities.

8.2.3.4 Clean Transportation

The transportation sector accounts for 40% of the fossil fuel CO2 emissions in NYS. Given this high GHG reduction potential, NYSERDA proposes to work to accelerate the movement toward an efficient, low-GHG emissions transportation system, enhancing the quality of life in communities across New York State. How people and goods are transported is integrally connected to the State's economy, building systems, telecommunications, and overall energy use. NYSERDA will work to decrease transportation GHG emissions and petroleum consumption, expand consumer options and affordability, and improve system resiliency and reliability. Across all focus areas, NYSERDA

[109] http://energy.gov/sites/prod/files/2014/02/f8/BTO_windows_and_envelope_report_3.pdf

proposes to expand existing relationships with sector stakeholders, build new relationships with emerging sector stakeholders, capitalize on new sector trends and technologies, and, structure demonstrations for self-sustaining business models. The Clean Transportation program will work closely with the Communities program area to implement solutions that support energy efficient building and development patterns and enable more efficient and cleaner transportation statewide. NYSERDA will heavily leverage CEF funds with other State funds (e.g., Department of Transportation (DOT) and federal funding in this area to increase impact. Historically NYSERDA has been able to leverage its SBC transportation funding to generate about $7 of private, federal, and other State project funds for every $1 of PSC-allotted funds expended. NYSERDA would use CEF funds similarly in the future, building a robust program from multiple State and federal funding sources while continuing to leverage private capital.

Public Transit and Electric Rail

An initial proposed focus area is public transit and electric rail. Public transit and electric rail are not only efficient means of transporting people, they also enable more densely built communities that contain more energy efficient buildings. The NYC subway system is the largest consumer of electricity in the NYC metro area (1.8 billion kilowatt hour (kWh) annually), a significant portion of which is wasted due to aging equipment and infrastructure. A cost-effective approach is needed to develop new solutions capable of improving the system's energy efficiency, such as the use of energy storage coupled with regenerative breaking. NYSERDA proposes to pursue this opportunity through enhanced collaboration with Metropolitan Transit Authority (MTA) and NYPA to develop new products, test and validate existing products and hypothesis, and document technology benefits and value propositions. To expand adoption, the Clean Transportation program proposes to engage MTA, NYPA, and the Communities program to build capacity for adopting new technologies and strategies for public transit. NYSERDA will also support companies in their development of promising solutions for more efficient transit operations. This multi-year effort could potentially lead to a 25% reduction in the electric traction power consumption of the NYC transit system over the long term. Indicators of progress will include validation of hypotheses and product performance, development of cost effective products developed, and the creation of IP.

Electric Vehicles

Expanding the use of electric vehicles (EVs) is another element of NYSERDA's transportation program area. EVs offer attractive opportunities for GHG reductions and operational savings for drivers. EVs also provide an opportunity to produce significant benefits to ratepayers by offering vehicle-to-grid power and by leveling electric grid loads throughout the day. EVs still face a broad set of challenges to adoption, including high upfront vehicle prices, a lack of charging infrastructure, regulatory barriers, and a lack of consumer awareness.

NYSERDA proposes to address barriers to EV adoption through demonstrations of new technologies, business models, policies, and processes that can bring down the cost of ownership and expand the market for EVs and charging stations. Governor Cuomo's Charge NY Initiative, which seeks to expand New York State's EV infrastructure and enact policies that encourage more EV adoption, is the main driver of this approach. NYSERDA also proposes to pursue public-private

partnerships, including collaborations with utilities, to drive greater EV adoption and generate greater consumer awareness of EVs. Emphasis will be placed on coordinating with NYSERDA's Communities program area to encourage local initiatives that create hubs for EV adoption in the State. Indicators of progress will include technology performances validated, growth of EV market share and infrastructure installations, growth of consumer awareness of EVs, and best practice documents developed and shared with stakeholders. Widespread adoption of EVs could lead to a 7% reduction in total gasoline use in the state by 2030.

Smart Mobility

An additional focus area is smart mobility. Optimizing how vehicles and transportation infrastructure communicate can significantly reduce transportation energy use and emissions while making cities more efficient and more attractive to live and work in. Smart Cities, Connected Vehicles, and intelligent transportation systems (ITS) are emerging strategies that can greatly reduce energy consumption. Cities are being fitted with sensors and vehicles are being designed to communicate with the infrastructure and with each other, with the goal of reducing congestion, informing drivers, and creating more livable communities.

Partnerships are already forming in New York State between state agencies, universities, trade groups, and major market participants. NYSERDA proposes to work with these partners to conduct large-scale demonstration projects, support the development and growth of new products and services, directly invest in companies, and provide technology transfer and information dissemination. NYSERDA proposes to coordinate with the Communities program area and DOT to build interest in promising strategies and technologies with municipalities. Indicators of progress in this focus area will include cost effective products developed, IP created, self-sustaining consortium development, product performance validated, and communities deploying smart mobility solutions. Smart Mobility projects will leverage significant federal and other non-CEF State funds to expand NYSERDA's efforts. By decreasing urban congestion and increasing system efficiencies, these strategies could result in an energy and petroleum reduction in adopting communities of approximately 10% by 2020, with more widespread and deeper impacts by 2030.

Transportation Demand Management

A fourth focus area is Transportation Demand Management (TDM), which is the application of strategies and policies to reduce travel demand (primarily that of single-occupancy vehicles), or to reallocate this demand to cleaner and more efficient modes of travel. TDM emphasizes the movement of people and goods, rather than motor vehicles, and gives priority to walking, cycling, ridesharing, public transit and telecommuting, particularly under congested conditions and in dense urban environments. Communities that implement TDM strategies enable the development of more compact, efficient buildings and transportation systems while generating significant economic benefits. To expand the use of TDM strategies, NYSERDA proposes to support the growth of shared mobility providers while collaborating with NYSERDA's Communities effort and behavior analysis professionals to work with municipalities and large employers. Specific actions will include research and demonstration of technologies and strategies to support TDM implementation, development of tactics to increase community interest in and support for TDM strategies,

conducting workshops and targeted outreach in partnership with the Communities team, and sharing information about business and technology successes and failures to the right market actors. Indicators of progress will include growth of shared mobility service providers, increased community support, and implementation of large employer efforts. TDM projects will leverage significant federal and other non-CEF State funds to expand NYSERDA's efforts. This work could lead to a significant petroleum reduction (8%) in the impacted communities from increased utilization of alternative transportation and decreased vehicle miles traveled on a timeframe similar to that of the Smart Mobility effort.

To meet New York State's GHG reduction goals, other segments of the transportation sector, such as efficient freight and alternative transportation fuels other than electricity, also require additional innovation to be adopted more broadly. NYSERDA may seek non-CEF funding to support the development of innovative freight and alternative fuel solutions that reduce transportation GHG emissions.

8.2.3.5 Innovation Capacity and Business Development

In addition to the more market and technology specific focus areas, NYSERDA will work to develop a vibrant, self-sustaining cleantech innovation ecosystem that will accelerate the pace and scale of clean energy innovation in NYS. New York has tremendous innovation assets, ranking 2nd in the United States in overall cleantech patenting, 3rd in university research expenditures, and in the top three for science, technology, engineering, and mathematics (STEM) degrees awarded and venture capital investment. However, in 2014 New York ranked sixth in the nation for clean energy venture capital funding, behind California, Massachusetts, Texas, Pennsylvania, and Illinois.[110] Therefore, to achieve the market potential of the innovation infrastructure and accelerate the pace of innovation, New York must create and foster the entrepreneurial climate for business creation and growth of early-stage companies. This innovation thrust combined with the other elements of the CEF will help New York achieve its energy goals more quickly and with more economic co-benefits.

To foster the innovation ecosystem, NYSERDA proposes to:

- Map the technology-to-market pathway and identify key market players ;
- Identify gaps that are relevant and critical to the commercial success of early stage/growth businesses in the clean energy sector;
- Target the gaps where NYSERDA can have an impact and that are unlikely to be filled by other entities;
- Invest in organizations/institutions that can ultimately obtain at a scale of competitive and sustainable operation that allows them to deliver important outcomes without ongoing NYSERDA funding;
- Implement activities to leverage existing resources and focus new strategies to fill-in identified gaps for cleantech businesses growth; and,

[110] 2014 Venture Capital Financing and Exist Report. CB Insights January, 2015

- Link companies to resources and increase awareness of the cleantech venture environment in NYS to attract both investment and entrepreneurs.

Develop Existing Clean Energy Innovation Assets

NYSERDA proposes to continue to grow existing clean energy innovation assets, including business incubators and proof-of-concept centers (POCC). POCCs are designed to transition clean energy research into business enterprises. In the first year of operation, 21 entrepreneurial teams participated in an intensive customer discovery/business model canvas program. With a clearer understanding of their value proposition, the next step for these teams will be to build out a management team and explore options to raise capital. In addition, NYSERDA has launched six clean energy business incubators which have assisted 133 participating companies raise over $163 million in private capital and $72.5 million in non-NYSERDA state and federal funding, while launching 130 new products. For example, New York University's New York City Accelerator for a Clean and Resilient Economy assisted Honest Buildings, a New York City-based startup that has developed a platform to connect professionals in the real estate construction and design space, raise $11.5 million from leading venture capitalists. Going forward, NYSERDA will optimize the performance and effectiveness of these existing assets to build on this success through stakeholder surveys, analysis of asset performance, surveys of existing operations and procedures, and customer discovery/needs assessments. This work will increase the success rate of the existing and future assets.

Strategic Partnerships

NYSERDA also proposes to pursue strategic corporate partnerships. Customers are slow to accept an unproven product from an unknown start-up, which makes it difficult for start-ups to access channels to the market. To address this barrier, NYSERDA proposes to continue to work on facilitating networking within the innovation ecosystem, connecting investors and inventors, and small cleantech companies with strategic corporate partners, and first customers. In addition to the current difficulty accessing the market, venture capital investment has pulled away from the clean energy sector, creating a lack of development capital for promising new businesses. NYSERDA will explore strategies to stimulate this investment in New York and address this lake of early-stage capital needed for commercialization.

Design and Manufacturing Optimization

NYSERDA will also develop initiatives to work with companies, as necessary, to translate their product designs into a product that can be readily manufactured and develop the manufacturing process for the technology. In addition to the lack of capital at the right stage, technology commercialization can be impeded by lack of access to equipment needed to test out a new product to see if it is fit for a specific application and by lack of physical resources to go from a prototype to a manufacturable product. NYSERDA is exploring the potential to complement and leverage existing multi-use facilities and resources to address these hurdles to cleantech innovation, specifically trying to identify what is most needed and broadly useful to accelerate innovation. This work could

lead to increased private investment in new cleantech product manufacturing and an increase in products designed for market fit and manufacturing.

Cleantech Ecosystem Communication and Integration

Currently, the dispersed nature of cleantech clusters across the state and the broader Northeast region make it time-consuming and inefficient to access services and strategic partners. NYSERDA will partner with and leverage existing programs in New York and, as necessary, outside of New York, to link the cleantech entrepreneurial ecosystem together, inform regional and national market players about opportunities in New York, and build business relationships across clusters. Tactics to pursue this opportunity include targeted web platforms, networking events, and partnerships with existing business/trade association. Indicators of progress will include number of active participants, number of out-of-state participants, and business relationships that can be attributed to events and initiatives.

9 Evaluation, Reporting and Transparency

9.1 Overview of Metrics, Reporting and Evaluation Principles

NYSERDA's metrics, evaluation and reporting strategy will be focused on supporting:

- Accountability for use of public funds to achieve credible and sizeable outcomes: Standardized reporting metrics and supporting evaluation analysis will focus on market change and progress toward the 2015 New York State Energy Plan policy goals related to environmental, energy and economic benefits. Key high-level metrics include:
    - Energy savings,
    - Energy cost savings,
    - Emission reductions,
    - Dollars invested in clean energy, and
    - Market penetration of clean energy technologies.
- Actionable insights for strategy and portfolio optimization: An effective and timely feedback cycle will provide information on strategy performance and market impact to support active management and adjustments over time.
- Transparency in terms of methods and results: NYSERDA will publish regular reporting on Clean Energy Fund investments, outputs and outcomes. Evaluation studies will be made publicly available, including details on the methodology. Data sets gathered through Evaluation will also be shared with the market.

Additionally, NYSERDA will focus on establishing a market oriented approach to its initiatives and programs, administrative procedures, and contracting to facilitate its engagement with the market. NYSERDA has already launched a concerted effort to revamp its organization, business processes, and systems to become more responsive to partners and customers, adaptable, easy to navigate, streamlined, and technology-enabled. NYSERDA will continue to advance improvements in its operations in order to expand the impact of existing programs, enable new initiatives, improve customer and partner interfaces, reduce cycle times, improve efficiency, manage risk, and reduce cost.

9.2 Evaluation Elements

The overarching goals of NYSERDA's CEF evaluation strategy are to provide objective and credible information that supports accountability as well as optimum initiative operation and outcomes. NYSERDA will provide the tracking and monitoring necessary to assess its overall performance including reduced energy use and associated dollar savings, emission reductions, investment in clean energy and market penetration of clean energy technologies. This includes identifying the outcomes and impact associated with CEF initiatives on the broader market, as well as understanding all-inclusive changes within New York State.

The evaluation approach will combine quick-cycle feedback activities along with long term tracking and accountability. A quick feedback cycle will provide actionable recommendations to refine NYSERDA's approach and rebalance its portfolio. The evaluation elements described herein are intended to apply equally to Market Development and Innovation and Research portions of the CEF, as well as to NY-Sun. The New York Green Bank separately committed to an equivalent program of evaluation and reporting.

9.2.1 Pilot Testing and Test-Measure-Adjust

Successful pilot testing requires clear goals and metrics, and sound design. As pilots are developed for testing, NYSERDA will establish measurements of success and ensure that approaches and hypotheses of market change are clear and reasonably testable. Plans will also define the necessary size and time frame to conduct a valid pilot test. Pilot testing will be supported by Evaluation but will be implemented broadly within NYSERDA.

Pilot testing will help determine whether a new initiative has the potential to succeed on a larger scale and, therefore, must address both the initiative design and its market effectiveness. Initiative design testing will gauge the target population's reaction to the initiative, as well as inform decisions about how to allocate time and resources within the potential initiative, confirm preparedness for full scale implementation, and ensure readiness for measuring success of the initiative at full scale. Market effectiveness testing will confirm that the initiative addresses the observed barrier in the market, determine the extent of impact, and provide insights into how the initiative can be optimized to maximize impact.

Equivalently, principles of Test-Measure-Adjust will also be applied to more established initiatives. Evaluation will be a key tool to continually test, measure and adjust the approaches used to engage the market under the CEF. NYSERDA will use the Test-Measure-Adjust platform to identify the effectiveness of pilots and decide whether and how to scale them up, and to continually assess the effectiveness of initiatives beyond the pilot stage. Many of the evaluation elements discussed in the following sections, i.e., process evaluation, field verification and market characterization and progress studies, will be applied within a Test-Measure-Adjust framework.

9.2.1.1 Common Systematic Framework

In general, as pilots and initiatives are developed, NYSERDA will apply a common systematic framework to define the theory/logic of the pilot or initiative, and the hypotheses needing to be tested in the market. In addition to defining the hypotheses of market change, this approach will identify in detail the following aspects of the pilot or initiative:

- **Market Barriers** intended to be reduced or eliminated by the pilot/initiative.
- **Activities** NYSERDA will engage in to reduce or eliminate the market barriers.
- **Outputs** which will generally serve as early, leading indicators associated with important strategy progress milestones. Outputs may consist of counts or other metrics related to the level of activity in the pilot/initiative. Outputs can help gauge the target population's reaction to the initiative.

- **Outcomes** which are typically associated with impacts of a pilot/initiative that accrue and can be measured in the market over the near or longer term. Measurement of outcomes will help to confirm the initiative effectiveness at addressing market barriers, provide data that can be used to gauge the extent of market impact, and provide insights on how to optimize future impacts.

The expected level of each major output and outcome will be defined in advance, as quantitatively as possible, so that success can be measured as data becomes available at each validation step. The Test-Measure-Adjust design will include a plan for validation of outputs, near term outcomes, and longer term outcomes. Validation could be accomplished through collection and analysis of internal NYSERDA tracking data, or by external data collected from the market through evaluation or other studies.

The purpose of the Test-Measure-Adjust approach will be to understand whether the pilot/initiative is on track to achieve its stated goals and to support ongoing refinement, including decisions to continue, modify or stop activities. Validation steps will provide this necessary feedback to support these decisions. For example, if validation indicates that the outputs are falling short of anticipated progress, NYSERDA would make adjustments to the design of the pilot and measure whether more favorable outputs result from those adjustments. If progress continues to fall short of expectations, NYSERDA would consider ending the pilot. See Section 12.8 for an example of how the Test-Measure-Adjust approach could be applied to an initiative.

9.2.2 Statewide Macro-level Accounting

Macro-level accounting will provide high level information to assess the collective impact of clean energy initiative and policies in New York State. For example, analysis of changes over time in energy consumption by major end-use sector can inform estimates of overall energy cost savings and emission reductions in the State. Additionally, data on public and private sector investment in clean energy technology development and deployment can be used to assess the broader economic impacts of such investment. Each of these types of analysis is discussed below and is viewed as a useful tool within NYSERDA's overall evaluation approach.

NYSERDA will engage in top-down econometric, macro-consumption studies to provide a more complete understanding of overall end-use energy reduction outcomes, including those associated with all clean energy initiative in the State. Macro-consumption analysis is a natural companion to the sector building stock studies (discussed in the next section) in that it can help corroborate and correlate building and equipment changes seen in the these studies with actual changes in energy use, controlling for factors such as energy prices, overall economic health and business cycles. Should the approach prove feasible and effective in New York, wider scale implementation of macro-consumption analysis every 2-3 years can provide comprehensive information directly related to assessing the State Energy Plan energy, environmental and economic goals. Reduced energy consumption by sector can be translated into energy cost savings and emission reductions.

NYSERDA's approach has also historically included macro-economic impact analysis, which models the impact of public and private investment in clean energy and associated energy dollar savings on

indicators such as job creation and economic output at the State level. This is another analysis tool NYSERDA plans to utilize.

9.2.3 Statewide Sector Building Stock and Potential Studies[111]

Sector studies, including statewide sector building stock and potential studies, enable robust evaluation of market change over time while informing impactful initiative design. Another equally important use, through the provision of a publicly-available, robust data set, is identification of market opportunities by service providers.

NYSERDA envisions conducting sector building stock studies (e.g., commercial and residential existing buildings) on building characteristics, energy use equipment characteristics, and behavioral and operational trends every 3-5 years. REV and the CEF aim to accomplish broad and significant change in the market in terms of the uptake of clean energy technologies and behaviors. These changes are expected to manifest themselves over time in the building stock and market participant behaviors. Sector buildings stock studies will focus on aspects of building energy use and behavior that are expected to move toward greater efficiency and will quantitatively track change over time.

The sector building stock studies will help bridge the more general macro-consumption analysis (discussed above) with the somewhat more focused, market-specific study efforts (described in the next section) by identifying and quantifying change in New York buildings and energy equipment, by major sector. These studies will identify and quantify change with actual New York specific building data, but will not attempt to attribute change to individual clean energy initiatives led by various entities in the State. The sector building stock studies will help quantify the overall size of market opportunities and provide a benchmark to understand the penetration of various initiatives.

As the sector baseline studies are conducted every 3-5 years for each major sector, on-the-ground, NY specific data will be used to update energy efficiency potential models. Identifying remaining technical, economic and achievable energy efficiency potential and refreshing the 3-5 year outlook will identify areas where future initiatives, in Innovation and Research and Market Development, could be most effective at moving the market toward a higher level of clean energy adoption.

9.2.4 Market Characterization and Market Progress Studies[112]

Market studies, including, market characterization and market progress studies, will be designed to identify and assess the theory of change (i.e., how early and intermediate accomplishments lead to long-range results) and market progress associated with specific initiatives, either individually or collectively in a given market. These studies will use primary and secondary data to set baselines and selectively monitor key indicators over time, potentially including those associated with penetration, awareness, and behavior with regard to clean energy solutions and practices.

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[111] Referred to as Baseline/Potential Studies in NYSERDA's September 23, 2014 Clean Energy Fund Proposal.
[112] Referred to as Market Effects/Transformation Studies in NYSERDA's September 23, 2014 Clean Energy Fund Proposal.

Information about gaps in market readiness for technologies will also be gathered to support Innovation investments.

Market studies may also include developing technology commercialization projections or technology adoption curves to project and later provide a marker against which to measure the penetration of specific clean energy technologies and practices over time. Market studies may focus on awareness, knowledge and behavior in more nascent markets, as early and intermediate indicators leading to longer-term adoption. Benchmarking may also be done to compare broad changes in market adoption of specific technologies in New York to changes in other states. The information provided by market studies will inform initiative design and operation, quantification of outcomes and impacts associated with the initiative and initiative evolution and exit decisions. In most cases, market change will be measured statewide.

Wherever possible, market tracking will be integrated into NYSERDA's Test-Measure-Adjust approach described above. For example, annual surveys of market actors may occur to assess early and intermediate indicators of clean energy technology adoption, or commercially-available data sets (e.g., sales data) could be assessed annually to identify the level of market penetration increase occurring in more mature areas.

Data from other markets beyond New York will also be sought to expand the value of market studies, as available, by providing greater comparability and greater statistical power.

9.2.5 Field Verification[113]

Field verification is a form of evaluation that assesses technology performance and user behavior with regard to the technology in order to verify energy impacts. Field verification is most commonly an accountability mechanism to ensure accurate and credible energy and emission impacts, but it will be implemented under the CEF in as "real-time" a manner as possible. In doing so, field verification will be designed to identify ways to improve current project level impacts, and to obtain key insights to improve impact projections for future initiatives. Data from field verification studies will also be publicized to support market experience and increase investor confidence in clean energy technology performance.

Field verification broadly encompasses methods such as utility billing analysis, engineering reviews, deemed savings analysis, and site visits for verification and monitoring. Historically, significant resources have been spent on field verification for incentive programs. Given the nature of the CEF initiatives, NYSERDA envisions field verification to remain an important area of work, but to be less resource intensive than in the past. Field verification will not address attribution or net-to-gross analysis. Instead, market impacts will be addressed by the methods described in earlier sections. In some cases, field verification will be used to assess non-energy impacts.

NYSERDA will invest in promising new approaches to field studies, especially those that promise valid assessments of results by harnessing technology, expanding statistical data sets and

[113] Referred to as Impact Evaluation in NYSERDA's September 23, 2014 Clean Energy Fund Proposal.

identification of key informative proxy metrics. Such approaches promise more rapidly available and lower-cost results, if those are proved valid by rigorous, confirmatory work using traditional, proven field verification approaches.

Where targeted incentives continue, e.g., LMI, certain pilot projects, field verification can be conducted on known participant projects, usually a sample. Market based initiatives will make it more difficult to identify direct participants. In these cases, field verification may still seek to identify sample projects to evaluate or may involve other types of non-project based analyses to support credible savings estimates. Data from other jurisdictions may also support field verification to the extent it is available and useful.

9.2.6 Process Evaluation

Process evaluation provides information to support initiative operations and will be designed and implemented for quick-cycle feedback and to support continued initiative refinement. Process evaluation is typically conducted early in the initiative cycle or during a cycle when changes are made. Issues addressed may include: initiative efficiency and effectiveness, participant satisfaction and barriers to participation. The ultimate goal of process evaluation is to provide actionable recommendations to improve initiatives. Thus, in comparison to prior funding cycles and in line with Test-Measure-Adjust principles, NYSERDA envisions conducting significantly more focused, targeted or phased process evaluations to provide better and timelier information to aid in initiative development, refinement and optimization.

9.3 Evaluation Budget

NYSERDA remains committed to robust and comprehensive evaluation of its investments, and recognizes that the evaluation approaches described in this plan may require a different level of budgetary resources than prior evaluation approaches, most recently those under EEPS. Budget requirements in some areas, e.g., field verification, is expected to be significantly less than in prior rounds of funding, whereas other areas, namely studies to identify and quantify market transformation progress, will be significantly more. Higher level baseline, potential and macro-consumption analysis studies are generally new additions to the overall Evaluation strategy, which will need to be more completely assessed in terms of their resource requirements over time.

NYSERDA's 2016 Evaluation budget for the CEF is $15 million. The Evaluation budget will not be set as a percentage of total programmatic funding for the ten-year CEF period, as has been done in the past for SBC and EEPS programs. Rather, the Evaluation budget will remain somewhat more flexible and be determined on a dollar value basis according to need, as defined by the plans described herein. The Evaluation budget will be reassessed periodically based on implementation and evolution of plans, and will be adjusted by NYSERDA, if necessary, to ensure it is providing the level of feedback and accountability needed by its own administrators and for PSC oversight.

9.4 Reporting

NYSERDA is committed to regular, periodic reporting on CEF investments, outputs and outcomes. Standardized reporting metrics will focus on indicators of market change and progress toward State Energy Plan policy goals related to environmental, energy and economic benefits. Regular reporting will also describe how NYSERDA is using data from the Test-Measure-Adjust approach to optimize initiatives and the overall CEF.

Evaluation studies will be made publicly available, including details on the methodology. Data sets gathered through Evaluation will also be shared with the market. More detailed information on planned reporting through the annual Investment Plan can be found in Section 12.8.

10 NY Green Bank

10.1 Introduction

NY Green Bank is a State-sponsored specialty finance entity working in partnership with the private sector to increase investments into New York's clean energy markets. NYGB represents an innovative business model as an instrument of government policy, but aligned with broader energy market initiatives within the State and at the forefront of comparable institutions nationally and internationally. NYGB is designed to address market barriers and financing gaps in clean energy markets and to transform those markets as part of the integrated REV plan. NYGB was announced by Governor Cuomo in the State of the State Address in January 2013 as a key energy priority for New York State: a large-scale specialty finance entity capable of using limited public dollars to mobilize multiples of private capital investment in New York's attractive and growing clean energy markets. NYGB received initial capitalization pursuant to a Commission Order issued on December 19, 2013[114] (the "Initial Capitalization Order").

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 NYGB's mission are partnering with private sector participants, implementing structures that overcome market barriers and address financing gaps in current clean energy financing markets, and transforming those markets by enabling greater scale, new and expanded asset classes and increased liquidity. These factors combine to motivate faster and more extensive implementation of clean energy investments within New York State, fostering greater energy choices, reduced environmental impacts and more green energy benefits per public dollar spent for all New Yorkers.

To carry out its mission, NYGB utilizes a variety of approaches and transaction structures that are market-focused and responsive. Rather than compete with private sector capital providers, NYGB looks to draw its private sector clients and partners into the marketplace, with its investments having an additionality requirement.[115]

NYGB focuses on eligible clean energy technologies[116] including renewable energy and energy efficiency with a project types running the spectrum of clean energy finance in the State: from large utility-scale, grid-connected projects, to smaller, distributed and behind-the-meter installations. NYGB issued an open investment solicitation in February 2014 (the "NYGB Investment RFP"). The NYGB Investment RFP specifically describes the types of transactions and investments that NYGB

[114] Case 13-M-0412 Petition of the New York State Energy Research and Development Authority to provide Initial Capitalization for the New York Green Bank, *Order Establishing New York Green Bank and Providing Initial Capitalization*, issued and effective December 19, 2013.

[115] See Section 6.2.2 of NYGB's current Business Plan, filed with the Commission on June 19, 2015 and available at http://greenbank.ny.gov/About/Public-Filings.

[116] Commercially proven technologies are preferred, although NYGB may consider demonstrably commercial-ready technologies on a case-by-case basis.

will consider, as well as its evaluation framework.[117] All NYGB potential investments must meet certain minimum investment criteria[118] including:

- Transactions will have expected financial returns such that the revenues of NYGB on a portfolio basis be in excess of expected portfolio losses;
- Transactions will be 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 will 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 transactions are structured to positively impact the wholesale financing markets and scalability of transactions.[119] NYGB does not provide grants or subsidies, but instead invests based on 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 developed and liquid.

Fundamental to the establishment of NYGB is that it be self-sustaining and leverage public dollars with private capital 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 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 clean energy 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 and REV, including:

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[117] "Clean Energy Financing Arrangements – Request for Proposals (RFP) No. 1", available at http://greenbank.ny.gov/Partnering-With-Us/Propose-an-Investment.

[118] Set out in the Initial Capitalization Order, Ordering Clause 6, pages 24 – 25.

[119] Wholesale financial markets are where there is the greatest opportunity for implementing clean energy projects within the State at scale and more rapidly. This may involve NYGB's participation in individual projects that are scalable and replicable (rather than "one-offs") or with its clients and partners in investments which aggregate a number of underlying projects (e.g., energy efficiency and distributed renewables). In any case, there is no restriction on the profile of the ultimate end-user – who could be part of residential, commercial or industrial sectors.

- The priority of clean energy outcomes (including GHG reductions) and market transformation;
- The focus on upstream action (i.e., NYGB operates in wholesale markets to facilitate investment at scale in the clean energy sector by NYGB's clients and partners);
- The leveraging of public-private partnership resources and approaches to mobilize private capital and recycle public 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 beyond its State-derived capitalization; and
- Entering into investments and transactions upon commercial terms, thereby facilitating development of commercial financing mechanisms to support increased deployment of clean energy resources throughout the State.

As a division of NYSERDA, NYGB represents a seamless complement to NYSERDA's anticipated activities under the CEF. NYGB's focus is accelerating clean energy deployment in the State through action in the wholesale financing and capital markets, while NYSERDA's other programs are active in different segments through the Market Development, Innovation and Research and NY-Sun portfolios, among others.

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.

10.2 Market Response & Investment Experience

10.2.1 Market Response

Demand for NYGB investments and participation in transactions, in dollar terms and by technology, is evidenced by proposals that have been submitted to NYGB in response to the NYGB Investment RFP. To date[120], proposals requesting over $734.0 million of NYGB capital have been received, in connection with total proposed clean energy investments in New York State of an estimated $3.0 billion[121] (including private sector capital; see Figures 3 and 4).

[120] From NYGB inception through and including June 12, 2015.

[121] 67% of the proposals received by NYGB identify the total project value of the investments proposed at $2.3 billion. While 33% of the proposals received do not specify the total project value of investments, these have been estimated at just under $1.0 billion.

Figure 3: $734.0 Million Requested NYGB Investment to Date (By Technology)

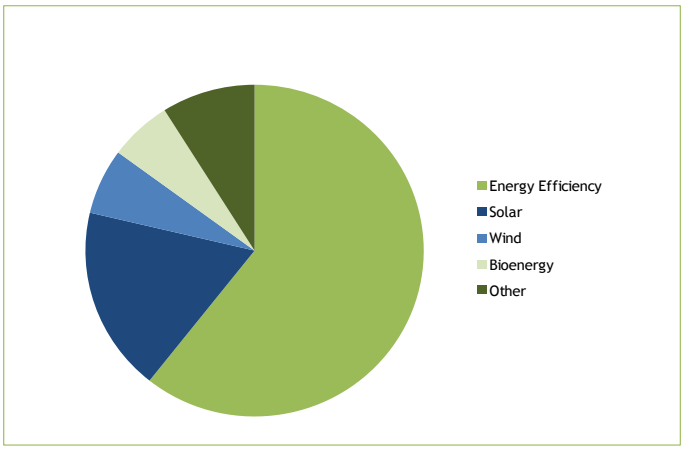
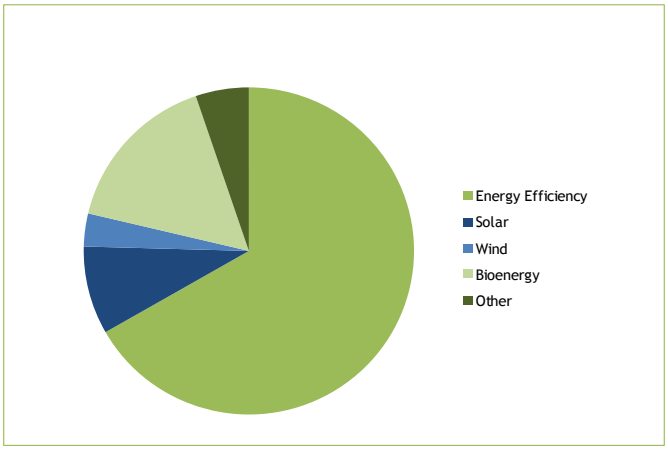


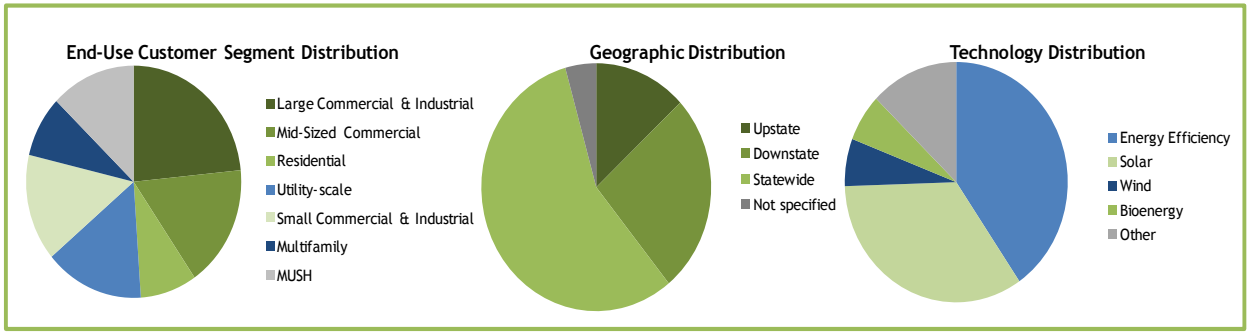
Figure 4: ~$3.0 Billion Proposed Total Investments to Date (By Technology)[122]



The investment proposals received to date are diverse by end-use customer segmentation, location throughout the State and technology as shown in Figure 5.[123]

[122] Represents total proposed investment amount (in dollars), including private capital.
[123] Based on the number of proposals received.

Figure 5: Diversity of Investment Proposals Received



10.2.2 Investment Experience

NYGB actively and consistently works on a large volume of potential transactions within a clear investment framework. As a steward of significant public funds, NYGB has established and adheres to certain investment and business standards – consistent with prudent practice in comparable industries and institutions. These practices include extensive risk management principles and are reflected in all aspects of NYGB's business – as described in NYGB's prior filings with the Commission[124]. Over the past year, NYGB established processes to originate, review, evaluate, perform due diligence with respect to, underwrite, assess risk and mitigants, structure, negotiate, document and close investments. These processes are consistently applied to the many transactions that are being advanced at any one time. Each transaction and step of the process represents substantial work by NYGB's clients, partners and team members.

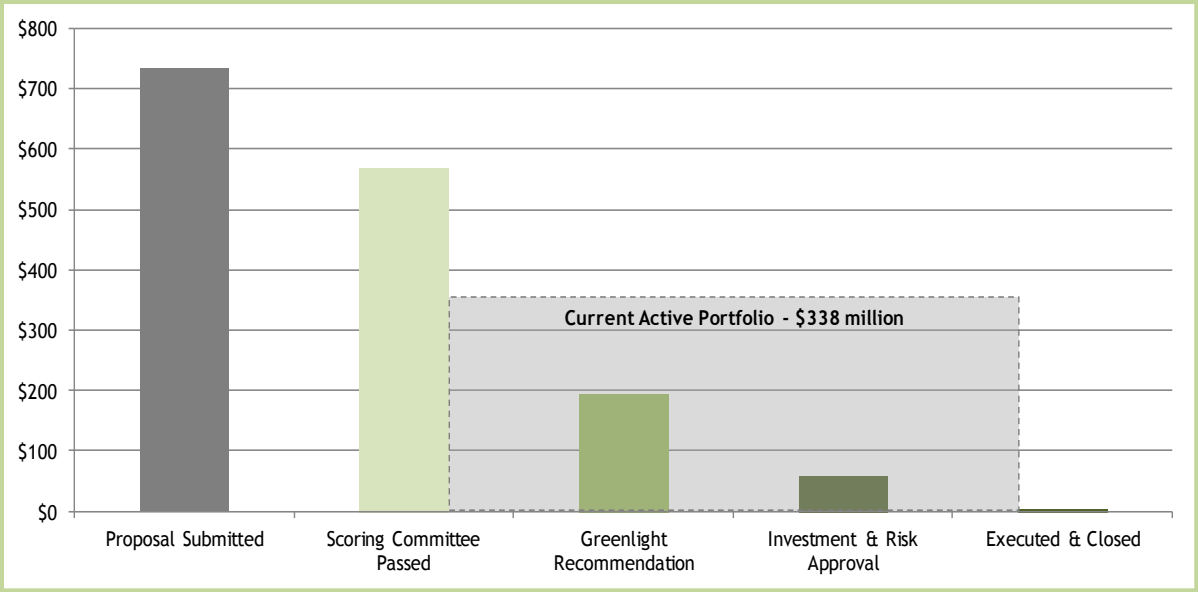
Each proposed investment is categorized by the stage it has reached in NYGB's internal processes. NYGB currently has an active portfolio of $338.0 million[125]. A summary of transaction status is included in Figure 6, showing:

- $734.0 million of proposals have been received and evaluated by NYGB's scoring committee (the "Scoring Committee");
- $569.0 million of proposals have passed Scoring Committee evaluation;
- $193.4 million of transactions have received NYGB greenlight committee (the "Greenlight Committee") recommendation for advancement;
- $56.9 million of transactions have been vetted by NYGB's investment and risk committee (the "IRC") and approved by NYSERDA's President & CEO; and
- $0.50 million of transactions have been fully executed and closed.

[124] See http://greenbank.ny.gov/About/Public-Filings.

[125] All numbers are on a cumulative basis as at June 12, 2015. Unlike other references which are cumulative since NYGB inception, "Active Portfolio" is a point-in-time reference including transactions where: there is agreement in principle between the parties; there is momentum in moving the transaction forward; conditions are expected to be met; and NYGB is dynamically proceeding towards greenlight recommendation, investment and risk approval and execution and closing. As momentum behind individual transactions fluctuates while advancing towards execution and closing due to various factors, including many not under NYGB's control, these transactions may move in and out of the Active Portfolio at any given time.

Figure 6: Transaction Status ($ Million)



While the differentials in the dollar amounts between each of the stages referenced above represent some attrition (e.g., between the proposals that NYGB receives and those that pass its Scoring Committee evaluation), they mostly reflect status at a particular moment in time. What is *not* captured is the fact that over time, groups of projects continue to move through the procedural steps and transaction milestones. This means that transactions in the Active Portfolio can be expected to move through Greenlight Committee, IRC and execution and closing milestones, with material increases in the aggregate dollar amounts of proposed investments in those categories going forward.

While NYGB currently has a total of $338.0 million in transactions being actively negotiated and progressing toward execution and closing, this Active Portfolio does not include: $47.0 million of proposals submitted but not yet scored; $142.0 million of proposals from credible counterparties expected to be submitted in response to the NYGB Investment RFP over the next few months; and $62.0 million of inactive proposals (those which have been scored positively but lack current momentum) which may move into the Active Portfolio in the future.

The metrics required to be reported quarterly and annually to the Commission pursuant to the NYGB Metrics, Reporting & Evaluation Plan[126] (the "Metrics") focus largely on transactions that are executed and closed as the trigger for the provision of information in the context of NYGB's growing portfolio of investments. Therefore, what is reflected in Metrics reports for signed and closed transactions only assumes, but without specifically highlighting, all the multi-faceted and long lead-time activities essential to the advancement of any clean energy technology investment by NYGB, as represented in Figure 6 above. In addition, since NYGB is focused on mobilizing private capital into investments that are not addressed in the current commercial market, it is by definition operating

[126] Case 13-M-0412, filed and dated June 19, 2014.

in new areas, seeking to create precedent where little to none has so far existed – all involving considerable time and effort.

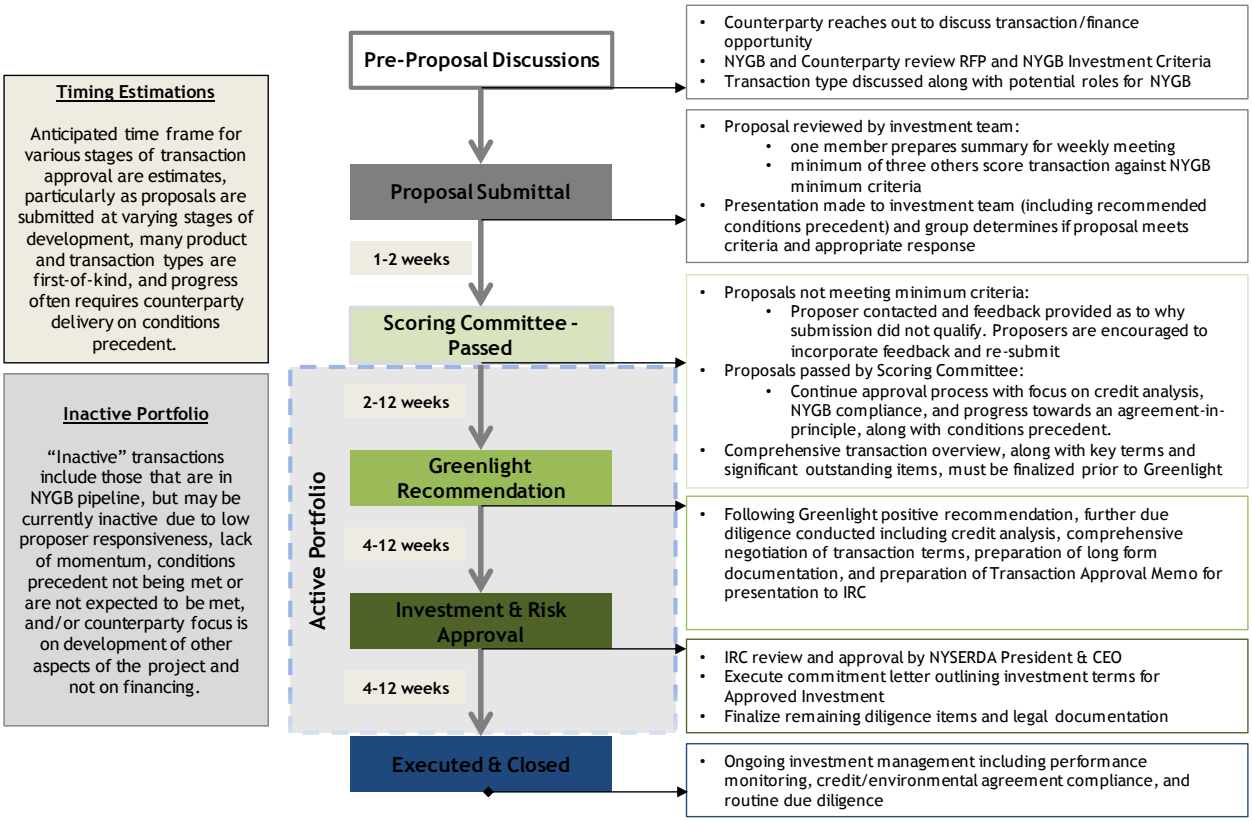
10.2.3 Key Controls

Control frameworks and guidelines are critical in the advancement of NYGB's activities. NYGB employs various organizational layers and bodies in the origination, evaluation and response to investment opportunities. In addition to NYGB bringing to bear the experience of its staff and management, input, review and approvals are required at prescribed points in the investment cycle from internal committees that evaluate and "greenlight" proposals, as well as from the IRC in transaction approvals. When NYGB receives proposals in response to the NYGB Investment RFP, those proposals are reviewed by the Scoring Committee, the members of which are all NYGB employees, designated by NYGB's President. The purpose of the Scoring Committee is to review and evaluate all competitive proposals received by NYGB for completeness and against evaluation and selection criteria described in the NYGB Investment RFP. This process is designed to ensure efficiency and standardization in NYGB's approach to evaluating, and responding to, investment opportunities.

No potential investment proceeds to full-scale diligence and negotiation of terms without vetting by the Greenlight Committee. All IRC members are eligible to participate in the Greenlight Committee, which is made up of at least three IRC members, including both NYSERDA and NYGB personnel (but excluding NYGB personnel directly involved in execution of the subject transaction). This committee reviews and makes recommendations (including the requirement of certain contingencies or conditions) to NYSERDA's President & CEO with respect to a proposed transaction. Before any potential transaction is submitted to the IRC for review, prior issues raised by the Greenlight Committee must be addressed. The "greenlighting" requirement adds another check and balance on potential investments in NYGB's pipeline to ensure that individual transactions meet credit quality standards and all other applicable investment criteria, are consistent with NYGB's mission and are appropriate from a risk perspective. No commitment of NYGB capital is made without further vetting by the IRC and approval by NYSERDA's President and CEO after considering recommendations made by IRC members. Like the Greenlight Committee, the IRC membership is made up of NYSERDA and NYGB staff.

The principal steps involved in the advancement of any investment proposal received by NYGB are represented in Figure 7. As shown in the figure, each transaction goes through a number of critical steps – each in turn involving detailed review, input and other work of the NYGB transaction team, its advisors, committees and clients and partners (including their respective advisors) in an iterative and ongoing process until milestones are reached, culminating in the execution and closing of fully-negotiated transaction documentation. This is consistent with how a bank or investment fund approaches transaction opportunities.

Figure 7: NYGB Typical Transaction Process



10.3 Balance of Capital

To synchronize with the mission of the CEF to provide comprehensive support for all clean energy activities, NYGB is included in this Supplement as a component of the overall CEF. To request capitalization for NYGB's remaining funding, NYSERDA filed a Petition to Complete Capitalization on October 30, 2014 (the "NYGB Capital Petition"). The NYGB Capital Petition sets out the request for allocation of NYGB's balance of capital from ratepayer funds in the total amount of $781.50 million, as follows:

- $195.375 million in 2015 (to be addressed in a stand-alone Commission Order in connection with the NYGB Capital Petition); and
- Three equal installments of $195.375 million due in each of 2016, 2017 and 2018 (to be addressed as part of the Commission's Order in connection with the CEF).

As described in the NYGB Capital Petition, and the related Reply Comments filed by NYSERDA and NYGB on February 2, 2015 (the "Reply Comments"), capitalization at $1 billion that is fully authorized and allocated to NYGB provides both credibility and certainty in the clean energy

financing marketplace in which NYGB operates.[127] NYGB's success requires market confidence in its ability to support its substantial and growing transaction pipeline based on available capital. The absence of such confidence will prevent engagement of private sector clients, partners and collaborators with NYGB, directly undermining its ability to be successful and deliver the expected benefits.

NYSERDA and NYGB are, however, cognizant of the feedback received in connection with both the CEF and NYGB proceedings, and the importance that the CEF and NYGB work in tandem to deliver the combined benefits of their related efforts. In particular, NYSERDA retains an acute focus on delivering real and sustained overall declines in the level of requisite ratepayer collections, while also continuing to deliver material and expected greenhouse gas reduction and other benefits to New York's citizens from both the CEF and NYGB activities.

Taking into account the overall CEF collections reductions proposed in this Supplement (and discussed in Section 12), NYSERDA provides for the Commission's consideration alternative allocation and payment schedules, as described and set forth below:

- $150.0 million to be made available to NYGB through a Commission order issued in response to the NYGB Capital Petition, from available uncommitted cash balances.[128] This capital installment would be available upon submission of a compliance filing to DPS staff that NYGB has committed at least $111.3 million, representing 75% of the capital (excluding funding for administration and evaluation expenses) approved pursuant to the Initial Capitalization Order;
- The remaining $631.5 million to be made available to NYGB through authorized CEF incremental collections, subject to submission of a compliance filing to DPS staff that NYGB has committed its initial capitalization and at least 75% of the additional $150 million authorized above. The remaining capital installment of $631.5 million shall be separately identified as CEF incremental collections for NYGB authorized in years 2016 through 2025 (the "CEF NYGB Incremental Collections") in the amounts shown in Table 5 below:

Table 5: NYGB Capital Installments & Timing from CEF

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Amount	$30 million	$30 million	$30 million	$30 million	$30 million	$30 million	$112.875 million	$112.875 million	$112.875 million	$112.875 million	$631.5 million

From 2016 forward, the alternative Capitalization Schedule represents a significant easing of the transition to the CEF, particularly in the early years, while continuing to support the business and growth of NYGB (when coupled with an external borrowing facility, as set out below).

[127] See NYGB Capital Petition at Section 6.0, pp. 23-25; Reply Comments at Section 2.1, pp. 2-6.
[128] From SBC3 ($71.9 million), EEPS1 ($47.4 million), SBC4/T&MD ($7.5 million) and RPS ($23.2 million) funds.

10.3.1 External Borrowing Facility

Clearly, the Revised Capital Schedule and CEF NYGB Incremental Collections will not of themselves support NYGB's projected capital commitments, nor provide critical market confidence (including certainty with respect to capital availability and timing). As set out in Section 10.2.2 above, NYGB currently has a total of $338.0 million of transactions being actively negotiated and progressing toward execution and closing, with continuing future demand evidenced by regularly-submitted proposals for additional capital deployment. NYGB's base business case assumes its commitment level will build to a projected $200 million per year of new investments as it reaches "steady state". Only with access to capital as and when needed, will NYGB be able to meet its present and projected demand and meet its investment goal of approximately $1.9 billion over a ten-year period.[129]

To ensure that NYGB remains fully able to meet and service market demand for its investment and participation in transactions, NYGB requests authorization from the Commission to use a portion of the CEF NYGB Incremental Collections to pay fees and interest associated with a bank line of credit or other debt facility, to be obtained by NYGB to provide the necessary liquidity and the certainty of sufficient available capital so critical to private sector engagement, as referenced above[130] (the "**Credit Facility**"). NYGB would pledge the CEF NYGB Incremental Collections to the provider of the Credit Facility as the source of repayment for amounts drawn on the Credit Facility. The Credit Facility would be put in place at the point it is needed, sized to ensure that the available amount would not itself become the constraint on NYGB's ability to run and grow its business and deliver clean energy benefits to New Yorkers. Further, structuring the Credit Facility on a NYGB stand-alone basis will be an important component of providing certainty of NYGB's capital funding (as to both amounts and timing) to the market. With a borrowing facility sized for NYGB's needs, and collateralized specifically by the CEF NYGB Incremental Collections, market participants can readily understand the nature of NYGB's ongoing access to capital in sufficient amounts and at the requisite times to support NYGB's mission and business plan.

Authorization by the Commission of $150 million in 2015[131] would allow the required size of the Credit Facility to be reduced by a commensurate amount, together with a corresponding reduction in fees and interest costs expected to be incurred. The Credit Facility, on which NYGB would draw only as needed, would allow NYGB to access capital consistent with its business plan and projected market needs, while still enabling the intended year-by-year decrease in ratepayer collections and without disruption to the accelerated development of clean energy markets in the State.

CEF NYGB Incremental Collections will be held by utilities and disbursed to NYSERDA to cover NYGB's actual expenditures (including amounts in support of NYGB commitments and the NYGB

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[129] This deployed amount represents NYGB not only preserving the funds provided (net of all authorized administrative and evaluation expenses), but also recycling funds to ultimately deliver the benefits to New Yorkers that will come from clean energy investment of a much greater magnitude.

[130] See NYGB Capital Petition at Section 6.0, pp. 23-25; Reply Comments at Section 2.1, pp. 2-6.

[131] Subject to submission of a compliance filing to DPS staff that NYGB has committed at least $111.3 million, representing 75% of the capital (excluding funding for administration and evaluation expenses) approved pursuant to the Initial Capitalization Order.

Credit Facility pursuant to the terms thereof) through the Pay-As-You-Go mechanism described in Section 12.5.

The combination of the Revised Capital Schedule and the proposed Credit Facility allows New York's citizens to reap the benefits of materially lower collections starting immediately, while still preserving the full clean energy outcomes from NYGB's investment activity. For example, if NYGB's capitalization (both as to amounts and timing of installments) was solely as set out in the Revised Capital Schedule:

- The amounts available to fund projects annually would not be material to market participants and financiers operating at scale, making it less likely that such participants would put in the time and effort to accelerate clean energy deployment in New York State;
- The total commitments that it may expect to make through Fiscal Year (FY) 2025-2026 would be ~$1.4 billion (which includes recycling of capital). Given the expected 3:1 leverage ratio for NYGB's first round of transactions (i.e., each $1.00 of NYGB investment mobilizes on average $3.00 of private capital)[132], this would equate to ~$4.2 billion in total new clean energy investment in the State over the 10-year period; and
- NYGB would be unable to meet its projected "steady state" $200 million/year capital commitment schedule, with aggregate shortfalls of up to ~$500 million. Such shortfalls represent transactions needed in the marketplace that would go unmet and therefore missed opportunities to deploy clean energy technologies (with all the attendant benefits) in the State materially earlier than would otherwise occur if NYGB's capital is constrained.

Alternatively, with a Credit Facility in place as proposed, secured by the CEF NYGB Incremental Collections:

- NYGB continues to have the capital available to support market participants and financiers at scale that will in turn support meaningful clean energy initiatives targeting New York State;
- The total commitments that NYGB may expect to make through FY 2025-2026 would be ~$1.9 billion (which includes recycling of capital). Again, taking the leverage ratio into account, this equates to ~$5.7 billion in total new clean energy investment in the State over the 10-year period; and
- NYGB would be able to meet its projected "steady state" $200 million/year capital commitment schedule and the CEF NYGB Incremental Collections would not become a constraint, provided that the Credit Facility is sized appropriately.

The comparative outcomes described above are represented in Figure 8.

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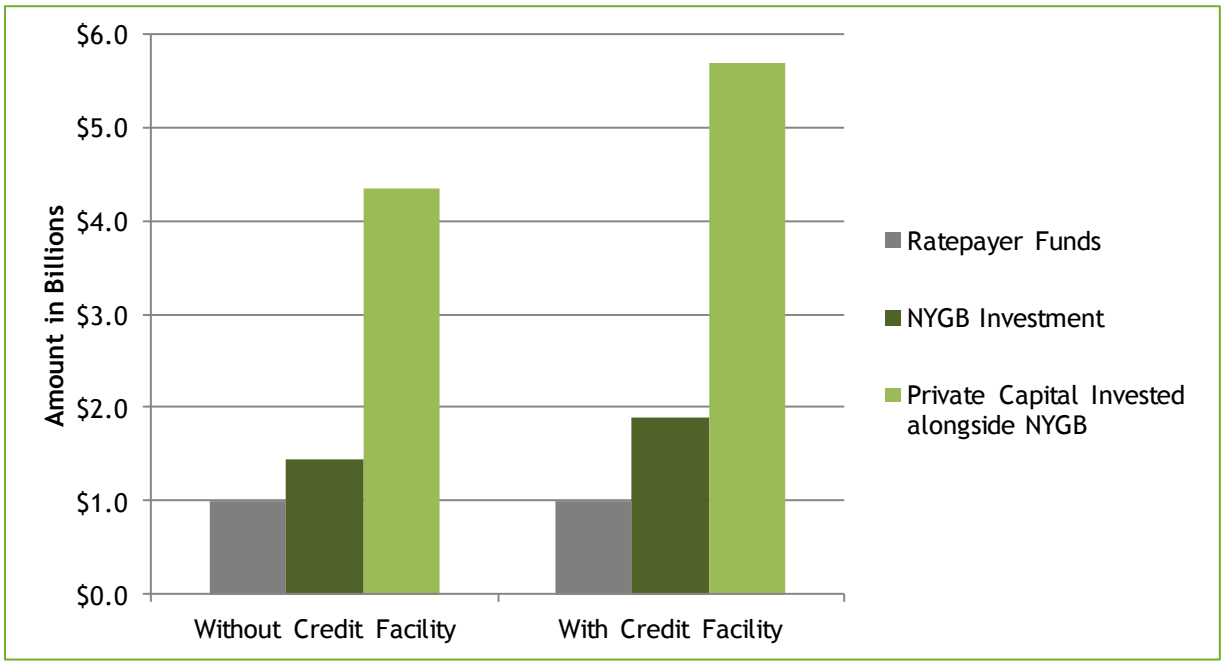
[132] After factoring in NYGB's ability to recycle funds over the ten years of the CEF, its overall leverage ratio is expected to increase to roughly 6:1. This ratio is commensurate with the overall expected ratio of the CEF. Furthermore, as NYGB continues to recycle funds beyond those 10 years, the leverage ratio would also continue to increase.

Figure 8. Investments in Clean Energy – Effect of Proposed Credit Facility



The details of the requisite Credit Facility will be structured and negotiated to support the expected timing of NYGB draws. This will likely be at some future time, when the majority of existing NYGB capital has been committed to investments. Nevertheless, for the purposes of this Supplement, initial advice and market feedback has been sought to confirm that it is possible to put in place the kind of facility contemplated and also to provide indicative pricing. A facility providing the requisite liquidity to NYGB based on the Revised Capital Schedule, could be expected to involve total costs in the amount of ~$40 million, made up of fees and interest[133]. To be clear, these costs would not allow the total amount of ratepayer collections allocated to NYGB under Commission Orders (i.e., $1 billion) to be exceeded, but the Credit Facility would provide a mechanism whereby the timing of NYGB capital deployment could be accelerated (compared with the collection schedule), producing nearer-term and increased clean energy benefits to the State achieved at the same overall ratepayer cost and collection timing. In addition, it should be noted that NYGB would only draw upon the Credit Facility after first using any available CEF surcharge collections and available recycled funds, in an effort to minimize interest costs. NYSERDA and NYGB strongly believe that the benefits of the Credit Facility in enabling the immediate strategic scale-up of NYGB consistent with its business plan, drawing in multiples of private clean energy investment to New York State while still enabling a decrease in year-by-year fee collection, significantly outweigh the expected cost.

The combination of the Revised Capital Schedule and the proposed Credit Facility has important benefits for ratepayers beyond the significant contribution to the overall declining collections cap over the CEF term. The Credit Facility, in providing liquidity to NYGB (secured by the CEF NYGB

[133] All fees and interest associated with the Credit Facility would be paid for from the CEF NYGB Incremental Collections. Also, it should be noted that this estimate is specifically based on the Revised Capital Schedule; variance would impact this estimate.

Incremental Collections), will only be drawn at the time that NYGB needs funds to invest into transactions. This mechanism is directly responsive to many of the comments received throughout the CEF and NYGB proceedings expressing concern where ratepayer monies may be collected but not utilized immediately. The Revised Capital Schedule coupled with the proposed Credit Facility would address this concern directly by requiring significantly less ratepayer collections in the near-term – while still allowing NYGB to execute on its business plan on the original time horizon and so not delay the realization of GHG reductions and other benefits flowing from NYGB's investments. In short, under the Revised Capital Schedule coupled with the proposed Credit Facility, ratepayers get the benefits of NYGB's activities in the expected magnitudes – both earlier than they would otherwise under the CEF and the Revised Capital Schedule, and without compromising the projected outcomes.

10.4 Administrative Costs & Cost Recovery Fee

The Initial Capitalization Order provided that:

> "NYSERDA is authorized to use up to $13.248 million for administrative costs and to pay any cost recovery fee under section 2975 of the Public Authorities Law that is allocable to the actual expenditure of any portion of the $165.6 million."

This allocation of funds to meet administrative costs was the equivalent of 8% of the initial capital allocated by the Commission.

Given the actual and forecast monthly expense run rate and projected investments for NYGB, it expects to be self-sufficient by the end of FY 2017-2018. The monthly run rate is expected to increase over time, reflecting more capital to deploy, greater deal flow (in turn driving more deal development and execution volume as well as transaction monitoring costs), and related third party costs for needed consultants and fund administration, loan/investment servicing and custodial services. The time between NYGB's opening for business in 2014 and reaching self-sufficiency by the end of FY 2017-2018 represents the requisite, usual and customary period for an investment fund to start-up, become established, publicize its investment criteria, generate potential transactions, structure, negotiate, finalize, execute and fund approved transactions and start to generate transaction revenues. To supplement the allocation for administrative costs included in the Initial Capitalization Order, NYGB requests authorization from the Commission to use an additional $4.0 million out of the 2016 capital installment to meet its administrative costs on its way to becoming self sufficient, as well as to pay any cost recovery fee under section 2975 of the Public Authorities Law referable to the actual expenditure of any portion of the $631.5 million balance of capital to be allocated to NYGB as part of the Commission's Order in connection with the CEF Proposal (i.e., the total of the 2016 – 2025 (inclusive) installments). This request for additional funding to meet administrative costs amounts to less than 1.0% of the remaining capital installments.

11 NY-SUN

NY-Sun is an initiative established by Governor Andrew M. Cuomo in 2012 to develop a sustainable and subsidy-free solar electric 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 solar electric 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 solar electric 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. 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 complement the goals of NY-Sun, as it will support efforts to reduce solar soft-costs, build demand, and support consumer education to ensure successful development of a vibrant subsidy-free solar market in New York.

The megawatt block (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/.

12 Budget and Benefits

12.1 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 evolve investment initiatives to meet the State's environmental commitment, while simultaneously managing costs to ratepayers by using initiatives 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 initiatives 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 Interveners, particularly concerning cash balances held by NYSERDA. This budget proposal accounts for the use of the cash balance in meeting current and future program and initiative obligations, and allows for a reduction in near-term collections for new initiatives, while utilizing the cash balance to ensure sufficient resources are available, in the event that project expenditures accelerate faster than originally estimated. 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 initiatives are launched. Experience during the 2016-2020 timeframe of developing and deploying new initiatives, 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 initiatives and 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 Innovation and Research portfolios over time, NYSERDA recommends that the portfolios be reviewed every 3 years to measure the advances made according to metrics and indicators, and adjustment of individual components of the portfolios as needed to meet the emergent market conditions.

The total program authorization requested for the Market Development portfolio, the Innovation and Research portfolio, and 2016 RPS Main Tier solicitation[134] are detailed in Table 6, along with the amounts anticipated to be committed by year. As discussed 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,[135] 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, estimated annual expenditures and current cash balance identified 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.

[134] To maintain market momentum as New York investigates LSR options a February 26, 2015 Order instructed NYSERDA to issue not only a 2015 Main Tier solicitation in the near-term but also, through the CEF, budget and plan for a 2016 Main Tier solicitation while the Commission deliberates LSR issues. Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued and effective February 26, 2015.

Table 6: Program Authorization Requests ($ millions)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Request for Program Authorization											
Market Development	$356.6	$298.2	$265.2	$256.2	$256.2	$256.2	$256.2	$256.2	$256.2	$256.2	$2,713.4
Innovation and Research	$66.4	$73.8	$73.8	$71.8	$71.8	$71.8	$71.8	$71.8	$71.8	$71.8	$716.6
2016 Main Tier Solicitation	$150.0										$150.0
Other Initiatives Included in Proposed CEF Budget											
NY-Sun[1] (including $129M in 2015)	$185.0	$148.2	$129.9	$137.4	$91.1	$67.6	$43.9	$20.7	$6.5	$1.3	$960.6
NYGB[2] (including $150M in 2015)	$30.0	$30.0	$30.0	$30.0	$30.0	$30.0	$112.9	$112.9	$112.9	$112.9	$781.5
Total	$788.0	$550.2	$498.9	$495.4	$449.1	$425.6	$484.8	$461.6	$447.4	$442.2	$5,322.1

[1] NY-Sun program authorizations were previously provided in the April 2014 Order.
[2] Total remaining capitalization is consistent with the Petition for $781.5 Million Balance of Capital filed October 30, 2014 (Case 13-M-0412). However, the annual capitalization installments have been revised and will be supplemented with a proposed external borrowing facility (see Section 10.3.1).

12.2 Proposed CEF Collections Cap for 2016 and Thereafter

The proposed CEF collections have been revised from the original Proposal and the information presented at the CEF Technical Forum. The proposed collections reduce ratepayer collections substantially from current (2015) levels. The proposed collections level provides an immediate reduction in ratepayer collections of $91.1 million from 2015 ($676.1 million) to 2016 ($585 million) as a result of eliminating natural gas surcharges. This elimination is proposed in order to permit the implementation of CEF on a fuel neutral basis. Moreover, the transition to an electric only surcharge will not result in an increase to the current electric surcharge. NYSERDA has proposed annual collections after 2016 that decline from each preceding prior year. During the period 2016-2025, total NYSERDA collections would be reduced by $1.5 billion.

The proposed collections cap for the CEF consists of both Previously Authorized Collections as well as new or "Incremental" collections. Previously Authorized Collections fund NYSERDA program activities for EEPS, SBC4, and RPS. Incremental collections will support activities for NYGB, NY-Sun, Market Development, Innovation and Research, and a 2016 RPS Main Tier solicitation, as summarized in Table 6. The Previously Authorized Collections and proposed Incremental Collections are shown in Table 7 below.

Table 7: Proposed Collections ($ millions)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2025
Previously Authorized Collections	$536.3	$433.3	$326.8	$193.9	$193.7	$159.5	$125.0	$81.0	$42.2	$0.0	$2,091.7
Incremental CEF Collections	$48.7	$146.7	$248.2	$361.9	$345.7	$363.0	$381.6	$406.9	$414.8	$421.1	$3,138.6
Total NYSERDA Collections	$585.0	$580.0	$575.0	$555.8	$539.4	$522.5	$506.6	$487.9	$457.0	$421.1	$5,230.3

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	Total 2016-2036
Previously Authorized Collections	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$2,091.7
Incremental CEF Collections	$290.0	$195.0	$85.0	$25.0	$20.0	$30.0	$30.0	$30.0	$30.0	$25.0	$10.7	$3,909.3
Total NYSERDA Collections	$290.0	$195.0	$85.0	$25.0	$20.0	$30.0	$30.0	$30.0	$30.0	$25.0	$10.7	$6,001.0

Figure 9 below demonstrates the relative contribution of Previously Authorized Collections and Incremental Collections to Total Collections for each year.

Figure 9: Proposed CEF Collections

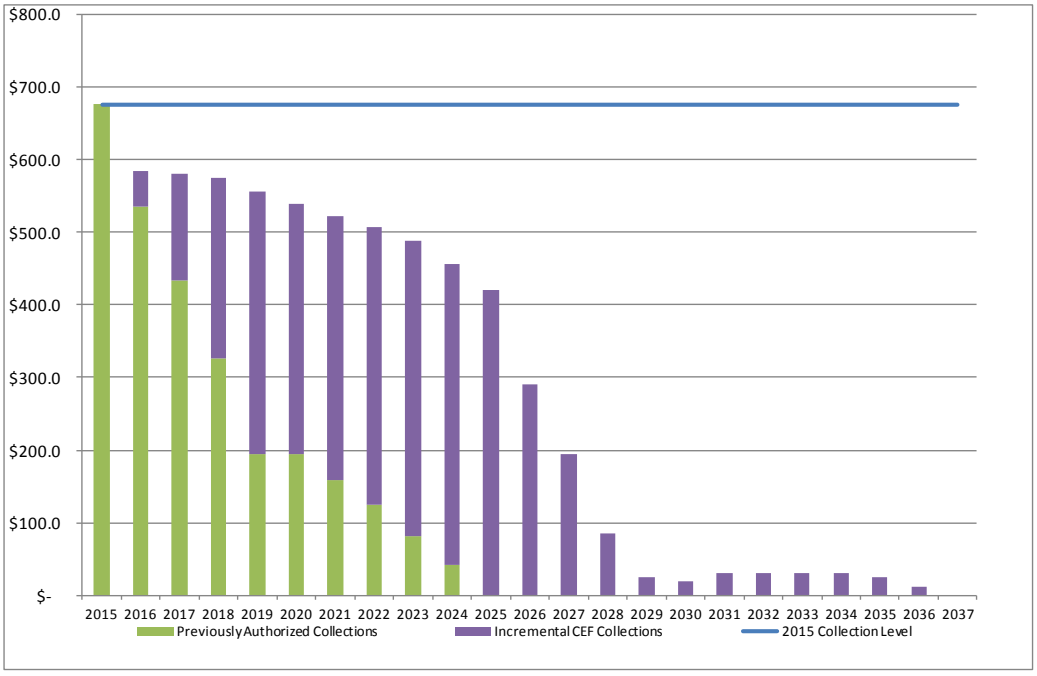
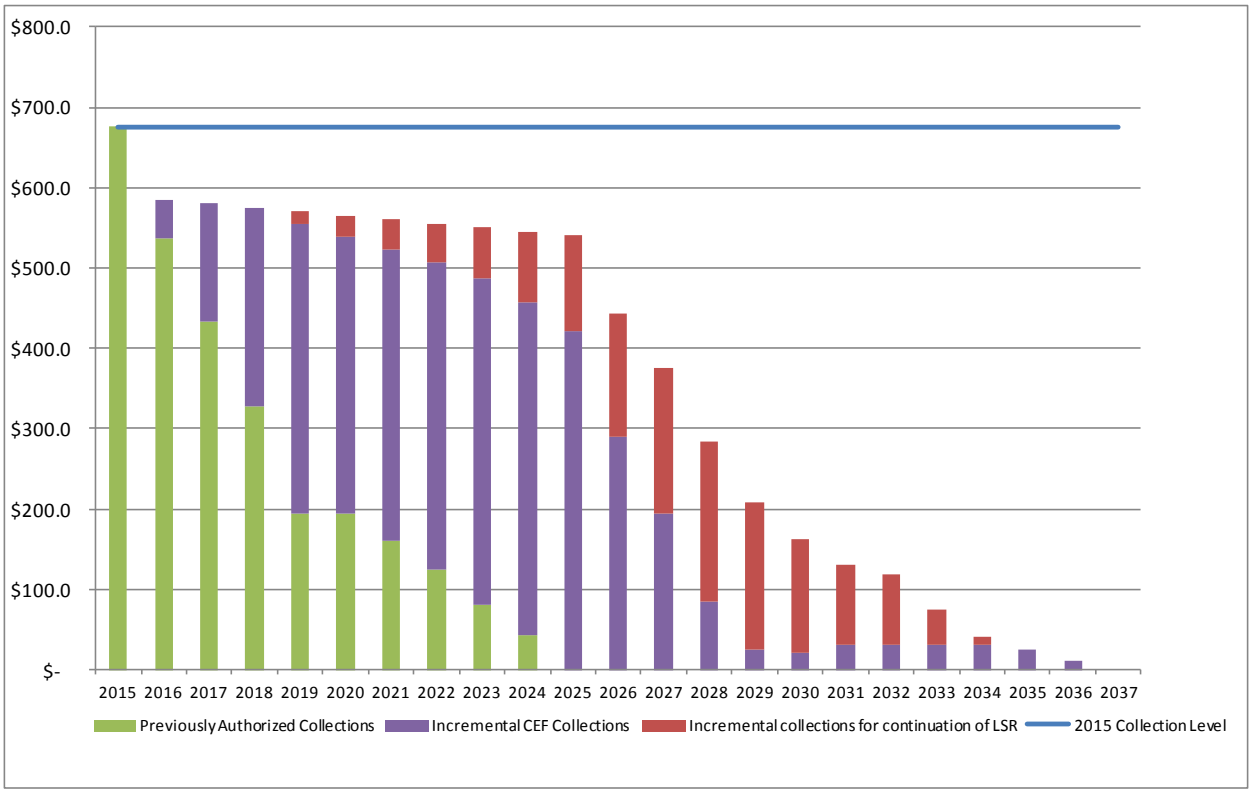


Figure 10 demonstrates the possible impacts on total collections for additional collections to support premium costs for LSR procurements from 2017-2026, using assumptions from the base

case scenario in the NYSERDA LSR options paper entitled "Large-Scale Renewable Energy Development in New York: Options and Assessment", filed on June 1, 2015 for public comment.[136] These collections are not part of this request, but are presented here so that the collections requested herein can be considered in the context of additional possible authorizations for continued support of LSR. The figure shows that NYSERDA's proposed collections plus these additional collections, if authorized, would still support an annual decrease in total collections.

Figure 10: Proposed CEF Collections and Funding for Large-Scale Renewables



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.

[136] NYSERDA, "Large-Scale Renewable Energy Development in New York: Options and Assessment", June 1, 2015, p. 110.

To support the CEF activities, NYSERDA proposes to repurpose approximately $1,162.5 million (as illustrated in Table 8 below) in existing NYSERDA program funds and projected interest earnings. These repurposed funds are detailed in Table 9 below, and represent funds which are uncommitted in 2014, additional funds that are anticipated to be uncommitted in the future resulting from projects which do not advance to completion, or projections of uncommitted program balances at the end of calendar year 2015. The repurposed funds and interest earnings, when combined with approximately $3,909.3 million in requested incremental collections and $250 in RGGI funds totals the $5,322.1 million in total funding requested for new CEF activities for NY Green Bank, NY-Sun, Market Development, Innovation and Research, and a 2016 RPS Main Tier solicitation, as shown in Table 8. Use of repurposed funds allows for the reduction in incremental collections to support the CEF.

Table 8: CEF Program Authorization Funding Breakdown ($ millions)

Incremental Collections Regional Greenhouse Gas Initiative Funds	$3,909.3 $250.0
Repurposed Funds and Interest Earnings	$1,162.5
Total New Program Authorization	$5,322.1

Table 9: Repurposed Funds and Interest Earnings Breakdown ($ millions)

	SBC3	SBC4	EEPS1	EEPS2	RPS	Total
Uncommitted balances as of 12/31/2014 (1)	$65.8	$7.5	$41.6	-	-	$114.9
Projected additional uncommitted funds (2)	$6.5	$104.1	$4.9	$75.7	-	$191.2
Projected interest earnings	$1.7	$6.8	-	$3.5	$10.8	$22.8
Uncommitted RPS funds (3)					$833.6	$833.6
Total Repurposed Funds and Interest Earnings	$74.0	$118.4	$46.5	$79.2	$844.4	$1,162.5

(1) As reported in Accounting Report of Uncommitted Balances filed March 5, 2015 (Cases 07-M-0548 and 10-M-0457). The SBC4 funds represent uncommitted funding approved by the Commission's December 20, 2013 *Order Approving the Allocation of Funds for a Power Electronics Manufacturing Consortium*. The EEPS1 funds exclude $5 million of uncommitted funds pursuant to the Commission's December 26, 2013 *Order Approving EEPS Program Changes*.

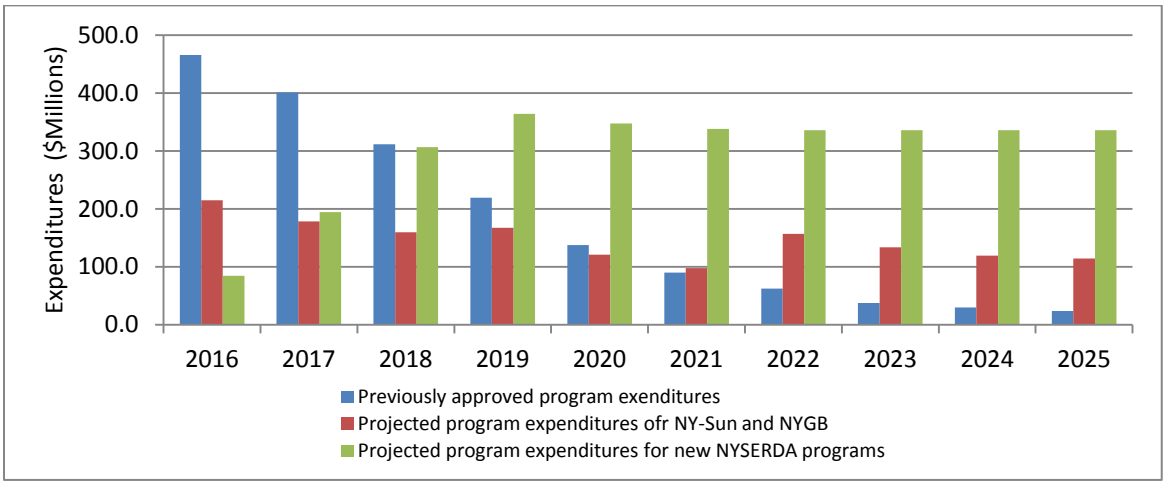
(2)Reflects funding which has been uncommitted during 2015 and projection of additional future uncommitted funds through the end of 2015. Pursuant to the Commission's Orders issued October 24, 2011 and October 25, 2011 (Cases 07-M-0548 and 10-M-0457), NYSERDA currently reports on the uncommitted balances in SBC3 and EEPS1 as of the end of each calendar year by March 31 of the following year. NYSERDA will add reporting of uncommitted balances for SBC4, EEPS2, and RPS to this reporting. If uncommitted funds are less than projected, NYSERDA will reduce its Program Authorization for Market Development and Innovation and Research activities accordingly. If uncommitted funds exceed projected amounts, NYSERDA's Proposal requests that the Commission authorize these funds for use in the Clean Energy Fund and to increase the Program Authorization for Market Development and Innovation and Research initiatives.

(3) As noted in Appendix E of the 2014 RPS Annual Performance Report.

12.3 Anticipated CEF Expenditures for 2016 and Thereafter

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 Innovation and Research 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 initiative activity based on the authorized budget.

Figure 11: 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 Figure 11 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 NYGB. The Commission authorized NY-Sun in April 2014 at $960 million through 2023. The Commission also approved the establishment of NYGB in December 2013, with an acknowledgement that NYGB would be fully capitalized at $1 billion. The aggregate annual expenditures listed for NY-Sun represent the best estimate of when expenditures will occur under the incentive structure. The expenditures noted for NYGB is the proposed schedule for providing the remaining capitalization and as discussed in Section 10, the funding available from incremental collections will be supplemented with an external borrowing facility to ensure that NYGB has the ability to deploy capital to meet market opportunities, but allowing incremental collections for the remaining capitalization to be structured to support objectives for declining total collections.

The third category of expenditures represents new program activity for NYSERDA as approved for the CEF. Expenditures on the new portfolios are relatively low in 2016, as NYSERDA transitions its program approaches. Table 10 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.

The cash flow analysis provided in Table 10 summarizes by year collections (both Previously Authorized and proposed Incremental collections), proposed repurposing of previously authorized collections, temporary transfers of cash balances between funding sources, anticipated expenditures (for previously authorized programs, as well as for NY-Sun, NYGB, Market Development, and Innovation and Research), projected interest earnings, and resulting cash balances. NYSERDA has proposed collections levels beginning in 2016 that are designed to use cash balances on a temporary basis to provide support for incremental program expenditures, and which allow for a progressive reduction in total collections over time. This schedule is also anticipated to impose controls on the level of year-over-year cash balances, avoiding the accumulation of unreasonable cash balances resulting from the variability of anticipated expenditures. This approach also helps to provide stability of the collections level to ratepayers over the duration of the CEF. The proposed approach results in a substantial reduction of cash balances by the end of 2016, and results in projected cash balances by year averaging about 18% of annual expenditures. The timing of actual program commitments and resulting expenditures will affect actual cash balances, and the ongoing process to monitor, evaluate and report on the status of program activity will allow for revisions to the proposed annual collections if warranted.

Table 10: CEF Proposal Cash Flow ($ millions)

CEF Cash Flow																							Total	Total
(Amounts in millions)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2016-2025	2016-2037
COLLECTIONS																								
SBC 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SBC 4/T&MD	90.0	90.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	180.2	180.2
EEPS 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EEPS 2	218.0	116.0	124.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	458.8	458.8
RPS	228.3	227.1	202.0	193.9	193.7	159.5	125.0	81.0	42.2	-	-	-	-	-	-	-	-	-	-	-	-	-	1,452.7	1,452.7
Subtotal - Previously Authorized	536.3	433.3	326.8	193.9	193.7	159.5	125.0	81.0	42.2	-	-	-	-	-	-	-	-	-	-	-	-	-	2,091.7	2,091.7
Incremental CEF Collections	48.7	146.7	248.2	361.9	345.7	363.0	381.6	406.9	414.8	421.1	290.0	195.0	85.0	25.0	20.0	30.0	30.0	30.0	30.0	25.0	10.7	-	3,138.6	3,909.3
Total NYSERDA collections	585.0	580.0	575.0	555.8	539.4	522.5	506.6	487.9	457.0	421.1	290.0	195.0	85.0	25.0	20.0	30.0	30.0	30.0	30.0	25.0	10.7	-	5,230.3	6,001.0
RGGI	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0													250.0	250.0
Total Revenues	610.0	605.0	600.0	580.8	564.4	547.5	531.6	512.9	482.0	446.1	290.0	195.0	85.0	25.0	20.0	30.0	30.0	30.0	30.0	25.0	10.7	-	5,480.3	6,251.0
EXPENDITURES																								
Previously authorized programs:																								
SBC3	28.2	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43.2	43.2
SBC4	65.1	71.1	58.8	36.8	22.0	10.9	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	268.3	268.3
EEPS1	25.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25.6	25.6
EEPS 2	178.3	147.9	95.8	56.6	27.0	8.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	513.8	513.8
RPS	168.4	167.1	157.0	126.0	88.8	71.2	59.0	37.5	29.7	23.9	23.9	22.7	21.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	6.2	-	928.6	1,149.6
Subtotal	465.6	401.1	311.6	219.4	137.8	90.2	62.6	37.5	29.7	23.9	23.9	22.7	21.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	6.2	-	1,779.4	2,000.4
Clean Energy Fund:																								
NYSUN [1]	185.0	148.2	129.9	137.4	91.1	67.6	43.9	20.7	6.5	1.3	-	-	-	-	-	-	-	-	-	-	-	-	831.6	831.6
NY Green Bank [2]	30.0	30.0	30.0	30.0	30.0	30.0	112.9	112.9	112.9	112.9	-	-	-	-	-	-	-	-	-	-	-	-	631.5	631.5
Market Development Programs	71.3	166.6	249.5	291.6	267.3	258.0	256.2	256.2	256.2	256.2	205.0	128.1	51.2	-	-	-	-	-	-	-	-	-	2,329.1	2,713.4
Innovation Programs	13.3	28.0	49.4	64.5	72.3	72.4	72.0	71.8	71.8	71.8	57.4	43.1	21.5	7.2	-	-	-	-	-	-	-	-	587.4	716.6
Main Tier 2016	-	-	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	60.0	150.0
Subtotal	299.6	372.9	466.3	531.0	468.2	435.5	492.5	469.1	454.9	449.7	269.9	178.7	80.3	14.7	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	4,439.6	5,043.1
Total Expenditures	765.2	774.0	777.9	750.4	605.9	525.7	555.1	506.6	484.6	473.6	293.8	201.4	102.2	35.6	28.4	28.4	28.4	28.4	28.4	28.4	13.7	7.5	6,219.0	7,043.5
Interest Earnings	3.7	2.8	2.0	1.1	0.7	0.4	0.4	0.5	0.4	0.3	0.2	0.2	0.2	0.1	-	-	-	-	-	-	-	-	12.3	13.0
Total Cash Balance	628.1	461.9	286.0	117.5	76.7	98.9	75.8	82.6	80.4	53.2	49.6	43.4	26.4	15.9	7.5	9.1	10.7	12.3	13.9	10.5	7.5	0.0		

[1] On December 19, 2013, the Commission issued an Order authorizing NYSERDA to reallocate $108 million of unencumbered RPS Main Tier funds to expand the solar electric program in the Customer-Sited tier for expenses in 2014 and 2015. The collections and expenditures associated with this authorization are included in the RPS program.

[2] The collections and expenditures presented in this Table do not include the NY Green Bank's initial capitalization of approximately $218.5 million, which included $165.6 million approved by the Commission from reallocated uncommitted funds, and approximately $52.9 million allocated by NYSERDA from Regional Greenhouse Gas Initiative (RGGI) auction proceeds.

12.4 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 the same approach to the accounting of administrative costs and those costs are included in the presented budget allocation table in Section 12.6. For Program Evaluation, NYSERDA recommends a different approach wherein it is provided a set budget line; this is also included in the budget allocation table in Section 12.6. The CEF envisions an evolution 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. 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.

12.5 Bill-As-You-Go Approach

NYSERDA proposes to change the way in which it receives funds to support future activities in the CEF. NYSERDA will refer to its proposal 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. For the CEF, NYSERDA proposes to use a different funding approach. This "Bill-As-You-Go" approach would minimize unexpended balances going forward. To implement this model, NYSERDA proposes that the Commission authorize NYSERDA and each utility to enter into new funding agreements 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 would 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 unexpended funds. CEF surcharge collections from customers not yet transferred to NYSERDA will be held by the utility, using customary approaches approved by DPS for the calculation of carrying charges and the segregation and reporting of such funding.

12.6 Initial Budget

Table 11 below provides further detail on the proposed initial budgets for Market Development and Innovation and Research portfolios as well as CEF evaluation activities and a 2016 Main Tier solicitation. These budget allocations provide a balance between investing in near term market development areas by addressing the barriers that offer the greatest energy and GHG reduction potential with longer term investments in technology advancement through innovation and research and development.

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

Market Development

The Market Development portfolio budget allocations represent combined funding for the new initiatives and the program transitions identified in Section 6. As acknowledged earlier in this filing document, the evolution to a more market-driven clean energy economy will require time to allow for new initiatives under the CEF and REV to take hold. As such, NYSERDA anticipates that the first two to three years of the CEF will be a period of transition, during which there's a progression towards initiatives that are market oriented and self sustaining. To support a gradual transition and maintain progress in meeting our clean energy objectives, NYSERDA proposes additional funding in the amount of $96 million in 2016, $42 million in 2017, and $9 million in 2018 to support many of the current programmatic activities into the CEF.

NYSERDA proposes to maintain a budget level in the LMI segment of the residential sector (single and multifamily) sufficient to serve the market at historical levels through current programs, a LMI solar initiative, and programmatic improvements and efficiencies that can drive greater impact for each dollar invested. Within the commercial, agriculture, industrial and residential sectors (single and multifamily), NYSERDA is proposing funding at levels sufficient to support the development and launch of the initial CEF initiatives as well as the continuation of current incentive offerings as described in Section 6.

In order to maintain flexibility to adapt to changing market conditions and be responsive to developments as new initiatives are launched and program transitions transpire, NYSERDA is

requesting flexibility within the 3 year review cycle to manage funding between components of the Market Development portfolio.

Innovation and Research

NYSERDA proposes to maintain historic levels of investment in innovation and research while: (1) focusing on high impact strategic priorities and maintaining an ability to pivot to emerging opportunities, (2) embracing a stronger technology-to-market focus to drive cleantech innovations towards market entry, and (3) employing rigorous portfolio management. NYSERDA will build upon past successes and best practices, apply lessons learned to identify and capture opportunities, and address pressing energy and environmental issues facing the state.

Table 11: Clean Energy Fund Budget Allocation

	2016	2017	2018
Market Development			
Commercial	$66,000,000	$49,300,000	$32,000,000
Industrial	$59,800,000	$26,000,000	$18,100,000
Agriculture	$6,200,000	$6,800,000	$4,200,000
Multifamily	$8,300,000	$8,000,000	$5,800,000
Residential	$17,400,000	$17,800,000	$16,700,000
Low-Moderate Income	$75,500,000	$78,500,000	$80,500,000
New Construction	$35,300,000	$29,700,000	$24,800,000
Codes	$4,000,000	$4,000,000	$5,000,000
Energy Storage	$6,000,000	$8,000,000	$8,000,000
On-Site Power	$41,500,000	$27,000,000	$23,000,000
Renewable Thermal	$5,000,000	$10,000,000	$14,000,000
Products	$5,000,000	$6,000,000	$7,000,000
Communities	$7,000,000	$8,000,000	$8,000,000
Workforce Development	$4,000,000	$4,000,000	$4,000,000
Large-Scale Renewables	$3,000,000	$4,000,000	$4,000,000
Market Development Evaluation	$12,600,000	$11,200,000	$10,200,000
Total Market Development	*$356,600,000*	*$298,200,000*	*$ 265,200,000*

Innovation and Research			
Energy-Related Environmental Research	$4,000,000	$4,000,000	$4,000,000
Smart Grid	$12,000,000	$13,100,000	$15,100,000
Renewables and DERs Integration	$18,900,000	$14,500,000	$14,600,000
Building Innovations	$9,700,000	$13,600,000	$12,700,000
Clean Transportation	$8,700,000	$8,500,000	$7,500,000
Innovation Capacity and Business Development	$10,700,000	$17,200,000	$17,000,000
Innovation and Research Evaluation	$2,400,000	$2,800,000	$2,800,000
Total Innovation and Research	$66,400,000	$73,800,000	$73,800,000
Main Tier 2016 Solicitation	$150,000,000	-	-
Grand Total	***$573,000,000***	***$372,000,000***	***$339,000,000***

Note: Totals may not sum exactly due to rounding.

Table 12 below provides an estimated budget breakdown for the full 10 years of proposed CEF funding. Years 2019 through 2025 should be considered rough estimates and are based on the proportional funding distribution proposed for the sectors/program areas in 2018.

Table 12: 10 Year CEF Funding Estimate

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Market Development										
Commercial	$66,000,000	$49,300,000	$32,000,000	$30,900,000	$30,900,000	$30,900,000	$30,900,000	$30,900,000	$30,900,000	$30,900,000
Industrial	$59,800,000	$26,000,000	$18,100,000	$17,500,000	$17,500,000	$17,500,000	$17,500,000	$17,500,000	$17,500,000	$17,500,000
Agriculture	$6,200,000	$6,800,000	$4,200,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000
Multifamily	$8,300,000	$8,000,000	$5,800,000	$5,600,000	$5,600,000	$5,600,000	$5,600,000	$5,600,000	$5,600,000	$5,600,000
Residential	$17,400,000	$17,800,000	$16,700,000	$16,100,000	$16,100,000	$16,100,000	$16,100,000	$16,100,000	$16,100,000	$16,100,000
Low-Moderate Income	$75,500,000	$78,500,000	$80,500,000	$77,800,000	$77,800,000	$77,800,000	$77,800,000	$77,800,000	$77,800,000	$77,800,000
New Construction	$35,300,000	$29,700,000	$24,800,000	$23,900,000	$23,900,000	$23,900,000	$23,900,000	$23,900,000	$23,900,000	$23,900,000
Codes	$4,000,000	$4,000,000	$5,000,000	$4,800,000	$4,800,000	$4,800,000	$4,800,000	$4,800,000	$4,800,000	$4,800,000
Energy Storage	$6,000,000	$8,000,000	$8,000,000	$7,700,000	$7,700,000	$7,700,000	$7,700,000	$7,700,000	$7,700,000	$7,700,000
On-Site Power	$41,500,000	$27,000,000	$23,000,000	$22,200,000	$22,200,000	$22,200,000	$22,200,000	$22,200,000	$22,200,000	$22,200,000
Renewable Thermal	$5,000,000	$10,000,000	$14,000,000	$13,500,000	$13,500,000	$13,500,000	$13,500,000	$13,500,000	$13,500,000	$13,500,000
Products	$5,000,000	$6,000,000	$7,000,000	$6,800,000	$6,800,000	$6,800,000	$6,800,000	$6,800,000	$6,800,000	$6,800,000
Communities	$7,000,000	$8,000,000	$8,000,000	$7,700,000	$7,700,000	$7,700,000	$7,700,000	$7,700,000	$7,700,000	$7,700,000
Workforce Development	$4,000,000	$4,000,000	$4,000,000	$3,900,000	$3,900,000	$3,900,000	$3,900,000	$3,900,000	$3,900,000	$3,900,000
Large-Scale Renewables	$3,000,000	$4,000,000	$4,000,000	$3,900,000	$3,900,000	$3,900,000	$3,900,000	$3,900,000	$3,900,000	$3,900,000
Market Development Evaluation	$12,600,000	$11,200,000	$10,200,000	$9,800,000	$9,800,000	$9,800,000	$9,800,000	$9,800,000	$9,800,000	$9,800,000
Total Market Development	*$356,600,000*	*$298,300,000*	*$ 265,300,000*	*$256,100,000*	*$256,100,000*	*$256,100,000*	*$256,100,000*	*$256,100,000*	*$256,100,000*	*$256,100,000*

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Innovation and Research										
Energy-Related Environmental Research	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000	$4,000,000
Smart Grid	$12,000,000	$13,100,000	$15,100,000	$14,700,000	$14,700,000	$14,700,000	$14,700,000	$14,700,000	$14,700,000	$14,700,000
Renewables and DERs Integration	$18,900,000	$14,500,000	$14,600,000	$14,200,000	$14,200,000	$14,200,000	$14,200,000	$14,200,000	$14,200,000	$14,200,000
Building Innovations	$9,700,000	$13,600,000	$12,700,000	$12,400,000	$12,400,000	$12,400,000	$12,400,000	$12,400,000	$12,400,000	$12,400,000
Clean Transportation	$8,700,000	$8,500,000	$7,500,000	$7,300,000	$7,300,000	$7,300,000	$7,300,000	$7,300,000	$7,300,000	$7,300,000
Innovation Capacity and Business Development	$10,700,000	$17,200,000	$17,000,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000
Innovation and Research Evaluation	$2,400,000	$2,800,000	$2,800,000	$2,800,000	$2,800,000	$2,800,000	$2,800,000	$2,800,000	$2,800,000	$2,800,000
Total Innovation and Research	*$66,400,000*	*$73,700,000*	*$73,700,000*	*71,900,000*	*71,900,000*	*71,900,000*	*71,900,000*	*71,900,000*	*71,900,000*	*71,900,000*
Main Tier 2016 Solicitation	$150,000,000									
Grand Total	***$573,000,000***	***$372,000,000***	***$339,000,000***	***$328,000,000***	***$328,000,000***	***$328,000,000***	***$328,000,000***	***$328,000,000***	***$328,000,000***	***$328,000,000***

12.7 Benefits

The CEF, as proposed, is structured to achieve greater impact over current NYSERDA program approaches, and is driven by long-term public policy outcomes that require increased scale of clean energy activity in New York. Through continuous optimization of the entire CEF, as well as real-time assessment of individual initiatives to advance identified indicators of progress, the CEF will assess and make investments that result in greater impact and greater scale, and thus contribute towards advancing the State's environmental and economic goals. In short, the proposed CEF will be managed to provide greater opportunity to increase the return on investment for ratepayers.

To ensure that the Commission and all stakeholders remain informed of the returns realized from the public investments, the CEF will manage the portfolios to advance 4 primary outcomes. These are:

- GHG emissions reductions;
- Customer bill savings;
- Energy efficiency and clean energy generation; and
- Mobilization of private sector capital.

NYSERDA proposes to establish these four outcomes as the key metrics for the CEF. Over the life of the CEF, NYSERDA will estimate and report on CEF achievements advancing these metrics on a long-range basis, as well as establish portfolio management structures to ensure that current initiatives are making adequate progress towards these long-range outcomes. To provide an approach to metrics advancement that is both transparent and meaningful, long-range outcomes will be estimated on a 10-year basis for the total CEF, along with 3-year estimates that benchmark near-term advancement toward the long-range outcomes. Further discussion of the benefits information that will be provided in future Investment Plans is provided in Section 12.8

The CEF is advancing a new market transformation approach for energy efficiency and clean energy activity. As such, a new approach to the portfolio benefits and metrics is also being advanced. The CEF is oriented to achieve long-term market shifts that are geared at achieving long-range policy goals, notably GHG emissions reductions. To fully measure the clean energy investment benefit realized, primary outcome benefits will be report in 'lifetime' benefits. That is, for the investment made in any year, the energy and environmental benefits of such investments persist for many years after the investment is made. Thus, to depict the total benefit derived from the CEF investment, the total amount of benefit estimated over the life of the investment will be estimated and reported. However, in order to provide an understanding of the annual benefits derived from CEF investments, benefits are also estimated according to 'first year' benefits, that is the efficiency or renewable energy realized in the year the investment first produces energy (savings or generation) to the system. NYSERDA will continue to support the NYISO as it develops long-term forecasts that reflect the impact of CEF activities. Meeting any such annual incremental estimate for a market transformation portfolio will be dependent upon the portfolio ability to meet the existing market need, as well as the market responsiveness to the initiatives offered at that time.

Investment Plans will thus adjust any such estimates based on two key inputs: 1) the Test-Measure-Adjust activities that will be conducted on programs; and 2) market intelligence.

CEF benefits are estimated in both 10-year and 3-year time frames, and are presented as both lifetime and first year cumulative achievements. These benefits are presented based upon a possible first Investment Plan, which is anticipated to evolve over time. While the primary outcomes drive the portfolio composition, this possible first portfolio is not optimized to maximize the energy or environmental primary outcomes, but has been designed to achieve a number of current public policy objectives. First, the portfolio includes the continuation of certain previously authorized programs (mostly at limited durations to maintain market engagement and activity until new initiatives take on higher levels of activity). Second, until greater confidence in the clean energy opportunities for the sector is demonstrated post-REV, LMI programs constitute a relatively higher percent of the new portfolio than the previously authorized program portfolio. As LMI constitutes a higher percentage of the portfolio, and given its relatively lower cost effectiveness compared to other initiatives or programs, this public policy allocation results in a degree of downward pressure on total portfolio benefits. Lastly, the benefits reflect a fuel neutral implementation of the CEF. Thus benefits of the CEF are best understood as achieving energy or environmental outcomes from all of the sources affected, and they may not be directly comparable to outcomes achieved from programs designed to affect single energy sources.

Below, estimate for the cumulative 10-year CEF, across all portfolios is provided in Table 13.[137]

Table 13: Estimated 10-Year CEF Lifetime Benefits

	Lifetime Benefits in Millions					
Portfolio	**MWh**	**MMBTU**	**CO2 (tons)**	**Bill Savings**	**Private Investment**	**Leverage Ratio**
Market Development	137	491	76	$ 20,412	$ 8,875	4.23
Innovation and Research	*	*	*	*	$ 3,265	5.00
NY-Sun	88	NA	28	$ 12,810	$ 9,216	9.60
NY Green Bank	*	*	*	*	$ 8,000	8.00

* Energy and other benefits for the Innovation and Research and NYGB portfolios will be measured and tracked over the 10 years of the CEF. The NYGB performance accounting will be separately identified and quantified through the NYGB procedures and business plans.

[137] Emissions reductions, energy metrics, and bill savings are measured on a 'lifetime' basis (average measure life of approximately 15 years) to account for the repeating benefits that are realized year-after-year from the implementation of clean energy activity. Progress reports will reflect annual metrics achievements, indicating both incremental and cumulative achievements. A different methodology for calculating carbon benefits has been adopted here, as compared to that reflected in the CEF Proposal filed in September. The carbon benefits are now estimated using standard factors to convert electricity, natural gas, and petroleum savings into carbon (625 lbs/MWh, 117 lbs/MMBTU, 162 lbs/MMBTU respectively). Additionally, a different methodology has been adopted to estimate bill savings, which are now based on avoided retail rates, not wholesale energy prices as used in the CEF Proposal. Additionally, bill savings estimates now include natural gas and petroleum bill savings, as compared to electric only savings reflected in the CEF Proposal.

Through regular reporting as described in the Evaluation and Reporting chapter, the CEF will measure, monitor and report on the benefits of the component portfolios by tracking these key metrics over the life of the CEF. As noted in the Table 13 above, NYSERDA has identified which metrics that each of the component portfolios will be monitored to achieve.

The CEF is designed to implement 'market transformation' activities, especially in the Market Development, NY-Sun and NYGB portfolios. As such, activities in each of these component portfolios will be designed to induce clean energy activities beyond the direct effect of the initiative. As these 'extra-CEF' activities will impact and advance statewide policy objectives and long-range outcomes, NYSERDA will also track and report economy-wide progress on key metrics (in particular energy metrics and GHG emissions reductions), including those impacts directly induced by CEF initiatives as well as statewide impacts whether or not directly induced. Such macro-economy evaluation of statewide metrics is further described in the Evaluation and Reporting chapter. For NYGB, such progress will emphasize the ability to leverage additional investment over past program approaches, in demonstration of the growth of market-based activity in the clean energy sector.

NY-Sun metrics have been developed and presented in the recent NY-Sun Operating Plan, and are reflected here.[138] NY-Sun initiatives progress will be tracked for their energy metrics, GHG emissions reduction impacts as well as private investment impacts. Over the course of NY-Sun, the market transformation effects of the program will also be studied and analyzed. As the authorized program implementation phase of NY-Sun demonstrates market effects demonstrating more market-enabled activity, NYSERDA will continue to track progress of the solar electric market, to help prove the market transformation program hypothesis that NY-Sun is implementing, as well as to understand the continued contribution of the at-scale electric market towards overall statewide environmental goals.

The Innovation and Research portfolio will emphasize the ability of the portfolio to attract capital supporting the acceleration of advanced technologies into New York, as well as the economic development impact of supporting cleantech innovation and businesses, and expanding the capacity for innovation statewide. CEF Innovation and Research investments are expected to maintain and even surpass the historical performance of NYSERDA's research and development programs, which have helped to mobilize private capital. Past investment leverage results for an Innovation portfolio have been $3.7 for each dollar of NYSERDA investment. The CEF estimated Innovation and Research leverage ratio is 5.0, which leads to $3,265 million dollars in private investment over the 10 year CEF. Additionally, the Innovation and Research portfolio is anticipated to advance innovations to market entry of low GHG-emitting technologies, produce significant commercial revenue, and improve the environment and economy of New York State. Energy and environmental metrics for specific Innovation activities will be further identified in

[138] See http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=17612 for NYSERDA's May 1, 2015 Operating Plan filing.

annual Investment Plans, as appropriate for the product development and demonstration activities that will become a component of the overall Innovation and Research portfolio.

Metrics for component pieces of the varied Market Development portfolio will also be estimated and tracked over the life of the CEF. The 10-year benefits for the Market Development portfolio, in sector level detail, are shown in Table 14.[139]

Table 14: Estimated 10-Year CEF Lifetime Market Development Benefits

	Lifetime Benefits in Millions					
Sector	**MWh**	**MMBTU**	**CO2 (tons)**	**Bill Savings**	**Private Investment**	**Leverage Ratio**
Low-Moderate Income	21	65	11	$3,844	$221	0.3
Residential Single Family	10	33	5	$2,003	$1,584	8.7
Residential Multifamily	7	26	4	$1,094	$359	4.9
Commercial	56	188	30	$8,264	$3,786	6.4
Industrial	28	94	15	$3,062	$1,205	4.4
Renewable Thermal	1	55	5	$83	$-	-
Codes	1	10	1	$215	$94	2.0
Products	1	19	2	$261	$862	13.2
On-Site Power	12	(0.1)	4	$1,584	$764	3.4
Total	**137**	**490**	**76**	**$20,412**	**$8,875**	**4.2**

Table 15 below presents the cumulative estimated first year annual savings for the 10-Year CEF.

[139] Benefits have been calculated assuming the historical sector-based budget allocations for years 1-3 of the portfolio, and benefits for years 4-10 of the portfolio are projections based on the budget allocation proposed for year 3, and assuming the portfolio authorization schedule as appears in the Budgets chapter. Benefit assumptions learned through the market research conducted as part of the CEF were then applied to the portfolio. Quantitative energy and carbon benefits were not calculated for the following budget categories: communities, workforce development, large-scale renewables and energy storage. For the purpose of calculating benefits, the agriculture funding was included in the industrial sector, affordable solar was included in low-moderate income, community solar was included in on-site power, and new construction was distributed across the commercial, residential and multifamily sectors. The sectors quantified represent 84% of the market development budget. Benefit information will be tracked in all categories going forward. Leverage ratios were not calculated for certain budget categories due to lack of experience in estimating private investment in those sectors. Sectors that were not included in the market development private investment estimate include: communities, workforce development, large-scale renewables, energy storage, renewable thermal, community solar and affordable solar. For the purpose of estimating private investment, the agriculture funding was included in the industrial sector and new construction was distributed across the commercial, residential and multifamily sectors. The sectors quantified represent 81% of the market development budget. Leverage ratio and private investment values for all sectors will be estimated and tracked going forward, once specific initiatives have been developed and implemented.

Table 15: 10-Year CEF Cumulative First Year Annual Market Development Benefits

Sector	MWh	MMBTU
Low-Moderate Income	1,466,664	4,651,355
Residential Single Family	805,366	2,762,228
Residential Multifamily	494,037	1,704,055
Commercial	3,731,987	12,558,468
Industrial	1,872,649	6,278,803
Renewable Thermal	42,023	3,648,373
Codes	76,916	692,883
Products	93,999	1,275,090
On-Site Power	80,290	4,160
Total	**8,663,932**	**33,575,415**

To support the portfolio, the benefits were calculated assuming $25 million a year in RGGI funds were included alongside the CEF program authorization request detailed in this Information Supplement. In order to provide a comparison, benefits for the market rate sectors of the existing NYSERDA EEPS portfolio were calculated against the equivalent CEF market rate sectors.[140] The EEPS calculation resulted in 191 trillion British thermal units (TBTU) of clean energy (including 57 million MWh), 34 million tons of GHG emissions reductions and a ratio of 4.6 for private leverage invested. By comparison, the estimated CEF achievements are 341 TBTU of clean energy (including 101 million MWh), 54 million tons of GHG emissions reductions and a ratio of 6.3 for private leverage invested. The CEF is therefore designed to achieve 79% more energy savings and 57% more GHG emissions reductions from current programs for these key sectors.

Benefits estimated in these calculations were initially calculated without any assumptions on increasing cost effectiveness over time, which would occur due to learned impacts of programs (that is, improved market responsiveness over time), learned improvements to programs through evaluations (that is, improved program design that is informed through the Test-Measure-Adjust evaluation cycles), or account for impacts from new initiatives that are currently untested in the market but are demonstrated to address known market barriers. Working from these initial estimates, a second step was taken to account for a ramp up of activities associated with new initiatives and improvement in effectiveness. To estimate this increase in effectiveness, the lifetime benefits for the sector initiatives were linearly back loaded, where the cost effectiveness was effectively reduced by as much as 30% in the first year and increased by as much as 20% in the final year. This adjustment did not change the cumulative 10-yr stream of lifetime benefits that were initially calculated; it only shifted the realization of the benefits in time.

[140] For purposes of this analysis, "market rate" program include: Single Family, Multifamily, Commercial, and Industrial. As part of the research and analysis conducted for NYSERDA's Corporate Strategy Assessment, $/MWh and $/MMBTU factors were calculated based on 2013 EEPS data. These factors were applied to the 10 year CEF budget to determine what that level of investment would generate using a historic approach.

For the first 3-year program investment cycle, the estimate of benefits based on the proposed budget allocation and program strategies for both new strategies and the transition from previously approved programs are presented are presented in Tables 16 and 17 respectively.

Table 16: Estimated 3-Year CEF Market Development Benefits

Lifetime Benefits in Millions						
	Lifetime Electric Savings (MWh)	**Lifetime Primary Energy Savings (MMBTU)**	**Lifetime Emissions Reduced (tons)**	**Lifetime Total Bill Savings**	**Private Investment**	**Leverage Ratios**
Low-Moderate Income	6	17	3	$998	$58	0.3
Residential Single Family	2	7	1	$394	$319	9.2
Residential Multifamily	2	6	1	$257	$85	5.2
Commercial	14	48	8	$2,092	$942	6.5
Industrial	6	21	3	$611	$263	4.6
Renewable Thermal	0.1	12	1	$20	-	
Codes	0.7	5	0.5	$126	$26	2.0
Products	0.4	5	0.4	$67	$201	13.2
On-Site Power	2	(0.01)	0.5	$226	$288	3.4
Total	**33**	**120**	**18.3**	**$4,791**	**$2,181**	**4.1**

* On-Site Power includes private investment from both CEF and Transition funding dollars. Energy benefits associated with the full funding amount are anticipated to start in 2018.

Table 17: Estimated 3-Year Transition Market Development Benefits

Lifetime Benefits in Millions						
	Lifetime Electric Savings (MWh)	**Lifetime Primary Energy Savings (MMBTU)**	**Lifetime Emissions Reduced (tons)**	**Lifetime Total Bill Savings**	**Private Investment**	**Leverage Ratios**
Residential Single Family	0.7	2	0.4	$142	$80	4.3
Residential Multifamily	0.3	1	0.2	$51	$14	2.0
Commercial	3	9	1	$478	$280	5.3
Industrial	4	13	2	$733	$202	3.8
Total	**7.7**	**25.4**	**4.1**	**1,402.9**	**776.4**	**4.0**

Tables 18 and 19 below present the cumulative estimated first year annual savings for the 3-Year CEF and transition funding.

Table 18: Estimated 3-Year CEF First Year Annual Market Development Benefits

Sector	MWh	MMBTU
Low-Moderate Income	380,941	1,211,746
Residential Single Family	158,531	544,390
Residential Multifamily	116,886	402,608
Commercial	955,286	3,216,129
Industrial	419,632	1,414,314
Renewable Thermal	9,854	795,487
Codes	49,596	302,080
Products	24,049	322,586
On-Site Power	20,695	520
Total	**2,135,469**	**8,209,860**

Table 19: 3-Year Transition Estimated Cumulative First Year Annual Market Development Benefits

Sector	MWh	MMBTU
Residential Single Family	57,099	192,708
Residential Multifamily	18,667	66,667
Commercial	176,667	588,889
Industrial	271,795	883,333
Total	**524,227**	**1,731,597**

Benefits estimates do not assume actions to optimize the portfolio over time (that is, adjust budget allocations across programs to improve metrics outputs), and account for a number of 'transition' strategies for previously authorized programs in the early years that are anticipated to change as the CEF becomes more firmly rooted. Thus, the benefits presented here reflect conservative estimates of the portfolio's performance for the 10-year CEF funding cycle. NYSERDA expects that the portfolio performance will measurably improve as the market responds to CEF activities and as NYSERDA continues to refine initiatives for optimal portfolio performance. Flexibility in the implementation of the portfolio will serve to augment the benefits estimates, given the ability to be more responsive to market conditions as they evolve.

12.8 Investment Plans

To ensure that the Commission and stakeholders are apprised of the near-term perspectives and opportunities for the Market Development and Innovation and Research portfolios, NYSERDA will

submit an annual Investment Plan, which will include a rolling 3-year budget projection as well as an estimate of benefits based on the 3-year budget allocation for these components of the CEF.[141] The Investment Plan will provide detailed information, on an initiative level, of the approaches to be adopted in initiatives as well as the outputs anticipated as a result of implementing those initiatives. NYSERDA proposes to provide information similar to that approved by the Commission for NYGB investments, namely:

- Sector/Vertical(s) Addressed
- High Level Strategy Description (e.g., Trusted Information Source, Matchmaker, Market Coordinator)
- Description/Form of Initiative
- Location(s) of Underlying Project(s), if applicable
- Types of Customer and Partner Organizations that are Initiative Participants (e.g., ESCO, developer, retailer, etc.)
- Summary of Market Objectives and Barriers Addressed
- Technologies Involved (e.g., Renewable Energy, Energy Efficiency, CHP)
- Planned Energy & Environmental Metrics (e.g., estimated clean energy generation or savings resulting from energy efficiency, and lifetime greenhouse gas emissions reductions)
- Planned Market Characterization Baseline and Market Transformation Potential
- Proposed Method of Outcome/Impact Evaluation and Timeframe

NYSERDA has requested additional flexibility in the ability to shape the Market Development and Innovation and Research portfolios, and to allocate funds within and across these two portfolios in order to optimize the anticipated benefits to be derived from the portfolios. This approach is requested in recognition that market transformation and innovation activities are most successful if they can be rapidly market responsive. Such flexibility and market responsiveness will be managed to capture opportunities that will have measurable benefit and contribute to the long-term outcomes of the overall CEF.

The Investment Plan will be designed with the understanding that flexibility in the CEF should not result in reduced transparency or accountability to the performance of the individual initiatives or to the outcomes of the CEF generally. The Investment Plan will become the vehicle by which the Commission and stakeholders will be able to see the entirety of the activities within Market Development and Innovation and Research, understand any shifts in the portfolios initiatives, and understand the nature of the benefits that each Investment Plan allocation is designed to achieve. The Investment Plan will identify, on an initiative basis, how stakeholder engagement, market research, customer feedback as well as data and progress assessments learned through evaluation and timely Test-Measure-Adjust practices provide direction on portfolio allocation decisions.

[141] NY-Sun and NYGB will continue to file and update separate operating plans and other progress reports as required through separate Order from the Commission. As such, it is envisioned that Investment Plans will comprise the Market Development and Innovation and Research portfolios.

Given the varied nature of each of the Market Development and Innovation and Research portfolios, initiatives and their individual outputs will necessarily vary, and no single set of initiative or output metrics will serve as valid metrics of progress across initiatives. However, what will be universal will be the process and fundamental principle that all initiatives must undergo an examination that will test each initiatives' ability to advance long-term outcomes, and identify what near-term metrics or program outputs will be measured to identify progress towards the long-term outcome will serve as milestones to measure adequate progress toward initiative objectives. In addition to the four key outcomes identified above, further outcomes will be tracked and reported as appropriate, such as market penetration of a supported technology. Milestones will be developed to allow NYSERDA to track and report whether any individual initiative is making the quality of progress on the required timeline to achieve success. Upon receiving results from near-term assessment of any initiative (known as the Test-Measure-Adjust process), future initiative support will then be diagnosed, and remedies to either cure initiative deficiencies (including discontinuing components or all of an activity) or capitalize on identified opportunities, will be pursued. All such assessments will be conducted according to pre-established criteria based on logic model exercises that will be completed at the onset of initiative activity, and which set known expectations for initiative performance. Initiative expectations and Test-Measure-Adjust assessments will be reported in the Investment Plan.

As noted, the Test-Measure-Adjust approach will include milestones that allow NYSERDA to track and report whether an initiative is making the quality of progress on the required timeline to achieve success. This will include assessment of whether:

- The initiative is on course to test the hypothesis with enough scale to achieve targeted levels of confidence, and
- The real time, emerging results are in alignment with expectations (implying steady continuation) or not (implying need to diagnose and intervene).

To illustrate, three examples are shown to provide greater clarity as to how NYSERDA will apply a Test-Measure-Adjust approach.[142]

Example 1: Home Energy Score Pilot

Overarching Pilot Goal: Demonstrate and increase the implementation of residential energy efficiency projects through demand created by the widespread adoption of a Home Energy Score (HES) rating system.

A HES rating system provides an "asset-based" analysis of single-family residential buildings on a rating scale of 1 to 10 where 10 is the highest rating. The U.S. Department of Energy tasked the Lawrence Berkley National Laboratory (LBNL) to develop this tool to provide standardized energy information for home buyers and sellers based on the energy characteristics of the home.

[142] The examples are not intended to be complete or exhaustive and the specifics of the examples are subject to change based on ultimate program design and logic model development.

Key Pilot Hypothesis: Increased awareness of the home energy score, and recognition of its value proposition in the real estate and residential home improvement markets, will increase the frequency and size of energy efficiency improvements occurring around the time of home sale transaction.

Pilot activities will include:

- Provide HES to homes in the pilot geography, funded by NYSERDA during initial pilot stage and expected to be paid for by homeowners in the future as part of home inspection services offered through NYS licensed home inspectors
- Launch education and outreach to buyers, sellers, brokers and other real estate professionals, and home inspectors on the meaning and value of the scores
- Enlist participation of contractors, vendors, and other service providers to track local energy improvement projects, including project scopes, budgets, and savings
- Track outcomes – for homeowners (cost, savings, satisfaction) and service providers (business impact)
- Catalog best practices and lessons learned, in form suitable for dissemination and replication
- Track costs and benefits of the pilot, and estimating costs and benefits in a non-pilot setting

The long term goals of the pilot are to achieve key energy and economic outcomes, and to demonstrate the viability of HES as a catalyst for home energy improvement. Accordingly, the long term outcomes advanced by the pilot will include:

- GHG emissions reductions
- Energy savings (kWh, BTU)
- Bill savings
- Private investment in energy projects
- Cost/benefit of HES as an instrument

Other near and intermediate term metrics will include:

- Local penetration of HES, compared to full population of homes and to population of homes on the market
- Local awareness, among buyers, sellers, service providers
- Relative frequency of energy improvement projects associated with sale of HES homes

See Appendix F for a detailed illustration of program logic/theory, metrics and measurement associated with elements of the HES initiative.

Example 2: Commercial Real Time Energy Management

Overarching Pilot Goal: RTEM market becomes standardized, shows signs of becoming self-sustaining, and becomes an enablement platform for other energy efficiency applications.

Key Pilot Hypothesis: Ready access to qualified vendors, a simplified implementation process, proof of energy savings, and O&M benefits of RTEM will encourage commercial customers to incorporate RTEM into their building operations as standard practice. Education efforts and focused vendor support for operators will improve the depth and persistence of energy savings and will better inform future capital investments.

Pilot activities will include:

- Identify and grow a list of qualified vendors to establish minimum standards and vendor differentiation
- Launch pilot and case studies of RTEM projects to showcase value for specific building sectors
- Identify, develop, and launch targeted training for building and system operators, leading to proof of concept, and documentation and tools to support replication
- Grow the data warehouse to showcase successes of RTEM and develop standard savings, analytics, and heuristics for Energy Conservation Measures (ECMs)
- Track outcomes – for building owners (cost, savings, satisfaction) and service providers (business impact)
- Catalog best practices and lessons learned, in a form suitable for dissemination and replication
- Track costs and benefits of pilot, and estimate costs and benefits in a non-pilot setting

The long term outcomes advanced by the pilot include key energy, environmental and economic outcomes, as well as demonstrate the viability of RTEM as a tool to commoditize energy efficiency.

Accordingly, the long term pilot metrics will include:

- GHG emissions reductions
- Energy savings (kWh, BTU)
- Energy bill savings
- Private investment in RTEM and subsequent energy projects
- Routine and continued use RTEM by building staff to identify, implement and assess the success of energy savings measures
- Market growth, standardization in vendor offerings, and transition of RTEM providers to new value added business models
- Financing markets develop around standard savings models for ECMs enabled by RTEM data
- Capability of RTEM networks to communicate between buildings and load serving entities

Other near and intermediate term metrics will include:

- Awareness of RTEM among building operators and potential service providers
- Penetration of RTEM in targeted commercial buildings, and ultimately across the population of commercial building

- Number of vendors qualified
- Number of pilot and case study projects
- Number of portfolios implemented (scalability)
- Number of people trained
- Differential level of energy management, and energy savings due to RTEM
- Persistence of RTEM practices, post-pilot
- See Appendix F for a detailed illustration of program logic/theory, metrics and measurement associated with elements of the RTEM initiative.

Example 3: Industrial On-Site Energy Manager

Overarching Pilot Goal: Achieve broader adoption of an energy management business process within industrial facilities through the use of dedicated on-site energy managers.

Overarching Pilot Hypothesis: An experienced on-site energy manager can effectively identify process efficiency and energy optimization measures that are attractive investments to industrial facilities and justify the cost of using a dedicated on-site energy manager.

Pilot activities will include:

- Select 5-10 pilot participants, who meet participation criteria which may include: commitment to a specific energy savings goal as a result of participation; commitment to implementing recommended projects; commitment from upper management of participating companies to both savings goals and overall energy management business process.
- Provide funding to support an on-site energy manager, at each pilot location, who is dedicated to driving process efficiency and energy optimization within the facility. Provide orientation, mentoring, and other support tools to energy managers to help drive successful engagement.
- Track the outcomes for the pilot sites including energy savings, cost savings, business impact, and continuation of energy manager role beyond pilot.
- Catalog case studies, best practices and lessons learned in a format that is suitable for dissemination and replication for use by other companies and outside consultants.
- Track the costs and benefits of the pilot facilities, and estimate the costs and benefits of non-pilot facilities.
- Develop scalable model
- Track outcomes – for industrial facilities (cost, savings, satisfaction) and service providers (business impact)
- Catalog best practices and lessons learned, in a form suitable for dissemination and replication
- Track costs and benefits of pilot, and estimate costs and benefits in a non-pilot setting

The goals of the pilot are to achieve key energy, environmental and economic outcomes, and to demonstrate the viability of an energy management business process. Accordingly, the long term pilot metrics will include:

- GHG emissions reductions
- Energy savings (kWh, BTU)
- Energy bill savings
- Private investment in energy projects
- Cost/benefit of energy management
- Number of companies adopting strategic approach to energy management
- Other near and intermediate term metrics will include:
- Awareness of on-site energy management among plant operators and potential service providers
- Penetration of on-site energy management practices in industrial facilities, across industries and plant sizes
- Number of companies with access to an on-site energy manager
- Number of consultants and facilities trained
- Differential level of energy management, and energy savings due to on-site energy management
- Persistence of on-site energy management as a business practice

See Appendix F for a detailed illustration of program logic/theory, metrics and measurement associated with elements of the On-Site Energy Manager initiative.

12.9 Fuel Neutrality

The estimated benefits assume implementation of initiatives on a fuel neutral basis in order to capture all efficiency opportunities as they exist, in the pursuit of GHG emissions reductions derived across various fuel uses. This "fuel neutrality" is the lynch-pin to providing truly customer-centric clean energy initiatives and allows for new market opportunities to emerge – a desired outcome of the REV approach. To attract private investment at levels needed to achieve the dramatic scale-up of the clean energy markets, initiative design must be aligned with how energy consumers approach their energy uses, energy costs, and energy choices. Fuel neutrality is also apt to offer a more cost-effective means to implement energy efficiency initiatives to achieve long-range GHG reduction goals, and may provide additional opportunities to achieve the State's broader emissions reductions targets. Support for a fuel neutral CEF 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.

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. This consumption is responsible for 21% of residential GHG emissions, 18% of commercial emissions, and 43% of industrial emissions. 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.

Fuel neutrality, on a project-specific basis, allows for the implementation of 'whole building' approaches and strategies. That is, as new service providers are strategically creating and offering new products to consumers, they will likely be working with consumers concerned with their entire energy burden – including electric and thermal (space and water heating) requirements. Also, new initiatives, such as combined heat and power options, will require an examination of all energy systems on a location (whether a home, commercial building, or campus/microgrid setting) in order to right size the generation equipment to ensure the greatest energy returns for the investment. Additionally, as has been demonstrated through the course of the SBC and EEPS programs, individual energy efficiency projects often result in ancillary benefits that result from the interactive effects of electric and thermal systems. For example, building envelope work (including insulation, air sealing, or as envisioned by the Innovation and Research portfolio, advanced building materials) will benefit both electric and thermal load – avoiding the need for fuel to meet winter heating requirements as well as reduced electric load to meeting air conditioning load. This avoided air conditioning load also will support electric system peak reduction goals. Thus fuel neutrality on a project basis would support several REV objectives, including improved system efficiency, robust market product and service development, and help with animating consumer demand for clean energy services. Further, given the ability to capture GHG emissions across all energy systems, a fuel neutral approach to the CEF will advance the broad GHG reduction policy of the State.

Fuel neutrality will also likely provide benefits on a larger systems basis. The State's primary energy systems – electricity, natural gas and fuel oil – have demonstrated a growing interdependence in the past years. The winter seasons of 2013/14 and 2014/15 have resulted in record-cold winters, requiring prolonged interruption calls for natural gas service, and requiring interruptible customers to turn to fuel oil to maintain operations. Interruptible customers comprise a spectrum of critical functions – including power plants, hospitals and other essential service facilities, and large residential housing developments. While designed for interruptions of limited durations, the past winters have resulted in weeks-long interruptions, placing unsupportable pressure on the fuel oil supply chain that is unable to fill a prolonged market gap resulting from an unplanned increase in demand. Traditional resupply activities can also experience disruption during cold weather, for example ice barriers in harbors for barge delivery of fuel oil. Finally, increases in demand result in increased fuel oil costs for customers who depend on that fuel for heating purposes; given that interruptions are intended to provide a degree of price modification for natural gas customers, resultant price increases to fuel oil customers due to natural gas interruptions results in a degree of cross-subsidy for natural gas customers by fuel oil customers. Electric customers may also experience price increases in zones where dual fuel

facilities may now set the clearing price for wholesale energy markets, in consideration that fuel oil has become a more costly fuel option for power plants than natural gas. Fuel neutral clean energy initiatives will be able to provide a degree of relief to each of these energy systems, potentially reducing the effects or impacts of system interruptions, and improve the resiliency of fuel availability when interruptions become necessary.

Finally, fuel neutrality is a rational approach to support aggressive GHG reduction needs in the energy sector and the shift to a low carbon energy future for New York. The capability of the CEF to reach market actors who will engage in energy efficiency services in the fuels sectors (gas and fuel oil) will be critical to the success of GHG emission reduction policy. The consumption of natural gas and fuel oil currently holds a higher CO2e content per BTU than does electricity. Thus, targeting thermal loads in New York provides a greater opportunity for more productive and cost-effective emissions reductions than does even the cost effective efficiency achieved in the electricity system. Further, given New York's relatively colder climate, long-range GHG reduction targets will be unachievable absent an ability to reach market opportunities and consumer interest to reach for energy efficiency for fuels. CEF initiatives to influence the development of markets that can reach fuel-based energy efficiency will be necessary to achieve the stated State GHG reduction policy. Another reason that must also be considered focuses on the future electricity system that will need to be designed in a low carbon energy future. The electricity system will become an ever-increasing source of power for economic activities that currently only marginally use electricity to power that sector. The largest such example is transportation. Greater penetration of electric vehicles has been a stated policy consideration in the REV proceeding. At its core, support for electric vehicles is truly a fuel switching activity, primarily impacting the use of petroleum fuels to the growth of the electric system. Also for consideration should be the use of heat pumps to displace on-site fuel use and provide thermal requirements for New York homes and businesses. As with EV's, greater use of heat pumps will result in greater opportunity for the electricity system. Given the above examples, fuel neutrality for the CEF is thus better viewed not as a 'cross subsidy' for fuel oil customers, but rather as providing increased opportunity for electricity industries as the State pursues a path to a low carbon energy future.

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 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 eliminate the surcharge on natural gas customers, collecting the entirety of CEF from electric customers. The presented collections schedule reflects this approach, accounting for 2015 natural gas collections of approximately $90 million. Further, this approach allows for continued electric surcharges reductions from the 2015 level. 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 initiatives 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 initiatives 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 initiatives is developed, care must be taken to avoid the disqualification of customers who contribute to the clean energy surcharge through a natural gas bill, but do not pay an electric surcharge, 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 surcharge on their electric bills. 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. To effectuate this "Statewide" CEF, NYSERDA will supplement the clean energy surcharge-funded initiatives with additional RGGI funds, proposed at $25 million per year.

In the absence of a statewide CEF, NYSERDA will seek to enter agreements with the LIPA and NYPA on initiative offerings to advance whole-building, fuel-neutral, customer-centric initiative models for their respective customer bases and to advance the broadest GHG reductions and market development potential desired by REV. A single CEF that could address electric and heating needs of all New York customers would simplify participation in the initiatives 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.

13 Conclusion

As described herein, NYSERDA has designed the CEF to complement REV by pursuing three long-term outcomes: thriving and self-sustaining clean energy industries able to operate without subsidies; greater levels of private capital invested in clean energy and jobs in New York; and significant reductions in greenhouse gas (GHG) emissions from the state's energy sector. The CEF will help to enable the full realization and maximization of the economic opportunity presented by REV. Accordingly, NYSERDA respectfully requests that the Commission issue an order that:

- Establishes the CEF, which supports the overall objectives of REV to develop at scale markets for clean, distributed energy resources; focuses on market transformation activities while ensuring a smooth transition from previously authorized activity; and works to transition to self-sustaining markets for clean energy technologies.
- 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 Evaluation, Reporting and Transparency principles and implementation strategies described herein, and 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 renewable energy in the electricity mix.
- Provides a 10-year commitment and budget for the CEF that:
    - Approves the strategic direction identified for the 4 portfolios detailed in the CEF Proposal; to include the Market Development approach for Large Scale Renewables as described in Section 7.2;
    - Authorizes $5.322 Billion in total new CEF activity through 2025.
        - This authorization includes a total of $3.430 billion for the Market Development and Innovation and Research portfolios, initiated with approximately $2.713 billion for Market Development and approximately $0.717 billion for Innovation and Research.
        - This authorization includes a total of $781.5 million for NYGB capitalization.
        - This authorization includes a total of $960.6 million for NY-Sun, which has been authorized in previous a Commission Order.
        - This authorization includes a total of $150 million for an RPS Main Tier solicitation in 2016.

    - Approves ongoing funding allocation flexibility in the Market Development and Innovation and Research portfolios, providing NYSERDA with the ability to reallocate funds within each portfolio and between the 2 portfolios where market engagement warrants, to improve the portfolios, and to capture emerging opportunities as market conditions evolve.
- Establishes a new ratepayer schedule to support the CEF through 2025, approving collections as set forth in Table 7.
    - Authorizes the use of existing unexpended fund balances to support both currently authorized program activity for SBC, EEPS, RPS and T&MD programs, and 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 a "Bill-As-You-Go" approach to ratepayer collections funds transfer, and directs NYSERDA and utilities to establish agreements to effectuate this policy.
- Directs NYSERDA to develop annual Investment Plan for the Market Development and Innovation and Research portfolios, to be submitted to the DPS Office of Clean Energy.
- Authorizes NYSERDA to convene Advisory Groups for the Market Development and Innovation and Research 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.
- Establishes a 3-year review cycle for the Market Development and Innovation and Research portfolios, the first such review to be conducted in 2019, which would demonstrate interim progress on CEF initiatives and benchmarks of progress towards goals.
    - Directs NYSERDA to submit periodic reports that show initiative progress and recommend portfolio adjustments as needed.
    - Authorizes an Evaluation program that, among other activities, will measure the effects of market transformation initiatives on the economy generally, better inform on the effects of multiple program initiatives aimed at accelerating and promoting the scale of energy efficiency and clean energy in the State economy, as well as apply approaches, including the Test-Measure-Adjust approach, to best inform the effectiveness of individual initiatives to advance CEF primary outcomes.
- Finalizes the allocation of NYGB's 781.5 million balance of capital, including:
    - Should the Commission issue an Order in response to the NYGB Capital Petition authorizing a 2015 allocation of $150.0 million of NYGB capital, authorization of the CEF NYGB Incremental Collections as set out in Section 10; or, should the 2015 allocation be in a different amount, revised NYGB Incremental Collections to achieve full capitalization of $1 billion by 2025, with yearly allocations proportionally consistent to those set forth at Section 10.
    - Authorization of a Credit Facility structure broadly consistent with the description set out in Section 10.3.1, including the use of NYGB funds for payment of all associated fees and interest.

- Authorizes an additional $4 million out of the CEF NYGB Incremental Collection for 2016 to meet NYGB's administrative costs, as well as to pay any cost recovery fee under section 2975 of the Public Authorities Law attributable to the actual expenditure of any portion of the $631.5 million balance of capital comprised of the aggregate of the CEF NYGB Incremental Collections. This request for additional funding to meet administrative costs amounts to less than 1.0% of the remaining capital installments.

Appendix A: Market Research and Stakeholder Engagement

In the formation of the 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 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 described and strategies to overcome those barriers described in Section 6.

Additional market research (including market interviews) was also conducted for the Innovation and Research 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 Innovation and Research activities described in Section 8.

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.[143] 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

[143] 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.

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 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: Stakeholder Participation

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

AARP New York
Advanced Energy Economy Institute
Affordable Housing Partnership
Alliance for a Green Economy
Alliance for Clean Energy New York
American Council for Energy Efficient Economy
American Lung Association in New York
Antares Group Incorporated
Apex Clean Energy
Association for Energy Affordability
Aztech Geothermal/ NY GEO
Binghamton Regional Sustainability Coalition
Black Oak Wind Farm
BloomEnergy Corporation
Boundless Energy NE, LLC
Brookfield Renewable Energy Group
Brookfield Renewable Power
Business Council
Capitol Hill Management Services
Catskill Mountainkeeper
Cattaraugus Community Action
Center for Economic Growth
Center for Social Inclusion
Central Hudson
CHHAYA CDC
Citizen Environmental Coalition
Citizen Housing and Planning Council
Citizens Campaign for the Environment
Citizens for Local Power
City of New York
City University of New York
CLEAResult
Climate Change Mitigation Technologies LLC
CodeGreen Solutions, Inc.
Colwell, Colwell & Petroccione, LLP
Community Greening Planner
Community Power Network of New York State
Con Edison Solutions

Concrete Green
Conservation Services Group
Consolidated Edison
Constellation Energy
Consulate General of the Netherlands in New York
Consumer Power Advocates
Consumers Union
Cordo & Co., LLC
Cornell University
Couch White, LLP
County of Westchester
Courtney Strong
Covanta Energy
Customized Energy Solutions
Distributed Wind Energy Association
DNV GL
Doosan Fuel Cell America, Inc.
E9 Insight
EarthKind Energy
EDP Renewables, North America
Efficiency First -- New York
Electric Power Research Institute
Empire State Development
Enel Green Power North America
Energy & Environment
Energy & Resource Solutions (ERS)
Energy Technology Savings
EnergyPro Insulation
EnSave
Environmental Advocates of New York
Environmental Defense Fund
Envitec Biogas USA, Inc.
EverPower Wind Holdings, Inc.
First Fuel
FuelCell Energy
Future Energy Development, LLC
Green Power Solutions
Guarini Center, NYU School of Law
Harris Beach
Harvest Power, Inc.
Hiscock & Barclay, LLC
Honeywell
Hudson Solar

Huttner Strategies
Iberdrola USA
Independent Power Producers of New York, Inc
Institute for Building Technology and Safety
International Brotherhood of Electrical Workers
Invenergy LLC
Just Energy
Leidos Engineering, LLC
LI Green
Lockheed Martin
Long Island Progressive Coalition
Luthin Associates, Inc.
Multiple Interveners
National Fuel Gas Distribution Corporation
National Grid
Natural Resources Defense Council
New England Clean Energy Council
New York Battery and Energy Storage
New York Biomass Energy Alliance
New York City Department of Environmental Conservation
New York City Energy Efficiency Corporation (NYCEEC)
New York City Environmental Protection
New York Farm Bureau
New York Geothermal Energy Organization
New York Oil Heating Association, Inc. and the Oil Heat Association of Long Island, Inc.
New York Power Authority
New York Public Interest Research Group
New York State Community Action Association
New York State Department of Environmental Conservation
New York State Department of Public Service
New York State Department of State Utility Intervention Unit
New York State Electric and Gas
New York State Homes and Community Renewal
New York State Office of Temporary and Disability Assistance
New York State Public Service Commission
New York State Weatherization Directors' Association
New York Water Environment Association
Nexant
NextEra Energy Resources LLC
Northeast Clean Heat & Power Initiative
Northeast Dairy Producers Association (NEDPA)
Northeast Energy Efficiency Partnerships
Northeast Wind Projects

Northwest Bronx Community and Clergy Coalition
Northwest Energy Efficiency Alliance
NRG Energy, Inc.
NYISO
Oak Point Energy
Oak-Mitsui Technologies, LLC
Oil Heat Institute of Long Island, Inc.
OPower
Orange and Rockland
Pace Energy and Climate Center
Performance Systems Development
PosiGen Solar Solutions
Public Policy and Education Fund- Southern Tier
Public Service Electric and Gas- Long Island
PUSH Buffalo
Real Estate Board of NY (REBNY)
ReEnergy Holdings LLC
Renewable Energy Long Island
Renewable Energy New England
Rensselaer Polytechnic Institute
Rochester Gas and Electric
Sealed
Sierra Club
Silicon Solution JV, LLC
SmartWatt Energy, Inc
Solar Energy Industries Association
Solar One
Southern Tier Solar Works
SRA International
State of New York Executive Department
Suffolk County
Sunnyside Farms
SUNY Albany
SUNY Purchase College
Syracuse United Neighbors
Taitem Engineering, PC
TechNet
The Nature Conservancy
The New York Energy Efficiency Coalition
The Roffe Group P.C.
Think Eco Inc.
TRC
Ulster County Legislature

UnitedWind
Vermont Energy Investment Corporation
Walmart Stores, Inc
Willdan Energy Solutions

Appendix C: Barriers and Decision Points 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 initiatives. Specific initiatives are included in Section 6, and additional detail will be included in a future 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:[144]

Table C-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).
- 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

[144] 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).

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 energy efficiency improvements and distributed generation/renewable energy 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.

Residential Multifamily

The Potential Study identified the following 2030 economic potential savings in the residential multifamily sector[145]:

Table C-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 informed of the potential benefits for the comfort of their units, their energy costs, and the environment[146]
- 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

[145] Economic potential for building common spaces is included in the commercial sector.

[146] 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).

sufficiently value efficiency for non-financial reasons (e.g., comfort, aesthetics, environmental or technology interests)
- Lack of trust in the manufacturers and service provider's assessment of performance of energy efficiency improvements and distributed generation/renewable energy 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 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.

LMI Residential (Single Family and Multifamily)

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 revealed the following LMI-specific primary end user barriers[147] to address in order to attain the available economic potential:

- 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 energy efficiency and distributed generation/renewable energy 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.

[147] 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.

- 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 energy efficiency 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 include:[148]

- 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.
- energy efficiency and distributed generation/renewable energy services providers often avoid disadvantaged communities based on the expectation that return on their marketing investment will be low.

NYSERDA market research identified a series of key decisions points with the greatest potential to influence clean energy choices[149]:

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[148] 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.

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

- 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.

Commercial

The Potential Study identified the following 2030 economic potential savings in the commercial sector[150]:

[150] 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)

Table C-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

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

Industrial

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

Table C-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 energy efficiency) 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 energy efficiency 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 or 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 capital expenditure 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

Appendix D: Energy Storage Sample Use Cases

Two sample use cases for energy storage and associated value streams follow. Benefits that can currently be monetized are noted in green and those which are not yet monetized are indicated in yellow. NYSERDA will work with stakeholders and the PSC to develop appropriate benefit cost analysis and validation tools to develop and test appropriate tariff structures to allow the full monetization of storage benefits. In the case of buildings and grid storage, this is essential to enable the intended benefits without the need for bridge incentives.

Use Case	Utility-Owned Distribution System Capital Deferral[1]	Customer Peak Shifting including DER/Storage Integration
Value to Owner	Capital deferral, greater flexibility in responding to load growth, ability to rate base[2]	Demand charge savings and energy time shifting
		Net metering constraints arise when integrating storage with solar electric
Distribution System Value	Cost avoidance and increased system utilization	Utility load reduction programs
		Distribution upgrade deferral; local congestion relief, renewable firming and voltage support
Bulk Transmission System Value	Potential capital deferral; increased system utilization	Wholesale demand response programs
Ancillary Services (wholesale market)	Not permitted for utilities; however a third party could provide services to the utility and receive value from wholesale markets	In aggregation, access value from ancillary services[3] in the wholesale market
Public Benefits	Ratepayer savings through capital avoidance and higher system utilization	Long term ratepayer savings, reduced emissions through greater DER integration and peaker reduction

System benefits presented above adopted from the Department of Energy/EPRI Storage Handbook, December 2013

[1] Under REV Track One Order issued February 26, 2015 utilities may own storage when integrated into their distribution system architecture

[2] For example, in order to meet an extended 12 hour peak demand at one of its Brooklyn-Queens substations, Con Edison received approval from the Public Service Commission to procure $500 million in demand side management services including $50 million for 11 MW of utility-owned storage on the distribution system to avoid a new $1 billion substation.

[3] Ancillary services are those necessary to transmit electric power from seller to purchaser and include reactive power and voltage control, load following, and other kinds of services on the wholesale market managed by the NYISO.

Appendix E: 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 E-1, E-2 and E-3, and present several metrics that would be tracked going forward.

Table E-1: Leverage Ratio

NYSERDA $	$311 M
Company Cost Sharing	$930 M
Investment and grants	$623 M
Ratio	5

Table E-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 E-2 Commercialization Rate

No. of Product Development Projects	No. Resulting in Commercial Revenue	Commercialization Rate
683	173	25%

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

Table E-3: Product Sales

Total Commercial Revenue	Total Investment Expenditures	Revenue Ratio
$2,284 million	$176 million	13

Products that have been commercialized following NYSERDA Product Development support have generated over $2 billion in revenue at a cost of $176 million to NYSERDA. This produces a "revenue ratio" of ~13. Over the period, NYSERDA grantees have on average generated over $126 million in commercial revenue per. Additionally, the *net* benefit (factoring in the SBC Assessment impact) to New York State's economy has been an increase in Gross State Product of $11 for every dollar invested.

Appendix F: Test-Measure-Adjust Application

Table F-1 illustrates a portion of the On-Site Energy Manager pilot logic/theory and validation pertaining to industrial end users. Other potential related pilot elements are not shown in this example. This example is non-exhaustive and the specifics are subject to change.

Table F-1: Industrial On-Site Energy Manager Pilot Logic/Theory and Validation

	Industrial End Users
Barriers	Industrial end users lack a dedicated energy manager function Lack of industrial end user understanding and/or trust in the ability of energy efficiency and distributed generation technology to deliver energy and productivity improvements
Hypotheses	Lowering the risk of trial and communicating the value of on-site energy managers to the market will lead to broader adoption of an energy management business process
Activities	Funding for technical assistance via an on-site energy manager within industrial facilities
Outputs and Goals	# of industrial facilities working with an on-site energy manager (Goal = #TBD)
Output Validation	Analyze tracking data and report internally on level of output achieved on a quarterly basis against goal
Near Term Outcomes and Goals	Managerial and corporate behavioral changes in pilot participants, with respect to integrating energy management into business processes Energy savings realized by industrial end user pilot participants (Goal = #TBD)
Near Term Validation	Pilot participant survey on changes in management/corporate practices and decision making regarding energy Analysis of energy savings data on pilot projects
Long Term Outcomes and Goals	On-site energy managers/engineers on demand achieve greater market penetration (i.e., permanent roles in industrial facilities) beyond the pilot participants Energy savings realized broadly, by industrial end users effectively utilizing on-site energy managers/engineers on demand, and associated investment level in energy projects
Long Term Validation	Industrial end user survey to quantify market penetration and investment Industrial end user site visits/data analysis to quantify savings

Appendix G: Summary of Market Development Initiatives, Transitions and Timing

	2016	2017	2018
Commercial			
Real Time Energy Management	Launch Pilots	Continuation of Pilots	Continue Pilots and Publish Case Studies
Standard Tools and Resources Development			
Energy Efficiency Packages	Research, Design Initiate Test	Test, Validate and Refine Packages	Validate and Refine Packages
Remote Auditing and Related Information Assets	Continue Pilots Launched in 2015 and Launch New CEF Pilots	Continuation of Pilots and Issue Case Studies	Evaluate and Refine Pilot Approach, Promote Successes and Sharing Data
Energy Efficiency Payback and Co-Benefits Analysis	Develop and Initiate Data Collection Approaches	Develop and Share Analytical Tools	Share Case Studies and Validate Information
Combined Service and Energy Purchase Packages	Research and Design	Launch Pilots/Seek Proposals	Test Pilots
Financing Standards, Tools, and Protocols	Develop and Initiate Data Collection Approaches	Collect Data and Analyze Tools	Share Case Studies and Validate Information
Other Tools and Resources	Research and Design	Launch Pilots or Seek Proposals	Test Pilots
Soft Cost Reduction Efforts			
Expanding Access to Data and Information	Research and Design	Launch Pilots/Seek Proposals	Test Pilots
Skills Development	Research and Design	Launch Pilots/Seek Proposals	Test Pilots
Referral Services for Demand Generation	Launch	Continue	Continue
Strengthening Clean Energy Service Companies			
Performance Contracting Model Expansion	Launch Pilots	Continuation of Pilots	Continuation of Pilots and Publish Case Studies
Commercial Real Estate Tenant Efficiency Initiatives	Continue NRDC Pilot and Initiate New CEF Pilots	Continue Piloting and Testing Models; Publish Information	Continue Piloting and Testing Models; Publish Information

Aggregation and Replication Strategies			
National and Regional Retail Sector	Continuation of Pilots Launched in ETAC in 2015 and Launch New CEF Pilots	Continuation of Pilots and Issue Case Studies	Evaluate and Refine Pilot Approach; Promote Successes; Share Data
Colleges and Universities	Continuation of Pilots Strategies Launched in 2015.	Continuation of Pilots and Issue Case Studies	Evaluate and Refine Pilot Approach, Promote Successes and Sharing Data
Current Programs			
Incentives for pre-qualified measures	Conclude		
Existing Facilities, Flex-Tech and Green Jobs Green NY small commercial audit programs	Continue with Modifications	Continue with Modifications	Conclude
Demand Management Program with Con-Ed	Conclude		
Industrial			
Piloting and Demonstrating New Business Models and Processes			
Strategic Energy Management	Launch Pilot	Complete Pilot	Develop and Roll out Services and Tools (incl. Web-Based)
On-Site Energy Management and Engineer on Demand Resources	Launch Pilot	Complete Pilot	Training and Data to Market
Strengthening Clean Energy Partners through Technical Assistance and Standardized Tools			
Education, Training, and Technical Assistance for Advanced Science and Technology	Develop and Hold Forums; Data to Market	Develop and Hold Forums; Data to Market	Develop and Hold Forums; Data to Market
Education, Training, and Technical Assistance to Spur Clean Energy at Data Centers	Develop and Launch Training	Pilot Completion	Data to Market
Providing Standardized Tools to Reduce Technical Risk of Energy Efficiency		Strategy Development	Data to Market
Providing On-Demand Technical Assistance	Research and Design	Launch Program	Data to Market

Quality Assurance			
Credible M&V Services	Launch Program	Data to Market	Data to Market
Current Programs			
Industrial and Process Efficiency Program	Continue with Modifications and Heightened Focus on Process Efficiency	Modify to Address Gaps in Self-Direct	Continue
Agriculture			
Strengthening Farm Partners with Technical Assistance, Education, and Outreach			
Technical Assistance for Farm Management Best Practices	Develop and Hold Forums; Data to Market	Develop and Hold Forums; Data to Market	Develop and Hold Forums; Data to Market
Technical Assistance for Controlled Environmental Agriculture			Develop and Hold Forums; Data to Market
Development of Standardized Tools and Resources			
On-Site Farm Management Tool	Research and Design	Develop Tool	Launch Tool
Piloting and Demonstrating New Technologies			
Technology Advancement Pilots	Research and Design	Launch Pilot	Continue Development
Current Programs			
Agriculture Energy Efficiency Program	Continue incentives, Modify Focus to Farm Audits and Technical Support	Continue incentives, refine technical support	Conclude incentives, refine, modify other strategies as needed
Multifamily			
Information, Awareness, and Demand			
Communications Toolkit	Research and Design	Design, Launch pilots; Design Final Toolkit	Roll out
Building Energy Performance Labeling	Research; Assemble National Working Group	Design, Launch pilots; Complete Label	Roll out
Standardized, Simple Tools and Resources			
Standardized Retrofit Packages	Launch Pilot	Complete Pilots; Assess Effectiveness	

Energy Efficiency Retrofit Calculators	Conduct Research and Design	Support Development of Calculators	Continue Development
Zoning and Permitting Tools	Conduct Research and Design	Support Development of Tools	Continue Development
Financing and Physical Needs Assessment Tools	Conduct Research and Design	Support Development of Tools	Continue Development
Strengthening Clean Energy Partners			
Network of Qualified Clean Energy Partners	Enlist Partners in initial Categories	Continue Development and Expand	Continue Development and Expand
Performance Validation and Quality Assurance	Design and Test Tools and Processes, e.g. IPC, revised QC processes through MPP	Continue Development	Promote Partner Performance Based on QC/QA Results
Support of New Business Models and Services	Research and Design	Assess Effectiveness, Refine	Encourage New models As Market Evolves
Aggregation			
Mid-Market Engagement	Implement Pilots	Complete Pilots; Assess Effectiveness	Launch Statewide Aggregation Initiative
Current Programs			
Multifamily Performance Program	Modify - Eliminate 15% Threshold; Revise Incentive Schedule; Expand project types, including tenant improvements	Refine and Continue	Conclude incentives, refine, modify other strategies as needed
GJGNY Financing	Expand Solutions, Refine and Continue	Expand Solutions, Refine and Continue	Expand Solutions, Refine and Continue
Advanced Submetering Program	Conclude		
Residential			
Information, Awareness, and Demand			
Incorporating the Value of Energy Efficiency into Homes	Launch Pilots	Continue/Add Pilots; Data to Market	Continue/Add Pilots; Data to Market
No and Low-cost Energy Saving Tips	Launch	Continue	Continue
Public Forums to Share Best Practices and Home Energy Improvement Data		Launch	Continue

On-line Communications Platform	Research and Design	Pilot	Transition to Market
Development of Standardized Tools and Resources			
Product, Data and Building Performance Standards	Continue Development and Delivery to Market	Continue Development and Delivery to Market	Continue Development and Delivery to Market
Building Energy Efficiency Packages	Continue/Add Pilots	Continue/Add Pilots; Data to Market	Continue/Add Pilots; Data to Market
Increase Access to Efficiency Financing Products	Continue current	Continue	Continue
Strengthening Clean Energy Partners			
Supporting Home Performance with ENERGY STAR Contractor Network	Launch Pilots	Continue/Add Pilots; Data to Market	Continue/Add Pilots; Data to Market
Leveraging Partnerships	Continue current	Continue	Continue
Current Programs			
Subsidized audits, advertising, and consumer and contractor incentives	Wind down Consumer Incentives, Modify Contractor Incentives	Wind down market rate Contractor Incentives	
LMI			
Financial Support	Continue current	Continue	Continue
Increased Coordination	Continue current	Continue	Continue
Development of Tools and Resources			
Technical Assistance and Quality Assurance	Continue current	Continue	Continue
Energy Efficiency Clearinghouse for Multifamily Affordable Housing	Research and Design	Launch Pilots; Assess Effectiveness	Complete Pilots; Assess; Roll Out
Green Physical Needs Assessment	Research and Design; Launch Pilots	Launch Pilots; Assess Effectiveness	Complete Pilots; Assess; Roll Out
Pilots and Demonstration Projects			
Demand Aggregation	Research and Design	Launch Pilots; Assess Effectiveness	Complete Pilots; Assess; Roll Out
Demonstrations to Increase Energy Affordability	Research and Design; Launch Pilots	Launch Pilots; Assess Effectiveness	Complete Pilots; Assess; Roll Out

Information, Awareness, and Demand			
Education and Outreach Efforts	Continue current	Continue	Continue
Leveraging Community-Based Organizations	Continue current	Continue	Continue
Strengthening Clean Energy Partners	Continue current	Continue	Continue
LMI Solar	Program rollout/pilot rounds completed	Continue	Continue
Current Programs			
GJGNY	Continue current	Continue	Continue
Assisted Home Performance with Energy Star	Continue/Modified-Combine With EmPower	Continue/Modified-Combine With EmPower	Continue/Modified-Combine With EmPower
EmPower NY programs	Continue/Modified - Combine with AHPwES	Continue/Modified-Combine with AHPwES	Continue/Modified-Combine with AHPwES
New Construction			
Information, Awareness, and Demand			
Zero Net Energy Road Map	Research and Design	Launch	Adjust
Information Resources	Launch Champions Networks	Continue and Expand	Continue
Strengthening Capacity of Clean Energy Partners			
Information, Tools and Technical Assistance for the Design and Construction Communities	Launch Annual Forums	Continue Annual Forums and Launch Technical Assistance and Tool Development	Continue
Leveraging Partnerships to Increase Scale	Launch new strategic partnership opportunities	Continue	Continue
Pilot and Demonstration Projects			
Deep Energy and Zero Net Energy New Construction Pilots	Research and Design	Continue Research/Design; Launch Pilots	Continue
Codes			
Strengthening Organizational Partnerships			
Community of Practice Support	Ongoing; Research/Design Successor Approaches	Disseminate Information	Continue

Municipal Partnership Support	Ongoing; Research/Design Successor Approaches	Continue	Continue
Model Codes and Code-Related Technical Assistance, Training, and Tools			
Code Advancement and Development of a Model NY Stretch Code	Research and Design	Support Model Code Proposals	Continue
Developing Training and Tools to Support Code Practitioners	Launch pilots and Launch Next Round of Code Training Development	Expand	Expand
Information and Awareness			
Evaluation of Code Compliance, Construction Activity, and Code-related trends	Ongoing; Research/Design Successor Approaches	Continue	Continue
Energy Storage			
Pilot and Demonstration Projects			
Quantifying and Monetizing Value of Storage Projects	Launch	Data to Market	Data to Market
Standardized Processes and Simple Tools			
Storage Soft Cost Reduction Strategy via Standardized Interconnection and Tools Development	Launch	Data to Market	Data to Market
Quality Assurance			
Catalogue of Product Offerings and Suggested Use Cases	Launch Pilots	Data to Market	Data to Market
Battery Safety and Performance Program	Launch Pilots	Data to Market	Data to Market
On-Site Power Production			
CHP			
Information, Data, Education, and Awareness			
Communications Platforms and Educational Activities	Modify Existing Programs; Merge Current CHP programs into "Single Interface."	Launch "CHP Interconnection Forum.", Mapping to Target Highest Potential Locations	Continue

Simplifying the CHP Purchase	Continue, Including Bridge Incentives	Launch Guidance Documents	Continue
Technical Assistance and Tools Development			
Building Capacity of Technical Assistance Resources	Launch support for Utility-Embedded DG/CHP Ombudsmen	Launch Support for CHP O&M Business Model; Launch Support "DG Soft Cost Team	Continue Development
Tools and Methods to Improve the CHP Value Proposition	Continue (promote value acceptance, matchmaking, soft-cost analytics)	Continue	Continue
Tools and Methods to Explore Hybrid Solutions		Launch exploration of" hybrid DG solutions."	Continue Development
Emerging On-site Power Technologies (ADG, Fuel Cells and Small Wind)			
Information and Awareness Building			
Wastewater Treatment Facilities Outreach and Match-making	Continue current	Continue	Continue
Anaerobic Digestion Information and Market Studies	Launch Mapping to Target Highest Potential Locations (feedstock, interconnection, etc.)	Continue Development	Continue Development
Pilots and Demonstrations			
Targeting High-value Early Adopter Projects		Pivot from Current "Standard Offer" Incentives to New "Competitive Selection" Incentives	Continue Development
Soft Cost Reduction Strategies			
Realizing Reduced Operating Costs and Expanding Revenue Streams	Research and Design Business Model Pilots	Launch Business Model Pilots	Continue Development
New Business Model Development	Continue as is; Research and Design Business Model Pilots	Launch Business Model Pilots	Continue Development

Regulatory Interventions	Continue as is (drive the Clean Energy for Agriculture Task Force, participate in REV proceedings).		
Solar Balance of System Cost Reduction	Continue Program with Significant Revisions (focus on state-wide problems and tools)	Continue Program (test-measure-adjust)	Continue Program (test-measure-adjust)
Current Programs			
CHP	Modify and Continue Current	Anticipate Stand-By Tariff Resolution; Modify Existing (Glide-Path Reduction of Incentives Within Standard Offer Incentive Program).	
ADG	Continue Current	Pivot from Current "Standard Offer" Incentives to New "Competitive Selection" Incentives	
On-site Wind	Continue Current	Pivot from Current "Standard Offer" Incentives to New "Competitive Selection" Incentives	
Fuel Cells	Continue Current	Pivot from Current "Standard Offer" Incentives to New "Competitive Selection" Incentives	
Renewable Thermal			
Renewable Heat NY	Continue Program with Refined Incentives; Increase Installer Network	Launch Pilots to Address Financing, Customer Acquisition, and Soft Costs	Continue
Solar Thermal	Expand Incentives to Include Space Heating; Pilot Solarize Models	Launch Pilots to Reduce Customer Acquisition/Soft Costs	Continue
Ground-Source/Air-Source Heat Pumps	Research and Design	Launch	Continue

Products			
Technical Assistance Provision			
Training and Education for Manufacturer and Vendor Sales Staff	Update Curriculum and Continue	Continue	Continue
Information, Awareness and Demand			
Increase Product Availability and Capacity for Aftermarket Products and Services	Continue current	Continue	Continue
Matchmaking	Continue current	Continue	Continue
Serve as a Trusted Information Resource	Continue current	Continue	Continue
Coordinate with Utilities	Continue current	Continue	Continue
Pilot and Demonstration Projects			
Prioritizing Underutilized and Emerging Technologies	Research and Design	Launch Pilot	Continue Development
Current Programs			
Product Buy Downs	Conclude		
Communities			
Leveraging Information, Awareness and Recognition			
On-Line Communications and Resource Platform	Research and Design	Launch Pilot	Continue Development
Community Summits	Initiate	Assess Effectiveness, Refine	Continue Development
Community Recognition and Certification	Initiate	Assess Effectiveness, Refine	Continue Development
Competitions	Research and Design	Launch Pilots	Continue Development
Replication	Research and Design	Research and Design; Launch Initial Replication Toolkits	Ongoing Development; Roll Out
Technical Assistance, Capacity Building, and Resource Provision			
Empowering Trusted Local Engagement	Initiate	Assess Effectiveness, Refine	Continue Development
Low-to-Moderate Income Engagement	Initiate	Assess Effectiveness, Refine	Continue Development

Building Capacity in the Higher Education Sector	Initiate	Assess Effectiveness, Refine	Continue Development
Funding for Advanced Actions	Research and Design Areas of Focus	Launch Pilot	Continue Development
Aggregation			
Enabling Community Solar and Other Demand Aggregation Activities	Continue current, Adapt to New Models (such as Community DG and CCA)	Continue	Continue
Workforce Development			
Workforce Development	Continue Current with Modifications	Continue	Continue
Technical Training	Continue Current with Focus on Market Gaps	Continue	Continue
Trusted Information Source	Continue Current	Continue	Continue
Current Programs			
Tuition Support	Continue for LMI	Continue for LMI	Continue for LMI
Reimbursements for Certification Exam Fees	Conclude		