

Biogas is just as good as CNG

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Think of Austria and you think of Alps, cakes and waltzing, although not necessarily in that order. Now, you might have to add biogas to that list.

The latest cutting edge research at the Institute for Internal Combustion Engines and Automotive Engineering in Vienna, Austria, shows that, contrary to some opinions, there is no disadvantage to running engines on biogas compared to (compressed) natural gas (CNG). Indeed the research results show that it shouldn't be a problem to run engines on a biogas/CNG mix.

[F090 Image 1](#)

Tank-to-wheel

Heiko Pflaum, researcher at the Institute, part of Vienna's Technical University, spent sixteen months working on engine rig testing of biogas, CNG and a biogas/CNG mix.

The research, which was funded by the Austrian Federal Ministry for Transport, Innovation and Technology, compared both biogas and CNG fuel performance to that of petrol through the tank-to-wheel element of driving life cycle.

Heiko says: "On an engine rig, the engine is tested at constant low points, with no changes to torque or revs, because it is easier to test fuel performance at a constant. I was interested in the engine efficiency and emission levels as well as looking at how the fuels burn and their combustion parameters."

Percentages

Three different qualities of biogas – 80 per cent, 85 per cent and 97 per cent methane – were tested alongside CNG and petrol. Testing was conducted on a single bio-fuel engine.

Heiko says: "At 97 per cent, biogas had the same level of performance as natural gas and of liquid fuel [petrol] – as did a natural gas and biogas mix. Raw biogas is anything from forty per cent to eighty per cent methane."

The research found that, when tested at the same constant low points, gaseous fuels reduce the

levels of carbon dioxide produced by an engine by 25 per cent. With a lower carbon-to-hydrogen ratio, a higher percentage of the emissions produced is water.

Real world

Now that the research is complete, the engine is ready to be tested at real-world standards using the New European Driving Cycle – where it's the speed of the car, not the speed of the engine, that is tested.

Heiko says: "Tank-to-wheel is an important element of the well-to-wheel cycle. But every car now has an oxidation catalyst which converts unburned fuel back into carbon dioxide and water through a hydrocarbon process, so you can't relate these research figures to real-world figures."

Although Heiko's research covered just the tank-to-wheel stage of the driving life cycle, when the latest figures regarding the well-to-tank phase are added to the equation, the reduced emissions results of biogas is even more impressive.

Heiko says: "The process of making fossil fuels releases carbon dioxide, but biogas has a negative carbon dioxide emission figure because it is a fuel produced by a biological process which uses up carbon dioxide. So, when compared to liquid fuel for the full well-to-wheel phase, the reduction in carbon dioxide emissions is up to seventy per cent.

Next step: biogas station

"There are already two pure biogas fuel stations in Austria and, in the future, others will be able to offer a natural gas/biofuel mix which alternative fuel cars already on the market will be able to use."

It means driving an alternative fuel car is going to be more convenient for Austrians and even better for the environment. Although, with only two biogas stations in the whole country, still not convenient enough.