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November 13, 2009

Via Hand Delivery and Electronic Mail

Hon. Kristi Izzo, Secretary
Board of Public Utilities
Two Gateway Center
Newark, NJ 07102

Re: In the Matter of Revisions to New Jersey's Clean Energy Program
December 2007 Protocols to Measure Resource Savings
BPU Docket No. ER09070460

Dear Secretary Izzo:

Please accept for filing the attached comments submitted on behalf of the New Jersey Department of the Public Advocate, Division of Rate Counsel pursuant to the schedule set forth in the Order dated October 8, 2009, as amended by the Office of Clean Energy.

Respectfully Submitted,

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**I/M/O Revisions to New Jersey's Clean Energy Program
December 2007 Protocols to Measure Resource Savings
BPU Dkt. No. ER09070460**

**Comments of the New Jersey
Department of the Public Advocate,
Division of Rate Counsel
November 13, 2009**

I. Introduction

Pursuant to the schedule set forth in the Order dated October 10, 2009, the within comments address the *New Jersey Clean Energy Program Protocols to Measure Resource Savings* dated December 2008, as posted at the web site of the New Jersey Office of Clean Energy ("OCE"). The Division of Rate Counsel ("Rate Counsel") reserves the right to supplement these comments.

At the present time, the OCE and the Market Managers for the New Jersey Clean Energy Program's ("CEP") energy efficiency ("EE") and Renewable Energy ("RE") programs use the current version of the protocols ("Protocols") to measure energy and demand savings. The Protocols are relied upon by the OCE to track the energy savings resulting from participation in CEP programs. Energy savings data submitted by the CEP Market Managers -- calculated using the Protocols -- is compiled by the OCE's CEP Program Coordinator, who then prepares quarterly and annual reports on CEP activity and results to the Board of Public Utilities ("Board", "BPU"). Additionally, the Protocols are used to determine energy savings, which, in turn, form the basis for performance incentives awarded to the CEP Market Managers under their contracts with the State.

Also, the Rutgers Center for Energy, Economic, and Environmental Policy ("CEEPP") has relied on CEP EE energy savings figures reported by the EE Market Managers pursuant to the Protocols, and summarized by the OCE's CEP EE Program Coordinator, for CEEPP's cost-benefit analysis of the 2006 CEP EE programs and its ongoing cost-benefit analysis of the 2007 CEP EE programs.

In addition, the current version of the Protocols is used by utilities to estimate prospective savings for the EE measures and programs found in their respective EE program proposals recently filed pursuant to the Governor's Economic Stimulus Plan. The resulting utility savings projections were forwarded to CEEPP, which uses these projections in its cost-benefit analyses of the utilities' proposals.

Rate Counsel understands that the CEEPP is now charged with revising the Protocols for

2010 in accordance with KEMA's findings and recommendations, as set forth in KEMA's recently completed evaluations of several CEP programs. KEMA has drawn together its recommendations in the document *New Jersey's Clean Energy Program Energy Impact Evaluation and Protocol Review: Summary Report* dated Sept. 30, 2009, which also may be found at the OCE web site. KEMA's retrospective findings about program savings are not addressed in these comments, nor are its suggestions for changes to improve the operation of CEP programs going forward. The focus here is on its recommendations for *improvements to the Protocols*.

Following an informal stakeholder meeting on November 5, 2009, in which Rate Counsel participated, CEEEP circulated its proposed revisions to the Protocols on November 10, 2009 ("November 10 Protocols Draft"). The within comments address CEEEP's recommendations regarding the Protocols, as set forth in the November 10 Protocols Draft.¹

There is also interplay between revisions to the Protocols and CEEEP's Draft 2009-2011 Evaluation and Research Plan. That is because future evaluation research is intended to inform updates to the Protocols. To the extent necessary to fully address Protocol issues, the within comments extend Rate Counsel's previously submitted comments on CEEEP's 2009-2012 evaluation plans.²

II. Substantive Comments on Recommendations Regarding the Protocols

First, the November 10 Protocols Draft continues to list among its uses:

3. Calculate lost margin revenue recovery³

Rate Counsel again objects to the inclusion of this item for several reasons. Point 3 presumptively considers Board approval of consideration of lost margin revenue, notwithstanding a Board Order in this Docket addressing this very point, dated August 7, 2009. Therein, on pages 6-7, the found that "including a reference to the use of the Protocols to calculate lost margin revenues does not presume Board approval of such recovery," and that "in the event it approves such recovery [lost margin revenue], it is not bound to use these Protocols in calculating any recovery." Rate Counsel notes that the Board has yet to rule on lost margin revenue recovery for EE measures. Furthermore, the Protocols do not yet measure net market effects that are reliably attributable to CEP programs. Rate Counsel submits that the draft should have been reworded to more fully reflect the Board's Order. Furthermore, after reviewing the KEMA report, Rate Counsel

¹ In April 2009, the OCE circulated revisions to the Protocols which partially reflected KEMA's initial recommendations. On June 5, 2009, Rate Counsel submitted comments on the earlier draft of the Protocols. Rate Counsel's earlier comments were summarized in the Order dated August 7, 2009. The within comments supplement Rate Counsel's June 5, 2009 comments.

² See Preliminary Comments of the New Jersey Department of the Public Advocate, Division of Rate Counsel, regarding CEEEP's June 8, 2009 Draft 2009-2011 Evaluation and Research Plan for New Jersey's Clean Energy Program Energy Efficiency and Renewable Energy Programs, dated September 18, 2009.

³ November 10 Protocols Draft, p. 1.

renews its objection to the use of the Protocols to calculate lost margin revenues or any other lost revenue recovery, should the Board permit such recovery. Even accepting *arguendo* this proffered use of the Protocols, a much greater level of scrutiny would be required of the measures used in the development and verification of the savings estimates.

In its reports, KEMA also addresses three general types of Protocols issues. The first issue involves how to calculate gross energy savings per particular EE program measures. This is an area where KEMA offers numerous specific recommendations. The second issue addressed by KEMA is attribution, or how much of the savings calculated to result from EE program measures can be attributed to the existence and operation of the particular EE program measure. This issue can be identified as the issue of “net” savings versus “gross” savings. Closely related to this is the third issue, which is the strategy used by the Protocols to specify the baseline condition from which EE program savings are measured. With respect to two latter issues KEMA flagged as important, KEMA offers few specific recommendations.

In the within comments, the two latter issues of attribution and baselines are addressed first. Next, KEMA’s recommendations for specific changes to Protocols for calculating gross savings are addressed in a subsequent section.

In the third section of these comments, we offer a few remaining specific comments on CEEEP’s November 10 Protocols Draft document.

A. Attribution and Baseline Issues

1. Attribution

KEMA makes the following recommendation regarding attribution: “Revise the current assumption that free ridership and spillover cancel each other out.”⁴ This addresses the issue of attribution and the net-to-gross ratio. Rate Counsel concurs with KEMA’s recommendation regarding program attribution. Clearly, the Protocols for 2010 should no longer state as they do on page 2 of the current Protocols:

Free riders and free drivers will be captured implicitly on a net basis through this approach to counting adoption of units. Further, the net of free riders and free drivers are assumed to be zero in the counting of units from direct program participation.

Rate Counsel supports CEEEP’s draft new language to in place of the above-cited language, as found on page 2 of the November 10 Protocols Draft: “[f]ree riders and free

⁴ “NJCEP Energy Impact Evaluation”, KEMA presentation at NJ BPU, October 6, 2009. These points are also made in KEMA, Inc., *New Jersey’s Clean Energy Program Energy Impact Evaluation and Protocol Review: Summary Report* (“KEMA Summary Report”), September 30, 2009, page I-4.

drivers are not addressed in these protocols and further research is needed.” However, this new language should say that “further research is planned.”

Unfortunately, apart from stressing the importance of revising the current Protocols’ assumption regarding attribution, KEMA did not view the comprehensive development of appropriate net-to-gross ratios to be part of its scope of work. KEMA did state in its summary of high level recommendations that their results for residential HVAC equipment programs “indicate a net free ridership between 32 and 43 percent for these two programs.”⁵ However, in several cases, KEMA’s work on these issues is incomplete, especially on the spillover (free drivers) side.

Therefore, it is necessary to conduct focused research on this issue as an immediate follow-on to the recent KEMA studies. The draft CEP Evaluation Plan for 2009-2011 includes significant funds (\$400-600,000) for “process evaluation” in 2010. Rate Counsel supports dedicating these funds instead to near-term impact evaluation research that follows up directly where KEMA left off. CEEEP should quickly design research that can helpfully illuminate net-to-gross issues where they are most important, such as in the several areas where KEMA found significant free ridership in its retrospective impact evaluations. Note that such research must identify positive spillover or market transformation effects, not just free ridership in a narrow sense. Targeted research should then be conducted to develop a set of net-to-gross ratios grounded in New Jersey research by mid-2010, to inform development of the Protocols for 2011.

Rate Counsel notes that serious efforts to establish attribution are part of the ongoing evaluation activities of most comprehensive EE programs. Appendix I to these comments briefly addresses the efforts to establish net-to-gross ratios in California and New York.

2. Baselines

KEMA makes the following recommendation regarding baselines: “The program should develop a standard policy for the assignment of baseline efficiency levels for the purpose of calculating energy savings.”⁶ The issue with regard to baselines is similar to the issue of establishing net savings in that KEMA has flagged the issue without making concrete proposals. An example of a baseline issue arises with the Commercial and Industrial (“C&I”) customer retrofit program where the present Protocols assume the baseline is “existing conditions,” even though it may be unrealistic to assume that absent the CEP program there would have been no change to existing conditions for the entire duration of a custom efficiency project. Additionally, the November 10 Protocols Draft provisionally treat the “Direct Install” EE program as in part an early retirement program, with different baselines from most other C&I EE programs.. Therefore, targeted research on how to best specify baselines should be another major part of the *impact evaluation*

⁵ KEMA Summary Report, page 1-9.

⁶ “NJCEP Energy Impact Evaluation”, KEMA presentation at NJ BPU, October 6, 2009. These points are also made in the KEMA Summary Report, page I-4.

follow-up research that we recommend for 2010.

B. Specific Changes in the Measurement of Gross Savings

KEMA's work constitutes the most thorough evaluation research on New Jersey Clean Energy Programs in years. Rate Counsel has reviewed KEMA's specific recommendations. Based on information currently available to us, we take no exception to specific recommendations for changes to Protocols for the following EE programs or measures:

- CORE Program (for on-site solar energy projects)
- Residential CFLs (Compact Florescent Light bulbs)
- Residential New Construction
- Residential HVAC--Cool and WarmAdvantage

In its November 10 Protocols Draft, CEEEP incorporates KEMA's specific recommendations in the Protocols for 2010, except where stakeholders at the November 5th Protocols meetings identified a specific, documented reason not to do so at this time. Rate Counsel generally supports this approach.

Rate Counsel does have some specific alternative suggestions to KEMA's in the area of its "SmartStart" recommendations. However, due to the need to revise Protocols in time for 2010, Rate Counsel's present comments will simply identify these suggestions, thereby offering them to CEEEP and other parties to consider for the next update of the Protocols. Rate Counsel's suggestions are found in Appendix II of these comments. Rate Counsel urges CEEEP to review these points. Perhaps some of them could be included in the 2010 update. In the alternative, these points may be considered as inputs for updating the Protocols in the future.

In our review of KEMA's work, Rate Counsel noted that KEMA recommended up to a dozen focused analyses or studies to improve specific Protocol values going forward. These recommendations should be addressed as another part of the *impact evaluation follow-up research* that we expect the final CEP Evaluation Plan will provide for.

III. Additional Editorial Suggestions on CEEEP Draft of November 9, 2009.

In this final section, Rate Counsel offers the following page-by-page editorial comments:

Cover: The cover page of the Protocols should state, "For Use in Program Year 2010."

Page 2: The final sentence(s) of the top paragraph should read, "Free riders and free drivers are not addressed in these Protocols. Further research in this area is planned."

Page 5: The *first* sentence of the last paragraph (after the "Baseline Estimates" subheading) should begin, "For most efficiency programs and measures, the ΔkW , ΔkWh , and gas energy savings values are based...." The *second* sentence is unnecessary and could be omitted.

Page 6: The top sentence of this page should read, “For the Direct install program, some ΔkW , ΔkWh , and gas energy savings values are based on high efficiency products vs. existing equipment, where the program targets early retirement.”

Page 19: The 5th source from the bottom of the “Residential Electric HVAC” table is missing, and there is a question about the value for “Avg. Heating Usage”.

Page 52: 6th line from the bottom, spelling of “Hydro One”.

Page 54: The first sentence should be removed because it logically follows the “C&I Electric Protocols” subheading. Instead, the first sentence(s) after the sub-subhead “Baselines and Code Changes” should read: “In general, efficiency baselines are designed to reflect current market practices –typically, the higher of applicable codes or the minimum efficiency of available new equipment—and are updated periodically to reflect changes in codes or information from evaluation results. There are some exceptions to this approach, as in the Direct Install program (see below).”

Page 55: When we clicked on the link in the top row of the table, the internet page did not open up.

Page 76: Delete the second 2 paragraphs (“Direct Install Program” and “Pay for Performance Program”) as those items are addressed later on.

Page 81: In the top paragraph (“Protocols”), the middle sentence should read: “In addition, for several of the measures where Direct Install Program Protocols uses algorithms and inputs from the ‘Commercial and Industrial Energy Efficient Construction’ section of the Protocols, different equipment baselines will be used to reflect that the Direct Install includes early replacement.” Note—we recollect that for lighting, for example, Direct Install will (and should) use the same protocols as other C&I.

APPENDIX I

Attribution and Net-to-Gross Ratios

Most comprehensive EE programs endeavor to calculate net-to-gross (“NTG”) ratios. A few illustrative examples follow:⁷

- Net-to-gross ratios for residential measures in California range from .65 to .98;
- NTG ratios for C&I measures in Connecticut range from .73 to 1.08;
- The NTG used in Wisconsin for common residential insulation measures is 0.85;
- The NTG used by National Grid for residential high-efficiency central AC is 0.85; and
- The NTG found by NYSEERDA for residential furnace/boiler measures is 0.84.

This appendix provides a brief discussion of methodologies used to estimate net-to-gross ratios for energy efficiency (“EE”) programs in California and New York.

A. California

The following discussion for California is based on information obtained from the following sources:

- Personal communication with George S. Tagnipes of the California Public Utility Commission (“CPUC”)
- California Public Utilities Commission 2008 NTG Update Report⁸ (see footnote below)

⁷ Sources:

California Public Utilities Commission 2008. NTG Update Report (posted October 14, 2008), available at <http://www.deeresources.com/deer0911planning/downloads/DEER%200607%20Measure%20Update%20Report.pdf>

Connecticut Light & Power Company and the United Illuminating Company 2007. CL&P and UI Program Savings Documentation for 2008 Program Year, available at [http://www.dpuc.state.ct.us/dockhist.nsf/6eaf6cab79ae2d4885256b040067883b/c6b24ea0557398ef8525755a004bc03a/\\$FILE/Final%202008%20PSD.pdf](http://www.dpuc.state.ct.us/dockhist.nsf/6eaf6cab79ae2d4885256b040067883b/c6b24ea0557398ef8525755a004bc03a/$FILE/Final%202008%20PSD.pdf)

Wisconsin Public Service Commission 2007. Focus on Energy Evaluation: Semiannual Report (FY07, Year-end), available at http://www.focusonenergy.com/files/Document_Management_System/Evaluation/semiannualsecondhalf07_evaluationreport.pdf

Kimberly Crossman, National Grid, personal communication

Quantec, LLC and Summit Blue Consulting, LLC 2006. New York Home Performance With Energy Star® Program Market Characterization, Market Assessment And Causality Evaluation, available at www.summitblue.com/dyn_downloads/finalmcahomeperformancesreport5-24-06.p

⁸ California Public Utilities Commission (“CPUC”) 2008. NTG Update Report (posted October 14, 2008).

1. Development and Application of NTG Ratios

Net-to-gross ratio values for California's EE programs are provided in the Database for Energy Efficiency Resources ("DEER"). The NTG values in the DEER were becoming obsolete given that the previous estimates were made in 2001. To increase confidence in NTG ratios for estimating net energy saving for current and future programs, the CPUC's Energy Division recently conducted a comprehensive literature review of recent NTG studies, compared the results to the most recent configuration of measure and delivery methods for the 2006-2007 programs, and recommended new NTG values. The new NTG values are provided for measure differentiated by efficiency, capacity, target market and delivery method.⁹ The NTG recommendations were incorporated into the 2008 DEER and are being used for evaluating the current (2006 to 2008) and future programs (2009 – 2011) as "interim values." These values will be revisited and revised as necessary for the March 2010 final measurement and verification ("M&V") report for the entire 2006 and 2008 planning cycle efficiency program.¹⁰

Note that all of the CPUC's M&V study contractors are required to estimate NTG ratios. However spillover effects were only evaluated when the evaluators perceive the possibility of the existence of spillover effects, and they felt that collecting data on additional EE measures installed outside a program, yet due to it, would require reasonable incremental effort.¹¹

2. NTG Survey Process and Method

The CPUC's Energy Division ("ED") hires consultants for and manages M&V studies. Within ED, there are multiple advisors or subgroups who help ED with technical details of M&V studies. One of the sub groups helps determine detailed survey process and methods including what questions should be asked, in what order, what are the skip patterns, what are the possible answer selections, what is the scoring algorithm.¹²

NTG ratios are typically evaluated using a variety of methods including self-report surveys, computer aided telephone systems, decision maker interviews for large customers, and discrete choice analysis which includes non-participant surveys.¹³

B. New York

The information provided below was obtained from the following source:

- Personal communication with Cherie B. Gregoire, Impact Assessment Manager, New York State Energy Research and Development Authority ("NYSERDA")

1. Development and Application of NTG Ratios

⁹ Id.

¹⁰ Personal communication with George S. Tagnipes of the CPUC.

¹¹ Id.

¹² Id.

¹³ Id.

NYSERDA typically estimates NTG every 2 years for its EE programs. NTG estimates include both free-ridership and spillover effects. EE program administrators other than NYSERDA (e.g., utilities) are required to estimate NTG ratios on their own programs. Until they finish their own studies, administrators other than NYSERDA have been directed to use a 0.9 default NTG value. While NYSERDA has already developed NTG ratios for existing programs, it also is tasked with developing NTG ratios for new programs. However, until NTG ratios for new programs are developed, NYSERDA also uses the 0.9 default NTG value.

NYSERDA has tried estimating NTG ratios at both the point of application and retrospectively. NYSERDA found that collecting data at the point of application did not provide substantially different data from a retrospective approach (after at least 12 months have elapsed). However, NYSERDA also found that the retrospective look gives them the benefit of collecting both free-ridership and spillover data.

2. NTG Survey Process and Method

NYSERDA hires consultants for M&V studies and also manages M&V studies in New York. One contractor is leading the attribution work across all program evaluations. NTG ratios are mainly evaluated through self-report telephone surveys. For larger custom programs, several parties that were involved in the projects –customers, vendors or contractors—are contacted to obtain different perspectives on variables influencing decisions.

APPENDIX II

SmartStart Savings Protocols

Here, Rate Counsel offers observations relating to the protocols for measuring gross Smart Start savings. The CEP's SmartStart Buildings Program is a comprehensive framework for marketing commercial/industrial EE, organized into three sectors: (1) general retrofit, (2) general new construction, and (3) schools (both retrofit and new construction). While supportive of many of KEMA's SmartStart recommendations, based on our review Rate Counsel has counterproposals for a number of specific items. These follow.

A. SmartStart EE Measure: Lighting

Here, Rate Counsel addresses two values evaluated by KEMA for the measurement of savings attributable to SmartStart lighting measures: Equivalent Full Load Hours ("EFLH") values, and Interactive Factor ("IF") values.

a-1. Equivalent Full Load Hours ("EFLH") Values

In Table 3-3 of its SmartStart report, KEMA recommends that New Jersey EE lighting programs use Equivalent Full Load Hours ("EFLH") values based on a standard known as California DEER 2005. We recommend instead that New Jersey use EFLH values based on California DEER 2008, a more recent compilation. The California DEER 2005 database has been updated, and now the California DEER 2008 database is available. According to a document called "2008 DEER Update - Summary of Measure Energy Analysis Revisions" ("California DEER 2008 Report"),¹⁴ EFLH for lighting estimates have been modified based on more recent studies, and are now provided not just for

¹⁴ 2008 DEER Update - Summary of Measure Energy Analysis Revisions
December 2008 Version 2008.2.05 for 2009-2011 Planning/Reporting. Available at
<http://www.deeresources.com/deer0911planning/downloads/DEER2008UPDATE-EnergyAnalysisMethodsChangeSummaryV7.pdf>

According to page 25 of the California DEER 2008 Report, the nature of this modification is as follows:

"2005 DEER lighting profiles were modified to achieve annual full load hours that were more aligned with the most recent M&V lighting monitoring research. Lighting profiles were updated to consider 2002-2003 and 2004-2005 state-wide express efficiency lighting logger studies. While not an exact process, the DEER team made its best effort to "map" activity areas in each DEER nonresidential prototype to the available lighting profiles. The DEER team started with preliminary shapes developed in April 2008 from the logger data collected for the 2004-2005 Express Efficiency evaluation. For business type and usage area combinations where the sample was large enough (e.g. Office - Office with window), the DEER team developed weekday and weekend load shapes at that level. Within a business type, usage areas with N<6 were collapsed together under the "Other" usage area label (e.g. School - Other.) These M&V lighting logger study data sets showed that CFL operating hours and resulting equivalent full load hours (EFLH) were quite different and often lower than linear fluorescent and other general lighting."

building type (as provided in California DEER 2005), but also for different spaces within a building, such as classrooms and gym space within school buildings. New Jersey should consider inputting EFLH by space type, modifying data input forms as required, or, alternatively, utilize DEER 2008 values at the building type level of detail.¹⁵ The updated EFLH estimates are provided in the table 14 of the California DEER 2008 Report. To illustrate, the table below extracts examples for a few facilities by space type from table 14 in the California DEER 2008 Report.

TABLE 1 Comparison of EFLH Values: California DEER 2005 vs 2008

Building Type	Space Use	Other Lighting Equivalent Full Load Hours		CFL Equivalent Full Load Hours	
		2005	2008	2005	2008
Assembly	Auditorium	not incl.	3760	not incl.	3760
Assembly	Office (General)	not incl.	3023	not incl.	3023
Education - Primary School	Classroom/Lecture	1440	2445	1440	2660
Education - Primary School	Exercising Centers and Gymnasium	1440	2051	1440	2434
Education - Primary School	Dining Area	1440	1347	1440	1530
Education - Primary School	Kitchen and Food Preparation	1440	1669	1440	1846
Education - Secondary School	Classroom/Lecture	2305	2445	2305	2608
Education - Secondary School	Office (General)	2305	2323	2305	2452
Education - Secondary School	Exercising Centers and Gymnasium	2305	2366	2305	2532
Education - Secondary School	Computer Room (Instructional/PC Lab)	2305	2137	2305	2522
Education - Secondary School	Dining Area	2305	2365	2305	2493
Education - Secondary School	Kitchen and Food Preparation	2305	1168	2305	1354
Education - Community College	Classroom/Lecture	3792	2471	3792	2619
Education - Community College	Office (General)	3792	2629	3792	2568
Education - Community College	Computer Room (Instructional/PC Lab)	3792	2189	3792	2629
Education - Community College	Comm/Ind Work (General, Low Bay)	3792	3078	3792	2740
Education - Community College	Dining Area	3792	2580	3792	2620
Education - Community College	Kitchen and Food Preparation	3792	2957	3792	2602

a-2. Interactive Factor (“IF”) Values

In Table 3-3 of its SmartStart report, KEMA recommends certain interactive factor (“IF”) values. Here, we recommend that New Jersey instead use the IF estimates that New York recently adopted in a study called *New York Evaluation Advisory Contractor Team (NYEACT) 2009. New York Standard Approach for Estimating Energy Savings from Energy Efficiency Measures in Commercial and Industrial Programs*.¹⁶

Building lighting fixtures are a source of heat, affecting air conditioning load. The current Protocols use IF to represent reduced-air conditioning load (kW and kWh) due to decreased lighting wattage.¹⁷ KEMA’s recommended IF values provide a single IF factor for each type of building which, in turn, is used to calculate the associated kW and kWh savings. In contrast, New York provides IF factors for kW and kWh reduction, as well

¹⁵ To use California DEER 2008 values at the building type level, weighted average values would need to be obtained from California, or unweighted averages across spaces could be used on an interim basis.

¹⁶ New York Evaluation Advisory Contractor Team 2009. *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Measures in Commercial and Industrial Programs*, prepared for New York Department of Public Service, available at http://www.dps.state.ny.us/90_day_CI_manual_final_9-1-09.pdf

¹⁷ KEMA’s SmartStart Program Protocol Review, page 3-9, 3-10, and 3-21.

for increases in gas use (measured in therms), for 10 building types and for 6 cities in New York. Rate Counsel believes that the IF estimates for New York represent a more comprehensive view of IF associated with lighting and HVAC load relationship for the following reasons:

- Efficient lighting will certainly reduce A/C load, but will also increase heating load because heat emitted from lighting fixtures will be reduced.
- HVAC interaction factors vary by climate. Using the estimates for New York City from the New York study would be more appropriate for New Jersey, from a climate perspective, than using the estimates for California.

The IF values for New York City are presented in the table below.

TABLE 2 IF Values for New York City

<u>Building Type:</u>	<u>HVACc</u>	<u>HVACd</u>	<u>HVACg</u>
Assembly (Asy)	0.16	0.2	-0.021
“Big Box” (BB)	0.17	0.2	-0.013
Fast Food (FF)	0.11	0.2	-0.028
Full Service Restaurant (FS)	0.11	0.2	-0.03
Light Industrial (Ind)	0.1	0.2	-0.021
Primary School (Sch)	0.11	0.2	-0.029
Small Office (Ofc)	0.12	0.2	-0.015
Small Retail (Ret)	0.13	0.2	-0.022
MF Lowrise (MFL)	0.06	0.14	-0.016
MF Highrise (MFH)	0.1	0.12	-0.143

Note:

HVACc = HVAC system interaction factor for annual electricity consumption

HVACd = HVAC system interaction factor at utility peak hour

HVACg = HVAC system interaction factor for gas consumption (therm/kWh)

B. Smart Start EE Measure: Electric Motors

KEMA recommends that the SmartStart program use the following formula and assumptions for electric motor EE measures, with values from Table 3 below:¹⁸

¹⁸ KEMA’s SmartStart Program Protocol Review, page 3-34 to 3-35.

$$\Delta kW = 0.746 * HP * VF * \left(\frac{1}{\eta_{base}} - \frac{1}{\eta_{prem}} \right) \quad \text{Equation 3.4-16}$$

$$kW \text{ Savings} = \Delta kW * CF \quad \text{Equation 3.4-17}$$

$$kWh \text{ Savings} = \Delta kW * HRS * LF \quad \text{Equation 3.4-18}$$

where:

- ΔkW = kW Savings at full load
- HP = Rated horsepower of qualifying motor
- LF = Load Factor, percent of full load at typical operating condition
- DC = Duty Cycle, percent of time motor is operating on average
- VF = VFD Interaction Factor
- h_{base} = Baseline motor efficiency
- h_{prem} = Qualifying motor efficiency
- HRS = Annual operating hours
- CF = Coincidence Factor

TABLE 3 Variables for Motor Savings Algorithms

Component	Type	Value	Source
HP	Variable	Nameplate	Application
LF	Fixed	0.75	California DEER 2005
VF	Fixed	1.0 (no VFD)	California DEER 2005
		0.94 (with VFD)	
h _{base}	Fixed	EPAct Baseline Efficiency Table	EPAct
h _{prem}	Variable	Nameplate	Application
CF	Fixed	0.74	California DEER 2005
HRS	Fixed	Annual Operating Hours Table	California DEER 2005

With respect to the KEMA’s recommendations regarding Electric Motor savings, Rate Counsel has the following comments:

- The final Protocol revision should state that the 0.746 factor in equation 3.4-10 is a conversion factor from horsepower to kW¹⁹.
- KEMA recommends the use of California DEER 2005 database for LF, VF, CF, and HRS values. We recommend instead the use of California DEER 2008 database, except for ventilation fan motors.
- For ventilation fan motors, we recommend the use of lighting hours from California DEER 2008 that we presented above. We expect that the operating hours for ventilation fans are very close to the hours for lighting operation which represents roughly the hours of building occupied. The lighting hours could be significantly different from other heating and cooling motor use depending on building type. For example, see Vermont’s data for motor operating hours presented in Table 3-8 on page 3-30 of the KEMA’s final SmartStart Program

¹⁹ KEMA’s SmartStart Program Protocol Review, page 3-32

Protocol Review. In addition, Connecticut’s technical manual sets ventilation fan hours equal to lighting hours.²⁰

C. SmartStart EE Measure: Electric HVAC Systems

KEMA does not recommend any changes to the variables for Electric HVAC Systems at this time, but recommends that the OCE investigate the values for EFLH and Coincidence Factor (“CF”). While we agree that the OCE should perform further studies on EFLH and CF (for EFLH, ideally by building type), Rate Counsel notes that New York has conducted research, not reported by KEMA, which may provide a basis for improving the New Jersey Protocols in the interim.

The EFLH values for New York are presented by building type and by city in the following tables

TABLE 4 Cooling Load Hours by Building Type in New York²¹

Building	Albany	Binghamton	Buffalo	Massena	NYC	Syracuse
Primary School	371	330	305	321	492	342
Assembly	597	545	621	519	836	632
Big Box Retail	961	950	1,033	860	1,599	1,039
Fast Food Restaurant	640	626	649	545	806	680
Light Industrial	500	544	529	463	686	536
Full Service Restaurant	546	642	575	486	718	583
Small Retail	803	805	833	749	1,102	848
Small Office	927	893	931	839	1,194	960

TABLE 5 Heating Load Hours by Building Type in New York²²

Building	Albany	Binghamton	Buffalo	Massena	NYC	Syracuse
Primary School	1,625	1,612	1,696	1,639	1,050	1,545
Assembly	1,201	1,257	1,237	1,448	754	1,129
Big Box Retail	693	636	696	775	239	653
Fast Food Restaurant	1,782	1,907	1,864	2,112	1,016	1,689
Light Industrial	1,597	1,650	1,485	1,607	892	1,500
Full Service Restaurant	1,878	2,003	1,959	2,182	1,026	1,774
Small Retail	1,230	1,257	1,275	1,417	681	1,211
Small Office	934	991	950	1,076	539	938

Rate Counsel recommends that the New Jersey Clean Energy Program consider adopting the cooling and heating hour values from New York’s study for the following reasons:

- These load hours were calculated using the DOE-2.2 building energy simulation model on prototypical small commercial buildings. Using a building simulation model like the DOE-2.2 is one of the approaches KEMA suggested in this report that the program should perform to investigate and update variables for the Protocols.

²⁰ UI and CL&P Program Savings Documentation for 2008 Program Year, Table 2.0.

²¹ New York Evaluation Advisory Contractor Team 2009, page 44.

²² New York Evaluation Advisory Contractor Team 2009, page 47.

- The study results include EFLH values for New York City, which is the closest location to New Jersey, versus other locations (eg Vermont, Connecticut, and California) for which KEMA investigated energy savings protocols for EFLH.

D. SmartStart EE Measure: Electric Chiller

KEMA recommends that Electric Chiller projects over 1000 tons be treated as custom measures, due to the potential for greater energy savings if systems are optimized. While this reasoning seems sound, 1000 tons may be a high threshold for custom projects whose performance differs significantly by site. Rate Counsel instead recommends that projects over 300 tons be treated as custom projects because, as KEMA notes, New York is treating chiller projects over 300 tons as custom measures and Connecticut is treating all such projects as custom.²³

KEMA’s recommended EFLH value (table 3-34, page 3-59 of the Smart Start report) for Electric Chillers has not been modified from the previous estimate. However, for Electric Chillers we recommend the recently estimated EFLH values for New York City found in the NYEACT 2009 study for office buildings and hospitals.²⁴ The following tables show the results of chiller operating hours by city, by type of building, and by three different chiller applications. These values were calculated using the DOE-2.2 building energy simulation model.

TABLES 6 & 7 Electric Chiller Operating Hours in New York²⁵

Office Building

System	Albany	Binghamton	Buffalo	Massena	NYC	Syracuse
CAV no econ	2,367	2,233	2,520	2,284	2,812	2,695
CAV econ	882	668	734	762	900	834
VAV econ	779	649	630	631	895	715

Hospital

System	Albany	Binghamton	Buffalo	Massena	NYC	Syracuse
CAV no econ	2160	2077	2385	2162	2796	2382
CAV econ	1297	1147	1393	1297	1780	1434
VAV econ	1201	1069	1283	1202	1521	1313

E. SmartStart EE Measure: Air Compressor with Variable Frequency Drive

Rate Counsel supports KEMA’s recommendations. We just note a typographical error in Equation 3.8-5 of the Smart Start report, which calculates Yearly Operating Hours. “774 Yearly kW/HP Savings” in the equation below should read instead “774 Yearly kWh/HP Savings”.

²³ KEMA SmartStart Program Protocol Review, page 3-59.

²⁴ NYEACT 2009, Page 63.

²⁵ Id., NYEACT 2009, Page 63.

F. SmartStart EE Measure: Compressed Air System Optimization

The current Protocols treat this measure as a custom measure and provide two options: (1) Compressed Air System Analysis and (2) the Pay for Performance Program. Given that the Protocols do not offer much detail about these options, KEMA suggested details for the description of these options and how to implement those options, which could help improve the standardization of the program.

KEMA also recommends the program resist the temptation to offer the Pay for Performance Program option to customers who have already begun installation of a product. The Protocols would be more useful if more details were provided on how to identify such customers.

G. General Smart Start Time Period Allocation Factor Comments

KEMA recommended changes in the Time Period Allocation Factors (“TPAFs”) for certain EE measures whose loads are expected to differ from end-use load shapes. These factors have applicability across several SmartStart EE program measures. KEMA’s summary TPAF recommendations for gas and electric measures are presented in tables in their SmartStart Program Protocol Review, page 3-74 and 3-75. Rate Counsel generally agrees with KEMA’s recommendations regarding the TPAFs. However, certain types of future research will help to better buttress these TPAF values, such as:

- KEMA notes that the current Protocols lack information used to determine Time Period Allocation Factors in the Protocols and surmises that “data related to load shapes may have been used to determine when measure savings occur across a single year.”²⁶ KEMA recommended no changes to the measures whose savings are likely to follow the end-use load shape. Rate Counsel instead recommends New Jersey investigate if the current TPAFs for such measures are appropriate as end use load shapes, given that the data source for current TPAFs are unknown.
- In addition to KEMA’s recommendation for water heaters, we also recommend the program study whether and to what extent “hot water use” varies on average across the commercial sector. We also believe that the results of these studies might be applicable to gas booster water heaters.

²⁶ KEMA SmartStart Program Protocol Review, Page 3-123.