



Pasadena Water and Power

**INFORMATIONAL UPDATE ON THE PASADENA WATER AND POWER'S
OPTIMIZED STRATEGIC PLAN TO ESTABLISH A ROADMAP TO MEET THE
GOALS SET FORTH BY CITY COUNCIL'S
ADOPTED RESOLUTION 9977**

City Council

October 28, 2024

Item 22





City Council Policy & Direction

Pasadena Water and Power

City Council Passes Resolution 9977

January 30, 2023

Declared a climate emergency

Set the goal to source 100% of Pasadena's electricity from carbon-free sources by the end of 2030

City Council Approves PWP's Integrated Resources Plan

December 11, 2023

Upon approval of the IRP, City Council issued guidance

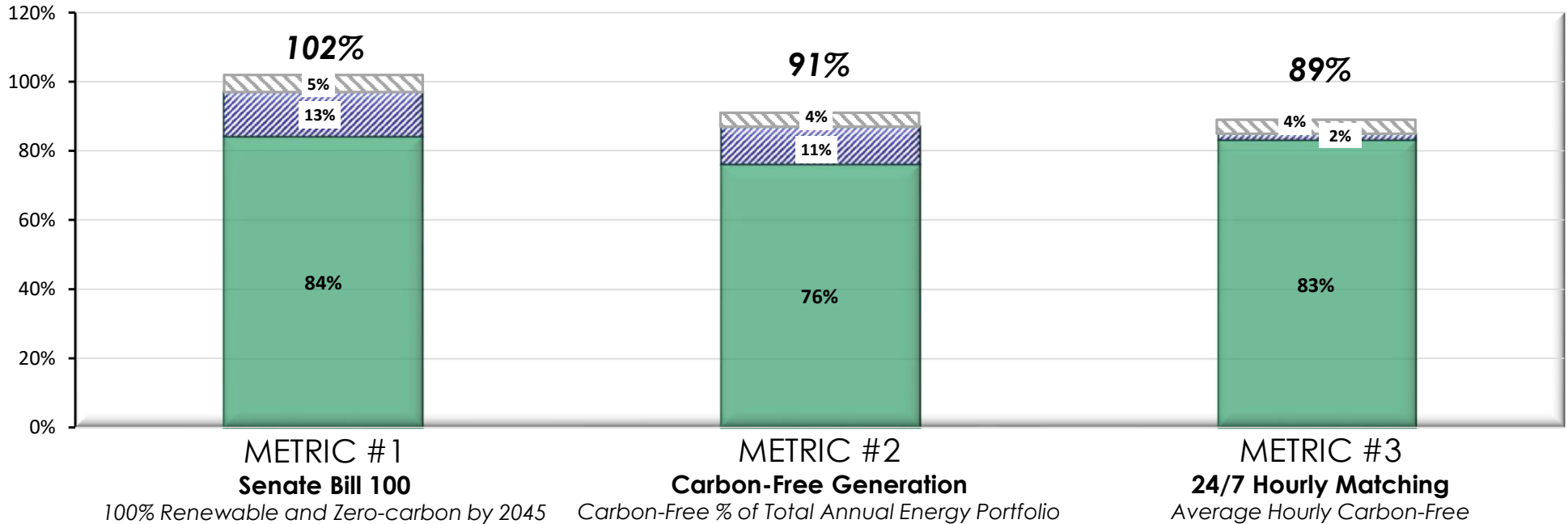
- Use a third-party with expertise in green energy
- City Manager's Office to assist with the oversight of the development of an Optimized Strategic Plan (OSP)



Forecasted Progress – Key Metrics

Pasadena Water and Power

Pasadena's Progress Towards 100% Carbon-Free Electricity by 2030
(Forecast as of October 22, 2024)



*Note Forecasted metrics presented are subject to change at anytime due to updated information

■ Executed

▨ Grace

▨ In-Progress

Development of an Optimized Strategic Plan for Pasadena Water and Power

Update for City Council

October 28, 2024



Energy+Environmental Economics

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About Energy & Environmental Economics, Inc. (E3)



Technical and Strategic Consulting for the **Clean Energy Transition**

100+ consultants across **4** offices with expertise in economics, mathematics, policy, modeling



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New York

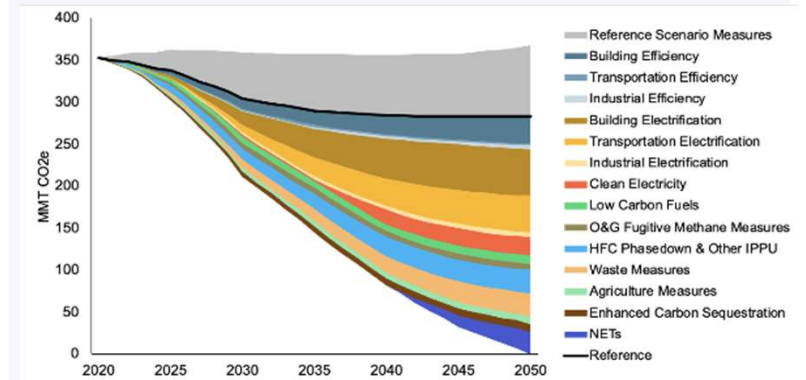


Boston



Calgary

250+ projects per year focused on energy & climate environment



Context for the Need for an Optimized Strategic Plan

- + In January 2023, Pasadena City Council passed Resolution 9977, setting ambitious goals for the city amidst a climate emergency
- + Goal to source all electricity from carbon-free sources by 2030 far exceeds requirements of California state policy
 - Establishes City of Pasadena as a leader on climate change in a state with already aggressive policy goals
 - Requires a head-on confrontation with a series of technical challenges well-established in literature regarding the transition to a carbon-free electricity system

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

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.

Defining “Optimized Strategic Plan”

The Optimized Strategic Plan is...

...a roadmap that lays out the key steps and future decision points that will best position PWP to achieve its goal to source all electricity from carbon-free sources by the end of 2030 while maintaining reliability and limiting cost impacts to customers

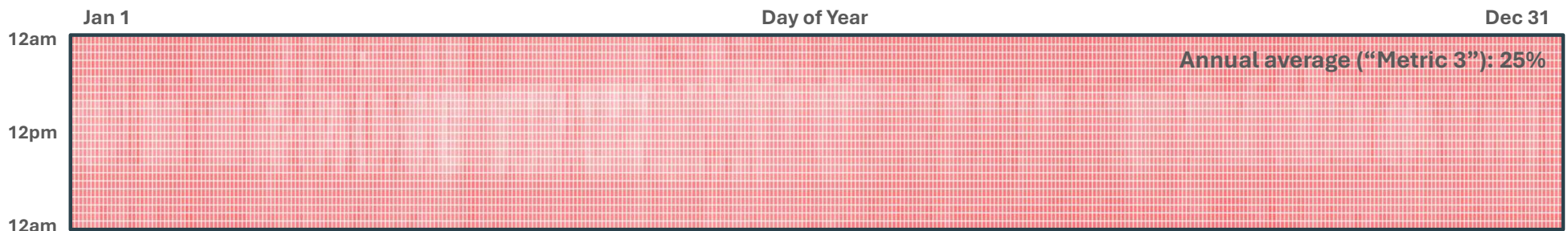
The Optimized Strategic Plan will...

...consider how new generation resources, investments in T&D infrastructure, and customer programs can facilitate transition to Pasadena’s carbon-free goal

Balance of Carbon-Free Energy Resources based on Currently Executed Contracts

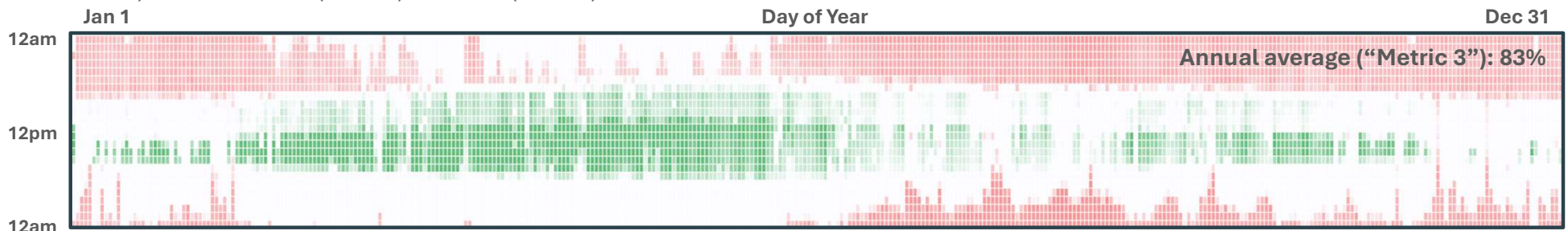
Not an OSP result – based on data underlying metrics presented by PWP to MSC July 9

2025 Carbon-Free Electricity Supply



2030 Carbon-Free Electricity Supply (Executed Contracts Only)

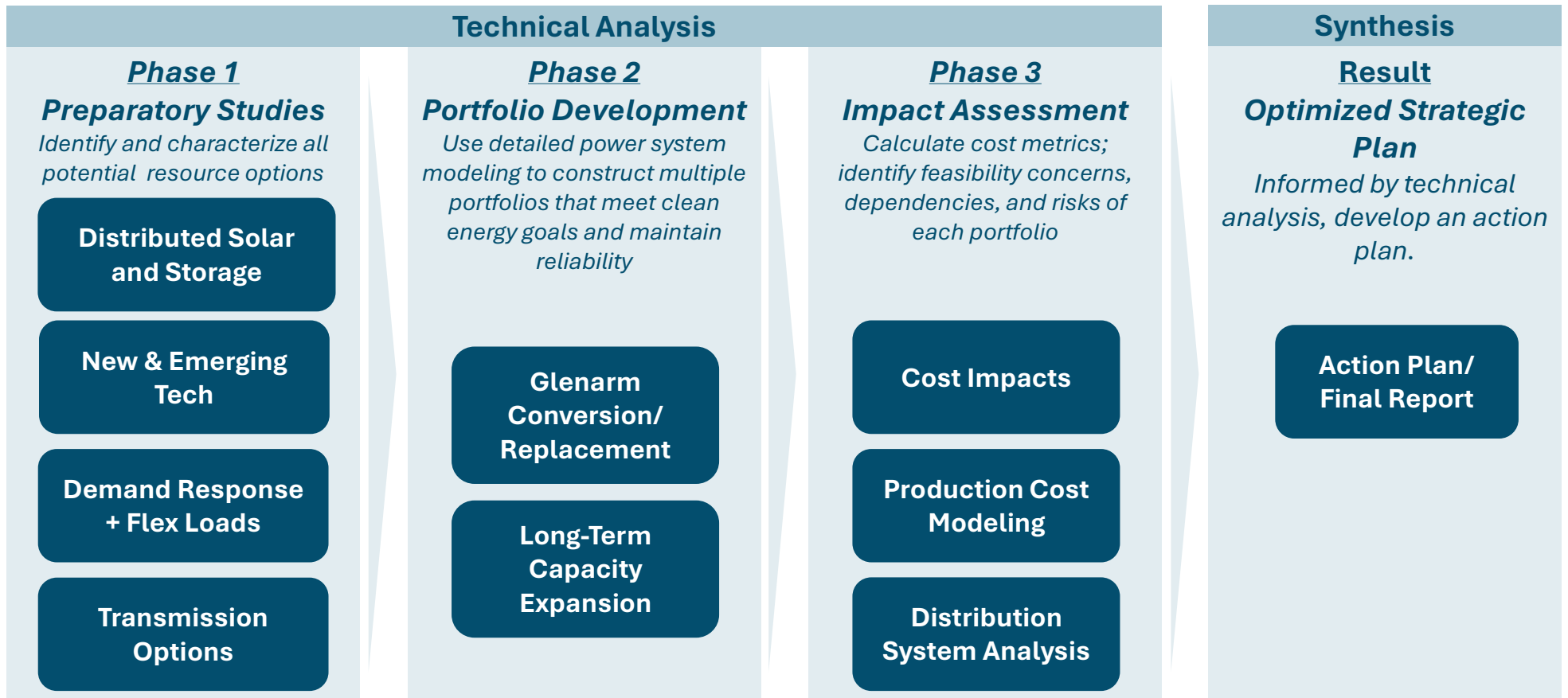
Additions: Coso Geothermal (11 MW), Geysers Geothermal (25 MW), Sapphire Solar/BESS (50 MW/25 MW), Bonanza Solar/BESS (105 MW/55MW), Glenarm BESS (25 MW), Calwind (20 MW)



Hourly Carbon-Free Electricity vs. Hourly Load









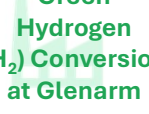


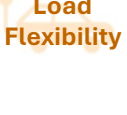
Optimized Strategic Plan: Study Workflow



Optimized Strategic Plan: Project Timeline

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Distributed Solar & Storage						★								
DR/Flex Loads Potential						★								
Emerging Technology				★										
Tx Expansion Options					★									
Glenarm Conv/Replacement							★							
LT Capacity Expansion									★					
Production Cost										★				
Distribution System										★				
Cost Impacts											★			
Final Report														★
Technical Advisory Panel Meetings		★	★	★	★	★		★	★	★	★	★	★	★
Municipal Services Committee / Environmental Advisory Committee Meetings				★	★		★		★		★		★	
Potential Community Meeting					★			★			★		★	

Three Core Case Studies to Achieve Resolution 9977 Goals

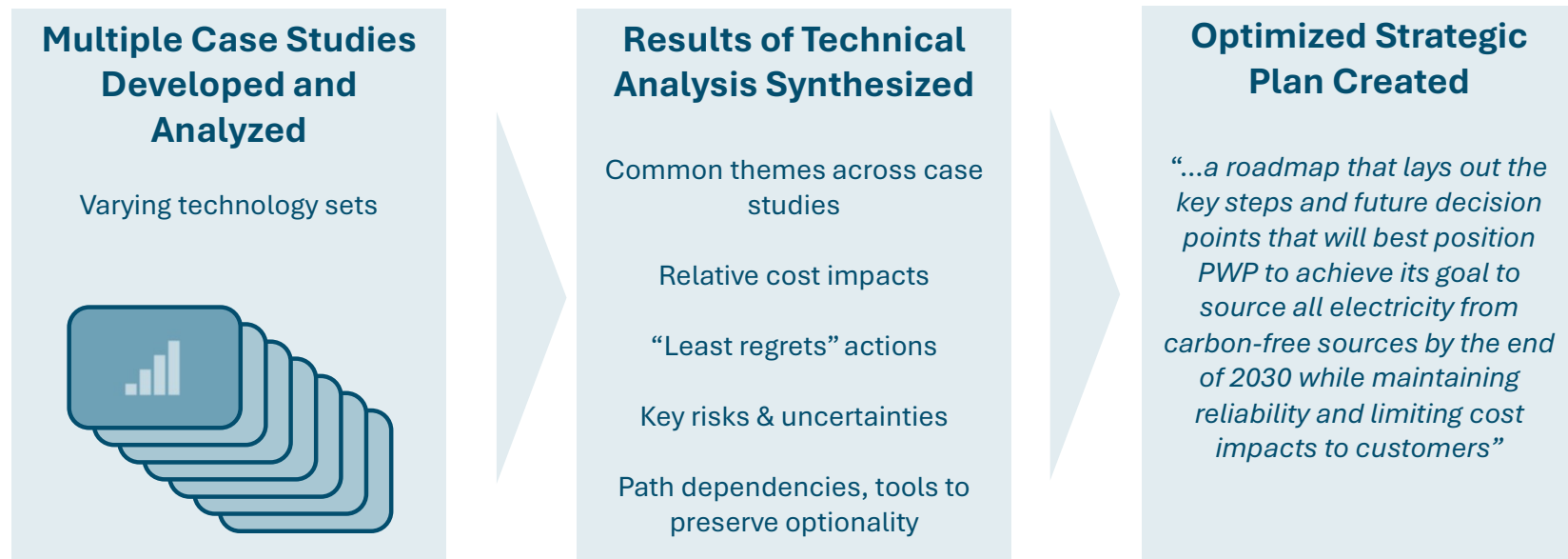
Case Studies	New Resource Options to Meet 2030 Goals						Additional variations explored to provide PWP and City Council with robust analyses to inform the Optimized Strategic Plan:
<p>Mature Technologies Only</p>	 Solar PV <i>(Distributed & Utility)</i>	 Land-Based Wind	 Geothermal	 Load Flexibility	 Battery Storage		<p>+ Accelerated Distributed Energy Resources (DER): What are the comparative impacts of portfolios that accelerate the deployment of DER while preserving Glenarm Power Plant as a backup for reliability?</p>
<p>Mature Technologies + Green Hydrogen</p>	 Solar PV <i>(Distributed & Utility)</i>	 Land-Based Wind	 Geothermal	 Load Flexibility	 Battery Storage	 Green Hydrogen (H₂) Conversion at Glenarm	<p>+ Timing: How does each strategy change if transition to carbon-free occurs less rapidly?</p> <ul style="list-style-type: none"> • Opportunity to synchronize transition with transmission expansion • More plausible timelines for technology readiness for emerging technologies
<p>Mature Technologies + Long-Duration Storage</p>	 Solar PV <i>(Distributed & Utility)</i>	 Land-Based Wind	 Geothermal	 Load Flexibility	 Battery Storage	 Long-Duration Energy Storage	<p>+ Markets: How does short-term market transaction flexibility impact these case studies, if PWP's owned and contracted generation is carbon-free?</p>

Common methods & assumptions across all three case studies:

- Natural gas combustion at Glenarm ceases by end of 2030 (either converted to H₂ or replaced)
- No reliance on wholesale market purchases (“24x7 carbon free electricity”)
- Quantities of each resource optimized in each case study to meet reliability needs and carbon-free objectives

Role of Case Studies in Development of the Optimized Strategic Plan

- + OSP supporting studies focus on development and analysis of “case studies” which model unique combinations of resources to meet PWP future needs
- + Goal of analysis is not to select a single case study as the Optimized Strategic Plan, but to synthesize learnings across all cases to inform creation of an OSP



Thank You

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