

Global CO₂ Emissions Laws are in Place – Almost

In July, the peak body representing the Australian automotive industry, the Federal Chamber of Automotive Industries (FCAI), was congratulating itself on the industry's meeting a self-imposed CO₂ 'target' of 222 grams of carbon dioxide per kilometre across Australia's new-vehicle spectrum. The FCAI also 'vigorously supported' the recent COAG decision to conduct an evaluation of options to lower carbon emissions from vehicles. While this token carbon-reduction effort was happening in Australia, other nations were living in the real emissions-lowering world.

Eighteen months ago, the European Commission adopted a proposal for legislation to reduce the average CO₂ emissions of new passenger vehicles from the present 160 grams per kilometre to 130g/km by 2012.

The proposal includes fines for non-compliance, but some makers aren't concerned by the new CO₂ targets: notably Peugeot, Citroen and Fiat, who already average around the 140g/km CO₂ figure.

Across the pond in the recalcitrant US of A, one of George Dubya's last acts was to sign legislation for more fuel-efficient vehicles. The legislation requires auto makers to increase fuel efficiency by 40 percent, to an industry average 35 miles per US gallon (6.7 litres per 100 kilometres) by 2020. However, the ink on this document was hardly dry before California and 15 other states requested a waiver, imposing much more strict emissions laws. California's target for 2020 is 44 mpg (5.3 L/100 km).

The Bush administration backed the Environment Protection Agency's refusal to allow California to implement more stringent CO₂ emissions targets and the matter headed into the courts. Then along came President Obama.

On 30 June 2009, the EPA granted California's waiver request, clearing the way for California and 13 additional states to require reductions in tailpipe emissions of CO₂.

The auto industry, in turn, agreed to dismiss its legal challenges to the state clean car programs, agreed not to challenge the EPA decision to grant the waiver for the California clean car standards and agreed not to challenge the national clean car standards.

In Asia, Japanese and Korean car makers have traditionally met whatever targets they must, to continue exporting vehicles, so compliance with EU CO₂ and US fuel consumption targets should mean business as usual.

Japan's existing domestic target is for 138g/km average by 2015, so tightening that to 130g/km to meet EU requirements for 2012 shouldn't be difficult. China is something of an unknown quantity, but the Chinese Government is likely to adopt a CO₂ standard at least as restrictive as Europe's.

Future 4x4 engines

What's predictable from overseas CO₂ legislation is that the proportion of big-burn engines in vehicle manufacturers' line-ups will decrease and, because such engines will attract a fine for the maker or need to be subsidised by other vehicle sales or carbon-trading, they'll become more expensive. Despair not, because smaller, more efficient petrol and diesel engines will replace most of today's big-burn engines, without power and torque compromises and with weight and fuel economy benefits. Examples of downsizing without compromise are already apparent. Who would have thought, a few years ago, that in 2009 Mercedes-Benz would be selling the 2.1-litre OM651 diesel, fitted with two-stage supercharging and a turbocharger, with outputs of 150kW(204hp) at 4200rpm and 500Nm at 1600-1800rpm?

The turbo-supercharging concept isn't new; having been pioneered in two-stroke truck GM ('Jimmy') diesels in the 1980s and later employed on Volvo's six-litre, four-stroke truck diesel in the 1990s, but, with computerised, high-pressure, common-rail injection, the design has been taken to a new level.

So, diesel technology seems well on track to satisfy the dual demands of performance and economy/emissions.

The petrol engine situation is also looking bright. The good news is that direct petrol injection makes high-pressure turbocharging, supercharging and intercooling feasible and there are several such spark-ignition engines on sale already.

Volkswagen's 1.4 litre TSI engine has just taken out the European International Engine of the Year 2009 Award and was also voted Best Green Engine 2009, as well as Best Engine in the 1.0- to 1.4-litre category. The VW TSI engine combines a mechanically-driven supercharger and an exhaust-gas-driven turbocharger: a combination that is relatively new in the petrol-engine world.

The TSI's supercharger supplies boost pressure at engine revs up to about 2400rpm, after which the engine enters what VW calls Dynamic Compressor Mode, where the supercharger helps reduce turbo lag as the boost from the turbo starts to kick in. At 3500rpm, the engine computer switches off the supercharger.

The VW 1.4-litre TSI engine develops 127kW (168hp) at 6000rpm and has 240Nm of torque from 1750-4750rpm.

As yet, we're not seeing small-capacity diesel and petrol engines with outputs in the big V8 category, but it's early days for high-pressure, small-capacity engines. More will come, so watch this space. It's unlikely that our love affair with off-road machinery will end in tears as a result of CO₂ emissions laws.