



## Synthetic fuels in Russia

With the help of gas-to-liquids (GTL) technology, remote or stranded gas resources and flared gas can be converted to liquid fuels, reports Gunter Festel

REMOTE GAS or stranded gas fields account for 30% to 50% of all confirmed gas resources worldwide and, with the help of gas-to-liquids (GTL) technology, these gas resources could be converted to liquid fuels.

With around 26% of global proved natural gas reserves and 17% of global coal reserves, Russia is now researching technologies to convert these abundant resources into synthetic fuels, both through state funded research institutes and through privately held R&D departments of mineral oil and gas corporations.

Gazprom, Russia's leading gas producer, controls around 25% of the world's natural gas reserves, and aims to implement GTL technology to improve utilisation of its many remote gas fields. In 2003, Gazprom and its R&D affiliate, Vniigaz, entered into an agreement with the US firm Syntroleum to assess potential locations for the construction of a GTL plant. Vniigaz is currently assessing the feasibility of a 100 000 tonne/year GTL pilot plant, before a decision is taken whether to proceed with a full scale 5.8m tonne/year plant. Although this \$2.7bn project will be financed by Gazprom, the company plans

to cooperate with foreign investors through Vniigaz. Meanwhile, Yukos, Lukoil, Yakutgasprom and TNK-BP are also exploring producing synthetic fuels at their fields.

### DIESEL SUBSTITUTE FUELS BUSES

Russia's natural gas resources could potentially also be converted to dimethyl ether (DME), a substitute for diesel. The Novomoskovsk Azot subsidiary of EuroChim has been manufacturing DME since 2001. It currently produces 10 000 tonne/year of DME, which will be expanded to 150 000–400 000 tonne/year if a project to transfer all the municipal buses in Moscow to DME by 2008 is successful. TNK-BP and Vostokgazprom have also announced plans for new DME plants for large-scale production.

Because DME is only liquid when compressed, vehicles have to be modified and equipped with catalytic neutralisers, at a cost of between \$300 and \$1200 per vehicle. After fitting of the neutraliser, both vehicle emissions and noise levels are significantly lower. For commercialisation, the price for DME should not exceed 68% of the price of diesel during the experimental/testing phase, and

50% during the commercial phase.

SAPR-Neftekhim, Moscow, processes petrol out of light hydrocarbons, associated petroleum gas and propane-butane fractions by using zeolite-bearing catalysts. This innovative process can help to make even flared gas economical. Besides zeolites, cobalt cement-based catalysts have been developed for the synthesis of aliphatic hydrocarbons out of various petrol fractions.

As well as interests in GTL, Russia is actively exploring the alternative coal-to-liquids (CTL) technology. CTL can be separated into two different liquification technologies: direct and indirect coal conversion. Direct liquification breaks down the coal structure into smaller component molecules, which can then be further refined into clean liquid fuel products by reducing the contents of sulphur and nitrogen. Indirect coal conversion is based on the gasification of coal into synthesis gas and yields a much higher cetane distillate, offering opportunities for petrochemical specialities production.

Independent researchers at the R&D plant ST-5 in Venev/Tula have developed a CTL technology that hydrogenates coal under lower pressure (6–10 bar) than previous processes (20–30 bar) and thus offers considerable cost savings of between 20–25%. Moreover, even brown coal can be converted into high quality petrol, diesel, benzene and phenol. Experts suggest using the brown coal from the Kansk-Achinsk coal basin for CTL technology, as resources are extremely high and mining costs relatively low.

Russia is now phasing in new rules and European emission standards: synthetic fuels could contribute to achieving these due to their low emission rates. Opening up of the internal market for synthetic fuels can be envisaged because GTL would help oil companies to enhance low quality diesel fuel and it is anticipated there will be a rise in sales of diesel cars in Russia.

Synthetic fuels also offer Russian energy companies the advantage of developing remote natural gas reserves, lying in regions such as the Arctic shelf and East and West Siberia. As pipelines are not required for the transportation of synthetic fuels, producing these fuels will also enable companies to develop new export markets. It is anticipated that global demand for GTL will rise to about 40bn m<sup>3</sup> annually in 2010. ■

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