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GREEN BUILDING STANDARDS

If you cannot open and read the pdf, let me know and I will be happy to submit as a docx.

Additional submitted attachment is included below.

GREEN BUILDING STANDARDS
CEC WORKSHOP ON 27 JULY 2021
COMMENTS

David Bezanson, Ph.D., CA voter

Thanks for your excellent workshops and the evolving IEPR. Please prioritize decarbonization of the power sector at a rate that exceeds decarbonization of all other sectors. Then, all sectors will be powered by renewable electricity. Recommendations in this document are crafted to enable CEC to actualize its mission statement.

"The California Energy Commission is leading the state to a 100 percent clean energy future for all. As the state's primary energy policy and planning agency, the Energy Commission is committed to reducing energy costs and environmental impacts of energy use while ensuring a safe, resilient, and reliable supply of energy."

Your workshops on building efficiency and decarbonization prepare for rulemaking to decarbonize the building sector. Mandatory statewide standards would benefit all residents in and visitors to CA. The following standards are recommended for existing buildings (via retrofits) and new building construction of residential, commercial, and government structures. Some of these policy recommendations would require collaboration with other agencies and perhaps with utility companies (1, 2).

NATURAL GAS

The installation of NG HVAC and appliances should be prohibited in new construction and incentivizing retrofits that disconnect NG and replace it with all electric HVAC and appliances is the foremost recommendation. Owners who do not upgrade to all-electric should be charged a monthly environmental impact surcharge on their electric utility bill. This revenue would pay for retrofit incentives.

Prevent pipeline explosions (e.g., San Bruno 2012) while decreasing new construction costs, improving air quality, uplifting public health, and countering climate change. Lifecycle analyses of NG energy show that it has several times the GHG emissions of renewable energy. Unlike renewable energy, its end use requires combustion and emits both carbon and toxics. NG is extracted primarily via hydraulic fracturing, which threatens the health of all Californians.

Buildings generate about 15% of GHGs, accelerating climate change. All-electric buildings, and efficiency, significantly decrease the carbon footprint of buildings. This becomes more effective as we power our grid with higher percentages of clean energy that meets the Renewable Portfolio Standard of SB100.

NG infrastructure, from extraction to combustion by consumers, is prone to leakage. Having such in areas of active seismic fault lines is hazardous. We can prevent disasters like the explosion 9 years ago in San Bruno. NG is 70 - 90% methane, which traps 83 times more heat than CO2 during its initial 20 years in the atmosphere. It gradually degrades into H20 and CO2. The latter has a half-life in the atmosphere of many centuries. NG increases the risk of fires.

In order to decelerate climate change, we need to completely phase out use of fossil fuels like NG. The sooner we accomplish this, the sooner we will benefit and the less it will cost.

Building a 2,500 sq. ft. house in San Francisco containing NG infrastructure costs $12,500 more than an all-electric house. Over the life of such an all-electric house, energy costs are $9,000 less than costs for a NG-enabled house. All-electric buildings will help us provide more affordable housing, decrease costs of new government buildings - decreasing tax burdens, and increase profits of businesses (by decreasing their real estate costs). Electrical unions favor all-electric construction.

NG infrastructure, from extraction to combustion by consumers, is prone to leakage. Having pipelines in areas of active seismic fault lines is hazardous. NG increases the risk of fires.

Common airborne emissions from NG appliances are listed below.

* methane – causes shortness of breath and fatigue
* formaldehyde – causes wheezing, fatigue, cancer, birth defects, chronic asthma
* nitrogen oxides, e.g., nitrogen dioxide – causes chronic cardiovascular disease, chronic kidney disease, cancer, chronic respiratory disorders, acute respiratory infections
* particulate matter including PM<2.5um – causes preterm birth disorders, cancer, chronic kidney disease, chronic cardiovascular disorders, chronic neurodegenerative disorders, and exacerbates chronic respiratory disorders.

Those who live in areas where PM levels are high and who contract COVID-19 are more likely to die from the virus.
There is no lower threshold for NOx and PM emissions, below which there is no harm. I.e., any exposure inflicts some harm.
NG appliances and infrastructure that are in disrepair may emit dangerous levels of carbon monoxide. Of the above 5 emissions, the only one that may be filtered out by an HVAC system is PM. To capture the most damaging size of PM (<2.5um), a HEPA filter is required.

The 650,000 miles of NG pipelines in CA are mostly over 40 years old. Over 1800 leaks are reported daily to 2 CA utilities. Fugitive emissions of NG, in the absence of combustion, load the atmosphere with high-GWP methane. There are thousands of abandoned/idle unplugged wells in CA. A small percentage have been inspected and leaks are commonly detected. Of the over 100,000 plugged wells, many are leaking.

Per Fractracker, 80,000 are leaking. There are over 100,000 active NG wells in CA, all of which release methane and toxic co-pollutants into the air via flaring, venting, and fugitive emissions. Proprietary slurry mixtures of over 1,000 synthetic chemicals are injected into many of these wells – which may pollute nearby surface water, agricultural lands, and aquifers.

The fossil fuel industry has consistently neglected self-regulation of its environmental impacts. It is unlikely that the industry will responsibly maintain NG infrastructure - jeopardizing public health.

The fossil fuel sector has been in decline for over 5 years by many measures. Its labor-force has been shrinking and, due to dwindling profitability, further furloughs are planned. In contrast, the renewable electricity and efficiency sector is growing new jobs at thrice the rate of the fossil fuel sector. The US fossil fuel sector is unsustainable for many financial reasons including stranded assets, litigation by governments, global divestment, cost parity with renewable energy, and consumer preference for renewables. Improving the maintenance of its NG infrastructure is a low priority for fossil fuel firms because it increases costs without increasing sales. For fiscal reasons, the industry's inadequate efforts to maintain a safe infrastructure are failing (3, 4, 5, 6, 7, 8, 9, 10, 11).

HYDROGEN (H2)

There are technologies for H2 production that have lifecycle emissions comparable to NG. Lifecycle analyses include mining, manufacture, construction, transport (Scope 1), electricity input to produce H2 (Scope 2), and combustion by end consumers (Scope 3).

95% of world production of H2 is from fossil fuel feedstocks. The second most prevalent
feedstock is biomass. Emissions of GHGs from the latter may be up to 50% higher than emissions from coal and may emit more toxics than coal combustion. A tiny percentage of H2, perhaps only 1%, is from electrolysis of water.The HyBlend research project is being conducted by Dept. of Energy to assess the feasibility of blending H2 and CH4 in the same pipelines. Like other H2/NG blend technologies in USA and Europe, the maximum safe percentage of H2 Is 5% - 15%. The remainder of the mix is NG. Pipeline embrittlement increases as the percent of H2 increases. At percentages above 15%, HVAC systems and NG appliances need modifications to accept and combust the blends. This inefficiency is costly financially and is unethical because it accelerates climate change. Because H2 molecules are much smaller than CH4 (methane), fugitive emissions of H2 from existing NG pipelines exceed fugitive emissions of CH4. Consequently, at the point of consumption (a building), the ratio of H2: CH4 is less than the ratio at the point of origin (the beginning
of the pipeline where the blend is loaded).

As mentioned above, fugitive emissions from NG pipelines are a daily occurrence in CA. Seismic activity of a magnitude <3 on the Richter Scale is thought to present low risk of leaks. However, further study of the issue is called for, especially for more severe seismic tremors.

Like NG, H2 transported via pipelines is at risk for explosion and fire. This is the case for blends as well as separate pipeline infrastructures designed just for H2.

A moral hazard is that use of carbon-intensive H2 production technologies (biomass and fossil fuels) will extend the lifespan and emissions of the fossil fuel industry. This would magnify the destruction from climate change for current and future generations of all species. Air pollution from the fossil fuel industry killed 8.7 million people in 2018 (12).
The only H2 production technology that avoids this hazard is electrolysis of water using 100% renewable electricity and is distributed via portable tanks or separate pipelines used exclusively for H2. A corollary hazard is failure to scale up renewable generation and storage rapidly enough to displace fossil fuel energy and prevent emissions of GHGs and toxic co-pollutants.

There is considerable agreement about the sectors that are most suitable for H2 use. The residential building sector is not one of them. This sector already has the electrical infrastructure to serve all of its energy demands. And the forms of energy with the lowest cost/kW can be delivered and managed safely with the current transmission, smart grid, metering, and control systems. H2 costs at least twice as much per kW as renewable electricity. Construction of thousands of miles of new H2 pipelines in CA would be costly and prevent H2 from being cost-competitive for many years.

Continued reliance on distributed renewable electricity is prudent until H2 technologies are in widespread use for difficult to decarbonize sectors, e.g., heavy industry and trucking. At that point, the role of H2 in non-industrial buildings may be reevaluated.

Cost: benefit studies of carbon-intensive H2 should contrast it with NG and with renewable electrolytic H2 for all-electric new construction and electrification retrofits. The latter commonly costs $3000 to $9000 for a single family detached house. These financial costs are avoided by permitting only all-electric new buildings. Other costs to factor in are emissions regulation, Social Cost of Carbon, and Environmental Injustice. Fossil fuel infrastructure, operations, and toxic emissions create proximal sacrifice zones with high rates of mortality and morbidity. The most comprehensive, real-life model to use is lifecycle analyses, which includes Scope 1, Scope 2, and Scope 3. This provides a more accurate picture of the total environmental impact of each energy option than studies limited to the operating phase (13).

APPLIANCES

While manufacturing and efficiency standards are set by the federal government, statewide incentives to acquire high-efficiency all-electric appliances are worth exploring.

ELECTRIC HEAT PUMPS

Electric heat pumps are four times more efficient for cooling and heating than NG HVAC. Widespread use would significantly decrease risk of power outages.

INSULATION

This is one of the most economical ways of decreasing energy usage in buildings. Provide information about insulation, building envelopes, electric heat pumps, and appliances on your website.

MULTIFAMILY DWELLINGS

Existing MUDs are one of the most difficult kinds of buildings to decarbonize. Set new MUD building codes that require high-efficiency, all-electric construction. This will decrease the need for energy retrofits in future decades. Require electric vehicle charging stations and >30 amp charger outlets to be installed in new construction. Evaluate building envelopes as a retrofit technology. Existing MUDs present challenges that interfere with the installation of electrical infrastructure for electric vehicles. Consider retrofit programs in collaboration with cities that enable installation of EV charging stations on curbs of surrounding streets.

ECONOMIC INCENTIVES AND DISCOUNTS

Provide bulk purchase and installation mechanisms that individuals, government, landlords, and businesses may use to contain costs.

Keep up the fine work. I look forward to future workshops and versions of IEPR.

ENDNOTES

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2.Reach codes

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6.https://www.sightline.org/2020/07/28/public-opinion-is-moving-against-natural-gas-and-fracking/

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11. "United States Spend Ten Times More On Fossil Fuel Subsidies Than Education," Forbes, June 15, 2019.

12. Deaths from fossil fuel emissions higher than previously thought (harvard.edu)

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