

Russian Classification of Reserves

The estimation of reserves of natural gas, gas condensate and crude oil can be broken down into two components: (i) geological reserves, or the quantities of natural gas, gas condensate and crude oil contained in the subsoil and (ii) extractable reserves, or the portion of geological reserves whose extraction from the subsoil as of the date the reserves are calculated is economically efficient given market conditions and rational use of modern extraction equipment and technologies and taking into account compliance with the requirements of subsoil and environmental protection.

The Russian reserves system is based solely on the analysis of geological attributes. Explored reserves are represented by categories A, B, and C1; preliminary estimated reserves are represented by category C2; potential resources are represented by category C3; and forecasted resources are represented by categories D1 and D2. Natural gas reserves in categories A, B and C1 are considered to be fully extractable. For reserves of oil and gas condensate, a predicated coefficient of extraction is calculated based on geological and technical factors.

Category A reserves are calculated on the part of a deposit drilled in accordance with an approved development project for the oil or natural gas field. They represent reserves that have been analyzed in sufficient detail to define comprehensively the type, shape and size of the deposit; the level of hydrocarbon saturation; the reservoir type; the nature of changes in the reservoir characteristics; the hydrocarbon saturation of the productive strata of the deposit; the content and characteristics of the hydrocarbons; and the major features of the deposit that determine the conditions of its development (mode of operations, well productivity, strata pressure, natural gas, gas condensate and crude oil balance, hydro and piezo-conductivity and other features).

Category B represents the reserves of a deposit (or portion thereof), the oil or natural gas content of which has been determined on the basis of commercial flows of oil or natural gas obtained in wells at various hypsometric depths. The type, shape and size of the deposit; the effective oil and natural gas saturation depth and type of the reservoir; the nature of changes in the reservoir characteristics; the oil and natural gas saturation of the productive strata of the deposit; the composition and characteristics of crude oil, natural gas and gas condensate under in-situ and standard conditions and other parameters; and the major features of the deposit that determine the conditions of its development have been studied in sufficient detail to draw up a project to develop the deposit.

Category B reserves are computed for a deposit (or a portion thereof) that has been drilled in accordance with either a trial industrial development project in the case of a natural gas field or an approved technological development scheme in the case of an oil field.

Category C1 represents the reserves of a deposit (or of a portion thereof) whose oil or natural gas content has been determined on the basis of commercial flows of oil or natural gas obtained in wells (with some of the wells having been probed by a formation tester) and positive results of geological and geophysical exploration of non-probed wells.

The type, shape and size of the deposit and the formation structure of the oil- and gas-bearing reservoirs have been determined from the results of drilling exploration and production wells and by those geological and geophysical exploration techniques that have been field-tested for the applicable area. The lithological content, reservoir type and characteristics, oil and natural gas saturation, oil displacement ratio and effective oil and natural gas saturation depth of the productive strata have been studied based on drill cores and geophysical well exploration materials. The composition and characteristics of crude oil, natural gas and gas condensate under in-situ and standard conditions have been studied on the basis of well testing data. In the case of an oil and natural gas deposit, the commercial potential of its oil-bearing fringe has been determined. Well productivity, hydro- and piezo-conductivity of the stratum, stratum pressures and crude oil, natural gas and gas condensate temperatures and yields have been studied on the basis of well testing and well exploration results. The hydro-geological and geocryological conditions have been determined on the basis of well drilling results and comparisons with neighboring explored fields.

Category C1 reserves are computed on the basis of results of geological exploration work and production drilling and must have been studied in sufficient detail to yield data from which to draw up either a trial industrial development project in the case of a natural gas field or a technological development scheme in the case of an oil field.

Category C2 reserves are preliminary estimated reserves of a deposit calculated on the basis of geological and geophysical research of unexplored sections of deposits adjoining sections of a field containing reserves of higher categories and of untested deposits of explored fields. The shape, size, structure, level, reservoir types, content and characteristics of the hydrocarbon deposit are determined in general terms based on the results of the geological and geophysical exploration and information on the more fully explored portions of a deposit. Category C2 reserves are used to determine the development potential of a field and to plan geological, exploration and production activities.

Category C3 resources are prospective reserves prepared for the drilling of (i) traps within the oil-and-gas bearing area, delineated by geological and geophysical exploration methods tested for such area and (ii) the formation of explored fields which have not yet been exposed by drilling. The form, size and stratification

conditions of the assumed deposit are estimated from the results of geological and geophysical research. The thickness, reservoir characteristics of the formations, the composition and the characteristics of hydrocarbons are assumed to be analogous to those for explored fields. Category C3 resources are used in the planning of prospecting and exploration work in areas known to contain other reserve bearing fields.

Category D1 resources are calculated based on the results the region's geological, geophysical and geochemical research and by analogy with explored fields within the region being evaluated. Category D1 resources are reserves in lithological and stratigraphic series that are evaluated within the boundaries of large regional structures confirmed to contain commercial reserves of oil and natural gas.

Category D2 resources are calculated using assumed parameters on the basis of general geological concepts and by analogy with other, better studied regions with explored oil and natural gas fields. Category D2 resources are reserves in lithological and stratigraphic series that are evaluated within the boundaries of large regional structures not yet confirmed to contain commercial reserves of oil and natural gas. The prospects for these series to prove to be oil-and gas-bearing are evaluated based on geological, geophysical and geochemical research.

The evaluation of natural gas reserves in newly discovered natural gas or oil-and-gas deposits is carried out under the Russian reserves system using the volume method. The volume method determines the volume of reserves by examining the filtration and capacitive parameters of the deposit based on (i) the area of the deposit; (ii) the effective depth of hydrocarbon saturation; and (iii) the porousness of the deposit and the level of saturation of the hydrocarbons, taking into account thermobaric conditions.

The evaluation of natural gas reserves in deposits already under development is carried out under the Russian reserves system using both the volume method and the material balance method. The material balance method takes into account temporal changes in the effective reservoir pressure as a result of the extraction of the hydrocarbons and the resultant influx of water.

In accordance with the Law on Subsoil mineral reserves in Russia are subject to mandatory state examination, and subsoil users cannot be granted a production license with respect to a field that was not examined. The state examination of reserves is conducted by subsidiary organizations of the Federal Agency on Subsoil Use, including the State Reserve Commission, Central Reserve Commission and its regional departments. If the commercial feasibility of certain reserves is approved by any such organization, the reserves are entered in the State Balance of Mineral Products. Once a subsoil user is granted an exploration, development or production license, it is required to file annual statistical reports reflecting changes in reserves. In addition, subsoil users' reserve reports are submitted annually for examination and approval by the Central Reserve Commission or its regional organizations or, if there has been a substantial change in reserves, by the State Reserve Commission.

Estimation of reserves, as examined by the state expert organizations and reflected in subsoil users' annual statistical reports, is accumulated in the State Balance of Mineral Products.