



CHP Field Project: Basin Electric, NB Pipeline Station #7, North Dakota

Project Description

The goal of this project is prove out the technical and economic feasibility of capturing thermal energy from a pipeline compressor station

- 30 MW (39,000 hp) gas turbine
- 4 MW ORC (6MW in winter)
- Selected compressor station number 7

Goals

- Integrate ORC into compression station
- Integrate in parallel with COOP grid
- Gather lessons learned from pipeline installation
- Demonstrate economic viability potential
- Provide technology transfer through the web, DOE CHP Application Centers, trade press and association presentations

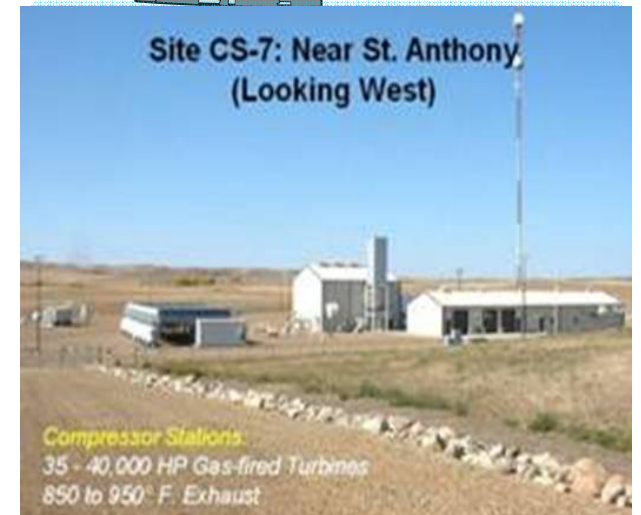
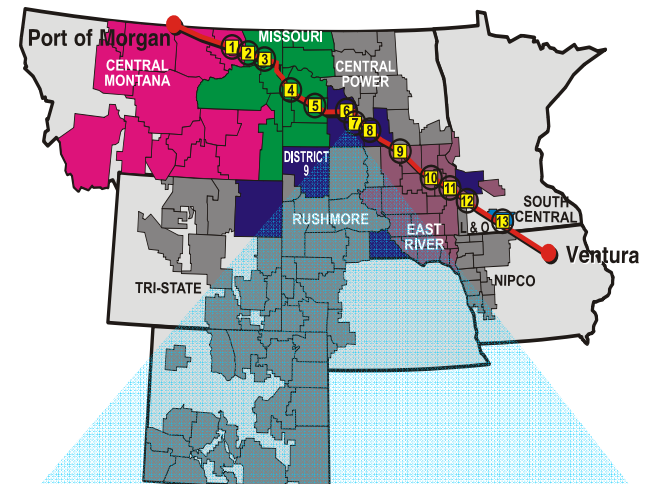




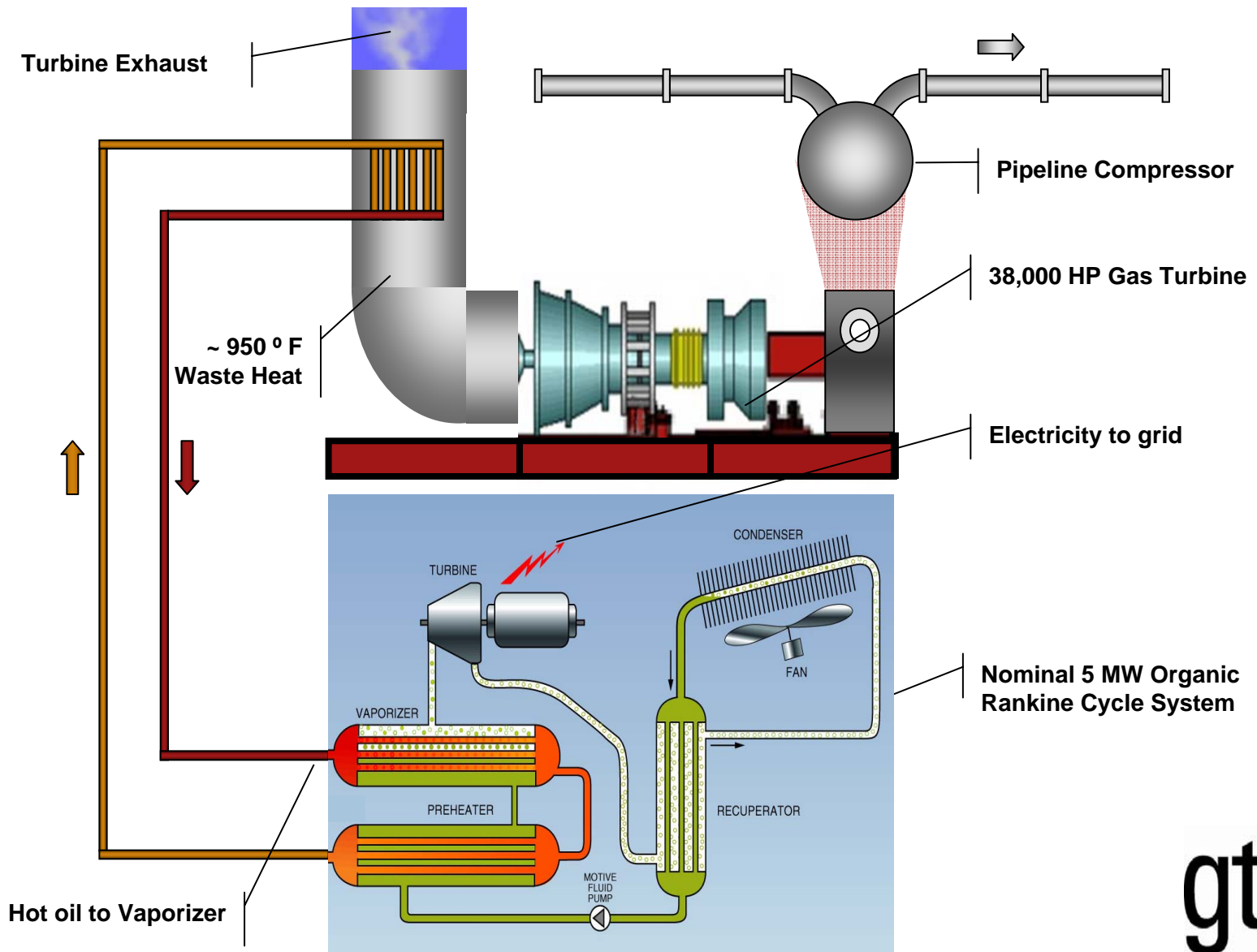
CHP Field Project: Northern Border Pipeline Opportunity

The Northern Border Pipeline:

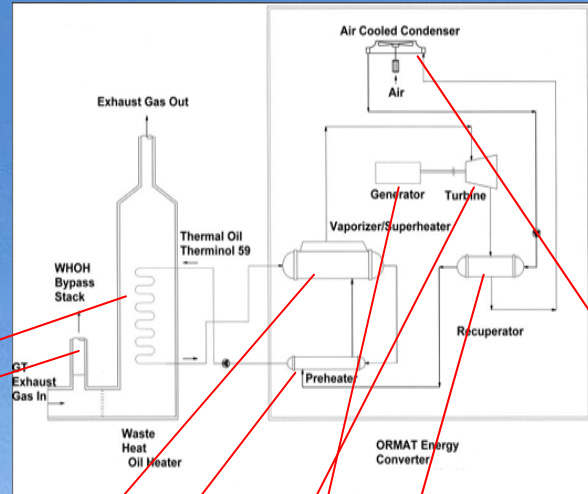
- Major U.S. Gas importer from Canada delivering natural gas to the Chicago hub.
- 1,200 miles long, 42 inches in diameter, 1,400 psig.
- 16 compressor stations totaling 499,000 SHP
- 2,500,000,000 BTUs of energy is wasted every hour in the form of gas turbine exhaust!
- Potential to generate 80 MW of economic pollution free power.



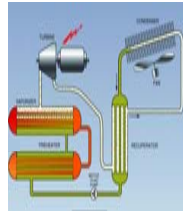
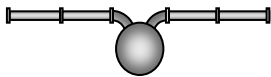
Design: The Basic Idea is to Generate Electricity from Waste Heat



Design: Organic Rankine Cycle System



Business Model:



Northern Border Pipeline supplies land and waste heat to ORMAT in exchange for royalty on electric sales. NBP also operates and maintains ORMAT equipment under separate contract.

ORMAT builds, owns and operates the ORC plant using its Power Purchase Agreement (PPA) with Basin to finance the project.

Basin executes 25-year PPA with ORMAT for all electricity produced at a very competitive price (no fuel cost except waste heat royalty).

MorGranSou Electric Cooperative builds distribution wires to Basin interconnection as CS#& and agrees to buy all electricity supplied. This power provides critical voltage support to their grid.

The result is cost effective, clean electric power also providing critical voltage support to a hospital.



Site Preparation Progress:



End Use Systems





Results, Accomplishments & Plans

- **Accomplishments**

- Designed the System
- Developed the Business Model
- Executed the Power Purchase Agreement
- Begun Construction

- **Plans for 2006**

- Complete Construction
- Commission the System

- **Plans for 2007**

- 12 months of Data Capture
- Complete Thermodynamic Analysis
- Complete Economic and Business Model Analysis
- Complete Real Time Data Portal, Final Report, Case Study
- Continue Technology Transfer Activities at Electric Power 2007, ASHRAE, NAEA, NRECA, AGA, on the WEB, with Pipelines.



GTI's Team Members

The real benefit of this project will be to provide a demonstration of the combined technologies into a prototype that can then be replicated at numerous similar compressor sites. This technology would provide the pipelines with a steady, long-term revenue stream, exploiting what is now only a waste product. Due to the large number of pipelines and compressor stations in the United States, the potential for energy recovery is vast, since this project has great potential to be replicated throughout the U.S. Additionally, this concept could be used at many other locations where waste heat is available.

