



INTRODUCING

# SHELL GTL FUEL

GAS TO LIQUID SYNTHETIC TECHNOLOGY FOR CLEANER AIR





## Introduction

Ukay energy always strive towards quality in everything we do and are aware of the pressures on the environment, we are therefore proud to announce our new partnership with Shell, introducing GTL (gas to liquid) Fuel.

GTL is a diesel and gas oil alternative which provides a cleaner burn and improves combustion properties when compared to a conventional crude oil based diesel. In turn this helps to reduce emissions of air pollutants and support local environmental regulations.

GTL is a 'drop in' fuel which can be used directly in conventional diesel engines without the need for modifications, new infrastructure or any vehicle investment, providing a cleaner, greener future.



**POWERING YOUR FLEET WITH SHELL GTL**



## GTL D

# Alternative Diesel

GTL D (Gas to liquid diesel) is an alternative product that can be used in all on road diesel engines without the need for modifications, new infrastructure, or vehicle investment. This product gives you a better starting performance in low temperatures due to its higher cetane number and is therefore a solution for all-season reliable operations.

Further benefits of this product is that it helps to reduce emissions of air pollutants and support meeting local environmental regulations.

We have measured a soot reduction of up to 60% and in the older engines even up to 95%!

As we are all working towards a cleaner greener future using our GTL D is a step closer to a cleaner future.



# GTL

## Alternative Gas oil

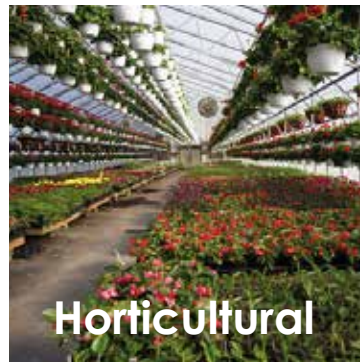
GTL G (Gas to liquid gas oil) is an alternative product that can be used in all off road diesel engines, generators and boilers without the need for modifications, new infrastructure, or investment.

This product can help with your efforts to reduce environmental impact and to care for your employees and the community.

Further benefits of this product is that it helps to reduce emissions of air pollutants and support meeting local environmental regulations. It also helps reduce noise levels in some engines, enabling you to work at night or in restricted areas.

GTL G is virtually free of unwanted components, such as sulphur, metals and aromatics, making it non-toxic and less harmful to the environment. It is also safer to handle and store, with no unpleasant smell.

As we are all working towards a cleaner greener future using our GTL G is a step closer to a cleaner future.



## Shell GTL fuel is a liquid fuel that is a cleaner burning alternative to diesel

Shell is pioneer of Gas-To-Liquids (GTL) technology which manufactures hydrocarbon products from natural gas using the Fischer-Tropsch process. This process breaks down gas molecules and reassembles them into larger uniform molecules in a carefully controlled manner. One of the products is Shell GTL Fuel, an alternative fuel that is cleaner-burning compared to standard diesel. Because this manufacturing process produces more consistent and uniform molecules compared to conventional crude oil refining, GTL Fuel has improved combustion properties inside standard diesel engines and so helps reduce emissions of air pollutants. It is also free of unwanted components such as sulphur, metals and aromatics, making it non-toxic and therefore less harmful to the environment.

As the world transitions to lower emissions mobility, Shell believes that GTL Fuel will be part of the fuel mix that will be needed to power the future, alongside e-mobility, biofuels, LNG, hydrogen, CNG, LPG, diesel, and gasoline.

Shell GTL Fuel can be used in existing heavy-duty and light-duty diesel engines without the need of engine modifications, new infrastructure or vehicle investment. It is particularly well positioned to reduce emissions from heavy-duty engines where the fuel's benefits are largest compared to conventional diesel. GTL Fuel is therefore suitable in the transport sector, for example city utility vehicles, public transport, rail, and inland and offshore shipping. It is also equally suitable to construction machinery and power generation equipment.

It is estimated that there is currently sufficient global supply of GTL Fuels to meet around 30% of the UK's entire national diesel demand, or the total diesel demand of any of the Scandinavian countries.

GTL Fuel is part of the family of fuels called "paraffinic fuels". The European Standardisation body CEN published the final specification of paraffinic fuels, EN-15940, in mid-2016, paving the way for legislators and manufacturers to specifically refer to these alternative fuels in legislation and handbooks.

## What is Shell GTL Fuel?

Shell GTL Fuel is a cleaner-burning direct diesel & gas oil replacement made from natural gas. As an end product it is chemically very similar to diesel & gas oil, however it provides an enhanced and cleaner performance compared to standard diesel.

Some of the properties of the fuel are as follows:

- Colourless
- Odourless
- Direct-drop in replacement
- Virtually sulphur-free
- Virtually aromatic-free



**Shell**  
**GTL Fuel**

**Diesel**

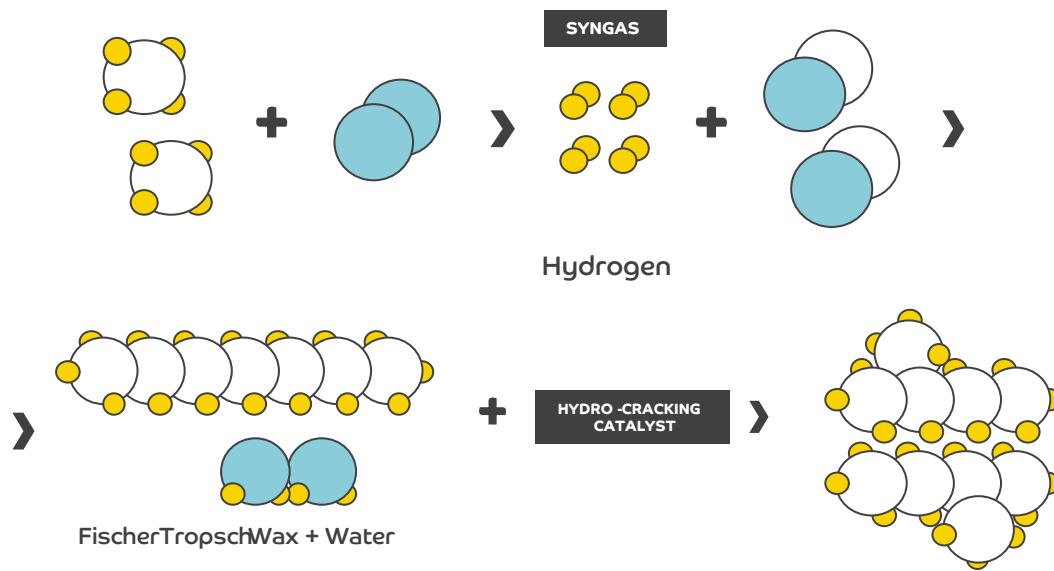
## How is GTL Fuel made?

Fischer-Tropsch process to convert natural gas into oil products

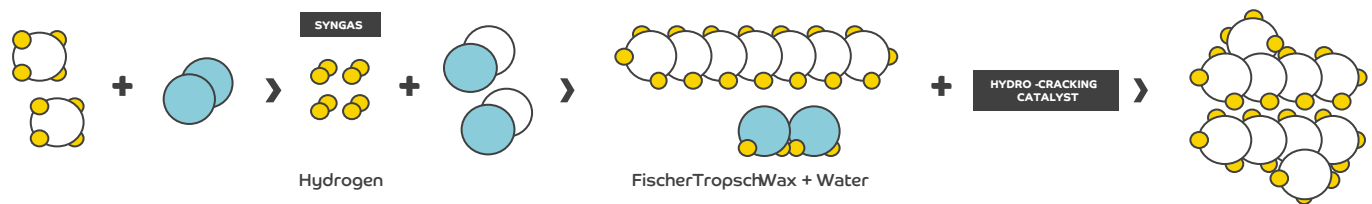
When we talk about 'emissions' there are really two challenges to focus on, climate change - which contributes to global warming due to our output of greenhouse gas emissions (eg. CO<sub>2</sub>)



### Close up break down

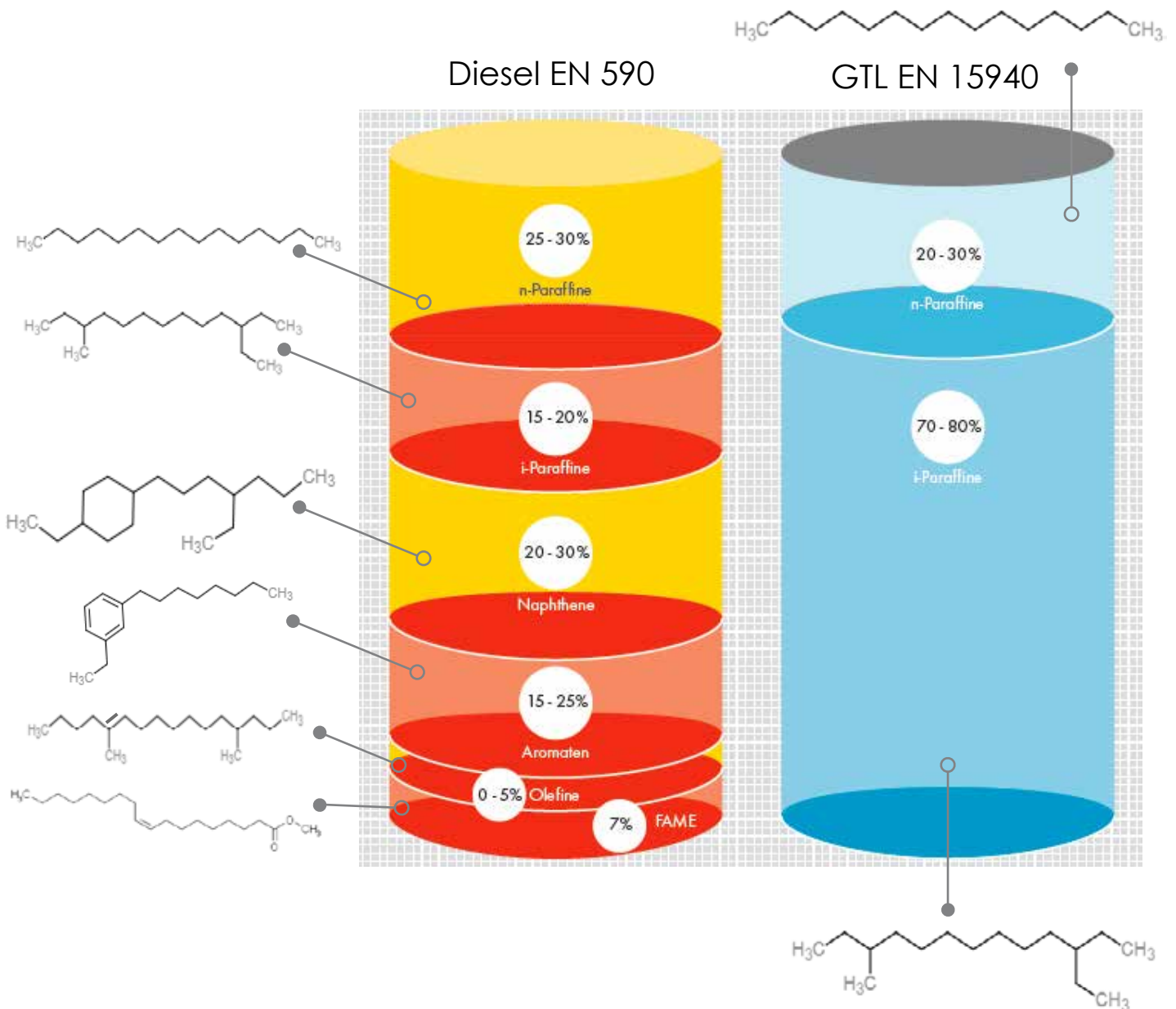


### Full Diagram



## Composition of Diesel and GTL Fuel

GTL has great performance in unmodified diesel engines in any blend ratio from 0 to 100%

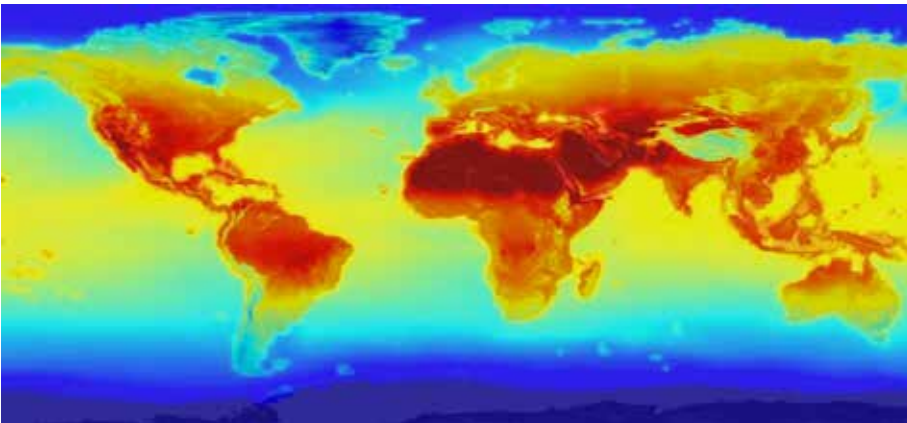




## The Emissions Challenge

When we talk about 'emissions' there are really two challenges to focus on, climate change - which contributes to global warming due to our output of greenhouse gas emissions (eg. CO<sub>2</sub>) and then local air quality, which cover the dangers faced to human health due to poor air quality in urban areas, caused by regulated tailpipe emissions of engines (mainly NO<sub>x</sub> and PM)

### Global Climate Change



#### Impact

Global economy

#### Timeline

Small effects in the short term, grow more severe longer term

#### Cause

Greenhouse gas emissions

### Local Air Quality



#### Impact

Human Health

#### Timeline

Immediate

#### Cause

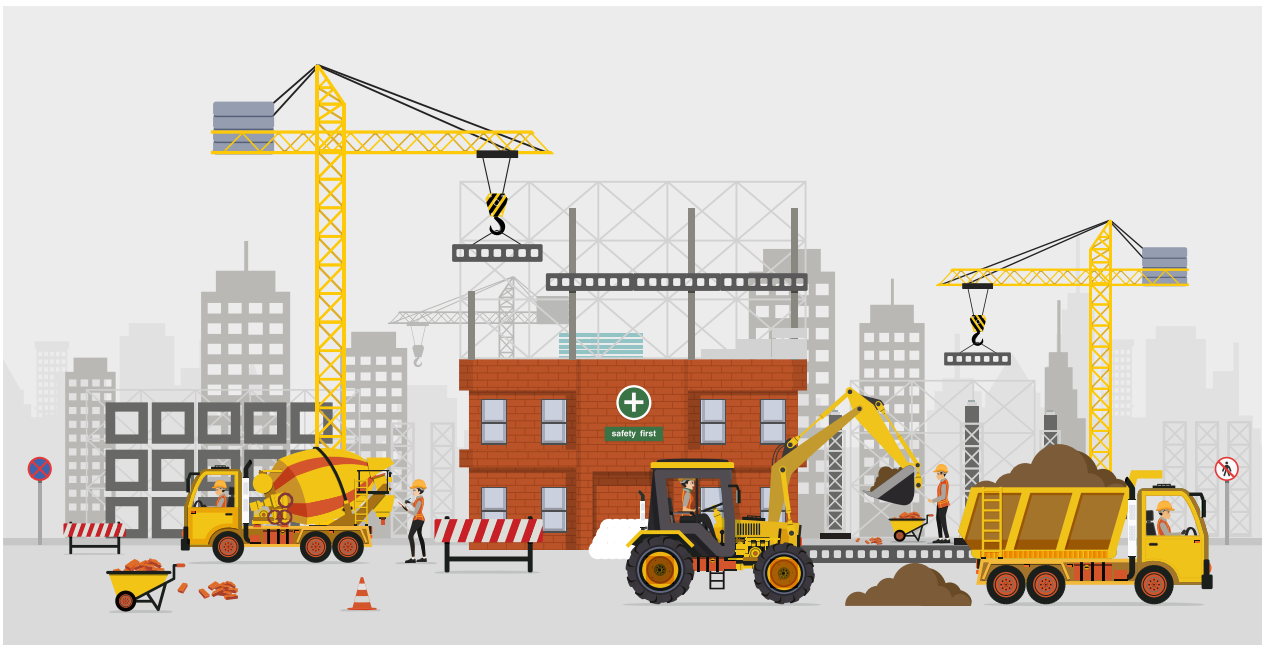
Predominantly NO<sub>x</sub> and Particulate emissions

## GTL AND CO<sup>2</sup> EMISSIONS

Shell uses the life Cycle or Well-toWheels (W+W) method for comparing GHG emissions, in line with industry practice. On a W+W basis, some GTL products have lower intensity than their conventional equivalents and some higher, but the total emissions are broadly comparable with the equipment quantity of products from conventional refining. Differences in assumptions and methodologies can lead to variations in the results.

The European Commission has reviewed the CO<sub>2</sub> values for various fuels on a W+W basis. Their evaluation of GTL's carbon intensity, available in Council Directive 2015/652, is 94.3 gCO<sub>2</sub>eq/MJ and their value for conventional diesel is 95.1 gCO<sub>2</sub>eq/MJ. Certain municipalities and legislations reference Tank-to-wheels (T+W) CO<sub>2</sub> emissions, and measured at 4% to 5% lower than standard crude-derived diesel. This is due to the higher energy content and higher hydrogen-to-carbon ratio of the fuel.

### Reducing Emissions from construction



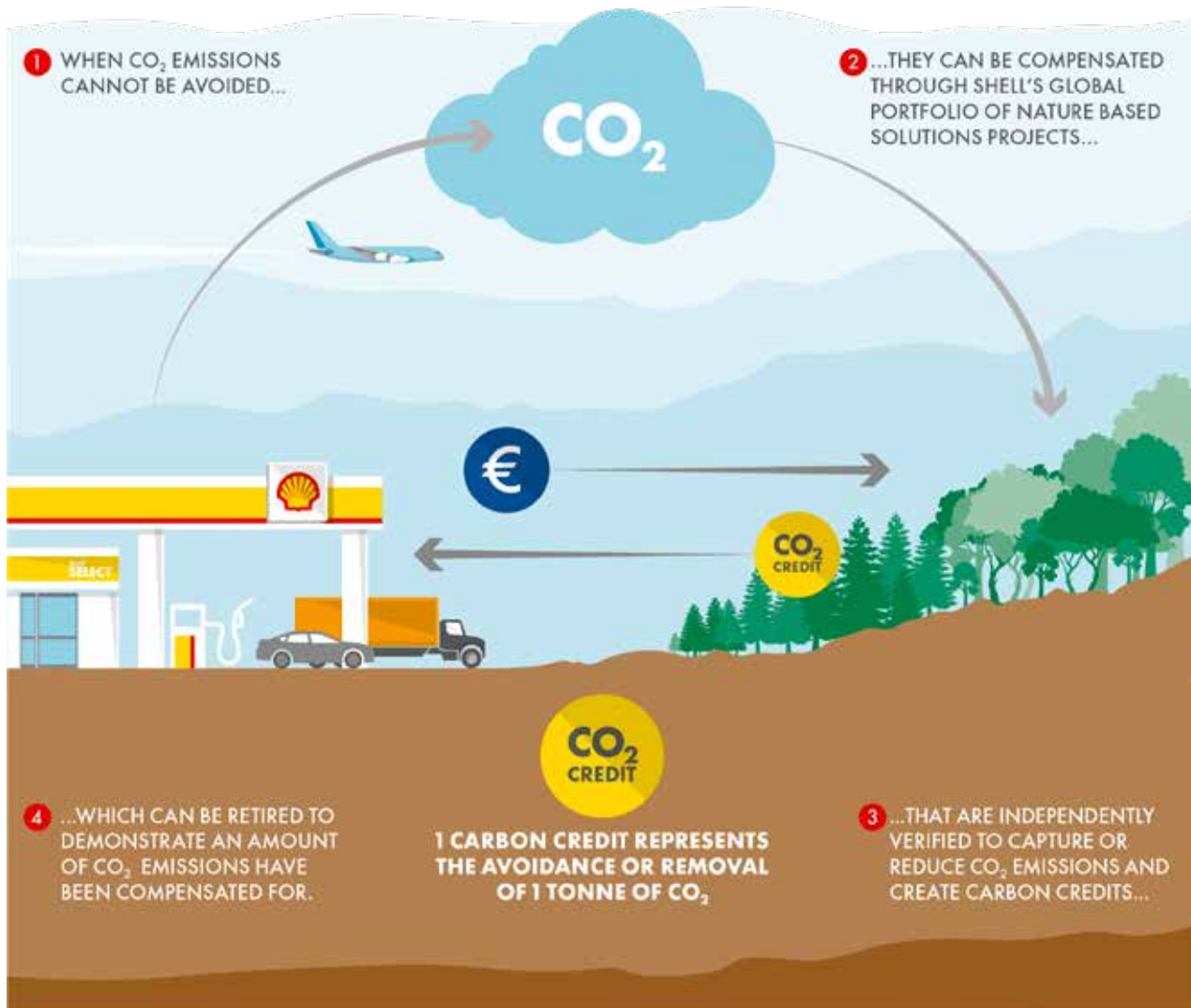
### Reducing Emissions from idling



### Improving air quality



## Shell GTL Fuel has many advantages



Shell GTL Fuel plus Nature Based Solutions enables this fuel to be CO<sub>2</sub> neutral as well as low emission, tackling both of the world's main emission challenges. Nature Based Solutions are a key piece of the Energy Transition story, since they offer scalable, tangible and cost effective pathways to significant net emissions reductions - nature has the potential to solve more than a third of the climate solution by 2030\*. Nature Based Solutions comprise all activity related to the protection, or re-development of natural ecosystems to lower concentrations of green-house gases in the atmosphere. Some examples of this are peat-land protection and restoration, re-forestation and fire and forest management.

## EN590 versus EN15940

GTL Fuel fully meets the diesel specification in:  
USA (ASTM standard)  
Japan (JIS standard)

And in Europe meets standard EN15940, which meets all of EN590 except density

Property	Unit	GTL vs. EN 590	EN 590		CEN EN15940	
			Minimum	Maximum	Class A (incl. Shell GTL Fuel)	
					Minimum	Maximum
Cetane number		Higher	51.0		70.0	
Density at 15 °C	kg/m <sup>3</sup>	Lower	820.0	845.0	765.0	800.0
Total aromatics content	%					1.0
Polycyclic aromatic hydrocarbons content	(m/m)	Lower				
	%			11		
Sulfur content	mg/kg	Lower		10		5.0
Flash point	°C	Same	>55		>55	
Carbon residue (on 10 % distillation residue)	%	Same		0.30		0.30
Ash content	(m/m)	Same		0.01		0.01
	%					
Water content	mg/kg	Same		200		200
Total contamination	mg/kg	Same		24		24
Copper strip corrosion (3 h at 50 °C)		Same		Class 1		Class 1
Oxidation stability	g/m <sup>3</sup>	Same		25		25
Oxidation stability	hrs	Same	20		20	
FAME content	% (V/V)	Same		7.0		7.0
Lubricity, corrected wear scar diameter (wsd 1,4) at 60 °C	mm	Same		460		460
Viscosity at 40 °C	mm <sup>2</sup> /s	Same	2.00	4.50	2.00	4.50
Distillation 95 % (V/V) recovered at	°C	Same		360		360
Distillation % (V/V) recovered at 250 °C	% (V/V)	Same		<65		<65
Distillation % (V/V) recovered at 350 °C	% (V/V)	Same	85		85	

GTL meets all of EN 590, except density

## Shell GTL Fuel has many advantages



### Drop in fuel

Easy to utilise with new and older on-road diesel engines. No infrastructure investment required.



### Lower emissions

Lower regulated emissions (PM, NOx, CO, HC)



### CO2 Neutral with NBS

NBS offsets with GTL addresses CO2 & local emissions challenges.



### Engine Benefits

Reduce regeneration of DPF filters, Adblue usage and increase lifecycle of EGR valves.



### Can reduce noise

Engine noise reductions of 1-4 dB



### Non-toxic & Readily biodegradable

Benign and biodegradable unlike conventional diesel



### Odourless

Greatly appreciated by customers.



### Cold start

Excellent low temperature performance, low cloud point.



### Storage stability

No bio component and good oxidation stability.

## What our Customers say



The Murphy site which took this first delivery of GTL is in Harefield, West London. The project involves the diversion of two existing high pressure gas pipelines to facilitate the construction of the new High Speed Rail 2 railway (HS2).

Murphy CEO John Murphy, said: "We're extremely proud to be the first in the UK construction industry to use Shell GTL Fuel. This is a huge step towards helping to reduce the impact of engineering and construction works on the environment, and demonstrates the ongoing commitment Murphy has for delivering safely, reliably and sustainability.



## GET IN TOUCH

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If you would like to know more about our GTL fuel, please contact us on the details below and speak to one of our friendly advisors.

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