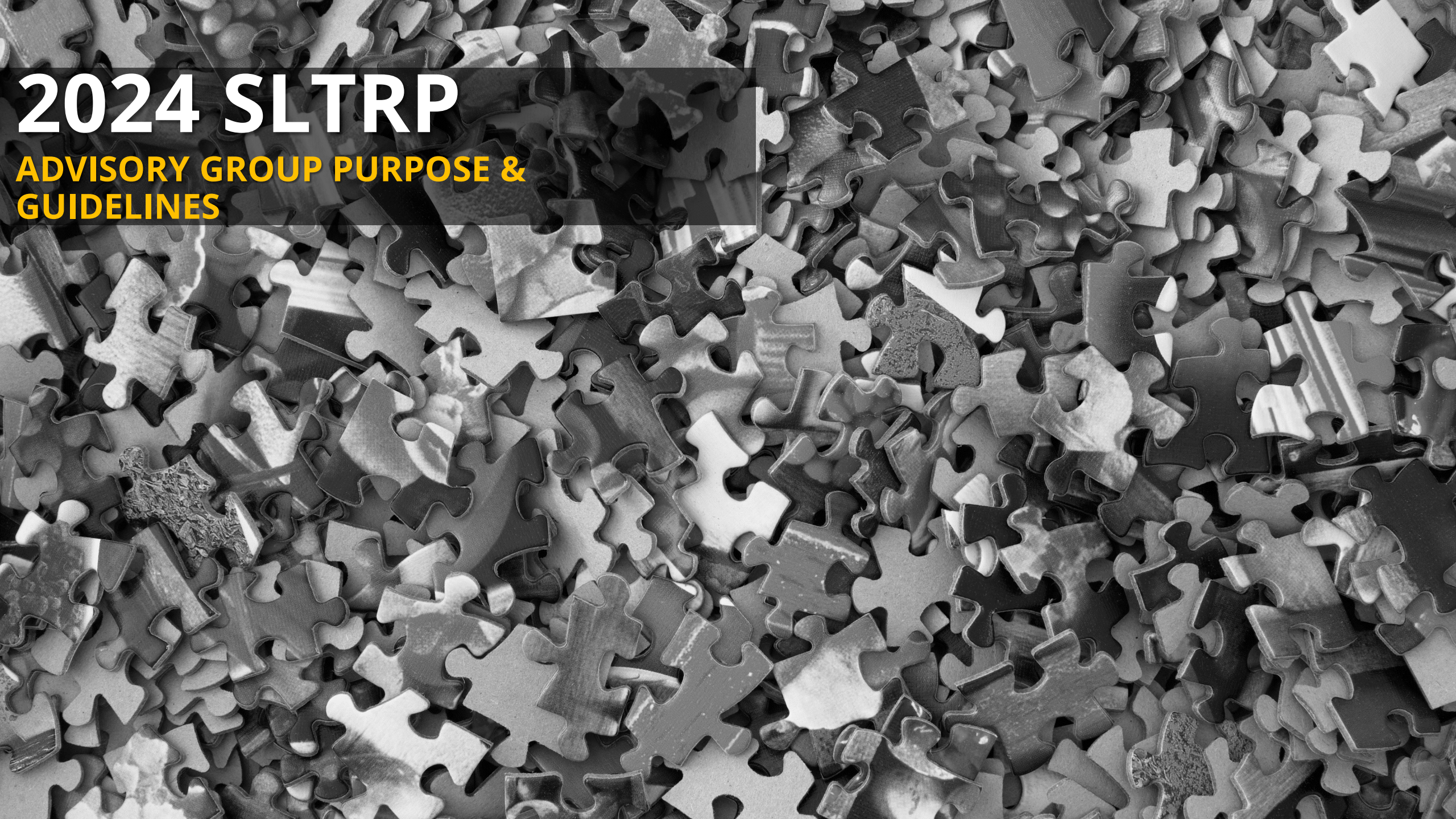


# 2024 SLTRP

## ADVISORY GROUP PURPOSE & GUIDELINES



# 2024 SLTRP Advisory Group Role

**Provide input and feedback based on the expertise, knowledge, and resources of the organizations, institutions, and constituent groups represented by the Advisory Group members**

- **Provide perspectives** on major issues that LADWP will face in the next 20 years, input and review of strategic scenarios that are used in the resource analysis, and input on final recommendations and near-term actions
- **Continue the collaborative dialogue** that was conducted in the recent LA100 Equity Strategies Study and 2022 SLTRP processes.
- **Conduct outreach to respective constituent groups** to bring their input into the process and to keep these constituencies informed of the SLTRP process.
- **Consider broader community input** during Advisory Group discussions.
- **Provide technical information and perspectives** related to appropriate areas of expertise.



# 2024 SLTRP Advisory Group Role

**Provide input and feedback based on the expertise, knowledge, and resources of the organizations, institutions, and constituent groups represented by the Advisory Group members**

*Continued:*

- **Participate** in all meetings or send an alternate – a total of 6 meetings are anticipated between March 2024 and December 2024. Meetings are expected to alternate between in-person and virtual conducted in two to three-hour segments.
  - To maintain stakeholder balance -- Only **one representative per member organization in meeting discussions**.
- **Read pre-meeting materials** that are distributed and be prepared to discuss agenda topics at the meetings. This includes reading and reviewing the 2022 SLTRP and LA100 Equity Strategies Study Report.

# Protocols Overview

**1**

**Introductions**

**2**

**Role and Responsibilities of the Advisory Group**

**3**

**Participation and Collaboration Principles**

**4**

**Advisory Group Composition**

**5**

**Primary Members and Alternates**

**6**

**Meeting Schedule, Location, Agendas, and Summaries**

**7**

**Information Sharing with Other Advisory Group Members**

**8**

**Email Communication**

**9**

**Media Interaction, Public Information and Involvement**

**10**

**Point of Contact for Advisory Group Members**



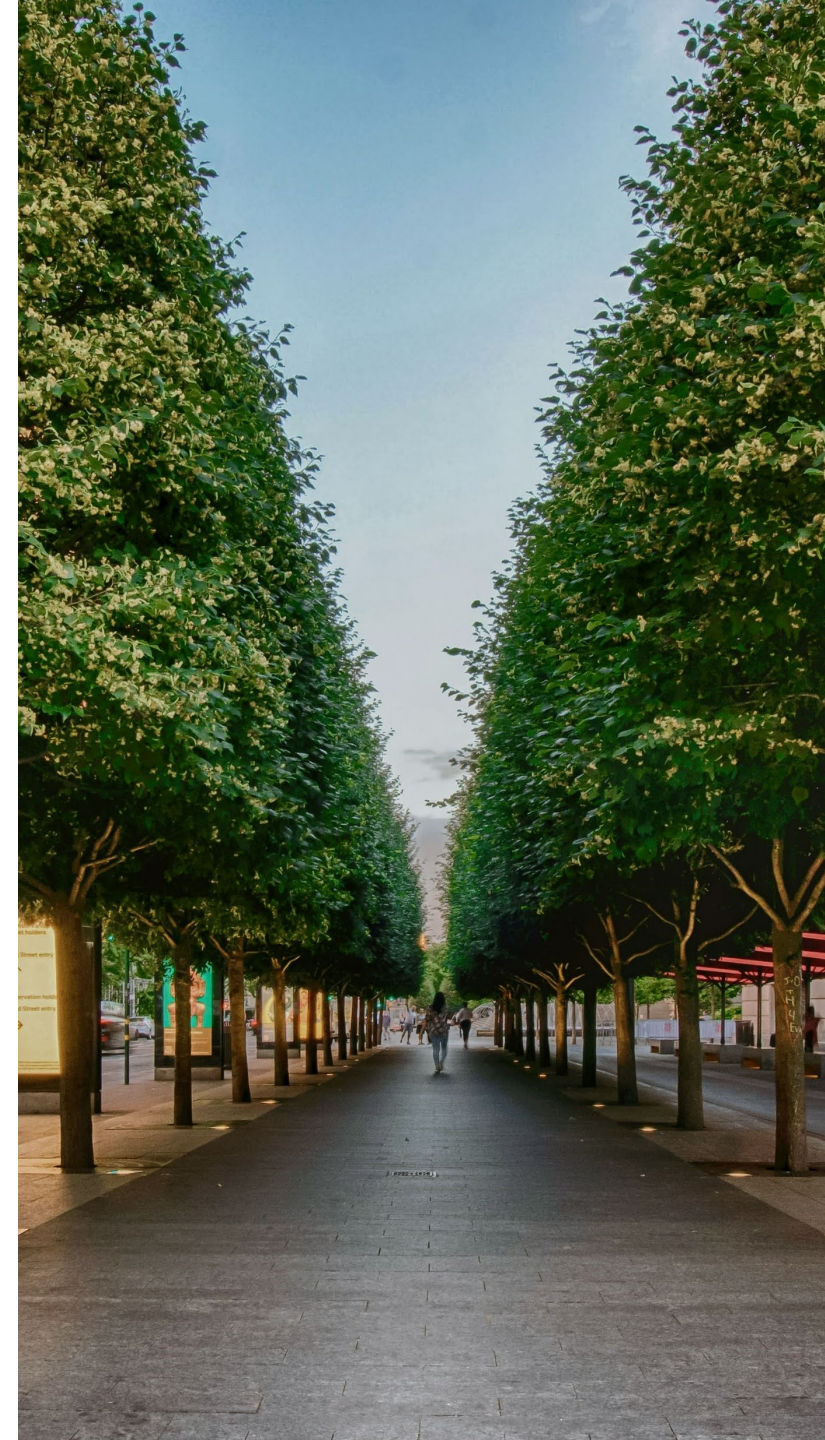
# 2024 Advisory Group Members

*Note: LA100 Equity Strategies Steering Committee has been integrated into the SLTRP Advisory Group Roster*

| Stakeholder Category                      | Organization(s)  |           |
|---|--|-----------|
| <b>Academia</b>                           | CSUN, UCLA, USC  | 6         |
| <b>Business and Workforce</b>             | CEERT, Center for Sustainable Energy, Central City Assoc, IBEW – Local 18, LABC, LA Chamber, VICA, LABC  | 16        |
| <b>City Government</b>                    | CLA, City Attorney, Council Districts, Rate Payer Advocate, Mayor’s Office, Civil & Human Rights and Equity Dept., CEMO, Housing Authority, LA City Planning, LADOT  | 26        |
| <b>Neighborhood Council</b>               | DWP Advocacy Committee, DWP MOU Oversight Committee, Neighborhood Council Sustainability Alliance, SLAANC  | 8         |
| <b>Environmental Community</b>            | CBE, EDF, Food and Water Watch, LA Cleantech Incubator, NRDC, Sierra Club  | 12        |
| <b>Community-Based Organizations</b>      | LAANE, Climate Resolve, Community Build, Enterprise Community Partners, Esperanza Community Housing, Move LA, PACE, Pacoima Beautiful, RePower, SLATE-Z, So. Cal. Association of Non-Profit Housing, SCOPE | 24        |
| <b>Premier Accounts and Key Customers</b> | LAUSD, LAWA, Metro, POLA, Valero Wilmington Refinery   | 10        |
| <b>Utilities</b>                          | Southern California Gas, Water and Power Associates  | 4         |
| <b>Total</b>                              |  | <b>84</b> |

# Guides for Productive Meetings

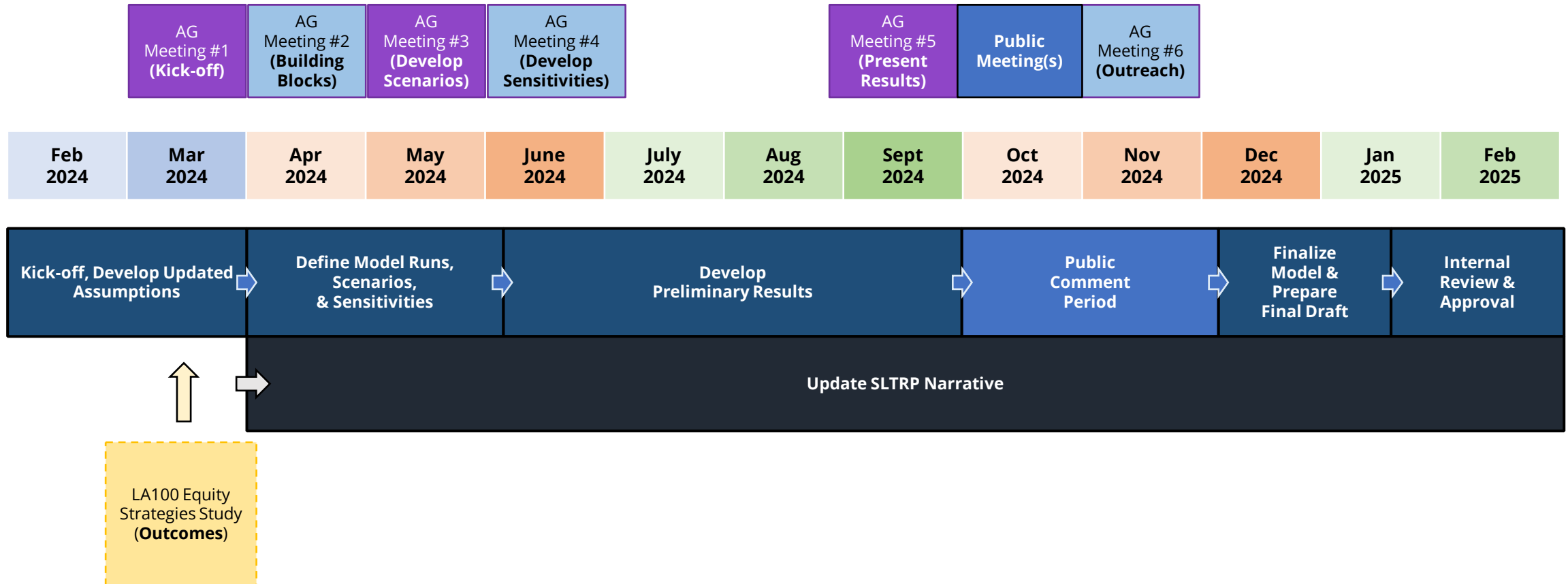
- 1** Everyone commits to all members having equal time to contribute input
- 2** Keep input concise so all members have time to participate
- 3** Actively listen to others, seek to understand perspectives
- 4** Offer ideas to address questions and concerns raised by others



In-person Meeting

Virtual Meeting

# Upcoming 2024 Schedule



Note: Specific dates and meetings are subject to change.

# Round Table Introductions

## Name and Organization

Please share a priority for the 2024 SLTRP (in 12 words or less!)



Email: [PowerSLTRP@ladwp.com](mailto:PowerSLTRP@ladwp.com)





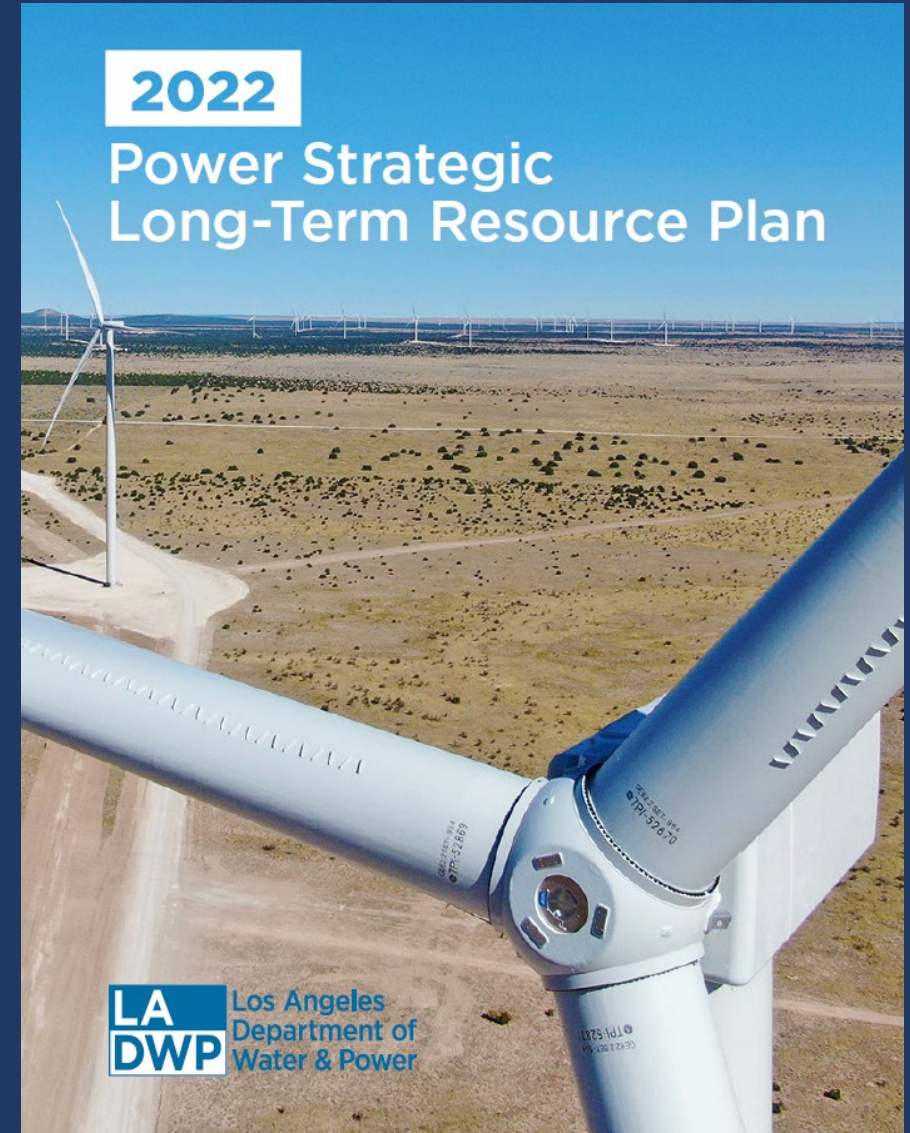
# 2022 POWER STRATEGIC LONG-TERM RESOURCE PLAN (SLTRP)

*Our Clean Energy Future is Now*

Resource Planning  
March 21, 2024

# AGENDA

- 1 Intro & Background (Ch. 1)
- 2 Cases (Ch. 2)
- 3 Model Inputs, Assumptions, Methodology (Ch. 3)
- 4 Model Results (Ch. 4)
- 5 Recommended Case (Ch. 5)
- 6 Risks, Challenges, Implementation (Ch. 6, 7) + Next Steps



[www.ladwp.com/sltrp](http://www.ladwp.com/sltrp)

# 2022 SLTRP

## INTRO & BACKGROUND (CH. 1)



# MAJOR DRIVERS



## LA100

ACHIEVING 100% RENEWABLE ENERGY IN LOS ANGELES

LA DWP

### LA100 Study

**Completed**

*Unprecedented analysis ID'd multiple paths to achieve 100% target*

**Considers reliability, equity, sustainability and affordability**

- Confirmed 100% by 2035 achievable
- Community & stakeholder input

**Common Investments Across All Scenarios**

|  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li>Electrification, Efficiency, Flexible Load</li> <li>Customer, Behavior Change</li> <li>Solar</li> </ul> | <ul style="list-style-type: none"> <li>Renewable Energy</li> <li>Energy Storage</li> <li>Transmission, Distribution</li> </ul> | <ul style="list-style-type: none"> <li>Renewable Energy Organization, Tariffs</li> </ul> |
| Solar +\$5,700 MW<br>Wind +\$4,300 MW  | +\$2,800 MW  | +\$2,800 MW (in base)  |

Much More

Natural gas Energy Data | Renewables Energy Intermittency

### LA100 Equity Strategies

**Fall 2021-23**

*Community-driven, objective to achieve equity*

**Robust community engagement**

Areas of Focus

|                     |                  |
|---------------------|------------------|
| Improve air quality | Solar access     |
| Energy Efficiency   | Affordable rates |
| Demand management   | Debt relief      |
| EV charging access  |                  |

### 2022 SLTRP

**Fall 2021-2022 | 2035 & 2045 Targets**

*Our comprehensive integrated power plan*

**Recommends path forward to achieve our goals**

- Integrates findings of LA100
- Community & stakeholder input
- Prioritizes reliability, resiliency, equity, affordability, sustainability

**Considerations**

|                                   |                                |
|-----------------------------------|--------------------------------|
| Building, Operating & Maintaining | Workforce                      |
| Supply Chain Risk                 | Cost to customers              |
|                                   | Implementation and Feasibility |

# 2022 SLTRP

CASES (CH. 2)



# 2022 SLTRP CORE AND REFERENCE CASES

| SB 100                                 |             |
|--|-------------|
| RPS % by 2030<br>Carbon-Free % by 2035 | 60%<br>~80% |
| DERs                                   | Reference   |
| Transmission*                          | Reference   |
| Natural Gas Phase Out                  | N/A, Backup |
| Green Hydrogen                         | 30% @ IPP   |

| CASE 1                                 |             |
|--|-------------|
| RPS % by 2030<br>Carbon-Free % by 2035 | 80%<br>100% |
| DERs                                   | High        |
| Transmission*                          | Mid         |
| Natural Gas Phase Out                  | 2035        |
| Green Hydrogen                         | Backup      |

| CASE 2                                 |             |
|--|-------------|
| RPS % by 2030<br>Carbon-Free % by 2035 | 90%<br>100% |
| DERs                                   | High        |
| Transmission*                          | Highest     |
| Natural Gas Phase Out                  | 2035        |
| Green Hydrogen                         | Backup      |

| CASE 3                                 |             |
|--|-------------|
| RPS % by 2030<br>Carbon-Free % by 2035 | 90%<br>100% |
| DERs                                   | Highest     |
| Transmission*                          | High        |
| Natural Gas Phase Out                  | 2035        |
| Green Hydrogen                         | Backup      |

- **SB 100 (“Reference Case”)** builds out to 100% clean energy by 2045, as a percentage of electric retail sales. Natural gas is still allowed as backup and to make up losses; green hydrogen is only assumed at IPP.
- **Cases 1 through 3 (“Core Cases”)** meet the L.A. City Council Motion for 100% carbon-free energy by 2035 and build upon assumptions from the LA100 Study (Early & No Biofuels scenario)
- **Cases differ in speed of reducing greenhouse gas (GHG) emissions, and buildouts** of renewable and distributed resources, among others

# 2022 SLTRP SENSITIVITIES

## Price Sensitivities

| Commodity Prices | Examples                          | Price Sensitivity Scenarios Applied to 100% carbon free by 2035 Scenarios |
|------------------|-----------------------------------|---|
| Fuel Prices*     | Natural Gas, Green Hydrogen, etc. | High/low sensitivities  |

\*Bookend scenarios to evaluate price sensitivities by matching low and high commodity prices:

- **Low Bookend:** Low natural gas prices, low green hydrogen prices
- **High Bookend:** High natural gas prices, high green hydrogen prices

## “What-If” Sensitivities

| Implementation Risk   | Description   | "What-if" Sensitivities                                |
|-----------------------|---|--|
| Emerging Technologies | No In-Basin Combustion Alternatives                 | Long duration capacity (e.g. Hydrogen Fuel Cells)      |
| Demand Side Resources | Demand Response                                     | Reaching only half of the 576/633 MW of DR by 2035     |
| Transmission          | Transmission Upgrades<br>(over 10 projects by 2030) | More difficult in-basin upgrades not completed by 2030 |
| Load                  | Transportation/Building Electrification             | Low Load and High Load                                 |

# 2022 SLTRP

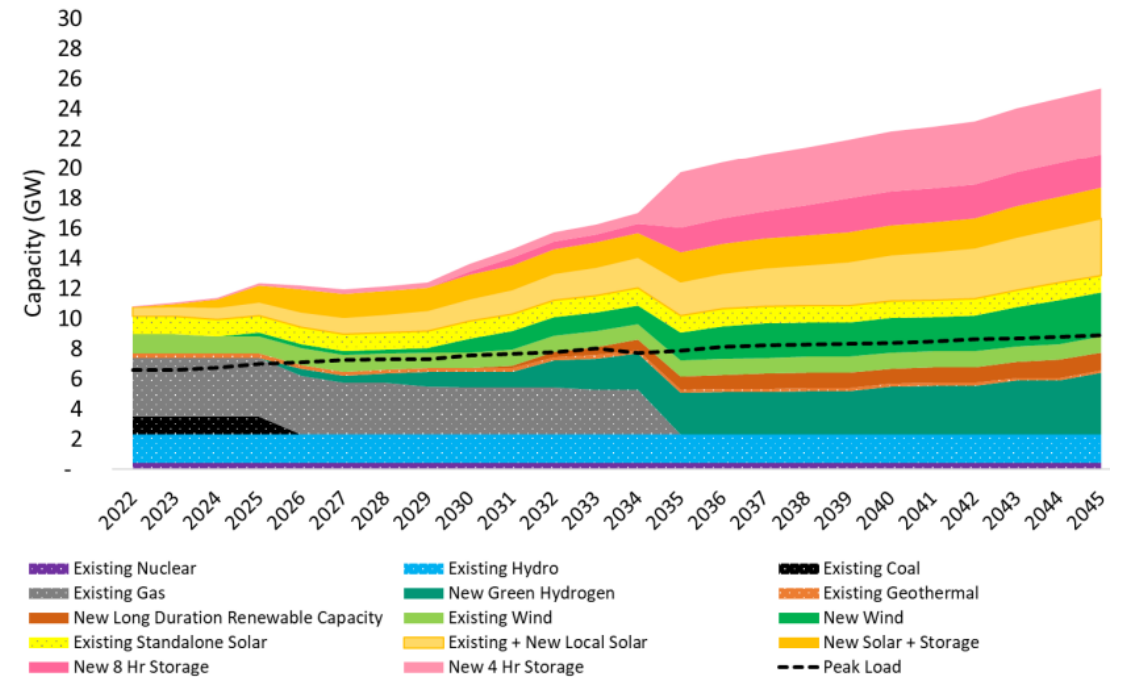
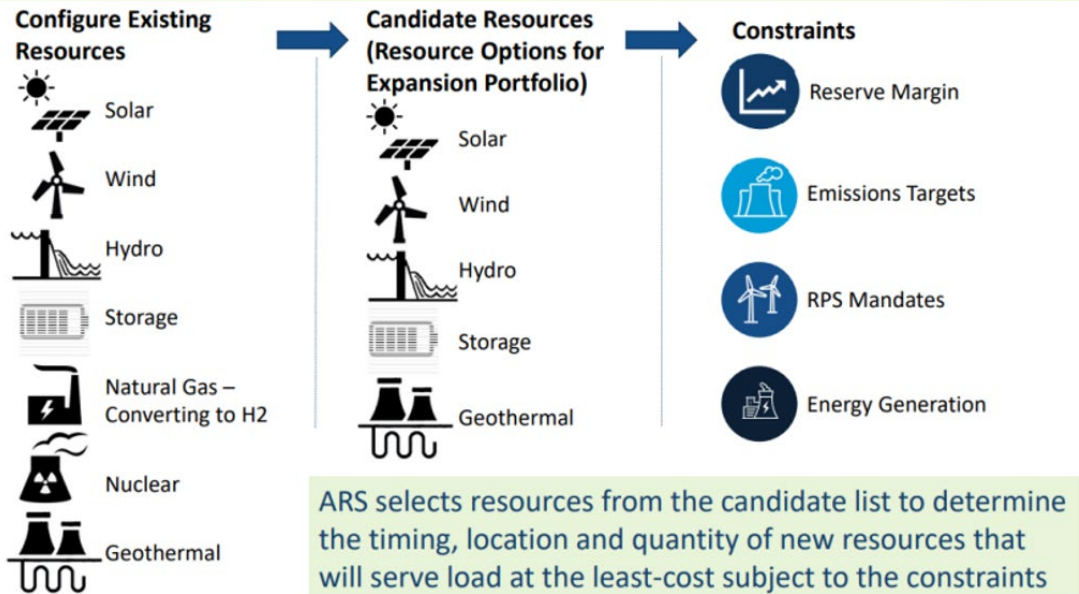
## MODEL INPUTS, ASSUMPTIONS, METHODOLOGY (CH. 3)





# DIVERSE & COMPLEMENTARY RESOURCES

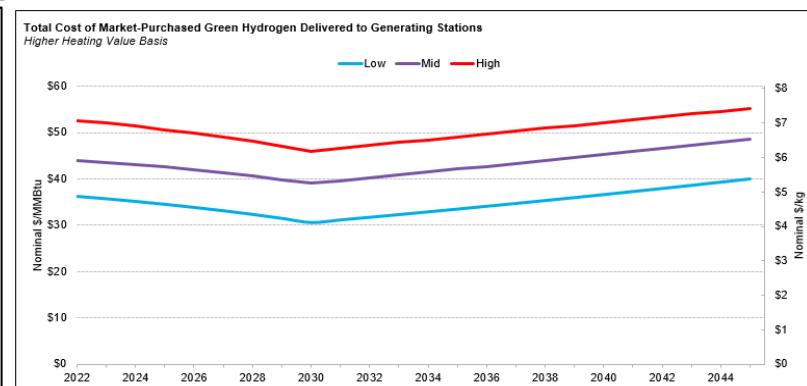
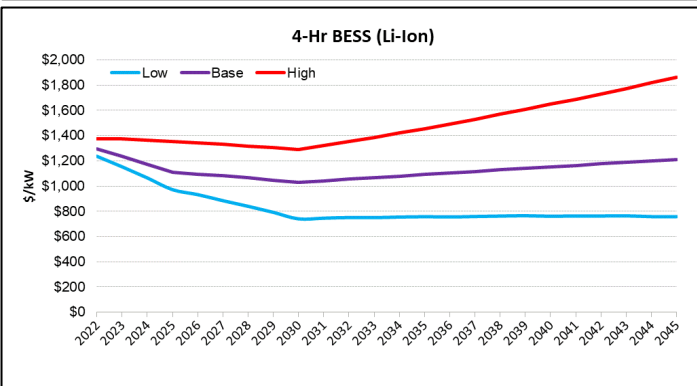
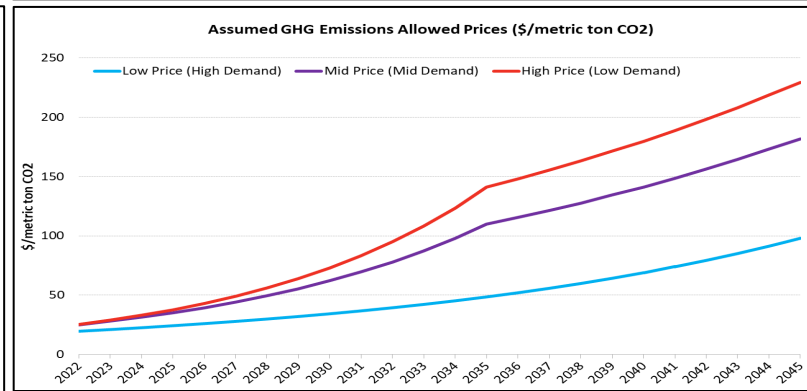
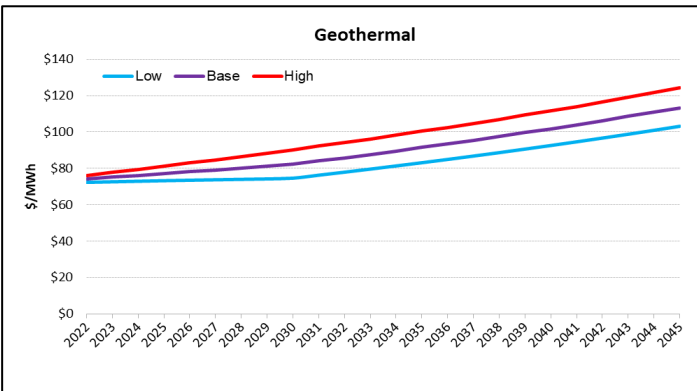
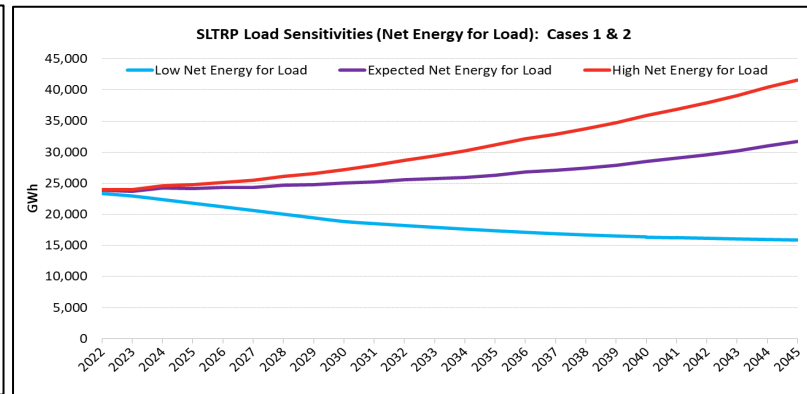
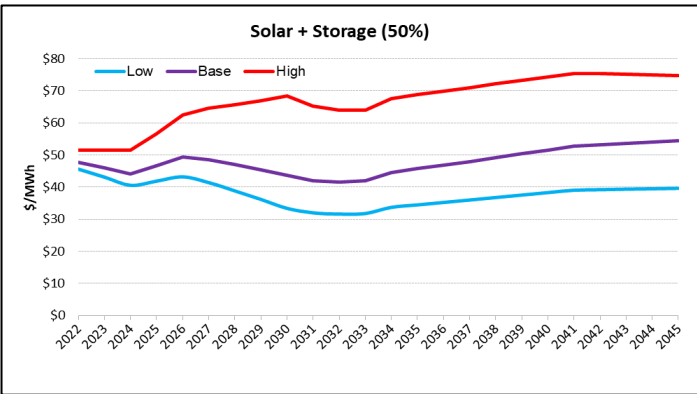
## ARS Overview



**Automated Resource Selection (ARS), part of proprietary modeling software package provided by LADWP's consultant, Ascend Analytics**

**Generation capacity buildout for Case 1**

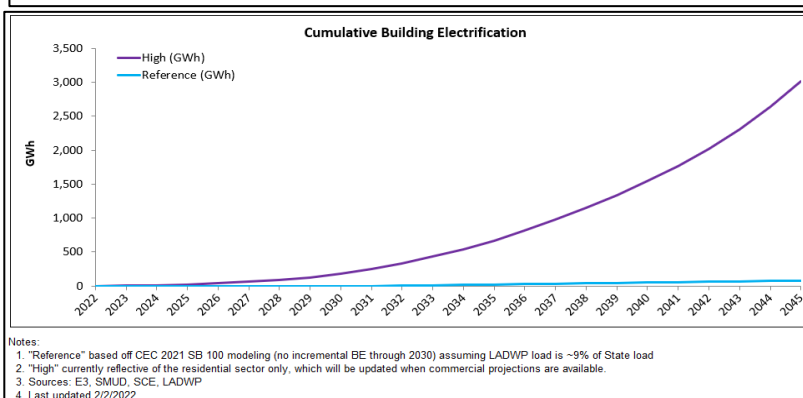
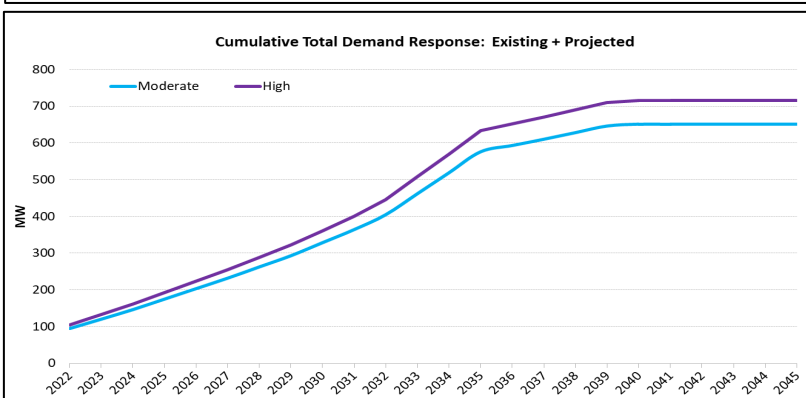
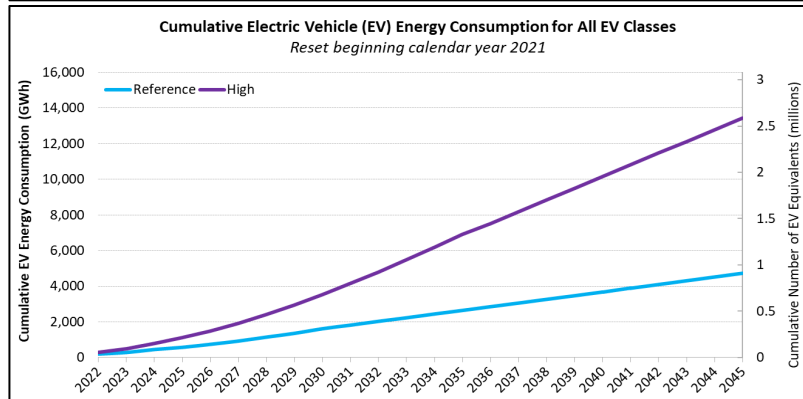
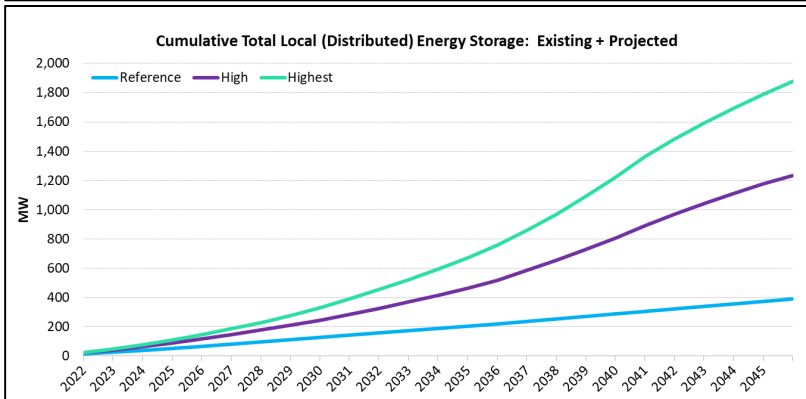
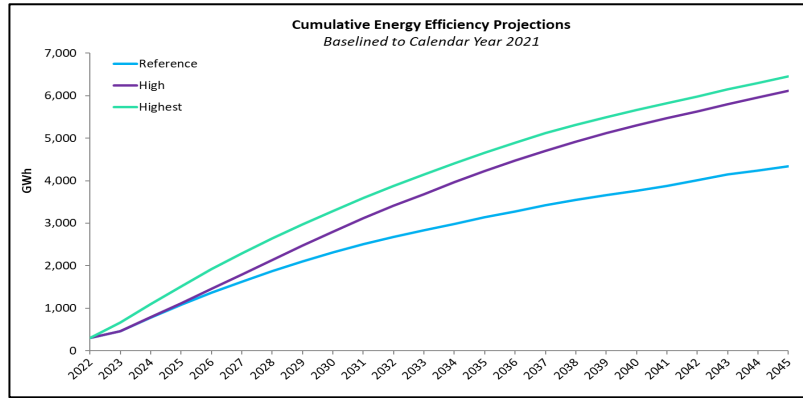
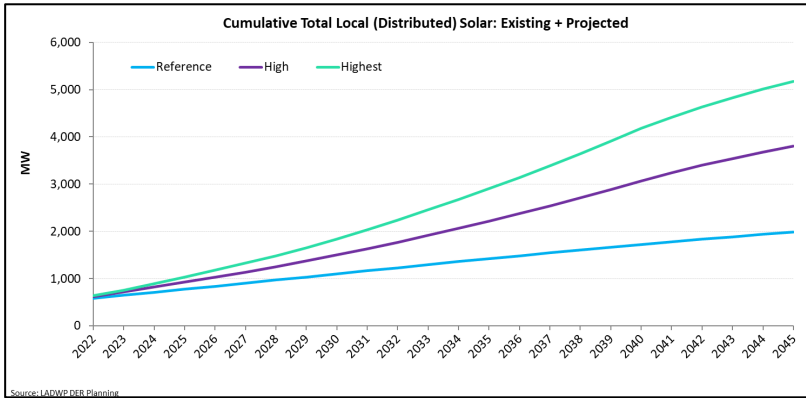
# ASSUMPTIONS (LOAD, FUELS, GHG, RESOURCES)



- **Renewable energy and energy storage price** projections based off the NREL's 2021 Annual Technology Baseline (publicly available)
- **Load sensitivities include high electrification (high load) and low electrification paired with high net-metered solar and energy efficiency (low load)**
- **GHG allowance prices** based off 2021 CEC Integrated Energy Policy Report
- **Green hydrogen (GH2) prices are derived from industry research** including Bloomberg New Energy Finance. Costs assume green hydrogen is "market-purchased" (i.e. produced by a third-party) and delivered to the in-basin generating stations
  - **IPP was assumed to "self-produce" its GH2 through 2035, after which any deficit was made up through "market-purchased GH2"**
  - **Technology readiness and feasibility is still under research**

Notes:  
 1. Fuel cost estimates are for the fuel "delivered," which includes transportation/tolling charges to bring the fuel to the generating stations.  
 2. These price assumptions apply for the portions of market-purchased green H2 assumed at the in-basin generating stations and Intermountain Power Project (separate from and in addition to any self-produced H2).  
 3. These prices were adapted from BloombergNEF references.

# ASSUMPTIONS (DISTRIBUTED ENERGY RESOURCES)



Notes:  
 1. "Reference" based off CEC 2021 SB 100 modeling (no incremental BE through 2030) assuming LADWP load is ~9% of State load  
 2. "High" currently reflective of the residential sector only, which will be updated when commercial projections are available.  
 3. Sources: E3, SMUD, SCE, LADWP  
 4. Last updated 2/2/2022

- DER projections were obtained in consultation with internal subject-matter experts from the DER planning and programs groups
- DER adoption relies critically on customer participation and cannot be guaranteed by LADWP, despite incentives
  - *Additionally, alleviating overloads, modernizing, and upgrading the distribution system will be required* to accommodate significant DER penetration
- Core Case modeling assumes "reference" transportation electrification (TE). "High" TE was explored as a load sensitivity.

# ASSUMPTIONS (GREEN HYDROGEN, PSRP REVAMP)

| Year         | 2030       | 2035        |
|--------------|------------|-------------|
| Harbor       | 0          | 257         |
| Haynes       | 0          | 762         |
| Scattergood  | 346        | 688         |
| Valley       | 0          | 398         |
| <b>Total</b> | <b>346</b> | <b>2105</b> |

- **2,100+ MW of green hydrogen-capable capacity comes online in-basin by 2035 for reliability purposes.** GH2 capacity is expected to serve as backup for system contingencies and low renewable output days.

| Case                          | Reference (SB 100)                   | 100% Carbon-Free by 2035             |
|-------------------------------|--------------------------------------|--------------------------------------|
| PSRP - Capital & O&M          | PSRP - Total Annual Fixed Cost (\$M) | PSRP - Total Annual Fixed Cost (\$M) |
| FY 21/22                      | \$899                                | \$1,101                              |
| FY 22/23                      | \$1,124                              | \$1,358                              |
| FY 23/24                      | \$1,271                              | \$1,539                              |
| FY 24/25                      | \$1,285                              | \$1,597                              |
| FY 25/26                      | \$1,421                              | \$1,768                              |
| FY 26/27                      | \$1,511                              | \$1,883                              |
| FY 27/28                      | \$1,537                              | \$1,845                              |
| FY 28/29                      | \$1,646                              | \$2,012                              |
| FY 29/30                      | \$1,744                              | \$2,130                              |
| FY 30/31                      | \$1,741                              | \$2,074                              |
| FY 31/32                      | \$1,826                              | \$2,178                              |
| FY 32/33                      | \$1,931                              | \$2,286                              |
| FY 33/34                      | \$2,029                              | \$2,401                              |
| FY 34/35                      | \$2,131                              | \$2,512                              |
| FY 35/36                      | \$2,236                              | \$2,639                              |
| FY 36/37                      | \$2,350                              | \$2,774                              |
| FY 37/38                      | \$2,471                              | \$2,915                              |
| FY 38/39                      | \$2,600                              | \$3,067                              |
| FY 39/40                      | \$2,729                              | \$3,219                              |
| FY 40/41                      | \$2,871                              | \$3,386                              |
| FY 41/42                      | \$3,019                              | \$3,561                              |
| FY 42/43                      | \$3,170                              | \$3,738                              |
| FY 43/44                      | \$3,314                              | \$3,910                              |
| FY 44/45                      | \$3,472                              | \$4,100                              |
| <b>SLTRP Est Totals (\$M)</b> | <b>\$50,330</b>                      | <b>\$59,992</b>                      |

- **Power System Reliability Program (PSRP) Revamp costs were incorporated for upgrades assumed to alleviate overloads and expand capacity on the distribution system to sustain resources for a 100% carbon-free portfolio.**

# 2022 SLTRP

## MODEL RESULTS (CH. 4)



# 2022 SLTRP CORE CASES

SCALE 0-1,500 MW

## **NEW** CARBON-FREE RESOURCES: AVERAGE ANNUAL BUILD RATES

- **Average Annual Build Rates** include:
  - **Utility-scale** carbon-free resources
  - **Customer-sided** carbon-free resources
- The **historical average** resource build rate from 2018 to 2021 has been **200 MW per year**
- The **required average build rate for new resources is more than double for the carbon-free cases**, in comparison to SB 100
- **Does not include additional system infrastructure** (like transmission and distribution capacity) nor additional **human resources** that are required to address existing backlogs



## BUILD RATE 2022-2035

AVERAGE **NEW** MEGAWATTS (MW) **PER YEAR**



## BUILD RATE 2036-2045

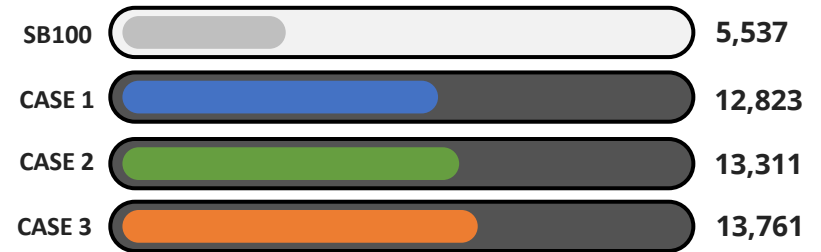
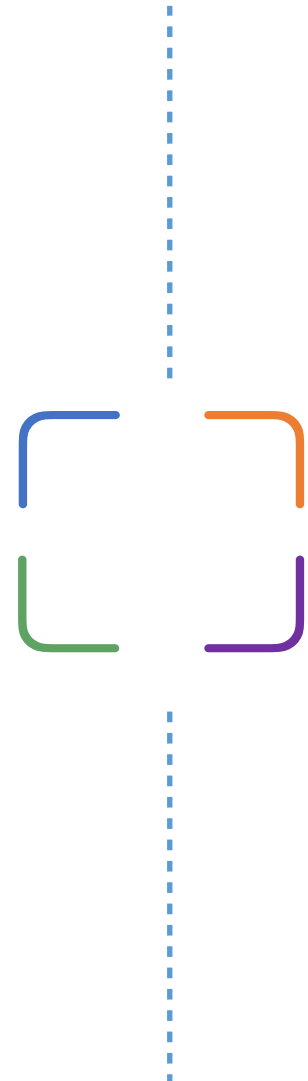
AVERAGE **NEW** MEGAWATTS (MW) **PER YEAR**

# 2022 SLTRP CORE CASES

SCALE 0 - 20,000 MW

## NEW CARBON-FREE RESOURCES: BULK POWER RESOURCE CAPACITY

- **Bulk Power Resources** include:
  - Utility-Scale Renewables
  - Utility-Scale Energy Storage
  - In-Basin Green Hydrogen
- **Case 3** requires the most bulk power resources
- **Total new resource capacity required is expected to more than double for the carbon-free cases**, in comparison to SB 100



## BULK RESOURCES 2022-2035

TOTAL **NEW** MEGAWATTS (MW), CUMULATIVE



## BULK RESOURCES 2022-2045

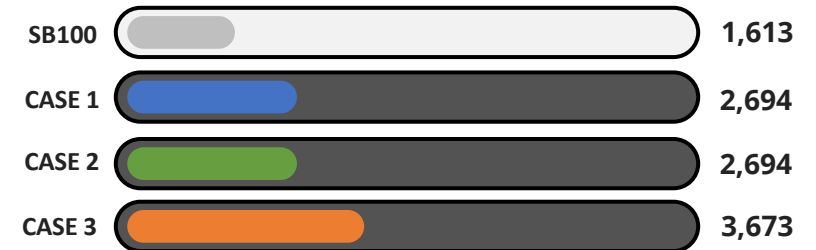
TOTAL **NEW** MEGAWATTS (MW), CUMULATIVE

# 2022 SLTRP CORE CASES

SCALE 0 - 8,000 MW

## **NEW** CARBON-FREE RESOURCES: DISTRIBUTED ENERGY RESOURCE (DER) CAPACITY

- **Distributed Energy Resources** include:
  - Distributed Solar
  - Distributed Energy Storage
  - Demand Response
- **Case 3** requires the most distributed energy resources
- **Total DER capacity is expected to more than double for Case 3**, in comparison to SB 100



### DERs 2022-2035

TOTAL **NEW** MEGAWATTS (MW), CUMULATIVE



### DERs 2022-2045

TOTAL **NEW** MEGAWATTS (MW), CUMULATIVE



# 2022 SLTRP CORE CASES

SCALE 0 - \$100B

## POWER SYSTEM PORTFOLIO COSTS

### Costs include:

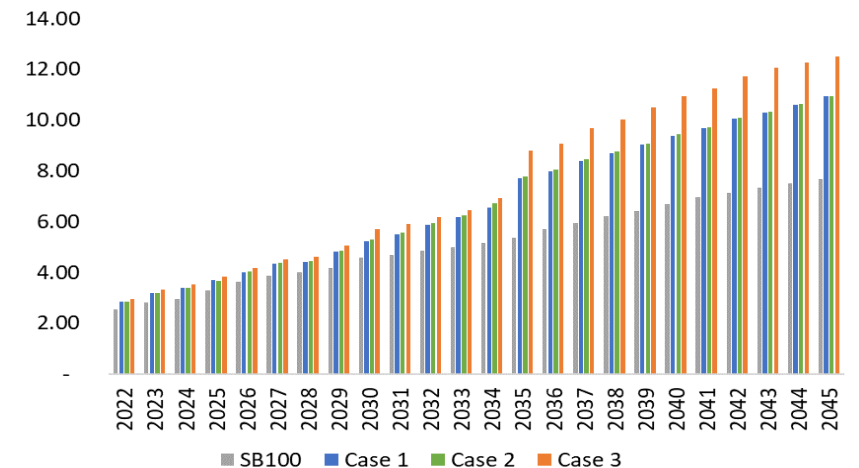
- Fixed Cost  
Debt service, Capital, Fixed operations & maintenance (O&M), Power Purchase Agreements, etc.
- Variable Cost  
Fuel, GHG allowances, NOx credits, Variable O&M, etc.

### Costs do not include:

- **Cost of customer-sided resources assumed to be borne by the customer** (e.g. behind-the-meter energy storage)
- **Nuances and risk uncertainties that are challenging to capture financially (including, but not limited to):** Incremental challenge for attaining permitting, securing required outages, timely procuring enough equipment, hiring sufficient personnel, and other factors, to build the additional generation, transmission, distribution, and customer projects required for one case over another (i.e. Case 2 vs Case 1 costs)



**TOTAL PORTFOLIO COST**  
**NET PRESENT VALUE (2022-45, 5.5%)**  
BILLIONS OF DOLLARS (\$B)



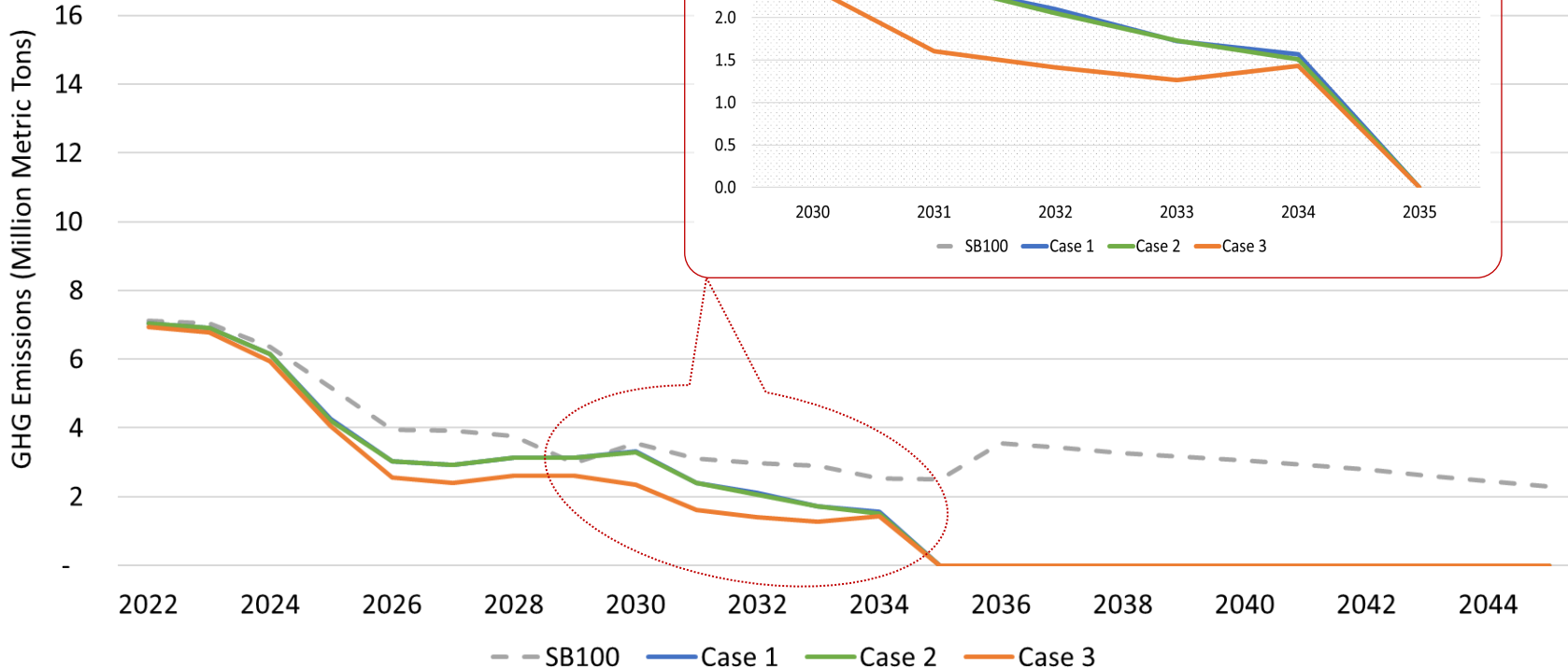
**TOTAL PORTFOLIO COST**  
**ANNUAL CASH FLOWS (2022-45)**  
BILLIONS OF DOLLARS (\$B)

# 2022 SLTRP CORE CASES

## RATE OF REDUCING GREENHOUSE GAS EMISSIONS

1990 baseline GHG levels  
= 17.9 MMT

18



- **Most-impactful action** towards GHG emissions reduction is **fully-divesting from coal** (emissions nearly half by mid-2025)
- SB 100 has the **highest emissions**
- Case 3 has the **lowest emissions.**
- Cases 1 to 3 **all achieve 100% carbon-free energy** through a combination of:
  - Renewables
  - Energy storage
  - Demand-side management
  - Use of renewably-derived hydrogen

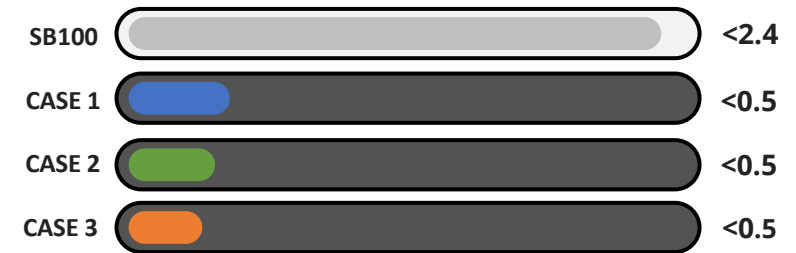
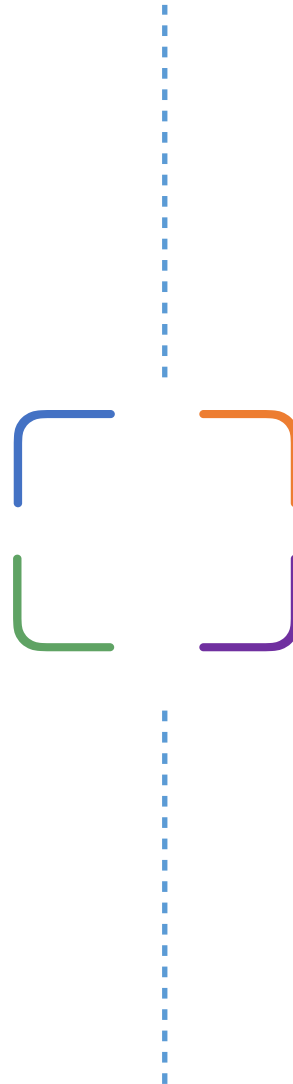
# 2022 SLTRP CORE CASES

## RELIABILITY

SCALE 0 - 2.5 LOLH

### Reliability:

- **Loss of load hour (LOLH)** is when generation cannot meet demand
- **Industry standard: At or below 2.4 LOLH per year**
- Each Case achieves high degree of reliability – LOLH below 0.5 per year
- **All cases developed to maintain in-basin dispatchable capacity, critical to sustaining reliability** and resiliency, even in a decarbonized future Power System



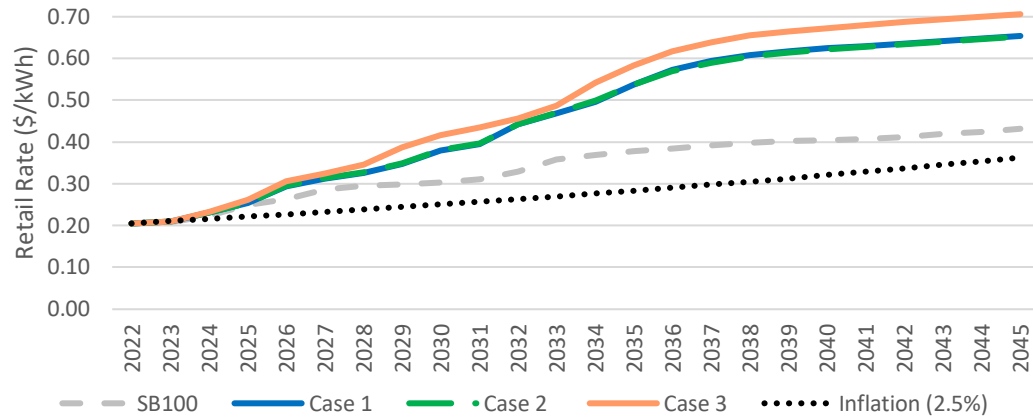
## RESOURCE ADEQUACY

LOSS OF LOAD HOURS (LOLH)  
LOWER VALUE IS BETTER

# 2022 SLTRP CORE CASES

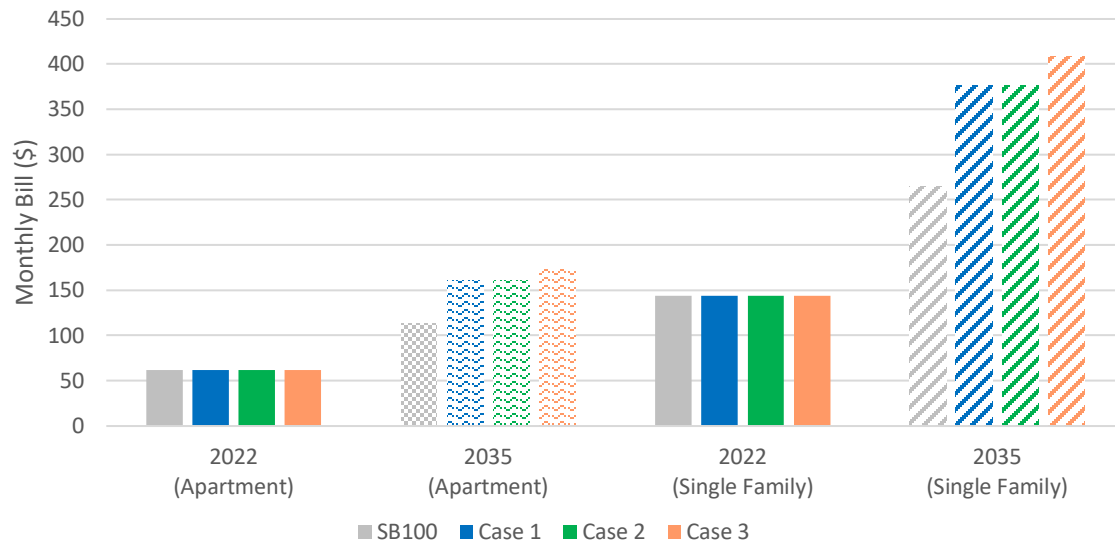
## KEY FINDINGS: ESTIMATED RATE & BILL IMPACTS

2022 SLTRP Avg. Retail Electric Rates (Nominal \$)



| 2022 SLTRP Scenario | Est. Avg. Retail Rate in 2030 and 2035 (\$/kWh) | Est. Avg. Retail Rate Increase (2022-35) | Est. Avg. Retail Rate Increase (2022-45) |
|---------------------|---|--|--|
| SB100               | <b>\$0.30, \$0.38</b> (in 2030, 2035)           | 4.8%                                     | 3.3%                                     |
| Case 1              | <b>\$0.38, \$0.54</b> (in 2030, 2035)           | 7.7%                                     | 5.2%                                     |
| Case 2              | <b>\$0.38, \$0.54</b> (in 2030, 2035)           | 7.7%                                     | 5.2%                                     |
| Case 3              | <b>\$0.42, \$0.58</b> (in 2030, 2035)           | 8.4%                                     | 5.6%                                     |

2022 SLTRP Avg. Retail Monthly Electric Bill (\$)



| 2022 SLTRP Scenario | Est. Avg. Retail Customer Bill in 2035 (Apartment) | Est. Avg. Retail Customer Bill in 2035 (Single-Family) | % Increase from 2022 |
|---------------------|--|--|----------------------|
| SB100               | \$112  | \$262  | <b>84%</b>           |
| Case 1              | \$160  | \$373  | <b>161%</b>          |
| Case 2              | \$160  | \$373  | <b>161%</b>          |
| Case 3              | \$174  | \$405  | <b>184%</b>          |

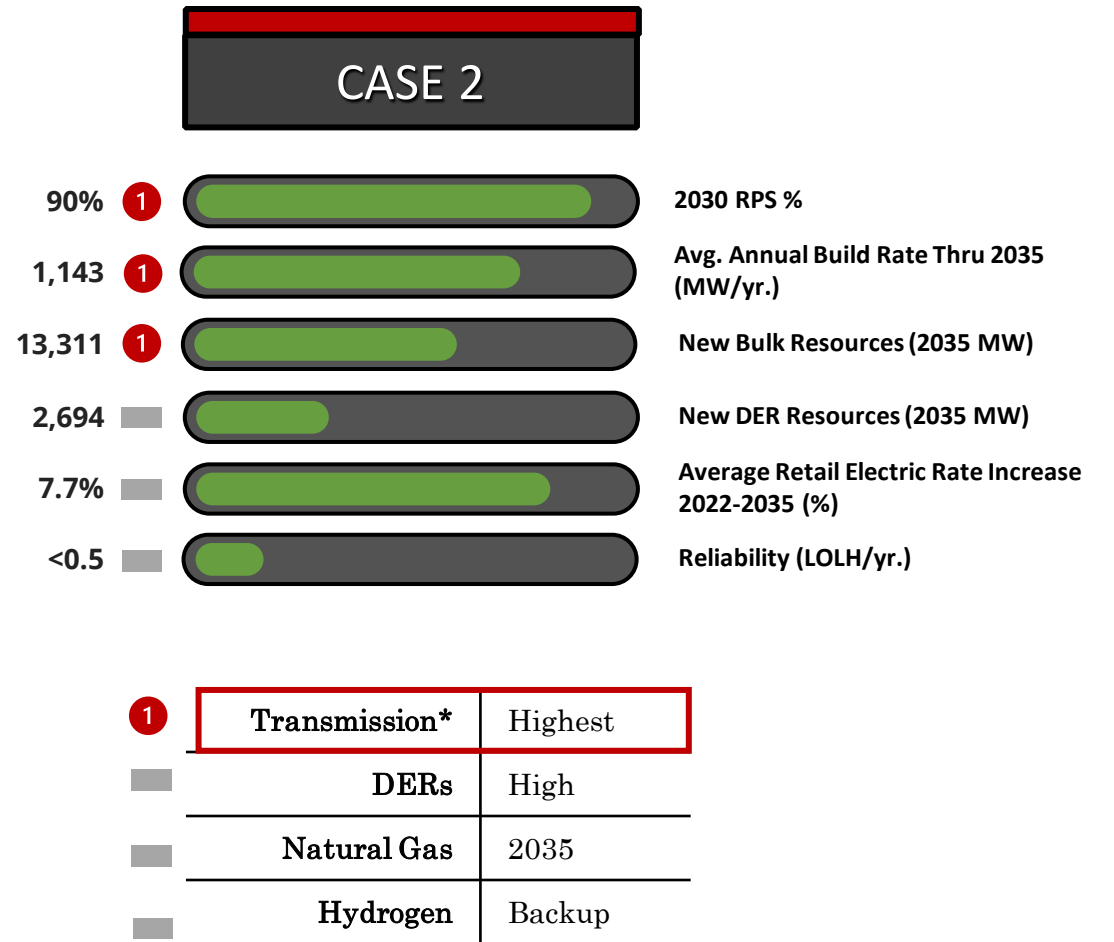
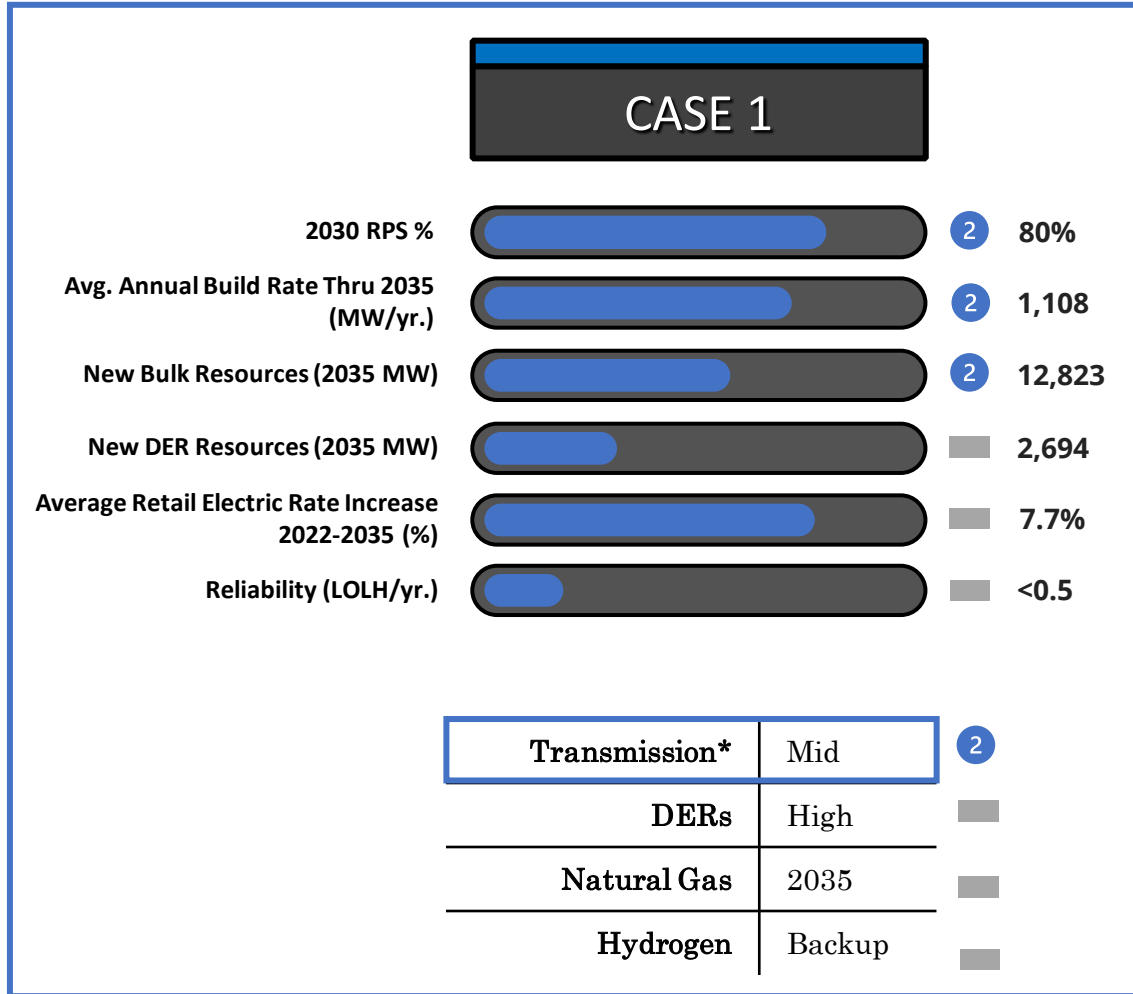
**Note:** Average monthly retail electric bill in 2022 is \$61.66/mo. for apartment and \$143.86/mo. for single-family home. Average monthly electric consumption is assumed to be 300 kWh/mo. for an apartment, and 700 kWh/mo. for a single-family home. Preliminary, subject to ongoing budget estimate and future rate review. *Inflation Reduction Act not yet incorporated due to becoming law late in the SLTRP process.*

An aerial photograph of a residential street. The street is paved and has several cars parked along the side. On either side of the street are houses with red-tiled roofs and lush greenery, including many palm trees. The scene is captured from a high angle, showing the layout of the neighborhood and the shadows cast by the trees and buildings.

# 2022 SLTRP

RECOMMENDED CASE (CH. 5)

# 2022 SLTRP RECOMMENDATION



\*Detailed Transmission Planning studies need to be performed for thorough assessment

# 2022 SLTRP

RISKS, CHALLENGES, & IMPLEMENTATION (CH. 6, 7)



# RISKS, CHALLENGES, & OPPORTUNITIES

- **EMERGING TECHNOLOGY READINESS**
  - Research, development, opportunity
- **INTEGRATED HUMAN RESOURCE PLAN**
  - Building the future workforce
- **IMPLEMENTATION & CONSTRUCTABILITY**
  - Coordination and project management
- **SUPPLY CHAIN ASSESSMENT**
  - Understanding access and ensuring availability of resources
- **PROCUREMENT RISK ASSESSMENT**
  - Financial health and investments
- **OPERATIONS AND MAINTENANCE**
  - Expanding the Power System Reliability Program

- **ENERGY AFFORDABILITY & EQUITY**
  - Improve access and alleviate burden
- **CLIMATE CHANGE & ADAPTATION**
  - Resiliency against extreme weather events
- **GEOPOLITICAL CONFLICTS**
  - Market conditions and resources
- **CYBERSECURITY THREATS**
  - Handling and mitigating external threats





# Q&A

**For more information, please visit:**

**[www.ladwp.com/sltrp](http://www.ladwp.com/sltrp)**