



Potential Gas Committee

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POTENTIAL GAS COMMITTEE REPORTS INCREASE IN MAGNITUDE OF U.S. NATURAL GAS RESOURCE BASE

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 2,515 trillion cubic feet (Tcf) as of year-end 2014. This is the highest resource evaluation in the Committee's 50-year history, exceeding the previous high assessment (from 2012) by 131 Tcf. The increase arose from reevaluations of shale gas resources in the Atlantic, Mid-Continent, Gulf Coast and Rocky Mountain areas, and conventional/tight gas resources in the Mid-Continent and Rockies.

These changes have been assessed in addition to 53 Tcf of domestic marketed-gas production estimated by the EIA for the two-year period since the Committee's previous assessment.

"The PGC's year-end 2014 assessment reaffirms the Committee's conviction that abundant, recoverable natural gas resources exist within our borders, both onshore and offshore, and in all types of reservoirs—from conventional, 'tight' and shales, to coals," said Dr. John B. Curtis, Professor Emeritus of Geology and Geological Engineering at the Colorado School of Mines and Director of the Potential Gas Agency there, which provides guidance and technical assistance to the Potential Gas Committee.

Dr. Curtis cautioned, however, that the current assessment assumes neither a time schedule nor a specific market price for the discovery and production of future gas supply. "Assessments of the Potential Gas Committee represent our best understanding of the geological endowment of the technically recoverable natural gas resource of the United States," he explained.

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The Committee's year-end 2014 assessment of 2,515 Tcf includes 2,357 Tcf of gas potentially recoverable from "Traditional" reservoirs (conventional, tight sands and carbonates, and shales) and 158 Tcf in coalbed reservoirs. Compared to year-end 2012, assessed Traditional resources increased by 131.2 Tcf (5.9%), while coalbed gas resources declined by a nominal 0.2 Tcf (0.1%), resulting in a net increase in total potential resources of 131.0 Tcf (5.5%). (See accompanying Table 1.)

When the PGC's assessments of technically recoverable resources are combined with the U.S. Department of Energy's latest available determination of *proved reserves*, 338 Tcf (dry gas) as of year-end 2013, the United States has a total available *Future Supply* of 2,853 Tcf, an increase of 161 Tcf over the previous evaluation. While the PGC reports these assessments of potential resources and future supply summarily on the national level, the Committee believes that the individual province-level assessment results offer the greatest value for purposes of analysis, planning and exploration.

As Dr. Curtis observed, "Our knowledge of the geological endowment of technically recoverable gas continues to improve with each assessment. Furthermore, new and advanced exploration, well drilling, completion and stimulation technologies are allowing us increasingly better delineation of and access to domestic gas resources—especially 'unconventional' gas—which, not all that long ago, were considered impractical or uneconomical to pursue."

"Consequently, our present assessment, strengthened by robust domestic production levels and reserves bookings, demonstrates an exceptionally strong and optimistic gas supply picture for the nation."

As a result of successive increases in the assessments of Appalachian basin shale gas, the Atlantic area ranks again as the country's richest resource area with 35% of total U.S. Traditional resources, followed by the Gulf Coast (including the Gulf of Mexico) with 23%, Rocky Mountains with 18%, and the Mid-Continent with 12.5%. (See accompanying Table 2.) Changes in the total assessment from 2012 to 2014 arose primarily from analyses of recent drilling, well-test and production data from these four regions. The largest volumetric and percentage gains were reported for Appalachian shales, primarily the Marcellus but also including the Utica and the newly assessed Rogersville Shale, which collectively rose by 137 Tcf (24%).

Gulf Coast assessments rose by 15 Tcf (3%), reflecting continued aggressive development of wet gas and condensate in the prolific Eagle Ford Shale of the Texas Gulf Coast basin and a first-time assessment for the Cretaceous Tuscaloosa marine shale in Louisiana. For the Mid-Continent, modest declines in assessments for the Arkoma and Anadarko basins (conventional reservoirs and shales) were offset by substantially higher evaluations of the Barnett Shale in the Fort Worth basin and the stacked pays of the Bone Spring and Wolfcamp plays in the Permian basin. The area's total assessment gained 26.9 Tcf (10%). The 9.6-Tcf (2.3%) net increase for the Rocky Mountain area resulted from reevaluation of new data and drilling results from the Cretaceous Niobrara shale play in western Colorado's Piceance basin and the Niobrara fractured-carbonate play in the Denver basin.

The growing importance of shale gas nationwide is substantiated by the fact that the PGC's total assessed shale gas resource of 1,253 Tcf for 2014 accounts for approximately 61% of the country's total Traditional potential resources, up from 57 percent in 2012.

PGC's new biennial report, commemorating the Committee's fiftieth anniversary, includes a complete review of the national aggregated mean-value assessment statistics, including tables and graphs, together with an area-by-area comparison of assessment results for year-end 2012 and 2014 and decennial changes in area-level assessments from 2004–14. The second chapter examines the 2014 evaluations at the area and province levels and discusses the factors behind the changes in assessments between 2012 and 2014. Also included are graphs for each area that track historical trends in the Committee's "most likely" (nonaggregated) assessments since 1984, 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, including a new formal methodology for shales, together with statistical tabulations of all nonaggregated area- and national-level assessments.

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Details of the Potential Gas Committee's Natural Gas Resource Assessment
(as of December 31, 2014)

The Potential Gas Committee (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, in turn, for all provinces combined. Mean values for Total Traditional Resources and Total Coalbed Gas Resources were aggregated separately. This procedure imparts greater statistical validity to the results and 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.

Resource Category	Mean Values, Tcf		Change Tcf (%)
	2014	2012	
Traditional Gas Resources:			
Probable resources (current fields).....	848.4	708.5	
Possible resources (new fields).....	930.1	952.3	
Speculative resources (frontier).....	586.1	558.7	
Total Traditional Gas Resources (not additive)*	2,356.8	2,225.6	+131.2 (5.9%)
Coalbed Gas Resources:			
Probable resources.....	14.2	14.2	
Possible resources.....	48.3	48.3	
Speculative resources.....	95.7	95.8	
Total Coalbed Gas Resources (not additive)*.....	158.1	158.2	-0.2 (-0.1%)
Grand Total Potential Resources (additive)**	2,514.9	2,383.9	+131.0 (5.5%)
Proved dry-gas reserves (DOE/EIA).....	<u>338.3</u> †	<u>308.4</u>	
U.S. Future Gas Supply	2,853.2	2,692.2	+160.9 (6%)

* Mean values for Probable, Possible and Speculative resources are *not* arithmetically additive in deriving Total Traditional Gas Resources and Total Coalbed Gas Resources.

** The separately aggregated mean values for Total Traditional Resources and Total Coalbed Gas Resources are arithmetically additive in deriving Grand Total Potential Resources.

† Latest available figure is for year-end 2013.

Note: Totals are subject to rounding and differences due to statistical aggregation of distributions.

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PGC's 90 geological provinces are grouped into seven geographic assessment areas. In similar fashion as above, the minimum, most likely and maximum value distributions for each category of Traditional resources in each province within an area are aggregated at the area level to derive mean values for Probable, Possible and Speculative Traditional resources and a separately aggregated (not additive) area total. Coalbed gas resources are aggregated only at the national level. Table 2 compares the total mean values for these areas for year-end 2014 and year-end 2012.

Table 2.

Assessment Area	Total Mean Values, Tcf		Change Tcf (%)
	2014	2012	
Traditional Gas Resources:			
Atlantic	833.4	741.3	+92.1 (12.8%)
Gulf Coast (including Gulf of Mexico)	536.0	521.0	+15.0 (2.9%)
Rocky Mountain	430.9	421.3	+9.6 (2.3%)
Mid-Continent.....	296.4	269.5	+26.9 (10.0%)
Alaska	193.8	193.8	0 (0%)
Pacific	54.1	54.4	-0.3 (-0.6%)
North Central.....	20.8	20.8	0 (0%)
Total U.S. Traditional Gas Resources (not additive)*	2,356.8	2,225.6	+131.2 (5.9%)
Total U.S. Coalbed Gas Resources (all areas)	158.1	158.2	-0.2 (-0.1%)
Grand Total Potential Resources (additive)**	2,514.9	2,383.9	+131.0 (5.5%)
Proved dry-gas reserves (DOE/EIA)	<u>338.3</u> †	<u>308.4</u>	
U.S. Future Gas Supply	2,853.2	2,692.2	+160.9 (6%)

* Mean values of Traditional Resources for the seven areas are *not* arithmetically additive in deriving Total U.S. Traditional Resources, which is a separately aggregated value. Area-level changes in values from 2012 to 2014 likewise are not arithmetically additive in deriving the total change.

** The separately aggregated mean values for Total U.S. Traditional Gas Resources and Coalbed Gas Resources are arithmetically additive in deriving Grand Total Potential Resources.

† Latest available figure is for year-end 2013.

Note: Totals are subject to rounding and differences due to statistical aggregation of distributions.

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How to Obtain the Potential Gas Committee 2014 Report

Orders for the PGC's 50th Anniversary report, *Potential Supply of Natural Gas in the United States (December 31, 2014)* 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\$325 (plus applicable sales tax for Colorado orders) if payment accompanies the order. All purchasers will receive both the printed report and a digital version (pdf) of the document together with other special 50th anniversary features on CD-ROM (or USB flash drive).

For additional information about ordering these and previous reports and CDs/DVDs, please contact Linda D'Epagnier, Program Assistant, at the Potential Gas Agency, telephone 303-273-3886, fax 303-273-3574, or e-mail: ldepagni@mines.edu.

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

About the Potential Gas Committee

The Potential Gas Committee, an incorporated, nonprofit organization, consists of knowledgeable and highly experienced volunteer members who work in the natural gas exploration, production, transportation and distribution industries and in the field and technical services and consulting sectors. The Committee also 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 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 Potential Gas Agency receives financial support from prominent E&P companies, gas pipeline companies and distributors, and individuals.

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