

# Agenda Report

November 6, 2023

**TO:** Honorable Mayor and City Council

**THROUGH:** Municipal Services Committee (October 10, 2023)

**FROM:** Water and Power Department

**SUBJECT: ADOPTION AND APPROVAL OF THE 2023 POWER INTEGRATED RESOURCE PLAN FOR THE WATER AND POWER DEPARTMENT**

**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. Adopt and approve the 2023 Power Integrated Resource Plan ("IRP") for filing with the California Energy Commission ("CEC") for the Water and Power Department ("PWP"); and
3. Support PWP's continuing efforts to meet State regulatory requirements and to study the feasibility and scope of future programs, projects, and procurements to advance progress toward a carbon-free energy resource portfolio.

**ENVIRONMENTAL ADVISORY COMMISSION RECOMMENDATION:**

On September 12, 2023, the Environmental Advisory Commission ("EAC") was presented with an informational update regarding the recommendations in this report.

Subsequently, the EAC held a Special Meeting on September 26, 2023, and provided correspondence to the City Council included in Attachment A.

**EXECUTIVE SUMMARY:**

In compliance with Senate Bill ("SB") 350 (2015), PWP has prepared a filing of its 2023 Power IRP, which is a long-term electricity system planning document that outlines and describes energy and capacity resource needs, policy goals, physical and operational

constraints, and other priorities. In addition to meeting all State-mandated targets for renewable and zero-carbon electricity supply, as defined by the Public Utilities Code (“PUC”) and as implemented and administered by the CEC, the IRP, as directed by the City Manager through Resolution 9977 (Attachment B), also outlines multiple approaches to achieving the policy 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.

For the development of the IRP, PWP contracted with the Alliance for Cooperative Energy Services Power Marketing LLC (“ACES”) for modeling and consulting services, a collaboration that included a computer simulation study of various energy resource portfolio designs that might be considered for Pasadena. This effort examined five distinct designs or conditions (hereinafter referred to as “Scenarios”) and several related impact studies to produce useful findings that can inform future policies and programs affecting and related to PWP’s portfolio. To ensure transparency in the modeling results, PWP contracted with Energy and Environmental Economics, Inc. (“E3”), a leading energy consulting firm focused on clean energy policy implementation, to conduct an independent review.

Based on specific parameters, each Scenario produced a portfolio of energy generation and storage resources, including an estimated cost over the course of the IRP Study Period; specifically, 2023 through 2050 (“Study Period”). While all Scenario-specific resource portfolios perform better than the current statewide greenhouse gas (“GHG”) target, those representing carbon-free electricity by 2030 on an hourly basis will be the most challenging to achieve.

PWP modeled five scenarios: three investigated the potential for carbon-free resources to meet load by the end of 2030, one met California requirements, and another met California State requirements and added a carbon tax based on the Social Cost of Carbon (“SCC”). PWP stressed the five resulting scenarios to four sensitivities: a month-long heat wave in summer 2030, a loss of TM Goodrich receiving station in 2030, high cost of new resources, and low cost of new resources. PWP also studied the potential of two different types of emerging technologies: an energy efficiency proxy resource and a demand response proxy resource.

## **BACKGROUND:**

SB 100 (2018) requires that 60 percent of PWP’s retail electricity sales be derived from renewable resources by 2030, increasing to 100 percent renewable and zero-carbon resources by 2045. SB 1020 (2022) accelerates progress by adding milestone targets to advance the State’s trajectory to the 2045 goal. To date, PWP has consistently exceeded its Renewable Portfolio Standard (“RPS”) and carbon reduction targets, focusing on renewable energy resources that are economically beneficial and best aligned with Pasadena’s retail load profile.

In compliance with SB 350 (2015), Publicly Owned Utilities (“POU”) such as PWP must file an IRP every five years. PWP previously produced IRPs in 2009, 2012, 2015, and 2018, plus an update in 2021. The IRP must be filed according to CEC requirements based on timing of adoption by the City Council.

In the preparation, development, and filing of the IRP, PWP has followed the prescriptive requirements of the CEC, as documented in *Publicly Owned Utility Integrated Resource Plan Submission and Review Guidelines – Revised Second Edition*, dated October 4, 2018, as well as a successor draft update distributed by the CEC in 2022 (collectively referred to herein as the “Power IRP Guidelines”). The Power IRP Guidelines can be found here: <https://efiling.energy.ca.gov/getdocument.aspx?tn=224889>. A submitted IRP must be consistent with the requirements of PUC Section 9621, which encourages POU’s to explore multiple scenarios and sensitivity analyses in order to identify best options that minimize impacts to ratepayers, ensure system reliability, strengthen the bulk transmission system and local communities, enhance distribution systems and demand-side energy management, and minimize air pollutants and GHG emissions – with early priority given to disadvantaged communities.

On January 30, 2023, the Pasadena City Council adopted Resolution 9977, which declares a Climate Emergency, and sets a policy goal to achieve 100% carbon-free electricity by the end of 2030. The Resolution further directs the City Manager to utilize the 2023 IRP process to identify multiple approaches to transition to this goal, while optimizing for affordability, rate equity, stability, and reliability. Accordingly, three of the five Scenarios for the 2023 IRP incorporate the goals of Resolution 9977.

### **IRP Scenarios**

After input from stakeholders, PWP and ACES modeled the following Scenarios for the 2023 IRP filing. For reference purposes in the descriptions below, “internal” refers to PWP’s service territory, while “external” refers to the “grid” outside PWP’s service territory.

#### **Scenario 1 – 100% Carbon-Free by 2030 on an hourly basis (no limit on internal resources)**

Scenario 1 allows for unlimited utility-side resources to be located inside PWP’s service territory. As it is a carbon-free representation, Scenario 1 excludes all carbon-emitting resources, including existing natural gas facilities and market purchases containing carbonized-based energy.

#### **Scenario 2 – 100% Carbon-Free by 2030 on an hourly basis (maximum limit on internal resources)**

Pasadena has limited space available to site new utility-side generation and/or storage facilities and sets maximum limits for internal resources based on the best available information. Scenario 2, also a carbon-free representation, excludes carbon-emitting resources, facilities, and market purchases.

### **Scenario 3 - 100% Carbon-Free by 2030 on an hourly basis (maximum limit on internal resources and doubled distributed resources)**

Scenario 3 applies the same carbon-free goals as Scenarios 1 and 2, plus the internal resource limitations of Scenario 2. However, it also doubles the amount of distributed (customer-side) solar and storage that is expected to occur naturally by including an additional amount into the modeling parameters. Like Scenarios 1 and 2, Scenario 3 excludes all carbon-emitting resources, facilities, and market purchases.

It should be noted that while Scenarios 2 and 3 include similar energy producing resources, they appear in different quantities and at different times, which impacts their respective costs.

### **Scenario 4 - Reference Case**

Scenario 4 (“Reference Case”) demonstrates PWP’s ability to comply with California’s increasingly aggressive clean energy targets while incorporating ambitious actions already in place through prior IRPs. Scenario 4 far exceeds regulatory requirements, achieving a renewable and zero-carbon portfolio in 2028, almost 20 years earlier than the 100% by 2045 target, 95% by 2040 and 90% by 2035 mandated by SB 100 and SB 1020. It also reduces PWP’s GHG emissions by 88% below 1990 levels by 2030.

### **Scenario 5 - Reference Plus Social Cost of Carbon**

Scenario 5 begins with the assumptions of the Reference Case but adds the estimated financial impact of carbon emissions on the environment and people, translated to \$/metric ton of carbon dioxide.

### **Emerging Technologies Study/Scenario**

This is an additional study that evaluates Scenario 2 with the effects of new “emerging technologies,” a general term that describes and/or predicts technologies that will be developed to enhance energy efficiency or support peak shaving, and which may become available during the IRP Study Period.

### **Sensitivity Tests**

To determine the degree of resiliency under pre-identified operational contingencies, specific Sensitivity Tests were applied to each study. These tests were not intended to produce pass or fail results, but rather provide information about the performance of the Scenarios under extreme conditions.

#### **Heat Wave – Extreme Weather Event**

This test evaluates the performance of a Scenario against the effects of a persistent, record-setting heat wave affecting the region in general, and Pasadena in particular, with daily temperatures that cycle between 90 degrees F (minimum) and 120 degrees F (maximum) for four weeks consistently during the summer.

#### **Goodrich Transfer Contingency – Partial Loss of Physical Connection to Outside Grid**

This test evaluates the performance of a Scenario against a substantial interruption of power flow to PWP's service territory through T. M. Goodrich Receiving Station ("Goodrich"), which is the primary location where electricity can be imported or exported to and from the region. The model represents this condition as the loss of one 220-kV transmission line into Goodrich for one week during the summer.

### **Price Fluctuations – Impacts of New Resource Price Changes**

This test evaluates the impacts of price fluctuations on a Scenario using the low and high price curves estimated by the National Renewable Energy Laboratory ("NREL") and accounts for cost uncertainty.

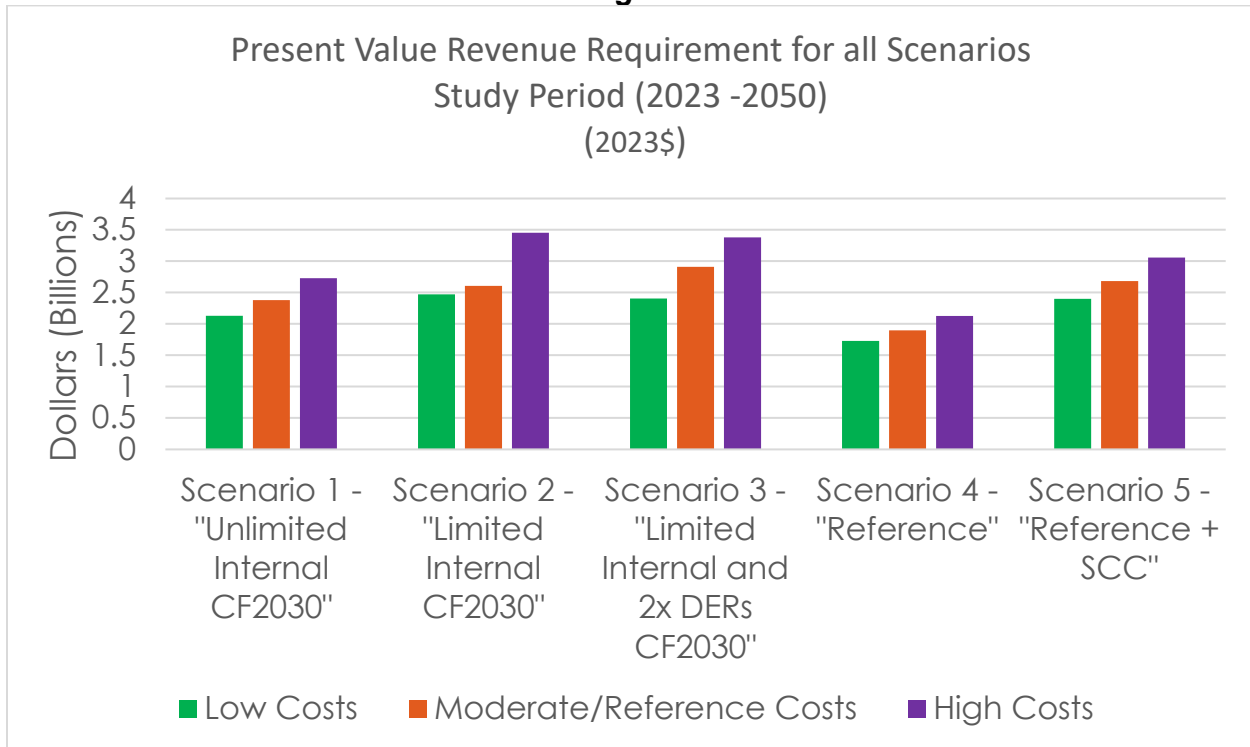
### **Key Takeaways**

- All Scenarios show that additional resources will be needed beginning in 2025 as participation in the Intermountain Power Project ("IPP") begins to scale down:
  - June 2025 – IPP converts to a natural gas facility. 108 MW of installed capacity is reduced to approximately 50 MW.
  - June 2027 – IPP expires, and PWP exits project.
- Scenarios 1 through 3 (Carbon-Free by 2030) exclude all carbon-emitting resources, including energy purchases from the California Independent System Operator ("CAISO") due to the embedded carbon content. They also result in stranded assets and early termination of existing contracts.
  - Glenarm Power Plant, which was repowered in 2017, becomes a stranded investment.
    - The associated stranded investment costs were not included in the modeled power supply cost projections.
  - Magnolia Power Project will require early termination before the 2036 contract end.
- All Heat Wave Scenarios require incremental resource additions within Pasadena's service territory to maintain reliability.
- All Carbon-Free by 2030 Scenarios require installation of a significant number of new resources in Pasadena to mitigate reliability concerns associated with a loss of 140 MW of transmission through Goodrich.
- All Scenarios require considerable incremental generation resources between now and 2030. The Carbon-Free by 2030 Scenarios, in particular, have relatively small timeframes available during which to procure, build, and begin electrical production of the required new resources. The fiscal cost to retail ratepayers is also time-compressed, resulting in exceptional year-over-year rate increase projections.

The impacts of both added and retired resources under each Scenario are depicted in Attachment C.

Figure 1 details the estimated power supply cost of implementing the resource portfolio calculations for each Scenario.

**Figure 1**



*Includes power supply costs only, not overall utility costs.*

### **Emissions Compliance Requirements**

In November 2022, the California Air Resources Board (“CARB”) issued the latest Scoping Plan for Carbon Neutrality (“Scoping Plan”), which accelerates statewide emissions reduction progress and impacts many industries, including utilities. While California’s statewide GHG reduction target is currently set at 40% below 1990 levels by 2030 as mandated by SB 32 (2016), the newly enacted AB 1279 (2022), which is incorporated in the 2022 Scoping Plan, increases this target to 85% by 2045. As part of the Scoping Plan rulemaking and implementation, CARB is also evaluating the future of the Cap-and-Trade program, which may further accelerate and/or impact emissions targets and program requirements.

California’s drive to reduce GHG emissions is ongoing, with new legislation introduced regularly that sets higher targets to achieve faster results. Utilities such as PWP must comply with the changing mandates of programs such as RPS and Cap-and-Trade, which all work together to help achieve increasingly aggressive State goals such as reduced carbon emissions.

In accordance with the 2018 IRP, an ambitious plan that was one of the earliest SB 100-compliant IRPs in California, City Council set its own GHG reduction target to be at least 75% lower than 1990 levels by 2030, which is far more aggressive than the 40% requirement of SB 32. The 2023 IRP continues this progression with all Scenarios showing better performance than both the statewide target and PWP’s minimum internal operating goals, as shown in Table I.

**Table I**

Scenario	Forecasted GHG Emissions in 2031 (End of 2030)	Percent Reduced compared to 1990 level of GHG emissions
Level of GHG Emissions in 1990	918,622	N/A
Scenario 1 "Unlimited internal Carbon-Free by the end of 2030"	0	100%
Scenario 2 "Limited internal Carbon-Free by the end of 2030"	0	100%
Scenario 3 "Limited internal and Doubled Distributed Energy Resources Carbon-Free by the end of 2030"	0	100%
Scenario 4 "Reference Case"	100,924	89%
Scenario 5 "Reference plus Social Cost of Carbon"	17,041	98%

Table II illustrates when each Scenario will achieve California’s 100% clean energy target, as defined by SB 100 and SB 1020.

**Table II**

<b>SB 100 and SB 1020 Compliance Percent Renewable and Zero Carbon 2025-2031</b>							
	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>
<b>Scenario 1</b>	98%	102%	131%	125%	125%	114%	108%
<b>Scenario 2</b>	83%	82%	112%	107%	107%	136%	128%
<b>Scenario 3</b>	78%	78%	108%	103%	103%	129%	123%
<b>Scenario 4</b>	97%	95%	125%	120%	120%	115%	103%
<b>Scenario 5</b>	191%	189%	217%	208%	209%	201%	187%

Results based on resource eligibility as defined in the in the SB 100 Joint Agency Report. See Citation 1.

### **Concerns with Accelerating California’s Targets**

California’s clean energy targets continue to become more stringent. In 2022, the State adopted new industry-wide legislation as part of the *California Climate Commitment* (also known as Governor Newsom’s “Climate Package”), which included several measures designed to reduce statewide carbon emissions, increase adoption of renewable energy, and address other industry-specific concerns. Relevant to utilities such as PWP, the package includes SB 1020, which adds new interim RPS targets that drive faster progress toward achieving SB 100’s “clean energy by 2045” goal. To be compliant, PWP will be required to serve its retail load with eligible renewable and zero-carbon resources on a quickly accelerating, milestone-driven scale. Also, as CARB continues with rulemaking for the Scoping Plan, it is likely that other programs and requirements will be implemented that will affect the utility industry.

At the end of Calendar Year (“CY”) 2022, PWP achieved RPS of 40% and is well positioned to achieve the 2045 target through groundwork that has already been set by the clean energy strategy of the 2018 IRP, which set goals that exceeded regulations in place at the time. The 2023 IRP was developed using the same forward-thinking approach and includes three Scenarios that achieve zero-carbon by 2030. Moreover, Scenario 4 achieves the “100% renewable and zero-carbon” target in advance of California’s 2045 mandate (specifically, in 2028).

As California and the nation push to decarbonize the power grid as quickly as possible, overall resource scarcity, transmission constraints, and volatile energy market conditions have resulted in statewide progress that is slower than expected. In the March *2021 SB 100 Joint Agencies Report*<sup>1</sup>, published by CARB, CEC, and the California Public Utilities Commission (“CPUC”), it is reported that to meet the 2045 target, California would be required to triple its electrical power capacity. Moreover, this study assumes that some natural gas would be retained through 2045 to ensure reliability of California’s power grid.

As PWP reported to the Municipal Services Committee (“MSC”) on January 24, 2023, accelerating California’s targets, which are already among the most ambitious in the nation and world, includes significant risks which the IRP modeling has shown.

### **Reliability of Electricity Service**

Due to resource scarcity, transmission limitations, and various macroeconomic conditions, it is doubtful that ample new renewable and zero-carbon resources or projects would be logistically implementable to meet a 2030 commercial operation date. These realities, combined with the condensed timeline, make it highly improbable that the magnitude of procurement that would be required under Scenarios 1 through 3 could realistically occur. Additionally, Pasadena is a transmission-constrained city, and having available local generation capacity is a critical requirement of everyday planning to ensure uninterrupted

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<sup>1</sup> <https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity>



reliable service. Considering these enormous challenges, pursuit of any of the carbon-free by 2030 options without additional reliability or compensatory safeguards such as local dispatchable generation would severely jeopardize reliability requiring the continued availability of Glenarm. This is further affirmed in the IRP reliability standards as defined in PUC 9621(b)(3).

### **Land Use – Space and Location Constraints**

Pasadena is a residential city with historic character and limited space for future development. Moreover, of the available space, only a small fraction is under the City's control. This presents a challenge when considering options for new energy resources to be constructed within City limits, especially photovoltaic solar, which has the lowest energy output per square foot of all resources evaluated and would require significant additional space. Even if site restrictions were not a factor (such as in customer-sited rooftop installations), a practical limit exists on buildable rooftop space within the City.

Battery Storage options also pose concerns since identifying suitable locations that meet zoning requirements will likely be challenging. Furthermore, community concerns about overall battery safety, especially near populated areas such as residences and schools, may present significant legal challenges that would not only delay projects but could also carry financial implications.

Traditionally, utilities, including electric utilities, have had the benefit of eminent domain to locate facilities and infrastructure that are deemed in the public interest or aligned with the public good. In general, renewable projects have not met this level of public interest, which adds to the existing land use and location challenges.

Ultimately, Scenarios 1 through 3, the studies that call for the most resource development within Pasadena, pose significant challenges from a land use perspective.

### **Resource Market Conditions**

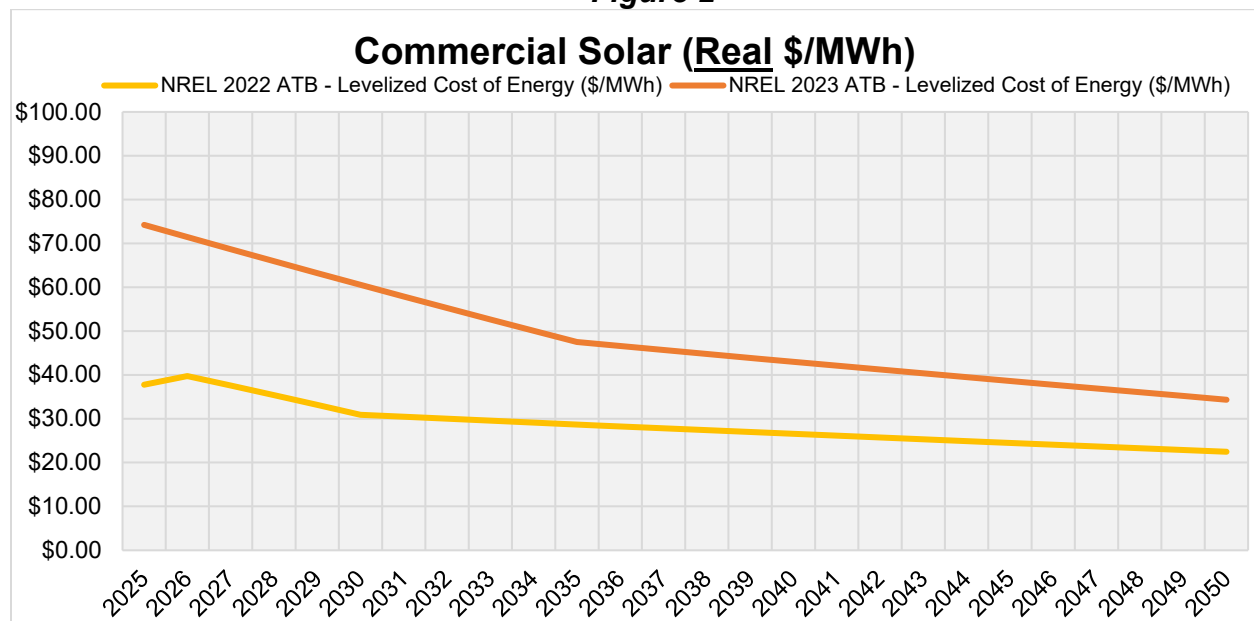
External and/or macroeconomic constraints, such as supply chain, limit the quantity of renewable generation resources available to PWP. This applies to both granular renewable components and rare earth metals needed to assemble renewable generation facilities. Furthermore, large scale renewable developers are challenged in the timely construction of new facilities due to a variety of issues ranging from CAISO high voltage transmission interconnection requirements as well as other considerations such as zoning requirements. Additionally, there is high demand for renewable resources, requiring utilities such as PWP to bid against larger entities with similar renewable resource requirements.

Negotiating an energy resource contract to final form can take several months, depending on the complexity, and usually results in a few well-executed contracts per year. To add new resources on the order of 1,000 MW by 2030, as required by Scenarios 1 through 3, equates to approximately 40 renewable contracts. Additionally, considering that statewide

oversubscription of transmission facilities is occurring, the location and attributes of a project must also be considered to ensure that the renewable energy can be electrically delivered to Pasadena in compliance with CAISO energy market protocols. These import challenges are in addition to local transmission constraints.

Finally, a potential contract must also fulfill the appropriate RPS and Resource Adequacy (“RA”) needs to ensure that it meets regulatory compliance requirements and represents a responsible investment. In today’s market, contracts must be executed approximately four to five years prior to Commercial Operation Date (“COD”), which means that opportunities negotiated now would typically be online by approximately 2028. According to LevelTen Energy, which publishes a Power Purchase Agreement (“PPA”) Index, “between the second quarter of 2022 and 2023, PPA prices increased nearly 30% in both North America and Europe.”<sup>2</sup> Prices in California are generally known to be higher. Considering these factors, in addition to the small volume of development projects in California, the logistical challenges of bringing sufficient resources online to achieve a carbon-free energy portfolio by 2030 are extreme. Figure 2 is a forecast of Commercial Solar costs through 2050.

**Figure 2**



*Comparison of moderate case of new resource cost forecasts based on National Renewable Energy Laboratory’s (NREL) 2022 and 2023 Annual Technology Baseline (ATB)*

**Financial Impacts**

The 2023 IRP Scenarios project cost increases of \$1.5 billion to \$3.5 billion (net present value) in energy supply, which will have an impact on PWP and its customers. The data in this report are estimates only and intended to provide a sense of the financial implications

<sup>2</sup> <https://www.leveltenenergy.com/post/to-fight-climate-change-ppas-need-to-leap-forward>

to the utility and customers based on each Scenario. The overall financial impact of the IRP will be fully evaluated after adoption and incorporated into a cost-of-service study expected to begin in 2024.

For the power supply portion, projections include the costs for existing debt and contractual obligations for facilities that will be stranded as the result of each Scenario. In 2016, Pasadena issued bonds for the Glenarm Power Plant which have an outstanding balance of over \$85 million as of the end of Fiscal Year (“FY”) 2023. Contractual obligations also exist for the Magnolia and IPP projects, which must be repaid regardless of participation. While IPP will terminate in 2027 without any further financial impact, Scenarios 1 through 3 strand the Glenarm and Magnolia assets beginning in 2030.

As a not-for-profit POU, PWP relies on collected rate revenue for all components of services provided. The amounts shown in Tables III and IV are provided for illustrative purposes only and represent “just in time” rates that would be needed for the different “moderate” and “high” costs in order to recover costs. Varying rate structures, capital financing plans, and rate offsets (such as grant funding) will all be actively pursued but cannot confidently be projected and as such are not included in this analysis.

Energy Charge projections are based on single-family residential customers on an annual basis. The projections assume usage of 500 kWh per month (6,000 kWh annually), with the average energy charge portion being \$836.12 per year. Rates will accelerate during the first seven years of the plan due to cost recovery associated with the compressed timeline and will remain elevated after 2030 to support the portfolio costs.

**Table III: Annual Bill Impacts for Single-Family Residential Customers  
(Moderate Cost Estimates)**

Scenario	Power Supply NPV Moderate Cost (\$ in Billions)	Current Energy Charge Portion of Customer Bill in 2023 (\$/single family residential customer, Annualized)	Energy Charge Portion of Customer Bill in 2030 (\$/single-family residential customer, Annualized)	% Change in Energy Charge Portion of Customer Bill from 2024 to 2030	Energy Charge Portion of Customer Bill in 2045 (\$/single family residential customer, Annualized)	% Change in Energy Charge Portion of Customer Bill from 2024 to 2045
1	2.456	\$836.12	\$1,254.18	50%	\$1,367.06	64%
2	3.003	\$836.12	\$1,596.99	91%	\$1,549.08	85%
3	2.926*	\$836.12	\$1,530.10	83%	\$1,484.20	78%
4	1.937	\$836.12	\$1,153.85	38%	\$1,061.54	27%
5	2.426	\$836.12	\$1,588.63	90%	\$1,429.77	71%

\*The total power supply Net Present Value (“NPV”) moderate cost in the table above for Scenario 3 includes the cost of doubling the growth of distributed solar and storage from the load forecast in

*the amount of \$632.33 million. All Scenarios studied in the 2023 IRP have included an embedded Distributed Energy Resource (“DER”) growth rate built into the load forecast. Scenario 3 takes this natural growth rate and doubles to study the value of DERs. The IRP modeling captures the estimated costs as they are an additional cost, regardless of the funding source.*

**Table IV: Annual Bill Impacts for Single-Family Residential Customers  
(High-Cost Estimates)**

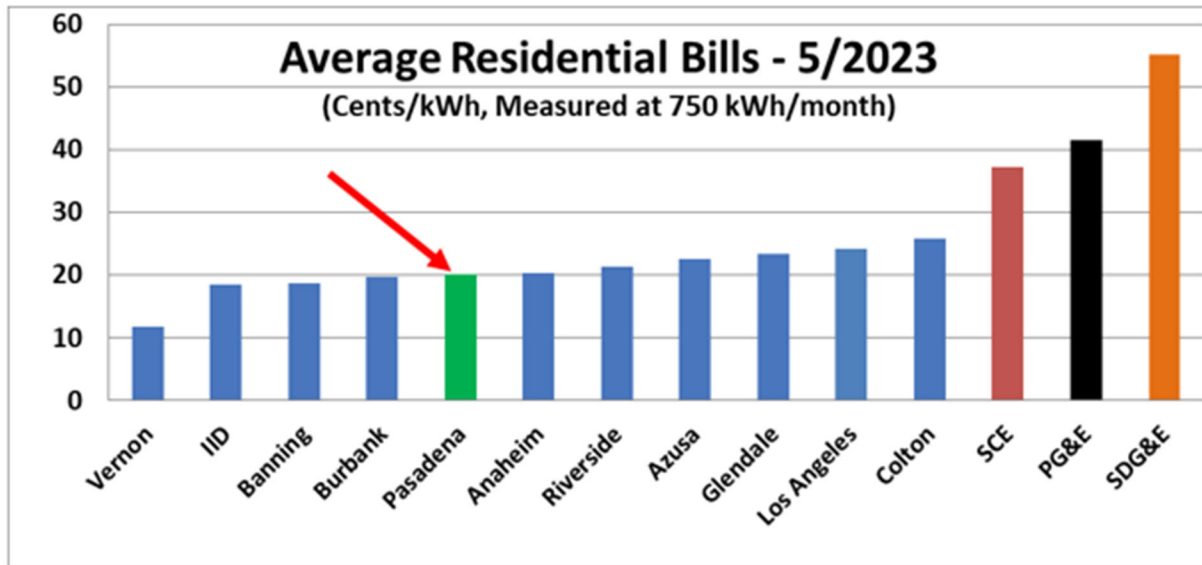
Scenario	Power Supply NPV High Cost (\$ in Billions)	Energy Charge Portion of Customer Bill in 2023 (\$/single family residential customer, annualized)	Energy Charge Portion of Customer Bill in 2030 (\$/single-family residential customer, annualized)	% Change in Energy Charge Portion of Customer Bill from 2024 to 2030	Energy Charge Portion of Customer Bill in 2045 (\$/single family residential customer, annualized)	% Change in Energy Charge Portion of Customer Bill from 2024 to 2045
1	2.728	\$836.12	\$1,354.52	62%	\$1,584.78	90%
2	3.453	\$836.12	\$1,806.02	116%	\$1,824.08	118%
3	3.378	\$836.12	\$1,722.41	106%	\$1,774.08	112%
4	2.127	\$836.12	\$1,220.74	46%	\$1,196.32	43%
5	3.057	\$836.12	\$1,722.41	106%	\$1,205.69	44%

**Retail Rates**

Given that the costs in the IRP are higher than what is currently in the Light & Power Fund Financial Plan, customer retail rates will need to increase to meet the additional revenue requirements. Tables III and IV represent the Energy Charge, just one component of the rates that customers pay for electricity. Other components recover costs for transmission of power to the PWP service area, distribution inside of the service area, customer service, administration, and other factors. All facets of the enterprise require revenue increases to address cost factors such as inflation, high demand, limited supply, supply chain issues, and a competitive job market.

Historically, PWP rates have been commensurate with neighboring and similarly sized utilities. Figure 3 below shows that as of May 2023, Pasadena was around the midpoint for other benchmarking utilities. Power services providers such as PWP have held residential rates around the historical rate of inflation, which is likely to change in the future.

**Figure 3: Pasadena Historical (2023) Power Cost Benchmarking**



*Pasadena's rates in comparison to neighboring cities and investor-owned utilities based on California Municipal Utilities Association DRAFT 2023 California Rate Forecast and Bill Comparison dated July 17, 2023*

On June 12, 2022, the City Council approved PWP's Power Delivery Master Plan ("PDMP") which outlines over \$821 million in investments needed through 2042<sup>3</sup>.

Additionally, the IRP calls for extra capital investments required for electrical distribution system support of battery storage infrastructure. The PDMP was developed using 2021 cost assumptions, prior to the recent high inflationary period and supply chain constraints. The infrastructure needs were also developed with a longer implementation period; accelerating the master plan schedule would be challenging as it may not be technically feasible, and there would be exposure to higher costs than estimated in 2021.

The other components to the total impact on operating cost to be considered are the finance, administration, information technology and customer service components of expenses.

Aside from delivery, CAISO has projected that over the next decade or so, it will need to invest approximately \$7.3 billion in new and upgraded transmission infrastructure to be recovered by participants such as PWP<sup>4</sup>. These transmission investments are required to support statewide decarbonization.

<sup>3</sup> <https://pwp.cityofpasadena.net/wp-content/uploads/2023/07/FY-2022-PWP-Annual-Report-Optimized.pdf>

<sup>4</sup> <https://www.caiso.com/Documents/caiso-2022-2023-transmission-plan-approved.pdf>

When factoring in the increasing costs of the various rate components, it can be confidently implied that bills will increase. While a full cost-of-service analysis will give more certainty on the exact rate impact, it is possible that bill amounts may double. The current rate is in the 20¢ per kWh range and doubling would result in 40¢ plus in the planning time horizon. By looking at just the Energy Charge in this report, customer will likely see bill increases in the double digits. Looking to other utilities who have done full cost analyses and have less ambitious plans and longer lead times, doubling retail rates may also be on the lower end of the spectrum.

### **Cost of Future Debt Financing and Credit Risk**

The added costs associated with the IRP represent a significant change to revenue requirements and will be incorporated into PWP's financial plan. This will prompt discussions with credit rating agencies about future cost recovery efforts to ensure continued excellent credit worthiness. Credit risk, including changes in the bond market, are omitted from rate figures due to the high variability and uncertainty of the credit market.

### **Comparative Benchmark Analysis**

While studying options for Pasadena's energy future, PWP reviewed the plans of two other California POU's – Sacramento Municipal Utilities District ("SMUD") and Los Angeles Department of Water and Power ("LADWP"), among many others:

SMUD has set a "Zero Carbon by 2030" goal and proposed to keep rate increases below the rate of inflation. In the March 2022 Progress Report<sup>5</sup>, SMUD reports that 2024 and 2025 rate cases suggest that supplemental rate increases must be considered due to inflation affecting supply and operating costs. In addition, SMUD is unsure when it will be able to fully eliminate natural gas generation unless additional fuels or new technology emerges to close the gap. Current indications suggest that reaching the 90% zero carbon mark will be relatively easy. However, the remaining 10% will be difficult and costly. In the two years since releasing its Zero Carbon Plan, SMUD has already fallen behind due to volatile market conditions and increasing prices. However, the flexibility of the plan, at its inception, accounts for these situations.

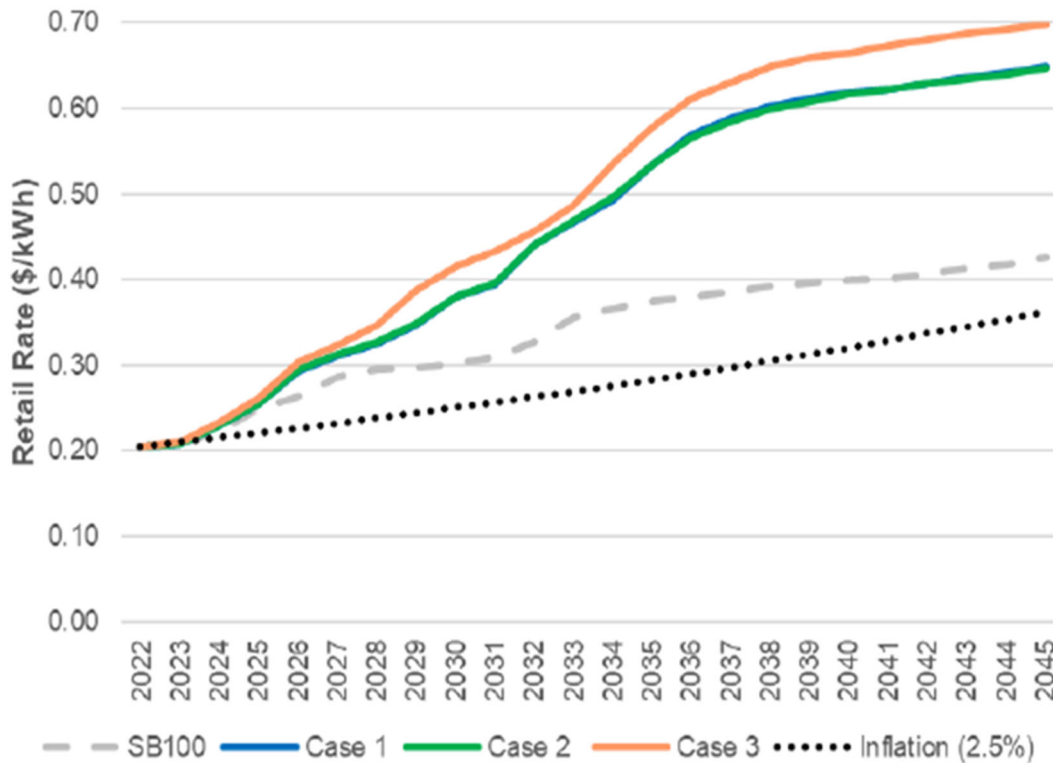
LADWP's "100% Clean Energy by 2035" goal differs from PWP's in that it sets a later target date and uses annual carbon emissions - which allows carbon output during some hours of the year as the benchmarking tool. LADWP has recommended an "80% renewable by 2030" interim goal, which is not necessarily carbon-free, and has affirmed the intent to do so "in a way that is equitable and has minimal adverse impact on ratepayers." Among the many challenges that LADWP lists in its planning document are resource build rates, on both the utility side and the customer side; supply chain and staffing limitations; weather volatility and load resiliency requirements; and potential

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<sup>5</sup>[https://www.smud.org/-/media/Documents/Corporate/Environmental-Leadership/ZeroCarbon/2030-ZCP-Progress-Report---March-2022\\_FINAL.ashx](https://www.smud.org/-/media/Documents/Corporate/Environmental-Leadership/ZeroCarbon/2030-ZCP-Progress-Report---March-2022_FINAL.ashx)

internal financial repercussions. LADWP estimated that rates may increase by up to three times by 2035 as shown in Figure 4 below:

**Figure 4: LADWP Nominal Forecasted Electric Retail Customer Rates**



*Figure 15. Nominal forecasted electric retail customer rates.*

Source: LADWP's 2022 Strategic Long Term Resource Plan - [https://www.ladwp.com/ladwp/faces/ladwp/aboutus/a-power/a-p-integratedresourceplanning.jsessionid=8LZtlR8bNnfbwk2zLdKMYDhlm1vNQqm1CJb120SbzyW5KnVNx9Js!536452485?\\_afzLoop=916568595449569&\\_afzWindowMode=0&\\_afzWindowId=null#%40%3F\\_afzWindowId%3Dnull%26\\_afzLoop%3D916568595449569%26\\_afzWindowMode%3D0%26\\_adf.ctrl-state%3D1ioizrh34\\_4](https://www.ladwp.com/ladwp/faces/ladwp/aboutus/a-power/a-p-integratedresourceplanning.jsessionid=8LZtlR8bNnfbwk2zLdKMYDhlm1vNQqm1CJb120SbzyW5KnVNx9Js!536452485?_afzLoop=916568595449569&_afzWindowMode=0&_afzWindowId=null#%40%3F_afzWindowId%3Dnull%26_afzLoop%3D916568595449569%26_afzWindowMode%3D0%26_adf.ctrl-state%3D1ioizrh34_4)

Both the SMUD and LADWP plans depend on the ability to repower natural gas combustion turbines to run on hydrogen fuel. As PWP has observed, the technology to do this on a utility scale has not yet been proven; therefore, this part of the strategy remains fluid. PWP has not included hydrogen combustion turbines in the 2023 IRP but continues to monitor development of this emerging technology for possible application in future years.

**Next Steps**

The 2023 IRP was developed with a forward-thinking and flexible approach, along with a determination to meet and exceed California's increasingly aggressive clean energy

targets as quickly as possible. As recommended by PUC 9621 and to instill confidence that due diligence was performed, PWP’s Scenarios represent diverse conditions, responses, and goals. Scenarios 1 through 3 include a very conservative treatment of carbon to achieve the results of Resolution 9977, while 4 and 5 are based on California’s continually advancing clean energy targets. Scenario 5 adds a SCC to the State requirements. As technology advances, California will likely continue to implement new laws and regulations which will have compliance requirements for utilities like PWP. Table V below shows the relative degree of concerns associated with each Scenario to address critical conditions and requirements (in order of least to most concerning).

**Table V: Scenarios – Comparison of Concerns**

Scenario	Adverse Rate Impacts	Resource Procurement Challenges	Reduced Reliability	CAISO Market Challenges
1	Most	Most	Most	Most
2	Most	Most	Most	Most
3	Most	Most	Most	Most
4	Least	Least	Least	Least
5	Most	Moderate	Moderate	Least

In any future resource portfolio, PWP will be required to fill the gap between its current resources and the forecasted quantitative performance requirement associated with each resource attribute (specifically, energy supply, RA, and renewable carbon-free energy content). PWP’s challenge will be to augment its portfolio with additional procured and owned resources of various technologies that will fill all three gaps simultaneously, yet cost-effectively.

Near-term resource procurement and/or construction planning initiatives:

- **100 MW of utility-scale solar capacity**
  - In addition to Sapphire solar + battery contract recently executed.
- **60 MW of 4-hour utility-scale storage**
  - Will require additional, as-yet undetermined locations to site within Pasadena.
  - In addition to 25-MW Battery Energy Storage System (“BESS”) currently in solicitation stages.

Besides the actual acquisition and development of individual energy and storage resources, the following are additional actions that PWP is considering that would support the overall carbon reduction goals of the IRP:

- Explore expansion of DERs.
- Support mass transit and electric vehicle fleet development and vehicle-to-grid distributed storage opportunities.
- Continue to study the reliability of PWP’s evolving resource portfolio.
- Perform a cost-of-service study to identify projected resource portfolio capital expenditures over the next 20 years.



- Evaluate possible changes to customer incentives or subsidies, including low-income assistance, and any follow-on Net Energy Metering programs.
- Expand Demand-Side Management, implement Advanced Metering Infrastructure, and explore connection incentives.
- Monitor the actual influence of the City’s Building Electrification Ordinance, which becomes effective in 2025.
- Continue to monitor developments in emerging technologies.

Each of these activities will be evaluated, and any resulting programs or actions will be presented to the City Council for approval and/or other guidance or policy directives.

### **Community Outreach**

As with past IRPs, the 2023 IRP process included a robust community outreach effort. Most notable was the organization of a Stakeholder Technical Advisory Group (“STAG”), a diverse representation of the Pasadena community that participated in ten planning meetings and provided valuable input. PWP also conducted/provided three widely advertised Town Hall Meetings, which encouraged participation and feedback from all members of the community; regular progress updates to MSC, EAC, and the City Council, all of which were accessible to the public; and written responses to approximately 100 comments, questions, and suggestions. Other communications included an informational video and ongoing advertising through local newspapers, website updates, social media, flyers, and bill inserts. All community feedback was carefully considered and used, where appropriate, to shape the IRP.

A summary of STAG and public meetings, and associated discussion topics are shown in Table VI below:

**Table VI**

<b>Meeting</b>	<b>Date</b>	<b>Topic</b>
STAG #1	December 14, 2022	Introductions
STAG #2	January 18, 2023	Introduction of ACES and IRP Process
STAG #3	February 15, 2023	Decarbonization Pathways
Community Meeting #1	February 22, 2023	Start of IRP Process and where is PWP now?
STAG #4	March 1, 2023	Proposed Scenarios and Sensitivity Tests
Municipal Services Committee	March 14, 2023	Informational Update
Environmental Advisory Commission	March 14, 2023	Informational Update
STAG #5	March 15, 2023	Assumption Data Discussion
STAG #6	April 12, 2023	Cost of New Resources
STAG #7	April 19, 2023	Final Scenarios and Sensitivity Tests
Community Meeting #2	April 27, 2023	What will be studied in the 2023 IRP (Scenarios, Sensitivity Tests, and Study)
Municipal Services Committee	May 9, 2023	Informational Update
Environmental Advisory Commission	May 9, 2023	Informational Update
STAG #8	May 17, 2023	Load Forecast
STAG #9	August 16, 2023	Results of 2023 IRP Scenarios
Environmental Advisory Commission	September 12, 2023	Informational Update
STAG #10	September 20, 2023	Wrap-up
Virtual Community Meeting #3	September 21, 2023	Results of 2023 IRP and Steps going forward

### **Independent Review**

To ensure transparency in the IRP study results, PWP also contracted with E3 to review the IRP analysis. A recognized leader in clean energy policy implementation, E3 provides technical, policy, and market analysis, and has worked with clients that include CEC, CPUC, CARB, and a variety of public and private utilities throughout the nation and the world. E3 has also explored higher RPS standards for SMUD, experience that was especially valuable for PWP's project considering the goals of Resolution 9977.

E3 reported that the modeling approach conducted by ACES was logically sound, and that the IRP meets CEC reporting standards. E3 also made recommendations for future consideration, including that further assessment would be required to demonstrate conclusively that the carbon-free portfolios developed would be sufficient to meet PWP's RA obligations and local reliability needs.

### **Summary and Recommendation**

In order to meet State of California compliance requirements and fulfill PWP's obligation to the community, it is respectfully recommended that the City Council adopt and approve the 2023 IRP. In addition to meeting CEC filing requirements, the IRP incorporates Resolution 9977, which directs the City Manager to use the IRP process to plan multiple approaches to transition to the policy goal of sourcing 100% of Pasadena's electricity from carbon-free sources by the end of 2030, while optimizing for affordability, rate equity, stability, and reliability.

It is also recommended that the City Council support PWP's continuing power supply decarbonation efforts, including future programs, projects, and procurements, that help advance Pasadena on the path toward a carbon-free future.

The IRP provides the technical objectives, data, information, and pathways needed to achieve 100% carbon-free by 2030. However, many of the required implementation plans are extremely challenging due to a variety of concerns that have been largely documented and are generally included in the *2021 SB 100 Joint Agencies Report*<sup>1</sup>. Those challenges include maintaining required reliability standards, the time compression leading to 2030, supply chain, inflation, and statewide land use issues. Furthermore, the immense renewable procurement that would be required with many facilities not yet built, sited, or still requiring further environmental analysis; in addition to known CAISO transmission constraints, CAISO interconnection queue requirements, and the prerequisite for incremental statewide transmission infrastructure needed to support renewable generation are among many of the technical and logistical concerns.

Through strategic operations, active planning, and effective procurements, PWP has realized significant reductions in electric system GHG emissions, with a 68% reduction as compared to 1990 thresholds. Moreover, the electric power industry, despite growing electrical demand, has outpaced other industrial sectors such as transportation, in the reduction of GHG emissions. Previous PWP plans and forecasted projections affirm

significant future GHG reductions, and the 2023 IRP builds upon that existing trajectory. While the timely implementation of the 2030 carbon-free goal is logistically challenged, the continuation of GHG reductions and trajectory are not compromised. Although achieving the removal of the final percentages of GHG emissions are known to be the most challenging and expensive, there is future expectation that new or emerging technologies, such as long-term battery storage, will be a valuable enabler.

There are federal and state regulatory requirements that ensure electric system reliability. The 2023 IRP optimizes across various factors, to include reliability requirements. By definition, these non-dispatchable resources do not rise to the level of providing electric system reliability by themselves, due to their vulnerability to insufficient wind or illumination. There is industry optimism that future technologies will be developed at scale that could mitigate this vulnerability such as long duration batteries as well as other technologies. The Glenarm facility would remain available as part of the Carbon-Free Scenarios. In a partially offsetting fashion, the Glenarm facility would operate sparingly responding to either energy scarcity or localized reliability events.

The 2023 IRP has been informative and valuable by identifying optimized renewable portfolio configurations and power supply costs. It also reinforces the understanding that power supply decarbonization will require flexibility in negotiation of renewable contracts as well as the employment of all approaches and carbon-free resource types identified in the Scenarios.

In summary, the 2023 IRP will continue the PWP trajectory of GHG reductions in an uninterrupted manner. As in past years, PWP will rely upon proactive planning which is critical to ensuring electric reliability and affordability while being responsive to new and changing laws, regulatory requirements, and market conditions.

PWP will continue to be responsive and aligned with local City governance and policy direction as assigned and instructed.

### **CITY COUNCIL POLICY CONSIDERATION:**

The 2023 IRP supports the City's Urban Environmental Accords goals with respect to increasing renewable energy and reducing GHG emissions, the General Plan Energy Element, the 2018 Power IRP (as updated in 2021), and the City Council's Strategic Planning Goals. The 2023 IRP specifically supports the following Urban Environmental Accords goals: Action 1 - Renewable Energy; Action 2 - Energy Efficiency; and Action 3 - Climate Change. The 2023 IRP also satisfies the directives of Resolution 9977.

### **ENVIRONMENTAL ANALYSIS:**

On March 11, 2009, March 5, 2012, and June 22, 2018, the City Council found that the adoption of the 2009, 2012, and 2015 IRPs were exempt from review pursuant to State CEQA Guidelines Sections 15262 and 15271. CEQA exempts from its application those projects that involve "only feasibility or planning studies for possible future actions, which


the agency, board or commission has not approved, adopted, or funded ... " and which do not have a legally binding effect on later activities. (State CEQA Guidelines §15262.) To fall under this exemption, however, the lead agency is required to consider environmental factors.

PWP presents the 2023 IRP with strong consideration of environmental factors. A primary goal of the plan is to analyze ways to reduce the environmental impact of Pasadena's overall energy portfolio, particularly, the reduction of GHG. Furthermore, any specific construction projects undertaken pursuant to the PWP 2023 IRP will be subject to full CEQA compliance, both as and when appropriate.

**FISCAL IMPACT:**

Approval of the PWP 2023 Power IRP compliance filing will have no direct fiscal impact. The IRP will, however, provide essential data and a framework to evaluate power resource and program choices -- some of which, if executed, would hold potentially substantial cost implications for PWP and its electric ratepayers.

Respectfully submitted,



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SIDNEY JACKSON  
General Manager  
Water and Power Department


Prepared by:

 for

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Robert Castro  
Power Resource Planning Manager  
Water and Power Department

Approved by:



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MIGUEL MARQUEZ  
City Manager

Attachments:

Attachment A: Correspondence from the EAC Special Meeting on September 26, 2023

Attachment B: Resolution 9977

Attachment C: Impacts of Resources Under Each Scenario

## Attachment A: Correspondence from EAC to City Council

### MEMORANDUM

**To:** Pasadena City Council  
**From:** Pasadena Environmental Advisory Commission  
**Date:** September 26, 2023  
**Re:** Integrated Resource Plan Letter to Council

Dear Councilmembers,

On September 12, Pasadena Water and Power presented to the Environmental Advisory Commission (“EAC”) on the state of Pasadena’s 2023 Power Integrated Resource Plan (“IRP”). That presentation included the results of modeling that PWP and its consultant had done, but PWP did not present the EAC with a written draft. It prompted a discussion with PWP regarding their efforts to comply with Council Resolution No. 9977, which calls for the City to source 100 percent of its electricity from carbon-free sources by the end of 2030. We write with recommendations for how the Council can ensure that Pasadena is meeting the goal set by Resolution No. 9977, both in the IRP process and beyond.

Subject to the Council’s approval, PWP plans to submit its IRP to the California Energy Commission (“CEC”) by December 31, 2023. PWP plans to submit an IRP that complies with CEC’s regulatory requirements. However, based on the discussion at our September 12<sup>th</sup> EAC meeting, we understand that PWP is not expecting to submit any single specific plan (such as a “recommended planning strategy”) for achieving an energy portfolio that meets the requirements of Council Resolution No. 9977. It is our understanding that what PWP plans to do is acceptable practice for an IRP. However, we note that PWP’s 2018 IRP did include a “Recommended Planning Strategy,” which selected a specific modeled scenario to assist PWP in procurement decisions.<sup>1</sup>

As PWP has acknowledged, this year’s IRP process has been driven by the carbon-free goal pronounced in Council Resolution No. 9977. Accordingly, we believe it is appropriate for the Council to direct PWP to include language in the IRP, as well as to produce a separate and more specific formal planning document, which can guide PWP as it works to comply with Resolution No. 9977. In addition, we recommend that the Council adopt a formal accountability process so that the Council can assess PWP’s progress toward meeting the goal set forth in Resolution No. 9977.

#### **I. IRP Statement and Formal Planning Document**

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<sup>1</sup> See Pasadena Water and Power, *2018 Power Integrated Resource Plan* (December 2018), 38–39, available at <https://pwp.cityofpasadena.net/wp-content/uploads/2018/12/Pasadena-Water-and-Power-2018-IRP-Final.pdf>.

If PWP is to meet the goal of sourcing Pasadena’s electricity from carbon-free sources by the end of 2030, PWP needs to set clear interim goals for its power procurement and proffer a plan of reasonable specificity as to how it will meet those goals. We recommend that the Council direct PWP to do the following:

1. Reaffirm, in the text of the IRP, that PWP recognizes the City’s commitment to sourcing 100 percent of electricity from carbon-free sources by the end of 2030, and that PWP intends to rely on a combination of the scenarios modeled in the IRP to achieve that goal.
2. Draft and submit to the Council, on a defined timeline, a formal planning document that outlines, with reasonable specificity, the steps that PWP will take to implement a combination of the modeled scenarios outlined in the IRP and to achieve compliance with the 2030 carbon-free electricity goal. We recommend that such a document include, as a minimum, plans in the following areas:
  - a. Plans to act expeditiously to negotiate and execute Power Purchase Agreements for carbon-free power sources.
  - b. Plans to shift toward expansion of distributed energy resources (“DER”). We are concerned that PWP has not taken sufficient affirmative steps to encourage distributed energy resources, particularly rooftop solar installations. We recommend that the Council direct PWP to set a plan to double the amount of installed rooftop solar as a starting point.
  - c. Plans to significantly expand battery storage infrastructure in Pasadena.
  - d. Plans to significantly improve and expand PWP’s energy efficiency programs.
  - e. Plans to significantly improve and expand PWP’s demand reduction programs. This should include implementing “time of use” programs for customers to reduce or curtail demand.
  - f. Plans to significantly improve and expand programs for financially disadvantaged customers.
  - g. Plans to move up the timeline for the Goodrich Intertie.

The EAC appreciates the Council’s strong statements and ambitious goal set forth in Resolution No. 9977. We believe that the Council is taking the right stance in the face of the reality of climate change. We also recognize that it will take strong, ongoing leadership to ensure that the City meets the 2030 carbon-free electricity goal. Continued action beyond the submission of the IRP document is required, and we believe that a formal planning document as described above is a necessary step in that direction.

## II. Accountability Process

We also recommend that the Council implement a robust accountability process to ensure that PWP remains on track to meet the City's carbon-free electricity goal. The Council has set an unambiguous target for Pasadena's clean-energy future, and we appreciate the Council's unwavering commitment to achieving that target. We also recognize that procuring and providing reliable, carbon-free electricity is a complicated technical, logistical, and financial undertaking. To ensure that PWP is acting with necessary speed toward that goal, we believe it is important for the Council to exercise close oversight to hold PWP accountable to that goal and to the formal planning document described above. We believe that the Council should consider the following accountability mechanisms:

1. Demand regular, fulsome reports from PWP on its progress toward the carbon-free electricity goal, on top of the regular reporting to Council that PWP does. This could involve, for example, PWP submitting certain simple and basic metrics to the Council each time it presents, as well as publicizing this information on the PWP website in an accessible format, which could include:
  - a. The number of carbon-free energy contracts currently in force (and what power they are expected to provide on what timeline)
  - b. The number of carbon-free energy contracts being negotiated (and what power they are expected to provide on what timeline)
  - c. The number of carbon-free energy contracts being contemplated or pursued by PWP (and what power they are expected to provide on what timeline)
  - d. Pasadena's total daily MW power usage and the percentage that comes from carbon-free sources
2. Demand regular, fulsome reports to a citizen body modeled on the Stakeholder Technical Advisory Group ("STAG"), including presentation of the information described in paragraph one.
3. Vest a City commission with meaningful and well-delineated audit authority over PWP. This authority could be vested in the Environmental Advisory Commission or in, for example, a reestablished Utilities Commission.

Respectfully Submitted  
Chairperson David Cutter





RESOLUTION NO. 9977

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF PASADENA, CALIFORNIA DECLARING A CLIMATE EMERGENCY AND SETTING A GOAL TO SOURCE 100% OF PASADENA'S ELECTRICITY FROM CARBON FREE SOURCES BY 2030**

**WHEREAS**, on March 5, 2018, the City of Pasadena ("City") adopted a Climate Action Plan ("CAP) based on the Global Warming Solutions Act of 2006 ("AB 32") and focuses on five specific GHG reduction strategies: Energy Efficiency and Conservation; Sustainable Mobility and Land Use; Solid Waste Reduction; Water Conservation; and Urban Greening; and

**WHEREAS**, the CAP reinforces Pasadena's commitment to providing sources of renewable power and reducing GHG emissions by meeting or exceeding state required emissions reduction targets; and

**WHEREAS**, the City has already implemented a number of important actions to achieve CAP GHG reduction goals including but not limited to a commitment to procuring only low carbon generating resources and phasing out all fossil fuel contracts, and offering a 100 percent renewable Green Program rate option for customers; and

**WHEREAS**, the City has declared a water supply shortage and has enacted stringent water conservation policies and strategies to mitigate the effects of ongoing drought conditions; and

**WHEREAS**, the City actively promotes active transportation, public transit, and continues to demonstrate leadership in accelerating the adoption of Electric Vehicle ("EV") technology with Pasadena having one of the highest percentages of registered EVs in the nation; and

**WHEREAS**, the City has adopted ordinances to achieve long-term GHG reduction including a requirement to include electrification in new building designs, prohibiting the use of gas-powered leaf blowers, and prohibiting polystyrene food packaging in Pasadena; and

**WHEREAS**, the City continues to exceed CAP Urban Greening targets by restoring greenspace and planting new trees to improve carbon sequestration, reduce urban heat-island effect, and increase opportunities for active recreation; and

**WHEREAS**, the City has developed partnerships with community-based organizations for inclusive energy efficiency and water conservation programs and actively engages the community in conservation strategies; and

**WHEREAS**, the Pasadena Environmental Advisory Commission on January 17, 2023, the Pasadena Unified School District Board of Education on December 15, 2022, and the Pasadena City College Board of Trustees on January 18, 2023, each took action to support a goal of the City of Pasadena achieving 100% carbon free Energy by 2030 to address the climate emergency; which aligns with and supports previous actions of the Pasadena City Council when it adopted an Environmental Charter in 2005, endorsed the U.S. Mayors' Climate Protection Agreement and the United Nations Urban Environmental Accords, and launched a Green City Action Plan in 2006; and

**WHEREAS**, the City recently implemented a comprehensive GHG Inventory process to measure actual and forecasted emissions of municipal operations and the community to gauge the ongoing progress of the CAP; and

**WHEREAS**, California continues to pass successor legislation that expands on the goals of AB 32 and prioritizes climate change mitigation strategies; and

**WHEREAS**, in the 2022 Scoping Plan for Carbon Neutrality ("Scoping Plan"), the California Air Resources Board ("CARB") has set a recommended GHG emissions reduction target of 85 percent below 1990 levels by 2030 and carbon neutrality by 2045, and updates the Scoping Plan every five years with increasingly ambitious targets; and

**WHEREAS**, in Policy D-135.966, the American Medical Association has declared climate change as a "public health crisis that threatens the health and well-being of all individuals" and promises to advocate for policies that limit global warming, reduce GHG emissions, and support clean energy solutions; and

**WHEREAS**, according to the California Energy Commission, the percentage of California's energy that comes from renewable resources continues to increase as the state moves toward 100 percent clean energy; and

**WHEREAS**, proactive planning is required to ensure that GHG emissions reduction can be achieved while maintaining a power supply portfolio that meets customer needs, satisfies local and state reliability requirements, and minimizes electric rate impacts and volatility; and

**WHEREAS**, the City’s role as a publicly owned utility is governed by local, state, and federal laws and regulations; multi-party agreements; and bond documents which direct and/or impact operating and investing decisions; and

**WHEREAS**, Pasadena Water and Power (“PWP”) undergoes its Power Integrated Resource (“IRP”) planning process every five years, which guides how Pasadena’s electricity will be sourced for the next 20 years; and

**WHEREAS**, the City is committed to demonstrating aggressive action and ongoing leadership in combating climate change and has set GHG targets that will achieve carbon neutrality before 2045.

**NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF PASADENA AS FOLLOWS:**

Section 1. The City Council hereby declares that climate change is an emergency that threatens the health and welfare of our city, region, state, nation, and the environment.

Section 2. The City commits to environmental stewardship and continued leadership in sustainability.

Section 3. The City Council hereby sets a policy goal to source 100% of Pasadena’s electricity from carbon free sources by the end of 2030.

Section 4. The City Council hereby directs the City Manager to utilize the 2023 IRP process to plan multiple approaches to transition to the goal described in Section 3 and to optimize affordability, rate equity, stability, and reliability of electricity while achieving this goal.

Section 5. The City Council hereby directs the City Clerk to send a certified copy of this resolution to the Pasadena Water and Power General Manager.

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Adopted at the regular meeting of the City Council on the 30<sup>th</sup> day of January  
2023, by the following vote:

AYES: Councilmembers Hampton, Jones, Lyon, Madison, Masuda,  
Rivas, Vice Mayor Williams, Mayor Gordo


NOES: None

ABSENT: None

ABSTAIN: None

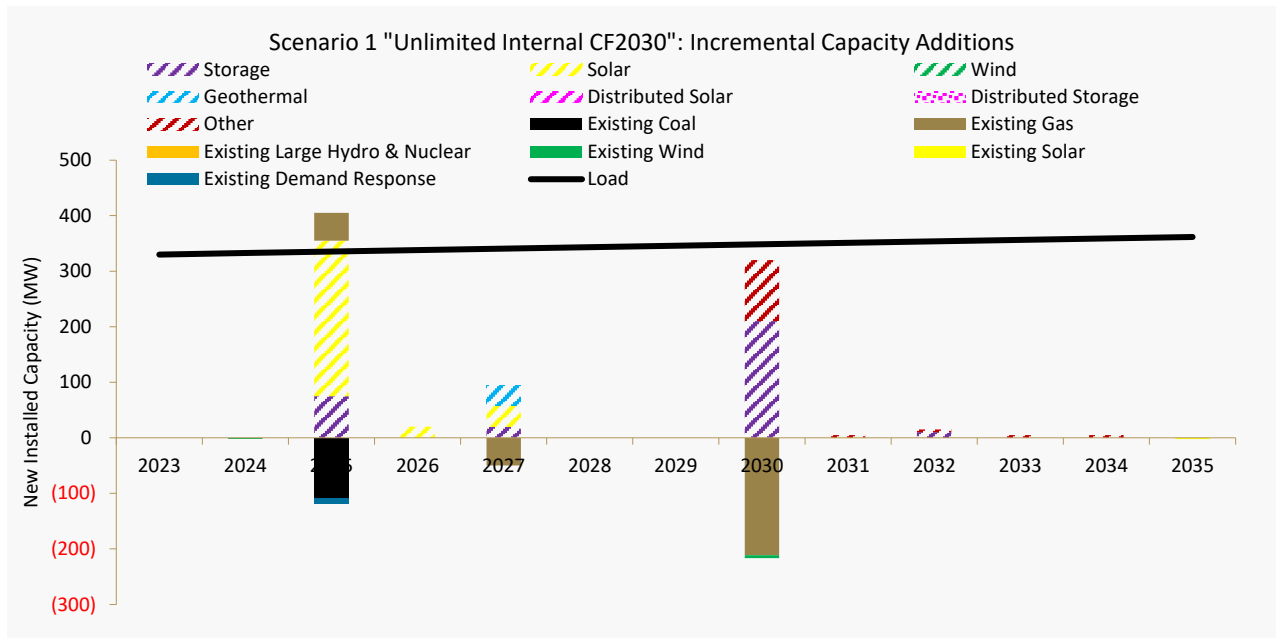
  
\_\_\_\_\_  
Mark Jomsky  
City Clerk

Approved as to form:

  
\_\_\_\_\_  
Lisa Hosey  
Assistant City Attorney

# Attachment C: Impacts of Resources Under Each Scenario

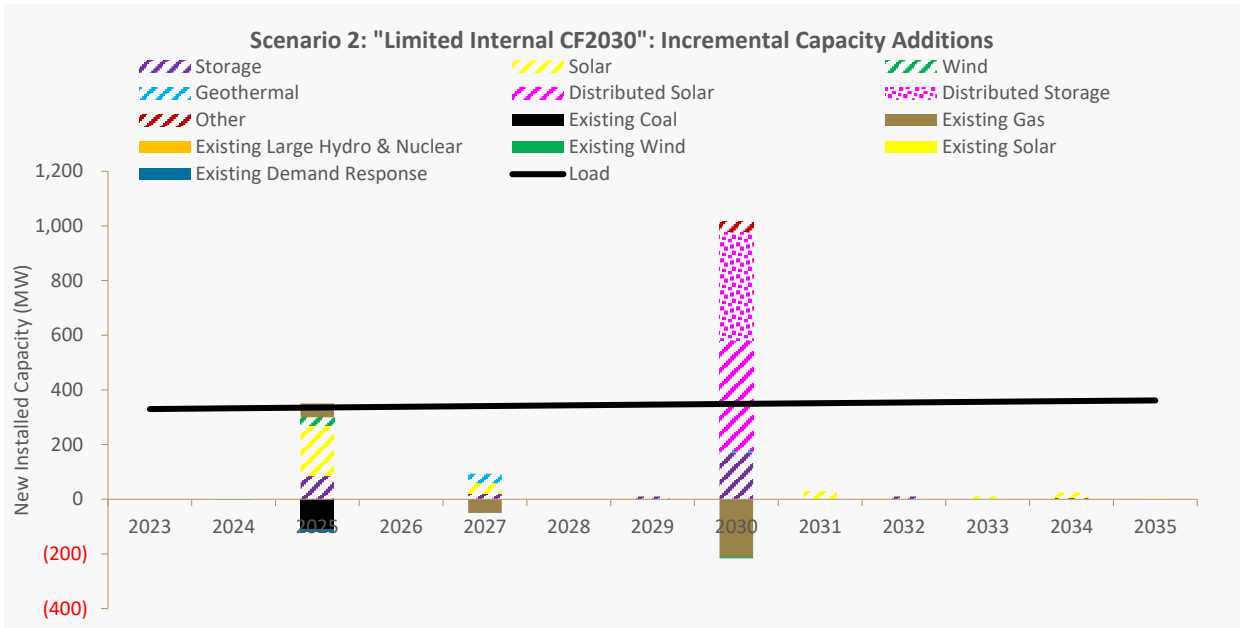
## Scenario 1:



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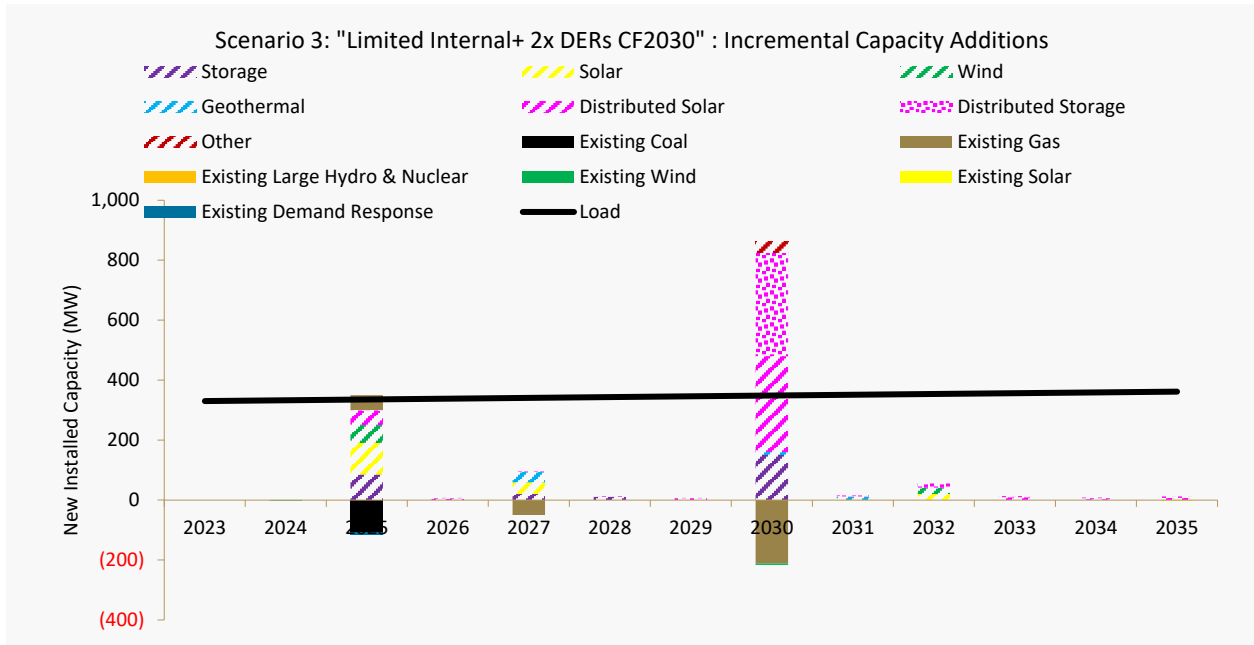
Scenario 1	
Timeline	Impacts
2025	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 108 MW IPP Coal</li> <li>• 10 MW Demand Response</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> <li>• 280 MW Solar</li> <li>• 75 MW Storage</li> </ul>
2027	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 39 MW Solar (EDF Sapphire)</li> <li>• 35 MW Geothermal (Coso Geothermal and Calpine Geysers_)</li> <li>• 20 MW Storage (EDF Sapphire)</li> </ul>
2030	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 212 MW Natural Gas (Glenarm + Magnolia)</li> <li>• 5 MW Wind (Milford 1)</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 210 MW Storage</li> <li>• 110 MW Fuel Cells</li> </ul>
Overall Impact	Scenario 1 focuses on Fuel Cells to meet most needs. Solar and Storage also make significant contributions.

## Scenario 2



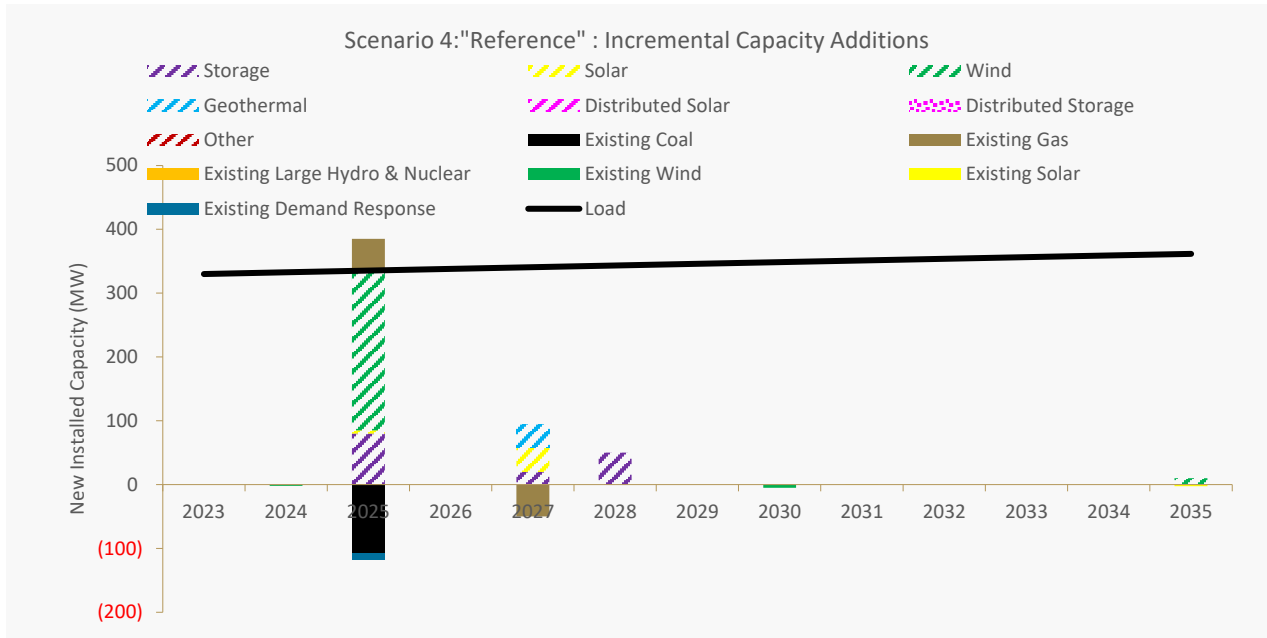
Scenario 2	
Timeline of Impacts	Impacts
2025	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 108 MW IPP Coal</li> <li>• 10 MW Demand Response</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> <li>• 185 MW Solar</li> <li>• 30 MW Wind</li> <li>• 85 MW Storage</li> </ul>
2027	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 39 MW Solar (EDF Sapphire)</li> <li>• 35 MW Geothermal (Coso Geothermal and Calpine Geysers)</li> <li>• 20 MW Storage (EDF Sapphire)</li> </ul>
2030	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 212 MW Natural Gas (Glenarm + Magnolia)</li> <li>• 5 MW of Wind (Milford 1)</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 170 MW Storage</li> <li>• 35 MW Fuel Cells</li> <li>• 10 MW Geothermal</li> <li>• 400 MW of Distributed Solar</li> <li>• 400 MW of Distributed Storage</li> </ul>
Overall Impact	Scenario 2 focuses on Distributed Energy Resources; specifically, solar and storage to meet needs.

### Scenario 3



Scenario 3	
Timeline	Impacts
2025	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 108 MW IPP Coal</li> <li>• 10 MW Demand Response</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> <li>• 105 MW Solar</li> <li>• 85 MW Storage</li> <li>• 60 MW Wind</li> <li>• 2 MW Distributed Storage</li> </ul>
2027	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 39 MW Solar (EDF Sapphire)</li> <li>• 35 MW Geothermal (Coso Geothermal and Calpine Geysers)</li> <li>• 20 MW Storage (EDF Sapphire)</li> </ul>
2030	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 212 MW Natural Gas (Glenarm + Magnolia)</li> <li>• 5 MW Wind (Milford 1)</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 150 MW Storage</li> <li>• 35 MW Fuel Cells</li> <li>• 320 MW Distributed Storage</li> <li>• 347 MW Distributed Solar,</li> </ul>
Overall Impact	Scenario 3 focuses on Distributed Energy Resources, with supplemental resources in Wind, Solar, and Storage.

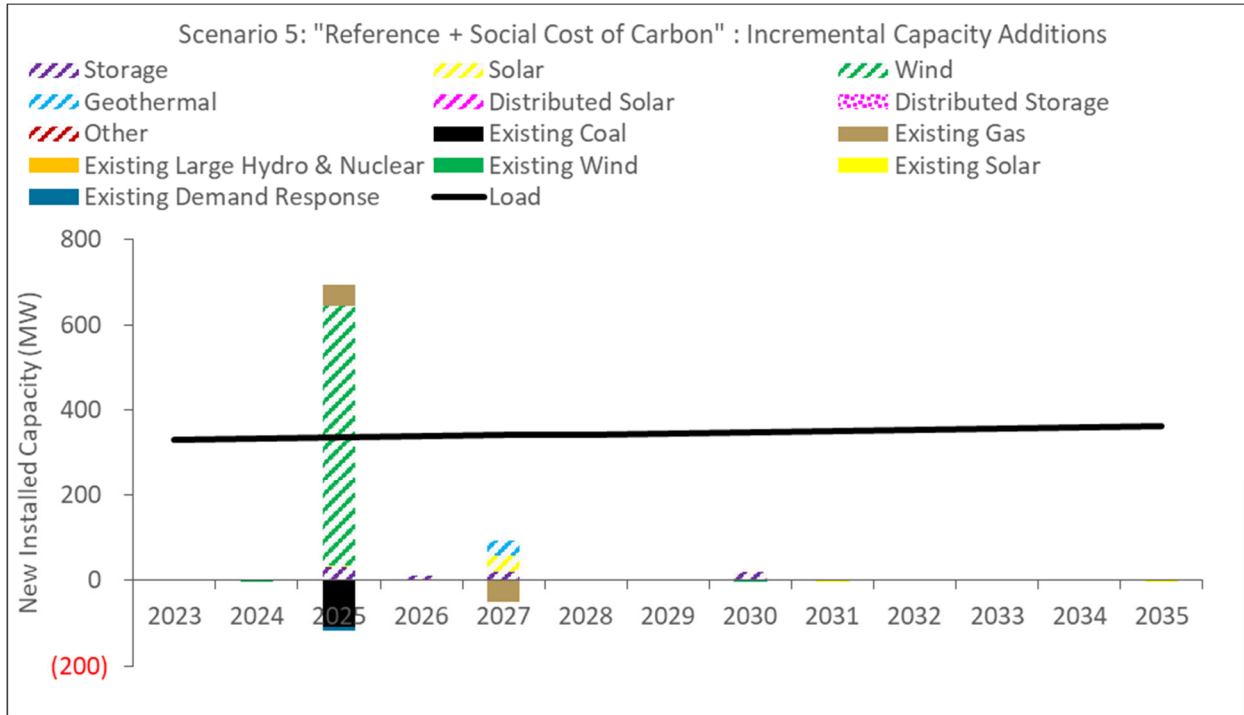
## Scenario 4



Scenario 4	
Timeline	Impacts
2025	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 108 MW IPP Coal</li> <li>• 10 MW Demand Response</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> <li>• 5 MW Solar</li> <li>• 250 MW Wind</li> <li>• 80 MW Storage</li> </ul>
2027	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> </ul> <p><b>Additions</b></p> <ul style="list-style-type: none"> <li>• 39 MW Solar (EDF Sapphire)</li> <li>• 35 MW Geothermal (Coso Geothermal and Calpine Geysers)</li> <li>• 20 MW Storage (EDF Sapphire)</li> </ul>
2030	<p><b>Retirements</b></p> <ul style="list-style-type: none"> <li>• 5 MW Wind (Milford 1)</li> </ul> <p><b>Additions – None</b></p>
Overall Impact	<p>Scenario 4 is designed to meet regulatory requirements and past IRP objectives. Glenarm remains online, reducing the need for additional resources, with remaining needs met by Wind. It achieves 100% renewable and zero-carbon by 2028, almost 20 years ahead of the 2045 California mandate, and reduces GHG emissions by 88% below 1990 levels by 2030.</p>



## Scenario 5



Scenario 5	
Timeline	Impacts
2025	<p>Retirements</p> <ul style="list-style-type: none"> <li>• 108 MW IPP Coal</li> <li>• 10 MW Demand Response</li> </ul> <p>Additions</p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> <li>• 5 MW Solar</li> <li>• 610 MW Wind</li> <li>• 30 MW Storage</li> </ul>
2027	<p>Retirements</p> <ul style="list-style-type: none"> <li>• 54 MW Natural Gas (IPP Renewal)</li> </ul> <p>Additions</p> <ul style="list-style-type: none"> <li>• 39 MW Solar (EDF Sapphire)</li> <li>• 35 MW of Geothermal (Coso Geothermal and Calpine Geysers)</li> <li>• 20 MW Storage</li> </ul>
2030	<p>Retirements</p> <ul style="list-style-type: none"> <li>• 5 MW Wind (Milford 1)</li> </ul> <p>Additions</p> <ul style="list-style-type: none"> <li>• 20 MW Storage</li> </ul>
Overall Impact	<p>In Scenario 5, Glenarm remains operational but is disincentivized due to a large, presumptive tax on carbon emissions (SCC). Wind, which provides the best ancillary services compared to other renewables, meets overall needs.</p>