

Budd Inlet Treatment Plant Renewable Energy Cogeneration System

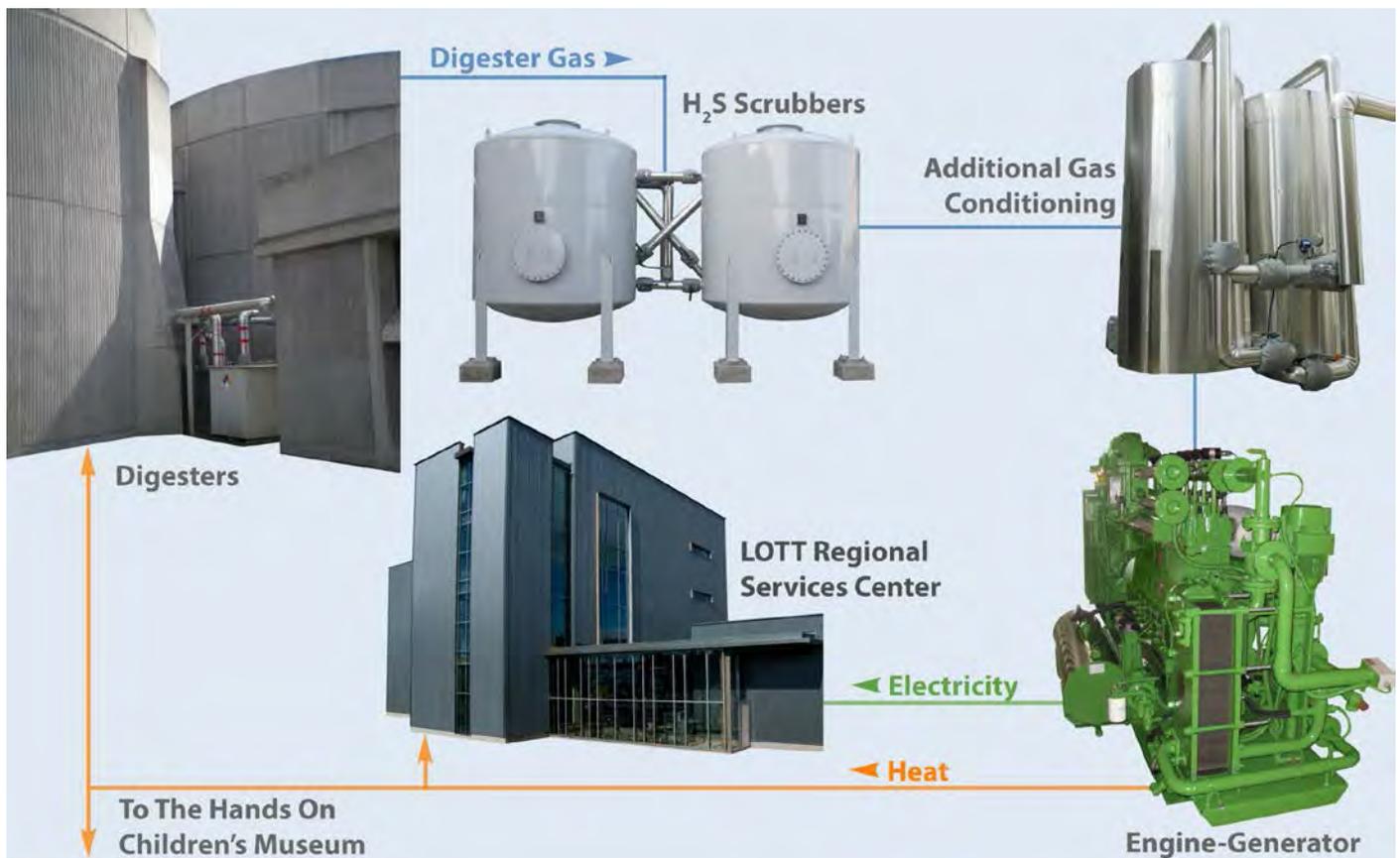
LOTT's Cogeneration System converts methane-rich digester gas to heat and electricity. The electricity serves LOTT's Regional Services Center, which houses the WET Science Center, laboratory, and offices. The heat will be used throughout the Budd Inlet Treatment Plant and the Regional Services Center, as well as the new Hands On Children's Museum.

The Need: Prior to project completion, LOTT's Budd Inlet Treatment Plant flared the bulk of its digester gas, produced as a by-product of the wastewater treatment process, into the atmosphere. Installation of the Cogeneration System allows the gas to be captured, cleaned, and used to produce heat and electricity.

Hands On Children's Museum. Enough electricity is generated from the system to serve the needs of LOTT's Regional Services Center, saving approximately \$150,000 - \$180,000 per year in utility costs. The system greatly reduces the need to flare excess digester gas, as well as reducing emissions from the site.

The Project: Cogeneration means the production of both electricity and heat. The Cogeneration System included the installation of a new gas treatment system, a reciprocating engine with a heat recovery unit, and two small natural gas boilers. The new system provides nearly all of the heating required by the treatment plant facilities and buildings, in addition to the new

Previous Use of Digester Gases: The LOTT Alliance's Budd Inlet Treatment Plant is a municipal wastewater treatment plant located in Olympia, Washington. Solid waste from the treatment process is stabilized by anaerobic digesters that historically have produced an average of 116,000 cubic feet per day of combustible, methane-rich digester gas.



Electricity and natural gas for heating of treatment plant operations is purchased from Puget Sound Energy (PSE). Prior to the Cogeneration System, some heat was provided from combustion of the digester gas in a boiler and was used primarily to maintain the anaerobic digesters at their optimal process temperature.



Excess methane-rich digester gas was previously handled through flaring. Flaring of the gas was wasteful, since this gas could otherwise be used to produce heat and/or energy. Additionally, an average of 14% of the methane had been escaping to the atmosphere. Methane is 21 times more damaging than carbon dioxide as a greenhouse gas.

Technology Selection: Several technologies were considered for the cogeneration project and four were reviewed in detail: 1) micro-turbines; 2) a new engine generator; 3) upgraded boilers for expanded plant use; and 4) boilers for “district” heating facilities other than LOTT’s. The engine-generator was selected as the preferred option because it is expected to produce the most usable energy per pound of carbon dioxide released in comparison to the other alternatives studied. Employing the cogeneration process includes adherence to strict emissions standards as well as combusting approximately 99.9% of the methane, dramatically reducing LOTT’s greenhouse gas emissions.

Project Management: This project was completed under an Energy Performance Contract agreement with the Washington State Department of General Administration (GA), Engineering and Architectural Services Division, to administer and implement this project, under RCW 39.35A. Under the contract, GA negotiated the scope and costs; developed the contract based on performance criteria; and provided oversight of implementation through commissioning. This approach offered numerous benefits to LOTT, including a single point of responsibility for all project phases, reduced time to completion of project, guaranteed equipment performance, and accountability through a follow-up performance audit to assure energy savings are being achieved.

Electricity: The engine-generator converts the digester gas to electricity, which is routed into the treatment plant’s overall power grid. Electricity generated through this project is sufficient to power the new Regional Services Center, including the WET Science Center. However, supplemental power still needs to be purchased to serve the remainder of the Budd Inlet Treatment Plant. LOTT purchases 100% of this power through PSE’s Green Power program.

Heat: Heat recovery units installed over the engine-generator capture and transfer heat from the exhaust to an existing hot water loop at the Plant. The loop was extended to the Regional Services Center and WET Center on the Budd Inlet Treatment Plant site and to the new Hands On Children’s Museum, adjacent to the plant. The heat generated from the system is anticipated to be nearly enough to serve all of LOTT’s needs at the treatment plant, the new LOTT building, and the Museum, greatly reducing the need to purchase supplemental heat energy from PSE. Both new buildings, LOTT’s Regional Services Center and the Hands On Children’s Museum, were designed with a goal of LEED certification, and heating through the cogeneration project supports this designation for both facilities.

Estimated Cost: The capital cost for this project is \$2.4 million for the engine, hardware, and construction costs. Puget Sound Energy awarded LOTT a \$1.7 million energy conservation grant toward completion of the project. The PSE grant represents 70% of the total project cost of \$2.4 million.

Benefits: The Cogeneration System results in an energy savings of approximately 2 million kilowatt hours per year, enough to power more than 165 Thurston County homes. It also eliminates emissions of greenhouse gases equivalent to taking about 306 cars off the road or planting 478 acres of trees.

It is LOTT’s hope that this Cogeneration System will serve as a demonstration project for the community, illustrating the use of an engine-generator as an efficient and successful technology for reducing emissions and energy demands.

For more information, visit www.lottcleanwater.org or contact Lisa Dennis-Perez at 360-528-5719.