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Steam Supply Control System for Geothermal Power Plant in the Philippines

Location: Sitio Pataan, Brgy. Mailum, Bago City, Negros Occidental, Philippines
End User: Philippine National Oil Company - Energy Development Corporation (PNOC-EDC)
EPC: Kanematsu Corporation and Yokogawa Philippines Incorporated
Order Date: December 2005
Start of Operations: February 2007
Industry: Power

Plant Information

Geothermal Power Plant
Generation Output: 49MW
Steam Turbine Generator: Fuji Electric/ABB Control Systems
Fluid Collection & Recycling System: Yokogawa CS 3000 DCS



Executive Summary

The Northern Negros Geothermal Project (NNGP) is a breakthrough for Yokogawa. After a long selection process, PNOC-EDC awarded the contract for a Fluid Collection Re-injection System (FCRS) control system to Yokogawa. This attests to the Company's capabilities as a major automation vendor.

There were several key factors for this success:

1. Yokogawa had a strong track record in the region of executing projects involving FOUNDATION fieldbus™ technology, which had been selected for the control system. This was critical in gaining the trust and confidence of the PNOC-EDC. The coordination and cooperation between Yokogawa Engineering Asia Pte. Ltd. and other Yokogawa companies showed PNOC-EDC that Yokogawa was the best partner for automation of the FCRS control system. Another advantage was that Yokogawa's infrastructure in the Philippines ensured long-term support.
2. The contract included not only CS 3000 Vnet/IP, field instrumentation from Yokogawa and other suppliers, PRM, and engineering, but also construction. Yokogawa's project management expertise was another important success factor.

Through this project, PNOC-EDC obtained:

- State-of-the-art FOUNDATION fieldbus technology
- Plant Resource Manager (PRM) field device management system
- Remote data monitoring capability via wide area network (WAN)



The Challenges and the Solutions

- State-of-the-art FOUNDATION fieldbus technology
PNOC-EDC had adopted FOUNDATION fieldbus and was aware that there were many vendors of this technology. They needed to select the best partner for the long haul, and they did this through interviews and plant visits. After speaking with other end users of Yokogawa fieldbus products in the region, PNOC-EDC saw that Yokogawa was best positioned for a long-term relationship.

- Plant Resource Manager (PRM) field device management system
PNOC-EDC recognized the importance of optimizing its operational costs and realized that asset management would be a critical success factor for attaining this objective. Yokogawa’s versatile PRM platform and fieldbus devices met the operational and technical requirements. With PRM, PNOC-EDC anticipates lower operational costs, effective maintenance programs, and high system availability.

- Remote data monitoring via WAN
Critical to the overall operation of the plant was the availability of plant information to PNOC control centers in Negros and in Manila. As part of the project, the FCRS control system was connected to a WAN by another vendor.

Customer Satisfaction

PNOC-EDC was very satisfied with Yokogawa’s performance in the NNGP. The Company earned the customer’s trust with its project management expertise and local engineering capabilities.

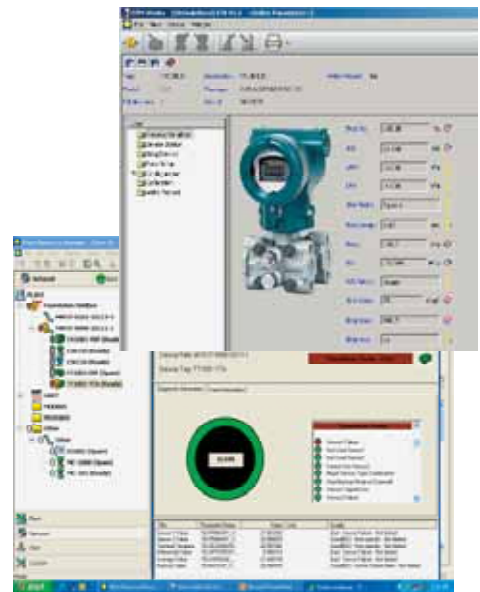
This project is part of the government’s efforts to reduce dependency on oil through the use of renewable energy sources. The NNGP was inaugurated by no less than the President of The Philippines, Ms. Gloria Arroyo, who was accompanied by key officials in the power sector.

About the End User

PNOC-EDC was established in 1976 to undertake the exploration and development of geothermal energy sources in the Philippines. It is engaged in the integration of power generation and the sale of steam to the National Power Corporation (NPC). It has been responsible for making the country the world’s second largest producer of geothermal steam and user of wet steam technology for energy production.

To date, PNOC-EDC operates nine geothermal steam fields with an aggregate capacity of 1,145 megawatts, accounting for about 60% of the country’s total installed geothermal capacity. Since PNOC-EDC’s venture into the power generation business in 1996 through a build-operate-transfer (BOT) scheme, it has made a significant contribution to growing the country’s overall power generation capacity. With the expiration of the first BOT contract in 2006, the company started to take over the operation of the BOT power plants.

PRM window



President Arroyo

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About the Project

The NNGP site is near Mt. Kanlaon. The P7.8-billion (US\$159.6 million), 49-MW project is funded by a loan package from the Japan Bank of International Cooperation (JBIC). This is the first geothermal power plant to be managed by PNOC-EDC. It is one of 20 projects that will be implemented during the 2006-2014 timeframe.

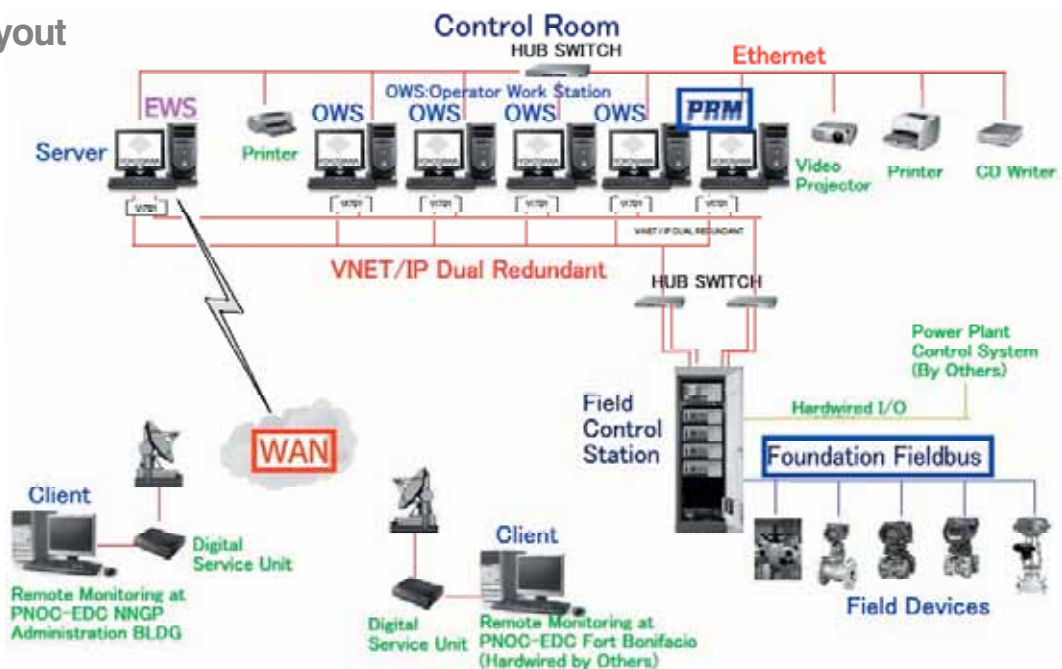
The construction work included the FCRS, steam supply development, steam turbine, generator, substation, and transmission lines.

The FCRS supplied by Yokogawa plays a critical role in the operation of the power plant by controlling the geothermal steam and the condensate, which need to be re-injected back into the earth to ensure a continuous supply of geothermal steam.

With the successful completion of the NNGP, Yokogawa has strengthened its relationship with PNOC-EDC. Yokogawa is now preparing for its next project with PNOC-EDC.

The Northern Negros Geothermal Power Plant is a welcome development not only for the people of Negros Occidental, but for those living on Panay Island as well. The plant will supply electric utility cooperatives in the Western Visayas Region.

System Layout



<Project Scope>

Control system: CENTUM CS 3000 & PRM

Number of I/O points: 112 points (14 segments)

Products: EJX430A (52 units), EJX110A (52 units) and CA71 (1 unit)

System configuration:

- FOUNDATION fieldbus: for advanced field instrumentation
- Standard-configuration transmitters for the geothermal application:
 - EJX430A-FAS3G-917DN/A/X2/D4/M11
 - EJX110A-FAS3G-917DN/A/X2/D4/M11
- PRM: for optimal plant asset management
- WAN: for remote data monitoring