



## Comparing Conventional Gas Turbine Generators to the Infinity Turbine Natural Gas Supercritical CO2 Prime Power System for Data Center Power

Infinity Turbine  
LLC

[ TEL ] +1-608-238-6001 (Chicago)

[ Email ] greg@infinityturbine.com

<https://www.infinityturbine.com/conventional-gas-turbines-vs-supercritical-co2-gas-turbine-by-infinity-turbine.html>

A detailed comparison of traditional natural gas turbine generators and the Infinity Turbine supercritical CO2 closed-loop power system, highlighting efficiency gains, faster payback, rugged environmental performance, energy flexibility, and improved availability for data center applications.



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## Comparing Gas Turbine Generators with the Infinity Turbine Natural Gas Supercritical CO2 System

Data centers demand high efficiency, rapid deployment, and strong reliability. This article compares conventional natural gas turbine generators with the Infinity Turbine supercritical CO2 closed-loop power system, revealing why sCO2 is emerging as the next generation platform for resilient, high performance power in modern digital infrastructure.

### Introduction

As data centers accelerate in scale and complexity, the need for reliable, independent power generation has never been greater. Traditional natural gas turbine generators remain widely used, but new technology is reshaping the landscape. The Infinity Turbine natural gas supercritical CO2 system introduces a closed-loop Brayton cycle that offers significant advantages in efficiency, resilience, installation flexibility, and long term operational performance. This article compares both systems and highlights why the sCO2 approach is rapidly becoming the preferred option for next-generation data center power planning.

### Efficiency and High Temperature Performance

Conventional air breathing gas turbines rely on large volumes of atmospheric air for combustion and expansion. Their efficiency depends heavily on ambient temperature, humidity, altitude, and air quality. Hot climates reduce power output, while cold climates or thin air regions introduce operational limitations.

The Infinity Turbine sCO2 system operates in a fully closed-loop Brayton cycle using supercritical CO2 as the working fluid. Because sCO2 is a dense, high energy medium, the system benefits from exceptional thermal efficiency at turbine inlet temperatures commonly ranging from 500 C to 700 C. These temperatures deliver improved heat-to-power conversion, lower heat rates, and a faster return on investment. Unlike open-cycle systems, performance remains consistent and does not vary with weather or atmospheric conditions.

### Faster Payback and Reduced Operating Cost

High efficiency directly affects operating cost and payback period. With a heat rate that can rival or exceed traditional turbines, the sCO2 system converts more energy into usable electricity while consuming less fuel. The closed-loop design also significantly reduces parasitic loads associated with air compression, air filtration, and environmental conditioning. As a result, data center operators achieve lower fuel costs, less maintenance, and a shorter payback period compared to standard turbine generators.

### Order Availability and Deployment Speed

Commercial gas turbines have long manufacturing lead times and are often backlogged due to global demand, especially from utility and industrial sectors. Delivery schedules can extend well beyond a year, causing delays in data center construction and commissioning.

The Infinity Turbine sCO2 system is modular, compact, and designed for rapid production and deployment. This makes it attractive for data center developers who must scale quickly and cannot wait for long supply chain timelines. Modular units can ship in standard containers, allowing fast site installation and simple integration into existing infrastructure.

### Silent Operation Compared to Air Breathing Turbines



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