Understanding the Size of U.S. Natural Gas Resources

History has proven that estimates of the size of U.S. natural gas resources change over time, so that supply estimates — astonishingly — increase even as more natural gas is produced and consumed.

Natural Gas Supply Association

Experts are aligned on natural gas estimates. The Potential Gas Committee (PGC) and, the U.S. Energy Information Administration (EIA) each periodically issues estimates of U.S. natural gas resources. Done independently, the most up-to-date estimates from each are similar.

- The PGC estimated 2,817 trillion cubic feet (Tcf) of natural gas in the U.S. (2017, based on 2016 data)
- The EIA estimated 2,355 Tcf. (2017 AEO)

To put these amounts in context, the United States consumes about 27 Tcf per year.

Focus on the Potential Gas Committee. We focus here on estimates made by the Potential Gas Committee, since that organization has published them the longest (since 1964) and most frequently. The PGC's estimates are based on solid scientific, geologic, statistical and economic principles. Contributors come from the natural gas industry, the field and technical services, and consulting sectors. Their findings are reviewed thoroughly by technical advisors and observers from government, universities, industry and research organizations in North America before publication.

Estimates are always evolving and usually growing. As technology has improved, the ability to detect and extract natural gas has also improved, boosting the PGC's resource estimates. In fact, if the 1966 estimate of 600 Tcf had remained static, the U.S. would have run out of natural gas in the 1990s. Instead, estimates doubled by 2002 and in 2017 grew to over 2,800 Tcf.

With advances in technology, immense quantities of natural gas once considered beyond reach have recently become economic to produce. For example, the PGC knew for decades that natural gas was trapped in shale rock formations in more than 20 states, but did not include it in resource estimates until the mid- 2000s, when energy producers successfully and economically combined hydraulic fracturing and horizontal drilling. That technological breakthrough unlocked a vast untapped natural gas resource in shale rock. As a result, the PGC's estimate of natural gas resources shot up. In fact, in the 2017 PGC estimate, shale gas accounts for 64 percent of the estimated 100-year supply of U.S. recoverable natural gas — yet, shale gas was barely on the chart as recently as 2006. Future technological breakthroughs could –and probably will – result in another significant increase in the size of U.S. natural gas resources.

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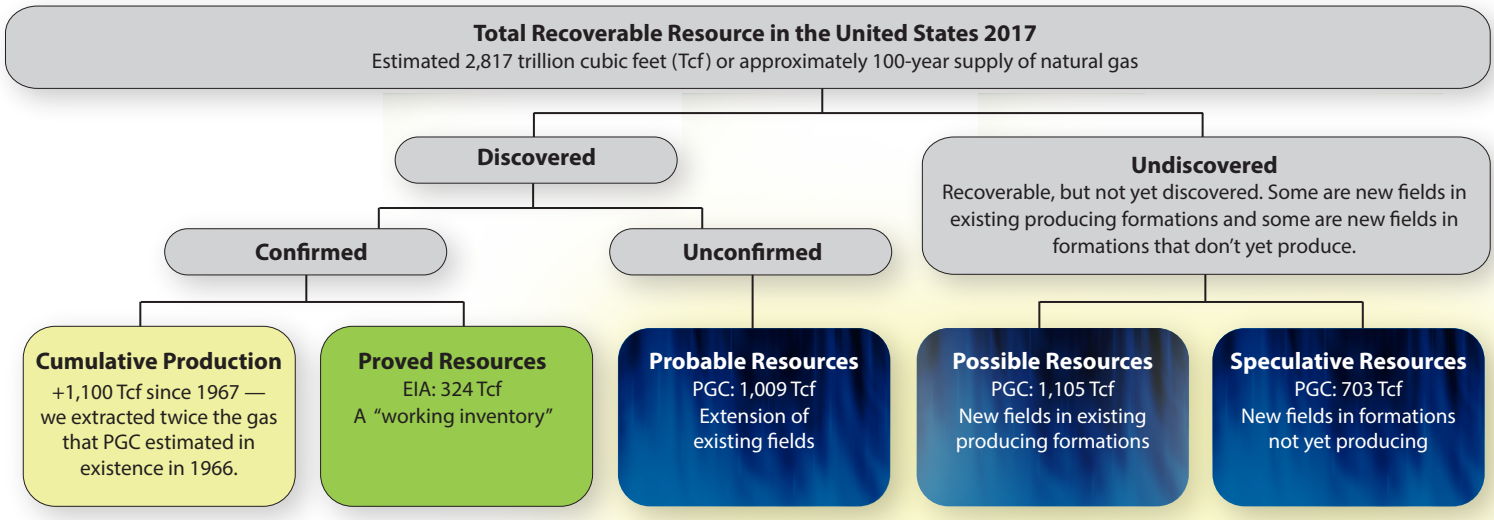
Understanding Natural Gas Resources



Sources — Potential Gas Committee *Report of Potential Supply of Natural Gas in the United States 2017*; U.S. Energy Information Administration *Annual Energy Outlook 2017*.

Not in Estimates: Unrecoverable Resource — Thousand-year supply, but need better technology or more money to extract. (Ex: methane hydrates)

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Potential Gas Committee estimates fall on the conservative side. The PGC is cautious in its appraisals. For example, even if natural gas is known to be present, if it is located too deep or in a quantity that does not justify the effort of extraction, the PGC does not count it. In fact, there is at least a 1,000-year supply of natural gas in the United States that is considered "unrecoverable" with current technology and economic constraints, such as gas locked deep under the ocean in frozen methane hydrates. It is likely that one day improvements in technology will enable the PGC to include some of those natural gas resources in its estimates.

The PGC estimates *resources* and EIA estimates *reserves*. The PGC estimates unconfirmed and undiscovered natural gas resources and then combines those figures with EIA's proved reserves to determine total recoverable gas in the U.S.

The distinction between resources and reserves. It is tempting to use the terms interchangeably, but they are entirely different ways of measuring natural gas in the United States. While both are important, *reserve* measurements provide a way to track natural gas that is in hand and where the presence and quantity have been confirmed through testing. Reserves (also called proved reserves) are the equivalent of animals in the zoo: you can count their heads and make good estimates of the offspring they will produce. The U.S. Energy Information Administration publishes measurements of U.S. natural gas reserves and updates them annually.

In contrast, the natural gas *resources* that the PGC estimates, and which this fact sheet explores in more detail, are like animals in the wild that are estimated through observation, association, deduction and logic. As technology improves, we get better at spotting their traces and our estimates become more and more precise. Although we can't yet touch resources, we can be assured that they are there.

In a way, reserves are today's natural gas, while resources represent tomorrow's untapped potential.

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Some critics would prefer that estimates be restricted to reserves, ignoring most or all of natural gas resources. Using that methodology is the equivalent of assuming there is only one bee in the hive because only one is in plain sight. It would short-sightedly exclude most of the natural gas in the United States.

Reporting of reserves. Both the U.S. Energy Information Administration and the Securities and Exchange Commission (SEC) require companies to provide information on their natural gas reserves. EIA collects information from both publicly traded and privately held companies, while SEC reporting requirements apply to larger companies whose securities are held by more than 500 owners. The government can levy stiff financial and legal penalties on companies if it determined they have falsely reported reserves.

PGC resource categories. The Potential Gas Committee's three resource categories reflect the geologic and engineering data available in the formations being assessed, both traditional and coal bed methane (CBM). Assessors apply probabilistic principles and work on a formation-by-formation basis, determining a minimum, a maximum and a mean estimate.

- Probable — existing fields (excluding proved reserves)
- Possible — new fields in productive formation
- Speculative — new fields in formation that has not yet produced

History shows us more to be discovered. Recently critics have suggested that natural gas estimates should only include a portion of the "probable" category of resources, along with proved reserves. This would mean assuming no new fields will ever be discovered, even in existing formations that are known to be productive but have not yet been fully explored.

Natural gas experts reject that approach and instead point to history and the time-tested understanding that there will be more fields discovered in producing formations and unexplored formations.