

DOCKETED

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2025 Senate Bill 100 Report Non-Energy Benefits

Presenter: James Barner

Asst. Director of Power System Planning

April 16, 2024

LA100 STUDY

THE LA CITY COUNCIL DIRECTED LADWP TO EVALUATE:

- What are the **pathways and costs to achieve a 100% renewable electricity supply** while electrifying key end uses and maintaining the current high degree of reliability?
- What are the potential benefits to **the environment** and **health**?
- How might **local jobs** and the **economy** change?
- How can communities shape these changes to prioritize **environmental justice**?



LA100

ACHIEVING 100% RENEWABLE ENERGY IN LOS ANGELES



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



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 (78°)
- Debt relief
- EV charging access



2022 SLTRP

Fall 2021-2022 | 2035 & 2045 Target

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

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

LA100 Study Key Findings

- **100% renewable energy** is achievable
- Combustion turbines powered by a renewable fuel, such as **green hydrogen**, are necessary for **reliability** and **resiliency**.
- Building and transportation electrification is key to affordability
- **Transportation Electrification** will have the biggest impact on reducing NOx in L.A. basin
- Investment of approx. \$57-87B **in addition to existing obligations**
- Significant job creation (9,500 jobs)

There are common investments across all pathways critical to achieving 100% clean power



LA100 Study Chapter Content

The 
Customer



CHAPTER 3
**Electricity Demand
Projections**



CHAPTER 4
**Customer-Adopted
Rooftop Solar
& Storage**

The 
**Power
System**



CHAPTER 5
**Utility Options for
Local Solar &
Storage**



CHAPTER 6
**Renewable Energy
Investments &
Operations**



CHAPTER 7
**Distribution System
Analysis**

The 
Community



CHAPTER 8
**Greenhouse Gas
Emissions**



CHAPTER 9
**Air Quality &
Health**



CHAPTER 10
**Environmental
Justice**



CHAPTER 11
**Economic Impacts
& Jobs**

LA100 Study Scenarios



SB100

Evaluated under **Moderate**, **High**, and **Stress** Load Electrification

- 100% clean energy by **2045**
- Only scenario with a target based on retail sales, not generation
- Only scenario that allows up to 10% of the target to be natural gas offset by renewable electricity credits
- Allows existing nuclear and upgrades to transmission



Early & No Biofuels

Evaluated under **Moderate** and **High** Load Electrification

- 100% clean energy by **2035**, 10 years sooner than other scenarios
- No natural gas generation or biofuels
- Allows existing nuclear and upgrades to transmission



Transmission Focus

Evaluated under **Moderate** and **High** Load Electrification

- 100% clean energy by **2045**
- Only scenario that builds new transmission corridors
- No natural gas or nuclear generation



Limited New Transmission

Evaluated under **Moderate** and **High** Load Electrification

- 100% clean energy by **2045**
- Only scenario that does not allow upgrades to transmission beyond currently planned projects
- No natural gas or nuclear generation

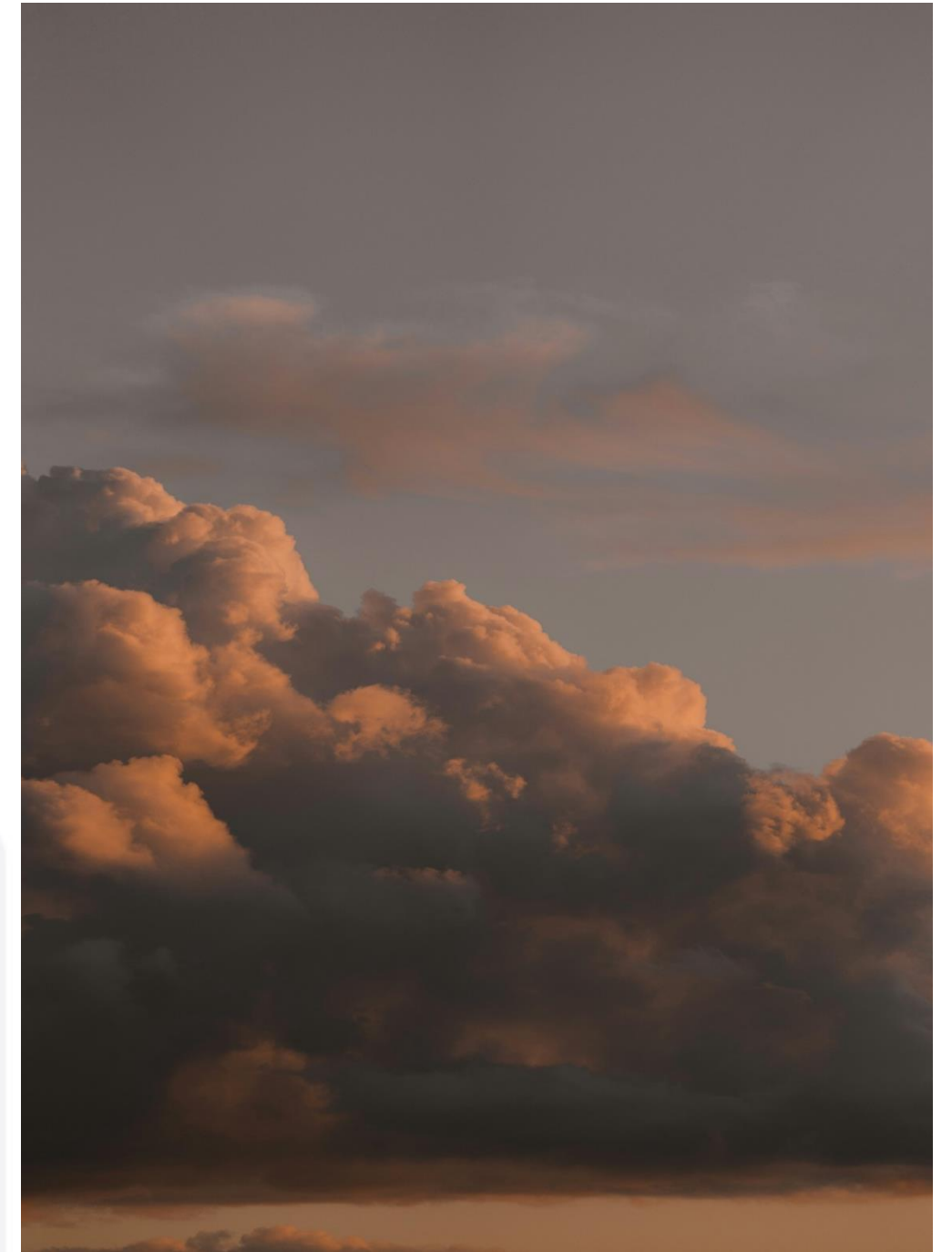
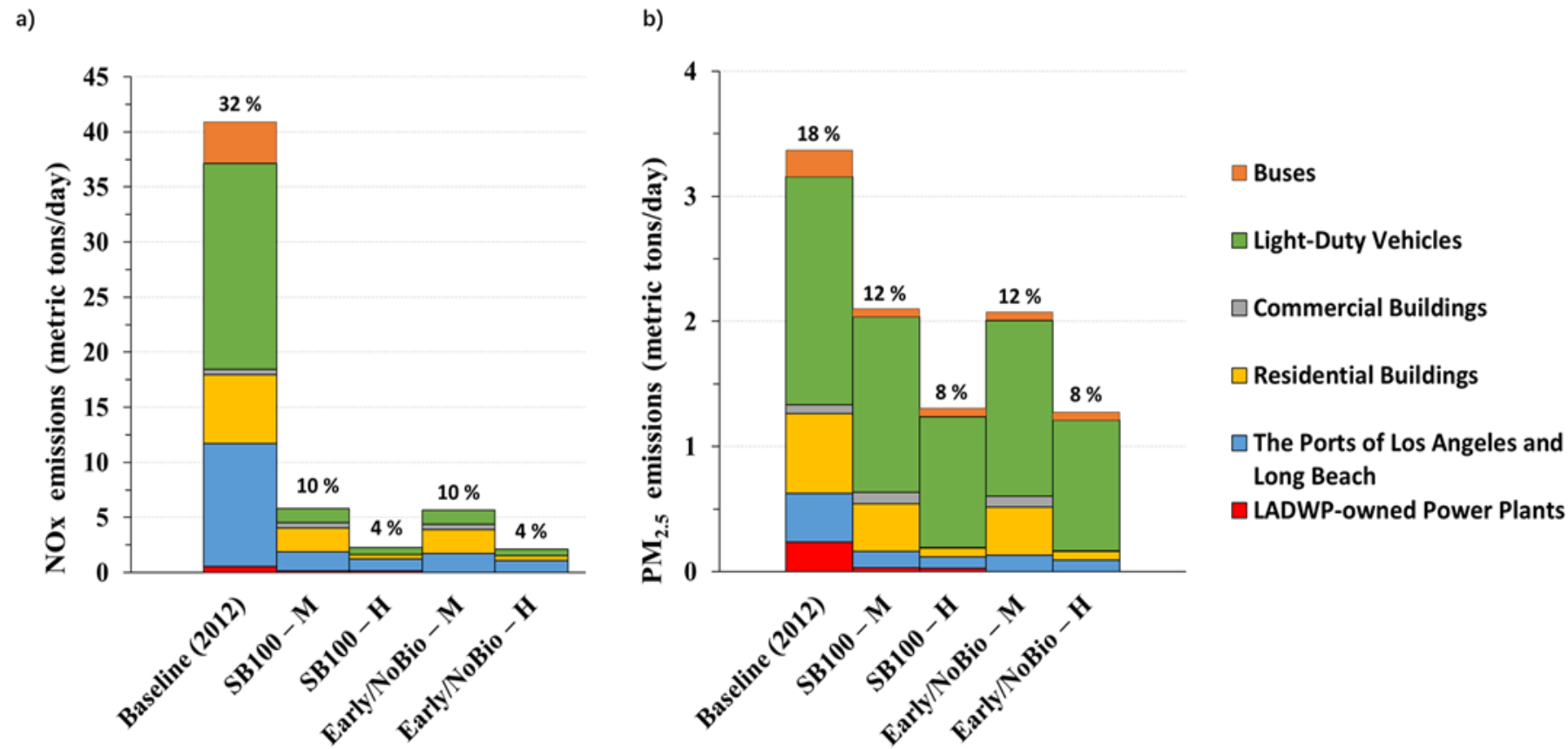
LA100 Study Results

SB100 vs. 100% by 2035 (Early & No Biofuels)

| Scenario | Total Clean Energy (Renewable, Hydro, and Nuclear) Penetration Achieved 2035 vs. 2045 | PV of Total Costs Present Value of Cumulative (2021-2045) Costs* at Alternative Discount Rates (Billion 2019\$) | Cumulative GHG (all sectors) Cumulative (2020-2045) Life Cycle GHG Emissions, All Sectors (MMT CO ₂ e) | GHG Reduction (all sectors) Reduction in Annual Life Cycle GHG Emissions in 2045 Compared to 2020, All Sectors | Social Cost of Carbon Cumulative (2021-2045) Monetized Emissions Costs of GHG Emissions at Discount Rates of 2.5% and 5% (Billion 2019\$) | Avoided Health Costs Annual Mean Value** of Avoided Health Impacts in 2045 Only (Undiscounted, 2019\$) Compared to 2012 | Annual Employment Average Annual Employment from LADWP Power-Sector Spending (2026-2045) by Location of Investment: In-basin Out-of-basin Total |
|------------------------------|---|--|--|---|--|--|---|
| SB100 MODERATE | 90% (Renewable), 90% (Hydro & Nuclear) | 0%: \$57B 2.5%: \$40B 5.0%: \$28B | 570 MMT | 54% | 2.5%: \$61B 5.0%: \$16B | \$900M | In: 4,900 Out: 3,000 Total: 7,900 |
| Early & No Biofuels MODERATE | 100% (Renewable), 100% (Hydro & Nuclear) | 0%: \$87B 2.5%: \$59B 5.0%: \$42B | 510 MMT | 61% | 2.5%: \$55B 5.0%: \$14B | Very similar results to SB100 - Moderate, likely*** | In: 8,200 Out: 4,200 Total: 12,400 |
| SB100 HIGH | 84% (Renewable), 88% (Hydro & Nuclear) | 0%: \$61B 2.5%: \$42B 5.0%: \$30B | 460 MMT | 79% | 2.5%: \$50B 5.0%: \$13B | Very similar results to Early & No Biofuels - High, likely*** | In: 5,500 Out: 3,500 Total: 9,000 |
| Early & No Biofuels HIGH | 100% (Renewable), 100% (Hydro & Nuclear) | 0%: \$86B 2.5%: \$59B 5.0%: \$41B | 390 MMT | 88% | 2.5%: \$43B 5.0%: \$11B | \$1,400M | In: 8,700 Out: 4,500 Total: 13,200 |

LA100 Study Results (cont'd)

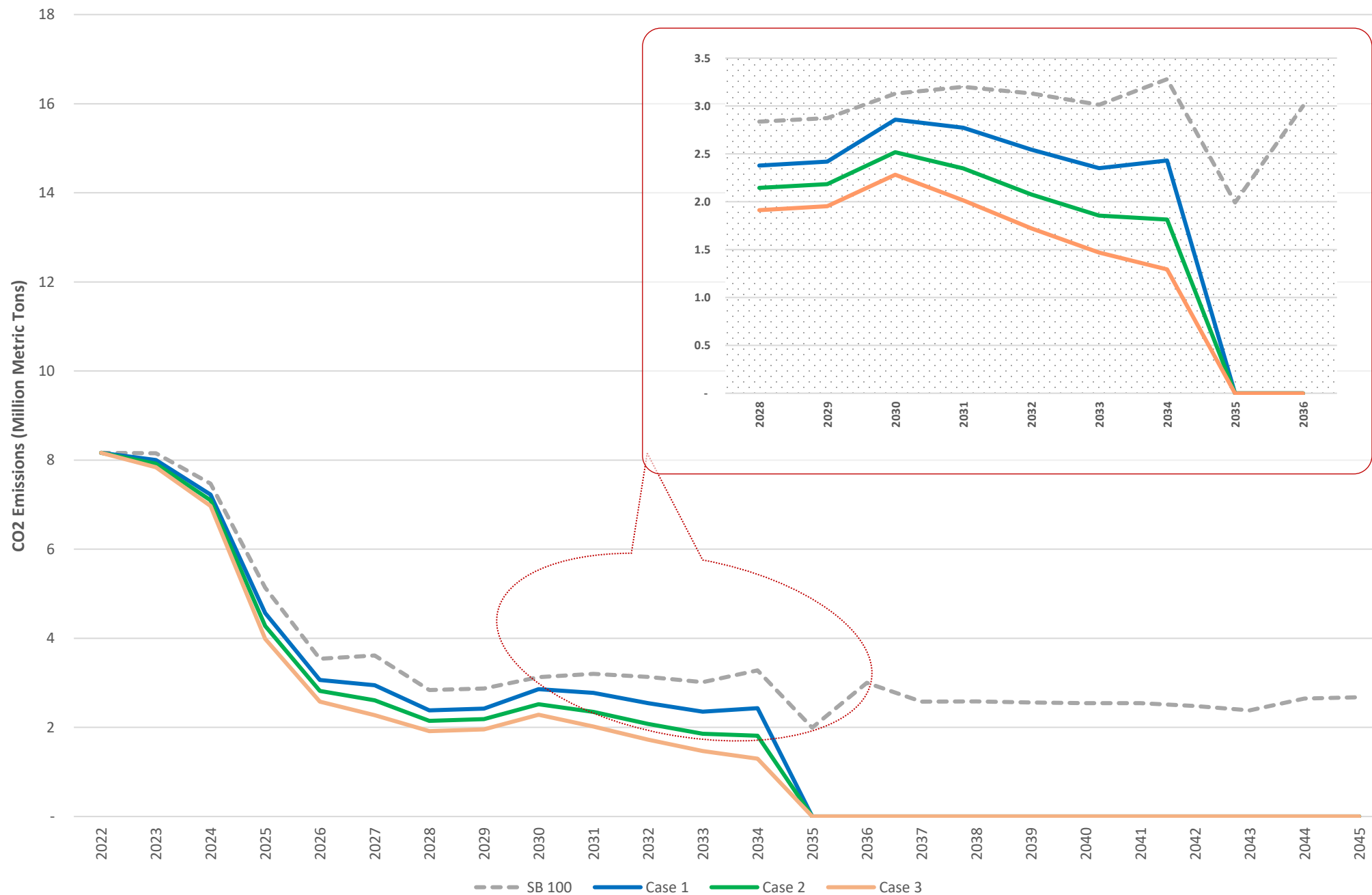
Electrification is Key to Improved Local Air Quality



| Scenario | Reduction in Annual Life Cycle GHG Emissions, All Sectors, in 2045 Compared to 2020 | Reductions in Annual Emissions from LA100-Influenced Sources in 2045 Compared to SB100 - Moderate | Annual Mean Value** of Avoided Health Impacts in 2045 (Million 2019\$) Compared to SB100 - Moderate | Annual Mean Avoided Incidences in 2045 Compared to SB100 - Moderate |
|--|---|---|---|---|
| Early & No Biofuels MODERATE | 61% | 2% NO _x , 1% PM _{2.5} | \$9M | 1 prevented premature death 0 change in cardiovascular hospital admissions 0 change in asthma ER visits |
| Early & No Biofuels HIGH | 88% | 63% NO _x , 39% PM _{2.5} | \$500M | 53 prevented premature deaths 23 fewer cardiovascular hospital admissions 19 fewer asthma ER visits |

2022 SLTRP GHG COMPARISON

1990 baseline
levels = **17.9** MMT



- Cases 1, 2, and 3 evaluated in the SLTRP are variations on the LA100 Study's **Early & No Biofuels Scenario**.
- Case 1 has the **highest emissions**.
- Case 3 has the **lowest emissions**.
- All Cases compared to SB100 emissions reference case.
- Cases 1 to 3 **all achieve 100% carbon-free energy** through a combination of:
 - Renewables
 - Demand-side management
 - Combustion of renewably derived hydrogen.

2022 SLTRP TOTAL COST

Cost (based on the net present value)

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



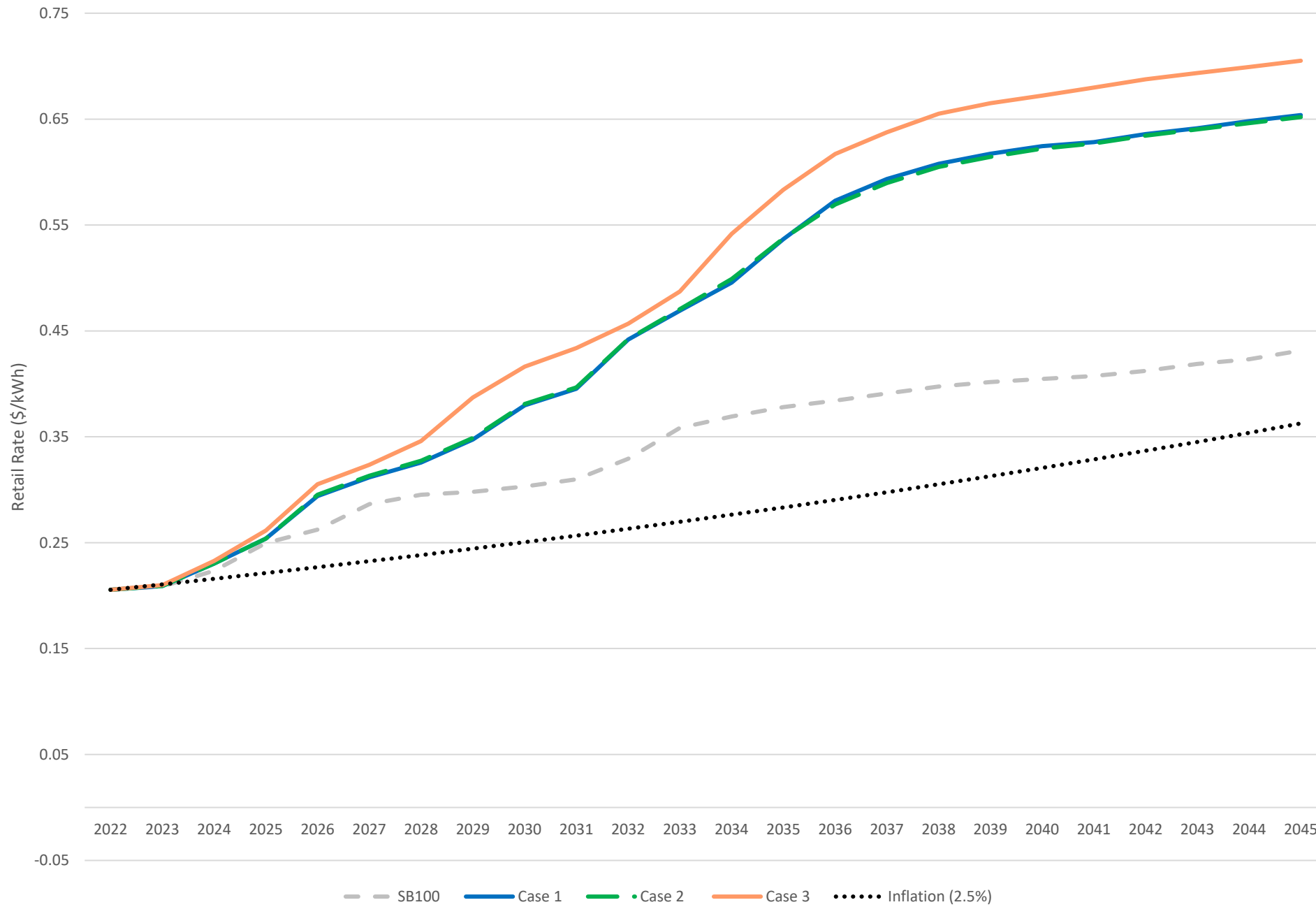
TOTAL COST

BILLIONS OF DOLLARS (\$B)

SCALE 0 - \$100B

2022 SLTRP RATE IMPACT

2022 SLTRP Customer Rates (Nominal \$)

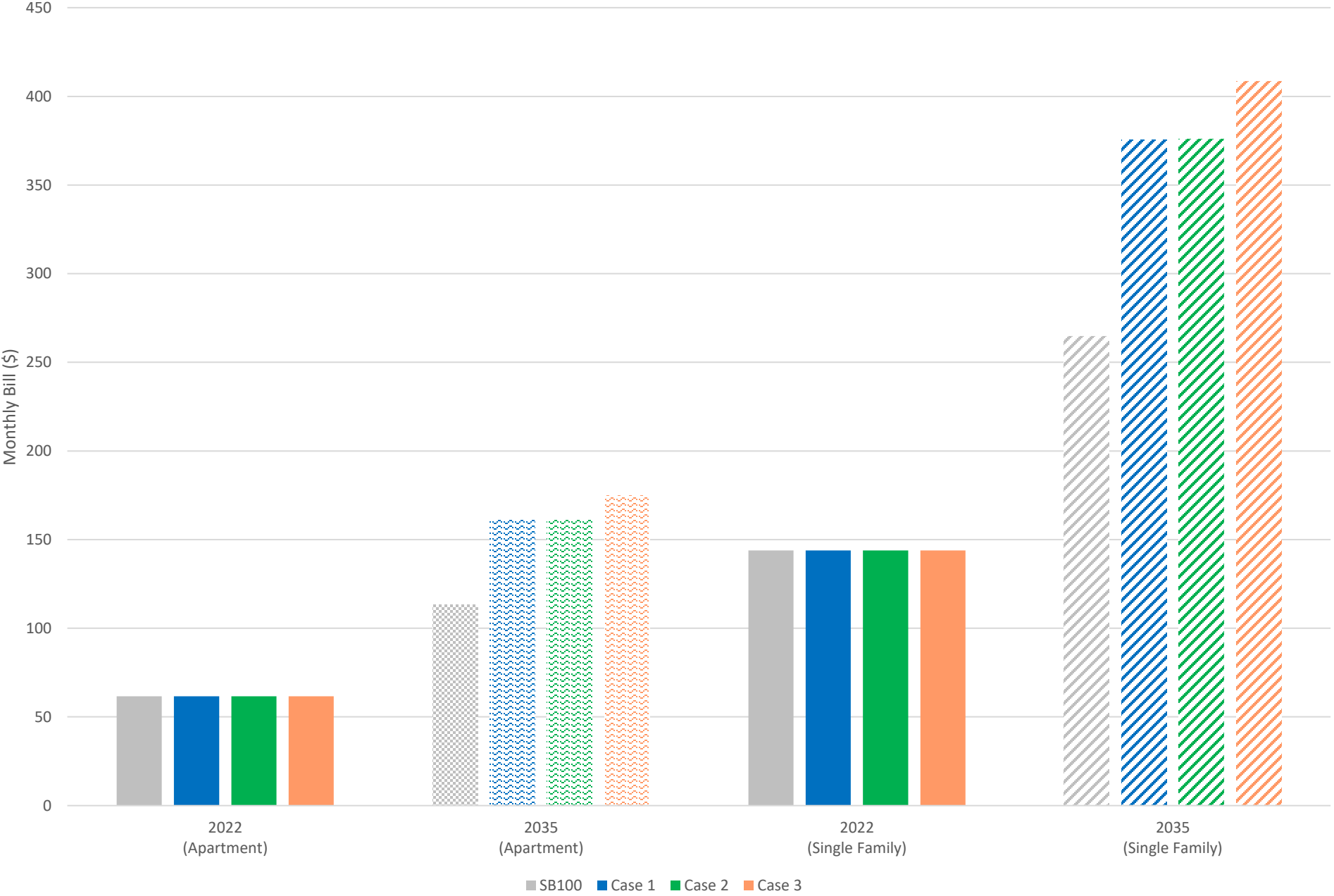


| 2022 SLTRP Scenario | Rate in 2030 and 2035 (cents/kWh) | Est. Avg. Rate Increase (2022-35) | Est. Avg. Rate Increase (2022-45) |
|---------------------|--|-----------------------------------|-----------------------------------|
| SB100 | 30 (in 2030) 38 (in 2035) | 4.8% | 3.3% |
| Case 1 | 38 (in 2030) 54 (in 2035) | 7.7% | 5.2% |
| Case 2 | 38 (in 2030) 54 (in 2035) | 7.7% | 5.2% |
| Case 3 | 42 (in 2030) 58 (in 2035) | 8.4% | 5.6% |

2022 SLTRP MONTHLY BILL IMPACTS

| 2022 SLTRP Scenario | Average Customer Bill in 2035 (Apartment) | Average Customer Bill in 2035 (Single Family) | % Increase from 2022 |
|---------------------|---|---|----------------------|
| SB100 | \$112 | \$262 | 84% |
| Case 1 | \$160 | \$373 | 161% |
| Case 2 | \$160 | \$373 | 161% |
| Case 3 | \$174 | \$405 | 184% |

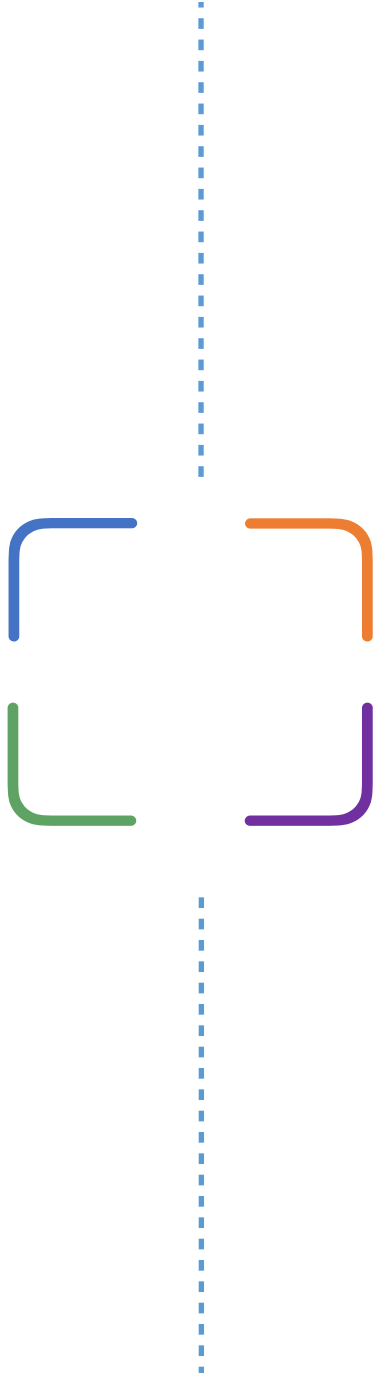
Note: Average monthly bill in 2022 is \$61.66 per month for apartment and \$143.86 per month for single-family home.



2022 SLTRP RELIABILITY

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







RESILIENCY

LOSS OF LOAD HOURS (LOLH)
LOWER VALUE IS BETTER

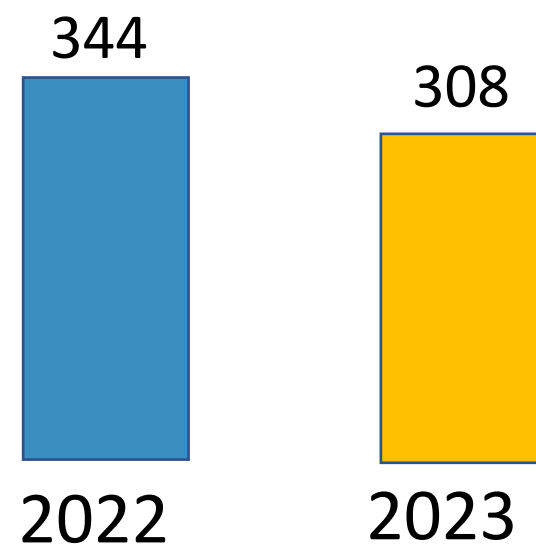
SCALE 0 - 2.5 LOLH

SCENARIO BASED HUMAN RESOURCE PLAN

New FTEs per Year (By Cumulative Scenario)

| Scenario | FY23 | FY24 | FY25 | FY26 | FY27 | FY28 | FY29 | FY30 | FY31 | FY32 | Total |
|--|------|------|------|------|------|------|------|------|------|------|-------------|
|  Scenario 1: System Intact | 97 | 389 | 356 | 346 | 211 | 243 | 251 | 254 | 179 | 146 | 2473 |
|  Scenario 2: PSRP+ | 142 | 473 | 446 | 437 | 272 | 317 | 315 | 335 | 242 | 199 | 3179 |
|  Scenario 3: Load Growth | 212 | 568 | 540 | 502 | 348 | 393 | 402 | 425 | 345 | 290 | 4024 |
|  Scenario 4: SLTRP + STP | 217 | 601 | 565 | 509 | 356 | 411 | 413 | 448 | 363 | 296 | 4178 |

Recent Hiring Levels (FTEs)



Power System Is On Target for Meeting Its Human Resource Needs.

LA100 EQUITY METRICS

| LADWP RESIDENTIAL INVESTMENTS 1999-2022 | | NUMBER OF YEARS | TOTAL AMOUNT SPENT | AVERAGE AMOUNT PER CUSTOMER DAC/Non-DAC | % OF INCENTIVES Normalized by number of customers DAC/Non-DAC | WHICH COMMUNITIES DISPROPORTIONATELY BENEFITED FROM PROGRAMS? | | | | |
|---|--|-----------------|--------------------|--|---|---|------------------------|------------------------------|-----------------------|---------------------------|
| | | | | | | DAC/Non-DAC | Mostly Non-White/White | Mostly Hispanic/Non-Hispanic | Mostly Renters/Owners | Below/Above Median Income |
| SOLAR INSTALLATION (1999-2022) | Net Energy Metering Programs | 22 | \$340,604,541 | 0.25 kW / 0.41 kW | 38% DAC / 62% Non-DAC | Non-DAC | White | Non-Hispanic | Owners | Above |
| | Home Energy Improvement Program | 3 | \$3,378,869 | \$3 / \$2 | 61% DAC / 39% Non-DAC | DAC | | Hispanic | Owners | |
| | Refrigerator Turn-In and Recycle Program | 5 | \$2,667,307 | 0.010 refrigerators / 0.014 refrigerators | 42% DAC / 58% Non-DAC | Non-DAC | White | Non-Hispanic | Owners | Above |
| ENERGY EFFICIENCY (2013-2021) | Consumer Rebate Program | 6 | \$93,248,144 | \$64 / \$74 | 46% DAC / 54% Non-DAC | Non-DAC | White | Non-Hispanic | Owners | Above |
| | Other Non-Low-Income-Targeted Programs | 15 | \$36,343,548 | \$178 / \$196 | 35% DAC / 65% Non-DAC | Non-DAC | White | Non-Hispanic | Owners | Above |
| | Energy Savings Assistance Program* | 5 | \$7,897,260 | \$11 / \$1 | 92% DAC / 8% Non-DAC | DAC | Non-White | Hispanic | Renters | Below |
| ELECTRIC VEHICLES (2013-2021) | Incentive Programs | 8 | \$5,361,426 | \$41 / \$64 | 23% DAC / 77% Non-DAC | Non-DAC | White | Non-Hispanic | Owners | Above |

* Low-Income Targeted

Anderson, et al. 2023. "Executive Summary." In LA100 Equity Strategies, edited by Kate Anderson, Sonja Berdahl, Megan Day, Casandra Rauser, and Patricia Romero-Lankao. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5C00-85947. <https://www.nrel.gov/docs/fy24osti/85947.pdf>. p.22.

LADWP POWERED-BY EQUITY INITIATIVES

| Initiatives | Description | Community Benefits | | | |
|--|--|--------------------|--------|------|-------------|
| | | Affordability | Access | Jobs | Air Quality |
| EV Hubs (Charging Plazas) | Provide EV charging access across the City of LA | ✓ | ✓ | ✓ | ✓ |
| Used EV Rebate | Provide \$4,000 rebate for used EVs | ✓ | ✓ | - | ✓ |
| EV Charger Rebate | Provide up to \$1,000 to purchase and install Level 2 chargers | ✓ | ✓ | ✓ | ✓ |
| Metro, LAWA, and POLA Electrification | Provide and support the electrification of Metro, LAWA, and POLA to significantly reduce GHG emissions throughout the City of LA | - | ✓ | ✓ | ✓ |
| Heavy Duty Truck Charging Infrastructure | Provide and support EV charging infrastructure for heavy duty trucks across the City of LA | - | ✓ | ✓ | ✓ |
| Solar Rooftop | Proliferate solar across the City of LA by leasing their rooftop to install solar in exchange of a direct monthly payment | ✓ | ✓ | ✓ | ✓ |
| Shared Solar | Provide access to solar energy for multi-family residents (mostly renters) with no individual rooftops | ✓ | ✓ | ✓ | ✓ |
| Cool LA | Provide air conditioner incentive to low income residents particularly to those vulnerable to heat waves | ✓ | ✓ | - | ✓ |
| Commercial Direct Install | Provide assessments and free efficiency upgrades to qualifying business customers. | ✓ | ✓ | ✓ | ✓ |
| Comprehensive Affordable Multifamily Retrofit (CAMR) | Assist low income buildings in retrofitting to reduce both energy and water usage | ✓ | ✓ | ✓ | ✓ |
| Project Powerhouse Affordable Housing | Accelerate the delivery of affordable housing projects at a reduced cost | ✓ | ✓ | ✓ | - |
| Home Energy Improvement Program (HEIP) | Provide a free home assessment to identify energy efficiency improvement areas. The program also performs necessary upgrades identified in the assessment. | ✓ | ✓ | ✓ | ✓ |
| EZ Save | Provide discount and explore higher discount to low income customers to reduce their electric bill | ✓ | ✓ | - | - |
| Senior Citizen/Disability Lifeline Rate | Provide discount to low income senior and disabled customers to reduce their electric bill | ✓ | ✓ | - | - |
| Level Pay | Provide option to pay higher seasonal bill across a 12-month period | ✓ | ✓ | - | - |
| Extended Payment Programs | Provide option to pay electric and water bill up to a period of 36 months for all customers and 48 months for low income customers | ✓ | ✓ | - | - |

GUIDING PRINCIPLES

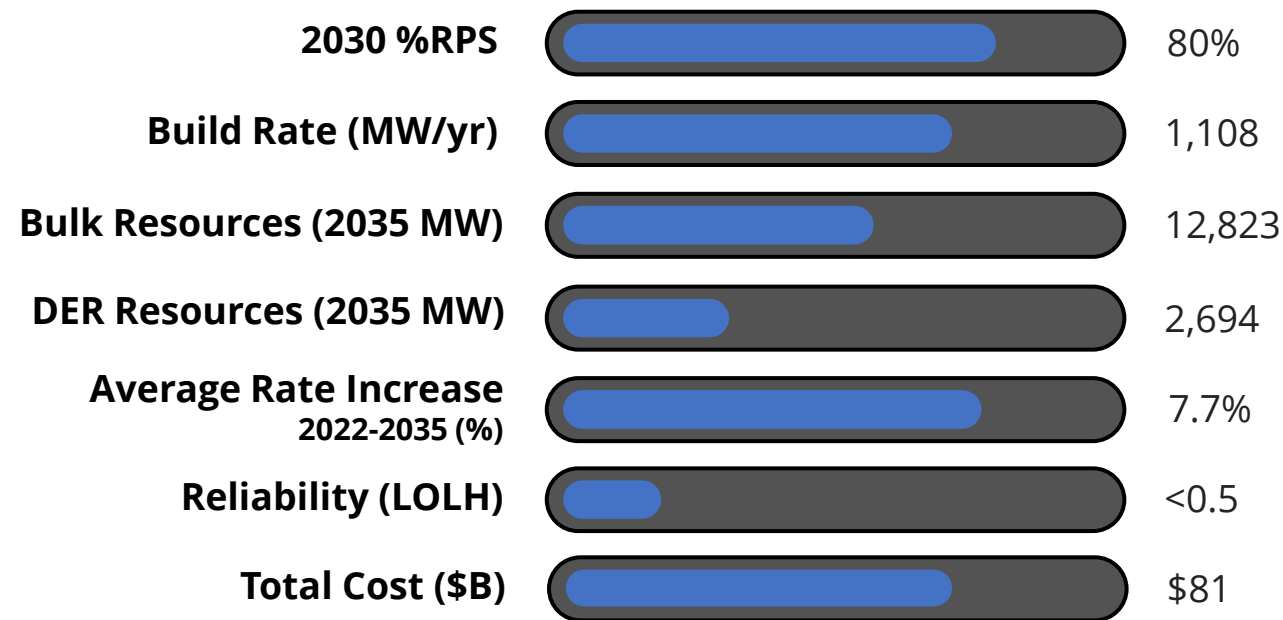
The SLTRP is a **Roadmap** to Meet Our Future Energy Needs



OUTCOME:

Develop a Recommended Scenario That Guides Our Near-term Actions and Future Energy Planning

LADWP'S 2022 SLTRP RECOMMENDED CASE



| | |
|--------------|---------------------|
| Transmission | Mid |
| DERs | High |
| Natural Gas | 2035 |
| Hydrogen | Backup (after 2035) |

Build Rates

- Average build rate from 2018 to 2021 has been **200 MW per year**
- Includes both **utility** and **customer-sided** clean energy resources

Bulk Power Resources include:

- Utility Scale RPS
 - Over 1,000 MW of firm renewables
- Utility Scale Energy Storage
- In-Basin Hydrogen

Distributed Energy Resources include:

- Distributed Solar
- Distributed Energy Storage
- Demand Response

Affordability

- 7.7% annual rate increase year over year through 2035
- 161% increase in customer bill by 2035

Cost

(based on net present value)

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

Firm Generation

- LA100 determined that in all scenarios firm, **dispatchable generation** was required by 2035.
- LADWP expects to minimize use of in-basin green hydrogen turbines to provide only **backup power** in case of transmission loss (e.g. wildfire) or low renewable energy output.
- Firm generation provides **resiliency during outages** and supports development of new transmission pathways.

Thank You