

DEFINITIONS OF OIL AND GAS RESERVES
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Reserves

Reserves are estimated volumes of crude oil, condensate, natural gas, natural gas liquids, and associated substances anticipated to be commercially recoverable from known accumulations from a given date forward, under existing economic conditions, by established operating practices, and under current government regulations. Reserves estimates are based on interpretation of geologic and/or engineering data available at the time of the estimate.

Reserve estimates generally will be revised as reservoirs are produced, as additional geologic and/or engineering data become available, or as economic conditions change.

Reserves do not include volumes of crude oil, condensate, natural gas, or natural gas liquids being held in inventory. If required for financial reporting or other special purposes, reserves may be reduced for on-site usage and/or processing losses.

The ownership status of reserves may change due to the expiration of a production license or contract; when relevant to reserve assignment such changes should be identified for each reserve classification.

Reserves may be attributed to either natural reservoir energy, or improved recovery methods. Improved recovery includes all methods for supplementing natural reservoir energy to increase ultimate recovery from a reservoir. Such methods include (1) pressure maintenance, (2) cycling, (3) waterflooding, (4) thermal methods, (5) chemical flooding, and (6) the use of miscible and immiscible displacement fluids.

All reserve estimates involve some degree of uncertainty, depending chiefly on the amount and reliability of geologic and engineering data available at the time of the estimate and the interpretation of these data. The relative degree of uncertainty may be conveyed by placing reserves in one of two classifications, either proved or unproved. Unproved reserves are less certain to be recovered than proved reserves and may be subclassified as probable or possible to denote progressively increasing uncertainty.

Proved Reserves

Proved reserves can be estimated with reasonable certainty to be recoverable under current economic conditions. Current economic conditions include prices and costs prevailing at the time of the estimate. Proved reserves may be developed or undeveloped.

In general, reserves are considered proved if commercial producibility of the reservoir is supported by actual production or formation tests. The term proved refers to the estimated volume of reserve and not just to the productivity of the well or reservoir. In certain instances,

proved reserves may be assigned on the basis of electrical and other type logs and/or core analysis that indicate subject reservoir is hydrocarbon bearing and is analogous to reservoirs in the same area that are producing, or have demonstrated the ability to produce on a formation test.

The area of a reservoir considered proved includes (1) the area delineated by drilling and defined by fluid contacts, if any, and (2) the undrilled areas that can be reasonably judged as commercially productive on the basis of available geological and engineering data. In the absence of data on fluid contacts, the lowest known structural occurrence of hydrocarbons controls the proved limit unless otherwise indicated by definitive engineering or performance data.

Proved reserves must have facilities to process and transport those reserves to market that are operational at the time of the estimate, or there is a commitment or reasonable expectation to install such facilities in the future.

In general, proved undeveloped reserves are assigned to undrilled locations that satisfy the following conditions: (1) the locations are direct offsets to wells that have indicated commercial production in the objective formation, (2) it is reasonably certain that the locations are within the known proved productive limits of the objective formation, (3) the locations conform to existing well spacing regulations, if any, and (4) it is reasonably certain that the location will be developed. Reserves for other undrilled locations are classified as proved undeveloped only in those cases where interpretations of data from wells indicate that the objective formation is laterally continuous and contains commercially recoverable hydrocarbons at locations beyond direct offsets.

Reserves that can be produced through the application of established improved recovery methods are included in the proved classification when (1) successful testing by a pilot project or favorable production or pressure response of an installed program in that reservoir, or one in the immediate area with similar rock and fluid properties, provides support for the engineering analysis on which the project or program is based and (2) it is reasonably certain the project will proceed.

Reserves to be recovered by improved recovery methods that have yet to be established through repeated commercially successful applications are included in the proved classifications only (1) after a favorable production response from subject reservoir from either (a) a representative pilot or (b) an installed program, where the response provides support for the engineering analysis on which the project is based, and (2) it is reasonably certain the project will proceed.

Unproved Reserves

Unproved reserves are based on geologic and/or engineering data similar to that used in estimates of proved reserves, but technical, contractual, economic, or regulatory uncertainties preclude such reserves being classified as proved. They may be estimated assuming future economic conditions different from those prevailing at the time of the estimate.

Estimates of unproved reserves may be made for internal planning or special evaluations, but are not routinely compiled.

Unproved reserves are not to be added to proved reserves because of different levels of uncertainty.

Unproved reserves may be divided into two subclassifications: probable and possible.

Probable Reserves

Probable reserves are less certain than proved reserves and can be estimated with a degree of certainty sufficient to indicate they are more likely to be recovered than not.

In general, probable reserves may include (1) reserves anticipated to be proved by normal stepout drilling where subsurface control is inadequate to classify these reserves

as proved, (2) reserves in formations that appear to be productive based on log characteristics but that lack core data or definitive tests and which are not analogous to producing or proved reservoirs in the area, (3) incremental reserves attributable to infill drilling that otherwise could be classified as proved but closer statutory spacing had not been approved at the time of the estimate, (4) reserves attributable to an improved recovery method which has been established by repeated commercially successful applications when a project or pilot is planned but not in operation and rock, fluid, and reservoir characteristics appear favorable for commercial application, (5) reserves in an area of a formation that has been proved productive in other areas of the field but subject area appears to be separated from the proved area by faulting and the geologic interpretation indicates subject area is structurally higher than the proved area, (6) reserves attributable to a successful workover, treatment, retreatment, change of equipment, or other mechanical procedure, where such procedure has not been proved successful in wells exhibiting similar behaviour in analogous reservoirs, and (7) incremental reserves in a proved producing reservoir where an alternate interpretation of performance or volumetric data indicates significantly more reserves than can be classified as proved.

Possible Reserves

Possible reserves are less certain than probable reserves and can be estimated with a low degree of certainty, insufficient to indicate whether they are more likely to be recovered than not.

In general, possible reserves may include (1) reserves suggested by structural and/or stratigraphic extrapolation beyond areas classified as probable, based on geologic and/or geophysical interpretation, (2) reserves in formations that appear to be hydrocarbon bearing based on logs or cores but that may not be productive at commercial rates, (3) incremental reserves attributable to infill drilling that are subject to technical uncertainty, (4) reserves attributable to an improved recovery method when a project or pilot is planned but not in operation and rock, fluid, and reservoir characteristics are such that a reasonable doubt exists that the project will be commercial, and (5) reserves in an area of a formation that has been proved productive in other areas of the field but subject area appears to be separated from the proved area by faulting and geologic interpretations indicates subject area is structurally lower than the proved area.

RESERVE STATUS CATEGORIES

Reserve status categories define the development and producing status of wells and/or reservoirs.

Developed

Developed reserves are expected to be recovered from existing wells (including reserves behind pipe). Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. Developed reserves may be subcategorized as producing or non-producing.

Producing

Producing reserves are expected to be recovered from completion intervals open at the time of the estimate, and producing. Improved recovery reserves are considered to be producing only after an improved recovery project is in operation.

Non-Producing

Non-producing reserves include shut-in and behind-pipe reserves. Shut-in reserves are expected to be recovered from completion intervals open at the time of the estimate, but which had not started producing, or were shut in for market conditions or pipeline connection, or were not capable of production for mechanical reasons, and the time when sales will start is uncertain.

Behind-pipe reserves are expected to be recovered from zones behind casing in existing wells, which will require additional completion work or a future recompletion prior to the start of production.

Undeveloped

Undeveloped reserves are expected to be recovered: (1) from new wells on undrilled acreage, (2) from deepening existing wells to a different reservoir, or (3) where a relatively large expenditure is required to (a) recomplete an existing well, or (b) install production or transportation facilities for primary or improved recovery projects.