W.H. Sammis Plant Environmental Retrofits

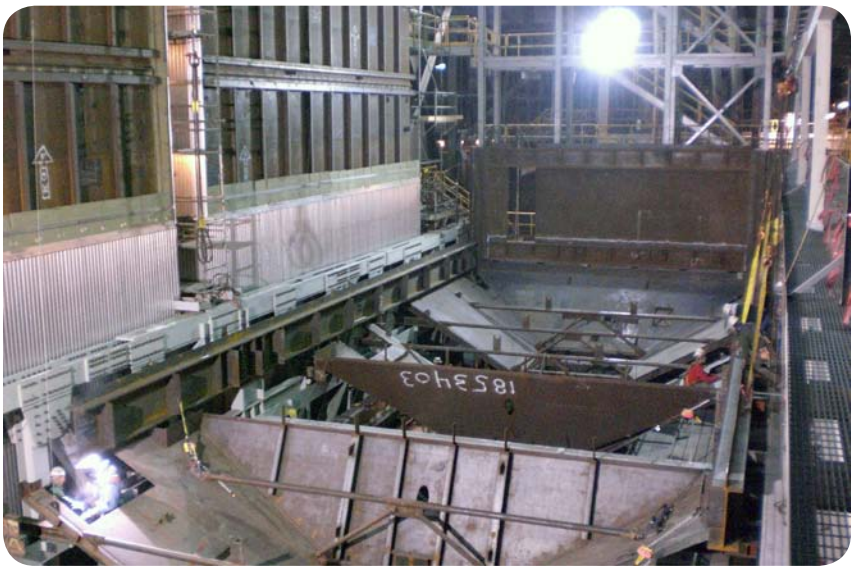
FirstEnergy Corp.
Stratton, Ohio

Project overview

The W.H. Sammis plant is the largest of FirstEnergy's coal-fired electric generating facilities in Ohio. The plant consists of seven coal-fired units totaling 2,220 MW and is located along the Ohio River.

In 2005, FirstEnergy embarked on one of the largest environmental retrofit projects in its history. This renovation included new selective catalytic reduction (SCR) systems and wet flue gas desulfurization (FGD) equipment. The project enabled FirstEnergy to significantly reduce nitrogen oxides (NO_x) and sulfur dioxide (SO_2) emissions. Upon completion of the five-year project, Platts Global Energy recognized the W.H. Sammis project as 2010 Construction Project of the Year.

The key components of the project involved adding two SCR systems and three wet FGD absorbers to the existing plant layout. One of the big challenges was the limited space available at the site to accommodate the new equipment. The plant is located on a congested, narrow strip of land bounded by foothills to the west and the Ohio River to the east. In addition, a state highway also runs along the exterior of the plant. Due to the congested site, all three wet FGD absorbers were located south of the plant, in what was a parking lot. The absorbers were shop fabricated in Mississippi as large alloy modules weighing up to 290 tons each and transported by barge to the job site. Another significant project challenge was removing the existing electrostatic precipitator (ESP) and installing the new SCR equipment in the space previously occupied by the abandoned ESP.



Unit 6 SCR reactor under construction.

FirstEnergy required that all equipment be operational by the end of 2010. This required extensive planning, design and equipment delivery coordination to meet the planned installation schedule. Babcock & Wilcox Power Generation Group, Inc. (B&W PGG) and its subsidiary, Babcock & Wilcox Construction Co., Inc. (BWCC), designed the equipment for constructability, which played a pivotal role in meeting FirstEnergy's project objectives.

Project scope

SCR systems installed on Units 6 and 7; 2 x 600 MW coal-fired units

B&W PGG had full engineer, procure and construct (EPC) responsibility for the SCR systems.

- Demolition of existing precipitators
- Concrete foundations including micropiles
- 3,500 tons of structural steel for main SCR support, platforms and walkways
- Relocate flash tanks, piping and existing electrical
- New electrical motor control centers, switchgear, controls and wiring
- Reactors, catalyst and flues
- Ammonia injection system, piping and valves
- Ammonia bulk railroad unloading facility, storage tanks with foundations, transport pumps and associated piping
- Railroad bed and tracks to the ammonia unloading facility
- Insulation, lagging and architectural siding

Wet FGD systems installed on Units 1 through 7; 2,220 MW coal-fired units

BWCC installed the wet FGD systems supplied by B&W PGG.

- Three shop modularized alloy wet FGD absorber towers
- Limestone milling and slurry preparation system that includes 15 slurry pumps and two ball mill systems
- Four oxidation air blowers
- Gypsum dewatering system that includes hydroclones and belt filters
- Auxiliary storage tank system for expanded slurry capacity
- Auxiliary tank for makeup water and fire water
- Sulfur trioxide (SO_3) mitigation system
- Bechtel provided balance of plant for the remaining wet FGD scope

Plant information

- Plant location: Stratton, Ohio
- Fuel: Pulverized coal

SCR motor control centers.

- Unit 1: 180 MW, Foster Wheeler front-wall fired
- Unit 2: 180 MW, Foster Wheeler front-wall fired
- Unit 3: 180 MW, Foster Wheeler front-wall fired
- Unit 4: 180 MW, Foster Wheeler front-wall fired
- Unit 5: 300 MW, B&W PGG opposed-wall fired
- Unit 6: 600 MW, B&W PGG opposed-wall fired
- Unit 7: 600 MW, B&W PGG opposed-wall fired

Ammonia storage tanks and rail station, along with the necessary pumps, valves and piping were all part of BWCC's balance of plant responsibilities.

Key project milestones

SCR project

- Contract award date: May 1999
- Start of engineering: January 2005
- Start of construction: June 2006
- Commercial operation: April 2010 for Unit 6, May 2010 for Unit 7

FGD project

- Contract award date: January 2006
- Start of construction: March 2008
- Commercial operation: January 2010

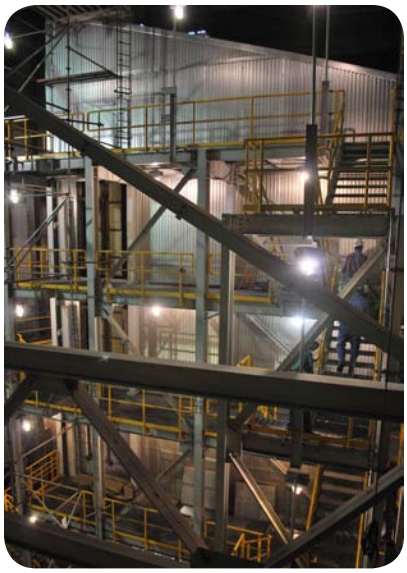
Wet FGD module crossing highway from barge unloading.

Highlights and results

- Extensive three-dimensional modeling was used to design the new SCR reactor; structural support steel; connecting flues; ammonia vaporization, dilution and injection equipment; and other auxiliary equipment within the space previously occupied by the abandoned ESP. The SCR design and material delivery schedule were tailored to meet the construction installation plan. Unlike many other SCR systems where large modules could be used to maximize shop and ground assembly techniques, these units required a more traditional construction method.
- Three wet scrubber absorbers are used to handle the flue gas of seven boilers.
- Shop fabrication of absorber modules facilitated reduced construction costs and minimized use of limited laydown space at the site.
- The SCR and FGD projects met every construction schedule objective. The commissioned units have met performance guarantees.

Wet FGD module on transporter moving to plant for installation.

Dual wet FGD lift, June 2008.



Completed SCR inside building.

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