



SIAM WHITE CEMENT COMPANY LIMITED

Installation of Capacitor Bank to Improve the Power Factor

SUMMARY OF THE OPTION

Siam White Cement Co., Ltd (SWCC) is located the Saraburi, Thailand, and is the largest white cement producer in Thailand with a production capacity of 160,000 tons of white cement.

The power factor at SWCC was 0.8 due to malfunctioning capacitor banks, which were installed to keep the current flow in phase with the voltage. The company pays high fines to the Electricity Generating Authority of Thailand (EGAT) because the power factor is lower than the minimum of 0.85 set by this authority. Two sets of capacitor banks with 200 kVA and 300 kVA were installed to improve the power factor to 0.93.

The installation of two capacitors banks cost US\$ 3,750, but the company gains US\$ 2,750 each year through reduced fines, and the payback period is 16 months. An improved power factor does not result in electricity and greenhouse gas emission reductions. However, the electricity producer benefits because electricity generation is more balanced, and thus the need for new power stations is delayed.

KEY WORDS

Cement, Thailand, Electricity, Power Factor, Capacitor Bank

OBSERVATIONS

Most of SWCC's electrical load has a lot of inductance, which causes the current to "lag" behind the voltage, and a lower power factor.

A capacitor bank consists of many capacitor units connected together. The capacitor bank is usually installed to cancel inductive loads in order to keep the current flow in the system closely "in phase" with the alternating voltage of the system (i.e. power factor close to 1). If the current flow is not "in phase" with the voltage (i.e. the current reaches its peak after the voltage peak in each cycle of alternating supply) then the power delivered is reduced, which can be seen by a lower power factor.

Two sets of capacitors banks (i.e. 200 and 300 kVAs) are installed at SWCC to keep the power factor of the company's electrical supply system above the minimum of 0.85 set by the Electricity Generating Authority of Thailand (EGAT). The Team recognized that capacitor banks were already installed in the company's electrical supply system but they were malfunctioning and had not been replaced. The power factor at SWCC has declined to 0.8 due to malfunctioning capacitors. As a result, the company was fined more than US\$ 25,000 per year by EGAT.

The reason for these fines is that a low power factor causes transmission losses during the delivery of electricity to customers. As a result, the power station must deliver more power to customers, and this means that EGAT must build a new power station sooner to meet increasing electricity demand.



OPTIONS

The Team proposed to replace malfunctioning capacitor banks. A detailed study with the option description and the results of the technical and financial feasibility analysis was submitted to the company's top management. A 300 kVA and a 200 kVA capacitor bank were installed next to the production lines 1 and 2 and close to the loads with inductances (Raw Mill and arc furnace, etc) are located. The installation of capacitor banks increased the power factor of SWCC's electrical supply system from 0.8 to 0.93.

RESULTS

Financial benefits:

- Investment: US\$ 3,750
- Annual cost savings: US\$ 2,750 through reduced fines
- Payback period: 16 months

Environmental benefits:

There are no immediate environmental benefits because increasing the power factor does not result in reduced electricity consumption. However, it does contribute to a reduced need to construct a new power station, and this brings benefits to the environment in the long term.

FOR MORE INFORMATION

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