

November 13, 2013

The Honorable Governor Jerry Brown
State Capitol
Sacramento, CA 95814

Dear Governor Brown,

We write to you as a group of scientists and engineers to thank you for supporting *Scientific Consensus on Maintaining Humanity's Life Support Systems in the 21st Century: Information for Policy Makers*, which some of us presented to you this year. This document outlined the five major threats to our environment that must be immediately addressed: climate disruption, extinctions, loss of ecosystem diversity, air and water pollution, and human population growth and resource consumption. Thank you for your commitment to recognizing and addressing these urgent problems.

We believe that the process of unconventional fossil fuel development including shale tight oil and gas development in the Monterey Shale formation using hydraulic fracturing, acidization, and other forms of well stimulation will exacerbate many of these environmental threats, particularly climate disruption, local air and water pollution, and resource consumption. Thus, the decisions you make about the development of unconventional oil and gas production from shale in California will hold important consequences for California and the state's future.

Shale gas and tight oil development is likely to worsen climate disruption, which would harm California's efforts to be a leader in reducing greenhouse gas emissions under AB 32 in a number of ways including:

1. **Increases in Fossil Fuel Production:** Shale gas and tight oil development will likely rapidly increase fossil fuel development at a time when California is poised to transition to low-carbon renewable energy technologies.
2. **Carbon Intensity of California Oil Production:** Much of the oil currently developed in California is very carbon intensive to produce and process. For instance, the California Air Resources Board (CARB) reported in 2012 that more than 30% of the oil developed in California is as carbon intensive to develop and refine as the Alberta tar sands in Canada,¹ one of the most climate-disrupting fuels on earth. Of course CARB's reporting did not include the development of the Monterey Shale, which may be even more carbon intensive to develop than conventionally developed oil.
3. **Increases in Fossil Fuel Consumption:** The consumption of the estimated 13.7 billion barrels of Monterey Shale tight oil would result in large carbon emissions to the atmosphere, whether consumed in California (which is not likely given the economics of the global oil market) or not.²
4. **Fugitive Methane Leakage:** Research suggests that large quantities of methane are leaked during shale gas and tight oil development processes.³ Methane is a potent greenhouse gas with up to 86 times the global warming potential of carbon dioxide over the all-important next two decades.⁴ Recent field measurements in the Los Angeles Basin of California indicated that 17% of all methane produced during oil and gas development is leaked to the atmosphere,⁵ a disturbingly high number from a climate and air quality perspective.

Shale gas and tight oil development also threatens California with pollution from the many toxic and carcinogenic chemicals used during the process, such as methanol, benzene, naphthalene, and trimethylbenzene. About 25% of chemicals used in the drilling and well stimulation processes are known carcinogens and evidence indicates that these chemicals are making their way into aquifers and drinking water.⁶ Studies suggest that shale tight oil and gas development can also increase levels of ground-level ozone due to emissions of ozone precursor emissions such as volatile organic compounds and nitrogen oxides,⁷ a key risk factor for asthma and other respiratory and cardiovascular illnesses.⁸ Other air pollution emissions from shale development, including diesel particulate matter, benzene, and aliphatic hydrocarbons may contribute to health problems among populations living near oil and gas development sites.⁹ Risk of exposure to other contaminants such as lead, arsenic and radioactive materials brought back to the surface with the flowback and produced waters has also been documented.¹⁰

In addition to its climate change and pollution impacts, shale development poses other threats to California. Shale tight oil and gas development requires large quantities of water. Recent data suggests that unconventional fossil fuel development uses an average of two to five million gallons of water per well, with some wells using up to 13 million gallons.¹¹ The disposal of wastewater in underground injection wells has also been linked to an increase in the frequency of earthquakes in the United States.¹² Studies show that accidents, spills, and other hazards from shale development have been associated with illness and death in both wildlife and domestic animals.¹³ Habitat loss arising from the deployment of the infrastructure required to develop shale resources has been tied to declines in the abundance of multiple species of wildlife.¹⁴ Finally, the process is very poorly regulated and exempt from many of our strongest federal environmental laws including the Safe Drinking Water Act and important provisions of the Clean Air Act and Clean Water Act.

California is on the precipice of scaling up its unconventional oil and gas development in the Monterey Shale formation. Yet, many scientific data gaps specific to California persist. Governor Cuomo has placed a moratorium on high volume hydraulic fracturing in New York while the risks are evaluated by independent scientists. Dr. Nirav Shah, the New York State Health Commissioner, recently stated “the time to ensure the impacts on public health are properly considered is before a state permits drilling.”¹⁵

In light of the known environmental and health risks as well as the scientific data gaps that persist, we urge caution in moving ahead until a fuller understanding of these risks is achieved. We strongly recommend that California immediately place a moratorium on shale tight oil and gas development until it is determined by independent scientific studies whether and under which conditions these forms of fossil fuel development can be deployed in a manner that protects public health and safety, the conservation of the State’s natural resources, and helps to achieve the climate goals set out by AB 32.

Signed,

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¹ CARB. 2012. Detailed California-Modified GREET Pathway for California Reformulated Gasoline Blendstock for Oxygenate Blending (CARBOB) from Average Crude Refined in California. Sacramento, CA, California Air Resources Board.

² EPA. <http://www.eia.gov/analysis/studies/usshalegas/>

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