

Queensland University of Technology Gardens Point Campus, Brisbane Australia

 **eci**
exhaust control industries
AUSTRALIA



Exhaust Control Industries

Air and noise pollution control specialists

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ECI worked with Leighton Contractors, Siganto and Stacey Air Conditioning and Mechanical Contractors to deliver outstanding design innovation in energy efficiency products and emission reduction technologies to one of the leading Australian Universities.



Background

Whilst students and academics at QUT work towards solving the most critical global issues, the new Science & Engineering Centre project must deliver world class air and noise pollution reduction and energy efficiency.

The Challenge

NOx emissions are of particular concern due to their contribution to ground-level ozone formation and acid rain. 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. The health effects of continued exposure to these pollutants are well documented to cause respiratory irritation, even in healthy adults and children. During periods of high ozone concentration there is an increase in hospital admissions for asthma and other related health conditions.

The History of SCR

SCR (Selective Catalytic Reduction) for NOx (oxides of Nitrogen) abatement was developed in Germany in the early 1950's with the first system commercialised in America in 1963. 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.

Nitrous oxides are the precursor to smog. With the ever increasing need for efficient power generation, coupled with stringent air policy regulations, Selective Catalytic Reduction (SCR) for NOx abatement is widely used in large peak lopping power stations, process plant applications and gas fired Co/Tri generation projects around Australia and in hundreds of projects in America and Europe.

The Solution

ECI (Exhaust Control Industries) worked with Siganto, Stacey Air Conditioning and Mechanical Contractors and Leighton Contractors to achieve a 5 Star Green Star Education V1 rating for the project.

ECI's tailored component design and installation experience provided the facility with the most efficient layout for both operational performance and plant room functionality. The SCR System includes a Continuous Emissions Monitoring System (CEMS) which keeps the exhaust NOx emissions of the gas generator below state regulation limits throughout the complete operation of the Tri-Generation plant.

ECI designed and manufactured all components which included a specifically designed high performance super critical Silencer, natural gas Oxidation Catalyst, Waste Heat Recovery Unit for hot water production and a CEMS controlled SCR System for NOx abatement. All components meet stringent Australian gas appliance and pressure vessel code standards.

ECI SCR System Components

The Catalyst, comprising of parallel plates or honeycomb structures, was installed in the form of rectangular modules, downstream of the engine. Typically, an SCR system is comprised of a urea storage tank, vaporization and injection equipment for the urea, a mixing duct, SCR reactor with catalyst, and instrumentation and control equipment.

ECI Oxidation Catalyst

In catalytic oxidation, a catalyst is used to oxidize carbon monoxide (CO). The addition of a catalyst to the basic thermal oxidation process accelerates the rate of oxidation by absorbing oxygen from the air stream and CO in the exhaust stream, onto the catalyst surface to react to form carbon monoxide (CO2) and water. Reduction efficiencies achieved for this project were a staggering 96 percent.

ECI's demonstrated experience in Tri-generation and SCR projects in Australia makes them a strong business partner for life.

ECI designed, manufactured and installed:

- Specifically designed high performance super critical silencer
- Natural Gas Oxidation Catalyst
- Waste Heat Recovery Unit for hot water production
- Continuous Emissions Monitoring system (CEMS) controlled SCR System for NOx abatement.
- Complete gas engine and boiler exhaust systems.

Achieving a 5 Star Green Star Education V1 rating.



Pollutants Tested	Target	Result
Oxides of Nitrogen (NOx)	50 mg/Nm ³	21 mg/Nm ³ (94% Reduction)
Carbon Monoxide (CO)	67.6 mg/Nm ³	14 mg/Nm ³ (96% Reduction)
Ammonia Slip (NH3)	0-4 mg/Nm ³	0.16 mg/Nm ³
VOC (NMHC)	N/A	0.6 mg/Nm ³

PARAMETER	Average Results	Guideline Limit	Unit of Measure
Exhaust Gas Temp	479	N/A	°C
Oxygen	9.10	N/A	%v/v
Carbon Dioxide	7.56	N/A	%v/v
Carbon Monoxide	14	67.6	mg/Nm ³
Moisture	15.8	N/A	%v/v
Non Methane VOC's (NMHC)	<0.6	N/A	mg/Nm ³
Oxides of Nitrogen (NOx)	21	50	mg/Nm ³
Ammonia after oxidation catalyst	0.16	4	mg/Nm ³

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