Agenda Report

May 5, 2025

TO: Honorable Mayor and City Council

THROUGH: Municipal Services Committee (April 8, 2025)

FROM: Water and Power Department

SUBJECT: **FINALIZATION OF AN OPTIMIZED STRATEGIC PLAN ESTABLISHING A ROADMAP TO MEET THE GOALS SET FORTH BY CITY COUNCIL-ADOPTED RESOLUTION 9977**

RECOMMENDATION:

It is recommended that the City Council:

1) Find that the proposed actions are statutorily exempt from the California Environmental Quality Act ("CEQA") pursuant to CEQA Guidelines Sections 15262, Feasibility and Planning Studies; and 15271 Early Activities Related to Thermal Power Plants;

2) Direct Pasadena Water and Power ("PWP") to complete an Optimized Strategic Plan ("OSP") final report, establishing a roadmap to meet the goals set forth by City Council-adopted Resolution 9977;

3) Direct staff to include the following five foundational components in the final OSP report, each of which has been demonstrated to be an important part of a portfolio that balances Resolution 9977 goals of carbon-free energy, reliability, affordability, and equity:

    a. Procurement of external renewables and storage resources, with a focus on resource diversity;
    b. Accelerated development of local solar and storage resources within the PWP service territory;
    c. Development of demand-side programs and rate structures to encourage load flexibility, managed electric vehicle charging, and other cost-effective demand response;
    d. Preservation of the Glenarm Power Plant as a "backup" resource for reliability that operates only under a narrow set of conditions; and

e. Pursuit of a balanced position in the California Independent System Operator ("CAISO") wholesale energy market, allowing for limited sales and purchases to manage imbalances in supply and demand;

4) Direct staff to continually evaluate and implement approaches to achieve the City's goals set forth in Resolution 9977 by the end of 2030 and to utilize the 2028 Waypoint ("Waypoint") to develop a revised Integrated Resource Plan ("IRP") that is consistent with state requirements and Resolution 9977.

EXECUTIVE SUMMARY:

On January 30, 2023, the City Council adopted Resolution 9977, Attachment 1, which declares that climate change is an emergency that threatens the health and welfare of the city, region, state, nation, and the environment.
Resolution 9977:

- Commits the City to environmental stewardship and continued leadership in sustainability;
- Sets forth a policy goal to source 100% of Pasadena's electricity from carbon-free sources by the end of 2030; and
- Directs the City Manager to plan multiple approaches to transition to this policy goal and optimize affordability, rate equity, stability, and reliability of electricity while achieving this goal.

Subsequently, the City Council (through the Municipal Services Committee "MSC"), authorized the City Manager to enter into a contract with Energy and Environmental Economics, Inc ("E3") to assist in the development of an Optimized Strategic Plan ("OSP") to achieve these policy goals. The City Manager and the Interim General Manager of PWP established a Technical Advisory Panel ("TAP") comprised of community stakeholders to assist in the development of the OSP and to provide transparency in the process.

This report summarizes the efforts completed to date, seeks Council direction in completing this stage of the work, and identifies a blueprint for next steps.

Council's policy direction is sought to complete the electric rate study. Thereafter, staff will continue its aggressive efforts to achieve the policy goals set forth in Resolution 9977 with periodic updates to MSC and the City Council.

Collaborative and Transparent Process

Although efforts toward completion of the OSP were briefly interrupted due to the impacts of the Eaton fire, staff has been engaged in robust efforts to complete this important step towards achieving the goals set forth in Resolution 9977, including meetings with the TAP, the MSC, and the City Council.

Stakeholders and community engagement have been instrumental in assisting PWP in the development of the OSP. A key theme in the development of the OSP has been extensive outreach, coordination, and collaboration between PWP, stakeholder groups, and the Pasadena community. We have shared and discussed the development and analysis of the multiple OSP portfolios across a variety of platforms, including: ten TAP meetings (virtual and in-person), four updates to the MSC, three updates to the Environmental Advisory Commission ("EAC"), and one Community meeting.

Technical Advisory Panel

The TAP is comprised of broad segment of community stakeholders
:

- Lauren Siegel, Chair, Environmental Advisory Committee
- Sam Berndt, Member, Pasadena 100
- Cynthia Cannady, Member, Pasadena 100
- Paul Little, President, Pasadena Chamber of Commerce
- David Kang, Associate Vice President for Facilities, California Institute of Technology
- Dr. Stephen Low, Professor of Computing and Mathematical Sciences and Electrical Engineering, California Institute of Technology
- David Coher, Resident

Staff has convened the TAP and E3 either in person or virtually on the following dates:

- TAP Meeting #1 – June 5, 2024
- TAP Meeting #2 – June 27, 2024
- TAP Meeting #3 – July 17, 2024
- TAP Meeting #4 – August 22, 2024
- TAP Meeting #5 – September 18, 2024
- TAP Meeting #6 – October 16, 2024
- TAP Meeting #7 – December 16, 2024
- TAP Meeting #8 – February 10, 2024
- TAP Meeting #9 – February 26, 2024
- TAP Meeting #10 – March 26, 2024

The meetings covered a variety of methodologies, technical studies, and conclusions detailed in presentations included in Attachment 2, TAP Presentations.

In addition, staff provided regular updates to the Municipal Services Committee on August 27, 2024; September 10, 2024; March 11, 2025; and April 8, 2025. The reports and presentations are included in Attachment 3, Municipal Service Committee Reports and Presentations.

Staff also provided an update to the City Council on October 28, 2024 (Agenda Report included as Attachment 4).

MUNICIPAL SERVICES COMMITTEE RECOMMENDATION:

On April 8, 2025, the MSC discussed the findings of the PWP OSP technical analysis, advising staff to pursue future energy resource portfolios with the aim of serving 100% of the City's energy needs from carbon-free sources, to accelerate the development of local resources, and to preserve the Glenarm Power Plant ("Glenarm") for limited operations to optimize reliability and to support the greater California electric grid.

MSC provided staff guidance on the OSP energy resource portfolios, which present a range of options to achieve the goals of Resolution 9977. Supported by technical modeling conducted in the OSP, MSC recommended that staff pursue the development of a portfolio that accelerates the production of local resources while maintaining the Glenarm Power Plant as a backup resource with limited need for operation. In addition to increasing system resilience and local reliability, preserving Glenarm Power Plant for local reliability creates additional opportunities to diversify Pasadena's supply of carbon-free energy with external renewables and storage resources, reducing costs to integrate these additional resources and potential future technologies.

BACKGROUND:

On December 11, 2023, the Pasadena City Council unanimously approved PWP's 2023 Power IRP, a 25-year planning roadmap to provide the local community with safe, reliable, and environmentally responsible electricity services at competitive rates. Preparing an IRP is a California regulatory requirement for utilities like PWP and must be updated and submitted to the California Energy Commission ("CEC") at least once every five years. In addition to meeting CEC's IRP requirements, the 2023 Power IRP also incorporated Resolution 9977, which includes the goal to source 100% of Pasadena's electricity from carbon-free sources by the end of 2030 while optimizing for affordability, rate equity, stability, and reliability of electricity.

As part of the IRP approval, the City Council requested that the City Manager's Office oversee the development of an OSP to define and outline actions needed to achieve the goals of Resolution 9977. It was further recommended that the OSP would be created in collaboration with a consultant experienced in green energy to ensure a feasible plan for meeting Pasadena's ambitious targets. Accordingly, the City Manager's Office proposed, and the City Council approved the reengagement of E3, an industry leader in clean energy policy that provided technical review services for the 2023 IRP and has a good understanding of Pasadena's clean energy goals.

Under contract to the City Manager and at the Council's direction, E3 developed a robust technical analysis that provides foundational data and evaluation to guide PWP in refining a roadmap of further actions to transform its energy resource portfolio to meet Pasadena's future needs while maintaining reliability and limiting cost impacts to customers. The OSP explored how new generation resources, investments in transmission and distribution infrastructure, and customer programs could facilitate the transition to a clean energy future. E3 assessed PWP's infrastructure needs, including types and locations of new generation resources and associated timing of acquisition.

They also explored the role of customer participation, including residential and commercial rooftop solar and battery energy storage, demand response, flexible loads, and managed electric vehicle charging.

Scope of Work

The OSP development process and workflow involved a series of independent analytical studies. The approved scope of work provides a cohesive and comprehensive framework built on rigorous technical analysis to inform an optimized plan towards the carbon-free goals of Resolution 9977. E3 has progressed through the following assessments, studies, modeling, and support tasks:

Preparatory Studies

- Local Solar and Storage Potential Study
- Demand Response and Flex Loads Potential Study
- Emerging Technology Assessment
- Transmission Expansion Options Assessment

Portfolio Development

- Glenarm Conversion and Replacement Analysis
- Long-Term Capacity Expansion Studies
- Production Simulation Studies
- Distribution System Analysis

Optimized Strategic Plan

- Cost Impacts Assessment

The completion of the technical analysis of the OSP will be synthesized into the development of a draft OSP action plan and final report. The findings of these independent analytical studies provide foundational data and analysis to guide PWP in creating a roadmap of further actions to transform its energy resource portfolio to meet Pasadena's future energy needs while maintaining reliability and limiting cost impacts to customers. The draft OSP final report will highlight the diverse mix of local solar and storage, external carbon-free resources and storage, investments in transmission and distribution infrastructure, and customer programs to create demand-side flexibility that can facilitate the achievement of Pasadena's carbon-free goal.

Clean Energy Tracker

To track Pasadena's progress on key clean energy targets and milestones, PWP has launched a Clean Energy Tracker (https://pwp.cityofpasadena.net/clean-energy-tracker/). The Clean Energy Tracker measures Pasadena's compliance with state

mandates, carbon-free generation percentages, and average hourly matching of clean energy demand.

The metrics below show PWP's progress to date towards Resolution 9977 goals based on resources currently owned or contracted:

- Metric #1 - The percentage of PWP's annual retail sales generated annually by carbon-free resources in PWP's portfolio (SB100) is 86%
- Metric #2 - The percentage of annual energy produced by resources owned by or contracted to PWP from carbon-free sources is 78%
- Metric #3 - The percentage of PWP's energy needs matched by carbon-free generation resources in each hour across the year is 83%

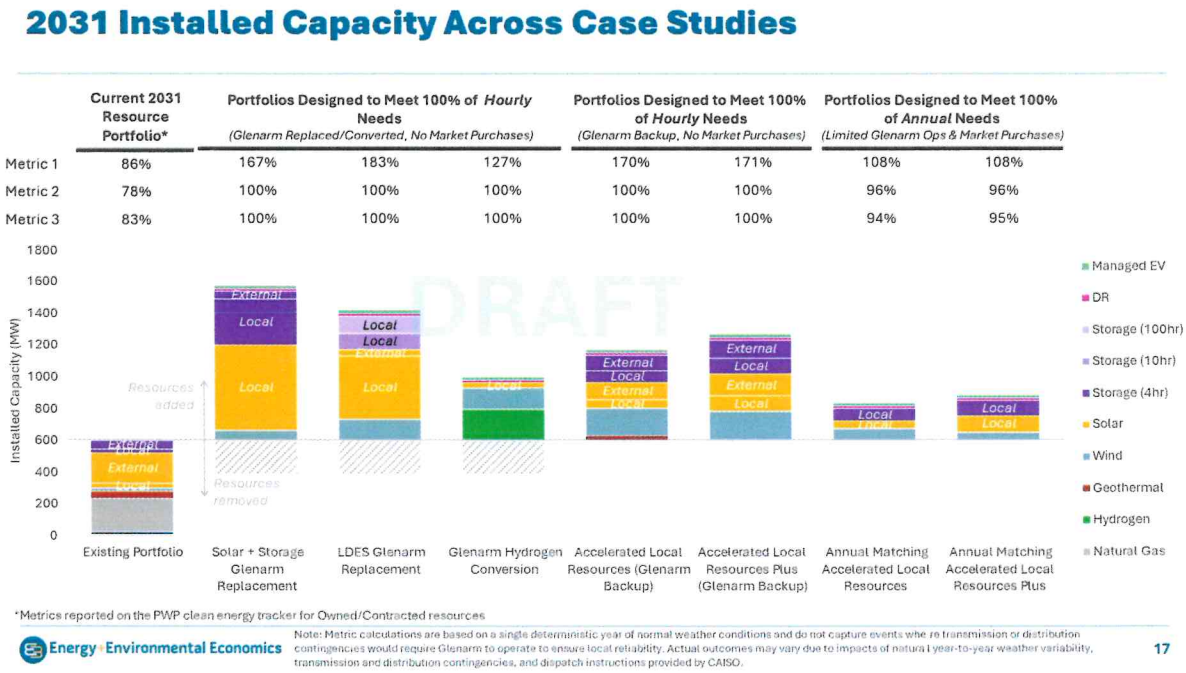
OSP Technical Analysis Findings

The OSP technical analysis findings present a range of technologies and options available to contribute toward meeting Pasadena's clean energy goals. The OSP portfolios showcase opportunities to diversify Pasadena's supply of carbon-free energy with local solar and storage options, including residential, commercial, and utility-owned installations, customer demand-side management options, external renewable and storage resources, and even potential emerging technologies that are not yet commercially available.

Each of the portfolios explored, summarized in Figure 1, was optimized to meet Pasadena's reliability needs and carbon-free goals. Differences notwithstanding, the suite of portfolios examined share multiple common elements that are expected to underpin PWP's strategies to meet Resolution 9977 goals:

- All portfolios include additional renewable resources, including both local solar and external renewables sourced from diverse technologies;
- All portfolios include additional storage resources, some of which are located within the City of Pasadena to improve grid reliability and resilience; and
- All portfolios leverage demand-side flexibility (including load shifting and managed vehicle charging) to reduce needs for investments in grid infrastructure.

Figure 1: 2031 Installed Capacity Additions Across Case Studies



The analysis showed that closing the gap between PWP's current energy resource portfolio and the 100% carbon-free goal likely requires the addition of renewable and storage resources at a scale of hundreds of megawatts ("MW"). Also, the combined addition of local resources and external resources would advance PWP towards the goals of Resolution 9977. While there is no minimum threshold of need for a specific type of resource, a diverse resource mix plays a vital role in this transition.

Glenarm Power Plant Operations

One of the key study components was the Glenarm Power Plant Conversion and Replacement Analysis. Glenarm is an approximately 200 MW peaking facility comprised of five units fueled by natural gas. Currently, the power plant's operations are typically limited to less than a five percent (5%) annual capacity factor (the ratio between the actual electrical energy produced by a generating unit and its maximum possible production over a period of time). However, Glenarm still plays a critical role in maintaining local reliability.

The Glenarm study showed that replacing Glenarm with a portfolio of local resources or converting it to hydrogen combustion presents some practical barriers. Portfolios that replace Glenarm with local carbon-free resources result in large needs for new local resource capacity, where options for diversity are limited, and land constraints and siting constraints pose significant additional challenges. Additionally, portfolios converting Glenarm to hydrogen require the development of upstream infrastructure to produce, store, and transport green hydrogen at scale, which is outside of PWP's control.

Because of the practical challenges and costs associated with replacement and conversion, the OSP study process also examined a range of case studies in which operations of the Glenarm Power Plant are further reduced as it transitions to a "backup" resource for reliability. Under this regime, operations of the Glenarm Power Plant would be limited to a select set of situations, including:

- Unplanned electric emergencies
- Extreme weather events
- When called upon by CAISO to support the larger California electric grid
- Transmission contingencies when Goodrich transmission or transformer capacity falls below 100%
- To support system capacity expansion efforts (e.g., during Goodrich Transformer upgrades, subtransmission upgrades, etc.)

Preserving Glenarm as a reliability backup resource in the near term also provides for longer-term optionality to leverage emerging technologies that may mature in the subsequent decade or transmission solutions that require long lead times for project permitting and development.

Accelerating Local Resources

The analysis showed that development of additional local solar and storage resources could mitigate the need to operate the Glenarm Power Plant during peak demand periods when electric loads exceed PWP's ability to import power from CAISO. Accordingly, multiple case studies that include accelerated development of local resources and that preserve Glenarm as a reliability backup were developed, representing variations in (a) the level of local versus external resource development, and (b) whether PWP's portfolio of carbon-free resources is sized to meet its hourly or annual electric needs.

Portfolios Designed to Meet 100% of Hourly Needs

With Glenarm preserved as a backup resource for reliability, multiple diverse portfolios combining local and external carbon-free resources are capable of supplying 100% of energy needs on an hourly basis under normal operating conditions. In these portfolios, Glenarm is retained, but is only operated for reliability emergencies, and PWP could eliminate its reliance on the wholesale energy market to purchase short-term energy. As shown in Figure 2, E3 explored two variations of the portfolios that correspond to different levels of local resource development. These variations showed that increasing local solar and storage resource development further reduced the frequency of Glenarm's use to meet local reliability needs.

As shown in Figure 2, in portfolios designed to meet 100% of PWP's hourly needs, larger additions of renewables and storage are required to supply load with 100% carbon-free generation during the most constrained conditions across the year, resulting in a large surplus of carbon-free energy outside of those constrained periods. Surplus

carbon-free generation must be either curtailed or sold to the market, which would make PWP heavily dependent upon wholesale energy market sales. Many hours in which PWP would have a surplus of generation could occur when prices in the market are low or negative, which would make PWP dependent upon uncertain revenues from off-system sales to mitigate rate increases, exposing PWP to novel wholesale market risks.

Portfolios Designed to Meet 100% of Annual Needs

When Glenarm is retained and operated infrequently for local reliability with portfolios sized to meet annual energy needs with carbon-free resources, the fewer new resource additions are required. As shown in Figure 2, modest incremental additions of renewables and storage allow PWP to meet 100% of annual energy needs with carbon-free sources. E3 explored two variations of portfolios accelerating local resource development. The acceleration of local solar and storage development reduces the frequency of Glenarm's use to meet local reliability needs. In addition, the increased internal resource development reduces the level of external resources.

Figure 2: 2031 Annual Generation Mix Across Case Studies

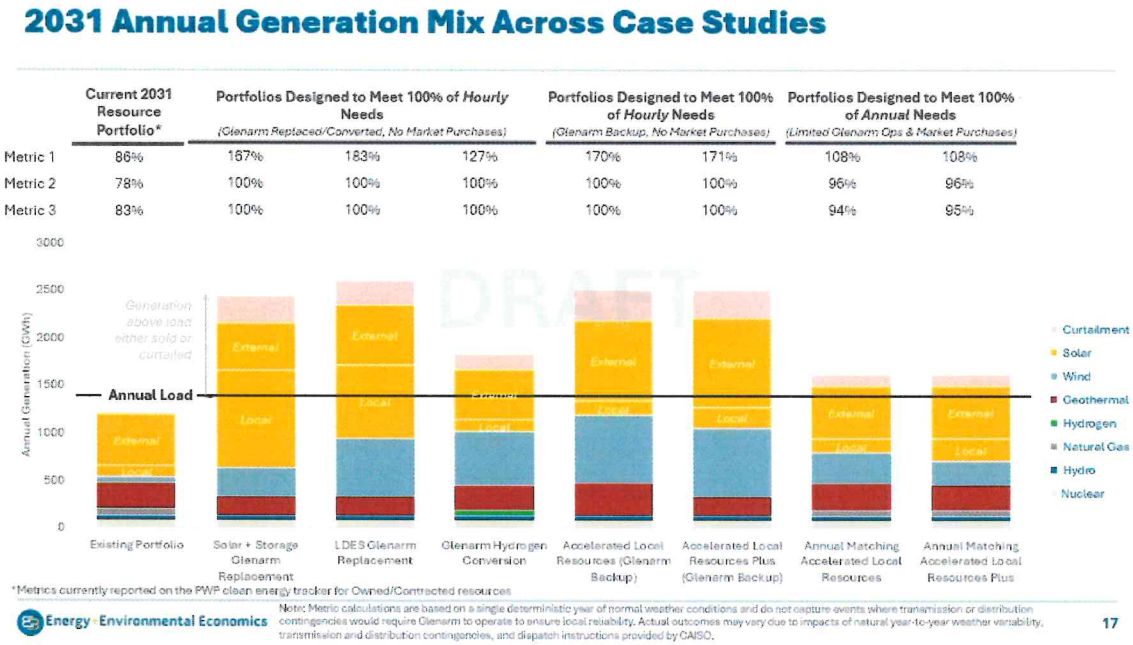


Figure 3: Summary Results for 2031 Case Studies

Summary Results for 2031 Case Studies

	Portfolios Designed to Meet 100% of *Hourly* Needs (Glenarm Replaced/Converted, No Market Purchases)			Portfolios Designed to Meet 100% of *Hourly* Needs (Glenarm Backup, No Market Purchases)		Portfolios Designed to Meet 100% of *Annual* Needs (Limited Glenarm Ops & Market Purchases)	
	Solar-Storage Replacement	LDES Replacement	Hydrogen Conversion	Accel Local Resources	Accel Local Resources Plus	Accel Local Resources	Accel Local Resources Plus
New Resource Needs by 2031							
New Renewables (MW)	600	568	165	363	417	123	151
New Storage (MW)	339	215	-	173	214	76	100
New DR & Load Flex (MW)	35	37	35	35	36	35	35
Clean Energy Metrics by 2031							
Metric 1 (%)	167%	183%	127%	170%	171%	108%	108%
Metric 2 (%)	100%	100%	100%	100%	100%	96%	96%
Metric 3 (%)	100%	100%	100%	100%	100%	94%	95%
Relative Costs in 2031							
Incremental Cost ($M/yr)	+$80-140	+$95-155	+$20-55	+$45-85	+$45-85	+$5-15	+$10-25
Other Considerations	Higher risk				Lower risk		
Local Resource Siting							
Technology Readiness							
Upstream H_2 Infrastructure							
Wholesale Market Exposure							
Resource Adequacy Risk							
Local Resilience							
Long-Term Optionality							

Energy + Environmental Economics

Note: Metric calculations are based on a single deterministic year of normal weather conditions and do not capture events where transmission or distribution contingencies would require Glenarm to operate to ensure local reliability. Actual outcomes may vary due to impacts of natural year-to-year weather variability, transmission and distribution contingencies, and dispatch instructions provided by CAISO.

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OSP and Electric Rates

As indicated above, portfolios designed to meet 100% of the City's electricity needs as measured on an hourly basis are the most costly to implement. The estimated incremental costs across these portfolios range from **$20 - $155 million** above existing expenditures on an **annual** basis. In addition, technologies that may be available in the 2030 timeframe are not currently widely commercially available at scale and therefore add some uncertainty to actual costs and viability.

Current policies on tariffs and federal funding associated with the development of green-energy solutions may also impact the cost and availability of future resources.

Portfolios designed to meet 100% of the City's needs for electricity as measured on an annual basis are both much less costly and require only technologies which are available today. The incremental cost to implement these portfolios ranges between **$5 – $25 million annually**.

All portfolios seek to identify a mix of carbon-free energy that would reduce the City's reliance on Glenarm and provide for the City's electric needs with clean energy.

The various portfolios provide enough detail for staff to continue implementation towards carbon-free electricity; however, further refinement would be needed to establish the revenue requirements for the City's electric rate study.

The electric rate study will provide further refined information on cost impacts to ratepayers; however, it is known based on overall cost data from the OSP that moving

toward a portfolio that meets 100% of the City's **annual electricity** would result in much more modest increases in electric rates compared to implementing scenarios which seek to address 100% of the City's **hourly needs**. The Council's direction this evening will be carried forward to the rate study, which is anticipated to come to Council several times before its target completion by the end of the calendar year.

OSP and Solar

The various portfolios indicate that local solar is an important component of a clean energy strategy, and this was clearly reiterated by the members of the MSC. However, it is important to note that the OSP case studies do not attempt to prescribe a combination of customer, utility, and/or third-party ownership, nor what specific compensation structures or incentive mechanisms, will result in the most equitable cost outcomes across all PWP customers. The OSP's focus on quantifying the total system costs – inclusive of all new generation, regardless of ownership – allows for development of a plan that is most affordable for all PWP customers as a whole; the ownership structures and compensation mechanisms ultimately pursued will impact how those incremental costs (and the corresponding benefits) are spread across electric customers in the city.

The MSC, at its April 8, 2025, meeting, requested staff to return with a full discussion of local solar power, including existing policies, staff recommendations for changes to the existing rules and regulations, and ways to streamline the permitting process. That discussion is anticipated to occur early this summer.

RECOMMENDATION AND NEXT STEPS:

The recommendation in this report is to pursue a portfolio that balances the goal to source all power from **carbon-free** sources with **affordability**, **rate equity**, **stability**, and **reliability** to meet the goals of Resolution 9977. Putting this portfolio into action would entail continued efforts to integrate carbon-free resources and minimize the use of fossil generation:

- Procurement of external renewables and storage resources, with a focus on resource diversity;
- Accelerated development of local solar and storage resources within the PWP service territory;
- Development of demand-side programs and rate structures to encourage load flexibility, managed electric vehicle charging, and other cost-effective demand response;
- Preservation of the Glenarm Power Plant as a "backup" resource for reliability that operates only under a narrow set of conditions; and
- Pursuit of a balanced position in the CAISO wholesale energy market, allowing for limited sales and purchases to manage imbalances in supply and demand.

The intent of the recommendation is to create a living and dynamic plan that will enable the electric utility to continue to progress towards the 100% carbon-free goal and to evolve as technology advances and the additional carbon-free resources are procured, consistent with the letter and spirit of Resolution 9977.

Any future proposed changes to the City's existing solar policies will also be brought back to the full Council and would likewise be incorporated into the electric rate study as appropriate.

While quarterly updates to the MSC are planned, longer-term efforts will be the Waypoint or check-in date in 2028, and the revision of a new IRP. At this point, the next steps are to ensure power supplies and investments are made to adapt and adjust as needed to address carbon-free energy supply, affordability, reliability, rate equity, and stability.

COUNCIL POLICY CONSIDERATION:

The City has a strong history of environmental stewardship. Implementation of the actions recommended in this report would result in increased carbon-free energy and a reduction in Greenhouse Gas emissions generated by the City, continuing and furthering the City's leadership in this area. Tonight's actions also seek to ensure rates are affordable and electricity remains reliable. The recommended action directly supports the goals and policies contained in:

- The City's Environmental Charter, adopted in 2005;
- The U.S. Mayors' Climate Protection Agreement (endorsed by the City);
- The United Nations Urban Environmental Accords (endorsed by the City);
- The City's Climate Action Plan, adopted in 2018;
- The City's 2018 Power IRP;
- Resolution No. 9977, adopted in 2023; and
- The City's 2023 Power IRP.

ENVIRONMENTAL ANALYSIS:

This action has been determined to be statutorily exempt from the California Environmental Quality Act (CEQA) pursuant to State CEQA Guidelines Section 15262. This Section states that a project involving only feasibility and planning studies for possible future actions which the agency has not approved, adopted, or funded are exempt from CEQA.

A primary goal of the OSP is to analyze ways to reduce the environmental impacts of Pasadena's overall energy portfolio, particularly the reduction of Greenhouse Gas emissions. Furthermore, any specific construction projects undertaken pursuant to the OSP will be subject to full CEQA compliance, both as and when appropriate.

FISCAL IMPACT:

Implementation of the portfolios outlined in this report hold the potential for substantial cost implications for the City and its ratepayers and varies greatly depending on the portfolio mix. This exposure will be measured and explained since each implementation step would be brought before the City Council before PWP commits to it. As PWP procures resources to meet clean energy targets, in response to the costs and availability of resources in the market, future utility portfolios and their associated costs may differ from the case studies developed in this planning exercise. There is no impact to the General Fund.

Respectfully submitted,

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Attachments:

Attachment 1: Resolution 9977
Attachment 2: TAP Presentations
Attachment 3: Municipal Service Committee Reports and Presentations
Attachment 4: October 28, 2024, City Council Agenda Report