

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

Clean Energy Fund:
Market Characterization & Design
Chapter

Submitted by:

The New York State Energy Research and Development Authority

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Clean Energy Fund:
Market Characterization & Design Chapter

Revision Date	Description of Changes	Revision on Page(s)
June 1, 2020	<p>Updated activities, timing and funding for market insights studies supporting the Market Development and Innovation and Research portfolios and added out-year building and industrial facility stock and potential studies.</p> <p>Removed Table 3 as expenditure projections are no longer included within CEF investment plans.</p> <p>Applied non-substantive updates to the Chapter including the year-by-year study status in Appendix A and other content adjustments related to study descriptions, and broader context policy (e.g., CLCPA).</p>	Multiple

Market Characterization & Design

The Market Characterization & Design Chapter (MCDC) presents NYSERDA's approach to market research and characterization to provide the necessary analytical information to identify and adequately understand target markets, including who the market players are and how they influence each other, barriers and leverage points, value added opportunities, pricing, baseline information, and other potential indicator metrics. Additionally, this Chapter encompasses "Novel Solutions" to identify and market test the effectiveness of different novel intervention types and their potential to inform future investments in New York.

The MCDC Chapter has been modified to outline new planned studies and provide an update on studies completed and currently underway. Appendix A outlines the timing and status of the various evaluation and research efforts undertaken through this Chapter.

The objective of market research and characterization is to provide energy use and demographic/firmographic information; economics perspectives on costs and value of energy solutions; and insights on market, provider and customer trends relevant to accelerating the deployment of effective clean energy solutions. This work is designed to be available and useful to all actors engaged in advancing the objectives of the Clean Energy Fund (CEF), including but not limited to utilities, customers, and emergent service providers, and Reforming the Energy Vision (REV) project developers seeking to develop new business opportunity in emerging markets. This work will provide ongoing information to market participants as REV changes the regulatory environment for energy services and as the CEF and utility activities help to advance the market for clean energy services. Further, with Governor Cuomo's adoption of the Climate Leadership and Community Protection Act (CLCPA) in July 2019, the work described in this Chapter will serve to support CLCPA goals addressing and mitigating the effects of climate change, diverting the state's energy reliance to renewable sources and creating green jobs.

The approaches outlined in this Chapter continue to recognize the value of learning in a timely manner from CEF interventions and from the REV demonstration projects, as well from the activities of other parties engaged in relevant and instructive work. The approach commits NYSERDA to effective sharing of insights, resulting both from studies and learnings derived from interventions. Importantly, this market research and characterization approach will also support predevelopment work required to identify, prioritize, and design the future market development interventions for NYSERDA.

This Chapter identifies known market characterization and design data needs, which NYSERDA expects will evolve along with the CEF portfolio. As new interventions are planned and introduced, NYSERDA will revisit needs and update this chapter, at least annually, to reflect material changes.

This Market Characterization & Design Chapter is organized into the following sections:

- Market Characterization & Design Activities
- Information Dissemination
- Additional Resources

- Budget

3.1 Market Characterization & Design Activities

The MCDC identifies five distinct categories of market characterization and design work required to initiate, accelerate, and evaluate interventions under the CEF. Furthermore, this work is expected to have broad applicability and value to other clean energy activities such as the CLCPA, utility Energy Efficiency Transition Implementation Plans (ETIPs), REV Demos and other activities.

- **Intervention Pre-Development (Sector Level)** – Improved quantitative/qualitative understanding of energy efficiency decision making, economics, value proposition, segmentation, market trends and opportunities to aid in planning or modifying investments.
- **Novel Solutions** – Research and analysis to identify and measure the effectiveness of novel interventions to inform new investments, including behaviorally-based and performance based interventions, and other pre-investment in-market tests appropriate for validation of effectiveness and impact potential, prior to filing a full-scale initiative or launching a larger-scale initiative.
- **Market Fundamentals** – For energy efficiency and renewable/distributed energy resources, NYSERDA requires data on: energy use in various areas of the market; demographic/firmographic information; economic perspectives on costs and value of energy solutions; and insights on market/technology, provider and customer trends relevant to accelerating the deployment of effective clean energy solutions and evaluating the effects of interventions in the market. Work in this area will fulfill such information needs, typically informing multiple NYSERDA interventions.
- **Market Baselines, Potentials and Progress** – This area encompasses: high-level market characterization information needs that are important to optimizing NYSERDA’s strategy in the market on an ongoing basis and to measuring overall market progress across strategies; ongoing updates to energy efficiency potentials by major end use sector to aid in planning; and overarching, ongoing information needs pertaining to buildings, energy equipment and impact of program activities on energy consumption by sector.
- **Macro-Level Analyses** – NYSERDA will explore the viability and utility of conducting 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 strategies in the State. NYSERDA is also exploring the potential use and development of energy intensity indicators.

Although this chapter is organized by these five areas, NYSERDA will optimize its data gathering efforts (e.g., using the same data sets, same primary data collection vehicles, etc.) to meet needs in multiple areas. NYSERDA has competitively selected multiple pools of qualified consultants to perform the market and evaluative research identified herein in order to inform program strategies and assess the effectiveness of strategy results. NYSERDA’s evaluation and market research

capabilities are transitioning to become increasingly nimble and flexible to meet short turnaround requests and provide actionable insights while supporting accountability goals. The results of this work will allow NYSERDA to improve impact and innovation in deploying clean energy projects and strategies.

In order to achieve these objectives cost-effectively and efficiently, work will be assigned for individual, discrete activities with firm timelines and approaches and tools (including, but not limited to, longitudinal surveys and analysis of secondary data) will be used in conducting analyses. In addition, non-traditional research methods such as ethnography and social media and community platforms to offer real-time and continuous feedback on concepts and strategies will also be explored.

3.1.1 Interventions Pre-Development (Sector Level)

NYSERDA will leverage a wide range of intelligence gathering and research techniques to hone investment opportunities, identifying and applying actionable insights to interventions to increase their likelihood of success in the market. Activities will largely focus on market discovery methods designed to understand (1) customer and partner attitudes and perceptions, (2) customer decision-making, drivers and barriers affecting market growth, and (3) partner, service provider and end-user economics and business models to ensure the design of interventions and approaches will be economically compelling. Voice of customer and concept testing, in addition to other research methodologies will confirm that strategies and market approaches resonate with target audiences. Activities may also include continuous monitoring of the social, economic, demographic and financial conditions which impact NYSERDA's efforts.

3.1.2 Novel Solutions

NYSERDA will test the effectiveness of different novel intervention types and their potential to inform future investments in New York. Research activities will include but not be limited to testing the market impact of interventions supporting: 1) behavior integrated clean energy design and 2) performance-based solutions.

Behavior Integrated Clean Energy Design

NYSERDA will continue to test integrated behavioral approaches for specific CEF strategies where a behavioral intervention is expected to result in high impact outcomes. Behavioral approaches use insights from social psychology and the decision sciences, like social norms that predict most people will adjust their behavior to be consistent with what is perceived to be the norm or common behavior. Integrated behavior design with a program or strategy could range from minimal to more extensive with in-market field testing using quasi-experimental design and/or random controlled trials. Successful outcomes for this behavioral science research could lead to broad intervention application and investment.

NYSERDA will work inside and outside of NYSERDA collaboratively with market partners to integrate effective behavioral principles into clean energy design, delivery and market activities to test efficacy and impact for potential to scale.

Performance-Based Solutions

NYSERDA will also support performance-based solutions and other novel financial mechanisms that have the potential to achieve greater clean energy adoption. Work will be related to strategies/pilots to create a more friendly lending environment to the LMI community by NYSERDA sharing some of the risk with the financiers.

This work is separate from and will complement the larger scale activities conducted by the New York Green Bank by focusing on new ways to drive projects forward and leverage financial markets without direct use of ratepayer funding.

As part of this work, NYSERDA will establish forums for knowledge sharing among technical and subject area experts to convene and discuss research analyses and other insights to hone in on areas of opportunity, and provide direction for future investments.

In-Market Testing for Novel Ideas and Concepts

NYSERDA will implement a mechanism to implement smaller-scale in-market tests of novel ideas, including behavior and performance based solutions, and other concepts that are promising, but in need of further real world market validation prior to proceeding to a full investment plan.¹ The in-market testing will accelerate the path to market for successful novel ideas and concepts that can be quickly proven.

The tests are anticipated to last up to two years, including implementation and evaluation. NYSERDA will allocate \$13,000,000 in total through 2025 to fund novel quality in-market tests each year. These market-driven projects will be solicited through an open enrollment procurement. Novel ideas may include but are not limited to the following examples:

Recent work underway:

- Testing Products, Tools, and Approaches to Improve Energy Affordability and Access to Clean Energy Solutions for LMI Customers and Affordable Housing
- Building Labeling in NYC for MF and Commercial Properties Leveraging a local energy efficiency building labeling law in NYC (LL33) in NYC as a testing ground for a potentially effective statewide labeling effort for Multifamily and Commercial properties.
- Community Blitz pilot design for LMI
- Demonstrating the Park of the future with electrification and energy efficiency designs in manufactured homes
- Comfort Home – making homes “heat pump” ready with standard envelop packages
- Tariff-backed financing solutions (pay as you save) for LMI

3.1.3 Market Fundamentals

¹ The novel solutions work here differs from the Novel Business Models and Offerings (NBMO) initiative which is more narrowly focused on supporting companies in scaling up novel service offerings.

In all areas of energy efficiency and renewable/distributed energy resources, NYSERDA requires data on energy use in various areas of the market; firmographic/demographic information; economic perspectives on costs and value of energy solutions; and insights on market/technology, provider and customer trends relevant to accelerating the deployment of effective clean energy solutions. This data is imperative to understanding current market activity and future changes related to clean energy interventions.

NYSERDA's initiatives define the current market situation, theory of change (including market barriers addressed and outcomes sought) and expected impact of each strategy. Market Evaluation data needs associated with measuring the effectiveness of each specific strategy, over time, are also outlined in the individual initiatives. In conjunction with and in addition to these strategy-specific market evaluation needs, there are several higher-level market characterization data needs that are important to optimizing NYSERDA's strategy in the market on an ongoing basis and to measuring overall market progress across strategies. This layered approach including investment-specific and high-level market data is an important foundational element of NYSERDA's approach to measuring market change and validating program effectiveness.

This section describes higher-level data needs and plans for fulfilling them in each major end use sector; Appendix A provides an update to the specific work that is planned. Among new studies that will be scoped is an Industrial facility scope and potential study. This study will be conducted in two phases: the first phase will rely on available secondary data focused on select sub sectors to assess key metrics such as equipment counts and hours of use, replacement and maintenance practices, and awareness of clean energy technologies and practices. Additionally, facility characteristics such as fuel types used, size of facility (sq ft and number of employees) will also be assessed. A concurrent energy efficiency potential study will be conducted to estimate the energy efficiency potential based on this data. This work will be completed in Q4 2020. Phase two of the study, to be conducted in 2021, will focus on primary data collection to provide a more robust assessment of the industrial sector.

The CEF order called for specific attention to LMI households, ordering both a specific LMI Chapter and a minimum commitment of CEF funds of no less than \$234.5M during the years 2016-2018. In recognition of the need to assure that CEF programs effectively deliver clean energy solutions to these households, NYSERDA has developed approaches to improve its understanding of LMI customers and guide CEF investments. Research has and will include critical and relevant demographic, housing and energy information such as detail on housing tenure, occupancy by building type and configuration (single family, multifamily, public housing), household composition, energy end use characteristics, energy cost, energy burden, and geography. NYSERDA also will coordinate information gathering and integration of data with agencies that maintain relevant data, including the Office of Temporary and Disability Assistance, Department of Environmental Conservation, Department of Health, Department of Public Service, and Homes and Community Renewal. The data collected could then be processed and presented in multiple ways, including in geospatial information system (GIS) mapping to identify trends, gaps, and opportunities that will guide CEF investments.

3.1.4 Market Baselines, Potentials and Progress²

To support CEF program design and evaluation, as well as assessment of overall progress toward the State Energy Plan and future Clean Energy Standard (CES) goals, NYSERDA will conduct a number of overarching, time series studies on building stock and energy consumption in NY State. These studies are described below.

Sector Building and Industrial Facility Stock Data

Comprehensive sector building stock data will be gathered statewide on existing and new construction buildings and industrial facilities across a broad range of customer segments and energy measures. The overall objective of this data collection effort is to understand the current condition of the building and facility stock (residential, multifamily, commercial, and industrial) and associated energy use, including the saturations of energy consuming equipment (electric, natural gas, and other fuels) and the penetrations of energy efficient equipment, building characteristics and energy management practices. The studies will also collect demographic and firmographic information along with behavioral and operational information which will be correlated with the energy usage features.

The information gathered from building and facility stock studies is necessary to support intervention design and evaluation, including a critical use in understanding market transformation. Based on the aggregation of data collected through the building and facility stock studies, NYSERDA will be better equipped to design interventions that strategically target high opportunity segments, measures, or behaviors within the different NYS building and facility markets. Further, these studies will provide valuable data to triangulate with other sources in order to arrive at estimates of the indirect, market transformative effects of NYSERDA and other interventions in the market in terms of key indicators, e.g., market penetration of high efficiency HVAC or other measures. In addition to measuring market transformation effects, the publicized results from these building and facility stock studies will also inform the private market to better understand energy efficiency and renewable energy investment opportunities (see Information Dissemination section for more details).

Research by major end use and operations and behavior elements vary by construction market. Data collection by major end use includes, but is not limited to lighting, HVAC, plug load and building shell; example data collection to assess operations and behavior includes, but is not limited to

² The *Plan for EEPS Statewide Research Studies and Joint Evaluations*, prepared by the Evaluation Advisory Group in February 2012 and updated August 2012, included two rounds of the Statewide Residential/Multifamily Baseline/Potential Study and two rounds of the Statewide Commercial Baseline/Potential Study. The first round of the Residential/Multifamily study was completed in 2015 and the first round of the Commercial study is currently underway; both have been funded with EEPS funds. The next round of the Residential study is included in this plan and will also be allocated EEPS II funds rather than CEF funds. This work activity is important to the CEF and will ultimately be allocated CEF funding for future rounds as NYSERDA updates this Chapter. As spending for legacy-funded evaluation activity ceases on February 29, 2020, the next round of the Commercial study and a new, separate Multifamily study will be funded entirely by CEF. The EEPS Statewide Study Plan can be found at:

[https://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/766a83dce56eca35852576da006d79a7/\\$FILE/2012-08-10_Feb_2012_Statewide_Study_Plan.pdf](https://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/766a83dce56eca35852576da006d79a7/$FILE/2012-08-10_Feb_2012_Statewide_Study_Plan.pdf).

equipment hours or use, replacement and maintenance practices and awareness of energy efficiency technologies and practices. Specifically, the building and facility stock studies are designed to collect key characteristics on buildings and equipment including, fuel type, vintage, equipment type, nameplate data, and measure counts. Building and facility stock studies will generally include secondary data aggregation to support primary data collection using public or purchased data sets, such as HARDI data from D&R International, to assess the penetration of high efficiency HVAC equipment. Primary data collection may include telephone and web-based surveys for less granular data points (e.g., heating equipment type) and on-site visits to validate phone and web-based data or collect additional granular data (e.g., Furnace annual fuel utilization efficiency (AFUE)) that may not be easily or accurately self-reported by the respondent.

From a longitudinal perspective, the comprehensive picture of the construction markets at different points in time can be used to understand the trend line within a construction market. These studies require regular updates, currently projected to be conducted every five years with specific elements collected annually through secondary data purchases and targeted primary data collection as described above. In addition, more frequent data collection may be conducted to ensure metrics on key indicators are current. Table 1 below is the schedule for building and facility stock studies.

Table 1. Timing of Sector Building and Facility Stock Studies

	2017	2018	2019	2020	2021	2022
Residential	Design & Implement Update Study	Measurement Year	Report Out		Design & Implement Update Study	
Multifamily			Design & Implement	Baseline Year		
Commercial	Design & Implement	Baseline Year	Report Out			Design & Implement
Industrial				Design & Implement; Phase 1 baseline year	Design & Implement: Phase 2 Update Study	

Future Potential

The building and facility stock studies and associated data will directly feed into NYSERDA’s statewide energy efficiency potential studies, which will be developed for each of the construction markets to estimate technical, economic and achievable energy efficiency opportunities in NYS over the next three, five, and ten years. The energy efficiency models applied to estimate potential will be developed using both bottom-up (measure-level) data from building stock studies and top-down (end-use or sector- level) data from secondary or other sources, e.g., technology cost forecasts. The potential studies will also include consideration of the influence of code changes. The potential studies will assist with the identification of energy-related opportunities and will inform intervention targets and the development of strategic initiatives that best align with the State Energy Plan, CEF, CLCPA and REV goals.

In its January 16, 2020 Order, the NYS Public Service Commission directed NYSERDA, in consultation with DPS Staff, the utilities, and the Long Island Power Authority, to conduct a comprehensive

statewide potential study encompassing energy efficiency and electrification by June 1, 2022.³ This study will address the fuel types of electricity, natural gas, oil and propane and multiple building sectors including small residential, multifamily, commercial and industrial.

As a precursor to the June 1, 2022 study, NYSERDA will publish, in 2020, the Commercial Statewide Baseline Study, Residential Building Stock Assessment for New York State, and information on energy efficiency potential in the multifamily and industrial sectors. By Q4 2020, NYSERDA will compile an assessment of statewide energy efficiency potential across sectors (small residential, multifamily, commercial and industrial), drawing from data made available through the associated building/facility stock studies.

Following publication of the June 1, 2022 study, NYSERDA will employ a strategy for keeping the comprehensive statewide energy efficiency and electrification potential study up to date in the interim years between major primary data collection efforts.

3.1.5 Macro Level Analyses⁴

NYSERDA will explore the viability and utility of conducting top-down analysis, including potentially basic approaches to more sophisticated econometric, macro- consumption studies, to provide a more complete understanding of overall end-use and energy reduction outcomes, including those associated with all clean energy strategies in the State. Macro level analysis is useful to corroborate and correlate observed building and equipment changes with actual changes in energy use, controlling for factors such as energy prices, overall economic health, weather and business cycles.

NYSERDA has procured a consultant to conduct this analysis and is currently reviewing findings. Should the approach prove feasible and effective in New York, wider scale implementation of macro-level 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 is also exploring the potential use and development of energy intensity indicators. Energy intensity is measured by the quantity of energy required per unit output or activity and may include energy use per unit of Gross State Product or energy use per square foot of building space in the residential sector, for example. Energy intensity indicators can be used to consistently track changes in energy intensity over time, for the State as a whole as well as for specific end-use sectors. Energy intensity indicators have been gathered for the residential and commercial sectors through the statewide building stock studies. Energy intensity for the multifamily and selected industrial subsectors will be gathered in 2020 as part of the building/facility stock studies.

³ Case 18-M-0084. Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios Through 2025. Issued and Effective January 16, 2020.

⁴ The *Plan for EEPS Statewide Research Studies and Joint Evaluations*, prepared by the Evaluation Advisory Group in February 2012 and updated August 2012, included Top-Down Energy Indicator/Econometric Study work consisting of identifying methods and conducting pilot assessments, as well as a full Statewide effort. Thus, the initial work identified in this MCDC will utilize EEPSII Evaluation funds. Future work planned for later years of the CEF will utilize CEF Evaluation funds, following appropriate updates to this MCDC to gain authorization.

3.2 Information Dissemination

The approach outlined in this Chapter allows for effective sharing of insights, resulting both from studies and the like and from learnings derived from interventions.

As studies are completed on the time lines identified within this Chapter, NYSERDA will share the data and information gained through this work with the public by publishing studies on its website and in the Department of Public Service's Document and Matter Management (DMM) system⁵, posting data on Open NY and in the context of later filed initiatives that will rely on this information. NYSERDA will also take a proactive role in disseminating information from these activities by engaging in a more robust feedback loop within NYSERDA while also publicizing findings through press releases and social media posts and presentations to the public, such as industry conferences. In particular, the anonymized data sets from the periodic building stock studies are published by NYSERDA for use and analysis by the public. NYSERDA will continue to provide updates on information gained through the work outlined in this Chapter, and how the information has influenced activities, in the annual investment plan and progress reports. Lastly, NYSERDA will continue to seek out other ways to ensure NY Program Administrators have access to, and can benefit from, this information.

3.3 Additional Resources

3.3.1 Technical Assistance for Reform of the Electric Distribution System and Markets

NYSERDA will competitively select a pool of contractors qualified to assist NYSERDA staff in conducting objective economic and technical analysis and analytical modeling to inform the modernization of the electric distribution system in New York State; this work will complement and enhance the impact of CEF activities and further the objectives outlined in the 2015 New York State Energy Plan. The 2015 Energy Plan coordinates across State policies, agencies, and authorities that touch energy to advance the State's comprehensive energy policy initiative, REV. Central to the REV agenda are initiatives to reform regulatory policy, create new markets, and catalyze technological innovation to integrate clean DER into the core of the State's electric system.⁶⁴

This contractor pool will make available specialized expertise and technical assistance across multiple support areas that reflect NYSERDA's current and anticipated work to advance reform of the State's electric distribution system and markets. Access to the contractor pool will augment NYSERDA staff capabilities when called upon to undertake distinct, time-sensitive projects. NYSERDA also may utilize technical assistance services from additional firms that offer specialized capabilities, in the event that pertinent needs outside of the contractor pool are identified.

Consistent with NYSERDA's leadership role in developing the State Energy Plan and in co-chairing the State's Climate Action Council under the CLCPA, NYSERDA will continue to provide research and analytic work to inform ongoing deliberations on relevant policy and regulatory proposals. NYSERDA

⁵ Final CEF evaluation plans and studies will be posted to DMM under Matter #16-02180.

⁶ DER is comprised of a variety of resources, principally located on customer premises, including energy efficiency, demand response and energy management controls that increase demand elasticity, distributed storage, microgrids, and roof-top solar, combined heat and power, and other on-site power generation.

also will use these technical assistance services in developing complementary CEF initiatives, which both account for anticipated regulatory reforms and help to accelerate technology and business model innovations that will make possible greater investment in and integration of clean DER. The budget for this effort will be reduced by \$500K which will be redirected to support the REV Connect initiative under the REV Technical Assistance Investment Plan plan.

3.3.2 Data Sets

To aid in securing timely information, NYSERDA will continue to expand its procurement of secondary data resources for intelligence gathering and analysis across NYSERDA's efforts. Databases will be purchased for both quicker and more qualitative findings, and also to support more foundational, quantitative work. The secondary research will be used both as a precursor to a primary research (i.e., to help clarify what is to be learned) and to answer specific, targeted research questions. In some cases, studies cannot definitively answer the research question but, nonetheless, can contribute to an understanding of the issue.

Data sources that NYSERDA has procured include:

- CoStarInfo Group (formerly Info USA)
- McGraw-Hill (including market sizing, relationship, and Dodge products)
- D&R International
- Navigant
- Green Tech Media
- E-Source
- Bloomberg Capital Markets Terminal
- Continental Automated Buildings Association (CABA)
- Business Monitor International (BMI)
- American Council for an EnergyEfficientEconomy (ACEEE)

In addition to the above data sets and resources, NYSERDA will also leverage and procure data from other sources, as appropriate, to support its efforts on an ongoing basis. Some of the initial purchases of data sets will utilize existing EEPS and T&MD funds.

3.3.3 Utility Data

The Market Characterization & Design work described herein will require access to utility customer and system data. In its January 17, 2019 Order, the Public Service Commission defined a process in which requests for utility customer data to support NYSERDA's evaluation, measurement and analysis of clean energy programs would be undertaken.⁷ To establish this process, the Commission directed NYSERDA and the Joint Utilities (JUs) to develop and execute a Memorandum of Understanding (MOU) that will govern the transfer and maintenance of both participant and non-participant data to NYSERDA and its contractors. This MOU was finalized and executed in October 2019. The types of data pursued through this newly-established process includes customer-level, anonymized

⁷ Cases 14-M-0094, 10-M-0457 and 05-M-0090. [Order Regarding New York State Energy Research and Development Authority Data Access and Legacy Reporting](#). Issued and Effective January 17, 2019.

data of certain defined segments/sectors of customers and including variables such as annual energy use, segmentation by NAICs code and location, and utility program participation in order to define populations and develop sampling plans for sector building stock studies. Similar data is also needed for macro-consumption analysis.

In addition, contact information is needed for a subset of customers selected for sampling within the sector building stock or other studies. These customers will be contacted for agreement to participate in such studies and will be asked to provide authorization for more detailed information, such as their individual energy consumption data, to be released to NYSERDA for use within the study.

3.3.4 Professional and Expert Engagement

The CEF will take advantage of national, state and regional entities whose mission is to advance and improve markets for clean energy to collaborate, further inform research, aggregate information from thought leaders and experts, and pool resources across multiple jurisdictions. Support for such organizations allows for the collection of best practices for program formation, as well as 'next generation' or innovations in program approaches and market designs that may help with New York's REV strategy as well as the CEF implementation. Memberships provide forums for NYSERDA to engage with experts in various topic areas, as well as platforms that both inform policy and program directions for New York, and promote New York's approaches to clean energy market development. Such engagements can also have the effect of eliciting interest in New York's clean energy market, providing greater opportunities for products and services as well as increasing the level of expertise among stakeholders to foster greater information exchange in public proceedings. Finally, such institutions often provide focused research and/or market data (particularly in regional markets) that help to ensure that CEF strategies can be best structured to have impact in target market audiences.

NYSERDA has found value in membership of national, regional, state organizations in the past. As NYSERDA evolves its focus and activities under the CEF, it will continue to assess which organizations/activities provide the greatest value for engagement in furtherance of the CEF objectives. NYSERDA will engage where the organization furthers its market characterization and design activities, as well as provides market intelligence, information, pooled resources from multiple sources such as various states, or expertise that can inform future initiatives that would not be achieved otherwise.

3.4 Budget

An annual commitment budget for all activities included in this chapter is shown in Table 2. Budgets do not include Administration or Cost Recovery Fee; these elements are addressed in the Budget Accounting and Benefits chapter filing. For transparency, NYSERDA has included in this budget activities planned for the years indicated. It is expected that activities will be added, especially for the later years in these tables, as this Chapter is updated and refiled in the future.

As noted earlier in this Chapter, some activities previously planned to be undertaken within EEPS or T&MD were supported by NYSERDA's EEPS or T&MD funding initially. Descriptions of these activities are included in this Chapter nonetheless as they are a critical part of NYSERDA's CEF evaluation approach and are planned to be included in future updates to this Chapter requesting allocation of CEF funding for later work. The budget schedule below includes only CEF funds needing authorization at this time and is not indicative of the level of future CEF budget/spending that is envisioned for the work described. Furthermore, the budget as presented in the Budget Accounting and Benefits Chapter will serve as the basis for any subsequent reallocation request. The additional level of detail presented within the table below is intended for informational purposes only.

Table 2. Evaluation Annual Budget – Based on Expected Schedule of Commitments

Budget - Commitment Basis		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Market Development Market Research	<i>Market Characterization & Design Activities</i>											
	Intervention Pre-Development	40,000	414,752	1,177,366	782,701	878,208	250,000	250,000	-	-	-	3,793,027
	Novel Solutions	-	-	468,190	667,454	7,964,356	1,250,000	1,250,000	1,000,000	1,000,000	1,000,000	14,600,000
	<i>Additional Resources</i>											
	Technical Assistance	150,000	1,387,361	2,074,961	409,546	500,000	-	-	-	-	-	4,521,868
	Data Sets	34,250	151,210	201,387	301,935	242,500	150,000	150,000	150,000	150,000	150,000	1,681,282
	Professional and Expert Engagement	264,189	501,842	555,792	477,588	500,000	500,000	500,000	500,000	500,000	500,000	4,799,411
<i>Sub-Total</i>	488,439	2,455,165	4,477,696	2,639,224	10,085,064	2,150,000	2,150,000	1,650,000	1,650,000	1,650,000	29,395,588	
Innovation & Research Market Research	<i>Market Characterization & Design Activities</i>											
	Intervention Pre-Development	-	653	-	-	250,000	250,000	250,000	-	-	-	750,653
	<i>Sub-Total</i>	-	653	-	-	250,000	250,000	250,000	-	-	-	750,653
Evaluation	<i>Market Characterization & Design Activities</i>											
	Market Fundamentals	\$ -	\$ -	\$ 47,840	\$ 446,048	\$ 5,478,000	\$ 3,825,000	\$ 5,350,000	\$ 6,750,000	\$ 50,000	\$ 6,075,000	\$ 28,021,888
	<i>Additional Resources</i>											
	Data Sets	\$ 200,000	\$ -	\$ -	\$ 115,500	\$ 415,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<i>Sub-Total</i>	\$ 200,000	\$ -	\$ 47,840	\$ 561,548	\$ 5,893,000	\$ 3,825,000	\$ 5,350,000	\$ 6,750,000	\$ 50,000	\$ 6,075,000	\$ 28,752,388	
Total		\$ 688,439	\$ 2,455,818	\$ 4,525,536	\$ 3,200,772	\$ 16,228,064	\$ 6,225,000	\$ 7,750,000	\$ 8,400,000	\$ 1,700,000	\$ 7,725,000	\$ 58,898,629

Appendix A – Study Timeline (Completed, In-Process and Planned)

This Appendix provides a status update on the studies identified in prior MCDC filings. Following the table is a listing of new studies anticipated to be scoped and undertaken during 2020-2022.

Sector	Activity	Status
2016		
Commercial	Market Assessments for Commercial: HVAC; EMS/BMS; Energy Service Market; Customer Decisions	Complete. Final market assessments posted here .
	Design and Implement Commercial Building Stock Study	Complete. Final study posted here .
Industrial	Current state of industrial operations among small to medium facilities	Completed end of 2019.
Single Family	Investigate Standardized Approaches to energy efficiency in the residential sector	Completed segmentation study at the end of 2019
	Net Zero Energy Homes Market Assessment	Complete. Final study posted here .
	Assess solutions gaining traction in the residential sector, including delivery mechanisms and key factors for contractor selection	Work in progress for 2020– analysis to pivot to support alternative approaches for increasing contractor pool
	Analysis of business models for residential HVAC and other contractors	In progress. Final deliverables expected by Fall 2020.
	MLS green field best practices and jurisdictions impacting home sale through energy efficiency promotion	Completed end of 2018.
Multifamily	Analysis of building management and investment structures, financing mechanisms and barriers, and tenant preferences; Analysis of multifamily service provider market	Shifted activities to 2020 pending investment planning. Final deliverables expected by end 2020.
LMI	Inventory of LMI homes previously served and assessment of unmet needs of market	Complete. Final study posted here . ¹
	LMI Key Housing/Energy Assessments	Complete. Final study posted here . ¹
	Integration of Key Cross-Agency Information Sets for LMI	Ongoing activity.
Products	Home Energy Management Systems Market Assessment	Complete. Final study posted here .
	Air Source Ductless Mini-Split Market Assessment	Complete. Final study posted here . ²
Workforce Development	Analysis of operations and maintenance skills gaps and training needs; research to isolate the energy impacts and non-energy benefits for buildings	Analysis completed mid-2018.
Transportation	Transportation Market Assessment	Complete. Final study posted here . ³
Solar PV	PV Balance of System Cost Study	Complete. Final study posted here .
Cross Sector	Impact Study on NYSERDA Technology Demonstration Projects	Complete. Final study posted here .
	Behavior Research	Ongoing activity.
	Performance Based Solutions Research	Ongoing activity.
	Explore macro consumption modeling and energy intensity indicators	Ongoing activity.

Sector	Activity	Status
	Information dissemination	Ongoing activity.
2017		
Commercial	Assess remote audits	Activities conducted in house in 2018.
	Intelligence for commercial office space and leasing process	Analysis completed mid-2018.
	Net Zero Energy Commercial Building Market Assessment	Study scoping in process.
Industrial	Testing uptake for new approaches to energy efficiency in the industrial sector	Activities incorporated into current state of industrial operations study. Final deliverables expected mid-2020.
Single Family	Analysis of realtors, appraisers, lenders and markets to integrate efficiency at point of home sale	Analysis complete in 2018.
	HVAC Market Assessment	Complete. Final study posted here .
	Design and implement Residential Building Stock Study	Complete. Final study posted here .
	Assess viability for a centralized on-line consumer resource to support residential energy systems, performance information, and service offerings	Activity shifted to 2020 and pending investment planning.
Multifamily	Analysis of multifamily building management and investment structures, financing mechanisms, and tenant preferences	Activities shifted to 2019 pending investment planning.
	Net Zero Energy Multifamily Building Market Assessment	Study scoping in process.
LMI	Analysis on affordable housing builders and developers for potential to build to higher standards	Scoping of project underway. Activities shifted to 2020 and may pivot to support electrification strategies
	Integration of Key Cross-Agency Information Sets for LMI	Ongoing activity.
Renewable Heating and Cooling	Customer analysis on decision making and value propositions	Project completed in 2018.
	Analysis of contractor business models	Project completed in 2018.
Workforce Development	Analysis of operations and maintenance skills gaps and training needs	Analysis completed in 2018.
Transportation	Assess critical clean transportation segments (i.e. car dealers, employers, municipalities, etc.) for economics, decision making and value propositions around EVs	Activities shifted to 2020 pending investments planned.
Cross Sector	Behavior Research	Ongoing activity.
	Performance Based Solutions Research	Ongoing activity.
	Information dissemination	Ongoing activity.
2018		
Commercial	Update to Key Commercial Market Assessments including: HVAC; EMS/BMS; Energy Service Market; Customer Decisions	Study moved to 2022.
Single Family	Update to Net Zero Energy Homes Market Assessment	Study scoping in progress.

Sector	Activity	Status
	Assess solutions in other jurisdictions for potential in New York	Analysis pending based on investment planning in 2020.
LMI	LMI Key Housing/Energy Assessments	Study underway.
	Integration of Key Cross-Agency Information Sets for LMI	Ongoing activity.
	Analysis of landlords and property owners capital improvements decision making	Shifted to 2019 and pending planned investments.
	Social Finance Pay for Success Potential Study	Analysis completed in 2018.
	NZE Modular Homes Feasibility Study	Completed in 2019.
Multifamily	Building Labeling Study for Multifamily and Commercial Buildings (Local Law 33)	Completed in 2020
	Mid-stream HVAC Study	To be completed in 2019.
Transportation	Update to Transportation Market Assessment	Study moved to 2020.
Solar PV	Update to PV Balance of System Cost Study	Study moved to 2020 .
Large-Scale Renewables	Assessment of attitudes and perceptions surrounding large-scale solar and land-based wind, including issues on siting and transmission development	Completed end of 2019.
	Analysis of bottlenecks in citing review process of major electric generating facilities	Completed in early 2019.
Financing Solutions	Understanding of potential barriers and obstacles to accelerate the cost-effective deployment of debt capital to finance energy efficiency improvements in the MF LMI space.	Completed in 2018.
Clean Heating and Cooling	Solar HVAC Market Assessment	Completed in 2018.
	Airsource Heat Pump NYC 1-4 Family Market Study with NYC Mayor's Office of Sustainability (MOS)	Completed in 2018.
	Financing Solutions CHC Market Study	Completed in 2018.
Renewables Value improvement and Connectivity	Analysis surrounding the development of innovations for renewables value improvement, connected buildings and smart mobility	Study shifted to 2020 and pending investment planning.
Cross Sector	Impact Study on NYSERDA Technology Demonstration Projects	Underway. Study will be complete Q2 2020.
	Building Labeling Study with NYC MOS and Department Of Buildings for Multifamily and Commercial Buildings (Local Law 33)	Ongoing; Analysis completed in 2020
	Behavior Research	Ongoing activity.
	Performance Based Solutions Research	Ongoing activity.
	Information dissemination	Ongoing activity.
	Novel Solutions In Market Testing	Ongoing activity.
2019		
LMI	Feasibility study and analyses on potential for scaling market for zero net energy modular homes to increase affordability for LMI residents.	Final analysis completed in 2019
Multifamily	Design and implement Multifamily Building Stock Study	Scoping; solicitation to be released in Q2 2020.

Sector	Activity	Status
Financing Solutions	Loan Loss Reserve Investment Plan	To be completed Q2 2020
	LMI Cost-share study for EE pre-project costs	To be completed Q2-3 2020
Advanced Buildings	Grid -Connected Buildings research to support investment plan	Completed
Clean Heating & Cooling	ASHP joint research with NYC MOS	Completed in 2019.
Cross Sector	Energy Efficiency Soft Cost Study	In process. Final deliverables due Q2 2020.
	Top-Down Macroeconomic Analysis for Energy Efficiency	In process. Expected completion Q2 2020.
	Market Mapping for Utility/NYSERDA Collaborations to identify market gaps, barriers needing attention, and opportunities across various sectors	Completed in 2019

Notes

1. Additional volumes of this study, including the Executive Summary, Special Topic Reports, Methodology Reports, Acronyms and Glossary can be found [here](#) under the Low- To Moderate-Income Market Characterization Study heading
2. Additional volumes of this study, including the appendices related to HARDI data can be found [here](#) under the Ductless Mini-Split Heat Pump (DMSHP) Market Characterization Study heading.
3. Additional volumes of this study, including the Executive Summary, Electric Vehicles and Transportation Demand Management Market Characterization and Baseline Assessments and report appendices can be found [here](#) under the Clean Transportation Market Characterization Study heading.

Additionally, during the time period of 2020-2022, NYSERDA plans to scope and undertake new studies, including, but not limited to the following:

- Commercial: Advanced Efficiency Solutions
- Solar PV Market Adoption Assessment and Process Evaluation
- Solar PV Balance of System Update
- Clean Transportation Market Assessment
- Industrial Facility Stock and Potential Study
- Electrification solutions for LMI, Small Business, Multifamily and Residential
- Supply Chain analysis and solutions for increasing adoption of Heat pumps
- Innovation: Natural Carbon Solutions; Finance & Insurance for CLCPA & Covid 19; Next Generation HVAC; Carbon to Value; Intelligent Buildings