



Puget Sound Energy's CHP Incentives

Program Description

Puget Sound Energy (PSE), a Washington State utility providing electrical power and natural gas primarily in the Puget Sound region, offers programs for three types of combined heat and power (CHP) systems—natural-gas-fired CHP to serve on-site energy, renewable CHP, and waste heat to power—under three different programs. Distributed generation, including CHP, is part of PSE's plan to reduce carbon emissions 50% by 2040.

Natural-Gas-Fired CHP ¹

In meeting energy conservation targets under Washington State's Energy Independence Act (EIA), utilities may count "high-efficiency cogeneration" owned and used by a retail electric customer to meet its own needs.² PSE offers a grant incentive of \$0.30/kWh of incremental savings for cost-effective natural-gas-fired CHP projects. The grant can cover up to a maximum of 70% of the incremental cost of a CHP project that meets minimum efficiency criteria. All energy generated must be used on site. To meet the requirements of the EIA, the CHP system must have a useful thermal energy output of no less than 33% of the total energy output. The incremental savings rate of \$0.30/kWh is the same as that offered for all PSE custom grants for energy efficiency upgrades. Incremental savings of the CHP project are determined by comparison to a PSE combined cycle power plant. Annual incremental electricity savings in kilowatt-hours are calculated as:

$$\text{Incremental Savings} = \text{Annual kWh Output} \times \left(1 - \frac{\text{Net Heat Rate}}{\text{Baseload Heat Rate}}\right) \quad (\text{Eq. 1})$$

where "Net Heat Rate" is calculated as the net natural gas input in Btu/hour divided by the electricity generated in kilowatts. Net natural gas input equals the natural gas use of the CHP alternative minus the natural gas use that is offset by implementing the project. The 2019 "Baseload Heat Rate" equals 6,624 Btu/kWh, which corresponds to the performance of a new combined cycle gas turbine. This baseload heat rate is adjusted up by 7.3% to account for transmission and distribution losses for a total of 7,107 Btu/kWh.

The incremental cost upon which the incentive cap is based is calculated as the difference between the installed cost of the CHP system and the capital cost of a utility-scale combined cycle gas turbine (CCGT) plant. In PSE's 2019 Integrated Resource Plan, the capital cost of a CCGT plant is given as \$1,167/kW.

Renewable CHP ³

For CHP projects with a renewable fuel source, such as qualifying biomass, PSE provides incentives through its renewable energy program. The program is governed by PSE's Electric Generation Schedule 152 and PSE's Power Purchase Agreement Schedule 91. Unlike natural-gas-fired CHP discussed above, renewable CHP may have three different interconnection options: export all generated electricity, export excess generation, or use all generation on site.

Waste Heat to Power ⁴

Waste heat to power is an energy recovery measure funded under PSE's standard custom grant program for energy efficiency. A grant incentive is calculated based on a rate of \$0.30/kWh of electricity savings.

Quick Facts

Location: Washington

Market Sector: Electric utility

Program Type: Grant incentive

Geography: Pacific Northwest

Program Start: 2018

¹ Puget Sound Energy, Cogeneration/Combined Heat and Power: <https://www.pse.com/rebates/combined-heat-and-power>

² Revised Code of Washington (RCW) 19.284.040: <https://app.leg.wa.gov/RCW/default.aspx?cite=19.285.040>

³ Puget Sound Energy, Distributed Renewables: <https://www.pse.com/green-options/Renewable-Energy-Programs/distributed-renewables>

⁴ Puget Sound Energy, Custom Grants: <https://www.pse.com/rebates/custom-grants>

Program Development

PSE began offering its incentive for natural-gas-fired CHP on January 1, 2018.⁵ Previously, CHP projects were considered under the custom energy efficiency grant program. PSE has engaged with multiple customers and consultants regarding potential CHP projects over several years. As of 2019, one natural-gas-fired CHP project—MultiCare Good Samaritan Hospital in Puyallup—has decided to move forward and take advantage of PSE’s CHP incentive.

Program Outcomes / Project Success Story

The 350-bed MultiCare Good Samaritan Hospital in Puyallup, Washington, is installing a 2,000 kW natural-gas-fired reciprocating engine CHP system, which is scheduled to be operational by the third quarter of 2019.⁶ Owing to Washington’s history of low electrical energy rates, this system will be the first CHP project to be operated at a health care facility in the state.

The project will receive a PSE CHP incentive upon completion of metering and verification. This was the only incentive MultiCare received for this project.



MultiCare Good Samaritan Hospital, Puyallup,
<https://www.multicare.org/good-samaritan-hospital/>

Consider a 400 kW reciprocating engine CHP system generating electricity and hot water:

- *Before implementation of CHP, a facility consumes 26,801 MMBtu/year of natural gas as boiler fuel and 3,536,740 kWh of electricity per year.*
- *The proposed CHP system generates 3,356,677 kWh per year, consuming 33,257 MMBtu of natural gas. Its recovered heat offsets all but 8,498 MMBtu of the facility’s boiler fuel. The installed capital cost is \$2,850/kW.*
- *The net natural gas use is*
 - *$33,257 + 8,498 - 26,801 = 14,954$ MMBtu/year*
- *Net Heat Rate is*
 - *$14,954 \times 10^6 \text{ Btu} / 3,536,740 \text{ kWh} = 4,455 \text{ Btu/kWh}$*
- *Incremental savings per Eq. 1 are 1,252,718 kWh. After measurement and verification of these savings, this project may be eligible for a grant of*
 - *$1,252,718 \text{ kWh} \times \$0.30/\text{kWh} = \$375,815$*
- *The program qualified incremental cost is*
 - *$400 \text{ kW} \times (\$2,850 - \$1,167 \text{ per kW}) = \$673,000$*
- *The incentive would be \$0.30 per kWh (\$375,815), which is less than the 70% cap of the incremental cost (\$471,240).*

The hospital currently uses 19.9 million kWh of electrical energy and 93,562 MMBtu of natural gas per year, with total purchased energy costs exceeding \$2 million. Annual energy and operating cost savings from the CHP project are expected to be 25%. Clay Ciolek, manager of engineering systems for MultiCare, described the project as “a hedge against the future” with the goal of keeping the hospital functional during an emergency. Mr. Ciolek said utility interconnection was fairly straightforward. A ten-year interconnection agreement was obtained with PSE, which involved several negotiation iterations. All electricity and heat generated will be used on site.

Lessons to Share

- CHP projects require more involvement by utility staff than traditional efficiency projects and take longer to develop.
- Policy discussions on natural gas use and carbon fees in Washington State may lead utilities to emphasize renewable CHP projects and waste heat to power.

For More Information

U.S. DOE NORTHWEST TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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PUGET SOUND ENERGY COGENERATION/CHP INCENTIVE

<https://www.pse.com/rebates/combined-heat-and-power>

More CHP Profiles:

<http://www.nwchptap.org>

Date produced: 2019

⁵ U.S. Environmental Protection Agency’s CHP policies and incentives database: <https://www.epa.gov/chp/dchpp-chp-policies-and-incentives-database>

⁶ Personal communication with Alex Cimino-Hurt of Puget Sound Energy and Clay Ciolek, manager of engineering systems for MultiCare