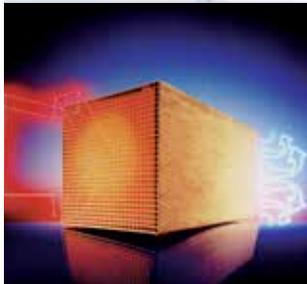


Leading the way in SCR NO_x abatement

Exhaust Control Industries Air and noise pollution control specialists





Exhaust Control Industries

The leading SCR experts

Over the past 20 years, ECI has led the way in Selective Catalytic Reduction (SCR) NOx Abatement Systems in Australia and around the world.

Current and future Co-generation and Tri-generation building projects that feature the ECI Selective Catalytic Reduction (SCR) System and Oxidation Catalyst continue to set the industry benchmark for both business and environmental sustainability. ECI's constant testing, research and development ensures cutting-edge design and maximum reduction in harmful pollutants into the lower atmosphere, thus reducing smog.



Co-generation and Tri-generation power for energy efficiency

Co-generation (or CHP - Combined Heat and Power) is the use of an engine or power station to simultaneously generate electricity and useful heat. Tri-generation (or CCHP - Combined Cooling, Heat and Power) refers to the simultaneous generation of electricity and useful heating and cooling.

Co-generation is a thermodynamically efficient use of fuel. In separate production of electricity, some energy must be discarded as waste heat, but in Co-generation this thermal energy is put to use. All thermal power plants emit heat during electricity generation, which can be released into the natural environment through cooling towers, flue gas, or by other means.

Emissions (NOx) Treatment

The emissions from these power stations or engines typically contain NOx. NOx is a generic term for mono-nitrogen oxides NO and NO₂ (nitric oxide and nitrogen dioxide). They are produced from the reaction of nitrogen and oxygen gases in the air during combustion, especially at high temperatures.

In the lower atmosphere, NOx combines with reactive organic gases in the presence of sunlight to form ground-level ozone, which is the primary component of urban smog. In addition, nitric oxide and nitrogen dioxide are components of acid rain, which is a significant problem in the northern hemisphere.

The ECI Australia SCR for NOx Abatement System is capable of reducing NOx emissions by over 95 percent. Over the past 40 years, the fitting of this post-combustion NOx control system on both diesel and gas fired engines and turbines has resulted in major reductions in NOx in our urban environments.

With the ever-increasing need for power generation, coupled with stringent air policy regulations, the SCR system for NOx abatement is widely used in large power stations and process plant applications around the world.

The ECI SCR System

SCR is a post-combustion control technology capable of reducing NOx emissions by 80-95+ percent. The ECI SCR system selectively reduces NOx by combining liquid Urea/Ammonia (NH₃) and Oxygen (O₂), with NOx in the exhaust gas, in the presence of a catalyst to form molecular nitrogen (N₂) and water (H₂O).

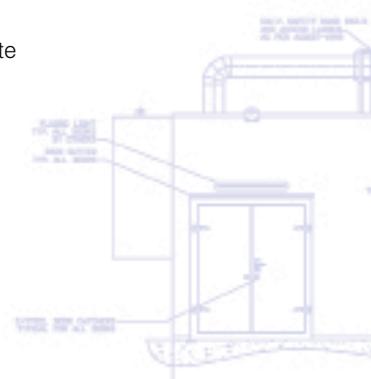
SCR, in conjunction with various oxidation catalyst options, produces beneficial and accountable NOx, CO (Carbon Monoxide), VOC (Volatile Organic Compounds) and PM (Particulate Matter) emission reductions.

ECI SCR System Components

A typical SCR system is composed of

- Reactor housing with catalyst material for NOx reduction
- Optional Oxidation Catalyst / Predator Particulate Catalyst (diesel engines)
- Injection and mixing unit
- Urea metering unit
- Continuous Emission Monitoring System (CEMS); OR
- Predictive Emission Monitoring System (PEMS) option
- Urea storage tank and accessories.

In addition, the system can be integrated with a BMS via a modbus port and offer 24 hour remote access and data logging.





ECI Oxidation Catalyst

The addition of an Oxidation Catalyst onto an SCR NOx Abatement System will further reduce levels of CO (Carbon Monoxide), hydrocarbon and VOC (Volatile Organic Compounds) emissions by up to 80-90 percent.

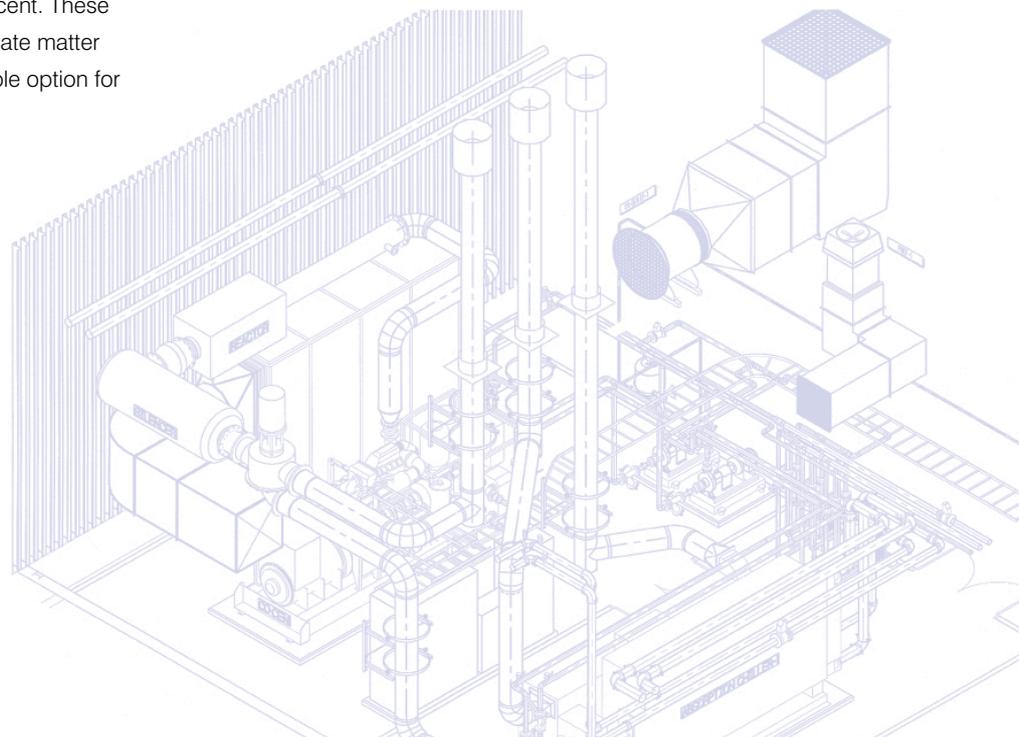
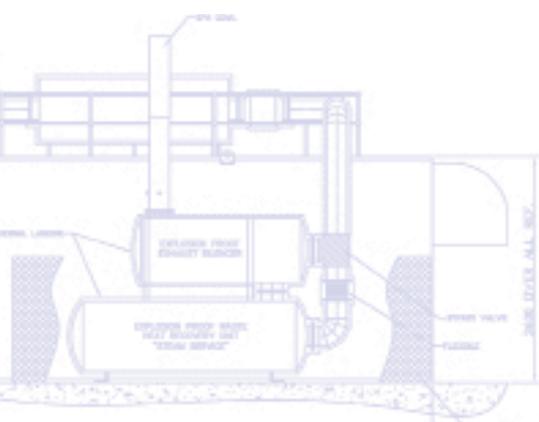
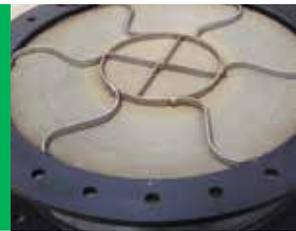
Time of fuel dispensation, peak pressures, combustion and exhaust temperatures all affect NOx formation. Typically there is an inverse relationship between the formation of NOx and CO. Higher combustion temperature and pressure levels, which are often conducive to NOx formation, tend to be out of the range of ideal CO forming conditions.

If the temperature conditions within the exhaust system cool (i.e. with the use of a Chiller), NOx emissions come down slightly, but CO, hydrocarbons and VOCs may rise. Therefore, to concurrently meet BACT (Best Available Control Technology) emission levels for CO, hydrocarbons and VOCs, the utilisation of an Oxidation Catalyst is required.

Further treatment can be applied by diesel fuel applications, that is, with the addition of Particulate Filters that provide particulate matter (i.e. soot) reductions of up to 95 percent. These Particulate Filters oxidize the particulate matter to offer an environmentally sustainable option for diesel fuel applications.

Benefits of Selective Catalytic Reduction

- Long catalyst life
- System design flexibility for marine, rail and plant applications
- Broad temperature range from 285°C to 520°C
- Compatible with various fuel types, which includes contaminated fuels with up to 3.5% sulphur
- Process guarantees
- Ongoing maintenance and emissions testing services
- Urea supply
- Remote access to PLC controls
- Technical training & engineering manuals.



Why use the SCR NOx Abatement System and Oxidation Catalyst?

In June 2012, the International Agency for Research on Cancer (part of the World Health Organisation) updated diesel engine exhaust to the classification '**carcinogenic to humans (Group 1)**'. This is the highest classification and indicates that diesel exhaust damages the DNA, or genetic material in body cells in a way that leads to cancer. The Group 1 classification places diesel exhaust alongside toxins such as asbestos, benzene, formaldehyde and arsenic.

Exposure to diesel exhaust can have immediate harmful health effects. Those most vulnerable are children whose lungs are still developing and the elderly who may have other existing health problems.

The following substances are present in diesel exhaust:

- **Ozone (precursors, NOx and VOC)**
Effects: eye and respiratory irritants, asthma exacerbation, bronchitis and irreversible lung damage.
- **Oxides of nitrogen**
Effects: respiratory irritant, immunosuppressant and asthma exacerbation.
- **Carbon monoxide**
Effects: headaches, irritability, impaired judgement and memory, breathlessness, aggravation of angina and other cardiovascular diseases, developmental toxicity and death.
- **Particulate matter (i.e. soot)**
Effects: Respiratory irritant with higher levels associated with increased incidence of cardiovascular and lung failure.



Green Square North Tower, Gas Powered Generator, Brisbane

ECI customise emissions treatment solutions for all types of applications including:

- Heavy transport
- Food and beverage
- Data and communication centres
- Industrial
- Health
- Construction
- Mining
- Power generation, including:
 - Standby power
 - Emergency power, and
 - Community power.

ECI can help provide a safer workplace for your employees and a cleaner world for us all.

Pictured Green Square North Tower project, Brisbane Australia.

ECI worked with Leighton Contractors to achieve a 6 Star Green Star rating. ECI's customised design met plant room requirements as well as stringent Brisbane City Council air policy regulations.



Exhaust Control Industries

Air and noise pollution control specialists

ECI is the leader in Co-generation and SCR technology in Australia.

Our air and noise pollution control products include Silencers, Diesel Particulate Filters, Diesel Particulate Catalysts, Catalytic Purifiers, Waste Heat Recovery Systems and Acoustic Enclosure Products.



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