OSIsoft®

SUMMARY

AES Tietê

Industry

Power Generation

Business Value

- Process Productivity
- Safety and Security
- Regulatory Reporting

PI System™ Components

- PI Server™
  - Data Archive
  - Asset Framework (AF)

Improving decision making at AES Tietê with data

One of the world's most important energy producing companies, AES generates and distributes electricity in 17 countries, employing around 21,000 people around the globe and serving over 10 million customers. In Brazil, the group's operations are divided into five different companies: AES Eletropaulo, AES Ergos, AES Sul, AES Uruguaiana, and AES Tietê. At the 2016 LATAM Regional Conference, Carlos Macedo, operations engineer at AES Tietê, describes the company's operations and how the PI System was used to streamline decision-making, minimizing risks and optimizing the operation of power plants at the AES Tietê division.

The presentation started with an introduction to AES Tietê, which has 12 facilities that generate hydroelectric power in the state of São Paulo and operates the Tietê - Paraná waterway. To manage all of these locations, power plants, floodgates, and ancillary services are remotely controlled and supervised. This control is crucial for: dam safety, preventing flooding of downstream plants, avoiding detrimental effects on the population who lives in areas where plant water drains, and navigating waterways as boats cannot go up-river when the flow is high.

To illustrate the consequences when such control doesn't work properly, Macedo described a case that occurred in 1977 at the Euclides da Cunha hydroelectric plant in Rio Pardo, which is a rocky and mountainous region. Macedo explained that the terain 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. Similarly, we have to decide very quickly how much water we will release," he continues. In 1977, that decision to release water was not made fast enough and the dam burst. "This case is frightening, because even more damaging than the loss of the facility was the damage to the population," Macedo explains. "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."

To keep an accident of this scale from repeating, AES Tietê adopted the following measures:

- Created an operating manual for emergency situations for each facility, that describing the procedures to be followed if a critical water level in the reservoir is reached;
- When a critical level is reached, decision-making and control must be decentralized and switched to the local facility, as soon as possible;
- Construction of a telemetric network, so the plant can measure water flow rates before they reach the reservoir and measure rainfall in the water catchment area.

Macedo continued the presentation saying "But if [the set of measures] worked, why do we then use the PI System?" He explained that the manuals generated a set of standards and tables that operators had to refer to but then had to run calculations manually. This whole analog process ended up making operations slower. "In some situations, timing is crucial, which is what happened in Euclides da Cunha. Precisely for this reason, we used the PI [System] to help us make such decisions."

Macedo explained, that to streamline the process the team input data from the telemetric network and the tables that were scattered around the operations center into the PI System. Moreover, logical calculations were created to estimate the inflow into 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," he says.

Demonstrating the success of using the PI System, Macedo says that in January 2016, heavy rainfall threatened the same dam in Euclides da Cunha. However, the tools made it possible to predict and calculate the flow rate, allowing action to be taken quickly. He explains that if the same measures had been taken just one hour later, the reservoir water level would have reached a critical level. The PI System gave plant operations the ability to predicting trends and speed up information delivery so remote plant control was more accurate and reliable, thus ensuring the safety of both the facility and the residents living near the reservoir.

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>
> – Carlos Macedo,
>   Operations Engineer,
>   AES Tietê

Macedo, Carlos. *Aprimorando a tomada de decisões na AES Tietê através dos dados*. OSIsoft.com. 08 Jun 2016. Web 15 September 2016. <http://www.osisoft.com/Presentations/PI-System-e-Hidrologia--Uma-Uni%C3%A3o-Promissora>.