RESOURCES *for the* FUTURE

Virtual Forum on Reclaiming Orphaned Oil and Gas Wells: Creating Jobs and Protecting the Environment by Cleaning Up and Plugging Wells

Written comments prepared for the Subcommittee on Energy and Natural Resources of the US House Committee on Natural Resources

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June 1, 2020

Introduction

Thank you Chairman Grijalva and Subcommittee Chairman Lowenthal, members of the committee, and good afternoon. It's an honor to present to you today.

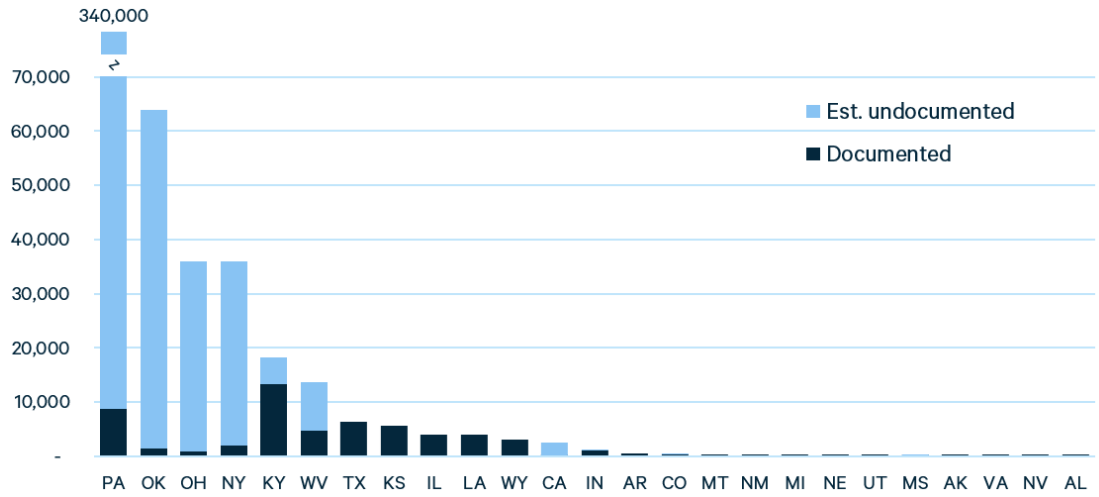
My name is Daniel Raimi. I am a senior research associate at Resources for the Future, and a lecturer at the Gerald R. Ford School of Public Policy at the University of Michigan. RFF is an independent, nonprofit research institution in Washington, DC. Its mission is to improve environmental, energy, and natural resource decisions through impartial economic research and policy engagement. The views expressed here are my own and may differ from those of other RFF experts, its officers, or its directors.

Background

To begin, workers and communities in oil and gas producing regions have been hit hard in recent months, as falling energy prices quickly translate into lost jobs, struggling businesses, and plunging tax revenue. A federal program to plug orphaned oil and gas wells has the potential to support these workers and communities while also providing environmental benefits.

The problem of orphaned oil and gas wells is widely known but not well quantified. The Interstate Oil and Gas Compact Commission, or the IOGCC, has documented roughly 56,000 orphaned wells in the US, but this is far below the true number. In Pennsylvania alone, regulators estimate that up to 560,000 orphaned wells exist, but are not documented (IOGCC 2019). The EPA estimates that there are 2.1 million unplugged abandoned oil and gas wells in the US (US EPA 2020).

Figure 1. Documented and estimated undocumented orphaned oil and gas wells in the United States



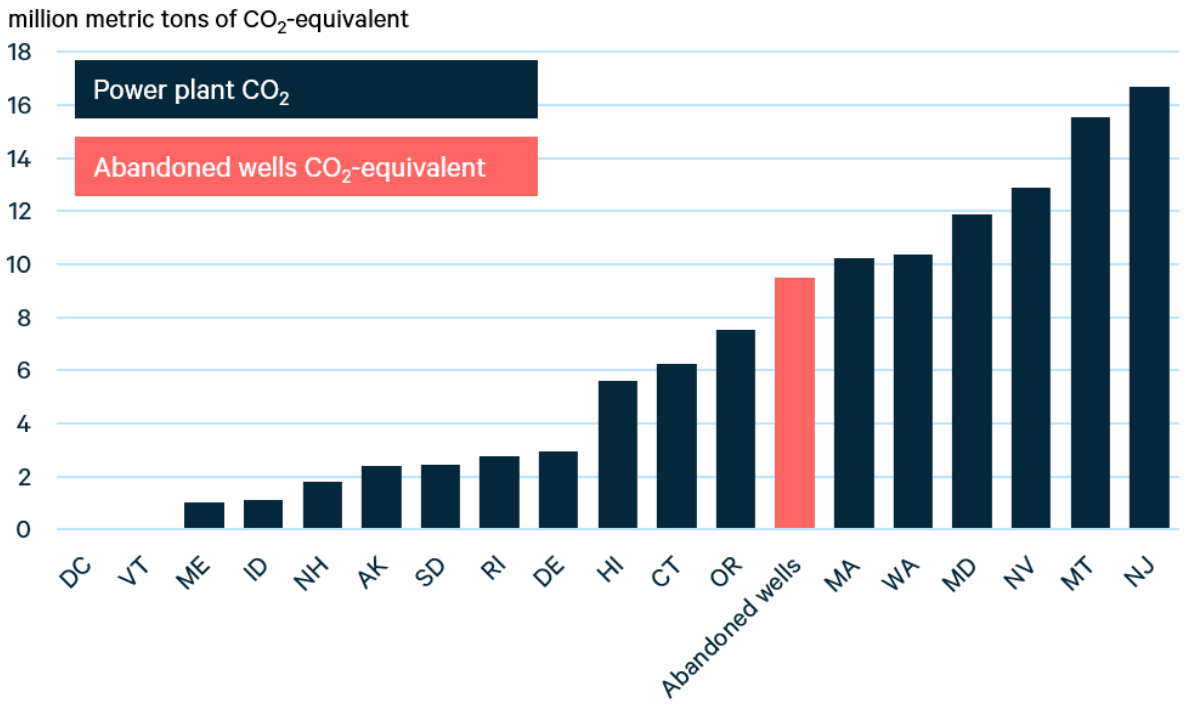
Data source: IOGCC (2019). Note: For estimated undocumented wells, some states report a range. For those states, the average of the low and high estimate is used.

Environmental Risks of Orphaned Oil and Gas Wells

These wells pose several environmental risks. They can endanger above- and below-ground water resources. They also release methane, a greenhouse gas that, pound for pound, is roughly 30 times as powerful as carbon dioxide over a 100-year time period (IPCC 2013).

The EPA (2020) currently estimates that unplugged abandoned wells emit 280,000 metric tons of methane each year,[1] equivalent to roughly 9.5 million metric tons of carbon dioxide.[2] For reference, that's about as much CO_2 as all of the power plants in Massachusetts.

Figure 2. CO_2 emissions from state power plants and CO_2-equivalent emissions from abandoned wells



Data source: US Energy Information Administration (2020).
Note: CO_2 emissions from 2017. CO_2-equivalent assumes a 100-year methane global warming potential (GWP) of 34, higher than the GWP of 25 used in EPA's Greenhouse Gas Inventory (2020).

[1] There is substantial uncertainty over methane emissions from abandoned wells. For example, see Kang et al. (2016), Townsend-Small et al. (2016), Kang et al. (2019), or Riddick et al. (2019).

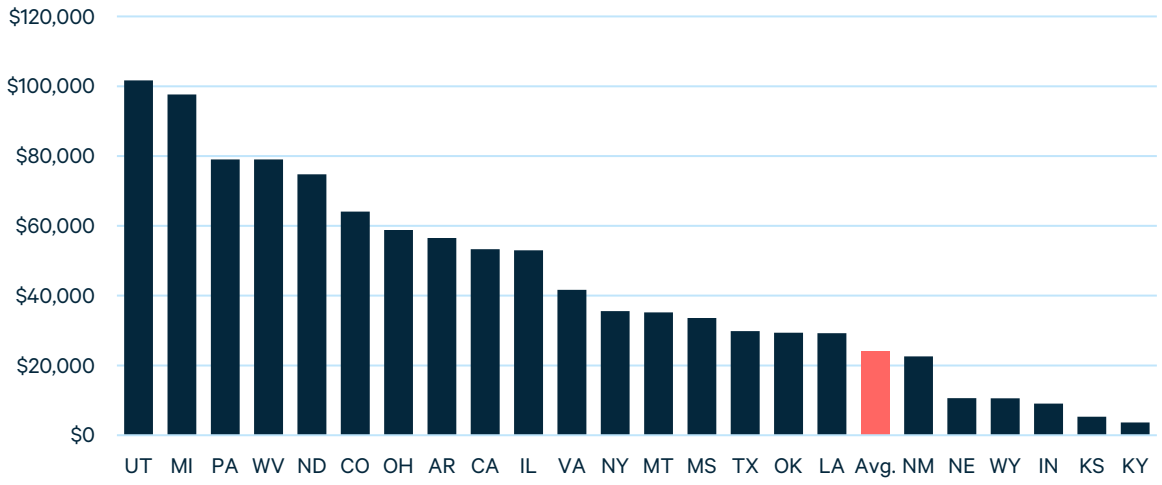
[2] This figure is higher than the EPA's estimate in its 2020 Greenhouse Gas Inventory because I use the IPCC's 100-year methane global warming potential (GWP) of 34, whereas the EPA uses an older GWP for methane of 25. Note that using a 20-year GWP of 86 results in an estimate of roughly 24 million metric tons of CO_2-equivalent (IPCC 2013).

Costs of Plugging Wells

The costs of plugging and restoring well sites vary widely. Some wells pose greater risks to groundwater, meaning that plugging operations are more complex. Some are easily accessible, while others are in hard-to-reach places or found on a steep hill. And some wells are deeper than others, requiring additional time and resources.

Recent estimates provided to the IOGCC (2019) range from over $100,000 per well in Utah to less than $4,000 in Kentucky. The national average is roughly $24,000 per well. Using this average, the cost of plugging and restoring 56,000 wells would be $1.4 billion.

Figure 3. Average plugging and restoration costs per well



Data source: IOGCC (2019)

Cost-Effectiveness of Methane Emissions Reductions

As with all policies, it is appropriate to consider the cost-effectiveness of this approach.

If we plug 56,000 wells at a cost of $1.4 billion, use EPA's methane estimates, and assume that the cement plug prevents emissions for 100 years, we arrive at a cost of roughly $5,600 per ton of methane emissions prevented. This is equivalent to a cost of $168 per ton of carbon dioxide.[3]

These abatement costs are higher than the US government's 2016 estimate for the social cost of methane and social cost of carbon (Interagency Working Group on Social Cost of Greenhouse Gases 2016b; 2016a), but similar in magnitude to some estimates published recently in the peer-reviewed literature (e.g., Ricke et al. 2018; Daniel, Litterman, and Wagner 2019).[4]

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[3] Again I use here the IPCC's 100-year methane global warming potential (GWP) of 34. Note that using a 20-year GWP of 86 results in an estimate of roughly $66 per ton of CO_2-equivalent.

[4] For recent estimates of the cost-effectiveness of current and recent state and federal climate policies, which show a very wide range, see Gillingham and Stock (2018).

Estimated Labor Requirements to Plug Wells

Turning now to jobs, I have gathered estimates of labor needs from regulators in Colorado, North Dakota, Pennsylvania, and Alberta, Canada. On average, they estimate that plugging 10 wells requires 2.4 person-years of work.[5] If this number stays constant, plugging 56,000 wells would create roughly 13,300 jobs for one year. At a cost of $1.4 billion, the cost per job is roughly $105,000.

Table 1. Estimated job-years required for well plugging in different states

Number of wells	Alberta	Colorado	North Dakota	Pennsylvania	Average
10	1.0	2.2	4.3	2.1	2.4
56,000	5,543	12,277	23,908	11,481	13,302

Sources: Internal communications with oil and gas regulators in Alberta, Colorado, and Pennsylvania, citing historical data. North Dakota estimate comes from recent reporting (MacPherson 2020), quoting Lynn Helms (Director of the ND Department of Mineral Resources).

Key Uncertainties and Future Research

Before concluding, I'd like to mention two important issues related to the feasibility of implementing a program to plug tens thousands of wells.

From an industry perspective, I have spoken with experts from two large oilfield service companies, who are confident that industry could scale quickly to plug wells.

But there may be challenges from a regulatory perspective. State programs follow standardized protocols for contracting that help prevent waste, fraud, and abuse. But these protocols would also slow the deployment of any large-scale well plugging effort.[6] In addition, states would need to monitor and verify well-plugging activities to ensure the jobs are done right. To oversee a large plugging program, they would likely need to add or re-assign staff.

Conclusion

In conclusion, a federal effort to plug orphaned and abandoned oil and gas wells has the potential to create a large number of jobs in struggling communities and reduce pollution at reasonable cost. It appears that industry could scale quickly to do this work, but there could be some challenges for state programs ramping up administrative capacity.

[5] Confidential estimates from two large independent oil and gas companies are similar to these figures.

[6] For example, Pennsylvania regulators estimate that it typically takes 4 to 5 months from initial bid development to work beginning in the field. They note that under emergency protocols (which could be authorized by the state), this could be reduced to 2 to 4 weeks.

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