

# Upgrade of Wet FGD Systems

**A low-cost approach to upgrade your older wet FGD system to meet today's performance requirements**

- Greater than 98% SO<sub>2</sub> removal
- Greater than 90% oxidized Hg removal
- Greater than 70% particulate removal
- Uninterrupted operation between scheduled outages
- Wall board-quality gypsum for sale
- Zero liquid discharge (ZLD) operation and landfill disposal
- Allow plant to burn lower cost (higher sulfur) fuel
- Allow plant to reduce operating costs

# Flue Gas Desulfurization (FGD) Solutions

AECOM is recognized as an industry leader.

- 40+ years of experience
- Upgraded more than 52,000 MW of FGD capacity
- Provided more than 40,000 MW of FGD retrofit solutions
- Installed more than 100 trays at 25 plants
- Recognized leader in nozzle upgrades



## Industry Challenges

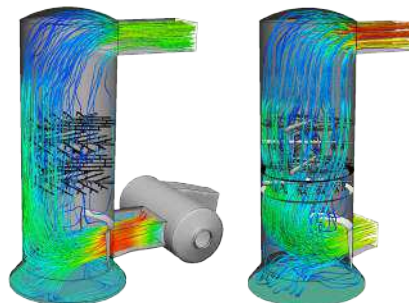
The power industry faces the challenge of increasingly stringent environmental regulations. As a result, existing FGD systems must operate at peak efficiency and reliability, and must provide maximum and sustainable performance to meet current and future emissions requirements. A large portion of the existing U.S. fleet of FGD systems were not designed to meet the emission standards currently being adopted or considered. In addition, these older systems often suffer from poor reliability and high operations and maintenance (O&M) costs due to their age or design.

In today's competitive environment, performance, operating costs, maintenance requirements, and reliability all have a significant impact on the bottom line, or worse, the viability of an aging asset. Through a cost-effective upgrade project, the performance and reliability of an older FGD system can be improved to levels matching or exceeding new FGD systems, regardless of age and design. In addition, new dewatering, wastewater treatment, and reagent preparation systems can be installed to lower operating costs and meet future regulatory requirements.

## AECOM FGD Experience

For 40 years, AECOM has been recognized as a world leader in air pollution and FGD control technology—installing new units, upgrading existing units, and helping utilities effectively and efficiently operate their FGD systems. Since the days when the FGD industry began, AECOM has been at the forefront, performing laboratory, pilot-scale, and full-scale studies aimed at obtaining a deeper understanding of FGD processes and systems. AECOM offers an experienced team of FGD engineers and technologists to support our utility and industry clients in developing, evaluating, and implementing proven technology and solutions for their FGD systems. As a result of our broad experience and know-how, AECOM offers designs and approaches that are more innovative and cost-effective than our competitors.

The reasons why a utility may want to upgrade an existing FGD system generally fall into three categories: improved performance, improved reliability and operation, and rehabilitation and life extension of existing equipment. AECOM has the know-how to successfully meet all of your project objectives—with innovative and low-cost solutions.



CFD Gas Flow Modeling:  
Bottom figure shows improved distribution resulting from design upgrades.

## FGD Upgrade Projects

Below are examples of the types of projects AECOM has successfully completed.

- Increased SO<sub>2</sub> removal performance to meet a lower emission limit, reduced scrubber operating costs by eliminating a costly performance additive, and reduced plant operating costs by firing a lower cost, higher sulfur fuel.
- Upgraded scrubbers to improve the removal of other pollutants such as fine particulate and oxidized mercury.
- Improved scrubber controls and scrubber chemistry to improve system reliability and performance and resolve process problems.
- Improved the performance of mist eliminators and mist eliminator wash systems.
- Improved the performance of reagent preparation and dewatering systems.
- Converted a system to forced oxidation to produce a saleable gypsum byproduct.
- Designed and installed dewatering systems to eliminate liquid disposal ponds.
- Designed and installed systems to treat FGD wastewater.
- Revised FGD system water balance to achieve plant zero discharge.
- Improved flue gas contact to reduce pressure drop and avoid fan upgrades.

### Technologies to Improve Your System

- Liquid distribution rings
  - Improve gas-liquid contact
  - Reduce "gas sneakage" along absorber walls and corners
  - Protect absorber walls from spray impingement
- Side-by-side double hollow cone spray nozzles
  - Improved droplet interactions (secondary atomization)
  - Enhanced removal performance
- Dual-flow sieve trays
  - Improved gas-liquid contact
  - Improved gas distribution
  - Reduced pump requirements
- CFD modeling
  - Improved gas distribution
  - Improved mist eliminator performance
  - Improved oxidation air sparger design
  - Reduce pressure drop
- Spray coverage design tools
- Mist eliminator design guidelines
- Material selection guidelines
- High-efficiency spray leader design to improve spray coverage
- Installed new reagent preparation systems to support higher SO<sub>2</sub> removal efficiency

## Benefits

### → To Your FGD System

- Increase performance and reliability
- Provide even and uniform gas distribution
  - No recirculation zones
  - Improved performance through spray zone
- Create vigorous gas-liquid contact
  - Increased removal performance
  - Reduce or eliminate performance additives
- Provide stable and controlled chemistry
  - Increase reagent utilization
  - Improve byproduct quality
  - Eliminate scaling
  - Improve mist eliminator performance
  - Improve dewatering, reagent preparation, and wastewater treatment operation

### → To Your Bottom Line

- Implement innovative and low-cost solutions
- Increase SO<sub>2</sub> removal efficiency
- Improve removal of Hg, PM, and other pollutants
- Improve reliability and availability of scrubber
- Reduce or eliminate performance additives
- Allow switch to lower-cost, higher-sulfur fuels
- Extend life of existing equipment
- Reduce operating and maintenance costs
- Produce a saleable by-product
- Avoid unit derating

#### Examples of Project Successes

Scope	Result
FGD performance upgrade and conversion to forced oxidation. New dewatering system.	SO <sub>2</sub> removal increased from high 80% range to 97%. High quality saleable gypsum produced.
Single hollow cone spray nozzles replaced with double hollow cone spray nozzles.	SO <sub>2</sub> removal efficiency increased from 91% to over 98% allowing plant to eliminate additive and use higher sulfur fuel.
Absorber upgrade, new mist eliminators, and conversion to forced oxidation.	SO <sub>2</sub> removal efficiency increased from 89% to over 98%. High quality gypsum byproduct produced. Improved system reliability and operation.
Absorber upgrade with new headers, trays, LDR, recycle pumps and mist eliminators.	SO <sub>2</sub> removal increased from high 80% to 99%.
Absorber upgrade with new headers, trays, and mist eliminators. Conversion to forced oxidation. New dewatering, reagent preparation, and wastewater treatment system installed.	SO <sub>2</sub> removal efficiency increased to over 98%. High quality gypsum byproduct produced. Improved system reliability and operation.

## About AECOM

AECOM is built to deliver a better world. We design, build, finance and operate infrastructure assets for governments, businesses and organizations in more than 150 countries. As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges. From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A *Fortune 500* firm, AECOM companies have annual revenue of approximately US\$18 billion.

See how we deliver what others can only imagine at [aecom.com](http://aecom.com) and [@AECOM](https://twitter.com/AECOM).

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