



DENO_x SOLUTIONS

We provide the most effective ways of significantly reducing nitric oxide and/or nitrogen dioxide (NO_x) in raw gas emissions, which contribute to acid rain and photochemical oxidation in the atmosphere as well as respiratory diseases. We offer **Selective Catalytic Reduction (SCR)**, **Selective Non-Catalytic Reduction (SNCR)** and **Hybrid SNCR/SCR Systems**.

We can help you evaluate which system is best for your needs, considering your combustion process, operating parameters, NO_x flue gas levels, emission reduction targets and CAPEX and OPEX availability. Based on this data, our experts can design, build, install and commission a customized NO_x reduction solution.

WHY CHOOSE OUR DENO_x SOLUTIONS?

The highest NO_x reduction rates

Depending on the system and your process parameters, we can achieve 95% NO_x reduction.

Ensured results

Our long-time experience in CFD modeling ensures field results reproduce theoretical CFD analyses.

Low maintenance

Our systems do not corrode as operations occur above dew-point.

Low OPEX options

Our engineers carefully study the reactions to provide low reagent consumption while selecting the appropriate catalyst to offer a low regeneration cycle.

A fast and reliable team

We can install and commission quickly, with little or no downtime, depending on the DeNO_x system chosen.



REDECAMGROUP

SELECTIVE CATALYTIC REDUCTION (SCR)

Selective Catalytic Reduction (SCR) is the optimal NO_x control system, able to achieve up to 95% NO_x reduction in combustion processes. It can therefore meet stricter incoming legislation.

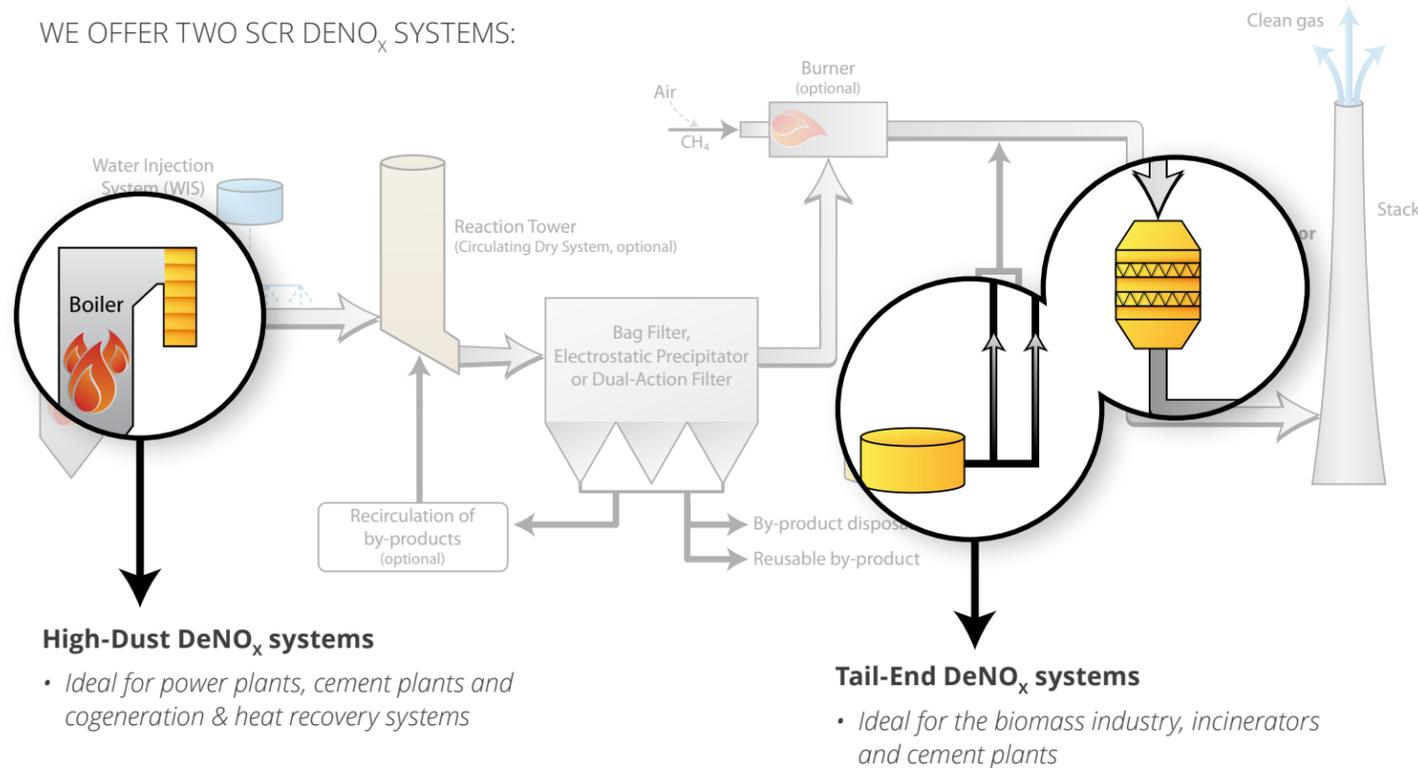
SCR converts NO_x into diatomic nitrogen, N₂, and water, H₂O, with the aid of a catalyst. A gaseous reductant, typically anhydrous ammonia, aqueous ammonia or urea, is added to a stream of flue or exhaust gas before the gas enters the catalyst chamber. SCR takes place at the end of the air pollution control process, after air filtration has taken place.



THE ADVANTAGES:

- 1 **Optimum effectiveness.** Our SCR system reduces NO_x by up to 95%.
- 2 **Reagent flexibility.** We can design a SCR system using either urea or ammonia.
- 3 **Customized catalytic chambers.** Our catalytic chambers are tailored to your needs and are designed for mechanical stability and a long service life, meaning lower OPEX than other such systems. The catalytic layers are completely extruded titanium dioxide (TiO₂), resulting in photocatalysis. Sensitive to the need for a low regeneration cycle, we are experts at selecting an appropriate catalyst, based on your gas and ammonia distribution, to offer a long catalyst lifetime.

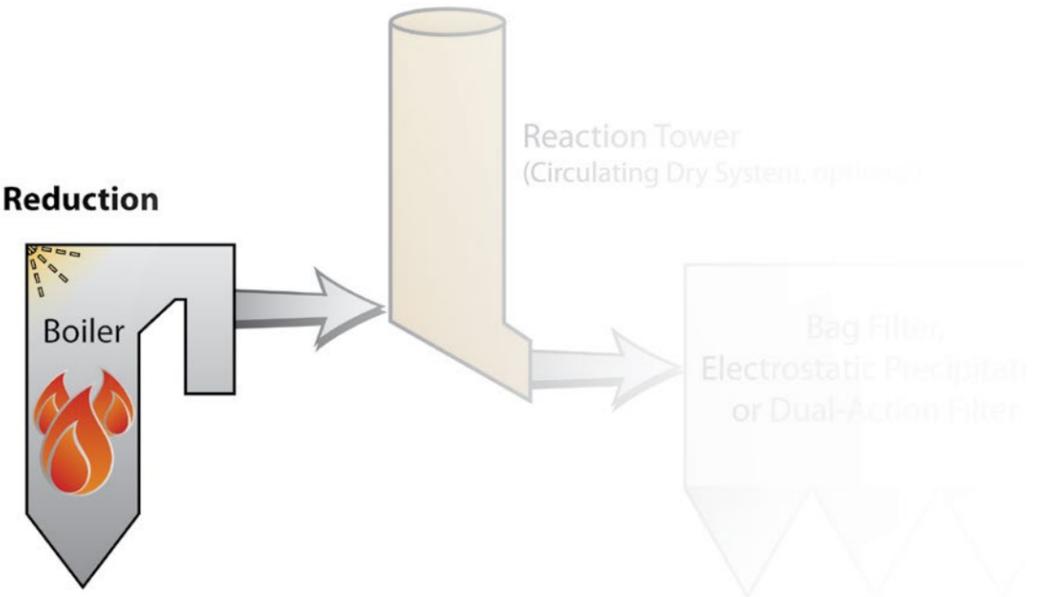
WE OFFER TWO SCR DeNO_x SYSTEMS:



SELECTIVE NON-CATALYTIC REDUCTION (SNCR)

Selective Non-Catalytic Reduction (SNCR) is a good option for conventional power plants that burn biomass, waste, coal and oil as well as for cement plants and waste incinerators.

Selective Non-Catalytic Reduction Dosing System (SNCR)



THE ADVANTAGES:

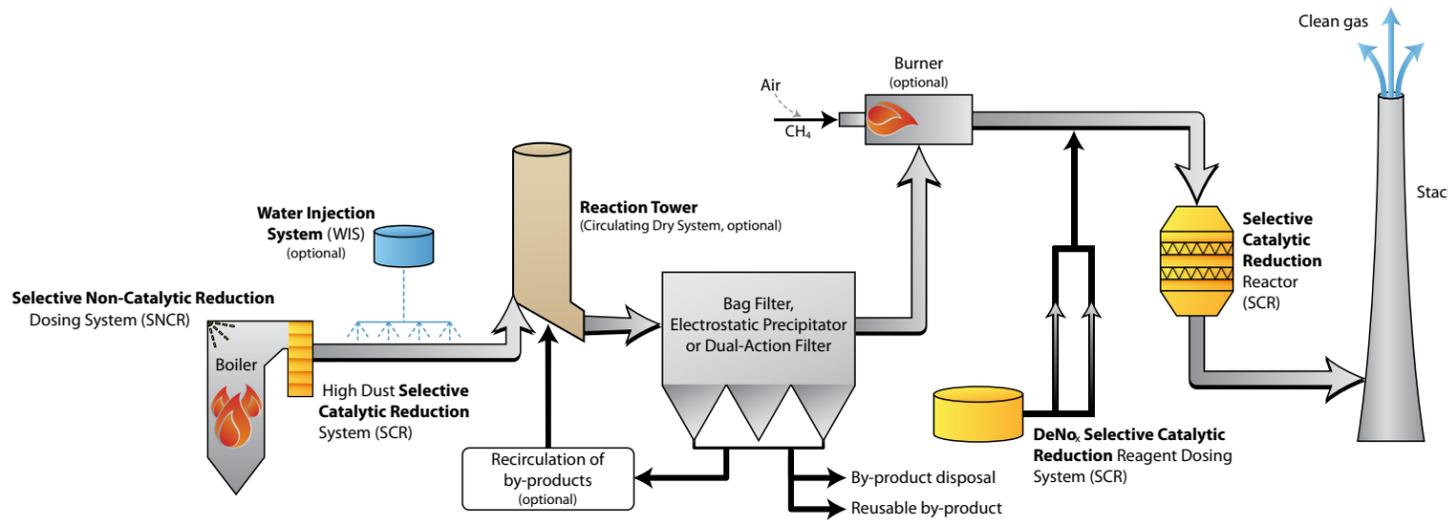
- 1 **Effective.** Our SNCR systems will reduce NO_x by up to 65%, depending on your process parameters.
- 2 **Cost-effective in terms of CAPEX.** Our experts can advise you as to whether this lower cost option is viable with your process parameters and your emission reduction targets.
- 3 **Optimized use of reagent.** Our system's high temperature converts urea to ammonia without the need to install external burners to transform the reagent.
- 4 **Low maintenance.** Our fully automated system monitors and optimizes the SNCR process remotely and can send any malfunction data directly to the control room of the plant.
- 5 **Fast installation.** We pre-commission the modules off-site to secure a smooth integration of the SNCR system at your plant. Often installation does not require any plant downtime.



HYBRID SNCR/SCR SYSTEMS

Hybrids are a newer technology, often an ideal choice when high NO_x reduction is required and space is limited. They are the most flexible choice to reduce NO_x emissions.

Hybrid systems involve a SNCR treatment stage followed by a SCR treatment stage. Our Hybrid systems are tailored to your needs: the percentage of the system acting as SNCR and the percentage acting as SCR vary depending on the process data of your facility.



THE ADVANTAGES:

- 1 Highly effective.** Our Hybrid systems reduce NO_x emissions by up to 90% and are ideal when a high NO_x removal is required.
- 2 Cost-effective in terms of CAPEX.** Our experts can advise you as to whether this lower cost solution is a viable option with your process parameters and your targets.
- 3 Lower operating costs.** Our Hybrid system is more cost-effective to run than SCR technology, partly because less catalyst is needed and there's a better reagent use.
- 4 Compact.** Our Hybrid solution requires limited space.

COMPARISON TABLE: SCR, SNCR & HYBRID SYSTEMS

	SCR	SNCR	HYBRID
NO _x reduction efficiency	Up to 95%	Up to 65%	Up to 90%
Temperature window	180°-510°C	870°-1150°C	SNCR: 870°-1150°C SCR: 180°-510°C
Reactant	Ammonia or urea	Ammonia or urea	Ammonia or urea
Ammonia conversion unit	Required if using urea depending on T°	Not required	Required if using urea
Reactor	Catalytic	- None - Direct injection	Direct injection + small catalytic
Catalyst regeneration	Sometimes required	None	Sometimes required
Waste disposal	Spent catalyst	None	Spent catalyst
Catalyst volume	Major	None	Minor
Capital investment costs	Higher	Lower	Balanced with OPEX
Plot requirements	Major	Minor	Medium
Maintenance	3 to 5 years (typical catalyst life)	Low	3 to 5 years (typical catalyst life)
Ammonia/NO _x (molar ratio)	1-1,05	1,0-1,5	1-1,05
Ammonia slip	5 to 10 ppmvd	20 to 50 ppmvd	5 to 10 ppmvd
Retrofit	Depends on current layout	Easy	Depends on current layout
Mechanical draft	Required	Not required	Required
Energy consumption	High: ID fan + dosing system	Low	High: ID fan + dosing system

The best system for your air pollution control needs depends on a number of factors: installed equipment, space limitations and air pollution control goals. Contact us today to have one of our experts recommend the best system for your process parameters.

OUR DENO_x REAGENTS



ANHYDROUS AMMONIA

Anhydrous ammonia is the preferred reagent where possible, as it is most effective in reducing NO_x emissions.

Anhydrous ammonia does require proper storage, correct handling and competence regarding ammonia properties to maintain safety. Our team offers on-site training to ensure your staff and your investment remain safe.

THE ADVANTAGES:

- Contains 100% reactive component, offering the highest efficiency
- Lower transportation costs, as the efficiency of the reagent translates into fewer necessary shipments
- Less tendency to form nitrous oxide and carbon monoxide than urea
- Reduced probability of fouling and corroding equipment downstream of the injection point

AMMONIA SOLUTION



Ammonia solution is also a recommended choice and is safer to use than anhydrous ammonia since the vapor pressure is greatly reduced by water.

Ammonia solution must be correctly handled and stored. We can offer your team training on how to safely handle this product.

THE ADVANTAGES:

- More efficient than urea and safer than anhydrous ammonia
- Less risk associated with its transport, storage and handling than anhydrous ammonia
- Does not freeze
- Less possibility of fouling and corroding equipment downstream of the injection point compared to urea



UREA

Urea is widely used and is the safest choice. It is, however, less efficient, as urea must be converted to ammonia prior to the NO_x reduction process.

THE ADVANTAGES:

- Poses fewer risks in the workplace and doesn't require specific training
- Non-hazardous, non-volatile, non-explosive and non-flammable
- The best solution for in-furnace injection

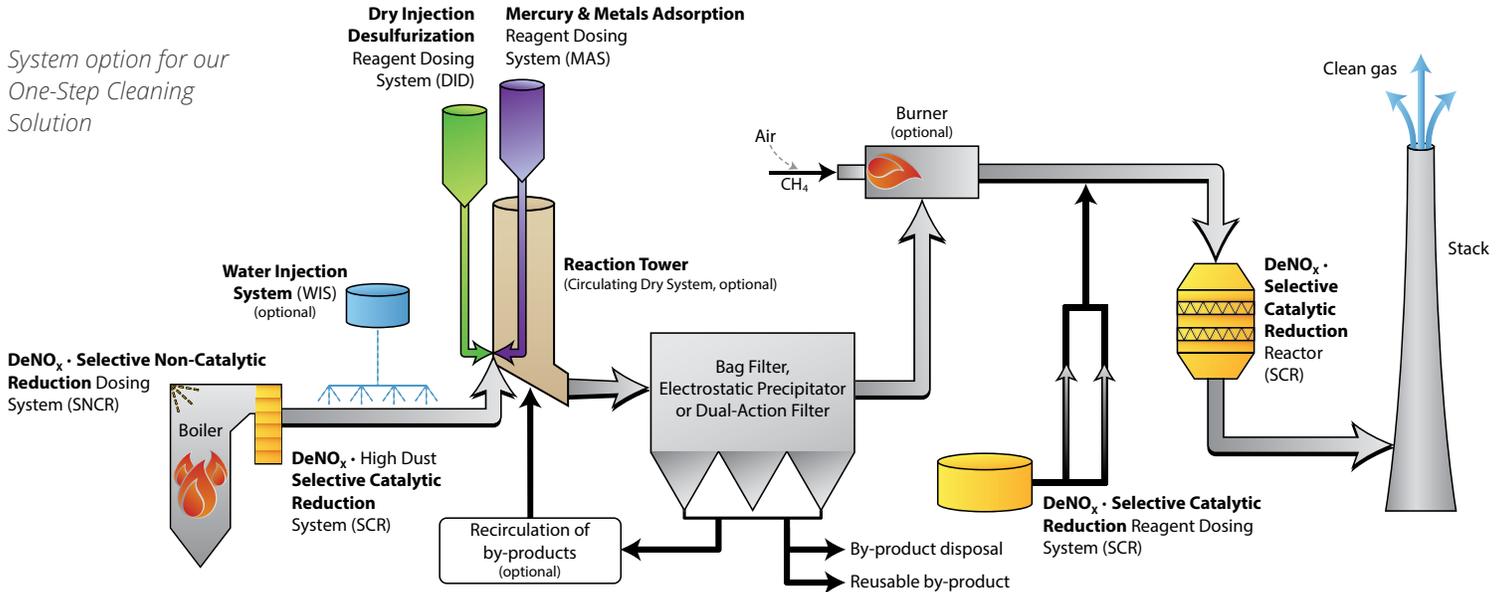
THE DISADVANTAGES:

- Can lead to additional nitrous oxide or carbon monoxide emissions
- Less effective
- More likely to foul and corrode equipment downstream of the injection point
- Leakages lead to white salt precipitates giving an aged look to equipment
- Scaling and clogging are likely when blended with hard water for DeNO_x operation
- Needs sufficient heat to avoid freezing
- In case of Tail-End SCR, the urea must be converted to ammonia before the SCR process

Advantages of our Flue Gas Treatment Solutions

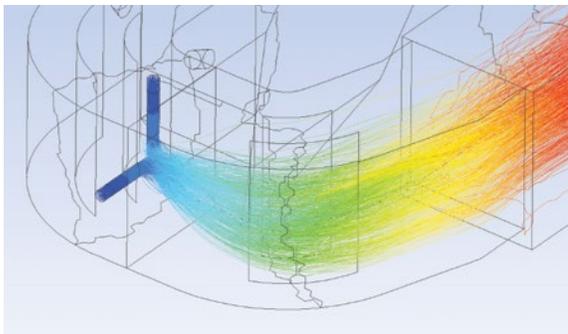
OUR COMPLETE PRODUCT PORTFOLIO

Our highly efficient and innovative filtration solutions can secure a better reaction from your flue gas treatment (FGT) system. From design to commissioning, we can provide everything necessary to optimize your emissions reduction system from air filtration to flue gas treatment, including conditioning, storage and handling systems.



OUR ONE-STEP CLEANING SOLUTION

Our proven system removes all pollutants (dust, SO_x, NO_x, mercury, HCl, HF, dioxins, furans, heavy metals), while offering an easy, low-cost installation and a highly compact design. Whether to meet current air emission reduction targets – or to prepare for future regulations – our One-Step Cleaning Solution is a cost-effective way to adhere to all environmental legislation.



MODELLING

We use Ansys's Fluent software to accurately design and study every solution. This allows us to engineer and analyze each system's broad physical capabilities, optimize the fluid dynamics and study the efficiency of pollutants removal. When a computerized simulation is not sufficient, we undertake a physical simulation on a 1:7 scale in our Milan workshop.

Redecam offers a comprehensive portfolio of air filtration, flue gas treatment (FGT), gas conditioning and transportation, handling & storage products. Please contact us to see how we can take care of all your air pollution control needs.



Visit our website to learn more at
www.redecam.com
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