NYSERDA **New York State Energy Research and Development Authority**

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October 15, 2008

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Jacklyn Brilling
Secretary
New York State
Public Service Commission
3 Empire State Plaza
Albany, NY 12223

Dear Secretary Brilling:

In its June 23, 2008 Order in Case 07-M-0548, Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard (EEPS), and a subsequent Procedural Ruling issued July 3, 2008, the New York State Energy Research and Development Authority (NYSERDA) was directed to submit a proposal by October 1, 2008, including a funding recommendation, for a program to promote enhancement, training, and compliance enforcement for achieving energy efficiency savings through enhanced building codes and appliance standards in New York. This filing date was later extended to October 15, 2008. This Strategy for Enhanced Building Codes and Appliance Standards is intended to fulfill the requirement of the July 3, 2008 Procedural Ruling. NYSERDA prepared this strategy in consultation with the Codes Division of the New York State Department of State (DOS), the entity responsible for administration of New York State Energy Law Article 11 (Energy Code) and Article 16 (Appliance Standards).

Enclosed are an original and 25 copies of the filing. If you or members of the Commission should have any questions, please feel free to contact me at 518-862-1090, extension 3233.

Sincerely,

Bob Callender
Vice President for Programs

Enc.

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A Strategy for Enhanced Energy Codes and Appliance Standards in New York

Prepared by

The New York Energy Research and Development Authority

Submitted in
Case 07-M-0548
Proceeding on Motion of the Commission
Regarding an Energy Efficiency Portfolio Standard

October 15, 2008

TABLE OF CONTENTS

TABLE OF TABLES

1. PREFACE

In its June 23, 2008 Order in Case 07-M-0548, Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard (EEPS), the New York State Public Service Commission (Commission) acknowledged that estimates presented by DPS Staff and other parties demonstrated that the potential energy savings associated with enhancing building codes and appliance standards exceeds that of most, if not all, efficiency incentive programs.[1] A Procedural Ruling issued July 3, 2008 directed NYSERDA to submit a proposal by October 1, 2008, including a funding recommendation, for a program to promote enhancement, training, and compliance enforcement for codes and standards.[2] This filing date was later extended to October 15, 2008.[3]

This Strategy for Enhanced Building Codes and Appliance Standards is filed to fulfill the requirement of the July 3, 2008 Procedural Ruling. NYSERDA prepared this strategy in consultation with the Codes Division of the New York State Department of State (DOS), the entity responsible for administration of New York State Energy Law Article 11 (Energy Code) and Article 16 (Appliance Standards).

The goal of the EEPS is to obtain the jurisdictional portion[4] of a 15% reduction in forecast electricity use by the year 2015 (referred to as "15x15"). In developing a strategy for meeting this goal, projections of potential electric savings under high levels of code compliance, increases in code stringency, and aggressive development and adoption of appliance and equipment standards were developed and found to provide the potential for significant "non-jurisdictional" savings at a relatively low cost. These projected savings were predicated on using EEPS funds to alter the course of "business-as- usual" in the building and appliance industries, by providing resources to achieve these high potential energy savings. This strategy examines the current status of codes and standards activities in New York and the energy savings gap that exists between maximum compliance and "business-as-usual", and provides a set of specific tasks and activities recommended to achieve the highest practical levels of compliance and associated cost-effective energy savings.

[1] Case 07-M-0548, Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard, Order Establishing Energy Efficiency Portfolio Standard and Approving Programs, June 23, 2008, pp. 10-11.

[2] Case 07-M-0548, Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard, Procedural Ruling Concerning EEPS Design Issues, issued July 3, 2008, p.4.

[3] Case 07-M-0548, Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard, Procedural Ruling Concerning Working Groups and Schedule, issued September 10, 2008, p.2.

[4] As stated in the June 23, 2008 Order, "The jurisdictional gap is calculated by forecasting electricity usage through 2015 (the baseline), calculating 15% of the baseline, and subtracting expected contributions of entities outside the Commission's jurisdiction and the effect of improvements in building codes and appliance standards." Order, p.9.

2. INTRODUCTION

Construction activity in New York, where population has shown little growth over the past decade, remains significant. During the past eight years, nearly 58,000 non-residential construction projects representing 576 million square feet of building area and $112.5 billion in construction value has been completed.[5] Over the past 8 years, more than 150,000 single family homes were constructed in New York, and thousands of pieces of heating, cooling, and lighting equipment units are purchased and installed in New York every year.

The Energy Conservation Construction Code of New York (Energy Code)[6] addresses the design of energy-efficient building envelopes and the installation of energy-efficient mechanical, lighting and power systems through requirements emphasizing performance. This comprehensive code establishes minimum regulations for energy-efficient buildings using prescriptive and performance-related provisions. It makes possible the use of new materials and innovative techniques that conserve energy.

New York Energy Law, Article 11, Section 107 places the overall administration of the Energy Code with the New York State Department of State (DOS). Within New York, the Energy Code is enforced at the municipal level by code enforcement officials in approximately 7,000 cities, towns and villages. The level and sophistication of plan review and enforcement varies widely in New York, as some communities have large building departments with full-time code officials, while others have part-time code enforcement officials.

Code enforcement officials are required to take 114 hours of training, as provided by DOS training staff, to obtain initial certification. The energy code component of the initial training is five hours. Code enforcement officials are required to take 24 hours of training, including minimums within certain categories, to maintain annual certification. Energy code training is not required to maintain certification. Several designated outside entities are approved by DOS to provide the in-service (annual maintenance) training. Basic training courses on the entire building code (fire, life safety, electricity, plumbing and mechanical) are provided by nine instructors from the DOS Codes Division Staff. NYSERDA and DOS have augmented the Energy Code portion of this training with special project grants from U.S. DOE, however no funding is currently available to continue this practice.

There is a need to increase compliance with existing energy codes, channel resources to advance code standards and ensure the timely enactment of appliance and equipment standards. As a result of working nationally with states on implementing energy codes, the experience of staff at the Building Codes Assistance Project (BCAP) is that projected energy savings are often not obtained due to a host of factors. Some of the identified barriers to achieving the maximum energy savings from codes and standards include:

- Lack of awareness of applicable codes and standards requirements within the building community (designers, engineers, code officials, owners);
- Unfamiliarity with the application of new technologies;
- Wide variations in the skills of code officials to review plans and specifications;
- Limited availability of advanced products;
- Limitations in the scope of work currently covered by the Energy Code (renovation work is largely excluded from code requirements);
- Lag in the development of State and federal appliance standards;
- Weak federal standards that do not push the marketplace or respond to regional climate variations;
- Lack of resources to address reviews and inspections of large, complex building projects;
- Contractors who lack training to properly install energy-saving devices in buildings;

[5]McGraw-Hill Construction; Dodge New, Addition and Alteration Database.

6 The 2007 Energy Code has an effective date of January 1, 2008.

- Limited use of building commissioning to assure correct design and installation;
- Inability of building operators to maintain equipment and building automation systems as designed; and
- Poor building operation and maintenance.

NYSERDA's strategy is based upon an ongoing commitment to increase compliance with current standards and to evolve more stringent standards as technologies advance and become cost effective. The American Society of Heating, Refrigeration and Air Conditioning engineers (ASHRAE) is currently developing a new standard intended to achieve 30 percent more energy savings than the 90.1-2004 standard. U.S. DOE will be developing standards for 13 covered equipment products over the next six years, and New York is developing standards for approximately six product categories not covered by U.S. DOE.

Many of NYSERDA's **New York Energy $mart**[SM] programs include efforts to inform the building community on the merits of energy efficiency and actively pursue the installation of equipment and appliances with the highest efficiency levels. As equipment and appliance standards advance, incentive payment levels offered by energy efficiency program administrators, including NYSERDA, should be recalculated to ensure ratepayer funds are not expended to meet mandated minimums.

NYSERDA and DOS closely collaborate on these issues and anticipate that these efforts will continue. As the implementing agency, DOS is responsible to provide support for both codes and standards. NYSERDA has also consulted with members of the Energy Code Technical Committee and has worked independently, and through consultants, with consumer representatives and manufacturers to develop appliance efficiency standards. Core activities such as compliance studies, technical analysis, and standards research are considered ongoing activities, moving forward as technology and product advancements push minimum efficiency levels higher in successive years.

3. BACKGROUND

3.1. New York State Energy Conservation Construction Code Background

The New York State Energy Conservation and Construction Code, updated in April, 2008, encompasses commercial provisions based on the text of the International Energy Conservation Code (IECC) 2003 and ASHRAE[7] 90.1-2004. The residential provisions are based on the IECC 2004 Supplements. Updating New York's Energy Code requires a rulemaking initiated by the DOS. The Energy Code Technical Subcommittee, directed by DOS, is comprised of stakeholders including code officials, builders, advocacy groups, heating ventilation and air conditioning (HVAC) and lighting experts, and agency representatives. After reviewing the current or supplemental version of the IECC, the Subcommittee prepares recommended code changes that generally follow the requirements and language of the IECC codes. However, the Subcommittee is not bound by the IECC requirements and often recommends requirements exceeding that of the IECC code. The proposed Energy Code must be shown to meet at 10-year payback as required by Article 11 of the State Energy Law and often a cost-effectiveness study must be completed to support proposed changes, particularly if the proposed changes are from the IECC Supplements or newer versions. All building-related codes in New York are currently reviewed and updated on a three-year cycle, with the next cycle beginning in 2009.

The recommended code changes are presented to the DOS Code Council for review and approval. The proposed Energy Code revisions are also reviewed by the Governor's Office of Regulatory Reform for conformance to applicable laws, such as the Energy Law. Once approved, a series of public hearings are held and resultant comments are provided and reviewed by the DOS Code Council. Once adopted, the modifications become mandatory throughout New York, although municipalities may choose to adopt a more stringent code.

3.2. Appliance Standards Background

National appliance and equipment efficiency standards were first established in 1987, and subsequent standards were enacted by Congress in 1988, 1992, and 2005. The U.S. Department of Energy (U.S. DOE) has updated many of the standards initially set by Congress. Typically, individual states set their own standards for a product, spurring manufacturers and efficiency advocates to negotiate national consensus standards that are recommended to U.S. DOE and Congress. Generally, once a Federal standard is enacted it preempts the state standard. States may petition U.S. DOE for a waiver, but the process can be lengthy and requires significant resources.

The American Council for Energy Efficient Economy (ACEEE) estimates that standards enacted prior to 2007 will save about 5 quadrillion Btu of energy by 2020 nationally, or about 4% of projected energy use in that year. Annual electricity demand savings will reach 144,000 MW by 2020 nationally, or the equivalent of 480 power plants at 300 MW each.[8]

Article 16 of the New York State Energy Law addresses appliance and equipment standards for New York. The New York State Secretary of State and the President of NYSERDA have combined responsibility to establish energy efficiency performance standards for listed products, promulgate regulations, and administer and enforce provisions of the Article. Standards developed under this article may not become effective without a waiver if federal government efficiency performance standards regarding such products preempt state standards. Article 16 currently includes 14 products, 13 of which have been preempted by subsequently established federal standards. The remaining product category is consumer audio and video products. DOS, in consultation with NYSERDA, is currently developing standards for these products.

[7] American Society of Heating, Refrigerating and Air Conditioning Engineers.

[8] See Appliance Standards Awareness Project website, Appliance Efficiency Standards in the 2007 Energy Bill: Key Facts, December 2007,http://www.standardsasap.org/documents/2007EnergyBill_Standardsfactsheet.pdf.

The 2007 Federal Energy Independence and Security Act contains new standards for 10 products.[9] Some of the standards update or expand existing Federal Standards, while others are new standards for certain classes of products. The largest potential energy savings in the bill are those for common general service light bulbs (or "lamps"). The standards require lamps to use 30% less energy by 2012-2014 than today's common incandescent lamps, and at least 60% less by 2020. Products that can meet the near-term efficiency targets include advanced incandescent lamps, compact fluorescent lamps, and light-emitting diodes (LEDs).

Additional products (bottle-type water dispensers, commercial hot food holding cabinets, circulating portable electric spas and hot tubs, residential furnaces, and main-air circulating fans) that are not covered by the Federal standards have been identified as having potential energy savings in New York, with fans accounting for 92% of the overall savings for these products. Other states, particularly California, are developing standards for other classes of non-exempt equipment and appliances, and New York plays an active role in these efforts.

[9] The ten products include: general service lamps (light bulbs), reflector lamps, residential boilers, clothes washers, dishwashers, dehumidifiers, electric motors, metal halide lamp fixtures, walk-in coolers, and external power supplies.

4. STRATEGY FOR ENHANCED BUILDING CODES AND APPLIANCE STANDARDS

NYSERDA recommends updates and implementation of advanced energy codes and appliance standards in New York beginning in 2009 in order to achieve the maximum electric energy savings attributable to enhanced compliance activities. The specific strategies and corresponding recommended approaches are presented below.

Strategy 1. Determine Current Levels of Energy Code Compliance Through Regular Baseline Compliance Assessments.

Recommended Approach:

As an essential component of an advanced code strategy, NYSERDA and DOS support conducting a baseline study to determine current levels of compliance, the compliance process for residential and commercial buildings, and barriers to full compliance as an essential component of an advanced code strategy. Without full compliance, a large gap will exist between predicted and actual energy savings. Further, low levels of current compliance and the barriers that contribute to this situation will likely translate into even lower levels of compliance with a newer, more stringent code, resulting in a much smaller than predicted energy savings. The baseline study will identify areas of low compliance, the energy savings gap, and provide information on how to better inform and train code enforcement officials about Energy Code requirements. The strategy employed by NYSERDA and DOS will be to conduct ongoing assessments of compliance, particularly as code requirements are updated and strengthened to better inform allocation of code resources in future years.

► NYSERDA will competitively select a contractor to complete a comprehensive baseline study of compliance in New York in 2009. This baseline study will be developed and coordinated with the evaluation activities described in the codes and standards evaluation plan, as well as those proposed as part of other EEPS program evaluation plans (e.g. commercial new construction baseline, residential new construction baseline) to prevent duplicative efforts. It is expected that follow-up studies will be conducted in subsequent years to assess changes in code compliance.

Strategy 2. Strategy: Development and Delivery of Advanced Training, Tools, Strategies, and Resources

Recommended Approach:

Ongoing training is critical to successfully supporting newer or advanced codes standards, particularly at the initial point of adoption. NYSERDA, in consultation with DOS will establish a code training advisory group to shape the development of training courses. NYSERDA will competitively procure training service providers for training directed at local code officials, designers, and engineers. NYSERDA has supported similar training with Federal Special Grant Funds, however, this funding is limited and sporadic. To build the necessary training infrastructure to ensure the greatest success, NYSERDA, in conjunction with DOS proposes to provide a predictable and continuous calendar of energy code training opportunities available Statewide. At a minimum, the training will be provided in 5 segments, targeting technical topics in residential and commercial buildings. The primary audience for the first segment is homebuilders and code enforcement officials. Architects, engineers, and advanced code enforcement officials are the primary audience for the remaining segments. The training segments are:

- One half-day (four contact hours) residential course addressing all compliance paths and methods, including highlights of the latest changes to the existing energy code and MECCheck.[10]
- One half-day commercial envelope course addressing Chapter 8 of the Energy Code and COMcheck-EZ[11] based on compliance paths.

[10] MECCheck is a software compliance tool developed and supported by U.S. DOE.

- One half-day commercial mechanical course addressing Chapter 8 and COMcheck-EZ based on compliance paths.
- One half-day commercial lighting and power course addressing Chapter 8 and COMcheck-EZ based on compliance paths.
- One half-day course on basic building science as it relates to energy efficiency and strategies to enhance energy efficiency and overall residential building performance. Specifically, this course will address the 2007 technical provisions and how to best achieve these levels with actual field examples and products currently available that enhance the structure while achieving compliance with the 2007 Energy Code.

In addition to these core topics, focused training on lighting design, daylighting, photovoltaic and wind technologies, green roofs, and green buildings will be developed and offered to encourage advanced building designs beyond code minimums.

► NYSERDA, DOS, and BCAP will work with a select group of local communities toward the development of a fee-based plan reviewer to address commercial building plan reviews. The concept of a pay-for-service plan review (with expenses paid by the building owner or developer) will be demonstrated for a better understanding of the advanced code requirements and, ultimately, higher levels of compliance. In the initial pilot effort, the plan reviewers will provide feedback to building designers and code officials responsible for the project. Some of the information will be used to corroborate findings for the code compliance studies. If successful, this concept could provide a format for other communities that would achieve higher levels of compliance with fewer community resources.

► DOS requires building code officials to complete a minimum number of training hours each year in energy. The minimum required energy code training hours will be examined to see if a more extensive training module would be beneficial and result in higher compliance.

Strategy 3. Strategy: Provide Technical Support for Enhanced Energy Code and Appliance Standards

Recommended Approach:

Detailed technical studies and analysis of available products and costs will need to be conducted to determine the overall economics of proposed code changes and equipment standards development. Often, these studies require a database of various building types and complex energy modeling to determine overall energy impacts.

NYSERDA has funded appliance and equipment standards technical analysis and marketplace studies, and has partnered with regional organizations such as the Consortium for Energy Efficiency (CEE) and the Northeast Energy Efficiency Partnership (NEEP) which have examined specific product categories. New York has also collaborated with other states, such as California, which has been leading appliance and equipment standards development for over two decades.

NYSERDA proposes to competitively procure the services of energy consulting firms and market research firms to provide as-needed technical support services. These firms will be able to provide the objective review necessary to advance changes to codes and standards. Having these services readily available will also allow New York to be more proactive in response to Federal standards and national energy code proposals.

►NYSERDA will issue one or more solicitations to procure technical assistance services by June, 2009. One or more of these contractors will review upcoming Federal appliance standards and identify efficiency levels that are technically feasible and cost-effective in New York. Contractors will also conduct market research on the five product areas where New York could develop state product standards.

[11] COMcheck-EZ is a software compliance tool developed and supported by U.S. DOE.

► NYSERDA will, on a continuous basis, work with local municipalities to adopt an Advanced Energy Code. NYSERDA and other stakeholders will work with early implementers to develop and evaluate the efficacy of implementation strategies, training efforts, and compliance methods.

► NYSERDA will develop case studies, outreach materials, and training tools to support advanced code adoption statewide, building upon work of local communities in and stakeholders.

► NYSERDA proposes to establish a codes and standards working group to include utility representatives, commercial real estate groups, low-income housing organizations, and designers. This working group will provide guidance for developing support services as outlined in this Strategy, and as may be recommended.

► By the end of 2010, the funded studies should provide adequate information to determine whether DOS should advance legislative proposals to expand the scope of the Energy Code to address all renovations and replacement. NYSERDA and DOS will collaborate with the New York City Mayor's Office of Long-Term Planning and Sustainability as they develop a proposed New York City Energy Code that expands required coverage to all renovations. NYSERDA and DOS will present a draft proposal to the Codes Council for voluntary adoption of advanced codes.

Strategy 4. Strategy: Expand Implementation Assistance to Communities and Product Supply Chain

Recommended Approach:

An increasing number of towns and communities in New York have adopted more stringent energy codes than the current 2007 Energy Code, as encouraged under Article 11 of the New York Energy Law.[12] This Strategy will provide technical assistance in reviewing code options, conducting "charrettes" and provide facilitation services. NYSERDA will offer a portion of this assistance through the **New York Energy $mart**[SM] Focus Program for local governments and the Building Codes Assistance Project (BCAP) will provide support to targeted communities. NYSERDA, DOS and BCAP will develop a cooperative training arrangement with several SUNY technical colleges such as Hudson Valley Community College. The training will focus on field inspection procedures for code officials, the application of Home Energy Rating System (HERS)-As-Codes models and other advanced code training in jurisdictions that will adopt advanced codes and use advanced compliance options. Working with towns and villages to gain insight on the efficacy of using HERS-as-codes and ENERGY STAR® as the "stretch code" will be valuable in informing the use of these standards Statewide.

NYSERDA and DOS will contract with one or more providers to offer "circuit-rider" assistance to municipalities that are struggling with the current Energy Code compliance and those that have adopted an advanced code and need training. Designated design professionals selected by NYSERDA will review plans and specification on-site with code officials, architects and engineers. Working directly with these communities this service will provide valuable information on barriers to implementation, costs of compliance, weak links in the compliance process, training needs, and energy savings impacts. Assisting with advanced code adoption at the community level will contribute to achieving the goal of statewide adoption as stakeholders become more familiar with standards, and the cost-effectiveness of higher standards can be demonstrated from completed projects. NYSERDA will also work to ensure statewide consistency among advanced codes.

NYSERDA's market-based incentive programs are already moving a large portion of the market to above-code performance. Since 1999, the New Construction Program has changed design practice and energy

[12] These communities include the Long Island towns of Huntington, Hempstead, Islip, Oyster Bay, Riverhead, Brookhaven and Babylon; and the upstate towns of Greenburgh, North Elba and Lake Placid. Larger cities such as Syracuse and Rochester have resolutions to meet LEED [TM] standards. These communities have looked at other recognize d standards as the baseline code – particularly ENERGY STAR ® and LEED [TM]. Other potential standards include ASHRAE/DOE Advanced Energy Design Guides, NBI's Core Performance and ASHRAE 189.

efficiency in over 172 million square feet of floor space in more than 1,600 projects with average energy savings of 17-19% above the Energy Code. This program is affecting more than 34% of all commercial construction activity in the State. On the residential side, NYSERDA's ENERGY STAR® Home Program has encouraged the construction of more than 11,000 homes built to the New York ENERGY STAR standards, with projected savings of 30% above the Energy Code. This represents over 16 % of the single family residential construction starts (11% of one-to-four family starts). Current results in NYSERDA's Multi-Family Performance Program are, on average, 20% above code in more than 80,000 housing units built since 2006. The combined efforts of these NYSERDA programs continue to demonstrate that achieving above-code performance is cost-effective and in demand.

► NYSERDA will continue to work with product manufacturers, vendors, trade associations and consumer groups to identify appropriate product standards as they are developed by U.S. DOE For products not currently covered by Federal standards, NYSERDA and DOS will continue to work with energy advocacy organizations such as the American Council for an Energy Efficiency Economy (ACEEE), the Northeast Energy Efficiency Partnership (NEEP), and the California Energy Commission to collaboratively develop standards for these products, and to work closely with New York manufacturers and retailers to implement the new standards.

► NYSERDA, DOS and BCAP will develop code assistance services such as field inspection, training, and circuit rider assistance to be provided by one or more selected contractors. NYSERDA will develop compliance models such as HERS –As-Codes and commissioning requirements for commercial buildings will also be developed in Fall 2009. These activities are independent of compliance activities and can be conducted concurrently with the baseline compliance study.

Strategy 5. Strategy: Continue Benchmarking Building Performance and Progress Toward Goals

Recommended Approach:

Using competitively-selected contractors:

► NYSERDA will conduct follow-up studies on a select group of building projects, to determine actual energy savings and the persistence of energy savings. This will be accomplished in concert with NYSERDA's commissioning and retro-commissioning activities, and also using the Energy Star benchmarking tools.

► NYSERDA will conduct a statewide study of the cost-effectiveness of an advanced code that achieves 30% more energy savings than ASHRAE 90.1-2004, and demonstrate that such standards meet the 10-year payback period required by Article 11 by the end of 2011.

► NYSERDA will conduct routine surveys of retailers and vendors in New York to assess conformance to applicable Federal product standards and to enforce compliance.

5. BENEFITS

Building codes and equipment and appliance standards set minimum efficiency and performance levels, effectively setting a floor or baseline. Over time, with education, enforcement and technology advances, the stringency of these codes and standards can be increased. As stated in a 2005 Codes and Standards White Paper:

> Raising the standards has two desirable effects: it brings more of the laggards along towards improved efficiency, and it reduces the drag on market transformation efforts to push the efficiency curve. A third order effect of raising standards is that the cost of better efficiency is reduced. Rather than having to pay incentives to people to produce more efficient buildings, the standards simply tell them that it must be done. Because the standards can only require demonstrably cost-effective measures, they really only impact the laggards who are not building economically smart levels of efficiency. Those are the same market actors who are least likely to be reached by education or incentive programs.[13]

Full compliance with applicable energy codes and equipment and appliance standards would produce significant annual and cumulative energy savings for New Yorkers. These efforts would primarily result in electricity savings, but could also realize savings in natural gas, propane, and home heating oil. Increasing the stringency of these codes and standards will produce incremental energy savings beyond those that would naturally accrue absent changes. Balance is needed to ensure the achievement of the highest levels of compliance with the current requirements while continuously increasing stringency of the requirements to reflect changes in technology and product availability. An additional necessary element is to shape the scope of codes and standards so that they reach the broadest possible applications in new construction, renovations, equipment installations, equipment replacements, and consumer purchases.

In the past, state efforts have been successful in effectuating enhancements of appliance standards at the Federal level. NYSERDA will continue to work with other states and organizations to promote timely development of the new Federal product standards that reflect the best available technology. Successful efforts at the Federal level will lead to additional, and more immediate, energy savings in New York than might otherwise occur.

The following table shows projected cumulative annual energy savings from enhanced commercial and residential codes, as well as totals resulting from enhancing both.

Table 1. Cumulative Figure Annual Energy Savings from Enhanced Codes 2009-2015 (Projected)

	2009	2010	2011	2012	2013	2014	2015
Commercial Code Savings with Enhanced Activities							
GWh	28	63	202	320	439	559	681
MW	6	14	44	70	96	122	149
Billion Btu	62	137	213	512	816	1,122	1,433
Expanded Commercial Code Savings*							
GWh	0	82	315	569	847	1,128	1,433
MW	0	18	69	124	185	246	313
Billion Btu	0	36	72	112	155	199	246

[13]Heschong Mahone Group, TechMarket Works, Megdal and Associates and Ridge and Associates, *Codes and Standards White Paper on Methods for Estimating Savings,* April 7, 2005.

	2009	2010	2011	2012	2013	2014	2015
Residential Code Savings with Enhanced Activities							
GWh	0	0	9	17	27	36	44
MW	0	0	1.3	3	4	5	7
Billion Btu	0	0	644	1,294	2,032	2,695	3,281
Total Code Savings							
GWh	28	145	526	906	1,313	1,723	2,158
MW	6	32	114	197	285	373	469
Billion Btu	62	173	929	1,918	3,003	4,016	4,960
*Expanding the scope of the Energy Code to cover renovation and equipment replacements which are currently not covered.							

Table 2. Enhanced Codes and Standards Savings with Annual Budget (Projected)

	2009	2010	2011	2012	2013	2014	2015
Total Code Savings, including Expanded Scope							
GWh	28	145	526	906	1,313	1,723	2,158
MW	6	32	114	197	285	373	469
Billion Btu	62	173	929	1,918	3,003	4,016	4,960
Appliance Standards Savings							
GWh	882	1,124	1,417	2,454	4,452	6,321	7,202
MW	193	245	309	536	972	1,380	1,572
Billion Btu	0	0	0	0	597	1,194	1,792
Annual Budget ($millions)1							
Codes	3.50	3.00	3.50	3.00	3.00	3.00	3.25
Codes with Expanded Scope	0.25	0.75	0.50	0.50	0.25	0.00	0.00
Standards	1.50	1.50	1.25	1.75	2.00	2.25	2.00
Total	**5.25**	**5.25**	**5.25**	**5.25**	**5.25**	**5.25**	**5.25**

The overall cost per unit of energy savings in 2011 from enhanced New York Energy Code activities is estimated to be less than $10/MWh saved. Potential estimated electric savings in New York from "enhanced" codes and standards activities total 9,360 GWh by the year 2015. The breakout of potential electricity savings includes:

Table 3. Projected Annual Energy Savings by 2015

	Electric Energy Savings (GWh)	Natural Gas Savings (Billion Btu)
Residential Energy Codes	44	3,281
Commercial Energy Codes	681	1,433
Expanded Scope of Code to include renovations	1,433	246
Appliance Standards	7,202	1,792
Total Annual Projected Energy Savings by 2015	**9,360**	**6,752**

Retail electric and natural gas bill savings based on statewide averages of 15.4 cents per kWh and $14.52 per MMBtu are shown in the table below. Lost revenue estimates were not included in the bill savings calculations.

Table 4. Retail Electric and Natural Gas Bill Savings 2009-2015 (Projected)

Annual Bill Savings (millions)	2009	2010	2011	2012	2013	2014	2015	Total (2009 - 2015)
Codes (millions)	$5	$12	$45	$78	$113	$147	$180	**$580**
Commercial Codes: Expanded Scope (millions)	$0	$13	$49	$89	$133	$177	$225	**$687**
Standards (millions)	$136	$173	$218	$378	$694	$990	$1,135	**$3,724**
Total (millions)	$141	$198	$313	$545	$940	$1,315	$1,540	**$4,991**

The impact of enhanced energy codes, beyond to current SBC programs, is included in this analysis. The target audience for enhanced energy codes is the remaining portion of the residential market that is not currently building to Energy Star standards (estimated to be about 85%) and the remaining portion of the commercial market not participating in the New Construction Program (estimated to be about 70%). The analysis assumes a rate of compliance based upon "business-as-usual" and an increased rate of compliance due to enhanced activities. The analysis also reflects increased stringency for codes, and the phase-in of Federal equipment standards, or the development of New York-based standards on equipment not preempted by Federal standards. Given the variables involved in building design, construction, and operation, it is possible that the current "effective" compliance rate (reflecting how much of the maximum potential energy savings are achieved) could be as low as 30%. This is the "business-as-usual" compliance rate. With no added involvement, over time this rate could slightly increase as compliance increases.

NYSERDA and DOS project that much higher levels of compliance (enhanced compliance rate) would occur given a concentrated effort to educate, train, and enforce codes and standards. With appropriate resources, obtaining a 70-75% enhanced compliance rate within the next three to four years is possible. The difference between the "business-as-usual" compliance rate and the enhanced compliance rate would be the savings increment attributable to codes and standards activities described in this Strategy.

Overall, the greatest benefit resulting from this Strategy will be the increase in overall efficiency of New York's building stock, resulting in lower demands on the electricity transmission infrastructure in New York and, ultimately, reduced greenhouse gas emissions. The occupants of these buildings will benefit from improved indoor air quality, while making buildings easier to maintain and operate. Consumers who occupy buildings they do not own will have greater assurance that the building meets required energy standards.

Increased opportunities in the workplace will develop as the need for skilled workers familiar with green building standards increases. Demand for trained energy inspectors, building raters, diagnostic technicians, building energy simulation modelers, and commissioning agents will also increase as standards become more widely enforced and efficiency requirements become more stringent.

Vigorous attention to Federal standards rulemaking activity, particularly to the selected performance levels, could result in significant electric savings in New York. NYSERDA will work closely with manufacturers, retailers, and vendors to ensure that high efficiency products are readily available and that the market is informed regarding new product standards.

6. BUDGET

Activities to support codes and standards in New York will be focused on three core areas: implementation (local adoption, rulemaking, advisory and stakeholder inputs, training); compliance support (education, development of tools, surveys, services); and technical support (economic studies, technology and products assessments, and market studies). Contractor services will be used to conduct most of the activities included in this proposal, particularly compliance and technical support. An annual budget of $5.25 million will be required to maximize the energy savings potential from codes and standards activities.

Table 5. Enhanced Codes and Appliance Standards Annual Budget (Proposed)*

Activity	Contract Services	Additional Staff Funding	Total Budget
Implementation			$1,750,000
Assist in local adoption of advanced energy codes	$300,000	Project management all tasks: $850,000	$700,000
Participate in regional and national codes and standards-setting activities			
Promulgate codes and standards			
Local training for code officials, designers, contractors. Assistance to appliance retailers and suppliers.	$600,000		$1,050,000
Compliance support			$2,400,000
Assessment of Energy Code compliance, benchmarking, retro-commissioning	$400,000	Project management all tasks: $200,000	$500,000
Assessment of appliance standards compliance	$300,000		$400,000
Development of compliance tools	$300,000		$300,000
Circuit rider assistance	$600,000		$600,000
Fee-for service plan review program	$600,000		$600,000
Technical Support			$1,100,000
Economic analysis, building energy modeling, product reviews, payback and energy savings calculations, marketplace studies	$900,000	Project management all tasks: $200,000	$1,100,000
TOTAL	**$4,000,000**	**$1,250,000**	**$5,250,000**

*This mix of core activities is representative of those that will be conducted annually, although the specific apportionment of funding to activities will vary annually depending on progress and needs.

7. CUSTOMER OUTREACH

NYSERDA's marketing and outreach will build on its strong alliance with building designers, engineers, home builders, school districts, colleges, local communities, energy service providers and contractors. DOS will continue collaborating with the 7,000 code officials across the State, also represented by the New York State Building Officials Conference. The New York State Builders Association can provide a liaison with home builders across the State and help to market training and education services.

Utilities and other stakeholder groups or organizations can reach out through established channels to customers or members, informing them of available services. Utilities may be able to co-sponsor or host local code training courses. NYSERDA will collaborate closely with utilities and other program administrators to market and provide outreach on training courses and other related programs.

8. EVALUATION

8.1. General Evaluation Approach

8.1.1. Evaluation Goals

The primary goal of the evaluation is to assess the affect of NYSERDA's activities on code compliance and appliance and equipment standards. Secondary goals include assessing the level of current code compliance (through already-proposed baseline studies), understanding the capability of the commercial and residential new construction markets to undertake a code upgrade, and the influence of NYSERDA's programs in developing upgrades to building code and equipment and appliance standards.

8.1.2. Brief Overview of the Evaluation Approach

The evaluation approach discussed in this plan was developed after a review of similar studies conducted in California and regarded as "best practices."[14] While the activities in this plan are somewhat limited in scope due to uncertainty of funding amounts, the more in-depth activities described in the California plans would be considered should the scope of this evaluation be expanded. NYSERDA has proposed a variety of program evaluation activities as well as overarching Statewide studies that could enhance codes and standards evaluation efforts. These already-proposed studies and plans include a statewide commercial new construction baseline study, statewide residential (one-to-four family as well as multifamily) new construction baseline studies, and larger sample sizes for the Enhanced Commercial New Construction Program evaluation (with matched samples for program participants and non-participants).[15] In addition, as described earlier, a codes and standards benchmarking study is also planned with matched samples for program participants and nonparticipants.

The evaluation approach presented in this section was designed based on NYSERDA's current plans for the design and administration of the Codes and Standards effort, in the absence of complete knowledge about potential funding. As such, these plans have been prepared in order to allow NYSERDA and its independent contractors flexibility to adapt the evaluation approaches that best suit the program as implemented, once a greater understanding is in place regarding final evaluation protocols and funding. NYSERDA's estimated evaluation budget for this program includes a set-aside for developing a full evaluation plan, an effort that will involve DOS and DPS Staff.

8.2. Evaluation Budget

NYSERDA anticipates the evaluation budget for this effort to be approximately 5% of the program funding level. NYSERDA proposes that the majority of the evaluation budget support market evaluation - which is the level at which impact evaluation of codes and standards efforts occur - through the formation of expert

[14] Evaluation activities described in this plan benefit from recent codes and standards evaluation protocols, plans, and studies developed for California. These sources are: 1) TecMarket Works et al., 2006, "Codes and Standards and Compliance Enhancement Evaluation Protocol," In *California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals.* San Francisco, Calif: State of California Public Service Commission; 2) Mahone, Doug et al., 2005, *Codes and Standards White Paper on Methods for Estimating Savings,* Rosemead, Calif: Southern California Edison; 3) RLW Analytics et al., 2007, *New Construction/Codes & Standards Direct Impact Evaluation,* San Francisco, Calif: State of California Public Service Commission; and 4) Heschong Mahone Group, 2005, *Codes and Standards Program Savings Estimate*, Rosemead, Calif: Southern California Edison.

[15] The high level of study proposed for commercial new construction non-participants consists of site-visit data collection and IPMVP Option D, calibrated DOE-2 models will provide the most in-depth information available on actual commercial new construction usage. Sampling and weighting differences for the needs of evaluating the Enhanced Commercial New Construction Program versus for this evaluation of the Codes and Standards Program will need significant analyses. Nevertheless, re-weighting using the code compliance benchmarking data collected will allow this effort to provide very valuable information for this evaluation.

panels and participation in already-proposed commercial and residential new construction baseline studies. Additional funding may be allocated to process evaluation activities designed to assess the effectiveness of program approaches in improving code compliance.

8.3. Evaluation Schedule

Evaluation studies included as part of this effort are shown in the table below along with the time frame for their anticipated completion. It is anticipated that expert panels will be convened in 2009 with updates conducted in 2012. In addition, this evaluation will also rely on already-proposed commercial and residential new construction baseline studies proposed for 2009 with subsequent updates. The schedule below does not include an anticipated schedule for those baseline activities.

Table 6. Evaluation Schedule

Evaluation Element	Expected Completion			
	2009	2010	2011	2012
Market/Impact Evaluation	X			X

8.4. Impact Evaluation

Codes and standards programs are designed to change the market by creating a minimum required level of performance (baseline). Given this design, impact evaluation of codes and standards efforts occur at the baseline market level.

8.5. Process Evaluation

No specific process evaluation activities are proposed for this program at the outset. However, it is anticipated that process evaluations may be conducted to assess the effectiveness of program approaches in improving code compliance (*e.g.* circuit riders, training). Based on discussions during the development of the full evaluation plan, some funding may be allocated to support process evaluation efforts.

8.6. Market/Impact Evaluation

The design for the building codes and appliance standards evaluation effort will be one that creates a comprehensive evaluation from the combination of data collected and analyzed through the other proposed statewide overarching baseline studies and NYSERDA evaluation activities for its new construction programs. A primary activity during the development of the detailed Codes and Standards Evaluation Plan will be compiling and analyzing the data generated from these other efforts.

Market evaluation activities will focus on expert panels designed to assess the influence of NYSERDA's new construction programs on code compliance, understanding the capability of the commercial and residential new construction markets to undertake a code upgrade, and the influence of NYSERDA's programs in developing code and standards upgrades.[16] Expert panels will be convened by sector (residential single family, multifamily, and commercial/industrial and equipment/appliances). Panel participants will respond to a series of questions and provide scores related to NYSERDA's impact on current code compliance, market capability to undertake code upgrades, and NYSERDA's influence on code and standards upgrades. These scores will be discussed among panel participants to arrive at a group consensus. These assessments will serve as the basis for attributing savings related to code compliance and potential code and standards upgrades. Prior to undertaking this analysis, the methodology will be reviewed to address possible bias in the model and to determine if the questions asked of the panel should be reevaluated or adjusted.

[16] A similar approach was conducted in California.

In addition to the expert panels, questions related to code compliance can be incorporated into already-proposed baseline studies of commercial new construction and residential new construction. The non-participant samples for the Enhanced Commercial New Construction Program and the ENERGY STAR Homes Program will provide on-site data collection that will include in-depth information on code compliance and "as-built" energy use information. Further, within NYSERDA's proposed Codes and Standards effort, a code compliance benchmarking study is already planned.

Interview panels will provide evaluation data concerning the likely movement of this baseline and NYSERDA's role in those changes. Data from construction baseline and code compliance studies will be analyzed to estimate the rate of current practices and code compliance. Subsequent updates to these studies will assess any changes in code compliance, particularly after the implementation of a code upgrade.

8.7. Evaluation Plan Variations

Given the level of uncertainty regarding final evaluation protocols and funding levels needed to support overarching evaluation studies and activities, the evaluation plan presented in this section should be viewed as scalable and flexible. Repeating the Program's code compliance study in later years could provide greater rigor in the evaluation, should funding be available. With additional funding, the proposed expert panels could be enhanced.