STATE OF NEW YORK DEPARTMENT OF PUBLIC SERVICE

THREE EMPIRE STATE PLAZA, ALBANY, NY 12223-1350

www.dps.ny.gov

March 17, 2014

Ms. Kathleen Burgess Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, NY 12223-1350

Re: Case 07-M-0548 – Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard.

Dear Secretary Burgess:

On June 20, 2011, the Commission issued an order in Case 07-M-0548[1] that organized all approved Energy Efficiency Portfolio Standard (EEPS) programs into specific Classification Groups, and established a specific list of approved energy efficiency measures for each Classification Group. The order also authorized the Director of the Office of Energy Efficiency and the Environment (OEEE) to make consensus additions of measures to the list of measures established for a Classification Group. In addition, the order authorized the Director of the OEEE to make minor changes to the New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs, "Technical Manual" used to guide savings calculations. Minor changes are limited to updated data and calculations to reflect changes to factors such as energy codes and standards, product specifications, and evaluation results. Finally, the order allowed the Director of the OEEE to make substantive consensus modifications to the Technical Manual.

The Commission outlined the following process to effect consensus changes:

1. The exact text of the intended modifications shall be presented in writing to the members of the Implementation Advisory Group (IAG) consisting of designated

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[1] Case 07-M-0548, Energy Efficiency Portfolio Standard (EEPS), Order Approving Modifications to the Energy Efficiency Portfolio Standard (EEPS) Program to Streamline and Increase Flexibility in Administration (issued June 20, 2011).

representatives of all program administrators. A copy shall be provided to members of the Evaluation Advisory Group (EAG).

2. The IAG and EAG shall be afforded a reasonable opportunity to review the intended modifications and to advise the OEEE Director as to the proposal.

3. If any member of the IAG objects to the intended modifications by making a written objection to the OEEE Director within a reasonable period of time established by the OEEE Director for the receipt of objections, the intended modifications may not be implemented without referral to and approval by the Commission.

4. If no member of the IAG makes a written objection to the intended modifications within a reasonable period of time established by the OEEE Director for the receipt of objections, the intended modifications may be implemented by the OEEE Director, without referral to and approval by the Commission, by filing the exact text of the modifications with the Secretary to the Commission in Case 07-M-0548 and by posting an update or supplement to either the Table of Classification Groups or the Technical Manual on the Commission's website.

On February 20, 2014 Staff proposed a number of changes to the Technical Manual. In response to a request from Con Ed, staff proposed a new multi-family building vintage identified as "Pre-war uninsulated brick," applicable to both high and low rise buildings. Staff proposed changes to the corresponding tables in Appendices A and G to add this new vintage and to rename the existing vintages to reflect the general time period in which they were constructed. In addition, staff proposed to revise Appendix G, to add the necessary EFLHs for the new vintage in the heating tables for both high and low rise buildings, and to add EFLHs for existing vintages in the heating and cooling tables for high rise buildings that had been previously missing.

The proposals were provided to the members of the IAG and the EAG by electronic mail. No written objections to the proposals were received within the time frame agreed to with members of both groups.

In accordance with the authority granted in the Commission's June 20, 2011 order, I find that the proposed changes to the Technical Manual as described above have the consensus support of the IAG. Accordingly, I approve these changes to the Technical Manual. The enclosed Attachments reflect the proposed changes to Technical Manual and an updated Technical Manual reflecting these changes is available on the Department's website.

Sincerely,

Colleen L. Gerwitz

Colleen L. Gerwitz
Director, Office of Energy Efficiency
and the Environment

cc: Anthony Belsito
Debra LaBelle
Robert Roby
Pete Sheehan

RECORD OF REVISION					
Revision Number	**Issue Date**	**Effective Date Range**	**Measure**	**Heading/Subsection of Tech Manual Change or Addition and Brief Description of Change/Addition**	**Location/Page in Tech Manual (October 15, 2010)**
3-14-1	3/17/14	3/18/14-6/17/14	Appendix A	**Prototypical Building Descriptions** Adds an additional multi-family building identified as "Pre-war uninsulated brick". Affects both low-rise and high-rise multi-family buildings.	Pgs. 212 - 217
3-14-2	3/17/14	3/18/14-6/17/14	Appendix G	**Heating and Cooling Equivalent Full-Load Hours (EFLH)** Adds the corresponding EFLH values for heating and cooling to the respective multi-family building tables. Completes the previously incomplete tables for multi-family high rise heating and cooling.	Pgs. 430 - 435
3-14-3	3/17/14	3/18/14-6/17/14	Appendices A & G	Changes previous building vintage names to better reflect time period in which vintage was constructed. See table 3-14-3 (A) below.	Pgs. 212 – 217 & 430 - 435

Table 3-14-3 (A)

Previous name/vintage	**Revised name/vintage**
N/A	Pre-war uninsulated brick
Older, poorly insulated	Prior to 1979
Existing, average insulation	From 1979 through 2006
New construction	From 2007 through the present

APPENDIX A. PROTOTYPICAL BUILDING DESCRIPTIONS

Multi-family Low-Rise

The low-rise prototype "model" in fact contains 2 separate buildings. Each version of the buildings are identical except for the orientation, which is shifted by 90 degrees. The selection of these 2 buildings is designed to give a reasonable average response of buildings of different design and orientation to the impact of energy efficiency measures.

Four separate models were created to represent general vintages of buildings:

1. Built prior to 1940, uninsulated masonry buildings. This vintage is referred to as "Pre-war uninsulated brick."

2. Built prior to 1979 when the NYS Energy Code (known as the Energy Conservation Construction Code of New York State – ECCCNYS) went into effect, poorly insulated wood-frame buildings This vintage is referred to as "Prior to 1979"

3. Built from 1979 through 2006, with insulation conforming to 1980s era building codes (1979 ECCCNYS.) This vintage is referred to as "From 1979 through 2006."

4. Built from 2007 through the present, new construction with insulation conforming to the 2007 ECCCNYS for residential buildings and the New York City Energy Conservative Code (if applicable.) This vintage is referred to as "From 2007 through the present."

Multi-family Low-Rise Residential Building Prototype Description

Characteristic	Value
Vintage	Four vintages simulated: Pre-war uninsulated brick; Prior to 1979 (wood frame); From 1979-2006; and From 2007 to present
Conditioned floor area	949 SF per unit; 6 units per floor, 2 floors per building, 11,388 SF total.
Wall construction and R-value	R-value and construction varies by vintage.
Roof construction and R-value	Wood frame with asphalt shingles. R-value varies by vintage.
Glazing type	Single or double pane. Properties vary by vintage.
Lighting and appliance power density	0.87 W/SF average in bedrooms, 0.58 W/SF in living space.

Characteristic	Value
HVAC system types	1. Split system AC with central gas heat 2. Split system AC with electric heat 3. Split system heat pump 4. PTAC with electric heat 5. PTHP 6. Electric heat only (no AC) 7. Central gas heat only (no AC) 8. Central steam (within the building) heat only (no AC)
HVAC system size	Based on peak load with 20% over-sizing.
HVAC system efficiency	AC and heat pump: SEER = 13 PTAC and PTHP: EER = 7.7 Furnace / boiler: AFUE = 78% Steam boiler: AFUE = 75%
Thermostat setpoints	1. Heating: 70^{0}F with setback to 67^{0}F(other than NYC); 73^{0}F with setback to 70^{0}F (NYC only) 2. Cooling: 75°F with setup to 78°F
Duct location (for systems with ducts)	In attic and plenum space between first and second floors. PTACs and PTHPs have no duct work.
Duct surface area (for systems with ducts)	256 SF supply, 47 SF return per system
Duct insulation (for systems with ducts)	Uninsulated
Duct leakage (for systems with ducts)	20% of fan flow total leakage, evenly split between supply and return.
Natural ventilation	Allowed during cooling season when cooling setpoint exceeded and outdoor temperature < 65°F. 3 air changes per hour

Wall and Ceiling Insulation Levels

The assumed values for wall and ceiling by vintage are below.

Wall Insulation R-Value Assumptions by Vintage

Vintage(when built)	Assumed R-value of insulated wall	Notes
Pre-war uninsulated brick	4	Three 4" brick layers. No insulation. 2" air gap resistance only.
Prior to 1979	7	Wood frame with siding. No insulation in 2 by 4 wall; 3.5" air gap resistance only
From 1979 through 2006	11	Wood frame with siding. Fiberglass insulation in 2 by 4 wall per MEC 1980.
From 2007 through the present	19	Code

Ceiling Insulation R-Value Assumptions by Vintage

Vintage	Assumed R-value of insulated ceiling	Notes
Pre-war uninsulated brick	2	No ceiling insulation
Prior to 1979	11	Minimal ceiling insulation
From 1979 through 2006	19	Fiberglass insulation per MEC 1980
From 2007 through the present	38 (Climate zones 4 & 5) 49 (Climate zone 6)	Code

Thermostatic Heating Setpoint Assumptions by Vintage

Vintage	Setpoint and setback (°F)	Notes
Pre-war uninsulated brick	73, 70 (NYC); 70, 67 (all others)	
Prior to 1979	70, 67	
From 1979 through 2006	70, 67	
From 2007 through the present	70, 67	

Windows

The glazing U-value and solar heat gain coefficient (SHGC) assumptions for the four vintages are shown below.

Window Property Assumptions by Vintage

Vintage	U-value (Btu/hr-F-SF)	SHGC	Notes
Pre-war uninsulated brick	0.93	0.87	Single pane clear
Prior to 1979	0.93	0.87	Single pane clear
From 1979 through 2006	0.68	0.77	Double pane clear
From 2007 through the present	0.28	0.49	Double low e per code

Infiltration

Infiltration rate assumptions were set by vintage as shown below.

Infiltration Rate Assumptions by Vintage

Vintage	Assumed infiltration rate	Notes
Pre-war uninsulated brick	1 ACH	
Prior to 1979	1 ACH	
From 1979 through 2006	0.5 ACH	
From 2007 through the present	0.35 ACH	Minimum without forced ventilation per ASHRAE Standard 66.

Multi-family High-Rise

The multi-family high-rise model was developed using the conceptual design "wizard" in eQUEST program, rather than a DEER prototype. A computer-generated sketch of the multi-family high rise prototype is shown in the figure below.

Note: The middle floors, since they thermally equivalent, are simulated as a single floor, and the results are multiplied by 8 to represent the energy consumption of the 8 middle floors. The general characteristics of the multi-family high rise building prototype model are summarized below.

Multi-family High-Rise Residential Building Prototype Description

Characteristic	Value
Vintage	Four vintages simulated: Pre-war uninsulated brick; Prior to 1979 (wood frame); From 1979-2006; and From 2007 to present
Conditioned floor area	810 SF per unit; 10 units per floor, 10 floors per building; 81,000 SF total living space. Corridors and common space: 18,255 SF; Laundry rooms: 6,845 SF Storage: 7,985 SF Total: 114,085 SF
Wall construction and R-value	Masonry wall with brick exterior, R-value varies by vintage
Roof construction and R-value	Wood frame with built-up roofing, R-value varies by vintage
Glazing type	Single or double pane; properties vary by vintage
Lighting and appliance power density	0.7 W/SF average
HVAC system type	1. Four pipe fan coil with air cooled electric chiller and gas hot water boiler 2. Central building steam
HVAC system size	Based on peak load with 20% over-sizing.
HVAC system efficiency	Chiller: COP = 3.9 Hot water boiler: Thermal efficiency = 78% Steam boiler: thermal efficiency = 75%

Characteristic	Value
Thermostat setpoints	1. Heating: 70^0F with setback to 67^0F(other than NYC); 73^0F with setback to 700F (NYC only) 2. Cooling: 75°F with setup to 78°F

Wall, Floor Insulation Levels

The assumed values for wall and ceiling by vintage are shown below.

Wall Insulation R-Value Assumptions by Vintage

Vintage	Assumed R-value of insulated wall	Notes
Pre-war uninsulated brick	4	Same as low rise
Prior to 1979	7	No insulation; air gap resistance only
From 1979 through 2006	11	Same as low rise
From 2007 through the present	19	Code

Roof Insulation R-Value Assumptions by Vintage

Vintage	Assumed R-value of insulated ceiling	Notes
Pre-war uninsulated brick	2	Same as low rise
Prior to 1979	11	Same as low rise
From 1979 through 2006	19	Same as low rise
From 2007 through the present	38 (Climate zones 4 & 5) -49 (Climate zone 6)	Code

Thermostatic Heating Set point Assumptions by Vintage

Vintage	Setpoint and setback (°F)	Notes
Pre-war uninsulated brick	73, 70 (NYC); 70, 67 (all others)	
Prior to 1979	70, 67	
From 1979 through 2006	70, 67	
From 2007 through the present	70, 67	

Windows

The glazing U-value and solar heat gain coefficient (SHGC) assumptions for the four vintages are shown below.

Window Property Assumptions by Vintage

Vintage	U-value (Btu/hr-F-SF)	SHGC	Notes
Pre-war uninsulated brick	0.93	0.87	Single pane clear
Prior to 1979	0.93	0.87	Single pane clear
From 1979 through 2006	0.68	0.77	Double pane clear
From 2007 through the present	0.28	0.49	Double low e per code

Infiltration

Infiltration rate assumptions were set by vintage as shown below.

Infiltration Rate Assumptions by Vintage

Vintage	Assumed infiltration rate	Notes
Pre-war uninsulated brick	1 ACH	
Prior to 1979	1 ACH	Same as low rise
From 1979 through 2006	0.5 ACH	Same as low rise
From 2007 through the present	0.35 ACH	Minimum without forced ventilation per ASHRAE Standard 66.

APPENDIX G. HEATING AND COOLING EQUIVALENT FULL-LOAD HOURS

Analysis used to develop parameters for the energy and demand savings calculations are based on DOE-2.2 simulations of a set of prototypical residential buildings. The prototypical simulation models were derived from the residential building prototypes used in the California Database for Energy Efficiency Resources (DEER)[2] study, with adjustments made for local building practices and climate.

Four separate models were created to represent general vintages of buildings:

1. Built prior to 1940, uninsulated masonry buildings. This vintage is referred to as "Pre-war uninsulated brick "

2. Built prior to 1979 when the NYS Energy Code (known as the Energy Conservation Construction Code of New York State – ECCCNYS) went into effect, poorly insulated wood-frame buildings This vintage is referred to as "Prior to 1979"

[2] 2004-2005 Database for Energy Efficiency Resources (DEER) Update Study, Final Report, Itron, Inc. Vancouver, WA. December, 2005. Available at http://www.calmac.org/publications/2004-05_DEER_Update_Final_Report-Wo.pdf

3. Built from 1979 through 2006, with insulation conforming to 1980s era building codes (1979 ECCCNYS.) This vintage is referred to as "From 1979 through 2006."

4. Built from 2007 through the present, new construction with insulation conforming to the 2007 ECCCNYS for residential buildings and the New York City Energy Conservative Code (if applicable.) This vintage is referred to as "From 2007 through the present."

Heating equivalent full load hours for residential buildings were calculated from a DOE-2.2 simulation of prototypical residential buildings. The prototype building characteristics are described in Appendix A. The heating EFLH for the vintages and six different cities in NY are shown below:

Multifamily Low-Rise Cooling Equivalent full load hours by Vintage and City*

City	Prior to 1979	From 1979 Through 2006	From 2007 Through the Present
Albany	286	295	279
Binghamton	217	219	210
Buffalo	270	274	256
Massena	230	228	218
NYC	507	550	562
Poughkeepsie	397	423	421
Syracuse	265	284	297

* Note, there are no cooling values for the "Pre-war uninsulated brick vintage due to a typical lack of any central cooling. This vintage assumes one room air conditioner (AC) within the unit. See the section in this manual pertaining to room AC units and how savings are calculated.

Multifamily High-Rise Cooling Equivalent full load hours by Vintage and City*

City	Prior to 1979	From 1979 Through 2006	From 2007 Through the Present
Albany	594	647	782
Binghamton	479	539	684
Buffalo	572	637	773
Massena	532	571	668
NYC	793	843	954
Poughkeepsie	626	669	812
Syracuse	592	665	845

* Note, there are no cooling values for the "Pre-war uninsulated brick vintage due to a typical lack of any central cooling. This vintage assumes one room air conditioner (AC) within the unit. See the section in this manual pertaining to room AC units and how savings are calculated.

Multifamily Low-Rise Heating Equivalent full load hours by Vintage and City

City	Pre-war uninsulated brick	Prior to 1979	From 1979 Through 2006	From 2007 Through the Present
Albany	1,111	1,030	1,012	729
Binghamton	1,397	1,320	1,245	899
Buffalo	1,281	1,219	1,215	883
Massena	1,433	1,306	1,326	964
NYC*	999	757	723	503
Poughkeepsie	857	894	868	616
Syracuse	1,395	1,175	1,206	845

* NYC building only incorporates a higher thermostatic set point of 73^0 F instead of 70^0 F based on reported data.[3] The other cities listed use the thermostatic set point of 70^0 F.

Multifamily High-Rise Heating Equivalent full load hours by Vintage and City

City	Pre-war uninsulated brick	Prior to 1979	From 1979 Through 2006	From 2007 Through the Present
Albany	975	786	626	363
Binghamton	1,102	1,006	831	484
Buffalo	1,181	966	813	471
Massena	1,111	1,016	873	552
NYC*	1,012	526	395	219
Poughkeepsie	922	656	510	291
Syracuse	1,063	889	787	474

* NYC building only incorporates a higher thermostatic set point of 73^0 F instead of 70^0 F based on reported data.[4] The other cities listed use the thermostatic set point of 70^0 F.

[3] Overheating in Hot Water and Steam-Heated Multifamily Buildings, U.S. Dept. of Energy, Jordan Dentz, Kapil Varshney and Hugh Henderson, October 2013.

[4] Ibid