

# Effect of Air Filter Pressure on Fuel Consumption and Cost of Gas Turbine in Southern Power Generation, Malaysia



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**Abstract** The effect of air filter pressure and fuel consumption for gas turbine generating Block 1 in the Southern Power Generation (SPG) power plant is presented. The prime mover for the generating block is the GE 9HA.02 gas turbine, and the power plant is the latest combined cycle gas turbine (CCGT) commissioned in January 2021 and the world's first commercial operation of the GE 9HA.02 fleet globally. Fuel consumption of the gas turbine is the primary concern as it which significantly affected by the gas turbine performance, which later translates to the power plant revenue to operate at optimum cost. Note that the fuel consumption of the CCGT is closely related to the Air Filter House (AFH) condition located at the most upstream component to protect the gas turbine from erosion, corrosion and fouling; as well as to achieve the required performance, efficiency, and life expectations. The present work aims to evaluate the value of pressure drop in the AFH and the fuel consumption. These two related parameters are significant for mitigation measures to achieve a cost-effective power plant operation. The operation data for both parameters based on the actual CCGT plant operation has been analysed from March to June 2021. Consecutively over the four months of operation, the AFH pressure drop had increased from 666.80 to 741.12 Pa (Pascal), translating to a total increment of 74.32 Pa or an average of 18.58 Pa every month. Separately, fuel consumption increased from 120,460.61 to 123,614.13 m<sup>3</sup>/h, a total increment of 3153.52 m<sup>3</sup>/h or an average of 788.38 m<sup>3</sup>/h for every month, which later translated to an average increment of fuel cost amounting to RM 767.86/h. The present results reveal that the AFH pressure drop has directly impacted the fuel consumption over the analysis period. On average, an increment of 1 Pa of the AFH pressure drop will increase fuel cost amounting to RM 41.33/h. It is expected that current air filtration elements can last within 41 months to achieve their

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