No Well Left Behind

Evidence-based policy options to improve Alberta's management of orphan wells

August 2026

Amanda Bryant

PEMBINA Institute

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The Pembina Institute
#802, 322 – 11 Avenue SW
Calgary, AB T2R 0C5
403-269-3344

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These acknowledgements are part of the start of a journey of several generations. We share them in the spirit of truth, justice and reconciliation, and to contribute to a more equitable and inclusive future for all.

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Executive summary

Alberta faces a growing orphan well crisis that poses significant risks to the environment and to the provincial economy. Orphan wells are non-operating oil and gas wells with no responsible owner. They often become orphaned when the most recent owner becomes insolvent without decommissioning the well or reclaiming the land. Orphan wells can leak methane and other pollutants, contaminate land and water, and pose health and safety risks to the public. The scale of the problem continues to worsen, driven by weak policy and insufficient financial safeguards.

This report provides an overview of existing and proposed policies to address orphan wells specifically and oil and gas liabilities more broadly. We argue that there is a need for sound public policy that manages economic liabilities and mitigates human and environmental harms more effectively than current policies, which too often fail to uphold the legal principle that polluters must pay to clean up after themselves. We summarize the main findings of two independent research projects: methane measurements conducted by McGill University and economic modelling performed by Environmental Defense Fund (EDF). We then develop policy recommendations based on that research and our own assessment of policy gaps.

Key research findings

The findings below are based on preliminary results from measurements conducted at 143 orphan wells in Alberta and British Columbia by McGill University, EDF's cash flow analysis of nearly 130,000 unplugged wells in Alberta, and our own analysis of policy gaps.

- While average emissions from individual orphan wells are low, a small proportion of high-emitting wells accounts for the majority of emissions.
- Annual methane emissions from orphan wells in Alberta and B.C. may exceed 30 kilotonnes of methane, equal to the emissions from consuming over 320 million litres of gasoline or over 1.7 million barrels of oil.
- Most unplugged wells in the cash flow analysis (76%) have a negative net-present value and are therefore likely to become liabilities.
- In addition, approximately one-third of the unplugged wells analyzed are at risk of becoming orphans.
- Plugging all wells at risk of becoming orphans would create over 40,000 jobs.
- An escalating inactive well fee can disincentivize long-term inactivity and make plugging the economically optimal decision for operators.

- Governance gaps, including an insufficient orphan well levy and a lack of upfront security requirements comparable to the stringent security requirements placed on new renewables projects, increase the risk of more wells being orphaned.

Recommendations

1. **Investigate and address regional variation:** Collect and analyze region-specific data on orphan well characteristics and methane emissions and develop tailored mitigation strategies.
2. **Identify and plug high emitters:** Prioritize identification and mitigation of high-emitting wells and introduce monitoring and follow-up requirements for known problem wells.
3. **Define operator health rigorously:** Establish a clear and transparent definition of operator financial health that is stringent enough to prevent the economic burden of well cleanup falling on the public.
4. **Impose an escalating inactive well fee:** Introduce a fee structure that makes prolonged inactivity more costly than plugging, with safeguards to prevent gaming the system.
5. **Increase the orphan well levy:** Scale industry funding to match current and anticipated liabilities, ensuring that the non-profit Orphan Well Association can fully meet its mandate to close orphaned wells without reliance on public funds.
6. **Establish fair security requirements for new energy projects:** Require upfront security for new wells that is at least on par with that required of the renewables industry and is based on realistic and transparent closure cost estimates.

1. Introduction

Alberta has had an orphan well problem for decades. Ineffective provincial policies to address oil and gas liabilities mean that the orphan well crisis in Alberta will likely continue to worsen.

Orphan wells are non-operating wells that lack a responsible owner, often because the last owner went bankrupt. In Alberta, these wells become the responsibility of the Orphan Well Association (OWA), a non-profit organization that has a mandate to close them. It is funded by industry levies ($154.56 million in 2026[1]) but also benefits from interest-free government loans ($337 million in repayment obligations in 2025[2]). The association is significantly under-resourced given the size and scale of the orphan well problem, which continues to expand as companies indefinitely defer paying cleanup costs during profitable years before later entering insolvency or bankruptcy.

As a result, many orphaned wells have not been properly closed and cleaned up, posing serious environmental and health risks through the release of toxic pollutants into the air, soil, and water. Orphan wells can also affect property values and land use.

The Alberta government must prioritize policy to ensure orphan wells are closed and cleaned up and to prevent the province's nearly 80,000 inactive wells from becoming orphans. Inactive wells are wells that have not produced for a specified number of months, which varies depending on the type of well.[3]

To date, government policies have failed to adequately manage the economic and environmental risks of orphan wells. The purpose of this report is to recommend sound, evidence-based policy options to improve the governance of these wells. It serves as a companion piece to two independent analyses, drawing on their findings to inform its recommendations. The first is a methane measurement study conducted by McGill University researchers.[4] The second is an economic modelling analysis performed by Environmental Defense Fund (EDF).[5]

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[1] AER, *Bulletin 2026-15: 2026/27 Orphan Fund Levy*, March 31, 2026. https://www.aer.ca/about-aer/media-centre/bulletins/bulletin-2026-15

[2] Drew Yewchuk, *Why the Polluter Has Not Paid: Alberta's under-funded orphan program* (C4RE, 2025), 4. https://responsibleenergyab.ca/wp-content/uploads/c4re-report-why-the-polluter-has-not-paid-albertas-under-funded-orphan-program-may-2025.pdf

[3] AER, "Well Status," June 17, 2026. https://www.aer.ca/data-and-performance-reports/information-hub/well-status

[4] Zachary Mailhot, Gloria Ding, Paola Prado, et al., "Methane Emissions from Orphan Oil and Gas Wells in Alberta and British Columbia," presented at the *PTAC Methane Leadership Summit, Banff, April 14–15, 2026*. Note that the results reported here are preliminary and likely to change when the study is published.

[5] Maureen Lackner and Christine Gerbode, "Unearthing Future Orphans: Evaluating End-of-Life Well Risk in Alberta," *EDF Economics Discussion Paper Series* (2026). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=7261278

2. Alberta's orphan well problem

Alberta has over 350,000 non-producing wells, nearly 50,000 of which are known to be unplugged.[6] Unplugged wells are wells that have not had their wellbores sealed permanently with cement. The category is broad and includes high-producing, low-producing, inactive, shut-in, and some orphan wells.

Non-producing wells produce no economic benefit while posing significant environmental and public health risks. They can leak methane and toxic pollutants, contaminate soil and groundwater, reduce agricultural productivity, harm human and animal health, and in some cases, even explode.[7] It is therefore vital that these wells be:

- properly abandoned through permanent plugging with cement, cutting below ground level, capping with a metal plate, and burial;
- remediated through the cleanup of any on-site contamination; and
- reclaimed through restoration of the land to its pre-development condition (or equivalent).

Oil and gas companies are legally required to perform and pay for closure of their infrastructure. This is a condition of the approval to extract resources. Companies can profit from developing the resources of the land, but they must clean up after themselves.

The costs of abandonment, remediation and reclamation are liabilities because they represent an obligation that someone is responsible for paying. Estimates of the oil and gas industry's liabilities in Alberta vary widely but are at least in the tens of billions of dollars.[8] Since Alberta lacks regulated timelines for closing unused wells, operators frequently leave them inactive for years or decades to postpone paying for closure costs.

Many companies defer paying for cleanup until they reach bankruptcy. At that point, their wells are designated as orphans and become the responsibility of the OWA. The orphan well levy is intended to cover the costs of their cleanup and is set at the discretion of the Alberta Energy Regulator (AER) in a process that experts say lacks transparency and relies heavily on industry

[6] Louise Klotz, Liam Woolley, Bianca Lamarche, et al., "Supporting Information: Sevenfold underestimation of methane emissions from non-producing oil and gas wells in Canada," Table S4. http://www.doi.org/10.1021/acs.est.4c05602?goto=supporting-info

[7] *Unfinished Business*, 4–5.

[8] AER, "Estimated Liability and Licensee Capability." https://www.aer.ca/data-and-performance-reports/industry-performance/liability-management-performance-report/estimated-liability-and-licensee-capability

input.[9] As of July 2026, the OWA has $1.66 billion in estimated closure liabilities, while the orphan levy for fiscal year 2026/27 is just $154.56 million,[10] demonstrating that the association is badly underfunded. It would take over 10 years of this level of funding just to clean up the existing orphan wells, but each year new orphan wells are added to the inventory.

The orphan well inventory increases significantly when companies with large numbers of wells go bankrupt. For example, the bankruptcy of Long Run Exploration Ltd. in April 2026 increased the province's orphan well inventory by 70% overnight.

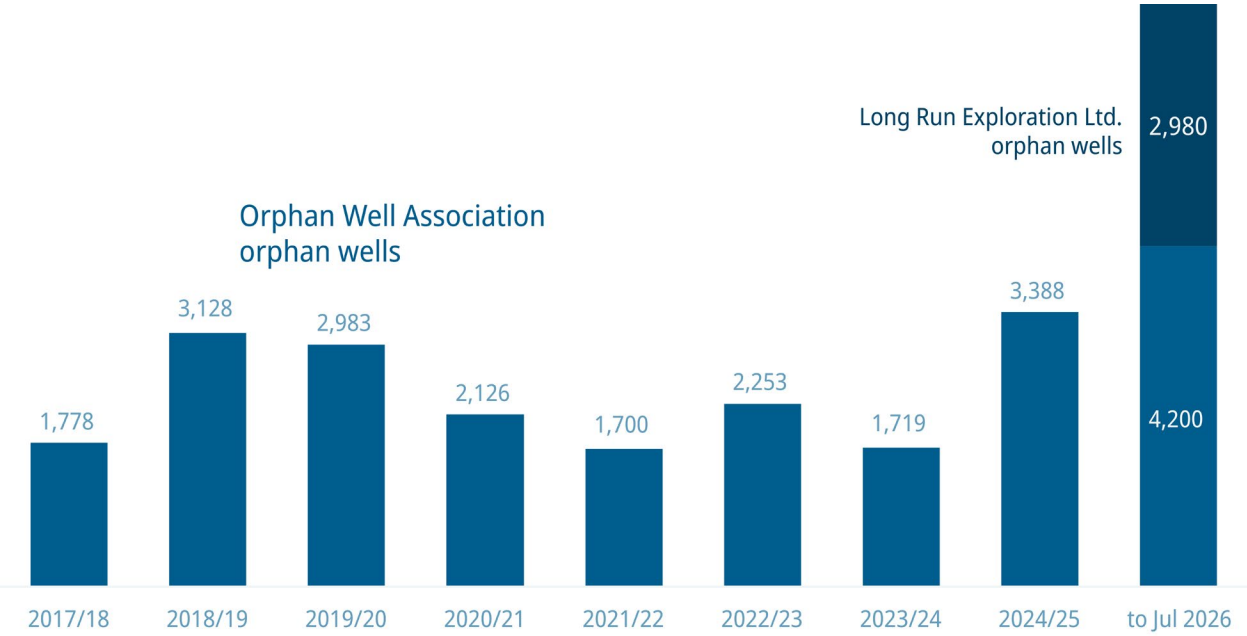

Figure 1. Total wells in OWA inventory requiring decommissioning and reclamation, as of July 2026

Data source: OWA[11]

Such bankruptcies are frequently foreseeable, as operators may display signs of financial distress for years before entering bankruptcy, including regulatory non-compliance and unmet financial obligations.

[9] Drew Yewchuk, Shaun Fluker, Martin Olszynski, *A Made-in-Alberta Failure: Unfunded Oil and Gas Closure Liability* (University of Calgary School of Public Policy, 2023), 21. https://journalhosting.ucalgary.ca/index.php/sppp/article/view/77468/56981

[10] AER, *Bulletin 2026-15: 2026/27 Orphan Fund Levy*, March 31,2026. https://static.aer.ca/prd/documents/bulletins/Bulletin-2026-15.pdf

OWA, *Annual Report 2025/26* (2026). https://cdn.prod.website-files.com/66a3c445f4f5971ff979146e/66a3c445f4f5971ff9791700_OWA%20Annual_2023-WEB_v2.pdf

[11] Data retrieved from annual reports. https://www.orphanwell.ca/about-us/annual-reports

For instance, oil and gas companies must pay taxes to the municipalities in which they operate. As of 2024, Alberta's oil and gas sector owed $253.9 million in unpaid municipal taxes.[12] Companies that have wells on private lands must also compensate landowners by paying land rent. If they fail to do so, landowners can submit a claim to the Land and Property Rights Tribunal. The tribunal has handled over 35,000 claims since 2016.[13]

Taxpayers are paying the price. The Government of Alberta paid $30 million on behalf of delinquent oil and gas companies in 2024 alone and has recovered less than 0.5% of that money.[14]

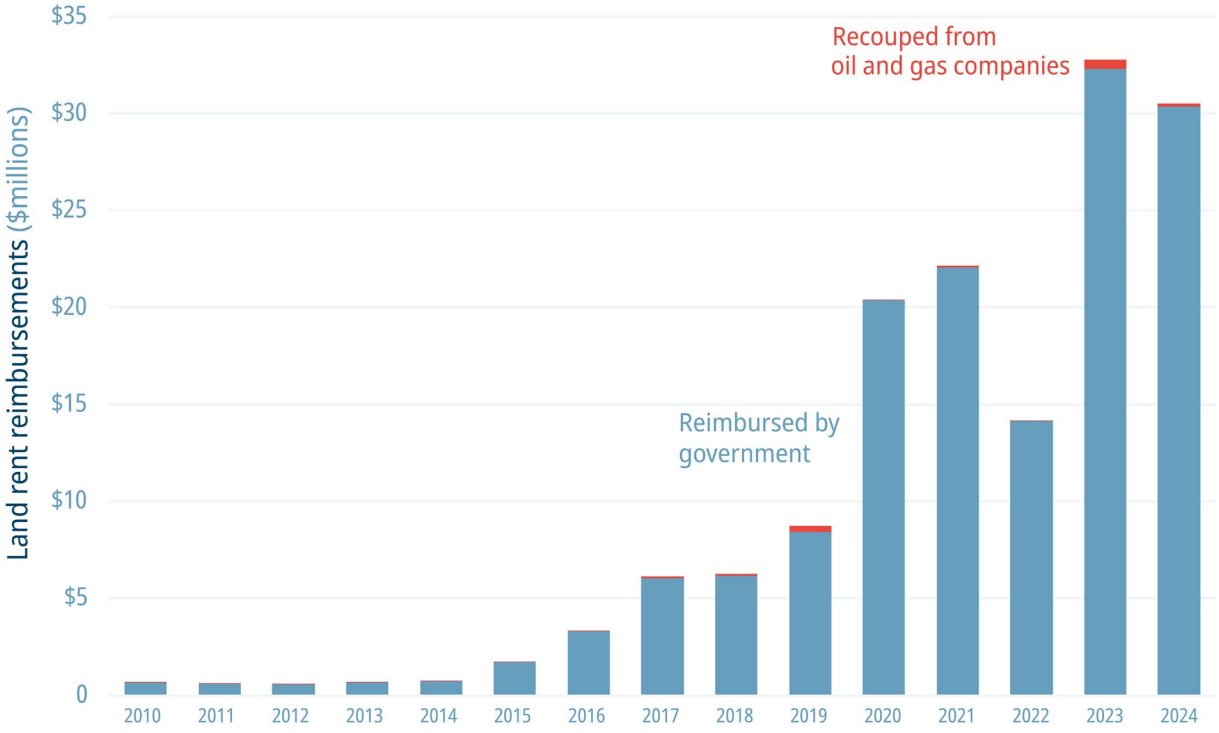

Figure 2. Land rent payments made by the Government of Alberta on behalf of delinquent oil and gas companies

Data source: The Narwhal[15]

Every dollar of public money spent to cover the unmet financial obligations of the oil and gas industry is a dollar not spent on essential public services such as education and healthcare. Should oil prices decline as the global energy transition accelerates, more wells may become

[12] Rural Municipalities of Alberta, "Unpaid Oil & Gas Taxes: Worsening Crisis Calls for a Collaborative Solution," news release, March 12, 2025. https://rmalberta.com/news/unpaid-oil-and-gas-tax-survey/

[13] Sharon Riley, "Alberta Spent $30M on Unpaid Land Rent for Delinquent Oil and Gas Companies in 2024," *The Narwhal*, July 28, 2025. https://thenarwhal.ca/alberta-oil-and-gas-unpaid-rent-2024/

[14] "Alberta Spent $30M on Unpaid Land Rent."

[15] "Alberta Spent $30M on Unpaid Land Rent."

financially unviable, increasing the likelihood that the liabilities borne by Albertan taxpayers will continue to grow.

2.1 Existing policies

The Liability Management Framework is Alberta's current policy framework for addressing oil and gas liabilities. Its key components include the following:

- **Licensee Capability Assessment (LCA):** An assessment of a company's financial capacity to meet its regulatory obligations, including closure obligations. It incorporates factors such as financial health, estimated liabilities, the remaining lifespan of assets, infrastructure and site management, the pace and level of closure spending, and regulatory compliance history.
- **Industry-wide closure spend quota:** A required amount for companies to collectively spend each year on closure activities, as determined by the AER. (For 2026, it was $750 million.[16])
- **Licensee closure spend quotas:** A requirement for individual licensees to spend a minimum amount on closure activities, determined by their share of inactive liabilities and level of financial distress.
- **Closure nomination process:** A process that allows landowners to nominate for cleanup any wells or facilities that have been inactive or abandoned on their land for at least five years.

The LCA replaced the much-criticized Licensee Liability Rating program, which was a ratio of operator assets to liabilities known to overestimate company health and underestimate liabilities.[17] While the LCA is intended to be more "holistic" by integrating a wider array of criteria, concerns remain about the lack of transparency in its decision-making process and the broad discretion granted to the regulator.[18] Similar concerns have been raised about other components of the Liability Management Framework. Experts have pointed out that the basis on which the AER determines closure spend quotas is unclear and that updates to methods for estimating plugging costs have not been accompanied by corresponding updates to reclamation and remediation cost estimates.[19]

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[16] AER, "Closure Spend Quotas." https://www.aer.ca/regulations-and-compliance-enforcement/liability-management-programs/inventory-reduction-program/closure-spend

[17] *A Made-in-Alberta Failure*, 12, 18.

[18] Susanne Calabrese, Tanya Jemec, and Barry Robinson, "Submission to the Alberta Energy Regulator's Invitation for Feedback on Revised Liability Directives," November 8, 2024. https://ecojustice.ca/wp-content/uploads/2024/11/2024-11-05-AER-Public-Comment-on-LMR-Replacement-Directives-3-002.pdf

[19] Drew Yewchuk and Shaun Fluker, "Grading the 2024 AER Liability Management Performance Report," *ABLawg*, February 5, 2025. https://ablawg.ca/2026/02/05/grading-the-2024-aer-liability-management-performance-report/

In theory, industry-wide and licensee closure spend quotas have the potential to reduce indefinite well inactivity. However, the actual effectiveness of the quotas is difficult to assess due to overlapping policies and programs, including the federal Site Reclamation Program.[20]

Since closure work takes years, it is too early to tell whether the closure nomination process (which began in 2023) is working. A sharp drop-off in accepted nominations was observed after the first year. The reasons for this drop-off are unclear.[21]

2.2 Proposed Alberta government policies

Decades of weak government policies have contributed to the accumulation of oil and gas liabilities, with tens of thousands of wells allowed to sit inactive and thousands of orphaned sites transferred to the OWA.

The Mature Asset Strategy (MAS) is a government report containing 21 policy recommendations aimed at addressing the province's aging oil and gas infrastructure and preventing the orphan well crisis from worsening.[22] Mature assets are those "at a stage where production rates are declining, making it marginal or uneconomic to continue operation at present or at some point in the near future."[23] The policy proposals in the report do not strengthen the oil and gas sector's accountability for its liabilities and could have the opposite effect. The report, initially leaked to the media in March 2025, emerged from closed-door discussions with a select group of invitees on issues such as unpaid taxes and land rents, closure liability funding, and closure regulations.

The MAS does not align with the principle that polluters must pay to clean up after themselves. Instead, it transfers cleanup responsibilities to special purpose entities. These entities, referred to as HarvestCo and ClosureCo, would be third-party companies created by the province. HarvestCo would produce the "last drops" from mature wells and (in theory) generate funds for closure. ClosureCo would take ownership of mature wells and assume the associated closure liabilities.

The details of how these companies would work and what their relationship would be to the government — and therefore taxpayers — are not clear. What is clear is that the business model of using revenue generated by producing the last drops of mature wells to fully fund their

[20] "Site Rehabilitation Program." https://www.alberta.ca/site-rehabilitation-program

[21] Drew Yewchuk and Shaun Fluker, "A Review of Closure Nomination for Inactive Oil and Gas Sites and AER Updates to Directive 088," *ABlawg*, October 24, 2025. http://ablawg.ca/wp-content/uploads/2025/10/ Blog_DY&SF_Dir088.pdf

[22] Government of Alberta, *Mature Asset Strategy: What we heard and recommendations report* (2025). https://open.alberta.ca/dataset/c1e0fc7b-ee55-4797-b640-5a2f4657d895/resource/0fcdf8c6-86a1-4e41-97f6-65e175982423/download/em-mature-asset-strategy-2025-04.pdf

[23] *Mature Asset Strategy*, 17.

closure is unsound. Wells nearing the end of their producing lives are often only modestly profitable (if at all), and the MAS assumes a government entity would be able to turn a profit when the private sector could not. At the same time, cleanup costs can be significant. If and when the business model fails, it remains unclear whether there will be anything to prevent the costs from falling on the public, especially if ClosureCo and HarvestCo are backed by taxpayers.

Most of the MAS recommendations either do nothing to address the growing problem of end-of-life liabilities or risk making it worse. What is needed is strong, evidence-based public policy that adequately manages economic liabilities, mitigates environmental risks and harms, and respects the principle that polluters must clean up after themselves. The recommendations presented below are designed to meet these objectives.

3. Methane emissions from orphan wells

3.1 Preliminary measurement results

At first glance, orphan wells would seem more likely to leak methane to the atmosphere than some other non-producing wells given that many are orphaned before being plugged and unplugged wells emit more methane on average than plugged wells.[24] Measurements of orphan wells in Colorado suggest that orphan wells do indeed emit more,[25] but research in Canada has so far been limited. Assessing methane emissions from these wells should be a top priority given that methane is an extremely potent climate warmer, with over 80 times the warming power of carbon dioxide in a 20-year timespan, and is associated with serious air quality, health and safety risks.[26]

In 2025, McGill University researchers conducted ground measurements at 143 orphan wells in Alberta and B.C. According to their preliminary analysis (the final results may differ), the average methane leak rate was 160 g/hr in Alberta and 6 g/hr in B.C. Similar to other types of non-producing wells,[27] a small proportion of the orphan wells sampled were responsible for most emissions, with 8% of wells accounting for 99% of total measured methane emissions. A few of the wells sampled were leaking significantly, including 3 wells that were leaking above 10 kg/hr. Extrapolating from these findings, orphan wells in Alberta and B.C. may emit over 30 kt/yr of methane.

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[24] Louise A. Klotz, Liam Woolley, Bianca Lamarche, et al., "Sevenfold Underestimation of Methane Emissions from Non-Producing Oil and Gas Wells in Canada," *Environmental Science & Technology* 59, no. 18 (2025), 9010. https://doi.org/10.1021/acs.est.4c05602

[25] Stuart Riddick, Mercy Mbua, Arthur Santos, et al., "Methane Emissions from Abandoned Oil and Gas Wells in Colorado," *Science of the Total Environment* 922 (2024), 3. https://doi.org/10.1016/j.scitotenv.2024.170990

[26] Amanda Bryant, *Unfinished Business: Addressing the emissions and environmental risks of Canada's non-producing oil and gas wells* (Pembina Institute, 2025), 4-5. https://www.pembina.org/sites/default/files/2025-08/Unfinished_Business.pdf

[27] Nicholas Gianoutsos, Karl Haase, and Justin Birdwell, "Geologic Sources and Well Integrity Impact Methane Emissions from Orphaned and Abandoned Oil and Gas Wells," *Science of The Total Environment* 912 (2024), 1. https://doi.org/10.1016/j.scitotenv.2023.169584

James Williams, Amara Regehr, and Mary Kang, "Methane Emissions from Abandoned Oil and Gas Wells in Canada and the United States," *Environmental Science & Technology* 55, no. 1 (2021), 566. https://doi.org/10.1021/acs.est.0c04265

James Williams, David Risk, Alexander Marshall, et al., "Methane Emissions from Abandoned Coal and Oil and Gas Developments in New Brunswick and Nova Scotia," *Environmental Monitoring and Assessment* 191, no. 8 (2019), 566. https://doi.org/10.1007/s10661-019-7602-1

3.2 Discussion

When assessing the scope of emissions from non-producing wells such as orphan wells, survey methods must be appropriate for the source in question. Many aerial technologies are still limited when it comes to detecting, quantifying and attributing small leaks. In most cases, individual non-producing wells are too small and potentially too diffuse a source of methane emissions to be detectable using aircraft-mounted sensors.[28] Close-range methods tend to be more successful at finding small leaks,[29] underscoring the importance of the ground-based surveys that were conducted.

The average leak rate of orphan wells measured in B.C. was low. Leak rates in Alberta were higher but still low compared with producing wells. However, this does not mean that these emissions are insignificant. Small leaks from individual wells can add up over time if left unaddressed. If a significant proportion of Alberta's thousands of orphan wells were emitting even small amounts of methane, the cumulative emissions could become substantial over time.

To put the estimated 30 kt/yr of methane emissions from orphan wells in Alberta and B.C. into perspective, 30 kt of methane is equal to the emissions from consuming over 320 million litres of gasoline or over 1.7 million barrels of oil. It also exceeds the annual methane emissions from B.C.'s entire upstream natural gas sector.[30]

[28] Natalie Pekney, J. Rodney Diehl, David Ruehl, et al., "Measurement of Methane Emissions from Abandoned Oil and Gas Wells in Hillman State Park, Pennsylvania," Carbon Management 9, no. 2 (2018), 165. https://doi.org/10.1080/17583004.2018.1443642

Khalil El Hachem and Mary Kang, "Reducing Oil and Gas Well Leakage: A Review of Leakage Drivers, Methane Detection and Repair Options" Environmental Research: Infrastructure and Sustainability 3, no. 1 (2023), 11. https://doi.org/10.1088/2634-4505/acbced

[29] Cassandra Pozzobon, Yajing Liu, James Kirkpatrick, et al., "Methane Emissions from Non-Producing Oil and Gas Wells and the Potential Role of Seismic Activity: A Case Study in Northeast British Columbia, Canada," Environmental Science & Technology 57, no. 51 (2023), 21677. https://doi.org/10.1021/acs.est.3c06062

Scott Seymour, Donglai Xie, and Mary Kang, "Highly Uncertain Methane Leakage from Oil and Gas Wells in Canada Despite Measurement and Reporting," Energy & Fuels, 14 (2024), 13083. https://doi.org/10.1021/acs.energyfuels.4c00908

[30] Environment and Climate Change Canada, "Canada's Official Greenhouse Gas Inventory," 1990-2024 GHG Emissions by IPCC Sector for British Columbia (Excel workbook). Available at ECCC Data Catalogue, https://data-donnees.az.ec.gc.ca/data/substances/monitor/canada-s-official-greenhouse-gas-inventory/

3.3 Recommendations

Recommendation 1: Investigate and address regional variation

Mean leak rates between B.C. and Alberta differ by an order of magnitude, indicating that regionally specific policies are needed. However, it is necessary to understand the reasons for these regional differences. We recommend collecting region-specific data on orphan well characteristics and emissions, analyzing relationships between well attributes and leak frequencies and rates, and developing regionally tailored mitigation strategies.

Recommendation 2: Identify and plug high emitters

A small number of orphan wells are responsible for most of the emissions, which has important implications for mitigation efforts. First, the more wells that are sampled, the greater the likelihood of finding the worst polluters. Finding these wells and accounting for their emissions is key to ensuring that methane inventories are accurate. Second, efficient strategies can target a small percentage of orphan wells for plugging while significantly reducing total emissions. Policies should therefore prioritize identifying and mitigating the highest-emitting wells and should incorporate stringent monitoring and follow-up requirements for known problem wells.

4. Wells at risk of becoming orphans

4.1 Economic modelling results

Alberta has over 230,000 unplugged conventional oil and gas wells. Researchers at EDF performed a cash flow analysis for nearly 130,000 of these wells. The purpose of the analysis was to estimate how many of them are at risk of becoming orphans by the end of 2050 based on estimates of expected future production capacity and costs. Of the wells assessed, roughly 27,000 were high producing, nearly 63,000 were low producing, and nearly 40,000 were shut in as of 2025. The wells were defined as follows:

- high producing: producing more than 10 barrels of oil per day
- low producing: producing, but no more than 10 barrels of oil per day
- shut in: either no production reported for 12 months or included on the AER's Inactive Wells list (if not contradicted by production data)

The detailed methodology can be found in the published version of the analysis.

In brief, the analysis estimated the long-term future value of each well. Past production data was used to model production decline for each well. This model was then used to estimate potential revenues each month through 2050, which were compared with the monthly costs of the following operator decisions: continuing to operate the well, shutting in the well, or plugging the well permanently. These monthly revenues and costs were calculated and converted to 2026 dollars using a discount rate,[31] providing the well's "net-present value" (or NPV) to the owner. The analysis was then repeated 100 times for each well using a range of cost and price assumptions. These results were then averaged to provide the well's expected NPV and the operator decision that usually occurred even as the price and cost assumptions varied.

NPV reflects projected revenues versus costs over time. High-producing wells that are expected to maintain healthy production levels for many years are likely to have a positive NPV. As a well's production declines, projected costs will eventually outweigh revenue. If this occurs relatively soon, the well's NPV falls below zero.

[31] A "discount rate" is a rate of growth used in cash flow accounting and many other types of financial and economic analysis. It is meant to reflect that a given amount of money is worth more today than it will be later (since inflation will mean you can do less with it later, and since you can potentially grow today's money through investment). A higher discount rate means that near-term costs and benefits are valued more heavily. Oil and gas companies tend to use rates around 10%, which is reflected in EDF's analysis.

Wells with positive NPVs are not considered at risk of becoming orphaned. Wells with negative NPVs and financially unhealthy owners are considered at risk of becoming orphaned. Wells with negative NPV but with healthy owners are classified as a transfer risk, as they may be transferred to less financially healthy owners and then become at risk of being orphaned.

Of the nearly 130,000 wells analyzed, roughly a quarter (24%) had a positive expected NPV, while the vast majority (76%) had a negative expected NPV. Most of the wells with a negative NPV were low producing or shut in.

Once the NPVs were established, the financial health of each well's operator was assessed to determine which wells were at risk of becoming orphaned. Operator health was determined using publicly available data about operator compliance with regulatory financial obligations, as well as licensing eligibility. Operators were considered unhealthy if they met any of the following criteria:

- They were non-compliant with closure spending or related bonding requirements.
- They had not paid their share of the orphan levy.
- They had unpaid municipal taxes as of 2024.
- They had their eligibility to hold new licences restricted by the AER.

The researchers found that 34% of the operators included in the analysis were financially unhealthy, 33% of the wells included were at risk of becoming orphaned and another 43% of them were a transfer risk. This represents a substantial level of risk with potentially significant costs. Given the chronic underfunding of the OWA, these liabilities threaten to mar the landscape for decades, impacting property values and agricultural productivity, as well as other land uses.

EDF also estimated the jobs that could be created through spending to close potential orphan wells. These values represent estimates of how increased spending in a given sector in Alberta would translate into job creation across Canada.[32] EDF's analysis found that decommissioning and reclaiming all the wells at risk of being orphaned would create almost 34,000 jobs in Alberta and over 40,000 jobs across Canada, assuming decommissioning costs of $58,110 per well and reclamation costs of $117,104 per well.[33]

[32] EDF's analysis included jobs created in the oil and gas sector and related support services, as well as jobs created due to supply chain interconnections.

[33] EDF used the low end of the estimate range set out in the Alberta Liabilities Disclosure Project 2021, adjusted to 2025 dollars. See *Estimated Cost of Cleaning Canada's Orphan Oil and Gas Wells* (Parliamentary Budget Officer, 2022), 18. https://publications.gc.ca/collections/collection_2022/dpb-pbo/YN5-241-2022-eng.pdf

Finally, the analysis included a scenario in which an escalating inactive well fee is imposed (Table 1), modelled after California's idle well fee.[34] EDF retained the timing and relative increases of California's fee schedule but used Canadian dollars, so the financial incentives are slightly smaller than California's.

Table 1. Escalating inactive well fee schedule

Time inactive	Annual fee per well (C$)
Under 3 years	$1,000
3–8 years	$2,500
8–15 years	$5,000
15–20 years	$12,500
20–25 years	$22,500
25+ years	$60,000

This scenario caused a major shift in operator behaviour, making plugging the optimal choice for nearly 100,000 wells by 2050. In contrast, under the base scenario, plugging is never the optimal financial outcome for any modelled well because it costs less, on average, to leave a well inactive than to plug it. Once the escalating fee pushes the cost of inactivity above the monthly equivalent cost of plugging, the rational decision becomes to plug the well. In this modelling scenario, operators begin to plug wells when the threshold fee reaches $2,500 per year, which occurs after 3 years of inactivity.

4.2 Discussion

Over three-quarters (76%) of the nearly 130,000 high-producing, low-producing and shut-in wells included in the analysis have a negative NPV. In the long run (at least to 2050), their costs will outweigh their economic benefits, and they will ultimately become a liability to their owners.[35] This is in some ways not surprising given that a substantial proportion of the wells are

[34] California Department of Conservation, Geologic Energy Management Division, "Notice to Operators: Requirements for Idle Wells Effective January 1, 2025," November 18, 2024. https://www.conservation.ca.gov/calgem/Documents/2024-13%20NTO%20-%20Idle%20Well%20Requirements.pdf

[35] EDF made the following cost assumptions – mean fixed operating cost for wells: $3,630/month; mean variable operating cost for oil wells: $87/month, and for gas wells: $66/month; mean cost of inactivity: $313/month. Oil and gas prices are simulated based on the AER's and the Canada Energy Regulator's price forecast trajectories to 2050.

already low producing or shut in, as well as the fact that the study had a 25-year time horizon and oil and gas wells typically have an early period of high productivity followed by years of gradually declining productivity. Nevertheless, it highlights the importance of having mechanisms to ensure that funds to cover closure are set aside during times of profitability.

Definitions and metrics of operator health have been an ongoing concern in Alberta because the AER has historically relied on overly permissive or opaque metrics to assess operator health (see section 2.1). When assessing operator health and related risks, it is crucial to apply an adequately rigorous definition. The recommendations below will provide some criteria in this regard.

EDF's results revealed that over a third of the unplugged oil and gas wells included in the analysis (almost 43,000 wells) are at risk of being orphaned, representing a sizable potential liability.

Alberta's current policy environment allows operators to leave wells inactive indefinitely. Since it costs less to maintain an inactive well than it does to plug the well and remediate and reclaim the site, operators are acting rationally by leaving wells inactive. A change in policy is needed to alter this economic incentive and make plugging the rational financial decision. EDF's scenario demonstrates how an inactive well fee could dramatically change operator decision-making in favour of plugging wells.

While the scenario indicated at what threshold in general plugging becomes the optimal choice for operators, confidential financial data would be needed to determine how many operators would be able to afford plugging and how many instead might be pushed into bankruptcy. While policymakers should consider the potential financial consequences of disincentivizing inactivity, it is not the role of regulators to shield companies from insolvency when they lack the resources to meet their legally mandated obligations to close and remediate wells. Policies that are designed to ensure that companies meet their obligations are not bad policies just because some companies will not be able to do so.

The polluter pays principle is enshrined in Alberta's Environmental Protection and Enhancement Act.[36] Covering the costs of well clean up is therefore not simply a matter of voluntary corporate responsibility; it is a legal requirement. When industry has shown an inability to reliably meet its closure obligations in a timely manner, implementing policy mechanisms to ensure compliance is just prudent governance.

Oil prices are assumed to start at $72.18/BOE and rise to $77.74/BOE. Gas prices are assumed to start at $17.17/BOE and rise to $27.70/BOE.

[36] Government of Alberta, *Environmental Protection and Enhancement Act*, E-12 RSA 2000, s. 2(i). https://kings-printer.alberta.ca/1266.cfm?page=E12.cfm&leg_type=Acts&isbncln=9780779860098

Policy must also be carefully designed to prevent operators from gaming an inactive well fee system by temporarily bringing wells back into production for the sole purpose of resetting the fee. For example, opening the valves of a non-producing well for a day should not entitle the operator to resume inactivity at the lowest end of the fee schedule. EDF's economic model assumed that the inactive well fee would reset when operators restarted production.

4.3 Recommendations

Recommendation 3: Define operator health rigorously

Past regulator uses of permissive definitions of operator health show the importance of adopting a rigorous definition. At a minimum, to qualify as "rigorous," the definition must be clear and transparent, enabling independent scrutiny. Any metrics used to assess operator health must be clearly explained and applied consistently and transparently. The prevailing consideration in determining the stringency of the definition should be the public good. In particular, the definition should be stringent enough to prevent economic risk from falling on the public. The primary interest of the regulator should not be to minimize reputational risk to companies.

Recommendation 4: Impose an escalating inactive well fee

Alberta must make it more costly for operators to keep wells inactive than to plug them by imposing an escalating inactive well fee, following California's model. The fee should reach a sufficiently high level early in the schedule to effectively motivate plugging. In EDF's modelling, this threshold occurred in the jump between $1,000 and $2,500 per year per well; more detailed information on operating and inactivity costs could help the regulator tailor this fee to the Albertan context. To prevent gaming the system, policymakers should only allow the fee to reset if a well produces more than zero barrels of oil equivalent for a suitable period of time, such as 6 months or longer.

5. Additional policy gaps

5.1 Orphan well levy

It is reasonable to think that the resources available to address the orphan well problem should be proportionate to the scale of the problem. As discussed in section 2, as of July 2026, the OWA has $1.66 billion in estimated closure liabilities, while the orphan fund levy for the 2026/27 fiscal year is just $154.56 million, representing a dramatic gap between the OWA's resources and its closure responsibilities. Moreover, the orphan well levy does not increase in proportion with growth in estimated liabilities (Figure 3).

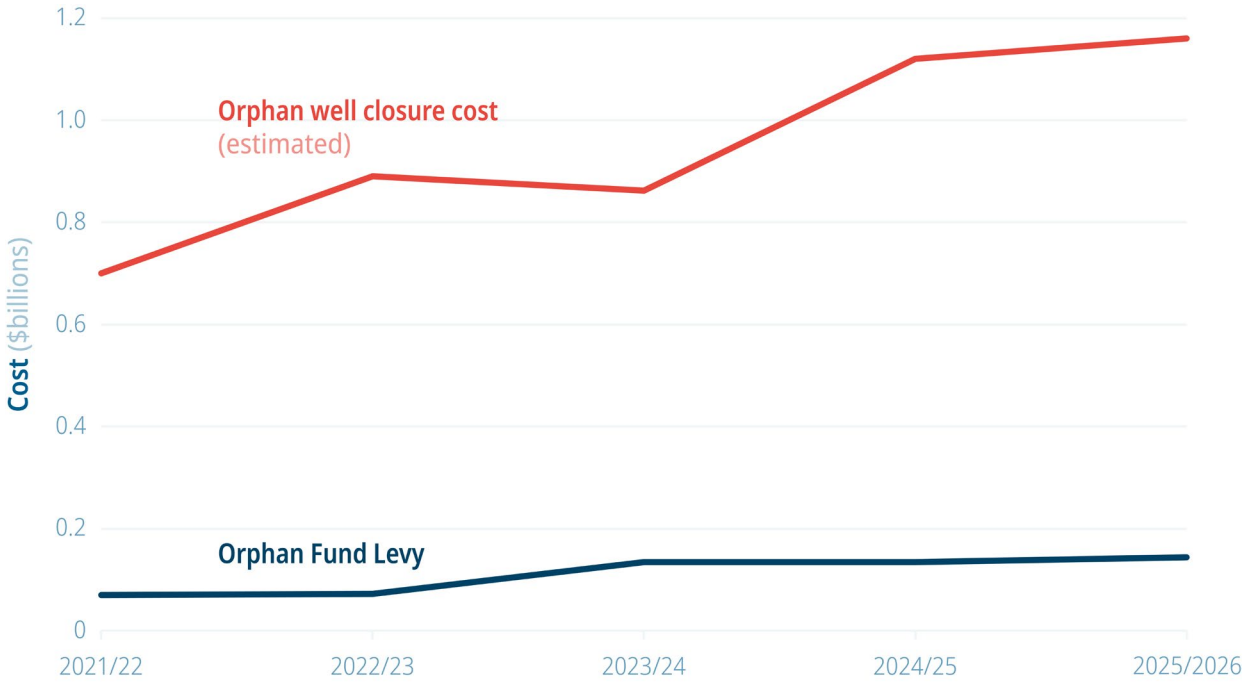

Figure 3. Orphan well levy compared with total estimated liabilities

Data source: OWA[37]

Given the current orphan well levy and the OWA's recent rates of decommissioning spending, it could take the OWA five decades or more to plug (let alone fully reclaim) all the wells found to be at risk of becoming orphaned in the EDF's NPV analysis.[38]

[37] Data retrieved from annual reports. https://www.orphanwell.ca/about-us/annual-reports

[38] Based on reported well decommissioning spending from 2023–2025 and using the lower end of the well plugging cost estimate range from the Alberta Liabilities Disclosure Project.

Recommendation 5: Increase the orphan well levy

The orphan well levy should be increased to a level that provides the OWA with adequate resources to cover its own administrative costs and the costs of fully plugging, remediating and reclaiming all wells currently in its inventory within five years, as well as those that are expected to enter the inventory in the very near term. The orphan well levy should scale in proportion to estimated liabilities. The regulator should also provide an accurate, up-to-date, and publicly transparent estimate of the sector's liabilities.

5.2 Security

Upfront security is an important tool to ensure that projects of various kinds are cleaned up at the end of their lives. Currently, Alberta requires all renewable energy projects to provide 30% of reclamation costs (rising to 60% after 15 years) as upfront security.[39] By contrast, while the AER *may* ask for a security deposit when its licensee assessment determines that a licensee is at risk of not meeting its cleanup obligations,[40] the regulator currently *does not require* upfront security for new oil and gas projects. This is the case despite oil and gas projects having much greater environmental impacts in terms of soil and water contamination, as well as air pollution, than renewable energy projects.[41]

Granted, the oil and gas sector has the OWA, which is in theory meant to ensure that industry cleans up after itself. However, the OWA should serve as a backstop when other mechanisms fail. The fact that the orphan well inventory continues to grow rapidly suggests that additional mechanisms are needed earlier in the oil and gas life cycle to prevent the overreliance on the OWA that exists today. The more security that is collected up front, the fewer wells will become orphaned and the lower the orphan well levy will need to be. Consequently, the markedly different treatment of the renewables sector compared with the oil and gas sector is not justified.

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[39] Government of Alberta, *Code of Practice for Solar and Wind Renewable Energy Projects* (2025), s. 5(4)–(5). https://kings-printer.alberta.ca/1266.cfm?page=Renewables.cfm&leg_type=Codes&isbncln=9780779853038

[40] AER, *Directive 088: Licensee Life-Cycle Management* (2026), section 3. https://static.aer.ca/prd/documents/directives/Directive088.pdf

[41] Clean Energy Council, "Soil and water contamination from renewable energy." https://cleanenergycouncil.org.au/for-consumers/fact-sheets/environment-and-planning-get-the-facts/soil-and-water-contamination-from-renewable-energy

Dalel Daâssi and Fatimah Qabil Almaghribi, "Petroleum-Contaminated Soil: Environmental Occurrence and Remediation Strategies." *3 Biotech* 12, 139 (2022). https://doi.org/10.1007/s13205-022-03198-z

Roberto Turconi, Alessio Boldrin, and Thomas Astrup, "Life Cycle Assessment (LCA) of Electricity Generation Technologies: Overview, Comparability and Limitations" *Renewable and Sustainable Energy Reviews* 28 (2013). https://doi.org/10.1016/j.rser.2013.08.013

Sharon Riley, "Stonewalled: Alberta ignored warnings about oil and gas cleanup, ex-government scientist says," *The Narwhal*, March 20 2022. https://thenarwhal.ca/alberta-oil-gas-wells-reclamation-scientist/

Recommendation 6: Establish fair security requirements for new energy projects

The AER should consider requiring new oil and gas wells to provide at least the same amount of security that is required for new renewables projects given the greater environmental impacts of oil and gas projects and the need to reduce overreliance on the OWA. These security requirements should also be based on realistic and transparent closure cost estimates.

6. Conclusion

Alberta's orphan well crisis is the result of decades of poor policy that has allowed economic liabilities to accumulate while failing to ensure that industry fully meets its cleanup obligations. Thousands of wells have already become orphaned, tens of thousands more are at risk, and the current policy framework is insufficient not only to address the true extent of the problem, but to prevent it from worsening.

Preliminary measurements of methane emissions from orphan wells suggest that they are a meaningful source of methane emissions and that a small number of high-emitting wells account for most emissions. Prioritizing these wells would provide an opportunity for efficient and impactful mitigation.

Economic modelling shows that without better financial safeguards, the number of orphan wells will continue to rise as more wells become uneconomic and operators face financial distress.

By strengthening financial requirements, improving regulatory clarity and transparency, and introducing targeted disincentives such as inactive well fees, Alberta can significantly accelerate the cleanup of existing orphan wells while minimizing future orphan well risk and ensuring that closure costs remain squarely on the shoulders of industry.

Appendix A. Glossary

Abandoned well – a well that has been permanently plugged with cement, cut below ground level, capped with a metal plate, and buried.

High-producing well – for the purposes of EDF's analysis, a well producing greater than 10 barrels of oil per day.

Inactive well – a well that has not produced in a specified number of months (6 or 12 months, depending on the type of well).

Low-producing well – for the purposes of EDF's analysis, a well producing more than zero barrels of oil per day but no more than 10 barrels of oil per day.

Mature well – defined by the province as a well at a stage where production rates are declining, making it marginal or uneconomic to continue operation at present or at some point in the near future.

Non-producing well – a well that is not currently producing oil or gas (includes inactive, shut-in, abandoned and orphaned wells).

Orphaned well – a non-operating oil or gas well with no financially solvent owner.

Reclaimed site – a site that has been restored to the condition it was in prior to development.

Remediated site – a site that has had any contamination cleaned up.

Shut-in well – for the purposes of EDF's analysis, a well with zero production reported for 12 months or included in the AER's Inactive Wells list (if not contradicted by production data).

Unplugged well – a well that has not had its wellbore sealed permanently with cement (includes high-producing, low-producing, inactive, shut-in, and some orphan wells).

Photo: Roberta Franchuk, Pembina Institute

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