

From: Schaal, Michael
Sent: Monday, June 20, 2011 4:15 PM
To: Ian Urbina
Cc: Cogan, Jonathan
Subject: RE: NY Times query

Mr. Urbina,

This email is in response to your recent inquiry to the Energy Information Administration (EIA) regarding shale gas.

My name is Michael Schaal and I am the director of the Office of Petroleum, Natural Gas and Biofuels Analysis within EIA's office of Energy Analysis. All of EIA's short term natural gas forecasts (out to 2012) and long term natural gas projections (out to 2035) are developed by EIA analysts and modelers who work in my office.

The attachment provides a quick overview of our approach to the shale gas issue, including material that addresses your specific questions.

One guiding principle that we employ is, "look at the data." It is clear the data shows that shale gas has become a significant source of domestic natural gas supply. Prior to 2005 shale gas constituted only 4% of natural gas production and had grown to become 23% of production for 2010. EIA's continued monitoring of the situation indicates that growth in shale gas production continues and that shale gas has exceeded 30% of total marketed natural gas production through May of this year.

Don't hesitate to contact me if you have any further questions.

A. Michael Schaal, Director
Office of Petroleum, Natural Gas and Biofuels Analysis
Energy Information Administration
1000 Independence Ave. SW
Washington, D.C. 20585

Attachment:

[EIA Response to 6/17/11 New York Times inquiry on Shale Gas](#)

The continuing discussion regarding estimates of technically recoverable shale gas resources among Energy Information Administration (EIA) staff at all levels is a part of a healthy analytical process that considers both the shorter term dynamic of the industry and the longer term implications. Ultimately, senior analysts and managers in EIA's Office of Energy Analysis decide how to characterize technically recoverable resources for EIA's *Annual Energy Outlook* (AEO) Reference case. Recognizing that the characterization of shale gas resources is both uncertain and important, the AEO2011 features a prominent *Issues in Focus* discussion of cases with both lower and higher availability of shale gas than in the Reference case, as discussed in the body of this response.

While resource estimates will continue to be updated as new information become available, experience suggests that EIA has been more likely to understate rather than overstate the contribution of unconventional oil and natural gas resources in recent AEO Reference cases.

Annual Energy Outlook

Every year, EIA develops the AEO based on the best available data regarding energy resources, supply technologies, consumption determinants, and prices. As part of this AEO effort, EIA uses a variety of public sources to develop data used in EIA energy models, for example, shale gas well production profiles, costs, and resources by shale formation. These data sources include, but are not limited to, the following sources:

- HPDI for individual well production data
- Lippman Consulting for shale gas production by shale formation
- INTEK, Inc. which collected publicly available shale gas well production profiles and well costs. INTEK also developed shale gas resource estimates for specific shale gas formations that currently under development (e.g., Barnett, Haynesville, Marcellus), based on both estimated shale gas well recovery rates (derived from well production profiles) and shale formation acreage.
- U.S. Geological Survey for resource estimates regarding shale formations that are not currently under development and for which there is no well drilling, production, or cost history
- Oil and gas company presentations that provide shale gas well production profiles and costs, and
- Press reports on company acreage, acreage costs, well production profiles and costs.

The assumptions regarding shale gas resources currently being used as the basis of EIA's Reference case projections are consistent with estimates of technically recoverable resources from a wide range of academic and industry experts. EIA uses contractors to supply critical expertise in resource assessment for regions and resource categories where development activities undertaken since the last available resource assessments by government agencies have added significant new knowledge about resources. This longstanding EIA practice has been applied for resources other than shale gas, including tight sands gas, shale oil, and enhanced oil recovery. EIA's procurement of contractors for this and other purposes conforms with all applicable federal rules and policies.

EIA's development of the projections and alternative cases for the AEO are documented and made available within the AEO itself, a paper outlining key assumptions¹ and the model documentation.² In

¹ Available on the EIA website at http://www.eia.gov/oiaf/aeo/assumption/oil_gas.html

² Available on the EIA website at <http://www.eia.gov/analysis/model-documentation.cfm>

addition, the process that we used to develop the underlying model structure itself is, and remains, an open process as documented on our website.³

The AEO oil and gas supply models undergo continuous modification and improvement based on new information regarding drilling and production technologies, and the ability and cost of developing oil and gas resources using those technologies. The resource recovery and cost of recovery associated with a specific well cannot be fully ascertained until that well is plugged and abandoned.

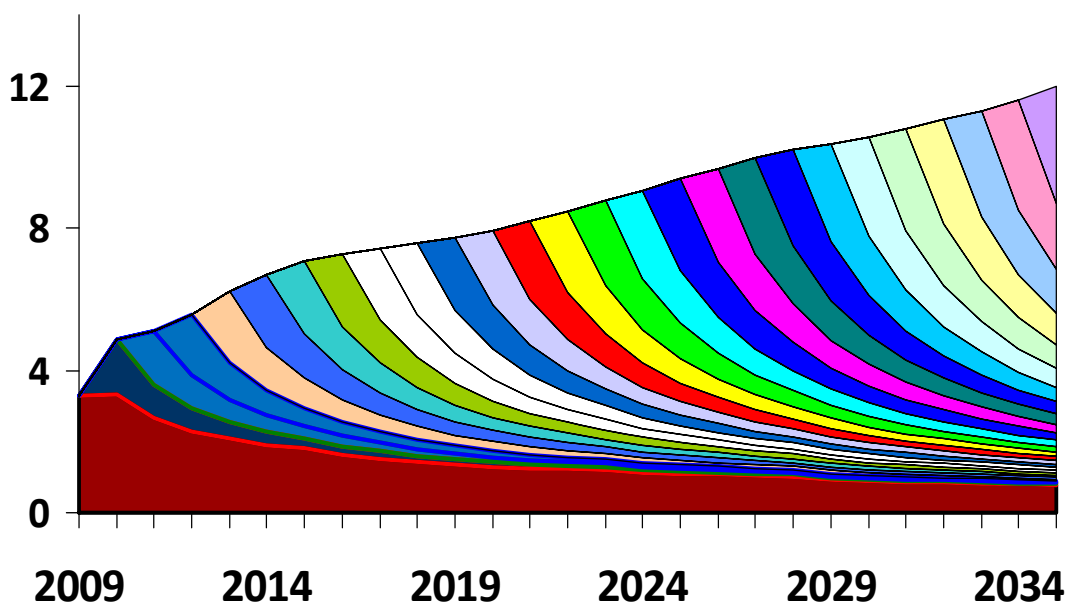
The *Annual Energy Outlook 2011* (AEO2011) acknowledges this uncertainty surrounding shale gas resources and the cost of developing them in the AEO2011 Issues in Focus analysis entitled: "Prospects for Shale Gas."⁴ We invite your attention to that section, which was developed in order to understand those issues. That analysis notes that "there is a high degree of uncertainty around the (AEO2011 reference case) projection, starting with the estimated size of the technically recoverable shale gas resource. Estimates of technically recoverable shale gas are certain to change over time as new information is gained through drilling and production, and through development of shale gas recovery technology." The article then delineates 5 specific uncertainties associated with shale gas resources and costs. The analysis goes on to discuss 4 alternate case projections, which double and halve the resource base and the shale gas production cost per well. The variation in alternate case assumptions is consistent with the degree of resource variability shown in USGS shale gas resource assessments. Across the 4 alternate shale gas cases, considerable variation is projected in domestic shale gas and total natural gas production, natural gas imports, natural gas prices, and natural gas consumption.

One issue that is directly incorporated into EIA's modeling is the steep declines in production from shale gas wells. EIA assesses the current and potential future decline curves for shale gas and other natural gas production by reviewing the well-level data available from HPDI as well as other sources. An aggregate representation of how shale gas decline curves impact shale gas production is shown in Figure 1. The figure shows the model result of how the relatively large first-year declines of wells drilled, combined with the decline in production from the all other wells in production results in an increasing amount of gas that must be replaced each year before further growth can be achieved. Our analysis and modeling shows, given all the information gathered and reviewed to date, that such production can be achieved within the time frame of the projection.

³ Available on the EIA website at http://www.eia.gov/oiaf/emdworkshop/model_development.html in the section describing the development of the Onshore Lower 48 Oil and Gas Supply Submodule (OLOGSS)

⁴ Available on the EIA website at http://www.eia.gov/forecasts/aeo/IF_all.cfm#prospectshale

Figure 1. Projection of U.S. Shale Gas Production by Vintage



International Shale Gas Resource Assessment

EIA's recent report, *World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States*, was developed to explore the issue of whether other countries have geological opportunities similar to the United States to develop shale gas. The report is intended to be a starting point in addressing that question. Above ground issues were not considered within the report. During the development of the report, bi-weekly conference calls were held with other offices within DOE as well as other government agencies to review and comment on draft chapters as they were developed by the contractor. We believe that the report stands on its own merits as we required the contractor to fully document all work and to clearly describe the methodology that was employed to produce the estimates. We welcome any substantive comments on the technical merits of the report.

The Shale Gas Industry: Short Term

There have been numerous discussions within EIA about whether the major production increases over the past several years are sustainable from an economic perspective. Included in these discussions are debates about lease costs, the costs of production, the decline rates and ultimately recoverable resources from shale wells, the price of natural gas, the price of natural gas liquids, and the price of crude oil.

Notwithstanding the sharp decline in natural gas prices since mid-2008, there are a number of factors that have prevented a significant slowdown in production growth up to the present time, some of which are likely to continue:

- Some producers have been active hedgers and, therefore, may not immediately respond to price declines with reduced production. Companies can continue to lock in prices that may limit their profit potential if prices rise quickly but also shield them from further declines that would make their short term business plans untenable.
- Lease terms often stipulate that production must begin within a number of years or the lease becomes void. Producers who purchased leases are sometimes motivated to drill in order to secure the lease for the future. According to trade press reports, this behavior has been a factor over the past year, particularly in the Haynesville shale. There are indications that this type of drilling is winding down as producers secure their leases.
- The major price differential between natural gas, natural gas liquids (ethane, butane, propane, etc), and crude oil means that a low natural gas price can be overcome by drilling in “wet” plays – areas such as parts of the Eagle Ford and Marcellus shales with high liquid or crude oil content. Some analysts estimate that natural gas in these plays can be sold at low prices while still maintaining a profitable well because of the high price of those liquids.
- Joint ventures from international partners have provided major infusions of cash to companies in the United States and Canada. These partners, who could be interested in expanding the use of new drilling technology overseas at some point in the future, may focus on gaining technical experience and technology associated with shale drilling in addition to the value of hydrocarbon production.