Maximizing Data Center Savings with Cluster Mesh Power Generation: A Deep Dive into Cooling Efficiency

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In today's world, data centers and industrial facilities are constantly seeking innovative ways to improve their energy efficiency and reduce costs. With an ever-growing demand for computing power and an increasing focus on sustainability, cooling efficiency has become a critical aspect of energy management.

Infinity Turbine's Cluster Mesh Power Generation System, utilizing supercritical CO2 (sCO2), presents an opportunity to turn waste heat into an efficient cooling solution. This advanced system achieves a Coefficient of Performance (COP) of 20, meaning it produces 20 units of cooling for every unit of power generated. In this article, we explore how this translates into substantial savings for power generation systems ranging from 5 kW to 100 kW, with an emphasis on cooling capacity and cost savings.

How the Cluster Mesh Power Generation System Works

The Cluster Mesh Power Generation System uses a supercritical CO2 turbine to harvest waste heat and convert it into power. The system is capable of not only generating electricity but also producing cooling as a byproduct of the expansion of supercritical CO2. This dual functionality significantly enhances energy efficiency and provides substantial savings for industries and data centers.

The COP of 20 indicates the efficiency of the cooling process, which means that for every unit of energy input to generate power, the system can produce 20 times the cooling output. This makes it an extremely effective solution for cooling-intensive environments.

Cooling Capacity and Savings Across Different Power Outputs

To illustrate the efficiency and savings potential of the Cluster Mesh Power Generation System, we'll evaluate the cooling capacity and cost savings for different power outputs: 5 kW, 15 kW, 30 kW, and 100 kW.

1. Power Output: 5 kW
• Cooling Produced: With a COP of 20, a 5 kW turbine will generate 100 kW of cooling.
• Cooling in BTU: This translates to 341,214 BTU per hour.
• Cooling in Tons: The cooling capacity is equivalent to 28.43 tons.
• Savings: At an electricity cost of $0.15 per kWh, the savings per hour are $15, which totals to $131,400 per year.

2. Power Output: 15 kW
• Cooling Produced: A 15 kW turbine will generate 300 kW of cooling.
• Cooling in BTU: This equals 1,023,642 BTU per hour.
• Cooling in Tons: The equivalent cooling capacity is 85.30 tons.
• Savings: The savings per hour are $45, adding up to $394,200 per year.

3. Power Output: 30 kW
• Cooling Produced: For a 30 kW turbine, the cooling produced is 600 kW.
• Cooling in BTU: This results in 2,047,284 BTU per hour.
• Cooling in Tons: The cooling capacity amounts to 170.61 tons.
• Savings: The system provides savings of $90 per hour, totaling $788,400 per year.

4. Power Output: 100 kW