Performance Monitoring of Existing and New Plants

Performance monitoring is an important aspect of any power plant. Performance monitoring is conducted at sub-component level (i.e. GTG compressor, inlet air filter system, turbine, and the various heat exchangers of the HRSG)

A lot of existing plants have the barest minimum information which provides sufficient information for only running the plant. For such plants, ***Vy Consult*** can analyse the existing power plant and make recommendations for additional sensors which would aid in providing the information necessary for performance monitoring.

The sensors necessary for condition monitoring can be installed within a new power plant at the design stage at a fraction of the cost which would be incurred if it would be installed for a running power plant. As such, ***Vy Consult*** can provide the necessary expertise to new plant owners.

Even in the best possible operating conditions, a GTG would undergo performance degradation due to inlet filter clogging, compressor fouling and oxidation of the hot gas path. The plant operator can recover some of the performance loss by regularly

- Using water-wash on the GTG to recover performance loss due to compressor fouling
- Replacing inlet air filters to reduce pressure drop

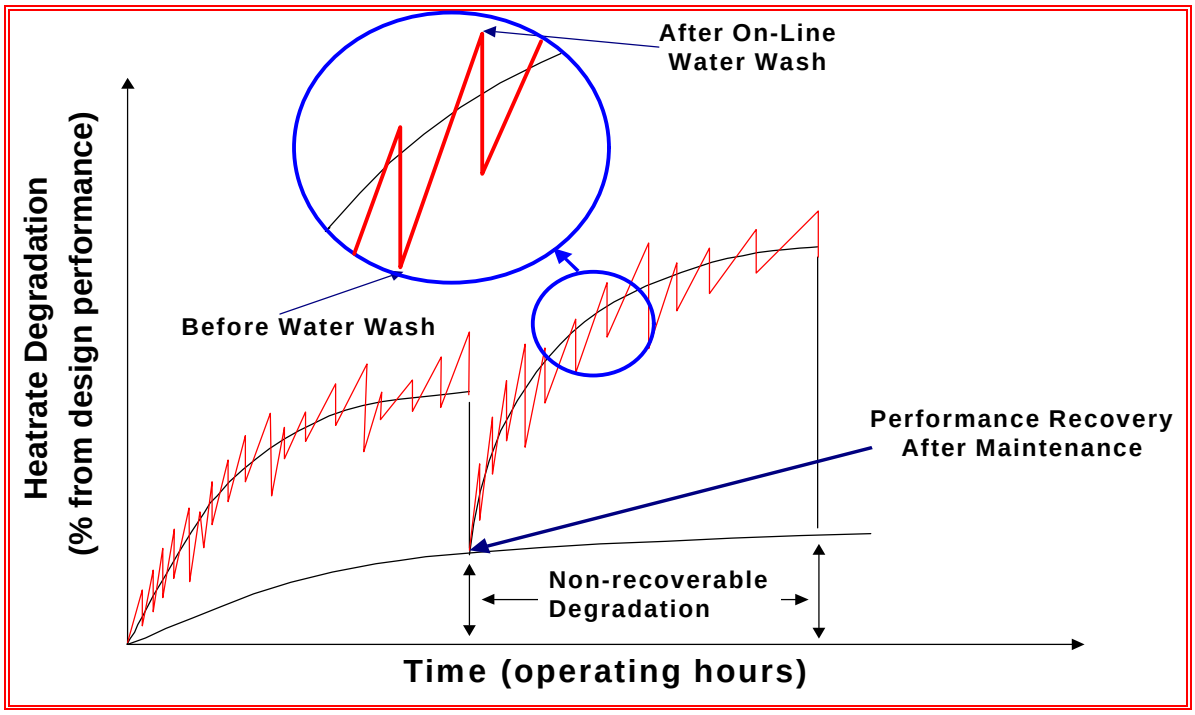

Figure 21 : Benefits of water-washing

The performance can only be recovered if the plant operator ***KNOWS*** that rectification action is required. Otherwise, the plant operator would be ***unknowingly***

water-washing the GTG or changing the inlet air filters without an appreciable gain in the power output or heatrate that can justify the cost. In the opposite scenario (likely the usual case), the plant operator may be operating the GTG at a degraded conditions and a simple water-wash or change of inlet air filters can provide a substantial gain in power output and heatrate.

A crank and soak water wash could recover as much as 4% of the GTG power output.

Vy Consult can customize specialized 3rd party software for performance monitoring of existing Gas Turbine Generator plants. This would enable the plant operator to constantly monitor the measured GTG performance against the New & Clean Condition.

This software would continuously monitor GTG compressor performance and machine loading to determine a wash schedule that optimally balances performance benefit with cost to ensure that the plant operator will never have to under-wash or over-wash the machine.

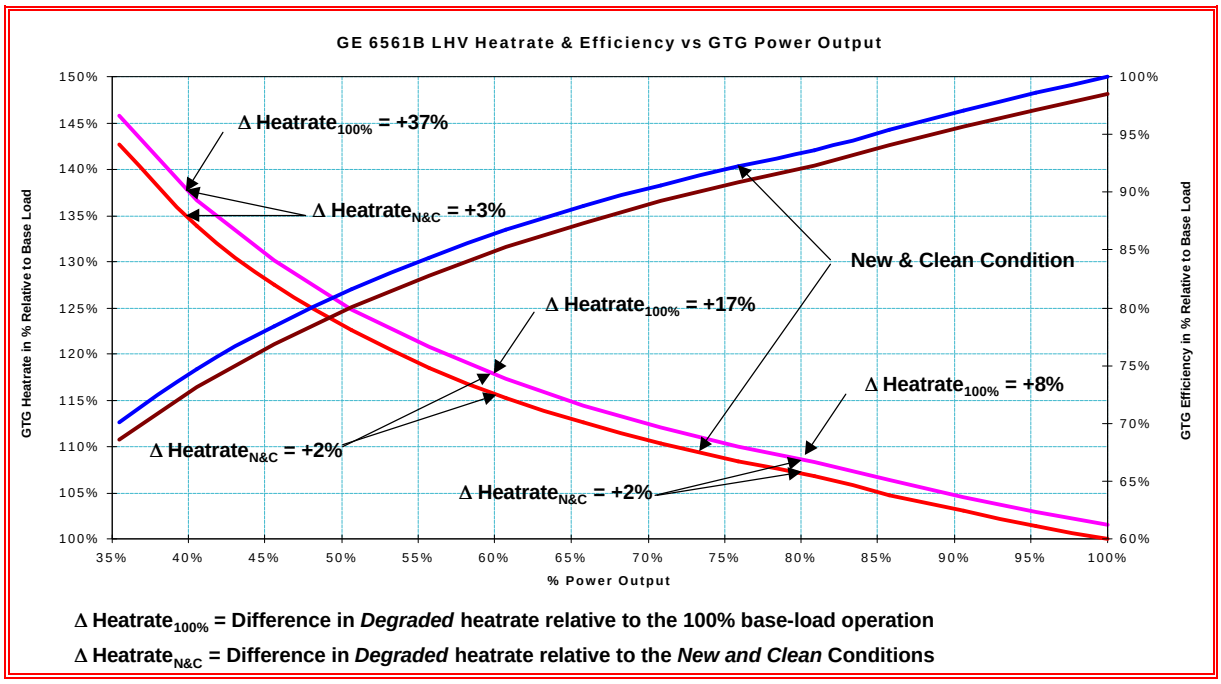

Figure 22 : Performance of a GE 6561B GTG due to a 5°C temperature rise in the compressor exit relative to the base-load/new & clean conditions.

The software would also predict the best time to replace filters by balancing total replacement cost with the beneficial impact of new filters on heatrate and production capacity using historic data.

The above chart correlates compressor degradation to a temperature rise at the compressor exit of a GE 6551 B GTG relative to its new and clean condition. This is for a 100 MW Combined Cycle Power Plant.

The following charts show the effect of inlet air filter pressure drop of a GE 6551B GTG on the revenue generated by a 100 MW Combined Cycle Power Plant.

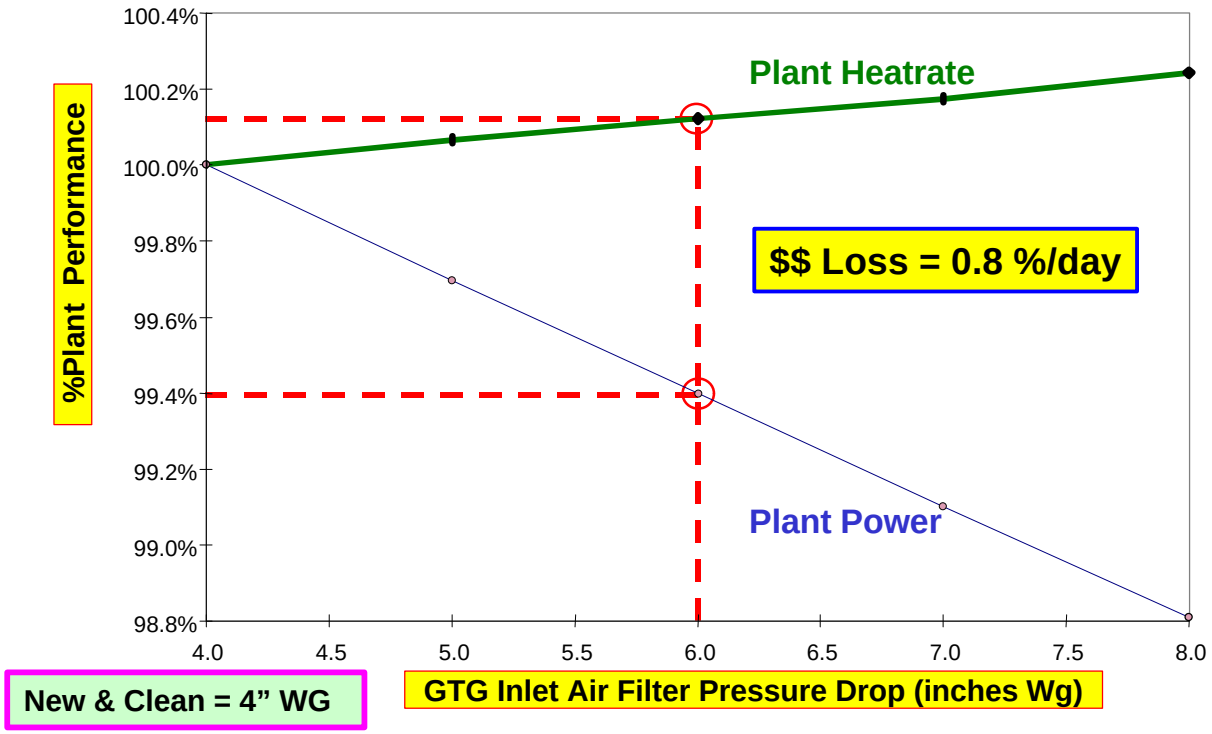

Figure 23 : Effect of GTG Inlet Air Filter Pressure Drop on the CCPP Performance and estimated daily revenue loss