

# NYSERDA Record of Revision

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Record of Revision
<p><b>Phase One Process Evaluation and Market Evaluation</b></p> <p><b>of the NYSERDA New Construction Program</b></p> <p><b>Final Report</b></p> <p>Navigant Consulting</p> <p>May 2015</p>

Revision Date	Name of Affected Program(s)/ Plan Components	Description of Changes	Revision on Page(s)
05/21/2015		Original Issue	Original Issue
05/21/2015		Revised Issue	Revised Issue
05/21/15	Whole Report	Naming convention change. Standardization of names and data aligning with McGraw-Hill New, Addition, and Alteration (NAA) Database instead of the Dodge Players Database. Removal of market correlation analysis related to the Dodge Players Database because this data can fluctuate, whereas the NAA data is historic and static.	Whole Report
	S.2 Conclusions	Removal of single conclusion relating to downstate new construction market.	S-2
		Addition of dates to clarify recession market data.	S-2
	3.1.1 General Market Activity in New York State	<p>Addition of date ranges related to post-Recession construction decline.</p> <p>Figure 3.1 adjusted to reflect annual data with removal of quarterly figures.</p>	3-1
	3.1.3 Market Activity by Building and Project Type	Added clarification on the distribution of new construction projects by sector and sector-specific economic impacts.	3-5 3-6

05/21/2015	3.2.1 NCP Participation	Table numbers updated.	3-7
	6.1 Conclusions	Removal of first bullet point referring to downstate market and national average.	6-1
	Appendix A: Evaluation Methodology Supporting Materials	Added Dodge Players Database to the list of secondary data sources. Added NAA Database to the list of secondary data sources.  Removed McGraw-Hill Construction Analysis System Database from secondary data sources.	A-1
	A.1.2 Analysis of NCP Project Database	Removal of several Non Commercial or Industrial Projects in paragraph number two.  Removal of paragraph number three along with footnote number 83.  Removal of Market Actor Metric in Table A-2.  Added paragraph about the information the Players database provided on market actors.	A-4 A-5 A-6
	A.1.3 market Penetration Analysis	Removal of second paragraph addressing the McGraw Hill Construction Analysis System (CAS) Database. Majority of Table A-3 has been removed.	A-6 A-7
	A.2.1 In Depth Interview Sampling Approach	Format change in Table A-4	A-8 A-9
	B.1 Market Activity by Building Size	Adjusted statement and figures about the volume of new construction for large projects since 2009 to reflect the NAA dataset.	B-1 B-2 B-3

# Phase One Process Evaluation and Market Evaluation of the NYSERDA New Construction Program

## Final Report

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# Notice

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# Abstract

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This report presents the findings and recommendations from the first phase of the combined process evaluation and market characterization and assessment (PE/MCA) of the New Construction Program (NCP). This report presents findings from the PE/MCA Evaluation activities, which were primarily MCA activities, that occurred in 2013 and early 2014. A second phase of activities that includes both PE and MCA activities is planned to begin in late 2014, contingent upon the program's funding being extended beyond 2015. The primary objectives of this evaluation were to provide a comprehensive understanding of current and emerging markets (e.g., market structure and market actors); to provide baseline and background information required by NYSERDA to define and deliver programs to target markets; and to track changes in markets over time, with a specific focus on market indicators in the logic model that are likely to be impacted by program offerings. The PE/MCA Team used a two-stage approach to address the evaluation objectives. First, the team conducted an initial market characterization analysis using mostly secondary data sources. The team supplemented these preliminary findings with information gathered during a series of in-depth interviews with a wide range of market actors (e.g., building owners, design teams, and design and construction trade organizations).

# Keywords

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Energy efficiency, new construction, market assessment, market characterization, evaluation research

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# S Executive Summary

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The NYSERDA New York State Energy Research and Development Authority (NYSERDA) New Construction Program (NCP) provides commercial and industrial (C&I) customers and certain types of multifamily residential projects<sup>1</sup> with technical assistance services and capital-cost incentives for electric energy efficiency improvements in new construction or in substantially renovated buildings<sup>2</sup>. The program is designed to encourage the incorporation of energy efficiency and green building features in the design, construction, and operation of commercial, industrial, institutional, and larger multifamily residential buildings. The NCP serves a multifaceted and technically sophisticated market segment that includes building owners, tenants, and design firms.

Through the program, Technical Assistance (TA) providers under contract to NYSERDA provide cost-shared analysis to building owners and their design teams to identify energy efficiency opportunities for their projects.<sup>3</sup> An additional level of technical assistance provides specialized green building assistance to interested customers, including computer modeling and support to comply with Leadership in Energy and Environmental Design (LEED®), a building rating system developed by the U.S. Green Building Council.<sup>4</sup> The program also offers technical assistance incentives to design teams for whole-building or green building design based on an escalating approach, providing increasing incentives for projects achieving higher levels of energy performance. For the actual construction of the project, various financial incentives (both pre-qualified and custom) help defray the capital costs for achieving higher energy efficiency levels. For whole-building and green building designs, these financial incentives also escalate with higher levels of energy performance.

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<sup>1</sup> According to NCP eligibility criteria, the program accepts multifamily projects with five or more units that are seeking Leadership in Energy and Environmental Design (LEED) Certification. As of early January 2014, the NYSERDA Multifamily Performance Program covered most multifamily activity. NYSERDA now limits NCP involvement in multifamily projects to institutional properties.

<sup>2</sup> Under revised Program Opportunity Notice (PON) 1601, effective on January 4, 2012, the NCP stopped offering incentives for the implementation of natural gas measures. The program continues to provide technical assistance to help customers identify natural gas opportunities on-site but customers are financially responsible for implementing these opportunities on their own. This evaluation covers NCP program performance from January 1, 2008 through December 31, 2012, during which the NCP still offered incentives for natural gas measures.

<sup>3</sup> Design teams include architecture and engineering (A&E) firms as well as other specialty contractors involved in the C&I and multifamily new construction process (e.g., lighting designers and heating, ventilation, and air conditioning [HVAC] contractors)

<sup>4</sup> Customers may use either a NYSERDA TA or a green building consultant of their choice, and receive the same green technical assistance incentive.

## S.1 Evaluation Objectives and Approach

The primary purpose of this Market Characterization and Assessment (MCA) Evaluation is to provide NYSERDA staff with a streamlined update of the new construction marketplace. Findings update those presented in the 2008 MCA Evaluation Report<sup>5</sup>. The primary objectives of the study include the following:

- Develop a comprehensive understanding of current and emerging markets (e.g., market structure and market actors);
- Provide baseline and background information required by NYSERDA staff to define and deliver programs to target markets; and
- Track changes in markets over time, with a specific focus on market indicators specified in the program logic model that are likely to be impacted by program offerings.

The Process Evaluation/MCA (PE/MCA) Team used a two-stage approach to address these evaluation objectives. First, the team conducted an initial market characterization analysis using mostly secondary data sources (e.g., the NCP tracking database, recent program evaluation reports prepared for NYSERDA and for similar programs operating in other jurisdictions, and other relevant market studies and literature). The team supplemented these preliminary findings with information gathered during a series of in-depth interviews with a wide range of market actors (e.g., building owners, design teams, and design and construction trade organizations). Through the in-depth interviews, the PE/MCA Team identified and validated current and emerging trends in the C&I new construction marketplace.

## S.2 Conclusions

The following highlights the major conclusions the PE/MCA Team developed from its key findings.

**Conclusion #1: The recovering market presents shifting opportunities for energy efficient new construction and renovations.** Market data interview responses reveal that the New York State new construction market is generally improving, though annual activity has yet to reach pre-recession levels. As the market continues to improve, key findings suggest the following region- or sector-specific opportunities:

- While public sector projects, many with stimulus funding, helped buoy this market activity during and following the Great Recession (“the Recession”) from December 2007 to June 2009, market data and interview responses indicate that near-term growth will likely shift back to the private sector.
- For the upstate market, vacant building stock may provide particular opportunities for large renovations.

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<sup>5</sup> Summit Blue Consulting. New Construction Program Market Characterization and Assessment – Final Report. Prepared for NYSERDA. August 2008.

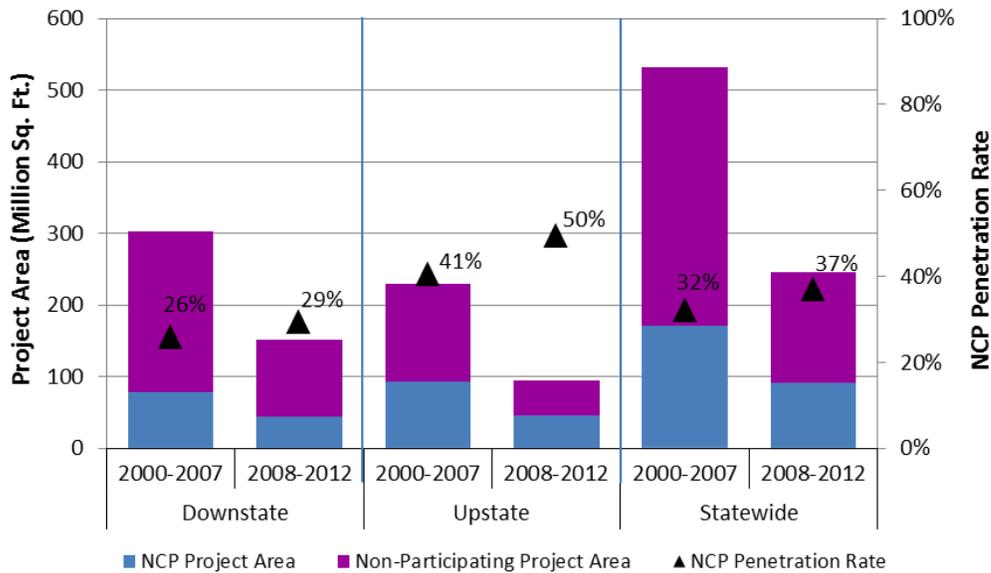
An overall decrease in the average size of new construction projects in the downstate market also implies that less energy savings per project may be available than before the Recession. Nonetheless, plenty of large projects are still being built in both the downstate and the upstate regions, and market actors are cautiously optimistic that market activity in the State will continue to increase. In the downstate market, the post-Recession growth in new construction coupled with New York City's Greater Green Buildings Plan presents ample opportunity for the NCP to capitalize on increased awareness of and demand for energy efficient buildings.

**Conclusion #2: Overall NCP market penetration has improved, but missed opportunities remain in some sectors.** While the program continues to improve in terms of overall market penetration, lower levels of engagement with the commercial, healthcare, and educational sectors suggest that additional opportunities remain. The cumulative share of new construction project area receiving an NCP incentive has increased from 32% to 37% of square footage constructed, compared to five years ago. This increase was evident statewide; however, a lower penetration downstate (29%) than upstate (50%) suggests that the program may be missing more opportunities in that region. Over the same time period, the program incentivized a decreasing share of healthcare (25%) and educational sector (49%) projects, and, despite an overall increase from 39% to 57%, the commercial sector also appears to represent a key area for additional engagement. See Figure S-1.

**Figure S-1. NCP Market Penetration (Building Area) by Downstate/Upstate Region and Statewide, Cumulative for 2000-2007 and 2008-2012**

Percentages indicate NCP Market Penetration

Source: Navigant analysis of McGraw-Hill Construction New, Addition, and Alteration Database and NCP Cross Program Database



From a building-size perspective, the program appears more balanced in its approach. In the past five years, NCP has provided incentives for approximately one-third of small (<20,000 square feet [sf]) and large (>100,000 sf) projects on a square footage basis, with nearly half of medium-sized projects (20,000-100,000 sf) projects participating. Overall, however, large projects continue to represent the majority of the program’s incentivized building area.

**Conclusion #3: As energy efficiency awareness and demand among end users has improved, so has industry standard practice.** Interviewed market actors indicated that building owner and tenant demand for energy efficiency is increasing compared to three years ago. Along with stricter energy codes and available incentives, this owner awareness and interest has contributed to improved standard practices and enhanced energy efficiency service offerings among many design teams. While higher awareness and more efficient standard practices are signs of a transforming market for energy efficiency, increasing baselines for these metrics may also make it more difficult for the NCP to claim energy savings from “standard” energy efficiency measures.

**Conclusion #4: Despite increased awareness and demand, key barriers to energy efficiency and NCP participation persist.** One of the major impacts of the Recession on the new construction market stems from a decrease in the amount of capital available to help finance new construction projects. While news

coverage and market actor interviews suggest that the financing landscape is improving, the inclusion of energy efficiency measures in a project still often requires measure-specific analysis of the financial benefits, as well as approval from members of a building owner's senior leadership team. For standard energy efficient technologies that have gained wider acceptance (e.g., enhanced lighting and HVAC), these financial calculations are more straightforward. For more advanced approaches and technologies (e.g., whole building design or building energy management systems), however, there is less certainty and acceptance about the energy savings that will materialize from those investments.

In addition to general market-related barriers, some process-related barriers continue to prevent project stakeholders from participating in the NCP. While the program provides incentives to help offset some of the upfront costs and uncertainty mentioned above, interview responses reveal that missed project opportunities may arise from confusion about NCP's offerings, competition from utilities' existing facility incentive programs (i.e., for large renovation projects), and a perception that NYSERDA requirements are cumbersome or slow down project timelines.

**Conclusion #5: Advanced technologies provide a pathway to enhanced efficiency, but more project support and staff training are needed to foster market acceptance.** As energy efficiency standard practices and building codes improve, opportunities to acquire energy savings from more widely accepted measures will likely diminish. Perceptions and understandings of what might constitute an "advanced" energy efficiency technology, however, vary widely. While the NCP offers incentives for designs that incorporate more advanced measures (e.g., building energy management systems [BEMS] or system sub-metering), program staff and project data reveal that relatively few projects have pursued those routes to a more efficient building. The PE/MCA team's analysis revealed three key barriers to more widespread adoption of such technologies: the financial barriers to (and uncertain financial returns of) installing them, mixed reports on whether those systems meet energy savings expectations, and building owner concerns about whether their facilities staff can properly utilize those systems.

**Conclusion #6: Tenant build-outs represent a missed opportunity for which end users and design teams are willing to consider innovative approaches.** Programs like NCP often face challenges to encouraging energy efficiency in commercial space tenant build-outs. Market actors report that incoming tenants generally place a low priority on energy efficiency and that project timeline considerations present a significant barrier to both enhanced efficiency and NCP participation. However, current downstate market activities may present a good opportunity for the NCP to foster greater adoption of energy efficient build-outs. High Class A office space vacancy rates imply increased bargaining power for tenants, and PlaNYC's Greener, Greater Buildings Plan is expected to increase owner and tenant awareness of energy efficiency opportunities. Interviewed market actors were open to new approaches to fostering energy efficiency in build-outs but expressed that demand would still be tenant-driven. Potential approaches the Team discussed

with market actors included setting aside landlord concessions specifically for efficiency improvements and NCP offering packaged bundles of pre-approved efficiency measures for tenant build-outs.

**Conclusion #7: A divergence in projects that pursue LEED certification from those that participate in NCP suggests misalignment of the two programs’ whole building design goals.** While LEED certifications for buildings in New York State have continued to climb over the past few years, the share of those projects that receive NCP incentives has dropped sharply (from 57% at the end of 2007 to just 22% at the end of 2012). See Table S-1.

**Table S-1. Cumulative USGBC and NCP-Participating LEED Projects (2000-2012)**

Sources: U.S. Green Building Council, LEED Projects Directory (Data through 12/31/12) and NCP Project Detail Report, Buildings Portal Database (as of March 2013)

	LEED-Certified Projects		LEED-registered Projects	
	Through 2007	Through 2012	Through 2007	Through 2012
NCP Participating Projects	25	51	156	574
Non-NCP Projects	9	736	119	2054
Total USGBC Projects	34	787	275	2638
<b>NCP Penetration</b>	<b>74%</b>	<b>6%</b>	<b>57%</b>	<b>22%</b>

Notably, meeting LEED rating criteria does not necessarily require that a building also meet the NCP’s energy efficient whole building design criteria. However, without a closer examination of the specific LEED credits those buildings received, it is difficult to understand whether those projects would have qualified for NCP incentives.<sup>6</sup> Market actor interviews provided little clarity on the issue, with mixed opinions about building owners’ interest in and the general perceived value of LEED certification. For the NCP specifically, design teams generally supported the program’s current approach to incentivizing whole building energy efficiency. The newest whole building efficiency approach—net zero energy (NZE)—still has relatively limited awareness in the market, particularly among end users.

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<sup>6</sup> The non-public data set containing building-specific LEED rating information is maintained by the U.S. Green Building Council. The public portion of this data is available at <http://www.gbig.org/>.

## S.3 Recommendations

Based on the broad scope of this evaluation and the relative maturity of the NCP, the PE/MCA team divided its recommendations into two types. The first includes some general observations and suggestions about potential focus areas for NCP outreach efforts, some of which NCP and Outreach Project Consultant (OPC) staff may already be targeting to some degree. The second includes specific, actionable recommendations related to the special topics that staff asked the evaluation team to explore. These primary recommendations focus on steps that will help the program evolve to provide the market with enhanced energy efficiency opportunities in the future.

### S.3.1 Outreach Opportunities

Both secondary data and market actor responses indicated some key characteristics of the types of new construction activity most likely to provide increasing opportunities to NCP staff over the next two to three years. These include the following:

- **Engage early with major renovation projects in the upstate market.** Market actors reported that a large share of upstate construction activity continues to focus on filling or repurposing larger spaces and buildings that have remained vacant since the recession. Both NCP program staff and OPCs should ensure that they are well positioned to market program incentives and services to current building owners and developers as well as potential tenants or buyers to encourage energy efficiency improvements during such large renovations.
- **In the downstate market, leverage increased end-user awareness of energy efficiency and the Greener, Greater Buildings Program's benchmarking requirements.** While market actors anticipate an increase in end-user awareness and demand for energy efficiency in response to the PlaNYC building programs, building owners and tenants will not necessarily know the extent of their options for enhancing the efficiency of their space. The NCP could capitalize on this increased awareness by emphasizing the program's role in helping to incentivize and elevate an individual building's energy performance and attractiveness.
- **Increase engagement with wholesale/retail commercial and healthcare projects.** While the wholesale/retail commercial sector comprises the largest square footage of total NCP project area, these two sectors represent the lowest levels of program market share for completed projects. As post-stimulus public sector construction activity slows down, greater opportunities for energy savings likely lie in the private sector over the next few years.
- **Continue to focus outreach and education activities toward targeted end-use customers.** While design teams remain a key target market for the NCP, NYSERDA staff should consider how it could improve end-use customer knowledge and awareness of advanced energy efficient technologies and NCP incentive opportunities. Design teams expressed that end-user demand (whether that of an owner or tenant) is the primary driver for increased energy efficiency and that it has generally increased in the past three years. Nonetheless, financial barriers continue to present the primary barrier to enhanced efficiency efforts. End-user outreach and messaging should continue to highlight sound evidence of positive financial returns associated with specific efficiency investments, including those considered to be more advanced (e.g., BEMS or whole building design).

### S.3.2 Primary Recommendations

In addition to the above general observations, the PE/MCA Team makes the following primary recommendations for NCP staff to consider as they move the program further toward its goals.

**Recommendation #1: Ensure the future success of advanced energy efficiency technologies like BEMS through enhanced technical assistance and facility staff training.** Reports about BEMS and other advanced technologies failing to meet owner expectations for energy savings and hesitations about facility staff's ability to fully understand and optimize those systems represent key barriers to the deeper energy savings those technologies could provide. While the actual energy savings that result from those systems may be difficult to measure, improving standards and baselines for energy efficiency will increasingly diminish the program's opportunities for pushing buildings to the "next level" for efficiency. The NCP can help to pave the way for enhanced energy efficiency and advanced technologies by increasing its level of technical support for (not just incentivizing) projects that install BEMS and other advanced technologies. For example, such support could include periodic (e.g., bi-monthly or quarterly) reviews of a participating facility's BEMS and associated energy-use systems to ensure optimal performance and energy savings. Similarly, NYSERDA could offer focused, hands-on training on BEMS and advanced building system operations for facility management staff that would help reduce owner uncertainty around the potential success of or financial return on those systems, potentially in partnership with the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).

**Recommendation #2: Investigate new options for encouraging and incentivizing energy efficiency in tenant build-out projects.** Market actors emphasized that the level of energy efficiency incorporated into build-out projects is primarily tenant driven and that such consideration typically need to happen at the beginning of the build-out process (i.e., during lease negotiations). To foster more energy efficient leased spaces, NYSERDA should explore new options for encouraging and incentivizing tenant interest and participation in pursuing efficiency upgrades during major build-out renovations. Investigation of these options should include focus groups or panel discussions with market actors, including design teams, commercial real estate owners and developers, and end users. Such options might include the following:

- **Green Leases:** Green lease arrangements and supporting programs, such as New York City's Energy Aligned Clause, are gaining more attention and deserve consideration by the NCP as potential opportunities. NYSERDA staff should explore how to leverage these existing green leasing programs and consider ways to further support property owners and tenants in negotiating green leases.
- **Efficiency-Specific Concessions:** Some market actors stated that landlord build-out concessions that are specifically earmarked for energy efficiency could more effectively motivate tenants to incorporate more efficiency into build-out projects. NCP should investigate offering a matching incentive for efficiency-specific build-out concessions, effectively doubling the concession a landlord would provide to a tenant for making energy efficiency improvements.
- **Pre-Packaged Build-Out Measures:** In addition to (or in combination with) concession-driven incentives, NCP should further explore the potential for packaged bundles of pre-approved, build-out

appropriate efficiency measures that might help expedite the consideration and inclusion of energy efficiency and program participation during tenant build outs. Pre-packaged incentive bundles could also provide guidance to less advanced design teams to assist them with completing energy efficient projects.

**Recommendation #3: Investigate the decrease in NCP participation from LEED-certified buildings and revisit alignment of Whole Building/Green Building incentives with the LEED program.** The decrease in the share of LEED-certified buildings that participate in NCP could indicate a combination of several drivers. Beginning in 2009, LEED for New Construction (LEED-NC) required minimum energy performance levels (10% above ASHRAE/Illuminating Engineering Society of North America [IESNA] 90.1-2007) that aligned with the lowest tier for NCP whole building design incentives (9.1%-16% above the same standard).<sup>7</sup> With access to U.S. Green Building Council (USGBC) data for LEED projects in the state, NCP staff could investigate the degree to which LEED-certified buildings met or exceeded those standards in their designs. Based on those findings, staff could then follow up with specific LEED-certified project representatives to inquire as to why they did not pursue either additional efficiency levels or NCP funding. Findings from this investigation would help staff determine whether to enhance or revisit whole building incentive thresholds or levels to foster more aggressive energy savings targets.

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<sup>7</sup> Program staff should note that the newest update to the LEED rating approach (LEED v.4) was released in late 2013 and uses ASHRAE/IESNA 90.1-2010 as its baseline for efficiency ratings.

# 1 Introduction

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This section introduces the New York State Energy Research and Development Authority's (NYSERDA's) New Construction Program (NCP) and outlines the approach the process evaluation and market characterization and assessment (PE/MCA) Team took to for this study and report. Section 1.1 provides a brief overview of the NCP, including its mission, history and objectives. Section 1.2 discusses the evaluation approach, including the evaluation objectives, scope, and methods employed. Section 1.3 summarizes the organization of the report.

## 1.1 Program Overview

The New York Energy Efficiency Programs are funded by an electric distribution System Benefits Charge (SBC) paid by customers of Central Hudson Gas and Electric Corporation (CHG&E), Consolidated Edison Company of New York, Inc. (ConEd), New York State Electric and Gas Corporation (NYSEG), National Grid (NGRID), Orange and Rockland Utilities (O&R), and Rochester Gas and Electric Corporation (RG&E). The programs are available to all customers that pay into the SBC and only to such customers. NYSERDA, a public benefit corporation established in 1975, began administering the SBC funds in 1998 through NYSERDA's New York Energy \$mart<sup>SM</sup> Program.<sup>8</sup> By order issued June 23, 2008, the Commission created an Energy Efficiency Portfolio Standard (EEPS) for New York State ("the State") to develop and encourage cost-effective energy efficiency programs. The Commission directed NYSERDA and the six large investor-owned electric utilities to submit electric energy efficiency program proposals. The Commission authorized the collection from ratepayers of approximately \$2.6 billion through 2015 to fund the EEPS program, part of which funds the NYSERDA NCP.

The NCP provides commercial and industrial (C&I) customers and certain types of multifamily residential projects<sup>9</sup> with technical assistance services and capital-cost incentives for electric energy efficiency improvements in new construction or in substantially renovated buildings<sup>10</sup>. The program is designed to encourage the incorporation of energy efficiency and green building features in the design, construction,

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<sup>8</sup> Projects located in Nassau County and Suffolk County (i.e., Long Island) do not pay SBC funds and have been excluded from this study.

<sup>9</sup> According to NCP eligibility criteria, the program accepts multifamily projects with five or more units that are seeking Leadership in Energy and Environmental Design (LEED) Certification. As of early January 2014, the NYSERDA Multifamily Performance Program covered most multifamily activity. NYSERDA now limits NCP involvement in multifamily projects to institutional properties.

<sup>10</sup> Under revised Program Opportunity Notice (PON) 1601, effective on January 4, 2012, the NCP stopped offering incentives for the implementation of natural gas measures. The program continues to provide technical assistance to help customers identify natural gas opportunities on-site but customers are financially responsible for implementing these opportunities on their own. This evaluation covers NCP program performance from January 1, 2008 through December 31, 2012, during which the NCP still offered incentives for natural gas measures.

and operation of commercial, industrial, institutional, and larger multifamily residential buildings. The NCP serves a multifaceted and technically sophisticated market segment that includes building owners, tenants, and design firms.

Through the program Technical Assistance (TA) providers under contract to NYSERDA provide cost-shared analysis to building owners and their design teams to identify energy efficiency opportunities for their projects.<sup>11</sup> An additional level of technical assistance offers specialized green building assistance to interested customers, including computer modeling and support to comply with Leadership in Energy and Environmental Design (LEED<sup>®</sup>), a building rating system developed by the U.S. Green Building Council (USGBC).<sup>12</sup> The program also offers technical assistance incentives to design teams for whole-building or green building design based on an escalating approach, providing increasing incentives for projects achieving higher levels of energy performance. For the actual construction of the project, various financial incentives (both pre-qualified and custom) help defray the capital costs for achieving higher energy efficiency levels. For whole-building and green building designs, these financial incentives also escalate with higher levels of energy performance.

NYSERDA staff issued a new request for proposals (RFP) in fall 2010 to increase the list of TA providers and further expand program capabilities in computer simulation modeling and green building services.<sup>13</sup> To meet the increased need for services in the Consolidated Edison and National Grid service territories, NYSERDA staff sought to contract with TA firms capable of servicing projects in these specific geographic areas.

## 1.2 Evaluation Overview

This section presents a summary of this MCA evaluation, including its objectives and the approach and methods employed by the PE/MCA Team.

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<sup>11</sup> Design teams include architecture and engineering (A&E) firms as well as other specialty contractors involved in the C&I and multifamily new construction process (e.g., lighting designers and heating, ventilation, and air conditioning [HVAC] contractors)

<sup>12</sup> Customers may use either a NYSERDA TA or a green building consultant of their choice, and receive the same green technical assistance incentive.

<sup>13</sup> NYSERDA, RFP 1523: Technical Assistance to Support the New York Energy Smart New Construction Program, 2010.

## 1.2.1 Evaluation Objectives

The primary purpose of this MCA Evaluation effort is to provide NYSERDA program staff with a streamlined update of the view of the new construction marketplace, building on the 2008 MCA Evaluation.<sup>14</sup> The primary objectives of the study are to the following:

- Develop a comprehensive understanding of current and emerging markets (e.g., market structure and market actors)
- Provide baseline and background information required by NYSERDA staff to define and deliver programs to target markets
- Track changes in markets over time, with a specific focus on market indicators specified in the program logic model that are likely to be impacted by program offerings

The key research questions for this MCA Evaluation include the following:

- What are the key characteristics of the current market and what emerging opportunities exist for C&I and large multifamily residential<sup>15</sup> new construction in the State?
- How has the new construction market changed over the past five years, and what changes might NYSERDA staff make to adapt the program's design and delivery in order to better serve the market and enhance program effectiveness?

## 1.2.2 Evaluation Approach

The PE/MCA Team used a two-stage approach to address the evaluation objectives. First, the team conducted an initial market characterization analysis using mostly secondary data sources (e.g., the NCP tracking database, recent program evaluation reports prepared for NYSERDA and for similar programs operating in other jurisdictions, and other relevant market studies and literature).<sup>16</sup> The team supplemented these preliminary findings with information gathered during a series of in-depth interviews with a wide range of market actors (e.g., building owners, design teams, and design and construction trade organizations). Through the in-depth interviews, the PE/MCA Team identified and validated current and emerging trends in the C&I new construction marketplace. Table 1-1 summarizes the evaluation activities, methodology, and key objectives.

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<sup>14</sup> Summit Blue Consulting. New Construction Program Market Characterization and Assessment – Final Report. Prepared for NYSERDA. August 2008.

<sup>15</sup> As of early January 2014, the NYSERDA Multifamily Performance Program covered most multifamily activity. NYSERDA now limits NCP involvement in multifamily projects to institutional properties.

<sup>16</sup> See Appendix A.1.1 for a list of resources used for this study.

**Table 1-1. Activities for NCP PE/MCA Evaluation**

Activity	Methodology	Key Objectives
<b>Project Planning and Work Plan Development</b>	<ul style="list-style-type: none"> <li>» Reviewed available program documentation and prior program evaluation results.</li> <li>» Met with NYSERDA evaluation, program, and marketing staff to develop a final project work plan.</li> </ul>	<ul style="list-style-type: none"> <li>» Identified and prioritized research items to overcome any existing gaps in staff's knowledge of current market conditions and opportunities.</li> <li>» Informed the evaluation work plan.</li> </ul>
<b>Review and Update Program Logic Model and Develop Sources and Uses Table</b>	<ul style="list-style-type: none"> <li>» Coordinated with NYSERDA evaluation and program staff, as well as other evaluation contractors, to review and discuss necessary updates to the 2010 NCP Logic Model Report.</li> <li>» Led a review process to reach consensus on the updated logic model and prioritization of measurement indicators.</li> </ul>	<ul style="list-style-type: none"> <li>» Ensured Program Logic Model Report accurately reflects the current program design and state of the market.</li> <li>» Worked with Impact Evaluation team to incorporate potential causal pathways for program spillover into logic model.</li> <li>» Developed a "sources and uses" memo to prioritize measurement indicators from the logic model and guide subsequent data collection activities.</li> </ul>
<b>Secondary Research</b>	<ul style="list-style-type: none"> <li>» Conducted literature review, including program materials and evaluations of similar new construction program offerings in the State and nationally.</li> <li>» Analyzed NCP tracking database and other datasets related to the new construction market to identify market trends and inform development of sample frames and interview guides.</li> </ul>	<ul style="list-style-type: none"> <li>» Characterized current market and emerging opportunities for C&amp;I and larger multi-family new construction in the State.</li> <li>» Provided baseline and background information required by NYSERDA to define and deliver programs to target markets.</li> <li>» Assessed changes in the new construction market against previous baselines.</li> </ul>
<b>Primary Data Collection: Market Actor In-depth Interviews</b>	<ul style="list-style-type: none"> <li>» Conducted in-depth interviews with a sample of market actors involved in or knowledgeable about the State's new construction marketplace.</li> </ul>	<ul style="list-style-type: none"> <li>» Characterized current market and emerging opportunities for C&amp;I and larger multi-family new construction in the State.</li> <li>» Provided baseline and background information required by NYSERDA to define and deliver programs to target markets.</li> <li>» Assessed changes in the new construction market against previous baselines.</li> </ul>

## 1.3 Organization of the Report

The remainder of the report is organized in the following manner:

- Section 2 discusses the detailed methodology employed by the PE/MCA Team to accomplish the project objectives.
- Section 3 characterizes the market eligible to participate in the NCP and discusses NCP accomplishments to date, including program market penetration.
- Section 4 discusses findings from the PE/MCA Team's review of industry literature and in-depth interviews with market actors.
- Section 5 discusses findings specific to several crosscutting topics, including advanced technologies, net zero energy buildings, LEED certification, tenant-build out projects, small projects, and the Consolidated Funding Application.
- Section 6 summarizes the PE/MCA Team's conclusions and recommendations for NYSERDA staff consideration.

## 2 Evaluation Methodology

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This section discusses the methodology employed by the PE/MCA Team to accomplish the project objectives. Section 2.1 presents the project research objectives. Section 2.2 describes the steps the PE/MCA Team used to revise the program logic model and develop the sources and uses table. Section 2.3 discusses the data sources and methods the PE/MCA Team used to conduct the secondary data analysis. Section 2.4 describes the PE/MCA Team's primary data collection effort.

### 2.1 Research Objectives

The PE/MCA Team designed this evaluation to assess the validity of program assumptions regarding market characteristics and provide additional details regarding market structure and opportunities. The evaluation results can be used by NCP program staff to adjust program implementation as needed to ensure maximum market interest and uptake of program offerings. The four research objectives to achieve the MCA Evaluation goals include the following:

1. **Review and update, as needed, the NCP Program Logic Model to reflect current program design and market conditions.** This included working with the Impact Evaluation Team to incorporate assumed causal pathways for program spillover into the logic model.<sup>17</sup>
2. **Characterize the current market and emerging opportunities for C&I and larger multifamily new construction in the State.**
  - A. Assess new construction activity (e.g., number of projects, building area, and value) segmented by market sector and geography.
  - B. Describe existing technical service delivery channels, both design teams and technical assistance providers, segmented by market sector and geography.
  - C. Identify industry leaders within targeted market segments to assist NCP outreach and promotional efforts.
  - D. Assess market interest in and activity around net-zero energy (NZE) buildings. In particular, determine degree to which a goal for NZE buildings is replacing LEED certification as a driver for energy efficiency efforts and assess attitudes about various metrics (i.e., ASHRAE standards versus Energy Use Intensity) that NYSERDA staff might use for determining incentives that support NZE efforts.
  - E. Assess market interest in and perceptions of commissioning, sub-metering (i.e., for specific equipment or systems), energy management systems, and advanced controls. In particular, look for differing perceptions among those who have and have not installed advanced controls.
  - F. Characterize opportunities to connect and work with tenant build-out projects, particularly those in New York City. Determine to what degree design teams would consider

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<sup>17</sup> NYSERDA's evaluation approach integrates the PE/MCA activities within one contractor team; Impact assessments will be conducted by a separate contractor (i.e., "the Impact Evaluation Team").

implementing a prepackaged set of energy efficiency measures for such projects or what other program changes might improve NCP staff's ability to engage in tenant build-out opportunities.

3. **Provide baseline and background information required by NYSERDA staff to define and deliver programs to target markets.**<sup>18</sup>

- G. Describe customer decision-making processes, including organizational structure and financial and other non-energy considerations.
- H. Assess applicant's experience with and reaction to the September 2011 change to the New York State Consolidated Funding Application (CFA)<sup>19</sup> process, particularly for smaller projects.
- I. Assess design teams' awareness of changing building codes, how (or if) they communicate these changes to end users, and how it influences the design approach.
- J. Identify barriers and opportunities for NCP to more effectively serve smaller projects (i.e., buildings less than 20,000 square feet [sf]).
- K. Assess how recent changes in the economy have affected new construction.
- L. Assess changes in market perceptions of and pursuit of LEED certification and the degree to which it remains a driver for energy efficiency.
- M. Assess factors that encourage owners to explore "deeper" energy savings (i.e., those beyond code or design-team standard practice) and barriers to those deeper savings.

4. **Assess changes in the new construction market against previous baselines, including changes in indicators that will help support the Impact Evaluation Team's analysis of program spillover.**<sup>20</sup>

- N. Assess the success of NCP in penetrating the green building/sustainable design market in terms of participating projects and specialized design teams/technical assistance providers.
- O. Assess NCP accomplishments and market share in terms of both new construction activity and interaction with key market actor groups. Estimate market share by building size.
- P. Assess design team/technical service provider expertise with energy efficiency measures/design approaches and green building/sustainable design. Include changes in design teams' adoption of energy efficiency design strategies and standard practices, especially for projects not supported by NCP. Determine NCP's role in those changes to inform spillover analysis. Determine whether design teams' standard practice is to comply with energy code versus exceeding it. If they exceed code, in which areas does standard practice exceed it?
- Q. Assess potential mechanisms or channels for program spillover to inform the Impact Evaluation Team's future spillover analysis. Assess which mechanisms or channels for spillover may have affected design teams' (participant and non-participant) adoption of

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<sup>18</sup> The project work plan included an objective to "assess whether owner and design teams feel that NYSERDA technical assistance is encouraging them to consider advanced or newer technologies, or if the market is relying on more well-established measures, and assess the degree to which this may stem from NCP's shift from project-level to measure-level Total Resource Cost (TRC) tests." The PE/MCA Team did not attempt to achieve this objective via its primary data collection efforts because limitations on interview length required the team to prioritize objectives. Lower-priority objectives were not included in the final in-depth interview guides; however, they may be reconsidered for inclusion in the Phase II PE/MCA evaluation.

<sup>19</sup> In September 2011, the State created the New York State Consolidated Funding Application (CFA) to streamline the funding and incentive application process. Customers seeking funding from the NCP must apply through the CFA.

<sup>20</sup> The project work plan included an objective to "assess the availability of service providers trained in energy efficiency measures/design approaches and green building/sustainable design". The PE/MCA Team did not attempt to achieve this objective via its primary data collection efforts because limitations on interview length required the team to prioritize objectives. Low priority objectives were not included in the final in-depth interview guides; however, they may be reconsidered for inclusion in the Phase II PE/MCA evaluation.

energy efficiency design strategies and standard practices and gain qualitative insights about the perceived extent of such spillover.<sup>21</sup>

## 2.2 Program Logic Model and Sources and Uses Table

The PE/MCA Team reviewed the 2010 NCP Logic Model Report to ensure the document accurately reflects the current program design and state of the market. The Team then incorporated NCP staff input to identify potential areas for revision based on recent changes in program design or market dynamics. The PE/MCA Team also collaborated with the Impact Evaluation Team to incorporate potential causal pathways for program spillover into the revised Logic Model Report.<sup>22</sup> Program spillover was primarily addressed by the Impact Evaluation Team; however, the two teams collaborated to streamline Logic Model Report updates and reduce the burden of reviews and revisions on NYSERDA evaluation and program staff. A copy of the revised Logic Model Report for the NCP can be found on the NYSERDA website.<sup>23</sup>

Based on the final work plan, a project kick-off meeting and Logic Model Report revisions, the PE/MCA Team developed a sources and uses table. This table outlined the potential measurement indicators and data sources (e.g., NCP database, market actor interviews, and literature review) that would be used to address each research objective listed in Section 2.1. The Team updated and referred to this table throughout the evaluation, using it to guide secondary data analysis, develop interview guides, and generally ensure that each research objective was addressed through the data collection efforts. Each item in the sources and uses table was assigned a priority level to inform subsequent discussions and decisions on altering the research plan should certain limitations prevent the satisfaction of all research objectives (e.g., interview guides are too lengthy, or appropriate secondary data is unavailable).

## 2.3 Secondary Data Analysis

The PE/MCA Team conducted the initial market characterization analysis using secondary data sources, including relevant literature, the NCP project database, and two McGraw-Hill Construction databases. Wherever possible, market characterization results were segmented on an upstate-downstate<sup>24</sup> regional

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<sup>21</sup> The PE/MCA Team collected data about program spillover via the in-depth interviews, but did not analyze the data for this report. Rather, the team provided the raw data to the Impact Evaluation Team for use in the impact evaluation.

<sup>22</sup> Staff-driven changes focused primarily on updating relevant program goals and funding information and incorporation of new elements from PON 1601, which was released in January 2012. The spillover-related changes were relatively limited. The team introduced a few intermediate and long-term outcomes that could indicate potential causal pathways for program spillover.

<sup>23</sup> <http://www.nyserda.ny.gov/Publications/Program-Planning-Status-and-Evaluation-Reports/NYERDA-Evaluation-Contractor-Reports/2013-Reports/Program-Logic-Model.aspx>

<sup>24</sup> The downstate region is defined as the following counties: Bronx, Kings, New York, Queens, Richmond, and Westchester. All other counties, with the exception of Nassau County and Suffolk County, are considered components of the upstate region.

basis to identify geographic variations in program and market opportunities and barriers throughout the State. Table 2-1 summarizes each secondary data analysis activity and relevant methodology details.

**Table 2-1. Summary of Secondary Data Analysis Activities and Methodology Details**

Analysis Activity <sup>a</sup>	Methodology Details
<b>Literature Review</b>	<ul style="list-style-type: none"> <li>» Reviewed recent industry literature to inform the development of a preliminary set of trends in the energy-efficient new construction market.</li> <li>» Sources included evaluation and best practice reports prepared for similar programs operating in other jurisdictions, industry trade publications, news and conference proceedings, information about municipal regulations and initiatives, including New York City’s PlaNYC, and general market and New York State-specific news.<sup>25</sup></li> </ul>
<b>Analysis of NCP Project Database</b>	<ul style="list-style-type: none"> <li>» Analyzed NCP program activity from 2008 through 2012 based on the NCP Cross Program Database and Custom Project Detail Database, both provided by NYSERDA staff.</li> <li>» The Cross Program Database provided information on the NCP’s completed projects and the Custom Project Detail Database provided information on all projects, regardless of completion status.</li> </ul>
<b>General Market Activity Data Analysis</b>	<ul style="list-style-type: none"> <li>» Used the McGraw-Hill Construction New, Addition, and Alteration Database (“NAA Database”) to quantitatively characterize activity and trends in New York’s non-residential new construction market during the 2008-2012 timeframe.<sup>26</sup></li> <li>» The Dodge Players Database (“Players Database”) provided information on the market actors associated with individual new construction projects, including owners, architects, engineers, and other market actors.</li> </ul>
<b>Market Penetration Analysis</b>	<ul style="list-style-type: none"> <li>» Conducted an analysis of the NCP’s market penetration of the statewide new construction market from 2008 through 2012.</li> <li>» In addition to a statewide penetration result, NCP market penetration was measured with respect to geography (upstate/downstate), utility territory, building size, and building structure type.</li> </ul>

<sup>a</sup> Section A.1 provides more detail about each of these activities.

<sup>25</sup> See Appendix A.1.1 for a list of resources used for this study.

<sup>26</sup> The McGraw-Hill Construction New, Addition, and Alteration Database provides information regarding construction and renovation projects that obtained a permit during the study timeframe. McGraw-Hill Construction uses a network of reporters to obtain information about smaller projects that do not require a permit; however, McGraw-Hill Construction notes that this information is extremely difficult to obtain and in many instances is not captured by the Database. Thus, comparisons and findings in this study likely underrepresent the annual amount of construction and renovation activity that occurs in New York State because many projects that do not require a permit and some standard equipment replacement activity are likely not captured in the Database if they are not part of a larger project. This same approach was used in the 2008 MCA Evaluation, thereby providing a reasonable approach to assessing market and program activity.

## 2.4 Primary Data Collection and Analysis

The PE/MCA Team supplemented the initial market characterization analysis using information gathered during a series of in-depth interviews (IDIs) with market actors involved in or knowledgeable about the State's new construction marketplace. Unlike the 2008 MCA Evaluation, this study did not include telephone surveys. Instead, the IDIs were completed directly by the PE/MCA Team, rather than a survey house. This decision stemmed partly from the risk of survey fatigue, particularly among program participants who were targeted by both the 2011 NCP process evaluation and by a series of phone and internet surveys conducted by NYSERDA's marketing department in late 2012. This approach enabled the Team to target significantly fewer respondents to obtain in-depth qualitative information on market issues (i.e., via follow-up questions). Through the interviews, the PE/MCA Team sought to illuminate current and emerging trends that better prepare NCP staff to adapt the program to shifting market issues. In addition, to help guide additional research into the program's spillover and other market effects, the PE/MCA Team included high-level questions related to program spillover and used the responses to gain qualitative insights about the perceived extent of such spillover and likely causal pathways of spillover that warrant further investigation. Appendix A.2 provides details about the Team's approach to sampling and interviewing respondents and analyzing the IDI responses.

## 3 Market Characterization

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This section characterizes the market eligible to participate in the NCP and discusses NCP accomplishments to date. Section 3.1 describes the new construction market within which the NCP operates, and Section 3.2 summarizes NCP accomplishments and market participation.

### 3.1 New Construction Activity

This PE/MCA evaluation covers a period of time during which the United States encountered the largest recession in several decades. The Great Recession of December 2007–June 2009 (“the Recession”) depressed new commercial construction nationwide, with levels falling to less than half of those at peak times.<sup>27</sup> While the Team’s analysis shows that the economy has begun to improve, the protracted recovery affecting the construction industry is not anticipated to reach pre-2006 levels until 2016.<sup>28</sup>

This section provides key findings related to overall market activity as well as regional and sector-specific changes both during the downturn and in the post-Recession recovery. The PE/MCA Team used the McGraw-Hill Construction New, Addition, and Alteration Database to quantitatively characterize activity and trends in New York’s non-residential new construction market during the 2008-2012 timeframe. Program staff can use this information to gauge their expectations and tracking of market and program activity. Section 3.1.1 characterizes the statewide new construction market in terms of overall project activity and type of projects, while the remaining sections discuss variations in market activity by geography and building type. Details about market activity by building size are found in Appendix B.1.

#### 3.1.1 General Market Activity in New York State

**An analysis of market data and trends in the State for 2008–2012 confirms that the Recession significantly impacted the market for new construction across the state but that general recovery may be underway.** This observation is echoed in overarching themes from reviewed literature, which reveal cautious optimism in the U.S. new construction market in the face of significant post-Recession market changes. After a steady decline from 2008 through 2010, an improvement in construction activity is shown in Figure 3-1, which compares the average and median number of annual new construction project

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<sup>27</sup> McGraw-Hill Construction, Energy Efficiency Trends in Residential and Commercial Buildings, Prepared by McGraw-Hill Construction for the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 2010. [http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/building\\_trends\\_2010.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/building_trends_2010.pdf)

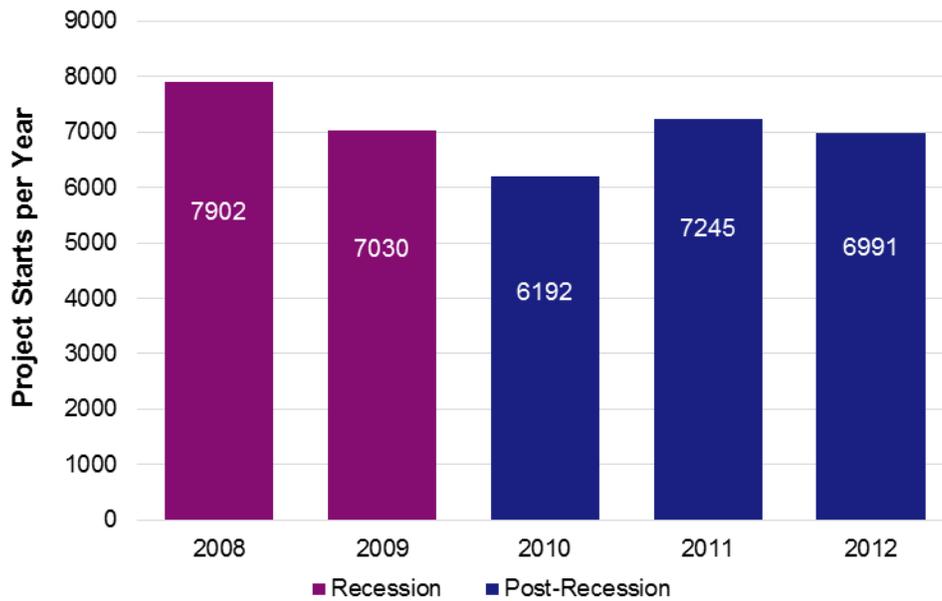
<sup>28</sup> The 2013 U.S. Markets Construction Overview, FMI Corporation, 2012, <http://www.fminet.com/the-u-s-markets-construction-overview-2013.html>

starts during the Recession (January 2008–June 2009) and post-Recession (July 2009–December 2012). However, project starts have not rebounded above 2008 levels.

**Figure 3-1. Annual Project Starts in New York, During and Post Recession**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded.

Source: Navigant analysis of McGraw-Hill Construction New, Addition, and Alteration Database

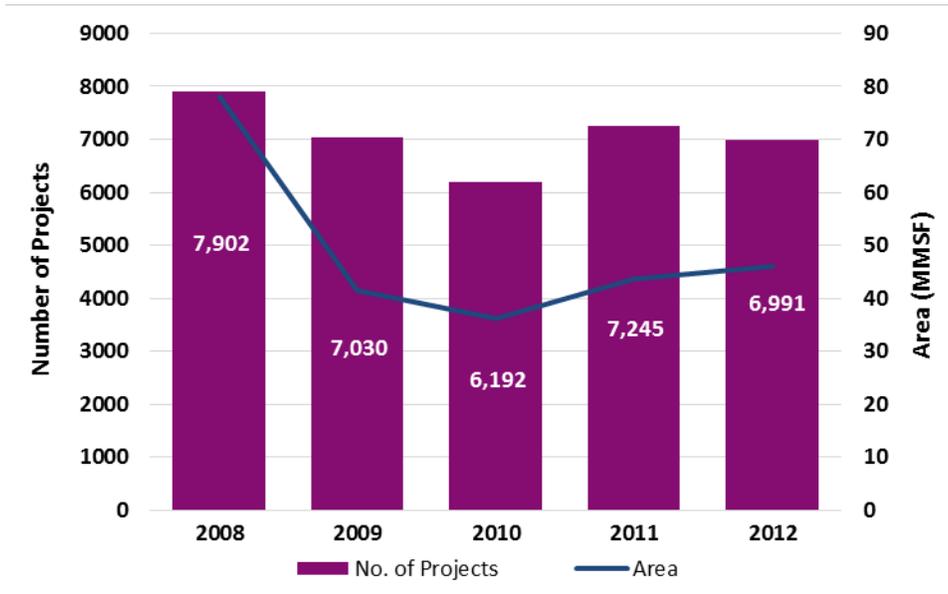


**The drop in total project area through 2012 suggests that overall average project size decreased following the Recession and has not yet returned to pre-Recession levels.** An analysis of project activity by year, as measured by new construction project starts and total new project area in Figure 3-2, further illustrates the dynamics of the Recession and subsequent recovery in the State. The figure shows that, despite the recent turnaround in project starts and project area in 2011, total new construction project area has yet to rebound to 2008 levels.

**Figure 3-2. Project Starts in New York, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded.

Source: Navigant analysis of McGraw-Hill Construction New, Addition, and Alteration Database



### 3.1.2 Market Activity by Region

New York State data reflect national trends, with increasing new construction activity concentrated in major cities. As expected, New York City is experiencing significant new construction activity, at levels higher than the national average, while upstate activity has remained relatively constant over time.<sup>29</sup> A comparative analysis of project activity in the upstate region versus the downstate region is presented in Figure 3-3. This data suggests that any post-Recession (July 2009) recovery has been driven by New York’s downstate region, as upstate project activity has generally continued to decline following the Recession’s end in June 2009.

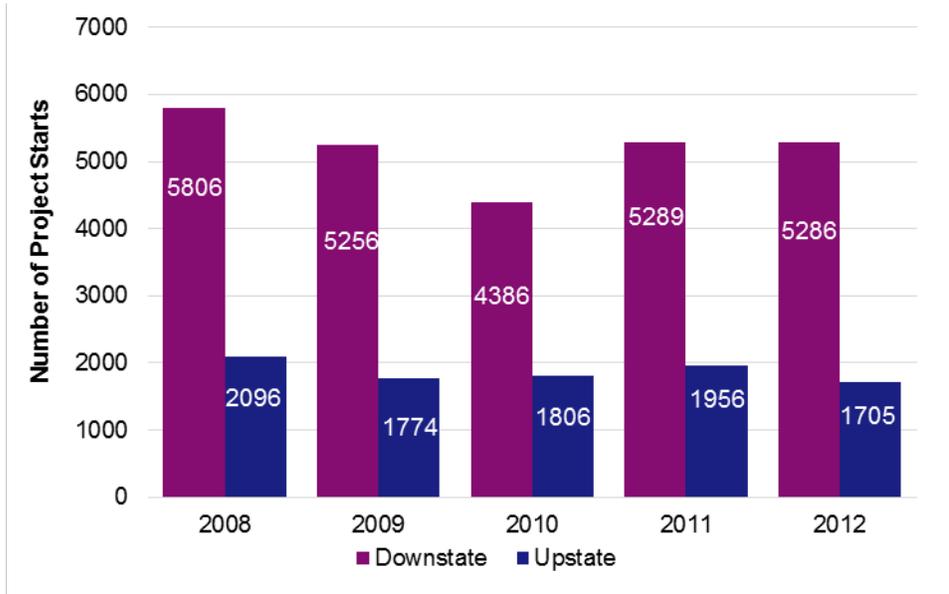
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<sup>29</sup> The 2013 U.S. Markets Construction Overview, FMI Corporation, 2012, <http://www.fminet.com/the-u-s-markets-construction-overview-2013.html>

**Figure 3-3. Project Starts by Downstate/Upstate Region, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded.

Source: Navigant analysis of McGraw-Hill Construction New, Addition, and Alteration Database

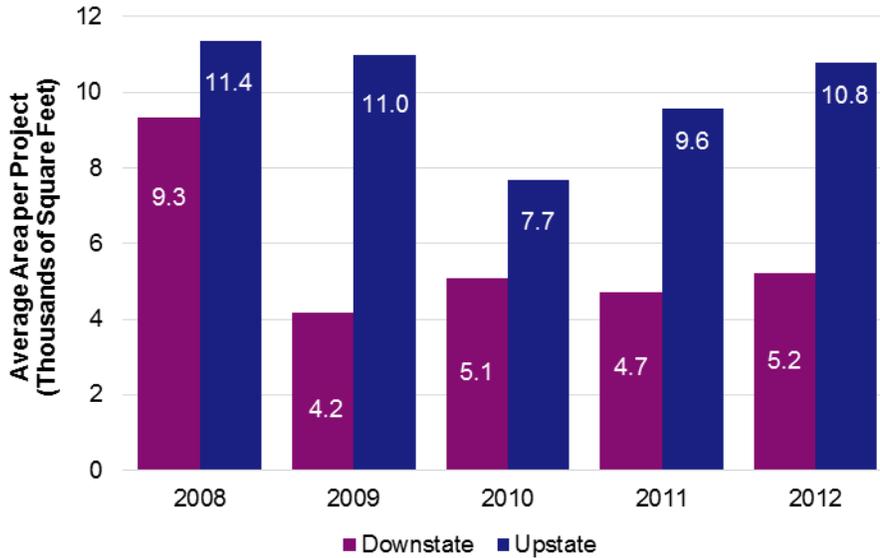


**One significant effect of the Recession was the drop in average project size in the downstate region; in contrast, average project size upstate has remained fairly consistent.** As shown in Figure 3-4, downstate project building area fell significantly after 2008 but has started to rebound post-Recession. On the other hand, the upstate average project size has not changed significantly over the 2008-2012 timeframe. These analyses suggest that the drop in total average project size applies more to projects in the downstate than the upstate region. Notably, the downstate region has historically had a larger share of its new construction activity come from large projects (>90%), whereas activity in the upstate market comprises a wider diversity of building sizes.

**Figure 3-4. Average Area of Project Starts by Downstate/Upstate Region, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded.

Source: Navigant analysis McGraw-Hill Construction New, Addition, and Alteration Database



### 3.1.3 Market Activity by Building and Project Type

Recent increases in new construction activity in the State have been driven primarily by the private sector, which was hit especially hard by the Recession.<sup>30</sup> Market sectors showing increasing activity in recent years include lodging/hospitality, healthcare, manufacturing, and some office space. For the hospitality sector, higher occupancy rates, improving economic indicators and a weak dollar driving tourism into the U.S. all contribute to improvements in construction activity.<sup>31</sup> Within healthcare, more than 70% of recent new construction has been focused on facility renovation & modernization to make facilities friendlier to patients and the environment.<sup>32</sup> Projections for construction in the manufacturing sector are also positive, as a growth rate of 7% was projected by the Associated Builders and Contractors for the year 2013.<sup>33</sup>

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<sup>30</sup> Associated Builders and Contractors (ABC) 2013 Economic Forecast, Associated Builders and Contractors, Inc.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid.

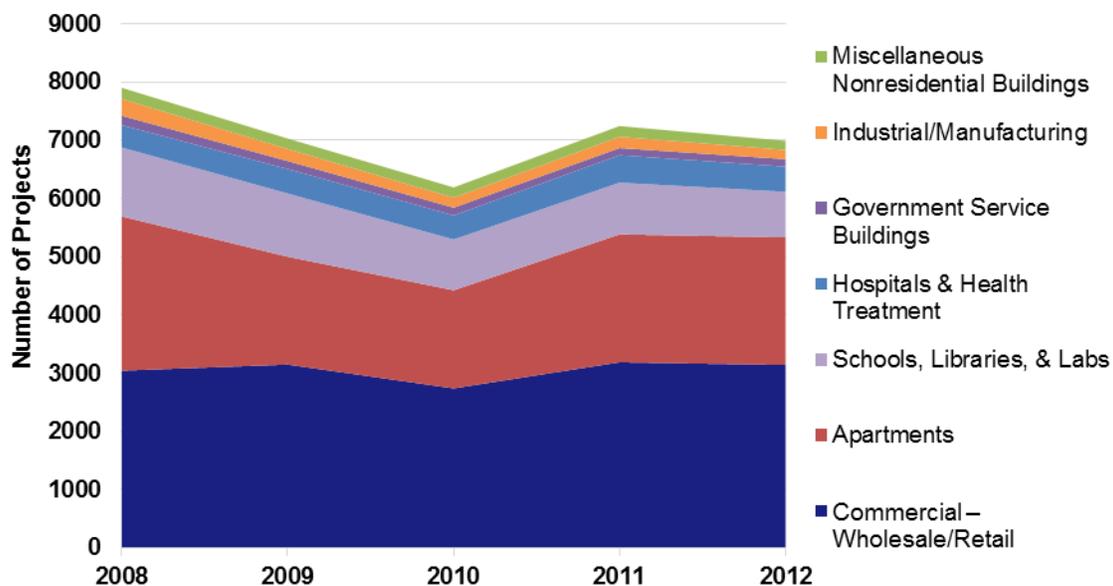
<sup>33</sup> Ibid.

The number of project starts in the State, broken out by sector in Figure 3-5, shows that the relative distribution of projects among sectors by year has remained fairly constant for 2008–2012. The commercial and apartment sector comprised a significant portion of project starts, followed by schools, libraries, and labs. Hospitals and health treatment facilities have represented an increasing share of new construction starts since 2010. The distribution of new construction projects by sector suggests that sector-specific economic impacts will affect the total statewide new construction market differently. For example, strong growth in the manufacturing sector (e.g., 10% annually) would have a smaller effect on statewide new construction project totals compared to a similar increase in growth for the commercial sector in the same year.

**Figure 3-5. Number of Project Starts by Sector, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded.

Source: McGraw-Hill Construction New, Addition, and Alteration Database



### 3.2 NCP Accomplishments and Participation to Date

This section describes NCP accomplishments and program participation over the 2008-2012 time period. In the context of the above noted general market activity findings, this information can help program staff better understand past performance and trends and make more informed decisions about how to focus program efforts going forward. Section 3.2.1 presents Navigant’s analysis of NCP program data with respect to three factors: geography (upstate/downstate), building size, and market sector. Section 3.2.2

presents an analysis of the NCP’s penetration of the statewide new construction market during the 2008–2012 time period. Then, Section 3.2.3 evaluates the number of top new construction project owners and developers that the NCP has supported and analyzes market data to determine the top 20 engineering and architecture firms in the state.

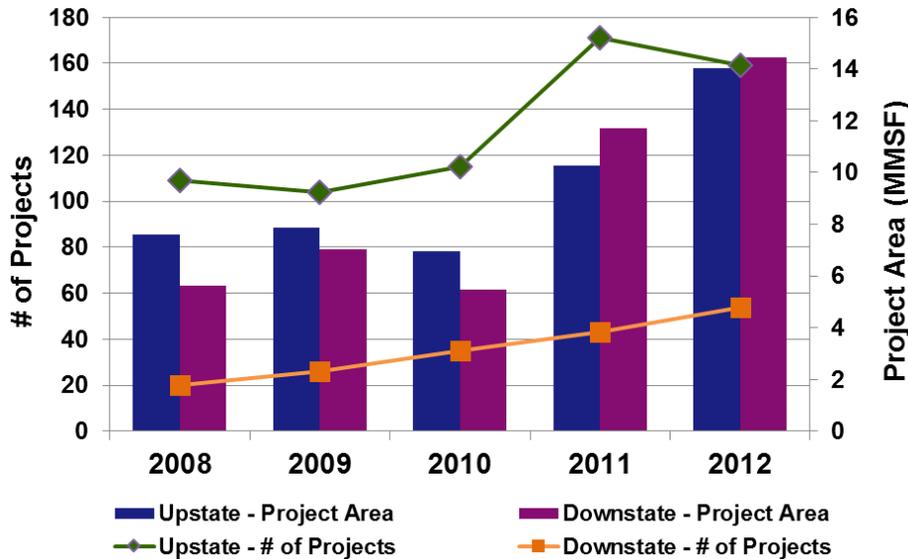
### 3.2.1 NCP Participation

From January 1, 2008 through December 31, 2012, the NCP engaged 836 new construction projects, comprising 91 million square feet of non-residential building space. Participating NCP projects were distributed across diverse sectors and building types within various utility territories and geographic regions (e.g., upstate and downstate).

**An analysis of NCP project completion data shows that more NCP projects were completed in the upstate market during the 2008-2012 time period, but that downstate NCP projects represent a comparable project area.** Figure 3-6 displays the number and square footage of NCP projects completed annually over this time period for the upstate and downstate markets. Compared to general statewide market data, NCP square footage in the upstate market did not experience as sharp a decrease following the Recession and appears to be growing at a greater rate than the general statewide market.

**Figure 3-6. Summary of Completed NCP Project by Year and Geography**

Source: Navigant analysis of NCP Cross Program Database

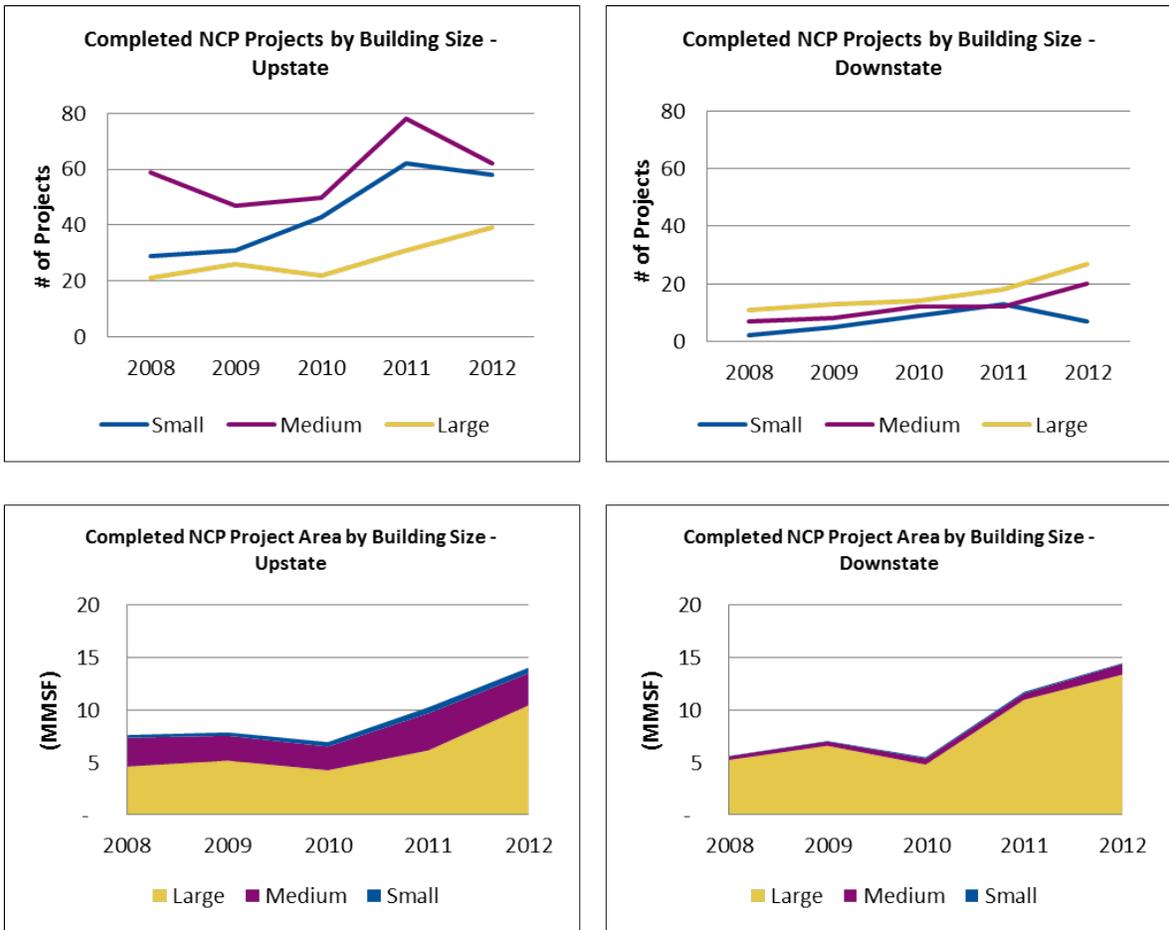


A breakdown of the number and area of NCP projects, as shown in Figure 3-7 suggests that regional differences in total project number and square footage is driven largely by a higher number of small and

medium NCP projects upstate and larger “large” projects downstate.<sup>34</sup> Medium-sized projects in the upstate region have consistently comprised the highest number of NCP projects on an annual basis.

**Figure 3-7. Completed NCP Project by Building Size and Downstate/Upstate Region, 2008-2012**

Source: Navigant analysis of NCP Cross Program Database

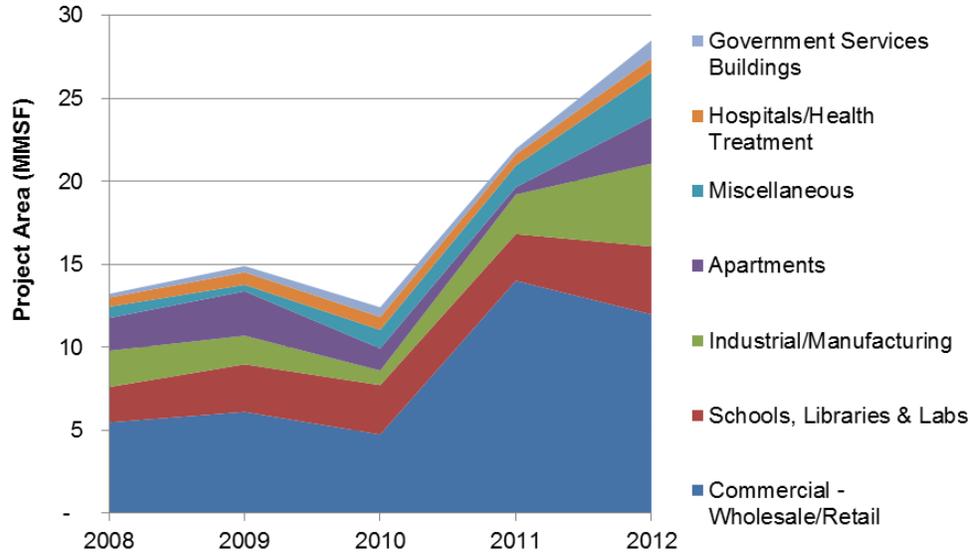


**NCP activity has increased in most sectors in the past two years, with all but the commercial wholesale/retail and schools/libraries/labs sectors showing constant growth since 2010.** Figure 3-8, which presents a breakdown of completed NCP projects by market sector for the 2008–2012 time period, reflects this trend. The analysis of program data by sector indicates that the industrial/manufacturing sector comprised a significantly higher portion of the total NCP project area in 2012.

<sup>34</sup> Small: <20,000 sf, Medium: 20,000-100,000 sf, Large: >100,000 sf

**Figure 3-8. Completed NCP Projects by Market Sector, 2008-2012**

Source: Navigant, NCP Cross Program Database



### 3.2.2 NCP Market Penetration

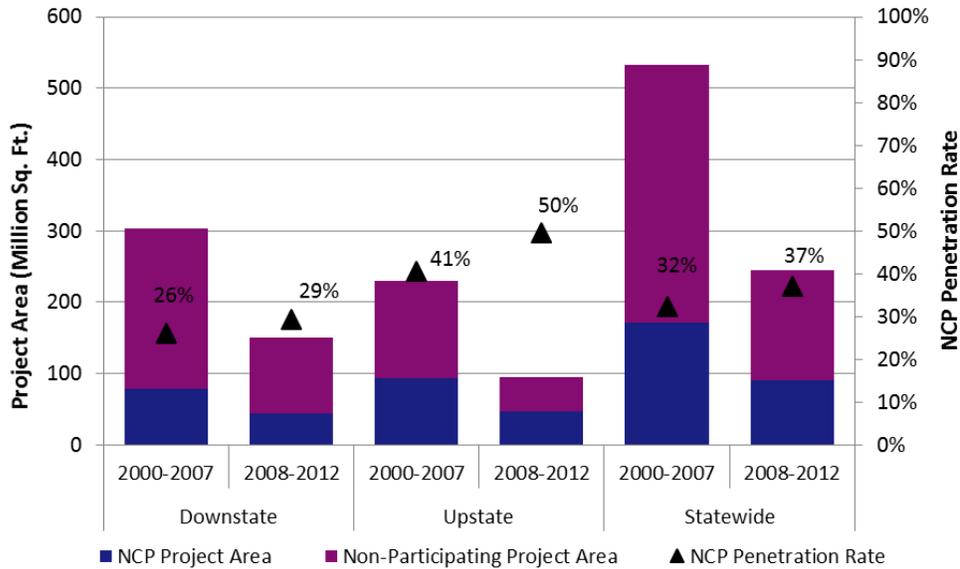
The PE/MCA Team conducted an analysis of the NCP’s penetration of the statewide new construction market during the 2008 – 2012 time period. This market penetration analysis serves as an update to the penetration evaluation completed for the years 2000–2007 in the 2008 NCP MCA, which reported NYSERDA’s statewide penetration at 32%. In addition to a statewide penetration result, NCP’s market penetration was measured with respect to geography (upstate/downstate), building size, building structure type, and utility territory. This section presents penetration analysis by geography, building size, and structure type; penetration by utility is presented in Appendix B.3.

**Results from the updated statewide market penetration analysis, as seen in Figure 3-9, suggest that the NCP’s overall market penetration has increased from 32% of total project area in 2008 to 37% in 2012.** Data by region shown in Figure 3-9 reveals that the NCP has been involved in projects representing 49% of upstate market project area but only 29% of project area for downstate projects.

**Figure 3-9. NCP Market Penetration (Building Area) by Downstate/Upstate Region and Statewide, Cumulative for 2000-2007 and 2008-2012**

Percentages indicate NCP Market Penetration

Source: Navigant analysis of McGraw-Hill Construction New, Addition, and Alteration Database and NCP Cross Program Database

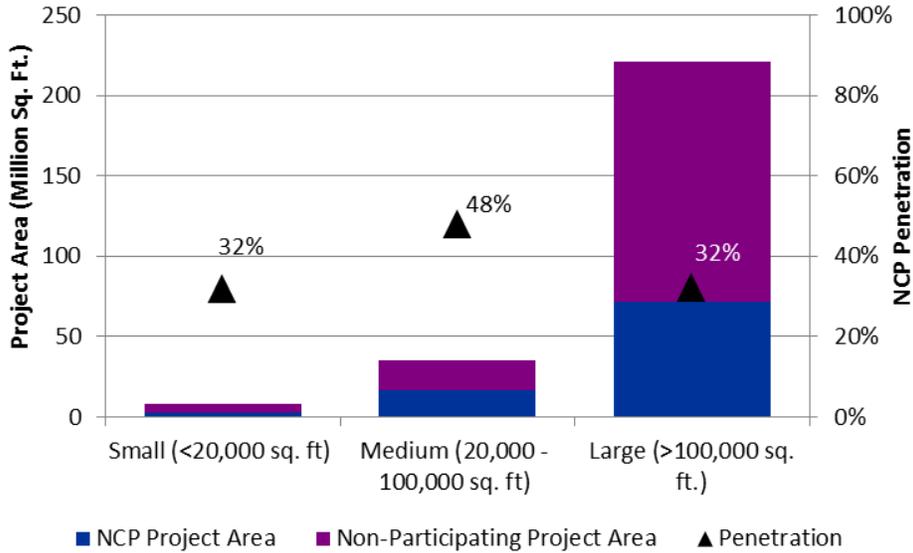


**An analysis of market penetration by building size shows that the NCP’s highest rate of market penetration is among medium-size buildings; however, large buildings still comprise the majority of NCP activity.** Figure 3-10 presents the NCP’s market share of total building area by building size for small, medium, and large buildings during the 2008–2012 time period. Projects engaged by NCP represented 48% of the floor space for medium-size buildings, but only 32% of square footage for each of the large and small building categories.

**Figure 3-10. NCP Market Penetration (Building Area) by Building Size, Cumulative 2008-2012**

Percentages indicate NCP Market Penetration.

Source: Navigant analysis of McGraw-Hill Construction New, Addition, and Alteration Database and NCP Cross Program Database

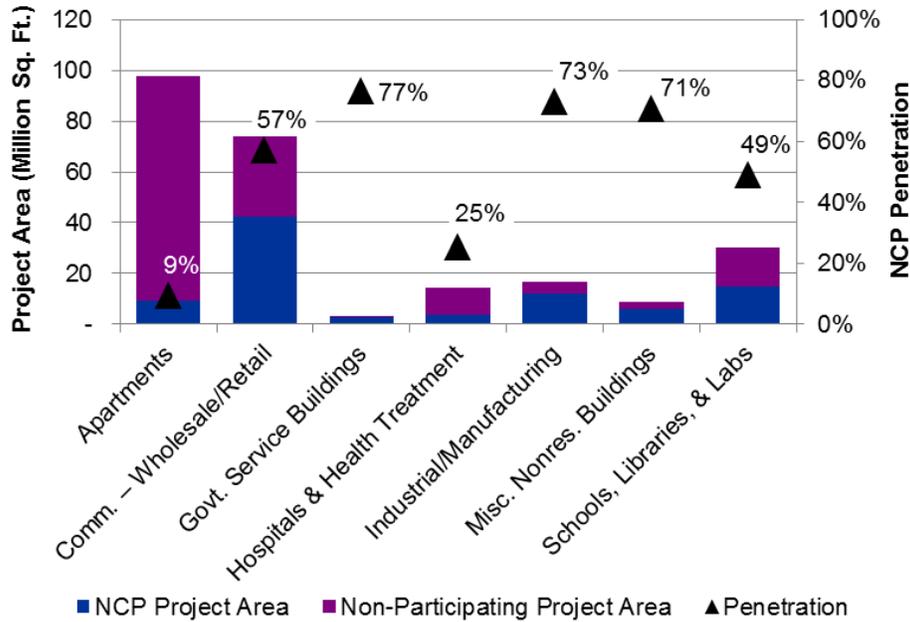


General market and NCP activity between 2008 and 2012 was dispersed among a number of different building types, as shown in Figure 3-11. The wholesale/retail commercial sector comprises the largest square footage of total NCP project area; however, the NCP achieved the highest penetration of total new construction activity in government services (77%) and industrial/manufacturing buildings (73%). NCP penetration was lowest for apartment buildings, at 9% of total statewide project area.

**Figure 3-11. NCP Market Penetration (Building Area) by Structure Type, Cumulative 2008-2012**

Percentages indicate NCP Market Penetration. The strategy used to map structure types to the categories presented in the figure is shown in Appendix A.1

Source: Navigant analysis of McGraw-Hill Construction New, Addition, and Alteration Database and NCP Cross Program Database



Notably, NCP penetration increased in most sectors since the end of 2008. Table 3-1 compares the program’s current market penetration by sector to that in the 2008 MCA Evaluation.

**Table 3-1. Comparison of NCP Market Penetration (Building Area) by Structure Type, 2000-2007 versus 2008-2012**

Percentages indicate NCP Market Penetration. The strategy used to map structure types to the categories presented in the figure is shown in Appendix A.1

Source: Navigant analysis of McGraw-Hill Construction New, Addition, and Alteration Database and NCP Cross Program Database

Structure Type	NCP Market Penetration: 2000- 2007	NCP Market Penetration: 2008-2012

Structure Type	NCP Market Penetration: 2000- 2007	NCP Market Penetration: 2008-2012
Apartments	13%	9%
Commercial – Wholesale/Retail	39%	57%
Government Service Buildings	69%	77%
Hospitals & Health Treatment	34%	25%
Industrial/Manufacturing	35%	73%
Miscellaneous Nonresidential Buildings	69%	71%
Schools, Libraries and Labs	52%	49%

### 3.2.3 End User and Design Team Participation

**In 2012, the NCP worked with 60% of the top 20 building owners based on number of project starts, but only 10% of building owners based on project value.**<sup>35</sup> To assess end-user participation in the NCP, the PE/MCA Team analyzed market data from the Dodge Players Database to determine the top new construction project owners in terms of the number of projects completed and total value of projects statewide. The team compared these data to data from NCP project database to determine the share of these owners/developers with which the NCP program has recently engaged.<sup>36</sup>

**In terms of 2012 project starts, the NCP worked with 70% of the top 20 architectural firms (50% based on project value) and 70% of the top 20 engineering firms (45% based on project value).**<sup>37</sup> Similar to the end user participation analysis, the PE/MCA Team analyzed market data from the Dodge Players Database to determine the top 20 engineering and architecture firms in the state in terms of the number of projects completed and total value of projects statewide. These data were compared with similar data from the NCP project database to determine with how many of the firms the NCP program is currently engaging.

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<sup>35</sup> Note that these figures do not fully account for those projects listed under alternative company names (i.e., limited liability corporations, real estate investment trusts or special purpose entities) that may be associated with a particular building owner. NCP often receives applications for large commercial projects with an owner name that is project specific, such as 99 East Street Associates LLC, rather than the name of the parent company. As a result, NCP total participation with a large development company on multiple projects may be difficult to ascertain.

<sup>36</sup> Appendix B.4 presents the top 20 building owners and indicates with an “X” which participated in the NCP during the 2008–2012 time period.

<sup>37</sup> As with project owners, a similar challenge may occur in tracking A/E firm participation in NCP, wherein a company may be listed under various partnerships.

## 4 Market Assessment

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This section presents findings from the MCA in-depth interviews and secondary literature review. Section 4.1 describes general trends and the effects of the Recession on the new construction and major renovations market. Section 4.2 discusses end user decision making and awareness of energy efficiency. Section 4.3 summarizes findings related to design team expertise and service delivery. Section 4.4 presents results from the questions regarding program spillover. Note that this study did not attempt to draw a statistically significant sample of market actors; therefore, the PE/MCA Team cannot extrapolate the quantitative conclusions presented in this section to the full population of market actors.

### 4.1 Market Activity

The market trends discussed in this section complement those in Section 3.1 by adding market actor perspectives to the prior general market activity findings. Findings presented here are more forward looking than those based on secondary data, and can be used by NCP staff to inform their own assessments of current market activity and their interactions with project stakeholders. Notably, the PE/MCA Team's review of available literature revealed a cautious optimism in the U.S. new construction market in the face of post-Recession market changes. Market actors also described several distinct differences between the upstate and downstate new construction and renovation markets; they most often mentioned financing challenges (e.g., financing availability) when describing how the Recession affected the state's new construction market.

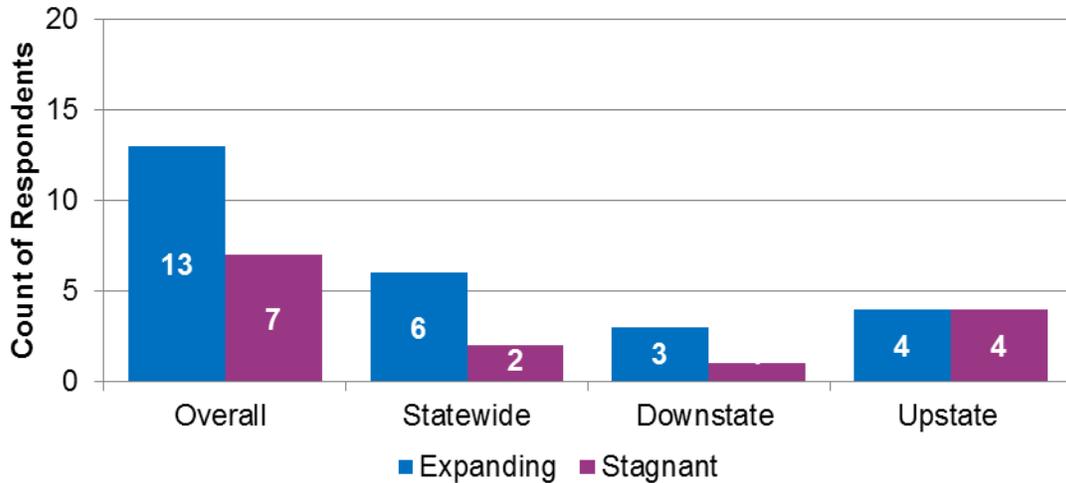
#### 4.1.1 Market Trends

**Market actors echoed the cautious optimism about new construction market growth over the next five years.** Interview respondents expect to see growth across most sectors, with the notable exception of the public sector. As shown in Figure 4-1, when asked about their expectations for the growth of the general new construction and renovation market over the next five years, respondents with an upstate perspective were evenly split in their responses (four of eight said expanding and the remaining four said stagnant). Compared to a 9/3 expanding/stagnant split among other market actors, this suggests that the recovery may be taking longer upstate. No respondents reported that the market was declining.

**Figure 4-1. What are your expectations for the growth of the new construction and renovation market in New York State over the next five years?**

“Overall” presents statewide, downstate and upstate categories combined. Statewide includes those market actors with a statewide, rather than upstate or downstate, perspective. Quantitative comparisons of interview responses are intended to show general trends or directions only. They should not be considered statistically representative or statistically significant.

Source: Navigant analysis of in-depth interview responses.



**Market actors described several distinct differences between the upstate and downstate new construction and renovation markets.** Respondents described the upstate market as having focused support from regional government, economic development, and job creation initiatives, longer project timelines and a slower pace of recovery from the Recession. Respondents generally described the downstate market as having higher property values, more office sector activity, higher utility rates and larger projects. When asked to describe differences between the upstate and downstate markets, respondents consistently mentioned the availability and cost of real estate and risk aversion as drivers behind the size of projects upstate versus downstate. For example, a few respondents indicated that upstate project owners are more risk averse than downstate project owners, which tends to limit the size of projects in the upstate area due to the higher risks inherent in larger buildings. One respondent elaborated on this by saying that, by comparison, “the land downstate is too expensive to build small stuff. If you buy the land, you are going to put a big building on it.”

#### **4.1.2 Effects of the Recession on Project Financing**

Secondary research revealed a shift in project economics during the Recession and subsequent recovery. In particular, the literature review established that private financing is largely driving construction market spending as public sector financing is decreasing. Recent news coverage also indicated that the lending

environment for new construction in the State is improving. The PE/MCA Team's interviews confirmed these trends and explored how the Recession and subsequent recovery have affected financing trends and mechanisms in the new construction market.

**Interviewed market actors most often mentioned financing challenges (e.g., financing availability) when describing how the Recession affected the state's new construction market.** Banks are reportedly still much more conservative than before the downturn, requiring project owners to contribute more equity to project budgets. While the Recession has pushed interest rates down to what market actors describe as artificially low levels (a positive driver), most recognize the change as temporary. Respondents explained that some projects lost their financing altogether during the worst part of the downturn, and that government sector projects (many likely supported by federal economic stimulus funding) provided a vital, albeit minimal, level of activity that allowed the market to sustain itself through the toughest part of the Recession.

**Despite challenges during the worst of the Recession, recent news coverage indicates that the lending environment for new construction in the State is improving.** Lenders have claimed they were more open to financing the construction market in spring 2013 than they were 1-2 year prior.<sup>38</sup> In addition, equity terms are softening, and interest rates have fallen from two years ago.<sup>39</sup> Some developers interviewed for this study also said that lenders are more willing to offer construction loans than they were two years ago, since they offer higher yields. Despite these positive perspectives, lenders remain conservative.<sup>40</sup> For example, construction financing for New York City office space is more conservative post-Recession, and lenders often require pre-leasing to avoid the risk of building a vacant office. Additionally, underwriting requirements remain strict, with some New York City financiers requiring price and schedule guarantees before providing funds for a project.<sup>41</sup>

As the market continues its recovery from the Recession, some trends have emerged. Lenders' conservative tendencies have created an opportunity for new types of financing to emerge and take on a greater percentage of the project cost (and more risk) for a higher return. On the other hand, some banks are opting to diversify their risk by collaborating with other funding partners on single-project loans.

**Most market actors perceived that capital availability for new construction projects has either increased or stayed the same compared to two years ago (six of 11 respondents, see Figure 4-2).**

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38 The New York Times, "Reins Easing on New York Construction Loans", February 12, 2013.  
<http://www.nytimes.com/2013/02/13/realestate/commercial/new-york-developers-find-loans-easier-to-get.html>

39 Ibid.

40 Ibid.

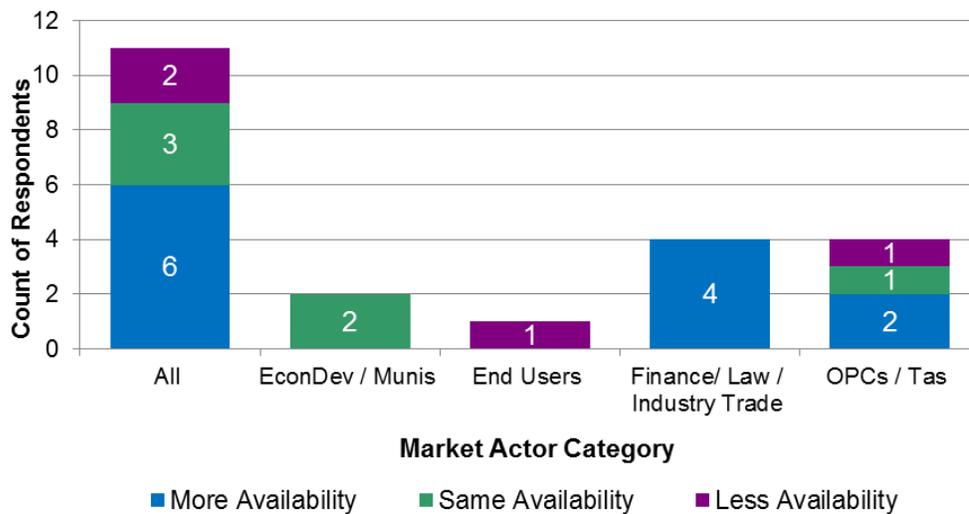
41 Ibid.

Underlying opinions varied among different types of market actors: all real estate finance and law respondents said that capital availability had improved, while OPCs and TAs had more varied responses. The Team also asked respondents whether decreased capital availability had affected (i.e., narrowed) the scope of projects during the Recession; however, responses were inconsistent and therefore inconclusive.

**Figure 4-2. How would you characterize the current availability of capital for new construction and renovation projects compared to two years ago?**

Quantitative comparisons of interview responses are intended to show general trends or directions only. They should not be considered statistically representative or statistically significant.

Source: Navigant analysis of in-depth interview responses.



**Respondents offered limited (but diverse) comments regarding the recent emergence or increasing use of new financing mechanisms; however, there was no consensus on what, if any, financing trends might arise**

"We've gone from extremes of zero equity and zero money available to a point of normalcy... as the market grows you'll see more and more competitive and more creative financing, takedowns, interesting debt structures and uses of equity... I don't see a whole lot of need for creative financing in the private sector...for the next 3-5 years, frankly."

**over the next three to five years.** When asked what new financing arrangements for energy efficient new construction have emerged or became more popular in the past few years, six of 17 market actors responded with "none." Notably, three respondents mentioned an increase in the use of public-private

partnerships<sup>42</sup> due to their ability to spread risk over several partners. Two respondents mentioned NYSERDA incentives and grants. Individual respondents also mentioned one of the following: allowable density incentives, increasing investment in projects from foreign organizations, and the tax-exempt leasing program.<sup>43</sup> When asked what they foresee in terms of trends in financing over the next three to five years, one respondent mentioned additional state financing and another mentioned advances in the “municipal district” approach to energy generation or building equipment.

## 4.2 End-User Decision Making and Awareness of Energy Efficiency

The PE/MCA team also sought market actor perspectives regarding any changes in end users’ (both building owners and tenants) awareness or decision making processes as they relate to energy efficiency. For program staff, OPCs and TAs, these findings can help inform outreach efforts and interactions with stakeholders on active NCP projects. In general, the team found that awareness and interest in energy efficiency has continued to increase over the past few years. However, final decisions about incorporating energy efficiency into construction projects still occur at the senior management level and usually require sound evidence of adequate financial returns.

**Representatives of trade, economic development, and real estate finance and law organizations expressed that building owner and tenant demand for energy efficiency is increasing compared to three years ago** (15 of 19

respondents, see Figure 4-3).

This trend generally held true regardless of geographic perspective. The only person who said demand for energy efficiency is declining **had an upstate focus.**

“Over the last several years there has been a major increase in the awareness of energy. Owners have become more aware of energy savings and what should be considered.”

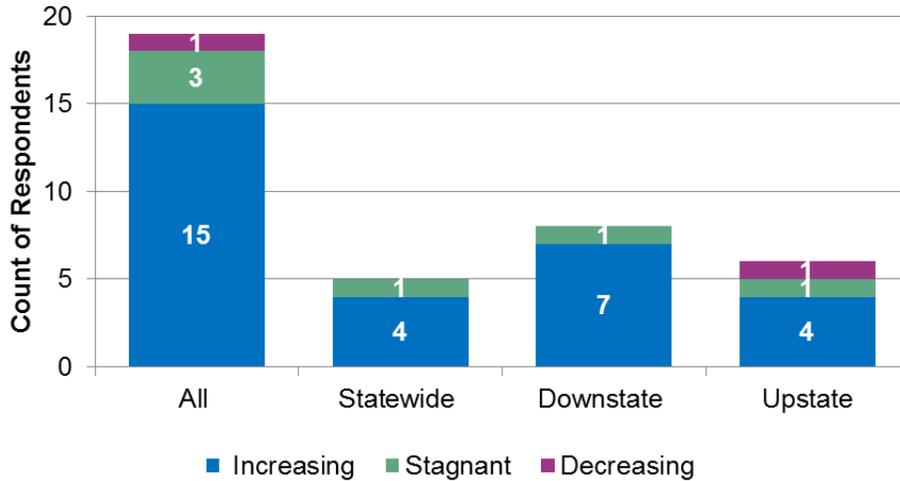
<sup>42</sup> A public-private partnership is a business relationship between a private-sector company and a government agency for the purpose of completing a project that will serve the public. Public-private partnerships can be used to finance, build, and operate projects such as public transportation networks, parks, and convention centers. Financing a project through a public-private partnership can allow a project to be completed sooner or make it a possibility in the first place. <http://www.investopedia.com/terms/p/public-private-partnerships.asp>

<sup>43</sup> Allowable density incentives allow developers an increase in the number of residential units or nonresidential square footage on a parcel beyond what the zoning ordinance allows. According to the American Planning Association (<http://www.planning.org/pas/quicknotes/pdf/QN12.pdf>), New York City uses three different approaches to award density incentives, depending on the location of the proposed development: what is allowed under the zoning ordinance, by approval of the planning commission, or by special permit with a public hearing. The Dormitory Authority State of New York (DASNY) offers a tax-exempt leasing program (<http://www.nyfirst.ny.gov/resourcecenter/AgencyPrograms/DASNY/TELP.html>). Under the program, a commercial lender retains the role of lessor while the DASNY functions as a tax-exempt lessee. The DASNY then subleases the property to a client institution.

**Figure 4-3. Response Summary: Among building owners and tenants, is demand for energy efficiency increasing, decreasing, or staying the same compared to three years ago?**

Quantitative comparisons of interview responses are intended to show general trends or directions only. They should not be considered statistically representative or statistically significant.

Source: Navigant analysis of in-depth interview responses.

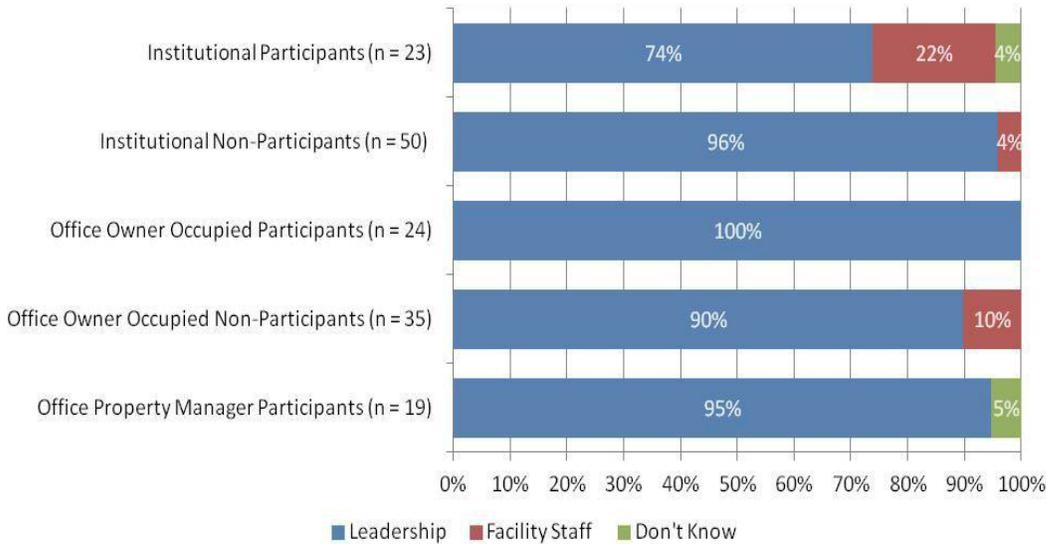


**While energy efficiency projects can start from either top-down or bottom-up initiatives, market surveys such as that shown in Figure 4-4, reveal that final decisions on implementing energy efficiency projects are most often made by a member of the organizational leadership team.<sup>44</sup>** Figure 4-4 illustrates this finding from a recent evaluation of NYSERDA’s Existing Facilities Program, highlighting the prevalence of senior-level decision making related to energy efficiency issues.

<sup>44</sup> NYSERDA Existing Facilities Program Survey Responses, Existing Facilities Program Market Characterization and Assessment Report, Prepared by Navigant Consulting, Inc. for NYSERDA. July 2012.

**Figure 4-4. Energy Efficiency Project Decision Makers (Existing Facilities Program)**

Source: NYSERDA Existing Facilities Program Survey Responses, Existing Facilities Program Market Characterization and Assessment Report, Prepared by Navigant Consulting, Inc. for NYSERDA. July 2012.



Within the decision-making team, the role of individuals dedicated to energy or environmental issues (e.g., a Sustainability Officer) is becoming more pronounced and influential, especially with respect to financing activities.<sup>45</sup> Currently, 55-70% of firms with more than \$250 million in annual revenue have a dedicated sustainability person/team.<sup>46</sup>

**Market actors expressed diverging opinions as to whether project owners incorporate energy efficiency before or after determining their project financing needs.** Most surveyed real estate finance and law firms indicated that project owners incorporate energy efficiency before project financing needs have been determined; OPCs, TAs, end users, and trade organizations provided mixed responses. For example, several end users acknowledged that the expected cost of any efficiency measures should be incorporated into financing decisions, and respondents said that they generally justify those decisions by forecasting savings from energy efficiency measures in their budget calculations. Conversely, end users that incorporate energy efficiency after they have identified their financing needs noted that they often work with pre-established capital budgets. These findings reiterate that earlier is better in terms of NCP engaging with project stakeholders, and that clear evidence about expected financial returns from specific efficiency measures and technologies can contribute greatly to their inclusion in project plans.

<sup>45</sup> The Business Case for Energy Efficient Building Retrofit and Renovation Smart Market Report, McGraw-Hill Construction, 2011.

<sup>46</sup> Ibid.

**Decisions to incorporate energy efficiency goals and measures occur earlier in public sector projects, likely due to institutional or public mandates.** More public sector end users indicated that they incorporate energy efficiency at the start of a project, compared to commercial sector end users. In general, these public-sector respondents were more likely to mention the role of a sustainability team, efficiency requirements, and goals for LEED certification in their planning processes. This finding suggests that goals and approaches to energy efficiency are more formalized in the public sector. Conversely, most commercial-sector end users said that they incorporate energy efficiency during the design phase.

**NCP OPCs perceive that confusion and lack of awareness are the greatest barriers to more project teams participating in the NCP.** According to interviewed OPCs, the large number of NYSERDA offerings and competition from utility programs<sup>47</sup> contribute to a lack of clarity about NCP opportunities among potential new participants and untapped markets. Similarly, a few OPCs noted that the NCP has developed a reputation for being “cumbersome” based on the perception that completing the program application and subsequent administrative tasks requires significant time and resources. Section 5.6 discusses market actor opinions on the NCP application process in more detail.

### **4.3 Design Team Expertise and Service Delivery**

The PE/MCA team explored several issues through design team interviews in an effort to explore how industry standards and practices have changed over time. This section’s findings reveal a sustained and growing role for energy efficiency in the State’s new construction market and can help NCP staff tailor their messaging and incentives to align with design team’s own efforts to engage end users.

#### **4.3.1 Standard Practice and Energy Code**

**Design teams and TAs stated that standard practices for energy efficiency have improved over the past three years due to increased owner awareness, stricter energy codes, and availability of incentives.** Design teams in particular described their standard practice as more efficient than three years ago, in large part because of increased availability and improved client awareness of efficient technologies. Respondents felt that continuing media coverage of energy efficiency and the availability of incentives have helped improve end users’ awareness and acceptance of energy efficiency.

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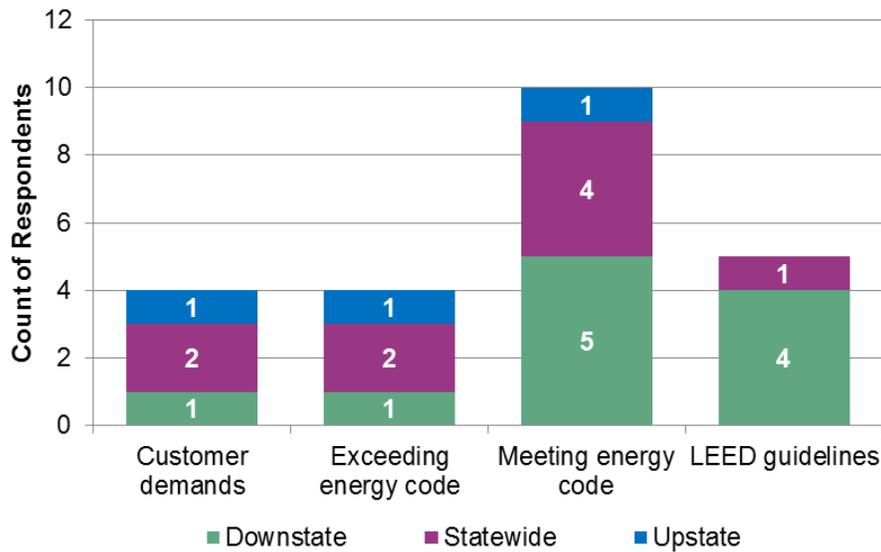
<sup>47</sup> While investor owned utilities in the State do not offer new construction incentives, utility incentives for existing facilities may compete directly with large renovation projects eligible for NCP incentives.

As demonstrated in Figure 4-5, when asked to describe their standard practice for energy efficient new construction, some design teams and technical assistance providers said that they aim to comply with state energy code (10 of 20 respondents). A few additional firms (four of 20 respondents) expressed that their standard practice aims to exceed energy code, but provided no detail about what influences them to do so.<sup>48</sup> Notably, four downstate respondents said that they consider LEED standards as their energy efficiency standard practice even when clients are not planning to pursue LEED certification.<sup>49</sup> Via follow up questions, some design teams said they try to design beyond energy code whenever possible (six of 12 respondents), but that building types and project budgets ultimately determine when extension beyond code is feasible (i.e., affordable).

**Figure 4-5. Response Summary: How would you describe your “standard practice” for energy efficiency in new construction or renovation?**

Quantitative comparisons of interview responses are intended to show general trends or directions only. They should not be considered statistically representative or statistically significant. Downstate, statewide and upstate categories indicate market actor perspective.

Source: Navigant analysis of in-depth interview responses.



<sup>48</sup> For this particular question, TAs were asked to provide their response based on their perspective as a design firm, rather than their perspective as an NCP TA.

<sup>49</sup> Because this study did not attempt to draw a statistically significant sample of market actors, no direct comparisons can be made between data in the 2008 NCP MCA and findings in this report regarding what percentage of market actors go beyond code as standard practice.

**Commercial builders stated that code officials inspect design plans for some measures more than others and that those officials are more likely to check design plans than actually field-inspect those buildings.** The PE/MCA Team reviewed existing code compliance literature to assess service providers' attitudes regarding the code compliance process the State and what measures are being installed to comply with new and evolving code requirements. The 2012 NYSERDA Code Compliance Study reports that most builders of commercial-code properties think there is a high degree of likelihood that code officials will check their plans regarding new commercial energy code requirements, but think it is less likely that code officials will field-inspect those buildings.<sup>50</sup> Most builders cited in the study expressed uncertainty about the level of difficulty to comply with new changes in the energy code. With respect to specific measures related to code compliance and enforcement, commercial builders expressed that code officials are most likely to check design plans for the installation of three measures: occupancy sensors, required lighting densities, and deck roof insulation. On the other hand, the contractors surveyed for the study expressed that those code officials are least likely to check for the following measures: fan and pump horsepower design specifications and demand control ventilation.

**Design teams and TAs consider efficient HVAC and lighting as the easiest ways to exceed energy code.** Those respondents that discussed exceeding energy code most often mentioned HVAC and lighting, particularly sensors and controls, as the most cost-effective technologies to exceed code. Respondents also noted several advanced energy technologies that are implemented more frequently than in the past, but are not yet standard practice, including LED lighting, renewable energy systems, and co-generation. A few interviewees noted that co-generation is more commonly implemented in New York City.

**Design teams have several channels for learning about and understanding energy code requirements and changes:**

- The U.S. Department of Energy's (DOE's) Building Energy Codes Program<sup>51</sup> provides information and assistance, including energy code technical assistance, DOE Advanced Energy Design Guides, Compliance Evaluation Checklists, and other Resource Guides.
- The NYSERDA Energy Code Training Website,<sup>52</sup> in collaboration with the New York Department of State (NYDOS), provides training support for the design, construction and code enforcement community to maximize compliance with the 2010 Energy Conservation Code of New York State (ECCNYS). The NYSERDA code training e-bulletin provides information on code enforcement and administration, law and regulation changes, technical bulletins, information on other state agency

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<sup>50</sup> New York Energy Code Compliance Study, Prepared by Vermont Energy Investment Corporation, January 2012.  
[http://energycodesocean.org/sites/default/files/VEIC\\_Statewide\\_Compliance\\_Study\\_Report.pdf](http://energycodesocean.org/sites/default/files/VEIC_Statewide_Compliance_Study_Report.pdf)

<sup>51</sup> Building Energy Codes Program Website, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy (DOE): [www.energycodes.gov](http://www.energycodes.gov)

<sup>52</sup> NYSERDA Energy Code Training Website: [www.nyserdacodetraining.com](http://www.nyserdacodetraining.com)

actions related to codes, product and equipment safety, and public hearing schedules. Other support includes energy code FAQs and online and in-person training.

- The Building Code Assistance Project (BCAP)<sup>53</sup>, established in 1994 as a joint initiative of the Alliance to Save Energy<sup>54</sup>, the American Council for an Energy-Efficient Economy<sup>55</sup>, and the Natural Resources Defense Council<sup>56</sup>, hosts the Online Code Environment and Advocacy Network (OCEAN)<sup>57</sup>.
- The Association of General Contractors (AGC) offers a Building Energy Codes Toolkit<sup>58</sup> with information about code development, adoption, implementation, and compliance.
- The American Institute of Architects (AIA) provides news, resources, guides, and training on their Codes and Standards and Advocacy Page.
- The USGBC offers online courses in Energy Codes and Standards.<sup>59</sup>

Rather than assess recall or awareness about specific code-related resources, the PE/MCA Team asked respondents to volunteer those that they most frequently rely on to stay apprised of relevant code changes.

**Design teams and TAs indicated that they rely primarily on professional associations for information about building code changes, though many supplement those resources with self-education.**

Respondents most often mentioned looking to the American Institute of Architects, the International Code Council, ASHRAE and NYSERDA for information about building codes. Respondents also mentioned relying on updates from groups like the State Education Board and the New York City Building Department to stay informed of code changes, particularly when significant market overhauls occur (such as PlaNYC). Many respondents said they maintain a dedicated staff member to stay informed of code changes.

**Most firms do not have a formal process for assessing how code changes might affect their approach to energy efficient new construction design; respondents seemed more reactive than proactive about addressing code changes.** Respondents from most firms asserted that they adjust their approach to code compliance “as necessary” when code changes occur. Only two of 20 responses from design teams mentioned proactively modeling the impacts of upcoming code changes early in project work to prepare for

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<sup>53</sup> Building Code Assistance Project Website: <http://bcap-energy.org/>

<sup>54</sup> Alliance to Save Energy (ASE) Website: <http://www.ase.org/>

<sup>55</sup> American Council for an Energy-Efficient Economy (ACEEE) Website: <http://www.aceee.org/>

<sup>56</sup> Natural Resources Defense Council Website: <http://www.nrdc.org/>

<sup>57</sup> Online Code Environment and Advocacy Network (OCEAN) Website, a project of the Building Codes Assistance Project: <http://www.bcap-ocean.org/>

<sup>58</sup> Building Energy Codes Toolkit, a project of the Associated General Contractors (AGC) and U.S. DOE Building Energy Codes Program (BECP): [http://www.agc.org/cs/building\\_energy\\_codes\\_toolkit](http://www.agc.org/cs/building_energy_codes_toolkit)

<sup>59</sup> U.S. Green Building Council, Energy Codes and Standards Online Course Information Website: <http://www.usgbc.org/courses/energy-codes-and-standards>

changes. These firms conduct this analysis to provide cost estimates to clients and to manage client expectations.

### 4.3.2 Service Offerings and Staff Certification

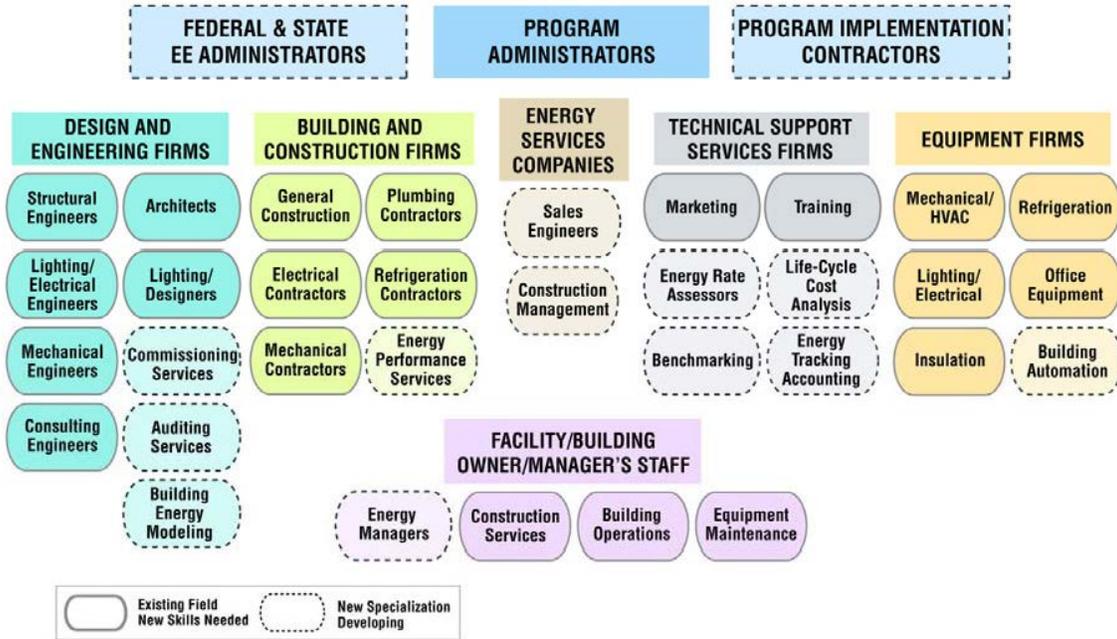
The literature review indicated that New York State firms are pursuing a convergence of design and construction services through mergers and acquisitions, partnerships, consortia, and organic growth.<sup>60</sup> This trend is driven by owner demands for greater energy efficiency services and concurrent pressure on firms to grow and survive in an era of uncertainty and restrained economic growth. **The interviews confirmed that client demands—coupled with enhanced building codes and requirements—are driving design teams and other service providers to include more energy efficiency-related services in their suite of offerings.** To keep up with this increasing demand, respondents said that they provide additional training or add staff with energy efficiency-specific skills. Figure 4-6 illustrates the spectrum of energy efficiency service providers and their energy efficiency-related offerings, with designations for existing service offerings and new developing specializations within design and engineering firms, building and construction firms, energy service companies, technical support services firms, and equipment firms.

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<sup>60</sup> Organic growth is defined as growth resulting from a company's existing services and products, rather than growth resulting from the development of new services or products.

**Figure 4-6. Commercial Institutional Energy Efficiency Service Providers and Energy Efficiency Related Offerings**

Source: Adaptation of graphic from C. Goldman, J. Peters, M. McRae, S. Lutzenhiser, and M. Spahic. "Energy Efficiency Services Sector: Workforce Size and Expectations for Growth," Ernest Orlando, Lawrence Berkeley National Laboratory, 2010.



**Design teams are hiring new staff with energy efficiency skills, but more often opt to train existing staff or collaborate with other firms in order to expand their efficiency-related services and capabilities (Figure 4-7).**

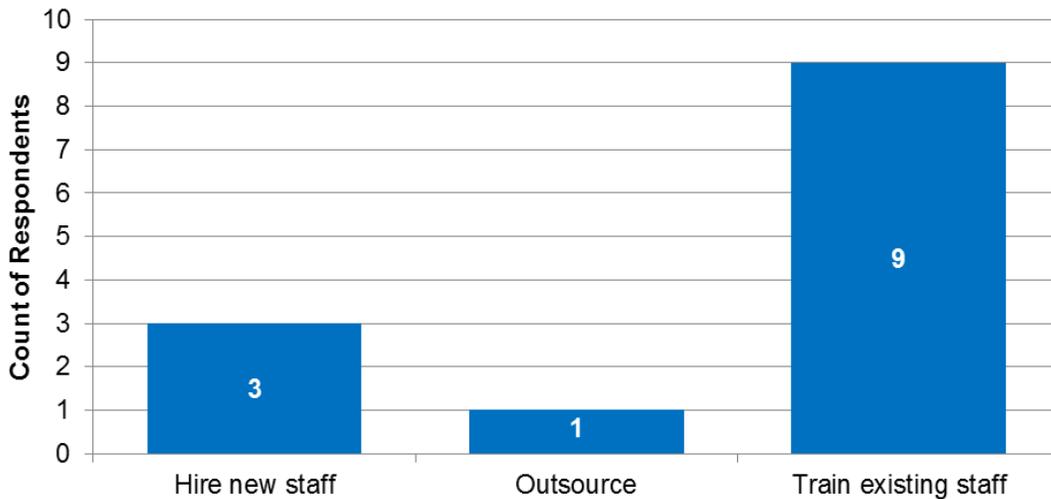
Architecture and engineering firms are hiring new staff with experience in deep energy retrofits, energy modeling, commissioning, and the multi-family sector in order to meet growing customer demands. Nearly all firms interviewed encourage their staff to seek professional certification related to energy efficiency. Those firms most frequently encourage (and some require) LEED accreditation for their staff. Six out of nine firms indicated that they have expanded the scope of their services by collaborating with other firms in the market.

“...I definitely see a lot more collaboration, not only by employing professionals in a specific area of expertise, but if they don’t have the capacity to do that they will then partner with another firm to do something like a design-build. In some instances they have almost created a new corporation in order to meet specific design needs.”

**Figure 4-7. Response Summary: In the past 3 years, have you either hired additional staff or trained existing staff specifically to help meet demand for energy efficiency expertise?**

Quantitative comparisons of interview responses are intended to show general trends or directions only. They should not be considered statistically representative nor statistically significant.

Source: Navigant analysis of in-depth interview responses.

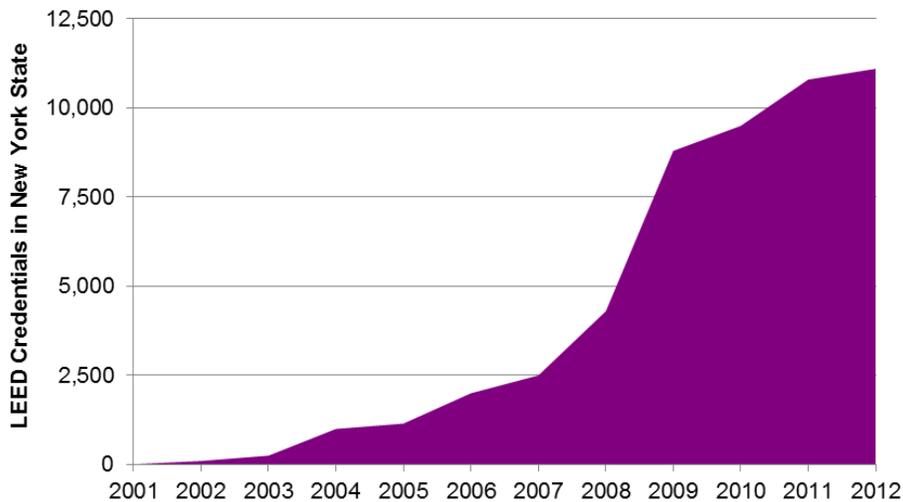


### 4.3.2.1 LEED Credentialing

Service providers can use LEED certification as a way to formalize their training, expertise, and services related to energy efficiency in new construction projects. In particular, professionals can obtain credentials as LEED Green Associates or LEED Accredited Professionals (APs)<sup>61</sup>. As of January 2013, the State had 11,417 LEED-accredited professionals, of which 1,775 were LEED Green Associates and 9,639 were LEED APs (with or without a specialty).<sup>62</sup> Credentialing trends in the State, as seen in Figure 4-8, have followed a pattern similar as the rest of the United States, with service providers pursuing LEED accreditation at a steady rate with the exception of a large jump in credentialing in 2008-2009. The jump in LEED credentials during that time could possibly be explained by the need for individuals to differentiate their skills and services during the Recession.

**Figure 4-8. LEED Credentials in New York State: Cumulative Count of AP, Specialty and Green Associate, 2012**

Source: Adapted from USGBC



Service providers also improve their services through a growing series of certification programs offered by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).<sup>63</sup> ASHRAE certifications have followed an upward trend, but with numbers far lower than LEED certifications. There are more than 1,700 ASHRAE certified professionals worldwide, at least 120 of which are based in New

<sup>61</sup> For more information about LEED accreditation, visit <http://www.usgbc.org/leed/credentials>.

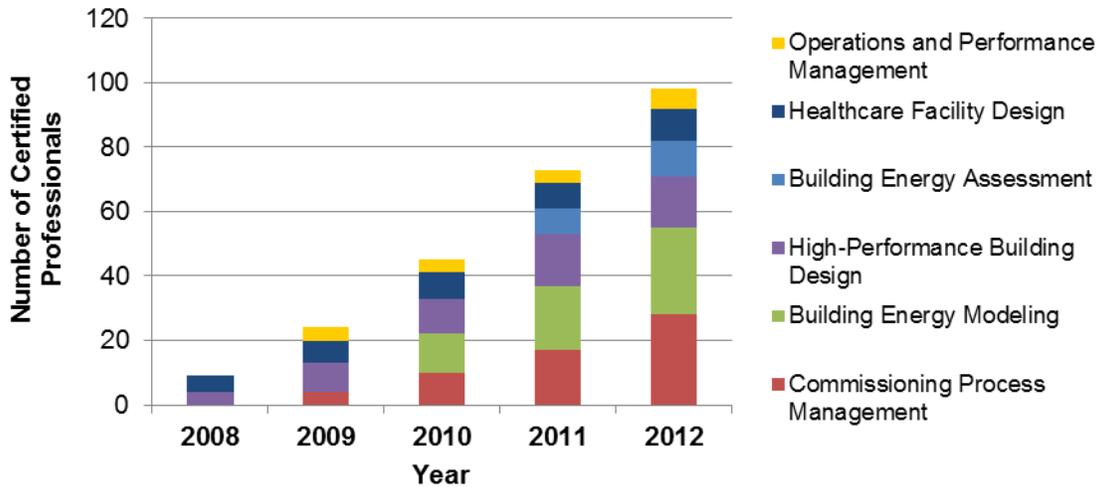
<sup>62</sup> US Green Building Council, LEED Project Directory. Available for download at: <http://www.usgbc.org/projects>

<sup>63</sup> For more information about ASHRAE's certification programs, visit <https://www.ashrae.org/education--certification/certification>

York State.<sup>64</sup> Certification is dispersed among a number of specializations, with commissioning process management and building energy management comprising the most certified professionals in 2012 (Figure 4-9).

**Figure 4-9. Number of ASHRAE Certified Professionals in New York State**

Source: Navigant analysis of ASHRAE certification data, May 2013  
 (http://cms.ashrae.biz/certification/logo/newsearch.php)



## 4.4 Program Spillover

This section serves as an initial characterization of the potential mechanisms for program spillover to inform a complete analysis by the Impact Evaluation Team and discusses spillover responses as they relate to: prior awareness of energy efficiency design and the NCP; NCP’s influence on energy efficiency in new buildings beyond design teams’ standard practice; and NCP’s influence on energy efficiency design outside of NCP-supported projects. Relevant trends are presented by geography (i.e., upstate and downstate) and by participation status (i.e., participants and non-participants) whenever possible. For context, Table 4-1 defines the three types of program spillover typically assessed in a spillover analysis.<sup>65</sup>

<sup>64</sup> Navigant analysis of ASHRAE data

<sup>65</sup> Additional information on program spillover can be found in the updated program logic model, which includes an appendix section dedicated to the topic for the NCP. <http://www.nyserda.ny.gov/Publications/Program-Planning-Status-and-Evaluation-Reports/NYES-Evaluation-Contractor-Reports/2013-Reports/Program-Logic-Model.aspx>

#### Table 4-1. Types of Program Spillover

Source: High Performance New Construction Program Logic Model Report, Prepared for NYSERDA by GDS Associates, Navigant, and Research Into Action. July 2013.

Term	Definition
Non-participant Spillover	Energy savings experienced or reported by non-participants that are judged to have been caused or induced by program influences such as through non-participant's conversations with participants or by their doing business with implementation contractors.
Participant Inside Spillover	Energy savings above and beyond reported program savings that arise from additional (non-incentivized) efficiency measures installed by a participant at a participating project site
Participant Outside Spillover	Energy savings from measures designed by participating design firms and installed at building sites that are not receiving any assistance or rebates from the program

When asked about positive early experiences with energy-efficient design that led them to pursue energy efficiency in subsequent new construction projects or renovations, most respondents (75%; n=12) could recall a positive early experience with energy efficiency design that led them to pursue energy efficiency in subsequent projects. Valid responses that captured detailed descriptions of how these experiences changed their thinking consistently included mention of a project with a specific client or technology that set the firm on the path of pursuing energy issues in projects.

The majority (86%; n=14) of non-participant design teams said that they had heard of the NCP prior to their interview. Of those who had heard of the NCP, two-thirds said that they were aware of new construction projects that had received funding or technical support from the NCP, and all but one indicated that they do believe NCP assistance resulted in a higher level of efficiency being designed and ultimately installed in those buildings, relative to standard practice in the market.

Six of the seven participant design team respondents indicated that over half of the buildings they have worked on in the past year have been designed to qualify for potential incentives from the NCP; three of these respondents indicated that 90% of their projects have been designed to qualify for NCP incentives. Most (71%; n=7) of the participant design team respondents agreed that the projects that received NCP funding or technical support resulted in a higher level of efficiency being designed and ultimately installed in those buildings relative to standard practice in the market.

The PE/MCA Team asked design team respondents whether their experiences with the NCP influenced them to include energy efficiency in other, non-NCP projects. Respondents were evenly split in their

responses to this question, with half (n=16) agreeing that their experience with the NCP has influenced them to include energy efficiency in other, non-NCP projects, and the other half disagreeing. Many of those who disagreed mentioned that energy efficiency is included in all of their designs and NYSERDA has not necessarily changed that mindset; rather, it has acted more as a bonus (five responses). One respondent who agreed that the NCP influences other, non-NCP projects mentioned that he/she learns things on NCP projects that can then be applied to other projects. Another respondent stated that the technical assistance portion of the program has really helped him/her understand what is possible in their specific facilities; this individual went on to describe themselves as very knowledgeable about individual technologies but not about the interplay between those technologies.

Design team respondents were also split in regard to whether the NCP has changed the way they specify or design the level of efficiency that is incorporated into new buildings; 44% of design team respondents agreed that NCP has changed the way they specify or design efficiency into new buildings while 56% disagreed (n=18).

Most design team respondents (82%; n=11) said that they were aware of other indirect effects that the NCP may have had on the level of efficiency being designed and installed in new buildings in their market. The most commonly-cited indirect effects were increased awareness of energy efficiency and more energy efficiency experts in the workforce. One participant respondent mentioned that the NCP makes maintenance easier for clients because it has straightforward requirements, which limits the options for lighting and makes it easier for people to keep equipment in stock.

## 5 Crosscutting Topics

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This section presents findings related to several crosscutting topics from the MCA secondary literature review and in-depth interviews. Section 5.1 discusses advanced technologies, Section 5.2 covers NZE building opportunities, Section 5.3 explores the relationship between the NCP and LEED certification, Section 5.4 reviews findings regarding tenant build-out projects, Section 5.5 covers small projects, and Section 5.6 explores the NCP's shift to the CFA.

### 5.1 Advanced Technology

One of the key research objectives of this study was to understand market perceptions of more advanced energy efficiency technologies and approaches.<sup>66</sup> As energy efficiency standard practices and building codes improve, opportunities to acquire energy savings from more widely accepted measures will likely diminish, and programs like the NCP will need to look elsewhere to encourage deeper savings. This section highlights the Team's key findings about market actor awareness, perceptions and experiences with these next steps in energy efficient building.

**Market actors vary considerably in how they define advanced versus standard energy efficiency technology. Specifically, end users' understanding of advanced technologies is wide ranging.** The breadth and inconsistency of interview responses about advanced technologies indicate that market actors have a varied opinion of what constitutes an "advanced" measure. Responses also indicated a general lack of understanding of the perceived costs and benefits of investing in advanced measures. In general, interviewees most frequently responded to questions about advanced technologies with mentions of building energy management systems (BEMS), operator training, and controls. Other approaches that received multiple mentions include renewable generation (eight mentions), chilled beams<sup>67</sup> (two mentions), plug-load controls (two mentions), and deep energy retrofit strategies (one mention). In general, respondents noted that efficient lighting, simple controls, and code-compliant technologies constitute a standard technology or strategy for energy efficiency (six mentions). Four respondents stated that they consider efficient HVAC systems with simple controls as standard in some buildings, such as schools. A summary of commonly cited advanced and standard technologies are presented in Table 5-1.

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<sup>66</sup> For the purposes of this study, the PE/MCA Team defined "advanced technologies" as building energy management systems and their components such as sub-metering and controls, as well as those technologies that are not yet part of standard design practice such as renewable energy generation and plug load controls.

<sup>67</sup> A chilled beam is a type of convection HVAC system designed to heat or cool large buildings. Pipes of water are passed through a "beam" (a heat exchanger) either integrated into standard suspended ceiling systems or suspended a short distance from the ceiling of a room. As the beam chills the air around it, the air becomes denser and falls to the floor. It is replaced by warmer air moving up from below, causing a constant flow of convection and cooling the room. Heating works in much the same fashion, similar to a steam radiator. Source: [http://en.wikipedia.org/wiki/Chilled\\_beam](http://en.wikipedia.org/wiki/Chilled_beam)

**Table 5-1. Commonly Cited Technologies by Market Actor Type**

Source: Navigant in-depth interview responses

<b>Market Actor</b>	<b>Advanced Technologies</b>	<b>Standard Technologies</b>
<b>Design Teams</b>	Renewable generation	Code compliant technologies
<b>End Users (non-participant)</b>	HVAC & controls, BEMS	LEED certification
<b>End Users (part-participant)</b>	Advanced BEMS, plug load control measures	Efficient lighting, efficient HVAC
<b>TAs</b>	LED lighting and controls	“Easy” controls

The literature revealed a market trend indicating that the adoption of advanced technologies is largely being driven by enhanced policies and a convergence of enhanced building and information technology (IT) capabilities (e.g., for monitoring multiple building systems remotely). The literature also demonstrated that drivers of and barriers to installation of advanced technologies vary at the measure-level. Table 5-2 presents a summary of the key drivers and barriers affecting the acceptance and implementation of the advanced measures on which this study focused.

**Table 5-2. Alignment of Drivers, Barriers and Market Trends**

Sources: Emmerich & Bloom, Commercial Building Automation Systems Security and Access, HVAC Controls, Fire and Life Safety, Building Management Systems, and Lighting Controls: Global Market Analysis and Forecasts, Pike Research LLC, Q1 2012;

Williams et al., Quantifying National Energy Savings Potential of Lighting Controls in

Commercial Buildings, Lawrence Berkeley National Laboratory, ACEEE Proceedings, <http://www.aceee.org/files/proceedings/2012/data/papers/0193-000071.pdf>;

Bloom & Gohn, Electricity Submeters: Basic and Advanced Submeter Hardware, Submeter Energy Management Software, and Submetering Services: Market Analysis and Forecasts, Pike Research LLC, Q2 2012.

	Advanced Technology Measure			
Owner Drivers	EMS	Adv. Controls	Commissioning	System Sub-Metering
Deeper savings opportunities	•	•	•	
Policies and Building Codes	•		•	•
Included in LEED			•	•
Desire for improved system integration	•	•	•	
Owner Barriers	EMS	Adv. Controls	Commissioning	System Sub-Metering
Upfront cost	•	•	•	•
Uncertainty around savings	•	•	•	
Limited technical expertise	•	•		
Not allowed in some states				•
Inconsistent standards/protocols	•			•
Key Market Trends	EMS	Adv. Controls	Commissioning	System Sub-Metering
New business models to meet demand	•			
Many installations driven by policy	•	•	•	•
Convergence of buildings and IT	•	•	•	•

**According to interviewed market actors, financial barriers continue to limit broad adoption of advanced efficiency measures.** High upfront costs, competition for capital, and other budgetary constraints most commonly prevent implementation of advanced measures and retro-commissioning. Several respondents emphasized that these financial barriers include the cost of training staff to operate new systems, adding to the upfront costs and introducing additional challenges to implementation. In contrast to the other interviewed market actors, however, a significant share of participating end user respondents (four of five) indicated there are no barriers to implementing advanced measures.

**In the downstate region, market actors expect PlaNYC’s Greener, Greater Buildings Plan requirements to improve awareness and implementation of advanced energy efficiency.** PlaNYC addresses advanced measures through requirements for benchmarking, energy audits, and retro-commissioning (RCx). The Local Laws embodied in the Plan also have code compliance requirements relating to efficient lighting and building sub-metering. PlaNYC also aims to make training materials and code compliance resources more available to the market. Collectively, these Plan elements and requirements are anticipated to improve efficiency by giving building owners and operators more information about their own consumption and how to reduce it. If successful, increased awareness from these efforts may provide a key opportunity for the NCP to improve program participation in the downstate region. Table 5-3 provides a summary of the anticipated influence of various PlaNYC initiatives on advanced measure awareness and adoption in downstate New York, based on the literature review.

**Table 5-3. Anticipated of Influence of Greener, Greater Buildings Plan Initiatives on Advanced Measure Awareness and Adoption in Downstate New York**

●= High Influence ◐= Medium Influence ○= Low Influence

Source: City of New York Greener, Greater Buildings Plan website: [www.nyc.gov/ggbbp](http://www.nyc.gov/ggbbp);  
 Navigant analysis of literature

	Initiative Summary	Anticipated Influence on Advanced Measures			
		BEMS	Advanced Controls	System Sub-Metering	RCx
<b>Local Law 84</b>	<b>Benchmarking</b> - Annual requirement to benchmark energy and water consumption (Bldgs. >50,000sf)	◐	◐	○	○
<b>Local Law 85</b>	<b>NYC Energy Conservation Code</b> - Any renovation or alteration must meet New York City's local energy code	○	●	○	○
<b>Local Law 87</b>	<b>Energy Audits and Retro-Commissioning</b> – Required energy audits and retro-commissioning once every 10 years (Bldgs. >50,000sf)	◐	◐	○	●
<b>Local Law 88</b>	<b>Lighting and Sub-metering</b> - By 2025, the lighting in the non-residential space be upgraded to meet code and large commercial tenants be provided with sub-meters	◐	◐	●	○

**Those who have implemented advanced measures and strategies provided mixed reports about the success of implementing and operating those approaches and systems.** While many respondents indicated that advanced efficiency approaches (e.g., BEMS or controls) generally met their expectations for energy savings and ease of installation, just under half noted encountering staff challenges with operating those advanced systems (13 of 31 respondents). A similar number noted having problems during the installation process or in integrating advanced measures with legacy building systems (12 of 31 respondents). Given the emphasis that owners and financiers place on the expected financial returns from energy efficiency investments, any uncertainties about the costs or ease of integrating and operating these systems could create an additional barrier to their adoption.

**Existing building staff's ability to understand and properly operate advanced technologies is a key consideration for project owners when deciding on the type of energy efficiency measures or systems to include in projects.** Design teams, end users, and representatives from real estate finance and law firms consistently noted the importance of technically trained staff when considering advanced measures. However, designers often underestimate the training that building owners and operators need to use BEMS effectively. Respondents noted that end users run into significant challenges when existing staff is unable to operate newly installed advanced measures. Designers may also encounter barriers to including BEMS and other advanced technologies in major renovations due to the need to integrate with legacy systems. These findings suggest that there are opportunities for the NCP to both manage customer expectations of BEMS and provide support for BEMS operator training for in new construction projects.

## 5.2 Net Zero Energy

As with the advanced technologies discussed above, the concept of NZE buildings represents an alternative approach to whole building design that could greatly enhancing the efficiency of new buildings and push the market beyond today's standards and practices. This study sought to complement NYSERDA staff's past exploration of market actors' understanding of NZE and their perceptions about its potential role in improving energy efficiency on a broader scale. The findings highlighted in this section reveal that market actor understanding and awareness of NZE is still relatively low, and that some market actors view the approach with skepticism. **The exact definition of a NZE building is still evolving, which may be causing some confusion in the market.** Most secondary data sources agreed that NZE buildings combine two key elements: exemplary building design to minimize energy requirements and renewable energy systems that meet these reduced energy needs. Other widely-used terms include "Zero Energy-Capable" or "Nearly Zero Energy" buildings, which generally mean the building demonstrates energy efficiency levels in the range of net-zero energy buildings but does not include any (or sufficient) on-site renewable generation to cover its annual energy use. The "Zero Energy-Capable" buildings are grid connected, which allows for electricity produced from traditional energy sources to be used when renewable energy generation cannot meet the building's energy load.

**Most interviewed architects and engineers are somewhat familiar with NZE buildings; awareness is generally low among end users.**<sup>68</sup> Six interviewees from multiple market actor groups had been involved

in at least one NZE project, typically a demonstration project.<sup>69</sup> Many market actors expressed that NZE is a good but often unattainable goal and that the perceived costs often deter potentially interested owners and developers. A few market actors

stated that better incentives for on-site solar photovoltaic (PV) systems would help encourage greater pursuit of NZE in the State. Similarly, a few downstate

“[NZE] only works in small buildings; you won’t see it on a large scale unless you are willing to allow people to buy RE [renewable energy] credits; eventually you’ll run out of credits; I think it’s something politicians like to talk about.”

market actors expressed that NZE is impossible to achieve for large buildings unless the owner can use renewable energy offset credits or other off-site energy generation; one such skeptic stated, “[NZE] only works in small buildings; you won’t see it on a large scale unless you are willing to allow people to buy RE [renewable energy] credits; eventually you’ll run out of credits; I think it’s something politicians like to talk about.” Others stated that the NZE building movement offers many valuable lessons: “(NZE) is a great learning tool for how we relate to building energy systems and the impact of occupants on energy. It is teaching us how to set measurable energy goals in our projects.”

**A lack of clear definition and low levels of awareness have likely limited NZE from gaining traction in the market.**

As of March 2012, the United States had 99 zero-energy commercial buildings, with the kindergarten through grade 12 (K-12) and higher education sectors having seen the most activity. Of the 99 zero-energy buildings, 21 were verified zero energy buildings (two in the State, with another in the planning stage<sup>70</sup>), 39 were net zero-capable buildings, and 39 were “emerging” zero energy buildings, meaning they are under construction or recently occupied. Figure 5-1 shows the number and area of zero energy buildings in the United States by sector.

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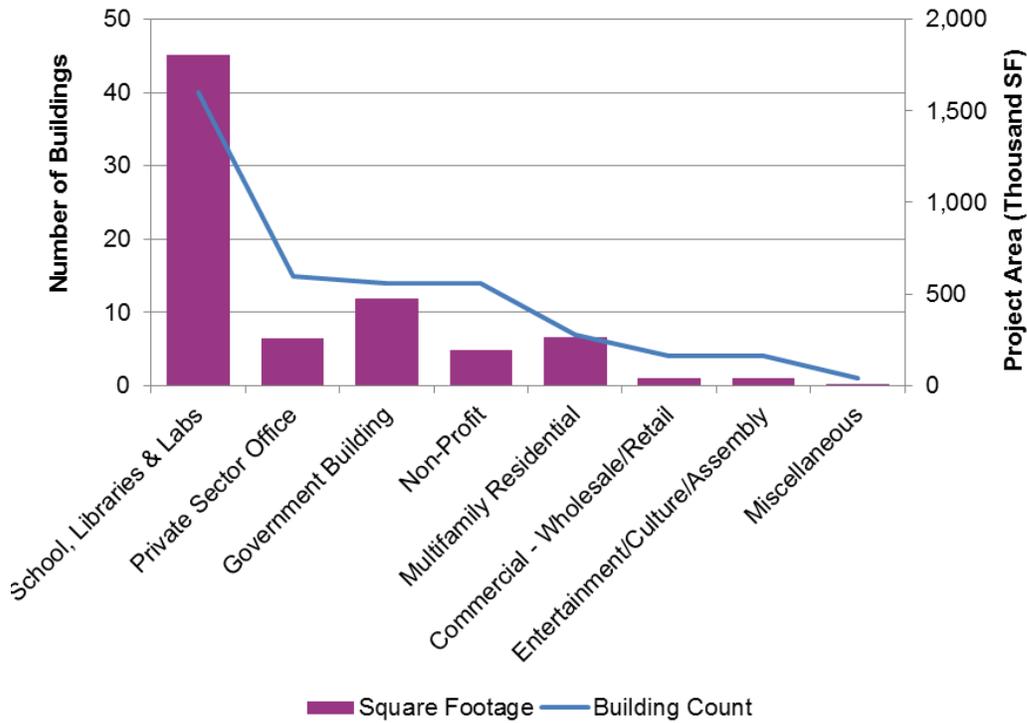
<sup>68</sup> Note that for the IDIs, the PE/MCA Team targeted design teams and end users with high levels of activity in the market, as established by their number and value or projects. This purposive sample was designed to gain insights from those organizations responsible for larger shares of market activity. Therefore, the reader should not consider these findings representative of the full population; these design teams in particular likely have higher levels of exposure to NZE projects than those less engaged with the market. See Appendix A.2 for details about the sample selection process.

<sup>69</sup> Three of those with hands-on NZE experience were TAs and OPCs, two were architects or engineers, and one was an end user.

<sup>70</sup> Project for Cornell University on Roosevelt Island.

**Figure 5-1. Number and Area of U.S. Net Zero Energy Buildings by Sector**

Source: Getting to Zero 2012 Status Update: A First Look at the Costs and Features of Zero Energy Commercial Buildings, New Buildings Institute, 2012.



When asked how NCP could better incentivize a whole building approach to energy efficiency, most market actors said they generally support the NCP’s current approach, which is based on ASHRAE/IESNA code<sup>71</sup>. However some respondents suggested that NCP should consider using different metrics, such as Energy Use Intensity, to calculate whole building incentives. Several interviewees discussed the pros and cons of various methods for incenting whole-building energy efficiency, while others noted that there “is no perfect approach”. The two most popular approaches (Energy Use Intensity [EUI] and the current method of comparing to code/ASHRAE requirements) also have their critics. In particular, some market actors expressed concerns that additional changes might make the incentives more difficult for end users to understand. Opinions on the possible metrics for incenting whole building approaches to energy efficiency can be summarized as follows:

<sup>71</sup> Currently, NCP designates ASHRAE/IESNA 90.1-2007 as the baseline for calculating whole building design incentives.

- **Comparison to code/ASHRAE requirements** (13 in favor, three against): Several of the interviewees who supported using ASHRAE requirements did not discuss any particular benefits of the method; they simply could not think of a better approach. Critics of the ASHRAE approach expressed concerns that modeled savings may be higher than actual building performance, which may lead to disappointed customers.
- **Energy Use Intensity** (eight in favor, four against): Though many market actors expressed support for using EUI as a metric to incentivize whole building performance, they provided some caveats. In particular, EUI cannot be directly used to compare different building types or buildings in different climates, and it would require a substantial effort to educate market actors about how to use the metric. Most of the market actors opposed to using EUI state that it is poorly understood, particularly by end users.<sup>72</sup>

### 5.3 LEED Certification

The LEED certification program has played a key role in raising awareness about green building and whole-building design practices, including those that improve energy efficiency. The NCP’s whole building design incentive largely mirrors LEED’s approach to assigning credits for building energy efficiency performance, and the NYSERDA program currently offers additional incentives for projects that pursue LEED certification. As a result, NCP staff has a particular interest in market trends around LEED certification and the degree to which those buildings are also participating in the NCP. This section describes several key findings that reveal an increasing divergence between LEED certification and NCP participation.

**New York State currently ranks third nationally for LEED-registered and certified commercial buildings.** As of December 2012, the State had 2,638 LEED-registered buildings, comprising more than 519 million square feet of commercial building space, and 787 LEED-certified buildings, representing nearly 136 million square feet of building area.<sup>73</sup> The number of new LEED-registered and certified buildings is shown in Figure 5-2 for 2000–2012. The chart shows that LEED registration activity dropped significantly following the Recession, but building certifications have continued to climb steadily. Note that LEED “registration” serves as a declaration of intent to certify a building, and “certification” indicates buildings that have completed the certification process and received approval.<sup>74</sup>

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<sup>72</sup> ASHRAE and the U.S. Department of Energy’s ENERGY STAR Portfolio Manager provide industry guidance on defining and calculating EUI for buildings.

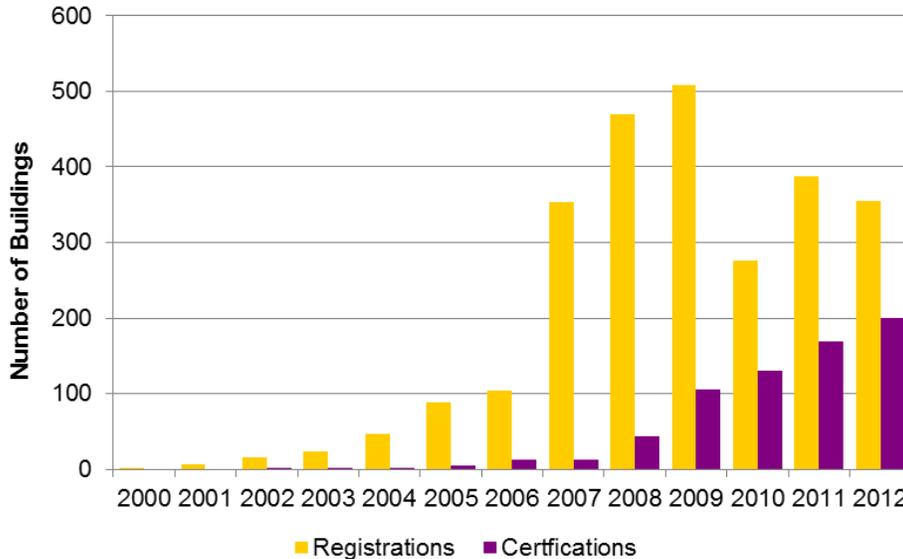
<sup>73</sup> U.S. Green Building Council, LEED Projects Directory (Data through 12/31/12). <http://www.usgbc.org/projects>

<sup>74</sup> Green Building Certification Institute, LEED for Building Design and Construction Website: <http://www.gbci.org/main-nav/building-certification/certification-guide/leed-for-new-construction/project-registration/registration.aspx>

**Figure 5-2. New LEED Registrations and Certifications in New York, 2000-2012**

Excludes Nassau and Suffolk Counties, but includes projects whose location is labeled “Confidential”

Sources: U.S. Green Building Council, LEED Projects Directory (Data through 12/31/12).  
<http://www.usgbc.org/projects>.



**Although the absolute number of LEED-certified and LEED-registered NCP projects has increased since 2008, NCP penetration of LEED-registered and certified buildings has decreased since the 2008 MCA (Table 5-4).** This analysis suggests that the NCP is engaging with a significantly lower percentage of LEED certified projects, an outcome that could be attributed to a variety of factors. Fully understanding the reasons behind the drop in NCP penetration of LEED-certified and LEED-registered projects requires further study beyond the scope of this MCA.

Regardless of the cause, NCP penetration of LEED buildings is not necessarily a reliable metric of the NCP’s role in the green building market given that energy efficiency represents only one of several categories contributing to LEED building certification. And, while LEED certification among NCP participants on a per-project basis may be low, an analysis of LEED participation among top NCP participant design firms in 2012 (see 0) shows that the majority of the top-performing NCP participant design teams are also pursuing green building projects.

**Table 5-4. Cumulative USGBC and NCP-Participating LEED Projects (2000-2012)**

Sources: U.S. Green Building Council, LEED Projects Directory (Data through 12/31/12) and NCP Project Detail Report, Buildings Portal Database (as of March 2013)

	LEED-Certified Projects		LEED-registered Projects	
	Through 2007	Through 2012	Through 2007	Through 2012
NCP Participating Projects	25	51	156	574
Non-NCP Projects	9	736	119	2054
Total USGBC Projects	34	787	275	2638
<b>NCP Penetration</b>	<b>74%</b>	<b>6%</b>	<b>57%</b>	<b>22%</b>

**Interviews with market actors revealed that, in general, there is no consensus regarding overall market interest in LEED certification.** When asked whether project decision-makers are more or less interested in LEED now compared to three years ago, an equal number of market actors responded “more interested” and “less interested” (12 of 42 respondents each), and almost as many said “no change” (10 of 42 respondents). Another six market actors (mostly from the upstate region) said that project decision-makers are increasingly interested in designing to LEED standards without seeking certification.

**Market actors’ opinions on the value of LEED certification are also mixed.** Those who said that LEED is valuable most often described it either as a tool for marketing and awareness (20 mentions) or as a process for goal-setting, ensuring accountability that efficient design components actually are realized in the construction phase, and documenting results (8 mentions). Some market actors reported that the value of LEED in promoting energy efficiency is declining due to improvements in the state energy code, or said that LEED certified buildings are achieving more of the points through non-energy efficiency measures. Critics of LEED described it as onerous and inflexible, and view it as encouraging “point chasing” rather than energy efficient design. As mentioned in the previous paragraph, upstate market actors in particular described designing to LEED standards for energy efficiency without seeking certification; downstate market actors are more likely to pursue LEED because the certification is a valuable marketing differentiator.

## 5.4 Tenant Build-Out

During this study’s scoping process, NCP staff indicated that tenant build-outs present an ongoing challenge for the incorporation of energy efficiency measures. Multiple stakeholders, competing priorities, and fast project timelines make it difficult for outreach staff to engage in the process. Through its interviews and literature review, the PE/MCA team sought to assess key drivers and barriers and to gain

market actor feedback on potential new approaches to integrating energy efficiency into tenant build-outs. This section describes the Team’s findings, which indicate both an opportunity and a willingness among market actors to consider innovative approaches to addressing the issue.

**While the overall rents for office space in New York City have been on the rise since 2010, availability of Class A office space (e.g., for banks or law firms) in New York City hit a 20-year high in 2012 and is still rising.** The reasons for increased office availability include Class A space users’ increased commitment to office space optimization, technology that enables businesses to increase e-commerce strategies and decrease employee time at the office, and tenants’ desire to reduce rents and operating expenses in the face of the recovering economy. In addition, office tenants increasingly prefer green buildings (e.g., LEED) that reduce operating expenses and entice Generation-Y professionals.<sup>75</sup>

**The increased availability of office space has improved the quantity and quality of office space, thus strengthening tenant bargaining power.** As a result, tenants can make tentative, short-term leasing decisions in place of long-term space commitments. The increased availability reduces pressure on tenants to quickly reserve space before other firms, while landlords of newly constructed buildings offer more generous concessions (e.g., free rent periods, tenant improvement allowances) to convince the first round of tenants to move in. This puts pressure on property owners of existing buildings to also offer increasingly competitive concessions. Considering that commercial office property owners in NYC offer some of the highest concessions in the U.S. real estate market (Table 5-5), projects could leverage NCP incentives to extend these build-out concessions, providing a win-win for property owners and tenants.

**Table 5-5. Average Tenant Concessions in Top U.S. Markets, Q4 2012**

Source: Studley Office Market and Spacedata Report, Studley, Q1 2013.

Market	Average Concession
Washington, D.C.	\$120/sf
Midtown Manhattan, NYC	\$115/sf
Chicago; Downtown Manhattan, NYC	\$95/sf
Median (16 highest U.S. concession markets)	\$71.25/sf

**Few energy efficiency programs have taken significant steps to address tenant build-out, but they**

<sup>75</sup> PwC and the Urban Land Institute. *Emerging Trends in Real Estate*® 2013. Washington, D.C.: PwC and the Urban Land Institute, 2012.

**could provide examples or insights for NCP to consider.** For example, one national program focused on tenant build-out includes the Office of the Future Consortium’s Office of the Future project, a multi-stakeholder-sponsored initiative that, as of 2010, included Southern California Edison (SCE), the Northwest Energy Efficiency Alliance (NEEA), Pacific Gas & Electric Company (PG&E), Sempra Gas & Electric, British Columbia (BC) Hydro, NSTAR, National Grid, Seattle City Light, and Sacramento Public Utility District (SMUD). The program sponsors pilot programs developed to “create a more responsive and responsible office environment that better serves tenant/occupant needs while reducing energy costs, enhancing property values, and delivering a reduced carbon footprint” and offers best practice guidance for lighting design and controls, plug loads, and metering and feedback.<sup>76</sup>

Other examples of stakeholder and service provider efforts related to tenant build-out were seen in real estate investment firms and other organizations that are collaborating to distribute best-practice tenant improvement manuals and toolkits that assist asset managers, property managers, and tenants in making sustainable decisions (e.g., Better Bricks & Kennedy Associates). However, while no examples of program benchmarks related to tenant build-out could be found (e.g., energy savings or penetration rates), resources exist to track leasing activity (including leases that are due to expire) that NYSERDA account managers can use to target outreach.

**Market actors reported that energy efficiency considerations generally receive low priority from tenants during build-outs; however, its emphasis can vary widely by tenant.**

Many interviewees described energy efficiency as an important, but not critical, consideration of tenants during the build-out process, though many also agree that it varies significantly by tenant. Interviewees suggested that energy efficiency is a less important factor than cost and functionality of the space. Notably, design teams view tenant interest in energy efficiency as weaker than most other market actors do. For example, one design team interviewee stated, “[For]

“Most tenants, I would say that energy efficiency is fairly low on their list. Usually cost is the most important factor, next ease of operation, and if there’s any energy efficient component, they would consider it if it doesn’t cost anything extra or there is less than a two year payback.”

most tenants, I would say that energy efficiency is fairly low on the list. Usually cost is the most important factor, next ease of operation, and if there’s any energy-efficient component, they would consider it if it doesn’t cost anything extra or there is a less than a two-year payback.” An end user similarly stated,

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<sup>76</sup> Emerging Technologies Coordinating Council, Office of the Future Project Protocol <http://www.etccc.ca.com/reports/office-future-project-protocol>

“Design is the key feature, followed by cost and energy efficiency. Energy efficiency is only considered in relation to saving money unless there is a company mission or policy in place.”

**Many market actors are skeptical about whether property owner concessions currently have any impact on energy efficiency; however, some are open to the idea of earmarking concessions specifically for energy efficiency improvements.** Few interviewees had previously heard of tenants using concessions for energy efficiency improvements (either because it was required by the property owner or because of the tenant's own initiative). Some respondents, however, thought that “earmarked” concessions designated specifically for energy efficiency would motivate tenants to incorporate more efficiency into build-out projects. In general, respondents expressed skepticism that tenants would choose to spend concessions on energy efficiency without being forced to do so: “They will use it for something else, unless they have a corporate goal; typically this doesn't happen.” One potential approach to this barrier is for NCP to offer to match (i.e., dollar-for-dollar) any landlord concession that is specifically earmarked for energy efficiency improvements (assuming they meet a list of approved uses or measures). Of the few interviewees who were aware of property owner concessions influencing energy efficiency, one specifically noted that the Empire State Building requires tenants to pursue efficiency in their build-outs.

**Market actors indicated that when tenants do consider energy efficiency during a build-out project, it is usually discussed early on in the process; however, market actors did not indicate a consensus on which party is best for the NCP to target for participation.** When asked at what point in the tenant build-out process the discussions about energy efficiency begin, the most common response was “at the beginning” (six of 18), followed by “at various times” (three of 18), during the initial lease negotiation phase (two of 18), and during the design phase (two of 18). Market actors were almost evenly split on whether the design team (13 of 24) or the owner/developer (11 of 24) is the best point of contact for NCP staff to discuss efficiency in tenant build-out. Six interviewees suggested that the tenant is the best point of contact, as without tenant demand for efficiency, the building owner/developer is likely to deliver the cheapest build-out possible.

These findings indicate that if tenant build-out project owners are going to incorporate energy efficiency into a project, the decision needs to happen at the very beginning of the tenant build-out process, likely during the lease negotiation. Notably, green lease arrangements and supporting programs are becoming more prevalent in major markets. New York City, for example, offers model green leasing language via an

Energy Aligned Clause.<sup>77</sup> In addition, some industry organizations have released guidelines and recognition programs for green lease negotiations (see the Institute for Market Transformation's Green Leaser Leader program).<sup>78</sup> Such examples and efforts might provide an opportunity for NYSERDA staff to market the NCP to receptive market actors.

**Most market actors supported the idea of the NCP potentially offering prepackaged incentive bundles for energy efficiency in tenant build-outs; OPCs and TAs expressed some skepticism about the concept due to perceived implementation challenges.** Most design teams (14 of 19) and end users (five of 10) say they would be more likely to include energy efficiency in tenant build-outs if the NCP offered a prepackaged incentive bundle. The key benefits of a bundled approach would be simplicity and reduced paperwork. Lighting and lighting controls (including occupancy sensors) were most commonly cited as ideal for inclusion in a prepackaged incentive bundle. Energy management systems, building management systems, and HVAC controls were also viewed as attractive for bundles if they offer enough flexibility for tenants to find options that are technically compatible with the building's shared systems. A few interviewees expressed interest in including office equipment, kitchen equipment, and water saving measures (two mentions each). TAs and OPCs were more skeptical about the idea of prepackaged incentive bundles; they think the measures would be challenging to implement and that they may reduce flexibility because tenants have such varying needs. Only two of the six TAs and OPCs who responded to this question felt confident that prepackaged incentive bundles would increase efficiency in tenant build-outs.

**Project timeline considerations represent the greatest barrier for tenant build-out projects to work with the NCP or incorporate energy efficiency.** Respondents expressed that the people involved in tenant build-outs tend to be resistant to potentially delaying their build-out process to incorporate more energy efficiency, particularly if these efforts will require persuading multiple parties about the value of energy efficiency. Some OPCs and TAs report that design teams view energy efficiency measures as a burden or roadblock to faster project completions, and that owners "just want to keep rents as low as possible". One TA suggested targeting design firms at the chief executive officer (CEO), rather than project manager, level and forming strategic partnerships with design firms that have shown interest in energy efficiency.

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<sup>77</sup> "This model lease language creates a pass-through structure where both sides share the costs and benefits of energy retrofits by agreeing on a predicted amount of annual savings and having the tenant pay the owner recovery costs based on the predicted savings." From: <http://www.nyc.gov/html/gbee/html/initiatives/clause.shtml>

<sup>78</sup> "Green Lease Leaders is a recognition program developed by the Institute for Market Transformation (IMT), with support from the Department of Energy's Better Buildings Alliance. The Green Lease Leader designation recognizes companies or brokerage teams that successfully implement green lease language into new or existing leases." From: <http://www.greenleaselibrary.com/green-lease-leaders.html>

**Tenants are unable to make informed decisions about energy efficiency due to a lack of information about their own energy consumption or opportunities to save energy, according to some TA and OPC respondents.** One OPC suggested that benchmarking might assist in mitigating this lack of information. Several OPC and TA respondents stated that the program needs to better engage with building owners and developers. In particular, owners need to perceive that participation will not be unduly burdensome. Several OPC and TA respondents also noted that program staff should leverage NYSERDA’s relationships with owners and developers to ensure that tenants receive efficiency-related information.

**Industry literature revealed expectations that PlaNYC’s Greener, Greater Buildings Plan will have a significant influence on downstate commercial tenant awareness of energy efficiency in the future.** In general, the PlaNYC requirements aim to lead building owners and tenants to reduce their energy consumption through mandatory energy audits, benchmarking, and retro-commissioning. For example, in an effort to influence the energy use behavior of tenants, PlaNYC’s Local Law 88 lighting and sub-metering statute will require that each tenant be provided a monthly statement showing their electricity usage, and that each tenant be billed according to the amount of electricity they consume as measured by a sub-meter. This requirement would help lessen the “split-incentive” issue, wherein tenants have less to gain from improving the energy efficiency of a leased space. As tenant responsibility for energy costs increases, they may become more interested and receptive to energy efficiency improvements (and related incentives) during build-out.

**In general, interviewed market actors reported that the PlaNYC Greener, Greater Buildings Plan has potential to increase awareness of energy efficiency and renewable energy, but that the guidelines are not likely to result in more energy efficiency activity unless the market is supported in following through on the guidelines.** Specifically, market actors stated that policy makers will need to implement compliance enforcement (e.g., monitoring, fines for non-compliance) and offer capital support to ensure project owners implement the plan. Nonetheless, interviewed market actors felt that PlaNYC has potential to increase awareness of energy efficiency and renewable energy; three of six end users indicated that they are currently accelerating their plans for energy efficient retrofit projects as a result of the PlaNYC guidelines.

## **5.5 Small Projects**

New construction programs, including the NCP, face common barriers to working with small projects. In general, these barriers include greater expectations around cost savings compared to larger firms, broad diversity in building and customer needs, disaggregated service providers, and program cost-effectiveness impacts. NYSERDA staff is working to address these barriers through a few potential different approaches, beginning with a streamlined approach for small projects. The Team’s interviews further explored barriers

to small project participation in the NCP and sought suggestions on how the program can better serve small projects.

**Literature reveals that new construction programs across the country have taken a variety of market-specific approaches to serve smaller projects.** Some offer full-service programs for small projects that include rebates, technical guidance, financing and referral to contractors to complete the work. Other programs work to better serve small buildings by taking a more customer-focused approach. For example, some programs train their associates to decide what a good lead is and create a process for lead development and follow-up, depending on whether the savings potential is sufficient. Other customer-focused approaches include hiring staff with sales experience, with a goal of closing the sale, not just sharing information with potential participants.

Other approaches to better serving small projects include relationship building, technology utilization, and market segmentation. To build relationships, programs have found success in aggressively forming connections with vendors and other lead-generating organizations. To help utilize technology, some programs emphasize that software should not only be a repository for audit information, but should have the functionality to allow staff to organize and track projects to promote implementation. Finally, programs that segment the market can offer sector-specific programs for small business (e.g., grocery, restaurants, health care, schools, and lodging).<sup>79</sup>

**The most frequent suggestions for improving small project participation from market actors were for NYSERDA staff to accelerate the program timeline and decrease the amount of required paperwork.** Additional suggestions from individual respondents included increased incentives and providing simple calculators for determining potential costs and savings. Non-participants in particular noted that incentives are insufficient. Two OPCs mentioned sensitivity to costs as a barrier and noted that small projects need to see the project economics up front because “money makes a much bigger difference for small projects.” Figure 5-3 shows the responses market actors provided when asked what prevents small projects from participating in the NCP.

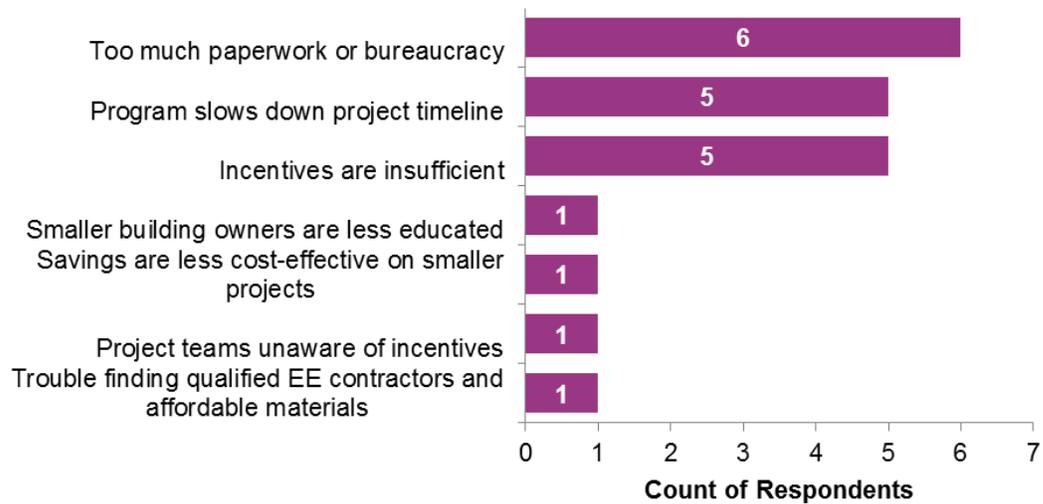
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<sup>79</sup> Such as the DTE Energy program in Michigan, or develop success stories, tools, and resources tailored to each sector like Northwest Energy Efficiency Alliance’s Better Bricks program.

**Figure 5-3. What do you think prevents more small new construction and renovation projects from participating in the NCP?**

Quantitative comparisons of interview responses are intended to show general trends or directions only. They should not be considered statistically representative nor statistically significant.

Source: Navigant analysis of in-depth interview responses



## 5.6 Consolidated Funding Application

In the evaluation planning process, NYSERDA staff expressed interest in understanding the effects of the shift to the State’s streamlined and consolidated funding application (CFA).<sup>80</sup> Due to interview length and prioritization of research topics, the evaluation team received a relatively limited number of responses to this question from OPCs and TAs (n=8), and end users (n=2).

**The September 2011 shift to a CFA received mixed reviews, with responses trending toward negative (Figure 5-4).** OPCs and TAs that described the CFA as negative noted that project sponsors “need a lot of handholding to complete it”, that it takes too much time to complete, and that there is uncertainty about what information is required versus optional. Two participating end users also characterized the CFA as negative, stating that it is “not consistently employed” and that the shift has been “frustrating.” Several OPC and TA respondents mentioned that the utilities emphasize the complexity of the CFA as a

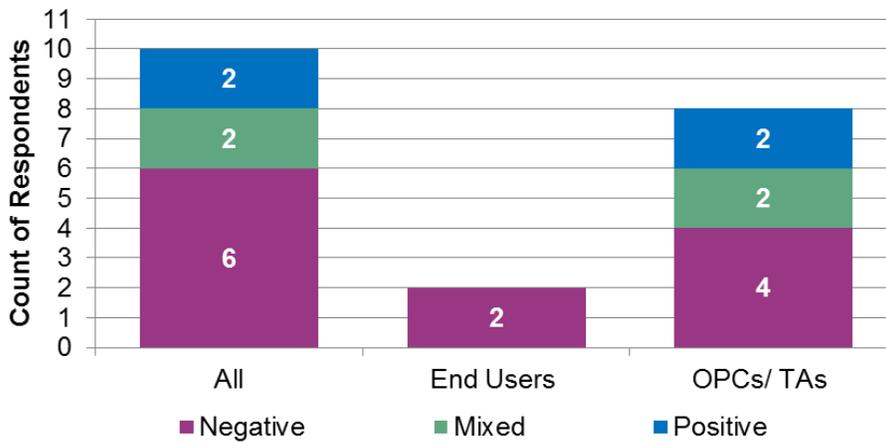
<sup>80</sup> In September 2011, the State created the New York State Consolidated Funding Application (CFA) to streamline the funding and incentive application process. Customers seeking funding from the NCP must apply through the CFA.

disincentive for participation in NYSERDA programs and a selling point for participating in comparable utility programs (i.e., “participate in our large renovation program and you won't have to fill out the CFA”). However, one respondent countered this opinion, saying that the program likely gets more projects overall because of the streamlined application.

**Figure 5-4. How would you characterize the shift to the CFA?**

Quantitative comparisons of interview responses are intended to show general trends or directions only. They should not be considered statistically representative nor statistically significant.

Source: Navigant in-depth interview responses



## 6 Conclusions and Recommendations

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The previous sections of this report presented analysis and key findings from the PE/MCA Team's exploration of the MCA research objectives. This final section distills those key findings into a consolidated set of major conclusions and offers recommendations for additional investigation or changes that NYSERDA staff might make to adapt the program's design and delivery to better serve the market and enhance program effectiveness.

### 6.1 Conclusions

The following highlights the major conclusions the PE/MCA Team developed from its key findings.

**Conclusion #1: The recovering market presents shifting opportunities for energy efficient new construction and renovations.** Market data interview responses reveal that the New York State new construction market is generally improving, though annual activity has yet to reach pre-Recession levels. As the market continues to improve, key findings suggest the following region- or sector-specific opportunities:

- While public sector projects, many with stimulus funding, helped buoy this market activity during and following the Recession, market data and interview responses indicate that near-term growth will likely shift back to the private sector.
- For the upstate market, vacant building stock may provide particular opportunities for large renovations.

An overall decrease in the average size of new construction projects in the downstate market also implies that less energy savings per project may be available than before the Recession on a per-project basis. Nonetheless, plenty of large projects are still being built in both the downstate and the upstate regions, and market actors are cautiously optimistic that market activity in the State will continue to increase. In the downstate market, the post-Recession growth in new construction coupled with New York City's Greater Green Buildings Plan presents ample opportunity for the NCP to capitalize on increased awareness of and demand for energy efficient buildings.

**Conclusion #2: Overall NCP market penetration has improved, but missed opportunities remain in some sectors.** While the program continues to improve in terms of overall market penetration, lower levels of engagement with the commercial, healthcare, and educational sectors suggest that additional opportunities remain. The cumulative share of new construction project area receiving an NCP incentive has increased from 32% to 37% of square footage constructed, compared to five years ago. This increase was evident statewide; however, a lower penetration downstate (29%) than upstate (50%) suggests that the

program may be missing more opportunities in that region. Over the same time period, the program incentivized a decreasing share of healthcare (25%) and educational sector (49%) projects, and, despite an overall increase from 39% to 57%, the commercial sector also appears to represent a key area for additional engagement.

From a building-size perspective, the program appears more balanced in its approach. In the past five years, NCP has provided incentives for approximately one-third of small (<20,000 sf) and large (>100,000 sf) projects on a square footage basis, with nearly half of medium-sized projects (20,000-100,000 sf) projects participating. Overall, however, large projects continue to represent the majority of the program's incentivized building area.

**Conclusion #3: As energy efficiency awareness and demand among end users has improved, so has industry standard practice.** Interviewed market actors indicated that building owner and tenant demand for energy efficiency is increasing compared to three years ago. Along with stricter energy codes and available incentives, this owner awareness and interest has contributed to improved standard practices and enhanced energy efficiency service offerings among many design teams. While higher awareness and more efficient standard practices are signs of a transforming market for energy efficiency, increasing baselines for these metrics may also make it more difficult for the NCP to claim energy savings from “standard” energy efficiency measures.

**Conclusion #4: Despite increased awareness and demand, key barriers to energy efficiency and NCP participation persist.** One of the major impacts of the Recession on the new construction market stems from a decrease in the amount of capital available to help finance new construction projects. While news coverage and market actor interviews suggest that the financing landscape is improving, the inclusion of energy efficiency measures in a project still often requires measure-specific analysis of the financial benefits, as well as approval from members of a building owner's senior leadership team. For standard energy efficient technologies that have gained wider acceptance (e.g., enhanced lighting and HVAC), these financial calculations are more straightforward. For more advanced approaches and technologies (e.g., whole building design or building energy management systems), however, there is less certainty and acceptance about the energy savings that will materialize from those investments.

In addition to general market-related barriers, some process-related barriers continue to prevent project stakeholders from participating in the NCP. While the program provides incentives to help offset some of the upfront costs and uncertainty mentioned above, interview responses reveal that missed project opportunities may arise from confusion about NCP's offerings, competition from utilities' existing facility incentive programs (i.e., for large renovation projects), and a perception that NYSERDA requirements are cumbersome or slow down project timelines.

**Conclusion #5: Advanced technologies provide a pathway to enhanced efficiency, but more project support and staff training are needed to foster market acceptance.** As energy efficiency standard practices and building codes improve, opportunities to acquire energy savings from more widely accepted measures will likely diminish. Perceptions and understandings of what might constitute an “advanced” energy efficiency technology, however, vary widely. While the NCP offers incentives for designs that incorporate more advanced measures (e.g., BEMS or system sub-metering), program staff and project data reveal that relatively few projects have pursued those routes to a more efficient building. The PE/MCA team’s analysis revealed three key barriers to more widespread adoption of such technologies: the financial barriers to (and uncertain financial returns of) installing them, mixed reports on whether those systems meet energy savings expectations, and building owner concerns about whether their facilities staff can properly utilize those systems.

**Conclusion #6: Tenant build-outs represent a missed opportunity for which end users and design teams are willing to consider innovative approaches.** Programs like NCP often face challenges to encouraging energy efficiency in commercial space tenant build-outs. Market actors report that incoming tenants generally place a low priority on energy efficiency and that project timeline considerations present a significant barrier to both enhanced efficiency and NCP participation. Current downstate market activities, however, may present a good opportunity for the NCP to foster greater adoption of energy efficient build-outs. High Class A office space vacancy rates imply increased bargaining power for tenants, and PlaNYC’s Greener, Greater Buildings Plan is expected to increase owner and tenant awareness of energy efficiency opportunities. Interviewed market actors were open to new approaches to fostering energy efficiency in build-outs but expressed that demand would still be tenant-driven. Potential approaches the Team discussed with market actors included setting aside landlord concessions specifically for efficiency improvements and NCP offering packaged bundles of pre-approved efficiency measures for tenant build outs.

**Conclusion #7: A divergence in projects that pursue LEED certification from those that participate in NCP suggests misalignment of the two programs’ whole building design goals.** While LEED certifications for buildings in New York State have continued to climb over the past few years, the share of those projects that receive NCP incentives has dropped sharply (from 57% at the end of 2007 to just 22% at the end of 2012). Notably, meeting LEED rating criteria does not necessarily require that a building also meet the NCP’s energy efficient whole building design criteria. However, without a closer examination of the specific LEED credits those buildings received, it is difficult to understand whether those projects would have qualified for NCP incentives.<sup>81</sup> Market actor interviews provided little clarity on the issue, with

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<sup>81</sup> The non-public data set containing building-specific LEED rating information is maintained by the U.S. Green Building Council. The public portion of this data is available at <http://www.gbig.org/>.

mixed opinions about building owners' interest in and the general perceived value of LEED certification. For the NCP specifically, design teams generally supported the program's current approach to incentivizing whole building energy efficiency. The newest whole building efficiency approach—net zero energy—still has relatively limited awareness in the market, particularly among end users.

## 6.2 Recommendations

Based on the broad scope of this evaluation and the relative maturity of the NCP, the PE/MCA team divided its recommendations into two types. The first includes some general observations and suggestions about potential focus areas for NCP outreach efforts, some of which NCP and OPC staff may already be targeting to some degree. The second includes specific, actionable recommendations related to the special topics that staff asked the evaluation team to explore. These primary recommendations focus on steps that will help the program evolve to provide the market with enhanced energy efficiency opportunities in the future.

### 6.2.1 Outreach Opportunities

Both secondary data and market actor responses indicated some key characteristics of the types of new construction activity most likely to provide increasing opportunities to NCP staff over the next 2-3 years. These include the following:

- **Engage early with major renovation projects in the upstate market.** Market actors reported that a large share of upstate construction activity continues to focus on filling or repurposing larger spaces and buildings that have remained vacant since the recession. Both NCP program staff and OPCs should ensure that they are well positioned to market program incentives and services to current building owners and developers as well as potential tenants or buyers to encourage energy efficiency improvements during such large renovations.
- **In the downstate market, leverage increased end-user awareness of energy efficiency and the Greener, Greater Buildings Program's benchmarking requirements.** While market actors anticipate an increase in end-user awareness and demand for energy efficiency in response to the PlaNYC building programs, building owners and tenants will not necessarily know the extent of their options for enhancing the efficiency of their space. The NCP could capitalize on this increased awareness by emphasizing the program's role in helping to incentivize and elevate an individual building's energy performance (and attractiveness).
- **Increase engagement with wholesale/retail commercial and healthcare projects.** While the wholesale/retail commercial sector comprises the largest square footage of total NCP project area, these two sectors represent the lowest levels of program market share for completed projects. As post-stimulus public sector construction activity slows down, greater opportunities for energy savings likely lie in the private sector over the next few years.
- **Continue to focus outreach and education activities toward targeted end-use customers.** While design teams remain a key target market for the NCP, NYSERDA staff should consider how it could improve end-use customer knowledge and awareness of advanced energy efficient technologies and NCP incentive opportunities. Design teams expressed that end-user demand (whether that of an owner

or tenant) is the primary driver for increased energy efficiency and that it has generally increased in the past three years. Nonetheless, financial barriers continue to present the primary barrier to enhanced efficiency efforts. End user outreach and messaging should continue to highlight sound evidence of positive financial returns associated with specific efficiency investments, including those considered to be more advanced (e.g., BEMS or whole building design).

## 6.2.2 Primary Recommendations

In addition to the above general observations, the PE/MCA Team makes the following primary recommendations for NCP staff to consider as they move the program further toward its goals.

**Recommendation #1: Ensure the future success of advanced energy efficiency technologies like BEMS through enhanced technical assistance and facility staff training.** Reports about BEMS and other advanced technologies failing to meet owner expectations for energy savings and hesitations about facility staff’s ability to fully understand and optimize those systems represent key barriers to the deeper energy savings those technologies could provide. While the actual energy savings that result from those systems may be difficult to measure, improving standards and baselines for energy efficiency will increasingly diminish the program’s opportunities for pushing buildings to the “next level” for efficiency. The NCP can help to pave the way for enhanced energy efficiency and advanced technologies by increasing its level of technical support for (not just incentivizing) projects that install BEMS and other advanced technologies. For example, such support could include periodic (e.g., bi-monthly or quarterly) reviews of a participating facility’s BEMS and associated energy-use systems to ensure optimal performance and energy savings. Similarly, NYSERDA could offer (potentially in partnership with ASHRAE) focused, hands-on training on BEMS and advanced building system operations for facility management staff that would help reduce owner uncertainty around the potential success of or financial return on those systems.

**Recommendation #2: Investigate new options for encouraging and incentivizing energy efficiency in tenant build-out projects.** Market actors emphasized that the level of energy efficiency incorporated into build-out projects is primarily tenant driven and that such consideration typically need to happen at the beginning of the build-out process (i.e., during lease negotiations). To foster more energy efficient leased spaces, NYSERDA should explore new options for encouraging and incentivizing tenant interest and participation in pursuing efficiency upgrades during major build-out renovations. Investigation of these options should include focus groups or panel discussions with market actors, including design teams, commercial real estate owners and developers, and end users. Such options might include the following:

- **Green Leases:** Green lease arrangements and supporting programs, such as New York City’s Energy Aligned Clause, are gaining more attention and deserve consideration by the NCP as potential opportunities. NYSERDA staff should explore how to leverage these existing green leasing programs and consider ways to further support property owners and tenants in negotiating green leases.

- **Efficiency-Specific Concessions:** Some market actors stated that landlord build-out concessions that are specifically earmarked for energy efficiency could more effectively motivate tenants to incorporate more efficiency into build-out projects. NCP should investigate offering a matching incentive for efficiency-specific build-out concessions, effectively doubling the concession a landlord would provide to a tenant for making energy efficiency improvements.
- **Pre-Packaged Build-Out Measures:** In addition to (or in combination with) concession-driven incentives, NCP should further explore the potential for packaged bundles of pre-approved, build-out appropriate efficiency measures that might help expedite the consideration and inclusion of energy efficiency and program participation during tenant build outs. Pre-packaged incentive bundles could also provide guidance to less advanced design teams to assist them with completing energy efficient projects.

**Recommendation #3: Investigate the decrease in NCP participation from LEED-certified buildings and revisit alignment of Whole Building/Green Building incentives with the LEED program.** The decrease in the share of LEED-certified buildings that participate in NCP could indicate a combination of several drivers. Beginning in 2009, LEED for New Construction (LEED-NC) required minimum energy performance levels (10% above ASHRAE/IESNA 90.1-2007) that aligned with the lowest tier for NCP whole building design incentives (9.1%-16% above the same standard).<sup>82</sup> With access to USGBC data for LEED projects in the State, NCP staff could investigate the degree to which LEED-certified buildings met or exceeded those standards in their designs. Based on those findings, staff could then follow up with specific LEED-certified project representatives to inquire as to why they did not pursue either additional efficiency levels or NCP funding. Findings from this investigation would help staff determine whether to enhance or revisit whole building incentive thresholds or levels to foster more aggressive energy savings targets.

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<sup>82</sup> Program staff should note that the newest update to the LEED rating approach (LEED v.4) was released in late 2013 and uses ASHRAE/IESNA 90.1-2010 as its baseline for efficiency ratings.

# Appendix A Evaluation Methodology Supporting Materials

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This section presents supporting materials to describe the process evaluation and market characterization and assessment (PE/MCA) Team’s evaluation methodology. Section A.1 provides details regarding the secondary data analysis, and Section A.2 describes the details surrounding the primary data collection and analysis.

## A.1 Secondary Data Analysis

The PE/MCA Team conducted market characterization analysis using secondary data sources. Where possible, the Team segmented market characterization results on an upstate-downstate regional basis to identify geographic variations in program and market opportunities and barriers throughout New York State. The following sections provide methodology details about the secondary data sources and analysis.

### A.1.1 Secondary Data Sources

The PE/MCA Team reviewed recent industry literature and other secondary data to inform the development of a preliminary set of trends in the energy-efficient new construction market. Sources included, but were not limited to, the following:

- Dodge Players Database (“Players Database”)
- McGraw-Hill Construction New, Addition, and Alteration Database (“NAA Database”)
- New Construction Program (NCP) Cross Program Database and Custom Project Detail Database
- McGraw-Hill Construction, Energy Efficiency Trends in Residential and Commercial Buildings, Prepared by McGraw-Hill Construction for the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 2010.  
[http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/building\\_trends\\_2010.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/building_trends_2010.pdf)
- US Business Cycle Expansions and Contractions, National Bureau of Economic Research, <http://www.nber.org/cycles.html>
- The 2013 U.S. Markets Construction Overview, FMI Corporation, 2012, <http://www.fminet.com/the-u-s-markets-construction-overview-2013.html>
- Associated Builders and Contractors (ABC) 2013 Economic Forecast, Associated Builders and Contractors, Inc.
- The New York Times, “Reins Easing on New York Construction Loans”, February 12, 2013. <http://www.nytimes.com/2013/02/13/realestate/commercial/new-york-developers-find-loans-easier-to-get.html>
- New York State Energy Research and Development Authority (NYSERDA) Existing Facilities Program Survey Responses, Existing Facilities Program Market Characterization and Assessment Report, Prepared by Navigant Consulting, Inc. for NYSERDA. July 2012.
- The Business Case for Energy Efficient Building Retrofit and Renovation Smart Market Report, McGraw-Hill Construction, 2011.

- New York Energy Code Compliance Study, Prepared by Vermont Energy Investment Corporation, 2012. <http://www.nyserdera.ny.gov/-/media/Files/Publications/Research/Energy-Efficiency-Services/New-York-Energy-Code-Compliance-Study.pdf>
- Natural Resources Defense Council Website: <http://www.nrdc.org/>
- Online Code Environment and Advocacy Network (OCEAN) Website, a project of the Building Codes Assistance Project: <http://www.bcap-ocean.org/>
- Building Energy Codes Toolkit, a project of the Associated General Contractors (AGC) and U.S. DOE Building Energy Codes Program (BECP): [http://www.agc.org/cs/building\\_energy\\_codes\\_toolkit](http://www.agc.org/cs/building_energy_codes_toolkit)
- U.S. Green Building Council, Energy Codes and Standards Online Course Information Website: <http://www.usgbc.org/courses/energy-codes-and-standards>
- C. Goldman, J. Peters, M. McRae, S. Lutzenhiser, and M. Spahic. "Energy Efficiency Services Sector: Workforce Size and Expectations for Growth," Ernest Orlando, Lawrence Berkeley National Laboratory, 2010.
- U.S. Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED) Project Directory. Available for download at: <http://www.usgbc.org/projects>
- Emmerich & Bloom, Commercial Building Automation Systems Security and Access, HVAC Controls, Fire and Life Safety, Building Management Systems, and Lighting Controls: Global Market Analysis and Forecasts, Pike Research LLC, Q1 2012;
- Williams et al., Quantifying National Energy Savings Potential of Lighting Controls in Commercial Buildings, Lawrence Berkeley National Laboratory, ACEEE Proceedings, <http://www.aceee.org/files/proceedings/2012/data/papers/0193-000071.pdf>;
- Bloom & Gohn, Electricity Submeters: Basic and Advanced Submeter Hardware, Submeter Energy Management Software, and Submetering Services: Market Analysis and Forecasts, Pike Research LLC, Q2 2012.
- City of New York Greener, Greater Buildings Plan website: [www.nyc.gov/ggbp](http://www.nyc.gov/ggbp)
- Getting to Zero 2012 Status Update: A First Look at the Costs and Features of Zero Energy Commercial Buildings, New Buildings Institute, 2012.
- Green Building Certification Institute, LEED for Building Design and Construction Website: <http://www.gbci.org/main-nav/building-certification/certification-guide/leed-for-new-construction/project-registration/registration.aspx>
- Studley Office Market and Spacedata Report, Studley, Q1 2013.
- PwC and the Urban Land Institute. Emerging Trends in Real Estate® 2013. Washington, D.C.: PwC and the Urban Land Institute, 2012.

### **A.1.2 Analysis of NCP Project Database**

The PE/MCA Team analyzed NCP program activity from 2008 through 2012 based on the NCP Cross Program Database and Custom Project Detail Database, both provided by NYSERDA staff. This analysis allowed the team to quantitatively characterize activity and trends in NCP participation during the 2008-2012 timeframe. The Cross Program Database provided information on the NCP's completed projects and the Custom Project Detail Database provided information on all projects, regardless of completion status. When required, the Team cross-referenced project data between the two databases using the "Project Number" fields.

To identify in-depth market trends, the Team segmented the NCP activity analysis based on various indicators, including project size (i.e., square footage), time period relative to the Recession (i.e., before, during, or after the Recession), geography (i.e., upstate and downstate), utility territory, sector, and market actor type (i.e., owner, engineer, architect, or other). Table A-1 includes the definition of each of these analysis segments.

**Table A-1. NCP Participation Data Analysis Metrics and Segment Definitions**

Metric	Segment Definitions
<b>Completed Projects</b>	<ul style="list-style-type: none"> <li>» Projects completed through NCP from 2008 through 2012 based on the “Project Number” field in the NCP Cross Program Database.</li> <li>» The Team consolidated data for duplicate project numbers to avoid double-counting of indicators in the analysis.</li> </ul>
<b>Project Applications</b>	<ul style="list-style-type: none"> <li>» Applications received by NCP from 2008 through 2012 based on the “Application Received Date” and “Project Status” fields in the NCP Custom Project Database.</li> </ul>
<b>Installed Measures</b>	<ul style="list-style-type: none"> <li>» Measures installed in completed projects based on “Measure Category” field in the NCP Cross Program Database.</li> </ul>
<b>Advanced Measures</b>	<ul style="list-style-type: none"> <li>» Based on the “NYSERDA CODE” field in NCP Cross Program Database.</li> <li>» “Advanced” defined as Commissioning, EMS &amp; HVAC Controls, LEED certification and registration, Green Technical Services, and Whole Building Design</li> </ul>
<b>Energy Savings</b>	<ul style="list-style-type: none"> <li>» Deemed energy savings included in the “kilowatt-hours” (kWh) field in the NCP Cross Program Database.</li> </ul>
<b>Design Teams</b>	<ul style="list-style-type: none"> <li>» Most-active architecture &amp; engineering firms in NCP based on count of completed projects (duplicates removed), sum of “Square Footage” and sum of “kWh” in the NCP Cross Program Database &amp; Custom Project Detail Database.</li> </ul>
<b>Owners</b>	<ul style="list-style-type: none"> <li>» Most-active building owners in NCP based on project completes (duplicates removed), application activity, sum of “Square Footage”, and “Project Status” (excluding projects with “Cancel Approved”, “Cancel Requested”, “Cancelled” or “On Hold”) in the NCP Custom Project Database.</li> </ul>
<b>Project Size</b>	<ul style="list-style-type: none"> <li>» Small: &lt;20,000 sf</li> <li>» Medium: 20,000–100,000 sf</li> <li>» Large: &gt;100,000 sf</li> </ul>
<b>Time Frame<sup>a</sup></b>	<ul style="list-style-type: none"> <li>» Before Recession: Up to December 2007 (Q4)</li> <li>» During Recession: December 2007 (Q4) up to June 2009 (Q2)</li> <li>» After Recession: June 2009 (Q2) through Q4 2012</li> </ul>
<b>Utility Territory</b>	<ul style="list-style-type: none"> <li>» The ZIP Codes in each county were used in conjunction with a utility-ZIP Code database provided by NYSERDA staff to allocate projects to specific utility areas.</li> </ul>
<b>Geography</b>	<ul style="list-style-type: none"> <li>» Downstate: Westchester, New York, Bronx, Kings, Queens, Richmond</li> <li>» Upstate: All others, except Nassau and Suffolk Counties<sup>b</sup></li> </ul>
<b>Market Actor</b>	<ul style="list-style-type: none"> <li>» Owners: “Applicant/Company Name” field in the NCP Custom Project Detail Database, “Customer Name” field in the Cross Program Database</li> <li>» Architect Firms: “Arch Organization” in the NCP Custom Project Detail Database</li> <li>» Engineering Firms: “Eng Organization” in the NCP Custom Project Detail Database</li> </ul>
<b>Project Sector</b>	<ul style="list-style-type: none"> <li>» The PE/MCA Team mapped the “Market Sector” fields in the NCP project databases to the Project Type/Market Segment fields in the NAA Database to allow for accurate comparison. See</li> <li>» Table A-3 for mapping details.</li> </ul>

<sup>a</sup> According to the U.S. National Bureau of Economic Research, the recession began in December 2007 and ended in June 2009. <http://www.nber.org/cycles.html>

<sup>b</sup> Projects located in Nassau County and Suffolk County (i.e., Long Island) do not pay System Benefits Charge (SBC) funds and have been excluded from this study.

The PE/MCA Team used the McGraw-Hill Construction New, Addition, and Alteration Database (“NAA Database”) to quantitatively characterize activity and trends in New York’s non-residential new construction market during the 2008-2012 timeframe. The PE/MCA Team restricted the general market activity analysis to include only single projects within the NAA Database that would be eligible for NCP incentives. Projects were excluded for two reasons:

1. **Non-SBC Customers:** Projects in Nassau and Suffolk counties were removed from the analyses because those customer accounts receive power from the Long Island Power Authority (LIPA), which is not part of the SBC program. Similarly, since New York City government buildings do not participate in the SBC, all New York City government building projects were excluded from the sample (i.e., municipal projects in New York, Bronx, Kings, Queens, and Richmond counties).
2. **Non-Commercial or Industrial Projects:** Projects that did not involve construction to a commercial or industrial building structure were removed, including those from one family houses and two family houses.

In line with the NCP activity analysis definitions and data segmentation outlined in Table A-1, the PE/MCA Team segmented the general market activity analysis based on project size (i.e., square footage), time period as it relates to the Recession (i.e., during or after the Recession), geography (i.e., upstate and downstate), utility territory, and sector. Table A-2 includes the definition of each of the relevant analysis segments for the general market activity analysis.

**Table A-2. General Market Activity Data Analysis Metrics and Segment Definitions**

<b>Metric</b>	<b>Segment Definitions</b>
<b>Project Size</b>	<ul style="list-style-type: none"> <li>» Small: &lt;20,000 sf</li> <li>» Medium: 20,000–100,000 sf</li> <li>» Large: &gt;100,000 sf</li> </ul>
<b>Time Frame<sup>a</sup></b>	<ul style="list-style-type: none"> <li>» During Recession: Project starts in 2008 and 2009</li> <li>» After Recession: Project starts in 2010 through 2012</li> </ul>
<b>Utility Territory</b>	<ul style="list-style-type: none"> <li>» The ZIP Codes in each county were used in conjunction with the utility-ZIP Code database provided by NYSERDA staff to allocate projects to specific utility areas.</li> </ul>
<b>Geography</b>	<ul style="list-style-type: none"> <li>» Downstate: Westchester, New York, Bronx, Kings, Queens, Richmond</li> <li>» Upstate: All others, except Nassau and Suffolk Counties<sup>b</sup></li> </ul>
<b>Project Sector</b>	<ul style="list-style-type: none"> <li>» The PE/MCA Team mapped the “Market Sector” fields in the NCP project databases to the Project Type/Market Segment fields in the NAA Database to allow for accurate comparison. See Table A-3 for mapping details.</li> </ul>

<sup>a</sup> According to the U.S. National Bureau of Economic Research, the recession began in December 2007 and ended in June 2009. <http://www.nber.org/cycles.html>. However, the NAA data is presented by year, so all projects in 2009 are counted as occurring during the recession.

<sup>b</sup> Projects located in Nassau County and Suffolk County (i.e., Long Island) do not pay SBC funds and have been excluded from this study.

In addition, the Players Database provided information on the market actors associated with individual new construction projects, including owners, architects, engineers, and other market actors. Information in the Players Database was segmented by market actor type (i.e., owner, engineer, architect, or other) according to the following scheme:

- **Owners:** Players classified as Owner in the Dodge Players Database
- **Architect Firms:** Players classified as Architect in the Dodge Players Database
- **Engineering Firms:** Players classified as Structural Engineer, Mechanical Engineer, Electrical, Civil Engineer, and Engineer (no specialty) in the Dodge Players Database
- **Other (excluded):** Players classified as Landscape architect, Consultant, Owner's Agent, Interior Designer, and Construction Manager in the Dodge Players Database

### **A.1.3 Market Penetration Analysis**

The PE/MCA Team conducted an analysis of the NCP's market penetration of the statewide new construction market from 2008 through 2012. Market penetration is defined as the total project square footage engaged with NCP divided by the total square footage of statewide new construction activity completed over that same time period. The penetration analysis serves as an update to the penetration evaluation completed for the years 2000 through 2007 in the 2008 MCA Evaluation. In addition to a statewide penetration result, NCP market penetration was measured with respect to geography (upstate/downstate), utility territory, building size, and building structure type. The PE/MCA Team mapped the market sector fields in the NCP project database to the project type/market segment fields in the NAA Database according to the sector category mapping scheme presented in Table A-3.

**Table A-3. NAA Database and NCP Data Sector Category Mapping Scheme**

<b>MCA Sector Category</b>	<b>NAA Database: Project Type</b>	<b>NCP Program Database</b>
<b>Apartments</b>	Apartments	Multifamily (Over Four Units) Residential & Private Individuals
<b>Commercial</b>	Amusement, Social and Recreational Bldgs Hotels and Motels Office and Bank Buildings Parking Garages and Automotive Services Stores and Restaurants	Commercial - Wholesale and Retail
<b>Government Services</b>	Government Service Buildings	Local Government State Government Federal Government
<b>Hospitals &amp; Health Treatment</b>	Hospitals and Other Health Treatment	Health Care
<b>Industrial/Manufacturing</b>	Manufacturing Plants, Warehouses, Labs Warehouses (excl. manufacturer owned)	Industrial/Manufacturing
<b>Miscellaneous Nonresidential Buildings</b>	Miscellaneous Nonresidential Buildings Religious Buildings	Agriculture & Forestry Not For Profit
<b>Schools, Libraries, &amp; Labs</b>	Dormitories Schools, Libraries, and Labs (nonmfg)	Education - Colleges & Universities Education - Elementary & Secondary Schools

## **A.2 Primary Data Collection and Analysis**

The PE/MCA Team supplemented the initial market characterization analysis using information gathered during a series of in-depth interviews (IDIs) with market actors involved in or knowledgeable about the State’s new construction marketplace. This provides details about the PE/MCA Team’s approach to sampling and interviewing respondents and analyzing the IDI responses.

### **A.2.1 In-Depth Interview Sampling Approach**

In developing an in-depth interview sampling approach, the PE/Team identified market actors that interact with the new construction market on a daily basis and make key operational decisions based on perceptions of the market’s future direction. Target organizations included NCP’s Technical Assistance (TA)

contractors and Outreach Program Consultants (OPCs), participating and non-participating building owners and property managers, architectural and engineering firms (design teams), economic development organizations, building design and construction trade organizations, firms that finance new construction activities, and local government agencies. Table A-4 summarizes the sampling approach for each market actor group.

Note that for the design team and end user interviews, the PE/MCA Team targeted those with the highest levels of new construction activity and NCP participation, as established by their number and value of projects. This purposive sample was designed to gain insights from those organizations responsible for larger shares of market activity. Therefore, the reader should not consider any findings derived solely from interview responses as representative of the full population.

**Table A-4. Sampling Approach by Market Actor Group**

Market Actor Group	Estimated Population Size	Targeted Number of Completions <sup>a</sup>	Sampling Approach
NCP OPCs	10-14	4	Worked with NYSERDA staff to identify the most appropriate individuals to target at the OPC firm (there is only one). Staff sought to divide interviews between outreach and technical staff.
NCP TAs	19	10	The team attempted to contact each TA firm in the population. Worked with NYSERDA staff to identify the most appropriate individuals to target at each firm.
End Users	Participants >200	10	End-use customers associated with NCP projects completed on or after January 1, 2010, through 2012. Sample frame extracted from the NCP Cross Program Database. Purposive sample included those with the largest share of project starts or project value.
	Non-participants >500	10	End-use customers associated with construction starts in the State on or after January 1, 2010, through 2012. Sample frame extracted from the Dodge Players Database and only included C&I and multifamily new construction projects eligible to participate in the NCP. Purposive sample included those with the largest share of project starts or project value.
Design Teams	Participants ~200	10	Architect and engineering firms associated with NCP projects completed on or after January 1, 2010, through 2012. Sample frame extracted from the NCP Cross Program Database. Purposive sample included those with the largest share of project starts or project value.

Market Actor Group	Estimated Population Size	Targeted Number of Completions <sup>a</sup>	Sampling Approach
	Non-participants >200	10	Architect and engineering firms associated with construction starts in the State on or after January 1, 2010, through 2012. Sample frame extracted from the Dodge Players Database and only included firms associated with C&I and multifamily new construction projects eligible to participate in the NCP. Purposive sample included those with the largest share of project starts or project value.
Industry/Trade Organizations	~15	5	Conducted internet research on trade organization target audiences, goals, and special topics including small projects, LEED, sustainability, and training.
Regional Economic Development Offices	10	2	Worked with NYSERDA staff to identify the most appropriate individuals to include in the sample.
Financial Firms & Real Estate Development Law Firms	>100	10	Conducted a combination of internet research and analysis of the Dodge Players Database to identify appropriate target firms.
Municipal Government Agencies	62	5	Assessed the top-five largest cities after New York City (Albany, Buffalo, Rochester, Syracuse and Yonkers) and their respective activities related to energy efficiency.

<sup>a</sup> The evaluation relied on in-depth interviews to collect primarily qualitative data. Therefore, the Team did not attempt to achieve the 90/10 confidence/precision targets intended for quantitative measurement. Instead, the team drew a purposive sample designed to gain insights from those organizations responsible for larger shares of market activity. Therefore, the reader should not consider any findings derived solely from interview responses as representative of the full population.

The PE/MCA Team worked with the NCP Impact Evaluation Team and checked potential interviewees against the most recent NYSERDA evaluations to identify areas of potential overlap in the evaluations' respective samples and mitigate potential respondent fatigue. In addition, the PE/MCA Team coordinated with the Multifamily Participant Program Evaluation Team to identify overlap between design team samples. All sample lists were cross-referenced according to NYSERDA's Contact protocol.

#### **A.2.1.1 Detailed Sampling Approach: Participating End Users**

The NCP Cross Program Database served as the sample frame for NCP program participants, with "participants" defined as those end-use customers associated with projects completed on or after January 1,

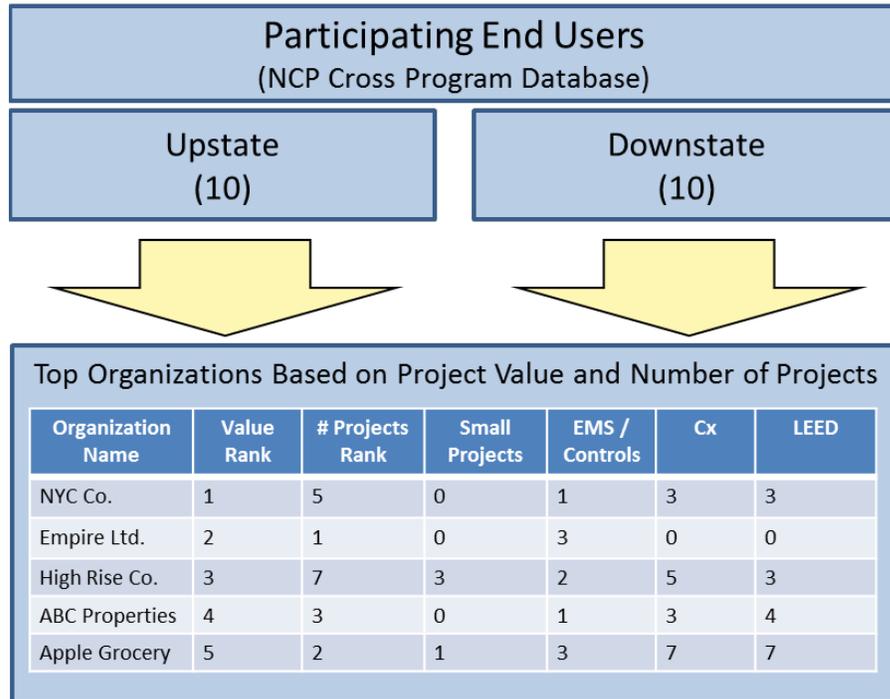
2010, through 2012.<sup>83</sup> The NCP Cross Program Database, provided by NYSERDA, contains data on completed projects only; therefore, participants have experienced the entire NCP process, from application to payment.

The PE/MCA Team grouped unique end users by geography (upstate and downstate) and assessed the number of projects and total project value completed by each end user to identify the top participating organizations. The team then assessed whether the end users completed small projects, installed advanced technologies, and pursued LEED certification.<sup>84</sup> Figure A-1 summarizes this approach.

**Figure A-1. Sample Development for Participating End Users**

Numbers in parentheses indicate the total number of target completions. Organization names are for illustration purposes only.

Source: Navigant



<sup>83</sup> Note that this “participant” definition differs slightly from the one that will be used by the Impact Evaluation in that it excludes “partial participants” (projects that engaged with the program but cancelled their participation or project). This discrepancy arises from the differing research objectives of the respective evaluations and the need for each evaluation to align (in order to make comparisons against prior baselines) with the respective population definitions used in previous impact, process, or MCA Evaluation reports.

<sup>84</sup> Small projects include projects fewer than 20,000 square feet. Advanced technologies include energy management systems, HVAC controls, and commissioning. The PE/MCA team will attempt to achieve at least five completions with end users who have projects that included each of these subcategories (small projects, advanced technologies, LEED).

### **A.2.1.2 Detailed Sampling Approach: Non-Participating End Users**

The PE/MCA Team developed the sample for non-participating end users using data from the Dodge Players Database for construction starts from 2010 to 2012. This database uses information from the F.W. Dodge New Construction Reporting system and is designed to furnish information on the market actors associated with individual new construction projects, including owners, architects, engineers, and other market actors. The sample frames were restricted to include only those commercial and industrial (C&I) and multifamily new construction projects eligible to participate in the NCP.<sup>85</sup> Non-participants included in the sample frame were limited to design teams associated with projects completed in the State on or after January 1, 2010, through 2012.

Similar to the participant sample, the unique end users were grouped by geography (upstate and downstate) and were assessed by the number of projects and total project value completed by each end user to identify the top participating organizations. The team then assessed whether the end users had completed small projects and installed advanced technologies. Figure A-2 summarizes this approach.

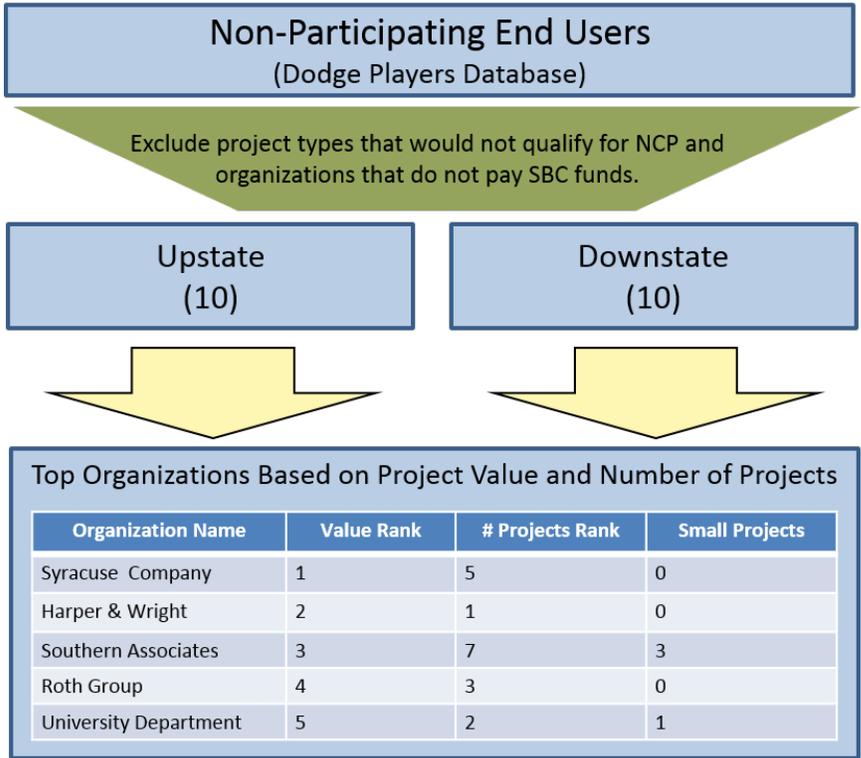
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<sup>85</sup> Dodge Players Database Reports include a number of project types that would not be eligible for NCP incentives including airports (non-building), bridges, communication systems, dams and reservoirs, gas systems, miscellaneous non-building construction, power/heat/cooling plans, river/harbor/flood control, sewage and waste disposal systems, streets and highways, and water supply systems. In addition, projects located in Nassau County and Suffolk County (i.e., Long Island) and other projects that do not pay SBC funds will be excluded from the sample frame. These non-applicable projects are easily identified and filtered within the Dodge Players Database.

**Figure A-2. Sample Development for Non-Participating End Users**

Numbers in parentheses indicate the total number of target completions. Organization names are for illustration purposes only.

Source: Navigant



**A.2.1.3 Detailed Sampling Approach: Participating Design Teams**

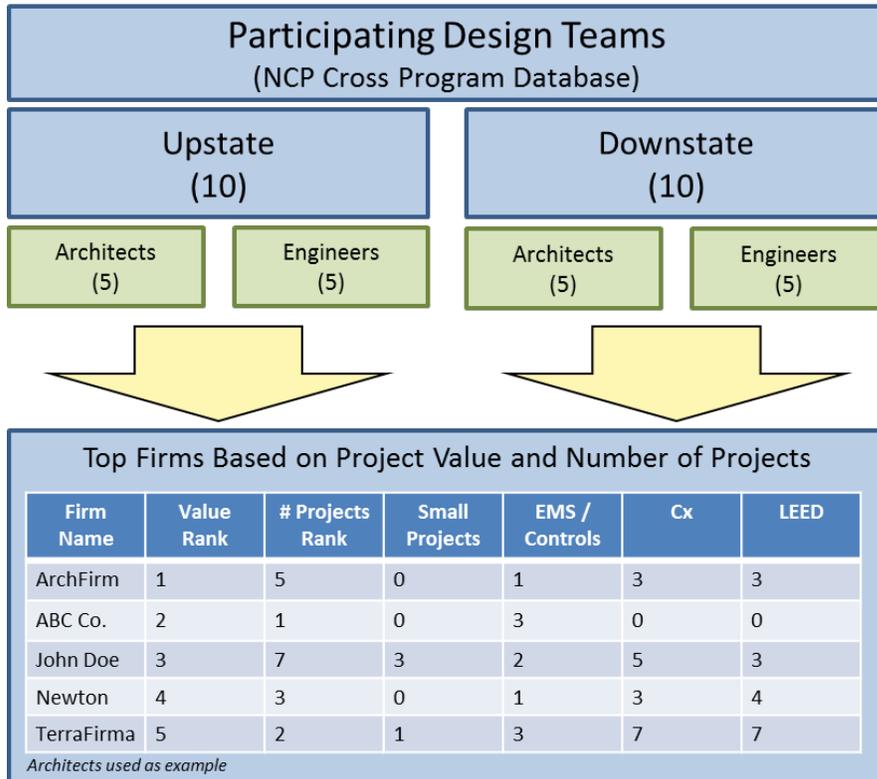
The NCP Cross Program Database also served as the sample frame for participating design teams, with “participants” defined as design teams associated with projects completed on or after January 1, 2010, through December 31, 2012. The NCP Cross Program Database, provided by NYSERDA, contains data on completed projects only; therefore, participants have experienced the entire NCP process, from application to payment.

The PE/MCA Team grouped unique end users by geography (upstate and downstate) and by type of firm (architects and engineers) and then identified the top participating organizations based on the number of completed projects and total value of completed projects. Finally, the team assessed whether the end users have completed small projects and installed advanced technologies, and pursued LEED certification. Figure A-3 summarizes this approach.

**Figure A-3. Sample Development for Participating Design Teams**

Numbers in parentheses indicate the total number of target completions. Organization names are for illustration purposes only.

Source: Navigant



**A.2.1.4 Detailed Sampling Approach: Non-Participating Design Teams**

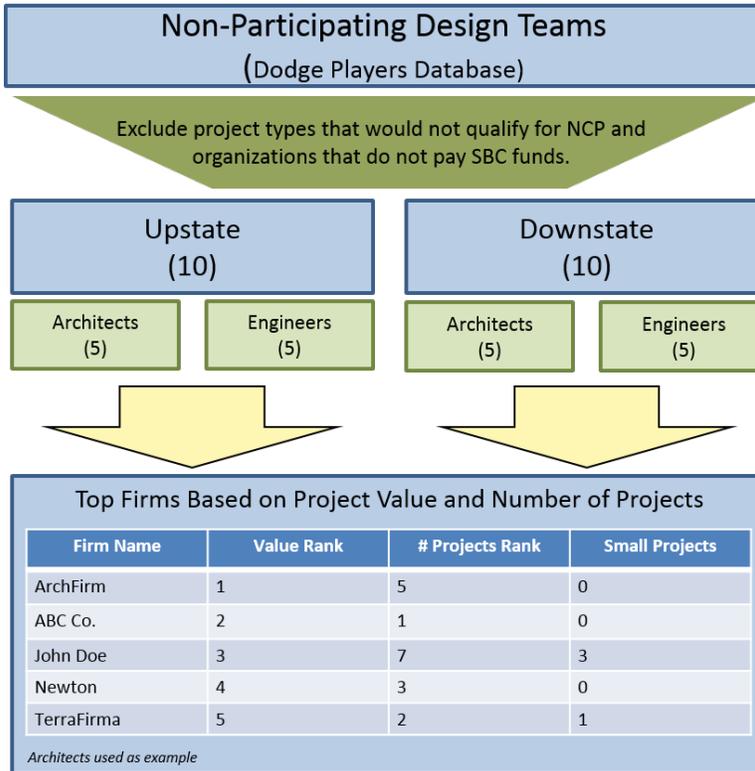
As with the non-participant end user sample, the sample for non-participating end users and design teams was developed using data from the Dodge Players Database for construction starts from 2010 to 2012. The sample frames were restricted to include only C&I and multifamily new construction projects eligible to participate in the NCP. Non-participants eligible to be included in the sample frame included end use customers and design teams associated with projects completed in the State on or after January 1, 2010 through 2012.

The PE/MCA Team grouped unique design teams by geography (upstate and downstate) and firm type (architects and engineers) and then assessed the number of projects and total project value completed by each end user to identify the top participating organizations. Figure A-4 summarizes this approach.

**Figure A-4. Sample Development for Non-Participating Design Teams**

Numbers in parentheses indicate the total number of target completions. Organization names are for illustration purposes only.

Source: Navigant



**A.2.2 Completed Interview Disposition and IDI Participation Challenges**

The PE/MCA Team directly managed the recruiting process for the in-depth interviews and coordinated with NYSERDA evaluation staff to draft all recruitment email and phone scripts and to ensure the scripts adhered to NYSERDA protocol. The Team began the recruitment process by sending emails to targeted market actors to alert them to the evaluation effort and solicit their participation in the study. The Team then followed up with each target via phone two to three days after sending the advance email to attempt to schedule an interview. Additional follow-up via email and phone was conducted as needed. The Team provided NYSERDA evaluation staff with weekly updates on the progress of interview scheduling and completion efforts in each market actor category. Table A-5 summarizes the overall completion rates for each market actor category. The team did not perceive a characteristic or set of characteristics for those who did not respond to requests for interviews that suggests nonresponse bias should be a concern.

**Table A-5. Overall Cooperation Rates by Market Actor Category**

<b>Market Actor Category</b>	<b>Targeted Number of Completions</b>	<b>Number of Individuals Contacted</b>	<b>Number of Completions</b>	<b>Cooperation Rate<sup>a</sup></b>
NCP OPCs	4	11	4	36%
NCP TAs	10	17	8	47%
End Users (Participants)	10	76	11	14%
End Users (Non-Participants)	10	90	12	13%
Design Teams (Participants)	10	106	9	8%
Design Teams (Non-Participants)	10	231	15	6%
Industry and Trade Organizations	5	25	2	8%
Regional Economic Development Offices	2	2	1	50%
Financial Firms and Real Estate Development Law Firms	10	31	9	29%
Municipal Government Agencies	5	5	3	60%
<b>Total/Overall</b>	<b>74</b>	<b>594</b>	<b>74</b>	<b>12%</b>

<sup>a</sup> Cooperation rate = Actual Number of Completions / Individuals Contacted

For the first six weeks of recruiting, the PE/MCA Team encountered low cooperation rates (i.e., number of scheduled or completed interviews divided by the number of individuals contacted), specifically among end users, design teams and industry trade organizations. In discussing these cooperation rates both internally and with NYSERDA evaluation staff, the PE/MCA Team identified several likely barriers to interview participation and adjusted its interview recruitment approach. Table A-6 outlines these barriers and each solution adopted by the PE/MCA Team in consultation with NYSERDA staff to increase the cooperation rate.

**Table A-6. Suspected Barriers to IDI Participation and Solutions Implemented**

Suspected Barriers	Solutions Implemented by the PE/MCA Team
Target market actors did not see value in participating	<ul style="list-style-type: none"> <li>» Strengthened value proposition in recruiting scripts by emphasizing the impact the market actor input may have on NYSERDA's offerings</li> <li>» Offered \$50 check in recognition of the value of respondent's time<sup>86</sup></li> </ul>
Request was too far removed from NYSERDA	<ul style="list-style-type: none"> <li>» Sent advance email directly from NYSERDA evaluation staff with follow up conducted by the PE/MCA Team</li> </ul>
Interview duration (60 minutes) was too long	<ul style="list-style-type: none"> <li>» Shortened end user and design team interviews from 60 minutes to 30 minutes by eliminating low- and medium-priority questions</li> </ul>

After implementing these solutions, end user and design team completions increased by 13% and 17%, respectively. Table A-7 presents the change in cooperation rate by market actor category before and after the PE/MCA Team implemented the set of recruiting adjustments outlined in Table A-7.

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<sup>86</sup> The PE/MCA Team did not offer the \$50 incentive to OPCs or TAs. Market actors who participated in the interviews before the PE/MCA Team began offering the incentive received an email from Navigant informing them of the incentive and asking for the contact information needed to send them the check. Those that responded received an incentive check.

**Table A-7. Cooperation Rate by Market Actor Category, Before and After Recruiting Adjustments**

Market Actor Category	Pre-Adjustment			Post-Adjustment		
	Contacted	Completed	Cooperation Rate	Contacted	Completed	Cooperation Rate
End Users	111	4	4%	113	19	17%
Design Teams	167	7	4%	80	17	21%
Trade Organizations	4	1	25%	19	1	5%
Outreach Project Consultants <sup>a</sup>	6	1	17%	11	3	27%
Technical Assistants <sup>a</sup>	16	5	31%	5	3	60%
Regional Economic Development Offices	N/A <sup>b</sup>	N/A	N/A	2	1	50%
Financial Organizations and Real Estate Law Firms	N/A	N/A	N/A	31	9	29%
Government Agencies	N/A	N/A	N/A	5	3	60%
<b>Total</b>	<b>304</b>	<b>18</b>	<b>6%</b>	<b>266</b>	<b>56</b>	<b>21%</b>

<sup>a</sup> The PE/MCA Team did not offer OPCs and TAs incentives for completing an interview, nor did they receive an email directly from NYSERDA staff asking for their participation.

<sup>b</sup> N/A indicates that recruitment had not yet begun in these market actor categories before the recruitment adjustments were made across all categories.

### **A.2.3 In-Depth Interview Process**

The PE/MCA Team directly managed the in-depth interviews, conducting hour-long interviews with program staff, OPCs, and TAs, 30- to 45-minute interviews with other market actors and 30- to 60-minute interviews with participant and non-participant teams. The PE/MCA Team developed interview instruments specific to each of the market actor categories identified in Section A.2.1 using the updated sources and uses memo to ensure coverage of the research objectives outlined in Section 2.1. The interview guides also included any issues that arose from secondary research (i.e., literature review and analysis of

NCP project data and other market data), as well as additional topics agreed upon with NYSERDA staff. The Team submitted the draft guides to the NYSERDA project manager to coordinate a review by NYSERDA staff, as well as to the Impact Evaluation Team for their review. The Team revised the guides based on the comments received prior to conducting any interviews. Section A.2.5 includes the final interview questions, including an indication of the market actor groups of which each question was asked.

Interviews were completed by staff experienced in qualitative market research and familiar with the new construction market and new construction programs. In addition to each interviewer taking detailed notes during the interviews, each conversation was recorded in order to verify notes as necessary. Final notes were then combined in a master analysis file and uploaded into the PE/MCA Team's qualitative data analysis platform, NVivo<sup>TM</sup>.<sup>87</sup>

#### **A.2.4 In-Depth Interview Data Analysis**

The PE/MCA Team analyzed interview responses in the context of the preliminary market characterization findings and against each of the research objectives as outlined in the sources and uses table. To accomplish this, the Team's researchers were assigned specific topics for analysis and review of responses to each question within that topic. These topic assignments aligned with the topic segments in the interview guides and the sources and uses table to ensure that the analysis accurately reflected the project research objectives.

Each researcher began question-level analysis by categorizing (coding) the responses based on common themes and market actor attributes such as geographic perspective, facility ownership status, and program participation. Next, the researchers analyzed the coded responses using the NVivo platform's query tools to assess common themes and to identify issues needing clarification. The analysis team met on an ongoing basis to discuss common themes across topics and to identify necessary adjustments or clarifications. Upon completion of the IDI data analysis, the team submitted a memo of preliminary findings to NYSERDA for review and comment by evaluation and program staff to help ensure no key issues were overlooked in the analysis. The memo was discussed in detail with NYSERDA evaluation and program staff in a meeting on January 16, 2014, and NYSERDA staff provided follow-up comments and guidance via email. Note that the findings memo and subsequent discussion presented only aggregate findings and trends; reporting of responses was designed to protect interview respondents' identities.

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<sup>87</sup> NVivo<sup>TM</sup> is a qualitative data and mixed methods (i.e., able to incorporate statistical quantitative data) research software used to collect, organize and analyze content from diverse sources, including, but not limited to interviews, surveys, web pages and other literature in electronic or online formats. See: [http://www.qsrinternational.com/products\\_nvivo.aspx](http://www.qsrinternational.com/products_nvivo.aspx).

## A.2.5 In-Depth Interview Questions and Response Details

This section presents the final questions developed by the PE/MCA Team for the IDI guides. The questions are organized by topic in Table A-8 through Table A-19. The tables include an indication of which market actor groups were asked each question and how many interview respondents were associated with each question.

**Table A-8. Market Activity Interview Questions**

Interview Question	Relevant Market Actors	Number of Respondents (n)
What are your expectations for the growth of the new construction and renovation market in New York State over the next five years?	OPCs, Trade Orgs, EcoDevo, Fin/Law, Munis	n = 21
Which sectors and building types will see increasing activity in new construction and renovation over the next three years and why? Which sectors will see decreasing amounts of activity?	OPCs, TAs, Design Teams, Trade Orgs, EcoDevo, Fin/Law, Munis,	n = 41
Among building owners and tenants, is demand for energy efficiency increasing, decreasing, or staying the same compared to three years ago?	Design Teams, Trade Orgs, EcoDevo, Fin/Law	n = 19
<p>What differences do you see in the upstate new construction market vs. downstate?</p> <p>Our analysis of market data showed a trend toward an increasing number of new construction and renovation projects under 100,000 square feet in the upstate market, but increasingly larger projects (over 100, 000 square feet) in the downstate market. What do you think is likely driving that trend?</p>	OPCs, TAs, Trade Orgs, EcoDevo, Fin/Law, Munis	n = 26

**Table A-9. Economic Downturn Interview Questions**

Interview Question	Relevant Market Actors	Number of Respondents (n)
How has New York's new construction market changed because of the economic downturn?	OPCs, TAs, Trade Orgs, EcoDevo, Fin/Law, Munis	n = 24
What impacts have the economic downturn and subsequent recovery had on how organizations finance new construction projects or large renovations? Have those changes affected the scope of projects? How so?	End Users, EcoDevo, Fin/Law, Munis	n = 27
How would you characterize the current availability of capital for new construction and renovation projects compared to two years ago [more, less, same]?	OPCs, EcoDevo, Fin/Law, Munis	n = 12
Has the availability of capital impacted the scope of new construction and renovation projects? How so?	End Users	n = 1
What, if any, new types of financing arrangements for energy efficient new construction and renovations have emerged or become more popular in the past few years? What characteristics of those arrangements have led to their increased use?	End Users, EcoDevo, Fin/Law, Munis	n = 15
How would you characterize the balance between developer-led vs. self-financed projects?	End Users, EcoDevo, Fin/Law, Munis	n = 9
Have you noticed any trends in terms of the balance between public versus private financing for new construction projects in the state? What do you think will happen with that trend over the next five years?	Fin/Law	n = 5
What other trends do you foresee in new construction finance over the next three to five years?	End Users, Fin/Law	n = 7

**Table A-10. Design Team Expertise Interview Questions**

<b>Interview Question</b>	<b>Relevant Market Actors</b>	<b>Number of Respondents (n)</b>
How would you describe your "standard practice" for energy efficient new construction or renovation? What energy efficiency technologies or measures do you consider to be part of your "standard practice"?	Design Teams, TAs	n = 20
On a typical new construction project, do you aim to comply with the current energy code or exceed it? In which energy end uses are you most likely to exceed energy code? Least likely?	Design Teams	n = 12
Has what you consider "standard practice" for energy efficiency measures changed in the past three years? How? What drove those changes? Has NYSERDA's NCP played any role in shifting your "standard practices" when it comes to energy efficient design? [if yes, probe for how]	Design Teams, TAs	n = 14

**Table A-11. Advanced Technologies Interview Questions**

Interview Question	Relevant Market Actors	# of Respondents (N)
What energy efficiency technologies or approaches do you consider to be more advanced? In how many projects have you incorporated [that measure/each of those measures] in the past three years?	OPCs, TAs, End Users, Design Teams, Trade Orgs	N = 32
<p>On a scale from 1 to 5, with 1 being not very familiar and 5 being very familiar, how familiar are you with building energy management systems, advanced controls, and system sub-metering? Have you incorporated any of those technologies or features into any projects in the past 3 years?</p> <p>[If yes] How has your experience with those systems or technologies compared to your expectations? What has prevented you from incorporating those systems or technologies into more projects?</p> <p>[If no] What has prevented you from incorporating those systems or technologies into projects?</p>	OPCs, TAs, End Users, Design Teams, Trade Orgs	N = 65
<p>On a scale from 1 to 5, with 1 being not very familiar and 5 being very familiar, how familiar are you with the purpose and process of retro-commissioning?</p> <p>[If yes] Have you conducted retro-commissioning for any buildings or projects in the past 3 years? How has your experience with retro-commissioning compared to your expectations?</p> <p>[If no] What has prevented you from pursuing retro-commissioning for more buildings? What has prevented you from pursuing retro-commissioning for buildings?</p>	OPCs, TAs, End Users, Design Teams, Trade Orgs	N = 60
For building owners and tenants interested in energy efficiency (EE), to what degree are they interested in and implementing "standard" energy efficiency measures versus more advanced technologies that we just talked about?	Design Teams	N = 6
What role has the shift from project-level to measure-level TRC tests played in the degree to which you consider advanced or newer energy efficiency technologies when designing projects? What role has it played in either encouraging or discouraging whole-building design approaches to energy efficiency?	TAs	N = 1

**Table A-12. Service Delivery Interview Questions**

Interview Question	Relevant Market Actors	Number of Respondents (n)
Over the past five years, what changes has your firm made in its approach to the new construction and renovation market? Have you increased your focus at all on specific market sectors or building types? Have you partnered with or acquired any other firms to strengthen your capabilities or offerings in a particular market sector or service offering? What's driving demand [in that sector/for those services]?	Trade Orgs, TAs	n = 9
To what degree are design firms taking a more integrated approach to delivering design and construction services? For example, are more design firms offering design-build or construction management services than five years ago? What's driving that shift?	Trade Orgs	n = 1
We're also interested in the degree to which architecture and engineering firms are able to meet end-user demand for expertise in energy efficient building design. In the past three years, have you added any energy efficiency related capabilities or service offerings? If so, what's driving demand for those capabilities? In the past three years, have you either partnered with or acquired other firms in order to meet demands for energy efficiency related expertise?	Design Teams	n = 11
In the past three years, have you either hired additional staff or trained existing staff specifically to help meet demand for energy efficiency expertise?	Design Teams, Trade Orgs	n = 12
Do you feel that the level and availability of energy efficiency expertise in the New York State market is adequate for your firm to meet client demand for energy efficient design?	Design Teams	n = 11
Do you feel that the level and availability of expertise in the New York State market is adequate to meet your and other building owners' or developers' needs related to energy efficiency?	End Users	n = 4
Do you encourage your staff to seek professional certifications related to energy efficiency? If yes, which ones?	Design Teams, Trade Orgs	n = 13
What is your opinion on the value of staff obtaining LEED accreditation?	Trade Orgs	n = 2

Interview Question	Relevant Market Actors	Number of Respondents (n)
<p>Are you familiar with any of the energy efficiency and building performance-related certifications offered by ASHRAE?</p> <p>[If yes] What is your opinion on the value of staff obtaining those ASHRAE certifications?</p> <p>[If opinion is not unfavorable] Which of those certifications do you think are most valuable in the current market?</p>	Trade Orgs	n = 2

**Table A-13. Decision Making Res Interview Questions**

Interview Question	Relevant Market Actors	Number of Respondents (n)
<p>At what point in the planning stages of a new construction project are energy efficiency opportunities considered and incorporated into building plans?</p>	OPCs, TAs, End Users, Trade Orgs, Fin/Law	n = 43
<p>Does the incorporation of energy efficiency efforts tend to occur before or after the project financing and capital needs have been determined?</p>	OPCs, TAs, End Users, Trade Orgs, Fin/Law	n = 43
<p>What are the most common reasons that a project team would choose not to incorporate energy efficiency into a new construction or renovation project?</p>	OPCs	n = 2
<p>What are the typical reasons that a project team chooses not to participate in the NCP? [Probe for barriers related to program awareness, project eligibility, convenience, etc.]</p>	OPCs	n = 3

**Table A-14. Tenant Build-Out Interview Questions**

Interview Question	Relevant Market Actor	Number of Respondents (n)
At what point in the process of identifying, leasing and building out new rental space do tenants and owners discuss energy efficiency issues?	End Users, Design Teams, Fin/Law, Trade Orgs	n = 18
Who would be the best party for NYSERDA to engage with regarding NCP incentive opportunities for tenant build-outs: the owner or developer, the tenant, or the design team?	OPCs, TAs, End Users, Design Teams, Fin/Law, Trade Orgs	n = 24
How important is energy efficiency relative to other improvements a new tenant considers when designing their build-out?	TAs, End Users, Design Teams, Trade Orgs	n = 34
To what degree do increases in landlord concessions (\$ per square foot) lead to a higher level of energy efficiency in build-out efforts versus other space improvements?	TAs, End Users, Design Teams, Trade Orgs	n = 28
What prevents more tenant build-out projects from including energy efficiency measures?	OPCs, TAs	n = 8
What prevents tenant build-out projects from utilizing NCP incentives?	OPCs, TAs	n = 7
What could the NCP could do to better engage in tenant build-out opportunities?	OPCs, TAs	n = 7
Do you think there are a few building types or occupant types for which NYSERDA could offer prequalified measure packages that would be usable by a majority of build-out opportunities?	TAs, Trade Orgs	n = 4
Would design teams and owners be more likely to include energy efficiency measures in tenant build-outs if NYSERDA were able to offer such prepackaged incentives?	OPCs, TAs, End Users, Design Teams	n = 35
What do you see as pros and cons of NYSERDA offering packages of prequalified incentives for such	OPCs, TAs, End Users,	n = 29

Interview Question	Relevant Market Actor	Number of Respondents (n)
efficiency measures?	Design Teams	
In terms of incorporation into build-out design and construction, what types of energy efficiency measures could most easily be included in a prequalified package for tenant build-outs? What measures would be more difficult to incorporate?	OPCs, TAs, End Users, Design Teams	n = 34

**Table A-15. Net Zero Energy Interview Questions**

Interview Question	Relevant Market Actors	Number of Respondents (N)
What is your opinion on the value of LEED certification for new construction projects?	OPCs, End Users, Design Teams, Trade Orgs, EcoDevo, Fin/Law, Munis	n = 61
Are project decision-makers more or less interested in obtaining LEED certification for their new construction projects relative to three years ago?	OPCs, Design Teams, Trade Orgs, EcoDevo, Fin/Law, Munis	n = 42
What other building certifications are decision-makers interested in?	OPCs, Design Teams, Trade Orgs, Munis	n= 20
How familiar are you with the concept of net-zero energy building? What do you think of it?	TAs, End Users, Design Teams	n = 54
Are the building owners you work with familiar with the net-zero energy building concept? If so, what is their attitude toward it?	TAs, Design Teams, Trade Orgs	n= 33
What thoughts or guidance can you provide about how NCP could better incentivize a whole-building approach to energy efficient design?	OPCs, TAs, Design Teams	n = 36
Who is the driving force behind exploring net-zero energy buildings, the building owners or the design teams? Why is that?	OPCs, End Users	n = 4

**Table A-16. Small Projects Interview Questions**

Interview Question	Relevant Market Actors	Number of Respondents (N)
What do you think prevents more small new construction and renovation projects from participating in the NCP?	OPCs, Design Teams, End Users	n = 19
For smaller projects that do participate, how well do you think the NCP currently serves those projects?	OPCs, Design Teams	n= 6
What barriers exist to incorporating energy efficiency measures that are greater for smaller projects than larger ones?	OPCs	n= 1
Are there any differences in how decision-makers for smaller projects consider energy efficiency compared to those for larger projects?	OPCs	n= 2
How could NYSERDA better encourage the incorporation of energy efficiency into smaller new construction and renovation projects? Are there specific ways in which NYSERDA could improve its program offerings or processes that would invite small projects to participate more?	Design Teams, End Users	n = 9

**Table A-17. Consolidated Funding Application Interview Question**

Interview Question	Relevant Market Actors	Number of Respondents (n)
How would you characterize the shift to the consolidated funding application? Was it a positive, negative or neutral change from your perspective?	OPCs, TAs, End Users	n = 10

**Table A-18. Code Changes Research Objectives and Interview Questions**

Interview Question	Relevant Market Actors	Number of Respondents (n)
Through what channels or information sources do you learn about recent and upcoming changes to building codes that affect your projects?	TAs, Design Teams, Trade Orgs	n = 15
Can you walk me through the process of assessing how building code changes will affect your energy efficiency work in new construction? How do you change your design approach in response to new or potential code changes?	TAs, Design Teams	n = 17
Do you recall the design teams for your recent new construction projects discussing with you the impacts of recent or upcoming changes to the building code as they related to the design of your building? [If yes] What did the design team convey to you with regard to building codes?	End Users	n = 3

**Table A-19. Spillover Questions**

<b>Interview Question</b>	<b>Relevant Market Actors</b>	<b>Number of Respondents (n)</b>
Can you think of any positive early experiences with energy-efficient design that led you to pursue energy efficiency in subsequent new construction projects or renovations? Can you describe how these experiences changed your thinking on energy efficiency?	Design Teams, Trade Orgs, Fin/Law	n = 12
[For non-participants] Prior to this interview, had you heard of the NYSERDA New Construction Program? Are you aware of any new construction projects in New York State that received funding or technical support from that? [If yes] Do you believe that this funding or program assistance resulted in a higher level of efficiency being designed and ultimately installed in those buildings, relative to standard practice in this market?	Design Teams	n = 9
[For participants only] What percentage of the buildings you have worked on in the past year have been designed to qualify for potential incentives from the NCP program?	Design Teams	n = 6
[For participants] Thinking about the new construction projects that you're familiar with that received NCP funding or technical support, do you believe that the program's assistance resulted in a higher level of efficiency being designed and ultimately installed in those buildings, relative to standard practice in this market?	Design Teams	n = 7
[Participants only] Have your experiences with the NCP influenced you to include energy efficiency in other, non-NCP projects? How so?	End Users, Design Teams	n = 18
[For participants and non-participants aware of program] Has the existence of the NCP program changed the way you or your firm specify or design the level of efficiency that is incorporated into new buildings you work on?	Design Teams	n = 18
Are you aware of any other indirect effects that the NCP program may have had on the level of efficiency being designed and installed in new buildings in your market? [After allowing an initial open-ended response, prompt with examples of possible market effects such as "increased customer awareness of energy efficiency measures", "increased availability of qualified energy efficiency experts in the workforce", etc.]	End Users	n = 11
On a scale of 1 to 5, how familiar are you with the various energy-related requirements of New York City's PlaNYC and the Greater, Greener Buildings Plan? If greater than 1, what changes, if any, have you made or do you plan to make in your buildings as a result of the requirements of PlaNYC and the Greater, Greener Buildings Plan?	End Users	n = 9

<b>Interview Question</b>	<b>Relevant Market Actors</b>	<b>Number of Respondents (n)</b>
On a scale of 1 to 5, how familiar are you with the various energy-related requirements of New York City's PlaNYC and the Greater, Greener Buildings Plan? [If greater than 1] What influence do you perceive those requirements will have on the new construction and renovation market in New York City?	OPCs, Trade Orgs, EcoDevo, Fin/Law, Munis	n = 14
To what degree are New York City's Greater, Greener Buildings Plan requirements likely to drive changes in awareness and adoption of energy efficiency in other parts of the state outside of New York City?	OPCs, Trade Orgs, EcoDevo, Munis	n = 4
To the best of your knowledge, are any other municipalities in New York State considering the adoption of requirements similar to those in New York City's Greater, Greener Buildings Plan?	OPCs, Trade Orgs, EcoDevo, Fin/Law, Munis	n = 4

## Appendix B Additional Market Characterization Data

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This section presents additional market characterization data to supplement the activity and trends described in Section 3 of this report. A summary of overall new construction activity in New York, as measured by new construction project starts, total new project area, and total new project value, is presented in Table B-1.

**Table B-1. Summary of New Construction Activity in New York, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded.

Source: McGraw-Hill Construction New, Addition, and Alteration Database

Year	Projects	Area (Million Sq. Ft.)	Value (\$ Billion)
2008	7,902	78.1	19.9
2009	7,030	41.4	17.4
2010	6,192	36.1	20.6
2011	7,245	43.6	18.0
2012	6,991	46.0	19.0
<b>Total</b>	<b>35,360</b>	<b>245.2</b>	<b>94.8</b>

The remainder of this section includes additional project activity detail and is organized in the following manner: Section B.1 describes the proportion of small, medium, and large buildings in New York's new construction market, Section B.2 presents the breakdown of new construction activity by sector, Section B.3 analyzes statewide new construction activity by utility territory, Section B.4 presents NCP participation among top building owners, design teams, and LEED projects, and Section B.5 discusses the effect of the Recession on statewide new construction activity and project financing.

### **B.1 Market Activity by Building Size**

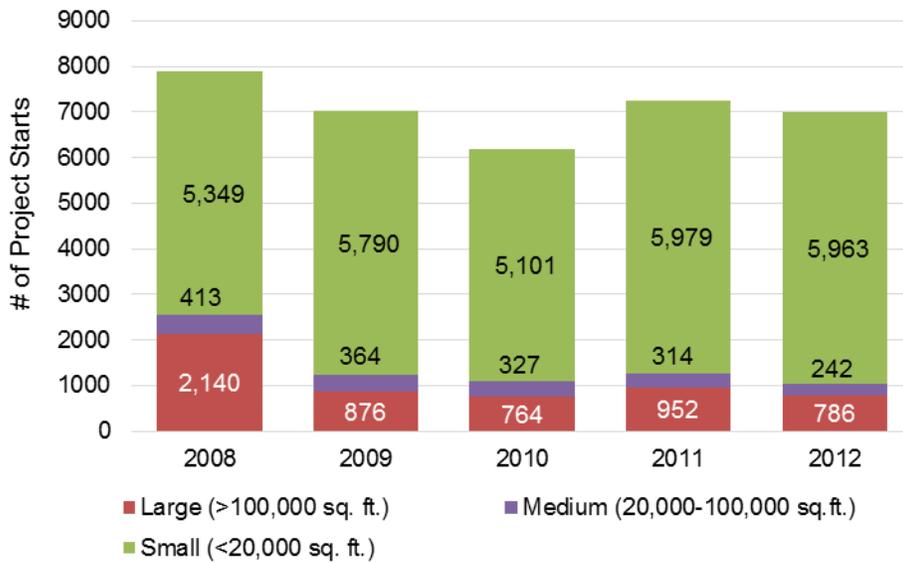
This section presents statewide new construction data by building size for project starts and overall new project area from 2008-2012. Statewide market data reveals that the volume of new construction coming from large projects has decreased and remains fairly consistent since 2009. This trend is reflected in Figure B-1, which displays the distribution of new construction projects starts for 2008–2012 by building size. Figure B-2 shows the distribution of project square footage, which shows that while the number of projects

greater than 100,000 square feet (sf) has been decreasing and is low compared to the number of smaller projects occurring (11% of all projects in 2012), the overall project area for these large projects is higher (i.e., 84% of total square footage in 2012). This contrast is significant given that the larger projects are subject to more volatile swings (e.g., boom and bust cycles) and projects over 200,000 sf see the most volatility.<sup>88</sup>

**Figure B-1. Project Starts by Building Size, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded.

Source: McGraw-Hill Construction New, Addition, and Alteration Database

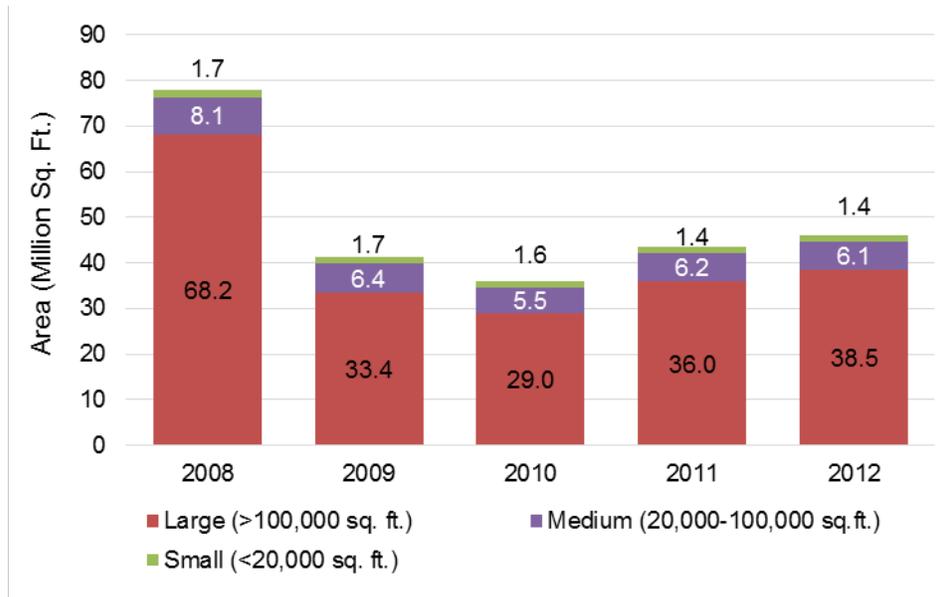


<sup>88</sup> McGraw-Hill Construction, Energy Efficiency Trends in Residential and Commercial Buildings, Prepared by McGraw-Hill Construction for the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 2010. [http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/building\\_trends\\_2010.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/building_trends_2010.pdf)

**Figure B-2. Area of Project Starts by Building Size, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded.

Source: McGraw-Hill Construction New, Addition, and Alteration Database



## B.2 Market Activity by Sector

This section presents statewide new construction activity by sector for 2008–2012. In terms of project square footage, the relative project area for apartments has decreased since 2008, suggesting that the average size of apartment projects has gone down over the past five years.

**Figure B-3. Area of Project Starts by Sector, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded

Source: McGraw-Hill Construction New, Addition, and Alteration Database

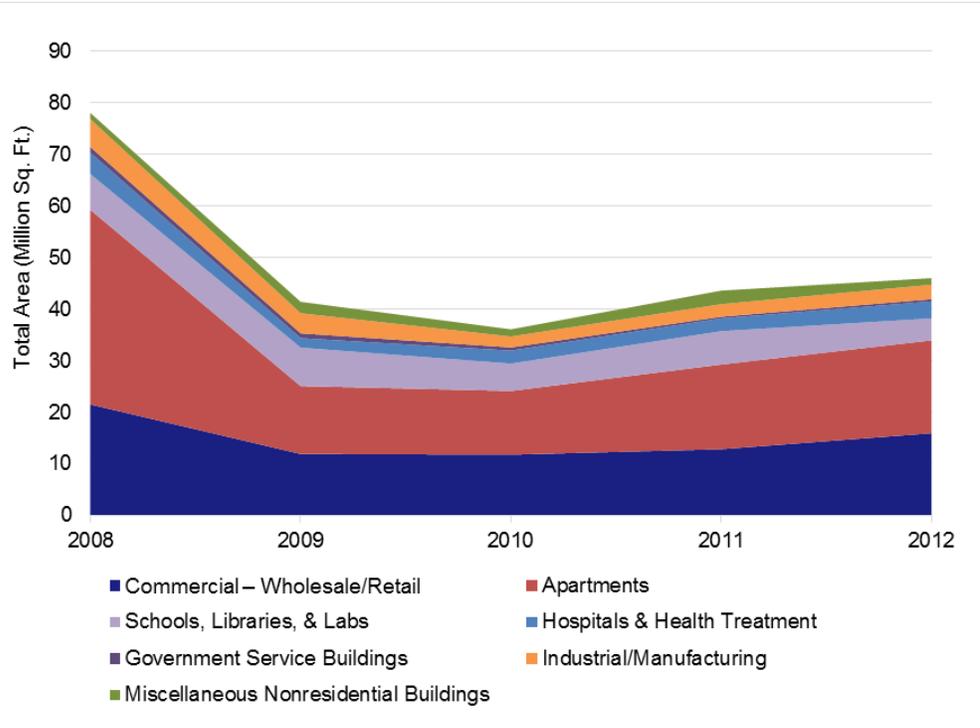
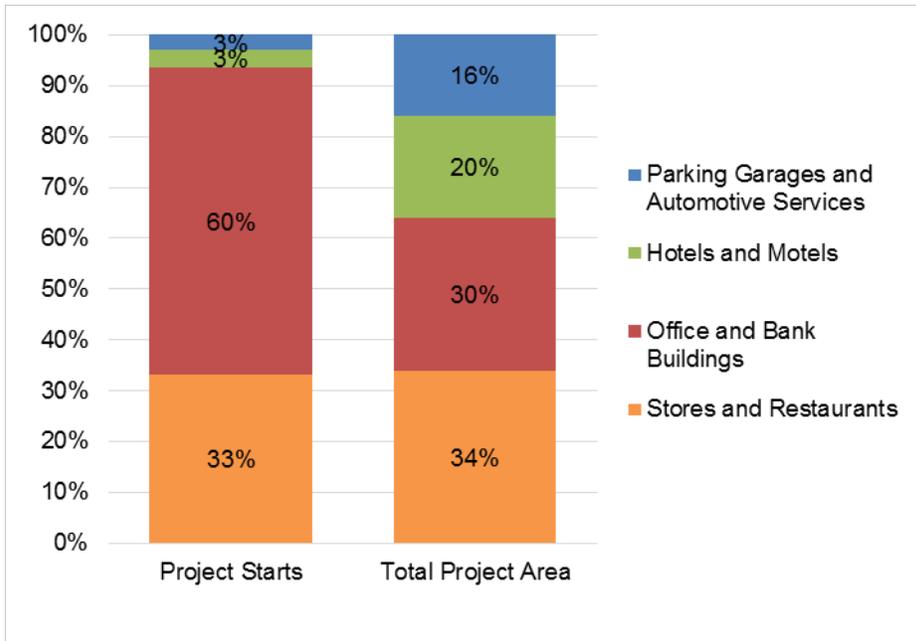


Figure B-4 provides a closer look at subsector market activity for the commercial sector in terms of the cumulative number of projects and total project area for 2008–2012. The chart shows that, while the majority of recent commercial activity has come from offices, retail stores, and restaurants, offices have generally been smaller projects.

**Figure B-4. Share of Project Starts and Total Area by Commercial Subsector, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded

Source: McGraw-Hill Construction New, Addition, and Alteration Database



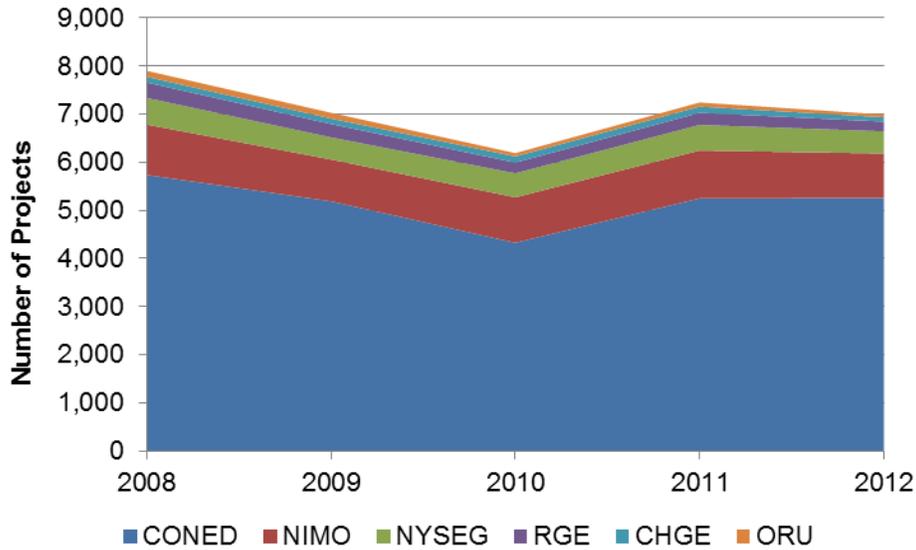
### **B.3 Market Activity by Utility**

An analysis of the geographic trends in New York’s non-residential new construction market during the 2008-2012 timeframe reveals that the majority of new construction activity occurred in the Con Edison utility areas, with this utility areas (which encompasses New York City) accounting for 75% of activity in 2012 in terms of number of projects and 60% of activity in 2012 in terms of building area (Figure B-5 and Figure B-6). Despite the change in absolute number of new construction projects and total project area from 2008-2012, the distribution of statewide new construction project activity among the five New York State utilities remains relatively constant over the five-year time period.

**Figure B-5. Number of Project Starts by Utility, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded

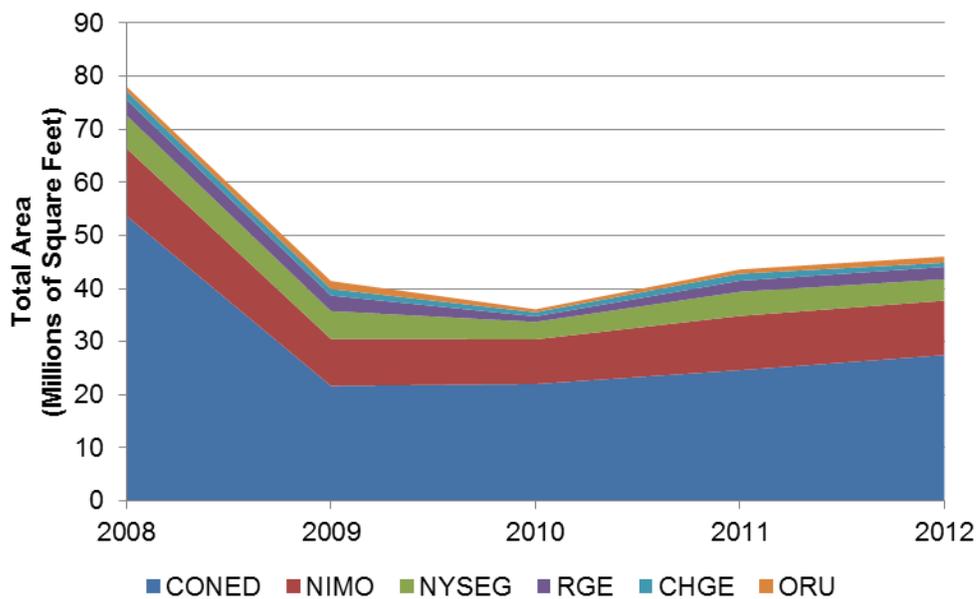
Source: McGraw-Hill Construction New, Addition, and Alteration Database



**Figure B-6. Area of Project Starts by Utility, 2008-2012**

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded

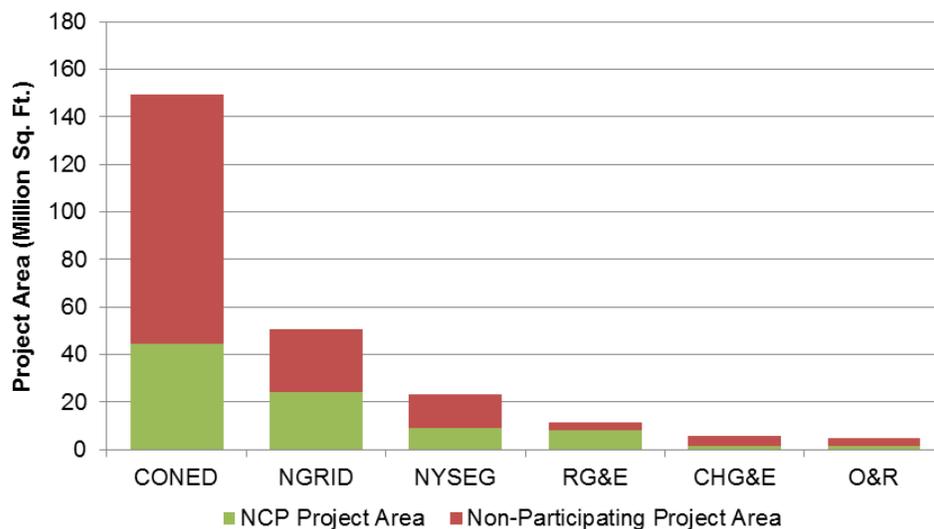
Source: McGraw-Hill Construction New, Addition, and Alteration Database



An evaluation of the market penetration by utility territory is shown in Figure B-7. The analysis indicates that NCP penetration among the six utility areas varies significantly for both total NCP project area and cumulative program penetration. While the Consolidated Edison (ConEd) utility territory accounts for the most NCP work in terms of total square footage, the highest penetration (i.e., percent of total project area constructed) was achieved in the Rochester Gas and Electric Corporation (RG&E) utility area.

**Figure B-7. NCP Market Penetration (Building Area) by Utility, Cumulative 2008-2012**

Source: McGraw-Hill Construction New, Addition, and Alteration Database; NCP Cross Program Database



## B.4 End Users and Design Teams

This section describes NCP participation among top building owners, design teams, and LEED projects. Navigant analyzed market data to determine the top 20 owners and engineering and architecture firms in the state, in terms of the number of projects completed and total value of projects statewide. This data was compared with the NCP project database to determine how many of these end users and design teams the NCP program is currently engaging with.

- Building Owners:** Table B-2 presents the top 20 building owners by number of project starts and total project value in 2012 and indicates with an X which of these owners participated in the NCP from 2008–2012. The analysis shows that, over the past five years, NCP has worked with 60% of the top 20 building owners by number of 2012 project starts but only 10% of building owners based on project value.
- Design Teams:** Table B-3 presents the top 20 engineering firms by number of project starts and total project value in 2012 and indicates with an X which of these firms participated in the NCP from 2008–2012. Over the past five years, NCP has worked with 70% of the top 20 engineering firms by number of 2012 project starts (45% based on project value). A similar analysis for architecture firms is

presented in Table B-4. The analysis indicates that, over the past five years, NCP has worked with 70% of the top 20 architectural firms by number of 2012 project starts (50% based on project value).

- **LEED Projects:** Table B-5 presents a summary of LEED participation among top NCP design firm participants in 2012 and shows that the majority of the top-performing NCP design teams are also pursuing green building projects.

**Table B-2. Top Building Owners – Statewide Activity, 2012**

Excludes projects in Nassau and Suffolk counties

Source: Dodge Players Database, NCP Cross Program Database

Number of Projects			Total Project Value (\$ Millions)		
Top 20 Owners by # of Projects	Projects (#)	NCP Participant?	Top 20 Owners by Project Value	Value (\$M)	NCP Participant?
New York State Dormitory Authority	48		The Related Companies	872	
Vornando Realty Trust Management Office	43	X	56 Leonard LLC	420	
Destiny USA Development LLC c/o Pyramid Companies	38	X	Norampac Industries	400	
RCPI Landmark Properties and Trust	27		Macys East Inc Federated Stores	400	
New York State Office Of General Services Des & Co	26		MTA -Capital Const East Side Access Project Office	325	
Cornell University Contracts & Capital Projs Admin	25	X	Douglaston Development Group	300	
Wal-Mart Stores Inc	22	X	Washington Square Partners Inc.	250	
Rochester City School District Administration	22		Albee Management LLC	250	X
New York State University Construction Fund	21	X	New York State University Construction Fund	229	X
Newmark Knight Frank	19		Seventh Armory Conservancy Inc.	200	
Brookfield Financial Properties	18	X	Lafarge North America Inc.	200	
SL Green Realty Corp	17	X	388 Bridge Street LLC	188	
New York Presbyterian Hospital	16	X	Delta Airlines, Incorporated	160	
Cushman & Wakefield	16		New York State Dormitory Authority	156	
Empire State Building Company	16	X	Seneca Gaming Corp	131	
J P Morgan Chase	15	X	Forest City Enterprises	124	
Rudin Management Co	14		US Army Corps of Engineers-NY District (USACE)	123	
Tishman Speyer	13	X	West 30 St Highline Holdings	117	
Boston Properties Inc.	13		The Witkoff Group	100	
Columbia University	13	X	Northwood Investors LLC	100	

**Table B-3. Top Engineering Firms – Statewide Activity, 2012**

Excludes projects in Nassau and Suffolk counties; Project area excludes a significant number of projects each year with no square footage recorded

Source: Dodge Players Database

Number of Projects			Total Project Value (\$ Millions)		
Top 20 Engineers by # of Projects	Projects (#)	NCP?	Top 20 Engineers by Project Value	Value (\$M)	NCP?
Robert Derector Associates	101	X	Cosentini Associates	\$2,346	X
M G Engineering Inc.	86	X	Jaros Baum & Bolles	\$2,017	X
M/E Engineering	75	X	WSP Cantor Seinuk Group	\$930	
Cosentini Associates	59	X	Thornton Tomasetti	\$875	
Lawless & Mangione	54	X	Highland Associates Architects & Engineers	\$815	X
AKF Engineers	54	X	M G Engineering Inc.	\$739	X
Clark Patterson Lee	41	X	WSP Flack & Kurtz	\$663	X
IBC Engineering PC	40	X	Arup	\$535	X
LaBella Associates	28	X	AKF Engineers	\$483	X
King & King Architects	26	X	Gilsanz Murray Steficek LLP (GMS)	\$438	
Edwards & Zuck Consulting Eng.	26	X	Consulting Structural Engineers	\$407	
Afshari PC	26		Beardsley Design Associates	\$400	X
Bernier Carr & Associates	26	X	Cannon Design Inc.	\$395	X
Lilker Associates	25	X	Langan Engineering	\$376	
Jack Green Associates	25	X	DeSimone Consulting Engineers	\$341	
Gilsanz Murray Steficek LLP (GMS)	25	X	AECOM USA Inc.	\$325	
AMA Consulting Engineers	25	X	M/E Engineering	\$310	X
Hunt Engineers, Architects & Land Surveyors	24	X	Robert Silman Associates PC	\$278	
Robert Silman Associates PC	23		Severud Associates	\$216	X
Watts Architecture & Engineering PC	23	X	Thomas Phifer and Partners	\$192	

**Table B-4. Top Architecture Firms – Statewide Activity, 2012**

Excludes projects in Nassau and Suffolk counties; Project area excludes a significant number of projects each year with no square footage recorded

Source: Dodge Players Database

Number of Projects			Total Project Value (\$ Millions)		
Top 20 Architects by # of Projects	Projects (#)	NCP?	Top 20 Architects by Project Value	Value (\$M)	NCP?
Gensler	55	X	Kohn Pedersen Fox Associates	\$854	X
Lawless & Mangione Architects & Engineers	39	X	SLCE Architects	\$604	X
TPG Architecture LLP	34	X	Cook + Fox Architects	\$575	X
King & King Architects	21	X	Goldstein, Hill & West Architects LLP	\$524	X
Oaklander Coogan & Vitto Architects PC	21	X	FXFowle Architects	\$300	X
CSArch	20	X	Platt Byard Dovell and White Architect	\$230	X
Clark Patterson Lee	20	X	Herzog & de Meuron Archt/Platt Byard White Archt	\$200	
Mancini Duffy Associates / TSC	19	X	Gensler	\$171	X
The Mufson Partnership (TMF Architectural LLC)	18		Skidmore Owings & Merrill	\$168	X
LaBella Associates	18	X	Cannon Design Inc.	\$140	X
S W B R Architects	15	X	Ismael Leyva Architect PC	\$138	X
SEI Design Group	15	X	Hnedak Bobo Group Inc	\$130	
Moed DeArmas & Shannon Architects	13	X	Perkins Eastman	\$118	X
Ted Moudis & Associates Architects	12		SHoP Architects PC	\$117	
LB Architects PC (Loffredo Brooks Arch)	12		KlingStubbins Associates Inc	\$100	X
Ashley McGraw Architects	12	X	Babey Moulton Jue & Booth (BAMO)	\$100	
SLCE Architects	11	X	Augustine M. Digneo Jr, Architect	\$100	
Mosaic Associates Architects	11	X	Brennan Beer Gorman Monk-BBG-BBGM	\$100	X
QPK Design	11	X	Architectural Resources	\$99	X
Hunt Engineers, Architects & Land Surveyors	11	X	Oaklander Coogan & Vitto Architects PC	\$86	X

**Table B-5. Summary of LEED Participation among Top NCP Design Firm Participants, 2012**

Source: Navigant, NCP Cross Program Database

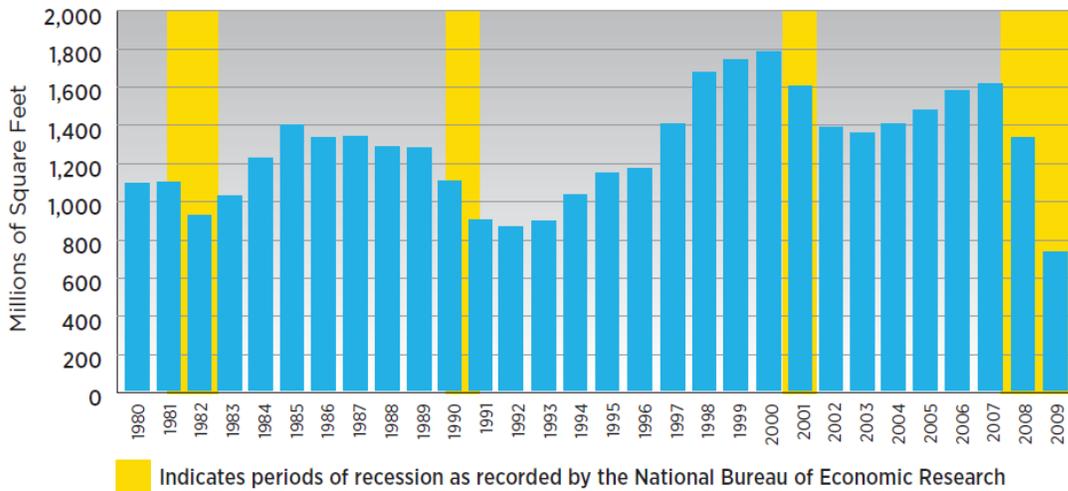
<b>Top NCP Design Firms by Total Project Value (\$ Millions)</b>	
<b>Top 10 Architects by Value of NCP Projects</b>	<b>NCP LEED Projects</b>
Moed De Armas & Shannon	X
QPK Design	X
Perkins Eastman	X
Ismael Layva Architects	X
Tetra Tech	
Kling Stubbins	X
Oaklander, Coogan & Vitto, Architects, P.C.	X
Helpern Architects	X
Ashley McGraw Architects	X
HLW	
<b>Top 10 Engineers by Value of NCP Projects</b>	<b>NCP LEED Projects</b>
Jaros Baum & Bolles	X
Robison & Woese	X
Postler & Jaeckle	
Schaefer Associates	X
Flack & Kurtz	X
Tetra Tech	
M & E Engineering	X
Van Ernst Refrigeration	X
PPJ Consulting	X
Walmart	X
HLW	

## B.5 Effect of the Recession on Construction Activity and Project Financing

This section discusses the effect of the Recession on statewide new construction activity and project financing. Economic conditions strongly affect the new construction market in the United States, as shown in Figure B-8, where periods of recession are associated with significant decreases in new construction activity since 1980. An analysis of market data and trends in the State for 2008–2012 confirms that macroeconomic condition and periods of recession significantly impact the market for new construction across the state.

**Figure B-8. Total Square Footage Started in U.S. Commercial Buildings**

Source: McGraw Hill Construction, 1978-2008

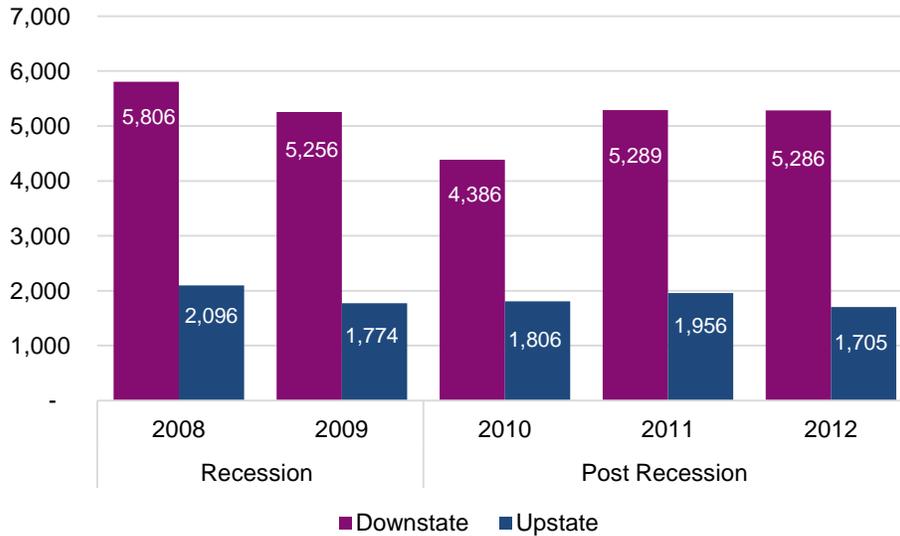


A review of activity and trends in the State new construction market revealed cautious optimism following the Recession, with economic recovery concentrated in large cities. Figure B-9 shows that the post-Recession recovery can be attributed to the downstate region, as upstate project activity has continued to decline following the Recession.

### Figure B-9. Effect of Recession on Annual Project Starts for Upstate/Downstate Region

Excludes projects in Nassau and Suffolk counties; project area excludes a significant number of projects each year with no square footage recorded

Source: McGraw-Hill Construction New, Addition, and Alteration Database



## B.6 Project Financing

In a survey of executives responsible for energy investments conducted by McGraw-Hill, the top three barriers to investing in energy efficiency include lack of funding, insufficient payback/return on investment (ROI), and uncertainty regarding energy savings/performance.<sup>89</sup> The barriers to investing in energy efficiency are presented in Figure B-10. Five of the top seven barriers were cited less in 2012 than 2011, with only lack of funding and insufficient payback becoming more significant in 2012. The average allowable payback for energy efficiency retrofit projects fell from 3.7 years in 2011 to 3.4 years in 2012, potentially indicating that organizations are becoming more discerning with respect to their financing criteria.

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<sup>89</sup> This study relates to major renovations.

**Figure B-10. Barriers to Investing in EE; Survey of Executives Responsible for Energy Investments**

Average Allowable Payback appears to refer to the average payback on installed measures, rather than the maximum payback

Adapted from Institute for Building Efficiency, 2012. “Setting the PACE Financing Commercial Retrofits”

