



Opportunities for Recycled Energy

“Recycled Energy” — also known as waste heat to power — is a form of clean energy that uses waste heat from an industrial process to generate electricity and does not combust additional fossil fuel. The generation of essentially free electricity (with no additional fuel consumption) is one of recycled energy’s main benefits. Recycled energy can be utilized in industrial operations with high temperature processes, such as glass or aluminum furnaces, steel mills, cement kilns, or refineries. Another common application of recycled energy systems is at natural gas-fired compressors, found throughout natural gas production operations.



Benefits of Recycled Energy

- Reduces electricity purchases and costs
- Reduces monthly electrical demand charges
- Can generate additional revenue from excess electricity sales
- Improves electrical reliability for key processes
- Reduces carbon footprint



Financing Options

There are several options for obtaining financing for a new recycled energy system:

- Leasing the system from a developer would allow you to obtain some benefits from the recycled energy system without having to provide any capital up front.¹
- You may be able to obtain a loan through a bank or credit union.
- The Colorado Commercial Property Assessed Clean Energy (C-PACE) program is an option that would allow you to finance the recycled energy system through a lien on the facility and pay it back at a low interest rate (6–7 percent) through the facility’s county property taxes, over a period such as 15–20 years. The advantages of C-PACE are that your facility saves money on your energy bills over the period of the loan, and the C-PACE loan is entirely off the facility’s balance sheet. You can learn more about Colorado’s C-PACE program [here](#).

¹ Most of the financial benefits would go to the lessor over the term of the lease such as 10 years. After the lease term expires, you may be able to purchase the recycled energy system from the lessor at a discounted price, and at that point you would receive all the financial benefits.



Recycled Energy Technologies and Case Studies

The two most common technologies for recycled energy systems are the Steam Rankine Cycle and the Organic Rankine Cycle. Both of these technologies involve a heat recovery boiler and a turbine generator. Here are some examples of recycled energy systems currently operating:

Project Description	Location	Exhaust Temperature	Capacity	Link for more info
Trailblazer Natural Gas Compressor Station	Peetz, CO	900° F	3.5 MW	Trailblazer Project Info
Northern Border Pipeline Compressor Station	St. Anthony, ND	950° F	5.5 MW	Northern Border Project Info
Oxbow Corporation Coke Plant	Port Arthur, TX	1800° F	5 MW	Oxbow Project Info



Do You Have a Good Recycled Energy Opportunity?

If you have a steady source of waste heat of at least 300 degrees Fahrenheit, you may have a good opportunity to reduce your energy costs and capture other benefits. Free technical assistance is available through the Southwest Combined Heat and Power (CHP) Technical Assistance Partnership (see contact information below). Their experts can help you decide whether your potential recycled energy application is promising and warrants a more detailed study of its technical and economic feasibility.



COLORADO
Energy Office



General Questions:

Neil Kolwey | Southwest Energy Efficiency Project | nkolwey@swenergy.org | 303-499-0213

Recycled Energy Opportunity Evaluation:

Gavin Dillingham | U.S. DOE Southwest CHP Technical Assistance Partnership | gdillingham@harcresearch.org | 281-216-7147