



Potential Gas Committee



Potential Gas Agency
Colorado School of Mines, Golden, CO 80401-1887

Press Release

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POTENTIAL GAS COMMITTEE REPORTS RECORD FUTURE SUPPLY OF NATURAL GAS IN THE U.S.

GOLDEN, COLORADO — The Potential Gas Committee (PGC) today released the results of its latest biennial assessment of the nation's natural gas resources, which indicates that the United States possesses a total technically recoverable resource base of 2,817 trillion cubic feet (Tcf) as of year-end 2016. This is the highest resource evaluation in the Committee's 52-year history, exceeding the previous high assessment (from 2014) by 302 Tcf (increase of 12%). The increase resulted from reassessments of shale gas resources in the Atlantic, Gulf Coast, Mid-Continent and Rocky Mountain areas.

"The latest assessment by PGC confirms that the U.S. has abundant resources of natural gas. These resources are present in various reservoirs both onshore and offshore," said Dr. Alexei V. Milkov, Professor of Geology and Geological Engineering and Director of the Potential Gas Agency (PGA) at the Colorado School of Mines. PGA provides guidance and technical assistance to the PGC.

The PGC's year-end 2016 assessment of 2,817 Tcf includes 2,658 Tcf of gas potentially recoverable from "Traditional" reservoirs (conventional, tight sands, carbonates, and shales) and 159 Tcf in coalbed gas reservoirs. Compared to year-end 2014, Traditional resources increased by 302 Tcf (13%), while coalbed gas resources essentially did not

change. Accompanying Table 1 summarizes the national resource assessment for year-end 2016 and acknowledges changes from the previous year-end 2014 assessment.

PGC assesses technically recoverable resources and does not consider a specific price or schedule for the discovery and production of gas. The U.S. Energy Information Administration (EIA) of the U.S. Department of Energy (DOE) estimates the proved gas reserves, which are additional to the resources assessed by PGC. When the PGC's assessments of technically recoverable resources are combined with EIA's latest determination of proved reserves (324 Tcf of natural gas as of year-end 2015), the U.S. future supply of natural gas stands at a record 3,141 Tcf, an increase of 288 Tcf (10%) over the previous evaluation.

Dr. Milkov highlighted that, "New exploration, more well drilling and continuous improvements in completion and stimulation technologies lead to better delineation and characterization of U.S. gas resources, especially in shale and tight reservoirs. The record gas resources assessed by the PGC, in addition to robust domestic production levels and booked reserves, paint a picture of strong supply of natural gas in the U.S. for many years to come."

PGC reports the potential resources at the national level as well as for individual seven geographic areas and 90 geological provinces. Such detailed area-level and province-level results offer great value for purposes of analysis, planning and exploration.

The Atlantic area ranks as the country's richest resource area with 39% of total U.S. Traditional resources, followed by the Gulf Coast (including the Gulf of Mexico) with 20%, Rocky Mountains with 17%, and the Mid-Continent with 14%. Changes in the total assessment from year-end 2014 to year-end 2016 (see accompanying Table 2) arose primarily from the evaluation of recent drilling, well-test and production data from these four areas.

The largest volumetric gains (214 Tcf or 26%) were reported in the Atlantic area. The major reason for the increase is new drilling and production results from Marcellus, Utica and Rogersville shale plays in the Appalachian basin. Specifically, the Utica shale is now assessed to have a considerably larger sweet spot area with highly productive wells.

Mid-Continent assessments rose by 73 Tcf (25%), reflecting intensive developments of the Woodford shale in the Anadarko basin (especially in the South Central Oklahoma Oil Province - SCOOP) and Sooner Trend Anadarko Basin (Canadian and Kingfisher Counties - STACK plays), the Barnett shale in the Fort Worth basin, as well as expansion of the Woodford and Mississippian shale development in the Permian basin (Alpine High, south-west Texas). In addition to this significant growth from shale plays, additional resources were identified in the conventional and tight reservoirs in the Anadarko and Permian basins as wells with higher estimated ultimate recovery (EUR) were drilled in these basins.

Gas resources in the Rocky Mountain area increased by 6 Tcf (1.4%). This resource growth reflects developments in the Mancos and the Niobrara plays in the Piceance basin.

Although the Gulf Coast area had a modest overall increase of only 1.5 Tcf (0.3%), the PGC made significant adjustments for specific provinces and plays in the current assessment. For example, new geotechnical data obtained for the Eagle Ford shale play, and better well performance in the Haynesville and Bossier shale plays, resulted in a significant growth of shale resources. On the other hand, most likely resources for some of the conventional reservoirs such as the Wilcox, Cotton Valley and Bossier sands were reduced.

The growing importance of shale gas in the USA is evidenced by the fact that the PGC's mean total assessed shale gas resource of 1,797 Tcf for 2016 accounts for approximately 64% of the country's total potential resources.

PGC's assessment results are presented in the report *Potential Supply of Natural Gas in the United States (December 31, 2016)*. The first chapter of the report includes a complete review of the national aggregated mean value assessment statistics (summarized in tables and figures), together with an area-by-area comparison of assessment results for year-end 2014 and 2016 and decennial changes in area-level assessments from 2006 to 2016. The second chapter examines the 2016 evaluations at the area and province levels and discusses the factors behind the changes in assessments between 2014 and 2016. Also included are graphs for each area that track historical trends in the Committee's "most likely" (non-aggregated) assessments since 1986, as well as trends in the aggregated mean values since 1990. The concluding chapter presents definitions and details of the PGC's resource assessment methodologies, as well as statistical tabulations of all non-aggregated area- and national-level assessments.

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Details of the Potential Gas Committee's Natural Gas Resource Assessment (as of December 31, 2016)

The PGC reports its biennial potential gas resource assessments in three categories of decreasing geological certainty - Probable, Possible and Speculative. For each category, a minimum, most likely and maximum volume is assessed in each of 90 onshore and offshore provinces in the Lower 48 States and Alaska. The category and total mean values shown in Table 1 below were computed by statistical aggregation of the minimum, most likely and maximum value distributions for each category and for all provinces combined. This procedure allows for more direct comparison of PGC's assessments with those made by other organizations.

The PGC's assessments are not static. Based on new exploration results, drilling and production information and various other data that become available, PGC members may reclassify resources at the province level from one category to another and to proved reserves.

Table 1. Summary of year-end 2016 nation-level resource assessment and comparison with the year-end 2014 assessment.

Resource Category	Mean Values, trillion cubic feet (Tcf)		Change from 2014 to 2016	
	2016	2014	Tcf	%
Traditional Gas Resources:				
- Probable resources (current fields)	993.8	848.4		
- Possible resources (new fields)	1,056.9	930.1		
- Speculative resources (frontier)	607.5	586.1		
- Total	2,658.3	2,356.8	+301.5	+12.8
Coalbed Gas Resources:				
- Probable resources (current fields)	15.0	14.2		
- Possible resources (new fields)	48.0	48.3		
- Speculative resources (frontier)	95.7	95.7		
- Total	158.7	158.1	+0.6	+0.4
Grand Total Potential Resources	2,817.0	2,514.9	+302.1	+12.0
Proved gas reserves (EIA)	324.3*	338.3**		
U.S. Future Gas Supply	3,141.3	2,853.2	+288.1	+10.1

Notes:

* Total gas (dry and wet), latest available figure is for year-end 2015.

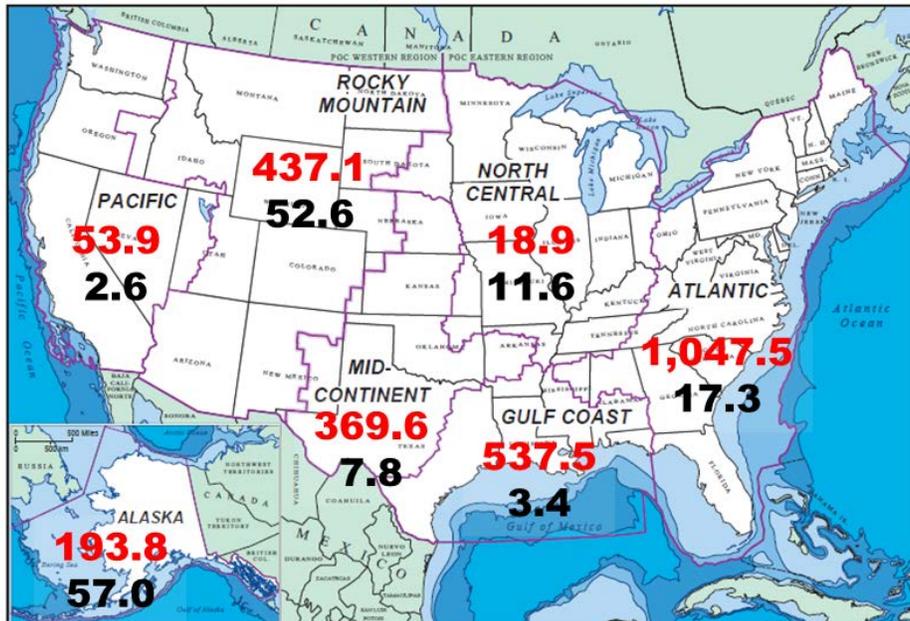
** Dry gas only.

PGC’s 90 geological provinces are grouped into seven geographic assessment areas. Table 2 compares the mean values of total traditional gas resources for these areas for year-end 2016 and year-end 2014. Coalbed gas resources are aggregated only at the national level. Figure 1 shows the assessment areas and summarizes the results of year-end 2016 assessment.

Table 2. Summary of year-end 2016 area-level assessment of Traditional gas resources and comparison with the year-end 2014 assessment.

Assessment Area	Mean Values, trillion cubic feet (Tcf)		Change from 2014 to 2016	
	2016	2014	Tcf	%
Total Traditional Gas Resources:				
- Atlantic	1,047.5	833.4	+214.1	+25.7
- Gulf Coast (incl. Gulf of Mexico)	537.5	536.0	+1.5	+0.3
- Rocky Mountain	437.1	430.9	+6.2	+1.4
- Mid-Continent	369.6	296.4	+73.2	+24.7
- Alaska	193.8	193.8	0.0	0.0
- Pacific	53.9	54.1	-0.2	-0.4
- North Central	18.9	20.8	-1.9	-9.1
Total U.S. Traditional Gas Resources	2,658.3	2,356.8	+301.5	+12.8

Figure 1. PGC assessment areas and the results of year-end 2016 assessments for Traditional (mean values in red, Tcf) and Coalbed (most likely values in black, Tcf) gas resources.



How to Obtain the Potential Gas Committee Report

Orders for the PGC's report, *Potential Supply of Natural Gas in the United States (December 31, 2016)*, may now be placed with the Potential Gas Agency, Colorado School of Mines, Golden, CO 80401-1887. The cost of the printed report is US\$350 (plus applicable sales tax for Colorado orders). All purchasers will receive both the printed report and a digital version (PDF file) of the document.

For additional information about ordering the new and previous reports, please contact Dr. Alexei Milkov, Director, at the Potential Gas Agency, telephone 303-273-3887, fax 303-273-3574, or e-mail: amilkov@mines.edu.

This press release and the accompanying slide presentation are available for viewing and download at the PGC website, <http://www.potentialgas.org>.

About the Potential Gas Committee

The Potential Gas Committee (PGC), an incorporated, nonprofit organization, consists of ~80 knowledgeable and highly experienced volunteer members who work in the natural gas exploration, production, transportation and distribution industries and in technical services and consulting sectors. The PGC benefits from the input of respected technical advisors and observers from federal and state government agencies, academia, and various industry and research organizations in the United States. Although the PGC functions independently, the Potential Gas Agency (PGA) at the Colorado School of Mines provides the Committee with guidance, technical assistance, training and administrative support, and assists in member recruitment and outreach. The PGA receives financial support from prominent E&P companies, gas pipeline companies and distributors, trade associations and individuals.

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