

DIVERSIFIED
GAS & OIL

Diversified Energy:

A Business Model Built to Fail Appalachia

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 Ohio River
Valley Institute

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The Ohio River Valley Institute is an independent, nonprofit research and communications center founded in 2020. We equip the region's residents and decision-makers with the policy research and practical tools they need to advance long-term solutions to some of Appalachia's most significant challenges. Our work includes in-depth research, commentary, and analysis, delivered online, by email, and in-person to policy champions, emerging leaders, and a range of community partners.

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Glossary

Bbls or Bbls/day: barrels of oil

Bcf: one billion cubic feet of natural gas

BOE: barrel of oil equivalent (one barrel of oil = 6,000 Mcf)

BOED or BOE/day: barrel of oil equivalent per day

Btu: British thermal unit (a heat unit). The heat required to raise the temperature of a one-pound mass of water by one degree Fahrenheit.

CO₂e: Carbon dioxide equivalents.

Mbbbls: one thousand barrels of oil (1,000 barrels)

MMbbl: one million barrels of oil (1,000,000 barrels)

Mcf: one thousand cubic feet of natural gas

MCFD or Mcf/day: one thousand cubic feet of natural gas per day

MCFE or Mcfe: one thousand cubic feet of natural gas equivalent (one barrel of oil = 6,000 Mcf)

Tcf: one trillion cubic feet of natural gas

GHG: Greenhouse gas

Methane (CH₄): A potent greenhouse gas that is the largest constituent of natural gas. Methane's global warming potential is more than 80 times greater than carbon dioxide over 20 years.

Cfpd (cubic feet per day): A measure of gas production or leakage from a well

NRM: No reliable measurement. A possible response in a required well gas leakage report

I: Inaccessible. A possible response in a required well gas leakage report.

NA: Not applicable. A possible response in a required well gas leakage report.

PADEP: Pennsylvania Department of Environmental Protection

Psig: Pounds per square inch gauge. A measure of fluid pressure.

High-producing (or nonstripper) well: an oil or gas well producing more than 15 BOED (90 Mcfe/day).

Stripper well: an oil or gas well producing less than 15 BOED (90 MCfe/day), as defined by EIA/IRS.

Marginal well: an oil or gas well producing less than 10 BOED (60 MCFe/day), as defined by IOGCC.

Financially distressed well: an oil or gas well producing less than 5 BOED (30 MCFe/day), as defined by COGCC.

Uneconomic well: an oil or gas well producing less than 1 BOED (6 MCFe/day), as defined by COGCC. As defined by ORVI, a well producing *less than 0.2 BOED (1.2 Mcfe/day)*.

Active well: a currently producing well or a well used for storage or disposal

Inactive well: a well that has not produced oil or gas for one year

Abandoned well: an unplugged, inactive well

Orphaned Well: An unplugged well where the owner is insolvent or there is no owner of record. Orphaned wells, if they are plugged, are usually plugged by federal and state regulatory agencies.

Decommissioning: When a well reaches its end of producing life, operators are legally obligated to plug the well, remove surface equipment, and restore the wellsite to its original state. This is commonly referred to as plugging and abandoning a well, or "P&A".



Executive Summary

After more than 150 years of oil and gas drilling, the legacy costs associated with millions of unplugged oil and gas wells are mounting. Just recently, Congress approved \$4.7 billion to help states clean up over 130,000 documented orphaned wells that oil and gas companies failed to properly plug and decommission.¹ In addition, there are millions of oil and gas wells scattered across the country that will need to be closed and plugged.² Most of these wells are inactive or producing very little oil or gas. Cleaning up these wells could cost hundreds of billions of dollars, yet money currently available from energy companies would cover only a tiny fraction of these costs.³

In the past several years, Diversified Energy (“Diversified”) has become the largest owner of oil and gas wells in the country. Since 2018, it has been on an acquisition spree, primarily adding aging, low-producing conventional wells to its inventory.⁴ Nearly a third of its wells are more than 30 years old.⁵ By some measures, more than half of its well inventory is uneconomic.⁶ These low-producing wells are often called marginal, or stripper, wells.

Almost all of Diversified’s nearly 70,000 oil and gas wells are in Appalachia.⁷ Though Diversified is the largest well owner, it doesn’t produce much oil and gas. It is only the 15th largest producer in Appalachia.⁸ While almost all its wells are conventional wells, its unconventional, or shale, wells now account for roughly 40 percent of its production.⁹

As the owner of wells, Diversified is responsible for plugging and abandoning (P&A), or decommissioning, them. Its schedule for P&A is at least partially based on consent agreements Diversified has reached with the four Appalachian states with the most Diversified-owned wells: Pennsylvania, West Virginia, Kentucky, and Ohio. These state-level consent agreements require Diversified to P&A a combined total of roughly 80 wells per year for the next 15 years.¹⁰ After these consent agreements end, Diversified could have approximately 60,000 wells to P&A in Appalachia.¹¹

Diversified’s business model is based on harvesting cash flows from its wells and delaying P&A costs for as long as possible.¹² It prioritizes payments to its equity and debt investors. It will wait ten years before it funds a reserve account to partially cover its P&A costs. Over those ten years, Diversified will have repaid more than \$1.2 billion in debt and paid millions in dividends to shareholders.¹³ In the same vein, Diversified’s accounting practices are also partly based on using accounting tactics to delay P&A costs, allowing the company to put future costs on its books at the lowest value possible.

Both its business model and its accounting practices call into question the company's ability to fund its P&A obligations.¹⁴

The company puts forth a schedule to P&A its wells based on estimates for costs and timeframes that are well outside industry norms. In 2020, it estimated its P&A would cost \$25,000 per well on average, and then lowered this per-well cost by roughly ten percent the following year.¹⁵ Most industry estimates are at least twice as high. It estimates the economic lives of its wells will last through 2095, allowing it to delay its cleanup costs for decades.¹⁶ In 2020, Diversified estimated that production from its wells will decline at only 5 percent per year, compared with other natural gas producers' decline rates that are two to three times as high.¹⁷ In its full-year 2021 results, the company acknowledged its actual decline rate for the year was, in fact, 9 percent.¹⁸ In 2021, it estimated inflation rates on P&A would be only 2.5 percent per year and did not transparently break out its forecast for future P&A costs.¹⁹

The question is: Will Diversified have the funds to P&A all its wells? It is highly unlikely, based on an analysis by the Ohio River Valley Institute (ORVI), using a combination of Diversified's own assumptions and U.S. Energy Information Administration expectations for natural gas prices.²⁰ Simply put, P&A costs will be higher than the revenue generated by Diversified's current well inventory by 2056.

ORVI's analysis also reveals significant issues with how Diversified accounts for its future P&A costs.²¹ These P&A costs appear on the company's books as a liability, called an Asset Retirement Obligation (ARO). Diversified's accounting for its AROs is unusual and based on assumptions that are outside industry norms. For example, after it acquires wells, Diversified often revalues these ARO liabilities at a small fraction of what the prior owners had used. Other uncommon ARO practices include extending the weighted average timeframe to P&A its wells to 50 years.²²

Diversified has benefited from other accounting practices that other oil and gas producers have not used. These include the highly unusual Gain on Bargain Purchase (GoBP), which Diversified has used every year since 2014 to boost its profits without paying taxes.²³ After most of its acquisitions, it recognizes a "gain," which is added, tax free, to its net income.²⁴ No other companies in the sector, according to the authors' knowledge, have used this practice. Also unusual? Unlike other oil and gas producers, Diversified has not written off or impaired any of its assets over the past few years, even when gas prices were extremely low.

Diversified has also taken full advantage of the Marginal Well Tax Credit. This federal tax credit provides funds for qualified gas and oil wells when commodity prices are extremely low. These credits can be carried forward for 20 years. In 2020, the company claimed an \$80.4 million marginal well tax credit.²⁵ The company generated an additional \$85 million tax credit in 2021.²⁶ It can carry forward its unused \$183 million in federal tax credits through 2037-2041.²⁷

Even as Diversified has received federal tax credits for continuing to keep its marginal wells producing, albeit marginally, it appears to be skirting its obligations to report methane leakage from its wells.²⁸

Roughly 85 percent of Diversified's revenue comes from selling natural gas.²⁹ Methane (CH₄), the primary component of natural gas, is a potent greenhouse gas, more than 80 times as potent as carbon dioxide over a 20-year time horizon. Despite owning the most gas wells in the country, Diversified does not transparently report methane leaks from its wells as is required by Pennsylvania.³⁰

An analysis of more than 20,000 active wells in Pennsylvania acquired by Diversified Energy reveals a drop in company-reported methane emissions post-acquisition.³¹ Diversified has used a variety of tactics to avoid transparently reporting methane emissions on the wells it acquired and may be underreporting its actual emissions.

The analysis identified all the active wells ever owned by Diversified Energy in Pennsylvania and that have self-reported gas leakage between 2014 and 2020. Total reported natural gas leakages from these wells in 2014 was about 3 million cubic feet per day when 90% of these wells were owned by previous operators.³²

Reported leakage for the same wells in 2020 was about 140,000 cubic feet per day when 95% of these wells were owned by Diversified Energy.³³ That is about a 93% reduction in reported leakage related to ownership change. The analysis identified five tactics Diversified uses to obscure its actual emissions.

While it appears that other operators reduced their emissions substantially between 2014 and 2020, that reduction is a mirage: Diversified was acquiring many of the leaking wells from them and markedly decreasing reported emissions using those tactics.³⁴

Why does Diversified matter? The high concentration of low-producing wells in one company's portfolio—along with more than 100,000 additional stripper wells in the region—presents a risk that even more wells could become orphaned or wards of the state. If Diversified, or other companies that own stripper wells in the region, were to go out of business, states could be on the hook for billions in clean-up costs since operators are not required to set aside sufficient P&A costs upfront.³⁵

Compounding the problem are public policy realities which suggest the industry may have difficulty fulfilling its P&A obligations over the long term. The first is the ongoing energy transition. The US energy system, in the long run, is moving away from fossil fuels to cut greenhouse gases that are fueling climate change. Renewable energy sources have also become a competitive source of energy in the US electricity sector. If the US moves quickly to lower carbon emissions over the next few decades, gas production will likely decline rapidly, threatening the solvency of all oil and gas operators throughout the country. This could leave states—especially those in Appalachia—with thousands of additional orphan wells.³⁶

The second reality is that the current, short-term spike in the price of both oil and gas, while temporarily benefiting the oil and gas sector, will ultimately drive faster adoption of renewable energy sources, dampening demand for natural gas.³⁷

In conclusion, Appalachian states would be wise to accelerate well plugging requirements for all oil and gas operators and levy fees on oil and gas producers to ensure funding for cleanup. Otherwise, the region's landowners and taxpayers could be left with a massive bill for cleaning up the wells that Diversified leaves behind, as well as an ongoing discharge of climate-warming greenhouse gases.

Key Findings:

> 1/2

of Diversified's wells are more than 20 years old; nearly a third are more than 30 years old.³⁸

~60%

of Diversified's wells produce less than 1 barrel of oil equivalent per day (BOED), considered uneconomic or "inactive."³⁹

Diversified's shale wells make up 1% of well inventory, yet

35%

of production.⁴²

By 2056, Diversified's projected commodity revenue could be less than the cost to decommission its wells.⁴¹ This could leave states with 44,000 wells to P&A, costing about

\$2.2 billion.

Diversified's 75-year plan delays P&A for

80%

of its current well inventory until 2049 or later.⁴⁰

Diversified uses a variety of strategies to avoid accurately reporting methane leakage on 20,000 wells it acquired in PA.⁴⁶ The company is likely

obscuring much higher emissions

than it is reporting.⁴⁷

Diversified has likely

understated P&A costs

of its wells by billions of dollars.⁴⁴

Diversified's business strategy has been called a

legal Ponzi scheme.⁴³

With so few state regulators in Appalachia, it is unlikely that most Diversified wells will be adequately monitored. WV has just

9 inspectors

for over 115,000 documented wells.⁴⁸

If Diversified used industry norms to calculate its Asset Retirement Obligations (AROs), its AROs would jump from

\$525 million to \$2+ billion.⁴⁵



Introduction

Diversified Energy (“Diversified”) is the largest owner and producer of stripper wells in Appalachia. The company operates more than 64,000 wells in Appalachia, with nearly 63,000 in the states of Kentucky, Ohio, Pennsylvania, and West Virginia that make up the Ohio River Valley region.⁴⁹ This high concentration of low-producing wells in one company’s portfolio—along with the company’s trend of buying more wells each year—presents a significant orphan well risk to Ohio River Valley states. If Diversified Energy were to go out of business, states could be on the hook for billions in P&A costs since the operators are not required to set aside adequate funds for clean-up costs. The first section of the report provides an overview of Diversified and explores its well inventory. The second section identifies orphan well risks by examining Diversified Energy’s business model and financials, including an examination of its plan for decommissioning its wells. The third section of the report explores the risk of methane leakage from Diversified’s aging wells, examining how the company self-reports its methane leakage.



1.0 Overview of Diversified Energy

Headquartered in Birmingham, Alabama, Diversified Energy went public in 2017 and was listed on London's Alternative Investment Market. In 2021, it changed its name from Diversified Gas and Oil PLC to Diversified Energy Company PLC and moved to the London Stock Exchange, where it is now traded under the stock symbol DEC. Its founder and CEO, Robert ("Rusty") Hutson, is a native of West Virginia, where he purchased his first gas well in 2001.⁵⁰ Since that time, the company has acquired more than 69,000 wells, most of which are in Appalachia.⁵¹ Diversified is the largest well owner in the United States and in Appalachia.⁵² The company owns 43 percent of the stripper wells in the Ohio River Valley states of Kentucky, Ohio, Pennsylvania, and West Virginia.⁵³ On top of being the largest well owner, Diversified also owns more than 17,000 miles of pipelines and a network of compression stations and processing facilities. From 2017 to 2021, the company has expanded dramatically, growing from 80 to 1,300 employees, and the market value of the company has increased from \$75 million to nearly \$1 billion.⁵⁴ Altogether, Diversified holds over 8.6 million acres of leasehold, including 7.3 million in Appalachia.

Diversified is not in the business of drilling new wells. It has drilled only 150 wells since 2001.

It describes its strategy as "acquiring low-cost, long-life, low-decline" oil and gas wells that previous owners found uneconomic.⁵⁵ Over the last decade it has purchased thousands of wells, many from unconventional shale operators, including EQT Corporation and CNX Resources, and some from smaller conventional well operators such as Alliance Petroleum, EnerVest, Titan Energy and Eclipse Resources.⁵⁶ Since it went public, the company has spent over \$2 billion on acquisitions. Diversified is also beginning to acquire aging high-volume hydraulic fracturing (HVHF) wells in Appalachia and in other shale-producing regions, like the Haynesville basin in Louisiana and Texas. Some of Diversified Energy's largest investors are UK-based Aberdeen, M&G, and AXA and BlackRock.⁵⁷

1.1 Taxonomy of Diversified's Wells in Ohio River Valley States

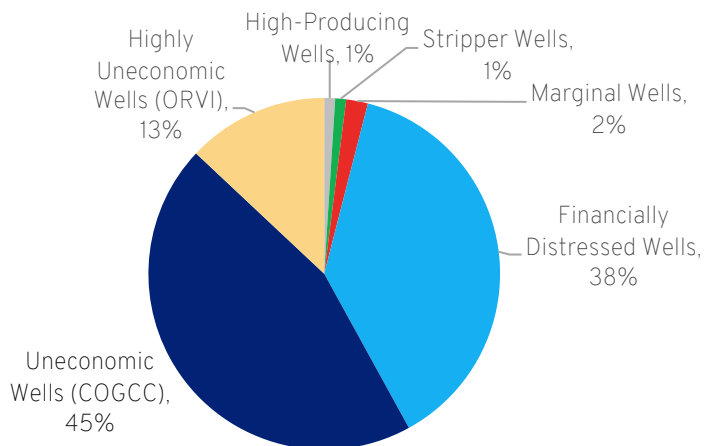
Production Thresholds of Producing Wells

Below are definitions of producing oil and gas wells by production thresholds from various agencies, including the US Energy Information Administration (EIA), Interstate Oil and Gas Compact Commission (IOGCC), Colorado Oil & Gas Conservation Commission (COGCC), and the Ohio River Valley Institute (ORVI).

- Above 15 BOED (above 90 Mcfe/day) is a **high-producing well** or nonstripper well.
- Under 15 BOED (90 Mcfe/day) is a **stripper well** as defined by EIA/IRS.
- Under 10 BOED (60 Mcfe/day) is a **marginal well** as defined by IOGCC.
- Under 5 BOED (30 Mcfe/day) is a **financially distressed well** as defined by COGCC.
- Under 1 BOED (6 Mcfe/day) is an **uneconomic well** as defined by COGCC.
- Under 0.2 BOED (1.2 Mcfe/day) is a highly **uneconomic well** as defined by ORVI.

Based on these definitions, 96 percent of Diversified's producing wells in the four-state region are financially distressed or uneconomic (Figure 1). More than half (58%) of Diversified's producing wells are uneconomic wells and could be classified as "inactive wells," according to Colorado Oil and Gas Conservation Commission standards.⁶⁰

Figure 1: Diversified Producing Wells by Production Thresholds



96 percent of Diversified's producing wells in Ohio, Pennsylvania, West Virginia, and Kentucky are financially distressed or uneconomic.

Source: US Energy Information Administration (EIA), Internal Revenue Service (IRS), Colorado Oil and Gas Conservation Commission (COGCC), and Ohio River Valley Institute (ORVI)

Note: Stripper wells accounted for 78% of US producing oil and gas wells but just 6.5% of total production in 2020. In the Ohio River Valley states of Kentucky, Ohio, Pennsylvania, and West Virginia, stripper wells accounted for 93% of producing oil and gas wells and just 2.6% of production in 2020. For purposes of this graph, well categories are exclusive of overlapping categories (e.g., stripper wells include 99% of all wells, marginal wells include 98% of all wells, and the same goes for the other categories).

1.2 Well Status and Age

According to the *TCF Upstream* database, Diversified owns approximately 62,900 wells in the four-state region. The great majority (85 percent, or 53,000) of Diversified's wells in the four states are active wells (producing wells or wells used for storage or disposal), while 12 percent are inactive (not producing for one year) or abandoned (unplugged). About 96 percent of Diversified's wells in the region are vertical wells, while horizontal wells make up about 3 percent of wells, and the remaining one percent are coalbed methane or other types of wells. A majority of Diversified's horizontal wells (63 percent) are in Kentucky, which are not high-volume unconventional shale gas wells like those found in Ohio, Pennsylvania, and West Virginia.

More than half of Diversified's producing wells are more than 20 years old, and nearly a third are more than 30 years old, according to our analysis based on the *TCF Upstream* database.

This database contains spud dates—or the date when drilling operations commence on a well—for 86 percent of the producing wells in Kentucky, Ohio, and Pennsylvania. The spud dates range from 1900 to 2021. Based on this universe of producing wells—which excludes West Virginia, non-producing wells, and wells with no spud dates—approximately 30 percent of Diversified's wells are more than 30 years old and 56 percent are more than 20 years old. Just around 2 percent are less than 10 years old. The average age of Diversified's wells is 28 years (spud date 1993), while the median age is 23 years (spud date 1998).

More than half of Diversified's producing wells are more than 20 years old. Nearly a third are more than 30 years old.

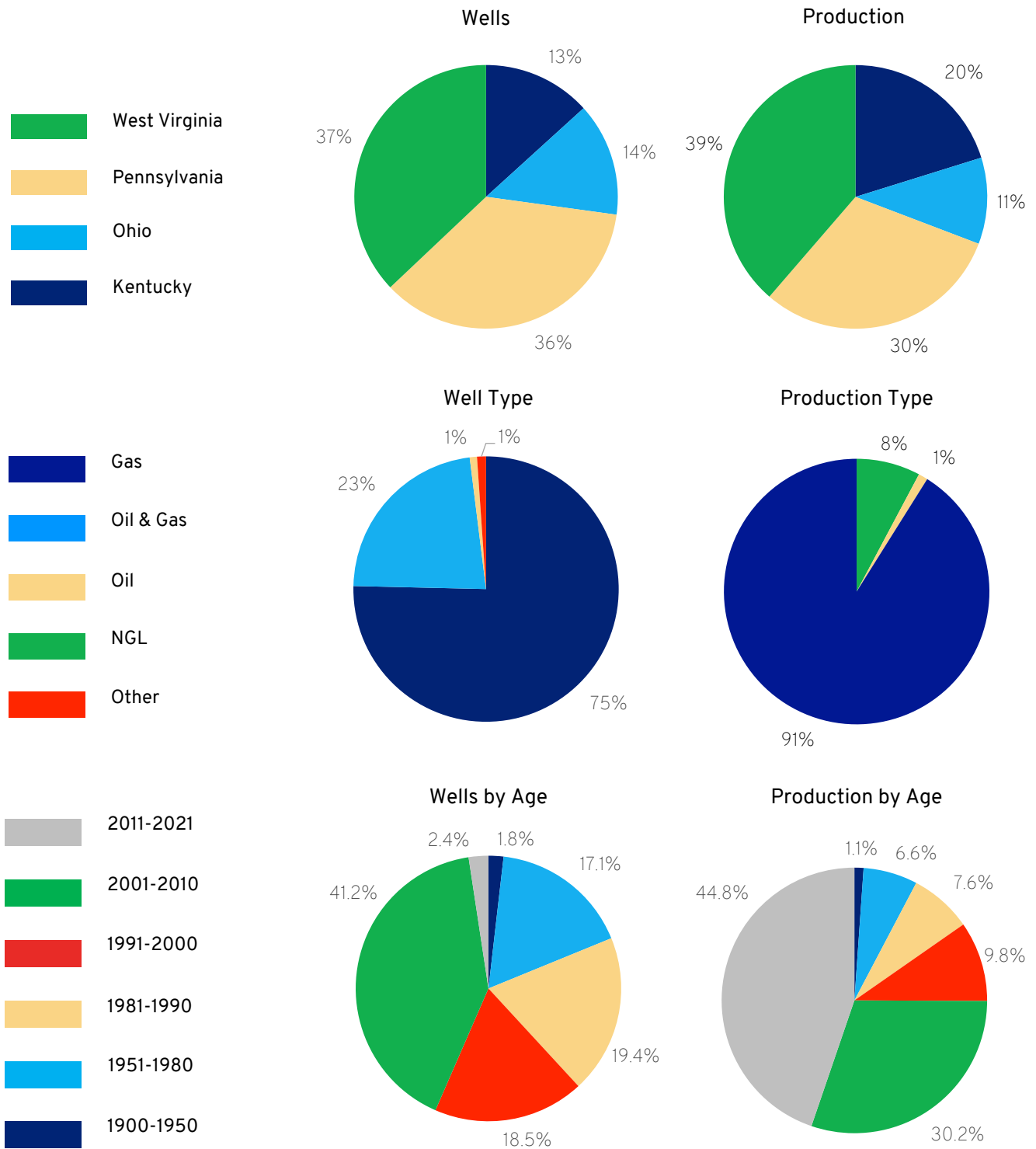
1.3 Production

Shifting to production, Diversified produces less than 2 percent of total oil and gas in Ohio, West Virginia, Pennsylvania, and Kentucky, but makes up 28 percent of producing wells in these states.⁵⁹ Figure 2 looks at Diversified's production in the four-state region in 2020 by several categories. In 2020, Diversified produced 238 billion cubic feet of gas equivalent in the four-state region. Of this amount, 39 percent was produced from West Virginia, 31 percent from Pennsylvania, 20 percent from Ohio, and 11 percent from Kentucky. In Kentucky, the company makes up 48 percent of producing wells and two-thirds of the state's oil and gas production.⁶⁰

About 99 percent of Diversified's production was gas (including natural gas liquids) in 2020, and just 1 percent was oil. Nearly all of its wells (96 percent) are conventional wells. But its unconventional, or shale wells, contribute nearly 40 percent of its total production. Diversified's horizontal wells, on average, produce about 22 times more gas per well than its vertical wells. While 96 percent of its wells are vertical conventional wells, vertical well production accounts for just 58 percent of total production. About 75 percent of Diversified's production comes from wells that are 20 years old or less.⁶¹

Stripper wells, which are wells producing less than 15 barrels of oil equivalent per day (BOED) or less than 90 Mcf per day of natural gas, make up 99 percent of Diversified's producing wells but just 65 percent of total production. Ultra-low-producing stripper wells—those producing less than 1 BOED (6,000 Mcf)—make up 57 percent of Diversified's well inventory but just 12 percent of the company's production. The company's nonstripper wells, those producing over 15 BOED, make up just 0.7 percent of their well inventory but comprise over 35 percent of total production. A large majority—86 percent—of Diversified's nonstripper well production is from horizontal shale wells. Diversified's highest producing wells, those producing between 100 and 1,600 BOED, are all horizontal wells and only one of the 106 is in Kentucky.⁶²

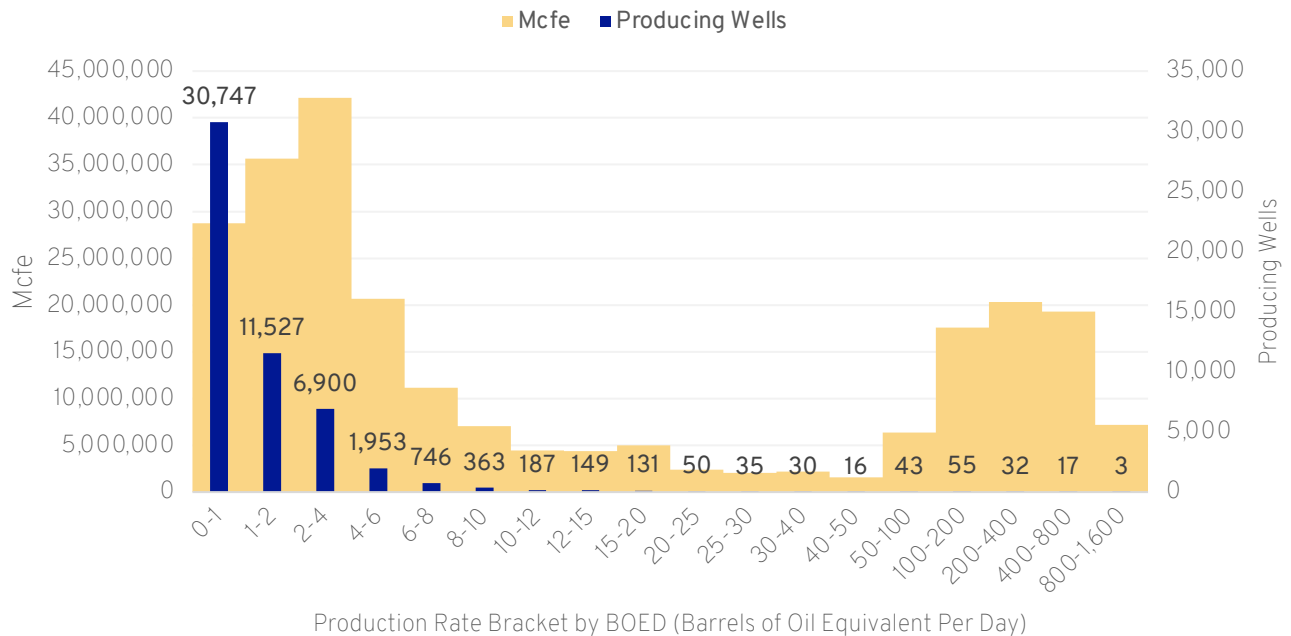
Figure 2: Percentage of Diversified Wells and Production by State, Type, and Age



Source: ORVI analysis of TCF Upstream database, Diversified Energy 2020 Annual Report.

For additional detail on Diversified’s wells by production status, configuration, and age, see Appendix I.

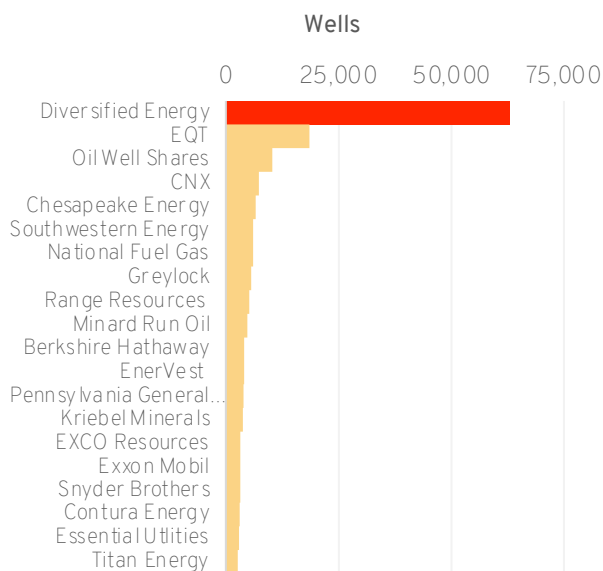
Figure 3: Distribution of Diversified Energy Wells by Production Rate and Total Production, 2020



Source: ORVI analysis of TCF Upstream database

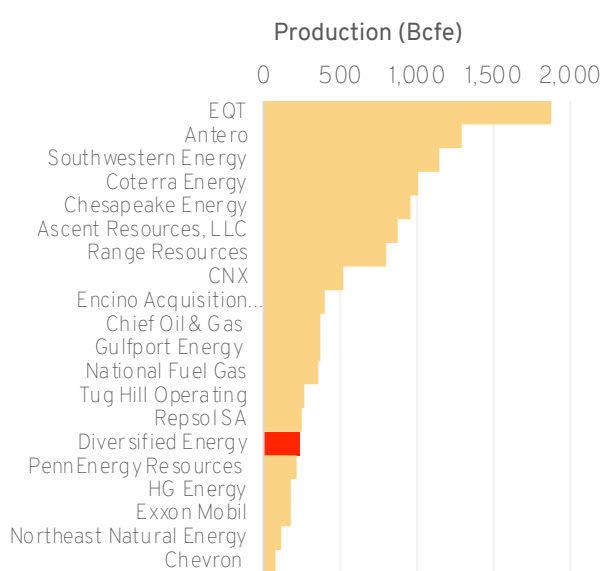
Diversified is by far the largest well owner in Kentucky, Ohio, Pennsylvania, and West Virginia, but not the largest producer. It owns 3.4 times as many wells as EQT, the second largest well owner in the region (Figure 4). In terms of production, Diversified is the 15th largest producer (Figure 5). The largest producer in the region is EQT, which produces 8.7 times more oil and gas than Diversified. On average, Diversified’s producing wells in the region produce 2 BOED compared to the four-state average of 25 BOED.

Figure 4: Top 20 Largest Well Owners in Ohio River Valley States



Source: ORVI analysis of TCF Upstream database

Figure 5: Top 20 Producers in Ohio River Valley States



Source: ORVI analysis of TCF Upstream database

1.4 Uneconomic Wells

For oil and gas producers, the decision to close a low-producing well hinges on a range of factors: a well’s production, current and projected commodity prices and operating costs, state and federal regulatory requirements, reputational risks, and more. Operators must decide whether it is more costly to P&A wells or leave them idled or shut-in. In practice, operators tend to delay well P&A for as long as possible. Even if a company is losing money operating a well, it often can lose even more money plugging a well and restoring the well site.

While state regulations require operators to eventually P&A their wells, states generally have very low or no minimum production thresholds to determine when a well should be decommissioned. In some cases, wells can be idled indefinitely, or they can be “false idled” and allowed to produce tiny amounts of gas or oil to avoid temporary abandonment or inactive status. State oil and gas divisions also tend to be short-staffed and hesitant to enforce state regulations that require wells to be P&A-ed at the end of their useful life. This is because the more stringent state regulators are, the more likely they could end up with additional orphaned wells as operators could be pushed into bankruptcy or forced to go out of business because they can’t afford to P&A their wells.

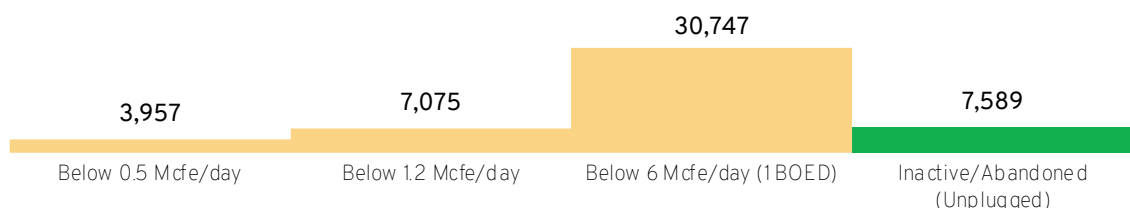
More than half of Diversified’s well inventory is considered inactive or uneconomic.

It can be difficult to determine when a low-producing stripper well has reached the end of its life. For example, in developing its definition of an “inactive well,” the Colorado Oil and Gas Conservation Commission (COGCC) determined that wells producing less than one barrel of oil equivalent per day (BOED) are “well below the threshold at which a well can continue to operate profitably” based on “the Commission’s experience and current and long-term oil prices.”⁶³ The COGCC also finds that a well producing 5 BOED or less is considered a low-producing well that is “financially distressed” because its operating cost is greater than the revenue it produces.⁶⁴

A 2021 study by Jeremy Weber and others on “identifying the end” found that conventional natural gas wells in Pennsylvania producing less than 0.5 Mcf (500 cubic feet) per day are “highly likely to be uneconomical even if gas prices rise considerably” and should “arguably be decommissioned.”⁶⁵ Based on this threshold, about 4,000 low-producing wells owned by Diversified in the four-state Ohio River Valley region are “uneconomic.” Using a slightly higher threshold of 0.9 Mcf per day based on Diversified’s 2020 base operating expenses, about 7,100 producing wells in the four states are highly uneconomic.⁶⁶ Using the larger production threshold of less than 1 BOED or 6 Mcfe per day as determined by the COGCC, approximately 31,000 of Diversified’s wells are uneconomic (Figure 6).

At what point inactive wells will need to be decommissioned varies, but most research and experience suggests that once a well has become inactive—either shut-in, abandoned, idled, or orphaned—it is rarely reactivated.⁶⁷ In addition to producing wells, Diversified also has about 7,600 wells that have been inactive for at least a year or abandoned (unplugged). Altogether, this means that more than half of Diversified’s well inventory could be considered inactive and uneconomic by the state of Colorado’s definitions.

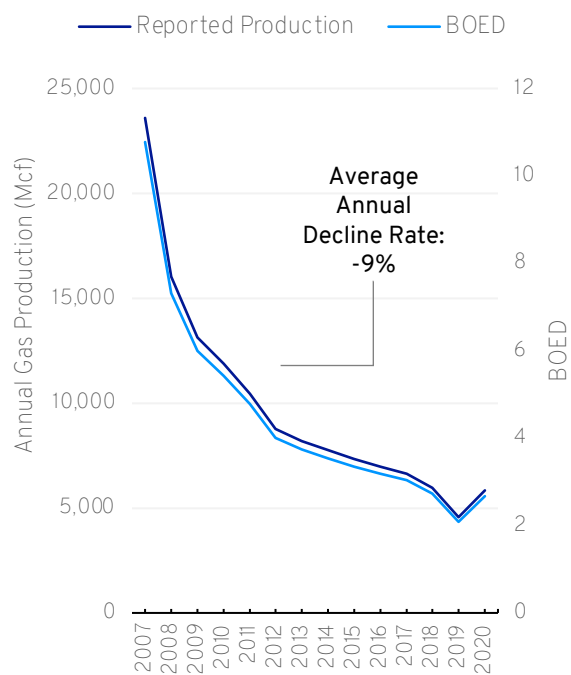
Figure 6: Estimated Uneconomic and Inactive Wells in Diversified’s Inventory, 2020



Source: ORVI analysis of TCF Upstream database



Figure 7: Annual Production of Diversified Well in Kanawha State Forest



Source: ORVI analysis of TCF Upstream database

Note: API# 47-039-05865, Spud Date: 12/3/2006

Purchased from Alliance Petroleum in 2019 by Diversified, the 14-year-old well pictured above is located near Charleston, West Virginia in Kanawha State Forest.⁶⁸ The well was previously owned by EQT from 2006 to 2017. It is a vertical conventional natural gas well that was drilled in December of 2006, and it began producing in January of 2007, according to state records. The well initially produced nearly 24,000 Mcf of natural gas, or 11 BOED, its first year of production but produced less than 6,000 Mcf in 2020. The average annual decline rate of the well is 9 percent (Figure 7). Despite being a low-producing stripper well, the well’s production rate in 2020 was higher than 80 percent of Diversified’s producing well inventory.

The 2020 production rate of the low-producing stripper well pictured at left exceeded 80 percent of Diversified’s producing well inventory.



2.0 Diversified's Business Model: Extended Decommissioning Schedules, Unusual Accounting Practices, Federal Tax Credits

Diversified Energy's business model has been based primarily on selling gas from aging conventional gas wells in Appalachia. Since 2015, it has built its business through an aggressive acquisition strategy, acquiring more than 40,000 wells just in 2018. Over the past few years, it has increasingly acquired unconventional wells, also known as high-volume hydraulic fracturing (HVHF) wells, sometimes called fracked wells or shale wells in Appalachia. In 2020, production from these unconventional wells in the Appalachian region has contributed nearly 40 percent of total production, though 96 percent of its wells are conventional, according to *The Capitol Forum* database.⁶⁹ (See Appendix 1 for more detail on Diversified's wells.) Over the past two years, its acquisitions have focused on other shale-producing regions beyond the Marcellus-Utica basins, such as the Haynesville and Barnett basins in Louisiana and Texas. Table 1, on the following page, lists the company's acquisitions since 2014.⁷⁰

Table 1: Diversified's Acquisitions, 2014-2021²

Diversified has spent about \$2 billion on acquisitions since 2017, financing its purchases with low-cost debt funding and issuing common stock.

Date	Seller/Acquired Entity	Well Count	Acquisition Price (USD, millions)
09/2014	Fund 1 DR Share Capital	-	4.3
05/2015	Broadstreet Energy	732	2.6
11/2015	Texas Keystone	1,709	0.725
04/2016	Eclipse Resources	1,300	4.8
06/2016	Seneca Resources	2,400	3.5
04/2017	Enervest	1,300	1.75
06/2017	Titan Energy	8,380	77.3
11/2017	NGO	550	3.1
03/2018	Alliance Petroleum	13,000	80.7
03/2018	CNX	11,000	89.2
06/2018	EQT	11,250	527
10/2018	Core Appalachia	5,000	90.6
04/2019	HG Energy II	107	400
09/2019	EdgeMarc Energy	15	50
05/2020	EQT	889	114.8
05/2020	Carbon Energy	6,100	122.9
05/2021	Indigo Minerals	780	135
05/2021	Blackbeard Operating	820	180
09/2021	Tanos Energy	390	154
09/2021	Tapstone Energy	660	218

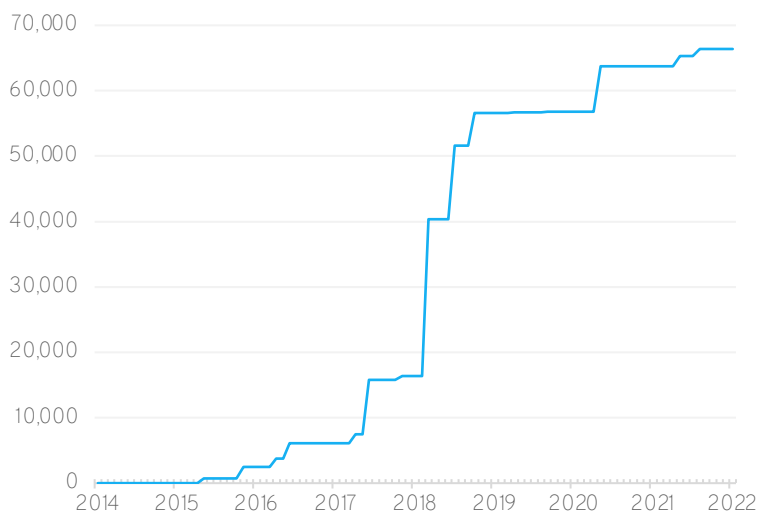
Source: The Capitol Forum

Diversified's acquisition strategy has been possible because sellers have been eager to divest their aging wells, especially wells that are leaking and will require higher P&A expenses, which also allows them to remove ARO liabilities related to these wells from their balance sheets. These ARO liabilities are often in the hundreds of millions of dollars—at least on the sellers' balance sheet. Diversified has frequently “revalued” these ARO liabilities post-acquisition. (See 2.5 for additional detail on Diversified's practice of reducing the ARO liabilities post-acquisition.)

Sellers have a variety of reasons for divesting legacy assets such as low-producing conventional wells. Some shale producers prefer to focus on what has become their core operation: drilling unconventional wells. Other sellers may be eager to shed the unpredictable costs of decommissioning thousands of wells.⁷¹ Others may want to strengthen their balance sheet by shedding ARO liabilities.

Diversified has spent roughly \$2 billion in acquisitions since 2017. To fund its numerous acquisitions, it has relied primarily on low-cost debt funding, thanks to the current low interest rate environment, and issuing common stock. Its long-term borrowing has increased more than ten-fold in five years, increasing from \$70.6 million in 2017 to \$951.5 million in 2021.⁷² Between 2018 and 2021, net proceeds from stock issuance were \$942.9 million. And it entered a partnership in October 2020 with Oaktree Capital Management (Oaktree) that allowed it to make additional acquisitions.

Figure 8: Number of Diversified Wells Over Time, 2014-2021



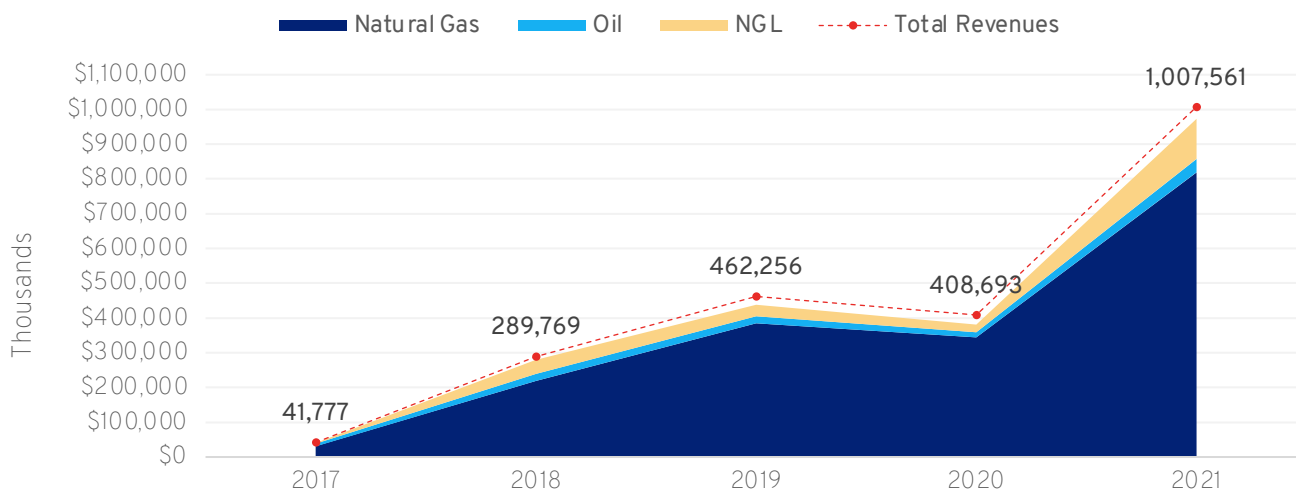
Through numerous acquisitions since 2017, Diversified has increased the number of wells it owns (Figure 8).

Source: ORVI analysis of Diversified Energy data

2.1 Annual Well Decline Rates Reduce Natural Gas Production and Ultimately Commodity Revenue

To fund its current and future operations, including decommissioning its wells, Diversified relies primarily on sales of natural gas it produces, or commodity revenue. Sales of its natural gas make up nearly all its commodity revenues. And revenues from commodities, which also include small amounts of oil and natural gas liquids (NGLs), make up nearly all the company’s total revenues. For example, in 2022, the company reported \$1.01 billion in total revenues for 2021, of which \$973 million (or 97 percent) were from commodity revenues, \$818.7 million (or 84 percent) of which were from natural gas. Figure 9 illustrates the company’s total revenues, and commodity revenue breakdowns among natural gas, oil and natural gas liquids from 2016 to 2021.

Figure 9: Diversified Energy Commodity Revenue by Source, 2017-2021



Source: ORVI analysis of Diversified Energy data

Since Diversified's primary revenue comes from natural gas sales, forecasting natural gas production is vital to its financial future. Unless it continues to raise outside capital from debt or equity, sale of natural gas is the primary way the company must fund current operations, debt repayment, dividends, and well decommissioning costs. Only a minimal amount, in performance bonds, estimated at less than \$13.2 million related to consent agreements with Pennsylvania, West Virginia, Ohio, and Kentucky, is currently set aside for cleanup costs in the future.

Forecasting commodity revenues from natural gas production is complicated for many reasons, primarily because production levels naturally decline, with conventional wells declining at a slower rate than unconventional wells. Decline rate estimates for conventional wells can vary from 7 percent to 54 percent, according to an Enverus analysis of decline rates among more than 40 E&Ps.⁷³

Diversified has only set aside a minimal amount, estimated at \$13.2 million, for future well cleanup costs. ORVI's model shows the full cost of decommissioning the company's wells could be much higher.

Diversified has increased its production decline rates over the past three years in its own financial filings. In 2019, the company references 5 percent decline rates in some reports and 6 percent in others.⁷⁴ In 2020, Diversified used 7 percent.⁷⁵ In various investor reports in 2021, Diversified included numerous decline rates assumptions, including 5 percent, 7 percent, 8.5 percent and 9 percent. (A 2020 analysis by financial advisory firm FLOW Partners suggests the decline rate of 37,000 Diversified wells was actually 19 percent. An analysis by *The Capitol Forum* in August 2020 found the decline rate of 54,000 Diversified wells to be 11 percent.)⁷⁸

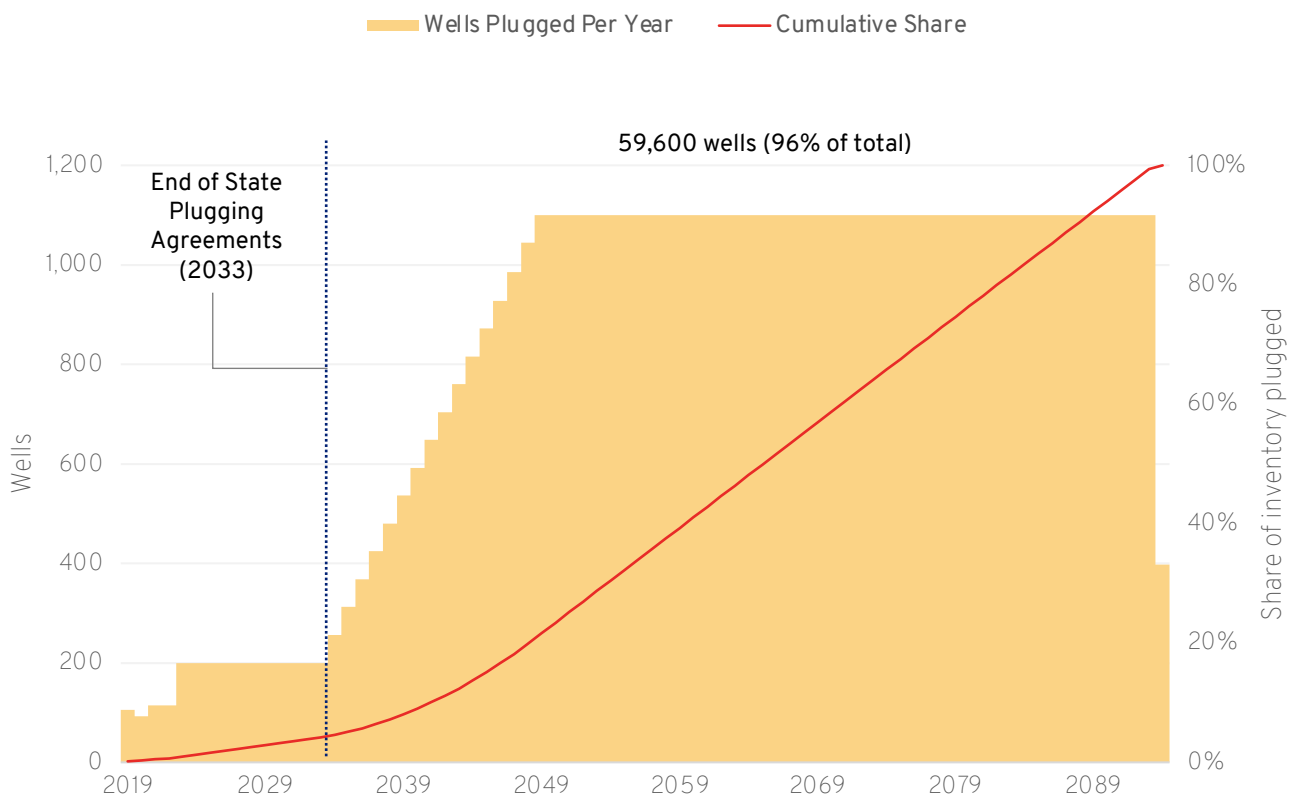
Diversified plans to decommission its estimated 69,000 wells (including those in Virginia and Tennessee) over 75 years, according to its financial reports.⁷⁹ In 2020, Diversified estimated that it will cost \$25,000 per well to decommission its inventory, and that inflation will increase by 2.5 percent per year from 2020 to 2094. By 2021, the company indicated it was reducing its P&A cost estimates even lower than the \$25,000 it used in 2020. The company noted it spent \$22,500 per well for the 136 wells it plugged in 2021. In 2021, the West Virginia Department of Environmental Protection (WVDEP) granted Diversified a variance to the state's well plugging rules that allowed them to plug some wells at a lower price by not removing metal casing. According to Diversified, this pilot program allowed the to use "new plugging techniques" to reduce the "time and cost of existing plugging processes."⁸¹

(For reference, average industry estimates for decommissioning costs are \$50,000.) Outside of bonding required by state-level consent orders, Diversified has not set aside any money to plug these wells. According to its latest financial documents, the company does not plan to pre-fund its AROs until at least 2030.

According to Diversified, it has decommissioned 105 wells in 2019, 92 in 2020, and 136 in 2021. It's unclear how many wells have been reactivated. Initially (2019), the company's plan was to decommission 80 wells per year over the first five years, 115 wells per year from years 6-15, increase gradually to 1,100 wells over the following 15 years and by 2049 begin P&A-ing 1,100 well per year until 2094. In a March 2022 investor presentation, Diversified says it has committed to P&A at least 200 wells per year beginning in 2023.⁸²

Figure 10, below, illustrates Diversified's scheduled plan to P&A its estimated 62,250 unplugged wells in Appalachia (it currently has 3,000 in Texas/Louisiana) over the next 75 years. From 2019 to 2033, the company plans to P&A an estimated 2,600. From 2034 to 2049 there is a linear increase until 2049, when they plan to P&A 1,100 per year until 2094. If this plan is followed, it means Diversified would P&A around 96 percent of its current well inventory after its state P&A agreements expire. Only about 4 percent of its well inventory would be decommissioned over 15 years, while over 80 percent of the wells would be decommissioned after the year 2049.

Figure 10: Diversified's Well Inventory P&A Plan (Appalachian Basin)



Source: ORVI analysis of Diversified Energy data

ORVI created its own model using Diversified's assumptions about production decline rates on its 2021 well inventory, and concluded the company simply will not have funds from commodity sales from these wells to decommission more than a fraction of these wells. The full model, including a detailed methodology for the analysis, is included in Appendix 3.

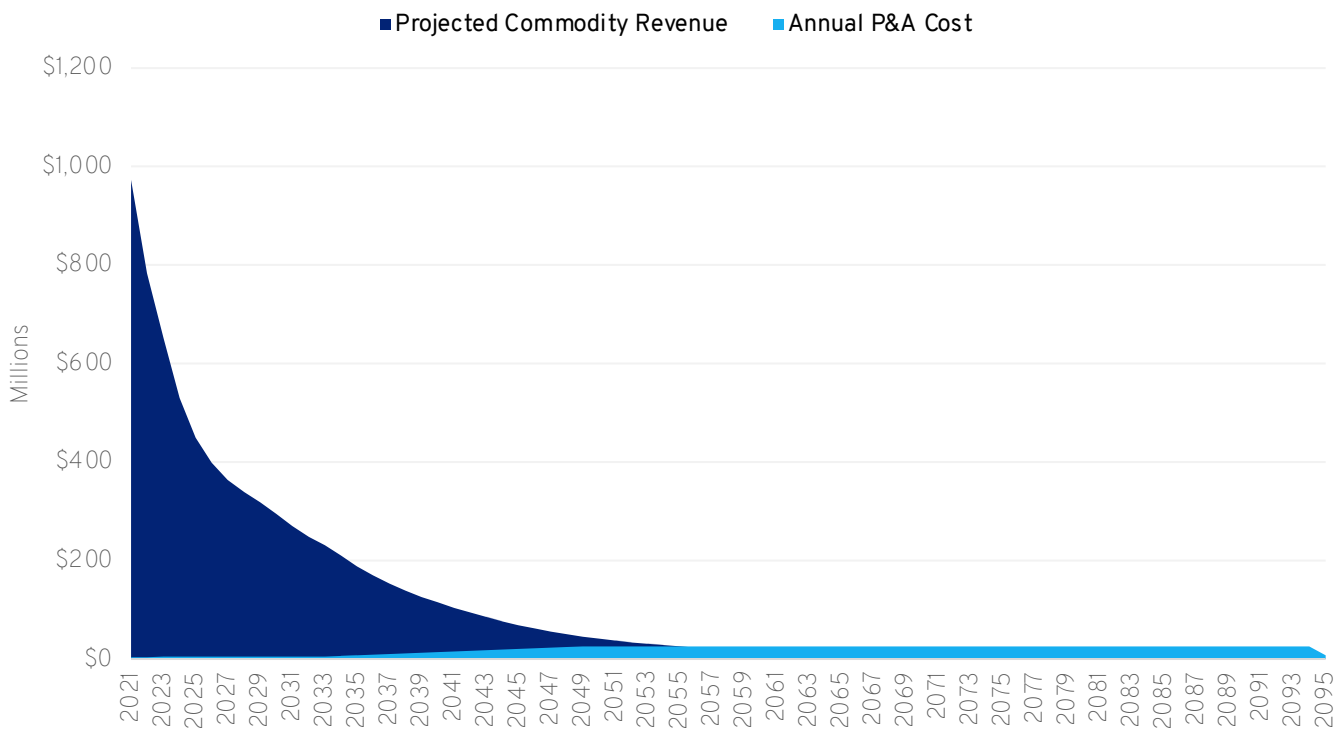
ORVI used the following assumptions, including:

- \$22,500 per-well average decommissioning cost, which Diversified uses in its financial reports.
- 2021 well inventory of 65,000 unplugged wells,⁸³ which is not augmented by additional acquisitions.
- Production decline rates of 9 percent per year.
- Energy Information Administration (EIA) 2022 forecast of the US eastern onshore natural gas price through 2050 and an additional \$0.16 to include oil and NGLs
- Decommissioning schedule based on Diversified’s disclosed schedule.

Using these extremely optimistic assumptions, ORVI estimates that by 2056, Diversified’s P&A costs will consume all commodity revenue from its 2021 well inventory (Figure 11). Only an estimated 20,400 wells, or 31 percent of Diversified’s inventory, would be plugged and abandoned, leaving about 54,000 additional wells that will need to be decommissioned. By 2055, P&A costs will be greater than 100 percent of total commodity revenue from Diversified’s 2021 inventory, with over 44,600 wells left to decommission.⁸⁴

The cost to P&A the additional 44,600 wells could fall to the states. At an average P&A cost of \$50,000 per well, this would amount to \$2.2 billion.

Figure 11: Projected Commodity Revenue from 2021 Well Inventory and P&A Costs, 2021-2095



Source: See Appendix 2

Diversified’s acquisition strategy could leave \$2.2 billion in P&A expenditures to states by 2056.

This declining commodity revenue from existing wells—the inevitable result of production decline rates—may be why Diversified continues to pursue acquisitions. These acquisitions are increasingly focused on unconventional, higher volume wells, which allows the company to shore up its production.⁸⁵ Greg Rogers, Senior Advisor at Carbon Tracker, has called Diversified’s acquisition strategy, a “legal Ponzi scheme.”⁸⁶

2.2 Bonding and State Consent Agreements on Plugging Wells

Before a company can drill an oil or gas well, it must set aside either cash or bonds to plug and restore a well site after production ceases. These funds—usually cash or bonds (surety or performance bonds)—are a debt-like legal obligation that is supposed to provide a financial incentive to drillers to properly decommission their well sites. While bonding requirements differ in each state, bonding coverage is just a small fraction of the real cost to decommission wells and well sites, averaging less than one percent of decommissioning costs.⁸⁷

Bonding coverage averages less than one percent of actual decommissioning costs.

This is because bonding amounts are not reflective of the actual cost of decommissioning wells. The use of “blanket bonds”, which provide a fixed amount of coverage to secure decommissioning obligations for an unlimited number of wells under a single operator, reduce the effective bond coverage per well. For example, in Pennsylvania, an operator can pay only \$35,000 to cover up to 50 vertical wells. Such a blanket bond costs just \$50,000 in West Virginia.⁸⁸ Blanket bonds do not cover full decommissioning costs (plugging and wellsite restoration) in these two states, which can range from \$25,000 to over \$150,000 per well.⁸⁹ There is no financial solvency test required to show companies have the money to maintain or decommission wells in the four-state region.

2.3 Diversified's State Consent Agreements

Unlike most oil and gas operators that follow state bonding requirements, Diversified entered into consent agreements with Kentucky, Ohio, Pennsylvania, and West Virginia. These consent agreements bypassed state regulations on bonding and secured long-term settlements on decommissioning Diversified's well inventory and included larger bonding amounts.⁹⁰ The central reason these consent decrees were used in each state was because state regulators must approve well transfers. 2018, the year the consent decrees were ordered in each of the four states, was also when Diversified was seeking to transfer over 40,000 wells they acquired from EQT, CNX Resources, Alliance Petroleum and Core Appalachia. Some of the wells previously owned by some of these operators were also in violation of state laws because they were inactive and not P&A-ed. Transferring such a large number of wells into the hands of one company, Diversified, dramatically raises the risk that these wells could be orphaned if Diversified were to go out of business. Moreover, the bonding coverage, which is already just a small fraction of real decommissioning costs, would be even lower if the company purchased a blanket bond to cover thousands of wells. The agreements may also protect Diversified if any of the four states adopt bonding reforms, such as full-cost bonding or larger blanket bond amounts, or any other new regulations that require wells to be plugged when they are inactive.

The plugging consent orders give the company a variance against state laws for agreeing to a set term of conditions with each state. The agreements range from 10 years in Ohio and 10 years or longer in Kentucky to 15 years in West Virginia, and up to 20 years in Pennsylvania.⁹¹ Each of the agreements includes a set number of wells covered, a bonding amount for the wells, reporting, and compliance stipulations (Table 2). The total bonding coverage is approximately \$13.2 million in the four states.⁹²

Table 2: Diversified Energy's State Consent Agreements

State	Timespan	Wells Plugged First Year	Wells Plugged per year	Wells Plugged Total	Wells Reactivated or Plugged	Bonding Amount	Wells Covered	Years
KY	2019-2028	25	20	225	30	\$2,500,000	7,500	10
OH	2020-2029	18	20	218	0	\$650,000	7,100	10
PA	2019-2033	20	20	320	30	\$7,000,000	1,400	15
WV	2020-2034	30	20	330	30	\$3,000,000	17,000	15

Source: Diversified Energy, Pennsylvania Department of Environmental Protection, West Virginia Department of Environmental Protection

Approximately 33,000 of Diversified's wells in the four states are covered by the state consent agreements, although the company currently owns approximately 66,000 wells in the four-state region.⁹³ According to Diversified, these long-term consent agreements cover more than 97 percent of the wells they own, which does not appear to be the case based on language in the consent decrees. According to these agreements, Diversified is only required to P&A about 1,200 wells over the timespan of the consent agreements.⁹⁴ (The company has also agreed to P&A or reactivate an additional 90 per year.) On the low end, this means only 1.9 percent of Diversified's well inventory in the four states would be P&A-ed by 2034. On the high end, it would be about 2,300, or 3.8 percent of current inventory.⁹⁵

2.4 Unusual Accounting Practices Used to Boost Profits, Reduce Liabilities

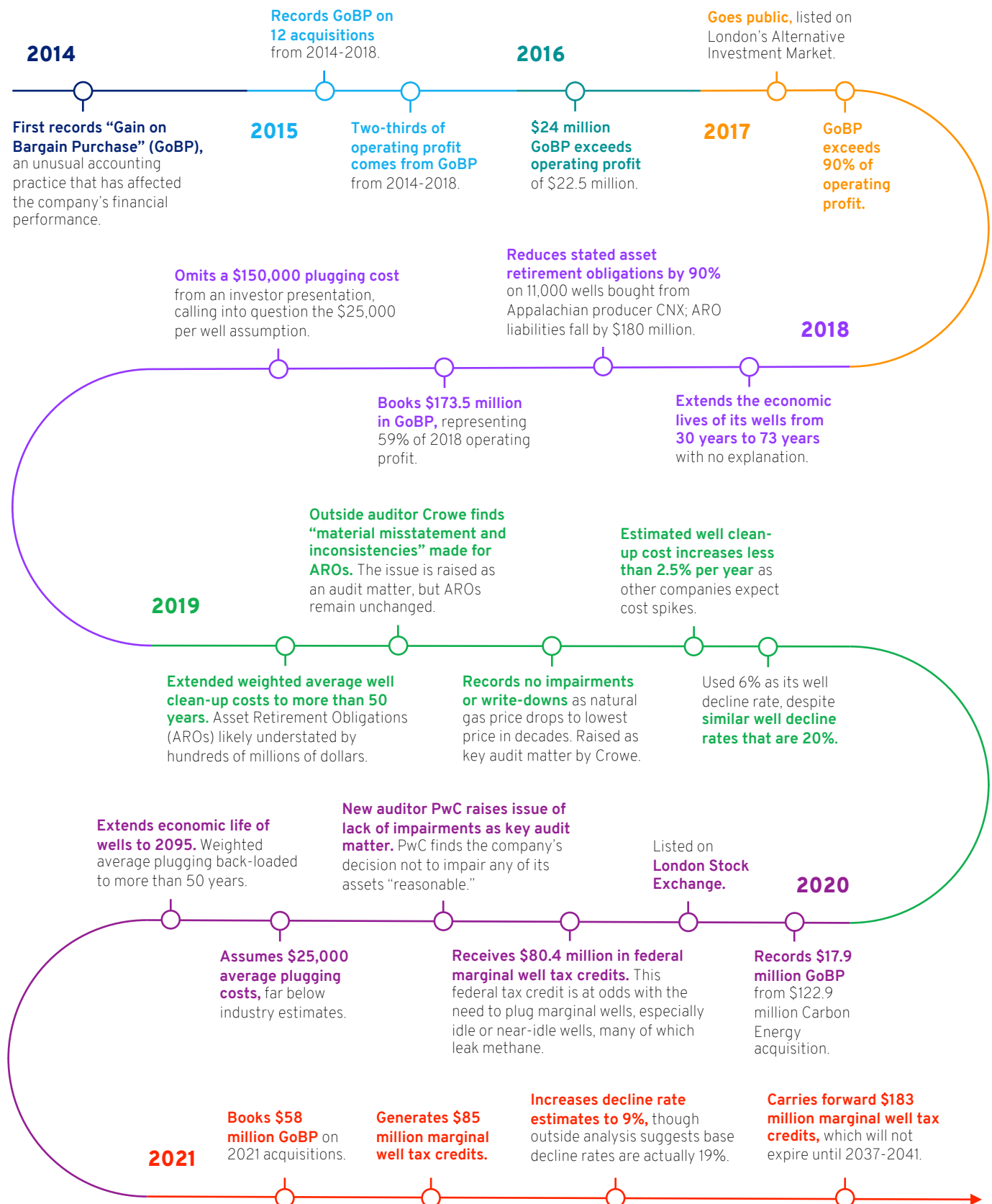
Over the past several years, Diversified has used highly irregular accounting practices. The company has also taken advantage of the federal marginal well tax credit. These practices have had the effect of boosting the company's income or reducing its liabilities on its financial statements.

The company's financial practices analyzed in this report include its accounting for its Asset Retirement Obligations (AROs), its use of Gain on Bargain Purchase (GOBP), its failure to impair assets, and its use of Marginal Well Tax credits.

See Figure 12 on the following page for a timeline of some of Diversified's accounting and financial practices.

Diversified's unusual accounting practices have boosted the company's income and reduced liabilities on its financial statements.

Figure 12: A Timeline of Financial Practices



Source: Diversified Energy Annual Reports, 2014-2021

2.5 Asset Retirement Obligations (AROs) Raise Red Flags

For Diversified, a company built around end-of-life conventional oil and gas wells, the question of its obligations to retire, or decommission, these wells looms large. This report analyzes the company's accounting practices around future P&A costs, its Asset Retirement Obligations (AROs), to determine whether Diversified will be able to fulfill its legal obligations to P&A its roughly 70,000 wells.

Diversified is harvesting cash flows now and deferring future P&A costs. Its business model is to buy marginal wells, restate the ARO using unrealistic assumptions, and defer most costs of well retirements for more than 50 years into the future. One analyst believes the company's core business model is, in fact, ARO accounting.⁹⁶

As described in Section 2.3, Bonding and State Consent Agreements on Plugging Wells, Pennsylvania, West Virginia, Ohio, and Kentucky each require Diversified, through 5-, 10- and 15-year state-level consent agreements, to retire only 20 wells per year.⁹⁷ In general, companies that currently own wells have a legal requirement to P&A their wells at the end of their useful life. In Appalachia, the obligation to P&A a well does not extend to prior owners. A series of reports *Capitol Forum* and *Bloomberg* raised questions about Diversified's ability to retire its well inventory. Shortly following the release of these reports, Diversified announced its intention to accelerate its retirement program.⁹⁸

Diversified's business model depends on buying low-producing wells, restating Asset Retirement Obligations (AROs) using abnormal assumptions, and deferring well decommissioning costs for decades.

Oil and gas companies must include costs to decommission their wells in their financial statements. These costs are categorized as AROs and appear as unsecured liabilities on a company's balance sheet. This liability does not mean that a company has put actual capital aside to decommission wells. It is, however, an amount the company calculates it will need to spend, in today's dollars, to decommission its wells.

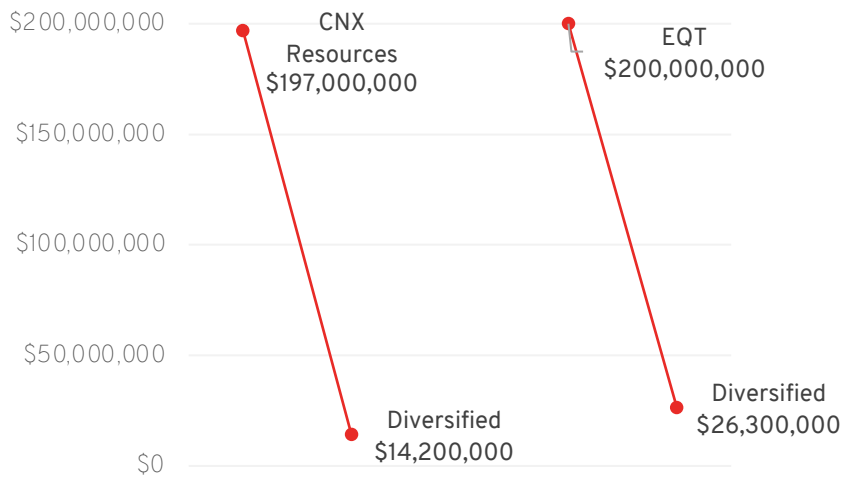
Diversified's accounting practices have reduced the amount of the company's ARO liabilities. The company's assumed decommissioning costs are significantly less than industry averages. If Diversified used assumptions based on industry norms, the increase in its ARO liabilities would make the company technically insolvent.

This next section of this report will offer a summary of Diversified's questionable approach toward its AROs, providing examples as illustrations.

2.6 Diversified Slashes Value of ARO Liabilities After Many Acquisitions

Diversified has consistently re-valuated the AROs on wells it acquires. Post-acquisition, Diversified significantly discounts its ARO liabilities, recording lower liability amounts than the prior owner had used in its financial accounts. For example, in 2018, Diversified purchased 11,000 wells from CNX Resources, a publicly traded gas producer in Appalachia. CNX had listed the ARO associated with these wells at \$197 million.⁹⁹ Post-acquisition, Diversified recorded the ARO for the same wells at \$14.3 million (Figure 13).¹⁰⁰ The 90% reduction in the ARO was an explicit part of the sale from CNX, which noted, "In connection with the sale, the buyer assumed approximately \$196,514 of asset retirement obligations." The ARO reduction was not explained in Diversified's 2018 financial statements. Diversified treated the AROs connected with the roughly 11,000 wells it acquired from EQT in 2018 in a similar way, drastically reducing them post-acquisition.¹⁰¹

Figure 13: AROs for Wells Under CNX Ownership and EQT Ownership compared to Diversified Ownership, post-2018 Acquisitions



Source: Diversified Energy, CNX Resources, and EQT Corporation data

Reducing the amount of ARO liabilities—particularly at the magnitude Diversified has made such reductions—greatly impacts the book value of the company, in effect increasing shareholders’ equity by the same amount of the ARO liability reduction. The effect is to boost the book value of the company. Both debt and equity investors look to the company’s financial books to make determinations about a company’s value. By reducing the ARO liabilities post-acquisition, Diversified may be providing a high value of the company. [Appendix 5 includes additional examples of Diversified’s practice of revaluing well AROs post-acquisition.]

2.7 Diversified’s ARO Liabilities Based on Numerous Unusual Assumptions

Diversified has also used numerous assumptions to calculate the value of its AROs, which include: 1) unrealistically low clean-up costs per well, significantly below industry norms; 2) implausibly long economic lives of wells though 2095, significantly beyond industry norms; 3) extension of the useful life of its wells by nearly 50 years, from 2047 to 2093, which the company did without explanation in 2018; 4) unrealistically low annual inflation costs of roughly 2.5 percent over the next 74 years (the final date Diversified expects to have productive wells); 5) an excessively long ramp-up timeline modeled to begin P&A-ing the vast majority of its wells; 6) overly optimistic calculations to keep classifying idle wells as economically productive; 7) the expectation that non-producing, or idle, wells can be brought back to production, allowing the company to delay P&A costs; 8) unverifiable claims about the company’s ongoing asset retirement program; 9) shifting net discount rate assumptions, without sufficient explanation, that reduce the present value of its AROs, well below a realistic level; and 10) failure to incorporate far higher costs to P&A a leaking well than a non-leaker.

Estimating P&A costs depends primarily on three variables: the number of wells, the costs to P&A the wells, and the cost of inflation. Since the costs will occur in the future, two additional variables are used to calculate the cost in today’s dollars for future clean-up costs: the timing of the P&A costs, and the discount rate used to convert future costs back to today’s dollars.

Diversified’s assumed P&A costs have lowered the company’s ARO liability.

Two financial assumptions raise questions about the amount of the AROs on Diversified’s books and call into question the company’s financial wherewithal to fund the actual clean-up of the wells. These include: 1) unrealistically low clean-up costs per well and 2) the estimated economic lives of the wells, which now extend through nearly the end of this century.

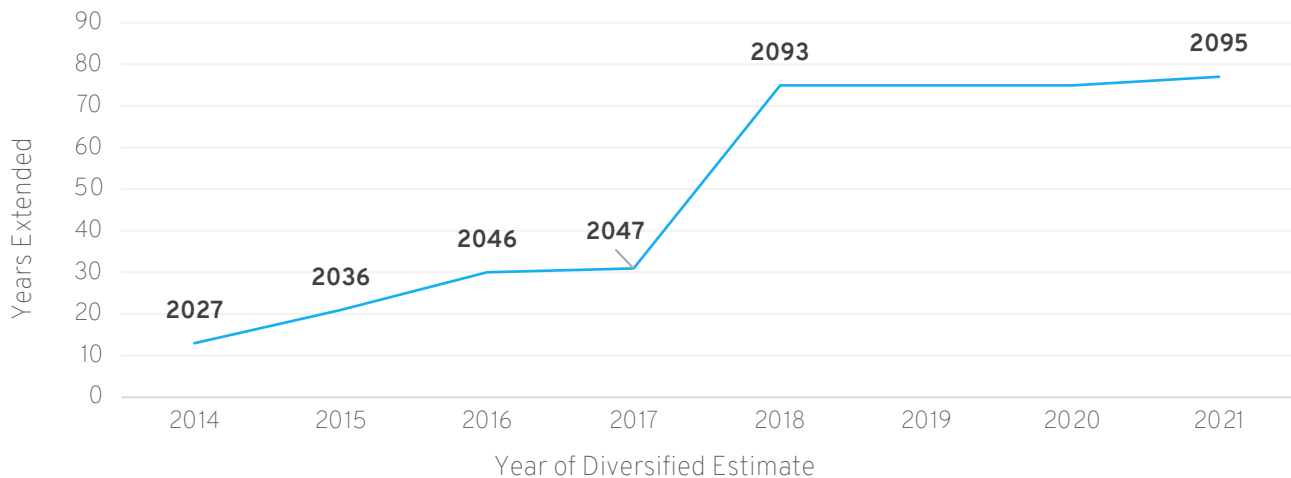
Decommission Costs Well Below Industry Estimates

In 2020, Diversified used a figure of \$20,000 to \$30,000 per well to decommission its wells, using an average of \$25,000 per well.¹⁰² That amount was further reduced in its 2021 financials.¹⁰³ The justification for the further reduction was based on Diversified’s costs for the 136 wells it plugged in 2021, which was \$22,500, a 10 percent reduction from the prior year. The sample size of 136 is far less than 1 percent of the company’s well inventory. The company appeared to use the \$22,500 to \$25,000 per-well P&A cost¹⁰⁴ to calculate ARO liability and to assure stakeholders—including debt and equity investors, regulators, and credit rating agencies—the company will have sufficient cash in the future to fund these costs. The \$22,500 to \$25,000 is much lower than industry norms.

Estimates of Economic Lives of Wells Repeatedly Extended

From 2017 to 2018, Diversified inexplicably more than doubled the economic lives of its wells from 30 to 75 years.¹⁰⁵ By changing this key assumption, the company was able to radically reduce its ARO liabilities in 2018.¹⁰⁶ In its 2017 financial statements, Diversified calculated its ARO using clean-up costs “presently estimated through 2047, when the company expects its producing oil and gas properties to reach the end of their economic lives.”¹⁰⁷ The following year, the economic lives of its wells had been extended and were “presently estimated through to 2093.”¹⁰⁸ No explanation was given for the massive extension of its wells’ economic lives. Again, in 2020, the company further extended its wells economic lives to 2095.¹⁰⁹ Figure 14 illustrates Diversified’s extension of the economic life of its wells. In 2021, the company maintained its estimates of its wells’ economic lives through 2095.¹¹⁰

Figure 14: Diversified’s Estimates of End of Economic Lives of Producing Wells, 2014-2021



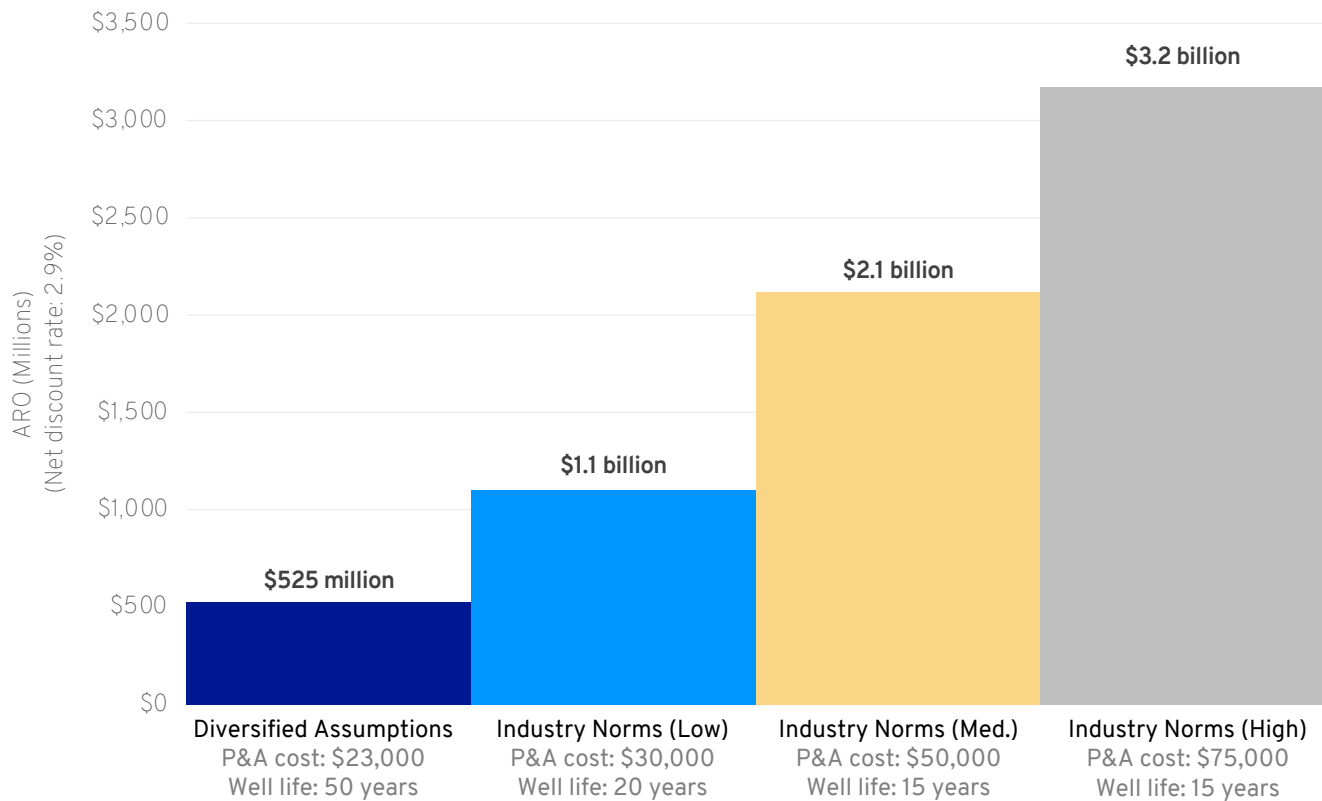
Source: ORVI analysis of Diversified Energy data

By shifting assumptions about the economic lives of its wells, Diversified has substantially reduced its Asset Retirement Obligation (ARO) liabilities.

If Diversified used industry norms for decommissioning costs, ranging from \$30,000 to \$75,000, and included a weighted average life of 15 to 20 years, the present value of its AROs on its books would need to be massively increased. If, for example, the company estimated that wells would cost \$50,000 or \$75,000 to decommission and assumed an average of 15 years to decommission all its wells, its ARO liability would have increased in 2020 from less than \$400 million to nearly \$2 billion or \$3 billion, respectively. The company increased its AROs to \$526 million in 2021, which is still far less than the \$2 or \$3 billion its ARO liability would be if industry norms were applied.^{111,112}

Figure 15 illustrates the magnitude of the amount of ARO liabilities Diversified has recorded on its books based on its assumptions, compared to what the AROs would be using assumptions based on industry norms.

Figure 15: AROs Using Diversified's Plugging Cost Assumptions Compared to Industry-Wide Estimates



Source: ORVI analysis of Diversified Energy data

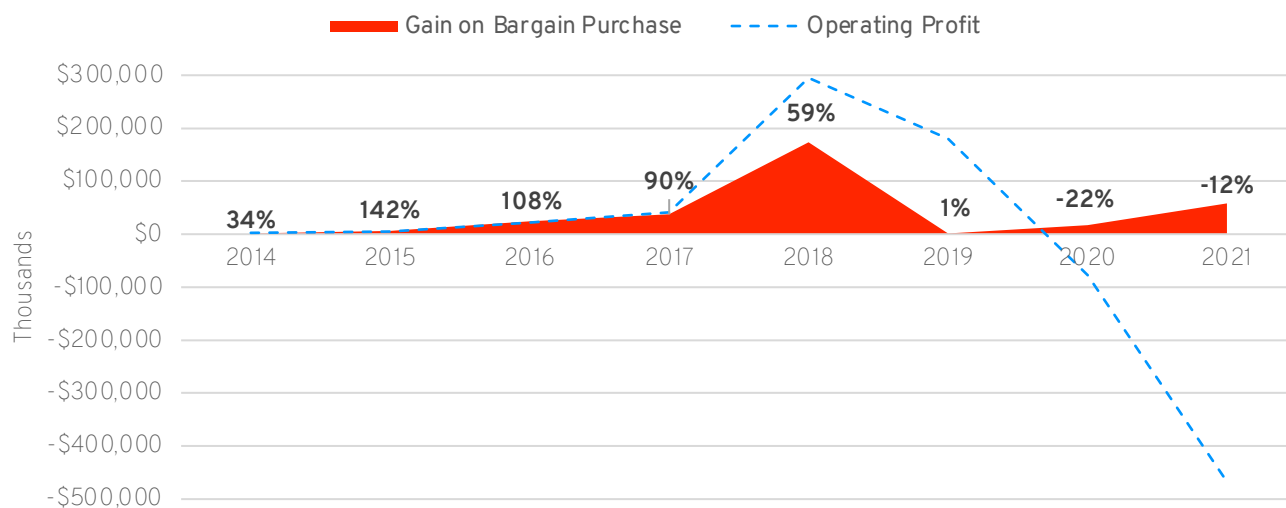
Greater detail about Diversified’s financial accounting of its AROs and additional examples of questionable assumptions are provided in Appendix 5.

2.8 Gain on Bargain Purchase: Oversized Share of Net Income

From 2014 to 2020, Diversified has regularly recorded a Gain on Bargain Purchase, which is an accounting practice used in rare cases reserved for distressed sales (Figure 16). The company’s regular use of Gain on Bargain Purchase is not used by other companies with similar transactions. This financial accounting tactic was the biggest contributor to the company’s income in many years.

In essence, a Gain on Bargain Purchase allows a company that buys another company or its assets to claim it got such a below-market price, or “bargain,” that it can re-calculate these assets at higher value. This accounting practice is used to produce a paper “profit” from the purchase. Assuming the fair market value calculated by the acquiring company is higher than its purchase price, the difference is recorded as negative good will. This accounting practice allows a company to record the paper gain as income and ultimately inflates assets on the company’s balance sheet.

Figure 16: Diversified Energy, Gain on Bargain Purchase Share of Operating Profit, 2014-2021



Source: ORVI analysis of Diversified Energy data

- Diversified Energy has booked at least one “Gain on Bargain Purchase” annually since 2014.¹¹³
- From 2014 to 2018, Diversified recorded a Gain on Bargain Purchase on *each* of its 12 acquisitions.¹¹⁴
- Two thirds (66 percent) of Diversified’s operating profit from 2014 to 2018 came from Gains on Bargain Purchases.¹¹⁵
- In 2016, Diversified recorded more from its Gain on Bargain Purchase (\$24.3 million) than from its Operating Profit (\$22.5 million).¹¹⁶
- In 2017, Diversified’s Gain on Bargain Purchase represented 90 percent of its operating profit. In its restated 2017 financial results, it increased its Gain on Bargain purchase from \$11.60 million to \$37.1 million, which allowed the company to restate its operating income, increasing it from \$16.2 million to \$41.2 million.¹¹⁷
- Annual profits plunged 85% in 2017. But Diversified used Gains on Bargain Purchases to make a significant upward adjustment to its earnings calculation. This adjustment allowed the company to, in effect, show a much greater profit than it generated from its ordinary operations.¹¹⁸
- In 2018, Diversified booked \$173.5 million in Gains on Bargain Purchases, representing 59 percent of its operating profit that year.¹¹⁹
- In 2020, Diversified recorded a \$17.9 million Gain on Bargain Purchase from its \$122.9 million acquisition of Carbon Energy.¹²⁰
- Without Gains on Bargain Purchases, Diversified would have been unprofitable in five of the seven years between 2014 and 2020.¹²¹
- In 2021, Diversified recorded a \$58 million Gain on Bargain Purchase. It recorded Gains on Bargain Purchase on two of its four acquisitions in 2021, Tapstone Energy and Tanos Energy, recording \$26 million and \$32 million, respectively.¹²²

In the same period, majors with decades of operational history in the region have been forced to divest at “fire sale prices.”¹²³ In large part, the integrated oil and gas companies have walked away from their gas assets in Appalachia, often recording jaw-dropping impairments. ExxonMobil, Shell, and Chevron each wrote off billions in 2020 related to their Appalachian gas assets. Chevron, as a case in point, wrote off approximately \$11 billion in late 2020, primarily related to its Appalachian shale gas assets. When announcing Chevron’s sale of these distressed assets to EQT for \$785 million, the industry press described the sale as “pennies on the dollar.”¹²⁴ Neither National Fuel Gas or EQT, which acquired Shell’s and Chevron’s distressed gas assets in Appalachia, recorded Gains on Bargain Purchases following these acquisitions.

For additional information on how Diversified’s use of Gain on Bargain Purchase is highly unusual and rarely used within the industry, and how this practice violates the accounting principle of conservatism, see Appendix 6.

2.9 Diversified’s Failure to Impair its Natural Gas Assets At Odds with Industry Norms

Diversified has taken no impairments, or write-offs, since at least 2015, according to its financial statements.¹²⁵ This is in sharp contrast to other natural gas producers, which have recorded significant impairments over the past several years as gas prices plummeted to the lowest prices in decades.

Since it went public in 2017, Diversified has made numerous acquisitions. These acquisitions have allowed the company to increase production of natural gas. Nearly all (roughly 85 percent over the last 4.5 years) of the company’s revenues are generated through sales of natural gas. During this time, the Henry Hub price of natural gas dropped below \$3.00/MMBtu, from nearly \$9.00/MMBtu in 2008 (Figure 17).¹²⁶ The gas price at the regional gas hub, then called Dominion South, was often far lower.

Figure 17. Henry Hub Natural Gas Spot Price, 2000-2022



Source: EIA

From 2015 to 2020, the price of gas was so low that industry began to use the term “Gasmageddon.”¹²⁷ Natural gas producers in Appalachia took massive write-downs on their assets and more than a dozen filed for bankruptcy during this time. Despite complicated hedging strategies that were designed to protect gas producers from falling prices, or gas prices that were expected to stay “lower for longer,” gas producers were *in extremis* during this period.

Diversified, unlike its peers, did not take write-downs or impair its assets during these years, even when it experienced significant losses. Between 2017 and 2019, when Crowe was the outside auditor, the question of impairments was considered a key audit matter. But Crowe agreed with management that no impairment was needed. For example, in 2018, Crowe stated, “We considered whether there are any observable indicators regarding the assets that are in decline and whether there have been any significant changes to the market or business in the period that could indicate the asset is impaired, with no matter arising.”¹²⁸

PwC, the company’s new outside auditors in 2020, did raise the question of impairments as a “key audit matter” in 2020, but concluded that the company’s decision not to impair any of its assets was “reasonable.”¹²⁹

Determining when assets should be written off is subjective, and reasonable management teams and their accountants can differ on when a company’s assets meet the criteria for an impairment. But it is notable that Diversified, nearly alone among all the gas producers in Appalachia, did not impair even one of its assets during this challenging time for that sector.

2.10 Marginal Well Tax Credit: Large Contributor to Net Income in 2020 and 2021

Since 2017, Diversified has received significant amounts of federal tax credits, specifically marginal well production tax credits. This federal tax credit provides a tax credit for qualified gas and oil wells when commodity prices are extremely low. The tax credit has buffered Diversified's operating losses in both 2020 and the first half of 2021. These tax credits can be carried back five years or forward 20 years, which effectively means Diversified will be able to avoid paying taxes for many years, based on its projections.

- By the end of 2018, Diversified had an unused marginal well tax credit of \$14.3 million.¹³⁰
- In 2020, the company claimed an \$80.4 million marginal well tax credit. The company's tax credit, along with other federal tax credits, largely obscured its \$77.6 million operating loss. As a result of the marginal well tax credit, the company had a net loss of "only" \$23.5 million.¹³¹
- In the first half of 2021, Diversified had a \$173 million marginal well tax credit, which put a large dent in the company's \$305.7 million first half operating loss.¹³²
- For the full year of 2021, Diversified generated a \$85 million marginal well tax credit.¹³³
- If Diversified received the maximum tax credit per well in 2020, approximately a third of its wells received the federal credit, which is unlikely since tax credits are capped at production levels per well of 1,095/Mcf. It is more likely that a greater percentage of Diversified's wells qualified for the credit in 2020, and will qualify for the credit in 2021.

The Federal Marginal Oil & Gas Well Production Credit was enacted by Congress in 2004 as an amendment to the Internal Revenue Code. The initial rationale for the credit, according to the Independent Petroleum Association of America (IPAA), which advocated for its passage, was "central to energy security." Passed before the shale-induced oil and gas production boom, the law was in effect, but effectively unused. The threshold prices for both oil and gas were too high to trigger the credit. In fact, the IRS did not even have a form to claim the credit "since the IRS has never needed to develop one."¹³⁴ For additional information on the Marginal Well Credit, see Appendix 7.

All the financial arrangements described in section 2 could have the effect of delaying the P&A obligations of Diversified's wells. However, those retirement costs are likely to be even higher because Diversified is perhaps understating the methane leakage rates from many of its wells and leakier wells are much more difficult and expensive to P&A. The next section describes an in-depth study of methane leakage from all of Diversified's wells in Pennsylvania.

Marginal Well Tax Credits can be carried forward 20 years or backward 5 years, effectively enabling Diversified to avoid paying taxes for many years.



3.0

3.0 Methane Emissions from Diversified Wells: Company-Wide Reporting Drops Post-Acquisitions

Oil and gas well integrity failures might lead to leakage of methane into the atmosphere, as a greenhouse gas (GHG) driving global climate change, and as a sickness-inducing pollutant. An analysis of more than 20,000 active wells in Pennsylvania acquired by Diversified reveals a significant drop in company-reported methane emissions post-acquisition.

The investigation reported here identified all the active wells, 22,384, ever owned by Diversified in Pennsylvania and that have self-reported gas leakage between 2014 and 2020. Total reported natural gas emissions for these wells in 2014 was about 3 million cubic feet per day (cfpd) when 90 percent of these wells were owned by previous operators. Reported emissions for the same wells in 2020 was about 140,000 cfpd when 96 percent of these wells were owned by Diversified. That is about a 93 percent reduction in reported emissions related to ownership change. We then analyzed all the emissions reports submitted by Diversified to discover how this decrease might have occurred and found that over the period of this study:

- Diversified reported a well was inaccessible for testing for leakage 3,238 times; remarkably, the wells associated with these reports were reported accessible by previous well owners 2,045 times in the previous year.¹³⁵
- Diversified filed a total of 90,443 reports and claimed no reliable leakage measurement possible in 41 percent of those reports.¹³⁶

- Of the 9,536 Diversified wells with one or more “not applicable” status reports, 9,458 (99 percent) of them had one or more subsequent reports with a status other than “not applicable.”¹³⁷
- Diversified failed to file a leakage report over 1,700 times.¹³⁸
- There appear to be many aberrant year-to-year reports for many of the “super-emitting” Diversified wells, those relatively few contributing the most to its total emissions.¹³⁹

Diversified appears to have used regulatory loopholes to reduce its reported gas leakage from wells where higher values had been previously reported, and to avoid measurements on thousands of wells in which additional “super emitters” might be hiding.¹⁴⁰

3.1 Methane Emissions from Diversified’s Wells

Methane (CH₄) is the primary component of natural gas.¹⁴¹ Methane is a powerful greenhouse gas that has 86 times the warming power of carbon dioxide over a 20-year time span. That makes reducing its emission crucial in the near-term. Methane is also a precursor for ozone formation and thus contributes directly to air quality degradation and resultant human morbidity. The most recent assessment report of the Intergovernmental Panel on Climate Change¹⁴² notes:

“Strong, rapid and sustained reductions in CH₄ emissions would also limit the warming effect ... and would improve air quality.”

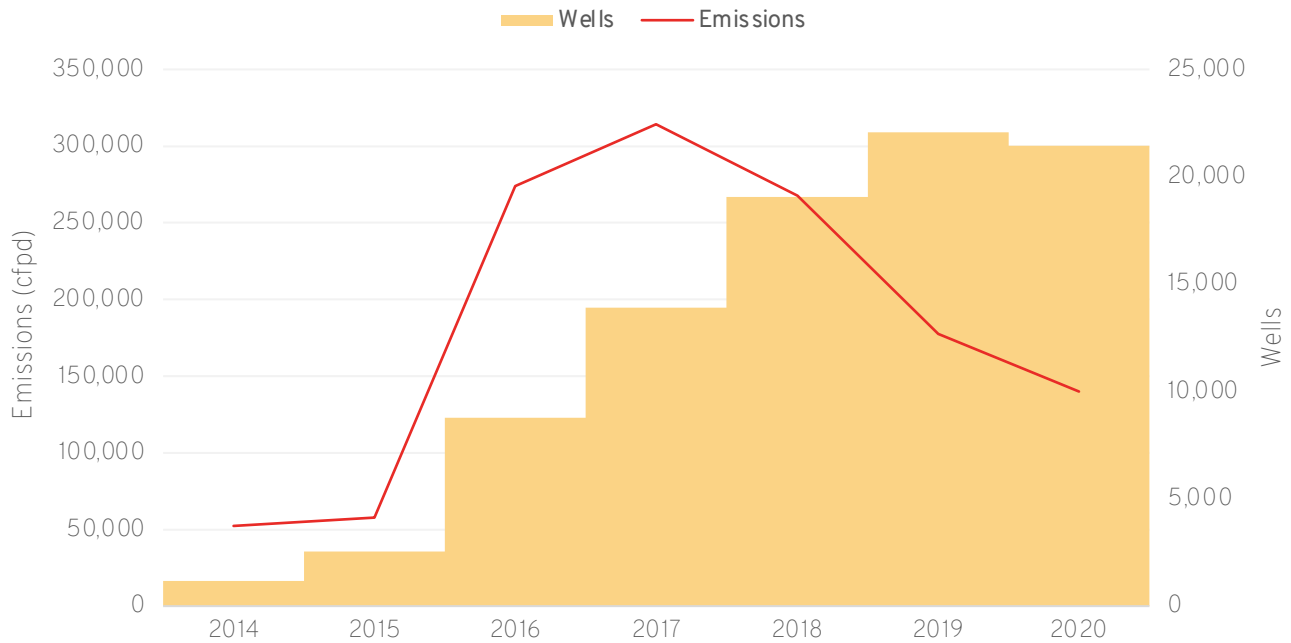
Investigators for Bloomberg Green¹⁴³ physically sampled 44 Diversified wells for methane emission and found methane leaks at most of them. The leak rate was so high for most of those wells that a sensor safety alarm was triggered.

Such anecdotal information begs for a concerted investigation of a much larger sample of Diversified wells, all of them, albeit on paper, the results of which are reported herein. As noted in the Bloomberg report:

“No one, including Diversified executives, knows how much methane is actually leaking.”

Our investigation identified all the wells, 22,384, ever owned by Diversified and that have self-reported to the Pennsylvania Department of Environmental Protection (PADEP)¹⁴⁴ from 2014 to 2020, inclusive. Total reported natural gas emissions for these wells in 2014 was 2,988,999 cfpd when 90 percent of these wells were owned by other operators. Reported emissions for the same wells in 2020 was 139,229 cfpd when 96 percent of these wells were owned by Diversified. *That is about a 93 percent reduction in reported emissions related to ownership change. Similarly, the reader should recall the contents of Figure 13 in Section 2.6 of this report wherein Diversified slashed its AROs on thousands of wells it had just acquired from another operator by 90 percent.*

Figure 18: Time History of Number of Diversified Gas and Combined Oil and Gas Wells and their Self-Reported Emissions in Pennsylvania, 2014-2020



Source: Pennsylvania Department of Environmental Protection Mechanical Integrity Assessment Program

What might explain this change in emissions, hidden behind the information shown in Figure 18, from the same wells from one owner to the next? A subsequent operator might:

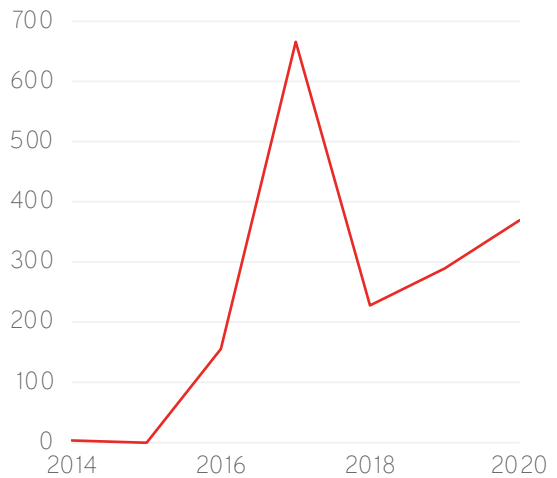
1. Report that a well is inaccessible (I). Inaccessible means that the operator cannot gain access to the well head; it is somehow obstructed when it should not be. Inaccessible means the wellhead is not inspectable but does not mean that no gas leak is present. *Over the period of this investigation, Diversified reported a well was inaccessible 3,238 times; remarkably, the wells associated with these reports were reported accessible by previous well owners 2,045 times in the previous year.*
2. Declare no reliable measurement (NRM) of emissions can be made on a well. NRM status does not mean that no gas leak is present. It means gas flow cannot be constrained for measurement or is too low or too high to estimate with equipment being used. PADEP currently has no protocols or required thresholds and accuracy for the required flow measurements. Operators can use equipment ranging from commercial manometers, with relatively high emission thresholds, to low-flow digital meters with thresholds as low as 1 cfpd. *Over the period of this investigation, Diversified filed a total of 90,443 reports for its wells and reported NRM status in 41 percent of those reports.*
3. Declare that measurement for emissions is not applicable (NA) to a well. This could mean that well was sold or reported plugged in a particular reporting year. Of the 22,384 wells ever owned by Diversified, there was a status of NA reported at least once for 9,536 wells.

Curiously again, 9,322 of those wells had at least one previous report with a status other than NA. Of the 9,322 with a non-NA previous status, 6,964 of those reports were filed by Diversified.

4. An operator can fail to report on a well in a reporting year. Figure 19 shows the history of Diversified’s missing well reports with an upwards year-to-year trend. *Although Diversified had 369 missing reports in 2020, it received only 22 notices of violations under the mechanical integrity provisions of the PADEP regulations.¹⁴⁵*

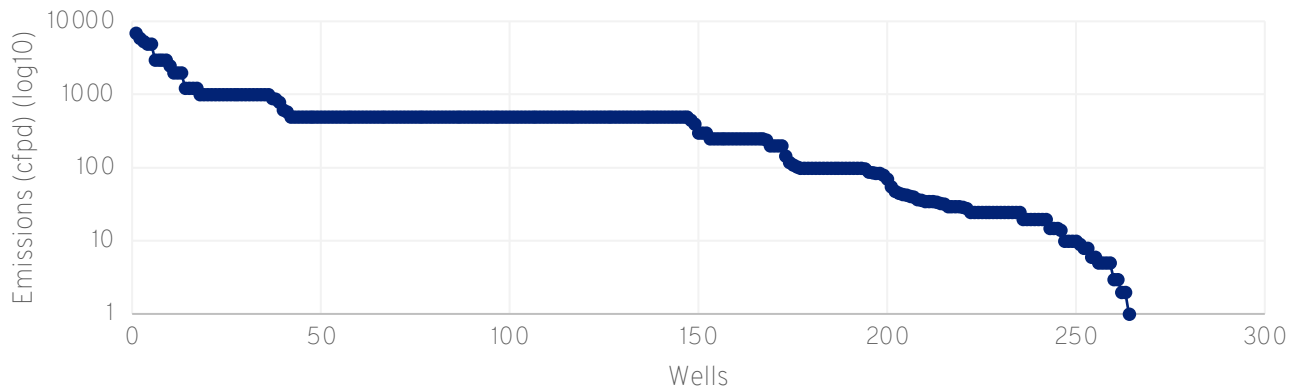
These four possible explanations pertain to the well-documented “super-emitter” phenomenon common in the oil and gas sector, wherein a small number of leak sources can dominate total emissions, *if they are located and measured*.¹⁴⁶ Figure 20 shows the distribution of emission magnitudes, in log-scale, across the 261 Diversified wells with reported emissions in 2020. It shows that about 10 percent of the high-emitting wells account for over 40 percent of the total emissions. Therefore, not reporting emissions because of any of the noted explanations could miss one or more super-emitters that could substantially alter total emissions. It is also curious to note that in this distribution, and in those for the other years studied, there is a relatively large number of wells with exactly the same emission value, 500 cfpd in the case shown here. This calls into question the reliability of these reports when, for other Diversified wells, measurement resolution is reported to within 1 cfpd.

Figure 19: History of Missing MIT Program Reports by Diversified, 2014-2020



Source: Pennsylvania Department of Environmental Protection Mechanical Integrity Assessment Program

Figure 20: Typical Distribution of Non-Zero Emissions Values Reported to the MIT Program for Diversified Wells, 2020



Source: Pennsylvania Department of Environmental Protection Mechanical Integrity Assessment Program

Additionally, and significantly, there is a fifth possible explanation for post-acquisition reported emission decrease. There appear to be aberrant year-to-year reports for many of the highest emitting Diversified wells, those few contributing the most to total emissions as explained in Figure 2A8 in Appendix 8.

Finally, it is now possible to interpret accurately the emissions data from all of Diversified’s Pennsylvania wells and their previous owners, as shown in Table 2A8. It *appears* that the other operators reduced their emissions substantially between 2014 and 2020. What actually happened is that the apparent reduction in emissions from the other operators is a mirage: Diversified was acquiring many of the leaking wells from them and markedly decreasing reported emissions using the tactics just described. The decrease from over 2.7 million cfpd in 2014 to only about one-half million cfpd in 2020 was largely due to a change in ownership to Diversified and the company’s reporting.

A detailed methodology for the authors’ in-depth investigation into methane emissions leaking from all of Diversified wells over the period 2014-2020 in Pennsylvania is presented in Appendix 8.

3.2 Diversified Wells: 659 Violations Related to Wellbore Integrity and Potential Methane Leakage in Six Years

Our investigation shows that Diversified has been flouting PADEP’s MIT Program reporting rules apparently with impunity, as noted in the previous section. Over the past six years, the company has received only a few (22) “administrative” Notices of Violation (NOV): essentially, failure to do paperwork properly. However, ORVI’s broad survey of PADEP violations over the last six years reveals that Diversified has received over 1,600 NOVs in Pennsylvania for actual environmental health and safety violations.¹⁴⁷ At least 659 of these could signal methane leaks, as these NOVs relate to wellbore integrity. The company failed to plug wells upon abandoning them more than 400 times, based on NOVs filed just in Pennsylvania. Table 3 presents a breakdown of these NOVs.

Table 3: Notices of Violation Related to Wellbore Integrity. Six Years of Diversified Wells in Pennsylvania

Description of Violation	Number of Violations
OGA3220(A) - PLUGGING REQUIREMENTS - Failure to plug the well upon abandoning it.	419
Operator failed to construct and operate the well in accordance with 25 Pa. Code Chapter 78 and ensure that the integrity of the well is maintained	59
Operator failed to immediately notify the Department and take corrective actions to repair or replace defective equipment or casing for wells exhibiting progressive corrosion, rusting or other signs of equipment deterioration that compromise the integrity of the well.	51
Casing and cementing violations	43
Upon abandoning a well, the owner or operator failed to plug the well to stop the vertical flow of fluids or gas within the well bore under 25 Pa. Code §§ 78.92–78.98 or an approved alternate method.	22
Operator failed to inspect each operating well quarterly for compliance with the well construction and operating requirements.	15
78a91(a) - PLUGGING - GENERAL PROVISIONS - Upon abandoning a well, the owner or operator failed to plug the well to stop the vertical flow of fluids or gas within the well bore under § 3221 of the 2012 Oil & Gas Act, 25 Pa	15
Operator failed to prevent gas, oil, brine, completion and servicing fluids, and any other fluids or materials from below the casing seat from entering fresh groundwater, and prevent pollution or diminution of fresh groundwater.	12
Owner or operator failed to comply with the reporting and corrective action requirements of 25 Pa. Code Section 91.33 when a release of a substance caused or threatened pollution to the Waters of the Commonwealth.	9
Operator vented gas to the atmosphere that produced a hazard to the public health and safety.	6
Operator failed to equip the well with one or more strings of casing of sufficient cemented length and strength to attach proper well control equipment and prevent blowouts, explosions, fires and casing failures during installation, completion and operation.	4
Failure to comply with permit condition for drilling, altering, or operating an oil and gas well	2
Operator failed to prevent excessive surface shut-in pressure and surface producing back pressure inside the surface casing or coal protective	1
Operator failed to take action in response to excessive pressures, as calculated in 25 Pa Code Section 78.73(c), to prevent the migration of gas	1

Source: Pennsylvania Department of Environmental Protection Violations Database

3.3 Diversified's Leaking Wells: The Future?

All but a few of Diversified's Pennsylvania wells investigated here were still "in production" as of the end of 2020. We have shown that Diversified's self-reported emissions from these wells are questionable at best. What emissions impact might they, and their other 40,000-plus wells outside Pennsylvania, have as they all eventually move into abandoned status? Growing research into methane emissions from abandoned wells has shown that many of them will continue to leak, some even after plugging.^{148,149,150,151} In response to this body of evidence, the EPA has now explicitly included abandoned oil and gas wells as a source in compiling its annual Greenhouse Gas Inventory under Abandoned Oil and Gas Wells (CRF Source 5 Categories 1B2a and 1B2b).¹⁵² Given the large and growing number of Diversified wells and the company's track record for under-reporting its emissions, it is likely that they will be contributing to the EPA inventory as abandoned wells for many years.



Conclusion

Nearly all the wells owned by Diversified are low-producing stripper wells. Meanwhile, more than half of their wells are uneconomic or financially distressed, according to some regulators, and may be near the end of their useful life. While Diversified has signed consent agreements with four states requiring the company to plug approximately 2,300 of their wells by 2034, this represents less than 4 percent of their well inventory.¹⁵³ According to Diversified's P&A schedule, over two-thirds of their wells will not be decommissioned until after the year 2056 and their entire well inventory will not be retired until 2095.¹⁵⁴

Given the boom-and-bust cycles of the oil and gas industry, and the significant headwinds for fossil fuel companies as the country moves away from fossil fuel energy, the high concentration of wells in one company's portfolio presents serious fiscal and environmental risks. By pushing a vast majority of their P&A obligations so far into the future, Diversified has created a too-big-to-fail business model where if they go out of business it could lead to an avalanche of orphaned wells where states could be left holding billions in unfunded liabilities.

To ensure that states don't end up holding the bag of P&A liabilities for Diversified or other operators, policymakers will need to pursue significant reforms. These reforms should include a number of actions, including ensuring that states have enough resources to enforce P&A requirements, requiring that bond amounts reflect projected well plugging and wellsite restoration costs, increased fees for idle wells, minimum production thresholds for an "active well," and, most importantly, the creation of an Abandoned Well Fund from a fee on production that is set aside in an account to ensure the proper closure of all wells. As noted in a previous report from the Ohio River Valley Institute, a production fee ranging from \$0.03 to \$0.07 per Mcf in Pennsylvania, Ohio, and West Virginia over the next 25 years could provide enough funds to decommission most of the state's unplugged well inventory based on current production projections.¹⁵⁵

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