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Response to Draft Report and Workshop for Natural Gas Infrastructure and Decarbonization Targets

Additional submitted attachment is included below.

California Energy Commission
Docket Unit MS-4
Re: Docket No. 19-MISC-03
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Staff Workshop (Docket No. 19-MISC-03) "The Natural Gas Distribution Infrastructure and Decarbonization Targets"

Thank you for the opportunity to participate in this forum, and please accept the following comments on the Staff Workshop referenced above. It is concerning to me that the study, Draft Results: Future of Natural Gas Distribution in California (CEC Staff Workshop for CEC PIER 16-011) from Energy+Environmental Economics, its draft conclusions, preliminary or otherwise, and its supporting documentation would provide the State with its main or only insight into this important decision about our future.

I am a managing director of Electrochaea GmbH, who have been working on renewable natural gas to decarbonize our existing gas distribution and storage network and to make renewable energy available to multiple business sectors. We have operating power to gas plants in two locations in Europe and are planning commercial projects for operation by 2023 in California. I have some knowledge of the markets and economics associated with this business sector. My comments here do not reflect the views of my employer but come from me as an interested citizen of California. These views are informed by my work in the US and in Europe since 2009 participating in the transition to low carbon energy sources.

As a California resident since 1986, it has been a pleasure to see the State take a leadership role in reducing our climate impact, lowering our per capita residential energy use while becoming the 5th largest economy in the world. It's a great record. We achieved this record, in part, by balancing our energy supply, experimenting in the market and supporting the development of nascent and innovative technologies and market concepts.

Here, we receive a proposal to limit technologies, squelch the market and eliminate the future for nascent technologies based on 'preliminary conclusions' from the comparison of a few selected scenarios, and a restricted set of technology and market options with the goal to electrify buildings. The conclusions are at odds with an earlier study authored by the same group (and left uncited) and ignore important contemporaneous and publicly available work with broader scope and drawing different conclusions.

I recommend to the CEC to review the work of Sepulveda et al.[i] as one example, and to evaluate having another party, such as EIRP[ii] review the current work and address scenarios not considered here (I have no relationship with EIRP and have done no business with them).

There are three main reasons I think the present study should not serve as the map for the CEC or the State's ensuing decision about it gas infrastructure, markets, or technology initiatives. These reasons are: objectivity, risk assessment, and cost analysis.

There is some good work in this study. Perhaps it can serve as a starting point for further discussion.

Objectivity In key places, the draft results document lacks objectivity, creating a narrative that could subtly alter the reader's view of choices and the assumptions. One example and the page that firmly grabs one's attention is page 20 of the Draft Results, "California's current energy cost challenge", which states:

- *"natural gas costs are increasing*
    - *Following the San Bruno explosion and Aliso Canyon gas leak, gas utilities in the state are in the midst of safety driven expenditures, markedly increasing their costs*
- *Electricity costs are increasing*
    - *Electric utilities expect increases cost due to wildfire liability and to harden their systems against wildfire risk*
- *The extent and duration of increases remain uncertain"*

In this comparison, we are presented emotive language associated with specific and named unfortunate events with gas, *"explosion"* and *"gas leak"* , including names of places we recall and noting new *"driven"* expenditures and *"markedly increasing costs*", as compared with a measured thoughtful consideration that we *"expect increases"* due to wildfire *"liability"* and to *"harden their systems"* against risk, and an omission of names and unfortunate events for the electric grid. The authors could have chosen a parallel and objective approach to the two cases, gas and electric, or selected an alternative presentation, with emotional approaches to both, including the names of the places that burned, the cause as powerline failure and the resulting utility bankruptcy. They did neither and emotionalize gas and take it easy on the electrical grid, despite available facts. Is this an objective comparison of the gas grid risks, failures and cost challenges to those of the electric grid?

An objective concluding point could have been:

- *The extent and duration of cost increases and risk mitigation costs for both gas and electric systems are unknown, but it is clear that more investment and thorough risk analysis are needed for both systems*

Risk Analysis There is little risk analysis presented in the Draft Results and it is not a point in the agenda. The Research and Modeling Approach diagram lacks the word "risk". From a decision maker's perspective, this is a troubling omission.

From a buyer's perpective, it would be helpful for the state to have a clear evaluation of the risks associated with economic, health, safety, environmental, system reliability, and C-goal outcomes of the considered options. A risk assessment would surely be helpful, if we are to objectively understand the options. We won't just buy the presumed benefits or best outcome of any scenario. We also buy the risks.

With reference to the safety, environmental and carbon emission risks it would be instructive to compare the carbon footprint impact of the system failures in the aforementioned "current energy cost challenge". These are not hypothetical events and the authors raised the issue. As a starting point, reviewing the impact of the unfortunate gas system events to the unfortunate electrical system events might illustrate the inherent climate, environmental, market and safety risks of failure of each system. If the argument is

to eliminate one set of risks by eliminating one system, it is fair to ask what risks remain, which have been created, attenuated or potentiated. The authors are clearly aware of the events. Why are they silent on the risks?

Is the "Gas Transition Strategy" a risk transition strategy that has been well evaluated along with its secondary impacts?

To address this question, in "Examples of a Gas Transition Strategy", we find a list of the components of the proposed transition. The components are clearly listed, but the implications and risks of only two points (targeted electrification and targeted gas retirements) are further elaborated in detail. These components could "potentially" reduce gas system costs with some "additional funds" in the high building electrification scenario. We are recommended to engage in this scenario while the authors also recommend some additional research needs to be completed on engineering and safety, legal and regulatory, and policy adjustments as well as the need to find the "additional funds". So, there are some potential risks, yet unexplored.

Should we complete this risk evaluation first? Or shall we proceed to building electrification and phase out the gas grid that stores and distributes energy in California, even though it is our largest source of primary energy, our largest system for energy storage, and supports vital industries such as cement, commercial enterprises, the residential sector and transportation?

Casting the net a bit wider in terms of scenario development and inspecting the work of others could be one path to reducing or understanding the risks in the decision we are to make regarding our future. The CEC would be well served to review additional studies in which a broader set of scenarios is evaluated than the limited options presented in the Draft Results. A strong case has been made by others that maintaining a low carbon stable generation base, such as stable renewable gas-based power generation is key to managing risks to system stability and to cost stability. Such work is not cited in the present Draft Results.

Cost Analysis In the draft conclusions, the dominant arguments are economic and related to the cost of RNG and maintaining and replacing elements of the gas system. We should admit that we will see increased costs in parts of our energy system as we continue the shift to renewable power from fossil power. Replacement and upgrading of assets is going to require investment for gas and power transmission and storage. If we elect to build heating and cooling infrastructure, or transportation electrification infrastructure, there will be new costs to bear.

But, let's remember that we already have an investment in the only battery with sufficient size to store the renewable energy we must generate, save and distribute. This is the gas grid. There are not sufficient batteries or capital available to replace the storage capacity of our exiting gas grid (>120,000 GWh). There is no cost assessment in the Draft Results of the batteries, additional transmission assets (that may need to be buried for fire prevention), and grid balancing resources that will be required as we achieve our eventual 2030 and 2050 renewable power production goals with no RNG or Gas grid to store this energy.

The UCI cost analysis of hardware for RNG production is thorough and generally reflects the most current market information we have for 2019. The use of that data in the Draft Results on page 11 "Base case and low cost assumptions for hydrogen and SNG are evaluated" seems unrelated to the current market conditions or to UCI's core data. Perhaps this is a misunderstanding of the UCI report, but the base case assumption for electrolyzer capital costs are lower today by approximately 40% than costs projected for the future on page 11 for projects of sufficient size to be considered commercial RNG applications. Electrolyzers at 20-50MW sizes are available today at costs below those cited for the 2050 "base case learning" and also lower than cited for 2030 in the "rapid learning" case.

There must be further discrepancies from current prices in other assumptions for RNG/SNG. The pricing on page 12 for *"SNG commodity cost for production from a new plant in 2030 or 2050*" exceeds production costs anticipated for projects currently under development in the US and Europe and with anticipated SNG production in 2023. We and others are anticipating costs of production for RNG between $35 and $45/mmBTU in projects to begin RNG production in 2022 to 2023. By comparison, the cases presented in the Draft Report are $120/mmBtu and $90/mmBtu for 2030 and 2050, respectively, for base learning rates. We anticipate costs will come down for SNG as the technology matures and reaches scale, just as has been true for wind and solar.

In short, I question the cost assumptions by the authors and therefore their related conclusions. If we had succumbed to the "too expensive" argument 30 years ago, we would never have proceeded with wind or solar power generation technologies, or with portable phones, or flat screen monitors, or electric mobility.

Big Picture The idea of linking the renewable electricity system, renewable gas, heating and transportation sectors is a growing reality in Europe and in China. This 'sector coupling' is viewed as an important avenue for ensuring parallel and rapid decarbonization across the entire energy system. It also allows energy security, reliability of supply and cost competitive solutions where technologies overlap in the same markets. The Draft Results suggest we limit rather than encourage this sector coupling for California.

Using RNG to charge the gas grid with renewable electrons is one example that can be deployed in California. It would allow decarbonization of the gas grid, and enable additional reduction in the carbon footprint of California's transportation sector, residential energy use, commercial buildings, and even the power grid.

Sincerely,

Mich Hein
California citizen, voter and taxpayer

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[i] https://doi.org/10.1016/j.joule.2018.08.006
[ii] EIRP website: https://www.innovationreform.org/