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Title

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Permalink

<https://escholarship.org/uc/item/5np018g8>

Journal

Nature Energy, 8(6)

ISSN

2058-7546

Authors

Deshmukh, Ranjit
Weber, Paige
Deschenes, Olivier
[et al.](#)

Publication Date

2023-06-01

DOI

10.1038/s41560-023-01273-0

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Peer reviewed

ENERGY POLICY – Well setbacks limit California’s oil supply with larger health benefits and employment losses than excise and carbon taxes

Ranjit Deshmukh^{1,2,3*†}, Paige Weber^{2,4*†}, Olivier Deschenes^{2,5*†}, Danae Hernandez-Cortes^{2,6,7}, Tia Kordell^{1,2,8}, Ruiwen Lee^{1,2,8}, Christopher Malloy^{2,5}, Tracey Mangin^{1,2,8}, Measrainsey Meng^{2,3,8}, Sandy Sum^{1,2}, Vincent Thivierge^{1,2}, Anagha Uppal^{2,9}, David W. Lea¹⁰ and Kyle Meng^{1,2,5*†}

¹Bren School of Environmental Science and Management, University of California Santa Barbara, Bren Hall, Santa Barbara, 93106, California, United States.

²Environmental Markets Lab (emLab), University of California Santa Barbara, Bren Hall, Santa Barbara, 93106, California, United States.

³Environmental Studies Department, University of California Santa Barbara, Bren Hall, Santa Barbara, 93106, California, United States.

⁴Department of Economics, University of North Carolina, Gardner Hall, Chapel Hill, 27599, North Carolina, United States.

⁵Department of Economics, University of California Santa Barbara, North Hall, Santa Barbara, 93106, California, United States.

⁶School for the Future of Innovation in Society, Arizona State University, PO Box 876002, Tempe, 85287, Arizona, United States.

⁷School of Sustainability, Arizona State University, PO Box 877904, Tempe, 85287, Arizona, United States.

⁸Marine Science Institute, University of California Santa Barbara, Santa Barbara, 93106, California, United States.

⁹Department of Geography, University of California Santa Barbara, Ellison Hall, Santa Barbara, 93106, California, United States.

¹⁰Department of Earth Science, University of California Santa Barbara, Webb Hall, Santa Barbara, 93106, California, United States.

*Corresponding author(s). E-mail(s): rdeshmukh@ucsb.edu; paigeweber@unc.edu; olivier@econ.ucsb.edu; kmeng@bren.ucsb.edu;

†These authors contributed equally.

Compared to excise taxes and carbon taxes, setback restrictions on new oil wells have larger health benefits and worker compensation losses, but are more equitable by bringing greater benefits and lower losses to Disadvantaged Communities in California. For California to meet GHG emissions targets, larger setbacks than currently proposed or additional supply-side policies are needed.

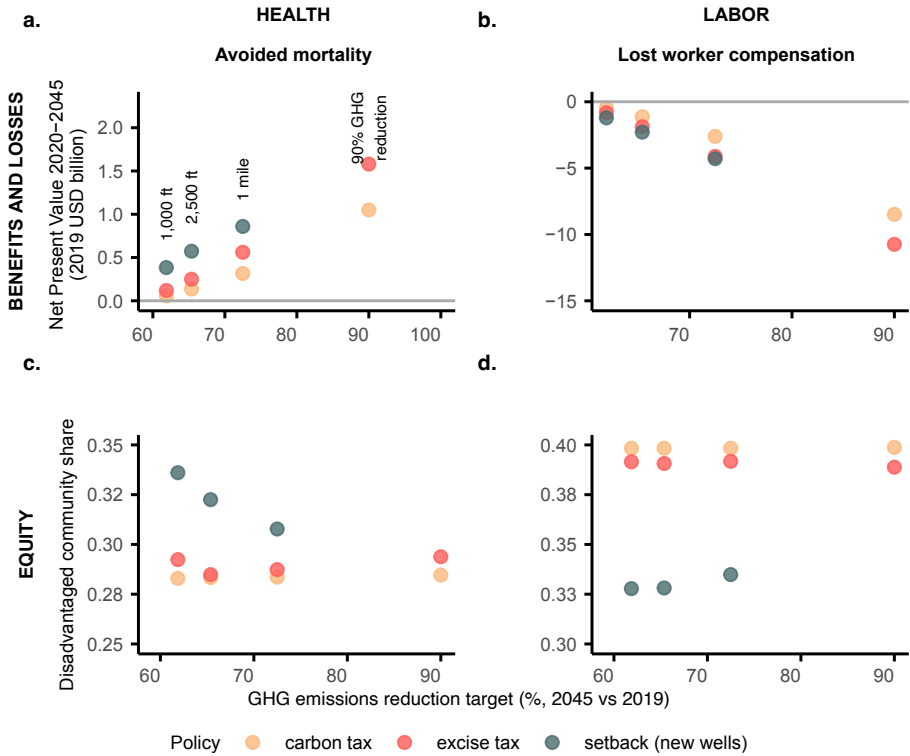
The policy problem

California's transportation GHG emissions remain high, accounting for half of statewide emissions in 2022. The state has implemented demand-side policies such as vehicle fueleconomy standards, low carbon fuel standards, and EV subsidies to tackle the issue. Yet, without complementary supply-side policies, California could continue extracting oil and exporting to the global market, potentially undermining GHG reductions. Oil well setbacks -- drilling bans on locations near homes, schools, health clinics and other sensitive sites -- and oil excise taxes and carbon taxes are all viable options to reduce GHG emissions from oil extraction. However, such policies have tradeoffs: they improve air quality but also lower employment near oil extraction, with potential for unequal distribution of costs and benefits. To support the state's goals of achieving a just environmental and energy transition, decarbonization policy needs to be evaluated not only in terms of its ability to reduce GHG emissions, but also in terms of which communities see its air quality benefits and employment costs. This policy debate is especially timely: California passed a 3,200 ft setback restriction on new oil wells in 2022 but that law has been suspended until the outcome of a referendum vote in 2024.

The findings

For a statewide 2045 GHG target, we find that setbacks applied to new oil wells generate the largest health benefits in terms of avoided mortality from reduced particulate matter air pollution, but also the largest lost worker compensation. This is followed by excise taxes and carbon taxes. Setbacks also have the most favorable equity outcomes by yielding the highest share of health benefits and the lowest share of lost worker compensation borne by disadvantaged communities. However, even a 1 mile setback—the largest considered in this study and much larger than the 3,200 ft currently proposed in California—may fail to meet California's ambitious 90% GHG reduction target by 2045. Meeting this target will require combining setbacks applied to both existing and new oil wells with other supply-side policies such as excise taxes and carbon taxes.

Fig 1: Health, labor, and equity outcomes of supply-side policies for decarbonizing oil extraction in California



Total health benefits from avoided mortality (a), total lost worker compensation (b) over 2020—2045, share of avoided mortality benefits accrued to individuals (c), and share of foregone worker compensation from oil extraction borne by workers (d) in disadvantaged communities under three supply-side policies---setbacks applied to new wells and equivalent excise tax on oil production and carbon tax on GHG emissions from oil extraction---relative to BAU to meet four 2045 GHG emissions targets. No setback distance equivalent to 90% 2045 GHG emissions target is applied. Net present values are in 2019 U.S. dollars, estimated using a discount rate of 3%. Adapted from Deshmukh, R. et al. *Nat Energy* [DOI] (2023); Springer Nature Ltd.

The study

We combine a statistically-estimated model of oil field production, an air pollution dispersal model, and an employment impact model to examine how different setback, excise tax, and carbon tax policies would lower production and GHG emissions from oil extraction, alter oil worker compensation across the state, and alter the distribution of local air pollution between disadvantaged and other communities. We draw on over

five decades of historical, field-level oil production and reserves data from California's state government agencies as well as proprietary data on oil production costs. Because of data limitations, we are likely understating the health benefits of supply-side policies by only quantifying mortality related to particulate air pollution and overstating labor costs by not being able to capture re-employment possibilities for workers affected by oil production phaseout.

Messages for Policy

- Oil supply-side policies including setbacks on new and/or existing oil wells, excise taxes, and carbon taxes can help phase out oil extraction and achieve carbon emissions mitigation goals.
- For the same 2045 GHG reduction target, oil well setbacks generate the largest statewide health benefits in terms of avoided mortality but also the largest statewide lost worker compensation, followed by excise taxes and carbon taxes.
- Setbacks may achieve the most equitable outcomes, with the highest share of health benefits and the lowest share of lost worker compensation borne by Disadvantaged Communities.
- Setbacks on new oil wells alone are unlikely to achieve California's 2045 90% GHG mitigation target and may need to be extended to existing oil wells and combined with an excise tax or carbon tax.

Source research

Deshmukh, R., Weber, P., Deschenes, O., Hernandez-Cortez, D., Kordell, T., Lee, R., Malloy, C., Mangin, T., Meng, M., Sum, S., Thivierge, V., Uppal, A., Lea, D.W., Meng, K.C. (2023) Equitable low-carbon transition pathways for California's oil extraction. *Nature Energy*

Further reading

- [1] Peter Erickson, Michael Lazarus, Georgia Piggot: Limiting fossil fuel production as the next big step in climate policy. *Nature Climate Change* **8**, 1037–2043 (2018). <https://doi.org/10.1038/s41558-018-0337-0>. **Erickson et al (2018) examine the effects of limiting oil production on carbon emissions in California.**
- [2] Elkind, E.N., Lamm, T.: Legal Grounds: Law and Policy Options to Facilitate a Phase-Out of Fossil Fuel Production in California. Technical report, Berkeley Center for Law, Energy and the Environment (April 2020). <https://www.law.berkeley.edu/wp-content/uploads/2020/04/Legal-Grounds.pdf> **Elkind and Lamm (2020) highlight the law and policy options including excise or severance taxes and oil well setbacks to facilitate the phase-out of oil production in California.**
- [3] Ericson, S.J., Kaffine, D.T., Maniloff, P.: Costs of increasing oil and gas setbacks are initially modest but rise sharply. *Energy Policy* **146**, 111749 (2020). <https://doi.org/10.1016/j.enpol.2020.111749>. **Ericson et al (2020) estimate the oil and gas resource and revenue loss under various oil well setback distances in the U.S. state of Colorado.**
- [4] Kunce, M.: Effectiveness of Severance Tax Incentives in the U.S. Oil Industry. *International Tax and Public Finance* **10(5)**, 565–587 (2003). <https://doi.org/10.1023/A:1026122323810>. **Kunce (2003) examines the impacts of severance or excise taxes on oil drilling and production activity across U.S. states.**
- [5] Mayfield, E., Jenkins, J., Larson, E., Greig, C.: Labor pathways to achieve net-zero emissions in the United States by mid-century. *Energy Policy* **177**, 113516 (2023). <https://doi.org/10.1016/j.enpol.2023.113516>. **Mayfield et al. (2023) estimate the labor impacts of a transition to a net-zero emissions energy system which includes the retirement of oil and gas infrastructure.**

Acknowledgments

We thank the State of California for supporting this work through the Green-house Gas Reduction Fund. The State of California assumes no liability for the contents or use of this study. The study does not reflect the official views or policies of the State of California.

Competing interests

The authors declare no competing interests.