Natural Gas Production Report

July to September 2022

Q3

This report uses data reported to the Pennsylvania Department of Environmental Protection (DEP) by natural gas operators to compute statewide totals for production volume and well counts. These data are presented on a quarterly basis to show recent trends in natural gas activity in the Commonwealth. Production volume and well count data pertain only to gas produced from unconventional sources (e.g., shale) and data used by this report focus on horizontal wells, which comprise over 99% of total production in Pennsylvania. The report also includes (1) county-level production and well count comparisons, (2) state production comparisons from the U.S. Energy Information Administration (EIA) and (3) natural gas hub price trends from Bentek Energy.

Production Volume and New Wells Spud

Recent data from DEP show that natural gas production volume from horizontal wells was 1,878 billion cubic feet (bcf) in the third quarter of 2022 (see **Table 1**). This output represents a 0.8% decrease from the third quarter of 2021, the third consecutive quarter in which production did not increase year-over-year. It also represents the strongest year-over-year decline in quarterly production since monthly production data have been published (2015).

There were 158 new horizontal wells spud in the third quarter of 2022. This figure represents an increase of 47 wells (42.3%) compared to the same period in the prior year. This uptick in drilling was likely in response to the dramatic increase in prices in late summer. Preliminary data for the fourth quarter show that the number of wells spud in October and November is down 13.6% from the same period in 2021.

Table 1: Production Volume and New Wells Spud

	2021			2022		
	Q2	Q3	Q4	Q1	Q2	Q3
Production Volume	1,852	1,892	1,956	1,852	1,852	1,878
Growth Rate	7.8%	7.2%	7.1%	-0.6%	0.0%	-0.8%
New Wells Spud	120	111	154	147	133	158
Growth Rate	6.2%	0.0%	55.6%	10.5%	10.8%	42.3%

Note: Growth rates are year-over-year. Production in billion cubic feet. All data exclude vertical wells, which account for less than one percent of production.

Figure 1 displays year-over-year growth rates for horizontal well production over the last 16 quarters. Annual growth in quarterly production fell to the lowest rate on record in the third quarter.

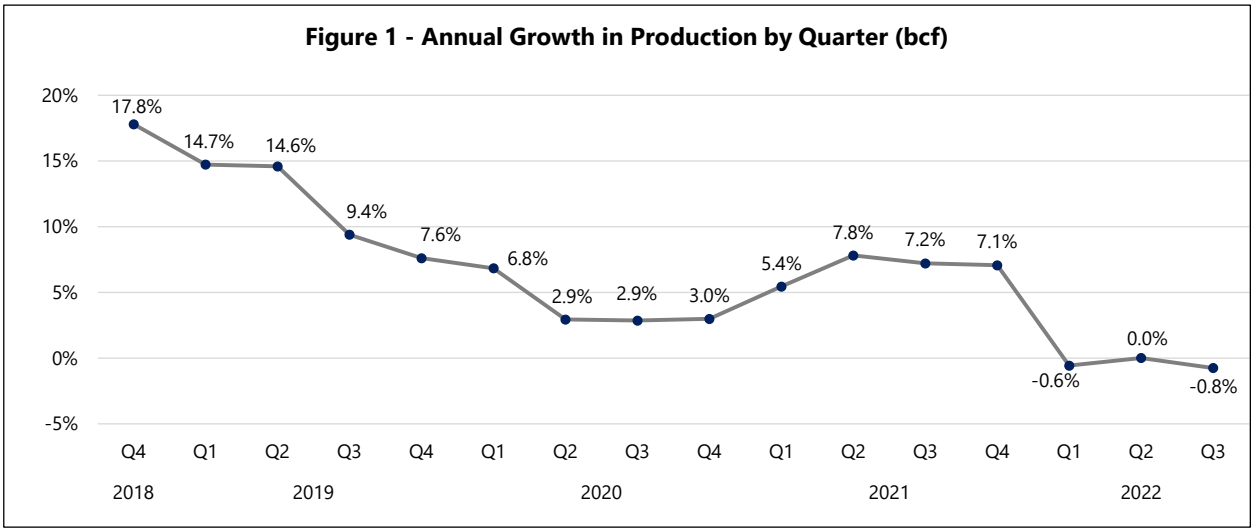
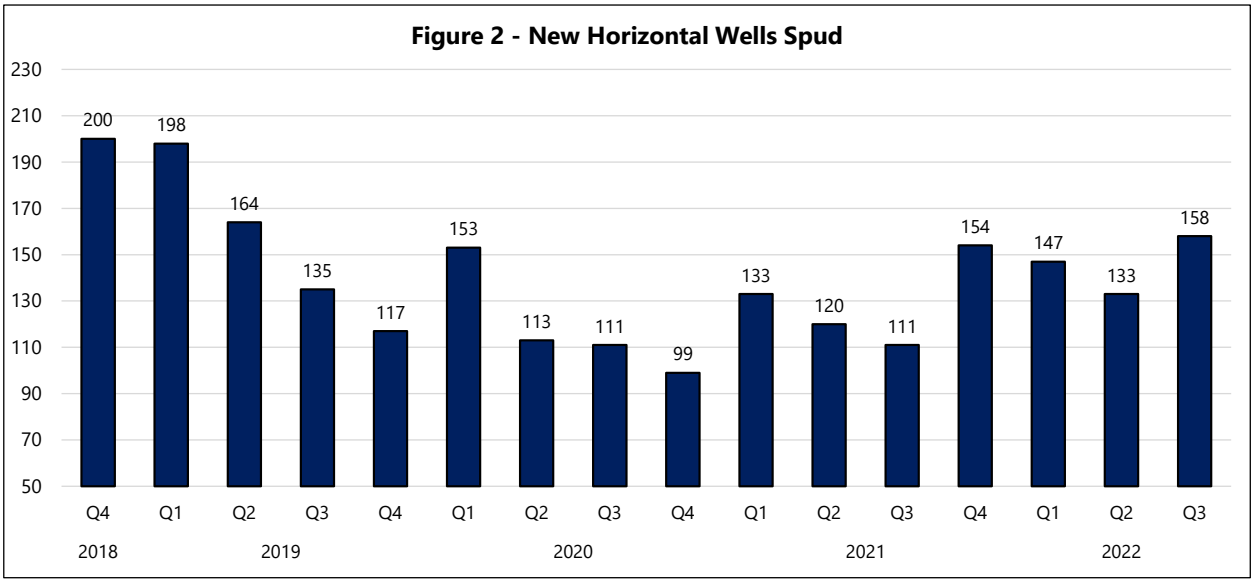


Figure 2 shows the quarterly number of new horizontal wells spud over the last 16 quarters. The number of new horizontal wells spud in the third quarter of 2022 was the highest quarterly spud count since the second quarter of 2019.



Well Count Trends

Table 2 displays the number of producing wells over the last six quarters. There were 11,119 total producing wells in the third quarter of 2022, an increase of 4.1% from the prior year. Horizontal producing wells, which account for over 99% of production, increased by 4.4%.

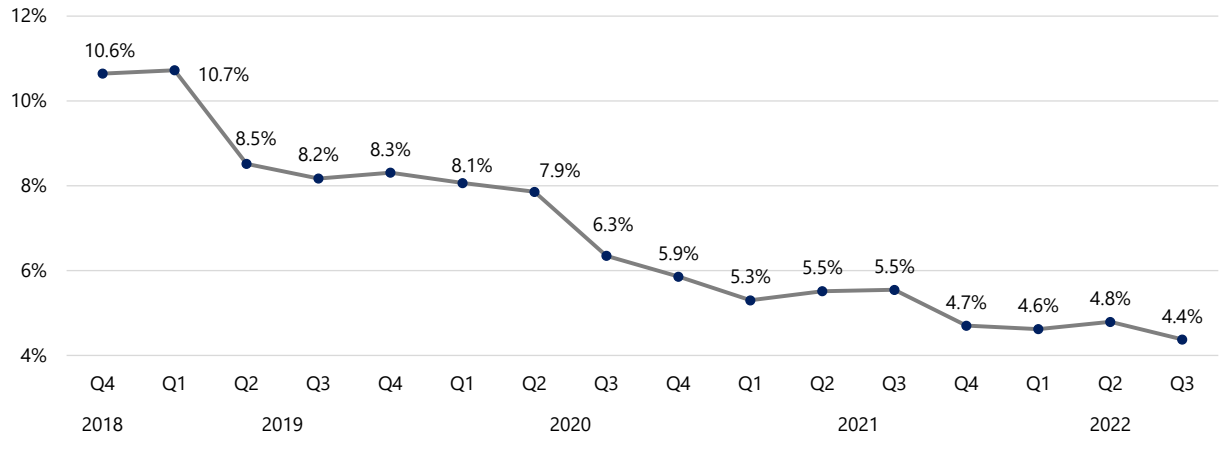
Table 2: Quarterly Producing Well Count

	2021			2022		
	Q2	Q3	Q4	Q1	Q2	Q3
Horizontal	10,123	10,238	10,334	10,436	10,608	10,686
Growth Rate	5.5%	5.5%	4.7%	4.6%	4.8%	4.4%
Total	10,582	10,684	10,779	10,875	11,047	11,119
Growth Rate	5.1%	5.1%	4.3%	4.1%	4.4%	4.1%

Note: Growth rates are year-over-year. Vertical wells are not shown separately, as they account for less than one percent of production.

Figure 3 shows the year-over-year growth in the number of horizontal producing wells over the last 16 quarters. Growth in producing wells fell to its lowest rate since data have been published (2015). Decelerating or flat growth in producing wells is due to less drilling activity in 2020 and 2021 and older wells that were shut in or plugged. The uptick in drilling in 2022 should lead to stronger growth in producing wells.

Figure 3 - Annual Growth in Producing Well Counts by Quarter



County and State Comparison

Table 3 shows county-level production volume and producing wells through the third quarter of 2022 and 2021. Ranked in order of production, the table shows (1) the top five counties, (2) the next five counties combined into one group and (3) remaining counties as another group. The top five counties accounted for 74.6% of production and 67.0% of producing wells statewide. Three of the top five producing counties (Susquehanna, Greene and Lycoming) recorded a year-over-year decline in production volume. Some smaller production counties (not shown separately) recorded strong production gains, such as Westmoreland (+91.3%), Sullivan (32.7%) and Armstrong (+31.7%).

Table 3: County Production Comparison

		Production Volume				Producing Wells			
		Year-to-Date		2022 Metrics		Year-to-Date		2022 Metrics	
Rank	County	2021	2022	Share	Growth	2021	2022	Share	Growth
1	Susquehanna	1,197	1,169	20.9%	-2.3%	1,681	1,778	16.4%	5.8%
2	Washington	1,031	1,009	18.1%	-2.1%	1,794	1,853	17.1%	3.3%
3	Bradford	846	849	15.2%	0.3%	1,395	1,432	13.2%	2.7%
4	Greene	804	816	14.6%	1.4%	1,209	1,274	11.7%	5.4%
5	Lycoming	367	324	5.8%	-11.8%	917	929	8.6%	1.3%
6-10	Next 5 Counties	933	927	16.6%	-0.7%	1,868	1,959	18.1%	4.9%
	All Other	429	489	8.8%	14.1%	1,509	1,622	15.0%	7.5%

Note: Horizontal wells only. Production in billion cubic feet. Next 5 Counties includes Wyoming, Tioga, Butler, Allegheny and Armstrong Counties.

Table 4 provides a state comparison of gross natural gas production from all well types. Ranked in order of production, the table shows (1) the top five states, (2) the next five states combined into one group and (3) remaining states combined into one group. These data show that after relatively strong production growth compared to other major producing states in CY 2021, Pennsylvania is the only major producing state to record negative annual growth through September 2022.

Table 4: State Production Comparison

		Production Volume			Annual Growth Rate		
Rank	State	CY 2020	CY 2021	CY 2022	CY 2020	CY 2021	CY 2022
1	Texas	10,410	10,669	8,371	-0.2%	2.5%	6.1%
2	Pennsylvania	7,148	7,627	5,637	3.6%	6.7%	-0.4%
3	Louisiana	3,212	3,436	2,946	-0.2%	7.0%	17.7%
4	Alaska	3,429	3,486	2,645	5.5%	1.7%	3.1%
5	West Virginia	2,592	2,760	2,158	20.3%	6.5%	5.4%
6-10	Next 5 States	10,522	10,386	7,983	-4.7%	-1.3%	3.5%
	All Other	3,300	3,302	2,438	-12.7%	0.1%	-1.0%

Source: U.S. Energy Information Administration. Production does not directly correspond to DEP data. Includes all production sources and well types. Production in billion cubic feet. Next 5 States includes Oklahoma, New Mexico, Ohio, Colorado and Wyoming. The growth rate for CY 2022 compares production through September.

Price Trends

Table 5 displays recent trends in natural gas spot prices for the Henry Hub and an average price for two major Pennsylvania hubs. Data for the third quarter of 2022 show that the Henry Hub price increased by 85.8% from the same period in 2021 and the average Pennsylvania hub price increased by 94.7%. The dramatic increase in prices was due to the combination of weaker-than-usual production growth and strong demand (domestic and international). Current forecasts project that prices will remain elevated in the short term due to global supply and demand pressures.

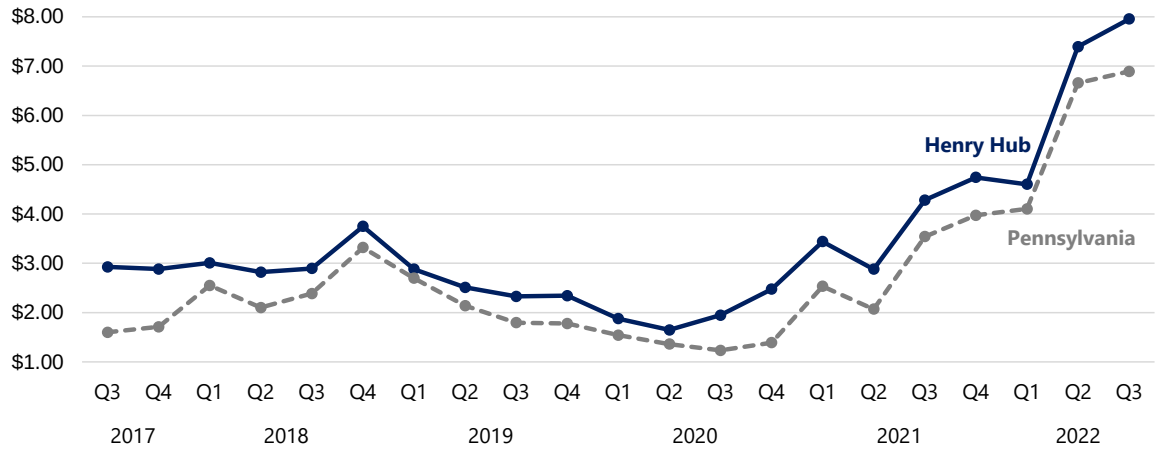
Table 5: Regional Spot Price Trends

	2021			2022		
	Q2	Q3	Q4	Q1	Q2	Q3
Henry Hub	$2.88	$4.28	$4.74	$4.60	$7.39	$7.96
Growth Rate	74.7%	120.1%	91.7%	33.8%	156.8%	85.8%
PA Average	$2.07	$3.54	$3.97	$4.10	$6.66	$6.89
Growth Rate	52.2%	187.1%	186.0%	62.1%	221.8%	94.7%

Source: Bentek Energy. Prices in $/MMBtu. The PA Average is a weighted average of the Dominion South and Transco Leidy trading hubs. The Henry Hub is located in Louisiana. Growth rates are year-over-year.

Figure 4 displays trends in the same prices over the last 21 quarters. The last time the Henry Hub price exceeded the level from the third quarter of 2022 was the third quarter of 2008.

Figure 4 - Regional Spot Price Trends ($/MMBtu)



Staff Acknowledgements

This report was produced by Jesse Bushman and Rachel Flaugh. Questions regarding this report can be directed to jbushman@ifo.state.pa.us.