

# OUR EMISSION STATEMENT

Introducing the **cleanest ever range** from Australia's truck market leader.



TIC: Isuzu is a member of the Truck Industry Council - Safer Greener Essential.



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## MEETING AUSTRALIAN EMISSIONS STANDARDS 2011

All vehicles sold in Australia are required to meet Australian Design Rules (ADRs), a set of national standards covering areas including design, safety and emissions. ADRs are regularly updated in an effort to improve the quality of vehicles manufactured in, or imported to Australia.

As of 1 January 2011, all new trucks<sup>1</sup> sold in Australia are required to meet the latest ADR80/03 exhaust emissions standards. Vehicles with engines rated to the European Euro V, United States US EPA 07 or Japanese JNLT 05 measures are generally acceptable under ADR80/03.

As a leader in diesel engine production for commercial vehicles and in keeping with Isuzu's long-term commitment to minimising its impact on the environment, the company has adopted Euro V emission standards in its new SITEC Series III engines which power the 2011 Isuzu truck range.

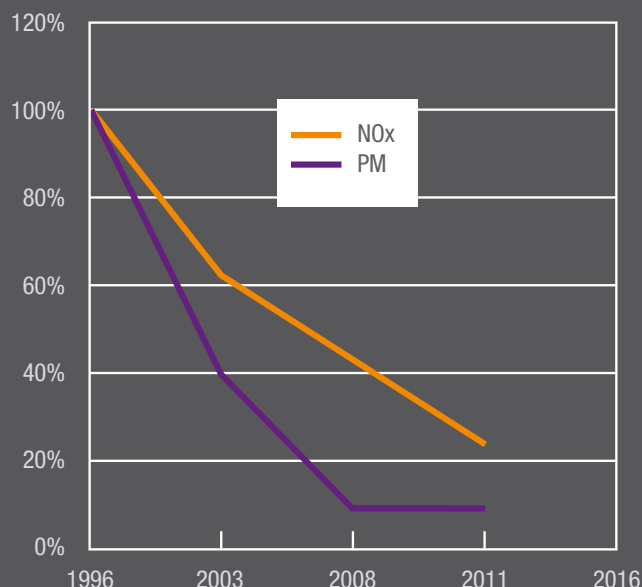


## AIR QUALITY GASES AND GREENHOUSE GASES

Below are two lists of commonly-referred-to gases when discussing exhaust emissions. Diesel engines produce relatively low CO and hydrocarbons such as methane, so manufacturers' efforts are focused on reducing NOx (combination of Nitrogen Dioxide and Nitrous Oxide) and PM.

Air quality gases:	Greenhouse gases (GHG):
Particulate Matter (PM)	Carbon Dioxide (CO <sub>2</sub> )
Ozone (O <sub>3</sub> )	Nitrous Oxide (N <sub>2</sub> O)
Nitrogen Dioxide (NO <sub>2</sub> )	Methane (CH <sub>4</sub> )
Sulphur Dioxide (SO <sub>2</sub> )	Hydrocarbon (HC)
Carbon Monoxide (CO)	

The chart to the right shows the substantial reduction in levels of NOx and PM emissions from pre-Euro I standards to Euro V levels achieved by the latest Isuzu engines.



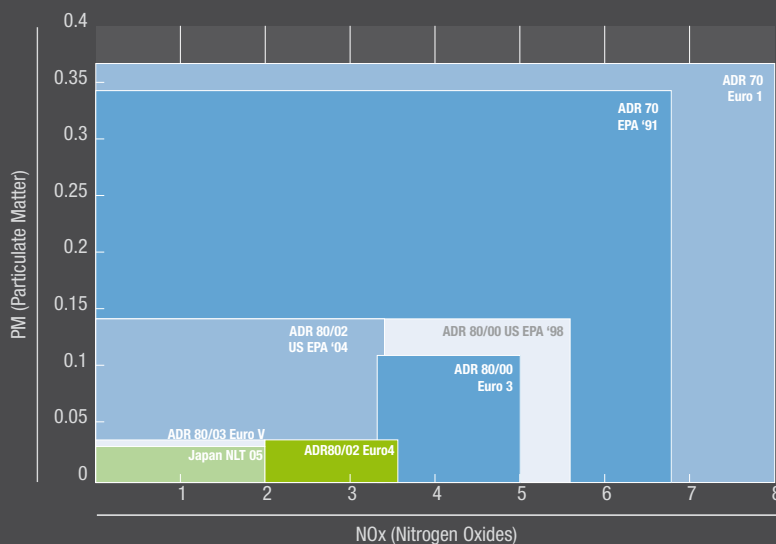
## EURO, US AND JAPANESE STANDARDS

This chart compares Euro, US and Japanese standards permitted by Australian Design Rules. Levels are shown in equivalent units, being grams per kilowatt-hour (g/kWh).

The chart illustrates the large reductions made from the Euro1 and EPA 91 levels of several years ago.

Isuzu's Euro V range conforms to limits requiring 93% less PM compared to new Isuzu trucks sold in 1996 or earlier.

The Euro V trucks emit approximately 40% less NOx than the previous models, or about 75% less than new trucks sold in 1996. NOx is one of the main contributors to acid rain.



<sup>1</sup> Greater than 3.5 tonne GVM.

## BENEFITS OF ISUZU'S EURO V RANGE

Isuzu Motors' commitment to reducing its impact on the environment is a genuine and passionate one, as is indicated by the progress in its engines' environmental performance. Further to this, all Isuzu N and F Series models easily exceed the stricter emissions standards outlined under the voluntary European Enhanced Environmentally-friendly (EEV) code, emitting less hydrocarbons, particulate matter and carbon monoxide than is allowable under Euro V (see chart below).

While the SiTEC Series III engines powering Isuzu's Euro V range have impressive environmental credentials, remarkably they offer the same – and sometimes higher – levels of power and torque than their predecessors.

With Isuzu's Euro V range, the balance between power and efficiency has been optimised, and Isuzu's stated objective clearly met with regard to minimising environmental impact through the provision of cleaner new trucks.

Emission Standard	HC	PM	NOx	CO
EURO V	.55	.03	2	4
EURO V (EEV)	.40	.02	2	3
ISUZU	.039	.004	1.72	.02

## ISUZU ENGINE TECHNOLOGY



In developing the new SiTEC Series III engines powering Isuzu's Euro V range, Isuzu Clean Air Solutions (I-CAS) technology has been applied to meet environmental requirements. I-CAS achieves an integration of three key technologies to decrease emissions and increase efficiency.

I-CAS includes 'in-cylinder' combustion optimisation technology, the very latest in exhaust after-treatment processes and the most advanced in-house developments in electronic control technology.

Engines are turbocharged, air-to-air intercooled and feature high-pressure common rail injection, advanced cooled EGR (Exhaust Gas Recirculation) systems, variable geometry system (VGS) turbochargers and a Diesel Particulate Diffuser (DPD) or Diesel Oxidation Catalyst (DOC) exhaust after treatment.

## ISUZU ENGINE TECHNOLOGY SUMMARY

- **Isuzu Clean Air Solutions (I-CAS)**
- **Overhead camshaft (OHC) design**
  - Improved efficiency and less parts than older pushrod designs
- **Advanced electronic control, featuring Isuzu's own 'Transtron' engine control modules (ECMs)**
  - Greater engine efficiency and power with less fuel usage
- **4-valves per cylinder**
  - Better 'breathing' and allows an ideal, central location for the injector
- **Variable geometry system (VGS) turbochargers**
  - Producing improved torque at low revs and eliminates the need for a waste-gate
- **Cooled exhaust gas recirculation (EGR) systems with minimum of two coolers**
  - Reduces Nitrogen Oxides by cooling the combustion temperature
- **Diesel Particulate Diffuser (DPD)**
  - Filters up to 95% of the Particulate Matter produced by the engine
- **High pressure electronic common rail fuel injection system**
  - Provides constant high pressure to all cylinders. High pressure injection = smaller droplets of fuel = better mixing with air = more efficient combustion



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## ISUZU'S DPD DIFFERENCE

Isuzu was one of the first manufacturers to introduce ADR80/03-compliant trucks to the Australian market with the launch of its FX and Giga Series in April 2008, and its Compressed Natural Gas (CNG) range in May 2009.

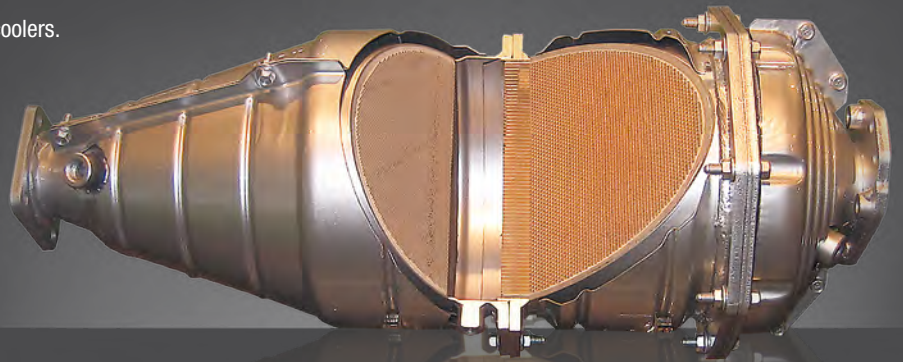
All Isuzu N and F Series models have been equipped with a serviceable diesel particulate diffuser (DPD) since 2007. This experience has contributed to our extensive local knowledge of this important after-exhaust emissions reduction technology.

Isuzu's competitors on the other hand, have been required to adopt DPD technology to comply with ADR 80/03.

In the unlikely event that your Isuzu DPD becomes damaged, our trained technicians will service the unit (where possible), rather than opting for a costly replacement. This is just one of the many advantages of Isuzu's DPD, which has incorporated several enhancements since its introduction in 2007.

To complete the journey to Euro V and ADR80/03, Isuzu's N and F Series models:

- Continue to be fitted with a DPD.
- Use revised Engine Control Module (ECM) software.
- Adopt improved Exhaust Gas Recirculation (EGR) coolers.
- Feature higher injection pressure.
- Include a fuel cooler (NLR, NLS and NRR models).
- Include a primary fuel filter (NLR, NLS and NRR models).



As the name suggests, the DPD minimises the amount of PM a truck emits via the exhaust. The DPD, which is located midway along the truck's exhaust, combines an oxidation catalyst to clean hydrocarbons, and a ceramic filter that traps PM.

Pressure differential sensors within the ceramic filter are used to monitor the accumulation of trapped PM. Once a certain amount of PM is detected, the ceramic filter regenerates; this is done via post-injection which elevates the exhaust gas temperature to burn off the accumulated PM.

The cleaning process is aided by precision control of the exhaust brake and exhaust throttle, which assists in raising the exhaust gas temperature, promoting PM cleaning.

The truck's ECM continually monitors the condition of the ceramic filter and under most operating conditions, regenerates the filter automatically without the driver even knowing. However, in some circumstances (rarely encountered in typical Australian conditions), the filter will require manual regeneration.

## DPD - MANUAL REGENERATION

Where the truck's operating temperature does not reach the required level for automatic regeneration, generally due to a combination of short distances travelled and the truck's engine being frequently turned on and off, manual regeneration may be required.

The DPD warning lamp in the instrument cluster will begin to flash slowly alerting that manual regeneration will be required within the next 60 to 100 kilometres, depending on model.

Within this distance, the driver will need to engage the manual regeneration cycle - stop the truck, keep the engine idling and press the DPD button.

## SO WHY CHOOSE AN ISUZU EURO V TRUCK?



When you purchase a truck from Isuzu's Euro V range you can rest assured it will live up to the meticulous standards set by Australia's truck market leader.

Isuzu's 2011 range is its cleanest yet - meeting, and at times exceeding, the stringent standards mandated by ADR 80/03.

The N and F Series range also meets even stricter voluntary EEV standards, so there's no need for costly upgrades or modifications which some of our competitors offer as an option.

And if your truck's DPD is ever damaged, Isuzu's technicians have the ability to service the unit (where possible) rather than replace it - potentially saving thousands of dollars.

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