



NUCLEAR POWER GENERATION

Korea Hydro & Nuclear Power Co., Ltd.

Corporate Headquarters:

Seoul, Republic of Korea

Technical Environment:

Intel, Microsoft, Cisco, Informix

Challenge:

Find an enterprise-level, unifying real-time platform that the environmental monitoring group could use to monitor and manage emissions from KHNP's nuclear power plants. Ensure that the company meets Korean environmental guidelines and provides continuous data to local communities were key requirements.

Why OSIsoft Won:

OSIsoft is a reliable, SAP-certified partner providing a bi-directional link between the production floor and SAP business applications, giving KHNP a seamless flow of information from the production units to business management.

RtPM Applications:

- Continuous Emissions Monitor
- Corporate Data Warehouse
- Environmental Compliance Monitor
- Manual Data Recording
- Plant Performance Overviews
- Power Turbine Trip Monitor
- Process Performance Analysis
- Production Data Integration to ERP
- Waste Treatment Monitor
- Weather Data Import

Benefits:

- Unifies previously separate and independent environmental monitoring systems at each of the plant sites
- Gives environmental engineers real-time information to help in identifying process abnormalities and determining the corrective action
- Integrates with SAP for synchronized data from the boardroom to the plant floor
- Provides the local community with Web-based information and updates on the nuclear plant's environmental emissions, thereby improving KHNP's public image

Korea Hydro & Nuclear Power Co. monitors environmental emissions with Real-time Performance Management from OSIsoft

Formed in 2001 as the result of a government initiative to create competitive subsidiaries in the power generation industry, Korea Hydro & Nuclear Power Company (KHNP) needed to monitor different variables at its multiple nuclear power facilities. KHNP also wanted to actively manage the changing business conditions in Korea. There was increasing public and government concern about safety and the environmental impact of nuclear power. Residents in the towns surrounding the plants were demanding greater transparency of operations and systems. Additional requirements were to enhance the efficiency of information between facilities and integrate plant data with the company's SAP Enterprise Resource Planning system. To solve information access and transparency problems, KHNP chose the Real-time Performance Management™ (RtPM™) Platform from OSIsoft®.



B.S. Lim

Assistant Manager
Radiation and Environment Management
Korea Hydro & Nuclear Power Co., Ltd.

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Korea Hydro and Nuclear Power Company, headquartered in Seoul, was formed as the result of the Korea Electric Power Corporation (KEPCO) reorganizing and splitting up into six separate subsidiaries. Government-owned KHNP is the largest of the country's power generation companies, producing 40% of all the electricity consumed in Korea. KHNP is the 6th largest producer of nuclear power in the world, out of a world total of more than 430 commercial nuclear generating units. The installed nuclear capacity is 15,716MW, or 28% of the country's total installed capacity. Nuclear power output is 129 billion kWh (40.2% of the country's electricity consumption), with average capacity of the nuclear power plants at 94.2%.

The government's restructuring strategy in the power industry has focused on ways to resolve Korea's power supply reliability and quality issues. The goal is to provide residents with stable supplies of high-quality, low-cost power by maximizing the competitiveness and efficiency of the various power generation companies. By reorganizing the utility industry, the government wanted to stimulate competition.

As one of KEPCO's subsidiaries, KHNP consists of both nuclear and hydro power plants. These plants are located in Yonggwang (6 plants in operation), Wolsong (four plants in operation), Kori (four plants in operation) and Ulchin (four plants in operation, two under construction). The nuclear reactors managed by KHNP are designed to initiate, control, and sustain a nuclear fission chain reaction that provides heat for electricity generation for communities. During the various stages of this process, emissions must be monitored, analyzed, and controlled.

The company needed to monitor such factors as environmental radiation dose rate, radioactivity in discharge, intake/discharge temperature, COD[KEC1], pH, water quantity in waste water disposal facility, and in-house radiation dose rate/activity concentration. KHNP also wanted to manage its response to the changing business conditions in Korea. With increasing public and government concern about the safety and environmental impact of nuclear power, residents in the surrounding towns had been demanding more information in order to establish safe management. To give the public and KHNP operations more operational visibility, there was a great need for a system that could continuously capture and deliver reliable information to many different users in an array of locations.

Integrating and delivering information

The company evaluated the situation, and realized it needed to improve the information flow by collecting and analyzing environment-related data in real time, and synchronizing/integrating that data with the company's SAP system. KHNP wanted to integrate various environmental monitoring systems, which were operating independently at each of the numerous nuclear plant



KORI NPP

sites, into one unified system. This system would share data at the enterprise level, integrate with the company's SAP system, and provide open, environmental-specific information to the public over the Internet.

The different systems to be unified and KPI's to be measured were:

- **Environment radiation monitoring system** — radiation dose rate in the air
- **Sea water radiation monitoring system** — radioactivity in discharge
- **Telemetry monitoring system** — flow quantity, pH, COD in the waste water disposal facility
- **Automatic meteorological system** — temperature, rainfall, wind speed, wind direction, etc.
- **Intake/discharge temperature monitoring system** — temperature, flow, velocity, flow direction
- **Thermoluminescent dosimeter** — accumulated dose in the air
- **Portable radiation detector** — radiation dose rate in the air

To unify these systems, effectively monitor KPIs, and accurately analyze the environmental emission process, KHNP chose OSIsoft's RtPM Platform and RLINK™ interface. The RtPM Platform was selected as the foundation to deliver real-time information across organizational boundaries and to continuously improve the performance of KHNP operations. RLINK is the SAP-certified

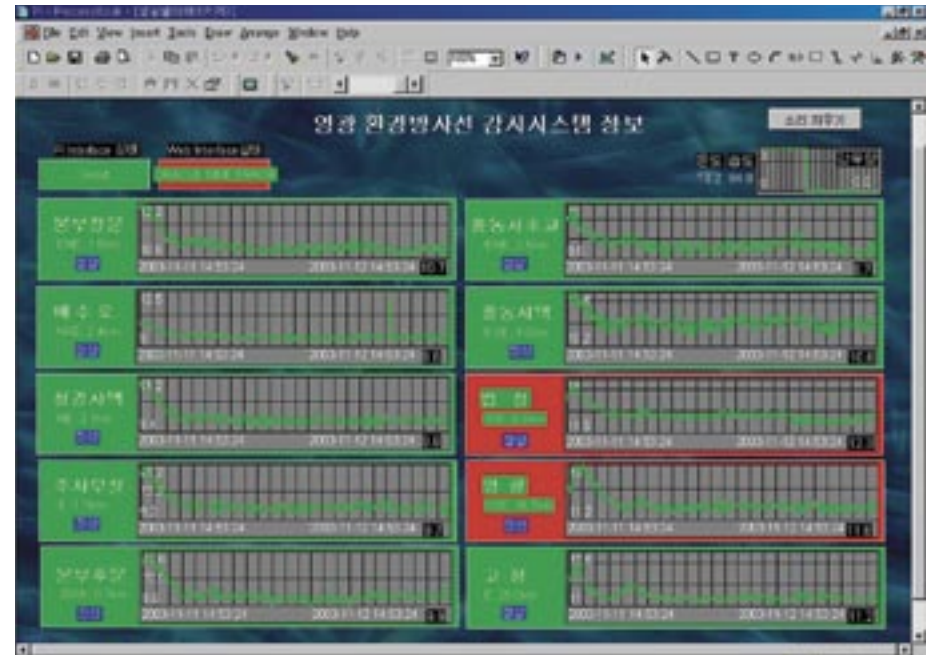
bi-directional link between the production floor and SAP business applications that closes the loop between KHNP's operating decisions based on SAP R/3 and the actual plant floor operation. Using RLINK, KHNP delivers timely process data and events to and from SAP business systems.

With the help of OSIsoft's distributor in Korea, AID Corporation, the environmental monitoring engineers were trained on site on OSIsoft's PI System™ (PI), the engine that feeds real-time, time-series data to the RtPM Platform. The PI System generates a series of both real-time and monthly reports for the environmental engineers. Users visualize and monitor performance via OSIsoft's ProcessBook package that allows users to create dynamic, interactive graphical displays; and via spreadsheet reports that update in real-time via DataLink; and via ActiveView, which seamlessly renders existing ProcessBook displays on the Web. Later, KHNP plans to move to OSIsoft's RtPortal™ product, which delivers secure, Web-based information throughout the enterprise and beyond.

"We found that the RtPM Platform was very easy to learn," said Mr. BS Lim, an assistant manager at the Radiation and Environment Management department of KHNP. "With the help of RtPM, we are able to constantly detect any and all changes in radiation levels in real time. Thankfully, there have been no radiation leaks from the environment radiation monitoring system and no impact to the environment or residents. The effluent of the radioactive waste (gaseous and liquid) has been thoroughly controlled and the information is provided to the community through the Internet."



Main Control Room where real-time data is a vital part of decision-making and operations.



KHNP engineers monitor real-time information (data, status of alarm) of the environmental radiation dose rate in ProcessBook.

ERP Integration

The SAP system at KHNP is used to coordinate all the transactions in the corporation; including sales, manufacturing, purchasing, inventory, finance, and personnel. By integrating real-time operations data with SAP, decision makers always have an up-to-date view of nuclear power plant operations. In many cases, the RtPM Platform plays a key role in this business architecture because it ensures delivery of timely, accurate, and reliable environmental emissions data to business-level systems. Through the capability of RLINK™, OSIsoft's bi-directional gateway between production floor data and ERP systems, the RtPM Platform is able to integrate directly with the SAP system, for an enterprise-wide sharing of information from the plant floor to the business office.

The PI System collects the legacy system data on environmental monitoring from all of the nuclear power plants through RDBMS interfaces to the various databases in Informix and SQL Server; performs calculations for analysis; and displays the data in real time. Through RLINK, the PI System sends the chemical data and rotary machine's operation status to the SAP system at the corporate office in Seoul.

Efficient power production with public trust

Using the RtPM Platform, KHNP developed a web display that enables environmental engineers to view the status of any of the plants, as well as its systems and sensors, at any time, from anywhere. The public has access over the Internet to a Web site that displays such factors as temperature, humidity, rainfall, direction and velocity of the wind, temperature of the intake/discharge, and the quantity of outflow, pH, and COD (KEC2) of the waste water disposal facility. Most of this information is transmitted and updated every five minutes.

The benefits achieved by implementing the RtPM Platform have been numerous. “We have established information sharing at the highest level,” says Mr. B.S. Lim, “as well as enhanced our productivity, secure collaboration, operational transparency and reliability, and created an image of integrity and safety to the public. Best of all, the Platform is easy to use and maintain, and we continue to find more ways to use it.”



KHNP information including environmental radiation dose rate, intake/discharge temperature etc. made available to the public.



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The RtPM Platform will continue to play a key role in real-time performance management at KHNP as the company expands in the future. In the process, KHNP will maintain its position as the nation's leading power generation company, ensuring a stable supply at an affordable cost. The company is truly using RtPM to fulfill its corporate mission of creating the world's most efficient power company with the public's trust.

Real-world, real-time success

The RtPM benefits and savings presented here, as well as the superiority of OSIsoft products, are actual matters of record at Korea Hydro & Nuclear Power Company. To find out how your company could become a real-world success story like this, email casestudy@osisoft.com. Explore the power of RtPM at www.osisoft.com/rtpm.

