

BEFORE  
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Energy Efficiency	:	
and Peak Demand Reduction Program	:	
Portfolio Status Report of the Ohio	:	
Edison Company, The Cleveland	:	Docket Nos. 19-1020-EL-EEC
Electric Illuminating Company, and	:	19-1021-EL-EEC
The Toledo Edison Company to the	:	19-1022-EL-EEC
Public Utilities Commission of Ohio	:	
for the period January 1, 2018 to	:	
December 31, 2018.	:	

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COMMENTS  
OF  
THE SMART THERMOSTAT COALITION

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The Smart Thermostat Coalition (“STC”),<sup>1</sup> pursuant to Rule 4901:1-40-05(B), Ohio Administrative Code, hereby files its comments regarding the above-captioned 2018 energy efficiency and peak demand reduction program portfolio status report of the FirstEnergy Corp. Ohio electric distribution utilities (the “Companies”) filed herein on May 15, 2019 (the “Status Report”). By these comments, STC wishes to bring to the Commission’s attention an error in the calculation of the savings attributed to smart thermostats in the Energy Efficiency Products Program Evaluation, Measurement, and Review Report submitted as Appendix G to the Status Report.

The Companies offer residential customers rebates and/or incentives for the purchase of energy-efficient appliances as well as midstream rebates to retailers to encourage stocking and

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<sup>1</sup> STC is an *ad hoc* coalition comprised of Ecobee, Inc. (“ecobee”) and Google, LLC, which are industry leaders in smart thermostat technology.

promotion of energy efficient products as a part of the lighting, consumer electronics, appliances, and HVAC portions of the Energy Efficient Products Program. The HVAC subprogram, which is examined in Chapter 8 of Appendix G, includes smart thermostats, the sales of which were promoted by a \$30 midstream incentive to retailers per unit sold.<sup>2</sup> Although the impact analysis relied on the State of Ohio Energy Efficiency Technical Reference Manual (the “Ohio TRM”) as the primary source for deemed savings and/or engineering algorithms used in determining program impacts, in those instances where a measure was not listed in the Ohio TRM, deemed savings from the 2016 Pennsylvania Energy Efficiency Technical Reference Manual (the “PA TRM”) were used as a surrogate for the Ohio values.<sup>3</sup> This approach may be reasonable in the case of certain energy efficiency products, but, as discussed below, it is demonstrably inappropriate in the case of smart thermostats and served to significantly understate the energy savings associated with this product.

The problem arises because the analysis uses the 2016 PA TRM energy savings factors of 2% for cooling and 3.6% for heating for *Programmable Thermostats*<sup>4</sup> to calculate the savings ascribed to the Companies’ 2018 *Smart Thermostat* midstream rebate program.<sup>5</sup> As the Commission well knows, the United States Environmental Protection Agency (“US EPA”) awards ENERGY STAR® certification to appliances and energy efficiency products based on achieving specific energy savings criteria as measured by actual performance in the field. In the

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<sup>2</sup> See Appendix G, Table 2.1 at 2-2. It is worthy of mention that, in 2018, the Companies had no separate Smart Thermostat program that entailed offering rebates directly to residential consumers, nor did the Companies offer a direct-install option to residential customers. See Status Report, 10.

<sup>3</sup> See Appendix G, 3-1.

<sup>4</sup> See 2016 PA TRM, 78-79, a copy of which is attached to these comments as Attachment 1. The PA TRM can be accessed at [2016 Technical Reference Manual with Errata Corrections](#).

<sup>5</sup> See Appendix G, 8-7, 8-8.

case of smart thermostats, the ENERGY STAR® requirements are 10% for cooling and 8.0% for heating – requirements that were developed through a robust two-year stakeholder process that included input and review from regulators, national labs, manufacturers, and other interested parties.<sup>6</sup> Moreover, to maintain the ENERGY STAR® designation, smart thermostat manufacturers must submit aggregate savings data and associated statistics to the US EPA every six months in accordance with the *ENERGY STAR® Method to Demonstrate Connected Thermostat Field Savings*.

Only ENERGY STAR®-certified smart thermostats are eligible for the Companies' midstream rebate program.<sup>7</sup> Thus, it necessarily follows that the smart thermostat products eligible for the Companies' program have demonstrated (and have continued to demonstrate) cooling savings of at least 10% and heating savings of at least 8.0%, a performance that far exceeds the 2% for cooling and 3.6% for heating energy savings factors for outmoded programmable thermostats borrowed from the dated PA TRM. In fact, the programmable thermostats upon which the PA TRM energy savings factors are based were stripped of their ENERGY STAR® designation by the US EPA in 2009 precisely because of their failure to demonstrate adequate energy savings in field studies.<sup>8 9</sup>

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<sup>6</sup> See ENERGY STAR "Smart Thermostats Key Product Criteria," accessible at [https://www.energystar.gov/products/heating\\_cooling/smart\\_thermostats/key\\_product\\_criteria](https://www.energystar.gov/products/heating_cooling/smart_thermostats/key_product_criteria).

<sup>7</sup> See Appendix G, Section 8.2.2, at 8-4. Only ENERGY STAR®-certified smart thermostats are eligible for the Companies' midstream rebate program as shown by the statement in Section 8.2.2 indicating that, as a part of its review, the evaluator verified the "measure rebate requirements (e.g., ENERGY STAR® qualified status and high efficiency level) for completed HVAC rebate applications."

<sup>8</sup> See May 4, 2009 letter from Katharine Kaplan, US EPA, ENERGY STAR Product Development, to thermostat manufacturers notifying them of the termination of the ENERGY STAR designation for programmable thermostats as of December 31, 2009, because "EPA has been unable to confirm any improvement in terms of the savings delivered by programmable thermostats and has no credible basis for continuing to extend the current ENERGY STAR specification. A copy of the letter is attached to these comments as Attachment 2.

<sup>9</sup> For an explanation of the distinctions between programmable thermostats and smart thermostats and a thorough discussion of the energy and demand savings features and attributes of smart thermostats, STC invites the

Under these circumstances, STC recommends that the Commission direct the Companies to require the evaluator to recalculate the post-ante kWh savings and realization rate for smart thermostats shown in Tables 8-7 and 8-9,<sup>10</sup> respectively, by replacing the inapposite programmable thermostat savings factors of 2% for cooling and 3.6% for heating with the ENERGY STAR® smart thermostat required savings of 10% for cooling and 8% for heating, and to file the revised calculations in these dockets. In so stating, STC recognizes that the ENERGY STAR® cooling and heating energy savings criteria apply in five climate zones and are not state-specific. However, as STC witness Tamara Dzubay reported in her testimony in the FE Grid Modernization case, STC caused a study to be conducted using the ENERGY STAR® methodology and the smart thermostats purchased in Ohio from STC members, which resulted in a blended average cooling savings value of 15.2%.<sup>11</sup> This result suggests that the use of the ENERGY STAR® savings requirements for purposes of determining the savings associated with the Companies midstream rebate for smart thermostats represents a conservative approach.

There is one additional matter that warrants comment. The analysis of the HVAC subprogram ascribes a peak demand reduction factor of zero kW to smart thermostats,<sup>12</sup> presumably because the PA TRM did not address this metric. However, there can be no question that, in addition to their energy efficiency attributes, smart thermostats serve to reduce peak

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Commission's attention to the testimony of STC witness Tamara Dzubay in the FE Grid Modernization case. *See In the Matter of the Filing by Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company of a Grid Modernization Business Plan*, Case No. 16-481-EL-UNC, Dzubay Direct, STC Exhibit 4, at 7-8.

<sup>10</sup> See Appendix G, Table 8-7, at 8-19 and Table 8-9, at 8-20.

<sup>11</sup> See *In the Matter of the Filing by Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company of a Grid Modernization Business Plan*, Case No. 16-481-EL-UNC, Dzubay Direct, STC Exhibit 4, at 16.

<sup>12</sup> See Appendix G, Table 8-7, at 8-19 and Table 8-9, at 8-20.

demand. Thus, ascribing zero kW savings to smart thermostats is inappropriate. The ENERGY STAR® requirements do not include a demand reduction criteria, so that source is not available as a benchmark for a peak demand reduction factor. Under these circumstances, STC recommends that the Commission direct the Companies to require the evaluator to conduct a review of available studies and to propose a kW savings factor for smart thermostats.

STC appreciates the opportunity to file comments in this matter, and urges the Commission to adopt the recommendations set forth above.

Respectfully submitted,

/s/ Barth E. Royer

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## ATTACHMENT 1



# TECHNICAL REFERENCE MANUAL

State of Pennsylvania  
Act 129 Energy Efficiency and Conservation Program  
&  
Act 213 Alternative Energy Portfolio Standards

June 2016  
Errata Update February 2017

## 2.2.8 PROGRAMMABLE THERMOSTAT

Measure Name	Programmable Thermostat
Target Sector	Residential Establishments
Measure Unit	Programmable Thermostat
Unit Energy Savings	<i>Varies</i>
Unit Peak Demand Reduction	<i>Varies</i>
Measure Life	11 years <sup>88</sup>
Vintage	Retrofit

Programmable thermostats are used to control heating and/or cooling loads in residential buildings by modifying the temperature set-points during specified unoccupied and nighttime hours. These units are expected to replace a manual thermostat and the savings assume an existing ducted HVAC system with electric resistance heating and DX cooling. A standard programmable thermostat installed on a heat pump can have negative energy consequences. However, the option exists to input higher efficiency levels if coupled with a newer unit. The EDCs will strive to educate the customers to use manufacturer default setback and setup settings.

### ELIGIBILITY

This measure documents the energy savings resulting from the installation of a programmable thermostat instead to replace an existing standard thermostat. The target sector is primarily residential.

### ALGORITHMS

$$\begin{aligned}\Delta kWh/yr &= \Delta kWh_{cool} + \Delta kWh_{heat} \\ \Delta kWh_{cool} &= \frac{CAPY_{cool}}{1000 \frac{W}{kW}} \times \frac{1}{SEER \times Eff_{duct}} \times EFLH_{cool} \times ESF_{cool} \\ \Delta kWh_{heat} &= \frac{CAPY_{heat}}{1000 \frac{W}{kW}} \times \frac{1}{HSPF \times Eff_{duct}} \times EFLH_{heat} \times ESF_{heat} \\ \Delta kW_{peak} &= 0\end{aligned}$$

### DEFINITION OF TERMS

<sup>88</sup> DEER Effective Useful Life values, updated 2/5/2014.

[http://www.deeresources.com/files/DEER2013codeUpdate/download/DEER2014-EUL-table-update\\_2014-02-05.xlsx](http://www.deeresources.com/files/DEER2013codeUpdate/download/DEER2014-EUL-table-update_2014-02-05.xlsx)

Table 2-41: Residential Electric HVAC Calculation Assumptions

Component	Unit	Value	Sources
$CAPY_{COOL}$ , Capacity of air conditioning unit	$\frac{Btu}{hr}$	EDC Data Gathering of Nameplate data	EDC Data Gathering
		Default= 32,000	1
$CAPY_{HEAT}$ , Normal heat capacity of Electric Furnace	$\frac{Btu}{hr}$	EDC Data Gathering of Nameplate Data	EDC Data Gathering
		Default= 32,000	1
$SEER$ , Seasonal Energy Efficiency Ratio	$\frac{Btu}{W \cdot h}$	EDC Data Gathering of Nameplate data	EDC Data Gathering
		Default= 11.9	1
$HSPF$ , Heating Seasonal Performance Factor of heat pump	$\frac{Btu}{W \cdot h}$	EDC Data Gathering of Nameplate data	EDC Data Gathering
		Default= 3.412 (equivalent to electric furnace COP of 1)	2
$Eff_{duct}$ , Duct System Efficiency	None	0.8	3
$ESF_{COOL}$ , Energy Saving Factor for Cooling	None	0.02	4
$ESF_{HEAT}$ , Energy Saving Factor for Heating	None	0.036	5
$EFLH_{COOL}$ , Equivalent Full Load hour for Cooling	$\frac{hours}{day}$	Allentown Cooling = 487 Hours Erie Cooling = 389 Hours Harrisburg Cooling = 551 Hours Philadelphia Cooling = 591 Hours Pittsburgh Cooling = 432 Hours Scranton Cooling = 417 Hours Williamsport Cooling = 422 Hours	6
	Optional	Can use the more EDC-specific values in Table 2-13	Alternate EFLH Table 2-13
	Optional	An EDC can estimate it's own EFLH based on customer billing data analysis.	EDC Data Gathering
$EFLH_{HEAT}$ , Full Load Hours for Heating	$\frac{hours}{day}$	Allentown Heating = 1,193 Hours Erie Heating = 1,349 Hours Harrisburg Heating = 1,103 Hours Philadelphia Heating = 1,060 Hours Pittsburgh Heating = 1,209 Hours Scranton Heating = 1,296 Hours Williamsport Heating = 1,251 Hours	6
	Optional	An EDC can use the Alternate EFLH values in Table 2-14	Alternate EFLH Table 2-14
	Optional	An EDC can estimate its own EFLH based on customer billing data analysis.	EDC Data Gathering

## ATTACHMENT 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460



OFFICE OF  
AIR AND RADIATION

May 4, 2009

Dear Programmable Thermostat Manufacturer or Other Interested Stakeholder:

The purpose of this letter is to notify programmable thermostat stakeholders of the U.S. Environmental Protection Agency's (EPA) intention to sunset the Version 1.2 ENERGY STAR® Programmable Thermostat specification as scheduled on December 31, 2009 and to outline EPA's next steps with programmable thermostats. EPA will also issue a letter later this month detailing the specific timeline associated with sunsetting the ENERGY STAR specification.

EPA recognizes the potential for programmable thermostats (PTs) to save significant amounts of energy. We remain committed to cooperating with industry and other experts to structure a program that works toward this end. At this point we see that the best next step is to proceed as outlined in a February 2008 decision letter on PTs to sunset the current specification while we continue to work to design and implement an improved program. This is for the following reasons:

- Significant questions have been raised as to the net energy savings and environmental benefits being achieved with the current set of ENERGY STAR qualifying PTs through a number of field studies as discussed in the February 2008 decision letter.
- EPA established December 31, 2009 as a sunset date for the ENERGY STAR PT specification: 1) in light of a January 2007 Gas Networks study that demonstrated savings from PTs under some circumstances; 2) to allow some ENERGY STAR partners to complete their programs which extended into 2009 and that incorporated ENERGY STAR PTs; and 3) to see if an enhanced educational effort on proper use could improve the effectiveness of the program.
- EPA has been unable to confirm any improvement in terms of the savings delivered by programmable thermostats and has no credible basis for continuing to extend the current ENERGY STAR specification.
- No new approach has been developed for differentiating thermostats that reliably and easily assist homeowners in saving energy (and one is not imminent) as EPA had outlined would need to be finalized by March, 2009 so as to avoid sunsetting the specification.

Despite sunsetting the specification, EPA plans to continue to advance energy efficiency through programmable thermostats in the following ways:

- Continue to work with industry to develop a new ENERGY STAR specification that differentiates products with demonstrated ease-of-use features so as to minimize the potential for user interface issues to reduce energy savings. EPA will be exploring the usability of PT products, functionalities that improve user savings, and functionalities that offer consumers further comfort, communication, and control of energy costs.
- Continue to educate homeowners about the energy savings associated with the proper use of these devices. Programmable thermostat education will be integrated into this year's *Change the World, Start with ENERGY STAR* campaign. EPA will continue to promote and provide the Agency's educational materials and tools at [www.energystar.gov](http://www.energystar.gov).

During the week of May 18, 2009, EPA plans to issue a letter to PT partners outlining the milestones associated with sunseting the specification. If you are aware of new studies or other information demonstrating PT effectiveness in terms of energy savings, we would appreciate receiving it prior to this date.

EPA appreciates the efforts programmable thermostat partners have made to deliver ENERGY STAR qualified products to consumers and to educate consumers regarding their proper use. We look forward to continuing our work to hone the ENERGY STAR program for these products and to staying in touch with you on any progress. Please feel free to share your comments or concerns with me at 202-343-9120 or [kaplan.katharine@epa.gov](mailto:kaplan.katharine@epa.gov) and Christina Chang, ICF International, at 202-862-1206 or [cchang@icfi.com](mailto:cchang@icfi.com).

Sincerely,



Katharine Kaplan  
US EPA, ENERGY STAR Product Development

Certificate of Service

I hereby certify that a copy of the foregoing Comments of the Smart Thermostat Coalition was served on the following parties by electronic mail this 14<sup>th</sup> day of June 2019.

/s/ Barth E. Royer

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Barth E. Royer

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Summary: Comments Comments of The Smart Thermostat Coalition electronically filed by Mr. Barth E. Royer on behalf of The Smart Thermostat Coalition