2015 Energy Efficiency Program Evaluation

prepared for

City of Shasta Lake

energy & resource solutions

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1 Executive Summary

This report documents the evaluation activities undertaken by ERS for the City of Shasta Lake (CSL). The evaluation focuses on the energy savings impacts of the commercial web-enabled programmable thermostat (WEPT) program and the reporting of CSL's fiscal year 2015 (FY2015) energy efficiency programs.

The evaluation effort had three objectives:

1. Assess the energy savings impact of CSL's WEPT program
2. Provide independent verification of CSL's program reported energy savings for the FY2015
3. Provide recommendations for program implementation and reporting based on ERS's observations and findings.

The evaluation consisted of five primary sets of activities: conducting research, reviewing program documentation, developing evaluation plans, collecting data, and estimating energy savings.

The WEPT program's annual savings were estimated to be 22,826 kWh. CSL's regulatory compliance report for FY2015 was reviewed and verified as accurately representing the energy savings performance of its energy efficiency programs.

ERS provided recommendations based on the results and activities conducted as part of this evaluation effort. The combined list of recommendations is provided in the final section of this report.

Introduction

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This report documents the evaluation activities undertaken by ERS for the City of Shasta Lake. The evaluation focuses on the energy savings impacts of the commercial WEPT program and the reporting of CSL's FY2015 energy efficiency programs.

2.1 Evaluation Objectives

The evaluation effort had three objectives:

1. Assess the energy savings impact of CSL's WEPT program
2. Provide independent verification of CSL's program-reported energy savings for the FY2015.
3. Provide recommendations for program implementation and reporting based on ERS's observations and findings.

2.2 Evaluation Activities

The evaluation consisted of five primary sets of activities:

1. Conduct research – ERS conducted the initial research and review of similar evaluation efforts, CSL's program process and procedures, publicly owned utility (POU) compliance reporting requirements and methodologies, and program- and/or project-specific technologies used to save energy.
2. Review program documentation – ERS reviewed the program documentation, including the program tracking database and rebate documentation for the participants who were selected for site verification. ERS also reviewed the regulatory compliance (E3) report and its supporting documentation.
3. Develop evaluation plan – ERS developed a site verification plan for assessing the measure installation and operational performance.
4. Collect data – ERS visited each of the selected participant sites to interview the staff and collect data regarding the energy efficiency measures (EEMs) installed at the site.
5. Estimate and validate energy savings – ERS combined the research and data collection results to analyze and develop the energy savings estimates per the methodologies described in Section 4 and validate the program-reported savings as described in Section 5.

2.3 Report Structure

The remainder of this report consists of four segments:

1. Section 3 describes the methodologies employed for data collection, sampling, and estimating energy savings.
2. Section 4 details the assessment of the WEPT program.
3. Section 5 describes the regulatory compliance report review and validation.
4. Section 6 provides a summary of the evaluation, including a combined list of the report's recommendations.

Methodology

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This section describes the measurement and verification (M&V) objectives and methodologies for sampling, data collection, and savings verification. It also provides recommendations for reporting the program's influence in terms of net-to-gross (NTG) energy savings.

3.1 Data Collection

For the WEPT program, ERS collected information on the best available energy savings estimate applicable to web-enabled thermostats. The information included documentation from other electric utilities, program evaluation studies, thermostat manufacturer reports, industry technical white papers, ESource, regional technical reference manuals (TRMs), the Database for Energy Efficient Resources (DEER), and Internet research. In addition, ERS collected information from eleven sites to determine if the thermostats were installed, operational, and to assist with estimating energy savings. Site visits were conducted during the first 2 weeks of December 2015.

3.2 Sampling

For the web-enabled thermostat program, ERS selected a statistically representative sample of participants for on-site verification. According to program records, there were twenty-one participants who installed forty-seven thermostats. ERS developed a simple random sample designed to exceed industry-standard[1] recommendations (90/30 level of statistical precision) for on-site verification. Based on a relative precision of 20% at the 90% confidence interval, a total of eleven of the thirty program participants were randomly selected for verification.

The thermostat installations of each of the selected participants were verified on-site. There were no drop-outs or refusals to participate. During the evaluation, ERS found that one participant had installed an additional thermostat. In total, twenty-nine of the forty-eight (60.4%) thermostat installations were observed and eleven of the twenty-three customer sites (47.8%) were verified.

3.3 Program Net Impact

The net impact (net energy savings) of an energy efficiency program is used to measure the program's cost effectiveness. The net impact is estimated by adjusting the program's gross energy savings by the amount of energy savings that is expected to occur in the absence of the program.

[1] California Energy Efficiency Evaluation Protocols, April 2006, California Public Utilities Commission

To determine the net impact, an NTG factor is used to adjust the gross energy savings for free ridership and spillover. Free ridership describes the program participants who would have implemented energy efficiency in the absence of the program, and spillover describes the program's ability to indirectly influence customer or market behavior, leading to increased energy efficiency.

The E3 report incorporates NTG factors in its cost effectiveness calculations. The NTG factors used by POUs are taken from DEER, which provides a list of factors developed from net impact studies of investor-owned utility (IOU) programs. Although the scale and program delivery methods for these larger IOU programs can greatly differ from POU programs, the available NTG factors are considered to be the best available sources of data for estimating the net program impact.

The WEPT program is a direct-install HVAC program that is generally effective at influencing customers to implement EEMs. Based on the values available from DEER, ERS recommends an NTG factor of between 0.80 and 0.94 for estimating the net energy savings achieved by the WEPT program.

Web-Enabled Thermostats – Commercial

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This section describes the assessment of the WEPT program implemented by CSL. Included are background information on the technology and its energy-saving attributes, the research conducted to identify the best available savings sources, the site verification activities conducted, and recommendations for provisional energy savings estimates and other program-related improvements.

4.1 Energy Savings

WEPTs offer potential energy savings when compared to nonprogrammable and traditional programmable thermostats for commercial HVAC systems. A WEPT can be accessed remotely, which allows a building operator to more effectively manage the programming features of the thermostat and ensure that they are optimized for efficient operation of the HVAC system. A WEPT can alert operators when its programmability features have been disabled to ensure the persistence of programming optimization and, thus, maximize energy savings.

WEPTs offer savings beyond those realized by traditional programmable thermostats, which have the potential to save energy compared to a nonprogrammable thermostat; the savings potential is often not realized because of a variety of factors, including programming complexity. It is common to find traditional programmable thermostats in manual override mode, negating their savings potential. And, they have also been found to increase energy usage when programmed improperly because of a lack of user training, a poor user interface, programming complexity, and/or a lack of programming updates to coincide with changes in occupancy schedules. The alarm and remote-programming functionality of a WEPT offer a fix to these common, traditional programmable thermostat failures.

Currently, there are no proven energy savings estimates available to reporting WEPT savings to utility energy efficiency programs. The thermostats represent a relatively new and rapidly improving technology. The savings potential for a WEPT is greatly influenced by user behavior, the operator's use of its remote access and alarming capabilities, and HVAC system deficiencies (i.e., advanced controls do not fix the system design or operating deficiencies commonly found in existing HVAC systems). Although proven energy savings estimates are not yet available, it is expected that current and/or future studies will be completed that provide savings estimates suitable for use by program administrators. The WEPT features and benefits that enable energy savings are listed in Table 4-1.

Table 4-1. Web-Enabled Programmable Thermostat Energy Saving Attributes

Features	Benefits	Energy Impact
Advanced programming ()	Enhances programming schedules	Optimizes cooling/heating required resulting in reduced run time
Accessible over the Internet	Central control ensures that programming features are in use.	Helps to ensure persistence of savings by maintaining appropriate schedules that result in reduced run time
Capable of sending alarms	Central control ensures that programming features are not overridden.	Improves maintenance for optimum HVAC system performance and helps to ensure persistence of savings
Enables remote oversight and control	Central control ensures that programming features are in use.	Helps to ensure persistence of savings by maintaining appropriate schedules resulting in reduced run time
Programmable	Eliminates conditioning unoccupied space, minimizes or eliminates manual control	Prevents overcooling and overheating of space; reduces run time compared to a nonprogrammable thermostat
Remote temporary setpoint override	Dispatchable; allows for participation in demand response (DR) programs	Reduces cooling demand during peak hours; shifts or reduces run time
Intuitive programming/ease of use	Ensures that programming features (setpoints, occupied schedules) are in use	Helps to ensure persistence of savings by maintaining appropriate schedules resulting in reduced run time

4.1.1 Research Results

ERS researched the available energy savings estimates for WEPTs; the majority of the studies produced savings estimates that are focused on residential thermostats and the DR capabilities of a remotely accessible thermostat. Those savings estimates are not applicable to the commercial application of a WEPT for achieving energy efficiency savings. The most applicable commercial data found was from the Bonneville Power Administration (BPA). Currently, BPA claims savings for WEPTs on a provisional basis; that is, it estimated the savings based on assumptions and will true up or revise those savings estimates once a sufficient amount of M&V data has been collected. Table 4-2 provides a summary of the results of our research.

Table 4-2. Web-Enabled Programmable Thermostat Program Savings Estimates

Source	Cooling Savings	Heating Savings	Market	Applicability Notes
BPA – currently approved savings estimates	1,500 kWh/sq ft	Electric heat	Commercial	Provisional savings estimates to be revised based on results from data collection and M&V
BPA – 2011 study	0.32 kWh/sq ft		Small office	Projected from study on modular school buildings with electric heat. Applicable to the Pacific Northwest.
	1.7 kWh/sq ft	Electric heat	Schools	
	0.64 kWh/sq ft		Small office – electric heat	
	0.352 kWh/sq ft		Retail – heat pump	
	0.704 kWh/sq ft		Retail – electric heat	
Department of Energy (Karr 2010)	1% per degree of setback		All	

Source	Cooling Savings	Heating Savings	Market	Applicability Notes
National Grid	16%	8%	Residential	
Energy Trust of Oregon study	12%	12%	Residential	Nest thermostats controlling electric heat pumps
Honeywell 2014 study	19%	5%	Residential	HW thermostats
Indiana	14%	10%	Residential	Nest thermostat
Pennsylvania	10%	10%	Residential	Nest thermostat
Austin Energy	13%		Residential	
Centerpoint	13.8%		Residential	
Puget Sound Energy – 2014 evaluation	0%	1.6%	Residential	
Pacific Gas & Electric – 2014 study based on randomized control trial (RCT) evaluation	0%	0%	Residential	
San Diego Gas & Electric – 2015 study	N/A	N/A	Residential and commercial	Lab study – currently ongoing

N/A = Not applicable

4.1.2 Proposed Energy Savings Estimates

ERS developed savings estimates for WEPTs using the California End Use Survey (CEUS) data developed by the California Energy Commission (CEC). CEUS provides climate zone-specific energy use intensities (EUIs) for nonresidential buildings. Based on the climate zone for CSL, ERS calculated the typical EUI for heat pump and gas/electric air conditioning (A/C) systems. The EUIs were normalized to the square footage of conditioned area (sq ft/ton) and the energy use per size of the A/C system (kWh/ton of system capacity). The savings estimates are based on the percentage of the total A/C system's energy use. Based on our research, a savings estimate of 10% is used to represent the energy savings potential for a WEPT. The final savings estimate is also normalized for both the conditioned space area (kWh/sq ft) and size of the A/C system (kWh/ton of capacity). Figure 4-1 shows the savings calculations.

Figure 4-1. Savings Calculation

	Energy Use Intensity	**CEUS - forecasting climate zone FCZ03, all commercial end use**		
a)	Heat pump energy use	3.43	kWh/sf/yr	=cooling + ventilation + heating energy use
b)	Gas/electric energy use	3.34	kWh/sf/yr	=cooling + ventilation electric energy use
	Heat pump energy use as a function of unit size			
c)	Connect load	492.64	sf/ton	Per CEUS
d)	Energy use per ton AC	1687.46	kWh/ton	= c / a
	Gas/electric energy use as a function of unit size			
e)	Sf cooled per ton AC	492.64	sf/ton	per CEUS
f)	Energy use per ton AC	1643.40	kWh/ton	= e / b
	Savings estimate for WEPT - heat pump			
g)	Savings percentage	10.0%		Estimate is consistent with BPA provisional savings for retail hp Savings applicable for replacing non-programmable thermostat or a poorly-functioning programmable thermostat
h)	Savings per sf	0.343	kWh/sf	= g x a
i)	Savings per ton AC	168.75	kWh/ton	= g x d
	Savings estimate for WEPT - gas/electric			
j)	Savings percentage	10.0%		Estimate is consistent with BPA provisional savings for small office Savings applicable for replacing non-programmable thermostat or a poorly-functioning programmable thermostat
k)	Savings per sf	0.334	kWh/sf	= j x b
l)	Savings per ton AC	164.34	kWh/ton	= j x f

4.2 Site Verification

ERS conducted eleven site visits to verify the installation and operation of forty-nine WEPTs. The site visits included the collection of information on the installed thermostat and current operating conditions and the confirmation of the information provided in the rebate application documentation.

Description of Web-Enabled Thermostat

A Honeywell Vision Pro 8000 thermostat was installed at each site. The manufacturer lists advanced control capabilities, including the following:

- Occupied and unoccupied scheduling, holiday and custom events scheduling, remote setback, economizer control, and time-of-day settings
- Alerts and user-interaction log
- Searchable history of alerts and setting changes to the thermostat to determine if there was a system malfunction or if an issue was caused by user error (saves time in troubleshooting and points the technician in the right direction)
- Alert and user-interaction logs are viewable on a computer after they are downloaded from the thermostat to a microSD card.

- ❑ Customizable service reminders allow dealers to remind customers when it is time to call for service and when warranties are expiring and to provide other customized alerts.
- ❑ Precise temperature control (+/- 1°F) for reliable and consistent temperature

Data Collection Plan

Data was collected to confirm the quantities of the installed thermostats and determine the operational and performance characteristics that are relevant to the thermostat's savings potential. For each site, the thermostat was located and visually inspected. If the HVAC unit model number was accessible, it was recorded to verify the size and type of unit. If the size of the unit was not available, the nameplate model number was used to identify the size in the manufacturer catalog data, or its size was confirmed by the installation contractor. If the unit was not accessible and its size could not be determined, the square footage of the building served by the unit was measured for use in the savings calculations. When an Internet connection was available, the web interface for each thermostat was used to verify that each thermostat was functioning properly. Table 4-3 provides a summary of the data collection plan.

Table 4-3. Data Collection Plan

Description	Data to Collect
HVAC equipment	❑ Size ❑ Type (heat pump, cooling only, gas/electric, electric resistance heating) ❑ Area of space served (if HVAC unit size is not available) ❑ Heating capacity (Btu/h, or kW for electric resistance heaters)
Operating characteristics	❑ Space type served (e.g., office, retail) ❑ Typical occupancy hours ❑ Space end-use changes (since thermostat was installed)
Preexisting controls	❑ Thermostat type (programmable, nonprogrammable) ❑ History of thermostat problems ❑ Programming or manual use? ❑ Who had access/permission to adjust thermostat?
New thermostat	❑ Thermostat make/model ❑ Programmable settings (modified, in-use)? ❑ Is web connection enabled? ❑ Are thermostats controlled through web connection? By who? ❑ Are alerts being used? ❑ Location ❑ Programming matches occupancy hours? ❑ Current settings (schedule, setpoints, etc.) ❑ Who has access/permission to adjust the thermostat?

Key Findings and Observations

The following list represents the evaluation's key findings and observations.

- Four of the twenty-nine thermostats were no longer connected to the web interface. Two of these were not connected because the site no longer has an Internet connection; the other two have internal issues with the sites' Internet routers and require IT support to reinstate their web connection.
- One extra thermostat was found at a site that was not listed in the application. The thermostat was added to the evaluated savings.
- Only one site was actively using the alarm function of the thermostat. It was located in an IT server space where temperatures outside of the normal operating conditions could damage the equipment. The same customer had alerts on other thermostats but did not have the time to manage the alerts and stated that the alerts were excessive at times.
- Most of the commercial customers (mostly small- to medium-sized customers) do not have a dedicated facility maintenance staff. The customer staff on-site indicated that remote control of the HVAC thermostat is not a priority.
- Most customers were able to demonstrate that they could access the thermostats' web-enabled functions either on their computer or through a phone app. When asked how often they used this function, one customer expressed that they no longer accessed the thermostat remotely after the initial novelty wore off.
- Several customers stated they had not accessed the thermostat via the web interface for months.
- No changes were made to any of the installed thermostats after the initial programming and setup were completed.
- Most of the thermostats were accessible by either the business owner or at least one employee. Other employees on-site were unaware of the thermostat's capabilities.
- Most interviewees indicated that they did not understand the function of the outside air temperature sensor or its related functions.
- One customer indicated that he had anticipated savings due to the new thermostat but did not see a noticeable drop in the utility bill costs.
- ERS observed two instances where two thermostats were installed to replace a single thermostat controlling a single-zone HVAC unit. This is an unusual control arrangement, and, while it is possible that it could improve temperature control, it has the effect of lowering the savings potential per installed thermostat.

A key factor of a WEPT's savings potential is its remote capabilities and their influence on operational control and persistence of savings. Although the majority of thermostats were connected to the web, the alerts and remote-access features were not widely used. Given that all of the existing thermostats were already programmable, the energy savings potential is mostly

limited to improvements in the user interface (usability) and the degree to which the replaced thermostats were not functioning and/or in manual override. Table 4-4 provides a list of the operational characteristics for each site.

Table 4-4. Web-Enabled Programmable Thermostat Operational Characteristics

Site ID	Quantity of Thermostats	Location	Web Connected?	Alerts?	Type of Thermostat Replaced	Web Site Use?
21	2	Lobby/conference	Yes	No	Programmable	Yes
21	1	Museum	Yes	No	Programmable	Yes
20	1	Conference room	Yes	No	Programmable	Yes
20	1	Offices	Yes	No	Programmable	Yes
20	1	Server	Yes	Yes	Programmable	Yes
6	1	Offices	Yes	Yes	Programmable	Yes
6	1	Computer room	Yes	No	Programmable	Yes
14	2	Hallway/offices	Yes	No	Programmable	Yes
14	1	Library	Yes	No	Programmable	Yes
14	1	Hallway	Yes	No	Programmable	Yes
12	1	Kitchen	Yes	No	Programmable	Yes
8	1	Offices	No	No	Programmable	Yes
18	1	Offices	No	No	Programmable	No
3	1	Offices	Yes	No	Programmable	Yes
13	1	Offices	Yes	No	Programmable	Yes
9	2	Retail	Yes	No	Programmable	No
10	1	Restaurant	No	No	Programmable	No
10	1	Kitchen	Yes	No	Programmable	Yes
10	1	Offices	Yes	No	Programmable	Yes
10	1	Offices	Yes	No	Programmable	Yes
10	1	Offices	Yes	No	Programmable	Yes
10	1	Offices	Yes	No	Programmable	Yes
10	1	Offices	Yes	No	Programmable	Yes
10	1	Offices	Yes	No	Programmable	Yes
10	1	Offices	No	No	Programmable	No
10	1	Offices	No	No	Programmable	No

Energy Savings

Energy savings were estimated for each site using the methodology described in Section 4.1.2. To estimate the savings for the entire program, the savings per thermostat determined for the sample sites were applied to the total number of thermostats installed. This approach is optimal given that the key energy saving estimate parameters (HVAC unit size or area of space conditioned) are unknown for the sites that were not in the sample. The savings estimates should be considered provisional. That is, the savings potential for WEPTs are as of yet unproven. Until better data is available, the energy savings for this measure should be reported

using a provisional savings estimate based on the best data currently available. Table 4-5 provides the savings summary for the eleven evaluated sites, and Table 4-6 provides the program's savings estimates.

Table 4-5. Energy Savings for Evaluated Sites

Side ID	Quantity of Thermostats	Area (Sq ft)	Unit Capacity (Tons)	Energy Savings (kWh)
21	2	N/A	7.5	1,266
21	1	N/A	2	337
20	1	N/A	3	506
20	1	N/A	3	506
20	1	N/A	2	337
1	1	N/A	3	506
6	1	160	N/A	55
6	2	1,500	N/A	514
6	1	N/A	5	844
14	1	750	N/A	257
14	1	750	N/A	257
14	1	750	N/A	257
12	1	N/A	2	337
18	1	1,000	N/A	343
18	1	1,000	N/A	343
3	2	3,300	N/A	1,130
13	1	1,000	N/A	343
9	1	N/A	2.5	422
10	1	N/A	3	506
10	1	N/A	5	844
10	1	N/A	4	675
10	1	N/A	3	506
10	1	N/A	5	844
10	1	N/A	5	844
10	1	N/A	3	506
10	1	N/A	3	506
Total	**29**	**N/A**	**N/A**	**13,791**

N/A = Not applicable

Table 4-6. Program Energy Savings

Thermostats	Quantity of Thermostats	Savings per Thermostat	Savings (kWh)
Savings – sample sites	29	475.5	13,791
Savings – remaining sites	19	475.5	9,035
Total	**48**	**N/A**	**22,826**

N/A = Not applicable

4.3 Program Recommendations

Based on our observations and analysis, ERS offers the following recommendations for program reporting and operation.

- Provisional savings estimates
  - Until future studies are completed on WEPT energy savings and/or a savings estimate is available from the POU TRM, use a provisional savings estimate of 0.334 kWh per square foot or 164 kWh per ton of unit capacity.
- Program rebate eligibility rules
  - For the purpose of reporting energy savings, require that the size of the HVAC unit (in tons) and/or the area served by the HVAC unit be provided.
  - Require the preexisting thermostat make, model, and type (programmable, nonprogrammable) be provided.
  - Request an assessment of the current operating conditions (including temperature setpoints) of the thermostat and whether the thermostat is in manual operating mode, and require that pictures of the thermostat be provided for proof of the operating conditions.
  - Recommend that the HVAC unit that will be controlled by the new WEPT be inspected first and that any deficiencies be fixed before the thermostat is installed.
  - For larger facilities with centralized maintenance and operation staff, require the use of the thermostat's remote-alert features.

Compliance Savings Report Verification

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ERS reviewed and verified the program's E3 report prepared for CSL's FY2015 program. The E3 report is a spreadsheet-based tool that is used by California POUs for reporting energy efficiency program performance to the state. The E3 report summary for each utility – as well as the combined results for all utilities – is provided to the CEC in a single report from the POU joint agencies (California Municipal Utilities Association, Northern California Power Agency, and Southern California Public Power Authority).

ERS obtained a copy of the preliminary E3 report developed by CSL's third-party program administrator, Efficiency Services Group (ESG). ESG provided the E3 report and the supporting documentation used to complete the report. The documents reviewed include the following:

- Shasta 2010 EE Tool 2015v10022015_DRAFT_12.30.15.xlsm
- Shasta FY15 SB1037 Admin-Overhead V2.xlsx
- Shasta FY15 SB1037 Cmmrcl Custom.xls
- Shasta FY15 SB1037 Cmmrcl lghtng.xls
- Shasta FY15 SB1037 Direct Install.xls

ERS reviewed this supporting documentation and verified that the data was correctly transferred to the E3 report. For measures listed in the E3 report, ERS confirmed that the correct measure quantities, incentives, and costs were entered. For custom measures, ERS validated that all of the measure attributes required by the E3 report were appropriately entered and match the program records and that the report contained no errors in the summary tables. ERS reviewed the sources of the savings estimates and confirmed that they represent the best available data for reporting savings.

After the review was complete, ERS developed a list of questions and met with ESG to discuss the report. Based on the results of the meeting and the proposed changes by ESG, ERS concluded that the E3 report accurately presents the energy savings achieved by the program.

Recommendations

Based on the evaluation activities that were conducted, ERS offers the following recommendations for reporting future program energy savings:

- Document all of the sources of the custom energy savings estimates that are used in the E3 report. The E3 report has a location for documenting these savings. The documents

referenced or used should be kept with the program records or otherwise be readily available for review if needed.

- Use the POU TRM as the primary source of energy savings estimates. Secondary savings sources are the CPUC's ex ante savings sources (DEER and non-DEER sources such as IOU work papers) and project-specific custom energy savings calculations. For custom calculations, follow the methodology and documentation recommendations provided in the POU TRM. Other credible sources of savings are available and appropriate for use, such as the Pacific Northwest Regional Technical Forum (RTF) and the California Technical Forum (CalTF).
- For compact fluorescent lighting (CFL) measures, use either the CFL savings estimates that will be provided in the upcoming update to the POU TRM or project-specific calculations based on wattage and the type of lamp replaced. For custom calculations, use the POU TRM default factors for coincident demand reduction and HVAC interactive effects.
- Use the provisional energy savings estimates presented in Section 4 for the WEPT program until better savings estimates are available.
- For measures categorized as early retirement, ensure that the equipment age and operating condition are collected and documented as proof of early retirement. Report the natural replacement and early retirement measures (for the same measure type) as separate line items in the E3 report.

Summary and Recommendations

6

ERS assessed CSL's WEPT program and estimated its potential energy savings as 22,826 kWh. CSL's regulatory compliance report for FY2015 was reviewed and verified as accurately representing the energy savings performance of the energy efficiency programs. ERS provided the following recommendations based on the results and activities conducted as part of this evaluation effort:

- WEPT provisional savings estimates
  - Until future studies are completed on WEPT energy savings and/or a savings estimate is available from the POU TRM, use a provisional savings estimate of 0.334 kWh per square foot or 164 kWh per ton of unit capacity.
- WEPT program rebate eligibility rules
  - For reporting energy savings purposes, require that the size of the HVAC unit (in tons) and/or the area served by the HVAC unit be provided.
  - Require that the preexisting thermostat make, model, and type (programmable, nonprogrammable) be provided.
  - Request an assessment of the current operating condition (including temperature setpoints) of the thermostat and whether the thermostat is in manual operating mode. Require that pictures of the thermostat be provided for proof of operating conditions.
  - Recommend that the HVAC unit that will be controlled by the new WEPT be inspected first and that any deficiencies be fixed before the thermostat is installed.
  - For larger facilities with centralized maintenance and operation staff, require the use of the remote alert features provided by the thermostat.
- Energy efficiency program reporting
  - Document all of the sources of the custom energy savings estimates that are used in E3 report. The E3 report has a location for documenting savings. The documents referenced or used should be kept with the program records or otherwise be readily available for review if needed.
  - Use the POU TRM as the primary source of energy savings estimates. Secondary savings sources are the CPUC's ex ante savings sources (DEER and non-DEER sources such as IOU work papers) and project-specific custom energy savings calculations. For custom calculations, follow the methodology and documentation recommendations provided in

the POU TRM. Other credible sources of savings are also available and appropriate for use, such as the Pacific Northwest RTF and CalTF.

- For CFL measures, use either the CFL savings estimates that will be provided in the upcoming update to the POU TRM or project-specific calculations based on the wattage and type of lamp to be replaced. For custom calculations, use the POU TRM default factors for coincident demand reduction and HVAC interactive effects.
- Use the provisional energy savings estimates presented in Section 4 for the WEPT program until better savings estimates are available.
- For measures categorized as early retirement, ensure that the equipment age and operating conditions are collected and documented as proof of early retirement. Report natural replacement and early retirement measures (for the same measure type) as separate line items in the E3 report.