



# Energy Recovery During Expansion of Compressed Gas Using Power Plant Low-Quality Heat Sources

## Opportunity

The Department of Energy's National Energy Technology Laboratory (NETL) is seeking licensing partners interested in implementing United States Patent Number 7,007,474 entitled "Energy Recovery during Expansion of Compressed Gas Using Power Plant Low-Quality Heat Sources."

Disclosed in this patent is a method for the recovery of energy that was previously lost from compressed gases in industrial power plant operations. By heating the gases using low-quality heat sources such as circulating water in a power plant and then allowing the compressed gases to expand in multiple turbines (or other expansion engines), energy can be recovered, thereby reducing energy costs.

## Overview

Currently, compressed flue gases from power plant operations are frequently vented to the atmosphere after various cleaning steps, but no attempt is made to recover the energy in this gas stream. Even in advanced processes in which high-concentration carbon dioxide (CO<sub>2</sub>) gas streams are treated using compression and cooling to obtain liquid and solid CO<sub>2</sub> in industry, the expansion of the resulting waste gas stream is not used effectively for energy recovery.

In this patented process, the cold, compressed flue gas, whether depleted of CO<sub>2</sub> or not, is first heated using a low-quality energy source, such as the circulating water of the power plant, thereby taking advantage of an often wasted resource. The gas is then allowed to expand in one or a series of turbines (or other expansion engines) to recover the energy in the heated compressed gas stream. The process enables the recovery of revenue in the form of otherwise lost energy in the cold compressed gas stream.

## Significance

This process

- makes good use of low-quality energy sources that are often wasted
- recovers energy from flue gas streams in power plants that would normally be vented to the atmosphere
- saves energy, and therefore increases the revenue of a power plant

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