Communication from Public

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Comments for Public Posting:	Regenerate California Campaign's Comments on Proposed LA Hydrogen Hub. See attached PDF.

REGENERATE CALIFORNIA

POWER UP CLEAN ENERGY | POWER DOWN DIRTY GAS

March 2, 2022

Los Angeles City Council
Office of the City Clerk
City Hall
200 North Spring Street
Los Angeles, CA 90012

Re: Hydrogen Hub - Comments from the Regenerate California Campaign

Dear City Councilmembers,

Regenerate California is a campaign led by the **California Environmental Justice Alliance (CEJA)** and the **Sierra Club** who, together, share a vision for California where we run on 100% clean renewable energy, ensuring our children grow up breathing clean air and the most impacted communities have access to renewable energy and local jobs. Many of our members live in or near Los Angeles.

We write to raise our concerns with the City's proposed use of green hydrogen to power the electric sector. It has been brought to our attention that the Los Angeles Department of Water & Power (LADWP), in collaboration with the Port of Los Angeles and others, is considering the submission of a proposal to the Department of Energy proposing the Greater Los Angeles Metropolitan area to be a regional Hydrogen hub. While we agree that green hydrogen has potential to support reductions in greenhouse gas (GHG) and criteria pollutant emissions in some difficult-to-electrify industries, hydrogen combustion in the electric sector is fraught with numerous issues.

For the reasons stated below, we urge the City Council to make no investments related to hydrogen combustion in the electric sector unless and until the following concerns are addressed.

1. **Only truly green hydrogen should be considered.**

The LA City Council should choose its definition of "green hydrogen" carefully to ensure that any hydrogen plans are designed to use truly green and clean hydrogen. Specifically, the definition of green hydrogen should include exclusively hydrogen produced through electrolysis powered by resources that qualify under the Renewable Portfolio Standard and that does not increase pollution burdens in either its production or use. Any Renewable Energy Credits (RECs) associated with the power source should be retired in order to ensure the resource's avoided emissions are not double-counted.

To be clear, hydrogen that is produced by any methods of reforming or refining fossil fuels, purposely grown feedstocks, biomass, biomethane, or biogas must be excluded from the definition of green hydrogen. The GHG reduction benefits of using these underlying fuel sources are dubious at best and, in the case of biofuels, impose additional environmental and environmental justice impacts that must be considered.

Using biofuels to generate hydrogen raises serious problems. For example, the California Public Utilities Commission issued an analysis indicating that biogas facilities emit higher levels of air pollutants than any other electricity-generating resource.[1] In addition, certain sources of biomethane, such as dairy confined animal feeding operations, contaminate air and water and disproportionately burden disadvantaged communities with harmful pollution.[2]

In addition, very little existing gas infrastructure is capable of handling 100% hydrogen, meaning that either new hydrogen-specific infrastructure must be built or "green hydrogen" must be mixed with significant quantities of natural gas in order to function. The City should forcefully declare that it does not anticipate developing blended hydrogen-methane products or uses.

2. Hydrogen combustion power plants generate far more nitrogen oxides per megawatt-hour than a gas plant, raising significant environmental justice concerns.

Hydrogen combustion may increase emissions at existing gas plants and could exacerbate existing environmental injustices. The combustion of hydrogen-methane blends produce significant quantities of criteria pollution, particularly nitrogen oxide (NOx) emissions. Two studies have found that burning this mix can lead to far higher NOx emissions, up to six times that of burning methane.[3] Burning pure hydrogen could potentially emit even higher levels of NOx emissions. Multiple parties, including gas utilities, have acknowledged the risk of increased NOx emissions, noting that "hydrogen burns faster than natural gas, which increases combustion temperatures and reduces ignition lag. . . . therefore, additional emissions testing should be completed with natural gas end-use equipment operating with hydrogen blends."[4]

Hydrogen proponents have suggested that additional emissions control equipment could be stacked and placed on smokestacks in order to manage NOx emissions. These suggestions are

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[1] California Public Utilities Commission Energy Division, Updated IRP Criteria Pollutant Analysis, at slides 6-7 (Feb. 20, 2020), available at ftp://ftp.cpuc.ca.gov/energy/modeling/CriteriaPollutantAnalysisUpdate_20200221.pdf.
[2] *See* California Public Utilities Commission Decision 20-12-022, at 37 (Cal. P.U.C. Dec. 22, 2020).
[3] Mehmet Salih Cellek & Ali Pınarbaşı. Investigations on Performance and Emission Characteristics of an Industrial Low Swirl Burner While Burning Natural Gas, Methane, Hydrogen-Enriched Natural Gas and Hydrogen as Fuels. International Journal of Hydrogen Energy 43, Issue no. 2 1194-1207 (January 11, 2018), *available at* https://doi.org/10.1016/j.ijhydene.2017.05.107 ("In the case of using hydrogen-enriched natural gas or pure hydrogen instead of natural gas as the fuel, the combustion emissions ... such as CO and CO2 are remarkably decreased compared to the [*sic*] natural gas. However, the NOx emissions are significantly increasing especially due to thermal NO."). *See also* ETN Global, *Hydrogen Gas Turbines: The Path Towards a Zero-Carbon Gas Turbine*, at 9 (2020), *available at* https://etn.global/wp-content/uploads/2020/01/ETN-Hydrogen-Gas-Turbines-report.pdf (recognizing that one of the challenges for hydrogen combustion is that "[t]he higher adiabatic temperature of H2 will result in higher NOx emissions if no additional measures are undertaken" and recommended that "[s]ome flexibility might be needed on NOx limits in future" for decarbonization through hydrogen).
[4] Prepared Direct Test. of Kevin Woo et al. on Behalf of Southern Cal. Gas Co. et al., Proceeding No. A.20-11-004, at 17 (Cal. P.U.C. Nov. 2020), *available at* https://www.socalgas.com/sites/default/files/2020-11/H2_Application-Chapter_4-Technical.pdf.

not compelling and have not been demonstrated. Even if such emissions control material did exist, NOx emissions controls do not traditionally work well during startup, shutdown, or cycling, meaning that the emissions from hydrogen or hydrogen-blend combustion plants could actually increase overall NOx emissions and/or generate intense concentrations of NOx emissions at various points throughout the plant's lifetime.

While hydrogen combustion increases NOx pollution and harm, green hydrogen could be used in fuel cells without increasing greenhouse gases or criteria pollution. Hydrogen fuel cell technologies that are truly green and do not emit criteria pollution could complement batteries as a zero-carbon, non-emitting alternative to gas peaker plants in a limited capacity.

3. **Green hydrogen will be extremely costly, and electricity can be produced and stored far more efficiently than burning hydrogen.**

As mentioned earlier, the LA City Council should only consider hydrogen that is green and clean. Additionally, it should limit its consideration of green hydrogen uses because the production and use of green hydrogen today to produce electricity is costly and inefficient when compared to using direct sources of clean and renewable energy. In order to generate sufficient volumes of green hydrogen, abundant and surplus renewable energy must be available to use. Electrolyzers require 3 to 3.5 times their installed capacity of renewable generation.[5] Furthermore, the cost of producing power in a gas facility that burns only 20% green hydrogen is about $127/MWh, compared to $44-$73/MWh for a standard gas plant.[6] Both sources of generation are far more expensive than the unsubsidized cost of solar PV ($29-$42/MWh) or wind ($26-$54/MWh).[7] Investments in clean and renewable energy that can directly serve demand are therefore a substantially more cost-effective option for the City.

4. **Producing and using green hydrogen will require an expensive rebuild of existing gas infrastructure.**

Existing gas infrastructure cannot safely tolerate high volumes of hydrogen, raising the possibility of massively expensive replacement of existing pipelines in order to provide safe transport. In particular, the small molecular size of hydrogen gas means that it frequently leaks through cracks in existing pipes.[8] California's investor-owned utilities recently submitted an application to the California Public Utilities Commission which detailed numerous safety and reliability risks that they would need to study before injecting hydrogen into existing pipelines.

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[5] Josh Eichman & Francisco Flores-Espino, *National Renewable Energy Laboratory, California Power-to-Gas and Power-to-Hydrogen Near-Term Business Case Evaluation, National Renewable Energy Laboratory, at 37* (Dec. 2016), *available at* https://www.nrel.gov/docs/fy17osti/67384.pdf.

[6] Lazard, Levelized Cost of Energy Analysis, p. 2 (Oct. 2020), https://www.lazard.com/media/451419/lazards-levelized-cost-of-energy-version-140.pdf.

[7] *Id.*

[8] Lynsey Tamlyn, *Improving Hydrogen Leak Detection to Increase PEM Fuel Cell & Electrolysis Efficiency*, Crowcon *Blog (Oct. 26, 2021), available at* https://www.crowcon.com/blog/improving-hydrogen-fuel-cell-leak-detection.

The host of potential problems include:

- Pipe swelling increases voids in the elastomers and rubbers that seal pipeline components due to exposure from pure hydrogen;
- Hydrogen can embrittle steel pipes;[9] and
- Underground storage options for hydrogen have not yet been demonstrated.[10]

Therefore, the use of green hydrogen in existing gas plants would likely require expensive and extensive storage and infrastructure upgrades.[11]

LADWP has issued a request for solicitations to establish potential prices for such upgrades, but the results of this request have not been made public. Without this cost information, neither the City nor LADWP can fairly estimate the infrastructure costs associated with transporting and distributing hydrogen in California.

5. Reserve green hydrogen use for difficult-to-electrify industries and sectors.

Given the high costs, extensive infrastructure needs, risk of increasing pollution in frontline communities, and the abundance of alternative renewable energy resources, the LA City Council should limit the use of green hydrogen for difficult-to-electrify sectors, such as the chemicals sector, long-haul trucking, shipping, and aviation. Because these industries all have fewer viable alternatives to operate without fossil fuels, they should be the planned recipients of any green hydrogen production in LA.

Even by limiting use to these demand categories alone, it will be extremely challenging to supply these sectors with adequate volumes of green hydrogen.[12] To meet just the world's current demand for hydrogen (e.g., for refining and industrial uses) using exclusively green hydrogen would require the use of all the wind and solar capacity installed to date.[13] The City cannot afford to invest in green hydrogen to produce electricity when there are far better, more cost-effective renewable energy alternatives today. Instead, green hydrogen resources should be reserved for difficult-to-electrify needs that do not currently have an alternative pathway to complete decarbonization. The City should avoid using this resource for incremental reductions and

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[9] *See* Erin M. Blanton et al., *Investing in the US Natural Gas Pipeline Sys. to Support Net-Zero Targets*, Columbia Center on Global Energy Policy, p.39 (Apr. 2021), available at https://www.energypolicy.columbia.edu/sites/default/files/file-uploads/GasPipelines_CGEP_Report_042221.pdf.

[10] Sara Gersen and Sasan Saadat, *Reclaiming Hydrogen for a Renewable Future*, Earthjustice, pp. 28-29 (Aug. 2021), available at https://earthjustice.org/sites/default/files/files/hydrogen_earthjustice_2021.pdf.

[11] Prepared Direct Test. of Kevin Woo et al. on Behalf of Southern Cal. Gas Co. et al., A.20-11-004, at 6-14 (Cal. P.U.C. Nov. 2020), *available at* https://www.socalgas.com/sites/default/files/2020-11/H2_Application-Chapter_4-Technical.pdf..

[12] Geert De Cock, *E-fuel would be wasted on cars while it's badly needed to decarbonise planes and ships – study*, Transport & Environment, (Dec. 7, 2020) *available at* https://www.transportenvironment.org/press/e-fuel-would-be-wasted-cars-while-it%E2%80%99s-badly-needed-decarbonise-planes-and-ships-%E2%80%93-study.

[13] Leigh Collins, *Liebreich: 'Blue hydrogen will be needed because green H2 alone will not be able to meet demand'*, Recharge News (Sept. 16, 2021), *available at* https://www.rechargenews.com/energy-transition/liebreich-blue-hydrogen-will-be-needed-because-green-h2-alone-will-not-be-able-to-meet-demand/2-1-1068786.

instead pursue a cost-effective, environmentally just, and viable path to complete decarbonization.

Thank you for considering these comments, and we look forward to continuing working with you to reach LA's ambitious climate targets while protecting our communities.

Sincerely,

Teresa Cheng
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My Gen Campaign
Sierra Club

Ari Eisenstadt
Regenerate California Campaign Manager
California Environmental Justice Alliance