



LP Amina direct SCR injection system Jingfeng Power Plant, Beijing

- > **82% NO_x reduction, with slip <2.0 ppm**
Direct injection of liquid aqueous ammonia:
- > **Eliminates hot gas fan or electric heater and associated parasitic power**
- > **Eliminates vaporizer**
- > **Simplifies AIG**

Jingfeng Power Plant, Beijing

Situated within a southwestern district of Beijing's fifth ring road, Jingfeng Power Plant needed to meet the city's new world class emission standards while supplying affordable electricity to the local Chinese market. The BEIH-owned plant turned to LP Amina to meet these objectives. LP Amina tackled the energy conundrum by utilizing a more efficient, direct injection method to reduce NOx from the 410 MW combined cycle power plant.

Customer & Location

Beijing Energy
China, Beijing, Fengtai District

Plant Equipment

1-on-1 combined cycle plant built in 2003, total output of 410 MWe
Combustion turbine (CT) – Mitsubishi 9F frame gas turbine MHI 701F
Heat recovery steam generator (HRSG) – Mitsubishi design / Retrofit

Reagent

Industrial-grade aqueous ammonia (20% chemical)

Objectives

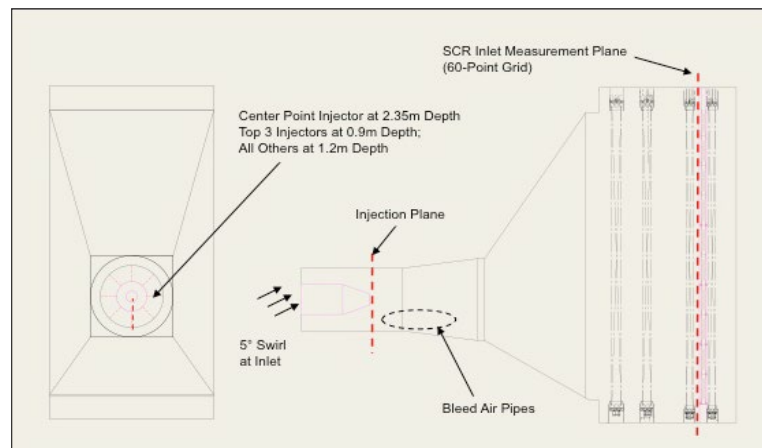
- 80% or greater NOx reduction guaranteed (15% O₂, dry)
- Slip must be under 3.3 ppm (2.5 mg/Nm₃)
- SO₂ to SO₃ conversion must be under 1%
- SCR availability should be 98% or greater, with a mechanical life of 25 years
- Catalyst chemical life should be 26500 hrs (> 3 years)
- Total system pressure drop must be less than 407 Pa over catalyst life

Challenges

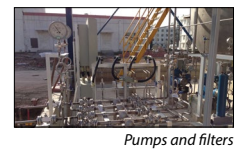
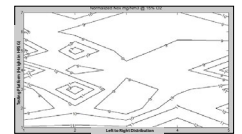
- HRSG had no cavity left for catalyst, ammonia injection grid (AIG) installation
- Several other companies were unable to provide solutions
- Plant considered tearing down and rebuilding HRSG

LPA Solution

LP Amina provided CFD and cold flow modeling, as well as complete project management, engineering, procurement, and construction. LP Amina installed a steel support structure and 47 m³ of Haldor-Topsoe corrugated catalyst (GT-201) between the first and second high pressure (HP) evaporator sections (391°C, 3.7 kPa,g), with an available space of just over 550 mm between the tube banks. To introduce the reagent, LP Amina used a novel direct injection scheme, avoiding the need to vaporize the ammonia. Nine injectors were installed in the CT exhaust duct (600°C, bulk velocity greater than 110 m/s or 250 miles/hr) using an air atomization nozzle and compressed air to create a uniform flow of ammonia in the exhaust gas. Finally, an ammonia "skid" was built to facilitate unloading and injecting of the reagent, utilizing tanks with a week's storage capacity and metering pumps. LP Amina designed the control logic and guided the implementation of the automatic control at the customer's DCS to achieve the optimal performance of the SCR system.



SCR and injection arrangement



Results

LP Amina was able to reduce NOx by over 80% to 0.010 lbm/MMbtu. Post retrofit slip is below 2 ppm and a NH₃/NOx distribution of 4.5% RMS. The pressure drop across the catalyst was 250 Pa (70% of design). Lances showed no signs of overheating or vibration upon inspection.