Donaldson
FILTRATION SOLUTIONS

CASE STUDY

Optimizing Performance and Sustainability

Filter Upgrade Delivers Additional Power and Efficiency for Gardabani Combined Cycle Power Plant

OVERVIEW

Generating more than 230 megawatts annually, the Gardabani Combined Cycle Power Plant plays a critical role in the country of Georgia's energy supply chain. Operational since 2015, the plant utilizes two gas turbines to help supply power to the region.

The plant has served the area well for nearly a decade. However, evolving operating conditions, a strengthened commitment to environmental sustainability, and increased attention to carbon emissions prompted the operator to re-evaluate the aging plant's filtration system to help ensure maximum efficiency, reliability, and compliance.

CHALLENGE

The Gardabani plant is located near a cement production facility, so airborne contaminants were a constant concern. The particulate posed significant challenges to the system's efficiency and filter life.

The plant's operators asked Donaldson for an optimized solution that would help improve efficiency, provide reliable system protection, and deliver long filter life supporting the plant's commitment to reduced emissions and enhanced environmental sustainability.

SOLUTION

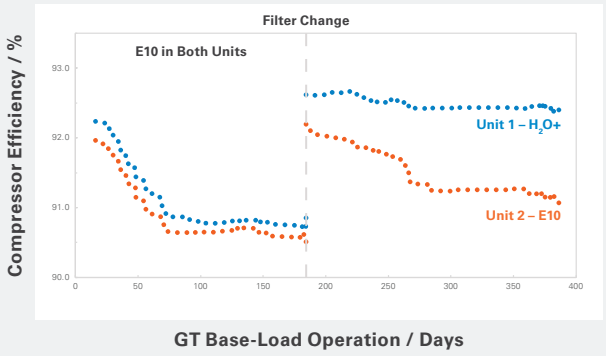
Donaldson engineers worked with the plant's operations team to conduct an in-depth assessment of the system, its output requirements and maintenance intervals.

The team quickly identified an opportunity to enhance turbine protection and performance by replacing the installed E10 filters with Donaldson® Turbo-Tek™ H_2O+ E12 filters, a product designed to handle the increased airborne particulate.

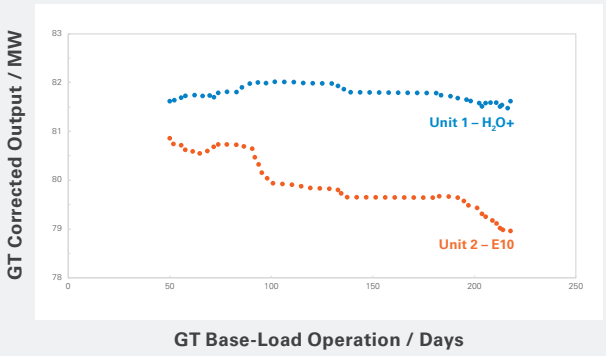
These high-performance filters provide increased filtration efficiency while helping maintain a uniform differential pressure. The stability helps reduce compressor axial efficiency loss and increase power output.

The Gardabani plant tested the new E12 filters for six months in real-world operating conditions. Throughout the trial period, the upgraded filters delivered as promised meeting differential pressure, performance, and maintenance requirements.

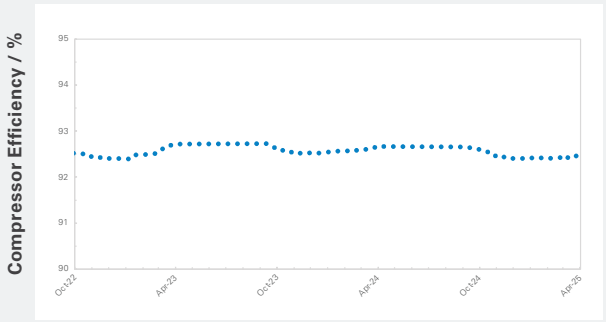
PERFORMANCE RESULTS



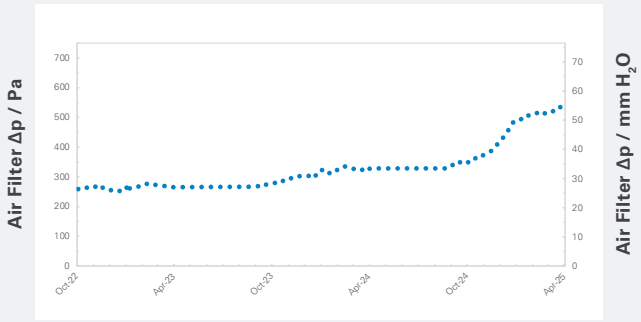
Graph 1: Decline of compressor efficiency on both units during initial 180 days of operation. At 180 days both GTs were washed offline and equipped with new sets of filters (Unit 1: H_2O+ E12 and Unit 2: E10).



Graph 2: Power output corrected for standard operating conditions of both units after offline washes and newly installed filters.



Graph 3: Compressor efficiency of Unit 1 with H_2O+ E12 filters installed.



Graph 4: Differential pressure across the air inlet housing of Unit 1 with H_2O+ E12 filters installed.

RESULTS

The transition to Turbo-Tek H_2O+ E12 filters led to significant benefits for the Gardabani plant in just six months:

- **Increased Output:** additional power generation of 3.456 million kWh
- **Fuel Savings:** reduced natural gas consumption by 0.244 million m^3
- **Environmental Impact:** carbon emissions reduced by 489 tons
- **Compressor Efficiency:** no recorded efficiency loss or reduction in E12 filter life when compared to the previous E10 filters over the same interval
- **Operations:** the Turbo-Tek H_2O+ E12 filters continued performing into a third year with minimal efficiency loss and relatively low dP increase

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> Donaldson took the time to understand our needs, testing solutions over several months. Their consultative approach gave us confidence, and the results speak for themselves – better efficiency and ongoing support that keeps us optimized.
>
> ***– Venkata Srinivas, Operation Manager***

MORE POWER TO YOU

With over a century of filtration experience and industry expertise, Donaldson can help enhance your system's power generation, hydraulic filtration, and compressed air filtration performance.

Our engineers will collaborate with you to develop energy-efficient and cost-effective solutions that support your equipment and compliance efforts throughout its entire lifecycle.

As a trusted partner, you can count on Donaldson to provide expert solutions and service for your operation:

- Review your existing gas turbine system architecture and operating environment
- Analyze your efficiency requirements and output demands
- Recommend and install solutions that optimize protection and performance
- Provide post-installation service and support including a full portfolio of replacement filters and parts

Contact your local Donaldson representative to help identify the ideal solutions for your gas turbine and industrial compressor challenges.

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