RESEARCHING **FUTURE FUELS**

The Exige 270E Tri-fuel is part of Lotus' research into the complex combustion process involved in running on mixtures of alcohol fuels and gasoline, which will be important for a successful transition from today's fuels to the sustainable, engine fuels of the future.

Alcohol fuels (such as methanol and ethanol) give more power when burned in the engine than gasoline (petrol). The performance benefits come largely from the high heats of vaporisation of methanol and ethanol, which give strong charge-cooling effects, and the increased octane ratings.

Developed from the supercharged Exige S, the roof scoop ensures that the air-to-air intercooler works as efficiently and effectively as possible in all climates and environments. The seamless switch point between these two cams is variable depending upon driving conditions and engine load. This gives the Lotus Exige 270E Tri-fuel a smooth and linear surge of power from idle speeds all the way to the maximum 8,500 rpm. An electronic drive-by-wire throttle ensures the quickest engine response possible whilst keeping the emissions as clean and as low as possible, to meet relevant legislative demands. Two extra fuel injectors have been fitted to increase fuel flow to the engine at normal and higher engine speeds and loads.

KEY FEATURES

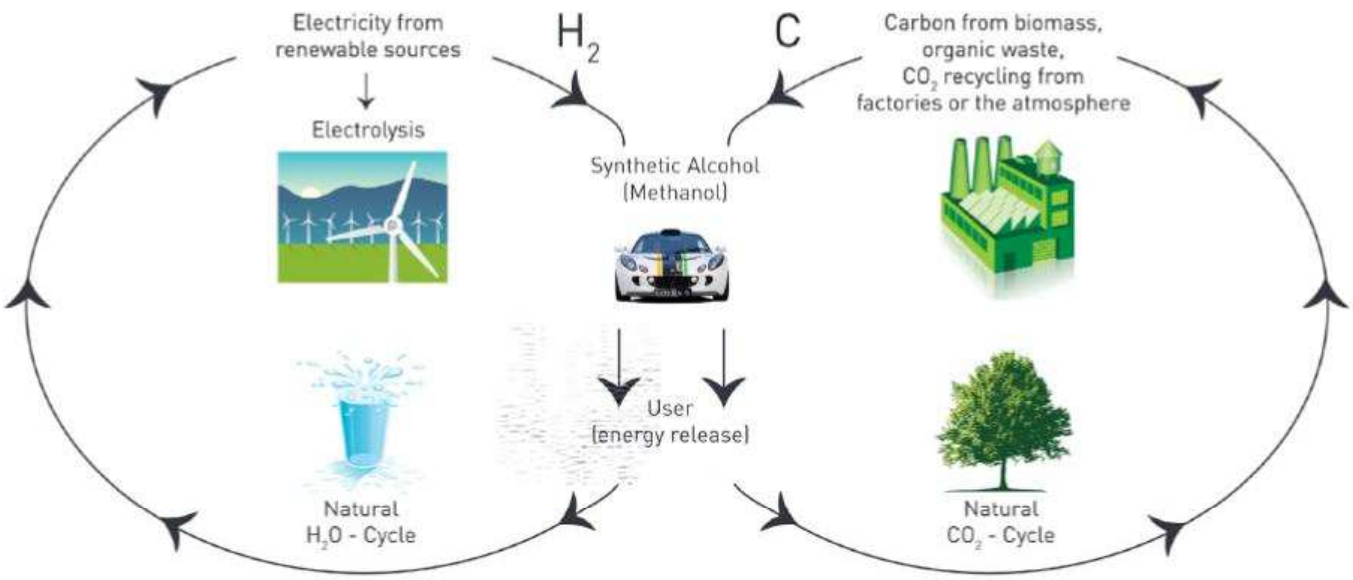
- Runs on any mixture of gasoline, ethanol and methanol
- Methanol and ethanol use similar engines and fuel systems to those in current cars
- Two additional injectors at the supercharger inlet to increase the amount of fuel being injected into the engine under higher engine speeds and loads
- Emissions compliance demonstrating that bio-fuel is a viable alternative fuel

SPECIFICATION

- Supercharged 4-cylinder 1.8 litre 2ZZ-GE VVTL-i engine
- Lotus T4e controller re-calibrated for full flex-fuel operation on bio ethanol and gasoline and methanol
- Peak power*: 270 HP (201 kW/273 PS) at 8,000 rpm
- Peak torque*: 184 lb/ft (260 Nm) at 5,500 rpm
- Acceleration: 0–60 mph (97 km/h) in less than 4 seconds
- Top speed: 158 mph (255 km/h)

*When running on methanol

EXIGE 270E TRI-FUEL



SYNTHETIC METHANOL

Synthetic methanol's green credentials arise from its potential to be CO_2 neutral. Future mass-production of the fuel is achievable by using electrochemical techniques to combine oxygen, hydrogen and carbon.

Methanol (CH_3OH) can be produced synthetically by combining CO_2 and hydrogen from hydrolysed water. Emerging processes to recover atmospheric CO_2 will provide the required carbon that can entirely negate the CO_2 emissions at the tailpipe that result from combustion.

Energy to manufacture methanol would be provided by renewable sources. The result is that a car running on synthetic methanol, such as the Exige 270E Tri-fuel would be environmentally neutral.

Synthetic methanol is better suited to spark-ignition combustion than today's liquid fuels, delivering better performance and thermal efficiencies, due to its higher octane rating and better resistance to 'knock'.

ENGINE MODIFICATIONS

Another crucial advantage of synthetic methanol is that it can be introduced relatively simply. As the Exige 270E Tri-fuel demonstrates, only small changes to engines are required, such as:

- Sensors to detect alcohol content
- Modified software for engine management controls over ethanol, gasoline and flex fuel operation
- Fuel lines compatible with alcohol
- Higher flow rate fuel pump and injectors
- Fuel tank material, compatible with alcohol

The Exige 270E Tri-fuel is quicker to 60 mph (97 km/h) from standstill and has a higher top speed using synthetic methanol over conventional gasoline (petrol). Synthetic methanol is also ideally suited to pressure charging, a trend already well underway as car makers look to downsize engines to cut emissions and fuel consumption.

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