

## APPENDIX C-6. WASHINGTON MEASURES COMPARED TO THE COUNCIL'S 6<sup>TH</sup> PLAN AND THE REGIONAL TECHNICAL FORUM

In compliance with Chapter 19.285 of the Revised Code of Washington (RCW), Chapter 480-109 of the Washington Administrative Code (WAC), and as described in Volume I of this report, this study employs methodologies consistent with the Northwest Power and Conservation Council's (Council's) 6<sup>th</sup> Northwest Electric and Conservation Power Plan (6<sup>th</sup> Plan) to estimate available Class 2 DSM (energy-efficiency) potential. Additionally, Cadmus conducted a thorough review of baseline and measure assumptions used by the Council or by the Regional Technical Forum (RTF); these included costs, savings, applicability, and current saturation. Although this study relies on data specific to PacifiCorp's service territory wherever possible, Council/RTF assumptions were incorporated where appropriate.

Since the completion of the 6<sup>th</sup> Plan, the RTF has continued to review baseline and measure assumptions. Thus, many of the measures used in the 6<sup>th</sup> Plan have been updated based on more recent data. Therefore, Cadmus used RTF assumptions where available and 6<sup>th</sup> Plan assumptions if an RTF update had not been completed as of early July 2012. Comparison to Council/RTF savings assumptions are shown in the following tables.

As part of this multi-state study,<sup>1</sup> measures were mapped, where possible, to RTF and 6<sup>th</sup> Plan measures. However, not all measure names, measure-efficiency tiers, measure iterations, and measure savings will directly mirror the RTF or 6<sup>th</sup> Plan. These differences account for changes in federal equipment efficiency standards, the latest version of Washington code(s),<sup>2</sup> and characteristics specific to PacifiCorp's territory, where appropriate. For certain measures, due to the overall complexity of updating the RTF and Council measure savings to current code and standards directly, the measure percent savings were calculated and assumed to be constant. To account for code and standard improvements the equipment consumptions over time were impacted by adjusting the baseline equipment assumptions. This occurred for such measures as "Integrated Building Design," "Low-Flow Showerheads," etc.

### Residential Sector

For the residential sector, the Council and RTF use the Simple Energy and Enthalpy Model (SEEM), a building simulation model.<sup>3</sup> Cadmus used SEEM v0.94 to develop estimates of HVAC baseline and measure consumptions (e.g., central air conditioning, heat pumps, and insulation) in single-family, multifamily, and manufactured homes. Model inputs were adjusted for PacifiCorp's territory, thereby customizing parameters such as building square feet and climate zones to match customer-specific data. Thus, the methodology to estimate savings was the same as used by the Council and RTF, but the actual savings differ due to unique

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<sup>1</sup> This study covers California, Idaho, Utah, Washington, and Wyoming. Oregon Class 2 DSM potential is assessed in a separate study conducted by the Energy Trust of Oregon.

<sup>2</sup> Washington State Energy Code 2009 Edition was used for this study. The 2012 edition energy code was not enacted at the time the analysis was completed for this study. Other state equipment standards were referenced in this study such as Revised Code of Washington (RCW) for refrigeration equipment minimum efficiency standards.

<sup>3</sup> <http://www.nwcouncil.org/energy/rtf/measures/support/SEEM/Default.asp>

characteristics of houses within PacifiCorp's service territory compared to Northwest regional averages.<sup>4</sup>

When comparing PacifiCorp measures with the RTF/Council, Cadmus used the most common end-use configuration. For example, there are two categories for PacifiCorp water heating end use is broken into two categories: greater than (GT) 55 gallons and less than or equal to (LE) 55 gallons. Most residential water heaters are less than 55 gallons. Therefore, the Water Heat LE 55 Gallon end use is compared to measure savings with the RTF, as appropriate.

It is also worth noting that one PacifiCorp measure, "Duct Sealing and Insulation – RTF," is incorrectly named and includes only duct insulation savings but not duct sealing savings. RTF measure tables do not include claimed savings for duct insulation; therefore, this PacifiCorp measure is not comparable to the RTF.

The major differences for residential sector are measures developed by SEEM modeling, measures referencing PacifiCorp evaluation results, and updates reflecting recent ENERGY STAR<sup>®</sup> specifications and/or code and standards. These are key differences in the SEEM modeling.

- PacifiCorp developed SEEM models using version of SEEM v.94, while current RTF workbooks are based on SEEM v.92.
- For most measures, RTF workbooks provide only the savings results without including the input or outputs from SEEM. Because of this, PacifiCorp developed the models independently.
- There are different input assumptions when compared to the RTF, including weather location, building characteristics such as building square footage, equipment efficiencies, and infiltration assumptions. The inputs used are specific to PacifiCorp's territory.

These differences and building assumptions contribute to different savings values for PacifiCorp compared to the RTF. Details for the residential sector are shown in Table C-6.1.

## Commercial Sector

For the commercial sector, RTF and Council measure savings were scaled up from a per-measure level to a total building level by applying the number of units specific to each building type. For example, RTF low-flow showerhead savings are presented on a per-showerhead basis, whereas this study calculates average building-level savings by multiplying per-showerhead savings by the number of showers per building (by market segment). RTF and Council measure workbooks may contain multiple savings values based on the capacity, efficiency, fuel type, climate zone, etc. Therefore, weighted averages were used to develop a single savings value that is specific to PacifiCorp's service territory, where possible.

For the commercial lighting measures, the input assumptions were derived from the 2008 Northwest Commercial Building Stock Assessment (CBSA) rather than the 6<sup>th</sup> Power Plan, where applicable. The 2008 CBSA dataset was used as the 6<sup>th</sup> Plan assumptions are based on the previous CBSA with the 1995 to 2001 vintage range. Additionally, the lighting technology types

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<sup>4</sup> The Northwest region includes Idaho, Oregon, Washington, and Western Montana.

in the 2008 CBSA have greater granularity than the 6<sup>th</sup> Plan, which allows for additional measure and baseline iterations to compete for potential. The main inputs taken or inferred from the CBSA dataset include the existing lighting power densities (LPD), the saturations of customers above the 2009 WA Code LPD, and wattage distributions by technology type.

In addition, there are some measures that exist in the residential sector but not in the commercial sector. For example, residential-sized clothes washers and dishwashers are applied in commercial buildings, but no RTF workbook exists. In these cases, we used the residential sector workbook and adjusted the number of cycles to reflect how these units are used in commercial buildings. In two cases the Council measures “Covered Parking Lighting” and “Exterior Building Lighting” had incomplete workbooks and therefore had calculated no overall potential. These two measures were not included in the final comparison within this appendix. PacifiCorp’s analysis used as much applicable data within Council’s workbooks to inform the measure inputs for this study.

The major differences between commercial RTF/Council savings values and those developed for Washington in this assessment are driven by the use of PacifiCorp evaluation results, Washington building codes and/or efficiency standards, updates reflecting recent changes in ENERGY STAR specifications, and current Northwest data (such as CBSA). See Table C-6.2 for a measure-level comparison of savings values and explanations of key drivers of differences, where present.

### **Industrial, Irrigation, Agriculture, and Street Lighting Sectors**

For the industrial sector, the end use savings assumptions relied heavily on the Council’s industrial analysis in the 6<sup>th</sup> Plan. Updates were made based on recent energy savings assumptions from the U.S. Department of Energy’s (DOE) Industrial Assessment Center (IAC) Database, Northwest Energy Efficiency Alliance (NEEA) 2011 Market Progress Evaluation Report, PacifiCorp’s Market Characterization studies (2011 and 2012), and other industrial sources. Primary differences in industrial savings between this study and the region are driven by PacifiCorp specific mix of facility types.

In the agriculture sector, neither the Council nor the RTF include a majority of the measures analyzed in this assessment. Only three measures could be compared directly: “VFDs - Potato / Onion Shed,” “High-efficiency Livestock Waterers,” and “VFDs for Dairy Vacuum Pumps.”

In the irrigation sector, there was variation in how measures were grouped and analyzed by the Council or the RTF.<sup>5</sup> However, savings from these measures can be broadly classified as resulting from 1) reduced water flow (i.e., repair leaks and replace worn nozzles, 2) improved plant efficiency (i.e., better motors, pumps, speed control, distribution system improvements), and 3) improved system scheduling (i.e., scientific irrigation scheduling – SIS). There is also significant variation in how these measures interact with each other. For these reasons, this study grouped the savings opportunities into one aggregate measure that incorporates the three types of savings described above. The PacifiCorp savings is an average of savings across these measure technologies based on PacifiCorp’s Market Characterization Study.

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<sup>5</sup> The irrigation measure comparison was not included in the C-6 industrial appendix document and only mentioned here. The PacifiCorp “Irrigation System Improvements” measure was comparable to the RTF workbook called “AgIrrigationHardware\_v2\_2”.

The industrial comparison table, excluding street lighting, is shown in Table C-6.3.

The street lighting sector relied on PacifiCorp's current equipment inventory, replacement options and turnover rates, equipment costs and operational and maintenance saving. Measure and baseline efficiencies are territory-specific based on PacifiCorp's data and differ from Council assumptions in some cases (see Table C-6.4). In addition, the Council assumes slightly lower annual operating hours for street lighting compared to PacifiCorp data.