



CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

Veyo Heat Recovery Project

7.8-MW Waste Heat to Power CHP Facility



Quick Facts

LOCATION: Veyo, Utah

MARKET SECTOR: Oil & Gas Midstream

IN OPERATION SINCE: 2016

TECHNOLOGY: ORMAT Organic Rankine Cycle

FACILITY PEAK LOAD: 7.8 megawatts (MW)

HEAT SOURCE: Three 15,000 HP Solar Mars
100 Combustion Turbines in an adjacent
natural gas compressor station

FUEL: Exhaust gas from combustion turbines

USE OF THERMAL ENERGY: Power generation

ENVIRONMENTAL BENEFITS: This site was the
recipient of Utah's 1st tax-exempt green
bond for a carbon-free power plant.

TOTAL PROJECT COST: ~\$21 million

Site Description

Utah Associated Municipal Power Systems (UAMPS) and Kern River Gas Transmission partnered to deploy the Veyo Heat Recovery project, named after its location in Veyo, Utah. Commissioned in May of 2016, the facility utilizes wasted heat from three 15,000 HP combustion turbines. These combustion turbines are the prime movers of the three natural gas compressors at the adjacent Kern River Gas Transmission compressor station. The heat recovery plant doesn't burn any fuel. It takes advantage of the heat in the exhaust gas of the turbines sited in the compressor station, which would otherwise be wasted into the atmosphere. This Organic Rankine Cycle technology can generate up to 7.8 MW of power. This is enough capacity to provide electricity to approximately 800 homes. The facilities are interconnected with the power distribution grid, owned and operated by Rocky Mountain Power.

While the site can run remotely from another power plant, in an effort to reduce costs and be more efficient, UAMPS employed one of their member cities (Santa Clara) to handle on-site operations and maintenance as needed. This site is quite straightforward, so the site is monitored remotely from another plant. Twice a week walk-throughs to check fluids and gauges, etc. as well as biannual outages are conducted for maintenance.

Reasons for CHP

Waste heat to power plays a key role in industrial, refining and oil and gas operations by providing energy savings, reduced emissions and opportunities for resiliency. This facility's set up was built under an energy performance contract agreement. Funding for the project came from 7 UAMPS members through revenue bonds (Series 2014 – Green Bonds). UAMPS is a nonprofit Joint Action Agency and political subdivision of the State of Utah. It's project based, meaning they don't provide all power requirements to their customers, and there are 46 members in 7 states (Utah, California, Idaho, Nevada, New

Mexico, Oregon, and Wyoming). At the Veyo site, UAMPS pays royalties to Kern River Gas Transmission based upon how many megawatts are produced in the course of operations.

UAMPS members seek to develop resources that accomplish shared goals. The Veyo project met these goals, namely:

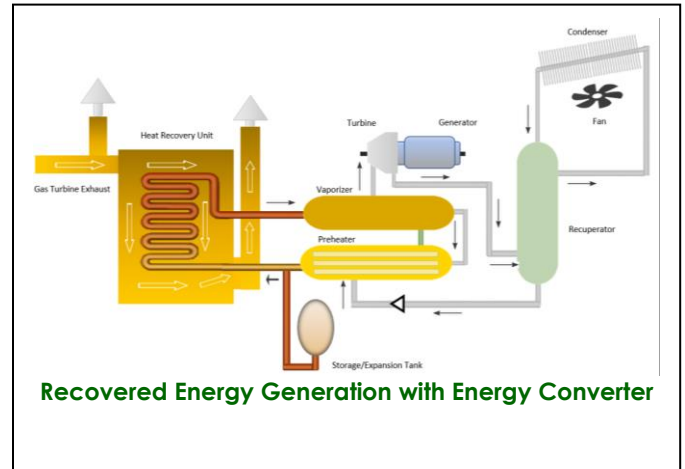
- Low relative cost to other base-load resources
- Developing resources that are carbon neutral
- Technically simple operations and maintenance

CHP Equipment & Operation

The Organic Rankine Cycle system was manufactured and installed by ORMAT and has a net generating capacity of 7.8 MW. The facility includes the following subsystems such as:

- Thermal Oil System which brings the heat from the compressor to the heat exchanger
- Cyclopentane System as the Motive Fluid
- Air Compressor to control the damper on the waste heat oil heater

As no water is kept on site, air cooled condensers are utilized to cool pentane vapors back to liquid state. Other systems on this site include an Interconnection Substation, Vaporizer, Pre-Heater, along with a mechanical control center for electrical, instrumentation and controls.



The heat source coming out of the compressors runs around 700 degrees. It's measurable, available and reliable. This heat was much easier and cheaper to tap into (over geothermal options also considered). **This site was the recipient of Utah's 1st tax-exempt green bond for a carbon-free power plant.**

The Veyo project only takes 2 acres of land, no new air emissions are created, and there is no water use except the potable water that is trucked into the site, representing an exceptionally small environmental footprint.

Lessons To Share

The Veyo Project was commissioned in 18 months from notice to proceed (NTP), completed 4 months ahead of schedule and has exceeded the contract's performance guarantee. The project site's construction was completed in less than 8 months after groundbreaking. Lessons to share include:

- Host agreements that cover service calls and maintenance checks are ideal.
- The 'base load' at this site is treated like a variable resource and there is more variability of resources in Spring due to gas demand and solar generation aspects.
- Due to the location, elevation and ambient temperatures of this site, cyclopentane was the most efficient motive fluid.

"A good host partner is key to a successful project."

***- Nathan Hardy
Director of Resource Strategy &
Environmental Policy at UAMPS***

For More Information

**U.S. DOE UPPERWEST CHP
TECHNICAL ASSISTANCE
PARTNERSHIP (CHP TAP)**
Gavin Dillingham, Director
281.216.7147
gdillingham@harcresearch.org

**UTAH ASSOCIATED MUNICIPAL
POWER SYSTEMS (UAMPS)**
Nathan Hardy, P.E., CEM
Director of Resource Strategy and
Environmental Policy at UAMPS
Nate@uamps.com
www.uamps.com

MORE CHP PROJECT PROFILES
www.uwchptap.org

Produced May, 2019