

# Orphaned and Abandoned Oil and Gas Wells: Public Health, Climate, Water and Prioritizing the Approaches to Remediation

**Seth B.C. Shonkoff, PhD, MPH**

*PSE Healthy Energy / University of California, Berkeley /  
Lawrence Berkeley National Lab*

Orphaned Wells Congressional and Federal Agency Briefing

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Bringing science  
to energy policy



**Physicians, Scientists, and Engineers for Healthy Energy (PSE)** is an energy science and policy research institute focused on the public health, climate and environmental dimensions of energy production and use.

We...

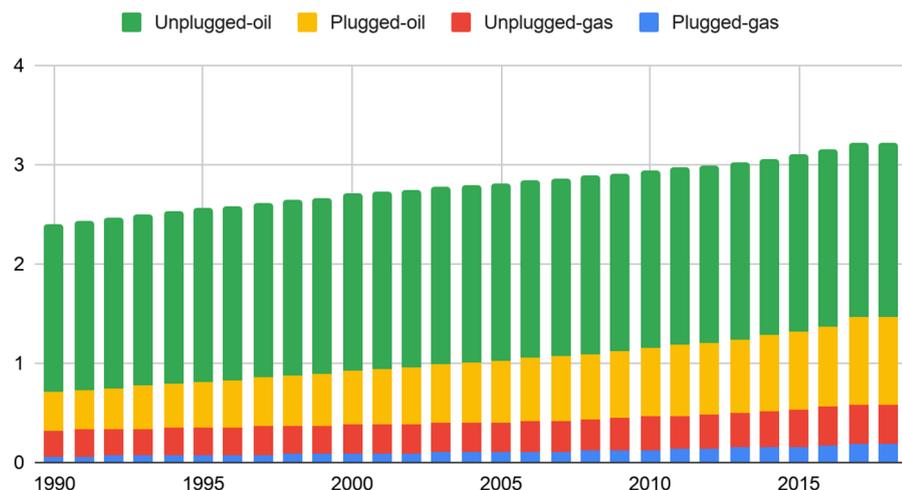
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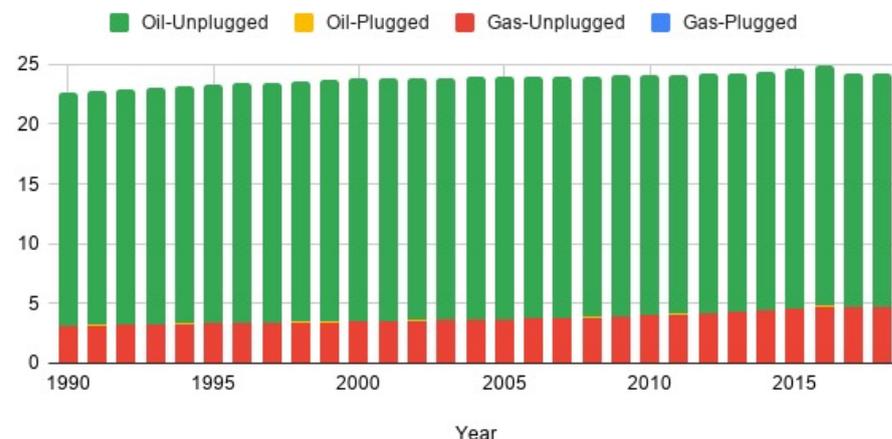
**Disseminate**

Science and put it into the places where it is used to ensure responsible energy policy decision-making

# Abandoned Wells in the US: Numbers and Climate



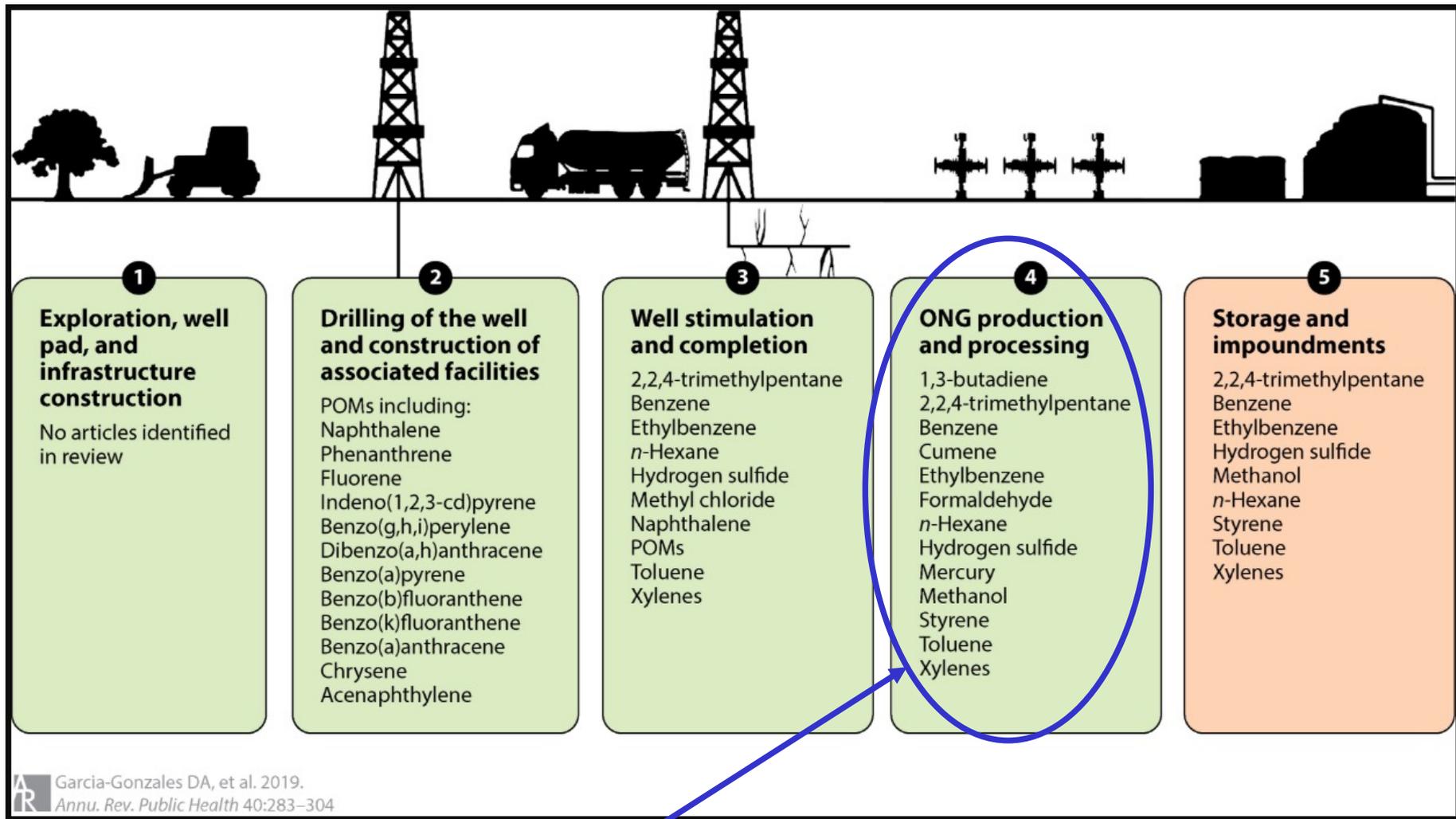
Methane Emissions (in million metric tons CO<sub>2</sub>e<sub>20</sub>) from Abandoned Oil and Gas Wells



(US EPA Greenhouse Gas Emissions Inventory)

- **3-4 million:** The estimated number of abandoned wells in the US (USEPA; Williams et al. 2020)
- **~2.1 million:** The estimated number of O&A wells that are unplugged (USEPA)
- **~57,000-69,000:** The estimated number of *known* orphaned wells. There are likely hundreds of thousands more that are undocumented
- **~24 million metric tons CO<sub>2</sub>e:** The estimated CO<sub>2</sub>e emitted from abandoned wells in the US. This is more than all of the CO<sub>2</sub> emissions from all NYS power plants in 2017 (Assumptions ~280k MT methane (USEPA); using the 20-year GWP of methane (~86)).

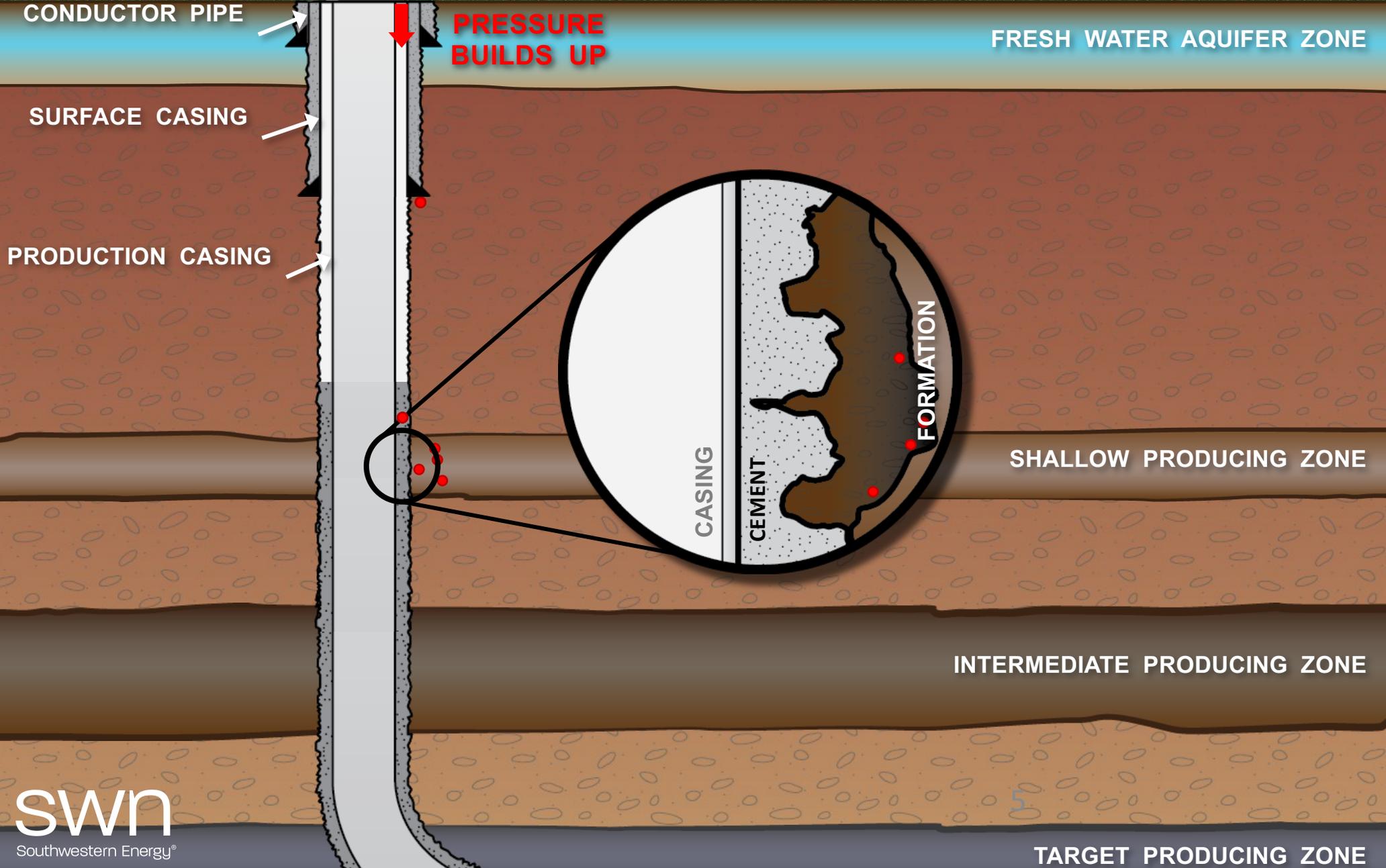
# Health Damaging Co-Pollutants in the Natural Gas Supply Chain



Median benzene concentration in string and bradenhead gas from Wyoming = 140 ppm (140,000 ppb) (DiGiulio & Jackson (2016).

Garcia Gonzales, et al. 2020

# CEMENT CHANNELING



# Know Before you Build: Land Use Change, Explosions and Chemical Exposure

Abandoned wells and well infrastructure have the potential to leak into confined spaces. With enough methane and/or NMVOC buildup, explosions can occur. For example:

- Ross Dress for Less Explosion from abandoned well (Los Angeles, CA, 1985)
- Home construction on top of an abandoned well; leak caused explosion (Trinidad, CO, 2007)
- Improperly abandoned pipeline explosion (Firestone, CO, 2017, pictured at right)



*Geo Forward (2020)*



*(NTSB, 2019)*

# Well Plugging Prioritization Framework

## Getting the Most Bang for the Buck: Climate, Health and Water Resources.

- High emitting wells (gas and liquid)
- Wells in proximity to human populations
- Wells in proximity to groundwater resources, especially those that meet definition of USDW under the SDWA

# Thank you.

**Seth B.C. Shonkoff, PhD, MPH**

[sshonkoff@psehealthyenergy.org](mailto:sshonkoff@psehealthyenergy.org)

[www.psehealthyenergy.org](http://www.psehealthyenergy.org)

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