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RE: Montgomery County Draft Climate Action Plan

Dear Ms. Hochberg, dear Montgomery County Climate Action Group members:

Thank you for the opportunity to provide input on the draft climate action plan (Plan) for Montgomery County. I am Emanuel Wagner, a Takoma Park resident, and I have over ten years of background in the hydrogen and fuel cell sector on the federal level and California. I am providing these comments as my work focuses on California's energy transition, and many strategies being developed in California are reflected in this draft Climate Action Plan, but without some of the nuances California is discussing. Please consider the changes I recommend to the Plan, and I am glad to provide further detail.

Introduction

The Plan is ambitious, and I appreciate the work to develop this Plan, which has received significant input from working groups and public stakeholders. In my comments, I urge reassessment of the Plan's clean energy, building, and transportation sections on the following points:

1. **Provide technology-neutral policy recommendations rather than have policymakers pick a technology.**
2. **Support all technologies that can advance the goals equally.**
3. **Review the assessment on energy reliability and resiliency and associated cost, and determine if there are less costly solutions that achieve the same GHG reduction benefits.**
4. **Decarbonize the grid and provide carbon-neutral investment options for gas companies.**

I hope the team can review the specific points and rationale, which I am elaborating on below. I am including additional information via footnotes and propose specific changes that should address the concerns I raised.

Comments

1. **Provide technology-neutral policy recommendations rather than have policymakers pick a technology.** In the document, specific technologies are identified for policy and funding support. For example, the Plan mentions battery storage systems four times, whereas the technology-neutral term "energy storage system" would be better to retain technology neutrality. With the commercial availability of other storage technologies, e.g. home hydrogen storage systems[1], the county should refrain from picking specific technology solutions.

[1] https://newatlas.com/energy/lavo-home-hydrogen-battery-storage/

Recommendation:
Choose technology-neutral terminology that focuses on the stated goal or service to be provided, rather than selecting a specific technology.

2. Support all technologies that can advance the goals equally.

a. **"Fuel Cell Electric Buses need to technologically mature"**
The Plan mentions hydrogen fuel cell technology only once on page 125: "fuel cell vehicles may be a viable option as that technology matures". Hydrogen fuel cell electric buses (FCEBs), however, have been in commercial operation for over ten years at several California transit agencies and elsewhere. AC Transit reported in 2017 that their fleet of 13 FCEBs operated 2,057,099 miles and accumulated 248,546 hours on the fuel cell power systems since being placed into service, topping over 25,000 hours of service in 2017 for one bus.[2] Furthermore, hydrogen FCEBs are a critical part of California's zero-emission transit strategy; all transit agencies are already required under the Innovate Clean Transit rule to develop plans that outline that transition.[3] So far, 18 transit agencies representing 47% of California's entire bus fleet submitted data that show that while almost 3,500 battery buses will be procured by 2040, between 1,700 and 3,400 FCEBs will also be procured. Therefore, between 25% to 50% of the transit fleet bus purchases will be FCEBs as they have emerged as a compelling option due to similar operational logistics and performance compared to incumbent technologies.

Recommendation: Reword this point to "For example, fuel cell electric vehicles are a viable option for the County to achieve the same climate objectives."

b. **Treat hydrogen fuel cell electric vehicles equal to battery EVs**
The Plan does not mention hydrogen fuel cell electric vehicles (FCEVs) otherwise at all. They are referred to in the appendix (pp 80, 84, 86, 87) in a confusing way, which needs to be addressed.

i. **Clarify language on EVs, BEVs and FCEVs**
This usage is confusing as fuel cell and battery vehicles are both EVs and ZEVs. Fuel cell cars run on electricity, they produce it on board the vehicle from hydrogen, whereas battery EVs have electricity stored onboard. Maryland's EV site (https://marylandev.org/hydrogen-101/) refers to fuel cell vehicles as EVs.

Recommendation: State that FCEVs and BEVs are both ZEVs and EVs, and update the language accordingly in the recommendations to be inclusive of both technologies.

ii. **Extremely unusual wording for fuel cell electric vehicles (or FCEVs) is used.**
The term "water-based hydrogen fuel cell" and has only three results in a google search, and two of those results link to this Plan. The Plan should not create new and confusing language but rather use common industry and agency terminology and avoid confusion.

[2] https://web.archive.org/web/20201112031211/http://www.actransit.org/2017/07/11/fuel-cell-record-25k/
[3] https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit/ict-rollout-plans

This term is not defined in the Plan, either. It is recommended to use the actual terminology used by the federal and state agencies, which is "fuel cell electric vehicle". If the focus is to ensure these vehicles are using green or renewable fuel, the Plan should include the term green or renewable hydrogen. However, since MD House Bill 1246[4] bans all sales of hydrogen from natural gas for transportation uses by 2025, "water-based" is an unnecessary limitation and creates contradictory language with existing state legislation. Limiting hydrogen to only water-produced sources would also prevent green hydrogen production from alternative technologies, like gasification, which cannot be in the interest of this Plan.[5]

Recommendation: Change wording from "water-based hydrogen fuel cell" to "hydrogen fuel cell"

iii. **Reword "Strategy 4.5 Increase ZEV options for public if/when technology develops"** and **including in funding for BEV charging infrastructure also funding for hydrogen refueling infrastructure.**

"Strategy 4.5 - Increase ZEV options for public if/when technology develops

1. *Action 4.5.1 - Monitor developments with water-based hydrogen fuel cell cars and include them in above actions (and charging network actions) when appropriate".*[6]

Hydrogen fuel cell electric vehicles are already commercially available vehicles in places with hydrogen fueling stations. There are over retail 45 hydrogen fueling stations in California[7], which will rise to almost 180 by 2024[6]. There are three FCEV models available in the state today, all with ranges between 360 and 400 miles (EPA rated) and refueling times of 3-5 minutes. The only reason for the lack of FCEVs in Montgomery County and Maryland is the lack of fueling infrastructure. Technological maturity is not the issue, and therefore this strategy should be:

"Strategy 4.5 - Increase ZEV options by developing hydrogen refueling stations Action 4.5.1 – Create funding programs, partnerships, and incentives for hydrogen fueling stations to allow for additional ZEV options for residents that cannot take advantage of BEVs due to their driving or parking needs".

While private and public charging infrastructure is supported by ratepayer funding, federal and state incentives, there is no single financial support for hydrogen fueling infrastructure. The county should identify a plan to financially support light and heavyduty hydrogen refueling infrastructure to allow for a second zero-emission option to be available to residents, businesses, and fleet operators. As hydrogen FCEVs operate and refuel very similar to gasoline and diesel vehicles, many more residents without access to home charging will be able to switch to ZEVs if FCEV technology is offered as

[4] https://legiscan.com/MD/bill/HB1246/2019
[5] https://www.forbes.com/sites/pikeresearch/2020/04/22/dont-forget-about-biomass-gasification-for-hydrogen/?sh=22aa81ed724f
[6] Montgomery County Climate Action Plan, Appendices, Page 80 [7] https://cafcp.org/stationmap
[6] https://www.sandiegouniontribune.com/business/story/2020-09-15/san-diego-to-get-more-stations-for-hydrogen-fuel-cell-vehicles

an option. Furthermore, as hydrogen refueling does not require extensive utility upgrades at depots and fleet headquarters, they are a solution for commercial fleets, including transit buses and, in the next few years, trucking.
As of last year, the State of California to date has invested over $5B in BEVs and infrastructure and less than $200M in FCEVs and hydrogen stations.[7] Despite that lack of hydrogen investment, hydrogen fueling stations are projected to become economically self-sufficient in California within the decade, and eight hydrogen fueling stations are already being developed without grant funding from the state.[8]

New hydrogen stations cost roughly $2.5 million[9], slightly more than gas stations ($2M). The most recent open station in California, a First Element station, has the capacity of 1,600 kg of hydrogen per day, with four dispensers, and can serve the needs of several thousand FCEVs, with each full refueling in only 3-5 minutes. That is possible in the same footprint as a regular gasoline station, a crucial metric for densely populated areas with premium property values. Furthermore, these stations do not require massive utility grid upgrades, as hydrogen production is centralized and not subsidized by ratepayers. Therefore, in the medium-term, hydrogen stations can be entirely self-sufficient and solely paid for by the people using the fuel, making this a more equitable transportation option.

Goals 6-12 in this segment all discuss the issues of expanding charging infrastructure to use BEVs conveniently. Adding a goal to build and expand a hydrogen refueling network and including the goal to specify a stations deployment plan by certain dates would be advisable to mirror the emphasis placed on charging infrastructure development.

Recommendation: Add a goal to deploy hydrogen fueling infrastructure and an action to develop target station numbers and dates, and update Strategy 4.5 as discussed above.

c. **SLCP emission management**

There is no discussion of agricultural emissions, such as from dairy operations, which can be a significant source for biomethane and short-lived climate pollutants (SLCP). A program to install anaerobic digesters at these farms to produce biomethane would immediately reduce GHG emissions that otherwise would directly vent into the atmosphere.

Recommendation: Develop a program to incentivize all farms to install digesters for converting their sources of short-lived climate pollutants to a fuel, either to produce onsite electricity via fuel cells, or to decarbonize the natural gas system by feeding biomethane into it. According to California's Low Carbon Fuels Standard Program, biogenic-derived renewable natural gas has a significant negative carbon intensity score, meaning it removes greenhouse gas emissions.[10]

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[7] https://www.californiahydrogen.org/wp-content/uploads/2019/01/20190814-CHBC-Comments-on-Transportation-Forecast-Final.pdf p.9

[8] https://www.energy.ca.gov/sites/default/files/2020-12/NOPA_Cover_Letter_GFO-19-602_1st_Revised_12-08-2020_ADA.docx

[9] https://www.energy.ca.gov/news/2020-12/energy-commission-approves-plan-invest-115-million-hydrogen-fueling

[10] https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities

3. **Review the assessment on energy reliability and resiliency and associated cost, and determine if there are less costly solutions that achieve the same GHG reduction benefits**

The Plan avoids a discussion of the ability to manage a highly or fully renewably powered grid. Largescale energy storage will be a significant part in ensuring seasonal fluctuations, especially to address the "dunkelflaute" during the winter months when wind and solar production drop considerably.

California agencies have undertaken an unprecedented effort to plan for a decarbonized economy and developed various studies and proceedings to understand the challenges for that transition. The natural gas grid will need to play a major role in that transition.

The California Council on Science and Technology reported that the gas system provides many critical functions related to reliability, including preparing for winter use, meeting winter peak day demand, supporting hourly changes in demand, and serving as back-up for renewable generation. Additionally, gas storage has been needed to respond to emergencies related to weather and wildfires. Gas storage serves a financial function through seasonal and short-term arbitrage. **A growing reliance on an electricity system that is powered by variable renewable sources will increasingly cause imbalances between power supply and demand in 2030 and beyond. California will need some type of low greenhouse gas fuel such as biomethane, synthetic natural gas, or hydrogen to address multiday or seasonal supply-demand imbalances**."[11]

Montgomery County needs to assess the impact of high-renewables grid penetration and needs for balancing measures to retain a reliable and resilient grid, including the role of the gas system.

Recommendation: Add a goal that focuses on the role of the gas grid in managing renewables expansion with reliability, resiliency, and cost.

4. **Decarbonize the grid and provide carbon-neutral investment options for gas companies.**

In a future where gas utilities have to rely on fewer and fewer customers, new business perspectives need to be available to utilize their existing assets, retain jobs, and manage costs to the remaining consumer. Enabling the gas utilities to invest in other, climate-neutral gases is a viable solution to decarbonize their assets. Gas utilities should be encouraged to invest in converting their grid to support hydrogen distribution and make-ready infrastructure. In addition, opportunities to blend their natural gas grid with green hydrogen, as is being done in Europe, are a way to reduce carbon intensity in the near term.[12] Longer-term, upgrading natural gas pipelines to hydrogen pipelines, as is being done in Germany for 1200 km[13], allows for a continued use of otherwise stranded assets, while also creating a

[11] https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Safety/Natural_Gas_Pipeline/News/R2001007-Track1BJuly212020-StaffWorkshop-Slides.pdf
[12] https://www.reuters.com/article/us-germany-energy-cabinet-idUSKBN2A9201
[13] https://www.rechargenews.com/transition/german-pipeline-operators-present-plan-for-world-s-largest-hydrogen-grid/2-1-810731

carbon-neutral, secondary energy system that can provide the resiliency that an energy economy solely reliant on the electric grid cannot.

With the increase in renewable generation, energy storage will become a massive challenge for grid operators. California curtailed 19.6 terawatt-hours in 2020, almost doubling from 2019 when it curtailed 11.5 TWh.[14] Converting excess renewable electricity into hydrogen and storing it in the gas grid could be one solution. The natural gas grid is the largest energy storage system available and could play a role in providing bulk, seasonal storage, without which a 100% renewable grid would not be able to function.

Recommendation: Add a goal to develop strategies and a timeline to decarbonize the gas grid.

Conclusion

Creating a holistic plan to address climate change and reduce emissions is an enormous undertaking. To develop successful strategies, policymakers need to avoid dictating specific technology solutions. Instead, they should create a framework and support mechanisms that allow technologies and solutions to compete that can achieve the same goals. Customers require options that fit their patterns and needs. To be successful, all stakeholders need to buy into the Plan and become part of the solution rather than be the target of vilification.

I appreciate the opportunity to offer these comments and stand available to provide further information and clarification on the issues I have raised.

Thank you for your attention.

Best regards,

/s Emanuel Wagner
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[14] http://www.caiso.com/Documents/ProductionAndCurtailmentsData_2020.xlsx