AVEVA

AGL enhances power generation site efficiency with predictive modeling and cloud-based data sharing

Australian Gas Light Energy (AGL) - www.agl.com.au
Industry - Power generation

Goals

- Give teams across the organization access to real-time data

- Expand from real-time awareness to predictive modeling

- Share power generation data securely with partners to optimize usage across distributed power generation sites

Challenges

- Company growth presented challenges to managing data systems

- Legacy systems couldn't access real-time data or support predictive analytics

- Aging turbines struggled to change direction to face into the wind

- Partner sites required enhanced collaboration and visibility

Results

- In just three years, AGL saved AU$18.7M in reduced forced outages and optimized maintenance

- Avoided an outage that would have cost 50-70 million AUD

- Real-time data sharing with partners reduced time generating reports, saving an estimated AU$35,000 in annual AGL worker hours

- A return on investment in just four months after upgrading the wind vanes on 200 machines

Solutions

- AVEVA™ PI System™

- AVEVA™ Data Hub

In 1837, Australian Gas Light Energy (AGL) was founded in Sydney. At the time, Sydney was a small colonial outpost with less than 35,000 people, and "grid management" consisted of operating a few gas lamps. Today, AGL manages one-third of the energy generated for Australia's eastern seaboard, where most of the nation's population lives.

Acquisitions and renewable adoption have been accelerating. In 2012, when David Bartolo, AGL's head of asset performance, joined the company, it had grown from supplying 300 megawatts (MW) of electricity in 2005 to providing 5,500 MW of output and was looking to further expand to 9,000 MW.

However, growth came at a price. "We were completely data blind," said Bartolo. "I had built a central asset management team. They were really clever people with years and years of experience, and they couldn't see a single piece of real-time data centrally.

I had to ask one of the sites to print off a trend every ten seconds and send me the screenshots so I could understand what happened during an overflow incident. It doesn't get worse than this."

Empowering employee innovation through data

AGL wanted everyone across the organization to have access to real-time data, so they could be empowered to make changes that would benefit the bottom line. "What came along was a solution that really fit what we needed, and that was [AVEVA PI System]," said Bartolo. "It could connect to any one of our controllers. We could harvest every piece of real-time data and make it available to every person at AGL."

After a single day of training, AGL employees throughout the organization found new and innovative uses for AVEVA PI System. For example, one engineer built a display to see the aggregate view of how two solar farm sites were performing. Chemists set alarms to add years to the lives of boiler-cycle assets. And other users built screens to monitor generator temperatures.

A non-engineer built a screen to monitor trends in small hydro units located 700 kilometers away. Immediately, he could see why his machines were tripping and remotely directed on-site subcontractors to the source of the problem. In just three months, the availability of those hydro units rose by seven percent.

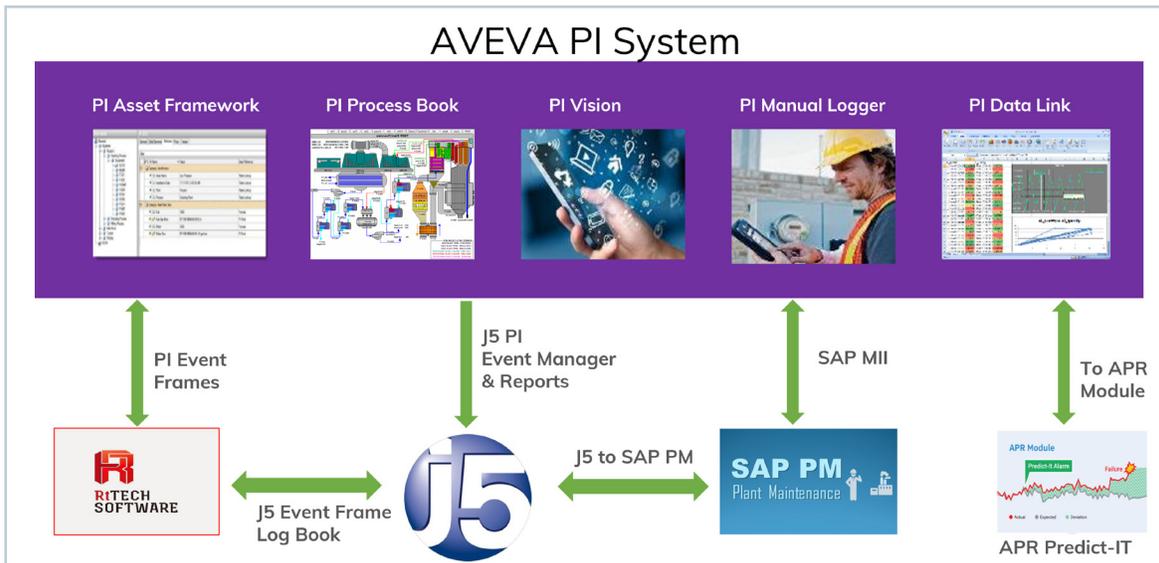## Avoiding outages with predictive modeling

In April 2015, AGL launched its Operational Diagnostics Center to move beyond real-time awareness to predictive modeling. The company implemented ECG's Predict-It anomaly-detection software for advanced pattern recognition.

AGL employees built 3,500 models that monitor 52,000 critical data points every five minutes, correlating incoming data with historical data. When correlations begin to vary, the team knows that something is wrong.

The project's cost was substantial – AU$1.2 million for initial setup and AU$620,000 for annual operating costs. However, the investment returned massive value quickly. In just three years, AGL saved AU$18.7 million in reduced forced outages and optimized maintenance. Since then, the solution has helped AGL create value of six to eight million AUD per year.

In addition, in 2017, AVEVA PI System helped AGL catch and prevent a catastrophic failure in a 560 MW hydrogen-cooled stator. Alarms from AVEVA PI System started ringing and the team saw anomalies in the hydrogen exit temperatures. An initial inspection did not reveal the cause.

When the instrument was recalibrated and put back online, the data showed a worsening problem, so the team planned an outage to investigate. After a partial dismantle, the team found that they were mere days from a number of coils catching fire. Had that occurred, the resulting outage would have cost AU$50-70 million.

AVEVA PI System

PI Asset Framework | PI Process Book | PI Vision | PI Manual Logger | PI Data Link

PI Event Frames

J5 PI Event Manager & Reports

SAP MII

To APR Module

RiTECH SOFTWARE

J5 Event Frame Log Book

J5 to SAP PM

SAP PM Plant Maintenance

APR Predict-IT

AVEVA PI System is the heart of AGL's operational technology platform

Reducing fuel consumption and saving millions

Today, AVEVA PI System is the center of AGL's enterprise operational technology platform, and the energy company is deploying two new initiatives. The first is a thermodynamic performance-optimization system, which aims to reduce fuel consumption by 0.5% and reduce CO_2 emissions, a marginal improvement that translates to savings of millions of dollars per year. The second is a wind-yield-optimization system, which targets a one to two percent increased yield in AGL's wind portfolio.

Data-sharing with partners saves AGL precious time

AGL also imports data from external sources, such as from test labs, directly into its AVEVA PI System, allowing AGL to integrate externally sourced data with its own, enriching its data ecosystem and expanding its data-driven capabilities.

Additionally, AGL used AVEVA Data Hub to securely share wind and solar generation data in the cloud with authorized partners in remote locations to gain insights into its power generation sites. Previously, AGL had to regularly create static reports on the renewable assets for its partners, but with AVEVA Data Hub, AGL can securely share real-time and dynamic data with multiple partners, saving precious time.

"AGL Energy [is] excited to be leveraging AVEVA Data Hub to deliver a new standard in collaboration and real-time data transparency within our renewable utility network," Bartolo said. "Newfound insights into energy and power generation are helping us enhance site efficiency and asset utilization, while mitigating costs and potential critical outages. We anticipate significant in-person savings in the first year and look forward to leveraging our competitive advantage to provide similar value to our diverse power generation portfolio."

So far, the AVEVA Data Hub data sharing effort has saved AGL an estimated annual personnel hour savings of AU\$ 7,000 with one partner and AU\$28,000 with three additional partners.

"The strategy we have around cloud technology is evolving very quickly. We see that for the foreseeable future we'll be running AVEVA PI System on-premises, but we'll be harnessing the AVEVA cloud solution to help us connect our data to the universities around the world and the original equipment manufacturers, especially for these new assets, so they can understand how those assets are behaving, as well as us."

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David Bartolo
Head of Asset Performance, AGL

A windfall return on investment for aging turbines

At one of AGL's wind farms, aging turbines struggled to face the wind at all times, wasting valuable wind energy potential. AGL needed to build an algorithm that was able to spot whether the turbine was facing the wind without needing to visit the turbines. This analysis required the team to pull data from turbines across the farm and use a machine-learning algorithm to compare the performance of each turbine. AVEVA PI System data allowed AGL to take data from one turbine and scale that data up to a number of turbines behaving the same way. AVEVA PI System also sped up data collection – from a ten-minute average to every second. These results justified upgrading the wind vanes on 200 turbines, and AGL realized a return on that investment in just four months.

After over a decade of technical partnership with AVEVA, AGL's David Bartolo said, "[our work with AVEVA] is the benchmark by which we measure technical partnerships."

To learn more about AVEVA's solutions for power and utilities, please visit: **aveva.com/en/products/pi-data-infrastructure**

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