



City of Palo Alto

Utilities Advisory Commission Staff Report

(ID # 11512)

Report Type: Agenda Items

Meeting Date: 9/2/2020

Summary Title: Overview of Utility Electrification Impacts

Title: Discussion of Future Studies of the Potential Impacts of Building Electrification Efforts on the Electric and Gas Utilities

From: City Manager

Lead Department: Utilities

Recommendation

This report is submitted to the Utilities Advisory Commission (UAC) for informational and discussion purposes only, so no recommendation is requested.

Executive Summary

The City's Sustainability and Climate Action Plan (S/CAP) contains some ambitious goals for reducing carbon emissions in Palo Alto through vehicle and building electrification. The building electrification goals would result in major reductions to natural gas use that would affect the physical infrastructure and financial position of the gas utility. The increased electric loads associated with electrified buildings and electric vehicle charging equipment would affect the physical infrastructure of the electric system and require significant investment. The goals would also generate significant workload for Utilities Engineering and Operations staff that existing staffing levels could not accommodate. Utilities staff is currently working on impact analyses to evaluate these issues. This staff report summarizes those efforts and identifies some challenges such as hiring qualified staff in the electric utility and potential opportunities such as operating the gas system in a scaled back configuration.

Background

The following is a timeline of recent climate action in Palo Alto:

- April 2016: City Council adopted the ambitious goal of reducing GHG emissions to 80 percent below 1990 levels by 2030¹ (80% by 2030 goal), 20 years ahead of the State of California 80% by 2050 target.
- November 2016: Council adopted the S/CAP Framework,² which has served as the road map for achieving Palo Alto's sustainability goals.

¹ <https://www.cityofpaloalto.org/news/displaynews.asp?NewsID=3534&TargetID=268>

² <https://www.cityofpaloalto.org/civicax/filebank/documents/60858>

- December 2017: Council accepted the 2018-2020 Sustainability Implementation Plan “Key Actions” as a summary of the City’s work program.³
- Early 2020: The City launched a 2020 S/CAP Update to determine the goals and key actions needed to meet its sustainability goals, including its 80% by 2030 goal.
- March 31 – April 14, 2020: A virtual on-demand 2020 S/CAP Community Engagement Workshop was held to solicit feedback on draft 2020 S/CAP Potential Goals and Key Actions on the City of Palo Alto Sustainability website.
- Staff presented the Goals and Key Actions the April 13, 2020 City Council Meeting, and at the May 20, 2020 UAC meeting.
- Staff reviewed all feedback received and incorporated it into an updated 2020 S/CAP Proposed Goals and Key Actions presented to Council on June 16, 2020.⁴

The proposed goals and key actions include major efforts to electrify significant portions of the Palo Alto building and vehicle fleet. For example, to meet S/CAP goals, up to 100% of residential buildings may need to be electrified, as well as 80% to 90% of light vehicles and a significant fraction of non-residential heating equipment. This will require major investments in electric distribution infrastructure and careful attention to the physical and financial impacts to the gas utility.

Workload impacts could be significant, depending on the pace of electrification. At various Council and UAC meetings individual Council members and Commissioners have advocated for further staff analysis of these issues.

Discussion

Staff is currently engaged in a number of analyses to assess the impacts of building and vehicle electrification on the gas and electric utilities. Other analyses have been scoped, but not yet started. This report is intended to give an overview of those efforts, to provide some basic information about the gas and electric utilities to guide future discussions, and to communicate some early insights from ongoing analyses.

Key Elements of the 80% by 2030 Utility Electrification Impact Assessment

Staff’s assessment is intended to address a few key questions:

1. *Gas Utility Impacts:* Will achieving the 80% by 2030 goals result in a non-viable gas utility? This question includes both operational and financial dimensions, and includes the impact on the bills of customers remaining with the gas utility in 2030.
2. *Electric Utility Impacts:* What will the impacts of achieving the 80% by 2030 goals be on the electric utility? This question includes both operational and financial dimensions and requires an assessment of new required capital investment.

Questions not addressed in this assessment include:

³ <https://www.cityofpaloalto.org/civicax/filebank/documents/63141>

⁴ <https://www.cityofpaloalto.org/civicax/filebank/documents/77028>

- The customer costs of building electrification.
- Legal issues and authorities related to gas service removal; these will be addressed separately as staff updates the S/CAP.
- The programs and mandates required to achieve the 80% by 2030 goals. These will be addressed through the S/CAP update process.
- Financing of the private and public community costs of electrification. These issues will be addressed as part of (and subsequent to) the S/CAP update process.
- Impacts to the General Fund revenue sources due to shifts in the quantity and type of utility services provided to customers.
- CEQA review of the 80% by 2030 goals. This will be addressed as part of the S/CAP update process.

Analytical Approach

To answer the two key questions listed above, staff intends to complete a series of three analyses:

1. *Utility cost to electrify:* Staff will assume an “end state” for the gas and electric utilities based on the proposed 80% by 2030 S/CAP goals. This end state represents customer loads once the 80% by 2030 S/CAP goals have been achieved. Staff will then assess all operational activities and investment required to achieve that end state (e.g. gas system abandonment activities, new electric distribution system investment to accommodate electrified buildings and increased EV charging). Staff will calculate the cost of these activities to generate the utility’s cost to electrify. This work is being commenced this summer and an analysis of operational activities needed to electrify single-family homes is expected to be completed by fall of 2020. Additional work will be needed to assess multi-family and commercial building operational impacts and no timeline for this work has been determined yet.
2. *Future annual utility costs:* Staff will assess ongoing annual utility costs for the end state described above for both the electric and gas utilities. Staff will use this information to calculate sample “end state” customer bills for various sectors and consumption levels.
3. *Workload assessment:* Staff will calculate the City efforts needed to support the community in achieving the end state described above. This includes both municipal and utility workload, including development review by various departments, field work required to support customer conversions, and staffing and funding required to support capital investment and other operational activities required to achieve the 80% by 2030 goals.

Staff is approaching these analyses in stages. Staff’s current efforts include:

- An analysis of the cost and staffing required to fully electrify all single-family homes in Palo Alto. The analysis will address both gas utility and electric utility operational costs and investments. This simplified analysis will act as the basis for a future, more comprehensive analysis that includes the multi-family and commercial sectors.
- An assessment of the vehicle charging network required to support the City’s 80%

by 2030 vehicle electrification goals. This assessment is a necessary part of determining the overall electric utility operational costs and investments required to achieve the 80% by 2030 goals.

These two analyses are expected to be completed by the end of September 2020 and will be presented to the UAC in the fall. Staff will then extend these analyses by:

- Assessing any additional operational costs and capital investment associated with building electrification in the multi-family and commercial sectors.
- Assessing the annual costs for the electric and gas utilities once the 80% by 2030 goals have been achieved and calculating sample customer bills under this scenario.
- Assessing the City's workload (both utility and other municipal) to achieve the 80% by 2030 goals.

These later analyses would ideally be completed in late 2020, but may not be completed until 2021 due to staffing constraints.

Opportunities to Explore

Staff's effort to scope these analyses and complete initial work has revealed some potential opportunities. For example, staff is exploring the viability of running a scaled down gas system. A couple of key insights hint at this being a real possibility:

1. *It is likely operationally possible to run a gas system that serves only commercial and some multi-family customers.* If all single-family residential customers and some multi-family customers electrified their homes (as one key-action in the S/CAP states), the gas system is designed in such a way that it could likely reliably and resiliently serve only Palo Alto commercial areas. Some existing gas infrastructure in predominantly single-family areas might need to remain to serve neighborhood commercial centers, schools, and other civic buildings, depending on how easy it would be to electrify those uses.
2. *Most gas utility costs decrease with declining customer count, customer loads and miles of gas main in service.* About 35 to 40% of the gas utility's costs are volumetric, meaning that they decrease with decreasing gas consumption. About 30% are allocated to the gas utility based on the number of customers. For example, staff time devoted to customer service activities are allocated based on the number of customers for each utility. As the number of gas customers decreases, the customer service staff full-time equivalents (FTEs) allocated to the gas utility will decrease as well. Similar dynamics apply to maintenance and engineering activities. Of the remaining costs, 10 to 15% relate to capital investment, and the remaining 20% are fixed, regardless of the size of the gas utility.

The insights above indicate a potential future in which the City can achieve its sustainability goals while preserving a significantly scaled back gas utility. More analysis is needed to determine feasibility. It also points to a potential need for the City to be

intentional about the way it electrifies. For example, if widespread partial electrification of single-family homes takes place, meaning that the same gas infrastructure is needed to serve homes using significantly less gas, this could lead to an unsustainable financial situation for the gas utility and for remaining gas customers. If, on the other hand, customers steadily electrify block by block, and gas infrastructure is removed, the viability of the gas utility could be maintained.

Maintaining the viability of a business-serving gas utility while achieving the City's sustainability goals is an important potential option to consider. The City may want to do so to minimize financial impacts of sustainability efforts on the business community and avoid the loss of business in Palo Alto. It also may be very expensive to electrify certain larger-scale commercial end uses while still reducing carbon emissions, meaning other emissions reduction measures would be more cost effective. Multi-family customers may also have central heating that is technically infeasible or very expensive to convert.

Potential Barriers

Electric Utility Operations and Engineering staffing is likely a critical barrier to achieving the S/CAP goals. Electric Engineering staff time is required for reviewing building electrification projects or installation of new charging infrastructure. The volume of project review applications will be quite high if the City is to achieve its sustainability goals, necessitating the hiring of additional staff or professional contractors. While some efficiencies could likely be achieved by doing system-wide studies of new infrastructure needed, some level of project by project analysis would be needed. To provide some perspective, to process the 30 project applications currently in queue with the City's multi-family EV charger program requires anywhere from 0.25 to 0.5 FTE of staff time. Supporting dozens of commercial and multi-family EV charger applications each year combined with hundreds or even thousands of residential panel upgrades would require significant additions to staff, perhaps even doubling existing staff. This estimate does not take into account the additional engineering design and inspection work that must be done to oversee construction work needed to increase distribution capacity to accommodate additional electric loads on the system.

Over the past 10 years, the Electric Engineering Division has had challenges hiring and retaining experienced engineers. The Division has been hiring entry-level staff and training them. The Division is also working with Human Resources to expand and improve the candidacy pool for vacant positions by posting positions on external websites and hiring professional recruiters. This is a significant organizational barrier to achieving the City's sustainability goals.

Staffing issues for Electric Operations are potentially even more significant. The Division has had difficulty filling existing vacancies. While contractors can fill some of the gap, it has been challenging to hire contractors due to a shortage of line workers throughout the industry and the high level of infrastructure investment being done by PG&E. Line

workers are needed to complete service upgrades and smaller capacity upgrades to assets such as line transformers. City staff is needed to oversee contracts and complete inspections.

Lastly, these limitations take place in the context of a growing backlog of infrastructure investment. The Utilities Department estimates the need for additional engineers and the filling of line worker vacancies in order to increase regular infrastructure investment to maintain current levels of electric system reliability. This will be even more critical if the community intends to rely even more on electricity in the future.

Staff is working to quantify these issues further as it completes its analysis.

Timeline

Staff's tentative timeline for completing this entire analytical effort is June of 2021, but staff will endeavor to complete the analysis earlier as staff time permits.

Resource Impact

These analyses will require approximately 1.25 FTE of staff time over the next year, which will be absorbed using existing staff and consulting resources.

Policy Implications

These analyses are intended to support the City's sustainability goals as embodied in the S/CAP and, additionally, to ensure the City's safety, reliability, and cost-effectiveness goals for its utilities continue to be achieved.

Stakeholder Engagement

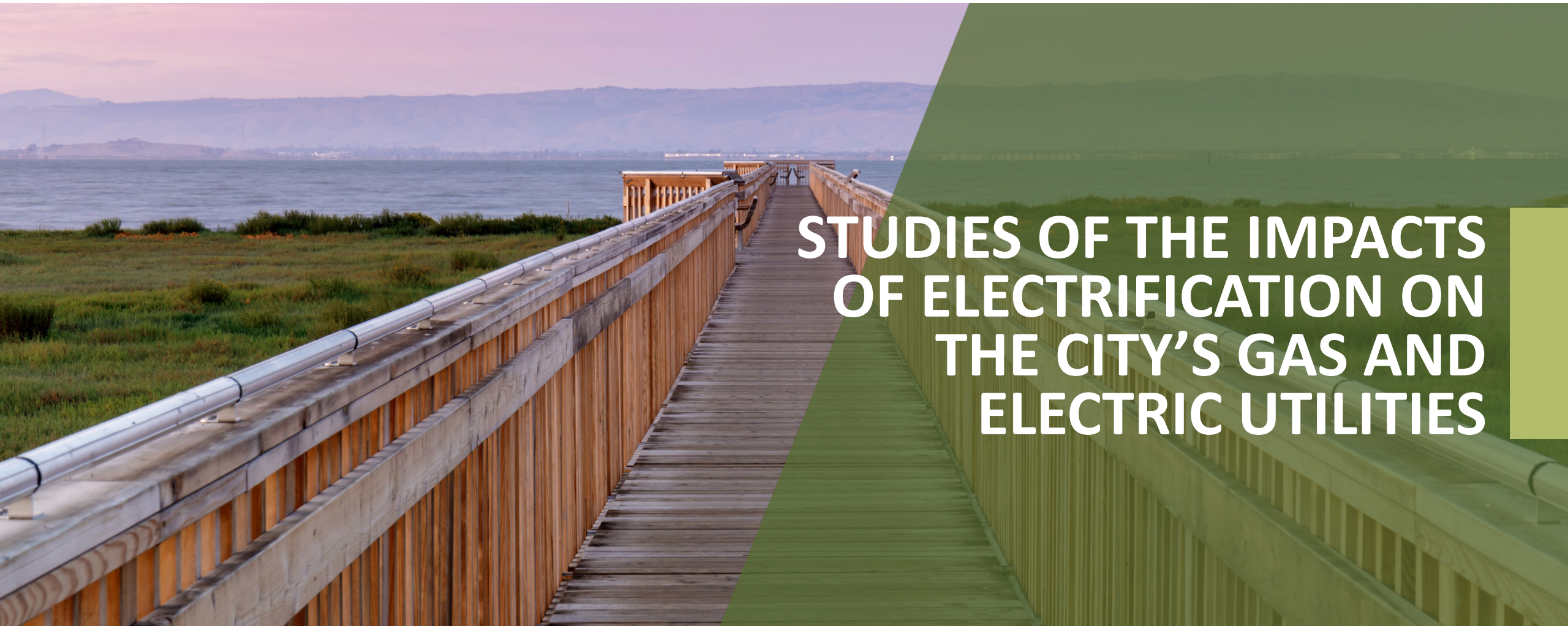
This is currently primarily an internal analysis effort, but once some initial results are completed, outreach and education will be needed. Most likely this would be undertaken as part of the S/CAP outreach effort rather than as part of a separate engagement effort solely on this topic.

Environmental Review

The UAC's review of these analytical efforts does not constitute a project under section 21065 of Public Resources Code and section 15378(b)(5) of CEQA Guidelines, as an administrative governmental activity which will not cause a direct or indirect physical change in the environment.

Attachments:

- Attachment A: Utility Electrification Impacts



STUDIES OF THE IMPACTS OF ELECTRIFICATION ON THE CITY'S GAS AND ELECTRIC UTILITIES

September 2, 2020

www.cityofpaloalto.org



Goal of the Studies

- The Sustainability and Climate Action Plan (S/CAP) has ambitious goals for reducing carbon through electrification of transportation and buildings
- These will impact both the gas and electric utilities.
- Key questions to answer:
 - Gas Utility Impacts: Will achieving the 80% by 2030 goals result in a non-viable gas utility?
 - Electric Utility Impacts: What will the impacts of achieving the 80% by 2030 goals be on the electric utility?
- Studies will involve multiple analyses of different issues to answer these questions.
- Goal is to complete studies by the end of 2020, actual completion will depend on staff availability.



Opportunities and Barriers

Could the City operate a scaled-back gas utility?

- Partial electrification of multi-family and commercial uses may be preferable for technical and economic reasons
- Single-family electrification could enable “pruned” gas system serving concentrated multi-family/commercial areas.
- Gas utility cost structure may allow for reasonable rates for a scaled back system.

Electric Utility staffing will be a key challenge

- The workload associated with electrification would require scaling up Engineering and Operations teams.
- Filling vacancies for these teams at existing staffing levels has been a challenge.
- Finding and keeping contractors has also been difficult.



CITY OF
**PALO
ALTO**

Jonathan Abendschein

Assistant Director, Utilities Resource Management

Jon.abendschein@cityofpaloalto.org

(650) 329-2309