



# Emission control solutions for power generation



**Johnson Matthey**  
Inspiring science, enhancing life





Johnson Matthey emission control systems containing SCR and oxidation catalyst installed on twenty 6MW natural gas engines powering a Colorado energy plant.

## Catalytic solutions for cleaner energy and cleaner air

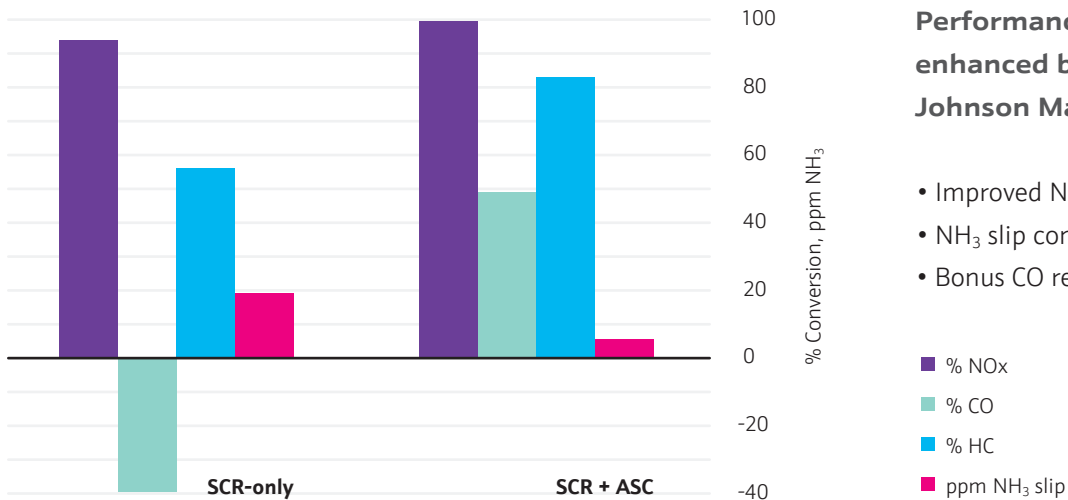
**Johnson Matthey, a global leader in catalytic emission control technology,** offers a complete portfolio of innovative emission control solutions for prime, peak, stand-by, demand response and combined heat and power (CHP) generation. Applications include stationary diesel, natural gas, HFO and biogas fueled engines.

Our emission control systems are built in the USA with technology that is based on more than 50 years of experience in reducing air pollution from thousands of stationary diesel and gas engines, and millions of mobile engines.

### **Your single source**

We develop and manufacture our own catalyst, design our catalytic converters and systems, supply replacement catalyst and recycle used precious metal catalyst for credit, so there is one point of contact for the convenience of our customers.

We provide full technical support, including commissioning and catalyst testing and maintenance services to ensure optimum performance and compliance with all environmental regulations over the lifetime of our products.



### Performance of SCR system is enhanced by adding a layer of Johnson Matthey's ASC

- Improved NO<sub>x</sub>, HC conversions
- NH<sub>3</sub> slip converted to nitrogen
- Bonus CO reduction

### Innovative solutions

For Johnson Matthey, the greatest challenges become our greatest opportunities. As environmental regulations become more stringent, we build upon our expertise in advanced materials and catalyst technologies to deliver innovative emission control products to our customers. One of our newest products is our selective ammonia slip catalyst (ASC) used to enhance the performance of our SCR systems.

### Covering the bases

Johnson Matthey's emission control solutions reduce pollutants from most combustion sources – NO<sub>x</sub>, PM, VOCs, CO, HAPs, formaldehyde, ammonia – to keep our customers in compliance with: RICE NESHAP; NSPS; BACT; Tier 4; CARB; EPA Quad J, Z; MACT; NAAQS; SCAQMD; MOECC; TA Luft; and other regulations.

### Clean energy for:

- Data centers
- Wastewater treatment
- Residential/commercial centers
- Dairy farms, greenhouses
- Industrial/manufacturing
- Mining operations
- And many more



Johnson Matthey's emission control system with SCR, ASC and oxidation catalysts in a single, compact housing.

# Johnson Matthey catalytic emission control solutions

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## Modulex™ and DualOx® Catalytic Converters and Silencers:

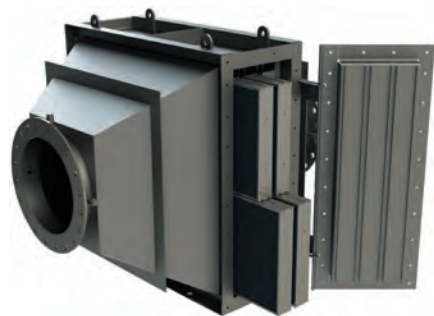
*A fast, easy, economical way to stay running and in compliance*

- For oxidation and three-way catalysts
- Brazed metallic catalyst - durable, low backpressure
- Horizontal or vertical mounting, easy-access door
- Pre-engineered or custom designs available

## Three-way and Oxidation Catalyst:

*Reduce air pollution from lean and rich combustion sources*

- NO<sub>x</sub>, CO, HAPs, VOC reductions up to 99+%
- Formulations optimized for performance
- Cell density optimized for backpressure
- Brazed for mechanical durability
- Wide variety of sizes and shapes
- Catalyst elements fit any housing



DualOx® catalytic converter

## Diesel Particulate Filter (DPF) Systems:

*Effectively control diesel particulates (PM)*

- Reductions: PM > 85%, CO > 80%, VOC > 70%

*Passive systems: CRT® Technology*

- CARB-verified or non-verified, JM patented, most widely used DPF system in the world

*Active Systems: CRT+ load bank*

- Regenerate DPF and test system at load

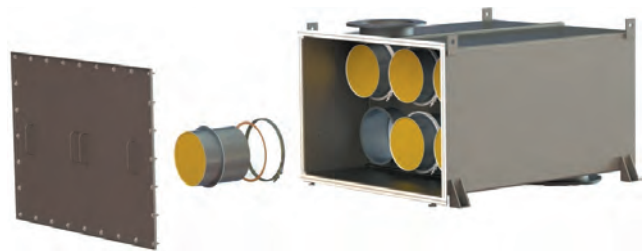
## Monitors:

*Soot Alert™ Monitor*

- For DPF systems
- Indicates when and how long to regenerate DPF

*HAPGuard™ Monitor*

- For RICE NESHAP catalytic converters
- For lean- and rich-burn engines
- Monitors RICE NESHAP operation



CRT® system for diesel PM control



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### SINOx® SCR System:

*Reduce NOx up to 99% with advanced SCR*

- Enhanced VOC, CO reduction
- Silencing for noise attenuation
- Complete systems: pre-engineered or custom
- Factory-assembled systems available

### SCRT® System:

*Integrates the best of SCR and CRT® technologies*

- Reduces NOx, PM, VOC, CO, and noise
- Achieves Tier 4 or better
- Single-box or modular configuration for any location

### SINOx® Extruded SCR Catalyst:

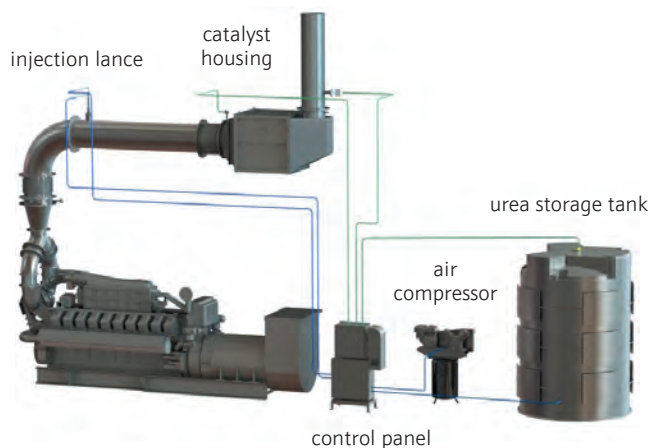
*For any SCR system*

- Made entirely of catalytically active materials
- Sulfur-tolerant, wide temperature window
- Cell densities for range of fuels:
  - Low cpsi for bio and waste gases
  - Medium cpsi for HFO
  - High cpsi for ULSD, natural gas

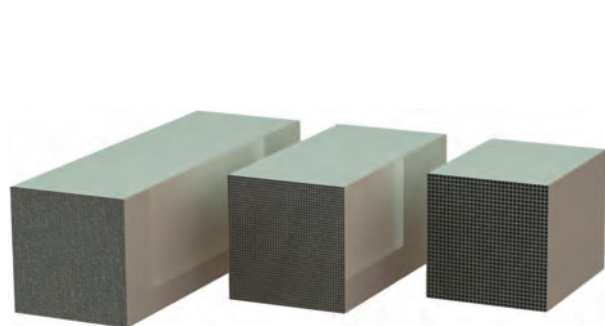
### Ammonia Slip Catalyst (ASC):

*Enhances SCR system performance*

- Converts NH<sub>3</sub> slip to nitrogen
- Delivers CO, VOC conversion
- Single-housing SCR + ASC + Oxicat



SINOx® SCR system



SINOx® extruded SCR catalyst



Middle East power plant operating thirty-eight 17 MW, HFO-fueled engines, each one equipped with a Johnson Matthey SCR system.

## Success stories

**Johnson Matthey emission control systems have prevented air pollution from many power generating applications.**

### Clean power from diesel and fuel oil

#### **Prime power diesel engines**

Catalina Island, more than 20 miles from the California coast, has its own micro-grid to generate the island's power. A total of 7.5 MW of electricity for the island is produced by four 2-stroke diesel engines. All of the engines are equipped with Johnson Matthey SCR and oxidation catalyst systems. The systems have been successfully reducing air pollution on the island since 2003.

#### **Diesel-powered emergency gensets**

A California data center voluntarily installed Johnson Matthey's passively regenerating CRT systems on its six 3MW emergency diesel gensets to reduce PM emissions. The gensets were run periodically as part of routine maintenance and the CRT systems reduced PM by more than 85%, without plugging. The data center has expanded and uses more than thirty gensets, with a Johnson Matthey CRT system installed on every one.



## Clean power from gas

### Prime power natural gas engines

A Pennsylvania power company uses Johnson Matthey advanced SCR systems to reduce NO<sub>x</sub>, with no ammonia slip. Despite fluctuations in engine NO<sub>x</sub>, emissions are maintained within the permit limit of 0.06 g/bhp-hr, a fraction of the PA DEP limit (0.50 g/bhp-hr) and the federal limit (1.0 g/bhp-hr). High reductions of CO, VOC and formaldehyde are also achieved.

### Power from digester gas

A Johnson Matthey SCR-oxidation catalyst system was pilot-tested for compliance with SCAQMD rule 1110.2 on a 2.5 MW digester gas engine at a California wastewater treatment plant. Test results demonstrated that NO<sub>x</sub>, CO and VOC emissions were well within the SCAQMD limits. The success of this project led to installation of eight SCR systems on the engines that generate 70% of the plant's power.

A power plant operating five 4.5 MW natural gas engines. Every engine is equipped with a Johnson Matthey advanced SCR system.





## About Johnson Matthey

Johnson Matthey is a global leader in science that enables a cleaner and healthier world. With over 200 years of sustained commitment to innovation and technological breakthroughs, we improve the function, performance and safety of our customers' products. Our science has a global impact in areas such as low emission transport, pharmaceuticals, chemical processing and making the most efficient use of the planet's natural resources. Today more than 13,000 Johnson Matthey professionals collaborate with our network of customers and partners to make a real difference to the world around us. For more information, visit [www.matthey.com](http://www.matthey.com)

Inspiring science, enhancing life

We can help your engine or facility run clean, run quiet, run compliant. Contact us now for more information.



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