October 14, 2021

Sustainability and Climate Action Plan Ad Hoc Committee Meeting
Focus: Non-Residential Building Electrification

Questions and Answers

1. Have you done any analysis of what it would take to adopt low carbon fuels instead of or in addition to forced electrification of so many buildings?
    A. These fuels seem to be part of the solution, but insufficient to replace residential and commercial building electrification. We have relied on analysis by E3 for the California Energy Commission showing high costs for renewable gas relative to electrification. This stems in part from the insufficient availability of biogas. Even if all viable sources are fully developed, challenges with incorporating green hydrogen as more than a percentage of the natural gas system, and the very high cost of synthetic renewable natural gas, even with optimistic projections for technological advances seem to make developing renewable gas at the scale that would be needed infeasible. These fuels are an active area of research and an active topic of discussion statewide, but have not yet seemed to present a clear alternative to electrification, but rather a supplemental action that could be used in addition to electrification, particularly to support high heat industrial processes, for example.

2. I have a residential home with less space for replacing a gas water heater with an electrical heat pump water heater. Can I apply for electrical tankless water heater(s) instead, and upgrade to a 200 amp panel with solar panels? If I chose an electric water heater, is a 240 V or 120 V more efficient?
    A. Electric heat pump water heaters are very efficient, at least three times more efficient than an electric tankless. Electric tankless water heaters draw a large amount of electricity at one time which puts a lot of stress on the electric grid. Tankless electric water heaters do not meet the Title 24 Building Energy Code for retrofit projects and incur penalties when doing Title 24 energy calculations. 240-volt electric heat pump water heaters are widely available in the marketplace. 120-volt systems are now becoming available; these systems have lower Uniform Energy Factors compared to 240-volt models and are therefore less efficient, but can work with a home's existing electrical system.

3. Can you please explain more about the benchmark ordinance for buildings over 25,000 SF (square feet)?
    A. California currently mandates benchmarking of energy use for buildings over 50,000 SF; this benchmarking mandate helps to raise awareness among building owners about the energy

use in their buildings. By lowering the square footage threshold of buildings and expanding the benchmarking scope to cover GHG emissions, we will be able to develop a GHG emissions baseline in preparation for a potential mandate of GHG emissions reductions in nonresidential buildings.

4. I switched to a tankless gas water heater about 15 years ago. My consumption of natural gas for water heating decreased 80 - 90% and is quite small in absolute terms. It was also relatively inexpensive, improved earthquake safety and takes far less space. While perhaps not "perfect," it's a very practical, fast, and cost-effective retrofit. I spend ~$4 / month for gas for water heating, and another $4 / month for cooking.
    A. Thank you for your feedback. We are trying to reduce all gas water heating - tank or tankless. According to the Department of Energy, for homes that use 41 gallons or less of hot water daily, tankless gas water heaters can be 24 – 34 percent more energy efficient than conventional gas tank water heaters. For homes that use a lot of hot water – around 86 gallons per day – tankless gas water heaters are 8 – 14 percent more efficient than conventional gas tank water heaters. We estimate that a typical household of 4 people uses around 57 gallons of hot water per day, whereas a typical household of 2 people uses around 34 gallons day.

5. How many landlords comprise the >25,000 SF commercial buildings in Palo Alto? Why is >25,000 sq ft the cutoff vs. a cutoff based on therm usage per SF? Is the assumption that the larger square foot buildings are consuming the greatest therms? I'm just wondering whether it merits a second pass by including things like insulation, circulation, etc. to rank building efficiency by monthly therms per SF.
    A. The cutoff of 25,000 SF is used because buildings over 25,000 SF account for 75% of the total non-residential building square footage in Palo Alto. Non-residential buildings have different energy use intensity; for example, hospitals are far more energy intensive than office buildings. Benchmarking provides a comparison of building energy use across similar buildings, and the benchmarking data allows City of Palo Alto Utilities to work closely with buildings that are outliers in their energy usage. Using the 2019 Santa Clara County Assessor data, we estimate around 130 landlords for nonresidential buildings over >25,000 SF in Palo Alto.

6. It seems that on-bill financing would help the split incentive for landlords and tenants. The tenant would be paying for the upgrade and receiving the benefits. The landlords would also benefit with newer units that, for heating, now also do air conditioning and they can rent the property for more.
    A. Thank you for your suggestion, we are exploring on-bill financing generally. We also agree that on-bill financing can help the split incentive issue and are investigating ways we could incorporate that feature into the program.

7. Will Palo Alto be getting rid of the Palo Alto only requirements for solar photovoltaics (PV)? What is the cost effectiveness of keeping the solar PV Palo Alto requirements that have cost the City and residents lots over the years?
    A. We encourage you to follow the Utilities Advisory Commission meetings for updates on permit streamlining efforts related to solar and storage. There was an update at the April 7, 2021 Utilities Advisory Commission meeting and another update is coming up at the December meeting.

8. What do we do for a condo owner who has a 60 amp panel in her condo? Upgrading that panel to 100 amps or higher is very expensive.
    A. City of Palo Alto Utilities CPAU is looking into on-bill financing to help homeowners with electrification projects including panel upgrades. The apartment units at Page Mill Court have 70 amp panels and the gas furnaces in these units are being retrofitted without upgrading the panels. Power draw depends on the heat pump system and there are some with a lower amp draw.

9. Solar App+ will be evolving to cover all electrification projects. This online permitting process was developed by NREL and is free for the city and there is $30 million from the State to help with this adoption.
    A. Thank you for this suggestion. The City has been exploring this option.

10. I understand that technology is moving quickly — what is the city's strategy to incorporate these innovations? (For instance, hybrid solar PV + hot water panels https://dualsun.com/en/product/hybrid-panel-spring/)
    A. We are working with consultants who are subject matter experts to evaluate emerging electrification technologies and help customers adopt new technologies as they become commercially viable.

11. Do you need an electrical load calculation prior to installing a heat pump water heater?
    A. Per the California Electrical Code section 220, an electric load calculation is necessary prior to installing a heat pump water heater. If it is a residential project, the Home Efficiency Genie may be a place to start to find a contractor who can help with that. To learn more about the services the Genie provides, please visit efficiencygenie.com or call 650-713-3411.

12. Given staff limitations (we are a smallish city), how about working together with the non-profit Community Choice agencies in adjacent areas (Peninsula Clean Energy, Silicon Valley Clean Energy) to devise joint systems of evaluating new technologies, and creating better business processes? We share public service values and GHG reduction goals with these Community Choice agencies and could work out ways to do joint analyses and programs.
    A. Thank you for this suggestion. We have been and will continue to collaborate with other cities and agencies in decarbonization efforts.

13. What happens to those still on gas when the first 50% of those who can stop using gas do stop?
    A. We did a very high-level evaluation of this question and provided it at the January Utilities Advisory Commission meeting. The answer depends on whether people disconnect from the gas system, or just electrify heating and water heating. In the former case, it is likely possible to maintain gas rates at a reasonable level for those who have not been able to switch. In the latter case, rates rise. In reality, this is a nuanced issue and will need to be actively managed. To ensure equitable electrification across the community, it is important to provide additional incentives and services to those who have financial challenges with electrification.

14. Recognizing the limited useful life of the gas distribution system in a carbon constrained future, has the Council directed Utilities to design a decommissioning charge on gas terms that would help signal the transition and help pay for it?

A. That's an interesting concept and we will take it under consideration. We are looking at ways to fund decommissioning.

Suggestions from Participants

- Since electrification benefits tend to accrue to the building occupants, and the occupants tend to pay the utility bills, and building owners are the parties that pay for equipment purchases, perhaps there is a natural solution of classic utility rebate programs that pay substantial rebates to owners for good equipment selection. This might be pushed further where there are more renters (e.g. focusing that type of program into multi-family and commercial sectors and their utility rates). This might produce progress and equity between tenants and owners.

- Maybe for the commercial and multi-family sectors the preferred type of assistance (given the split incentive problem) would be lending money to the building owner. Given their high discount rates and the utility's low discount rate, a 120% loan amount at zero interest repaid over 10 years would be more attractive than a xx% rebate. The owner would be able to depreciate the full cost of the project. This takes advantage of the different parties' different discount rates and tax situations.

- Seeing the picture of gas meters closer than current code distance allowed makes me wonder about an incentive mechanism - could the gas utility charge a 10 cents per therm compliance assistance charge to gas meter sales volumes where the meter is in a location that is no longer approvable under current code? This could generate revenue to fund the electrification of the gas end uses that would allow the removal of the offending meter.

- Perhaps gas meters and electric meters could be separated by a gas barrier of some kind to make them code compliant without having to separate them out physically.

- Imagine a laminated sticker on the building department counter that told the permit applicant that "The city is moving toward all-electric and that we do not recommend choosing gas fired appliances anymore."

- For those wall heater replacements with mini-split heat pumps, it seems tempting to use the abandoned exhaust stack as the path to run the refrigerant line-set to the roof. Perhaps some innovator will make the drop-in replacement that fits right where the gas wall heater hole was abandoned.

- There is a product that may be an easier swap for gas wall furnace than a mini split - a self-contained heat pump - https://innova-usa.com/hpac-2-0/

- For contractor training, the city needs to get with BayRen, Silicon Valley Clean Energy, and Peninsula Clean Energy for training as they already have this.

- Among funding sources, it has recently dawned on me from looking at Palo Alto sea level rise maps that climate change will impact many or all properties. Perhaps one of the funding sources to explore would be a voter approved property assessment to generate funds for climate leadership that might

have a ripple effect to encourage action beyond Palo Alto. That ripple effect could be our best shot at slowing climate change and preserving the usefulness of Palo Alto properties.

- If organizational challenges are going to delay achieving 80 x 30, we should consider the investment and relatively quick return of offsets so we can achieve our goals. Consider ways to break organizational challenges. Work more closely with chambers of commerce so business communities can be brought into this.