

# REAL-TIME PERFORMANCE MANAGEMENT INCREASES PROFITABILITY

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Large power companies worldwide are deploying enterprise-wide software architectures to do real-time performance management (RTPM) and increase profitability. They are monitoring plant operations data in real-time and providing enterprise-wide views to all levels of management.

Data is collected from the many different sources typically found in a plant (Figure 1). It is then stored online, organized in proper context and distributed over the plant LAN/corporate WAN for viewing anywhere, anytime across the corporation.

Access to operational data sources in real-time permits remote monitoring of unit performance and allows immediate action on deviations. For example, a travelling executive can monitor key performance indicators (KPIs) of all units in all plants using a wireless connection to their PDA. Operations can monitor running conditions of geographically dispersed plants over the Internet or corporate intranet. With access to all operational data sources in real-time, engineers can troubleshoot or optimize unit operation right from their desktop. Real-time performance management harnesses increased productivity in three main areas — availability, performance and reliability.

## Availability

A smart way to increase profit is to improve unit availability. Time is critical to maintaining unit availability — corporate executives, engineers, maintenance and operations personnel all need operational information in real-time to understand and predict the behavior of the corporation's units. Real-time performance management can provide not only unit operations information, but also actionable intelligence to all parts of the company in seconds or minutes instead of days and weeks. A variety of factors can influence unit availability — equipment health, weather conditions, head pond levels, etc.

With accurate operations intelli-

gence, engineers and planners can take preventive action to minimize unplanned outages and the resulting negative effects. Even in the case of an unplanned outage, decision makers can determine and immediately implement the lowest cost solution. Increasing availability by one megawatt-hour for the entire year can yield significant increased revenue. Traders, ISOs and executives are resolving disputes about transaction history using information collected, stored and aggregated in RTPM performance applications.

Corporations can monitor the following to determine availability:

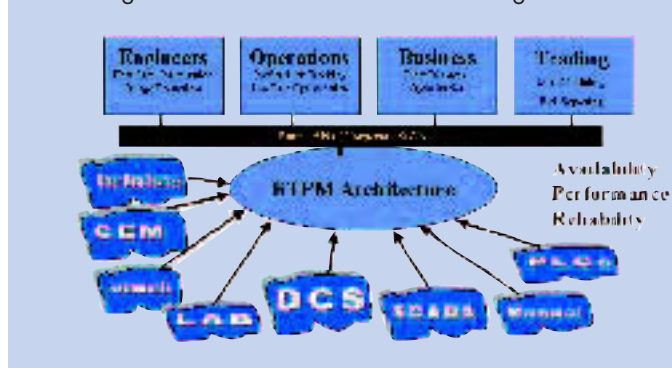
- Generation statistics and characteristics
- Weather — past patterns and present conditions
- Plant information — use past/present behavior to predict future performance
- Cost of outages — planned and unplanned
- Lost opportunity costs

Plants can track the following unit availability factors: megawatts available; ramp rates; operating status (AGC, base load); fuel (type, cost); heat rate efficiencies; and emissions limits.

## Performance

Depending on the age and type of fuel used, power plant units vary greatly in their efficiency, with many older units operating as low as 35 per cent efficient. Power companies are increasing unit efficiencies by using RTPM to continually monitor their units and track the most significant cost issues. The financial savings are substantial — an efficiency increase of one per cent on 1000MW can reduce annual costs by more than US\$1 million.

Figure 1: Real-Time Performance Management



Many companies initially concentrate on plant equipment health and boiler efficiency when building performance-monitoring applications, however, another major benefit is often realized in reduced plant electrical service. The average coal- or oil-fired plant uses up to 10 per cent of the power generated to produce the power and a reduction of only one megawatt of power can provide large financial gains. More efficient use of plant equipment also reduces wear, lowering maintenance costs.

Companies are using a variety of methods to implement these performance solutions. Many internal engineering groups configure and implement their own performance applications using the analysis and visualization tools of the RTPM architecture. Some companies hire outside consulting experts to engineer the performance solutions. Others use the RTPM architecture to collect, store and visualize the data for integrated third party performance-monitoring applications.

Performance can be tracked using RTPM to determine: generation characteristics and statistics; load optimization versus generation; and past/present performance for predicting future performance. Plants can use RTPM to improve unit performance by: optimizing heat rate; optimizing fuel consumption; optimizing emissions output versus limits; minimizing station service; and tracking fuel type and cost information.

## Reliability

Power sales are only as valuable as the reliability of the plant equipment. Real-time performance management enables effective troubleshooting and accurate predictive maintenance by providing enterprise-wide access to historical data in its original fidelity and in the proper context. In a recent example, a plant engineer used the trend analyses to predict that a unit did not need to be brought down for maintenance. The avoided replacement power costs exceeded the cost of deploying the RTPM architecture in the plant.

The RTPM architecture includes an integrated module database to configure information hierarchically. Using the hierarchical structure, knowledge workers can group data points by division, plant, unit and equipment. This enables engineers and troubleshooting experts to easily find individual data points and view historical trends. Unit performance can be analyzed against its own historical performance or compared to the performance of other units.

Rule-based unit condition assessment can be determined from real-time and historical operating data using the advanced calculation engine built into the RTPM architecture. This enables equipment performance to be assessed based on actual unit run-time conditions and reliability criteria and to automatically trigger maintenance alerts. The advanced calculation engine can also be used to build software-based smart sensor calculations to monitor difficult-to-measure variables.

Corporations and plants can use RTPM to improve reliability as follows:

- More accurately predict available megawatts
- Predict future reliability based on past/present reliability statistics
- Reduce unit downtimes
- Reduce unplanned outages
- Increase run-time between planned outages
- More accurately predict mean time between failure (MTBF)
- Speed up troubleshooting with better information/analysis
- Provide better information for equipment health monitoring and maintenance

## Conclusion

Implementing real-time performance management provides many ongoing benefits to a power corporation. Plant engineers, by accessing historical maintenance information and calculating

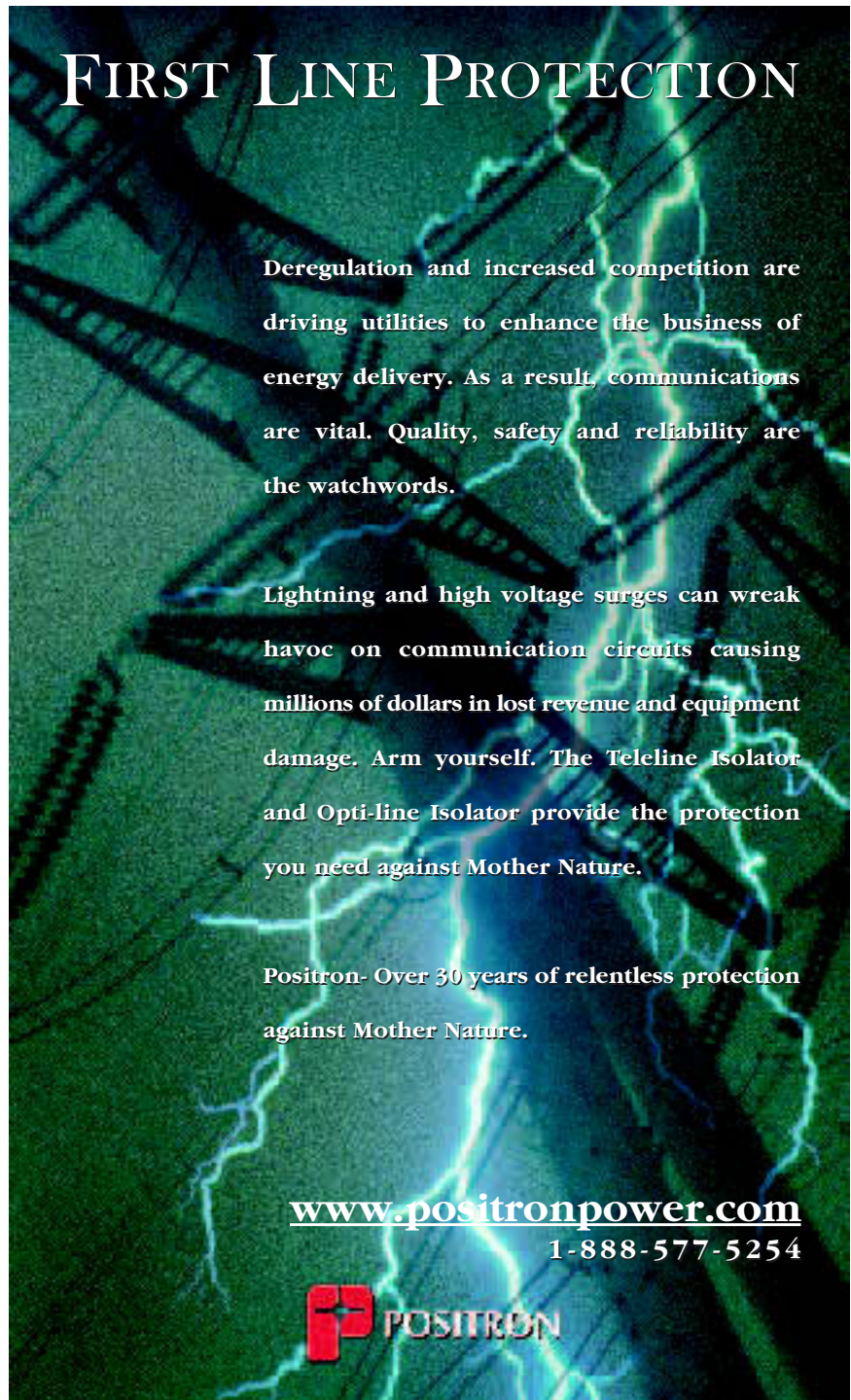
run times and start/stops, can optimize equipment service intervals. With the ability to view data remotely, experts can troubleshoot equipment from anywhere in the world reducing the time to get units back on line. With accurate maintenance information, online companies can better negotiate warranty disputes with individual equipment vendors.

Corporate management, with a real time view of plant operations worldwide, can make decisions in minutes that otherwise would have required days or

weeks just to compile and analyze the information.

Most power companies who have implemented an RTPM infrastructure agree that it's a good investment. Installation is quick, benefits are realized within weeks and, in many instances, their initial investment has been recovered within a few months after installation and deployment.

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