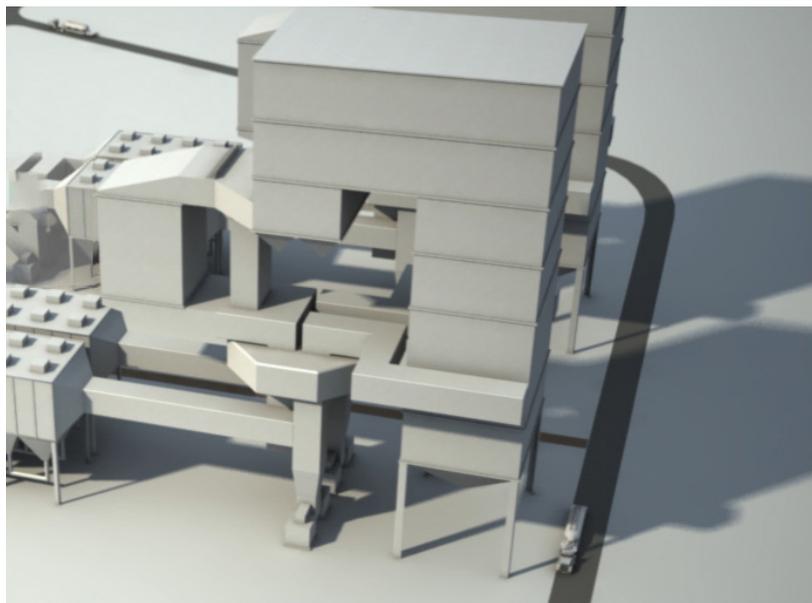
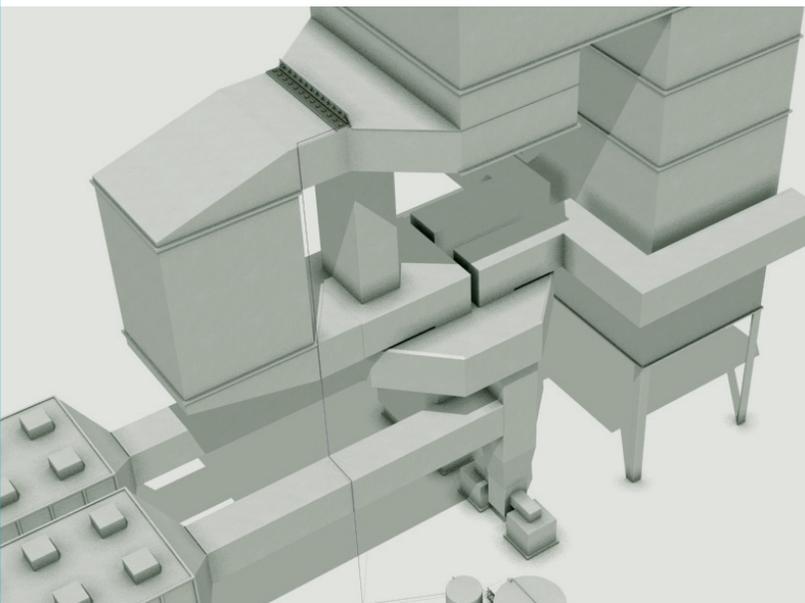


SBS Injection™ Technology: SO₃ Control for the Power Industry

Generating Benefits Beyond Opacity Control



SBS Injection™ Technology: The solution to your problems

1

Do you burn high-sulfur coal or pet coke?

2

Are you injecting PAC for mercury control?

3

Do you have a sulfuric acid plume "issue"?

4

Do you suffer "back-end" corrosion and APH fouling?

5

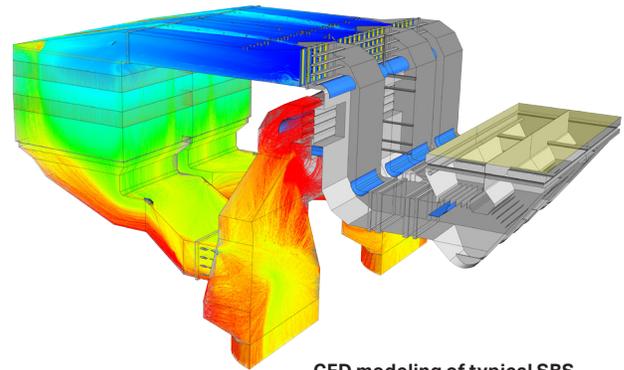
Is your SCR limiting boiler turndown?

Things are getting tighter

Coal-fired boilers supply nearly 40% of the U.S. electricity demand. With U.S. coal reserves exceeding a 200-year supply, coal will continue to be a fuel of choice for low-cost power generation. However, current and proposed regulations will require that the power industry meet tighter environmental emission limits in the future. With installation of SCR and wet scrubbers, sulfuric acid mist (SAM) emissions increase and can become a visible issue to surrounding communities and regulators. Add ever increasing economic pressures and the threat of New Source Review (NSR) litigation, and the challenges multiply. You need a solution that not only controls opacity, but will also meet the most stringent SAM limits—and help your plant run more efficiently. Consider the SBS Injection technology, a patented process developed by Codan Development LLC and offered exclusively by AECOM.

Simple means better

The SBS Injection process is simple compared to the use of other sorbent injection technologies. Although the reagent, soda ash, is received dry to minimize delivered cost, it is immediately dissolved in warm water for ease of storage and handling. And because you're injecting a clear solution, you don't have to deal with slurries or solids that can plug your injection system, causing poor performance, downtime, and extra maintenance. Computer-based flow modeling helps ensure that our proprietary injection lances, utilizing ultra-fine atomization technology, are properly designed and located to achieve uniform distribution and intimate contacting of the reagent and flue gas. This ensures maximum SO₃ removal with minimal reagent usage, and avoids downstream deposition. Simple means better.



CFD modeling of typical SBS Injection at inlet to SCR

A solution that generates benefits beyond opacity control:

- Improves heat rate
- Enhances mercury capture
- Eliminates air heater fouling
- Prevents "back-end" corrosion
- Enhances SCR performance
- Reduces CO₂ emissions
- Captures HCl and Se

Sampling of AECOM's SBS Injection™ Installations

Utility	Plant	MW	Injection Location	Startup Date
Vectren	AB Brown 1-2	2x265	FGD Inlet	2015
IP&L	Petersburg 1-4	1875	SCR Inlet/APH Inlet	2015
FirstEnergy	Pleasants 1-2	2x700	SCR Outlet	2012
Hoosier Energy	Merom 1-2	2x540	SCR Inlet	2012
Duke Energy	Gibson 1-5	5x650	SCR Inlet	2009-2014
NIPSCO	Bailly 7	180	SCR Outlet	2008
DP&L	Stuart 1-4	4x620	SCR Inlet	2008
DP&L	Killen 2	635	Economizer/SCR Outlet	2007
IP&L	Harding St 7	465	SCR Outlet	2007
Duke Energy	Gibson 1-5	5x650	Air Heater Outlet	2005
NIPSCO	Bailly 8	365	Air Heater Outlet	2004
Vectren	Culley 3	287	SCR Outlet	2004
PPL	Montour 1-2	2x765	Air Heater Outlet	2004
FirstEnergy	Mansfield 1-3	3x860	Air Heater Inlet	2003
TVA	Widows Creek 7	550	Air Heater Inlet	2003

Benefits that exceed costs

SBS Injection is not an environmental burden on your plant operating budget—it actually generates economic benefits. SO₃ presents unique challenges and opportunities in that it adversely affects plant reliability and efficiency, as well as performance of other pollution control systems.

With typical operating costs of \$600-\$800/ton of SO₃ removed, the SBS Injection process is competitive with alternatives. But also consider the numerous co-benefits of efficient SO₃ removal, including:

- Up to 3% improvement in unit efficiency via APH
- Enhanced mercury capture—reducing or eliminating need for carbon or halogen injection
- Significant reduction in “back-end” corrosion and maintenance outage costs
- Improved SCR NO_x removal performance or extended SCR catalyst life
- Reduced outages and costs for cleaning fouled air heaters
- Reduced CO₂ emissions achieved with unit efficiency gains
- Capture of selenium and HCl in fly ash
- Enhanced low-load capability of SCR

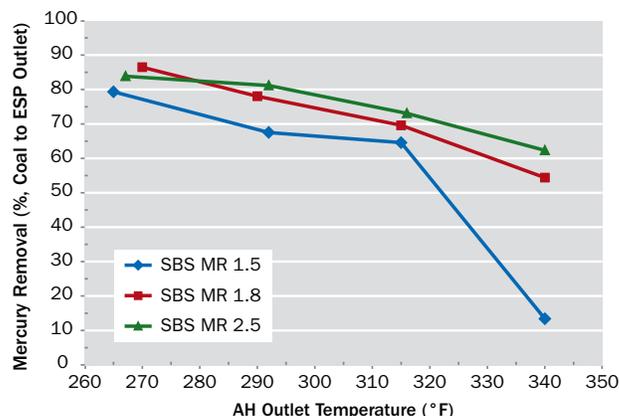
You quickly see how the benefits can well exceed the operating costs, making it the control technology of choice. However, these benefits are only achievable when SO₃ is efficiently removed upstream of the air heater; a unique feature of the SBS Injection process.

Because the process is relatively simple, installed capital costs are typically \$10-20/kW, making it significantly cheaper than Wet-ESPs and competitive with other sorbent injection technologies. Imagine meeting your environmental requirements and reducing your plant operating costs—SO₃ control that more than pays for itself.

Experience that counts

The SBS Injection process has been successfully applied on 30 boilers, totaling over 17,000 MW. With the majority of that experience injecting upstream of the air heater or SCR, the process has consistently demonstrated SO₃ removal levels of 95-99% at low reagent usage rates. With over a decade of operating experience, the SBS process is the only commercially demonstrated technology that can reliably remove SO₃ prior to the air heater, guarantee the elimination of sulfuric acid opacity, and provide significant plant operational benefits. You can be confident that SBS will meet your current SO₃ control needs, as well as more stringent future BACT requirements.

AECOM offers the technology in a variety of ways to suit your plants' specific needs—ranging from a core Process Technology Package to a fully engineered turn-key system including all balance of plant components.



Effective Hg Removal without PAC

Stack SO₃ Emissions and Removal Summary

Plant*	SO ₃ Inlet (ppmv-d, 3% O ₂)	SO ₃ Outlet (ppmv-d, 3% O ₂)	SO ₃ Removal (%)	H ₂ SO ₄ Emission (lb/MMBtu)	Particulate Control Device	SO ₂ Control Device
A	32	1.3	95.9%	0.0038	ESP	WFGD
B	65	1.6	97.5%	0.0046	Venturi Scrubber	WFGD
C	36	1.3	96.4%	0.0038	ESP	None
D	66	1.2	98.2%	0.0035	ESP	WFGD
E	45	0.2	99.6%	0.0006	ESP	WFGD
F	15	0.6	96.0%	0.0017	ESP	WFGD
G	44	0.5	98.9%	0.0015	ESP	WFGD
H	55	0.3	99.5%	0.0011	ESP	WFGD

*Confidential client

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\$19 billion.

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

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