LEGAL GROUNDS

Law and Policy Options to Facilitate a Phase-Out of Fossil Fuel Production in California

APRIL 2020

Berkeley Center for Law, Energy and the Environment

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Acknowledgments

CLEE thanks Amanda Prashun (J.D., Stanford Law School), Calen Bennett (J.D. candidate, UC Berkeley School of Law), and Naomi Spoelman (J.D. candidate, UC Berkeley School of Law) for their research assistance. CLEE also thanks the expert reviewers who provided valuable feedback on this report.

This report was made possible in part thanks to support from the Natural Resources Defense Council.

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Design

Layout **Odd Moxie**

Template **Studio Clear**

Photography Licensed from **Adobe Stock**

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I. INTRODUCTION & EXECUTIVE SUMMARY

California is home to the United States' most aggressive and successful climate change laws, including a renewable energy mandate that has seen carbon-free power grow to approximately one-third of statewide electricity production; a zero-emission vehicle program that has driven over 700,000 electric vehicle purchases; and state targets of 40 percent greenhouse gas emission reduction by 2030 and carbon neutrality by 2045.[1] California is also home to some of the most rigorous environmental protections in the country, with state laws like the California Environmental Quality Act and regulators such as the California Air Resources Board dedicated to protecting air and water quality, ecosystems, and public health.

At the same time, California is home to a major fossil fuel production industry. The state is the seventh-largest oil producer in the United States, behind Texas, North Dakota, New Mexico, Oklahoma, Colorado, and Alaska.[2] California's crude oil production in 2018 was approximately 162 million barrels (the vast majority from onshore wells), down from 174 million barrels in 2017 and a recent high of 205 million barrels in 2014.[3] Meanwhile, California's net natural gas production for 2018 was between 180 and 199 billion cubic feet, which ranked 15th in the nation (near the bottom of major gas-producing states, some of which produce trillions of cubic feet per year).[4] These resources are responsible for billions of dollars in state and local revenue and other economic activity each year.[5] But they come at significant risk to public health and the environment.

As a result of these risks (discussed in the accompanying sidebar), particularly in low-income disadvantaged communities, many advocates and policymakers seek ways to enhance regulation of, reduce, and eventually phase out oil and gas production in California. Given the stakes for policymakers and the public, this report seeks to outline steps California leaders could pursue on the state- and privately-owned lands over which the state has primary jurisdiction. What legal, regulatory, and policy tools are available to achieve this reduction and improve protection of public health and the environment? What authority does California's governor have to limit oil and gas production to meet state climate goals, short of (or in preparation for) a ban on the activity? What new or expanded authority could the state legislature create? And how might existing law, regulation, or local government powers affect the state's authority? This report addresses those questions and offers recommendations for decision makers seeking to bolster environmental protections and reduce fossil fuel production in California.*

* This policy brief primarily addresses actions on private and state-owned lands in California. Oil and gas on federally owned lands in California may fall under federal legal authority in addition to that of state actors, although wells drilled on federal land in California do require permitting and environmental review from state oil and gas regulators. For example, in October 2019 the Trump Administration opened more than 700,000 acres of federal lands in California for oil and gas drilling, an action the state has limited legal or regulatory authority to block (though it may seek remedies via litigation).

Climate, Environmental, and Public Health Impacts of an Oil and Gas Production Phase-out

Predicting the precise impacts of a phase-out of oil and gas production in California is beyond the scope of this report. However, such a phase-out could have three key benefits:

Climate: Fossil fuel extraction, processing, refining, and distribution are responsible for a significant portion of California's greenhouse emissions, by some estimates up to 10 percent (including one quarter of state methane emissions).[6] In addition, oil produced in the state is responsible for a substantial portion of California's total transportation emissions, which represent more than 40 percent of statewide greenhouse gas emissions.

While phasing out fossil fuel extraction would seem to create immediate benefits for greenhouse gas emission reduction, experts from the economic, scientific, and policy communities have not reached agreement on the expected impacts. If California's production decreased, long-distance oil shipments from other countries (which may have weaker local environmental and labor laws than California) could increase to compensate for some of the lost in-state supply, in particular to meet demand from California's significant fleet of oil refineries, which serve global demand for a range of petrochemical products.[7] While some analysts note that reduced production in California could align with decreased consumption under existing state climate policies, limit future lock-in of fossil fuel infrastructure investments, and contribute to a partial net reduction in global consumption, the lack of conclusive data and the impact of refinery demand render a complicated picture.[8]

Regardless of the debate over emissions impacts of supply reductions, any such initiative will be accompanied by an ongoing, parallel demand-reduction effort in California. The state is already implementing a suite of policies to accelerate zero-emission vehicle adoption to reduce in-state petroleum demand, including its vehicle production mandate, consumer rebates, and charging infrastructure initiatives.[9] These programs are essential to meet the state's target of 5 million zero-emission vehicles by 2030 and ultimately to facilitate California's

SUMMARY OF KEY RECOMMENDATIONS

State legislative leaders could:

- Implement a per-barrel or per-well severance tax or fee and dedicate the revenue to projects that further the goal of transitioning away from fossil fuel, with the level of the tax potentially tied to the carbon intensity of the oil or gas produced.
- Clarify the core supervisory authority in the oil and gas provisions of the Public Resources Code for the Geologic Energy Management Division (CalGEM) to expressly privilege environmental protection concerns over production provisions.
- Clarify CalGEM's authority to deny drilling permits based on climate and environmental considerations.
- Require CalGEM to consider alternative drilling locations and undertake an assessment of the overall environmental impacts of drilling in advance, which could potentially reduce the scope and impacts of any new projects.
- Institute drilling setbacks of 2,500 feet or more from sensitive receptors and/or launch a science-based process to determine appropriate distances to protect the health and safety of nearby residents, while ensuring that such setback policy does not preempt more stringent local rules and contains provisions to minimize challenges based on constitutional takings claims.
- Require the California Air Resources Board to develop and implement a plan for a phase-out of all in-state oil and gas production by a date that tracks overall climate goals.
- Require CalGEM and other state agencies to collaborate on a comprehensive assessment of the environmental and greenhouse gas impacts of statewide production operations to provide a factual basis for subsequent statewide actions and inform policy decisions by multiple agencies to enhance protection of human health and the environment.

Geologic Energy Management Division leaders could:

- Levy a per-barrel or per-well fee to fund oil and gas drilling application review, health and safety monitoring, and enforcement activities.
- Promulgate setback requirements under the agency's core supervisory authority to protect public health and safety and environmental quality, with assurances against preempting more stringent local rules (an action potentially contemplated among agency reforms announced in November 2019).
- Conduct site-specific environmental review under the California Environmental Quality Act (CEQA) for all new or modified wells when local governments fail to do so (or do so inadequately).
- Collaborate with other state agencies on a rigorous statewide environmental impact report for all oil and gas production, which would include enforceable requirements for site-specific mitigation measures for both new and modified projects, including for downstream uses of the fuels.

California Air Resources Board leaders could:

- Promulgate setback requirements through the agency's governance over local air districts (while ensuring such setback policy does not preempt more stringent local rules).

transition away from fossil fuel production and use.

Precedent: Although near-term climate benefits may be uncertain, reducing in-state production could set a significant global precedent: countries and states around the world might be inspired to take similar steps to limit their production if a state like California, committed to long-term climate targets, begins reducing its own domestic fossil fuel production. Reducing the supply of oil from in-state sources could also indirectly encourage vehicle manufacturers and consumers to use less polluting fuels and transition more quickly to cleaner (and possibly less expensive) ones, such as electricity or hydrogen. While a California phase-out would probably not lead to other producing economies (particularly those more reliant on oil and gas revenues) immediately limiting their own production, it would align with the broad scientific consensus that maintaining a stable global climate by limiting warming to 1.5 or 2 degrees Celsius will require a substantial portion of oil and gas reserves to go unused. California's move in this direction could also illuminate feasible policy pathways to achieve that result in other jurisdictions.[10] Ultimately, some country or jurisdiction will have to act first to keep their reserves in the ground, and as the fifth or sixth largest economy in the world, California's step in this direction would be impactful at a global scale.

Public Health, Local Ecosystems, and Environmental Justice: Oil and gas production is a major public health and environmental justice issue. Scientists have linked drilling to many public health challenges, including increased rates of asthma, cancer, and other health threats.[11] The impacts are particularly severe in disadvantaged communities, including those in California's Central Valley and greater Los Angeles areas.[12] Thousands of California's active oil wells are located in densely populated portions of Los Angeles and Long Beach, exposing tens of thousands of residents—many economically and environmentally disadvantaged—to heightened levels of hazardous air pollution.[13] In addition, California is home to a long legacy of ecosystem- and habitat-damaging oil spills, including the largest single oil spill in history (the 1910 Lakeview Gusher), the 1967 Santa Barbara offshore spill that helped launch the modern environmental movement, and most recently major surface spills in Kern County.[14]

A reduction in fossil fuel production could significantly benefit human health and the environment in disadvantaged communities and throughout the state, given the extent to which oil and gas activities are harmful to those who live and work in close proximity to wells and nearby natural resources. The environmental justice benefits of reducing production would be particularly noteworthy, given the disproportionate air and water quality impacts that disadvantaged communities suffer due to nearby oil and gas operations.[15] Community and advocacy organizations have long pushed for greater regulation of the environmental and public health impacts of oil and gas operations, and California elected officials and environmental advocates have begun to call for measures to reduce or end production in the state.[16]

In November 2019, the state took a number of steps toward enhanced regulation of the in-state fossil fuel industry, including a moratorium on approval of new high-pressure steam injection wells, an independent review of all pending hydraulic fracturing (fracking) permit applications, and a new rulemaking process for health and safety protections (potentially including mandatory setback distances between wells and sensitive receptors).[17] While the impact of these measures is far from clear, they represent both an increased commitment to limiting the public health and environmental impacts of drilling and initial steps in managing the long-term decline of production and consumption of fossil fuels in California.

- Require local air districts to promulgate setbacks, time-of-day restrictions, and more protective equipment and increased observation and maintenance rules to protect nearby residents.
- Develop a plan for the eventual phase-out of all in-state oil and gas production and assist CalGEM with implementation, based on the agencies' coordinated authority under AB 32/SB 32 and AB 1057 and in coordination with a pending state study of phase-out options under the 2019 budget.

Natural Resources Agency leaders could:

- Revise CEQA regulations to clarify ineligibility of new and modified oil-and-gas wells in existing oil fields for CEQA exemptions.

II. CALIFORNIA OIL & GAS DRILLING AND PERMITTING BASICS

Fossil fuel production in California begins with oil and gas developers. These companies first choose a location to drill based on geological studies, historical production data, and land availability. (While drilling occurs throughout the state, the vast majority takes place in Kern County.) After selecting a well site, a developer uses a drill string (a steel column that includes a drill bit and pipe to deliver fluids) to drill the well bore into the ground to an average of nearly 5,000 feet for crude oil and 6,500 feet for natural gas.[18] While drilling, the developer delivers a mixture of water, clay, and chemicals to maintain pressure and circulate the rock cuttings back to the surface, and subsequently places well casing (steel pipe to transport the oil and gas up to the surface) with cement to create a seal and provide structural support[19]. The well operator then completes the well by perforating the casing in the oil/gas reservoir, allowing hydrocarbons to flow up the casing to the wellhead. On the surface, the operator places a series of valves (sometimes known as a Christmas tree) to control pressure or a pump jack (often with the familiar "horse head" structure) to pump fluids to the surface, if there is insufficient reservoir pressure for the fluid to flow to the surface via the well casing on its own. After drilling a well, an operator may employ underground injection, involving injecting water into wells or adjacent zones, to enhance oil recovery, maintain pressure, prevent subsidence of surrounding rock, or dispose of wastewater.[20]

Developers use these drilling techniques for "traditional" production, as opposed to non-traditional methods such as well stimulation treatment (WST), including hydraulic fracturing ("fracking"), which involves further injecting water, chemicals, and other materials into the ground in order to produce hydrocarbons from hard-to-access rock formations. Notably, while WST/fracking activity has increased significantly nationwide over the past two decades, it is generally less prevalent in California than in states such as North Dakota, Pennsylvania, and Texas, where major shale formations are home to massive WST/fracking industries. According to 2015 data, fracked wells were responsible for approximately 20% of statewide oil and gas production.[21]

Other non-traditional techniques include steam flooding and cyclic steaming, types of underground injection that are used to produce especially viscous or "heavy" oil that exists in many areas of California. These techniques rely on converting substantial amounts of water (much of it drawn directly from the oil wells) into steam and injecting it to lower the viscosity of heavy oil so it is easier to produce. This method relies on substantial energy consumption to heat the water into steam, and refining the heavy oil it produces is also particularly energy-intensive, generating up to 44 percent more life-cycle emissions than conventional oil. By some estimates the technique is responsible for 40 percent or more of total production in California.[22] In November 2019, following multiple high-profile spill events, the California Department of Conservation (CalGEM's parent agency) announced a temporary moratorium on approvals of new high-pressure steam injection wells, in addition to a WST/fracking permit review and public health regulatory review.[23]

But before they can begin these processes, developers are subject to a range of permit and approval requirements and regulations at multiple levels of government and agencies, covering land use, air and water quality, hazardous materials handling, safety, and more. CalGEM (which prior to October 2019 was named the Division of Oil, Gas, and Geothermal Resources, or DOGGR) is the main state-level oil and gas regulator, but it represents only one part of the overall approval process. Operators may need to obtain permits from or demonstrate compliance to dozens of state and local agencies. This section describes the requirements to drill a new conventional oil or gas well, but in brief they center on the following:

- The local city or county zoning and planning department issues (or denies) a permit to drill based on compliance with land use and local environmental review requirements;
- The regional air quality management district (AQMD) or air pollution control district requires implementation of emissions and vapor monitoring, reporting, and control equipment;
- The regional water quality control board requires monitoring and reporting for storage of water produced by the drilling process and issue permits for underground injection;
- The California Air Resources Board (CARB) requires methane leakage testing and control equipment, as well as compliance with the state's greenhouse gas cap-and-trade system; and
- CalGEM approves (or denies) an operator's application to drill based on technical requirements and compliance with all other state and local laws.

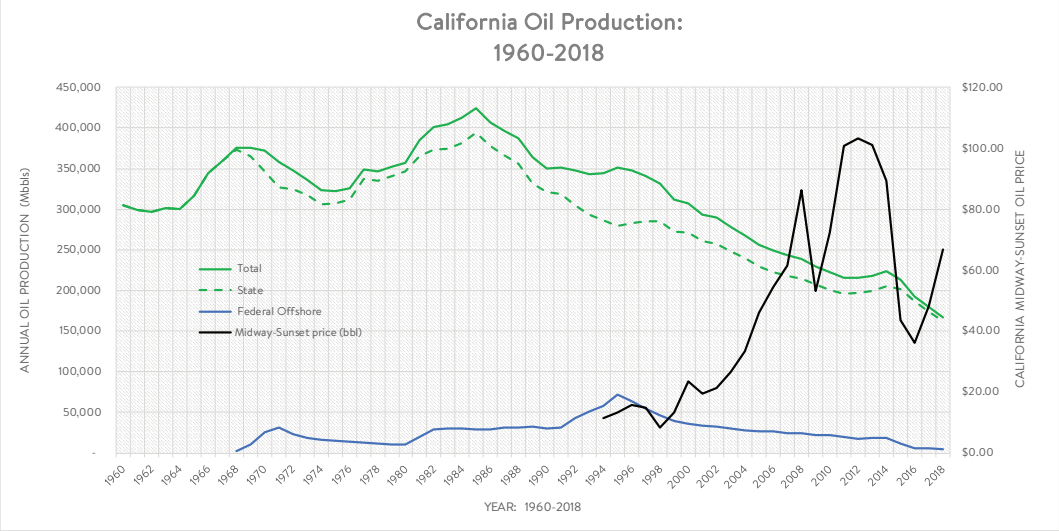
Additional requirements and permits apply for underground injection or WST/fracking techniques.[24] Underground injection wells undergo more thorough review than traditional production wells, including additional permitting related to water chemistry and geology, as well as separate joint federal-state analysis of drinking water quality impacts under the Safe Drinking Water Act. This analysis includes potential issuance of an aquifer exemption based on factors including existing water quality and demonstration that injected fluid will not migrate underground (a highly controversial issuance, as local and environmental groups argue that federal and state regulators' approvals threaten essential water supplies), as well as additional CalGEM permitting related to water chemistry and geology.[25] In addition, 2013's Senate Bill 4 (Pavley, Chapter 313) requires operators to meet enhanced permitting and operational requirements to demonstrate and maintain the safety of new WST/fracking wells with respect to nearby water resources.

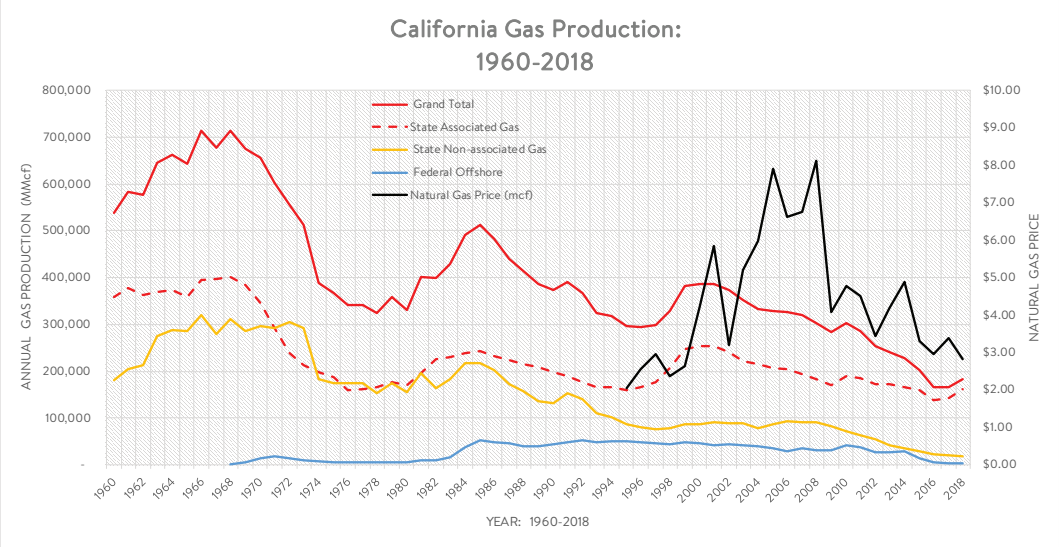
The following table lists local and state agencies that may be involved in approving or regulating an oil and gas production well in California. This summary will describe the processes for some, but not all, of these entities.

LOCAL/REGIONAL	STATE	FEDERAL
Planning/Zoning Department	CalGEM	Environmental Protection Agency
Air Quality Management District	Water Resources Control Board	Department of Homeland Security
Water Resources Control Board	Air Resources Board	
Fire Department	Department of Transportation (Caltrans)	
Water/Power Department	Office of Spill Prevention and Response	
Sanitation Department	Department of Toxic Substances Control	
	Office of Emergency Services	
	Department of Fish and Wildlife	
	Occupational Safety and Health Administration	
	Department of Motor Vehicles	

1. THE STATE OF PRODUCTION IN CALIFORNIA

California is currently the seventh-largest oil producer in the United States with approximately 162 million barrels produced in 2018, largely in Kern and Los Angeles counties. This production resulted from approximately 84,000 oil and gas wells.[26] Approximately 31,000 of these wells are categorized as idle or inactive, and thousands of those are plugged and abandoned annually.[27] But many more fossil fuel resources remain in the ground: California still has proven (i.e. geologically known and economically recoverable) reserves of approximately 2 billion barrels of oil and 1.5 trillion cubic feet of natural gas.[28] Although it remains a top oil-producing state nationwide, California's production has declined substantially in recent decades.





Source: Reproduced from CalGEM, 2018 Report of California Oil and Gas Production Statistics. "Associated" gas refers to gas produced in connection with oil wells. "Non-associated" gas is produced from wells containing only gas.

There are approximately 84,000 oil and gas wells in California, primarily in Kern County. Between February 2019 and February 2020, CalGEM approved over 2,000 new wells.

Despite this recent decline, total production remains high and development of new wells and expansion of existing wells continues. Based on a tally of CalGEM's weekly summary data for all oil and gas production drilling (i.e., excluding observation, disposal, pressure maintenance, storage, and other auxiliary wells), between February 2019 and February 2020, CalGEM approved approximately 2,254 new drill wells and 2,155 re-drill wells (deepen, sidetrack, or rework).[29†] Of those, approximately 2,028 new drill approvals (92 percent of total issued) and 1,465 re-drill approvals (68 percent) were issued in the "Inland" region (one of CalGEM's four regulatory districts, covering Fresno, Kern, Kings, and Tulare counties). CalGEM otherwise received and approved few new drill applications for the "Coastal" (Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Clara, Santa Cruz, Ventura, and part of Los Angeles counties), "Southern" (Imperial, Inyo, Orange, Riverside, San Bernardino, San Diego, and part of Los Angeles counties), and "Northern" (all other counties) regions, though there was more significant re-drilling activity in those regions.[30]

CalGEM traditionally has approved most applications to drill new conventional wells. The agency often works with operators to identify and request missing information, holding applications in "abeyance" if remedying a deficiency will extend beyond the statutory approval period. When CalGEM does not give approval, that decision typically results from the operator abandoning a drilling application after determining that the cost of performing the necessary operational or environmental reviews exceeds the potential value of the well. In addition, developers drill many new wells as part of large, older reservoirs that have already received approvals to drill and produce from local land-use authorities, streamlining the CalGEM review process. In the second half of 2019, CalGEM received approximately 1,272 new drill notices and approved 1107 (87 percent).[31] The ratio of wells drilled to applications submitted is lower (78 percent in 2018 and 79 percent in 2017), which could be due to the fact that operators have up to 12 months

† As described below, state law does not formally require CalGEM to issue permits to drill conventional wells; rather, it requires approval of notices of intent to drill filed by operators. However, CalGEM does refer to its approvals as permits.

(previously up to 24 months) to begin operations after receiving approval to drill or due to post-approval business decisions.[32]

Two counties represent the bulk of the oil and gas production in California. As of 2018, Kern County at the southern end of the San Joaquin Valley contains approximately 80 percent of the active wells in the state and 70 percent of its total production, while Los Angeles County contains about one quarter of the remaining wells and 7.5 percent of total production, primarily in Wilmington, Huntington Beach, Long Beach, and Inglewood (Baldwin Hills). Ventura, Fresno, Orange, Monterey, and Santa Barbara counties round out most of the remaining in-state production.[33] Fracking/WST activity in California is even more geographically concentrated, with up to 90 percent (and in some years 100 percent) taking place in Kern County.[34]

2. OIL AND GAS WELL APPROVAL AND PERMITTING – STATE & LOCAL PROCESSES

A. Local governments

The primary step for a developer seeking approval of a new oil and gas production well (as opposed to a well within existing oil or gas fields[35]) is to obtain a permit from the local land-use authority, typically a county or city zoning or planning department. This type of permit authorizes drilling activity in a particular location, though the developer must separately obtain from CalGEM authorization to construct and operate the well. In general, California city or county control over land-use decisions encompasses oil and gas activity, and courts have long acknowledged the ability of local governments to regulate the location of oil and gas operations, including banning them in certain areas or altogether.[36] (As described later in this report, a recent trial court decision in litigation over a Monterey County measure intended to limit production operations—currently under appeal—appears to question the extent of that authority.[37]) Many counties allow operators to drill by right in certain areas (such as under Kern County's recently invalidated county-wide project environmental review), bypassing the need for individualized local land-use approvals, but developers will still need local air district and water board permits, in addition to state-level approval from CalGEM.

The following section describes key aspects of the local government approval procedures for Kern and Los Angeles Counties, two relevant examples given their significance to overall production.

i. Kern County

In 2015, Kern County introduced a permitting regime for developers seeking permits in the unincorporated parts of the county where most drilling occurs, partly in response to oil and gas operators' calls for a streamlined, standardized process. (Incorporated cities within the county have their own approval processes, and significant levels of extraction occur in both unincorporated and incorporated areas.) The county based this program on the 2015 Environmental Impact Report (EIR) it prepared under the California Environmental Quality Act (CEQA) (discussed in more detail later in this report) to evaluate drilling impacts on ecological, community, utility, and other resources.[38] In February 2020, however, a state appeals court held that the EIR relied on inadequate analysis and mitigation of certain impacts to water supplies, air quality, and land conversion and set aside the county ordinance enforcing the permitting regime until the county completes a new CEQA analysis. Following the ruling, developers must obtain individual permits to drill under the unsystematic program that was in place prior to passage of the 2015 ordinance.[39] This decision may lead to changes in the requirements of the

permitting and mitigation regime, but pending a final disposition and/or new CEQA analysis, this report describes the original version of the 2015 program.

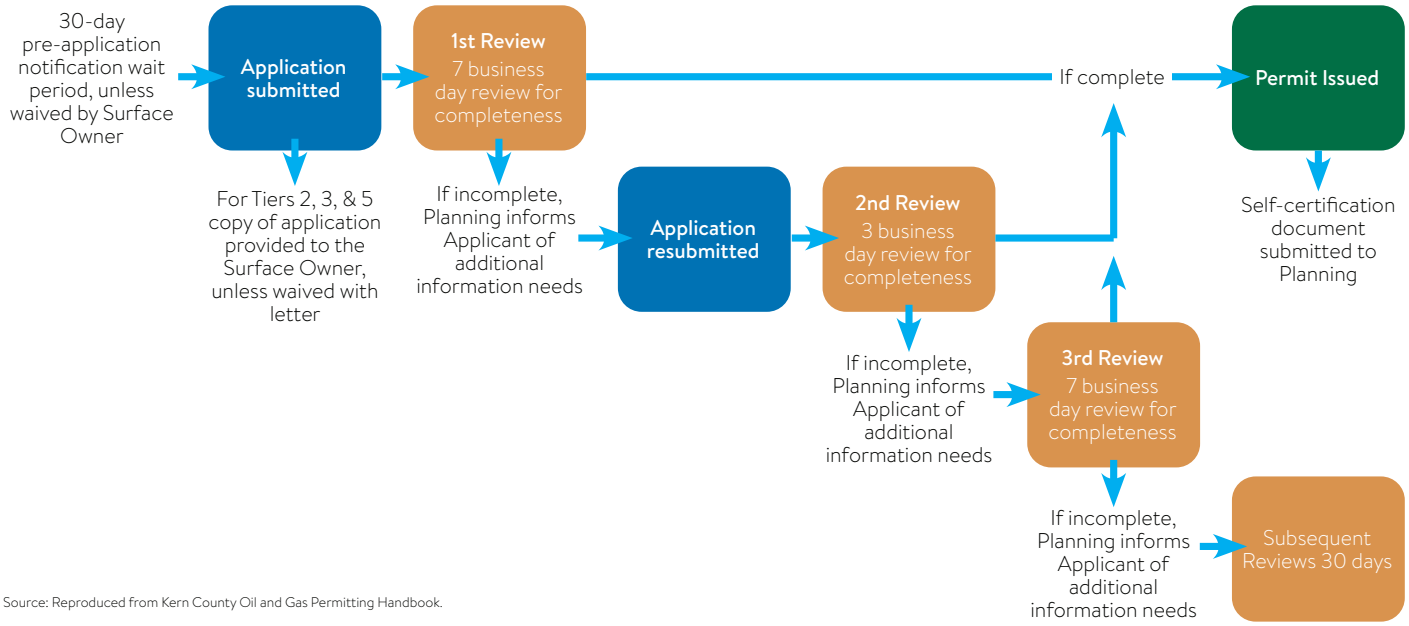
The 2015 program required operators to comply with all applicable mitigation measures contained in the county's Mitigation Monitoring and Reporting Program (MMRP). The mitigation program included measures to reduce or eliminate (or demonstrate a lack of) project-related impacts to aesthetics, agricultural resources, air quality, biological resources, cultural resources, greenhouse gas emissions, hazardous materials, land use, noise, public services, traffic, and utilities.[40] These included hundreds of individual measures such as drilling setbacks of up to 367 feet from sensitive receptors, compliance with cap-and-trade and CARB methane regulations, species protections, and more, applicable depending on site location and dynamics. The Kern County Planning Department was ultimately responsible for enforcing or confirming an operator's compliance with these mitigation measures. In practice, however, satisfying the MMRP required an operator to work with the San Joaquin Valley Air Pollution Control District, the Central Valley Regional Water Control Board, the California Department of Fish and Wildlife, the Kern County Fire Department, and other federal, state, and local agencies, in addition to the Kern County Planning Department, in order to demonstrate compliance with applicable measures before obtaining land-use approval.[41]

The now-suspended ordinance had two different sets of procedures for permitting in unincorporated areas: one for ministerial permits and another for conditional use permits,

OIL CONFORMITY REVIEWS

TIER 1

TIERS 2, 3, & 5 with Surface Owner Sign Off



Source: Reproduced from Kern County Oil and Gas Permitting Handbook.

with the former being much easier to obtain. Within the main oil and gas drilling area in the western part of the county (the "Oil and Gas Activities Boundary Area"), the ordinance deemed ministerial the first 3,647 drilling permits issued per calendar year in four of its five designated "tiers" (all areas other than residential, commercial, and open space areas, which are classified as "Tier 4"). The county devised this static number based on a review of historical drilling activity and current drilling conditions as part of the 2015 EIR. Developers needed to submit drilling permit applications to the county planning director, who would then decide within seven days if the applicant meets the requirements for a ministerial permit and then issue the permit within that timeframe or inform the applicant of missing information or requirements.[42] A failed applicant could appeal a denial within seven days to the Planning Commission and then appeal that subsequent decision to the Kern County Board of Supervisors. Notably, Kern County's oil and gas regulations did not contemplate full denial of a permit: they anticipated that county officials would either issue permits or deem applications incomplete.[43]

By contrast, all permits that Kern County issues outside the Oil and Gas Activities Boundary Area, within "Tier 4" areas, or after the first 3,647 in other areas within the Boundary Area required conditional use permits.[44] These conditional use permits were classified as discretionary, with more stringent provisions and review procedures. A developer needed to submit a conditional use permit application to the county planning director along with a complete environmental review document (prepared by the local government as lead agency; certain counties do not prepare environmental documents, in which case CalGEM serves as lead agency). The developer also needed to hold a public hearing on the application.[45] The full Planning Commission would then evaluate the permit application within 35 days of the hearing, and any appeal would go to the County Board of Supervisors. In short, the conditional use permit required more public processes, environmental review, and opportunities for veto by various levels of decision makers than ministerial permits, though both types at a minimum needed to abide by the predetermined mitigation measures discussed above. Following these permit processes, if the county approved an application, it would certify satisfactory completion to CalGEM.

According to the Kern County Planning Department, the county issued between 1,000 and 2,000 drilling permits in each of 2016, 2017, and 2018 (approving approximately 95% of applications), indicating that the 3,647 cut-off exceeded the permit demand. The county did not appear to issue any conditional use permits during that period.[46] As a result, the county did not require any of the new drilling projects in this time to undergo project-specific environmental review or mitigation. The county did, however, still require developers to comply with and fund the mitigation measures identified in the MMRP.

ii. Los Angeles County

Los Angeles County, which houses the second-most oil and gas production in California, implements a special set of permitting and regulatory requirements for the Baldwin Hills district, where the majority of drilling on county-regulated lands takes place.[47] The rules allow for ministerial review of no more than 45 new wells per year (and 600 over 20 years), requiring a conditional use permit for any additional wells; direct operators to obtain emission offsets and prepare county-specific air quality, groundwater quality and odor monitoring plans; prohibit drilling within 400 feet of developed areas; enforce extensive noise limitations; and require significant habitat restoration and ecosystem protection measures, among numerous other rigorous standards.[48] As of this publication, the county was in the process of developing new permitting requirements for wells on unincorporated land that could potentially be more stringent than those in Kern.

In 2016, county officials convened an oil and gas "strike team" consisting of directors from the regional planning, fire, public health, and public works departments. The team's mandate was to assess and report on a biannual basis "the conditions, regulatory compliance and potential public health and safety risks associated with existing oil and gas facilities in unincorporated Los

California city and county control over land-use decisions encompasses oil and gas activity, and courts have long acknowledged the ability of local governments to regulate the location of oil and gas operations, including banning them in certain areas or altogether.

Angeles County."[49] This mandate included reviewing the zoning code to eliminate ministerial, as-of-right drilling in unincorporated areas of the county and otherwise ensure best zoning practices, in addition to developing health and safety regulations and preparing a well inventory. The current planning code requires a conditional use permit for all wells drilled outside existing oil fields (as identified in CalGEM's maps) but a ministerial permit for all wells within existing fields.[50]

In September 2017, the strike team produced a set of recommendations for an updated zoning code, including elimination of by-right permitting for all areas, imposition of (unspecified) minimum setback distances, heightened air quality monitoring standards, and other requirements.[51] These changes have not yet been adopted but could serve as an example for other jurisdictions (see Appendix A for a complete list of the recommendations). In particular, the elimination of ministerial permits for all oil and gas projects, which would entail heightened environmental reviews and greater opportunities for community involvement, could serve as a potential statewide model. A 2019 study by the Los Angeles Office of Petroleum and Natural Gas Administration and Safety analyzed these proposals and suggested that new setback requirements could exact significant economic costs on the city (potentially in the billions of dollars) due to reduced revenues, abandoned well cleanups, and constitutional takings litigation.[52] However, legal experts have challenged those findings, noting that only a small subset of well operators could bring successful lawsuits for some (let alone all) of the value of their claims and that the city would not be responsible for well cleanup costs.[53]

iii. Other Local Governments

Other California local governments, which are responsible for approximately 20 percent of statewide production, have taken a variety of approaches to the well-permitting process, often relying on CalGEM for environmental review. For example, Fresno County implements a zone-based system, which generally permits drilling activity in established oil fields outside of urban areas and requires conditional use permits for all other areas. Ventura County relies on a conditional use permit issued prior to CEQA enactment to drill in any unincorporated portion of the county, leading to limited review in many cases. Santa Cruz County, which requires voter approval for any facilities built to support offshore oil and gas development, does not specifically address oil and gas permitting procedures, meaning there is no county-level environmental review process.[54]

Some counties have attempted to curb production altogether, pursuant to the long-established authority of local governments to limit or prohibit drilling as a matter of land use. For example, Santa Cruz County's General Plan contains a policy prohibiting all onshore and offshore oil and gas development within unincorporated areas.[55] In 2016, Monterey County voters approved Measure Z, which banned well stimulation or wastewater injection activities and techniques essential to fracking on county lands, as well as the drilling of any new oil and gas wells.[56] However, a state court has blocked parts of the measure, concluding that CalGEM's regulatory authority over "production techniques" and subsurface operations—in contrast to local authority over land uses and surface concerns—preempts the local ban.[57] The trial court suggested that state oil and gas law could preempt local land-use authority to ban operations altogether and held that the federal Safe Drinking Water Act preempted the portion of Measure Z that banned fracking-related wastewater injection applications. However, legal experts argue that settled California law (including the seminal *Beverly Oil* and *Big Creek Lumber* cases) clearly establishes the primacy of local authority to determine land uses, despite state-level authority to regulate subsurface operations. They contend that this primacy remains in effect even when those land use restrictions have the practical effect of limiting extractive conduct.[58] The decision is currently under appeal.[59]

B. California Air Resources Board

Fossil fuel extraction, processing, refining, and distribution are responsible for up to 10 percent of California's greenhouse emissions.[60] This includes approximately 25 percent of California's

total emissions of methane, a greenhouse gas with approximately 80 times the global warming potential of carbon dioxide and serious long-term emission reduction implications.[61] To address these emissions, the California Air Resources Board (CARB) requires well operators to comply with the "Oil and Gas Regulation" (also known as the Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities), which sets greenhouse gas emission standards for oil and natural gas production and storage facilities.[62] The standards cover operational emissions from wells and associated equipment, which are responsible for the majority of these methane emissions. CARB finalized the regulation in 2017 after a three-year workshop and proposal process, with full compliance required by January 1, 2020. The regulation addresses fugitive and vented emissions of methane from both new and existing oil and gas facilities, requiring operators to implement:

- Methane leakage testing and vapor collection for oil and gas separator/tank systems (used for collection at well sites);
- Emission control plans including vapor collection for well stimulation circulation tanks;
- Leak detection and repair procedures for natural gas compressors and pneumatics; and
- Vapor collection, measurement or monitoring for liquid storage, underground gas storage, and well casings.[63]

CARB staff estimate that the regulation will reduce emissions by 556,000 metric tons of CO_2 equivalent and 5,000 tons of volatile organic compounds (VOCs) per year, as well as toxic contaminant reductions, in the agency's regulatory impact analysis. A separate estimate projects reductions of 1.4 million metric tons of CO_2, 3,600 tons of VOCs, and 100 tons of toxics per year.[64] Local air districts implement the regulation in coordination with CARB.[65]

In addition to the Oil and Gas Regulation, pursuant to Senate Bill 887 (Pavley, Chapter 673, Statutes of 2016), CARB requires natural gas storage facility operators to conduct continuous monitoring, risk management, and leak prevention under a plan certified by CARB. The agency (potentially in conjunction with local air quality districts) may also be responsible for implementing federal new source performance standards (NSPS) that require capturing natural gas emissions, implementing leak detection programs, and other measures to limit methane and volatile organic compound emissions at well sites.[66]

Oil and gas production facilities must also comply with California's greenhouse gas cap-and-trade program, which CARB implements.[67] The program requires operators to obtain greenhouse gas emission credits equal to their operational emissions and/or purchase emission offsets for a qualifying portion of those emissions, subject to the declining cap. Similar to the oil and gas regulation, under the cap-and-trade system oil and gas producers do not have to account for greenhouse gas emissions from the downstream combustion of their fuel in vehicle engines (often known as "scope 3" emissions).

CARB also launched a program in 2017 to monitor pollution from wells in disadvantaged communities and potentially enforce clean-up actions in these neighborhoods, following the Aliso Canyon natural gas leak.[68] The Study of Neighborhood Air near Petroleum Sources (SNAPS) program involves identifying disadvantaged communities for monitoring based on their proximity to oil and gas wells and public input, analyzing air pollution and public health impacts, and posting the data and summary reports for public review, with community follow-up. According to CARB, post-monitoring next steps may include enforcement action via CARB, CalGEM, or local air districts, further testing, and input into revising state-level regulations and strategies, including potential drilling setbacks.[69] SNAPS identified first-round communities in September 2018 including Lost Hills and McKittrick (Kern County) and Baldwin Hills and South Los Angeles (Los Angeles County), but CARB has not yet taken follow-up actions.

Finally, CARB implements California's Low Carbon Fuel Standard (LCFS), a regulation that sets carbon intensity standards for transportation fuels based on their life-cycle greenhouse gas emissions, including emissions associated with production. The standards decline over time,

requiring California fuel producers and refiners to gradually reduce the carbon intensity of their operations and products, for which they earn transferable credits. Compliance methods for oil and gas production operations include carbon sequestration techniques like direct air capture (DAC), which involves capturing greenhouse gas emissions at the production site and returning it underground for storage and/or enhanced recovery. [70]

C. Air Quality Management Districts/Air Pollution Control Districts

Oil and gas production creates significant environmental and human health risks through emission of local air pollutants, often in disadvantaged communities such as in California's Central Valley and greater Los Angeles areas where the bulk of the in-state production occurs.[71] Local air quality management or air pollution control districts have primary responsibility for implementing the state-level CARB oil and gas regulation and can also develop their own region-specific air quality management and monitoring requirements. For example:

- The San Joaquin Valley Air Pollution Control District (which covers the western half of Kern County where oil and gas operations are concentrated) requires operators to register equipment subject to CARB's methane leakage testing requirements and charges annual registration fees for a variety of oil and gas equipment before it will issue a permit. The district must issue a permit within 90 days to a compliant owner/operator, while the owner/operator then reports the required data directly to CARB.[72] The district also places direct limitations on VOC and toxic air emissions from oil and gas wells.[73]
- The South Coast Air Quality Management District (SCAQMD), which covers much of Los Angeles County, including the Long Beach/Wilmington area where a significant portion of production occurs, also places direct limits on VOC and toxic air emissions from oil and gas wells (including leaks).[74] In addition, SCAQMD regulations impose liquid collection/pumping requirements, inspection and reporting requirements, and a ban on natural gas venting.[75] SCAQMD further requires oil and gas well operators to provide notice prior to new drilling, rework, or well completion, including information on sensitive receptors (residential, educational, and health care facilities) within 1,500 feet of the well location, and provide reports on combustion equipment, materials, drilling fluids, and emission and pollution control techniques.[76] Finally, SCAQMD requires operators to limit visible fugitive dust emissions to the property line of the site, employ best available control measures to limit dust emissions, limit particulate matter, and other similar requirements related to drilling site excavation/preparation.[77]

These examples demonstrate the general types of requirements that regional air quality districts impose, though significant variety exists statewide.

D. Regional Water Quality Control Boards

Oil and gas wells use and discharge a significant amount of water, potentially impacting public health, agriculture, plant and animal life, and overall water quality. According to the Central Valley (Region 5) Regional Water Quality Control Board, in 2017, Central Valley oil and gas operations generated approximately 1.9 billion barrels of produced water, of which operators discharged 392 million barrels to land, 95 million to ponds, and reused the remainder (statewide operations generated over 3 billion barrels of produced water). This water may meet drinking water quality standards and be reused for irrigation, but it may also have high concentrations of dissolved salts and metals, including benzene.[78] According to CalGEM, oil and gas operations produced approximately 100,000 acre-feet in the two most recent quarters for which summary data are available, and operators injected approximately 88,000 acre-feet of water underground (the vast majority of which was produced water from oil or gas wells).[79] The substantial water consumption for oil production purposes suggests that further research into

total water use, and the interactions between this use and state water budgeting rules including under the Sustainable Groundwater Management Act, could be fruitful for policymakers.

Oil and gas developers using and discharging this water must obtain approval from their regional water quality control board, which regulates discharge and storage of produced water. In Kern County, for example, the Central Valley water board Oil Field Program issues permits regulating the quality and quantity of oil-and-gas water discharges for activities including well development drilling fluid and mud disposal; produced water disposal and reuse; oilfield discharges to land (often enforced via waste discharge requirements or WDRs); and underground injection control practices.[80] Discharge into surface water is prohibited and discharges must meet water quality specifications. In addition, regulations enforced via the permits require a variety of notice provisions and cleanup. Operators must also conduct groundwater surveying.[81]

For well operators conducting WST/fracking, Senate Bill 4 requires compliance with additional State Water Resources Control Board (SWRCB) procedures, described in more detail later in this report.

E. California Department of Fish and Wildlife

Fossil fuel production can result in habitat disruption for threatened and endangered species. Under the California Endangered Species Act and the Fish and Game Code, a well operator must obtain a California Department of Fish and Wildlife (DFW) permit for any taking of an endangered species that is incidental to otherwise lawful drilling activities.[82] If an operator's activities give rise to a taking, the operator must submit a permit application to the regional DFW office, including analysis of the species population trends, threats, and the proposed taking's impacts. The operator must also prepare and implement a mitigation plan and identify funding sources. In addition, the well must undergo a CEQA analysis, as an incidental take permit is considered a discretionary act under the law.[83] Mitigation measures can include protective fencing, seasonal operating restrictions to avoid breeding or migration impacts, mitigation banking, or a conservation easement.[84] Of note, DFW's Office of Oil Spill Prevention and Response is also the state's lead for oil spill response activities.

In addition to these capacities, DFW staff are responsible for notifying CalGEM if they find any oil sump (an open basin used to collect excess oil or other fluids) is hazardous or constitutes an immediate danger to wildlife, with DFW and CalGEM staff then responsible for notifying the operator and ordering cleanup and remedial action, including potential closure of the operation if abatement is not satisfactory.[85]

F. Other state agencies

Other state agencies that may be involved in permitting or regulating new oil and gas well operations include:

- The Division of Occupational Safety and Health, known as Cal/OSHA, which requires operators to implement worker safety and hazard communication programs.
- The Department of Toxic Substances Control, which may require operators to perform hazardous waste manifesting for the disposal of drilling fluids under the federal Resource Conservation and Recovery Act (RCRA) and associated California laws and regulations.
- The Governor's Office of Emergency Services, which manages emergency preparedness and response for well operations, including releases of oil and gas.
- The Department of Motor Vehicles, which issues licenses for drivers who deliver drill rig equipment and other large vehicles such as drilling fluid tankers. [86]

CalGEM's Core Supervisory Authority and Purpose: Public Resources Code Sections 3106 and 3011

§ 3106(a): "[CalGEM] shall so supervise the drilling, operation, maintenance, and abandonment of wells…so as to prevent, as far as possible, damage to life, health, property, and natural resources…."

§ 3106(b): "[CalGEM] shall also supervise the drilling, operation, maintenance, and abandonment of wells so as to permit the owners or operators of the wells to utilize all methods and practices known to the oil industry for the purpose of increasing the ultimate recovery of underground hydrocarbons and which, in the opinion of the supervisor, are suitable for this purpose in each proposed case."

§ 3011(a): "The purposes of [the oil and gas law] include protecting public health and safety and environmental quality, including reduction and mitigation of greenhouse gas emissions associated with the development of hydrocarbon and geothermal resources in a manner that meets the energy needs of the state."

G. Other local agencies

Other local agencies that may be involved in permitting or regulating new oil and gas well operations include the local Certified Unified Program Agency (CUPA), typically the local fire or health department, which may issue permits for new wells and/or require operators to provide monetary bonds; local sanitation departments, which require permits for discharges into wastewater systems; and local water and power departments, which may conduct site inspections.

H. Geologic Energy Management Division (CalGEM)

i. CalGEM overview

Once an oil and gas operator has obtained all other state and local approvals for their project and undergone an environmental review as required by CEQA (discussed later in this report), it must submit an application for drilling approval to the state's Geologic Energy Management Division. The state legislature first created CalGEM (formerly DOGGR) in 1915 primarily to protect oil and gas resources from damage and destruction. The state originally called the agency the Department of Petroleum and Gas and placed it within the State Mining Bureau. Early regulations dealt with issues such as well spacing requirements and limiting production rates.[87] Rather than requiring it to protect the environment, the state tasked the department with promoting fossil fuel development, including preventing "damage to underground petroleum and gas deposits from infiltrating water and other causes and loss of petroleum and natural gas." Primarily, the agency was responsible for "supervising the drilling, operation, and maintenance and abandonment of petroleum or gas wells," with no focus on environmental concerns.[88]

Starting in the middle of the 20th century, the state expanded that authority, creating tension between the provisions and substantial dispute between environmental and pro-drilling groups, which neither state leaders nor the courts have resolved to date. First, in 1961 the legislature amended the enabling statute to define CalGEM's supervisory responsibilities to include increasing the ultimate recovery of oil and gas. Then in 1970, the legislature added a parallel provision for prevention of damage to life, health, property, and natural resources.[89] In October 2019, Governor Gavin Newsom signed Assembly Bill 1057 (Limón, Chapter 771, Statutes of 2019), which added a new statement of environmental considerations and explicit references to protecting public health and addressing greenhouse gas emissions in CalGEM's supervisory authority. Specifically, AB 1057 stated that the purposes of the state oil and gas conservation law also "include protecting public health and safety and environmental quality, including reduction and mitigation of greenhouse gas emissions associated with the development of hydrocarbon and geothermal resources in a manner that meets the energy needs of the state." The law also requires CalGEM to coordinate with the California Air Resources Board in furthering the greenhouse gas emission reduction goals of AB 32 (Nunez, Chapter 488, Statutes of 2006).[90] But CalGEM's core supervisory authority under Public Resources Code section 3106 remains dual in nature, covering both prevention of damage to health and the environment and supporting increased total recovery, with no express statement of priority between them.

As of this publication, CalGEM's work and staffing revolve primarily around technical assessments of drilling applications, with some focus on issues of public health and environmental protection (through both in-house environmental review and communication with other agencies). The agency's staff consists mostly of engineers, geologists, and related professions, and recent planning materials do not identify a need for environmental scientists, air or water quality experts, or climate change experts.[91]

ii. CalGEM drilling approval

In California, a developer that wants to drill, expand, rework, or plug a traditional well must file a notice of intention (NOI) to request and obtain CalGEM's approval to drill before commencing operations.[92] (Developers seeking to use the injection techniques described earlier must follow a separate process involving more in-depth permit filing and issuance.[93]) NOIs for new wells require various information such as the depth and elevation and well type, an assessment of the presence of freshwater or underground drinking water, and whether the location is in an urban area or near environmentally sensitive areas. Operators must also describe blowout prevention equipment and drilling fluids and disposal methods to be used, as well as technical details related to casing and cement usage, proposed work plan, and abandonment plan. A complete NOI must include evidence that the operator has satisfied local permitting requirements and CEQA requirements.[94] Finally, Senate Bill 551 (Jackson, Chapter 774, Statutes of 2019) requires operators to report the estimated cost of plugging and abandoning all wells and decommissioning facilities and increases CalGEM's reporting obligations for idle wells.[95]

CalGEM typically makes quick work of its drilling approval requests, processing and issuing most drilling approvals within a week. The agency has strong incentive to work quickly, as by statute, CalGEM must respond (at minimum, a formal acknowledgement of receipt) within 10 working days or the NOI is deemed automatically approved (although CalGEM can potentially extend that period by issuing a document known as a notice of abeyance). After receiving approval, an operator must begin operations within 24 months or else the approval will expire. Prior to drilling, an operator must also submit an indemnity or cash bond and satisfy CalGEM requirements relating to protection of hydrocarbon zones and surface/subsurface waters (via casing, cementing, and drilling techniques), blowout prevention, and well spacing.[96] These bonds can range from $200,000 for 50 or fewer wells to $3,000,000 for over 10,000 wells, while individual well bonds must be $25,000 for wells under 10,000 feet and $40,000 for those over 10,000 feet.[97]

Operators that conduct WST/fracking must conform to additional requirements separate from the NOI process.[98]

CalGEM's Well Approval Process: Public Resources Code Section 3203

§ 3203(a): "The operator of any well, before commencing the work of drilling the well, shall file with the [CalGEM] a written notice of intention to commence drilling. Drilling shall not commence until approval is given by [CalGEM]. If [CalGEM] fails to give the operator written response to the notice within 10 working days from the date of receipt, that failure shall be considered as an approval of the notice and the notice, for the purposes and intents of this chapter, shall be deemed a written report of [CalGEM]."

iii. Well stimulation treatment and fracking approval and permitting

Developers that choose to employ WST (including fracking) for oil-and-gas production face a distinct permitting path from traditional production. Developers first began using WST/fracking in California as early as the 1950s, but advances in horizontal drilling and fluid technology in the 2000s greatly increased their use throughout both California and the nation. Today, these activities occur almost exclusively in Kern County.[99]

As WST/fracking activities accelerated, members of the public and environmental groups became concerned over its environmental and health impacts.[101] In response, the California Legislature enacted Senate Bill 4 (Cal. Pub. Res. Code § 3150-3161, Cal. Water Code § 10783) in 2013 to institute a new set of regulatory and permitting requirements for production via WST/fracking.[102] The bill created a separate permitting process for WST/fracking wells, heightened water quality protection measures, and enhanced notice requirements for neighbors. Requirements include providing technical information on stimulation fluid constituent chemicals and water sources, surveys, a spill contingency plan, and more, as well as notifying neighbors within 500 feet of the boundaries of the proposed treatment. Operators must also meet heightened standards regarding well casing, wellbore integrity, separation from groundwater resources, site geological appropriateness, and storage and handling of stimulation fluids.[103] During WST/fracking operations, operators must conduct continuous monitoring of treatment fluids levels and pressures, seismic activity, and stored fluids. They must also monitor wells on a monthly basis after the treatment is completed.[104] SB 4 further required the California Natural Resources Agency to conduct a programmatic EIR for WST/fracking activities statewide, as well as a scientific study on the state of WST/fracking in California and potential environmental and health, both of which the agency completed in

Fracking: As Defined by CalGEM

Oil and gas operators sometimes use hydraulic fracturing when pore space [gaps that can be filled by gas or liquids] in the rock making up the oil or natural gas reservoir is too tight to allow the flow of fluids or gasses to the well. The hydraulic fracturing process involves a mix of fluids and substances called "proppants" injected at high pressure into an oil or gas reservoir. The mix and the force with which it is injected causes reservoir rock to fracture. When the fluids are removed, the proppants keep the cracks open. Natural gas or oil flow into the cracks and into the well.[100]

New York State's Fracking Ban

In 2015, New York regulators banned the use of high-volume fracking for oil and gas extraction. After fracking activity around the Marcellus Shale formation (which lies under large portions of western New York and much of Pennsylvania) boomed in the mid-2000s, a number of local governments passed zoning laws restricting or banning fracking, and the governor issued a moratorium pending completion of a public health review by the state Department of Health.[111] The 2014 study recommended that high-volume fracking not proceed in the state, citing a lack of sufficient information to determine the level of risk to public health and adequate mitigation. The following year, the state Department of Environmental Conservation issued an environmental impact statement (roughly parallel to a CEQA EIR) that chose a no-action alternative by which the department would establish no permitting program for high-volume fracking, issue no individual permits, and prohibit the practice, on the basis that other alternatives "all fail[ed] to limit unavoidable adverse environmental impacts and fail[ed] to address the risks and uncertainties."[112] The department found that authorizing high-volume fracking "under any scenario would not adequately mitigate adverse impacts to ecosystems and wildlife, air and water resources, community character and public health and would likely have diminished economic and social benefits."[113] While the current California regulatory regime under SB 4 presents a different legal context than exists in New York, New York's actions, and in particular its findings on statewide adverse impacts, present a potential model for California state leaders seeking to take a more decisive stand on WST/fracking.

2015 and subsequently defended against legal challenges in 2019.[105] While legislative leaders designed SB 4 to enhance environmental protection around WST/fracking, the law may not have slowed or limited WST/fracking approvals, at least prior to the programmatic review ordered by Governor Newsom in November 2019.

iv. Enhanced permitting and operational measures

SB 4 mandated increased disclosure and strengthens well construction requirements for WST/fracking, while requiring operators to obtain permits via a process separate from that for traditional wells. This process includes a requirement that CalGEM evaluate the "quantifiable risk" of the proposed operation, a provision that could authorize denial of permits on environmental grounds (although as of this publication, it was unclear to what extent CalGEM acted on this direction).[106] The law also directed a new rulemaking including, but not limited to, well integrity and fluid disclosure requirements. CalGEM's implementing regulations contain nine conditions that WST/fracking operators must continuously meet, as well as thirty-one permit application requirements.[107]

To conduct WST/fracking, an operator must obtain a special permit; hire a third party to notify neighbors within 500 feet of the boundaries of the proposed treatment and provide a 30-day waiting period, with water sampling on request; and perform pressure testing of well and surface equipment integrity and a cement evaluation.[108] Operators must also meet heightened standards regarding well casing construction, wellbore integrity, separation from groundwater resources, site geological appropriateness, and storage and handling of stimulation fluids.[109] During stimulation operations, the operator must conduct continuous monitoring of treatment fluids levels and pressures, seismic activity, and stored fluids. Finally, operators must monitor wells on a monthly basis after they complete treatment.[110] Each of these measures is designed to protect local groundwater supplies from the increased risks that fracking processes and fluids may pose.

CalGEM's detailed requirements for a WST/fracking permit application include information on the quantity, source, and composition of the fluids to be used in the process (including any toxic substances) and a comprehensive water use and disposal management plan.[114] Despite the oil and gas industry's resistance to disclosure of stimulation fluids, claiming their formulas are protected trade secrets, SB 4 took a relatively aggressive step by requiring disclosure to CalGEM of all fluid components, with protection from public disclosure for a narrowly defined set of trade secrets and exact chemical ratios.[115]

SB 4 also directed CalGEM to consider the "quantifiable risk" of a WST/fracking operation and stated that the agency "may permit" an application if it is complete, indicating that CalGEM could have discretion to premise permitting decisions on environmental considerations. But CalGEM's implementing regulations do not include such factors.[116] As of this publication, CalGEM did not appear to have integrated any express environmental protection criteria into its permitting process. In addition, the state's SB 4-commissioned technical analysis of WST/fracking concluded that only limited data exists to assess the direct environmental impacts of WST/fracking (although the analysis, as well as the state's EIR and numerous experts, identified a wide range of potential risks).[117]

v. Enhanced groundwater measures

Oil and gas well operators conducting WST/fracking must also comply with additional SWRCB procedures. SB 4 required the board to establish and implement a comprehensive regulatory groundwater monitoring and oversight program. Under the law, oil and gas well operators must implement groundwater monitoring programs based on the criteria developed by SWRCB, while SWRCB or regional water boards implement regional monitoring programs. SWRCB developed (in consultation with CalGEM) and released final criteria in July 2015.[120] The criteria characterized baseline water quality conditions in order to detect potential impacts to beneficial use waters from well stimulation treatments, while acknowledging that water well

stimulation takes place in areas that have already been drilled for oil and gas, so baseline water quality will not necessarily reflect natural conditions.[121]

Well operators must conduct monitoring to characterize conditions and detect impacts pursuant to these criteria. Operators must also develop a groundwater monitoring plan for aquifers penetrated by the well and submit these plans to SWRCB with detailed maps and cross-sections, methods, well locations and descriptions, contingency plan in case of breach, and more.[122] In addition, they must conduct sampling on a semi-annual basis following US Environmental Protection Agency (EPA) requirements for contaminated sites and submit regular reports to SWRCB.

J. California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires the state, regional, or local "lead" agency responsible for approving a proposed project to identify the environmental impacts of the project and avoid or mitigate those impacts, if feasible.[123] If decision makers anticipate that a project will have significant impacts on the environment (for example by harming air or water quality or affecting transportation patterns), the project can trigger the preparation of an in-depth environmental impact report (EIR), which requires analyzing the impacts, examining project alternatives, identifying all feasible mitigation measures to reduce or avoid significant impacts, and mandating the incorporation of those mitigation measures into the project approval, among other tasks. If lead agency staff members determine that a project will not give rise to significant impacts, they can issue a "negative declaration" requiring no further environmental review for the project; or, if a project will generate a limited, narrowly defined set of impacts, the lead agency can issue a "mitigated negative declaration" requiring mitigation measures but not a full EIR.[124]

Decision makers respond to the environmental analysis of a proposed project by modifying the project through required adoption of measures to mitigate environmental impacts; approving it (via a "statement of overriding considerations") if they determine that some impacts are not capable of mitigation and are overridden by economic, social, or other benefits; or rejecting it entirely. Importantly, government action only triggers CEQA review if the agency decision or approval is discretionary (i.e., involves some sort of policy choice or exercise of decision-making authority). If the action is ministerial (i.e., a simple evaluation of compliance with existing laws or regulations, where a compliant project is approved "as of right"), then CEQA is inapplicable. (as would be the case under Kern County's now-suspended permitting regime, discussed earlier).

Local planning agencies typically serve as the lead agency for CEQA review of new oil and gas projects; CalGEM may serve as the lead agency when a local government does not have CEQA review capacity, though this need rarely arises in practice. While the agency does assert officially that it exercises discretionary approval over well permits, as opposed to ministerial approval, the agency relies primarily on local governments for this process and usually conducts only a subsequent review of the local lead agency's CEQA findings and process, almost exclusively on "downhole" impacts not related to surface environmental impacts. Importantly, local lead agencies frequently cite (and CalGEM approves) exemptions to CEQA as a basis for avoiding undertaking new environmental review, such as for new wells at developments that predate the 1970 law (and thus may be statutorily exempted). Lead agencies also often allow developers to "tier" CEQA approvals based on prior CEQA review of a larger development project that includes the individual well in question.

As discussed later in this report, nothing in CalGEM's permit authorization statute (Section 3203 of the Public Resources Code) specifically limits its discretion to approve, alter, or deny authorization to drill. While a trial court in Kern County recently held that CalGEM's drilling approval is in fact ministerial, that case is on appeal, and courts have otherwise not yet ruled definitively on the matter. [125]

State Agency Coordination Agreements

Senate Bill 4 required CalGEM to craft formal agreements with agencies such as the California Air Resources Board, State Water Resources Control Board, local air districts, and regional water boards to delineate "respective authority, responsibility, and notification and reporting requirements associated with well stimulation treatments and well stimulation treatment-related activities."[118] Beginning in 2014, CalGEM and the agencies entered into these agreements laying out responsibility for matters like air and water quality monitoring, materials disposal, and providing public access to records as related to well stimulation treatment activities.

For example, the agreement between CalGEM, CARB, and local air districts outlined a process for CalGEM to share WST permit applications and data with CARB and the applicable air district and solicit their recommendations for air quality mitigation measures to include in the final permit; confirmed CARB and air district responsibility for air quality monitoring and required the agencies to notify CalGEM of equipment failures; required the agencies to notify each other of permit or regulation violations and allowed them to coordinate enforcement action; and required coordination on air pollution prevention planning; and provided for general information sharing.[119] These responsibilities and processes are exclusive to the context of well stimulation (as opposed to conventional wells or underground injection) but over time may build general agency capacity and practices that can enhance coordination around all drilling activities.

III. LAW AND POLICY OPTIONS TO FACILITATE A PHASE-OUT OF OIL AND GAS PRODUCTION IN CALIFORNIA

In response to the myriad environmental and public health and safety impacts, California elected officials and environmental advocates have begun to call for measures to reduce or end production in the state.[126] Policymakers have multiple options in the near term to limit oil and gas production and move toward an eventual phase-out, including taxation, greater state authority to deny or limit drill approvals, setback requirements, enhanced environmental review of proposed and renewed projects, and an outright phase-out of drilling activity based on long-term environmental needs. This section details some of these options for consideration.

State leaders can also benefit from key out-of-state examples in crafting some of these policy responses. The following section presents recommendations for California policymakers based in part on a survey of five states that present useful comparisons for different reasons:

- **Texas** and **North Dakota** are the two largest oil-producing states in the country;
- **Colorado** has production statistics similar to those of California, as well as a recent focus on oil and gas reform;
- **New Mexico** has production statistics similar to those of California; and
- **Pennsylvania** has faced a recent expansion of natural gas fracking.

These five states' approaches to oil-and-gas regulation may be instructive to California policymakers seeking to increase regulation of or limits to in-state production through steps like taxation, drilling setbacks, and enhanced well approval authority. (A complete catalog of the five states' policies discussed below is available in Appendix B.) Ultimately, these and other measures (such as air-quality agency regulation and enhanced environmental review) must have firm grounding in current California law or legislative reforms. This section identifies where such authority exists and where the legislature may need to create it.

1. Severance tax

Over 30 U.S. states have enacted taxes on oil and gas production, known as severance or extraction taxes, raising hundreds of millions to billions of dollars in annual state revenues. These taxes have mostly been in place for many decades, serving primarily revenue (rather than environmental) goals. Taxing states include all major producers, including the six states that outrank California in crude oil production (Alaska, Colorado, New Mexico, North Dakota, Oklahoma, and Texas) and those immediately behind it (Louisiana, Utah, and Wyoming).[130] In contrast, California currently imposes no general tax on the production or extraction of oil and gas, save for a de minimis assessment of approximately 55 cents per barrel of oil and 10,000 cubic feet of natural gas, which CalGEM uses to support agency operations.[131] (Certain California localities also impose their own minimal production assessments, a summary of which is included in Appendix B.[132]) Instituting a severance tax in California could raise substantial revenues, bring the state in line with all other major oil-and-gas producers, and serve one or more environmental goals, such as improving monitoring and enforcement of production activities, funding potential well-cleanup obligations, raising revenue for projects that reduce reliance on fossil fuels or improve public health and safety, and discouraging the least-efficient production.

Key questions for the design of a state severance tax statute include:

- The structure of the tax (i.e., a "true" production tax based on quantity, a tax on revenues or proceeds, or a tax on profits);

- The amount of the tax (including any provisions modifying the rate by market price or well age); and
- The allocation of revenue generated.

Summary finding: *State policymakers should consider implementing a per-barrel or per-well fee and dedicating revenue to expenses that support environmental protection and advance the transition away from fossil fuels, such as worker retraining programs or zero-emission vehicle incentives. If the state solely wishes to bolster permit review, monitoring, and enforcement activities, CalGEM could consider levying an increased per-barrel fee as a regulatory action without needing legislative approval.*

A. Tax structure

The structure of a severance tax should depend on policymakers' goals. A tax could theoretically discourage some types of production in the state, as it would create an additional, marginal cost that may tip some borderline projects (those that are least economically efficient, which may overlap with those that produce the dirtiest oil) into economic non-starters. The state already imposes special taxes on potentially harmful activities, such as cannabis, cigarette, and alcohol consumption, in order to both raise revenue and discourage those activities.[133] A tax on oil and gas production could similarly serve dual purposes. It could also operate like an economy-wide carbon tax, which many economists believe would be an effective means of greenhouse gas emission reduction, by decreasing overall emissions through increasing the cost of the emissions-generating activity.[134] Legislators structuring a tax for this purpose could consider tying the rate of taxation to the greenhouse gas emissions intensity of the product in question since, as noted earlier, some of California's oil deposits are among the most emission-intensive in the entire world. For example, a tax could adopt a graduated structure, imposing a higher rate for more emission-intensive fuels, mirroring Pennsylvania's fracking well fee structure (which declines over time), and using a tool like the Carnegie Endowment's Oil-Climate Index as a basis to determine emissions profiles of California hydrocarbons.[135] Alternatively (or in combination), a graduated tax could focus on operational methane emissions of individual production wells, based on aerial imaging that can map methane plumes with high accuracy.[136]

Limited research exists on the impact of severance taxes on overall drilling, but recent studies have found that increased severance taxes may lead to decreased drilling and that imposition of new fees can discourage drilling in inefficient or marginal areas. These studies have also indicated that while market forces likely have a greater impact than taxation or other regulatory schemes, new drilling is sensitive to price shifts including tax effects.[137] While the precise supply and revenue outcomes in California under a new severance tax would be difficult to predict, the basic economic implications are relatively clear: either drilling profits would decrease or consumer prices would increase, potentially leading to some decrease in drilling or consumption. While the 30 U.S. states that have enacted severance taxes do not appear to have comprehensively studied the economic impact of these taxes on oil and gas production, nationwide production has increased in the U.S. in recent years in response to technological developments and market dynamics, and many of the taxes have been in effect for decades. Since California's oil market is something of an "island" cut off from overland domestic supplies, the supply and demand effects of a tax could be different than in other states.[138]

California policymakers seeking to limit production overall through a severance tax could consider a per-unit tax like North Dakota's natural gas tax. Such a tax would not fluctuate with

The Interstate Compact to Conserve Oil and Gas

California is a member of the Interstate Compact to Conserve Oil and Gas, a 30-state agreement whose purpose is "to conserve oil and gas by the prevention of physical waste thereof from any cause."[127] Although the compact should not present a barrier to the actions discussed in this section, policymakers considering reforms should nonetheless note its status in state law. While the legal force and effect of the compact are unclear (limited case law and legal analysis is available), it includes a commitment to enact laws "to accomplish within reasonable limits the prevention of…locating, spacing or operating of a well or wells so as to bring about physical waste of oil or gas or loss in the ultimate recovery thereof," a measure that could potentially be read to constrict state authority to limit production in some respects.[128] However, this provision does not expressly bar a member state from enacting measures discussed in this section, such as setback regulations, health and safety measures, permitting procedures, or production taxes (which many member states impose), and the "reasonable limits" language in the compact likely provides sufficient flexibility to allow for well-crafted, science-based measures. In addition, the compact does not refer to any enforcement mechanisms or penalties for non-compliance, and the state may withdraw at any time.[129]

California's lack of a significant oil and gas production tax stands alone among major oil-producing states in the US.

oil prices, as would a severance tax based on a constant percentage of the value of produced oil and gas (which most other states levy). California leaders could also consider a flat per-well fee, similar to Pennsylvania's unconventional (i.e. fracking) well fee. Such a fee could have the most direct effect of discouraging production at the least-efficient wells. By levying a tax purely on production levels, rather than production value, California could ensure that the tax retains its value and impact regardless of global price fluctuations.

An additional consideration for legislators structuring a severance tax would be whether to account for local taxes already paid by oil and gas operations. For example, Colorado allows oil and gas operators to discount up to 7/8th of their severance tax liability based on local taxes paid, while North Dakota imposes its severance tax in lieu of local ad valorem taxes (before returning a portion of statewide proceeds to local governments). Most, if not all, California jurisdictions assess standard property and other local taxes on oil and gas operations, and some cities charge additional per-barrel assessments. (See Appendix B for greater detail on local and out-of-state measures.) If the goals of the tax include either raising new revenue or dis-incentivizing production and consumption, then discounting for these other costs (via credits or otherwise) would not be advisable.

B. Tax implementation

California could institute such a severance tax by statute, though it faces a high bar to do so in the legislature. Under California's Propositions 13 and 26, any such tax would require a two-thirds vote in each house.[139] State lawmakers have considered such a measure in the recent past: following multiple stalled severance tax bills between 2008 and 2014, Senate Bill 246 (Wieckowski), proposed in 2019, would have imposed an oil and gas severance tax of 10 percent of average statewide prices for both oil and gas production in California, with revenues deposited into the state general fund.[140] Similar 2013 and 2014 efforts both passed the Senate Finance and Appropriations committees but received no subsequent action; SB 246 never reached a vote in the 2019 session.

Another option for a severance tax could be to enact it via statewide ballot measure, although this process could entail similar political challenges given the public nature of the vote and the issue campaigns that would likely accompany it. An initiative measure circulated via petition in 2014 would have enacted a severance tax but did not qualify for the November ballot.[141]

C. CalGEM fee assessment alternative

As an alternative to avoid Proposition 13/26 requirements, CalGEM's leadership could consider increasing its existing oil and gas assessment, either in place of or in addition to legislative action to impose a severance tax, provided the agency did so for the exclusive purpose of using the funds to bolster oil and gas permitting, monitoring, and enforcement. Under state law, CalGEM has authority to assess fees on oil and gas production to fund supervisory activities.[142] CalGEM currently charges approximately 50 cents per barrel of oil or 10,000 square feet of gas produced, generating approximately $80 million to fund CalGEM's budget. However, this rate is not set by statute (CalGEM leaders determine it), and the statutory language includes no express cap on the amount. CalGEM's discretion appears limited only by the statutory purpose to "supervise and protect deposits of oil and gas," and the sources to which funds may be allocated: CalGEM's general departmental needs; SWRCB and regional water boards' activities related to oil and gas operations' impact on water resources; and CARB and Office of Environmental Health Hazard Assessment activities related to oil and gas operations' impact on air quality, public health, and public safety.[143] Pursuant to this existing statutory authorization under Public Resources Code Section 3400, CalGEM's leadership could increase the assessment to approach or equal the (much higher) amounts levied by severance tax in other states, so long as agency staff develop a plan to distribute the revenues exclusively to the named agencies for established oil and gas-related efforts. This increase could serve as

the basis for a significant ramp-up of review and enforcement in permitting and protection of water and air quality.

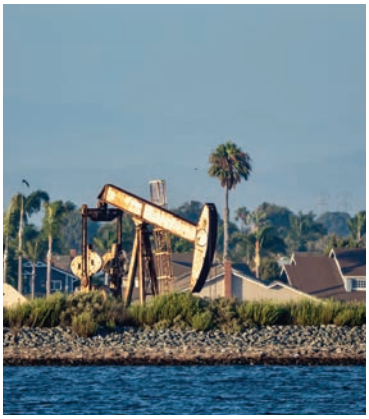
While opponents of such an agency fee hike might argue that it would violate Proposition 26, recent court cases indicate that an increased CalGEM assessment could survive such a challenge. Proposition 26, building on Proposition 13, greatly restricted the types of new fees or charges the state may impose without supermajority vote by applying the supermajority requirement to any new state levy that falls outside five narrow exceptions.[144] A state severance fee imposed only on owners and operators—in connection with the specific benefit of state authorization to drill, and with fee levels set not to exceed the costs of implementing and enforcing oil and gas regulations—could potentially satisfy one of these exceptions. Furthermore, courts have ruled that fees levied pursuant to statutes that the legislature adopted prior to 2010 and that do not exceed the costs of the program they fund are exempt from Proposition 26. For example, in a challenge to the cap-and-trade system imposed under AB 32, a California appeals court held that Proposition 26 "is not generally retrospective in operation" and applies only to newly enacted state statutes, not previously authorized agency actions that have the effect of imposing fees or increasing tax bills.[145] Furthermore, in a later challenge to the State Water Resources Control Board's adoption of an increased fee schedule pursuant to pre-2010 statutory requirements, the California Supreme Court held that Proposition 26 did not bar the increase as it was not a statutory change, and the fees did not exceed the reasonable costs of the program they were statutorily required to fund.[146] The current version of the CalGEM assessment statute dates to 1988, and the original authority dates to 1939; while increasing the assessment would constitute a change in division policy, it would fall entirely within existing legal authority. These cases thus indicate that as long as CalGEM leadership strictly adheres to the requirements of the Public Resources Code by allocating assessment funds to the named agencies for the stated purposes, Proposition 26 would not block a fee increase.

D. Tax amount

Severance taxation rates should depend on policymakers' goals, such as achieving target revenue for specific regulatory efforts, funding economic transition projects, or discouraging production. State leaders would have difficulty calculating expected revenue from a severance tax subject to variability in the price of oil and gas. But they would have more certainty calculating revenue based on a fixed per-barrel or per-well tax. As noted earlier, recently introduced legislation proposed a 10 percent rate based on average statewide prices. While political considerations and revenue needs would likely determine the level of the tax, other states' models offer some context. (While not a severance tax, a potential Proposition 13-related ballot measure in November 2020 to create "split roll" property tax, in which commercial and industrial properties are taxed based on their market value rather than purchase price plus limited annual increases, could impact oil and gas projects' total tax liabilities and the optimal level of a severance tax as well.)

States with severance taxes typically charge the taxes as a percentage of the gross value of oil and gas produced by qualifying wells, often in a range from 2 to 7.5 percent. For example, New Mexico has a flat 3.75 percent tax, but it also imposes a separate school tax of 3.15 percent on oil and 4 percent on natural gas produced, a statewide ad valorem tax of approximately 1.5 percent, and a small conservation tax of 0.19-0.24 percent.[147] By one calculation, these taxes result in an effective tax rate of approximately 9.1 percent, placing New Mexico between North Dakota (9.4 percent) and Texas (8.3 percent) when severance, production, and property taxes are combined (calculations of effective tax rates for these states vary, but generally fall between 7.5 and 12 percent).[148] As noted above, North Dakota and Pennsylvania both levy natural gas taxes independent of the value of produced hydrocarbons, calculating the taxes instead on a per-unit basis and a per-well basis, respectively.

Some (but not all) states vary the amount of the severance tax by the level of income produced or by the age of the well. For example, Colorado imposes a 2 percent tax on gross income



under $25,000, which then increases until reaching 5 percent of income over $300,000, while Pennsylvania decreases its tax per well, per year, with a starting point between $40-$60,000 in the first year and decreasing to $5-$10,000 per well by years 11 through 15. In the most extreme case, Alaska imposes an extraction tax equal to 35 percent of production profits.

E. Allocation of revenues

A voter- or legislatively-enacted severance tax could raise a significant amount of revenue. All of the states surveyed for this section (including multiple that have produced less oil and gas than California in recent years) generate hundreds of millions of dollars in annual revenue via their severance taxes. In the most extreme case, Alaska's 35 percent tax generates up to 90 percent of the state's revenues (in lieu of state property and sales taxes), supporting the bulk of government operations and an annual "dividend" paid to each state resident. This arrangement though can lead to fluctuations in the dividend and severe budget and political consequences when oil prices are low. (Low prices in recent years have been linked to cuts in infrastructure and community spending and reduced dividend payments, which is a key income source for many residents.[149])

Revenues generated by these taxes typically range from $500 million to over $1 billion per year. States distribute them primarily to a special fund to issue bonds for state capital projects, state general funds, local governments, and a special reclamation fund.[150] For example, Colorado generates annual revenue of up to $300 million, New Mexico between $500 million and $1 billion, North Dakota between $300 million and over $1 billion, and Pennsylvania between $175 and $250 million.

In general, states with severance taxes vary the allocation of generated revenues, but most distribute funds to some combination of special-purpose oil and gas funds, water and resource management funds, county and local governments, and the general fund. For example, Colorado dedicates 25 percent of revenue to a state water project fund, 25 percent to a state energy and resource project fund, 35 percent to local governments for local facilities, services, and revenue compensation, and 15 percent directly to local governments. North Dakota dedicates 70 percent to its general fund and producing counties and 30 percent to the state "legacy fund," a trust fund created by a ballot initiative constitutional amendment in 2010. And Texas sends 75 percent of its revenue to the general fund and 25% to a special school fund. Due to Texas' nation-leading oil and gas production, the tax generates billions of dollars in revenue on an annual basis.[151]

California lawmakers would face a political decision on how to allocate the substantial revenues a tax would generate. Policymakers could use the dollars to fund climate change mitigation and adaptation measures, as California has done with auction proceeds from its greenhouse gas cap-and-trade program. Such an approach could afford the greatest environmental benefits and, if committed to near-term projects, could minimize reliance risks that might arise from dedicating the revenue to the general fund, education, or other ongoing uses, as many other states do. Policymakers could also potentially bolster public support for a new tax measure by delivering benefits directly to communities through a "just transition" program that dedicates severance tax revenues to efforts directly related to climate and environmental health, such as assisting low-income communities with clean technology deployment like investments in electric vehicle chargers or water quality protection projects.

California would be unlikely to suffer from over-reliance on tax revenue because California (unlike Alaska) also imposes both income and sales taxes to fund the state budget, while oil and gas production constitutes a much smaller portion of state economic activity. But Alaska's example represents a cautionary tale that suggests California policymakers could consider limiting the use of severance tax revenues to a restricted class of projects or for reserves that can survive future downturns in market prices or total production. The use of the revenue could help further offset or discourage production, such as by investing in alternative fuels or job training for displaced fossil fuel workers. State leaders could also dedicate a portion of

revenue to increased staff and enforcement capacity at CalGEM and other agencies, which could support a number of the regulatory reforms proposed in this report. Revenue could also contribute to costs that state and local governments may ultimately face for plugging and abandoning orphaned wells, which could reach hundreds of millions of dollars. As a recent study estimated, the average cost of fully plugging and abandoning an onshore well is $68,000, while nearly 5,500 wells are likely to be or at high risk of becoming abandoned by insolvent owners or "orphaned." The potential net liabilities of these wells, which include the cost of plugging and abandoning minus available bonds, could exceed $500 million and increase to over $9 billion in the unlikely case that developers orphan all wells in the state.[152]

Ultimately, imposing a severance tax in California would require significant coalition-building (either in the legislature or among the voters), economic modeling to determine the proper level and structure of the tax to achieve desired aims, and responsible planning to avoid overreliance on funds and generate the most beneficial outcomes. In addition, should federal or state leaders ever enact an economy-wide carbon tax, policymakers in California (as well as other taxing states) would potentially want to consider whether they need to provide any credit or offset to avoid double-taxation. (However, since severance taxes and carbon taxes serve different goals and any carbon tax is unlikely to account for the full social cost of carbon, the need for such offsets or credits may be unlikely.) As the examples of California's peers demonstrate, levying such a tax could not only raise hundreds of millions of dollars per year but also bring California up to the standard already met throughout much of the nation.

2. Drilling authorization and denial

As discussed earlier in this report, California's state-level legal requirements for CalGEM's approval of traditional oil and gas wells, as well as its supervisory authority with respect to environmental protection and facilitating production, have long been subject to conflicting interpretations.[153] While limited case law or other authority on the matter exists, CalGEM has traditionally interpreted its statutory authority to offer minimal authority to deny permits based on environmental considerations. Ultimately, full clarity on the extent of CalGEM's current authority might arise only through extensive litigation, which is beyond the scope of this report. Although such authority could exist pursuant to the agency's supervisory authorities under Public Resources Code Sections 3106(a) and 3011, legislators could take action to eliminate any doubt.

Reform options for state-level well approval processes could center around amending the agency's core supervisory authority to clarify CalGEM's discretion to deny drilling applications and require consideration of environmental factors as part of the drilling application process. While the five surveyed states generally impose few limitations on drilling via their oil and gas regulatory agency, recently enacted (though controversial) reforms in Colorado could offer a potential template to give CalGEM more authority in the permitting process to achieve improved environmental outcomes from projects.

Summary finding: *California legislators could amend CalGEM's core supervisory authority in the oil and gas provisions of the Public Resources Code to expressly require CalGEM to privilege environmental protection concerns by deleting or making subordinate any reference to maximizing production, requiring the agency to consider alternative drilling locations, mandating an assessment of the overall environmental impacts of drilling in advance, and/or clarifying agency authority to deny well approvals.*

Legislation amending CalGEM's primary enabling statute could bolster agency authority to expressly prioritize environmental considerations in decisions regarding drilling applications.

A. Statutory authority to privilege environmental concerns in state-level drilling authorization

Legislators could amend CalGEM's enabling statute to prioritize environmental protection and de-emphasize production. As mentioned previously, AB 1057 added a new provision that clarified that the purposes of the state oil and gas conservation law "include protecting public health and safety and environmental quality, including reduction and mitigation of greenhouse gas emissions associated with the development of hydrocarbon and geothermal resources in a manner that meets the energy needs of the state." However, the amendment does not directly address the nature or weight of CalGEM's duties under Section 3106(b) (which involve supervising drilling to permit methods that increase recovery of hydrocarbons), and it does not include any specific new rulemaking authority or requirement. Legislative updates expressly prioritizing environmental considerations could bring an end to any lack of clarity regarding these responsibilities.

As discussed earlier, at least one reviewing court has viewed Section 3106(b)'s production-related provisions as CalGEM's "mandate," although that case is now on appeal.[154] While Section 3106(b) does not explicitly prevent CalGEM from denying permits based on environmental considerations—it requires supervision of drilling operations "so as to permit" owners and operators to increase recovery of hydrocarbons—the lack of direction or prioritization between this production language and the Section 3106(a) protection provision leaves CalGEM's authority to deny or limit permits for environmental purposes potentially unclear and subject to litigation. To address this, the legislature could amend Section 3106 to clarify that CalGEM must prioritize environmental, health, and safety concerns over maximizing production, or delete the production provision altogether. (Assembly Bill 1440 [Levine, 2019], a companion bill to AB 1057, would have shifted CalGEM's production provision to a focus on permitting "methods and practices…suitable in each proposed case" and expressly subjugated that provision to the damage prevention authority. While the measure passed both houses of the legislature, Governor Newsom vetoed it.)

One potential example is Colorado's reform legislation enacted in April 2019 (SB 19-181) that updated the State Oil and Gas Conservation Commission's (COGCC) mandate and environmental protection focus. Prior to the reform, the law required the commission to "foster responsible, balanced development" that was "consistent" with environmental concerns, similar to CalGEM's dual supervisory authority. After SB 19-181, the commission instead has to "regulate the development and production of the natural resources of oil and gas in the state of Colorado in a manner that protects public health, safety, and welfare, including protection of the environment and wildlife resources."[155] In addition, the law affirmatively required the commission to protect and minimize adverse impacts to public health and the environment and "protect against adverse environmental impacts on any air, water, soil, or biological resource."[156] As of this publication, the impact of this reform on COGCC's regulatory and permitting activities, and the extent to which it improves environmental and health outcomes, are far from clear, and early implementation has led to some controversy.[157] Yet it could serve as a template (or a model to improve) for California legislators.

The Colorado statute also required COGCC to develop a set of regulatory reforms aimed at implementing the refocused agency mandate. While the commission has not yet finalized new permitting and other regulations under these statutory changes as of this publication, the commission listed rule changes it is considering. These non-binding proposals include removing the requirement that agency rules be "technically feasible and cost effective" for developers and instead replace them with rules "reasonable and necessary" to protect public health, safety, welfare, wildlife and the environment. They also would "[i]dentify denial criteria based on long-term impact on public health safety, welfare, and the environment" (a complete list of the non-binding concept proposals is provided in Appendix C).[158] While California's regulatory structure differs from Colorado's, these proposals indicate the shape that a reformed CalGEM supervisory authority could take. A revised authority like that of Colorado, coupled with a

directive that CalGEM promulgate permitting and other regulations in accordance with its terms, could offer California regulators more clarity to prioritize environmental considerations in oil and gas drilling approval, while affording CalGEM some discretion to tailor those rules to the state's characteristics and needs based on stakeholder input.

B. Statutory authority to deny permits

California legislators could also update Public Resources Code Section 3203 to expressly clarify CalGEM authority to deny drilling authorization based on environmental and health and safety concerns. While some of the surveyed states have granted express authority to deny permits, none of them has historically done so specifically for environmental reasons. For example, New Mexico's Oil Conservation Division has regulatory authority to deny a permit for reasons relating to financial assurance, corrective orders, unpaid assessments, or compliance of other wells, but not for environmental reasons. Regulations also authorize the commission to "impose conditions on an approved permit to drill" without any stated limitation. But it is unclear if these conditions ever encompass environmental concerns.[159] North Dakota's Industrial Commission has regulatory authority to "impose such terms and conditions on the permits…as the director deems necessary" but can deny permits only to prevent waste or protect correlative rights.[160]

By contrast, Colorado's recent reform provides a potential model for permit denial or conditioning on the basis of environmental concerns. SB 19-181 directed COGCC to enact regulations under its new environmental protection obligations and allowed the agency to delay a permit approval to conduct additional environmental or public health analysis in the period before promulgation of those regulations (which follow a single mandate to affirmatively "protect against adverse environmental impacts").[161] The commission has yet to issue these regulations as of this publication, but it is ultimately likely to develop new permit issuance criteria based on the statute (COGCC referred to permitting process changes in its informal documents discussing regulatory updates, as described in Appendix C). The commission issued a set of "objective criteria" that may merit a delay in the interim period, including locations within 1,500 feet of a residence or municipal or county boundary and within 2,000 feet of a school; while not final regulations, these temporary criteria may indicate the scope of future permit denial or conditioning regulations that COGCC adopts.[162] As the Colorado commission develops its permitting regulations, California policymakers could follow the process to identify the substantive outcomes of the new mandate, as well as any opposition or challenges from industry or local governments.‡

Given California's environmental goals, legislators could consider amending Section 3203 of the Public Resources Code to expressly incorporate environmental and health and safety impacts as a basis to deny or condition an approval to drill. They could also direct CalGEM to engage in new permit process rulemakings pursuant to the change in the agency's core supervisory authority under Section 3106, as described earlier. In addition, California legislators could expressly clarify CalGEM denial or delay authority for wells based on air quality impacts. Alternatively, legislators could direct CalGEM to assess drilling approvals based on anticipated life-cycle emissions and/or water needs. (As noted, certain deposits in California contain especially "heavy" oil that is among the most carbon- and water-intensive to produce and refine in the world.) As discussed in this report, CalGEM's current drilling authorization and CEQA review processes rely almost exclusively on the environmental, health, and safety analyses of local permitting agencies, which local and environmental advocates often consider overly permissive.[163]

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‡ Illinois, which was not included in this report's survey, also stands out for its general and fracking-specific permitting statutes that expressly contemplate permit denial. Ill. Stat. 225 §§ 725/6.1, 732/1-53. However, Illinois ranks among the lowest oil- and natural gas-producing states in the country.

Alternative Location and Cumulative Impact Analysis

Two elements of Colorado's recent reform merit additional consideration by California legislators. SB 19-181 required the Colorado Oil and Gas Conservation Commission (COGCC) to adopt rules for an "alternative location analysis process" for proposed wells located near populated areas, as well as rules to "evaluate and address the potential cumulative impacts of oil and gas development."[167] Because the text of the law did not include details regarding any required analyses or intended outcomes, it did not clarify the extent to which it will affect permit issuance or well location. SB 19-181 also expressly granted Colorado local governments land-use and siting authority with respect to oil and gas operations—authority already enjoyed by California local governments—which may limit any effect of an alternative location analysis.[168] However, given the goals of the law, the analyses are likely to contribute to more robust consideration of environmental factors in new well approval and siting. California legislators could track the ongoing regulatory developments in Colorado and, if COGCC adopts and enforces environmentally supportive regulations in response to SB 19-181 that comport with local land-use control, consider replicating these new impact analysis requirements for the California context (potentially integrating them into the CEQA review process). To maximize the intended environmental protection benefits of these reforms, state leaders could include alternative location or cumulative impact analysis as additional to any new authority to condition or deny permits and/or new statewide setback requirements (discussed in the next section), as opposed to a substitute.

To facilitate a new environmental focus in drilling reviews, CalGEM would likely need to increase collaboration with state air and water resource agencies and public health entities, through both formal and informal processes. CalGEM might need to add additional staff for the purpose of such collaboration, including those with expertise in environmental regulation, air and water quality science, and health assessment. New staff and processes would complement CalGEM's existing environmental review capacities and could rely (and build) on existing expertise throughout California's state government. The legislature could appropriate funds for this purpose at the same time that it modifies the drilling approval statute. It could also direct CalGEM to consult with CARB, SWRCB, and local air districts and regional water boards to craft appropriate mitigation standards. As an indication of potential scope, Governor Newsom's proposed 2020 budget includes a special fund for over 100 new CalGEM staff positions, including enforcement and transparency positions.[164] Alternatively, CalGEM could, as discussed earlier, increase its existing well assessment under Section 3400 of the Public Resources Code, as increasing staff to meet a legislative mandate would fall within the statutory purpose of supporting CalGEM's operations. In developing the criteria, CalGEM could expand on analyses and data already compiled in the state's SB 4 scientific study, the Air Resources Board's SNAPS program, and the recent Los Angeles city and county analyses described in the next section. The legislature and/or CalGEM could delay the effective date of new well approval regulations to account for the hiring and criteria-preparation processes.

If California legislators strengthen CalGEM authority to deny or condition drilling for environmental reasons, the state may want to clarify that such denials or limitations based on environmental considerations would not conflict with CalGEM's other existing requirements to minimize waste and loss, in order to avoid any challenges based on these provisions. Colorado forestalled such a conflict between its new environmental focus and portions of the existing law that require prevention of waste via pooling and spacing measures by expressly declaring that "the nonproduction of oil and gas from a conditional approval or denial authorized by" the subsection creating this new environmental protection obligation "does not constitute waste." Such a legislative approach could be necessary in California as well to avoid legal challenges over denials on these grounds. In addition, reform legislation could clarify that any expansion of CalGEM authority to review environmental and health impacts that fall outside of "downhole" drilling considerations does not preempt or displace local environmental or land-use authority that is more stringently applied, as discussed further in the following section.

3. Setback Requirements

The institution of statewide oil and gas well setback requirements (also referred to as buffer zones) would deliver benefits for the health and safety of local residents and could potentially reduce the feasibility of some new or existing wells. Setbacks establish minimum distances between wells and residences, public facilities, parks and ecologically valuable areas, and other locations that support human activities or natural ecosystems. Production operations can place these locations at risk. As such, setbacks could offer particular benefits for the communities most directly affected by oil and gas operations, such as many disadvantaged neighborhoods in Los Angeles and Long Beach that are disproportionately exposed to harmful air pollution. California currently employs no statewide setback requirement, although state law declares any well drilled within 100 feet of a property line or public road a de facto public nuisance.[169] In addition, a number of local governments have imposed their own setback requirements. As part of his November 2019 CalGEM reforms, Governor Newsom directed CalGEM to include consideration of setback rules in its new health and safety rulemaking process.

The imposition of setbacks as a means to limit both in-state production and greenhouse gas emissions is less clear. Developers may still be able to access deposits in a setback zone by drilling horizontally, allowing them to continue producing while moving wellheads farther from sensitive receptors. And, as noted previously, any in-state drilling limitations may have a limited impact on total consumption and greenhouse gas emissions. However, the setback could impose additional costs that might discourage marginally economical production if costs outpace expected revenue. In addition, policymakers have traditionally employed setbacks to protect residents and nearby ecosystems from the health and environmental risks posed by drilling operations. As a result, imposing them statewide could at a minimum provide health-and-safety and environmental benefits to all Californians, regardless of the impact on greenhouse gas emissions.

State legislators and regulators seeking to institute a setback would need to evaluate a host of legal questions discussed later in this section. Perhaps chief among these is whether to apply a setback rule to all oil and gas operations or only new wells. While application to existing wells could have a far greater impact on both public health and greenhouse gas emissions, it could also present greater legal implications due to likely litigation over whether or not the setbacks effect a constitutional taking of property. Such litigation would depend in large part on whether an owner/operator's right to drill is fully vested due to the issuance of necessary permits (discussed at the end of this section). State leaders would also need to identify an optimal setback distance to protect public health while minimizing these legal risks, which some experts have placed at 2,500 feet or more.

Given the lack of statewide setback policy and overall weakness of local measures, this section describes options to set a statewide floor to protect health and safety and possibly reduce emissions, using existing statutory and regulatory authority.

Summary finding: *CalGEM could promulgate setbacks of up to 2,500 feet or more, or launch a California-specific, science-based process to determine optimal distances on the basis of the agency's new core supervisory authority to protect public health and safety and environmental quality. Agency leaders would need to ensure that any such setback policy avoid preempting more stringent local versions and avoid protracted regulatory processes to enact. Alternatively, legislators could enact a setback statute, clarifying that the setbacks do not preempt local authority. State leaders would need to carefully craft any measure to avoid constitutional takings issues.*

Instituting a statewide minimum setback distance could protect sensitive populations and ecosystems while discouraging some of the least economic, most energy-intensive drilling.

A. Statewide minimum setback

State leaders seeking to impose a statewide setback would first need to decide the proper minimum distance to protect health and safety. While not much California-specific scientific literature on the benefits of these setbacks exists, recent literature offers support for a wide range of distances. A 2015 report commissioned by the California Natural Resources Agency pursuant to SB 4 found (based on studies from outside California) that "the most significant exposures to toxic air contaminants" occur within one-half mile (approximately 2,500 feet) of well operations.[170] The report did not go so far as to call for a statewide half-mile setback, but it recommended that the state "develop policies such as science-based surface setbacks, to limit exposures." Advocacy groups have called for a 2,500-foot setback based on this report and other data.[171]

Meanwhile, a 2018 Los Angeles County Department of Public Health study identified the most significant air quality, noise, and odor impacts from drilling operations on nearby residents at between 600 and 1,500 feet.[172] A subsequent 2019 report from the Los Angeles Office of Petroleum and Natural Gas Administration and Safety, in part building on the LACDPH study, suggested that the city consider setbacks of 1,500 feet for new wells and 600 feet for existing wells, seemingly balancing economic feasibility and public health protection.[173] The report estimated that setbacks in this range would reduce production by approximately 2.5 million barrels of oil and 4.5 million cubic feet of gas and benefit between tens and hundreds of thousands of nearby residents.[174] And as a more aggressive finding, a 2017 literature review prepared for a Los Angeles environmental justice coalition identified over 10 scientific studies that found increased health risks for residents within 1,500 to 6,600 feet of oil and gas wells (all based outside California).[175] Assembly Bill 345 (Muratsuchi, 2019) would direct CalGEM to adopt health and safety regulations including a minimum setback from sensitive receptors, allowing the agency discretion to determine the optimal distances, while requiring it to consider a 2,500-foot setback for schools and public facilities where children are present, perhaps indicating a level of legislative support for this minimum distance. As of this publication, the bill is still active in the legislature.

In coordination with CalGEM's health and safety rulemaking directed by Governor Newsom in November 2019, the legislature could consider directing (and funding) CalGEM to collaborate with CARB, SWRCB, and other relevant state and local agencies on a definitive study of setbacks, including assessment of health and safety benefits, economic impacts, and out-of-state examples, and prepare a formal legislative recommendation based on the findings. Alternatively, the legislature could commission an independent study similar to the WST/fracking analysis conducted under SB 4. The study could largely build on existing research, including what was compiled in the recent Los Angeles city and county studies and any analysis from states like Colorado and Pennsylvania where setback measures have recently been considered, to determine the optimal distance to protect public health and the environment while maintaining legal and practical feasibility in California. The study would need to account for California's particular drilling methods, geological conditions, and air quality concerns. AB 345's proposal could serve as a baseline for the assessment. The state could also utilize data from the California Air Resources Board's SNAPS program to determine appropriate setbacks, although the timeline for conclusive findings from that process is unclear.

California policymakers could also set a variable setback based on the sensitivity of nearby sites. This approach would follow the example of Colorado, which instituted one of the largest statewide setback requirements in 2013 at 500 feet from all occupied buildings, with a more stringent 1,000-foot setback from high-occupancy residences and schools (along with a 350-foot requirement from outside activity areas).[176] The "alternative location analysis" required under Colorado's SB 19-181 reforms may add further variability based on site-specific health and safety factors. California officials seeking a more stringent but still adaptable regime could consider combining a statewide setback with such an analysis process to permit some flexibility.

Many other states employ some setback requirement, though most are minimal. At least some states instituted setbacks as state-level responses to preempt more stringent local rules. North Dakota imposes a statewide 500-foot setback requirement.[177] New Mexico's well-spacing requirements include a setback from property lines of 330 feet for oil wells and 660 feet for gas wells.[178] Pennsylvania set a 200 feet setback from buildings or water wells (for conventional drilling) and 500 feet from buildings or water wells (for fracking). (The Pennsylvania setbacks are subject to waiver by the neighboring owner or if the operator can show the setback "would deprive the owner of the oil and gas rights of the right to produce or share in the oil or gas underlying the surface tract." The operator must also be able to satisfy additional protection requirements—an exemption that likely limits the efficacy of the rule in protecting health and the environment.[179]) Texas, which generally exercises minimal regulatory control over operations, has a well-spacing requirement that includes a 467 foot setback from property lines, although the state oil and gas regulator may grant exceptions "to prevent waste or to prevent the confiscation of property"—another exception that likely limits efficacy.[180] A number of other states around the country have also imposed statewide setbacks, including states as diverse as Louisiana (500 feet from residential or commercial structures), West Virginia (200 feet from homes or water wells), and Wyoming (500 feet from homes).[181] Thus while little uniformity exists nationwide, California is generally an outlier in its lack of a statewide minimum setback requirement. By following Colorado's example, California leaders could institute a setback regime that is responsive to variable health and environmental conditions as well as operators' concerns.

B. Avoiding preemption of more stringent local setbacks

While California has no statewide setback requirement, a number of local governments have imposed such a requirement as a condition of approving oil-and-gas production. These local setbacks, though mostly minimal in nature, cover a variety of structures, such as homes and schools. Examples include Arvin (300 feet), Carson (750 feet), Huntington Beach (300 feet), Long Beach (300 feet), and Signal Hill (300 feet).[182] These local setback rules are generally less stringent than the minimum distances needed to protect public health, which could range up to 2,500 feet or more, according to the studies noted earlier. The Ventura County Board of Supervisors recently proposed extending its current 500-foot setback rule to 1,500 feet from homes and 2,500 feet from schools for all new wells drilled under discretionary permits (in addition to banning transportation of oil by trucks and flaring or venting of gases). But, as of this publication, the county has not yet adopted the policy.[183]

Should California legislators impose a statewide setback, they would need to ensure that the state policy does not preempt local setbacks, if they are more stringent than the statewide version. A statewide setback also must not otherwise generate any concerns regarding the primacy of local authority. The California Constitution grants local governments primary control over land use decisions.[184] However, state law generally preempts local law, and local rules that conflict with state law or regulation are typically void. California law firmly establishes the ability of local governments to regulate the location of oil and gas operations or to ban them altogether as a land-use matter (which some jurisdictions have done). But neither state law nor CalGEM regulation to date has entered the area of setbacks.[185] While the trial court decision in the challenge to Monterey County's Measure Z (now on appeal) appeared to take an expansive view of the preemptive effect of the legislature's grant of authority to CalGEM, the ruling related to local regulation of production techniques—rather than land use—as a means to limit operations, and the court acknowledged the state's long-standing precedent upholding local authority to ban operations altogether.[186]

Absent express language preserving local authority to set more stringent setbacks, courts could potentially interpret a statewide legal minimum as preempting local rules. While minimal evidence exists on the issue of implied preemption of local setbacks, some precedent from New Mexico and North Dakota has pointed in the direction of state regulation displacing local rules.[187] Colorado's 2019 oil and gas overhaul, meanwhile, grants local governments the express

Avoiding Constitutional Takings Challenges

A key consideration for changing permit issuance and denial rules or imposing setbacks is the general constitutional limitation on government taking of private property. Both the U.S. and California constitutions prevent the public taking of private property without compensation. This principle has long been extended to cover not only the direct taking of property, such as through eminent domain, but also laws and regulations that block or inhibit its profitable use relative to the rights of the owner at the time it acquired the property.[198] Any new law or regulation limiting the ability of a current owner to drill or operate wells, including but not limited to setback rules, could potentially be subject to challenge on this constitutional basis, which would expose the implementing government body to potentially significant litigation costs (and even greater compensation costs should a claim prove successful). The success of such a claim would depend on a number of factors, including the central question of whether the owner/operator's extraction right is vested and to what extent it may be lawfully terminated.

In general, to establish an unconstitutional taking, and thus render a law or regulation invalid without financial compensation, a property owner must show that the rule deprives it of all economically beneficial use of the property or otherwise imposes an unreasonable burden, either facially (i.e. in all cases) or as applied in the case of the individual challenger.[199] In this general context, a taking likely does not occur if the property rights holder should reasonably expect and acknowledge "legitimate restrictions" limiting the property use; the property is located in a "human and ecological environment" that is "subject to, or likely to become subject to, environmental or other regulation"; and the value of the property under the regulation is measured "with special attention to the effect of burdened land on the value of other holdings."[200] Courts generally require near-total elimination of the value of property in order to find a regulatory taking has occurred, and they rarely regard a loss of future profits as adequate to support a claim.[201]

However, in the context of extractive property rights like oil and gas drilling rights, constitutional takings analysis focuses more specifically on whether the operator's right has vested: whether the operator has obtained all permits necessary to begin oil and gas operations, actually performed work, and spent funds to further those operations in reliance on those permits.[202] Thus, only an operator that has already commenced oil and gas production or is far along the permitting process would be likely to have a strong takings claim. In addition, even a vested right might not form the basis of a valid takings claim where the activity in question threatens public health and safety (protection of which is at the core of the government's police power authority) or is a nuisance, and if the regulation is appropriately tailored to the urgency of that threat.[203] Because policymakers would ground any setback rule or other measure to limit oil and gas operations in public health and environmental imperatives, the responsible government body would have a strong argument that abatement of public health hazards supersedes a vested right to drill.

Policymakers crafting a setback or similar rule could focus

authority to regulate surface impacts of oil and gas operations "to the extent necessary and reasonable, to protect public health, safety, and welfare and the environment" via regulations on land use, public facilities impacts, well siting, environmental impacts, insurance and indemnification, and nuisance, and allows these measures to be more stringent than state rules.[188] Presumably, this expanded authority would include local setbacks.

Any legislator considering a setback should avoid preempting and thereby invalidating any existing, more stringent local laws as well as future ones. To address this potential counter-productive outcome, state leaders could draft any law setting a minimum statewide setback with language expressly allowing local governments to institute setbacks that are more protective of public health and the environment, such as through greater minimum distances or more inclusive lists of sensitive receptors. State leaders could also make clear that the statewide law is a floor and not a ceiling. To defend against any arguments (possibly drawing on the trial court decision in the Measure Z case) that local governments lack authority to enforce other environmentally-focused restrictions on oil and gas operations due to preemption by state authority to regulate how those operations function, lawmakers could also clarify that the state's regulatory authority does not have preemptive effect over any local land use or environmental limitations on drilling more broadly.

C. Existing CalGEM statutory authority to promulgate setbacks

CalGEM leaders could also consider instituting a statewide setback requirement on the basis of the agency's supervisory authority to prevent damage to life, health, property, and natural resources and to protect public health and environmental quality.[189] As a preliminary matter, CalGEM would need to support such a regulation with substantial evidence in the form of a review of available science demonstrating the public health and environmental benefits that a setback could provide.[190] Supported with the data, CalGEM could impose such a requirement on existing wells, requiring their abandonment if they lie within setback zones; or only on new wells, preventing future drilling within the zones. CalGEM and the legislature have taken limited steps in this direction in the past. As mentioned, state law declares any well within 100 feet of a property line to be a de facto public nuisance and authorizes the State Oil and Gas Supervisor to impose minimum spacing requirements between newly drilled wells to protect health and safety and prevent waste.[191] CalGEM regulations also include special treatment of wells within 300 feet of a home (known as "critical wells"), requiring advance notice of drilling and enhanced safety measures. But neither existing law nor existing regulation has extended to statewide setbacks mandating a protective distance.[192]

However, as discussed earlier, CalGEM's new environmental protection purpose (Section 3011) and its original damage-prevention authority (Section 3106(a)) do not have clear priority over the original recovery provisions (Section 3106(b)), an issue

subject to ongoing litigation. In addition, the approval process outlined in Section 3203 may have given rise to an assumption on the part of the oil and gas industry that it has a "right to drill," though the statute expresses no such right, indicating a regulatory setback would likely invite legal challenge from the industry on the grounds that the rule violates the agency's recovery provisions or subverts the existing well approval process.[193] Industry could also argue that existing well-spacing plans conclusively address the issue of well distance, leaving no room for additional regulation. Yet those plans and regulatory authorities do not focus on health and safety, indicating the legislature's purpose likely was not to displace a health and safety-focused setback.[194] Finally, industry could argue that setback requirements, whether applied to existing wells or only to new wells, constitute an unconstitutional taking, as discussed later in this section.

A reviewing court would owe deference to CalGEM on its determination that a setback requirement was "reasonably necessary" in the exercise of its protective authority, so long as the agency provided adequate scientific support for its decision. But litigation continues on the question of whether the legislature granted CalGEM the discretion to protect and enforce health, safety, and environmental measures at the expense of production. California case law discussing CalGEM's core supervisory authority is minimal, but the recent court decision overruling Monterey County's Measure Z (which banned any well stimulation or wastewater injection activities essential to fracking, as well as the drilling of any new wells) appeared to take the position that the Section 3106(b) recovery authority is CalGEM's "mandate," albeit for preemption purposes in the face of local action rather than state regulation. This reasoning could suggest that courts may give the recovery authority controlling weight. However, the ultimate effect is unclear, as the ruling did not directly address the balance between the two authorities and is still under appeal. Thus, while CalGEM's supervisory authority to prevent damage to (and protect) public health and the environment could authorize a setback requirement, the lack of specific statutory language might open such a measure to industry challenge via litigation. Reform legislation specifically authorizing this type of measure (or expressly prioritizing environmental protection) would reduce litigation risk.

CalGEM leaders would also need to consider any potential preemptive effects of a new setback rule. Since California has not previously instituted statewide setbacks, case law and legal analysis of their preemptive effect is minimal. A non-binding 1976 California Attorney General opinion on the general scope and preemptive power of CalGEM's authority concluded that while local governments have a general right to regulate with respect to "land use, environmental protection, aesthetics, public safety, and fire and noise prevention," state regulation in these areas could potentially curtail the primacy of local law, should CalGEM leaders choose to implement a setback.[195] ("With regard to [land use and surface activity concerns], local governments may impose regulations more stringent than those imposed by the state

on a few key considerations to reduce or eliminate the risk of takings claims and possible litigation. A regulation can terminate a vested right to operate without effecting a taking if the regulation creates an appropriate amortization or phase-out period for the operator to recover its reasonable investment. This amortization period must be "commensurate with the investment involved" based on "weighing the public gain to be derived from a speedy removal of the nonconforming use against the private loss which removal of the use would entail."[204] Policymakers contemplating a setback or other restrictive measure would need to weigh the anticipated public health and environmental benefits of the measure against various operators' reasonable investments and recovery to date. While newer wells could legally require a multi-year period of operation to avoid a takings claim, owners of the oldest wells (which have been operating for decades, fully recovered their initial investments and were not issued permits under modern regulatory regimes) might have no vested claim at all.[205]

To insulate against potential takings claims and limit costly litigation, agencies or lawmakers considering new rules to restrict production could craft savings clauses or other self-limiting measures to ensure no taking occurs:

- For a setback regulation or law to avoid a facial challenge, the implementing agency or the legislature could include a clause that allows for case-by-case waivers or expressly directs implementing parties not to infringe on constitutional rights, following Section 30010 of the California Coastal Act as one possible example.[206]
- For a setback rule or an air quality measure, the state could institute a requirement that owners who cannot feasibly reduce or relocate drilling locations must instead abide by increasingly stringent emission standards, as Colorado has imposed in certain circumstances. This provision could address constitutional concerns by protecting the smallest owners.[207]
- For any new restriction, a phase-in or amortization period could allow owners to recover on their investment-backed expectations in a manner sufficient to overcome constitutional challenges. This approach has succeeded in the past for zoning ordinances that render existing land uses unlawful and might necessarily involve creation of multiple amortization options to address varied operator claims.[208] Some legal experts have proposed a five-year amortization period (with the ability to extend where necessary) to address oil-and-gas takings concerns. [209]

If any cases remain in which savings, fallback, and phase-in provisions fail to insulate against a taking claim, the state could still maintain application of the restriction by providing constitutionally required just compensation to the affected owner as required by the state and federal constitutions (as is typically done in cases of eminent domain). But to avoid lengthy and onerous litigation involving numerous parties around the state, representing a wide variety of oil and gas rights arrangements, the state could seek to limit the potential for a takings claim to arise through one or more of these preventive steps.

so long as they do not conflict with, frustrate the purposes of, or destroy the uniformity of the Supervisor's statewide regulatory conservation and protection program.") As a result, a court could limit local authority over land use-related matters if CalGEM interprets its core supervisory responsibilities to include authority over well-siting and then regulates accordingly. At the same time, the opinion affirms the general proposition that cities and counties may prohibit oil and gas operations within their boundaries through land-use and environmental rules, though it does not specifically discuss whether state agencies like CalGEM could override this power.[196] The opinion also states that CalGEM's issuance of authorization to drill under Section 3203 of the Public Resources Code would not override a local prohibition on drilling.[197]

Regulators considering setbacks or similar measures would be entering an ambiguous regulatory area where local governments have prime authority but the state's decision to regulate could potentially displace it. This risk of preempting local controls that seek maximum protection of public health and the environment means that regulators, like state legislators, would have to craft any setback rule to expressly authorize more stringent local rules or outright bans, while at the same time explicitly displacing any less stringent rules.

4. California Air Resources Board Options

As the state's primary air quality regulator, the California Air Resources Board holds broad authority to control and reduce emissions of the harmful air pollutants that are associated with oil and gas production to protect public health.[210] In general, CARB has authority over statewide emissions from mobile sources such as automobiles, while local air quality management districts have primary authority over stationary sources, including oil and gas wells, under CARB's general supervision. But CARB is also responsible for setting the air quality standards that local districts must achieve, in particular for the toxic air pollutants that oil and gas production can generate. CARB also has two distinct sources of authority that could support enhanced regulation of fossil fuel production activities. Adoption of such regulations would advance CARB's Community Air Protection Program, established under Assembly Bill 617 (C. Garcia, Chapter 136, Statutes of 2017) to reduce exposure to air pollution in most-vulnerable communities.

Summary finding: *CARB could employ its existing authority to prevent air pollution episodes or to limit exposure to certain toxic air contaminants associated with oil and gas production as a basis for instituting new restrictions to protect public health and the environment. These policies could include minimum setbacks from sensitive receptors, time-of-day operational limitations, or mandates for additional protective equipment. CARB could also initiate a formal, multi-agency process to plan a long-term phase-out of all production activities.*

A. Air pollution episode prevention

First, CARB has the power to require local air districts to adopt rules to prevent air pollution "episodes" from any type of air pollutant that cause "discomfort or health risks."[211] While state law does not conclusively define what constitutes an "episode," it would likely include the short-living but health-harmful leaks of benzene, formaldehyde, and other toxic air pollutants that well drilling and operation can occasion.[212] CARB could use this power to require local air districts to promulgate new regulations for oil and gas production operations that protect

nearby residents from the most harmful impacts, which could serve to discourage production at some wells that pose the greatest risk to local populations.

In requiring such preemptive measures, CARB could allow local air districts flexibility in setting these preemptive requirements so long as they meet minimum standards for public health protection. Setbacks from sensitive human and natural receptors would be a reasonable preemptive measure to prevent production operation leaks from causing negative health impacts: some leaks may be unavoidable with even the most advanced technologies, maintaining safe distances through setbacks could protect populations and landscapes, and many of these air pollutants are most harmful in the immediate vicinity of their release. Alternatively, an air district could institute time-of-day operating limitations to require well operators to suspend production activity near sensitive receptors when they are most populated, such as during evenings and overnight for homes and daytimes for schools and businesses. Or an air district could require operators to install more protective equipment and increase observation and maintenance the closer a well is to those receptors. CARB's authority covers episodes that affect "a significant number of persons or class of persons," which may focus the applicability of these measures to more densely populated areas.

B. Toxic air contaminant regulation

Another potential source of more stringent oil and gas regulatory authority is CARB's broad mandate to identify and limit exposure to toxic air contaminants. Pursuant to this authority, CARB could implement measures to limit exposure to benzene and formaldehyde emissions, both of which are known to result from oil and gas production and have been identified by CARB and US EPA as toxic air contaminants. These prior listings likely form a basis for mandatory adoption of control measures by CARB, although additional studies of the California-specific negative health impacts of these pollutants might bolster a requirement based on EPA's findings.[213]

Under this authority, CARB could promulgate setback or time-of-day regulations as a control measure to protect public health from the harms occasioned by toxic air contaminants. While toxic air contaminant control measures must meet a "best available control technology" standard, the governing statute permits CARB to opt for "more effective measures" where justified.[214] Moreover, CARB has previously implemented setbacks as toxic air contaminant control measures in other contexts, for example limiting exposure to pollution from chrome-plating facilities and stationary diesel generators.[215] This history indicates that a setback or time-of-day requirement to limit exposure to the toxic air emissions from fossil fuel production would fall within CARB's existing interpretation of its statutory mandate.

Issuing new regulations pursuant to this authority would require a complex rulemaking process, including the assessment of existing and new scientific analyses of the pollutants' toxicity, which could take significant time to develop. As one example, an Air Resources Board effort to update regulations limiting the use of asbestos in road surfacing materials under Section 39650 included scientific study beginning in 1992, monitoring and interagency review beginning in 1998, issuance of a control measure in 2000, and litigation that concluded in court approval of the measure in 2004.[216]

To the extent that opponents might argue that regulations requiring the shutdown of existing wells or preventing construction of new wells stretch CARB authority, agency leaders could look to past experience with timed or limited phase-outs of other technologies or business practices as a model to balance the burdens of regulation. In similar contexts (including dry cleaning operations, chrome plating, and use of asbestos in road construction) CARB leaders have phased out certain business operations over a long timeline or provided a means to continue operating for a limited period, similar to the amortization periods discussed in relation to constitutional takings questions.[217] CARB leaders could consider a policy phase-in period if similar concerns arise.

CARB could use its existing AB and SB 32 authority, together with CalGEM's new mandate under AB 1057, to develop a structured phase-out plan for oil and gas production.

C. Planning for an oil-and-gas phase-out in California

CARB is the state agency responsible for administering and achieving California's greenhouse gas emission reduction laws, AB 32 and SB 32 (Pavley, Chapter 249, Statutes of 2016). These laws afford CARB wide authority to institute rulemakings and processes to meet the target of reducing emissions 40 percent below 1990 levels by 2030. As such, the agency is well positioned to draft a plan for an eventual phase-out of all in-state oil and gas production by a date certain. AB 1057 added express provisions regarding CalGEM's obligation to protect public health and environmental quality, including the reduction and mitigation of greenhouse gas emissions, in part through coordination with other state agencies such as CARB. CARB could use its existing AB and SB 32 authority, together with CalGEM's new supervisory authority, to develop a phase-out plan and coordinate on implementation. Such a plan could identify and account for near-term emission reductions from production activities, primarily methane. The plan could also evaluate demand-side impacts of limiting in-state production, particularly whether reduced production could affect consumer or refinery demand and the extent to which fuel imports would increase to meet demand, as well as the anticipated carbon profile of any imports. In addition, the plan could identify any long-term impacts a production phase-out policy might have on compliance with the Low Carbon Fuel Standard, since it could substantially alter the balance of the state's fuel mix. The state legislature could require CARB to develop and implement such a plan through new legislation, along with a date certain for an end to in-state production. CARB could base such a plan on the forthcoming $1.5 million state-sponsored study to "identify strategies to decrease demand and supply of fossil fuels," funded under the June 2019 California budget.[218]

5. CEQA processes

CEQA review is a tool for analyzing and disclosing environmental impacts and mitigating significant ones when feasible. A more stringent CEQA process on proposed new and modified wells would enhance community and environmental protection, increase decision-making transparency, and possibly reduce the scope and prevalence of, and impacts from, the most environmentally harmful and emission-intensive projects through the imposition of all feasible mitigation requirements. To achieve these goals, state leaders could consider regulatory action to ensure that all new and modified production wells in the state trigger site-specific CEQA analysis and feasible mitigation measures. The ultimate goal would be a strengthened CEQA process for all new and modified wells, requiring at a minimum an initial study to determine if the environmental impacts are significant enough to warrant mitigation. These enhanced requirements would not necessarily trigger a full environmental impact report for all new and modified wells but provide a statewide minimum level of environmental review, public process, and mitigation measures, based on project-specific conditions.

Summary finding: *To strengthen the CEQA process governing oil and gas production, the state could:*

1. *Through the Governor's Office of Planning and Research and the Natural Resources Agency, revise CEQA regulations to limit eligibility of new and modified oil-and-gas production projects in existing oil fields for CEQA exemptions;*
2. *Through CalGEM, conduct site-specific environmental review for new or modified wells when local governments fail to do so (or do so inadequately); and*
3. *Through CalGEM, CARB, SWRCB, and other cooperating agencies, conduct a rigorous statewide environmental impact report for all oil and gas production (similar in concept to what SB 4 required for WST/fracking), which would include requirements for site-specific mitigation measures for both new and modified projects, including for downstream uses of the fuels.*

A. Limiting exemptions

As discussed previously, CalGEM typically defers to local agencies to serve as the lead agency for the initial CEQA analysis for proposed new wells, with CalGEM providing technical assistance on any "downhole" review. However, when local agencies do not serve as the lead, CalGEM assumes those responsibilities.[219] In this context, the agency often invokes one or more of three existing exemptions to avoid CEQA review on any new or modified well projects; this issue is currently being litigated and on appeal in a Kern County case involving over 200 proposed new wells in an existing oil field, *Association of Irritated Residents v. California Department of Conservation*. Local lead agencies can also claim these exemptions. The first (statutory) exemption applies to an "ongoing project" that was initially approved prior to the passage of CEQA in 1970, with a cut-off date of 1973 in the implementing guidelines.[220] Since many California wells are drilled within larger oilfield projects begun long before 1970, this exemption may cover a large portion of drilling activity if applied broadly. The second exemption, a categorical (i.e. promulgated by regulation) exemption referred to as "Class 1," covers "negligible expansion" activities of existing facilities, which includes "the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration" of "existing public or private structures, facilities, mechanical equipment, or topographical features, involving

By limiting statutory and categorical exemptions under the California Environmental Quality Act, OPR and CalGEM could significantly increase the environmental scrutiny applied to new oil and gas projects..

negligible or no expansion of existing or former use."[221] The third exemption, also a categorical exemption referred to as "Class 4," is for "minor alterations" to land, covering "drilling operations that result only in minor alterations with negligible or no permanent effects to the existing condition of the land."[222] Both categorical exemptions can also cover a large portion of new drilling activity, since so much of it takes place in existing oil fields.

Given that each new or modified well, even in a large and established oil field, can create significant local and downstream impacts, allowing these exemptions contributes to environmental risks. The state could take regulatory action to address these risks by clarifying the inapplicability of these CEQA exemptions to new and modified oil wells. First, the Governor's Office of Planning and Research (OPR), which is responsible for developing the primary CEQA regulations (codified by the Natural Resources Agency), could limit by regulation the applicability of the statutory exemption for projects approved prior to 1970. Courts have found that, in order for the statutory exemption to apply, the proposed action must be "'a normal, intrinsic part of the ongoing operation' of a project approved prior to CEQA, rather than an expansion or modification thereof."[223] Along these lines, at least one court has found that substantial increases in operations or extraction at projects approved prior to 1970 constitute significant impacts, at least for publicly operated projects.[224] CEQA guidelines further state that a private project approved prior to CEQA's enactment is subject to the law if additional, post-CEQA approvals "involve a greater degree of responsibility or control over the project as a whole than did the approval or approvals prior to that date."[225] OPR could build on this guidance to clarify in its CEQA regulations that drilling, expanding or re-working wells at an existing oil field does not constitute an ongoing operation for purposes of meeting the statutory exemption. OPR could specify that the language of AB 1057, which as discussed earlier added a new CalGEM responsibility to protect "public health and safety and environmental quality" and "reduction and mitigation of greenhouse gas emissions" creates additional authority and adds a new "degree of responsibility or control" over oil and gas projects beyond what the agency held at CEQA's enactment. In addition, modifications to CEQA itself since that time have increased lead agencies' environmental considerations, and SB 4 expanded CalGEM's scope of authority for WST/fracking wells, also potentially rendering the existing exemption inapplicable.[226]

Second, OPR could modify its Class 1 "negligible expansion" exemption regulation for existing facilities to specifically exclude new or modified oil and gas wells from qualification.[227] The agency could do so on its own or by written request from any public agency by adding an explicit statement of inapplicability to the list of supporting examples illustrating application of the guidelines (the agency typically includes in the guidelines only examples of how a regulation applies, as opposed to examples of inapplicability, so such an addition could represent a new direction for OPR).[228] As a result, well projects that expand existing oilfield operations would not be eligible for this CEQA exemption. CalGEM could similarly clarify in its implementing regulations that "existing" uses do not include new drilling and new wells at old operations, precluding qualification for this exemption.

Finally, OPR and CalGEM could modify their respective regulations containing examples of Class 4 exemptions relating to minor alterations to land to clarify that oil and gas production is not contemplated.[229] Current CalGEM regulations state that drilling operations that qualify for these exemptions must "result only in minor alterations with negligible or no permanent effects to the existing condition of the land, water, air, and/or vegetation."[230] OPR and CalGEM could clarify in their implementing guidelines that "all new oil and gas wells, including re-drilling and re-working of existing ones, will have a permanent effect on the environment," which could limit or eliminate eligibility of these wells for the exemption. In addition, OPR could list new or modified wells as examples of activities that have a "significant effect" on the environment, therefore making them ineligible for all categorical exemptions.[231]

B. State-level review limiting local avoidance

CalGEM could seek to prevent local governments from treating all current and future wells in its jurisdiction as one single project for CEQA review purposes, a practice that allows proposed expansions and new wells to avoid site-specific review. For example, Kern County used project-level treatment of all wells in its oil and gas activity area to prepare its now-suspended county-wide 2015 EIR and drilling program. CalGEM could clarify in its regulations and through formal comment on local environmental documents that such a local government approach is not a properly conceived "project" for CEQA purposes, which could undermine the legality of this local government approach or provide CalGEM an opportunity to assert lead agency status. CalGEM could also assert itself as the lead agency in instances where local governments seek to limit review of new or expanded wells through this type of treatment. OPR's CEQA regulations provide a mechanism to assert lead role status in situations when the current lead agency (i.e., the local government) prepared inadequate environmental documents without proper consultation, which may offer CalGEM a path to implement this enhanced requirement (although the statute of limitations may have expired for this action to apply to Kern County's 2015 EIR).[232]

C. Statewide review and required mitigation, including for downstream impacts

The Department of Conservation could conduct a statewide environmental impact report of all oil and gas production operations in the state, including required site-specific mitigation measures, as the agency will conduct for well stimulation treatment permits beginning in 2020 (discussed below). CalGEM could simultaneously declare a statewide moratorium on new permitting for types of drilling identified as particularly environmentally problematic, potentially including WST/fracking and steam flooding, until completion of the document. (The Obama Administration's 2016 moratorium on new coal leasing on public lands pending the completion of a programmatic environmental impact statement offers a potentially informative precedent, although the federal government has greater legal latitude over public lands than the Governor might over private lands in this context.[233]) CalGEM could launch this review on its own or the legislature could require the agency to do so if specific authorization, scope, and funding allocations are desired. The review could cover all new and modified wells and include at least an initial analysis of greenhouse gas, air quality, water quality, and other impacts, and CalGEM could develop a set of required mitigation measures based on the findings. To conduct effective review, Department of Conservation and CalGEM staff may need to consult with and utilize other state resources to assess impacts, in particular CARB for air quality and climate change analysis and SWRCB for water quality expertise. As described earlier, increased fees on oil and gas production could support enhanced staffing at CalGEM, CARB, and SWRCB for this purpose.

Following statewide review, the Department of Conservation could draft an enforceable mitigation manual for these projects, similar in structure to what SB 4 required the agency to conduct for WST/fracking permits.[234] A stringent mitigation manual could provide permitting agencies, including both CalGEM and local governments, with a statewide floor of strong mitigation measures, ensuring a minimum level of state-approved environmental protection. Regulators would need to craft rules carefully to avoid precluding decision makers from conducting further CEQA review and requiring enhanced mitigation depending on site-specific considerations for individual projects. Mitigation manual measures could include, for example, limiting the locations of wells, restricting the amount of trucking associated with drilling, and requiring state-of-the-art well casing and groundwater testing (expanding on SB 4 standards and applying them to all new wells), among other options. The Department of Conservation and CalGEM could commit to reviewing and updating the manual periodically, or the legislature could direct such a process. The goal would be to account for ongoing improvements to environmental, public health and climate science; changing science, technology, and economic feasibility of mitigation measures; and any revised statewide changes to long-term greenhouse gas goals.

CalGEM and other lead agencies could also fill a current gap in environmental review in which no agency analyzes downstream climate impacts of oil and gas production (CARB's cap-and-trade program only covers oil-and-gas operations' on-site emissions). Currently, lead agencies limit climate-related review only to direct project impacts, such as on-site methane emissions from wells, and do not evaluate the impacts of refining or burning fuel produced by the wells. To expand the scope of this review, OPR and the Department of Conservation could provide more detailed guidance requiring analysis of downstream impacts through revised CEQA guidelines and recommended agency mitigation measures. The state could follow the lead of federal courts adjudicating disputes under the National Environmental Policy Act (NEPA), the federal environmental review statute roughly analogue to CEQA. In cases such as *Montana Environmental Information Center v. U.S. Office of Surface Mining*, courts have held that lead agencies are appropriately situated to conduct life-cycle (i.e. downstream) assessments of greenhouse gas impacts, particularly when these impacts are substantial and quantifiable.[235] OPR could similarly specify in the CEQA guidelines that lead agencies are responsible for assessment and mitigation of downstream impacts.[236] OPR, CalGEM, and CARB could then collaborate on a checklist of potential on-site mitigation measures, as well as off-site mitigation (including but not limited to emission offsets) when on-site measures have been exhausted.

6. SB 4's potential model

Finally, state leaders could look to the existing model of enhanced regulatory and permit approval authority that the legislature created in 2013's SB 4. State legislators designed SB 4 to enhance regulatory and permitting rigor for WST/fracking operations, creating a potentially more stringent and formal review process that could serve as a model for traditional drilling. In addition to detailed application requirements, SB 4 expressly stated that CalGEM may not approve an incomplete application for well stimulation and that operators may not perform well stimulation work without a valid application approved by CalGEM (a potentially significant departure from the 10-day deemed approval model for traditional wells). Following SB 4, the Public Resources Code also requires the agency to evaluate "quantifiable risk" of proposed projects, although the exact nature of such risk is not entirely clear.[237] The law was not without controversy, as some environmental groups in California contended that the focus on disclosure, monitoring, and well integrity failed to protect environmental health in an enforceable manner, making minimal difference in permitting outcomes; advocates have continued to push for an outright ban on WST/fracking.[238]

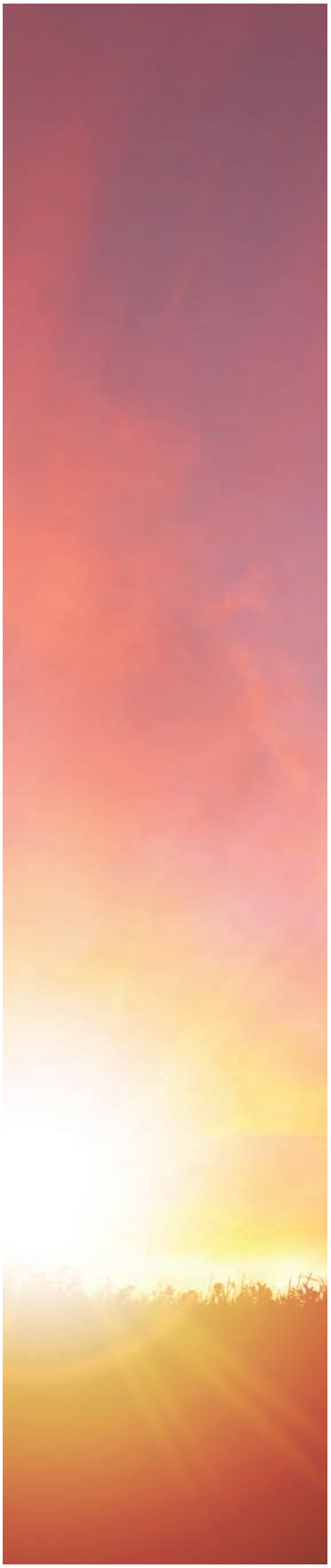
As noted earlier, in November 2019 Governor Newsom instituted a new review of all pending WST/fracking permits to ensure environmental protection standards are being met and to develop recommendations for strengthened review procedures. This announcement, as well as other recent CalGEM reforms, followed reports that approval of WST/fracking permits more than doubled (and new well permits increased by more than one third) in the first half of 2019, with some then-DOGGR staff also reporting financial ties to permit recipients.[239] In large part due to the relative newness of the regulatory regime, it is not yet entirely clear whether or to what extent SB 4 has materially enhanced environmental protection goals or affected the overall prevalence of WST/fracking within California by erecting potentially higher regulatory hurdles.

CalGEM's data indicate that the total level of WST/fracking in California may have decreased in the early years SB 4 went into effect. In 2015, the first year of SB 4 reporting, CalGEM reported 2,127 WST/fracking permit approvals, all in Kern County except for 35 across Fresno, Kings, Los Angeles (offshore), Orange, and Ventura counties. In 2016, CalGEM reported 579 WST/fracking stimulations, all in Kern County except for one in Orange County. And in 2017, CalGEM reported 169 stimulations, all in Kern County.[240] Independently compiled data show that 222 WST/fracking permits were issued in 2018, and 191 were issued in the first half of 2019 (prompting the aforementioned reports). However, CalGEM does not yet have complete,

publicly available data for these years.[241] The data do not detail the reason for this decline (market, geological, or regulatory factors, or some combination thereof) nor the level of production from the remaining wells. Further research is needed to determine the scale of SB 4's impact on production.

Legislators also intended for SB 4 to increase the level of information available on WST/fracking operations in California, and it has succeeded to the extent that CalGEM produces annual reports on WST/fracking permitting and operations, makes available online all permits issued and operator disclosures filed, and produced a programmatic EIR evaluating statewide impacts of the practice. In its SB 4-mandated annual reports on WST/fracking activity and regulation, CalGEM stated that it issued over 50 notices of violation for deficient disclosures, and one civil order for water sampling and testing, under the new requirements in the first year under the law. But the agency appears to have issued none since and has never initiated a criminal enforcement action or assessed a monetary penalty.[242] These data could be viewed as evidence of strong compliance with the new law, that SB 4's requirements impose no significant burden on WST/fracking, or that CalGEM has not undertaken aggressive enforcement.

Because SB 4's provisions largely apply to operational and chemical aspects specific to WST/fracking, not all aspects of the law offer precedent for replication across traditional drilling operations. However, SB 4's mandate for a statewide EIR on WST/fracking operations is a compelling item for the state to replicate. Requiring CalGEM, CARB, SWRCB, and other state agencies to collaborate on a comprehensive assessment of the environmental and greenhouse gas impacts of statewide production operations could provide a factual basis for subsequent statewide actions and inform policy decisions by multiple agencies in a new regulatory environment. Such a study could take a similar approach as California Council on Science and Technology's study of WST/fracking impacts, which concluded that environmental and greenhouse gas impacts from non-fracked wells may in fact be greater than those from fracked wells.[243] Assessing these impacts for all drilling forms could facilitate statewide prioritization of reform efforts and offer greater public and decision maker clarity on the nature of drilling impacts in California. This information could allow legislators, regulators, and advocates to better understand the potential effects of new regulations and assess the indirect consequences of greater restrictions, including potentially greater imports from other jurisdictions.



IV. CONCLUSION: CALIFORNIA FACES A RANGE OF OPTIONS TO FACILITATE A PHASE-OUT

California has multiple options to reduce in-state oil-and-gas production, with attendant benefits for the climate, air and water quality, and public health and safety, among other impacts. Some of the steps the state can take are well within the norm of other producer states, such as a minimum statewide setback, severance tax or increased fees to support enforcement, and express sovereignty for local governments to set more stringent requirements. Other steps would follow states like Colorado, which added an explicit mandate to its oil-and-gas regulator to privilege environmental protection. And some steps require more pioneering leadership, such as an aggressive setback requirement of 2,500 feet, enhanced ability to deny drilling approvals based on environmental considerations, and a plan to phase out in-state production altogether.

In addition to protecting public health and safety and the environment, state leadership to limit in-state production of fossil fuels would also bolster California's reputation as a global climate leader and demonstrate how other oil-and-gas-rich states or countries with similar climate goals can act to reduce their production. While California's fossil fuel resources are relatively minimal in the context of worldwide production, the state could help inspire limits on production elsewhere that could have a cumulatively significant effect of decreasing overall supply.

Ultimately, the imperative of climate change will require bold action from California's policymakers, who have already committed the state to doing its part to address this mounting global crisis. The variety of options presented in this report to place limits on fossil fuel production could provide a powerful new opportunity for policymakers to demonstrate this commitment.

APPENDIX A: LOS ANGELES COUNTY OIL AND GAS STRIKE TEAM ZONING CODE RECOMMENDATIONS [244]

OIL CODE RECOMENDATION	ANALYSIS/ISSUE
Removal of by right permitting	As required by the Board, the new code would include discretionary approval for oil and gas wells and removing the current allowance by right. Implementation of discretionary approval provides for the requirement of project specific mitigation measures and permit requirements.
Setback distances	The updated code should require that wells and associated facilities have a sufficient buffer zone from residential and other sensitive land uses. This would be determined based on health risk, air quality, noise, odors, aesthetics and other environmental, health and safety, and public nuisance considerations. An incentive program could be developed as part of the new code to encourage oil and gas producers to plug and abandon facilities within the new setback.
Well stimulation techniques	An updated code should address recent development in well stimulation and completion techniques. The code would reference recent SB 4 adopted regulations to be consistent with the State's DOGGR rules.
Air quality monitoring	An updated code should include requirements for monitoring to document that offsite air quality impacts are within applicable standards and to take measures to reduce impacts as appropriate.
Odor plan/monitoring	An updated code should include plans to monitor potential odors and include mitigation as applicable. Requirements would likely include the preparation of Odor Minimization Plans under specific circumstances, for all existing or proposed oil and gas facilities within a certain distance of sensitive receptors.
Down hole chemical use (Chemicals pumped down the well during drilling, maintenance or production activities)	These chemicals are not currently included in Hazardous Materials Business Plans due to the short-term use and temporary storage at oil fields. An updated code should require the tracking of the volumes and use of these chemicals and provide guidelines for storage, transportation and usage to prevent spills or releases into the environment
Transportation of chemicals through residential areas	Transportation of chemicals should be routed away from neighborhoods as feasible. The updated code should contain requirements for specific transportation routes for certain chemicals as appropriate to protect the health and safety of residents and to route chemicals away from residential areas where feasible.
Pipeline systems monitoring and leak detection	Monitoring and leak detection systems should be used for pipelines near residential and other sensitive land uses. Currently, there are a variety of regulations at the state and federal level, but local oversight is limited. This addition to the code would allow for requirements for pipeline maintenance, integrity testing, and leak detection systems.
Gas gathering systems operated under a vacuum	Operation of gas gathering systems with pipelines operating under vacuum can prevent odor and other nuisance releases for facilities located near residential or other sensitive uses, and provide for rapid identification of leaks and operating irregularities. The updated code should contain provisions to address this issue.
Well site berms	Well site berms provide tertiary containment in the event of a leak but are not currently required by State regulations. Well site berms in the County range from no berm to dirt or gravel berms to concrete/cinder block walls. Regulations for non-permeable material berms could provide consistent tertiary containment for leaks and spills.
Well cellar size, volume, and depth	Well cellars with sufficient depth and volume can provide secondary containment in the event of a leak from well equipment. Well cellars in the County range from no capacity to concrete vaults with significant capacity. The updated code should provide for well cellars with sufficient volume provide consistent secondary containment for leaks and spills.
Fire water supply and monitors	Many facilities do not have a fire water supply or system and require assistance from County Fire in the event of an incident as allowed by the Fire Code. The addition of on-site fire water and or monitors would assist County Fire in incident response.
Abandonment of long idle wells	DOGGR regulations encourage abandonment of idle wells not planned for future use. Local regulations as provided in an updated code could provide local oversight of well abandonment activities in advance of State requirements.

OIL CODE RECOMENDATION	ANALYSIS/ISSUE
Review of Emergency	Response Plans ERPs are reviewed by County Fire as applicable. Requiring review of ERPs in a code update should allow for other County agencies, including DRP, to become familiar with emergency incident response and allow for coordination with other area current and future projects.
Decommissioning and removal of out of service equipment	Oil fields, due to the long ongoing operations that are part of the industry, can contain and accumulate significant volumes of unused equipment and trash. Requirements for cleanup could improve aesthetics at oil and gas sites.
Storm water discharge handling with spills, drain valves control	The potential exists for storm water systems to discharge oil in the event of a spill during a precipitation event. Requirements in an updated code for drain valves and other control systems could help prevent offsite discharge of contaminated water.
Secondary containment	Secondary containment types for tank farms, vessels, and other oil and gas infrastructure in the County range from dirt berms to concrete cinder block walls. Requirements in an updated code for secondary containment systems made of non-permeable materials could provide consistent protection from leak and spills.
Community Communication	The updated code should require oil and gas facilities to prepare a community communication plan for residents within a certain radius. The plan should include conditions requiring notification, methods of notification and information on hazardous materials, conditions, or operations that may otherwise impact the health and well being of nearby residents.

APPENDIX B: SELECT REVIEW OF TAXATION, PERMITTING, AND SETBACK POLICIES

SEVERANCE TAX

	OIL AND GAS TAX LEVEL/ STRUCTURE	ALLOCATION OF PROCEEDS	PROCEEDS GENERATED	OTHER
CO	2% of gross income < $25k 3% of $25k < gross income < $100k 4% of $100k < gross income < $300k 5% of gross income > $300k[245]	25% to state water project fund 25% to state energy and resource project fund 35% to local governments for local facilities, services, and revenue compensation 15% direct distribution to local governments[246]	Up to $300 million per year, including approximately $125 million in 2017-2018.[247]	Operators may claim a credit of up to 87.5% of the severance tax for other state and local ad valorem taxes. The state has a separate tax for oil shale proceeds ranging from 1% of GI in year 1 to 4% in year 4 and beyond.[248]
NM	3.75% of value (oil/gas severance tax) 3.15% of value (oil school tax) or 4.00% of value (gas school tax) ~1.5% of value based on property tax (oil and gas ad valorem tax) 0.19-0.24% of value (oil/gas conservation tax)[249]	Severance tax: to state bonding fund and state general fund School tax: to state general fund Ad valorem tax: to local governments Conservation tax: to state reclamation fund and to state general fund[250]	Between $500 million and over $1 billion per year.[251]	Taxable value excludes any federal, state, or tribal royalties and trucking expenses.[252]
ND	5% of gross value (oil severance tax) 5% of gross value (oil extraction tax) $.07 per mcf (gas severance tax)[253]	Severance tax: 70% to state general fund and producing counties; 30% to legacy fund Extraction tax: 30% to legacy fund; 30% to state general fund; 20% to energy and water project fund; 20% to schools fund [254]	Between $300 million and over $1 billion per year (legacy fund only).[255]	The state assesses the severance tax in lieu of all other state and local ad valorem taxes on oil and gas property rights and production, so it both displaces and replaces local revenue with distributions from the state government.[256]
PA	Year 1: $40k-$60k per well/yr Year 2: $30k-$55k per well/yr Year 3: $25k-$50k per well/yr Year 4-10: $10k-$20k per well/yr Year 11-15: $5k-$10k per well/yr ("Unconventional gas well fee" applied to fracked natural gas, based on market price of gas) [257]	100% to a fund managed by the state public utility commission for road and water infrastructure, emergency response and preparedness, environmental programs, housing, and social services.[258]	Between $175 and $250 million per year.[259]	County and municipal governments are responsible for imposing the fee within their jurisdictions, via adoption of a local ordinance reflecting the statutory terms, as a condition of receiving a portion of the proceeds.[260]
TX	4.6% of value (oil severance tax) 7.5% of value (gas severance tax) [261]	75% to state general fund 25% to special school fund[262]	Multiple billions of dollars per year.[263]	The state offers various tax credits and exemptions including for low-producing wells, carbon dioxide injection projects, certain forms of high-cost gas, and geothermal energy production.[264]

PERMIT ISSUANCE AND DENIAL

	AGENCY MANDATE	PERMIT ISSUE/DENIAL/ DISCRETION	ENVIRONMENTAL CONSIDERATIONS	OTHER
CO	State Oil and Gas Conservation Commission is directed to "regulate the development and production of the natural resources of oil and gas in the state of Colorado in a manner that protects public health, safety, and welfare, including protection of the environment and wildlife resources."[265]	Law requires an operator to obtain a permit to begin drilling.[266] Commission is required to adopt rules for an "alternative location analysis process" for proposed wells located near populated areas and rules to "evaluate and address the potential cumulative impacts of oil and gas development."[267] Law does not discuss permit denial, but allows Commission to delay a permit for environmental or health analysis until new permitting regulations are developed.[268]	Commission directed to regulate "in a reasonable manner to protect and minimize adverse impacts to public health, safety, and welfare, the environment, and wildlife resources and shall protect against adverse environmental impacts on any air, water, soil, or biological resource resulting from oil and gas operations" when issuing permits.[269]	Reform legislation enacted in April 2019 (SB 19-181) updated the Commission's mandate and environmental protection focus, shifting from a "balanced development" framework to one that emphasizes environmental protection.[270] The Commission is currently developing implementing regulations under the new law.
NM	Oil Conservation Division has "authority over all matters relating to the conservation of oil and gas" and "jurisdiction, authority and control of and over all persons, matters or things necessary or proper to enforce effectively" the oil and gas law, but no specific reference to permitting or to environmental considerations.[271]	Regulations require an operator to obtain a permit to begin drilling and grant express authority to deny a permit (only for reasons relating to financial assurance, corrective orders, unpaid assessments, or compliance of other wells. Regulations authorize the commission to "impose conditions on an approved permit to drill" without any stated limitation.[272]	None.	None.[273]
ND	Industrial Commission has general authority to regulate oil and gas operations, including to limit production so as not to exceed demand, but no specific reference to environmental considerations.[274]	Law and regulations require an operator to obtain a permit to begin drilling.[275] Commission regulations include authority to "impose such terms and conditions on the permits…as the director deems necessary," but only to deny permits to prevent waste or protect correlative rights.[276]	Permit applications must include notice to any owners of dwellings within 1,000 feet of the proposed site. Those owners have a right to require the operator to locate flares, tanks, and treaters farther from the dwelling than the wellhead.[277]	None.[278]
PA	Office of Oil and Gas Management has general regulatory authority, but no specific reference to environmental considerations or permitting.[279]	Law and regulation require an operator to obtain a permit to begin drilling.[280] Law requires permit issuance within 45 days of receipt of the application and authorizes denial of applications for incompleteness, failure to meet bonding requirements, or other specified violations (none environmental).[281]	Under a 2012 oil and gas law reform (Act 13) that was targeted primarily at fracking wells, the legislature added a new permitting provision requiring the oil and gas office to "consider the impact of the proposed well on public resources" including parks, rivers, and habitats, when making a determination on a well permit.[282] Litigation broadly challenging the constitutionality of the new provisions led to an injunction on enforcement of the new permitting criteria; it appears this injunction is no longer in place, but new rules have not yet been issued.[283]	None.[284]
TX	Railroad Commission has broad general regulatory powers over oil and gas, but no specific reference to environmental considerations or permitting.[285]	Regulations require an operator to obtain a permit to begin drilling.[286] Law and regulations do not discuss permitting denial or discretion.	None.	None.[287]

DRILLING SETBACKS

	STATEWIDE REQUIREMENT	PREEMPTION/LOCAL AUTHORITY	OTHER
CO	500 feet from all occupied buildings 1000 feet from high-occupancy residences and schools 350 feet from outside activity areas[288] To drill within the setback zones, operators must obtain waivers from neighboring property owners, certify specific risk mitigation measures, or demonstrate to the Oil and Gas Conservation Commission that no other area is available to the operator to drill. (By regulation of the Oil and Gas Conservation Commission)	SB 19-181, the 2019 oil and gas overhaul, grants local governments the express authority to regulate surface impacts of oil and gas operations "to the extent necessary and reasonable, to protect public health, safety, and welfare and the environment" via regulations on land use, public facilities impacts, well siting, environmental impacts, insurance and indemnification, and nuisance, and allows these measures to be more stringent than state rules. Presumably, this expanded authority would include local setbacks.[289]	The Commission promulgated the regulation under an authorizing statute similar in scope to California's (the statute has since been amended, though no specific setback authority was included). In 2018, Colorado voters rejected a ballot initiative (Proposition 112) to institute a statewide 2,500-foot setback for new oil and gas wells.[290]
NM	330 feet from property line (oil wells) 660 feet from property line (gas wells) [291] (By regulation of the Oil Conservation Division)	A federal court recently held that the state's oil and gas legal regime preempted a county ordinance banning oil and gas extraction (among other expansive measures and declarations), which impliedly permits oil and gas development by setting out an "extensive statutory and regulatory scheme to regulate oil-and-gas production." The ordinance and the decision did not, however, address setbacks.[292] No other case law appears to deal with preemption or local authority.	The statewide requirements do not relate to distances from residences or sensitive environmental receptors, and thus differ from the other setbacks described herein. There is no other setback requirement in state law or regulation.[293]
ND	500 feet from dwellings (subject to waiver by neighboring owner or by Industrial Commission if necessary to prevent waste)[294] (By law and by regulation of Industrial Commission)	Two opinions of the state attorney general, in 1990 and 2010, determined that the state's permitting authority for oil and gas wells preempts local permitting authority, extending even to land-use approvals. A county "may not apply its zoning ordinances to regulate land usage for the location of oil, gas, or saltwater wells," including requiring non-conforming use permits to drill in agriculturally zoned areas.[295]	Industrial Commission is authorized to impose in any permit "reasonably necessary to minimize impact to the owner of the occupied dwelling" for wells within 1,000 feet.[296]
PA	200 feet from buildings or water wells (conventional drilling) 500 feet from buildings or water wells (fracking) (subject to waiver by neighboring owner or if operator can show the setback "would deprive the owner of the oil and gas rights of the right to produce or share in the oil or gas underlying the surface tract" and satisfies additional protection requirements.)[297] (By law)	2012's Act 13 included provisions expressly preempting local regulation on environmental grounds and requiring uniformity in local ordinances. This pro-drilling uniformity requirement included a ban on regulating oil and gas operations more stringently than other industrial operations, a requirement to authorize drilling operations as a permitted use in all zoning districts, and a limited authorization (effectively a ceiling) of 300-foot local setback requirements.[298] In 2013, the state supreme court held these provisions unconstitutional under Pennsylvania's Environmental Rights Amendment, which establishes the right of the people to clean air and water and environmental preservation—an amendment that has no direct parallel under California's constitution.[299]	The law also specifies a narrower set of setbacks for certain state waters (with a substantial set of waivers and limitations).
TX	467 feet from property line (subject to exceptions "to prevent waste or to prevent the confiscation of property)[300] (By law)	State law expressly preempts local regulation of oil and gas operations, except for measures that regulate "only aboveground activity," are "commercially reasonable," and do not "effectively prohibit an oil and gas operation conducted by a reasonably prudent operator," including "reasonable setback requirements.[301]	The statewide requirement does not relate to distances from residences or sensitive environmental receptors, and thus differs from the other setbacks described herein. There is no other setback requirement in state law or regulation.

SELECT CITY OIL AND GAS ASSESSMENTS IN LOS ANGELES COUNTY

CITY	CODE SECTION	ASSESSMENT STRUCTURE/FORMULA	REVENUE GENERATED
Beverly Hills	3-1-219 Classification I[302]	2020 inside city: $4,640 base fee + $0.42687 per each additional barrel over 10,000 2019 outside city: $2,311 base fee + $0.17073 per each additional barrel over 10,000[303] (Updated annually in the city Schedule of Taxes, Fees and Charges.)	Not itemized in city budget
La Habra Heights	3.6.60 B(2)(b)[304] 2013 Measure B[305]	Set at $0.60 in 2013 and then adjusted annually based on the U.S. EIA California Crude Oil First Purchase Price (approximately $0.26 in 2019).	Not itemized in city budget
Long Beach	3.80.221[306] 3.80.222	Per-barrel fixed fee of $0.15, plus additional special tax of $0.25 (subject to adjustment by regional consumer price index and suspension if per-barrel price falls below $20).	$5,128,231[307]
Santa Fe Springs	§117.022[308]	Between $0.41 and $0.52 per barrel, determined based on the Buena Vista Hills crude oil price per barrel.	$350,000[309]
Seal Beach	5.55.015 License Tax[310]	Base fee of $0.205 per barrel, adjusted annually based on the producer price index for crude petroleum ($0.125 floor).	$190,445[311]
Signal Hill	§5.12.010[312]	Base of $0.15 per barrel, adjusted annually based on the producer price index for crude petroleum ($0.125 floor).	$525,727[313]
Torrance	§228.2.1[314]	$0.15 per barrel, adjusted annually based on the regional consumer price index. Minimum amount paid by any producer is $56.25.	$9,139[315]

APPENDIX C: LIST OF "POTENTIAL NEW RULES AND PRACTICES" OF COLORADO OIL AND GAS CONSERVATION COMMISSION UNDER SB 19-181[316]

Mission Change: Potential New Rules & Practices

- Require emergency response plans and tactical response plans upon permit filings
- Incorporating new protections to apply to existing facilities
- Requiring takeaway capacity to minimize flaring and truck traffic
- Improve Mechanical Integrity Testing requirements
- Reform spill reporting
- Evaluate Best Management Practices in context of multi-well horizontal developments
- Alternative Site Analysis? In conjunction with local governments?
- Create basin-wide spacing
- Use cumulative impacts to inform and develop permit review and best management practices; Revisit CDPs
- Right-sizing or right location of well pads
- Use cumulative impact noise, odor, and other nuisance rules
- Evaluate and incorporate management of change and process safety management protocols
- Address liability for historic spills

Neutral Framework: Potential New Rules & Practices

- Remove "Shall Approve" from decision-making language
- Remove "technically feasible and cost effective" from rules and replace with "reasonable and necessary" to protect public health, safety, welfare, wildlife and the environment?
- Minerals left in the ground are no longer considered "waste"
- Reorienting COGCC rules to horizontal development
- Rewrite standing rules to allow for increased community engagement in the permitting process

Holistic Decision-Making: New Rules and Practices

- Create a more comprehensive drilling permit application process
- Require spacing, drilling and location permit applications at the same time
- Increase number of local public forums
- Identify denial criteria based on long-term impact on public health safety, welfare, and the environment
- Require oil and gas location permit to include facility layout and as- built drawings to the COGCC
- Re-examine nuisance rules and definitions in relation to cumulative impact

Trust Building: Potential New Rules and Practices

- Establish an ombudsperson for communities
- Reform local government outreach and designee program
- Expand and simplify notices to include more impacted citizens and communities, maps, and site diagrams
- Rewrite standing rules to allow for increased community engagement in the permitting process
- Use the newly created communications officer position to increase public awareness of COGCC activities
- Require flowline mapping consistent with SB 181 mandate

State-Local: Potential New Rules and Practices

- Create a Technical Review Board; Provide hand to local governments who are involved in siting
- Establish ombudsperson for local communities
- Ensure COGCC expertise is available to local governments
- Provide hand to regional local governments who are addressing siting practices for oil and gas development near each other's borders
- Coordination with local governments, CDPHE, CPW, and COGCC on siting
- Increase number of local public forums

REFERENCES

Note: Links to some articles may be paywall-restricted

1. See SB 350 (de León, Ch. 547, Stats. 2015); SB 100 (de León, Ch. 312, Stats. 2018); AB 1493 (Pavley, Ch. 200, Stats. 2002); SB 32 (Pavley, Ch. 249, Stats. 2016); E.O. B-55-18 (Governor Edmund G. Brown, 2018); Veloz, "Sales Dashboard," available at http://www.veloz.org/sales-dashboard (last visited March 14, 2020).

2. United States Energy Information Administration (US EIA), "Crude Oil Production," (monthly production data through December 2019), available at https://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbbl_m.htm (last visited March 14, 2020).

3. Id; see also California Geologic Energy Management Division (CalGEM), 2018 Report of California Oil and Gas Production Statistics, p. 1, available at https://www.conservation.ca.gov/calgem/pubs_stats/annual_reports/Pages/annual_reports.aspx (last visited March 14, 2020). (CalGEM's most recently available data, in its 2018 Report of California Oil and Gas Production Statistics, reports 161.8 million barrels produced in 2018, fewer than the 170 million reported by US EIA).

4. US EIA, "Natural Gas Gross Withdrawals and Production," (annual production data through 2019), available at https://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_FGW_mmcf_a.htm (last visited March 14, 2020). (CalGEM's most recently available data, in its 2018 Report of California Oil and Gas Production Statistics, reports 180 bcf of onshore production for 2018, less than the 199 bcf reported by US EIA).

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118. Cal. Pub. Res. Code § 3160(c)(2).

119. Memorandum of Agreement among the Department of Conservation, Division of Oil, Gas, and Geothermal Resources and California Air Resources Board and Local Air Districts Regarding Well Stimulation Treatments and Well Stimulation Treatment-Related Activities (December 2014), available at https://www.conservation.ca.gov/calgem/for_operators/Pages/mou_moa.aspx (last visited March 14, 2020).

120. California State Water Resources Control Board, "Model Criteria for Groundwater Monitoring in Areas of Oil and Gas Well Stimulation" (July 7, 2015), available at https://www.waterboards.ca.gov/water_issues/programs/groundwater/sb4/docs/model_criteria_final_070715.pdf (last visited March 14, 2020).

121. Id. at 3.

122. Id. at 7-12.

123. Cal. Pub. Res. Code §§ 21000 et seq.

124. Cal. Pub. Res. Code §§ 21061, 21064, 21064.5, 21080(c)-(d).

125. Minute Order concerning First Amended Writ Petition, Assn. of Irritated Residents v. California Dept. of Conservation (AERA Energy), No. S-1500-CV-283418 (August 23, 2018) (Super. Ct. Kern Co.).

126. See Letter from Nobel Women's Initiative to Governor Edmund G. Brown (July 30, 2018), supra; Letter from Elected Officials to Protect California to Governor Gavin Newsom (February 14, 2020), supra.

127. Cal. Pub. Res. Code § 3276, Art. II.

128. Id. at Art. III(e). A review of legislative, judicial, and secondary legal sources did not identify California case law, legislative history, or analysis offering insight into the intent of the enacting legislature or the scope of the compact's effect on California's ability to limit production. The limited legal analysis available indicates only that the compact, which entails no enforceable obligations, may fall outside Supreme Court precedent on interstate compacts. Witkin Summary of Calif. Law, 11th ed., Ch. X, § 78. A review of the laws codifying the compact in Colorado, Oklahoma, Texas, and Wyoming revealed no further federal or state case law or analysis defining the nature of the compact's obligations. See Colo. Stats. § 34-60-123; 52 Okla. Stat. § 201 et seq.; Tex. Natural Res. Code § 90.001 et seq.; Wyo. Stat. § 30-5-201 et seq. These states have enacted oil and gas severance taxes while members of the compact, and Colorado has also instituted a suite of state oil and gas agency reforms under SB 19-181, with no apparent violation. Consultation with one or more of these member states could be advisable to ensure new laws or regulations do not raise compliance concerns, but it appears that no significant barrier exists. Regardless, California may withdraw from the compact should it present any legal barrier. The compact allows any member to withdraw upon 60 days' notice with no further obligations. Cal. Pub. Res. Code § 3276, Art. VIII. Since California's entry into the compact was ratified and approved by the state legislature, and the enabling statute is silent as to specific withdrawal procedures, legislative action rather than executive action would likely be necessary to effect the withdrawal. Cal. Pub. Res. Code § 3275.

129. Id. at Art. VII.

130. Anne Kolesnikoff and Cassarah Brown, National Conference of State Legislatures, "State Oil and Gas Severance Taxes" (September 6, 2018), available at http://www.ncsl.org/research/energy/oil-and-gas-severance-taxes.aspx (last visited March 14, 2020). Production rankings based on US EIA, "Crude Oil Production," supra.

131. Cal. Pub. Res. Code §3400 et seq.; CalGEM, "Assessment Process," available at https://www.conservation.ca.gov/calgem/for_operators/Pages/Assessments.aspx (last visited March 14, 2020). According to CalGEM's most recent available financial report, the agency's revenue from assessments in 2017 was approximately $83 million.

132. LAOPGAS, Oil and Gas Health Report, supra, pp. 123-124.

133. Cal. Rev. & Tax Code §§ 30001 et seq., 32001 et seq., 34010 et seq.

134. See, e.g., Congressional Budget Office, "Impose a Tax on Emissions of Greenhouse Gases" (December 8, 2016), available at https://www.cbo.gov/budget-options/2016/52288 (last visited March 14, 2020); Center for Climate and Energy Solutions, "Options and Considerations for a Federal Carbon Tax" (February 2013), available at https://www.c2es.org/document/options-and-considerations-for-a-federal-carbon-tax/ (last visited March 14, 2020).

135. See https://oci.carnegieendowment.org/ for more information.

136. See Riley M. Duren et al., "California's methane super-emitters," supra.

137. Jason P. Brown, Peter Maniloff, and Dale T. Manning, Effectiveness of State Taxation on Investment: Evidence from the Oil Industry, Federal Reserve Bank of Kansas City Working Papers (September 2018), available at https://www.kansascityfed.org/~/media/files/publicat/reswkpap/pdf/rwp18-07.pdf (last visited March 14, 2020); Katie Jo Black, Shawn J. McCoy, and Jeremy G. Weber, "When Externalities Are Taxed: The Effects and Incidence of Pennsylvania's Impact Fee on Shale Gas Wells," 5 Journal of the Association of Environmental and Resource Economists 1, 107-153 (January 2018), available at https://www.journals.uchicago.edu/doi/pdfplus/10.1086/694034 (last visited March 14, 2020); Soren T. Anderson, Ryan Kellogg, and Stephen W. Salant, "Hotelling under Pressure," 126 Journal of Political Economy 3, 984-1026 (June 2018), available at https://www.journals.uchicago.edu/doi/pdfplus/10.1086/697203 (last visited March 14, 2020).

138. See, e.g., California Attorney General, "California Gasoline Market" (webpage), available at https://oag.ca.gov/antitrust/gasoline (last visited March 14, 2020).

139. Cal. Const. Art. XIIIA.

140. See Senate Bill 241 (Evans, 2013) and Senate Bill 1017 (Evans, 2014) (proposing a severance tax of 9.5 percent of the average price of each barrel of oil produced and 3.5 percent of the average price per unit of gas).

141. See California Secretary of State, "Oil and Natural Gas Tax Initiative Enters Circulation" (April 26, 2013), available at https://www.sos.ca.gov/administration/news-releases-and-advisories/2013-news-releases-and-advisories/db13-016/ (last visited March 14, 2020).

142. Cal. Pub. Res. Code §§ 3400-3403.

143. Cal. Pub. Res. Code § 3401.

144. Cal. Const. Art. XIIIA § 3(b).

145. Cal. Chamber of Commerce v. State Air Resources Board, 10 Cal. App. 5th 604, 633 (2017), rev. denied.

146. California Building Industry Association v. State Water Resources Control Board, 4 Cal. 5th 1032, 1049 (2018).

147. N.M. Stat. §§ 7-30-4, 7-31-4, 7-32-4; New Mexico Legislative Finance Committee, "New Mexico Cost Burden on the Oil and Gas Extraction Industry" (June 2018), available at https://www.nmlegis.gov/handouts/ALFC%20060418%20Item%203%20LFC%20Hearing%20Brief_Effective%20Tax%20Rates%20on%20Oil%20and%20Gas%20Industry.pdf (last visited March 14, 2020).

148. Id.

149. See Andrew C. MacMillan, "Oil Production Tax in Alaska: An Evolution away from a 'True' Production Tax," 34 Alaska L. Rev. 2, 320-343 (2017); Becky Bohrer, "Oil unease: Alaska faces tough budget decisions," Associated Press (August 9, 2019), available at https://www.apnews.com/452d2d0431f544be9abc7de32169a58a (last visited March 14, 2020). The Alaska Permanent Fund, which holds extraction tax revenues and is the source of dividend payments, was created by state constitutional amendment in 1976. Alaska Const. Art. IX, § 15. The level and nature of the production tax is set by statute and has shifted multiple times in recent decades. Alaska Stat. § 43.55; Andrew C. MacMillan, supra.

150. Id; N.M. Const. Art. 8, § 10; N.M. Stat. §§ 7-1-6.21, .22, .23, .61.

151. New Mexico Legislative Finance Committee, "New Mexico Cost Burden on the Oil and Gas Extraction Industry," supra.

152. CCST, Orphan Wells in California: An Initial Assessment of the State's Potential Liabilities to Plug and Decommission Orphan Oil and Gas Wells (November 2018), pp. 24-29, available at https://ccst.us/wp-content/uploads/CCST-Orphan-Wells-in-California-An-Initial-Assessment.pdf (last visited March 14, 2020).

153. Cal. Pub. Res. Code. § 3203.

154. Final Statement of Decision, Chevron U.S.A. v. Monterey County, supra, at 27-28.

155. Colo. Stat. § 34-60-102(1)(a).

156. Colo. Stat. § 34-60-106(2.5)(a).

157. See, e.g., Saja Hindi, "Nonprofit Colorado Rising asks district court judge to halt new oil and gas development until rulemaking is complete," Denver Post (October 9, 2019), available at https://www.denverpost.com/2019/10/09/colorado-rising-complaint-oil-gas-development-sb-181/ (last visited March 14, 2020); Judith Kohler, "Six months after Colorado's sweeping oil and gas law took effect, fight over path forward hasn't faded," Denver Post (October 24, 2019), available at https://www.denverpost.com/2019/10/24/colorado-oil-gas-law-6-months-old-sb-181/ (last visited March 14, 2020).

158. Colorado Oil and Gas Conservation Commission (COGCC), "Insights into COGCC Rulemaking from 30,000'" (August 2019), available at https://cogcc.state.co.us/documents/sb19181/Overview/SB_19_181_Rulemaking_Update_20190821_rev.pdf (last visited March 14, 2020).

159. N.M. Admin. Code §§ 19.15.14.8-.10, 19.15.5.9.

160. N.D. Admin. Code § 43-02-03-16.2.

161. Colo. Stat. §§ 34-60-106(1)(f), 34-60-106(1)(f)(III); 34-60-106(2.5)

162. COGCC, "SB 19-181 Required Director Objective Criteria" (May 16, 2019), available at https://cogcc.state.co.us/documents/sb19181/DOC/COGCC_Directors_Final_Objective_Criteria_20190516.pdf (last visited March 14, 2020). New permit regulations will likely be issued under amendments to Colorado Oil and Gas Conservation Commission Rules § 303.

163. See, e.g., Association of Irritated Residents v. California Dept. of Conservation, 11 Cal. App. 5th 1202 (2017).

164. Governor Gavin Newsom, Governor's Budget Summary 2020-21, pp. 162-163, available at http://www.ebudget.ca.gov/2020-21/pdf/BudgetSummary/FullBudgetSummary.pdf.

165. See Cal. Pub. Res. Code §§ 3106(a) ([CalGEM "shall supervise the drilling, operation, maintenance, and abandonment of wells…so as to prevent…loss of oil, gas, or reservoir energy"); 3106(b) ("To further the elimination of waste by increasing the recovery of underground hydrocarbons, it is hereby declared as a policy of this state that the grant in an oil and gas lease or contract…is deemed to allow the lessee or contractor…to do what a prudent operator using reasonable diligence would do, having in mind the best interests of the lessor, lessee, and the state in producing and removing hydrocarbons").

166. Colo. Stat. § 34-60-106(2.5); see Colo. Stats. § 34-60.107 (prohibiting waste).

167. Colo. Stat. § 34-60-106(11)(c).

168. Colo. Stat. § 29-20-104.

169. Cal. Pub. Res. Code § 3600.

170. CCST, An Independent Scientific Assessment of Well Stimulation in California, pp. 45-46.

171. See Oil Change International, The Sky's Limit California: Why the Paris Climate Goals Demand that California Lead in a Managed Decline of Oil Extraction (May 2018), available at http://priceofoil.org/content/uploads/2018/05/Skys_Limit_California_Oil_Production_R2.pdf; Stand Together Against Neighborhood Drilling, available at https://www.stand.la/.

172. LACDPH, Public Health and Safety Risks of Oil and Gas Facilities in Los Angeles County, supra, pp. 17-18, 22-23.

173. LAOPGAS, Oil and Gas Health Report, supra, pp. 145-147.

174. Id. at 109, 115 (the study included data estimating 32,000 residents within 328 feet (100 meters) of a well and 230,000 residents within 1,312 feet (400 meters) of a well).

175. Nicole J. Wong, "Existing scientific literature on setback distances from oil and gas development sites" (November 2017), available at https://www.stand.la/uploads/5/3/9/0/53904099/2500_literature_review_report-v2-share.pdf (last visited March 14, 2020).

176. 2 Colo. Admin. Code § 404-1:604.

177. N.D. Stats. § 38-08-05(2).

178. N.M. Admin. Code §§ 19.15.15.9-.10, 19.15.16.15(C).

179. 58 Pa. Stat. § 3215(a).

180. 16 Tex. Admin. Code § 3.37.

181. La. Rev. Stat. § 30:28; W. Va. Code § 22-6-21; Wyo. Rules and Regs. 055.0001.3 § 47.

182. LACDPH, Public Health and Safety Risks of Oil and Gas Facilities in Los Angeles County, supra, p. 16; Arvin (CA) Municipal Code § 17.46.022; Carson (CA) Oil and Gas Code § 9521; Huntington Beach (CA) Municipal Code § 15.20.030; Kern. Co. (CA) Zoning Ordinance § 19.98.060(A); Long Beach (CA) Municipal Code § 12.16; Signal Hill (CA) Municipal Code § 16.16.030.

183. Kathleen Wilson, "Curbing greenhouse gases a top priority in update to Ventura County's general plan," Ventura County Star (August 7, 2019), available at https://www.vcstar.com/story/news/politics/2019/08/07/reducing-greenhouse-gases-top-priority-update-ventura-county-general-plan/1912769001/ (last visited March 14, 2020).

184. Cal. Const. Art. XI § 7.

185. See Beverly Oil Co. v. City of Los Angeles, 40 Cal. 2d 552 (1953) ("[T]he enactment of an ordinance which limits the owner's property interest in oil bearing lands located within the city is not of itself an unreasonable means of accomplishing a legitimate objective within the police power of the city."); Pacific Palisades Ass'n v. City of Huntington Beach, 196 Cal. 211 (1925) (A city "has the unquestioned right to regulate the business of operating oil wells within its city limits, and to prohibit their operation within delineated areas and districts, if reason appears for so doing.").

186. Final Statement of Decision, Chevron U.S.A. v. Monterey County, supra, at 27-28.

187. Swepi, LP v. Mora County, N.M., 81 F.Supp.3d 1075, 1198 (D.N.M. 2015); 2010 N.D. Op. Atty. Gen. No. L-01 (February 5, 2010); 1990 N.D. Op. Atty. Gen. No. 90-23 (October 5, 1990). Other states have enacted laws expressly preempting local control, including Ohio, Oklahoma, and North Carolina. Oh. Stat. § 1509.02 ("The division has sole and exclusive authority to regulate the permitting, location, and spacing of oil and gas wells and production operations within the state… this chapter and rules adopted under it constitute a comprehensive plan with respect to all aspects of the locating, drilling, well stimulation, completing, and operating of oil and gas wells"); Okla. Stat. Tit. 52, § 137.1 ("A municipality, county or other political subdivision may also establish reasonable setbacks… as are reasonably necessary to protect the health, safety and welfare of its citizens but may not effectively prohibit or ban any oil and gas operations"); N.C. Stat. § 113-415.1 ("[A] ll provisions of local ordinances, including those regulating land use…that regulate or have the effect of regulating oil and gas exploration, development, and production activities…are invalidated and unenforceable"). Perhaps most importantly, Texas law (enacted in response to a local fracking ban) expressly preempts local oil and gas regulations except those measures that regulate "only aboveground activity," are "commercially reasonable," and do not "effectively prohibit an oil and gas operation conducted by a reasonably prudent operator," including "reasonable setback requirements." Tex. Nat. Res. Code § 81.0523. Hundreds of Texas localities had setbacks in place prior to the law, according to data compiled by the Texas Municipal League. Approximately 50 cities enforced setbacks of 1,000 feet, with an additional five at 1,500 feet (including Dallas) and two at 2,000 feet. It is unclear whether any party has issued a preemption challenge to these rules since passage of the law. See Mose Buchele, "After HB 40, What's Next for Local Drilling Rules in Texas?" NPR StateImpact Texas (July 2, 2015), available at https://stateimpact.npr.org/texas/2015/07/02/after-hb-40-whats-next-for-local-drilling-bans-in-texas (last visited March 14, 2020); Jim Malewitz and Ryan Murphy, "See How Local Drilling Rules Vary Across Texas," The Texas Tribune (March 27, 2015), available at https://www.texastribune.org/2015/03/27/see-how-local-drilling-rules-vary-across-texas/ (last visited March 14, 2020) (article includes link to complete data set).

188. Colo. Stat. §§ 29-20-104, 34-60-131.

189. Cal. Pub. Res. Code §§ 3106(a), 3011.

190. See Cal. Gov't. Code § 11350(b)(1).

191. Cal. Pub. Res. Code. §§ 3600, 3609; 14 Cal. Code Regs. § 1721.

192. 14 Cal. Code Regs. §§ 1720(a), 1724.3; see also § 1760(f).

193. Cal. Pub. Res. Code §§ 3106(a)-(b), 3203; 14 Cal. Code Regs. § 1722.

194. See, e.g., Environmental Protection Information Center v. Dept. of Forestry & Fire Protection, 43 Cal. App. 4th 1011 (1996). In addition, Cal. Pub. Res. Code § 3643 requires the "unit agreements" that govern management of existing oil and gas fields to eliminate waste and free areas for development. Imposition of new setback requirements could conflict with some existing unit agreements, which require owner consent to modify. Cal. Pub. Res. Code § 3649. A new regulation would need to be carefully crafted to carve out locations where a unit agreement would be disturbed and/or create a process to resolve any disputes that arise.

195. 59 Ops. Cal. Atty. Gen. 461, 478-479 (1976).

196. Id. at 469.

197. Id. at 480.

198. US Const. Art. V; Cal. Const. Art. I § 19. See Lucas v. S.C. Coastal Council, 505 U.S. 1003 (1992).

199. See Penn Central Transp. Co. v. City of New York, 438 U.S. 104 (1978); Lucas v. S.C. Coastal Comm., 505 U.S. 1003 (1992); San Remo Hotel v. City and County of San Francisco, 27 Cal. 4th 643 (2002); Gerawan Farming, Inc. v. Ag. Labor Relations Bd., 3 Cal. 5th 1118 (2017).

200. See generally Murr v. Wisconsin, 137 S.Ct. 1933 (2017); see also See Colony Cove Properties, LLC v. City of Carson, 888 F.3d 445 (9th Cir. 2018) (citing Penn. Central Transp. Co. v. City of New York) (noting that regulator is not required to account for debt obligations in evaluating a regulated entity's investment-backed expectations, but rather must account for such factors as it typically analyzes when designing a regulation); Andrus v. Allard, 444 U.S. 51 (1979).

201. See William C. Haas & Co., Inc. v. City and County of San Francisco, 605 F. 2d 1117 (1979); Andrus v. Allard, 44 U.S. 51.

202. Avco Cmty. Devs., Inc. v. S. Coast Reg'l Comm'n, 17 Cal. 3d 785 (1976).

203. See Davidson v. County of San Diego, 49 Cal. App. 4th 639 (1996); Creppel v. United States, 41 F.3d 627 (Fed. Cir. 1994).

204. Metromedia, Inc. v. City of San Diego, 26 Cal. 3d 848 (1980).

205. See Letter from Environmental Defense Center to Ventura County Board of Supervisors, "County Counsel Opinion on Antiquated Oil and Gas Conditional Use Permits" (April 28, 2015), available at https://www.environmentaldefensecenter.org/wp-content/uploads/2015/04/ventura-county-antiquated-cup-letter-2015_4_28.pdf (last visited March 14, 2020); Kimberly Rivers, "No More 'No Limits': County Amending Rules for New Oil Drilling on Old Permits," Ventura County Reporter (September 11, 2019), available at https://vcreporter.com/2019/09/no-more-no-limits-county-amending-rules-for-new-oil-drilling-on-old-permits/ (last visited March 14, 2020).

206. See Home Builders Assn. of Northern Calif. v. City of Napa, 90 Cal. App. 4th 188 (2001); Beach & Bluff Conservancy v. City of Solana Beach, 28 Cal. App. 5th 244 (2018); Brief for League of California Cities and California State Association of Counties as Amici Curiae Supporting Petitioners, Chevron U.S.A. v. Monterey County, supra, pp. 42-44. Section 30010 of the California Coastal Act, which empowers the Coastal Commission to deny coastal development projects based on certain criteria, contains a clause prohibiting such denials if they violate constitutional property rights.

207. Colo. Admin. Code § 404-1:604.

208. See Metromedia, Inc. v. City of San Diego, supra; National Advertising Co. v. County of Monterey, 1 Cal. 3d 875 (1970); Tahoe Regional Planning Agency v. King, 233 Cal. App. 3d 1365 (1991).

209. See Letter from Natural Resources Defense Council, Communities for a Better Environment, and the Center for Biological Diversity to Mike Feuer, Los Angeles City Attorney, "Los Angeles City Authority for Setback from Oil and Gas Operations" (September 4, 2019), available at https://legal-planet.org/wp-content/uploads/2019/12/LANLT-STAND-LA-Letter-12.17.19.pdf (attachment to letter of Los Angeles Neighborhood Land Trust) (last visited March 14, 2020).

210. Cal. Health & Safety Code § 39602.

211. Cal. Health & Safety Code § 40001(b).

212. See 17 Cal. Code Regs. § 93118.

213. Cal. Health & Safety Code § 39658. Adoption of control measures for a TAC identified by US EPA is only mandatory if the EPA standard is inadequate and the cost of the control measure would be justified by the expected public health benefit.

214. Cal. Health & Safety Code § 39666.

215. 17 Cal. Code Regs. §§ 93102, 93115.6.

216. Respondent's Brief, Coalition for Reasonable Regulation of Naturally Occurring Substances v. California Air Resources Board, 122 Cal. App. 4th 1249 (2004).

217. See 17 Cal. Code Regs. §§ 93109(h), 93104.

218. Assembly Bill 74 (Ting, Chapter 233, Statutes of 2019).

219. See CalGEM "Notice to Operators (NTO)" (guidance documents), available at: https://www.conservation.ca.gov/calgem/CEQA (last visited March 14, 2020).

220. Cal. Pub. Res. Code § 21169; 14 Cal. Code Regs. § 15261(a) (Guidelines for Implementation of the California Environmental Quality Act – Statutory Exemptions).

221. 14 Cal. Code Regs. § 15301 (Guidelines for Implementation of the California Environmental Quality Act – Categorical Exemptions); see also 14 Cal. Code Regs. § 1684.1.

222. 14 Cal. Code Regs. § 15304; see also 14 Cal. Code Regs. § 1684.2 (codifying this exemption in CalGEM's regulations).

223. N. Coast Rivers Alliance v. Westlands Water Dist., 227 Cal. App. 4th 832 (2014).

224. See County of Inyo v. Yorty, 32 Cal. App. 3d 795 (1973).

225. See 14 Cal. Code Regs. § 15261(a)(2) & (b)(3).

226. See, e.g., SB 97 (Dutton, Chapter 185, Statutes of 2007) and 14 Cal. Code Regs. § 15064.4 (requiring lead agencies to analyze greenhouse gas emission impacts of proposed projects).

227. See 14 Cal. Code Regs. § 15301.

228. The CEQA guidelines allow for such agency requests for new or amended categorical exemptions. See "Revisions to List of Categorical Exemptions," 14 Cal. Code Regs. § 15300.3.

229. See 14 Cal. Code Regs. § 15304.

230. See Cal. Code Regs. § 1684.2

231. 14 Cal. Code Regs. §§ 15300.2(c) ("A categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.").

232. 14 Cal. Code Regs. § 15052 (a)(3).

233. See U.S. Department of the Interior, "Secretary Jewell Launches Comprehensive Review of Federal Coal Program" (press release) (January 15, 2016) available at https://www.doi.gov/pressreleases/secretary-jewell-launches-comprehensive-review-federal-coal-program (last visited March 14, 2020).

234. CalGEM, "Mitigation Policy Manual for Well Stimulation Treatment Permits" (July 2015), available at https://www.conservation.ca.gov/calgem/CEQA/Documents/Mitigation_Policy_for_WST_Permits.pdf (last visited March 14, 2020).

235. 274 F. Supp. 3d 1074 (D. Mont. 2017).

236. See 14 Cal. Code Regs. §§ 15064(b)(3), 15064(c).

237. Cal. Pub. Res. Code § 3160(d).

238. Julie Cart, "State issues toughest-in-the-nation fracking rules," Los Angeles Times (July 1, 2015), available at https://www.latimes.com/local/lanow/la-me-ln-state-issues-fracking-rules-20150701-story.html (last visited March 14, 2020); Lifsher and McGreevey, "Brown signs bill on fracking, upsetting both sides of oil issue," supra; Julie Cart, "Activists want California to ban fracking. What does Gov. Newsom want?" CalMatters (April 11, 2019), available at https://calmatters.org/environment/2019/04/activists-want-california-fracking-ban-newsom/ (last visited March 14, 2020); CBD, "Fracking in California: Nine Questions and Answers," available at https://www.biologicaldiversity.org/campaigns/california_fracking/faq.html (last visited March 14, 2020).

239. See Consumer Watchdog, "Watchdogs Call For Resignations & Permit Freeze As California Oil Regulators Approve Surge In Well Permits While Personally Invested In Oil Companies" (July 11, 2019), available at https://www.consumerwatchdog.org/energy/watchdogs-call-resignations-permit-freeze-california-oil-regulators-approve-surge-well (last visited March 14, 2020).

240. CalGEM, Well Stimulation Treatment Annual Reports (2014-15, 2015-16, 2016-17), Table 17, available at https://www.conservation.ca.gov/calgem/pubs_stats/Pages/legislative_reports.aspx#wst-annual-report (last visited March 14, 2020).

241. See FracTracker Alliance, "Permitting New Oil and Gas Wells under the Newsom Administration" (July 11, 2019), available at https://www.fractracker.org/2019/07/permitting-more-oil-gas-newsom/ (last visited March 14, 2020).

242. CalGEM, Well Stimulation Treatment Annual Reports (2014-15, 2015-16, 2016-17), supra.

243. CCST, An Independent Scientific Assessment of Well Stimulation in California, Vol. II, supra, at 40-41.

244. Los Angeles Co., Oil and Gas Facility Compliance Review Project Bi-Annual Report Number Three, supra, pp. 134-136.

245. 39 Colo. Stat. § 29-105. Wells that produce less than 15 barrels of oil or 90,000 cubic feet of gas are exempted.

246. 39 Colo. Stat. §§ 29-108 – 29-110. State water, energy, and natural resource project funds are administered by the Department of Natural Resources via the Severance Tax Trust Fund. Local government funds are administered by the Department of Local Affairs via the Local Government Severance Tax Fund. The 15 percent direct allocation to local governments is based on drilling-related factors like the proportion of statewide oil and gas activity based in a given locality.

247. Colorado General Assembly, Legislative Council Staff, "Severance Tax," available at https://leg.colorado.gov/agencies/legislative-council-staff/severance-tax (last visited March 14, 2020).

248. 39 Colo. Stat. §§ 29-105, 29-107.

249. N.M. Stat. §§ 7-29-4, 7-30-4, 7-31-4, 7-32-4; New Mexico Legislative Finance Committee, "New Mexico Cost Burden on the Oil and Gas Extraction Industry," supra.

250. N.M. Const. Art. 8, § 10; N.M. Stat. §§ 7-1-6.21, .22, .23, .61.

251. New Mexico Legislative Finance Committee, "New Mexico Cost Burden on the Oil and Gas Extraction Industry," supra.

252. N.M. Stat. §§ 7-29-4.1, 7-30-5, 7-31-5, 7-32-5.

253. N.D. Cent. Code §§ 57-51-02, 57-51.1-02; see also Headwaters Economics, "How North Dakota Returns 'Unconventional' Oil Revenue to Local Governments," available at https://headwaterseconomics.org/wp-content/uploads/state-energy-policies-nd.pdf (last visited March 14, 2020).

254. N.D. Cent. Code §§ 57-51-15, 57-51.1-07.

255. North Dakota State Treasurer, "Historical Legacy Fund Deposits," available at https://www.treasurer.nd.gov/north-dakota-legacy-fund-0 (last visited March 14, 2020).

256. Headwaters Economics, "How North Dakota Returns 'Unconventional' Oil Revenue to Local Governments," supra.

257. 58 Pa. Stat. § 2301 et seq.

258. 58 Pa. Stat. § 2314.

259. Pennsylvania Public Utility Commission, "Act 13 Disbursements and Impact Fees," available at https://www.act13-reporting.puc.pa.gov/Modules/PublicReporting/Overview.aspx (last visited March 14, 2020).

260. 58 Pa. Stat. § 2302(a)-(b).

261. Tex. Tax Code §§ 201.052, 202.052.

262. Tex. Tax Code §§ 201.353, 202.353.

263. New Mexico Legislative Finance Committee, "New Mexico Cost Burden on the Oil and Gas Extraction Industry," supra.

264. Tex. Tax Code §§ 202.056-063.

265. SB 19-181; Colo. Stats. § 34-60-102(1)(a).

266. Colo. Stats. § 34-60-106(1)(f).

267. Colo. Stats. § 34-60-106(11)(c).

268. Colo. Stats. §§ 34-60-106(1)(f), 34-60-106(1)(f)(III). Commission-issued criteria for delay include locations within 1,500 feet of a residence or municipal or county boundary, within 2,000 feet of a school, within a floodplain or identified public drinking water supply, within certain designated wildlife areas, or within 1,000 feet of a designated outdoor activity area. COGCC, "SB 19-181 Required Director Objective Criteria," supra.

269. Colo. Stats. § 34-60-106(2.5).

270. Drivers of reform included a fatal natural gas explosion in 2017, an attempt to institute setback requirements via a statewide ballot initiative in 2018 (the unsuccessful Proposition 112), and a Colorado Supreme Court decision affirming that the existing "balanced" oil and gas regulatory mandate (similar to California's) did not require regulations privileging environmental concerns over production. See Kirkland & Ellis, "Passage of Senate Bill 19-181: New Era of Change and Uncertainty for Oil and Gas Operations in Colorado" (April 8, 2019), available at https://www.kirkland.com/publications/kirkland-alert/2019/04/new-era-of-change-and-uncertainty-for-oil-and-gas (last visited March 14, 2020); Bruce Finley, "Deadly Firestone explosion caused by odorless gas leaking from cut gas flow pipeline," Denver Post (May 2, 2017), available at https://www.denverpost.com/2017/05/02/firestone-explosion-cause-cut-gas-line/ (last visited March 14, 2020). In Colorado Oil and Gas Conservation Commission v. Martinez, 433 P.3d 22 (Colo. 2019), a group of youth and environmental advocates proposed a rule that would have precluded issuance of a drill permit unless the commission could demonstrate that it would not adversely impact human health or natural resources or contribute to climate change. The COGCC statute contained a balanced, dual-purpose supervisory authority, and the legislative history showed that the environmental protection element was added more recently than the development element—both parallel to California's Public Resources Code. The court held that the commission acted properly by refusing to adopt the proposed rule, stating that an enabling statute that prioritizes both production and environmental protection does not "allow the Commission to condition one legislative priority (here, oil and gas development) on another (here, the protection of public health and the environment)."

271. N.M. Stats. §§ 70-2-6, 70-2-12.

272. N.M. Admin. Code §§ 19.15.14.8-.10, 19.15.5.9, 19.15.14.10(B).

273. A preliminary review of New Mexico case law, administrative decisions, and secondary sources citing the relevant portions of the statutes and administrative code reveal few discussions or dispositions of the division's permitting authority or regulations, and none discussing the scope of its ability to deny a permit. However, the Supreme Court of New Mexico has held that failure to obtain a permit does not mandate the conclusion that an operator has failed to commence drilling operations in the context of a lease or operating agreement. Enduro Operating LLC v. Echo Production, Inc., 413 P.3d 866 (N.M. 2018).

274. N.D. Cent. Code § 38-08-04, 38-08-06.

275. N.D. Cent. Code § 38-08-05; N.D. Admin. Code § 43-02-03-16.

276. N.D. Admin. Code § 43-02-03-16.2.

277. N.D. Admin. Code § 43-02-03-16.

278. A preliminary review of North Dakota case law, administrative decisions, and secondary sources citing the relevant portions of the statutes and administrative code revealed few discussions or dispositions of the commission's permitting authority or regulations, and none discussing the scope of its ability to deny a permit.

279. 58 Pa. Stat. § 405.

280. 58 Pa. Stat. § 3211; 25 Pa. Admin. Code § 78.11.

281. 58 Pa. Stat. §§ 3211(e)-(e.1), 3212.

282. 58 Pa. Stats. § 3215(c).

283. Robinson Tp., Washington County v. Commonwealth, 623 Pa. 564 (2013). The injunction resulted from the invalidity of a related (and un-severable) but distinct provision, rather than the constitutionality of the criteria themselves.

284. A preliminary review of Pennsylvania case law, administrative decisions, and secondary sources citing the relevant portions of the statutes and administrative code surfaced recent litigation of the permitting statute in the context of the Act 13 reforms, but the dispute did not focus on the discretion or ability of the office to deny or condition a permit. Historical examples offer minimal additional insight.

285. Tex. Nat. Res. Code §§ 85.051-81.053, 85.052, 85.201. See Tex. Atty. Gen. Op. No. JM-418 (December 31, 1985) (finding the Commission's permitting authority to be an extension of its statutory authority to prevent waste).

286. 16 Tex. Admin. Code § 3.5(c).

287. A preliminary review of Texas case law and administrative decisions citing the relevant portions of the statutes and administrative code revealed no litigation detailing the commission's ability to condition or deny a permit for discretionary reasons. Secondary literature and historical case law, however, indicate that the permitting power is linked most closely to well spacing and density requirements and do not indicate that the commission holds the authority to deny a permit for discretionary reasons or reasons related to environmental or health protection. See 56 Tex. Jur. 3d Oil and Gas §§ 798, 799 (summarizing Railroad Commission's regulatory requirements and state court jurisprudence).

288. 2 Colo. Admin. Code § 404-1:604.

289. Colo. Stat. §§ 29-20-104, 34-60-131. A preliminary review of case law identified no cases directly discussing the commission's authority to promulgate the setback rule or its constitutional implications. Of note, two recent decisions by the Colorado Supreme Court held that state law preempted two public measures on fracking adopted in home-rule cities (a ban via charter amendment in Longmont and a five-year moratorium via municipal code amendment in Fort Collins) due to their operational conflict with the state's oil and gas regulatory authority and interest in uniformity. City of Longmont v. Colorado Oil and Gas Association, 369 P.3d 573 (Colo. 2016); City of Fort Collins v. Colorado Oil, 369 P.3d 586 (Colo. 2016). The court held that by preventing fracking that otherwise complied with state processes, these local bans rendered the state rules and regulations "superfluous." Notably, the local governments enacted these fracking bans before the recent amendments to Colorado's oil and gas laws, when the prior version of the commission's statutory mandate more closely resembled the current CalGEM mandate under the California Public Resources Code.

290. See John Aguilar, "Prop 112 fails as voters say no to larger setbacks for oil and gas wells," Denver Post (November 6, 2018), available at https://www.denverpost.com/2018/11/06/colorado-proposition-112-results/ (last visited March 14, 2020).

291. N.M. Admin. Code §§ 19.15.15.9-.10, 19.15.16.15(C).

292. Swepi, LP v. Mora County, N.M., 81 F.Supp.3d 1075, 1198 (D.N.M. 2015).

293. The oil conservation division's regulations do include standard safety-related distance requirements for hazardous fluid and waste storage, firewall maintenance, and blowout prevention. N.M. Admin. Code §§ 19.15.11, -.17, -.18, -.34, -.36, -.40.

294. N.D. Stats. § 38-08-05(2); N.D. Admin. Code § 43-02-03-28.

295. 2010 N.D. Op. Atty. Gen. No. L-01 (February 5, 2010); 1990 N.D. Op. Atty. Gen. No. 90-23 (October 5, 1990).

296. N.D. Stats. § 38-08-05(2).

297. 58 Pa. Stat. § 3215(a).

298. 58 Pa. Stat. §§ 3215(b), 3215(d), 3303, 3304.

299. Robinson Tp., Washington County v. Commonwealth, 623 Pa. 564 (2013); Robinson Tp., Washington County v. Commonwealth, 637 Pa. 239 (2016); Pa. Const. Art. 1, § 27. The Colorado Supreme Court has rejected the argument that that state's constitutional inalienable rights clause, nearly identical to California's, has the effect of blocking state preemption of local laws protecting citizens by banning fracking. See Longmont at 585; Colo. Const. Art. II, § 3; Cal. Const. Art. I, § 1.

300. 16 Tex. Admin. Code § 3.37.

301. Tex. Nat. Res. Code § 81.0523. The statute defines "commercially reasonable" as "a condition that would allow a reasonably prudent operator to fully, effectively, and economically exploit, develop, produce, process, and transport oil and gas, as determined based on the objective standard of a reasonably prudent operator and not on an individualized assessment of an actual operator's capacity to act" and considers a measure prima facie commercially reasonable if it "has been in effect for at least five years and has allowed the oil and gas operations at issue to continue during that period."

302. Beverly Hills Muni. Code § 3-1-219(I) (Tax applied to "[a]ll registrants engaged in the business of extracting oil from a well where the well, or any portion of the well, is located in, passes through, or is bottomed under real property in the city" at different rate depending on location of wells, as established in the city of Beverly Hills schedule of taxes, fees and charges, citing Ord. 96-O-2255, eff. 3-22-1996; amd. Ord. 01-O-2361, eff. 1-2-2001; Ord. 01-O-2370, eff. 3-8-2001; Ord. 05-O-2467, eff. 4-16-2005; Ord. 05-O-2481, eff. 8-16-2005).

303. 2020 Beverly Hills Taxes Fees and Charges, p. 57, available at https://www.beverlyhills.org/cbhfiles/storage/files/16782406101139308407/Taxes,FeesCharges.pdf (last visited March 14, 2020).

304. La Habra Heights Muni. Code § 3.6.60(B)(2)(b). The fee is set by multiplying $0.60 by the ratio of the current California Crude Oil First Purchase Price index to the 2012 level; the post-2012 decline in oil prices has led to a significant decrease in the fee.

305. See https://ballotpedia.org/City_of_La_Habra_Heights_Oil_and_Gas_Taxes,_Measure_LHH-B_(March_2013) (last visited March 14, 2020).

306. Long Beach Muni. Code §§ 3.80.221-.222. (Imposing "annual business license tax" of $0.15 per barrel for general fund purposes and "special tax" of $0.25 (as adjusted) for special police and fire response purposes).

307. 2019 Long Beach Proposed Budget, pp. 81, 448, available at http://www.longbeach.gov/globalassets/finance/media-library/documents/city-budget-and-finances/budget/budget-documents/fy-19-proposed-budget/fy-19-proposed-final-book (last visited March 14, 2020). (2017 Actual Revenues: Oil Production Tax = $1,738,227; Police & Fire Public Safety Oil Production Act Tax = $3,390,004).

308. Santa Fe Springs Code of Ordinances § 117.022 (including graduated rate table with floor rate of $0.41 per barrel at Buena Vista Hills crude oil prices below $70 per barrel, up to $0.52 per barrel at prices above $160 per barrel).

309. Santa Fe Springs FY 2019-20 Approved Budget, p. 8, available at https://www.santafesprings.org/civicax/filebank/blobdload.aspx?blobid=13024 (last visited March 14, 2020).

310. Seal Beach Muni. Code § 5.55.015 (a separate de minimis charge is also imposed on out-of-city operations).

311. City of Seal Beach Proposed Budget FY 2018-2019, p. 15 (Revenue Summary by Fund FY 2016-17 Actual), available at https://www.sealbeachca.gov/Portals/0/Documents/Proposed%20Budget%20FY18-19%2006.11.18.pdf (last visited March 14, 2020).

312. Signal Hill Muni. Code § 5.12.010.

313. Signal Hill Adopted Operating and Capital Budget for Fiscal Years 2018-2020, p. xv (2016-2017 Actual revenue from Oil Production Barrel Tax), available at: https://www.cityofsignalhill.org/DocumentCenter/View/6297/City-of-Signal-Hill-Final-Operating-and-Capital-Budget-2018-2020 (last visited March 14, 2020).

314. Torrance Muni. Code § 228.2.1.

315. City of Torrance 2019-2021 Budget Proposed, p. 90 (Oil Severance Actual for 2016-17 and 2017-18, available at https://www.torranceca.gov/home/showdocument?id=50806 (last visited March 14, 2020).

316. Copied from COGCC, "Insights into COGCC Rulemaking from 30,000,'" supra.

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