



U.S. Haynesville Shale Gas Production

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In this article, we provide an update on the fortunes of the U.S. Haynesville shale region, which is amongst the top four natural gas production areas in the U.S., as shown in Figure 1 on the next page. The Haynesville Formation is in northwest Louisiana and eastern Texas.

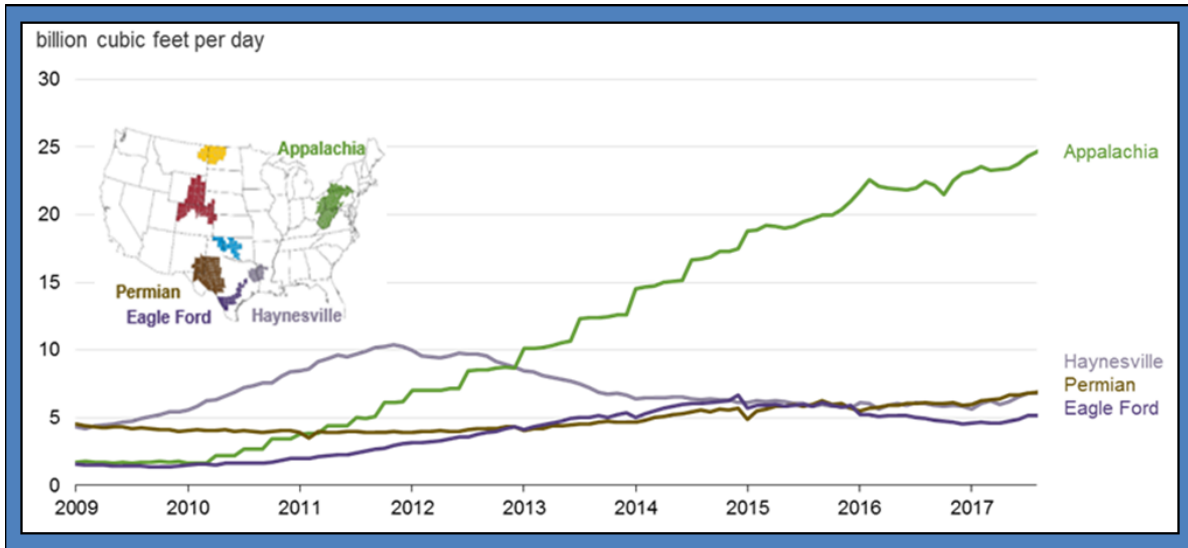


Mr. Faouzi Aloulou of the EIA, addressing members of the Energy Equipment and Infrastructure Alliance, in Washington, DC on September 20, 2016 regarding the response of U.S. shale gas and tight oil production to both changes in prices and the completion of drilled-but-uncompleted (DUC) wells. Ms. Danya Murali of the EIA, who assisted with this article, is in the center of the photo.

Recent increases in drilling activity and well production rates are raising natural gas production levels in the Haynesville region, according to EIA (2017a), and as shown in Figure 2 on the next page. Marketed natural gas production in Haynesville reached 6.9 billion cubic feet per day (Bcf/d) in September after remaining near 6.0 Bcf/d for the previous three years. The recent growth in Haynesville natural gas production is attributable to an increase in the number of active drilling rigs (starting late in 2016) and a trend toward higher per-well initial production rates.

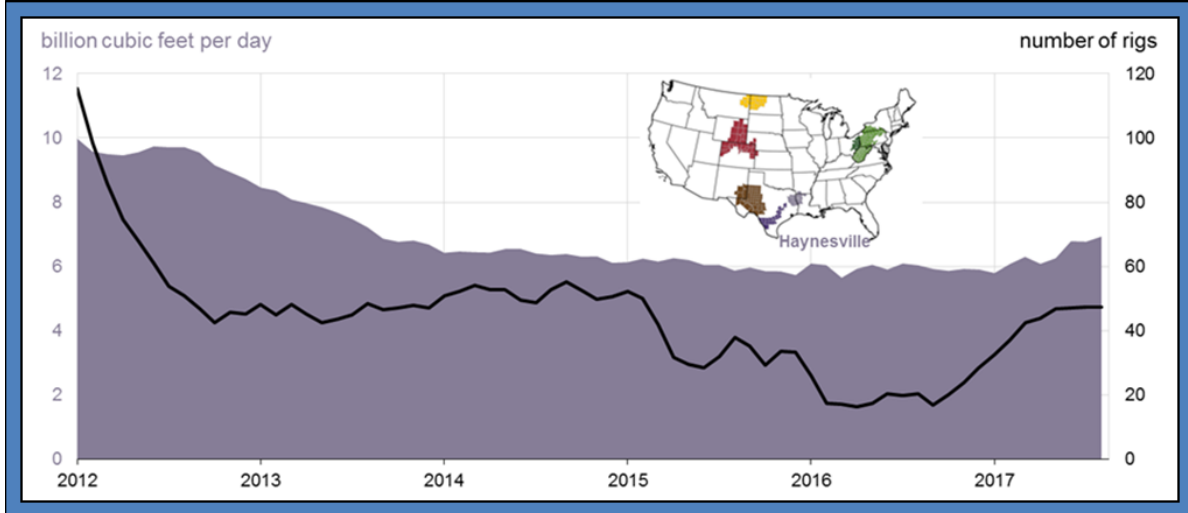


Figure 1
Marketed Natural Gas Production in the Top 4 U.S. Production Regions



Source: U.S. Energy Information Administration (2017a).

Figure 2
Haynesville Marketed Natural Gas Production and Active Rig Count (January 2012 – August 2017)



Sources: U.S. Energy Information Administration (2017a) and Baker Hughes.

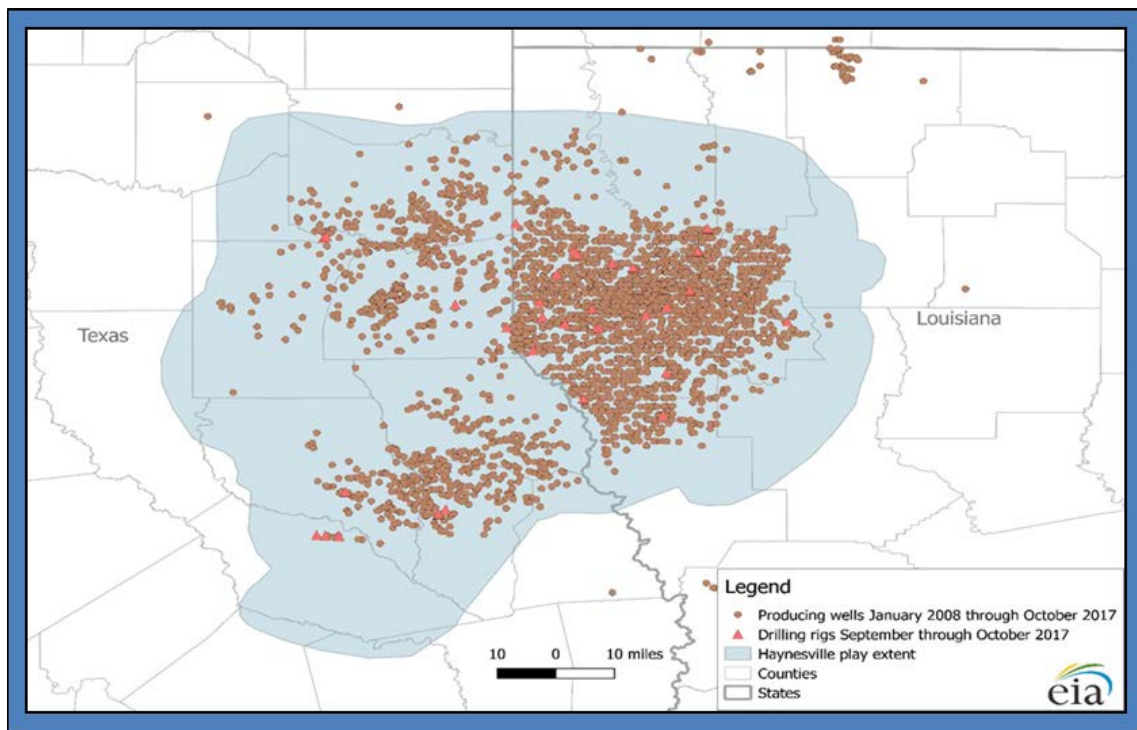
In USGS (2017), the United States Geological Survey estimates that the Haynesville shale play holds 174.6 trillion cubic feet of technically recoverable shale gas resources, the second-largest level in the United States after the Appalachia region. Compared with Appalachian resources, Haynesville natural gas reservoirs are farther underground. Most Haynesville producing wells are in areas where the formations have depths ranging from 10,000 feet to 14,000 feet below sea level. In the Appalachian



region, wells are in areas where formations are 2,000 feet to 12,000 feet below sea level. Haynesville shale formation thickness is also slightly narrower, ranging from 100 feet to 350 feet, compared with Appalachia, where shale thickness ranges from 50 feet to 400 feet.

From 2009 to 2012, the Haynesville region was the largest shale gas-producing region in the country. In November 2011, Haynesville regional production reached a record high of 10.4 Bcf/d. In early 2013, however, as natural gas prices started to decrease, natural gas production in the Haynesville region was surpassed by production in the Appalachian region, which includes the Marcellus and Utica formations. By late 2015, shale gas production from relatively liquids-rich areas such as the Eagle Ford region in Texas and the Permian region, which spans parts of western Texas and eastern New Mexico, also started to surpass production from the Haynesville region, which is mapped in Figure 3.

Figure 3
Haynesville Shale Play Producing Wells and Drilling Rigs through October 2017



Source: U.S. Energy Information Administration based on data from Drillinginfo.

Drilling operators in the region have increased the lateral length of horizontal wells beyond 7,000 feet, added more fracturing stages, and significantly increased the quantity of proppant used in completion activities. In combination, these technological improvements have led to a rebound in shale gas production to the highest levels for the region since the end of 2013.



Endnote and Acknowledgement

This article is based on EIA (2017b).

The author gratefully acknowledges the contributions of Ms. Danya Murali of the EIA to this article.

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Author Biography

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Faouzi Aloulou is a Senior Industry Economist at the Energy Information Administration (EIA) of the U.S. Department of Energy in Washington, DC. Since 2010 he has been the Project Manager of EIA's Global Shale Resources and Activities' research effort, for which he regularly authors analytical reports on shale gas and tight oil in the U.S. and the rest of the world. Mr. Aloulou initiated the monthly EIA Energy Forecasting Forum in 2002, an activity he still is responsible for organizing. Additionally, from 2014 to 2016, he was the Project Manager of EIA's Global Hydrocarbon Supply Model.

Prior to the EIA's re-organization in 2010, Mr. Aloulou was the EIA China and Middle East expert, monitoring the two regions' energy resources, supply and consumption patterns, trade, technology use and investment strategies, information provided to the World Energy Projections System (WEPS), the EIA's international energy model. In this capacity, Mr. Aloulou took the initiative to have the EIA's *International Energy Outlook* translated into Chinese and Arabic. In the period, June 2007 to June 2008, Mr. Aloulou was seconded from the U.S. Department of Energy to the Riyadh-based International Energy Forum (IEF) where he developed the early prototypes of country surveys used to extend the Joint Oil Data Initiative (JODI) to natural gas. He also compiled and edited the IEF book, *From Confrontation to Dialogue*, which was released at the Third Summit of OPEC Heads of State on November 13, 2007.

Prior to joining the EIA in 2001, he was a Research Associate at Cambridge Energy Research Associates (CERA), Massachusetts, where he worked with the CERA Refined Products team that produced the quarterly *World Refined Products Watch*. While at CERA he authored reports on the taxation of petroleum products, corporate strategies of the national oil companies, and Japan's activities in the Middle East oil and gas sectors. Mr. Aloulou interviewed the Prime Minister and the Finance Minister of Malaysia for the 1998 CERA book co-authored by Daniel Yergin and Joseph Stanislaw: *The Commanding Heights: The Battle between Government and the Marketplace That Is Remaking the Modern World*. Mr. Aloulou subsequently served as Energy Advisor at the Prime Minister's Department in Malaysia and reviewed Malaysia's investment programs and energy policies (Vision 2020) as well as working as an independent energy group consultant in Singapore.

Mr. Aloulou has a Bachelor of Arts from University of California at Berkeley and a Master's in Public Administration from the Kennedy School of Government at Harvard University. His thesis, "The European Commission Proposal on Carbon/Energy Tax and the OPEC Response," was nominated for the Kennedy School's Don K. Price award. He was granted a fellowship at the Harvard Business School where he continued his research on pricing options and derivatives for tradable permit schemes as an alternative to energy taxation while assisting in teaching courses on negotiation analysis, leadership and authority at Harvard's Kennedy School of Government.