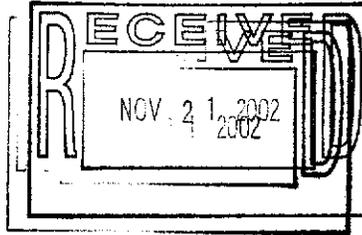




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November 14th, 2002

Dear Linda,

As agreed at our recent meeting, following the Workshop, we attach herewith Sasol Chevron's submission as part of the DOE's consultation exercise on the designation of Fischer-Tropsch diesel fuel as EPA alternative fuel.

You will recall that we explained Sasol Chevron has recently undertaken a Life Cycle Analysis (LCA) based upon the system boundary expansion method (ISO 14040). We are doing all we can to ensure that we are able to share the findings of this LCA with you and your colleagues at the DOE on or around the end of this month. We have spoken to Michael Wang and he has kindly agreed to accompany us when we come in to present and discuss the LCA.

Thank you again for finding the time to meet us last month. Please do not hesitate to get in touch with either of us if you have any questions on our submission, or require further information.

We shall contact you as soon as we can to arrange a meeting to present and discuss our LCA.

Yours Sincerely,

Stephen Colville

Gregg Skledar

Sasol Chevron Consulting Limited

Submission To USA Department Of Energy

**Designation of Fischer-Tropsch
Diesel Fuel as EPA Act Alternative Fuel**

November 2002

1. Preamble

1.1 Sasol Chevron (SC) is a joint venture company established by South African energy and chemical company Sasol and US energy company ChevronTexaco to build, own and operate production plants which incorporate the Fischer-Tropsch (FT) process to produce high quality fuel products from a natural gas feedstock. Sasol Chevron will also market these products on a world wide basis.

1.2 The FT production process and product expertise, extensive research and development programmes, lie primarily with its parent companies.

1.3 Accordingly, SC has been working with its parents to provide DOE with process and product data to assist it fill in the gaps in the data already gathered by the DOE itself or provided by other companies. The technical papers we are able to submit now which address many of the issues discussed at the workshop are enclosed with this submission. These include:

- Diesel Exhaust Emissions Using Sasol Slurry Phase Distillate Process Fuels
- Some Comparative Chemical, Physical and Compatibility Properties of Sasol Slurry Phase Distillate Diesel Fuel
- Characterisation of the Injection-Combustion Process in a Common Rail D.I. Engine Running with Sasol Fischer-Tropsch Fuel
- Comparative Emissions Performance of Sasol Fischer-Tropsch Diesel Fuel in Current and Older Technology Heavy-Duty Engines

Papers are available for a fee from SAE: http://www.sae.org/servlets/techtrack?PROD_TYP=PAPER.

1.4 In addition to the enclosed data, SC has very recently received the results of a new Life Cycle Analysis which it commissioned from Price Waterhouse Coopers. Michael Wang has acted as the independent critical reviewer and he has verified and validated the LCA's scope, assumptions and results. Currently, SC is undergoing the necessary internal roll-out and parent company process before public release. The results of the LCA should prove invaluable to the DOE's thinking and decision making process and we very much look forward to sharing the findings with the DOE shortly after the end of November 2002.

2. Introduction

2.1 This submission deliberately avoids the simple replication of the excellent work already undertaken by the DOE and other companies as communicated at the DOE Workshop on 16th October 2002. Rather, it seeks to develop and build on some of the valuable ideas and thinking that emerged at that Workshop. It does this through examination and clarification of the fundamental principles that lie behind the key issues at the heart of resolving this debate.

2.2 All our comments are restricted to the low temperature Fischer-Tropsch process and its products.

3. Philosophy of Regulation of GTL Diesel

3.1 With declining US domestic energy production the coming challenge is to ensure adequate energy supply without inhibiting growth of the economy. Put simply, the overall aims of the US must be to obtain ready and secure imports of energy to be used in the most efficient way possible and with the most favourable environmental impact. To deliver to the above drivers the USA, like Europe and Asia, will have to look to non-oil energy sources from diverse sources around the world.

3.2 While the USA has identified its objectives and the DOE has set in place its mechanisms to achieve them, these do not of themselves address the enormity of the challenge of obtaining sufficient quantity of these alternative fuel supplies. In many instances there are very real practical difficulties of producers manufacturing the fuel in sufficient quantity. These are often compounded by costly distribution networks and the requirement for expensive vehicle engine and fuel storage adjustments.

3.3 GTL Diesel holds the solution to a significant part of the above challenge but the industry is in its infancy. The next 5-10 years will be critical to its future success. As with other sunrise industries, technology is set to improve and costs will fall. More producers will enter the market place and volumes will grow. With GTL Diesel the world faces the exciting prospect of a cost competitive, highly efficient Alternative Fuel that can play a major part in the mainstream fuel market. Further, it can do so in full compliance with the three criteria for Alternative Fuel status under section 301(2): Substantially non-petroleum; Substantial energy security benefits; and Substantial environmental benefits.

3.4 A key issue for the DOE is to resist the temptation to extend regulation beyond the absolute minimum which is both sensible and necessary. The tests laid down under Section 301(2) are both simple and transparent. They are readily understood and fit for purpose. SC cannot see any reason or benefit to be had by the DOE to seek to extend regulation beyond this level. Indeed, to do otherwise would seriously jeopardize the obtaining of adequate supplies of fuels which is the fundamental purpose for which Section 301(2) was intended.

3.5 Any issues beyond the three simple criteria of Section 301(2) that the DOE might seek to address are already more than satisfactorily taken care of by other legislation, including such things as fuel specifications and suitability for use in engines. Accordingly, SC would suggest that the DOE seeks to regulate only where absolutely necessary and restrict it to the absolute minimum.

4. Domestic Versus Non-Domestic GTL Diesel

4.1 For the purpose of this submission, SC has assumed that domestic GTL Diesel has already passed the same three criteria under Section 301(2) for Alternative Fuel status that the DOE is applying to non-domestic GTL Diesel.

4.2 Accordingly, given that the physical composition / properties of domestic and imported GTL Fuel are the same, two of the three Section 301(2) criteria (Substantially non-petroleum; Substantial environmental benefits) must be identical for US domestic GTL Diesel.

4.3 For the third criterion (Substantial energy security benefits), the production / supply of domestically produced GTL Diesel is physically secure. However, it is highly unlikely to be able to deliver significant volumes as the US is largely committed to using all readily available domestic gas in the utility system.

4.4 By contrast, non-domestic GTL Diesel will be available in much greater volumes, being able to draw upon vast natural gas reserves from geopolitically diverse sources of supply.

4.5 SC believes that, since non-domestic GTL Diesel is equal to domestic GTL Diesel on two of the DOE's criteria and better than domestic GTL Diesel on the third criterion, non-domestic GTL Diesel should qualify for Alternative Fuel status.

5. Fischer-Tropsch Process & Products

5.1 Throughout Europe and Asia, developed economies are moving towards diesel fuel for its efficiency. With the cleaning up of the fuel (lower sulphur) through after-treatment systems, increasing demand looks set to continue. Further, car & engine manufacturers having taken up the baton from Governmental regulators are now leading the way in demanding ever higher performance (efficiency & environment) diesel.

5.2 The GTL Diesel produced through the numerous proprietary Low Temperature FT processes is largely generic with little meaningful difference in product characteristics. This is fully a function of the FT process itself and not something that manufacturers consciously seek to achieve. These product market drivers provide GTL Diesel with some distinct advantages.

5.3 Accordingly, all manufacturers of low temperature GTL Diesel will produce uniformly high specification fuel that refiners cannot easily match without a lot of costly process improvements, production facility upgrades and fuel additives. It is inconceivable, therefore, that GTL fuel manufacturers would readily or lightly give up these inherent competitive advantages by seeking to "downgrade" the key performance benefits of their products. This would be particularly so if the market, as expected, is likely to pay some form of premium for these very fuel qualities. Accordingly, SC would question why the DOE should seek to overly regulate that which the free market would enforce in any case.

6. Designation of Fischer-Tropsch Diesel Process

6.1 Currently, the only method of producing diesel fuel from gas is using FT technology. For this reason, SC believes that it is unnecessary to specify FT in the designation. Rather, we would suggest that the focus should be upon the original feedstock (i.e. natural gas and not gas produced from coal or other sources) and the finished product (Diesel). The designation should make obvious to potential users of the fuel its alternative fuel status (clean environmental performance) and the use to which the fuel can be put (compression ignition engines).

6.2 SC has done much research into this with an international naming agency. The objective driving this work was to gain an understanding of the descriptors that would give ready understanding and recognition of the category type, and communicate energy from an alternative source to oil, with environmentally positive references.

6.3 It is from this background that we use the **GTL Diesel** (Gas-To-Liquids Diesel) designation as a category descriptor.

6.4 From our perspective, we should be only too pleased for others to use this product / category descriptor and for the DOE to adopt it for the Section 301(2) designation.

7. Fuel Parameters for Generic Designation

7.1 The generic FT Low Temperature process produces a GTL Diesel that incorporates the following primary values: Cetane greater than 70; Aromatics less than 1%; and Sulphur less than 5ppm. SC believes that any designation should be limited to these three properties.

7.2 These properties provide the foundation of GTL Diesel's positive environmental profile. They encapsulate in themselves or are the springboard for the engine combustion and emission benefits provided by GTL Diesel. While all the other fuel specifications / parameters set out in the DOE's consultation paper and discussed at the recent workshop are clearly significant, they are very much secondary in their impact and importance. SC believes that any additional benefit obtained from additional parameters (beyond Cetane, Aromatics and Sulphur) are more than offset by their unnecessary complexity.

7.3 In addition, the Cetane rating of greater than 70 is a simple way in resolving the issue of how to deal with High Temperature FT Diesel in the context of Section 301(2) since, as made clear above, Cetane 70 is a key component of GTL Diesel's meeting the "Substantial environmental benefit" criteria.

8.0 Additives

8.1 GTL Diesel may well need specialized additives including such things as lubricants, detergents, anti-static and anti-oxidants. However, these additives are commonly required by any ultra low sulphur fuel and their inclusion is administered by other regulations and standards. Therefore, since these additives do not degrade or negate the environmental benefits of GTL Diesel, SC contends that the DOE need not seek to specify them by type or volume.

9.0 Production Plant Efficiency

9.1 SC considers that concerns about GTL Diesel plant efficiency are misplaced and unfounded, for three reasons.

9.2 First, process efficiency is largely a matter of market economics. Inefficiency is costly and where it does not make commercial sense production will not take place. If countries wish to produce GTL Diesel then the process must manifestly be considered efficient by the producing country and the viewpoint and decision is surely a matter solely for them alone.

9.3 Second, all energy producers strive continuously to improve efficiency of their production processes. GTL Diesel as a sunrise industry can expect major / quantum leap improvements in production technology. Indeed, there are already extensive research programmes underway into such things as ceramic membranes which would obviate the need for oxygen plants. Such innovations would represent huge leaps forward in process efficiency improvement.

9.4 Third, and perhaps one of the most important, GTL Diesel is already one of the most efficient Alternative Fuel production processes and is highly comparable to conventional refiners.

9.5 The DOE is correct in its viewpoint that the opportunities to utilize flared gas as feedstock would be very limited in the context of the total volume of natural gas required by GTL Diesel plants around the world. That said, SC does believe that it is neither necessary, desirable or practicable to establish plant efficiency categories for individual GTL Diesel plants based upon whether or not they produce and sell steam and/or electricity.

10. Greenhouse Gasses

10.1 It was apparent at the recent workshop that the DOE is largely persuaded that non-domestic GTL Fuel satisfies the criteria of: non-petroleum and security of supply. Its fundamental concern was with the provision of substantial environmental benefits, in particular whether the benefits the fuel provides in some environmental respects is negated or may be balanced by the negatives in others.

10.2 It is clear that the principle negative environmental aspect that the DOE attributes to GTL Diesel is the emission of CO₂ at the production plant phase. It is SC's viewpoint that greenhouse gas emissions for the LCA of GTL products is comparable to the LCA emissions of a refinery.

10.3 SC recently commissioned an independent LCA from Price Waterhouse Coopers utilizing the full system boundary expansion method, according to ISO specification 14040. Essentially, this methodology incorporates all aspects of the technology including production, distribution and usage process for all products and not simply across a single fuel type.

10.4 While the detail findings of the report are currently being rolled-out within the parent companies, the report indicates that, given the assumptions used in the LCA, GTL offers benefits in air quality, in terms of, nitrogen oxides, sulphur oxides and hydrocarbon emissions without a greenhouse gas penalty.

10.5 In addition, GTL Diesel's neutral environmental performance with regard to the greenhouse gas emissions is using today's technology. GTL technology is at the top of the learning curve compared to refining and production processes will improve significantly over the next five to ten years. In particular there are technology research programmes to improve efficiencies and production of oxygen via ceramic membranes.

11. Summary

SC believes that:

- GTL Diesel should be adopted as the generic fuel category descriptor
- Non-domestic GTL Diesel meets all three criteria under 301(2) and should be classified by DOE as an Alternative Fuel
- The generic GTL Diesel fuel parameters should be limited to -
 - Cetane greater than 70
 - Aromatics less than 1%
 - Sulphur less than 5ppm
- Additives should not be specified by type or volume
- Production plant / process efficiency should not form part of the decision process