

## Shell Gas to Liquids

# Gas to Liquids for Automotive Fuel

GTL Fuel is colourless, odourless and virtually free of sulphur and aromatics. It has a very high cetane number (75-80) – a measure of fuel combustion quality - compared to refinery diesel (45-55). It significantly reduces local emissions (PM, NO<sub>x</sub>, CO, HC), either as a blend with diesel fuel, or 100% pure compared with refinery diesel fuel – even ultra low sulphur (50 ppm) diesel. This makes GTL Fuel ideal for reducing pollution in major cities. It can be used in conventional light and heavy duty diesel engines, and can use the existing diesel distribution and refuelling infrastructure. It is readily biodegradable and is generally a less toxic product than refinery diesel fuel. It is a gas-derived, rather than an oil-derived, product thus providing strategic diversification of energy supply.

### GTL Fuel Trials

GTL Fuel has been successfully trialled in a number of countries alongside several partners, using fuel from Shell's Bintulu plant in Malaysia. In Germany, Shell is collaborating with Volkswagen, and has conducted a five month test of the clean fuel with a fleet of VW Golf cars. In the UK, Shell is collaborating with DaimlerChrysler, and has successfully completed a 3-month trial of GTL Fuel in a London Bus. In co-operation with Toyota, ten Avensis cars were fuelled by GTL Fuel and driven by London-based charities over a 3 month period. In Shanghai, a GTL blend was used in buses to demonstrate lower emissions than standard diesel. Similar trials are planned or ongoing in the United States and Japan using GTL neat or in a blend with standard diesel, to demonstrate that GTL is an effective alternative fuel in both light and heavy duty vehicles. These trials have demonstrated GTL Fuel is compatible with existing engines and provided considerable evidence on the performance benefits of GTL Fuel.

### GTL Fuel in Today's Markets

In Thailand, Shell Pura Diesel containing GTL Fuel has been on sale since 2002 and has captured a significant market share of the diesel sold in Shell retail stations. A segment of customers are prepared to pay for the premium quality of Shell Pura Diesel as it reduces black smoke in a market where vehicles are subject to on the spot fines for smoke. A GTL blend is available in Greece at Shell retail stations in the Athens area contributing to a cleaner environment for the Olympic Games. In May 2004, Shell V-Power, a blend containing GTL Fuel, was launched in Germany. The millions of kilometres driven with GTL Fuel blends from Shell's GTL plant in Malaysia without problems, confirm customer acceptability and technical compatibility.



### Future Alternative Transport Fuels

GTL Fuel offers a continuum towards a renewable 'alternative fuel' future as part of Shell's Future Transport Fuel strategy. It is compatible with many conceivable developments in the transport fuels market. It can be blended with existing fuels, such as low-sulphur and ultra low-sulphur diesel and used in modern diesel engines to reduce levels of regulated emissions. Engine efficiency can be improved through minor adjustments, e.g. to ignition timing and compression ratio, to take advantage of the fuel's high cetane number.

GTL Fuel can enable automotive manufacturers develop ultra-efficient derivatives of the diesel engine, and can be used in diesel-electric hybrid vehicles.



### Other benefits of Shell GTL Fuel

GTL Fuel has a large number of benefits for both governments and fleet operators. It is compatible with existing diesel engines and distribution infrastructure, and therefore will be efficient and convenient to introduce. It can be used either as a pure product or as a blend with conventional diesel and provides lower emissions of local pollutants. Its use in diesel technology provides the high efficiency, operational reliability and fuel economy associated with the compression ignition engine.

GTL Fuel enables governments to meet policy objectives in a cost effective manner and provides significant benefits to customers. As a result automotive manufacturers are investing in advanced engine designs to improve efficiency and performance further. The supply of GTL Fuel looks set to rise with future demand, as worldscale GTL plants will start to be in operation by the end of the decade, including Shell's GTL project in Qatar.

