INDEPENDENT ENERGY PRODUCERS ASSOCIATION ANNUAL MEETING

LA100—LADWP GOES CARBON FREE

Martin Adams, LADWP General Manager & Chief Engineer

September 28, 20022

POWER SYSTEM OVERVIEW

L.A.'s Power Grid

7,880 MW of Generation Capacity

Peak Load: 6,502 MW on August, 31, 2017

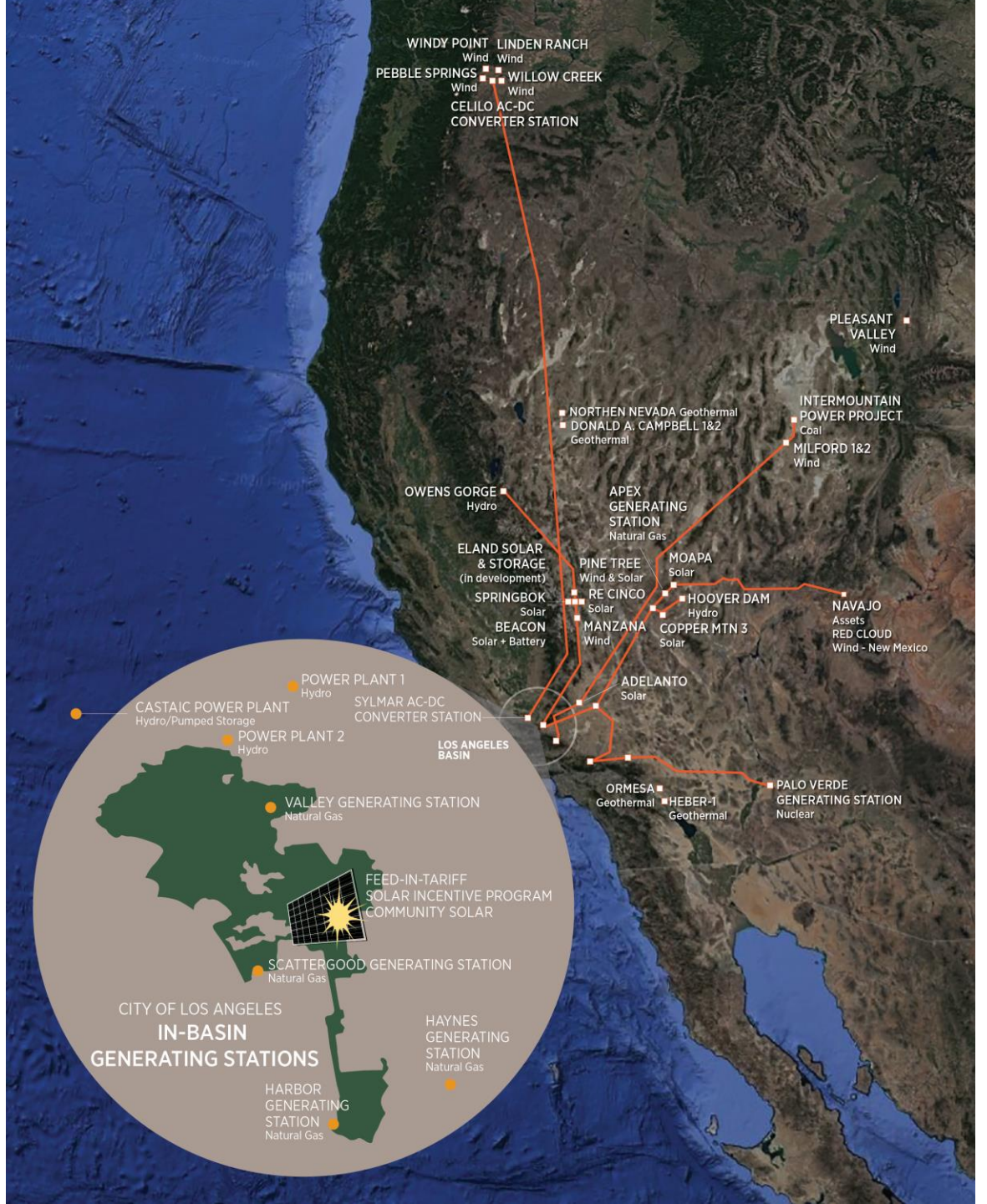
1.5 million electric customers

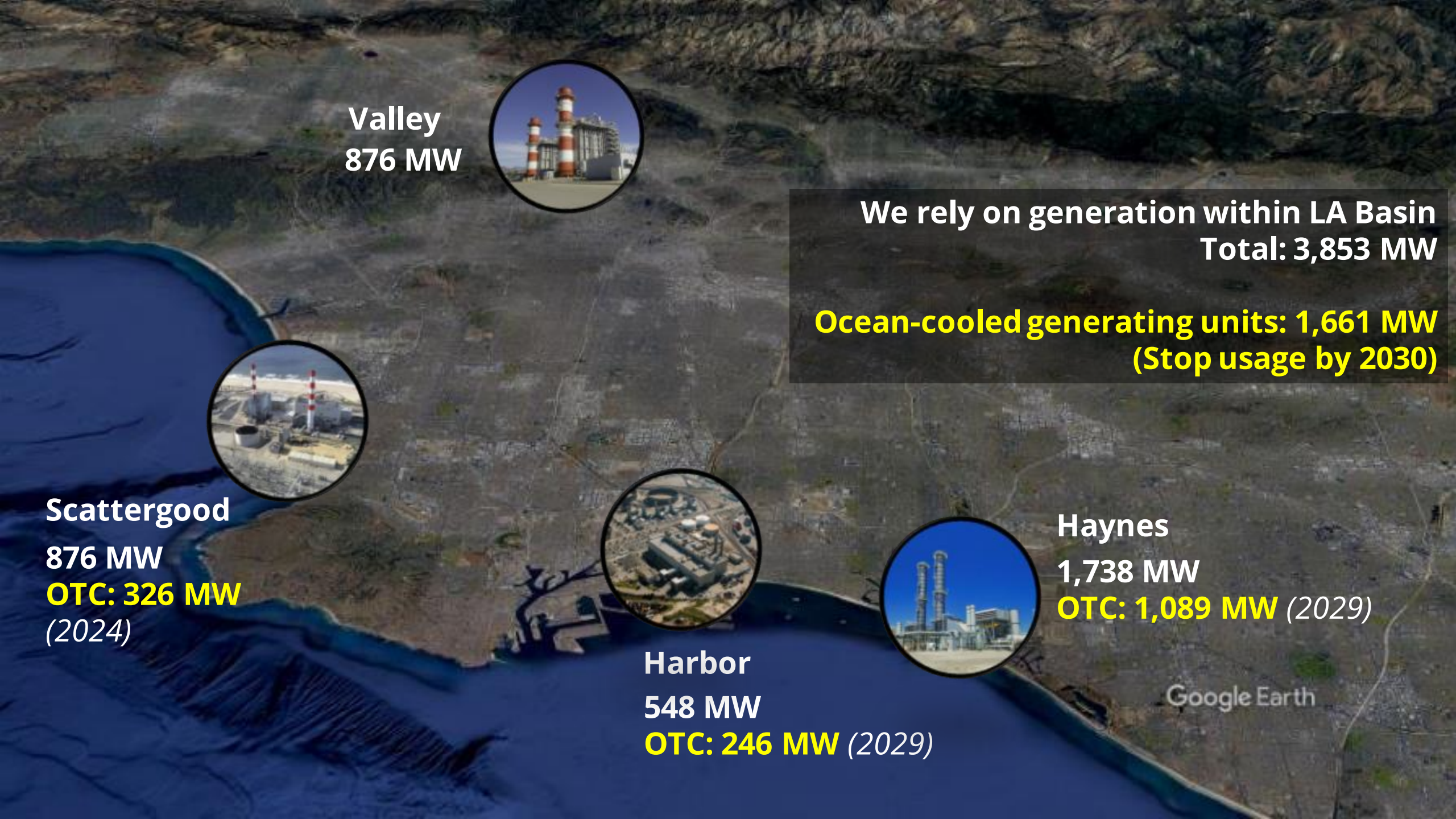
15,000 miles of power lines and cables across five Western states

L.A.'s Power Resources

Over 40% Renewables

Over 60% Carbon-Free




Valley
876 MW
We rely on generation within LA Basin
Total: 3,853 MW
Ocean-cooled generating units: 1,661 MW
(Stop usage by 2030)
Scattergood
876 MW
OTC: 326 MW
(2024)
Harbor
548 MW
OTC: 246 MW (2029)
Haynes
1,738 MW
OTC: 1,089 MW (2029)
Google Earth

LA100

The Los Angeles 100% Renewable Energy Study

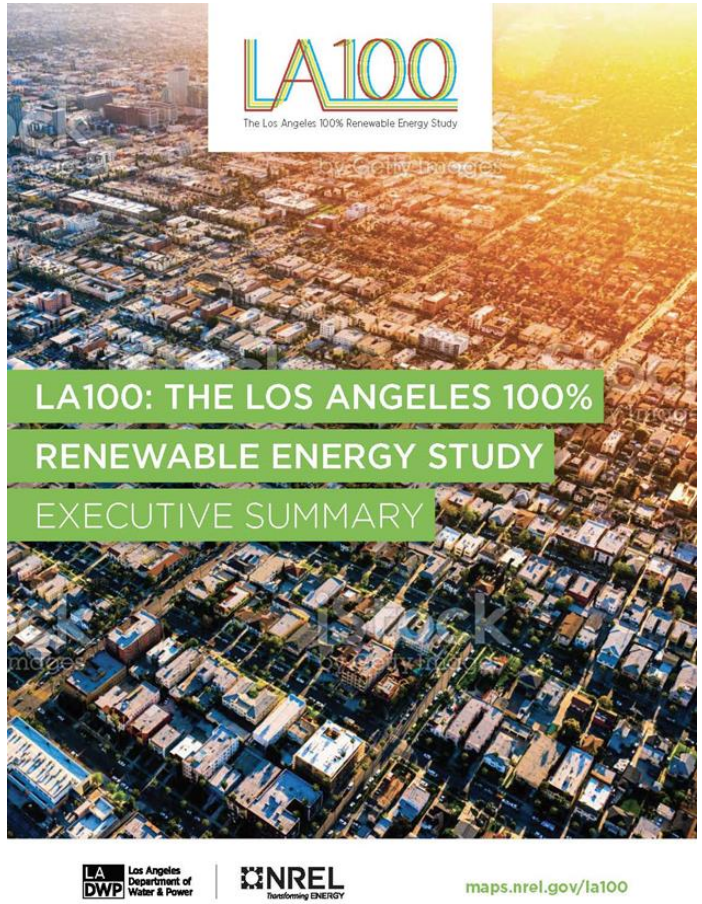
LA City Council motions directed LADWP to evaluate:

- 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 STUDY OUTCOMES

Independent study by the U.S. Department of Energy
National Renewable Energy Laboratory (NREL):

- **100% renewable energy is achievable** as early as **2035**
- Combustion turbines powered by a renewable fuel, such as **green hydrogen**, necessary for **reliability** and **resiliency**.
- Building and transportation electrification is key to affordability
- Rate impacts track inflation if we see building and transportation electrification
- Significant investment (approx. $57-87B) and job creation (9,500 jobs)



LA100 did not recommend a single pathway to 100%, but showed common investments across all pathways.

BASED ON LA100 FINDINGS, L.A. CITY LEADERS SET ACCELERATED TARGETS

100% Carbon-Free Energy by 2035

Interim 2030 targets:

80% Renewables

97% Clean Energy

State Law (SB100) – The 100% Clean Energy Act of 2018*

100% clean energy by 2045

60% renewables by 2030

THE ROAD AHEAD: LA100 EQUITY STRATEIGES

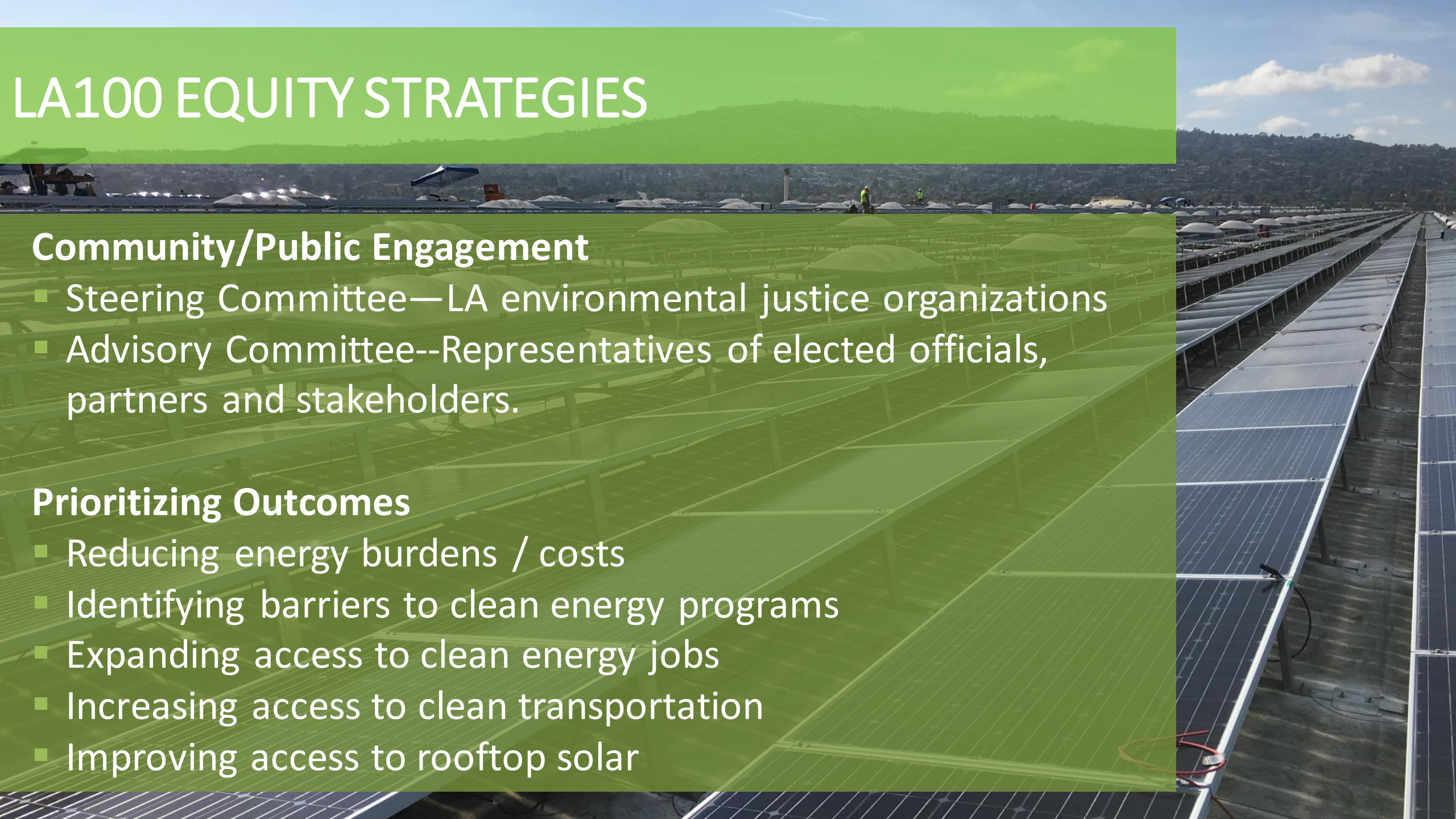
LA100 Finding:

"All communities will share in the benefits of the clean energy transition, but improving equity in participation and outcomes would require intentionally designed policies and programs."

LA100 Equity Strategies picks up where LA100 left off to answer the question:

How can Los Angeles ensure its transition to 100% clean energy with high levels of electrification **improves energy justice**?

LA100 EQUITY STRATEGIES



Community/Public Engagement

- Steering Committee—LA environmental justice organizations
- Advisory Committee--Representatives of elected officials, partners and stakeholders.

Prioritizing Outcomes

- Reducing energy burdens / costs
- Identifying barriers to clean energy programs
- Expanding access to clean energy jobs
- Increasing access to clean transportation
- Improving access to rooftop solar

WHAT WE HEARD SO FAR

- Rate Reform and Affordability
- Residential and Commercial Buildings
- Local Solar and Storage
- Transportation Electrification
- Reliability and Resiliency
- Air Quality, Health, & Environment
- Jobs & Workforce Development

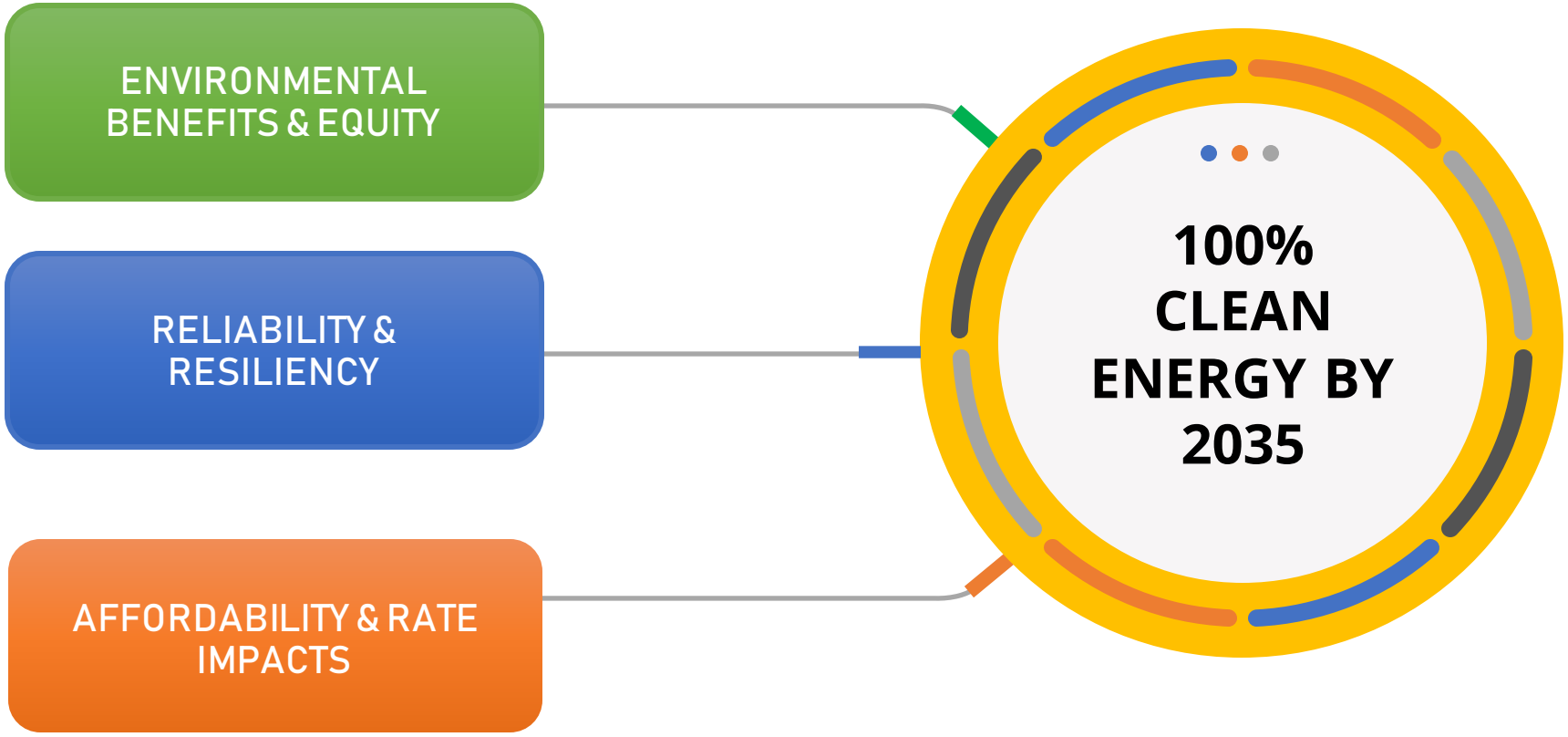
11

THE ROAD AHEAD: 2022 STRATEGIC LONG-TERM RESOURCE PLAN (SLTRP)

2022 SLTRP Outcome:

Develop a recommended scenario that guides LADWP's near-term actions and future energy planning.

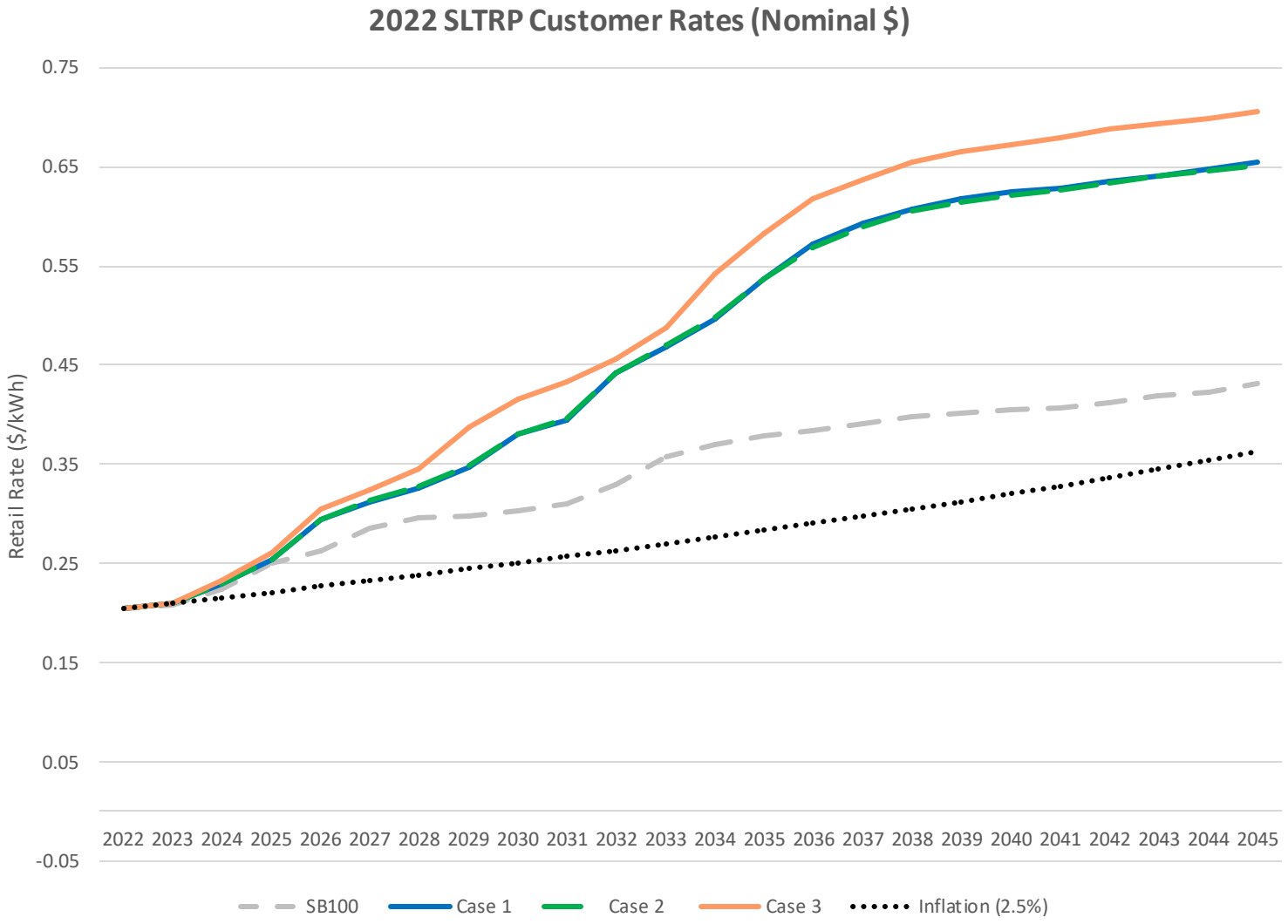
2022 SLTRP GUIDING PRINCIPLES



2022 SLTRP CORE CASES

- Cases differ in **speed of reducing greenhouse gas emissions** and amount of DERs benefiting customers
- All achieve **ZERO** carbon by 2035
- Cases 1 through 3 meet the City Council's to accelerate 100% clean energy by **10 years** in 2035.
- Each Case **builds upon** assumptions from **LA100** (Early, No-Biofuels scenario)
- A recommended case will be presented to LADWP to determine path forward.

2022 SLTRP KEY FINDINGS: RATE IMPACTS



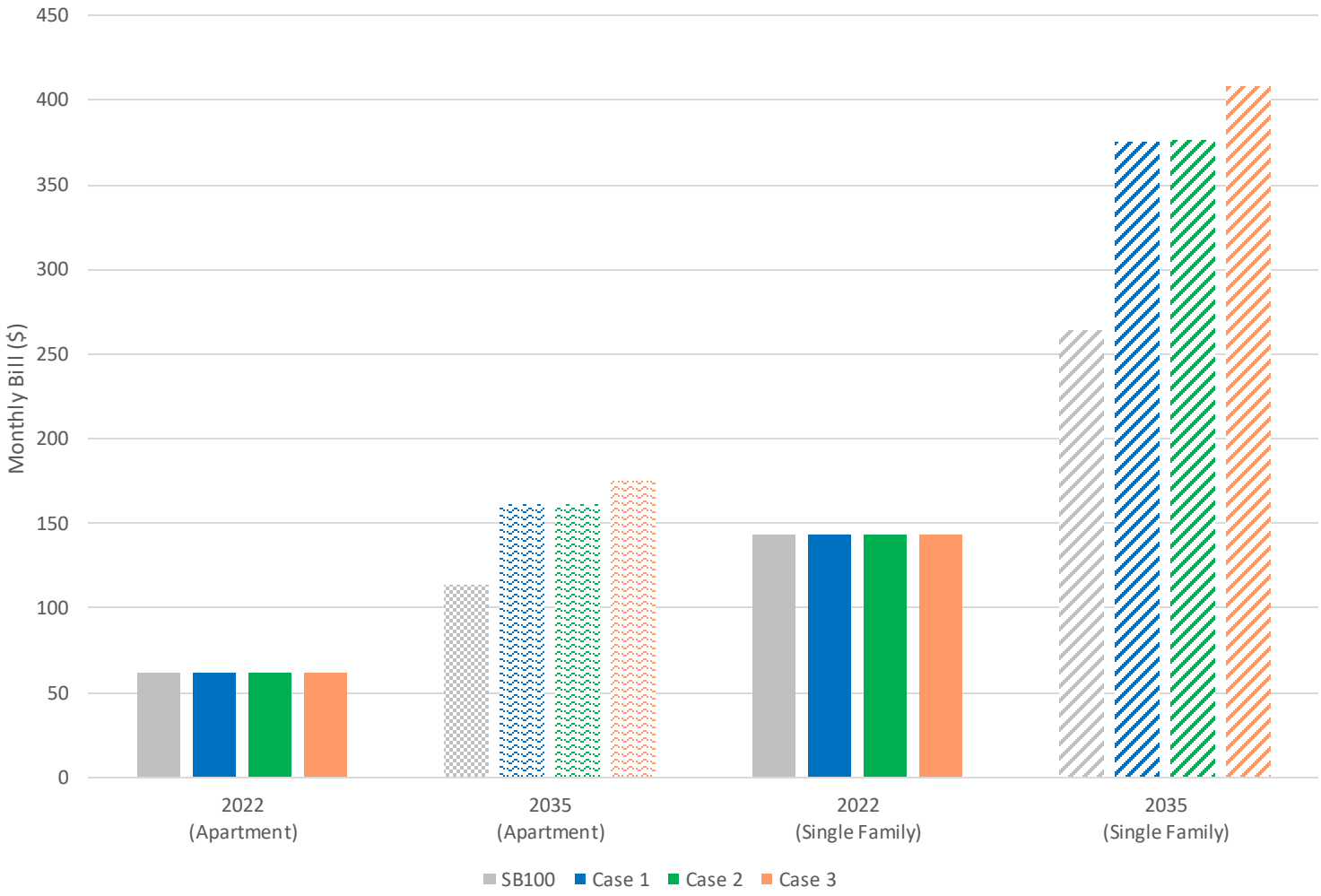
2022 SLTRP Scenario	Rate in 2030 and 2035 (cents/kWh)	Est. Avg. Rate Increase (2022-35)	Est. Avg. Rate Increase (2022-45)
SB100	***30** (in 2030)* ***38** (in 2035)*	*4.8%*	*3.3%*
Case 1	**38** (in 2030) **54** (in 2035)	7.7%	5.2%
Case 2	**38** (in 2030) **54** (in 2035)	7.7%	5.2%
Case 3	**42** (in 2030)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

*Note: Preliminary, subject to ongoing budget estimates and rate review.

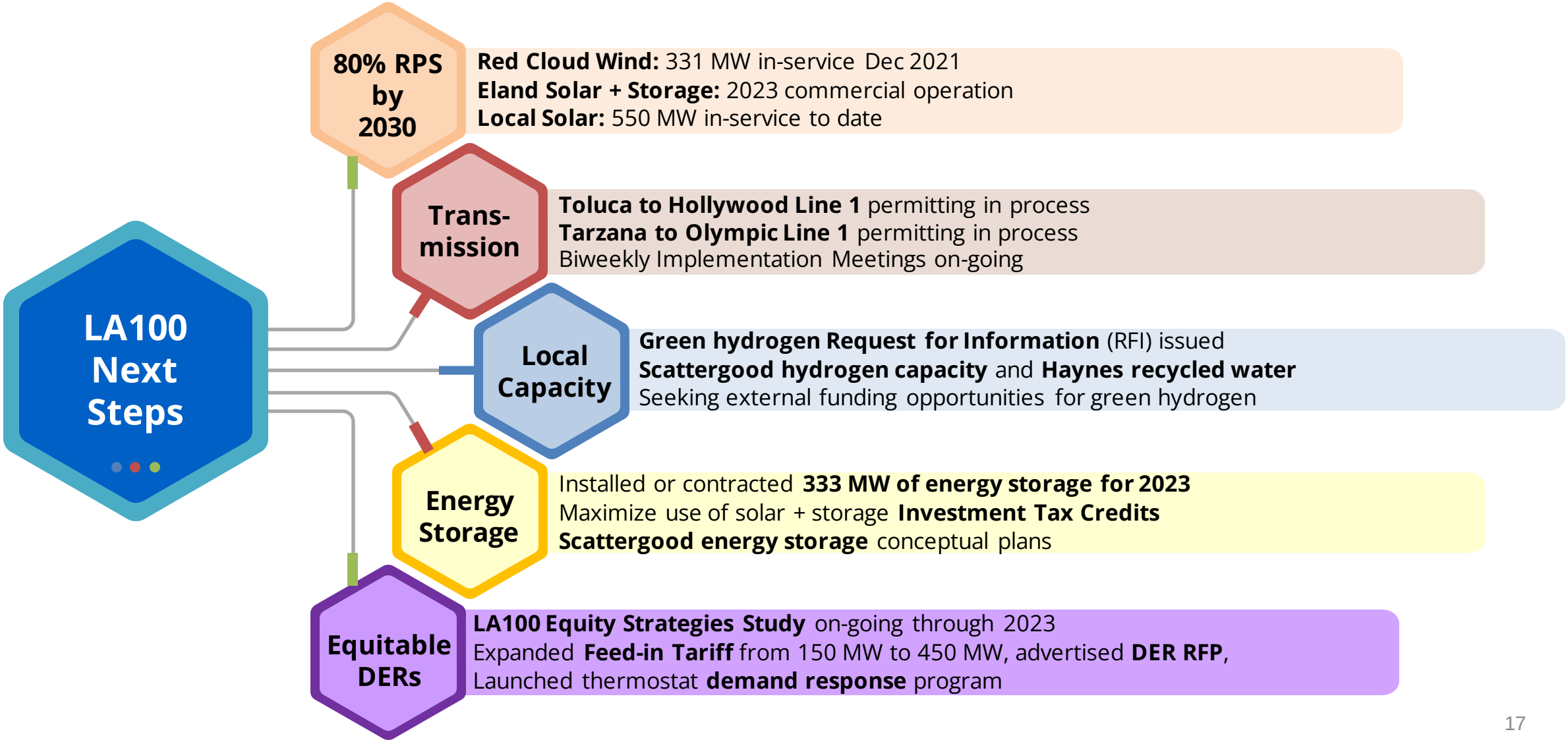
2022 SLTRP KEY FINDINGS: MONTHLY BILL IMPACTS

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.*



INITIAL MOMENTUM & CRITICAL ACTIONS

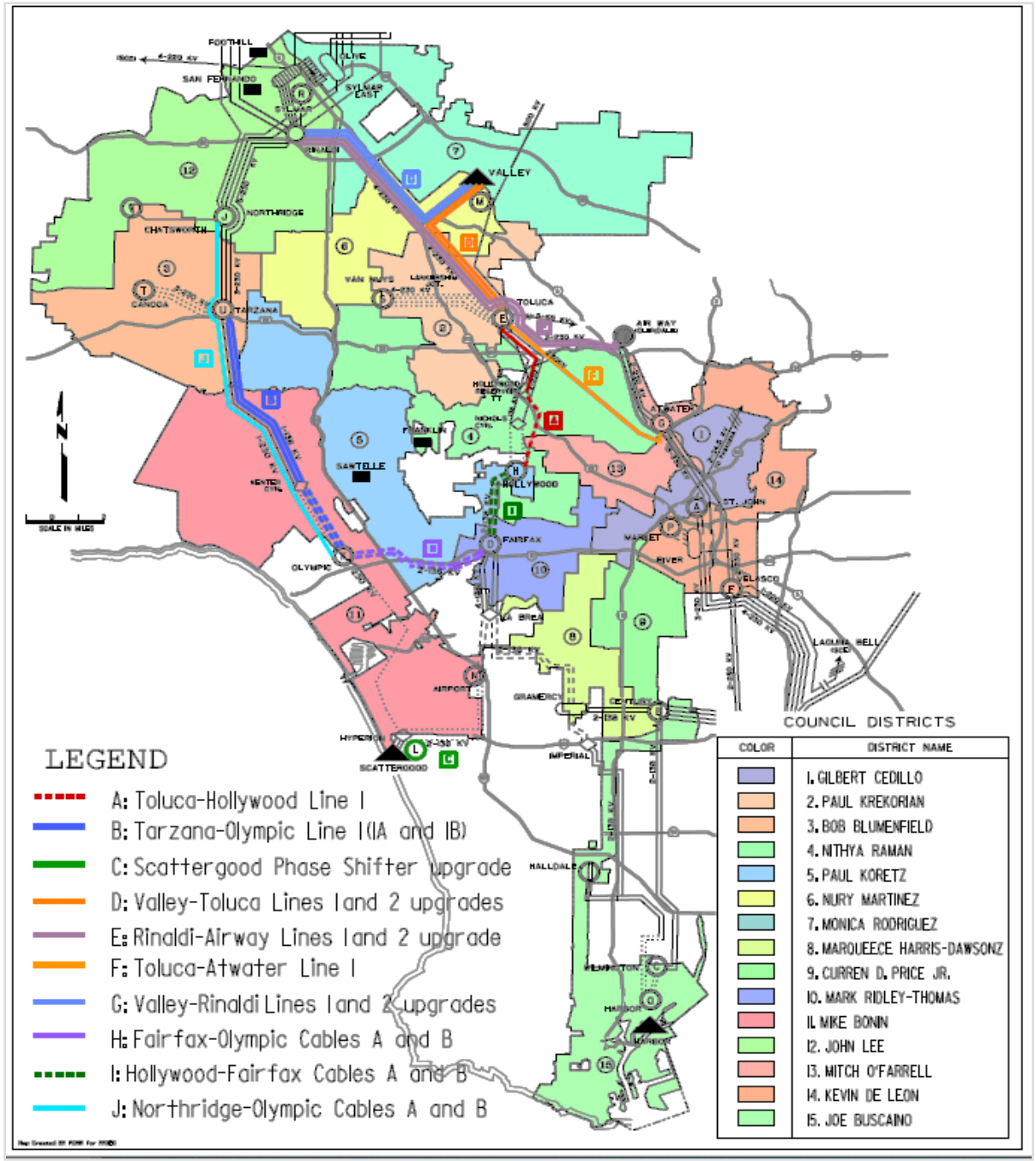


ACCELERATE TO 80% RENEWABLE AND 97% CARBON FREE BY 2030

- Deploy 3,000 MW of new renewable energy projects
- Leverage significant existing external transmission
- Upgrade local transmission critical to delivering renewable power
- Increase local generation and transmission capacity critical to integrating renewables and resiliency

ACCELERATE LOCAL TRANSMISSION PROJECTS

- 10 Transmission Projects over 10 years to bring renewable power where its needed within the City
- Unprecedented deployment of transmission infrastructure
- **Flexible generation capacity in-basin needed to complete transmission projects in time for 2035**



ELECTRIFICATION REQUIRES DISTRIBUTION INVESTMENTS

- Capacity Needs for Electrification
  - Over 650 MW Receiving Station capacity shortfall by 2040
  - Over 800 MW of Distributing Station capacity shortfall by 2040
  - These require the building or expansion of 20 new stations
  - **In the last 30 years LADWP has built three stations**

- Hundreds of Stressed Distribution Assets
  - A third of all feeders (>500 distribution lines) are over capacity
  - **Existing replacement targets need to increase several fold**

LA100 Study –

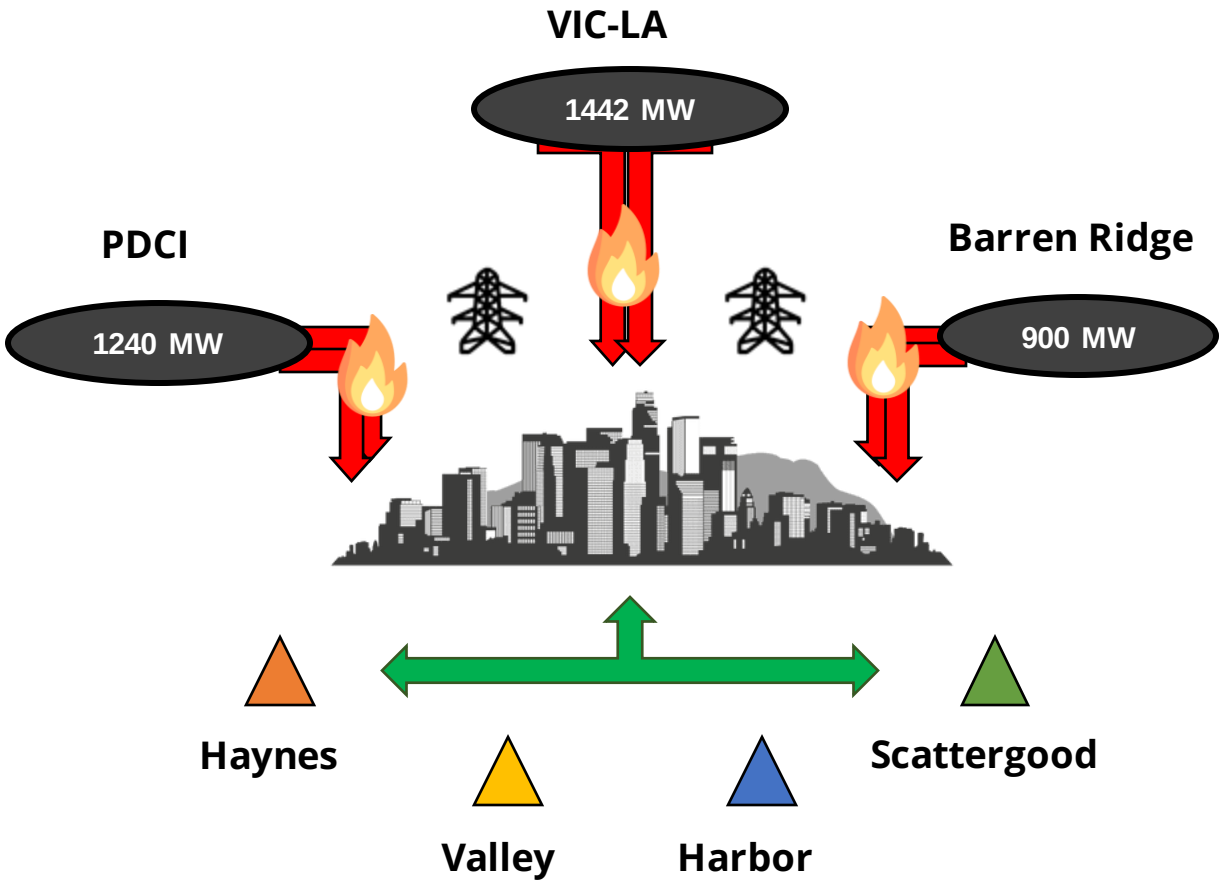
Maintaining low rates requires high electrification

GREEN HYDROGEN CAPACITY AT SCATTERGOOD

- Transforming local generation: LA100 study shows need for renewable in-basin capacity at all generating stations, in all scenarios.
- System reliability: Capacity at Scattergood is our most immediate need.
- Load growth: Port & LAX electrification, Operation NEXT at Hyperion.
- Challenges: Limited footprint and in-service prior to retirement of Units 1 & 2 to support transmission buildout.
- OTC extension critical: Scheduled for 2024, seek extension to 2029. Net reduction in water use with early elimination of water usage at Haynes.

IN-BASIN RESILIENCY

WHEN THERE IS A TRANSMISSION OUTAGE, WE WOULD RELY ON GREEN HYDROGEN TO KEEP CRITICAL POWER FLOWING



LA100 Study – Key Takeaway

In-basin capacity must be maintained for **reliability** and **resiliency**, even in a decarbonized future Power System.

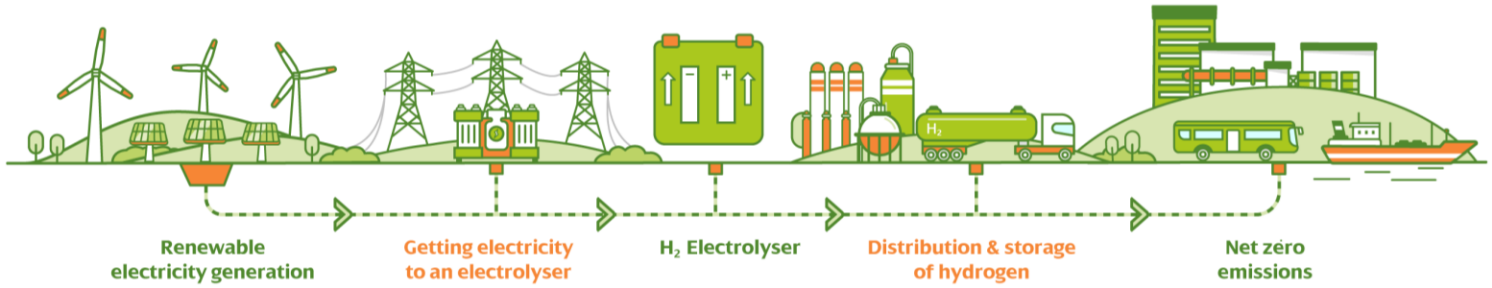
All 2022 SLTRP cases have been developed to maintain reliability and resiliency.

Example:

The 2019 Saddle Ridge Fire impacted the Pacific DC Intertie for **22 hours**, Barren Ridge corridor for **10 hours**, and VIC-LA path for **5 hours.**

WHY GREEN HYDROGEN?

- Uses renewable energy to create hydrogen power
- Most viable technology today for clean generation that can be dispatched when needed.
- **Not a greenhouse gas** and does **not produce carbon emissions** when used for power generation
- Based on LA100, LADWP would use **green hydrogen** to:
  - Back up renewable energy when sun isn't shining or wind isn't blowing
  - To achieve last 10% toward a 100% carbon-free and reliable power grid
- Can provide clean power for hard-to-electrify industries, like transportation
- In-basin green hydrogen usage for electricity generation is forecasted to account for **1% of energy needs**



EQUITY: REDUCING USE OF VALLEY GENERATING STATION

- LADWP to dramatically reduce utilization of Valley Generating Station:
  - Today Valley is utilized 30% of the time
  - The combination of **80% renewables** by 2030, **Haynes recycled water cooling,** and **Scattergood capacity** reduces Valley usage
  - Valley usage to be reduced from 30% to 5% thereby reducing adverse impacts on the local community
- Utilize significant space at Valley Generating Station for future clean energy projects

ACCELERATE ENERGY STORAGE

- Build over 1,000 MW of energy storage by 2030 in-basin and out-of-basin
- Large scale energy storage at or near all in-basin generating stations
- Expand energy storage by co-locating storage at all future utility-scale solar projects
- Advertised Energy Storage Rolling Request for Proposals in 2020
- Increased usage of Castaic pumped hydro to integrate increased renewables

DEPLOYING DISTRIBUTED ENERGY RESOURCES EQUITABLY

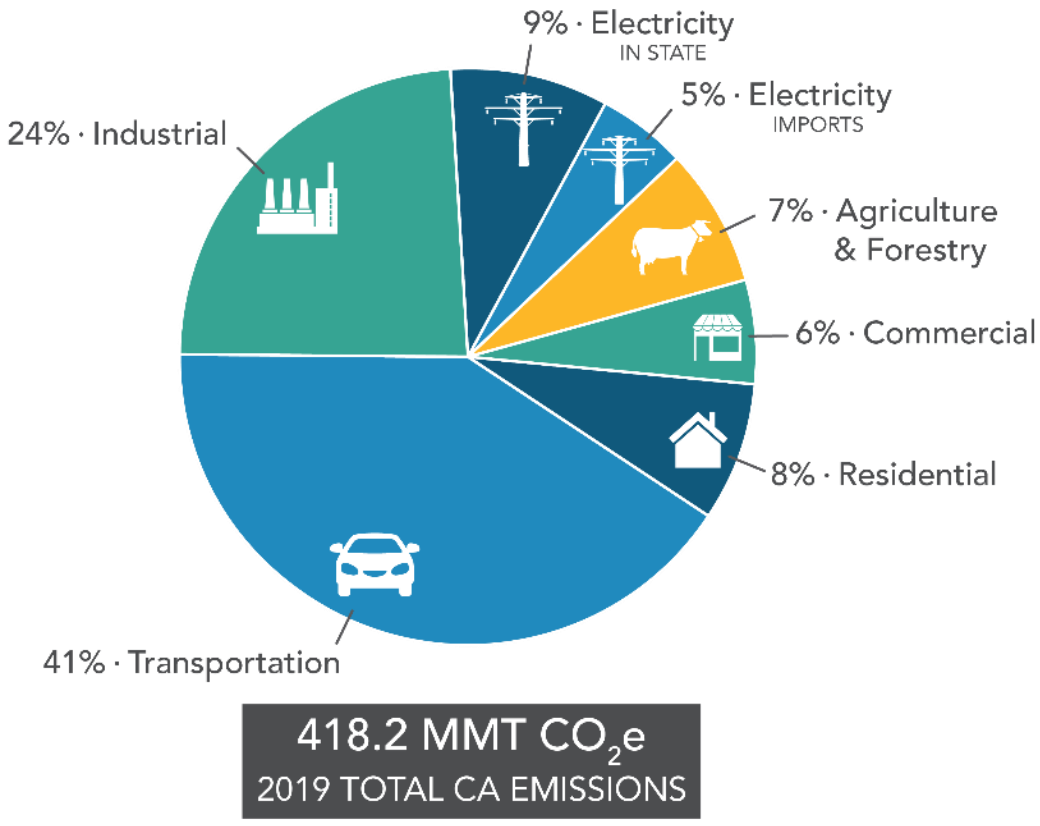
We need: 1,000 MW of local solar, 500 MW of demand response, double energy efficiency, and support 580,000 electric vehicles by 2030.
Progress:

- LA100 Equity Strategies study through 2023
- Expanded FiT from 150 MW to 450 MW
- Launched FiT+ allowing energy storage
- Launched VNM Pilot Program
- Expanded Power Savers (residential DR program)
- More DER proposals under negotiations

AIR QUALITY IMPACTS ACROSS SECTORS

As we work to decarbonize our power plants, SLTRP provides opportunities to shave down the carbon footprint of transportation and other sectors.

- Partnerships support buildout of EV infrastructure
- Enable electrification and EV adoption
- Work with state agencies to track and monitor local emissions



CALIFORNIA
AIR RESOURCES BOARD

CONSIDERATIONS & CHALLENGES

- **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

- **Climate Change**
  - Overbuilding Resources
- **Geopolitical Conflicts**
  - Market Conditions and Resources
- **Cybersecurity Threats**
  - Handling and mitigating external threats

Questions?