AVEVA

AES Tietê uses AVEVA™ PI System™ to improve decision-making and dam safety

AES Tietê - www.aesbrasil.com
Industry - Power Generation, Infrastructure/Water

Goals

- Create redundant safety protocols for hydroelectric dams

- Make emergency decisions faster

- Gain real-time insight into reservoir levels

Challenges

- Remote operation of 12 separate facilities

- Difficult to compile data for timely analysis

Results

- Speed up information delivery for remote plant control

- Successfully predicted flowrate trends to simulate reservoir conditions

- Accurate models led to greater dam safety

Solution

- AVEVA PI System

As the primary power producer for the entire state of São Paulo, AES Tietê manages twelve hydroelectric facilities as well as floodgates, dams and boat traffic on the Tietê-Paraná waterway. To ensure downstream plants, population centers and boat traffic remain safe from flooding and increased flow, plant operators and managers control each facility and ancillary service remotely.

Operators need to be able to respond quickly to changing conditions to prevent disaster. In 1977, a dam burst at the Euclides da Cunha hydroelectric plant in Rio Pardo. Carlos Macedo, Operations Engineer at AES Tietê, explained that the terrain in Rio Pardo keeps rainwater from being absorbed by the soil, so it flows directly into the plant's reservoir. "Heavy rain makes the volume [of the reservoir] change very quickly," Macedo said. "Similarly, AES Tietê must decide very quickly how much water we will release." In 1977, the dam burst because operators couldn't make the decision to release water fast enough.

"This case is frightening because even more damaging than the loss of the facility was the damage to the population," Macedo explained. "The wave that emerged from this burst was approximately 3,000 cubic meters per second, while the river's average is 90. It was an avalanche that descended, destroying everything in its path."

Speeding up response time

After the cataclysmic disaster at the Euclides da Cunha hydroelectric plant, AES Tietê constructed a telemetric network, which allows each plant to measure flow rates before water reaches the reservoir, as well as to record rainfall in the water catchment area. It also put many analog safeguards in place. It created emergency operating manuals with procedures for each of its facilities. It also instituted a policy under which, in case of emergency, decision-making reverts to the local facility.

Though AES Tietê had already installed the telemetric network, with so many data points, it was difficult for dam operators to compile and analyze the information.

The manuals generated a set of standards and tables that operators had to first refer to before running calculations manually. This whole analog process ended up making operations slower.

To streamline the process, the team input data from the telemetric network and tables from the operations center into AVEVA PI System.

"In some situations, timing is crucial, which is what happened in Euclides da Cunha. Precisely for this reason, we use PI System to help us make such decisions."

-
Carlos Macedo
Operations Engineer, AES Tietê

The team also used AVEVA PI System to create logical calculations that estimate the inflow to the plants, which made simulation of reservoir conditions possible.

"We managed to give the operator a single view of everything that was happening in the reservoir."

-
Carlos Macedo
Operations Engineer, AES Tietê

Data saves the day

In January 2016, another heavy rainfall threatened the same dam in Euclides da Cunha, but this time, AES Tietê successfully predicted and calculated the flow rate, which allowed dam operators to take action quickly.

Had operators waited just another hour to take the same measures, the reservoir water level would have reached a critical level. AVEVA PI System allowed plant operators to predict trends and speed up information delivery so remote plant control was more accurate and reliable. AE AES Tietê – along with AVEVA PI System – ensured the safety of the facility and the residents living near the reservoir.