Company Overview

Power System Stability Expert

NR Electric Co., Ltd.
Profile

• Global leading solution-provider to improve power safety, reliability, efficiency & environmental-friend
  - Leading in the world on digital substation solution
  - One of the world largest protection & control manufacturers
  - Main supplier in the world on power electronics application

• Solid products & services on control and protection for:
  - HVAC Transmission (500kV to 1,000kV)
  - HVDC Transmission (±500kV to ±800kV)
  - Thermal/Nuclear/Hydro Generators (1000MW/thermal, 1000MW/nuclear, 800MW/hydro)
  - Largest power stability system (250+ stations with 220-500kV)
Technology-Oriented

• A technology-oriented company with own creative technologies, know-how and innovative patents

Human Resource

• Staff of NR: >3000
  - R&D Engineers: >500
  - Design Engineers: >150
  - Application Engineers: >800

CMMI-5

• Assured R&D quality control
• Timely release of reliable products

Patents

• Technical Patents: >250
Organic Growth in Sales

- Sales in 2013: $1.1 Billion with 22% annual growth
NR In Globe: Key Data

11 Offices
Subsidiary & TSC

71 Countries
Marketing & Sales

World Top 1
Digital Substation
Stability Control

World Top 5
Protection & Control
HVDC & FACTS

- Marketing & Sales
- Oversea Offices
NR In Globe: Oversea Offices

- Subsidiaries at United States, India, Indonesia, Brazil, Nigeria and Hong Kong
- Technical Service Centers (TSC) at Saudi Arabia, Philippines, Vietnam and Kazakhstan
NR In Globe: Sold to Countries

- 71 countries & regions using NR solutions, products & services (ex. China)
Subsidiaries

NR Electric Co., Ltd.

NR Electric Engineering Co., Ltd.

NR Electric Power Electronics Co., Ltd.

NR Electric International Co., Ltd.

NR Electric Nigeria Co., Ltd.

NR Electric USA LLC.

NR Electric Brazil Co.

NR Energy Solutions India Pvt Ltd.

PT NR Electric Indonesia

Project Implementation

HV Equipment Factory

Marketing, Sales & Service

www.nrelect.com
• Five bases providing substantial R&D, testing and manufacturing capabilities with world-class facilities

- Headquarter and R&D (58,000 m²)
- IED & Software Manufacturing
  - IED Factory (75,000 m²)
  - New IED Factory (Under Construction, 320,000 m²)
- Power Electronics Manufacturing
  - Power Electronics Factory 1 (50,000 m²)
  - Power Electronics Factory 2 (100,000 m²)
Manufacturing

- Annual Production Capacity:
  - 150,000 IEDs
  - 30,000 Panels
  - 500 sets of Power Electronics Product
  - 1,500 Electronic/Optical CT/VTs
- Automatic test for every module and unit
- Digital simulation test for every panel
- Integrated system test for each project
Management Certification

ISO-9001:2008
Quality Management System

ISO-14001:2004
Environment Management System

OHSAS-18001:1999
Occupational Health and Safety Management System
QC for P&C Products

- Automatic test for EVERY module
- Automatic test for EVERY unit
- Digital simulation test for EVERY panel
- Integrated system test for EVERY project

Chip Check

Module Check

Aging Test

Electrical Check

Soldering Check

Unit Test

Panel Test

Mechanical Check
QC for Power Electronics Products

- “Receiving Check – Process Check – Delivery Check” for raw material, component, modular and system
- Dedicated test laboratory for HV test, accuracy test, physical material test and mechanics test
- Integrated system-level test before delivery

Material Check  Mechanical Check  Assembly Check  HV Test  Component Check  Soldering Check  Modular Test  System Test
Simulation Test

HVAC Analog Model

HVAC Digital Simulator

HVDC Analog Model

HVDC Digital Simulator

Combined HVAC & HVDC Analog Model, First in World
Type Test & Protocol Test

- Type Test Laboratory Certified by **ILAC** & **CNAS** for EMC test, environmental test, mechanical test & safety test
- IEC 61850 Level B Test Certified by **UCAug**
High Voltage Test

- AC High Voltage Test: up to 1500kV
- DC High Voltage Test: up to ±1600kV
- Lightning Surge Test: up to 3600kV
HVDC Projects

3 George-Shanghai HVDC
Northwest-Central China BTB
Gezhouba-Shanghai HVDC
China-Russia BTB
Luchaogang-Shengsi HVDC
Korea Jeju Wind Farm HVDC
References in Integrated Secondary System

- 1000kV HVAC Transmission Protection & Automation
- ±800kV HVDC Transmission Protection & Control
- Three-George Hydro Generation Protection & Control
- 100+ 110kV-750kV Smart Substations
- Largest PSCS for CSG with 250+ 220kV-500kV Stations

www.nrelect.com
References in HVDC/FACTS

VSC-HVDC for 5-terminal & 3-terminal projects

2*360 MVA SVCs & 2*390 MVA CSRs in 750kV Substation

460 MVA & 540 MVA FSCs in 500kV Substations

±500kV HVDC Electronic CT/VTs

STATCOM for Offshore Wind Farm & Industrials

www.nrelect.com
References

Power Grid

- 10,000+ HVAC substations in transmission system
  - 30 substations with 750-1000kV
  - 1,000+ substations with 345-500kV
  - 9,000+ substations with 110-230kV

- 15 HVDC/BTB/VSC-HVDC transmission projects with 30+ GW transfer capacity

- Highest AC&DC voltage level in the world
  - 3 UHVAC 1000kV substations
  - 2 UHVDC ±800kV transmission projects
• 900+ large generators with 300-1000MW unit capacity
  - 35 sets of 1000MW generators
  - 300+ sets of 600-1000MW generators
  - 600+ sets of 300-600MWW generators

• Largest thermal/nuclear/hydro generators
  - 1000MW thermal generators
  - 1000MW nuclear generators
  - 800MW hydro generators

• Renewable Energy
  - Up to 200MW solar energy generation
  - VSC-HVDC interconnection for offshore wind farm
References

**Industrials**

- 100+ oil, gas & petrochemical industrial enterprises
- 200+ mining industrial enterprises
- 400+ metal industrial enterprises
- 300km/hour high-speed railways & city metros

**Social Events**

- 2008 Olympic Game (30 out of 31 Stadiums)
- 2010 World Expo
Reference Projects

- Projects in 71 countries outside China
- 650,000+ IEDs in service worldwide
- 10,000+ substations from 110kV to 1000kV
- 30 out of 31 stadiums for 2008 Olympic Game
Reference Cases In International

• Power Grid
  - Integrated Secondary System for R.Congo, including IEDs in 5*220kV S/S, 3*110kV S/S and 18*30kV S/S, EMS, TMR in remote control center
  - SCADA, protection & automation of 2*500kV S/S and 2*220kV S/S for Tajikistan
  - Smart Substations for National Grid, UK and CLP, Hongkong

• Generation
  - Protection and automation system of 5*660MW APL power plant for India

• Industrials
  - SCADA, protection and control system of 2.2 MTPA steel project for EIL, India
Thanks for Your Attention!

www.nrelect.com