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ComEd RLD Resources LLC Commercial and Retail IP Thermostat and Controller Program PY6 Evaluation Report

Final

Energy Efficiency/Demand Response Plan: Plan Year 6 (6/1/2013-5/31/2014)

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Executive Summary

This report presents a summary of the findings and recommendations from Navigant Consulting, Inc.'s (Navigant's) impact evaluation for the PY6[1] of the Commonwealth Edison Company (ComEd) RLD Resources LLC Commercial and Retail IP Thermostat and Controller (IP Thermostat) program. The IP Thermostat program targeted small- to mid-size office buildings and retail stores (100 – 400 kW). This program launched in late PY4, and had a small amount of energy savings in PY4 and an undetermined energy savings in PY5. [Navigant evaluated the PY5 savings which are described in Section 6.2. Seven facilities participated in PY4 and 14 facilities participated in PY5. Sixteen facilities had attributable savings in PY6 and the net savings target for PY6 was 6,125 MWh[2]. The program met less than two percent of its PY6 savings goal.

The IP Thermostat program offers low-cost automation with monitoring and proactive control of HVAC systems. The benefits for the building owners (as well as property managers or tenants) include cost-savings in energy and more scientific (data-driven) HVAC maintenance. The program provided outreach programs and technical support, including marketing support to help business partners reach new customers and build on existing relationships with clients through innovative, value-added services. The program also identifies inefficient buildings that can benefit most from the program.

The evaluation objectives in PY6 were: (1) verifying tracking system data, (2) verifying gross savings impacts based on the calculation approach used in PY4 and (3) quantifying net savings impacts. The implementation contractor did not supply an approach or calculations for estimating demand savings in PY6. Navigant estimated the program's demand savings from programmable thermostats to be zero. Programmable thermostats usually contribute to energy savings but not necessarily peak demand savings in the commercial sector. Programmable thermostats are usually used to setback the heating and cooling temperature set points during non-occupied hours. This requires the customer to successfully program the programmable thermostat for non-occupied temperature setbacks, and savings are assumed against a baseline thermostat that does not use a programmed setback schedule. For the commercial sector, non-occupied hours are typically during the nighttime hours, which do not coincide with the utility or PJM peak periods (1 pm – 5 pm on weekdays). The program implementer did not provide any evidence that the thermostats used for this program operated in a manner different than the usual operation programmable thermostats regarding the time period for the energy savings.

[1] PY6 began June 1, 2013, and ended May 31, 2014.
[2] Dent on Energy's Proposed Program Revisions for PY6, savings goal of 6,125 MWh with ComEd Smart Ideas branding, received via email from Kelly Shelton, December 11, 2013.

E.1 Program Savings

Table E-1 summarizes the electric savings from the ComEd PY6 IP Thermostat program. The IP Thermostat program realized net energy savings of 98.9 MWh which represents less than two percent of the savings goal for PY6 and net demand reduction of zero MW.

Table E-1. PY6 Total Program Electric Savings

Savings Category	Energy Savings (MWh)	Demand Reduction (MW)
Ex Ante Gross Savings	98.9	Not provided
Verified Gross Savings	98.9	0
Verified Net Savings	98.9	0

Source: Navigant analysis of program tracking data

E.2 PY6 IP Thermostat Program Savings by Measure

Table E-2 summarizes PY6 gross and net savings by building category.

Table E-2. PY6 Program Results by Facility Type

Facility Category	Ex Ante Gross Savings (MWh)	Ex Ante Gross Demand Reduction (MW)	Verified Gross Savings (MWh)	Verified Gross Demand Reduction (MW)	Verified Gross Realization Rate	NTGR	Verified Net Savings (MWh)	Verified Net Demand Reduction (MW)
Laundromat	46.4	-	46.4	0	100%	1.0	46.4	0
Church	23.8	-	23.8	0	100%	1.0	23.8	0
Storage Facility	14.2	-	14.2	0	100%	1.0	14.2	0
Fitness Center	8.9	-	8.9	0	100%	1.0	8.9	0
Hospitality	4.1	-	4.1	0	100%	1.0	4.1	0
Radio Station	1.6	-	1.6	0	100%	1.0	1.6	0
Total	98.9	-	98.9	0	100%	1.0	98.9	0

Source: Navigant analysis of program tracking data

E.3 Impact Estimate Parameters for Future Use

In the course of the PY6 research, the evaluation team did not conduct any additional research on parameters used in impact calculations.

E.4 Program Volumetric Detail

Although the program had 22 electric participants in PY6, only 16 participants had attributable savings, as shown in Table E-3. Regarding the six facilities without attributable savings:

- One facility (laundromat) did not have 2013 usage,
- One facility (laundromat) had a blocked account,
- One facility's (grocery) ComEd account was closed after January 2014,
- Two facilities (laundromats) did not have valid ComEd account numbers, and
- One facility (church) did not have savings because their cooling season usage increased.

Table E-3. PY6 Volumetric Findings Detail

Participation	ComEd Total Participants
Participants	22
Facilities with attributable savings	16
Laundromat	10
Church	2
Radio Station	1
Fitness Center	1
Storage Facility	1
Hospitality	1

Source: Navigant analysis of program tracking data

E.5 Results Summary

Table E-4 summarizes the key metrics from PY6 that reflect the allowable savings using the implementation contractor's approach.

Table E-4. PY6 Results Summary

Metrics	Units	PY6
Net Savings	MWh	98.9
Net Savings Goal	MWh	6,125
Percentage of goal met	%	<2
Net Demand Reduction	MW	0
Verified Gross Savings	MWh	98.9
Gross Demand Reduction	MW	0
Program Realization Rate	%	100
Program-Level NTGR	#	1.0
Participating Customers with attributable savings	#	16

Source: Navigant analysis of program tracking data

E.6 Key Findings and Recommendations

This section provides insight into key program findings and recommendations.[3] Overall, the PY6 IP Thermostat program achieved 98.9 MWh gross savings, with an overall verified gross realization rate of 100 percent for electricity savings. Verified gross savings were 98.9 MWh. The program met less than two percent of its targeted goal of 6,125 MWh[4] of net savings. Navigant estimated the program's demand savings from programmable thermostats to be zero.

Program Savings Achievement

Finding 1. Verified gross savings were 98.9 MWh, with a corresponding gross realization rate of 100 percent for energy savings. The program met less than two percent of its targeted goal of 6,125 MWh. Verified net savings were 98.9 MWh. Several facilities did not have attributable savings due to: insufficient data history, account being closed, account being blocked, and account number was not valid.

Recommendation 1. Implementation contractor should include ability to determine facility usage history as a criterion for participation as well as determining that facility usage data is available and accounts are not blocked and are valid.

Program Participation

Finding 2. The majority of participants in PY6 were laundromats.

Recommendation 2. Since one of the PY6 marketing and outreach strategies was to target coin-operated laundromats, if this program were to be relaunched, consider additional marketing strategies specifically targeting commercial market segments i.e. churches, storage facilities, fitness centers, etc.

[3] For ease of reference between each section, the numbered findings and recommendations in this section are the same as those found in the Findings and Recommendations section of the evaluation report.

[4] Dent on Energy's Proposed Program Revisions for PY6, savings goal of 6,125 MWh with ComEd Smart Ideas branding, received via email from Kelly Shelton, December 11, 2013.

1 Introduction

1.1 Program Description

Commonwealth Edison Company (ComEd) RLD Resources LLC Commercial and Retail IP Thermostat and Controller (IP Thermostat) program offers low-cost automation with monitoring and proactive control of HVAC systems. The benefits for the building owners (as well as property managers or tenants) include cost-savings in energy and more scientific (data-driven) HVAC maintenance. The program provided outreach programs and technical support, including marketing support to help business partners reach new customers and build on existing relationships with clients through innovative, value-added services. The program also identifies inefficient buildings that can benefit most from the program.

Changes for PY6 included adding the Smart Ideas branding to marketing and outreach materials and having a dedicated program manager at the implementation contractor.

1.2 Evaluation Objectives

The evaluation objectives in PY6 were: (1) verifying tracking system data, (2) verifying gross savings impacts based on the calculation approach used in PY4 and (3) quantifying net savings impacts. The implementation contractor did not supply an approach or calculations for estimating demand savings in PY6. Navigant estimated the program's demand savings from programmable thermostats to be zero. Programmable thermostats usually contribute to energy savings but not necessarily peak demand savings in the commercial sector. Programmable thermostats are usually used to setback the heating and cooling temperature set points during non-occupied hours. This requires the customer to successfully program the programmable thermostat for non-occupied temperature setbacks, and savings are assumed against a baseline thermostat that does not use a programmed setback schedule. For the commercial sector, non-occupied hours are typically during the nighttime hours, which do not coincide with the utility or PJM peak periods (1 pm – 5 pm on weekdays). The program implementer did not provide any evidence that the thermostats used for this program operated in a manner different than the usual operation programmable thermostats regarding the time period for the energy savings.

The evaluation team identified the following key researchable questions for PY6:

1.2.1 Impact Questions

1. What are the program's verified net and gross savings?
2. Are the implementation contractor's algorithms and measure savings applied correctly and are they accurately reflected in the program tracking system(s)?

1.2.2 Process Questions

For this impact evaluation, Navigant conducted process research through interviews with program managers with the implementation contractor to understand the program's performance and changes in PY6.

2 Evaluation Approach

This evaluation of the IP Thermostat program reflects the third and final year of ComEd third-party program operation. Navigant reviewed the program tracking data and performed gross and net impact calculations to determine verified energy savings for PY6. The core data collection activities included review of program tracking data and verification of IP thermostat savings using the implementation contractor's algorithm. Table 2-1 and Table 2-2 show the full set of data collection activities.

Table 2-1. Primary Data Collection Activities

Method	Subject	Quantity Goal	Quantity Achieved	Dates	Impact/Process
Review program tracking data	Program tracking database(s)	All	All	September-October 2014	Impact
Review IC's approach to calculate savings	RLD algorithms to calculate savings from IP thermostats	Selected	Selected	September-October 2014	Impact
Interviews with program staff	Program goals, strategy, and implementation	2	2	December 2013-June 2014	Impact/Process

Table 2-2. Additional Resources Used in Evaluation

Reference Source	Author	Application	Impact	Process
Summary of Monthly Normals 1981-2010	U.S. Department of Commerce National Climatic Data Center, National Oceanic & Atmospheric Administration Federal Building National Environmental Satellite, Data, and Information Service 151 Patton Avenue Asheville, North Carolina 28801 www.ncdc.noaa.gov Station: CHICAGO MIDWAY AIRPORT, IL US	Impact analysis	X	

2.1 *Verified Savings Parameters*

Navigant calculated verified gross direct install savings for the PY6 IP Thermostat program using algorithms, assumptions, and parameters defined by the implementation contractor. A NTGR value is applied to verified gross savings to quantify verified net savings. Table 2-3 shows the key parameters used in the verified gross and net savings analysis.

Table 2-3. Verified Savings Parameter Data Sources

Verified Gross and Net Input Parameter	Value	Data Source	Deemed or Evaluated
NTGR	1.0	PY5 Evaluation Research	Evaluated

2.1.1 Verified Gross Program Savings Analysis Approach

Navigant evaluated gross savings by (1) reviewing the tracking system, (2) reviewing measure algorithms, if applicable, and their respective values in the tracking system to ensure that they are appropriately applied, and (3) cross-checking totals. Navigant applied the verified gross realization rate on all claimed savings. The implementation contractor, RLD Resources, provided the excel spread sheet tracking system.[5]

2.1.2 Verified Net Program Savings Analysis Approach

Navigant conducted participant surveys in PY5 and the estimated net-to-gross ratio (NTG) was 1. Since the program remained similar in PY6, Navigant used the NTGR of 1.

2.2 *Process Evaluation*

Navigant conducted process research through interviews with program managers at ComEd and the implementation contractor to understand the program's performance and changes in PY6. The marketing and outreach included the Smart Ideas brand in PY6 with the expectation that the participation would increase accordingly. An example of the co-branded marketing is shown in Section 6.1.

[5] RLD Resources spreadsheet, "FINAL SAVINGS FILE - Dent on Energy - 141105 NAVIGANT," received November 5, 2014.

3 Gross Impact Evaluation

In this section, Navigant presents verified savings for the PY6 IP Thermostat program. Navigant performed a tracking system review on the program tracking system and calculated verified gross program savings. The program reported ex ante gross savings of 98.9 MWh and did not estimate demand savings. Navigant reports verified gross savings of 98.9 MWh, with a corresponding verified gross realization rate of 100 percent for energy savings. The implementation contractor did not supply an approach or calculations for estimating demand savings in PY6. Navigant estimated the program's demand savings from programmable thermostats to be zero. Programmable thermostats usually contribute to energy savings but not necessarily peak demand savings in the commercial sector. Programmable thermostats are usually used to setback the heating and cooling temperature set points during non-occupied hours. This requires the customer to successfully program the programmable thermostat for non-occupied temperature setbacks, and savings are assumed against a baseline thermostat that does not use a programmed setback schedule. For the commercial sector, non-occupied hours are typically during the nighttime hours, which do not coincide with the utility or PJM peak periods (1 pm – 5 pm on weekdays). The program implementer did not provide any evidence that the thermostats used for this program operated in a manner different than the usual operation programmable thermostats regarding the time period for the energy savings.

For the PY6 evaluation, Navigant reviewed the tracking system provided by RLD Resources to verify the completeness and accuracy of the tracking system data and to identify any issues that would affect the impact evaluation of the IP Thermostat program. Navigant found the tracking data documents sufficient to complete the gross impact evaluation of the IP Thermostat program.

Key findings from the tracking system review were that five facilities did not have attributable savings:

- One facility (laundromat) did not have any 2013 usage
- One facility (laundromat) had a blocked account
- One facility's (grocery) ComEd account was closed after January 2014
- Two facilities (laundromats) did not have valid ComEd account numbers
- One facility (church) did not have savings since their usage increased during the cooling period

3.1 Program Volumetric Findings

Although the program had 22 electric participants in PY6, only 16 participants had attributable savings. Table 3-1 shows the full volumetric detail for PY6.

Table 3-1. PY6 Volumetric Findings Detail

Participation	ComEd Total Participants or
Participants	22
Facilities with attributable savings	16
Laundromat	10
Church	2
Radio Station	1
Fitness Center	1
Storage Facility	1
Hospitality	1

Source: Navigant analysis of program tracking data

3.2 Gross Program Impact Parameter Estimates

Navigant calculated verified gross savings from the PY6 IP Thermostat program using algorithms and parameters defined by the implementation contractor.

Reduced air conditioning usage is calculated by total usage minus base load usage. Calculating the savings for a weather normal year includes calculating the savings due to reduced air conditioning usage, dividing by cooling degree days and multiplying by the thirty-year average annual cooling degree days.

<u>IP Thermostats</u>

ΔkWh = Cooling Degree Days for 30 year Average x ((June-August 2013 energy use – 3 x Monthly base load)/ Cooling Degree Days for June- August 2013) - (June-August 2014 energy use - 3 x monthly base load)/ Cooling Degree Days for June-August 2014)) = Annual energy savings due to programmable thermostat[6]

Where:
Monthly base load = the minimum monthly energy use for the year
Cooling Degrees Days for 30 year Average= Annual cooling degree days (1,045) is a thirty-year average.

3.3 Verified Gross Program Impact Results

This section details the results of Navigant's verified gross impact analysis for the PY6 IP Thermostat program. Navigant calculated verified gross savings with algorithms and assumptions provided by the implementation contractor.

[6] RLD Resources spreadsheet, "FINAL SAVINGS FILE - Dent on Energy - 141105 NAVIGANT," received November 5, 2014.

In addition, Navigant calculated an overall gross realization rate of 100 percent for IP thermostats. The resulting total program verified gross savings are 98.9 MWh, and zero MW verified gross demand savings as shown in Table 3-2 by facility type.

Table 3-2. PY6 Verified Gross Impact Savings Estimates by Facility Type

Research Category	Facility Type	Ex Ante Gross Savings (MWh)	Ex Ante Gross Demand Reduction (MW)*	Verified Gross Savings (MWh)	Verified Gross Demand Reduction (MW)	Verified Gross RR**
Direct Install Measure	Laundromat	46.4	-	46.4	0	100%
	Church	23.8	-	23.8	0	100%
	Storage Facility	14.2	-	14.2	0	100%
	Fitness Center	8.9	-	8.9	0	100%
	Hospitality	4.1	-	4.1	0	100%
	Radio Station	1.6	-	1.6	0	100%
Total		98.9	-	98.9	0	100%

**Implementation contractor did not track ex ante demand (megawatt [MW]) savings in PY6.*
***RR stands for realization rate. This is the ratio of verified gross to ex ante gross savings.*
Source: Navigant analysis of program tracking data.

Installations in ten laundromats accounted for the majority of the IP thermostat MWh savings as a percentage of total direct install energy savings, followed by installations in churches.

4 Net Impact Evaluation

In PY6, the IP Thermostat program verified net impact savings was 98.9 MWh. Navigant estimated the program's demand savings to be zero. The evaluation determined that the NTG values found in the PY5 program evaluation are appropriate values to use for the PY6 program, since the program did not have significant changes. Table 4-1 shows the NTGR values and PY6 verified net savings.

Table 4-1. PY6 Verified Net Impact Savings Estimates by Measure Type

Research Category	Measure	Verified Gross Savings (MWh)	Verified Gross Demand Reduction (MW)	NTGR	Verified Net Savings (MWh)	Verified Net Demand Reduction (MW)
Direct Install Measures	Laundromat	46.4	0	1.0*	46.4	0
	Church	23.8	0	1.0*	23.8	0
	Storage Facility	14.2	0	1.0*	14.2	0
	Fitness Center	8.9	0	1.0*	8.9	0
	Hospitality	4.1	0	1.0*	4.1	0
	Radio Station	1.6	0	1.0*	1.6	0
Total		98.9	0	1.0*	98.9	0

**The evaluation determined that the NTGR found in the PY5 evaluation of the IP Thermostat program is an appropriate value to use for PY6 since the program did not have significant changes.*
Source: Navigant analysis

5 Findings and Recommendations

This section summarizes key program findings and recommendations.[7] Overall, the PY6 IP Thermostat program achieved 98.9 MWh of gross savings and TBD MW of demand reduction with an overall verified gross realization rate of 100 percent for electricity savings. Verified net savings were 98.9 MWh. Navigant estimated the program's verified demand savings from programmable thermostats to be zero.

Program Savings Achievement

Finding 1. Verified gross savings were 98.9 MWh, with a corresponding gross realization rate of 100 percent for energy savings. ***The program met less than two percent of its targeted goal of 6,125 MWh.*** Verified net savings were 98.9 MWh. Several facilities did not have attributable savings due to: insufficient data history, account being closed, account being blocked, and account number was not valid.

Recommendation 1. Implementation contractor should include ability to determine facility usage history as a criterion for participation as well as determining that facility usage data is available and accounts are not blocked and are valid. In addition, since IP thermostats is new, unfamiliar technology for many end users, additional education is warranted to condition the market for increased uptake.

Program Participation

Finding 2. The majority of participants in PY6 were laundromats**.**

Recommendation 2. Since one of the PY6 marketing and outreach strategies was to target coin-operated laundromats, if this program were to be relaunched, consider additional marketing strategies specifically targeting commercial market segments i.e. churches, storage facilities, fitness centers, etc.

[7] For ease of reference between each section, the numbered findings and recommendations in this section are the same as those found in the Findings and Recommendations section of the evaluation report.

6 Appendix

6.1 Example of Co-Branded Program Literature

Smart Thermostat Program

CUTTING EDGE TECHNOLOGY
promotes energy savings with
INTERNET MANAGED THERMOSTATS

Smart thermostats *SAVE YOU MONEY!*

- **Smart thermostats** automatically cycle into energy saver mode when your space is not occupied!
- **Smart thermostats** make adjustments to temperature settings to use less energy!

Smart thermostats *SAVE YOU TIME!*

- **Smart thermostats** program themselves, so you don't have to!
- **Smart thermostats** allow you to control temperature settings from your computer or smart phone!

In addition to the Smart Thermostat, our experienced Energy Professionals will provide energy savings suggestions and help you track your savings!

Visit
www.dentonenergy.net
to learn about financial incentives for the purchase and installation of
SMART THERMOSTATS

Sign up is quick and easy!!

PROGRAM CRITERIA:

- Commercial Accounts
- Annual electric bill of $10,000 - $25,000
- Currently using a traditional thermostat
- Currently using wireless internet

This program is brought to you by
RLD Resources, LLC
Richard Dent
President/CEO, RLD Resources, LLC
Chicago Bears Legend

for more information
phone: 312-782-0512
email: info@dentonenergy.net
web: www.dentonenergy.net

Energy Efficiency Program Provider

smart ideas

ComEd. An Exelon Company | powering lives

This program is offered by RLD Resources, LLC and is funded by ComEd customers in compliance with Illinois law

6.2 PY5 Savings Calculations

Table 6-1. PY5 Program Results By Facility Type

Facility Category	Ex Ante Gross Savings (MWh)	Ex Ante Gross Demand Reduction (MW)	Verified Gross Savings (MWh)	Verified Gross Demand Reduction (MW)	Verified Gross Realization Rate	NTGR	Verified Net Savings (MWh)	Verified Net Demand Reduction (MW)
Fitness Center	38.5*	-	38.5*	0	100%	1.0	38.5*	0
Hospitality	17.8	-	17.8	0	100%	1.0	17.8	0
Church	5.1	-	5.1	0	100%	1.0	5.1	0
Garage	4.0	-	4.0	0	100%	1.0	4.0	0
Counseling Center	0.4	-	0.4	0	100%	1.0	0.4	0
Total	65.7	-	65.7	0	100%	1.0	65.7	0

Source: Navigant analysis of program tracking data[8] *Totals due not sum exactly due to rounding.*
**According to a participant survey in PY5, this facility removed their IP Thermostat early in the cooling season, therefore the attributable savings is unclear.*

[8] RLD Resources spreadsheet, "FINAL SAVINGS FILE - Dent on Energy - 141105 NAVIGANT," received November 5, 2014.