
# Energy Efficiency

## Exhibit i

## 2011-2021 Ten-year Conservation Potential and

## 2012-2013 Two-year Targets

*This is a new name for this Exhibit. It is included in the 2013 Annual Conservation Plan as reference only.*

*January 1, 2013*

PUGET SOUND ENERGY
*The Energy To Do Great Things*

<<December 1, 2012. Please note that this document is the same as that provided in the 2012-2013 Biennial Conservation Plan. Readers will note that headers and footers have not been updated for purposes of 2013 Annual Conservation Plan reference.>>

## Cumulative Ten-Year Conservation Potential

Statutory and Regulatory Requirements

RCW 19.285.040 requires that, beginning in 2010 and every two years thereafter, utilities must project their "cumulative ten-year conservation potential", including all electric savings that are "cost-effective, reliable and feasible". WAC 480-109-010 (1) says that this projection may be derived from either the utility's most recent IRP or the Northwest Power and Conservation Council's most recent regional power plan. Further guidance is provided in Condition (9)(a) of the Settlement Terms for Conservation in Docket UE-100177, which stipulates that the ten-year potential "must be based on a current conservation potential assessment study of PSE's service area".

As defined by WAC 480-109-007 (3), conservation is defined as "any reduction in electric power consumption" due to increased efficiency of:

- Energy Use, where PSE includes energy efficient building systems, high efficiency electric end use equipment, conversion of electric end uses to high-efficiency natural gas equipment, and high efficiency cogeneration systems to meet on-site customer load;
- Distribution, where PSE includes line phase balancing and conservation voltage reduction;
- Production, where PSE includes energy efficiency improvements at PSE electric production facilities.

The remainder of this section describes determination of the conservation potential and consistency of the company's methodology with that of the Northwest Power and Conservation Council (hereafter referred to as the "Council").

Identifying All Conservation Opportunities That Are Cost-Effective, Reliable, and Feasible

The ten-year cumulative conservation potential consists of the optimized level of energy use and distribution system conservation potential selected by PSE's resource portfolio model for the 2011 Integrated Resource Plan (IRP). It includes ramping the timing for achieving this potential so that all the economic achievable retrofit potential in existing buildings would be achieved in 10 years, not the full 20-year planning horizon of the IRP. In addition, PSE subsequently estimated the potential for electric energy savings from improvements to the efficiency of PSE's power generation facilities in Washington State. The methodology for deriving these potentials is explained more fully below.

The combined total of 2011 IRP potential plus production facility efficiency represents the total amount of conservation that is technically available, cost-effective, and achievable in the long run, based on the best information and analysis available. This includes all potential savings from any combination of utility programs, new codes and standards, and market transformation.

Consistency with Council Methodology

The methodology used to determine these potentials was consistent that that used by the Council to develop the 6th Northwest Power Plan. The conservation potential was built with a bottom-up approach, using individual energy-efficient technologies applied to appropriate end uses and building types to determine technical, economic, achievable potential.

Both PSE and the Council use similar Total Resource Cost (TRC) approaches to their economic analyses. In the spring of 2011, a sub-group of the Washington State Conservation Work Group was convened to examine the methodologies of all the state's electric investor-owned utilities relative to the Council methodology (see Attachment _). That sub-group concluded that all the utilities, including PSE, were generally consistent with the Council methodology. A few minor differences in methodology were identified, but none of these had significant impacts on the results. One minor difference in the economic analysis is that PSE analyzed bundles of measures with similar costs while the Council analyzes individual measures, but this does not appear to cause significant differences in results. Another minor difference is that PSE expresses its benefits and costs in nominal terms (includes inflation) while the Council uses real terms (excludes inflation), which does not cause any difference in relative cost-effectiveness since benefits and costs are treated equally. Finally, PSE uses its own after-tax cost of capital as the discount rate for present value calculations, while the Council uses a regional discount rate that combines utilities, customers, and BPA. Again, the absolute difference in discount rates is small and does not materially affect results

Figure 1 identifies the key elements of PSE's methodology, consistent with the methodology outline of published on the Council's website, except for minor differences noted above. Complete descriptions of PSE's technical and achievable potential are in Appendix K of the 2011 IRP. The derivation of the economic potential is presented in Chapter 5 and Appendix I of the 2011 IRP.

**Figure 1**
**PSE Conservation Potential Consistency with Council Methodology**

| Technical Potential | Economic Potential | Achievable Potential |
|---|---|---|
| • Wide array of technologies, applied to all customer sectors<br>• "Applicable" units, as determined by<br>o Building characteristics<br>o Fuel & equipment saturations<br>o Equipment life/turnover<br>o New & existing units<br>o Measure interactions & substitutions<br>• Calibrated to customer & load forecasts for PSE service area | • Economic screen uses TRC approach<br>• Based on forecast of wholesale market prices<br>• Energy and capacity savings shaped for time and seasonal differences<br>• Use range of scenarios to account for uncertainty and risk<br>• Use full incremental measure costs, plus applicable O&M and program admin. Costs<br>• Benefits include energy, capacity, T&D losses and deferral<br>• Non-energy benefits, 10% Power Act credit & environmental externalities included | • Annual acquisition levels based on IRP portfolio modeling where conservation competes against all other resources<br>• Discretionary & lost opportunity potentials identified<br>• Use ramp rates that accelerate discretionary retrofit measures, with 85% maximum market penetration<br>• Potentials are revised based on new information and market experience gained since previous IRP |

Efficiency improvements at electric production facilities were not projected in the Company's IRP. Therefore PSE developed a separate assessment of the conservation potential at its electric production facilities. This assessment included all hydro and thermal plants operated by PSE in the state of Washington. In 2009, an energy audit was conducted at each facility and efficiency improvements to all energy-consuming equipment were identified, totaling 27,224 MWh saved. It is assumed that all of this potential from production facilities is achievable in ten years and is distributed evenly across that period. Figure 2 summarizes the conservation potential for each generation plant.

**Figure 2**
**Conservation Potential from PSE Electric Production Facilities**

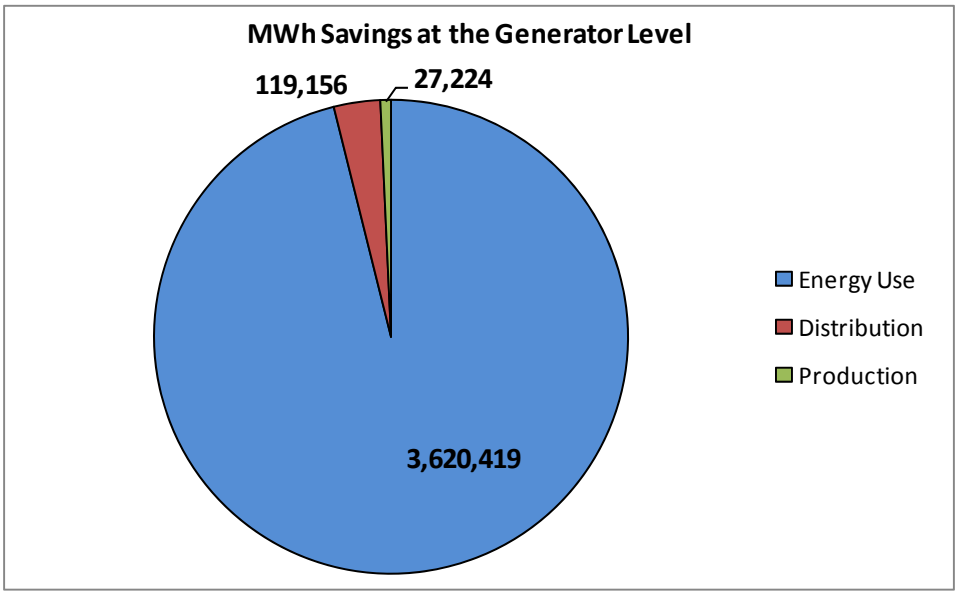
| Facility | Measure | Energy Savings |
|---|---|---|
| Upper Baker | Lighting Upgrade | 24,601 kWh |
| | Pumping Station Motors | 45,000 kWh |
| | Pumping Station Transformers | 51,000 kWh |
| | Pumping Station Controls | 150,000 kWh |
| Lower Baker | Lighting Upgrade | 59,300 kWh |
| Electron | Lighting Upgrade | 20,061 kWh |
| Encogen | Lighting Upgrade | 37,692 kWh |
| | VFD Air Compressor | 127,000 kWh |
| Fredrickson | Lighting Upgrade | 15,000 kWh |
| Fredonia | Lighting Upgrade | 9,800 kWh |
| Mint Farm | Supply Gas Pressure Increase | 19,000,000 kWh |
| | Lighting Upgrade | 54,000 kWh |
| | Air Compressor Upgrade | 77,709 kWh |
| | Exterior Sensors | 6,900 kWh |
| | Cooling Tower | 2,500,000 kWh |
| | Feedwater Pump | 2,349,900 kWh |
| Goldendale | Lighting Upgrade | 25,600 kWh |
| | Cooling Tower | 2,520,000 kWh |
| | Compressed Air | 35,000 kWh |
| Sumas | Lighting Upgrade | 30,000 kWh |
| | Compressed Air | 70,000 kWh |
| Whitehorm | Lighting Upgrade | 15,000 kWh |
| | **Totals** | 27,223,563 kWh |
| | | 3.1 aMW |

Total Ten-year Conservation Potential

Based on the analysis described previously, PSE's total cumulative ten-year conservation potential is 3,766,799 MWh (429.9aMW) at the generator, which includes line loss savings from the customer meter back to the power generator (consistent with conservation council's basis for reporting energy savings). Expressed in terms of energy savings at the customer meter (excluding line loss savings), the ten-year potential is 3,531,508 MWh (403.1 aMW).

Figure 3 shows how the cumulative ten-year potential breaks out by type of conservation resource. As can be seen, the vast majority (96%) of the ten-year potential comes from Energy Use Conservation. Energy Use Conservation consists of improved building shell efficiency, high-efficiency electric end use equipment and controls, and electric-to-gas customer fuel conversion.

**Figure 3**
**PSE Cumulative Ten-Year Conservation Potential (2012-2021)**



## Biennial Conservation Target

Statutory and Regulatory Requirements

RCW 19.285.040 requires that, once the ten-year conservation potential has been developed, utilities shall set a biennial electric conservation acquisition target which is no lower than the utility's two-year pro rata share of its ten-year potential.

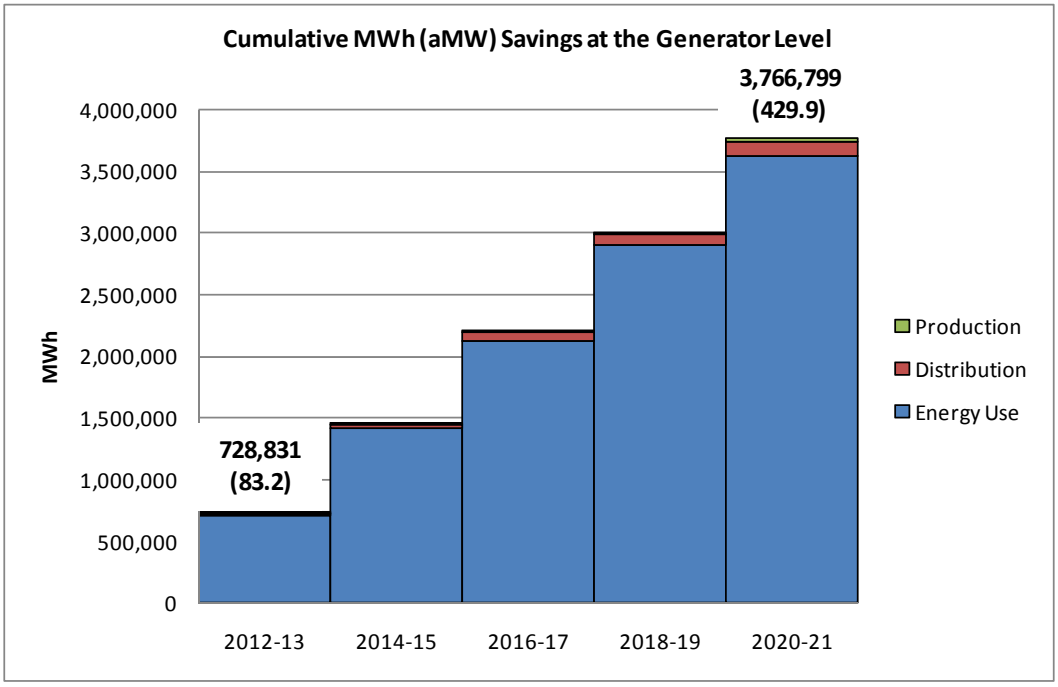
The WAC rule for setting the biennial target defines "pro rata" simply as "the calculation used to establish a minimum level for a conservation target" (WAC 480-109-007 (14)) and requires that the utility must document how the ten-year cumulative conservation potential was prorated (WAC 480-109-010 (2)).

Determination of Pro Rata Share of the Ten-Year Conservation Potential

The conservation potential in PSE's 2011 IRP assumes that all retrofit end use energy efficiency and fuel conversion potential is accelerated into a ten year period, while other types of conservation or demand-side resources are ramped in more gradually over time over natural measure life cycles or customer growth rates. This is consistent with previous IRP's and is intended as a general planning assumption to demonstrate that there is value to acquiring these resources as quickly as realistically possible, but that they cannot be acquired immediately.

The 2012 – 2013 two-year portion of the cumulative ten-year potential is 728,831 MWh (83.2 aMW) at the generator level. Figure 4 shows the cumulative savings by resource type for each biennial period over the next ten years.

**Figure 4**
**PSE Cumulative Conservation Potential**




However, not all the potential represented Figure 4 is realistically feasible to achieve through PSE-funded programs. The conservation potential includes electricity savings from all possible sources: utility programs, codes and standards, market transformation, and adoption of conservation measures outside of any programs or code requirements. Some conservation potential is therefore outside of PSE's control and ability to measure.

It is also not possible for a conservation potential assessment to fully capture all the market feasibility and uncertainty factors that can affect real-world program design and implementation. Projecting actual savings from programs is an imperfect science. The potential assessment represents the best possible estimate of achievable cost-effective savings, given the information available at that particular point in time. Assumptions are made on such things as the rate of customer replacement or adoption of a measure. Factors outside of the Company's control, such as the economy, adoption of more stringent energy efficiency codes, or introduction of a new technology, can influence whether a customer will invest in energy efficiency measures and what the baseline level of efficiency is.

Therefore, the company has made some additional pro rata adjustments to the cumulative conservation potential. These adjustments are intended to address changing market conditions, technical feasibility, timing issues, and other uncertainty factors beyond those considered in the company's conservation potential assessment. These additional factors are identified below.

- End Use Efficiency: Programs that are funded and operated by PSE will not achieve all the identified conservation potential over the next ten years, as this potential includes energy savings achieved through any means. Some of this potential will be acquired through the new Washington State Energy Code and new federal appliance standards which were adopted after completion of the conservation potential assessment for the 2011 IRP. Some potential savings may also be achieved by customers acting independently, outside of any utility, state, or regional program. The federal tax credits for the purchase of certain energy-efficient equipment, which helped create a demand "bubble" for these products, have been reduced. The loss of these tax credits, coupled with slower than expected economic recovery, is expected to depress consumer spending on appliance and equipment purchases in at least the short term. PSE has sought to offset some of this downside adjustment through a Request for Proposals process in 2011 to identify and implement additional measures or market delivery mechanisms that enhance the company's existing portfolio of programs.
- Production Efficiency from PSE Generation Facilities: The potential projects identified by PSE's production facility potential assessment require detailed engineering and economic feasibility studies. Implementation plans must also be developed and funding sources identified. PSE completed a more detailed feasibility analysis of the original potential assessment in 2011. This review found that lighting upgrades at most sites and a variable frequency drive upgrade at a combined-cycle plant were feasible and cost effective to implement in 2012 - 2013. Other measures in the potential assessment may be implemented in the future as existing equipment fails or after further study to verify energy savings and cost-effectiveness.
- Distribution System Efficiency: As with the conservation potential from PSE generation facilities above, actual implementation of distribution efficiency projects will require detailed engineering and economic feasibility studies, implementation plans and identification of funding sources. The target for 2012 -- 2013 includes projected savings from distribution system projects based on an informal feasibility review of eligible circuits.

The total effect of these prorated adjustments on the maximum cumulative conservation potential in the 2012 – 2013 biennium is shown in Figure 5. They amount to a reduction of 2.5% from the total conservation potential in 2012 -- 2013.

**Figure 5**
**Pro Rata Adjustments to Cumulative Conservation Potential**

| | Generator Level Savings (MWh) | Generator Level Savings (aMW) | Less: 6.7% Line Losses* | Meter Level Savings (MWh) | Meter Level Savings (aMW) |
|---|---|---|---|---|---|
| End Use Efficiency | 703,831 | 80.3 | | 659,636 | 75.3 |
| Distribution Efficiency | 19,555 | 2.2 | | 18,327 | 2.1 |
| Production Efficiency | 5,445 | 0.6 | | 5,445 | 0.6 |
| Total 2012-13 Potential | 728,831 | 83.2 | | 683,407 | 78.0 |
| | | | | | |
| End Use Efficiency | -10,449 | -1.2 | | -9,793 | -1.1 |
| Distribution Efficiency | -2,513 | -0.3 | | -2,355 | -0.3 |
| Production Efficiency | -5,260 | -0.6 | | -5,260 | -0.6 |
| Pro Rata Adjustments | -18,221 | -2.1 | | -17,407 | -2.0 |
| **2012-13 Target** | **710,610** | **81.1** | | **666,000** | **76.0** |

** Line losses are not applicable to production facility efficiency since they occur at the point of generation.*

Biennial Conservation Target

The 2012 - 2013 biennial target, accounting for the pro rata adjustments described above, is 710,755 MWh (81.1 aMW) at the generator level. This is equivalent to 666,000 MWh (76.0) aMW) at the customer meter level (line loss adjustments excluded). The two-year target represents 18 percent of the total ten-year conservation potential. This target represents the company's pro rata share of all conservation potential available over ten years that is reliable, cost-effective, and feasible to achieve through its program efforts in the next two years.

As a point of comparison, using the Council's 6th Plan calculator (option 2), PSE's 2012-13 share would be 72.6 aMW at the generator level. This is less than the Company's target in Figure 5, which is 81.1 aMW at the generator level.

Figure 6 breaks down the target by type of conservation resource. Nearly all the target savings (98%) is expected to be achieved through end use efficiency programs. This proportion is consistent with the distribution of savings by resource type in the ten-year potential, shown previously in Figure 3.

**Figure 6**
**2012 – 2013 Biennial Conservation Target**