



High efficiency NO_x control solutions for Power Plants

Your Partner in emission control...

NOx abatement and control technology is a relatively complex issue and the selection of technology is dependent on various factors including Boiler type & arrangement, Plant layout, Flue gas composition, temperature etc. and outlet NOx requirement.

The selection of deNOx technology can be any of the following type:

- Selective Non-Catalytic Reduction (SNCR)
- Selective Catalytic Reduction (SCR)
- Hybrid (SCNR+SCR)

DEC Envirosystems (A Division of DEC Engineering & Constructions Pvt. Ltd.) based at Vadodara, India in association with Beijing National Power Group Company Ltd. (BNPC), Beijing, Peoples Republic of China can provide optimized deNOx technology and solutions for Thermal Power Plants.

DEC Envirosystems focuses on providing solutions for deNOx to the Cement & Power and other combustion systems - from taking up Plant studies to commissioning including design & engineering, supply & installation in association with their technology Partner on virtually all emission related matters. The Division is headed by Subhajit Hazra (CEO) who has around four decades of experience in the Operations & Project execution of Metallurgical Units in India & Central Africa and the Division is supported by an able team of designers and personnel for Project execution.

Beijing National Power Group Company Ltd. was founded in 2013 and has a registered capital of 102 million RMB. The primary commitment of the Company includes design & development of environmental protection products. BNPC has a successful track record of carrying out design & engineering, supply and installation of over 20 Plants for deNOx systems in the last three years for Plant size of upto 600 MW. Units have been supplied for SNCR, SCR and Hybrid Systems.

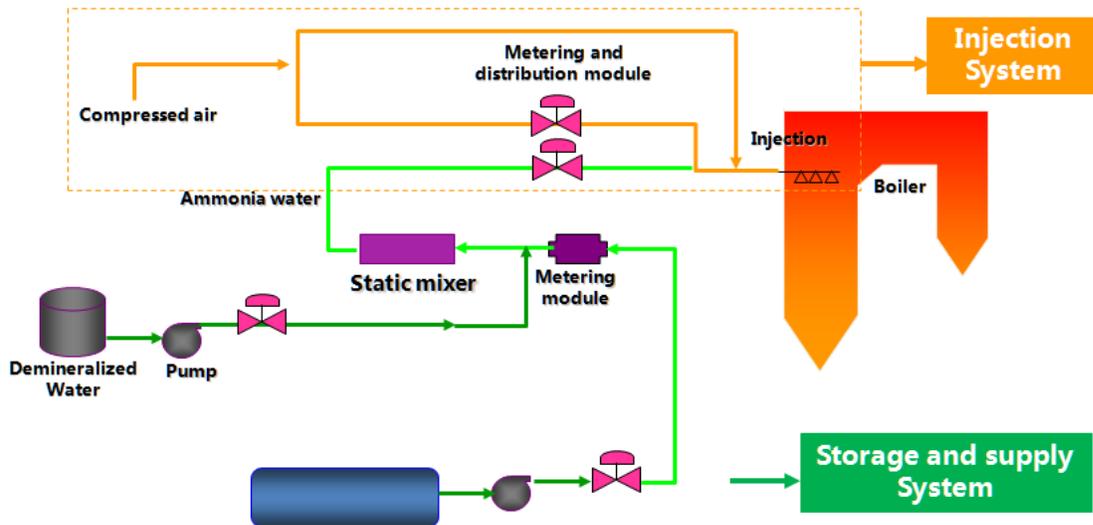
Beijing National Power Group Co. Ltd. has a strong R&D base and has over 13 Patents to its credit which includes nine invention Patents.

The Company has its own Catalyst manufacturing Unit.

NOx control technologies...

- Selective non-catalytic reduction (SNCR)**

Selective non-catalytic reduction (SNCR) Systems inject Ammonia/Ammonia solution/Urea in flue gas having temperature of 800-1100°C. The DRE (Destruction or removal efficiency) is to the extent of 70% (varies as per flue gas conditions etc.). It is a relatively simpler deNOx system with lower investment.

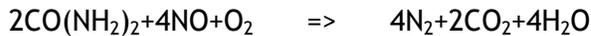
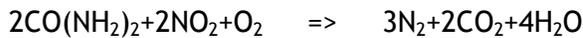


The reactions are as follows:

With Aqueous Ammonia

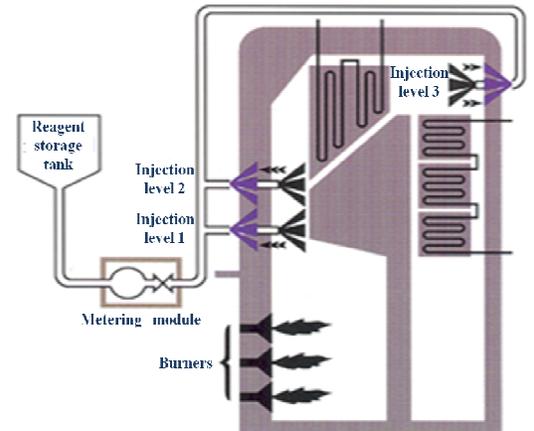


With Urea



Based on the Flue gas characteristics, Boiler configuration etc., the key design considerations include:

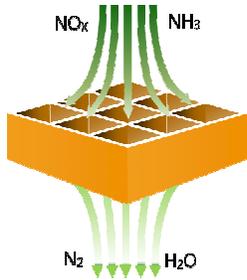
- Design of Injectors
- Selection of injection point
- Control strategy of injection at different injection points at varying loads.



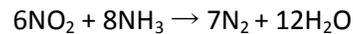
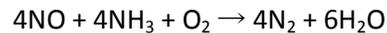
Advantages and disadvantages of SNCR	
Advantages	Disadvantages
No need of Catalyst	Low NOx removal efficiency
Simple deNOx system	Large reagent consumption
Relatively low investment	High running cost
Short construction period	High reaction temperature

- **Selective catalytic reduction (SCR)**

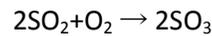
Selective catalytic reduction (SCR) is most efficient (DRE up to around 90%) means to convert Nitrogen oxides (NO_x) to Nitrogen and Water with the aid of a Catalyst in oxidizing atmosphere and temperature range of 250-430°C . Choice of Catalyst mainly depends on the flue gas characteristics. Anhydrous Ammonia is generally preferred as the reductant.



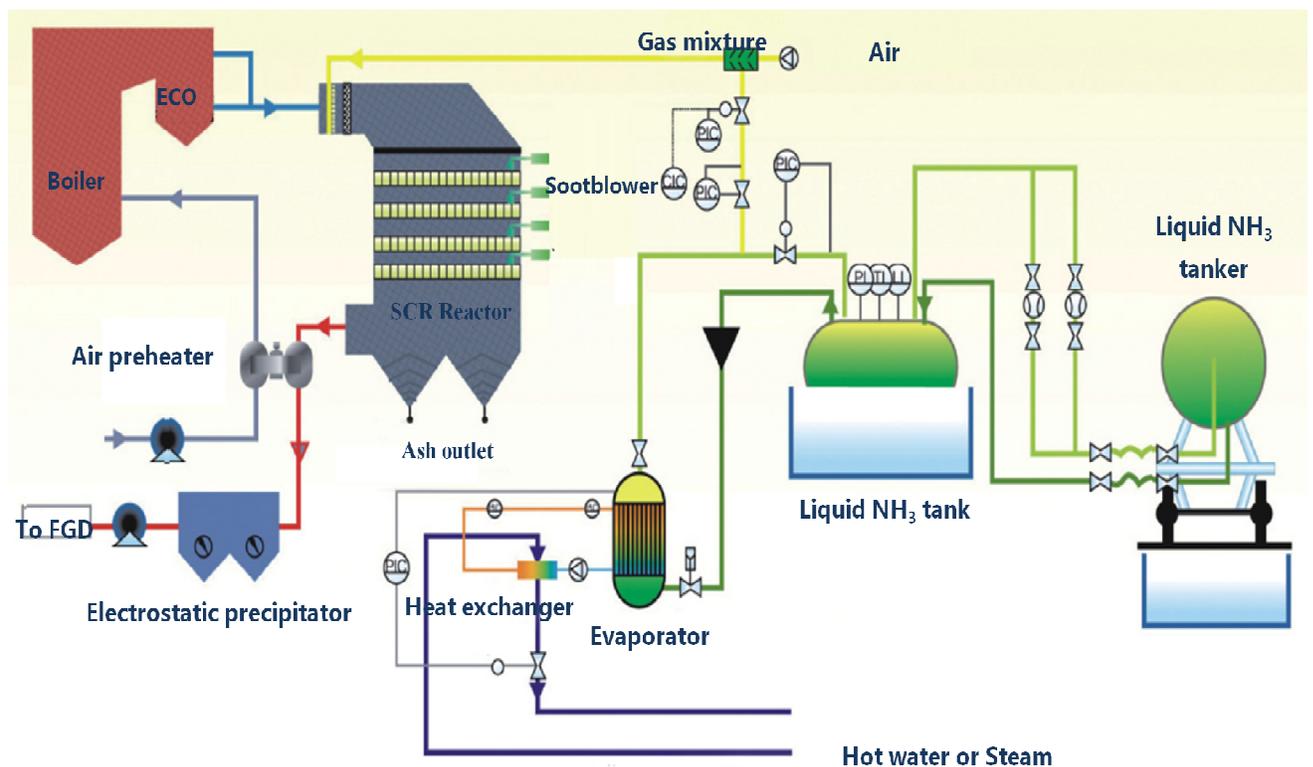
Main reactions are:



Side reaction:



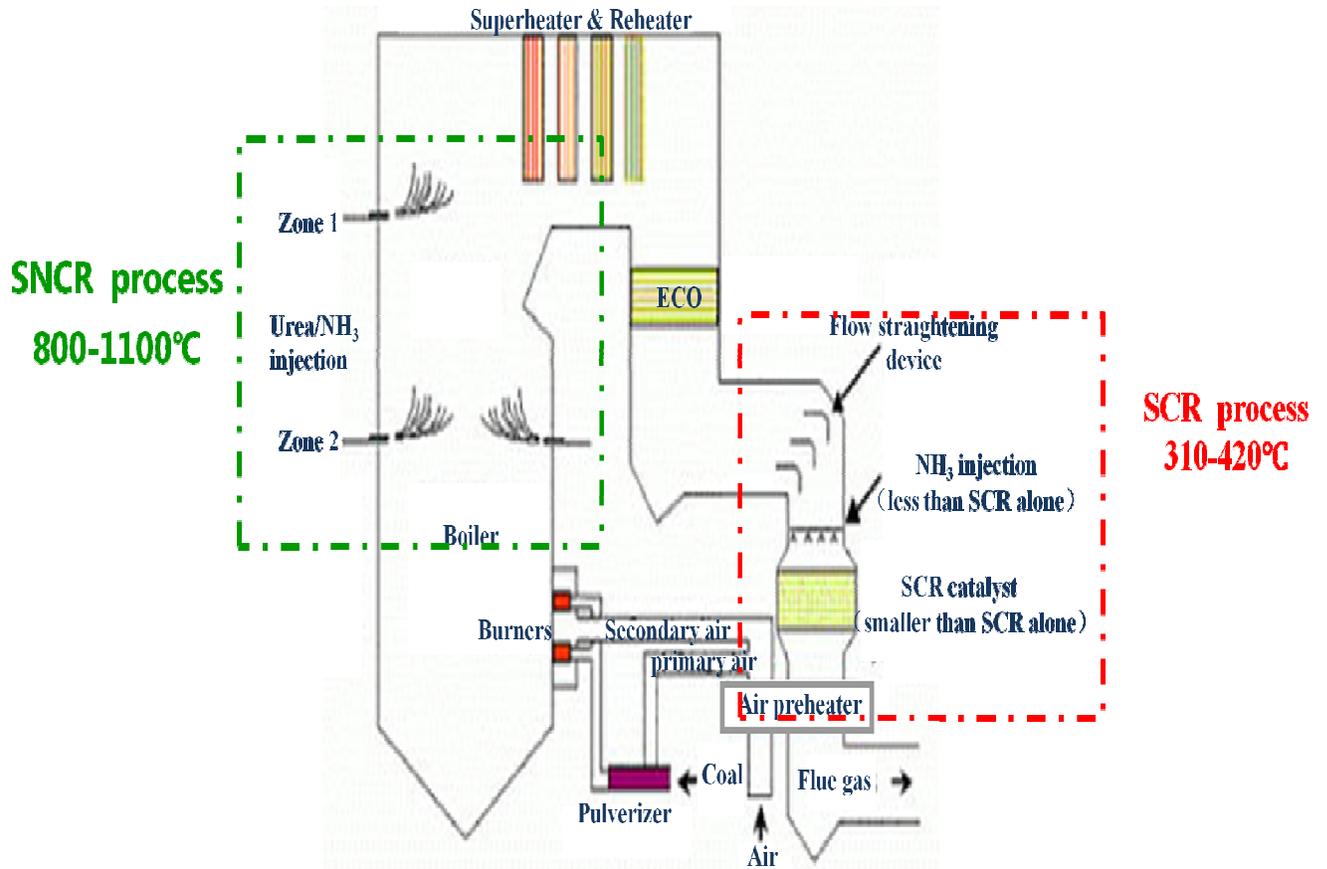
The Process System





• **Hybrid Systems (A combination of SCR & SNCR)**

Hybrids (SCR+SNCR) are the optimal choice where the need for NOx reduction is high but space limitations etc. are present. The Hybrid system is relatively new and the most flexible choice for NOx reduction technology. With a Hybrid System, the catalyst volumes can be reduced in comparison to full SCR System, reducing the space and investment needed.



Comparative for Reagents

Reagent	Advantages	Disadvantages
Liquid Ammonia	<ul style="list-style-type: none"> Smaller volume of storage Simple system Lower energy consumption Lower equipment investment 	<ul style="list-style-type: none"> Hazardous Chemical Risk in transportation and storage
Ammonia water	<ul style="list-style-type: none"> Concentration range is convenient to control 	<ul style="list-style-type: none"> Bigger volume of storage Higher equipment investment Hazardous as liquid ammonia
Urea	<ul style="list-style-type: none"> Non-toxic and harmless Non-explosive Transportation and storage is safe 	<ul style="list-style-type: none"> Highest equipment investment Higher running cost Higher energy cost

Catalysts for SCR:

Main constituents are:

- Carrier : TiO₂
- Active component : V₂O₅
- Forming agents : WO₃, MoO₃ etc.

Types of Catalyst

Description/Characteristics	Honey Comb type	Corrugated Plate type	Plate type
Pictures			
Production process	Extrusion forming process	Extrusion-coating process	Coating on Stainless steel plate
Surface area	Big	Biggest	Small
Anti clogging performance	Good	Poor	Best
Anti poisoning performance	Weak	Strong	Strongest
Abrasion Resistance	Weak	Weak	Strongest

With you from concept to commissioning.....

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DEC Engineering & Constructions Pvt. Ltd.: Reference list

- *Essar Constructions (India) Ltd. Hazira SEZ, Gujarat
Erection of Structures, fabrication & erection of Piping for Steel Melting Plant*
- *Essar Projects (India) Ltd, Hazira, Gujarat
Erection & alignment of static & rotary equipments for Heat Treatment Furnace in Plate Mill*
- *Heinz India Pvt. Ltd. Sitarganj, Uttaranchal
Piping fabrication & erection including pipe racks*
- *ASTA India Pvt. Ltd. Savli, Gujarat
Structural fabrication and Equipment erection*
- *BGR Energy Systems Ltd. Jhalawar, Rajasthan
Fabrication & erection of Cooling water piping, Raw water piping; fabrication & erection of Pipe Racks & Storage Tanks for Kalisindh 2 x 600 MW Thermal Power Plant*
- *YORK India Ltd. (Johnson Controls)
Fabrication & erection of piping, structurals and equipment installation & alignment in GFL, Dahej and Abott, Jhagadia*
- *Reliance Petroleum Ltd. Jamnagar SEZ, Gujarat
Fabrication and erection of piping*
- *McCain Foods (India) Pvt. Ltd.
Mechanical Contract for 1.2 T new Specialty Line*
- *Jubilant Life Sciences Ltd. Vilayat SEZ, Gujarat
Erection & alignment of equipments*
- *AVA Huep GmbH & Co. Jammu
Speciality welding along with installation, pressure testing and commissioning*
- *INBISCO India Pvt. Ltd. Sanand, Ahmedabad
Supply, fabrication, erection & testing of utility piping including structurals and equipment erection*
- *Avenza Pharmaceuticals Private Limited Vadodara
Civil works including boundary wall*
- *PI Industries Ltd. Jambusar, Gujarat
Plant structure fabrication & erection, fabrication & erection of piping and equipment erection*
- *Aditya Birla Nuovo Ltd. Veraval, Gujarat
Equipment installation in CSY Plant and continuing order for Mechanical ARC*

Beijing National Power Group Co. Ltd.:

Reference list

Sr. No.	Name of Project	Location of Project	Year of Installation	Plant size	Type of System	Reductant used	Outlet Nox (mg/NM3)
1	Shanxi Huaguang Power Generation Co. Ltd.	LiuLiang City, Shanxi Province	2015	600MW	SCR	Liquid Ammonia	50
2	Shanxi Huaguang Power Generation Co. Ltd.	LiuLiang City, Shanxi Province	2015	600MW	SCR	Liquid Ammonia	50
3	Shanxi Pingshuo Coal Gangue Power Generation Limited Liability Company	Shuozhou City, Shanxi Province	2015	300MW	Hybrid	Ammonia water (20%)	50
4	Shanxi Pingshuo Coal Gangue Power Generation Limited Liability Company	Shuozhou City, Shanxi Province	2015	300MW	Hybrid	Ammonia water (20%)	50
5	Harbin Heilongjiang First Thermal Power Plant of Datang Corporation	Haerbing City, Heilongjiang Province	2014	300MW	SCR	Liquid Ammonia	100
6	Harbin Heilongjiang First Thermal Power Plant of Datang Corporation	Haerbing City, Heilongjiang Province	2014	300MW	SCR	Liquid Ammonia	100
7	Shanxi Zhaoguang Power Generation Co., Ltd.	Linfen City, Shanxi Province	2015	300MW	SCR	Urea	50
8	Shanxi Zhaoguang Power Generation Co., Ltd.	Linfen City, Shanxi Province	2015	300MW	SCR	Urea	50
9	Guangxi Tiandong Jinsheng Chemical Co., Ltd.	Tiandong County, Guangdong Province	2015	135MW	SCR	Liquid Ammonia	100
10	Guangxi Tiandong Jinsheng Chemical Co., Ltd.	Tiandong County, Guangdong Province	2015	135MW	SCR	Liquid Ammonia	100



11	Tiefa Coal Industry Group Co., Ltd.	Diaobingshan City, Liaoning Province	2015	25MW	SCR	Urea	50
12	Tiefa Coal Industry Group Co., Ltd.	Diaobingshan City, Liaoning Province	2015	25MW	SCR	Urea	50
13	Tiefa Coal Industry Group Co., Ltd.	Diaobingshan City, Liaoning Province	2015	25MW	SCR	Urea	50
14	Xinjiang Blue Ridge Tunhe Energy Co., Ltd.	Changji City, Xinjiang Province	2015	320t/h	Hybrid	Urea	63
15	Xinjiang Blue Ridge Tunhe Energy Co., Ltd.	Changji City, Xinjiang Province	2015	320t/h	Hybrid	Urea	63
16	Xinjiang Blue Ridge Tunhe Energy Co., Ltd.	Changji City, Xinjiang Province	2015	160t/h	Hybrid	Urea	59
17	Xinjiang Blue Ridge Tunhe Energy Co., Ltd.	Changji City, Xinjiang Province	2015	160t/h	Hybrid	Urea	59