

CASE STUDY



ModuPower™ SMPS Reduces Particulate Matter Emissions from Undersized ESPs

Company

AES Gener (www.aesgener.cl)

Plant

Norgener

Location

Tocopilla, Chile

Industry

Electric Power Generation

Scope

Replaced 3 of 4 TR Sets with ModuPower™ SMPS on Unit 1 and 2 ESPs to reduce particulate matter emissions.

Stock Equipment Company recently supplied ModuPower™ SMPS's for two 135 MW pulverized coal generating units at AES Gener's Norgener Plant located in Tocopilla, Chile. To control PM (Particulate Matter) emissions each unit was originally equipped with a 1990's vintage Mitsubishi electrostatic precipitator powered by conventional TR sets (Transformer Rectifiers).

The original design collection efficiency of the ESPs was 98% which resulted in an estimated 211 mg/Nm³ emission rate at full load when using an imported bituminous coal with 10.6% ash content. Changes to government regulations would require compliance with a reduced PM emission limit of 50 mg/Nm³ in 2014. AES Gener's Norgener Plant had planned to meet the new requirements by replacing the ESP with a bag house. However in late 2013, AES Gener was informed of significant delays in delivery of the bag house and an accelerated schedule to meet the 50 mg/Nm³ PM emission rate limit by the end of January 2014. In response, AES Gener was forced to source an alternate 6% ash coal and reduce production to 120 MW or below to stay in compliance.

AES Gener contacted Stock Equipment in December 2013 to discuss potential solutions for further reducing emissions and recover production capacity using Stock's ModuPower™ SMPS (Switch Mode Power Supply). The ModuPower™ SMPS reduces PM emissions by increasing the overall power input to the precipitator



Fig. 1 AES Norgener U1 ModuPower™ lineup consists of 2 x 120kW and 1 x 150kW units. The units were installed at ground elevation with 150ft. HV cables run to ground switches on the ESP roof. Courtesy: AES Gener, Norgener Plant

versus conventional TR sets. Stock was able to utilize their process expertise to provide the customer with performance estimates for a variety of scenarios. They then leveraged the global assets of their parent company, Schenck Process Group, to source trial equipment from their Chinese affiliate for delivery in January 2014. The confidence generated by this analysis prompted the customer to quickly exercise the proposed solution and successfully lower the PM emission rate.

The scope of the project consisted of replacing 3 of 4 conventional TR sets with ModuPower™ SMPS on each of the two units. The ModuPower™ units were installed at grade using 100 kV rated HV cable to connect the high voltage output with the precipitator discharge electrode frame.

This remote mounting capability is unique to the ModuPower™ allowing for flexibility in the final location of the equipment. Stock also provided a ground switch designed to mate up with the Norgener Plant's existing insulator compartments. The combination of these features allowed for the majority of the installation to be performed with the ESP's in service and without removing of the existing TR sets. The final ModuPower™ tie in was performed during brief outages on each unit. Comprehensive support was provided throughout the duration of the project by performing pre-outage site evaluation, providing service engineers for installation support and commissioning, and additional support.

AES Gener's Norgener Plant was able to increase generation to full output while maintaining a PM emission rate below the 50 mg/Nm³ limit after a successful startup of the boiler, ModuPower™ tuning, and refinement of the rapper control program.

No other changes or repairs were made to the precipitator during the installation. The resulting performance improvement was better than expected and allowed the plant to resume full production.

The ModuPower™ units will remain in operation at the Norgener plant until the bag houses are installed. Then the ModuPower™ units may be transported elsewhere within the AES Gener's system to reduce particulate emissions at another facility.

Cristian Olivares, Head of Electrical Maintenance, AES Gener Norgener Plant said, "It was a good experience working with Stock Equipment Company. Stock's Customer service and Field service were fast and thorough. I recommend the product technology offered by Stock Equipment."



Fig. 2 AES Norgener ESP with ModuPower™ ground switches (teal color) installed on top of its ESP. Courtesy: AES Gener, Norgener Plant



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