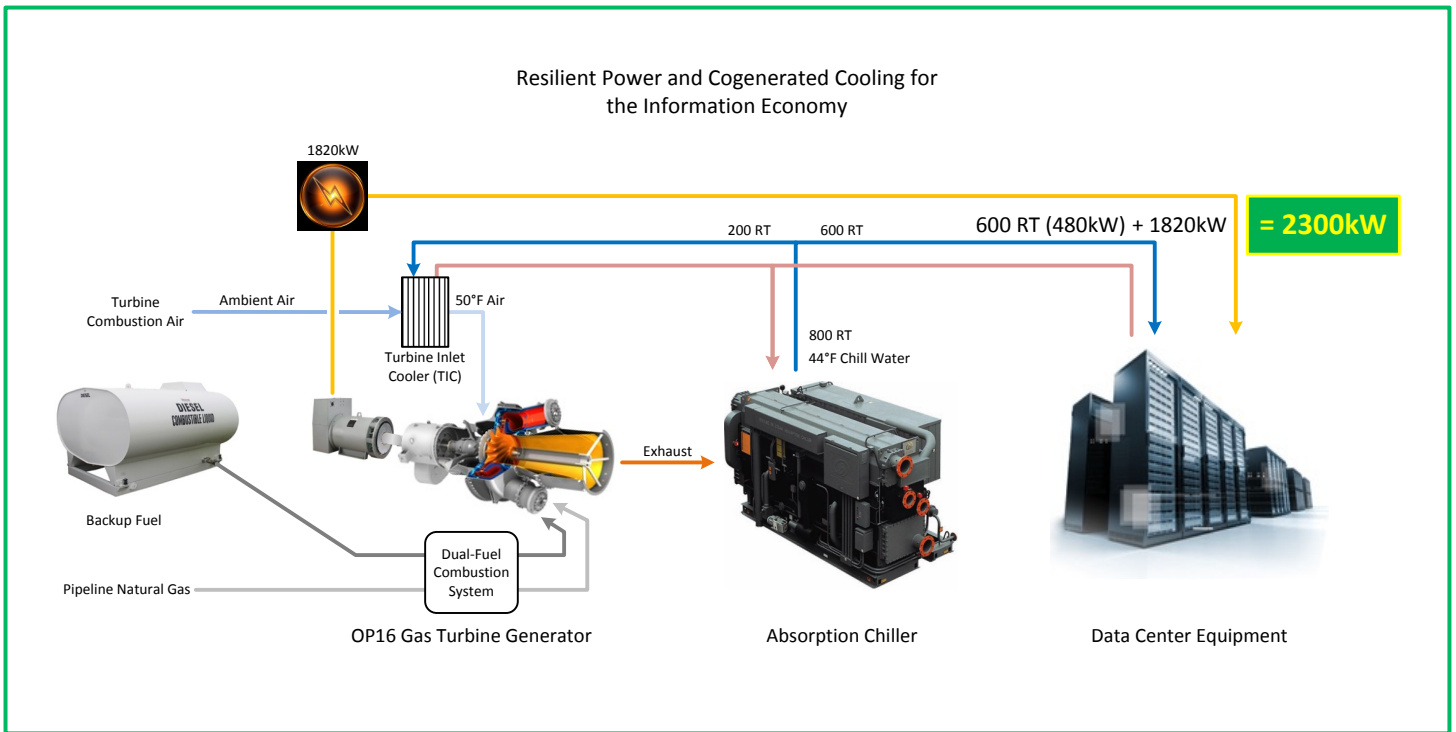


Powering the Information Economy

Kinsley Energy Systems (KES) is exploring a promising new application for the OP16 gas turbine generator to provide resilient power and cogenerated cooling to the booming data center market. The OP16 is ideally sized for data center applications. Coupled with an absorption chiller, a single turbine generator displaces 2300kW of electric power from the grid. But more importantly, the dual-fuel OP16-3B is capable of smoothly switching from 100% natural gas to 100% diesel at full load without power interruption in the event that the utility gas supply is disrupted. Thus, the OP16 can single-handedly provide superior reliability of prime electric power and equipment cooling during both normal operation and in times of emergency, reducing or eliminating requirements for and the associated maintenance of backup diesel generators and UPS.

Data centers are large power users and heat producers, requiring backup generators and redundant cooling to qualify for high reliability ratings. Diesel generators sufficient to power the electronics and electric cooling (normally powered from the grid) have been the standard for data center standby power due to their ability to startup rapidly in the event of a power outage. Uninterruptible Power Supplies (UPS) bridge the gap to maintain power during the ten seconds it takes for the diesels come on line. Despite tightening restrictions on exercising diesel engines for maintenance and reliability checks, gas reciprocating engines have not displaced diesels. Gas engines are slower to start and bring up to full load, so they must be accompanied by higher-capacity UPS. Further, the probability of gas supply disruption during a major disaster results in unacceptable system reliability of the gas option.



Enter the dual-fuel OP16-3B, capable of smoothly switching from 100% natural gas to 100% diesel at full load without power interruption in the event that the utility gas supply is disrupted. The generator is operated 24/7 on 100% natural

gas in parallel with the grid, transitioning seamlessly to island mode when grid power is interrupted. In order to maximize value during normal operation, an absorption chiller powered by turbine exhaust provides continuous equipment cooling to the facility. Excess chiller capacity is employed through a turbine inlet cooling (TIC) system to boost generator output.

The OP16 is ideally sized for data center applications. Coupled with an absorption chiller, a single turbine generator displaces 2300kW of electric power from the grid: it produces 1820kWe to power electronic equipment plus 600 Tons of Refrigeration (RT), which would normally draw 480kW when electric chillers are employed. Total exhaust energy from each turbine is sufficient to produce 1560 RT; substantial additional energy is available to power redundant chillers should the data center require it. Data centers typically employ backup generators in 2-2.5MW increments, so the OP16 will perfectly support a typical facility strategy of modular incremental expansion.

The fuel control is tuned for a six-second transition time for switchover from 100% gas to 100% diesel or from diesel back to gas. A small receiver in the gas line or a run of large-diameter pipe ensures adequate gas pressure through the switching transient after the gas supply is lost. The turbine will require 14,000 gallons of U.S. conventional diesel to operate continuously for 72 hours in the event of a crisis. During normal operation, an automated maintenance action will switch from gas to diesel and perform diagnostic checks to periodically demonstrate reliability of operation on the backup fuel. Total time operating on diesel for these routine checks will be less than 15 hours over the course of each year.

The OP16 represents a sea change for power in the data center industry. In addition to the avoided cost of UPS and backup diesel generators, an OP16 with cogenerated cooling will provide exceptional value during normal operation by reducing energy costs while continuously demonstrating the availability of reliable power to carry the center through times of emergency.