

PERP Program – New Report Alert

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Chem Systems' Process Evaluation/Research Planning program has published a new report, *Fischer-Tropsch Liquids as Steam Cracker Feedstocks (01/02S9)*.

The use of low-cost, stranded-gas reserves for production of synthetic fuels (synfuels) and chemicals may become an economic alternative to conventional fuels and chemicals. For chemicals production, the most promising scenarios involve manufacturing olefins and also the ensuing polymer products at a remote location and shipping them to developed markets such as the U.S. Gulf Coast (USGC), Western Europe, and Japan.

There are about 5,000 trillion cubic feet (tcf) of proven natural gas reserves in the world. Together Eastern Europe and the Middle East account for more than 70 percent of these reserves. However, almost 60 percent of global proven reserves are considered remote or “stranded”.

Several technologies are being evaluated by various companies, including gas-to-liquids (GTL), methanol-to-gasoline (MTG), methanol-to-olefins (MTO), methanol-to-propylene (MTP), olefins-to-gasoline and distillates (MOGD), dimethyl ether (DME) processes, large-scale methanol processes, and power generation from methanol.

The commercially proven technologies (Shell's SMDS and Sasol's SSPD processes) for production of middle distillates via GTL processes show a great potential for fuel alternatives and higher value products. Other GTL technologies (Conoco's process, Syntroleum's process, ExxonMobil's AGC-21 process and Rentech's process) are in various stages of development.

Fischer-Tropsch (F-T) naphtha and gas oils, produced by these GTL processes are attractive for steam cracking applications because of their high concentration of normal paraffin components. The high paraffinic content of the F-T liquids allows them to be cracked at very high severities not normally seen for conventional feedstocks. Typical ethylene yields for a conventional full range naphtha range from 25.5 percent (maximum propylene production) to 30.8 percent (maximum ethylene production). A typical ethylene yield for conventional atmospheric gas oils is about 26.5 percent. Based on feedback from the various licensors, cracking yields were developed taking into account the recycle of the ethane and propane. When compared to conventional naphtha cracking

yields, the yields for the F-T naphtha show a higher selectivity to ethylene and less to heavier products, such as C₄s and pygas.

Economics have been prepared for the production of ethylene from Fischer-Tropsch full range naphtha (FRN) and gas oil at several severities and compared to economics for a similar steam cracker using conventional full range naphtha and gas oil for a leader plant on the USGC during the fourth quarter of 2001. The plant capacity for the naphtha cracker is assumed to be a world scale plant with a capacity of 2.18 billion pounds per year of ethylene produced (989 thousand metric tons per year) which is equivalent to a leader plant on the USGC. At a maximum capacity of 75 thousand BPD it will require multiple GTL plants to provide the naphtha feed for a world scale steam cracker. The F-T naphtha price is assumed equal to the market price for conventional naphtha for this evaluation on a weight basis (\$175.8 per ton). The sensitivity to naphtha price is also studied in this report.

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