



Colorado Recycled Energy Incentive Program

Program Description

The Colorado Renewable Energy Standard (RES) requires utilities to generate, or cause to be generated, a certain percentage of electricity from eligible energy resources, including recycled energy and renewable energy. Passed in 2004 and amended three times since, the RES defines recycled energy, also known as waste heat to power (WHP), as the process of capturing discarded heat from an existing process and using the heat to generate electricity. The standard is applicable to systems that have a nameplate capacity of 15 MW or less and does not include waste heat from systems whose primary purpose is the generation of electricity.

An eligible system must convert the thermal energy from exhaust stacks or pipes to electricity. A variety of thermal energy sources are applicable under this standard: thermal energy from a kiln, furnace or oven; by-product heat from exothermic reactions, incineration, or pressure reduction; or energy recovered from mechanical drive systems such as pipeline compressor stations and natural-gas-fired compressors. The site cannot combust additional fossil fuels to produce power. For example, a combined heat and power (CHP) system with a heat recovery steam generator (HRSG) would not be eligible.

Power from a recycled energy project can be used by a qualifying retail utility toward its RES. Investor-owned utilities must acquire 30% of their generation capacity from eligible energy resources by 2030; co-ops with 100,000 or more customers have a 20% goal; municipal utilities and smaller co-ops have a 10% goal.¹

Quick Facts

LOCATION: Colorado

MARKET SECTOR: WHP applications, includes oil and gas, manufacturing, refining

Program/Policy Type: Renewable Energy Standard

Geography: State-wide

Program Start: 2004

Program Development

The Colorado Energy Office (CEO) sees recycled energy as a viable resource to help reach goals set for the RES. Further, recycled energy is viewed as an additional resource to help meet the Colorado Governor's Executive Order to reduce greenhouse gas emissions by 26% by 2025.² In 2016, the Colorado Energy Office (CEO) commissioned a recycled energy market study to better understand the market, which appeared to have significant potential but was struggling to gain traction. The 2016 study focused on sites that had waste heat greater than 450°F and larger than 250 kW. It identified 52 facilities that could benefit from investment in recycled energy systems. Many of these sites had payback periods of less



than 10 years. In 2017, the state updated the study and also considered opportunities for facilities with waste heat less than 450°F. This study found an additional 75 sites that could benefit from the recycled energy program. The sectors with the greatest opportunity for power generation are pipeline transportation, petroleum refining, primary metals, and non-metallic minerals. To facilitate adoption of recycled energy, the CEO has been actively conducting outreach, with the help of the Solid Waste Environmental Excellence Protocol (SWEEP), the DOE Upper West CHP TAP, and Heat is Power. The CEO has also offered to cover the costs of in-depth feasibility studies for sites interested in assessing recycled energy opportunities.

¹ <https://www.colorado.gov/pacific/sites/default/files/atoms/files/CEO%20Recycled%20Energy%20Market%20Overview%20-%20Updated%202017.pdf>

² D 2017-015, Supporting Colorado's Clean Energy Transition www.colorado.gov/pacific/archives/governor-hickenlooper-executive-orders#eo2017

Incentives and Financing for Recycled Energy

Xcel Energy and Recycled Energy Program – In 2013, SWEEP, Heat is Power, the CEO, and the Western Resource Advocates worked with Xcel Energy to identify appropriate incentives for recycled energy. At the request of the state and clean energy advocates, Xcel Energy established a recycled energy incentive program through its Renewable Energy Compliance Plan. The incentive program is for systems less than 10 MW in size. The program pays \$500/kW installed over a 10-year period for a 20-year contract, at about \$0.12 per kWh. While the program was in development, the stand-by rate for recycled energy was renegotiated to cover an hourly demand charge vs. a monthly demand charge. This change better represents a WHP plant outage event. If the WHP system came offline for either emergency or maintenance purposes, having an hourly (vs. monthly) stand-by rate would likely reduce overall demand charge costs to the end user.

Colorado PACE – Colorado has adopted a state-wide property assessed clean energy (PACE) program for commercial and industrial properties. This program provides low interest loans for investment in clean energy projects, whether energy efficiency or renewable energy, and includes recycled energy.

Investment Tax Credit – The state has established an investment tax credit (ITC) program for projects located within designated enterprise zones. Pre-2018 projects have the option to apply for an income tax credit equal to 3% of the investment, up to \$750,000. Otherwise, all projects starting in 2015 through 2020 can opt to receive a refund of 80% of the amount of the enterprise zone ITC. The qualified renewable energy investment must be put in service between January 1, 2015, and December 31, 2020.

Green Colorado Credit Reserve Program – This loan loss reserve is provided to private capital lenders as an incentive to make small commercial loans up to \$100,000 for renewable energy and energy efficiency projects, including recycled energy.

Program Outcomes

Based on the CEO's most recent market review (2017), the state has approximately 75 sites that would be good candidates for the recycled energy program. About three-quarters of this opportunity can be found in the oil and gas sector, from upstream to downstream applications. The 4.5 MW Trailblazer pipeline compressor station is one of two recycled energy projects in Colorado that contributes to RES obligations. The power is generated by capturing the exhaust heat from the natural gas compressors owned by Tallgrass Energy. Ormat owns and operates the recycled energy system and sells the power via a 20-year power purchase agreement to the Highline Electric Power Association. Highline Electric counts the recycled energy system output toward its RES obligations.

Lessons To Share

- WHP systems are being used across the country to improve industrial energy efficiency and decrease emissions associated with power generation.
- The CEO is investing in outreach efforts to increase awareness and motivate end users by sharing case studies and information on financing and incentives and providing funding for feasibility studies.
- Improved market knowledge of financing mechanisms, i.e., the Colorado C-PACE webpage, made sure lenders understand what recycled energy is and how it is eligible for C-PACE and other funding.
- There are 20 states that include WHP in their renewable portfolio standards or energy efficiency resource standards. WHP may go by a variety of terms, so it is critical to pay close attention to statute language.

Resources:

- [Colorado Energy Office Recycled Energy Program](#)
- [Recycled Energy Oil & Gas Fact Sheet](#)
- [Williams Recycled Energy Case Study](#)
- [PASE Recycled Energy Case Study](#)
- [Trailblazer Recycled Energy Case Study](#)

For More Information

U.S. DOE UPPER WEST CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)
Gavin Dillingham
Director
281-216-7147
gdillingham@harcresearch.org

COLORADO ENERGY OFFICE
Lindsey Stegall
Manager, Policy and Regulatory Affairs
303-866-2594
Lindsey.stegall@state.co.us

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