Since the early 90's Wahlco has developed and tested innovative post-combustion NO$_X$ reduction systems. From predictive performance analysis and CFD modeling to on-line performance, Wahlco has the know-how to package the right solution for your facility. Call us for the latest in NO$_X$ technologies.

Adding Wahlco to your team, works to your advantage in many ways.
- As a flexible OEM resource, we can supply complete ammonia (NH$_3$) systems.
- We manufacture highly automated anhydrous and/or aqueous systems for storage/vaporization and metering/injection.
- The NH$_3$ equipment we provide meets the most rigorous utility and industrial standards while delivering the highest availability.
- By incorporating our NH$_3$ equipment and expertise into your SCR & SNCR system, you benefit from proven products supported by the recognized industry leader.
- When transportation and on-site storage of ammonia presents a problem, Wahlco provides its proven Urea to Ammonia (U2A™) technology. The Wahlco U2A converts harmless urea to ammonia in small quantities as needed. (Contact WAHLCO at 800-423-5432 for more information about U2A).

**WORLDWIDE EXPERIENCE**

Wahlco is the first company in the United States to have a full-scale installation where selective non-catalytic reduction and in-duct and air heater SCR are combined to reduce NO$_X$ emissions. Wahlco is also the only company with retrofit staged NO$_X$ reduction experience on a coal-fired unit in North America.

As the world's leading supplier of flue gas conditioning systems (FGC), we have installed over 470 systems worldwide, representing over 150,000 MW. Over 70 of these FGC systems, representing 28,000 MW, employ ammonia injection to enhance fuel flexibility and precipitator performance.

**NO$_X$ REDUCTION STRATEGIES**

**Selective Non-Catalytic Reduction (SNCR)**

Well proven in utility applications, the SNCR process involves ammonia injected into the boiler in the 1800–2100 °F (1000–1150 °C) region where it reacts with oxygen and NO$_X$ to form nitrogen and water. Usually 30–50% of the NO$_X$ can be removed.

The advantages of SNCR are:
- Simplicity
- Low capital cost
- Low pressure drop
- Very little space required

Because SNCR is sensitive to temperature and flow distribution, Wahlco makes a careful study of boiler behavior and reagent delivery options to maximize the effectiveness of SNCR systems. You will get a system optimized for your plant's needs.
Selective Catalytic Reduction (SCR)
In the SCR process ammonia is added to the flue gas stream ahead of a catalyst. The reaction takes place on the surface of the catalyst at lower temperatures, typically between 400 and 900 °F (220–500 °C), depending on the catalyst selected. SCR has become the standard post-combustion NOx reduction technology to meet the most stringent regulations.

The advantages of SCR include:
- Higher NOx reduction efficiency
- Lower ammonia consumption
- Drastic reduction in chemical by-products

Unlike SNCR that can only work at high temperatures, SCR is suitable for:
- Coal, oil or gas fired utility boilers
- Simple cycle turbines
- Combined cycle turbines utilizing HRSGs and heat recuperators
- Reciprocating engines
- Fired heaters
- Kilns
- Waste incinerators

The principal considerations for the proper design of SCR systems are accurate selection of catalyst size, location, housing design and pressure drop, matching of NH3 distribution to the NOx distribution across the flue gas stream and proper flow velocity distribution across the catalyst. As appropriate, Wahlco utilizes detailed physical cold flow and computational fluid dynamic modeling of the SCR process for each application.

For your SCR applications Wahlco makes a careful study of flue gas NOx and flow distribution, temperature profiles, catalyst options and housing configurations to maximize the economy and effectiveness of the SCR systems.

Staged NOx Reduction System (SNRS)
Wahlco offers a patented alternative to traditional SNCR and SCR. The Staged NOx Reduction System (SNRS) offers enhanced performance of the traditional SNCR system without the capital expense and space requirements of a full SCR system. SNRS can be installed in phases to provide reduced initial capital cost with options for later installation of additional system enhancements. SNRS stages further reduce NOx while maintaining ammonia slip at acceptable levels.

Implement NOx Reduction in Stages
STAGE 1: Traditional SNCR. Provides low cost moderate NOx reduction limited by ammonia slip.

STAGE 2: In-duct SCR (IDSCR) employs catalyst in the existing ductwork between the economizer and the air pre heater. Coupled with higher NH3 injection rates in the SNCR, IDSCR results in higher NOx removal efficiencies while limiting NH3 slip.

STAGE 3: Catalytic air pre-heater (CAPH) baskets replace the hot end layer of the air pre-heater (APH). The volume of catalyst installed in Stage 3 is limited by the geometry of the ductwork and acceptable pressure loss of the boiler system. CAPH results in greater Denox efficiency by adding catalyst surface area, thereby permitting more ammonia injection in the SNCR and further reduction of NH3 slip.

The combined use of SNCR, IDSCR and CAPH realizes the full potential of staged NOx reduction: Highest NOx reduction with limited ammonia slip. SNRS achieves this improvement without the capital expense of a full blown SCR system and the associated major boiler ductwork modifications and space requirements.

CONCEPT, DESIGN, FABRICATION, INSTALLATION, START-UP, MAINTENANCE, TURNKEY

For more information contact
WAHLCO at 800-423-5432
or visit our website
at www.wahlco.com
AMMONIA SYSTEMS
- Anhydrous Ammonia Systems – Unloading, Storage, Transfer, Vaporization, Metering, and Injection
- Aqueous Ammonia Systems – Unloading, Storage, Transfer, Metering, Vaporization, and Injection
- U2A™ Urea to Ammonia Conversion Systems – Patented process converts urea to ammonia on-site.

FLUE GAS CONDITIONING (FGC)
Worldwide Leader in FGC.
- Sulfur Systems – Molten, Gas, or Granular
- Ammonia Systems – Anhydrous and Aqueous
- Dual Conditioning Systems – Combination Sulfur and Ammonia

NOx SYSTEMS
- SNCR Systems – For moderate efficiency applications, ammonia or urea is injected directly into the boiler.
- SCR Systems – For high efficiency requirements, ammonia is injected into the flue gas stream ahead of catalyst.

THERMOCOUPLE ARRAYS
- Custom Thermocouple Assemblies
- Reliable, Accurate and Fast Temperature Sensing
- Widely used in Gas Turbine Applications and other Harsh Environments

TUBULAR ELECTRIC HEATERS
- Low Watt Density Duct and Immersion Heaters for High Temperature Application utilizing Incoloy™ Sheathing with MgO Insulation

CUSTOMER SUPPORT
- Field Service – Worldwide Response
- System Maintenance Contracts
- Rental Systems – FGC and Ammonia Skids
- Upgrades – Equipment and Technology Improvements
- Replacement Parts
- In-situ Resistivity