



Power Stability Expert

| Case Study |

# China Southern Power Grid EMS Management System for the Most Complex Power Grids in the World



Faced with the difficult to manage the world's most complex power grids, China Southern Power Grid company needed a more open and powerful Energy Management System(EMS) to improve information sharing and enhance economical operation of the grid. NR Electric(NR), as a power stability expert, has developed a customized EMS to deal with client's needs. After put into service, PCS-9000 EMS has been operating smoothly for over 20 years, leading to effective system management and better economic benefits.

## Overview

China Southern Power Grid Co., Ltd. (hereinafter referred to as CSG) is the second largest utility company in China which invests, constructs and operates power networks in Guangdong, Guangxi, Yunnan, Guizhou and Hainan provinces and regions with a total service area of 1 million square kilometers and a population of 230 million. Adjacent to Hong Kong, Macau, and bordering Vietnam, Laos and Myanmar, CSG also supplies electricity to Vietnam, Laos and Myanmar through ten 110 kV and above lines.

Featuring long distance, extra high voltage and hybrid DC/AC operation, China Southern power grid is considered as one of the most complex power grids in the world. With power grid spanning 2000 km from west to east, the total installed capacity was 0.267 TW in 2015. CSG has built an "8AC and 8DC" grid in the "West-to-East" Power Transmission with the maximum power transmission capacity over 35GW. In the service area of CSG, the 220kV-and-above transmission lines.

*The whole grid contains 2 sets of 800kV converter substations, 165 sets of 500kV Substations, 814 sets of 220kV substations, 3259 sets of 110kV substations and 2707 sets of 35kV substations.*

## Existing Problems

With expansion of China southern power grid, the existing EMS can't meet requirements of ever-changing power system. Before 2014, there are over 20 systems deployed in the control center of CSG. All these systems need real-time data of power system and share information with each other, and therefore CSG requires a more open and powerful EMS.

The EMS is an important foundation to ensure safety, quality and economy of the power grid. It would provide more comprehensive, timely and accurate monitoring and management of power grid when it interchanges information with other systems. The openness of the existing EMS of CSG is poor and a new generation of EMS is expected.



## NR Solution

In April 2014, CSG has chosen NR Electric(NR) as the supplier to help the company to enhance network efficiency, increase power reliability and provide strategy support to dispatchers. Based on a thorough system study and analysis, NR has offered a customized EMS solution for CSG to enhance economical and efficient system operation. PCS-9000 EMS consists two parts: Operation Control Subsystem and Operation Management Subsystem. Functions supplied by PCS-9000 EMS include:

### PCS-9000 EMS

SCADA(supervisory control and data acquisition)	DMIS(Dispatching Management Information System)	SCIS(Satellite Cloud Image System)
AGC(Automatic Generation Control)	AMS(Automatic Metering System)	MIADSS(Meteorological Information Application Decision Support System)
NAS(Network Analysis Software)	PSCS (Power Stability Control System)	DSMS(Device Status Monitoring System)
WAMS(Wide Area Measurement System)	DRRMS(Digital Relays Remote Monitoring System)	GIS(Geographic Information System)
DTS(Dispatcher Training Simulator)	DFRMS(Disturbance and Fault Recording Management System)	

PCS-9000 EMS follows the SOA architecture, based on the unified modeling and service interface standard, to build integration platform and enterprise service bus (OSB). It uses OSB to exchange information with hydropower scheduling system, lightning monitoring system, automatic fire detection system, weather forecast system and so on.

The system is deployed in three secure zones, Zone I, Zone II, Zone III. Zone I is a real-time supervisory control zone which has the most priority security level. The functions include data acquisition, data process, monitoring and control, analysis and optimization. Zone II is a non-control zone which includes DTS, AMS and Protection Information System. Zone III is a production management zone which includes WEB and other management functions. The physical isolators are used to separate between Zone I / II and Zone III to increase cyber security.

## Client Benefits

PCS-9000 EMS monitors and controls the whole transmission network and provides reliable process information to users. After the system was put into service, it brought advantages to utility operators, such as,

- Panoramic view of power grid
- Easier and more intuitive operation mode
- Situational awareness support
- Lower work intensity

PCS-9000 EMS facilitates a secure, reliable and efficient grid operation, not only for managing today's power networks but also for tomorrow's Smart Grids, with rapidly expanding sources of renewable energy.

