



UTILITIES ADVISORY COMMISSION MEETING MINUTES OF FEBRUARY 5, 2025 REGULAR MEETING

CALL TO ORDER

Chair Scharff called the meeting of the Utilities Advisory Commission (UAC) to order at 6:05 PM.

Present: Chair Scharff, Commissioners Croft, Gupta, Metz, Phillips, and Tucher (6:07 PM)

Virtual: Vice-Chair Mauter

AGENDA REVIEW AND REVISIONS

None

ORAL COMMUNICATIONS

None

APPROVAL OF THE MINUTES

ITEM 1: ACTION: Approval of the Minutes of the Utilities Advisory Commission Meeting Held on January 7, 2025

ACTION: Commissioner Croft moved to approve the UAC meeting minutes for January 7, 2025.

Commissioner Metz seconded the motion.

The motion carried 6-0 with Chair Scharff, Vice Chair Mauter, and Commissioners Croft, Gupta, Metz, and Phillips voting yes. Commissioner Tucher was absent.

UTILITIES DIRECTOR REPORT

Kiely Nose, Interim Director of Utilities, delivered the Director's Report.

On January 25, 2025, the City Council held its annual retreat to select their priorities for 2025 as well as review community input and key accomplishments for 2024. Council established the following four priorities: Implement housing strategies for social and economic balance, climate action and adaptation, natural environment protection, economic development and retail vibrancy; and public safety, wellness, and belonging. The Council approved the formation of the

following four committees for the 2025 calendar year: Climate Action and Sustainability Committee, Retail Committee, Rail Committee, and Cubberley. On February 24, 2025, the Council will discuss the objectives, projects, and work plans associated with their four priorities as well as the scope of the ad hoc committees. After February 24, 2025, committees and commissions will work on their 2025 work plans. The UAC's 2025 work plan will go to Council for approval in March or April.

At last month's meeting, Council authorized staff to execute a \$16.5 million grant for replacing old gas pipelines from the Natural Gas Distribution Infrastructure Safety and Modernization grant program. Staff believed the funds were in alignment with the current Administration's priorities; however, staff will continue tracking the availability of funds.

In January, staff, Vice Mayor Veenker, and Chair Scharff attended the NCPA Strategic Issues Conference in Sacramento. Following the retirement of Dean Batchelor, the NCPA Commissioners were amended to include Chair Scharff and Ms. Nose as alternates for Vice Mayor Veenker.

The Utilities Director and Assistant Director for Electrical Engineering positions were posted on the Utilities webpage, LinkedIn, and the TPA's webpage. Both postings will close in February. Commissioner Gupta asked if the document the UAC reviewed was internal or for the public. Ms. Nose replied that the UAC reviewed the Utilities Director job description, which was a public document but not used for marketing the position. The job description identified what the role was and the minimum requirements but an external recruiter had developed marketing tools to attract the most qualified candidates.

With the recent storms after a dry January, the San Francisco regional water system storage was adequate. A water supply shortage was not expected this year.

Staff heard from a few residents about their high utility bills, so staff is looking into that. Customers can call Customer Service if they need financial assistance or have questions.

The UAC packet contained an informational item about the results from the most recent customer satisfaction survey of businesses and key account customer groups. Takeaways from the surveys included the following: CPAU demonstrated strong performance in the water utility service. The electric service had decreasing satisfaction around rates, trust, and affordability efforts. There was significant interest in energy and water efficiency programs. Challenges existed around customer awareness and financial barriers. Action items resulting from the survey included expanding awareness and participation in rate programs, evaluating financial options for customers, improving communication on infrastructure projects, and fostering greater customer trust by highlighting testimonials or customer experiences.

NEW BUSINESS

ITEM 2: DISCUSSION: Reliability and Resiliency Strategic Plan: Update on Studies

Karla Dailey, Assistant Director of Utilities Resource Management Division, addressed the UAC. The Reliability and Resiliency Strategic Plan (RRSP) was a collaboration between Utilities, Engineering, and Resource Management and was part of a larger interdepartmental team led by Jonathan Abendschein, Assistant Director of Climate Action. The Utilities leads on this part of the project were Shiva Swaminathan from Resource Management and Mohammad Fattah from Engineering. The RRSP goal was to improve reliability and resiliency for the community via upgrading distribution equipment and strategies such as distributed energy resources. Council approved the RRSP in April of 2024. In the fall of 2024, staff came to the UAC to obtain feedback on the scope for consultants. Staff returned today to provide an update per the UAC's request and to request feedback on parts of the RRSP.

Mr. Abendschein stated there was widespread agreement that customer adoption of these technologies could help the grid. Staff had been working on efforts to reduce barriers to voluntary customer adoption. Staff had been communicating to customers some of the advantages of these technologies and strategies. Tonight's discussion will focus on answering the following questions: Will we provide incentives, technical assistance, or other staff-intensive, costly programs to promote these technologies and strategies? What types of programs will be most effective at getting people to adopt and what resources will be required to run them?

The two phases were a cost/benefit analysis and program development consideration. There were quantifiable and qualitative benefits to the Utility's electric supply costs, distribution costs, and community resiliency but it was unknown whether those benefits exceeded the costs and if so by how much. Some cost/benefit analyses on the electric supply were done in the past but a full cost/benefit on all three components had not been performed in a long time.

Buro Happold was the lead consultant handling supply, resiliency, and cost of implementation. E3 was performing the distribution analysis. Buro Happold will integrate E3's information to complete a comprehensive analysis. Buro Happold will develop a list of programs for consideration by the UAC and Council, including costs, benefits, as well as administrative and staffing needs for those programs. Buro Happold's and E3's focus was primarily at the individual utility customer level but strategies such as neighborhood microgrids could be done at utility scale. The airport microgrid study will be discussed in Item 2B. Burns-McDonnell has a microgrid practice and was the consultant doing a study on adding solar and storage at the airport. The Buro Happold study on supply, resiliency, cost/benefit analysis, and program ideas was underway and would largely be completed by the end of spring. The other two studies will be completed in late spring and in the summer. Buro Happold will integrate the results from the other two studies into a final report for consideration in the fall. Staff will provide an update to the UAC when results are available.

A tentative list of technologies and strategies was presented to the UAC in September of 2024. Since then, staff developed more clarity on how those technologies contribute benefit to the community, supply cost, distribution cost, and resiliency. Staff wanted to confirm the UAC's interest in having the list of technologies analyzed and that the UAC was in alignment on how

those technologies could contribute benefit to the community. In September, staff was asked whether energy efficiency could be included. Staff considered the idea but felt it was duplicative to have Buro Happold analyze energy efficiency because CPAU partnered with other publicly owned utilities (POU) throughout the California Municipal Utilities Association to do a study on energy efficiency measures.

In February or March of 2025, Buro Happold will complete the supply and resiliency components of the cost/benefit analysis and develop a list of potential programs. Tentatively in April or May of 2025, UAC and Council will review the cost/benefit results and programs. Burns-McDonnell's microgrid study and E3's distribution benefit analysis study will be completed in summer of 2025. In fall of 2025, Buro Happold will integrate the distribution benefit results into a cost/benefit study, develop a final list of recommended programs, and provide a final report. In fall of 2025, staff will return to the UAC and Council for final consideration of potential programs.

Chair Scharff invited public comment and commissioner questions. There was no public comment.

Commissioner Tucher thought it was difficult to talk about a microgrid for the airport without understanding how the Utility felt about microgrids. Commissioner Tucher wondered what was the difference or if there was overlap between grid modernization versus reliability and resiliency if the focus was on distribution, not transmission. Mr. Abendschein stated that Buro Happold would suggest a framework for thinking about the distinctions between reliability and resiliency. Buro Happold's focus was primarily on the supply and individual customer resiliency. The grid modernization program was designed to add capacity for electrification as well as add features to reduce outages and speed recovery, so it was included as part of the RRSP.

Referring to the technologies listed on Slide 5, Commissioner Tucher thought solar and storage, vehicle to grid, and microgrids were ideal ways to modernize the grid. Alan Kurotori, Utilities Chief Operating Officer, explained that distribution was the final part of the system from Palo Alto to the customers. Some of the items shown on the list of technologies were on the distribution side, such as vehicle to home, managed storage, solar, time-of-use rates, and electrification. Grid modernization was more than distribution because it involved improving all the components from the customer up to Palo Alto's connections to PG&E, including changing out the overhead poles, underground transformers, subtransmission, substations, 60 kV loops, and receiving stations. Staff was actively engaging with PG&E and CAISO on a second transmission line, which had been a goal for a long time. Staff will come back to the UAC when they have more information on a second transmission line.

As part of the grid modernization effort, Mr. Abendschein stated that some studies have been performed to determine if an upgraded system would allow power flowing in both directions and accommodate a high penetration of technologies on the grid such as solar and storage, vehicle to home, and vehicle to grid. Enabling a higher penetration of these technologies help us use the grid more efficiently.

Commissioner Tucher looked in September and December's meeting materials and was unable to easily find if an assessment has been performed to identify areas of weakness in reliability and resiliency. Mr. Abendschein said the grid modernization study was a basic assessment that identified areas needing work. Mr. Abendschein suggested watching the February 2024 Council Study Session on reliability. Commissioner Tucher hoped to find a map showing the trouble areas in Palo Alto or a document explaining how reliability and resiliency were assessed and what the weak points were. Commissioner Tucher thought the grid was resilient, Palo Alto did not have a lot of outages, the duration of outages was not bad, and customers were generally satisfied. Mr. Abendschein encouraged Commissioner Tucher to email him so staff could share further information.

Relative to the S/CAP and the list of technologies, Commissioner Phillips asked if climate change impact was considered or if it would be looked at separately. Mr. Abendschein explained that the carbon impact was integrated into the supply cost analysis because markets were structured in California to have high costs when carbon emissions were high, so the supply cost included the carbon benefits on the grid in avoided gas generation. Commissioner Phillips asked if the cost was high because the marginal cost of gas generation was a proxy for or equaled the cost we would assign to the carbon emission. Mr. Abendschein stated that the market cost of carbon was included but staff will take Commissioner Phillips's comment into consideration when looking at the supply cost analysis. When staff comes back to the UAC, they will address the question on whether a higher carbon cost should be allocated to avoided gas generation in the electric system.

On Slide 5, Commissioner Phillips was surprised to see time-of-use rates and demand response did not impact resiliency because he thought it would make the system more resilient. Outages tend to happen at certain times of the day because of peaking, so charging higher prices for that time of day would dampen local demand and possibly cause industrial to shift away from those times to reduce the impact. Commercial was 85 percent of the load. Mr. Abendschein clarified that the resiliency column on Slide 5 was about what happened when an outage occurred. Demand response indirectly could contribute to reductions in outages, so it qualitatively improved reliability and resiliency of the system.

Commissioner Gupta asked if the assessment of the technologies listed on Slide 5 might inform how we approach grid modernization. Commissioner Gupta recalled a member of the public commented about using meter socket adaptors as a means of reducing the need to increase the capacity to a home because it bifurcated the circuit from your electric vehicle (EV) and the rest of your house. Mr. Abendschein replied that meter socket adaptors would be talked about in Buro Happold's presentation. The E3 analysis was to assess whether technologies or efficient electrification could allow for changes in the grid modernization implementation, which would be talked about in depth in Item 2C.

Commissioner Gupta asked for definitions of the technologies listed on Slide 5. Mr. Abendschein responded that EV managed charging was a technology used to limit the

maximum draw from the distribution system at any one time. Demand response was when people stopped EV charging in response to grid events. Vehicle to home was the ability to back up a home using a vehicle. Vehicle to grid was the ability to have your EV discharge or charge in response to grid signals.

Commissioner Gupta needed additional time before providing feedback on other technologies that should be studied. The Stanford Office of Government Affairs offered to connect Commissioner Gupta with Stanford faculty who perform research in this field and Commissioner Gupta wanted to include staff. Mr. Abendschein was interested in any information provided in those conversations.

Commissioner Croft asked which category on the list of technologies would include EV managed charging, smart panels, circuit sharing, and technologies that might enable houses to manage on a lower power load. Mr. Abendschein replied that efficient electrification included all strategies to electrify your home with a smaller electric footprint, such as smart panels, circuit pausers, circuit sharers, and 120-volt water heaters and other efficient appliances.

Besides 2A, 2B, and 2C, Commissioner Tucher inquired if other studies had been performed or will be performed. Mr. Abendschein responded that studies had been performed that focused on supply cost, the cost/benefit of demand response, and a decade ago a study was done on energy storage.

Commissioner Tucher could not find any mention of Burns-McDonnell or Buro Happold in the meeting packets for September of 2024 or December of 2023. Mr. Abendschein replied that when staff spoke to the UAC in September, the consultants could not be named because the final contracts had not been negotiated. Mr. Abendschein offered to send Commissioner Tucher the staff report for Council's contract adoption. Commissioner Tucher declined but asked staff to keep in mind the UAC's perspective when sending the commission packet. For example, the UAC did not know who was Buro Happold and Burns-McDonnell.

Reliability and resiliency had six strategies. Commissioner Tucher wanted to know which strategy we were in. Mr. Abendschein explained that today's discussion was about Strategies 4 and 5. Strategies 1 and 2 were focused mostly on grid modernization but included traditional utility approaches to improving reliability and resiliency. Strategy 3 was reducing barriers to voluntary adoption of these technologies. Strategy 4 was the cost/benefit analysis. Strategy 5 was identifying potential programs. Strategy 6 was program implementation, if staff received direction to do so.

Commissioner Gupta stated he was informally working with Commissioner Metz on disaster preparedness and resiliency, so their work might have some crossover with this topic. Mr. Abendschein stated it was helpful to share. The resiliency part of the cost/benefit study was primarily focused on shorter-term outages and the hope was to learn more about longer-term outages in the microgrid study.

Commissioner Croft asked whether staff had looked at all the grids in Palo Alto, such as energy generators and arrays on schools. Commissioner Croft looked on Google Maps to see which companies or buildings had big solar arrays. Commissioner Croft inquired if there had been any consideration to negotiating with the owners of those arrays to have them be a backup source of energy to the City or perhaps connected to storage as part of the resiliency plan. Mr. Abendschein made note of Commissioner Croft's comment for staff to consider.

ITEM 2A: DISCUSSION: Supply and Resiliency Cost/Benefit Analysis and Program Ideas

Jonathan Abendschein, Assistant Director of Climate Action, directed the UAC's attention to Slide 7, the Buro Happold study. Julian Parsley is the Project Principal for Buro Happold, a global engineering and advisory firm that had expertise in the energy sector and resilience.

Commissioner Tucher asked how long staff had been working with Buro Happold. Mr. Abendschein replied it was the first time the UAC was hearing from Buro Happold but their scope was discussed with the UAC in September. Buro Happold had done some of this work for other agencies in the region, including Silicon Valley Clean Energy.

Fernando Miramontes, Senior Engineer with Alternative Energy Systems Consulting (AESC), led the development of the avoided supply cost model he will be discussing. Mr. Abendschein clarified that AESC was a subcontractor to Buro Happold. Fernando Miramontes stated that AESC was founded in 1994 in California and worked on avoided supply costs and emerging technology studies for the majority of the IOUs and POUs throughout the state and various other utilities throughout the United States. AESC was supporting the Buro Happold team in the quantitative analysis. Part 1 was development of an avoided supply cost model to determine quantitative benefits of various technologies to help inform program development. The supply cost reduction benefits methodology modeled the cost of energy on a monthly and hourly basis per year to determine avoided supply cost for each technology under consideration and forecasted to lifetime, as well as cost-effective metrics from the perspectives of the Utility and participants. The charts show the benefits, not the cost of the distributed technology.

The methodology was an hourly approach based on data received from Palo Alto on the cost of energy delivered per megawatt hour for various hours throughout the year. The goal was to develop a net present value of avoided costs to the Utility. The statewide program, PG&E, SCE, and SDG&E used a statewide avoided cost model but there was some disparity in the value of energy across the different utilities, so a specific model was developed for Palo Alto to evaluate technologies. The disparity between the statewide model and Palo Alto was due to how capacity and transmission were handled by CPAU. The Palo Alto avoided costs model and statewide model were shown, which showed spikes during 4-9 PM.

Mr. Abendschein mentioned that direct avoided costs in Palo Alto were different from the benefits the State saw in the statewide model. There was a California-wide societal benefit to these technologies that may not be realizable financially in Palo Alto.

Commissioner Metz asked about capacity cost, RA cost, and other CPAU costs. Mr. Miramontes replied that the cost per megawatt hour encompassed transmission and distribution but he thought the RA was built in. Mr. Miramontes offered to follow up with the exact parameters included. Commissioner Metz was interested in the financial cost beyond the kilowatt hour energy cost and the benefits beyond financial benefits. Mr. Abendschein explained that supply costs included energy costs and a renewable energy dimension, a greenhouse gas cost, losses, as well as transmission, distribution, and generating capacity, which were costs based on needing to meet a peak. Transmission was charged to Palo Alto on a kilowatt hour basis and spread across the year, so the summer peak was not as steep as the statewide model. Palo Alto buys generating capacity that other utilities do not need. Palo Alto does not build and own large, new generators. Other utilities may put the cost of new generation into their peak capacity value; however, that is not an economic value we can realize in Palo Alto. Statewide, the zero value on the chart due to new generation was hours of solar over-generation. The City's avoided cost model did not show a zero cost because we pay to transmit energy and transmission is on an hourly basis.

Commissioner Phillips inquired if it was possible to arbitrage, which would also capture some of the social value. Mr. Abendschein will get back to Commissioner Phillips with a response. Shiva Swaminathan, Senior Resource Planner, explained the disparity was primarily driven by transmission constraints and the State needing to invest in transmission. Transmission capacity was embedded into an easy-to-model framework but energy arbitrage was on an energy basis. You cannot arbitrage capacity in the market. The difference was due to transmission and generation capacity, not the energy component alone. Adding generation capacity through technologies could avoid Utility costs. Palo Alto sells surplus generation into the market to make money but has to buy from the market at a higher price when we are short. The capacity was a transparent market. Mr. Abendschein remarked that the State's valuation model looked at the cost of building a new transmission line or generator, which was more costly than the market value of capacity. Almost never was the price of building a new transmission line or generator reflected in the market, so it made arbitrage difficult. Mr. Swaminathan agreed with Mr. Abendschein's explanation and added that the modeled results were for 2025, 2030, 2035, 2040, and 2045, which included new capacity needing to come online.

Vice Chair Mauter asked if it was the marginal cost of acquiring a new unit. Mr. Abendschein answered yes for the long-term marginal cost, although the marginal price was not always reflected in the market. Vice Chair Mauter thought it might help for the Commission to know that this did not include local distribution avoided cost. For example, there could be a citywide variation in costs for a microgrid. Mr. Abendschein agreed and stated that the set of studies would capture supply, distribution, and resiliency benefits.

Commissioner Croft queried what was the difference between 2025 and 2030, and if batteries coming online would reduce the statewide peak. Mr. Abendschein replied that the disparity would remain but would probably change. Mr. Miramontes remarked that in the 2035 and 2040 models, the peaks tended to shift further toward nighttime hours likely due to more EV

charging on the grid, so the pricing reflected additional demand. Different load shapes were presented in the forecasted years. The modeling process incorporated technologies when reflecting the current and future state of the grid and pricing structure. Mr. Abendschein asked whether the divergence between the Palo Alto and statewide models narrowed, widened, or stayed about the same. Mr. Miramontes thought it stayed about the same. Commissioner Metz commented that Palo Alto had a diurnal load profile that peaked earlier in the day than other parts of the state on average. Palo Alto could sell energy. Mr. Abendschein stated that Palo Alto had generation from hydro to put into evening hours.

Commissioner Tucher wanted to know the takeaway from Slide 11 on avoided costs and why there was a difference between the Palo Alto model and the statewide model. Mr. Abendschein replied that the takeaway for the UAC as policymakers was that there were technologies that had value for the State grid that Palo Alto could not monetize because of the market was structured to charge transmission on every kilowatt hour we bring in. Palo Alto does not build transmission lines or generators and is therefore unable to avoid those costs. The cost/benefit may show a benefit for Palo Alto but a greater benefit for the statewide grid, so the question will be if you want to run these programs or promote these technologies based on additional statewide benefit even if Palo Alto cannot realize it monetarily. The differences between Palo Alto and the statewide model were transmission and generation. When the State considers the value of technologies, they take into consideration that those technologies could avoid the costs of needing to build a new generator or transmission line. Commissioner Tucher pointed out that Palo Alto will spend half a billion dollars on grid modernization and maybe this discussion about technologies will allow us to spend less or spend better. Mr. Abendschein mentioned that will be talked about in Item 2C.

Commissioner Gupta wondered if Palo Alto could use the study results as an opportunity to ask the State for funding to build some of these things in Palo Alto because of the avoided costs at a statewide level. Mr. Abendschein acknowledged the suggestion and maybe will address it when staff comes back to the UAC.

Commissioner Gupta wanted to know what software was used to build this model. Mr. Miramontes replied it was an Excel-based model using the Utility's data for cost per megawatt hour. For each of the technologies, expected performance was simulated. For example, the nominal capacity was set for battery energy storage, charge and discharge duration, and charge and discharge timing, which was then overlaid onto the cost per megawatt hour. The cost savings from 4 PM onward was captured and called the avoided supply cost/benefit for the technology.

Chair Scharff asked if Palo Alto should advocate for a restructuring of market pricing and if it would benefit all of California. Mr. Abendschein mentioned that the current market structure provided advantages in costs. Mr. Abendschein recommended that the Utilities Director discuss Chair Scharff's idea as a policy question with the NCPA to get more clarity on NCPA's posture. The relationship between NCPA members and CAISO was a very complex arrangement.

On a scale from 1 to 10, Commissioner Gupta wanted to know the confidence level on the assumptions made about costs, which would be helpful for the Commission to keep in mind when assessing the benefits of these technologies at a later stage. Mr. Abendschein stated that all inputs were reviewed, staff provided a lot of the inputs, and these were the best estimates but there was always uncertainty. A change in market conditions could change the cost/benefit assessment. Because of uncertainty, the quantitative analysis was not meant to be the only consideration when deciding whether to run these programs.

Commissioner Croft observed it was only August that Palo Alto was very different than the statewide model. Other than August, Palo Alto was a little higher throughout the entire day in avoided costs. It looked compelling to avoid high costs in the evening hours. Commissioner Croft requested an explanation on how using these methods to avoid costs benefited the State rather than the City. Mr. Abendschein said the State had an additional benefit of avoiding costs to build new generators or transmission lines, which Palo Alto does not build and therefore does not monetize on avoiding those costs. There is value to the City but not as high as the statewide model. When looking at studies or analyses done by other agencies, they might look at it differently because they are looking at the statewide model.

Commissioner Tucher asked for an example of avoided cost for a specific technology. Mr. Abendschein explained that if a utility-scale solar and storage system was installed in Palo Alto, it generated solar energy in Palo Alto, and so it avoided paying the transmission cost to bring power in from the outside. Using the storage system during summer peak hours reduced the overall system peak, resulting in a lower obligation to buy capacity, thus saving the City money. Commissioner Tucher thought that if the City used massive batteries as much as possible, then perhaps the transformer or substation did not need to be upgraded. Mr. Abendschein stated that was not part of the discussion. Alan Kurotori, Utilities Chief Operating Officer, said that today's discussion included the airport microgrid, solar and a battery component.

Commissioner Tucher wanted an example of resiliency threats the Commission should think about as they listen to this presentation, such as an airplane flying into the transmission wires, a big earthquake, or too many 400-amp panels in one neighborhood impacting a few transformers. Mr. Abendschein will come back to this question after the next part of the Buro Happold presentation.

Nathaniel Gundersen from Buro Happold presented Part 2 on Resilience Benefits. Resilience considerations continue to evolve with more frequent and severe climate hazards, rising EV adoption, and building electrification. Buro Happold conducted a literature review of authoritative sources, including the National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, and others. Buro Happold established a methodology to evaluate resilience benefits, which was used to identify and evaluate quantitative and qualitative costs for selected technologies. Those metrics were used to develop and quantify the economic impacts based on potential outage patterns. Resilience included reliability. Reliability referred to outages under routine uncertainty with a duration of seconds to hours, and often the scale of impact involved neighborhoods, facilities, and/or campuses. Resilience within the power

sector referred to low-probability, high-consequence, disruptive impacts with a duration of hours to months, often had a much wider scale of regional or statewide impact, and often had cascading impacts in other parts of the economy. For this study, the scope was focused on outages in the range of two to eight hours, and the technologies typically provided outage prevention within 24 hours.

Valuing resilience was the avoided outage costs incurred when a customer loses power. Defined in terms of human impact, how much the risk reduction was worth relative to other solutions considered within this study. Some metrics commonly used included loss of utility revenue, cost of grid damages occurring from a natural hazard causing an outage, cost of recovery, residential and commercial interruption costs, as well as loss of assets and perishables. To quantify resilience, numbers were applied to the amount of risk reduction a given measure achieved and the cost. Resilience metrics were being further developed as this study continues, including customer outage time, the amount of load not served, and the time to recovery.

The methodology used for resilience benefits was defined by the outage duration. This study focused on technologies providing backup power for short-duration outages of less than 24 hours. These were measured through stated preference surveys of residential customers, customer damage functions (determining outage costs to commercial and industrial customers), value of lost load, and loss of load probability. To measure the impacts of long-duration outages of more than 24 hours required a more complicated analysis involving econometric models such as input-output models and computable general equilibrium models. Mr. Abendschein mentioned he was told by Buro Happold there were multiple models that could estimate the impacts of short-duration outages; however, long-duration, multi-week outages had to model the entire local economy, which was a more complex analysis and out of the scope of this study.

Buro Happold was looking at the value of resilience as the present value of avoided costs from technologies and investments as well as its ability to avoid disruptive events. The Interruption Cost Estimator (ICE) developed by the National Renewable Energy Laboratory was based on aggregated customer survey data between 1989 and 2012. ICE was used for this study to estimate costs in numerous hypothetical outage scenarios and characteristics, including duration, time of day, and cause of outage. The resulting dataset was comprised of over 105,000 observations. The accuracy and relevance to the regional context was useful. The customer damage functions and parameters were adapted to Palo Alto, including the median household income, the reliability metrics the Utility has reported for the past several years, the typical outage time, as well as the mix of industrial and commercial customers. The outputs provided weighted averages of customer interruption cost for residential as well as small, medium, and large commercial industrial customers. If an outage was avoided through a particular technology and/or program, these provide metrics per event or per kilowatt hour that we apply and integrate into the cost/benefit analysis. ICE was constantly maintained and updated. An update was scheduled for release in early 2025 with new responses that will

improve data accuracy. Depending on when it is released, Buro Happold can easily update it in their model.

Mr. Abendschein wanted to clarify that the customer damage function estimate was the economic cost of things such as damaged equipment, lost perishables, lost productivity based on customer surveys, and lost business because you cannot run a credit card. Mr. Abendschein was seeking Commission feedback on whether this resiliency framework adequately reflected the quantitative and qualitative costs and benefits of deploying these technologies.

Commissioner Tucher asked if staff thought the resiliency framework reflected the benefits they were looking for. Mr. Abendschein believed the ICE model reflected the value of reliability and resiliency. An individual customer may value reliability or resiliency significantly higher than the ICE model may output, which is why the final report will include a qualitative assessment, such as groups of customers with medical conditions who have a higher need.

Chair Scharff wanted to know where the data was coming from. Mr. Abendschein explained that the value of resilience was obtained through information from a survey performed across the western states and the data was applied to Palo Alto. Part of the baseline was a range based on SAIDI and SAIFI metrics over the past several years of the average amount of time a customer experienced outages. Palo Alto had relatively low outage experiences, so it will be a relatively low benefit. In an outage up to 24 hours, the benefit was expanded if a customer added a battery because they were able to avoid all outages and reap the benefits from that technology. Avoided outage costs were based on Palo Alto data, how much a given technology enabled a customer to avoid outage losses, and incorporated to determine the multiplier. Mr. Gundersen added that it was also based on a residential customer's kilowatt hour consumption over a period of time, whereas a different consumption and usage level would apply to a commercial customer, so it was based on time and consumption.

Commissioner Phillips supported this approach. As quickly as possible, Commissioner Phillips wanted to see the annual economic cost of outages experienced in Palo Alto when applying this methodology to the last five years, which could be used as a benchmarking number to help determine what the City should potentially be investing in the future. Commissioner Phillips trusted what will be done on the supply side but for valuation it depended on how well it was calibrated to Palo Alto. For example, data centers have backup, so their business is not interrupted.

Mr. Gundersen did not want to fully disclose the costs because the numbers were still in development; however, he could share that the total cost when considering residential and commercial was into the millions. Mr. Abendschein stated the outage data was specific to Palo Alto. Mr. Gundersen explained that the survey results were tailored to the outage statistics and the total number of customers but it did not allow for adjustment based on the specific type of industries, so he thought it captured some but not all the nuances of Palo Alto's technology-heavy economy or data centers. Buro Happold was using the data and tools available to them;

however, the data in the current model was not recent. Commissioner Phillips asked for a list of what was included, such as if median income was split between residential and commercial.

Commissioner Gupta wondered whether this study was felt to overestimate or underestimate Palo Alto, and how was this study updated to 2023 dollars. Mr. Abendschein asked Mr. Gundersen that when he mentioned regional context, what granularity of region was the ICE model. Mr. Gundersen stated the ICE model granularity was at the California state level. Mr. Abendschein asked Mr. Gundersen when thinking about California industry business demographics versus Palo Alto, if he had an instinct about what that difference might be or did this need to be addressed when they come back to the UAC. Mr. Gundersen did not want to speculate but he could look into whether this study overestimated or underestimated Palo Alto.

Vice Chair Mauter believed the study was fine methodologically but acknowledged the challenging data limitations, data availability, and precision in adapting old surveys to Palo Alto in 2025. Vice Chair Mauter wanted to ensure that uncertainty was communicated to the UAC alongside the results. Because a lot of the implementation of these technologies will happen over a 20-year period, there needed to be an understanding of how those technologies were trending in benefits and costs. Vice Chair Mauter asked if it was recommended to cautiously interpret certain elements of this benefit/cost analysis given the trends in prices, outages, and maintenance costs that would substantively shift the balance of cost and benefits. Mr. Gundersen explained that this assessment considered things over the investment lifetime. At this stage of the analysis, Buro Happold had not incorporated or determined what those trends might be for the value of resilience. There was a lot of uncertainty in the projected trends for potential hazards or other utility characteristics that influence the cost a customer assigns to an avoided outage. With increasing climate-related hazards, those costs could potentially increase.

Vice Chair Mauter commented that it was important to apply the trend of prices and price spread from hour to hour and month to month to this study and the previous analysis of the grid, and that the model be revisited in the future. Mr. Abendschein knew there was uncertainty but they had expectations on what would happen in coming years to supply costs because of projections about generation and transmission being built and it could be modeled to see how it would affect prices over time. Mr. Miramontes agreed. Mr. Abendschein acknowledged there was less clarity on how outage damages will increase as the climate changes, and it needed to be noted what they were not capturing in the models. Mr. Abendschein was not intending the cost/benefit or quantitative results to be completely aligned with the decision.

Commissioner Gupta asked if staff was seeking the UAC's feedback on qualitative benefits now. Mr. Abendschein replied that work was not far enough along to share; however, staff was interested to hear tonight from commissioners about qualitative benefits they wanted to ensure staff took into account. Commissioner Tucher asked for an example of a qualitative benefit. Commissioner Gupta thought some qualitative benefits were security, safety, and peace of mind. Mr. Abendschein stated there were psychological and emotional benefits. Programs may be considered that were focused on people with medical issues who may have a

much higher value of resiliency. Chair Scharff commented some qualitative benefits were comfort, the ability to take a shower and flush your toilet if you do not have electricity.

Commissioner Tucher inquired about the process for thinking about qualitative benefits such as psychological and safety benefits. Mr. Abendschein thought the UAC could keep psychological benefits in mind when looking at programs and considering the community's needs, for example seeing a need to reassure the community that is electrifying might be taken into account in the decision-making process. Mr. Parsley described qualitative benefits as the ones we cannot put a dollar value to but we want to recognize. Buro Happold will have more information on how to frame this when they come back to the UAC.

Commissioner Croft asked how the locality of the outage and the ability of the technology to address that outage were included in the avoided outage calculation. For example, some technologies kick in the instance the PG&E line is down. Other technologies do not help if a transformer blows and there is an outage in a small area. Vehicle to home only helps someone in their home. Mr. Abendschein referred to Slide 5 and asked Mr. Gundersen how he factored in the characteristics of each technology when valuing the reliability of benefits using the ICE model. Mr. Gundersen responded that it depended on the technology. As Buro Happold builds different program designs, it depended on its integration to the grid. For vehicle to home, if a transformer blows and an outage occurs, their vehicle can run power for their home, so Buro Happold would assign those costs but they cannot estimate what it would look like at a local level particularly because as they design the program they were making assumptions on how many people might use each technology, so there were a lot of variables. If electricity was lost, Mr. Abendschein stated that the four technologies listed on Slide 5 would provide some resiliency benefit for a number of hours depending on the load, and those benefits applied regardless of the locality of the outage.

Commissioner Croft wanted to know which technologies on the list were utility scale and which were residential scale. Mr. Abendschein replied that all the technologies on Slide 5 were residential scale. We will learn more about utility-scale technology with the microgrid study. Chair Scharff pointed out that 85 percent of our load was commercial whereas the technologies to be studied were only going to affect residential. Mr. Abendschein clarified that most of those technologies were applicable to residential and commercial with the exception of vehicle to home because you cannot run a business off electric vehicles. Solar and storage, demand response, time-of-use rates, and thermal storage can be used at multiple scales.

On Slide 13, Packet Page 39, the definition of resilience was preparing for absorbing, adapting to, and recovering from low-probability, high-consequence disruptive events of duration of hours, days, to months. Slide 15 noted that this study was only addressing short-duration events of less than 24 hours. Commissioner Metz stated it was important for this analysis to address resilience longer than 24 hours. Commissioner Metz thought this study only considered financial benefits. This study did not address other quantitative impacts such as emergency preparedness, reducing death and injury, sustainability, and CO2 emissions. Commissioner Metz reviewed some of Buro Happold's C40 studies on clean construction and was impressed.

The C40 studies were quantitative but addressed financial and sustainability impacts. Commissioner Metz recommended evaluating resilience using a scenario approach starting with business as usual, a normal interruption from minutes or hours, and an emergency such as an earthquake with days or weeks of disruptive interruption. The analysis of emergencies needed to be coordinated with the Office of Emergency Services (OES). Commissioner Metz and Commissioner Gupta had some discussions with Ken Dueker and other folks at the OES. The OES had strong and well-informed opinions about design emergencies we should be preparing for and Commissioner Metz did not see those reflected in this study. Commissioner Metz believed it was important for CPAU and the City to coordinate its definition of and preparation for an emergency with the OES.

To address longer-term, more severe events, Commissioner Metz felt it was important to have a second transmission line. As a result of having a single line, Palo Alto experienced a disruption caused by an airplane. Mr. Abendschein acknowledged Commissioner Metz's comment; however, the analysis for multi-week outages used econometric modeling and was beyond the scope of the consultant's contract. Chair Scharff did not support going forward on a multi-week outage analysis now because it required a new scope of work, perhaps had to be rebid, and staff had to get money from Council; however, at a later stage it could be decided if it was worth the money. Chair Scharff was aware that staff has looked into an additional transmission line since at least since 2010. Chair Scharff stated that if staff can figure out how to do a second line, it will be done. Commissioner Metz did not think an econometric model was needed to analyze an earthquake with a multi-week disruption because a study could be done with the OES's Assets at Risk model.

Mr. Abendschein was aware that people want to prepare for a multi-week outage, so this study will explain what somebody needs to do in an electrified home or a mixed-fuel home to last through an outage during a major event but it will not be factored into a cost/benefit analysis. By providing that information, it could be taken into account as a qualitative factor in addition to the quantified supply cost, distribution cost, and short-term outage cost/benefits. For short-duration events, Commissioner Metz stated that the value of technologies was in providing resilience but the economic value was not great, which was another reason it was important to consider more severe events.

Commissioner Tucher inquired if the RRSP included another study or scope of work about longer-duration outages. Chair Scharff assumed if staff wanted to do a study, they would put it on consent and go to Council. Mr. Abendschein stated there was some discussion of longer-duration outages but it was not a primary focus of the RRSP and they would not do a cost/benefit. Longer-duration outages can be thought about in the context of the microgrid discussion in Item 2B.

Commissioner Tucher thought it was embarrassing to introduce the CPAU RRSP and it not talk about a multi-day earthquake plan. Kiely Nose, Interim Utilities Director, did not have an answer today but staff will think it through. Ms. Nose acknowledged that resilience was defined

as low probability and the strategic plan was called Reliability and Resiliency yet it would not study resilience in that context.

Chair Scharff was in Palo Alto during the 1989 earthquake and remembered seeing a powerline sparking on the street in front of his house and the power was out. Chair Scharff's recollection was that the outage was under control in about a day. Commissioner Phillips pointed out that catastrophic events and weeklong outages needed to be thought about differently. Half the power poles in the city may be gone in an earthquake, which was a different problem.

Commissioner Croft asked if the majority of the short-duration outages we were trying to address were within our system versus PG&E, and if we should we have utility-scale solutions for avoided cost that have a resiliency element such as storage where you can provide a certain number of hours of supply. Mr. Abendschein replied that the microgrid study would give some exposure but there were more strategies. Mr. Kurotori remarked that looking at solar and storage had come up in the past and it made more sense if you had large solar in Palo Alto but we were constrained. Infrastructure was part of the first phase of the Resiliency Plan, so analysis could be done on utility-scale storage at some of our substations, how we can benefit in resource adequacy and bring down some peaks. The Resiliency Plan talked about a second transmission line, upgrading infrastructure, and increasing capacity. Reliability was embedded in infrastructure investments, such as increasing our facility size, having redundancies in the system, and performing upgrades. Commissioner Croft was uncertain how much it will help if almost all the outages were local. Mr. Abendschein explained that with substation-level storage, the locality of where the outage occurred on the feeder was important, which was a different analysis requiring engineering time and effort. This analysis focused on individual households. Commissioner Croft asked if the data inputs for this study took into consideration the characteristics of our outages. Mr. Abendschein answered yes; it was based on Palo Alto's outage data.

Mr. Parsley commented that the focus today was on the two biggest pieces of the analytical work feeding into this study. As Buro Happold builds out the program and technology options, there were broader quantitative and qualitative benefits they will assess and inform on the pros and cons of the various technologies and programs.

Grace Callahan with AESC spoke about Part 3, Preliminary Program Research. The research included energy programs across the country with a focus on resilient technologies such as battery storage, vehicle to home, enabling technologies, and resilience hub. Slide 21 showed a list of programs in California and by California POU peers. A pilot was identified as a program or project of a limited duration or budget and intended mostly to demonstrate a program or technology concept. Programs included offerings that provided a financial incentive, service, or product to customers and were recurring or considered part of a standard offering from the funder. Policies encompassed policies or rate plans that increased access to enabling technologies such as time-of-use rate structures for EV owners or the installation of a meter socket adapter. The most common offerings were battery storage programs and EV time-of-use rate structures. Solar plus storage, managed EV charging, and resilience hub programs were

found across the state. Programs with a component for Disadvantaged Communities (DACs) were denoted, such as higher incentive rates for low-income customers or customers residing in a DAC-designated area. The most common amongst Palo Alto's peers was battery programs. This research will be used to inform program design.

Mr. Abendschein asked the Commission if there were programs they wanted to include in the research. Commissioner Metz suggested looking at Hawaii because they had the most experience with local-generation technologies.

Commissioner Gupta needed more time to study this before suggesting programs or technologies to staff. Commissioner Gupta asked if the Commission could be provided the list of programs on Slide 21. Mr. Abendschein will get back to Commissioner Gupta on his request.

Regarding Slide 21, Commissioner Gupta was interested in what staff thought were the most effective things being deployed in California. Mr. Abendschein stated they will look at the extent of which some of these programs were deployed for specific circumstances, such as for communities in the wildland-urban interface facing public safety power shutoffs. Commissioner Tucher emphasized it was important to see what was effective, not what was popular.

ACTION: None.

The UAC took a break at 8:32 PM and reconvened at 8:43 PM.

ITEM 2B: DISCUSSION: Airport Microgrid (Burns McDonnell)

Jonathan Abendschein, Assistant Director of Climate Action, stated that airport staff initiated this study. Burns McDonnell was an airport consultant and had a microgrid practice. The airport had a sustainability plan. The focus of this study was how much solar and storage can fit at the airport. Airports cannot have equipment that cause glare. Burns McDonnell was doing glare studies as well as developing plans and layouts to file with the FAA to allow solar installation. Learnings from this study will help in evaluating future opportunities for microgrids on City-owned facilities. People have raised the idea of a microgrid at Cubberley.

Three critical load scenarios were modeled under two outage types. Scenario 1 was the airport. Scenario 2 was the airport plus Regional Water Quality Control Plant (RWQCP). Scenario 3 was the airport plus EV charging hub with ten Level 3 chargers. The scenarios were each modeled in September and December. There was less solar generation in winter, so you can power less of a load or power it for a shorter time. Scenario 1 was modeled in Outage Type 1 as a six-hour September outage and Outage Type 2 was a three-day September outage. Scenario 2 was modeled in Outage Type 1 as a September outage of three days for the airport and six hours for the RWQCP, Outage Type 2 was a December outage of three days for the airport and six hours for the RWQCP. Scenario 3 was modeled in Outage Type 1 as a three-day September outage for

the airport and 200 vehicles/day, Outage Type 2 was a three-day December outage for the airport and 200 vehicles/day.

There was capacity in the contract to model a third outage type, which had not been decided on but staff anticipated it would be a longer-term outage of at least a week. Staff was seeking the UAC's feedback on these scenarios and if these would advance our understanding of microgrids enough to evaluate future opportunities. Staff thought it covered a reasonable range of scenarios.

Commissioner Phillips asked what the output was. Mr. Abendschein answered that the output was how much equipment was needed to manage an outage duration as designated in Outage Type 1 or 2 based on nine different sizes.

Since most of the benefits were accrued on a daily basis, Vice Chair Mauter asked how other benefits such as reliability and resiliency were being accounting for. Mr. Abendschein responded that the reliability and resiliency benefits from the daily operation of a microgrid were factored into how much the microgrid costs you to own and operate as part of this study. Vice Chair Mauter suggested that it be made clear that this study was looking at reliability and resiliency and maybe it was important to choose a size that balanced both. Mr. Abendschein was interested in hearing Vice Chair Mauter's opinions offline on how to perform the analysis on the RWQCP integration.

Commissioner Croft asked if Outage Type 1 for Scenario 2 was a September outage of three days at the airport plus six hours at the RWQCP or if it was either/or. Mr. Abendschein replied it was the combination of the airport and RWQCP. Because of the RWQCP's large load, you were only able to run it for a few hours before switching to diesel generators in order to preserve enough energy for the airport to run for the rest of the time. Commissioner Croft asked if the airport did not have diesel generators or if the airport needed three days. Mr. Abendschein did not know whether the airport had diesel generators, and if the airport had diesel generators if this would replace diesel or diesel would be used to run for a longer period.

Chair Scharff asked why September and December were chosen. Mr. Abendschein responded that the strongest solar output was in September and the weakest was in December.

Commissioner Tucher inquired if the RWQCP was an ideal candidate for a microgrid because it seemed like a great idea to deploy something that would save money for a City fixture. Mr. Abendschein stated this was the easiest place to do this analysis and gain experience whereas other City facilities such as Cubberley might have some barriers.

Chair Scharff noted that this would save the RWQCP money but cost the Utility money because the Utility was not charging the RWQCP. The RWQCP had non-Palo Alto partners, so Chair Scharff wondered if this study would analyze what was best for the City. It was a regional plant. If we have less load in our Utility and we are not using electricity, then Chair Scharff assumed it was a financial negative, so he would like to see that analyzed. Mr. Abendschein explained this

could be done as a behind-the-meter system, which he did not think was common when crossing parcels, so a Utility Power Purchase Agreement (PPA) was probably more appropriate for crossing parcels. Commissioner Tucher asked if staff was contemplating going to a partner or customer and saying the City wanted to install a microgrid for you. Mr. Abendschein stated that in Commissioner Tucher's scenario it would be used fulfill part of the City's energy portfolio.

Alan Kurotori, Utilities Chief Operating Officer, explained that this study was looking at a City facility, the airport. The RWQCP was owned by the City but had partners with other entities. From the study will come some of the financials behind it. A PPA and a battery with storage in front of the meter or behind the meter were options that will come from this study and the outputs will help determine next steps. Commissioner Tucher inquired if there was a budget for this study to spend six figures on battery deployment. Mr. Abendschein replied that the budget was for analysis only and then a decision could be made about moving forward with a system.

Commissioner Gupta asked if this study was limited to the airport and RWQCP or would it study microgrids in general or microgrids for residences, industrial, or enterprise functions. Mr. Abendschein explained this was starting with the simplest type of large-scale industrial microgrid. A residential neighborhood-scale microgrid was the most complex. An intermediate microgrid analysis would involve looking at other City facilities contained within a single parcel, although there was no City facility where there was certainty on it being appropriate for a microgrid study now; however, Cubberley was most likely coming soon. Commissioner Tucher questioned why it was necessary to do a study before deploying microgrids when staff could talk to anyone who had built microgrids on campuses and in commercial, residential, and municipal settings. Mr. Abendschein did not think a cost/benefit on microgrids in Palo Alto was done previously, which was necessary because Palo Alto's cost profile had costs, benefits, rates, and demographics that differed from other locations. Most of the microgrids deployed in California were in the wildland-urban interface where the ability to run critical facilities was important when the community experienced public safety power shutoffs, not in a suburban context such as Palo Alto. Microgrids on campuses were running cogeneration.

In reply to Commissioner Phillips asking if this was a solar and battery microgrid, Mr. Abendschein answered yes. Commissioner Phillips inquired if the economics were mostly driven by the resiliency effect, the City will build it, it will displace other generated energy, and there will probably be a surplus at times that can potentially be sold. Mr. Abendschein agreed that most of the economic value was related to the day-to-day operation and the resiliency drives the configuration.

Chair Scharff thought the resiliency portion was minor. Chair Scharff wondered if this made sense without a resiliency aspect; if not, it probably should not be done. Commissioner Phillips assumed the RWQCP had substantial backup generation, so it may not increase overall resiliency much. Mr. Abendschein remarked that microgrids replace a diesel generator. Qualitatively, the value was in displacing diesel fuel that can become scarce during a major

outage and being able to run critical loads for a longer period. Mr. Abendschein stated he was told by Shiva Swaminathan that the airport did not have backup generation.

Commissioner Croft believed the value was primarily in having locally generated power and storage. Because the RWQCP had a backup generator, Commissioner Croft viewed Scenario 3 as the most important for resiliency to have the ability to charge 200 vehicles per day in the event of an outage and it could be used to charge City EV vehicles. Commissioner Croft did not know how critical the airport was but vehicles seemed more important to her than the RWQCP.

For resiliency, Chair Scharff wanted staff to think about how much more cost effective it was for charging stations to have solar without a battery because the battery was an expensive component. In an emergency, you can charge when the sun is up and it will help people the most. Chair Scharff asked if much was gained by making a microgrid with storage. You do not need to charge cars 24 hours a day. Solar panels could run EV chargers throughout the City. Garages with solar panels could have solar-powered emergency chargers installed. Otherwise, Chair Scharff wondered how people can charge their cars citywide in an outage. Mr. Abendschein believed Chair Scharff made an interesting point and it might be something the UAC could ask to be modeled in Scenario 3. Chair Scharff advised staff that if they know the community perception was wrong about something, it was important for staff to say to Council and the UAC that we are the technical experts and the community perception was wrong for these reasons, or we think the community perception is wrong and this study will likely show it is wrong.

Commissioner Tucher asked if there was an incorrect community perception that solar and storage was effective and needed to be deployed more. Chair Scharff stated it was for resiliency as opposed to creating energy. Mr. Abendschein had periodically heard advocacy for microgrids under the assumption they were unambiguous cost/benefit positive. This study will be helpful in understanding when that may be true and what the qualitative dimensions were that might make it work in one location versus another. Commissioner Tucher questioned if the Utility staff or the Council had a position, strategy, or commitment on microgrids. Mr. Abendschein did not think there was a position, which was why they were exploring microgrids. Mr. Kurotori stated CPAU's focus was to provide energy and services to all customers. Microgrids typically were discussed in wildland-urban interface areas that had a higher frequency or concern about energy supply. When looking at potential uses of cleaner energy and storage, there were opportunities for resiliency hubs in strategic locations such as Cubberley, places outside of homes where residents can charge their vehicles maybe through a combination of solar and storage. In the past, the potential for the airport, the RWQCP, and EV charging was brought up and staff wanted to know if the UAC thought this should be studied. Smaller airports in more rural areas of Northern California on the coast have done microgrids, so that information can be used in this study if the analysis fit Palo Alto's unique aspects.

Commissioner Tucher asked what was the definition of a microgrid, how many microgrids were in Palo Alto; and if Stanford Hospital, Stanford University, and/or a house with solar and a Powerwall were microgrids. Commissioner Tucher felt it was important for CPAU to be very

clear on their position on microgrids. Mr. Abendschein replied that a microgrid was a combination of generation and loads that can run off-grid for some period of time. One house, a small commercial building, and a campus can be run as a microgrid but Stanford University was not. Mr. Abendschein thought there were maybe one or two microgrids in Palo Alto but he was not aware of campuses or large facilities in Palo Alto being run as microgrids. Customers can have a microgrid but CPAU had connection rules and regulations. CPAU did not have a position for or against microgrids.

Commissioner Tucher wanted a study on all the scenarios but he questioned how costly it was to do a study. Mr. Abendschein responded that they had the budget to do this study on all three scenarios. The question to the UAC was if these were the right three scenarios.

Chair Scharff wondered why the airport was being studied for a microgrid instead of the new Public Safety Building that was a critical infrastructure. Mr. Abendschein replied that staff did want to look at those types of facilities but the airport was presented as a more viable platform to examine some of the issues. The ratio of the generation to load density was similar to industrial sites, so we will learn things from this study that gives us the ability to examine those types of buildings.

Commissioner Phillips stated that microgrids did not make sense as a primary source of power without taking the reliability benefit into account. If it was economic to do, the City should build multiple microgrids with solar plus storage, detach from PG&E, and not have transmission. Commissioner Metz recalled CPAU studied it multiple times but it was not feasible.

Commissioner Metz thought December was great to model. September was a shoulder month for solar, so if the intent was to select a solar peak it would be June or July. Shiva Swaminathan, Senior Resource Planner, said they did not want to pick a peak month, so September was chosen because it was in the middle.

For Outage Type 3, Commissioner Metz suggested modeling a longer-duration outage with throttling down of the operation, which was typically done in emergencies. For example, hospitals typically operate only the most important loads, so it is a much lower energy use. Mr. Abendschein made note of Commissioner Metz's advice.

Commissioner Phillips inquired what the base economics were if there were no outages, and how many outages of what duration would make it economical. Mr. Swaminathan replied there was no feasible way to answer Commissioner Phillips's question because it was similar to the value of insurance but you can have a cost/benefit assessment for insurance. Chair Scharff stated there was the benefit of capacity and energy. Mr. Swaminathan mentioned the standby generation had value but that alone would not support a capital expenditure. Chair Scharff asked if the study would tell us if it made economic sense or what were the reasons to do this because the study was a waste of time if it did not. Chair Scharff wanted to know why the City would subsidize and spend a lot of money if it did not make economic sense, and why did we care about the airport going down for three days or displacing diesel generators. Mr.

Abendschein replied that after the study was completed, they will tell the UAC the economics and whether it made sense. Chair Scharff was convinced cheaper EV charging could be done by using garages with solar panels so people can charge in an emergency.

Kiely Nose, Interim Utilities Director, pointed out that the Public Safety Building (PSB) was in a much denser area and very different geographically and in the built environment than the airport. Mr. Abendschein stated that the airport's ratio was similar to the PSB in the amount of space relative to the load. Mr. Kurotori said the pump stations that provide water to our reservoirs had power from the Utility and backup diesel generation because you cannot put enough solar on the square footage of the pump station to derive a tangible benefit from making a microgrid. The airport was unique because of its large amount of area, so it had the potential to have self-generation. Backup generation for the PSB, a hospital, or community center typically was thermal generation using diesel. This conversation was looking at the potential benefits to having solar or renewable generation so you may not have to use diesel as much during shorter outages; however, each site was unique.

Commissioner Tucher wanted a list of the 20 or 30 best places in Palo Alto where you could put a microgrid, starting with the airport at the top, some municipal, some corporate partners such as Xerox PARC and the VMware Campus, places that were big and small, places that had medical or emergency value such as a hospital where reliability mattered more than other places. The list could rank the places by how much power they use and their peak load. Commissioner Tucher noted the presentation had no numbers for the total energy need and how it fluctuated day and night. Mr. Abendschein stated this was a low-cost, convenient opportunity to gain some knowledge on the economics of a microgrid that could be applied to a Phase 2 ranking analysis as described by Commissioner Tucher.

Vice Chair Mauter noted that the scenarios did not provide any context on which sites were better than others. Mr. Abendschein confirmed Vice Chair Mauter's understanding that the RWQCP was the largest load for a municipally operated site. Vice Chair Mauter viewed this as a generic case study to understand the benefit to the grid. The airport had proximity to a lot of wide open space with the potential to do work behind the meter and in front of the meter. Vice Chair Mauter was unsure about the charging hub in Scenario 3 but Scenario 2 seemed logical. Commissioner Tucher asked if the RWQCP used power at night. Vice Chair Mauter answered yes, a lot of power was used for aeration basins 24 hours a day and the power will increase exponentially to implement nitrogen control technologies at the plant. Commissioner Tucher thought Scenario 2 should be done because of the value of day and night load shifting.

Commissioner Croft inquired if this study would determine what size of solar panel installation was needed to support the base load at the RWQCP all the time and what kind of battery size was needed to support six hours in an outage. Chair Scharff replied it was too much electricity. Ms. Nose agreed the RWQCP takes up too much power. This study was looking at how long we could sustain ourselves or how much usage of gas or diesel power generation could we defray in an emergency situation. Mr. Abendschein noted that an OES concern was the lack of diesel availability, so it was not just about completely displacing a diesel generator but also if you can

delay using the available diesel through the use of solar and storage, although it had to provide other economic benefits.

Commissioner Tucher's enthusiasm for the RWQCP was based on his assumption that it was valuable to power a percentage of the RWQCP largely through time shifting to bring some dollar value every night. In contrast, many deployments of microgrids do not provide value in operating daily power when there was no outage. Commissioner Phillips agreed but he believed the value relative to other options was driven by the reliability benefits, displacing the RWQCP's diesel, and having electricity available for the airport. It does not have to be a microgrid to load shift because you could do it with batteries and buy power during the day and tie it to the grid. Chair Scharff agreed with Commissioner Phillips. Chair Scharff believed that a shortage of diesel was a legitimate concern. Chair Scharff advised that we should not say this is green because this was not a green initiative, it was a resiliency initiative. People will want to do it if they think it provides a green benefit but this did not have green value. It was rare for Palo Alto to have outages. Commissioner Tucher thought it was green if you do not fire up peaker plants but Chair Scharff disagreed. Chair Scharff stated the money could be spent in a much more effective way to reduce greenhouse gas emissions than to worry about small emissions on the few days we have outages. If we have an earthquake, Scenario 2 was displacing diesel at the RWQCP for six hours.

Commissioner Tucher thought that building a massive microgrid at the airport to use for 50 percent of the RWQCP nighttime energy would save a lot of money and would use a lot less kilowatt hours. Chair Scharff did not think that was true. Mr. Abendschein said diesel generation did not generate a lot of greenhouse gas emissions, so building solar and storage that had greenhouse gas benefits and using it in an outage had a primary value of resiliency and not dealing with diesel availability issues, and it was green because of solar and storage. Chair Scharff preferred if staff performed an analysis on battery and storage in Palo Alto. Mr. Abendschein stated that these analyses compared our avoided cost. If possible, Commissioner Phillips wanted to see an economical scenario for Outage Type 3 and if it was likely to provide, for example, 10 hours or 2 days of outage coverage for the RWQCP.

Commissioner Gupta was happy with the scope as a first step. Commissioner Gupta wondered if windmill energy at the airport was evaluated or if it might affect planes taking off or landing. Mr. Abendschein replied that wind in Palo Alto was very low. When looking at wind in the past, wind was not strong unless you were up in the foothills.

Vice Chair Mauter thought it was beneficial to evaluate these benefits under several different rate structures including time-of-use. Mr. Abendschein explained that they did not have to worry about different rate scenarios because this was utility-scale, so it will use the cost to the Utility. The benefit of being an in-front-of-the-meter installation was not going through a translation of utility costs into a time-of-use rate structure because you get the utility benefits directly, which was more efficient and captured more costs than if you were to trying to translate it through a rate structure.

Mayor Lauing, UAC Liaison, addressed Commissioner Tucher's question about policies. There were no policies in most cases, which was why the UAC and staff were working on this. There were not a lot of climate policies in place, so the Climate Action Committee was working on creating policies, programs, and financing for everything that has to be done. Commissioner Tucher asked for an example of a microgrid policy. Mayor Lauing replied that they had a neutral policy but an example of a policy could be to actively subsidize microgrids or an incentive program to promote microgrids with a goal to have X number of microgrids or X megawatt capacity through microgrids built within a specified amount of time. Some of this will be addressed through the S/CAP committee to Council as well.

Mr. Abendschein said that we will learn through this study, including the answer to the question of economics, and it will help guide us to decide if we want more, less, or whether we are indifferent on microgrids. After the studies were completed, Chair Scharff requested staff to return to the UAC for a meeting devoted to what we have learned about microgrids.

Commissioner Tucher advocated starting studies on any of the three scenarios as soon as possible to get results as fast as possible but he thought Scenario 2 was the best. In reply to Commissioner Tucher asking how long it will take to complete the study, Mr. Abendschein answered they were targeting by the end of summer.

ACTION: None.

ITEM 2C: DISCUSSION: Distribution Cost/Benefit Analysis (E3)

Jonathan Abendschein, Assistant Director of Climate Action, stated the scope of this analysis was to estimate the existing system capacity for electrification and validate the impact of full electrification on line transformers. This analysis was intended to evaluate the distribution benefit from deploying flexible technologies and encouraging efficient electrification through things such as smart panels, circuit pausers, circuit sharers, and low-wattage equipment to make better use of capacity and reduce investment cost. Areas will be identified where you could avoid some distribution system investment by investing in equipment. You could make better use of available capacity to do more electrification if you deploy some of these technologies and strategies in places that will take longer or be more difficult to upgrade, for example in undergrounded areas. This analysis was going to be done by another company but there was difficulty reaching a contract agreement last summer, so the contract was awarded to E3 to perform this analysis.

Mr. Abendschein said that the grid modernization upgrades do not get in the way and in fact enable some of these technologies. Staff had been reducing barriers and encouraging people to install these technologies. Planning and Development Services integrated circuit sharing into their load calculation sheets for new developments. Utilities Engineering takes into account managed EV charging in multifamily buildings when evaluating transformer loading. Solar and storage was promoted through the SunShares program. An electrification expert program is

being launched to help people electrify efficiently. Low-power EV charging was encouraged on our website and through our Qmerit service that helps people find contractors to install EV charging.

This analysis was intended to determine whether we should provide incentives or other staff-intensive forms of promotion to get more people to adopt these technologies. A detailed timeline is in development but the targeted completion was by the end of summer 2025. Mr. Abendschein believed this study will address a lot of the questions that arose at the last meeting about how these technologies could affect grid modernization. If these technologies were voluntarily deployed and used correctly, such as charging your storage in the day and discharging it at night, it is beneficial to the system but the question was how beneficial and if it was beneficial enough to provide incentives and help people install these technologies.

Commissioner Metz wanted to see a detailed scope as soon as possible, and how this tied into grid modernization.

ACTION: None.

FUTURE TOPICS FOR THE UPCOMING MEETING ON MARCH 5, 2025, AND REVIEW OF THE 12-MONTH ROLLING CALENDAR

Commissioners Metz and Phillips have a meeting with CPAU staff on February 12 to talk about grid modernization and the commercial strategy. Commissioner Metz wondered if the Commission wanted to have a UAC ad hoc committee to address grid modernization. If so, it needed to be agendaized to establish it. Chair Scharff stated the Commission can think about it but he thought grid modernization was important and everybody was focused on it, so it was unfair to the rest of the commissioners who would not be part of the ad hoc.

Commissioner Metz wanted to calendar a discussion on emergency preparedness. Previously, Chair Scharff suggested that Commissioners Metz and Gupta have an informal discussion with CPAU staff, which Commissioner Gupta requested but it had not been scheduled. Chair Scharff asked staff if they could schedule it. Alan Kurotori, Utilities Chief Operating Officer, agreed to calendar the meeting with Commissioners Metz and Gupta.

Commissioner Gupta wanted to confirm that One Water was on the UAC agenda for March or at least before it is addressed by Council at their April meeting. Mr. Kurotori did not have the schedule with him but staff will get back to Commissioner Gupta if the date did not work. Staff was reviewing the letter on One Water drafted by the UAC subcommittee. Kiely Nose, Interim Director of Utilities, confirmed that staff will agendaize it before Council hears it.

Commissioner Gupta noted the UAC will see fiber rates/packages and an FTTP update in April, and the City Council will see fiber rates/packages (FCM) in April. Commissioner Gupta asked what was included in the UAC's presentation on fiber, and if the City Council's presentation will be after the UAC advises on it. Ms. Nose may try to bring fiber to the UAC in March but it was

not guaranteed because it depended on staff's time and the UAC's agenda. Staff planned to present fiber rates and packages, and provide the UAC an opportunity to ask questions about fiber-to-the-premise. It was a three-month process to go from the UAC to the Finance Committee and then to Council. The goal was to have it done this fiscal year. The soonest that rates could be adopted by the Council was June of 2025, which meant a program would be instituted the following month. As part of the discussion with the UAC, staff will provide a broader and more firm response on the timing.

Commissioner Gupta noted an item for July on grid modernization bond financing. Many commissioners had expressed support for a more technical and detailed presentation about grid modernization, so it might be helpful to have that calendared before talking about bond financing in July.

Commissioner Gupta saw that the Council had items he did not recall reviewing, such as the InfoSend contract or the 3-GIS contract amendment. Commissioner Gupta wanted to know how staff determined what comes before the Utilities Advisory Commission for advice before it reaches Council. Ms. Nose explained that the UAC opined on policy actions associated with the utilities. Council priorities guide resources and staff allocation, which then guides the UAC work plan. The UAC work plan guides what staff brings forward to the UAC for review. Many of the contracts were part of the daily operations and have gone through an RFP process, so staff was continuing on something that had already been developed rather than a new policy, which was why a contract went straight to Council as opposed to moving through the multistep process. Mr. Abendschein mentioned that contracts typically were on Council's consent calendar.

Commissioner Gupta remembered talking about ideas with the Council during his interview process and the work plan had already been set. Commissioner Gupta wondered if the timing of work plan setting could be aligned with the admission of new commissioners. Ms. Nose will take that into consideration as the UAC moved through this next work plan. Ms. Nose thought the UAC moved to two recruitments a year and she did not remember how the timing aligned with the work plan. The timing of work plans was in alignment with the timing of Council's annual priority setting to ensure resources were allocated accordingly.

Commissioner Tucher drafted a letter to SFPUC but in subsequently talking to staff leadership, it may make sense to send it first to the new head of BAWSCA. The letter talked about SFPUC's water supply and demand projections, as well as how BAWSCA does due diligence of SFPUC's CapEx plans, capital projects, and change orders. The letter posed a few questions for SFPUC to answer and suggested that SFPUC come and speak to the Utility or maybe SFPUC could come to a community workshop to answer questions from the UAC, Council, and the community. Peter Drekmeier would be one of the community speakers. Commissioner Tucher wanted to agendize his draft letter so the UAC could recommend the letter to Council. The letter would be signed by Council, not the UAC. Council Member Greer Stone was on the BAWSCA Board. Chair Scharff wondered if the Commission wanted to draft a letter from the UAC expressing how we feel about certain topics. Chair Scharff conducted a straw poll, asking commissioners to raise their hand if they wanted to agendize a discussion on Commissioner Tucher's draft Letter. Staff could

send a copy of Commissioner Tucher's letter to the UAC and include it in the next UAC package. Chair Scharff stated there could be an agenda item about whether the UAC wanted to agendize it. Commissioner Croft pointed out there were four raised hands in response to the straw poll. Commissioner Metz verbally stated he would like to agendize the letter. It was the consensus of the Commission, so Chair Scharff asked staff to agendize it.

Ms. Nose mentioned that consideration of the 2025 UAC work plan will be on the March or April agenda and perhaps staff can include a discussion on advocacy with the main points that Commissioner Tucher identified about BAWSCA and SFPUC. If this was going to be agendized, Chair Scharff requested that staff review Commissioner Tucher's letter and provide a staff report about how the letter might look, what other things might be included, and what other options we might have to achieve those goals. Ms. Nose clarified it would not be part of the work plan but it would be part of the discussion when that item came to the UAC to be considered. It was a way to tell Council that this was a topic the UAC would like to address in 2025, and we will be spending the UAC's time and staff's time to support this. Ms. Nose thought this likely would not be considered until June.

Commissioner Tucher hoped this could have been a quick follow-up after SFPUC and BAWSCA spoke to the UAC instead of letting months go by. Commissioner Tucher's letter posed three or four questions and an invitation to come speak with us in a public forum. Commissioner Tucher believed SFPUC used scare tactic scenarios to lead us to contemplate multimillion dollar investment projects for water recycling in contradiction with a Bay Delta Plan that the City of Palo Alto had backed. Commissioner Metz wanted to hear from Commissioner Tucher and Vice Chair Mauter on what they saw as the issues and what they think we should do about it.

Commissioner Tucher noted repeatedly at UAC meetings there were unresolved items, so he suggested an agenda section for things left over from last month.

Commissioner Gupta agreed with the feedback he read from public comment and heard from fellow commissioners. The UAC had a lot of discussion but Commissioner Gupta was unsure if it became advice to the Council. Commissioner Gupta suggested more topics should be action items rather than discussion items. Commissioner Gupta did not know which parliamentary rule set the Commission followed but it was a much more relaxed format than Robert's Rules. Maybe adding some elements of Robert's Rules might be helpful to the UAC procedurally as we think about how to agendize items. Commissioners could move, second, and vote on whether an item should appear on the next UAC agenda. As a follow-up from the One Water presentation, Commissioner Gupta liked the process of a One Water draft letter to address some of the concerns and the letter included Vice Chair Mauter's strategic advice. Commissioner Tucher asked why there was not a five-minute time slot tonight to hear about the One Water letter. Chair Scharff thought it had been discussed and he pointed out it was getting late.

Vice Chair Mauter thought the UAC needed advice from staff on how to agendize items in accordance with the Brown Act. Vice Chair Mauter agreed stronger follow-up and continuity

was needed, and recommended using the Director's Report as a way to respond and maintain continuity going forward.

Chair Scharff believed it was easy to agendize items. The difficulty with Commissioner Tucher's letter was to agendize asking the Council to ask Greer Stone to do something with BAWSCA, as opposed to agendize a list of items to advise Council. For example, the Commission could have a discussion about the design drought. Chair Scharff stated the full agendas were causing the UAC to wait months to address this. The UAC did not have to tell Council what to do. Chair Scharff suggested that the Commission say to Council that the UAC believes we should have the following questions answered, Council could you please get that information from the SFPUC.

Since the UAC had not discussed it as a group, Commissioner Croft thought a faster way to address this was for Commissioner Tucher to attend a City Council meeting and provide his individual standpoint about the presentation and the follow-up questions he recommended. Chair Scharff agreed but Commissioner Tucher had to say he was speaking on his own behalf and say the UAC will agendize further discussion. Commissioner Tucher agreed it might be the right approach.

Chair Scharff was open to having a discussion about how we run the UAC. At Council, members were allowed to speak once unless the Chair agreed otherwise. Chair Scharff acknowledged he had been running the UAC very laxly, which worked in the past but he was not sure it was working well now because everyone wanted to speak three or four times, although it was a balancing act because the UAC had good discussions. Chair Scharff encouraged the commissioners to give him private feedback on allowing commissioners to speak once or twice, how they would like the meetings run more efficiently or differently, and if meetings were too long or if more time was needed to have enough discussion. Chair Scharff's goal was to finish meetings by 10 PM but he might say yes if the Commission decided to start at 5 PM and end whenever.

COMMISSIONER COMMENTS and REPORTS from MEETINGS/EVENTS

In the supplemental information was a brief survey overview. Commissioner Croft liked to look at data and was interested in seeing more detail from the survey but this was written as text. Commissioner Croft was concerned that only 30 percent of commercial customers considered us a good energy partner. Commissioner Croft wanted to know where we declined from the previous commercial customer survey and hoped to hear in the coming months how we were addressing this.

Commissioner Croft sent her feedback on the AMI data UX to Chair Scharff and wanted to know what the best way to share it was. Chair Scharff recommended giving it directly to staff. Kiely Nose, Interim Director of Utilities, agreed. Chair Scharff invited Commissioner Croft to provide her feedback now. Commissioner Croft looked at her AMI data in MyCPAU and found it hard to Grok the data. Commissioner Croft had suggestions to make it easier for users to find data on their usage. Downloads were not useful for Commissioner Croft because she could not

download more than what she saw on the screen although it said you could. Commissioner Croft had her feedback written out and she will send it to staff.

Packet Page 67 reported a stat on our regional water system storage. Given recent events, Commissioner Gupta wondered if federal water releases had an effect on the regional water system storage. Alan Kurotori, Utilities Chief Operating Officer, explained the Hetch Hetchy Reservoir was SFPUC but there were some blending areas, so he will check on it. Chair Scharff thought it was a good question for NCPA. Chair Scharff wondered if our hydro was affected by water releases, and maybe staff could answer that at some point.

ADJOURNMENT

Commissioner Gupta moved to adjourn.

Commissioner Phillips seconded the motion.

The motion carried 7-0 with Chair Scharff, Vice Chair Mauter, and Commissioners Croft, Gupta, Metz, Phillips, and Tucher voting yes.

Meeting adjourned at 10:35 PM.