

CONVERSION OF NATURAL GAS TO TRANSPORTATION FUELS VIA THE SHELL MIDDLE DISTILLATES SYNTHESIS PROCESS (SMDS)

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Abstract. Gas resources which are too far from the main markets for transport by pipeline can be processed or converted into liquids to make such transport economically viable. Liquefied natural gas (LNG), liquid transportation fuels and methanol are then the options to be considered.

LNG and methanol are now well developed; LNG is regasified and the natural gas is applied in power generation and is sent out in domestic gas grids. Methanol is used as feedstock in the chemical industry. To broaden the scope of utilization of natural gas, Shell has developed since the early 1970s a process in which natural gas is converted mainly into high quality kerosene and gas oil. This process is now known as the Shell Middle Distillate Synthesis process (SMDS) and consists basically of three major steps. In the first step desulphurized natural gas is converted into synthesis gas by partial oxidation, making use of the Shell Gasification Process (SGP). In the second step the synthesis gas is converted into pure, long-chain paraffins (no aromatics) via a modernized version of the classical Fischer-Tropsch route. The third step converts these long-chain paraffins into very high quality gas oil, kerosene and some naphtha via selective hydrocracking.

The products form excellent blending material to upgrade low-quality products: the gas oil has a cetane number in excess of 70 and the smoke point of the kerosene can be over 50 mm. Moreover, due to the nature of the feedstock, the products do not contain any sulphur or nitrogen. With the increasing environmental awareness with respect to particulates emissions, sulphur and aromatic content, the middle distillates from the SMDS process are well placed to find a premium value in the market.

This technology has been applied in the 12 000 bbl/day SMDS Malaysia project, in Bintulu, Sarawak, which started-up in 1993.