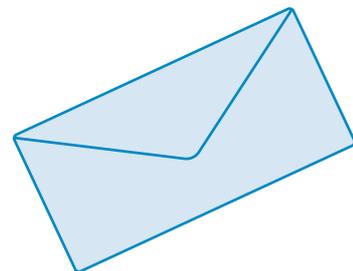


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# The future of GTL



In February *Gas Matters* looked at the changing prospects for the gas-to-liquids (GTL) industry in our article: *Shell starts work on Pearl GTL as Oryx prepares to load first cargo*. As some projects enter commercial operations or construction, others are being cancelled, suggesting that the industry is becoming more realistic about what is feasible and what is not.

This month we have two letters, one from John Baldwin, Managing Director of CNG Services, the second a response from SasolChevron. Please feel free to join in the debate.

In relation to the article on GTL in February's *Gas Matters*, I would like to point out the CO<sub>2</sub> downside of GTL – identified in an independent EU 'Well to Wheel' study carried out by car makers and oil companies (see: <http://ies.jrc.ec.europa.eu/wtw.html>). This found that to go a mile on GTL required almost 50% more energy than to go a mile on normal diesel, with a 9% increase in CO<sub>2</sub> emissions, the energy and CO<sub>2</sub> inefficiency arising primarily as a result of the large amount of energy consumed to convert natural gas into synthetic diesel.

The EU wants new cars to produce less than 130g of CO<sub>2</sub>/km by 2012. But they want the industry to get a further 10g/km reduction from greener fuels such as bio-diesel, bio-ethanol and bio-methane. Whilst normal diesel is good for CO<sub>2</sub>, GTL, based on the above information, is bad.

GTL had three advantages 10 years ago, but these no longer hold fast:

1. It could be used in an ordinary 'dirty' diesel engine to improve air quality. Now, new diesel engines are much cleaner, with most having urea injected into their exhaust

from 2008 to mop up all the nitrogen oxide (NO<sub>x</sub>), meaning there is no longer such a local air quality reason in the EU and US.

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2. It was a use for 'stranded' natural gas that had no home. Given the growth of LNG this argument no longer applies. Where now is there any stranded gas? Certainly not in LNG rich Qatar.

3. GTL could be made in the US, reducing the country's reliance on the Middle East. Pretty much the only place to make GTL now is the Middle East given high capital costs and need for a plentiful source of gas (that would otherwise not be produced for decades), negating the energy security argument. There are not believed to be any examples in Europe or the US of grid gas being made into GTL.

I would specifically like to point out the comment made by Mark

Schnell, Marketing Manager at Sasol Chevron, the company that will be selling Oryx's output, who was quoted in the February *Gas Matters* article saying:

"One of the big advantages of this product as an alternative fuel is that while it delivers against the environmental drivers that those kinds of authorities are

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looking for, it also is transparent to the existing storage and fuelling infrastructures – unlike where fleets have tried to convert some or all of their vehicles to alternatives like CNG or LPG. GTL could be dropped into a Paris bus fleet, for example, with no need to modify either vehicles or fuelling infrastructure and would still deliver environmental benefits.”

I question whether there would be any environmental “benefits” at all in the Paris bus example because:

1. There would be a 9% increase in Well to Wheel CO<sub>2</sub> if used in a diesel bus or a 24% increase compared to a CNG bus (of which there are 2,000 in France).

2. There is no air quality benefit compared to new Paris buses that have ‘clean diesel’ engines or are increasingly running on CNG which meets a clean emissions standard (EEV) that GTL cannot meet.

3. There would typically be a 7 decibel increase in noise compared to the CNG buses that Paris uses (equal to a doubling of noise).

GTL may make economic sense for the Qatar Govt if the price of oil is greater than the price of gas and they do not want to flood the world with LNG. That’s fine, the Qataris are entitled to monetise their reserves as they see fit. But it does come at a very heavy global warming cost and so it should not be passed off as an environmentally friendly fuel. Once emissions trading applies to surface transport, it will be a much less attractive fuel due to the cost of carbon associated with making it.

*John Baldwin*

Managing Director, CNG Services Ltd

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## ... Reply from ... Reply from ... Sasol Chevron

Following your February issue you said that you would be interested to hear the GTL industry’s response to a series of points made by Mr John Baldwin of CNG Services Ltd regarding the environmental benefits of GTL. Whilst Sasol Chevron is not the whole industry, we are certainly prominent within it and, on that basis, we are happy to take up the challenge.

Mr Baldwin’s first point referred to an independent EU ‘Well to Wheel’ study carried out by car makers and oil companies. This study is well known, but, when compared with more rigorous methodology, such as the internationally accepted full lifecycle analysis (ISO14040), there are at least three serious flaws:

Firstly, regarding the efficiency of the GTL process, although the study has a 2010-2020 focus, they used current GTL efficiency standards for the CO<sub>2</sub> calculations. The study acknowledged that GTL efficiency will improve as the technology improves but this was not reflected in the calculations.

Secondly, refinery-based diesel has an associated heavy tail (heavy fuel oil) while GTL does not. This was not adequately accounted for in the study with the methodology used. GTL as a technology is inherently cleaner than its refinery counterpart because the total product slate is less carbon rich and results in less CO<sub>2</sub> in the atmosphere

upon combustion. Focussing on the diesel stream alone conveniently ignores this fact and distorts the picture.

Finally, in the vehicle emission factors, no credit was given to GTL for the improved efficiency that could result from GTL optimised engines – yet this was done for CNG. Whilst it is true that GTL can deliver great benefits in unmodified diesel engines, which gives it an advantage over other alternatives, it is only fair to compare like with like.

The variety of studies and competing claims can be bewildering and anyone interested in following up on these points will find the Gas to Liquids Life Cycle Assessment Synthesis Report on the Sasol Chevron website ([www.sasolchevron.com](http://www.sasolchevron.com)). This report is a synthesis of lifecycle assessments carried out separately by Shell, ConocoPhillips and ourselves. It was prepared by Five Winds International and independently assessed by Dr Michael Wang of the Argonne Laboratories. The Sasol Chevron Lifecycle Analysis was carried out by PricewaterhouseCoopers in accordance with ISO 14040.

The simple take away point from all of this is that the ‘50% more energy’ figure has been nailed as a myth and any argument resting on it is a house built on sand.

The second part of Mr Baldwin’s challenge identified three advantages that GTL no longer possessed. Addressing them in order:

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1. Although Sasol Chevron would agree that the air quality benefit is greater for older vehicles, GTL diesel provides benefits for all vehicle types from Euro 1 to Euro 5 (emissions standards that the vehicle manufacturing industry has to conform to, with a Euro 5 compliant vehicles being the cleanest) as demonstrated in a Berlin case study completed by the Institute for Energy and Environmental Research. Even for Berlin, which has a “modern” first world vehicle fleet, substantial air quality and human health benefits were demonstrated for the average fleet – not just for the older vehicles. This effect would be even more pronounced in cities in Eastern Europe and developing countries. In addition, the lifecycle analysis discussed earlier showed that these air quality benefits are achievable without a greenhouse gas penalty. Ultimately a refinery, unlike GTL, cannot produce diesel without co-producing a range of heavier carbon rich products which carry an associated GHG burden.

2. It is true that Qatar doesn't have a problem with stranded gas because of the development of LNG, but Qatar is a strange example to cite given that it is home to the world's largest operational GTL plant, the 34,000 bbl Oryx GTL, and is going to be home to Shell's 140,000 bbl/d monster. Nigeria is building a 34,000 bbl/d project, EGTL, and Algeria is assessing the prospects for a development based on Tinrhert. Nigeria has options for its gas and Algeria is not generally considered to be remote with the European market on its doorstep. GTL is a potentially very valuable gas monetisation option which allows gas products to be targeted at a growing global transport fuels market. It makes sense for gas-rich

countries to acquire a GTL capability of whatever size since GTL is an industry which rewards experience.

3. The assertion that the Middle East is “the only place to make GTL now” does not reflect reality. The Nigerian example has already been cited but, in addition, GTL is under consideration in locations as diverse as Australia and Trinidad and Tobago and it is likely that major gas producers like Russia will join the GTL club.

When GTL diesel is considered on a level playing field, it is a very attractive proposition which is why the car

manufacturers want to use it and why companies such as Sasol Chevron want to make it. We think that Mark Schnell's views on the Paris bus fleet are correct.

Fuel fleets which shift from spark ignition (petrol) to compression ignition (diesel) immediately deliver a reduction in CO<sub>2</sub> emissions and concurrent fuel efficiency benefits. This is why European car manufacturers support diesel so strongly and are pressing for material improvements in the quality of the European diesel fuel pool. More than anyone, they know

the challenges associated with introducing unfamiliar vehicle technology to the consumer and they understand the investment required to do so. The scale of challenge and the high levels of investment are a fact of life and that will not change. GTL works comfortably within that framework, supporting an existing and trusted technology and successful fuels in the future will have to do likewise.

The fuel slate of the future will consist of a range of fuel options and perhaps CNG will be one of those. At Sasol Chevron, we know that GTL will be. 

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