

Improving Power Output and Reducing Greenhouse Gas Emission with HEPA Air Filtration for Gas Turbines

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Abstract

Current inlet filtration technology for gas turbines reduces the particles ingested, but many particles within the submicron range still pass through the filters, resulting in fouling of compressors, plugging of small passages in cooling ducts and accelerating the corrosions of sensitive parts. Loss of power outputs and fuel efficiencies are widely experienced by operators today. To address these problems, new filter cartridges achieving HEPA filtration without the burden of high pressure drop or short life-time were tested in the field. Results showed that the filters kept the compressor blades clean without washing and allowed the gas turbines to maintain power outputs and efficiency. This resulted in improved profitability and fuel savings to the operators. The equivalent fuel usage required to offset the 3% to 6% power deficit in the baseline case was used to calculate green house gas (GHG) savings. The model projects that the performance of improved gas turbine systems using the new HEPA filter cartridges would result in savings of 17,422 – 34,843 metric tons of CO₂ in the US alone.