POLICY BRIEF

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The Case for Banning Oil Exploration

COULOMB Renaud[1], D'AGRAIN France[1], HENRIET Fanny[2]
[1]Mines Paris - PSL University, CEDP-i3 CNRS
[2]Aix-Marseille University, CNRS, AMSE
Contact : renaud.coulomb@minesparis.psl.eu
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KEY TAKEAWAYS

CONTEXT

Burning all proven oil reserves would emit about 582 $GtCO_2e$, which is far more than the remaining carbon budget for limiting warming to 1.5°C [4, 5]. Yet oil and gas companies are expected to spend about $22 billion a year on exploration through 2027 [1, 3]. Continued exploration brings two risks: if climate policy stays weak, new discoveries add low-cost supply and raise consumption and emissions; if policy tightens later, new discoveries and associated investments end up partly stranded. These risks have fueled policy momentum: France, Portugal, Belize, Costa Rica and Greenland have banned exploration, and several participate in the Beyond Oil and Gas Alliance (BOGA) [1, 7].

OBSERVATIONS

A global model of 14,637 oil fields compares oil supply with and without exploration under two carbon-price scenarios. Outcomes are measured in social welfare, net of climate damage valued at $200/$tCO_2e$. With no carbon price, a global exploration ban raises welfare by $12.5 trillion and avoids 114 GtCO2e; with full carbon pricing, a ban costs only $0.3 trillion. Banning new oil exploration would yield large gains under current climate policies, and would cost very little even under full carbon pricing A ban by OECD and BRICS countries alone captures two thirds of the global gain [1].

RECOMMENDATIONS

Governments should stop issuing and renewing exploration licenses now; banning the development of known undeveloped fields would go even further. They should build a coalition around BOGA and the main OECD and BRICS producers, who would jointly gain from a ban, backed by conditional finance for keeping oil underground [7, 9, 10]. Early action matters: if exploration continues until 2030 and policy then tightens, 82% of post-2021 discoveries will end up stranded [1].

Why continued oil expansion is a policy problem

When carbon is underpriced, should governments keep looking for more oil? Burning known reserves would emit about 582 GtCO2e, which is about 1.2 times the remaining carbon budget (up to 2050) for the 1.5°C target estimated by the IEA in 2021, which must also cover coal, gas and land-use change [1, 4, 5, 14]. Yet oil and gas exploration spending is expected to average about $22 billion a year through 2027, before appraisal and development costs [3].

Continued exploration creates two risks. If climate policy stays weak, new discoveries raise consumption and emissions. If policy tightens later, much of the capital spent finding and developing fields is written off. These risks have pushed policymakers to act: France, Portugal, Belize, Costa Rica and Greenland have adopted exploration bans or moratoria, and several participate in the Beyond Oil and Gas Alliance (BOGA) [1, 7]. Researchers have also proposed a supply-side climate treaty [8, 13].

The industry offers two arguments to justify continuing to search for new oil resources. First, oil fields differ: life-cycle emissions per barrel are about 25% higher for bitumen than for light oil, with further variation from flaring, venting and recovery methods [1, 6]. New, cleaner fields might therefore displace production from higher-emission existing fields. Second, output from producing fields declines by roughly 5% a year even with maintenance: this can create short-term supply bottlenecks that can be relaxed by discoveries and field development. The IEA estimates that sustained field development and discoveries of about 10 billion barrels a year would be needed through 2050 to keep production constant [2]. That is an argument for maintaining today's output, not for a transition path in which oil demand falls. In the IEA's net-zero pathway, no new fields are needed beyond those already committed in 2021 [14]. These two arguments have substance from the point of view of a social planner but must be weighed against the risks of increased pollution and stranded assets.

Currently, GHG emissions remain severely underpriced; as of 2024, the ten largest oil and gas producers had only limited carbon-pricing schemes and, apart from partial coverage in Canada, none covered extraction emissions [1].

What a ban would bring

To weigh these arguments, we compare world oil supply with and without exploration. The model covers 14,637 fields discovered before 2022 and still holding reserves, plus an estimated 248 billion barrels yet to be found. Each field has its own cost, capacity and life-cycle carbon intensity; demand responds to price; and a carbon-free substitute is available without limit at $180 per barrel-equivalent. The comparison is made under two extreme settings: no carbon price, and a life-cycle price of $200/tCO2e in 2022 (the social cost of carbon) rising by 3% a year [1, 11].

With no carbon price, an exploration ban yields large gains. This setting approximates a world in which emissions are severely underpriced, which describes the current situation well. Producer cost, not social cost, then determines which fields are found and developed. Because cost and carbon intensity are only weakly correlated, the new barrels are not systematically cleaner; increased supply raises consumption as the latter is not impacted by any carbon price. Relative to laissez-faire, a global ban raises welfare by $12.5 trillion in present-value 2022 dollars (roughly half a year of US GDP), cuts cumulative production

from 1,379 to 1,138 billion barrels and avoids 114 GtCO2e, about 28% of the emissions gap between laissez-faire and the welfare-maximizing policy [1].

With full carbon pricing, a ban causes small losses. At $200/tCO2e across the oil life cycle, high-social-cost fields stay in the ground. Proven reserves already hold more cheap, relatively low-carbon oil than a climate-wise path requires: therefore, exploration triggers limited resource displacement and has little impact on relaxing field capacity constraints for low-social-cost fields. Exploration then raises welfare by only $0.3 trillion, adding 12 billion barrels of production and 5 GtCO2e.

Table 1. Cumulative outcomes under four policy regimes

Policy regime	Cumulative GHG emissions ($GtCO_2e$)	Cumulative oil production (Gbbl)	Welfare relative to first best ($ trillion)
Optimal carbon tax, exploration allowed (first best)	243	526	0
Optimal carbon tax, exploration banned	238	514	-0.3
No carbon price, exploration banned	537	1,138	-23.0
No carbon price, exploration allowed (laissez-faire)	651	1,379	-35.5

Note: The first-best carbon tax is $200/tCO2e in 2022 and rises at 3% a year. Welfare figures are present values in 2022 dollars. Emissions and production are cumulative over the full horizon. Source: [1], Table 2.

Unless otherwise indicated, estimates come from the authors' global oil-field model [1].

Exploration pays only at a high carbon price. With a $200/tCO2e social cost of carbon, exploration becomes welfare-improving above a life-cycle price of about $144/tCO2e.

A ban protects producer profits but shifts costs to consumers. By restricting supply, a global ban raises prices. Discounted producer profits (before production taxes, net of carbon taxes) are globally higher than under laissez-faire, whereas a carbon tax lowers them. This may make a ban easier for incumbent producers to accept. However, a ban weakens the polluter-pays principle and is less favorable to consumers than a carbon tax whose revenues are redistributed to households. Other taxation can be envisaged: an increase in royalty rates for instance is known to reduce discoveries much more than production from developed fields [12].

A partial coalition retains much of the gain. With no carbon price, a ban by OECD and BRICS countries (Brazil, Russia, India, China and South Africa) raises welfare by $8.2 trillion, 66% of the global-ban gain, and delivers 59% of its emissions reduction.

A development ban is a better policy. Roughly 25% of proven reserves are not yet fully developed. Banning all new development, future discoveries and known undeveloped fields alike, raises the welfare gain from $12.5 trillion to $19.5 trillion in the no-tax case; with full carbon pricing, the cost of a ban rises from $0.3 trillion to $2.4 trillion because some low-social-cost fields are also excluded.

Delay creates stranded discoveries. In a scenario where exploration continues until 2030 and an unanticipated carbon price is then imposed to match the carbon budget

consistent with the case where the optimal tax is implemented today, 118 of the 144 billion barrels discovered after 2021 (about 82%) remain unproduced by 2100. Delayed action leaves exploration spending without a producing asset.

Reform agenda

1. Banning oil exploration. New oil exploration brings little benefit when climate damage is properly priced and imposes large costs when it is not. Banning exploration is a first step towards a managed decline in oil supply. While life-cycle carbon pricing remains the first-best policy, an exploration ban offers a practical alternative where carbon pricing is incomplete. An exploration ban delivers about one-third of the welfare gains achievable under optimal carbon pricing. The prospect of future carbon pricing is no reason to allow exploration to continue today.

2. Scope of the ban. An exploration ban has to say which activities and which fields it covers; the gains reported above assume that all exploration stops in the countries that join. The simplest and most immediate step is to stop issuing new exploration licenses, without waiting for global carbon pricing: the case for a ban is strongest precisely when carbon is underpriced. Exploration already authorized under existing licenses is a more complex legal case to handle: licenses can be left to expire without renewal or extension, or bought back. The ban should cover the entire exploration process, from seismic surveys to exploration and appraisal drilling, to prevent new exploration from continuing under the guise of "appraisal" or "extensions" of existing fields. A third case is the approval of fields already discovered but not yet developed, a quarter of proven reserves: banning their development is a separate and stronger measure, with larger benefits under weak climate policy ($19.5 rather than $12.5 trillion) but a real cost ($2.4 trillion) if emissions are fully priced, since some low-cost, low-carbon fields are then excluded. Neither ban closes producing fields. Their output declines on its own by about 5% a year, but that decline is not enough to keep emissions within a net-zero budget: production from existing fields will have to be curbed as well.

3. Coalition. BOGA is the starting point. The OECD–BRICS result shows that a universal treaty is not a precondition for large gains [1, 7]. Reserve and license definitions need harmonizing, so that exploration does not continue under other names, such as expansion of existing fields or development of "known" resources. A club of first movers can establish a wider norm against new fossil-fuel projects [13]. The oil industry globally benefits from an exploration ban as it curbs supply and increases prices, yet the distributional effects of a ban vary across producers, depending on their resource characteristics and their ratio of yet-to-find resources to proven reserves. However, the fact that the oil industry as a whole gains from a ban does not make a coalition easy to build: what matters is the incentive of each country to join, and each small coalition member has an incentive to defect, if it expects the others to hold, and there is no loss associated with being outside the coalition. Therefore, producers that benefit from the price support created by others' bans can be asked to contribute to a fund rewarding verified non-exploration.

4. Permanence. A ban only shapes investment if it is expected to last. Write it into primary law and reward compliance, domestically or through international cooperation: conditional conservation loans, repayable only if exploration resumes [9], or a fund paying for verified non-exploration and for keeping resources underground [10].

5. Consumers and supply security. A ban raises oil prices and concentrates supply among incumbent producers, increasing their profits. A windfall profits tax could capture part of these gains and finance transfers to households affected by higher energy prices. Such compensation would help secure lasting public support for the policy. Since oil is

homogeneous and cheap to transport, supply risks are smaller than for other resources, but partial bans should be designed with them in mind.

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MINES PARIS
UNIVERSITÉ PARIS SCIENCES & LETTRES
TTI.5° The Transition Institute

The Transition Institute 1.5
Mines Paris - PSL
60 boulevard Saint Michel
75272 Paris cedex 06
FRANCE
the-transition-institute.minesparis.psl.eu
tti.5@minesparis.psl.eu