



Waste Energy Recovery and CHP:

Potential, Suitability,
Integration, and Modeling

Christine Hurley Brinker



About Waste Energy Recovery

- Captures energy that's normally wasted and turns it into clean electricity
- Can be used onsite or transported
- Most sources are <5 MW
- Not CHP/cogen (related but different)

Example



***4-MW Heat Recovery Project
Highline Electric Association***

***Peetz, CO
Trailblazer Natural Gas Pipeline***

Sources of Waste Heat in Tri-State Member Territories

■ Sources:

- Natural gas pipeline compressors
- Other natural gas-fired turbines
- Process heating equipment
- Flares
- Recip engine exhaust

■ Industries:

- Natural gas pipelines
- Brick
- Glass
- Steel and metal
- Chemicals
- Ethanol

Waste Energy Recovery Potential in Tri-State Member Territories

- Decent potential in Tri-State's region
- Potential is already mapped out (NRECA):
 - “Industrial waste heat sources.xls” *
 - Facility name, address, zip, county, estimated recoverable MW, waste heat (BTU/hr), SCC
- NRECA: “Much of the potential is located in rural sites served by electric cooperatives”

* Excel file accompanying NRECA/CRN report “*On-site Power Generation Options Using Waste Heat*” (project 07-18) from cooperative.com

Recommendation #1: Potential

***Refine the NRECA spreadsheet
“Industrial waste heat sources.xls” to just Tri-State
territory, further divide by member co-op
territory, and send the sources to each
member co-op***

Environmental Attributes and CO RPS Compliance

- No added fuel
- No greenhouse gas emissions
- No other pollution
- Qualifies as a renewable in Colorado
 - 1.25x Colorado-based multiplier or
1.5x community project multiplier
- Potentially will qualify as a renewable in NM
- Non-intermittant
- **Baseload power**

Recommendation #2: Modeling

Explicitly include Waste Energy Recovery in all high-renewable, medium-renewable, and RPS-compliance modeling scenarios

Energy Efficiency Resource

- Mentioned in Tri-State Energy Efficiency Study by Nexant, but not modeled

Quote from Nexant Study

The oil and gas industry is highly specialized, and traditional DSM programs are not well-suited to meet its needs.

20% of Tri-State's industrial load is comprised of oil and gas transmission stations that utilize specialized pipeline transmission motors.

Such applications typically are found in remote areas, with limited or no other fuel requirements on site.

Tri-State, in partnership with its utility members, should **explore program options** to enable end-user oil and gas companies to recover onsite waste heat, and **identify opportunities** for supplemental uses of waste heat from oil and gas production generators, compressors (sites with thermal loads), and natural gas processing plants as well as **promotion** of gas-fired compression with waste heat power generation on gas pipelines instead of traditional, line-powered, central-generation, electrically-driven compressors.

Recommendation #3: Modeling

*Explicitly include Waste Heat Recovery
in any high-efficiency and medium efficiency
modeling scenarios*

*(along with the resources from
the Nexant Study)*

Specific Additions to Modeling Scenarios

Model moderate goal of 5-8 MW/year

Model aggressive goal of 10+ MW/year

Model low goal of 1-3 MW/year

Cost and Performance Characteristics

- Use the resource cost and performance characteristics from the NRECA/CRN study
 - Ex. \$2500-3000/kW installed cost for 5.5 MW pipeline
 - Maintenance costs \$0.005/kWh
 - Modify as necessary to reflect experience with Highline project

Recommendation #4: Tri-State Role

Take an active role in identifying, pursuing and developing waste heat projects with member co-ops, rather than waiting for member co-ops to bring forth ideas to you

Recommendation #5: RUS

Continue to pressure USDA to revise RUS borrowing rules to allow a greater percentage of local supply – say, 10% (up from 5%)

Additional Recommendations

- Explore program options to enable end-user oil and gas companies to recover onsite waste heat
- Ensure that future RFPs for renewable capacity are technology-neutral and allow for waste energy recovery to fairly compete
- Include waste energy recovery in your renewables page on your website

Recommendation #9: CHP

- Pursue Combined Heat and Power (cogeneration) projects
- Renewable-fueled CHP qualifies for CO RPS
 - Lumber mills
 - CAFOs (incl. cattle feedlots, hog farms, dairies)

Recap

- Refine the potential; send to members
- Model as a renewable resource and as an efficiency resource
 - 6-8 MW/year moderate goal
- Actively identify, pursue, and develop projects
- Consider program targeted at oil and gas
- Technology-neutral RFPs
- Waste energy recovery onto website
- Pursue renewable and non-renewable CHP projects

Thank You

Questions?

Christine Hurley Brinker

US DOE Intermountain Clean Energy Application Center

Southwest Energy Efficiency Project

720-939-8333

cbrinker@swenergy.org

www.intermountainCHP.org