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Item 7 of the provisional agenda

DEVELOPMENTS AND PROSPECTS OF GAS RESOURCES FROM TIGHT FORMATIONS

(Replies to the questionnaire, transmitted by
the Government of the Russian Federation)*

Criteria of reservoir classification in tight formations

1.1.1. In-situ permeability to gas

Minimum: < 0.01 mD

Maximum: 0.5 mD

1.1.2. Initial production rate

Maximum: 30,000-50,000 m³/day (depending on region)

Minimum: < 5,000 m³/day

Estimation of natural gas reserves and resources in tight reservoirs

Russia's potential natural gas resources were estimated, for the state of exploration as at 1 January 1993, at over 200 trillion m³. In most of the country's gas-bearing areas, resource estimates have been made down to a depth of 7,000 m.

* In accordance with the decision taken at the Meeting of Experts on Natural Gas Resources at its nineteenth session in June 1996 (ENERGY/WP.3/GE.1/12, para. 9 (b)).

No estimates have been made of resources in the lower Palaeozoic or Riphean suites of the European Plain or the lower Mesozoic and Palaeozoic sedimentary formations of the Northern Caucasus or Western Siberia. For a number of promising sedimentary basins in the east of the country there exist only qualitative estimates. No account has been taken of non-conventional sources of hydrocarbon gases: natural gas in tight reservoirs, methane from coal deposits, gas dissolved in water, gas hydrates or deep-lying gas fields.

With regard to the unexplored portion of the conventional resources, the expectation is that medium-sized and small fields and reservoirs with complex structure (including non-anticlinal reservoirs) will be found to predominate.

In addition to conventional (currently economic) hydrocarbon resources, Russia's subsoil contains huge non-conventional resources, principally free gas and oil in tight reservoirs in Siberian continental sedimentary basins.

In the case of Western Siberia, the viability threshold for recoverable reserves in isolated deposits is, for gas and oil respectively, 0.1 billion m³ and 0.1 million t at flows of 20,000-50,000 m³/day (depending on the depth of the deposit) and 5 t/day.

In the northern part of Western Siberia, tight gas-saturated reservoirs with permeability of less than 0.5 mD and varying, but generally low effective porosity (from 8 to 14-15%) have been developed in the Achimov series (Berriassian/lower Valanginian) of the Nadym-Pur-Taz interfluvium, in Neocomian mudstone reservoirs in the Yamal and Gydan depressions and throughout the deep-lying, hot Lower/Middle Jurassic series (depths in excess of 3.3-3.5 km and contemporary geotemperatures in excess of 100-105°). VNIIGAZ estimates non-conventional gas resources in tight reservoirs at: around 2 trillion m³ in the lowest strata of the Neocomian in the Yamal and Gydan depressions; 1-1.5 trillion m³ in the Achimov series in the Nadym-Pur and Pur-Taz zones, and 6-7 trillion m³ in the Lower and Middle Jurassic - in all, no less than 9-10.5 trillion m³. In addition, the major part of the dry and low-condensate gas in pre-Jurassic sedimentary series at depths of more than 3.5-7.0 km will also count as non-conventional resources; at present, it is not easy to assess their quantity.

For continental Russia as a whole, gas in place in tight reservoirs in just the middle and lower levels of the sedimentary mantle in the oil- and gas-bearing basins is estimated to total 45-50 trillion m³. It seems likely that, with the depletion of readily accessible resources of free gas, the strengthening of international gas and condensate prices and the improvement of equipment and technology for extracting gas from difficult reservoirs, the exploitation of gas and gas-condensate deposits with poor (current) extraction characteristics will become economic as from 2010-2015. No later than during the first third of the next century, annual extraction of 30-50 billion m³, and perhaps more, from tight reservoirs in the deeper horizons of the currently known fields in Western Siberia will be worthwhile.
