LA100 PLAN

ADVISORY GROUP MEETING #6 (SLTRP & DSA)

LA DWP

PRESENTED BY:
Power System Planning Division
Resource Planning

December 5, 2024

AGENDA

9:00 – 9:05 am	Welcome and Introductions
9:05 – 9:15 am	Meeting Purpose, Agenda Overview, Guide for Productive Meetings
9:15 – 9:25 am	LA100 Plan (formerly SLTRP)
9:25 – 9:30 am	LADWP Recent Accomplishments
9:30 – 10:30 am	Distribution System Planning Assessment Results (2 of 2)
10:30 – 10:40 am	*Break*
10:40 – 11:50 am	LA100 Plan Preliminary Results (1 of 2)
11:50 – 11:55 am	Discuss Public Meetings
11:55 – 12:00 pm	Wrap Up and Next Meeting

NEXT MEETING
February TBD; Public Meetings targeted for January 2025

LOCATION
In-person, LADWP Wall Street

SAFETY MINUTE

ADVISORY GROUP ROLES (1/2)

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

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Provide Perspectives. Discuss major issues that LADWP will face in the next 10-20 years. Provide input and review of strategic scenarios that are used in the resource analysis and final recommendations for near-term actions.

Continue the Collaborative Dialogue. Build upon the momentum from the LA100 Equity Strategies Study and 2022 SLTRP Process.

Conduct Outreach to Respective Constituent Groups. Bring diverse input into the process and keep constituents informed of the SLTRP process.

Consider Broader Community Input. During Advisory Group discussions think of the various communities and considerations throughout the City of Los Angeles.

Provide Technical Information & Perspectives. Add value through your areas of expertise.

ADVISORY GROUP ROLES (2/2)

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

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Read Pre-Meeting Materials. Prior to each meeting materials and agendas will be distributed and you are expected to be prepared for the meeting. This includes reading and reviewing the 2022 SLTRP and LA100 Equity Strategies Study Report.

Participate in All Meetings. A total of six (6) meetings are anticipated between March and December 2024. Meetings are expected to alternate between in-person and virtual. Each meeting will be conduced in 2-3 hours segments.

Alternate Representatives. If you cannot attend a meeting, then please send an alternate on your behalf.

Balancing Perspectives. To maintain stakeholder balance – only one representative per member organization in meeting discussions.

READ MATERIALS

PARTICIPATE

REPRESENTATIVES

BALANCE

2024 ADVISORY GROUP MEMBERS

90 Members Total

NOTE:

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

# of Representatives	Stakeholder Category	Organization(s)
6	ACADEMIA	CSUN, UCLA, USC
17	BUSINESS & WORKFORCE	CEERT, Center for Sustainable Energy, Central City Assoc, IBEW – Local 18, LABC, LA Chamber, VICA, LABC
26	CITY GOVERNMENT	CLA, City Attorney, Council Districts, Rate Payer Advocate, Mayor's Office, Civil & Human Rights and Equity Dept., CEMO, Housing Authority, LA City Planning, LADOT
5	NEIGHBORHOOD COUNCIL	DWP Advocacy Committee, DWP MOU Oversight Committee, Neighborhood Council Sustainability Alliance, SLAANC
20	ENVIRONMENTAL COMMUNITY	CBE, EDF, Food and Water Watch, NRDC, LAANE, Sierra Club, Climate Resolve, Community Build, Enterprise Community Partners, Esperanza Community Housing, LA Cleantech Incubator, Move LA, PACE, Pacoima Beautiful, RePower, SLATE-Z, So. Cal. Association of Non-Profit Housing; SCOPE
10	PREMIER ACCOUNTS & KEY CUSTOMERS	LAUSD, LAWA, Metro, POLA, Valero Wilmington Refinery
6	UTILITIES	Southern California Gas, SCPPA, Water and Power Associates

GUIDELINES

1. **EQUAL TIME** — Everyone commits to all members having equal time to contribute input and perspectives
2. **CONCISE** — Keep input concise so all members have time to participate
3. **ACTIVELY LISTEN** — Actively listen to others, seek to understand perspectives
4. **OFFER IDEAS** — Offer ideas to address questions and concerns raised by others
5. **RAISING NAME TENT or RAISING HAND** — Participate by using the Raising Name Tent or Raising Hand

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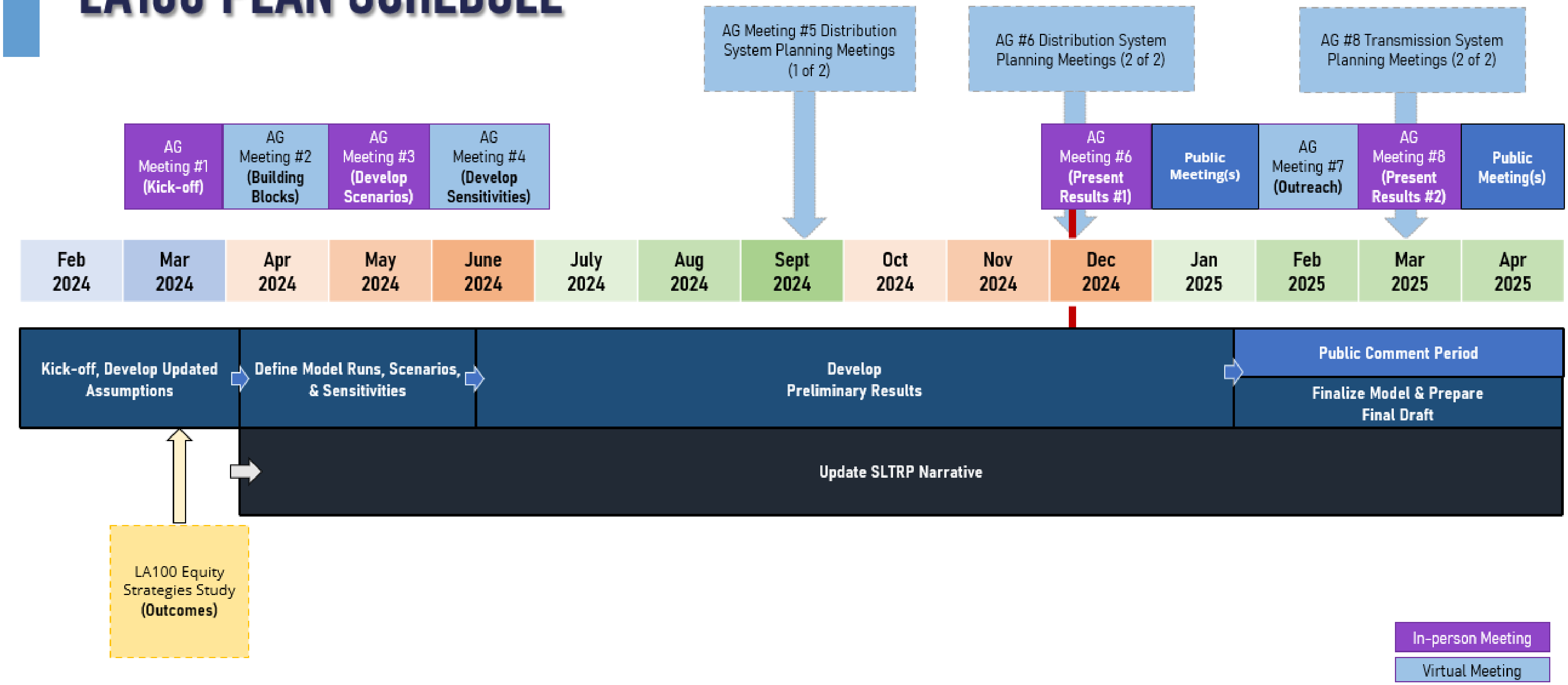
LA100 PLAN SCHEDULE



Note: Specific dates and meetings are subject to change.

LA100 PLAN (FORMERLY SLTRP)

What is LA100 Plan?

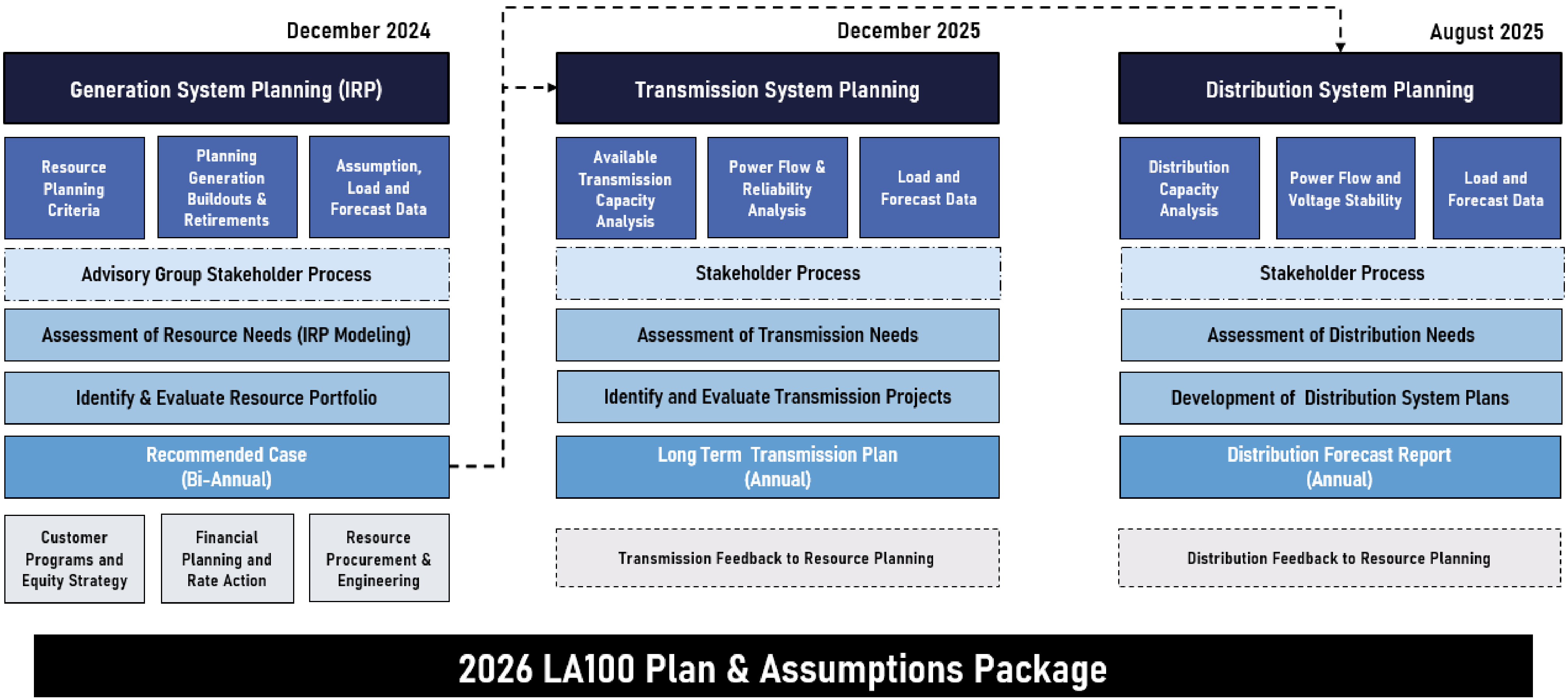
- Emphasizes LADWP's position to **fully decarbonize** the electric **power sector by 2035**
- Focus on **100% carbon free by 2035** goal as the main roadmap compared to the State's mandate as a reference, and assess numerous risk factors as sensitivities
  - Updates LADWP's Power System Roadmap to achieve 100% carbon free by 2035 while tracking progress
  - Updated input assumptions (load, pricing, buildout schedules) and output metrics (cost, emissions, reliability, energy burden, rates)
  - Incorporates new technologies as they develop
- Expands Planning from traditionally Generation Resources to integrate Transmission System and Distribution System needs

What is different between LA100 Plan and SLTRP?

- LA100 Plan will focus on **100% by 2035 as the only pathway** (scenario) for LADWP, whereas SLTRP traditionally has considered various scenarios to decarbonize
- LA100 Plan will incorporate outcomes from **LA100 Equity Strategies Implementation** to the greatest extent possible
- Provides an iterative loop between planning for Generation, Transmission, and Distribution System needs (e.g. Integrated System Planning)

POWER INTEGRATED SYSTEM PLANNING

Regulatory Requirements & Public Policy Goals



LA100 PLAN
LADWP Recent Accomplishments

RECENT ACCOMPLISHMENTS & UPDATES

Transmission & Distribution System Upgrades

Investing $1.8 billion in transmission system upgrades to improve ability to **import renewables**; over $1.3 billion in distribution system upgrades to improve **system resilience** during heat storms and other stressed-grid conditions, while preparing for system **load growth and electrification**

Local Solar

Achieved approximately **750 MW** of local solar, with a target of over 2,200+ MW by 2035.

Clean Energy Progress

Near 60% carbon-free energy with 43% renewables (In 2023)

- Eland 1 now in operation/commissioning (200 MW solar + 600 MW-hr battery)
- Eland 2 expected online in Q1 2025 (200 MW solar + 600 MW-hr battery)

Forecasting nearly 66% carbon-free energy with 49% renewables for 2024

Distributed Energy Resources

Upcoming Request For Proposal (RFP) will result in $1+ billion in investments toward distributed energy resources to **maximize local sustainability and resilience**

Demand Response

Currently evaluating vendor proposals for deploying **300 MW** of demand response to **reduce strain on the electric grid** during peak-load conditions

RECENT ACCOMPLISHMENTS & UPDATES

Electric Vehicle Infrastructure

Targeting **45,000 charging stations** by 2025 and 120,000 by 2030, with plans to build EV Hubs, **accelerating the transition** to electric vehicles, especially for low-income and disadvantaged communities **greatly improving air quality and health**

Intermountain Power Plant (IPP) Renewed Project

First-of-a-kind green hydrogen ready power generation project slated for commercial operation by mid-2025, **eliminating millions of tons of CO_2** and freeing **1,000 MW+ of transmission capacity** for renewable imports to LA

Energy Efficiency

Achieved **15% energy reduction** through various customer programs and plans to achieve an **additional 15% energy reduction** over the coming decade. Programs will provide **cost-savings to customers**, particularly the most vulnerable

Building Electrification

LADWP has introduced new building electrification Business Offerings for Sustainable Solutions (BOSS) Programs lowering the overall cost of electrifying, which will **accelerate building electrification and improve air quality and health**

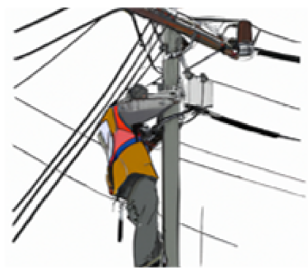
Grant Funding

LADWP applied for more than **$4 billion** in federal, state, and local grants and was selected for ~$150 million, which are currently awarded or in negotiations and will reduce the **cost impacts of the clean-energy transition for ratepayers**

DISTRIBUTION SYSTEM ASSESSMENT RESULTS MEETING (2 OF 2)

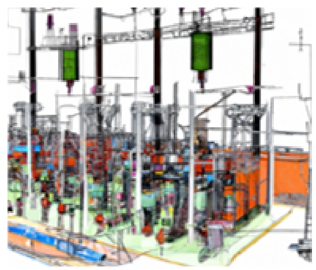
DISTRIBUTION SYSTEM INITIATIVES

Power System Reliability Program



- Replacement of distribution assets to ensure long term system longevity and reliability.

Distribution System Capacity



- Grid's capacity to accommodate existing load and load growth from electrification

Customer Interconnections

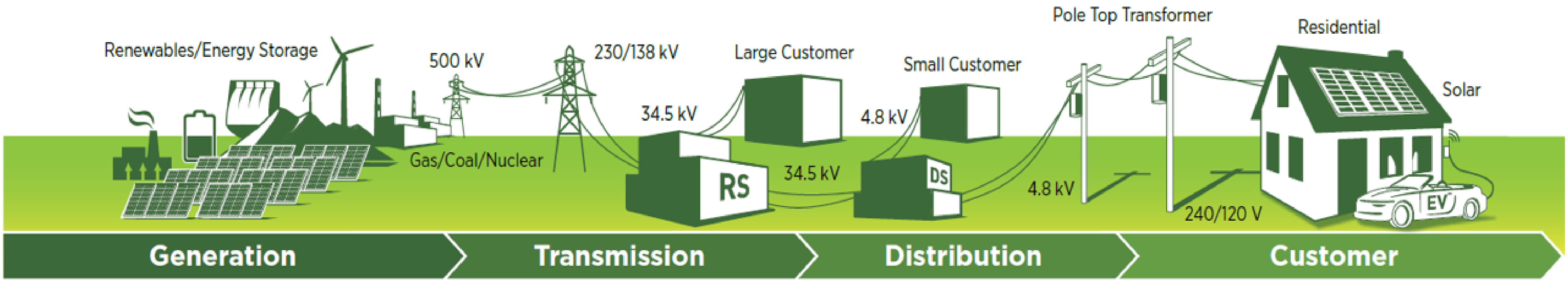
- Onboarding of new customers, load, and distributed energy resources.

Programs

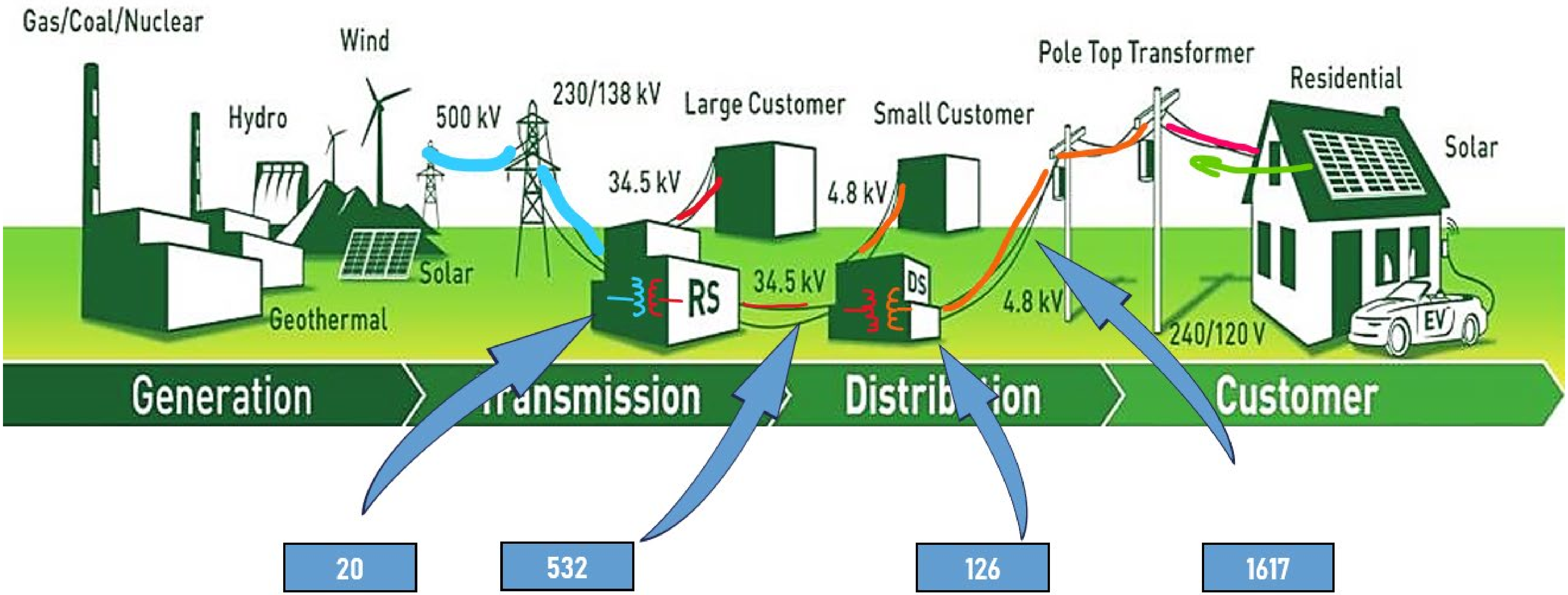
- Multitude of distributed customer programs offerings such as Solar, Electrical Vehicle Charging, Demand Response, Energy Efficiency, V2G and more.

Modernization

- Transitioning to a more data-centric, self -healing, resilient, carbon-free power distribution systems

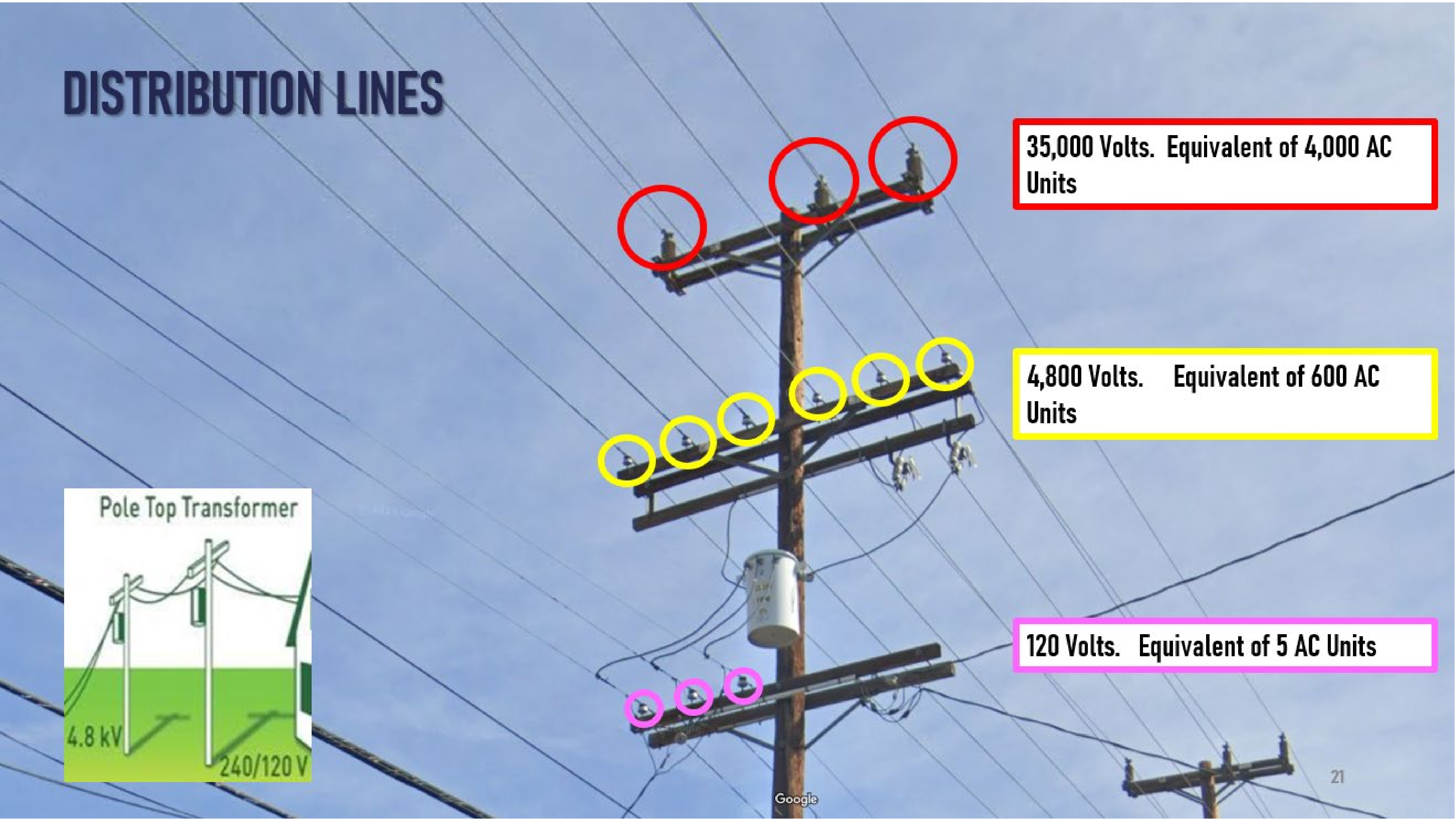


HOW POWER GETS TO YOU

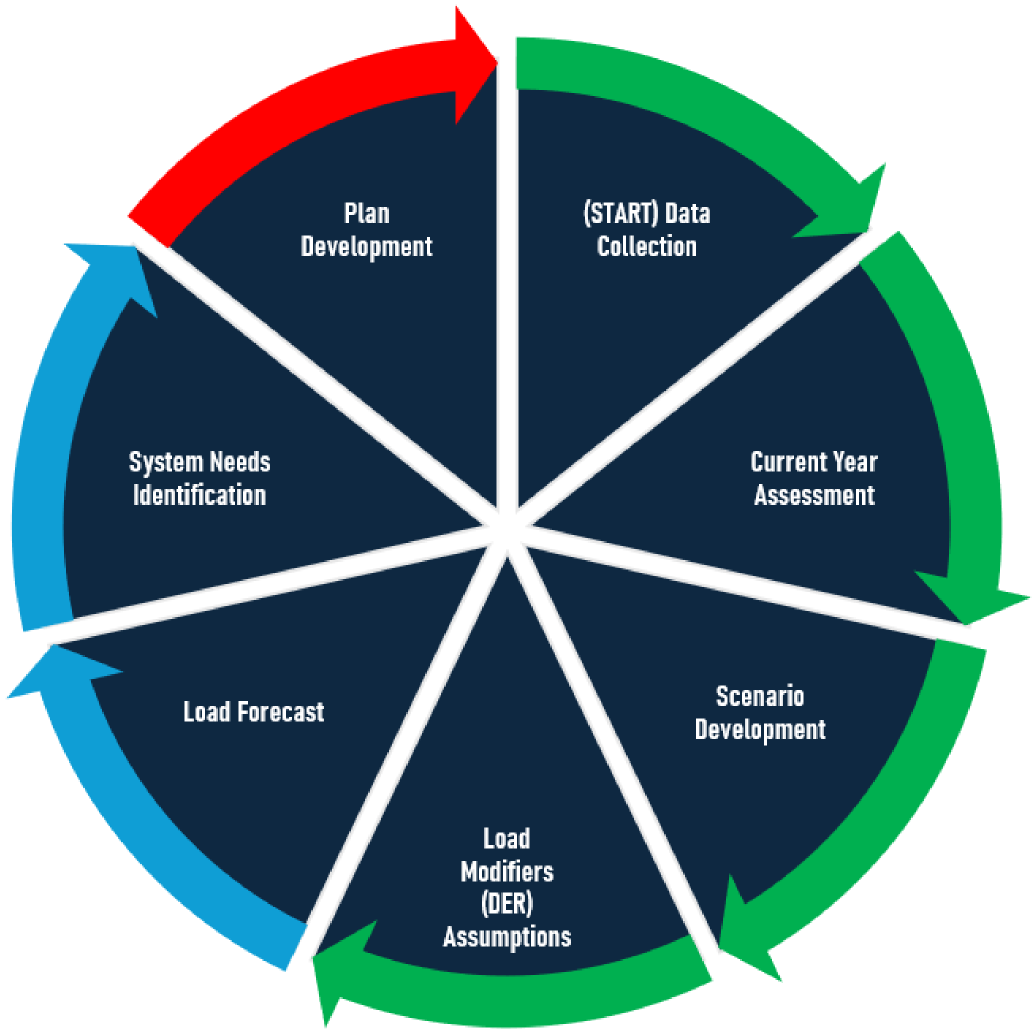


SUBSTATIONS

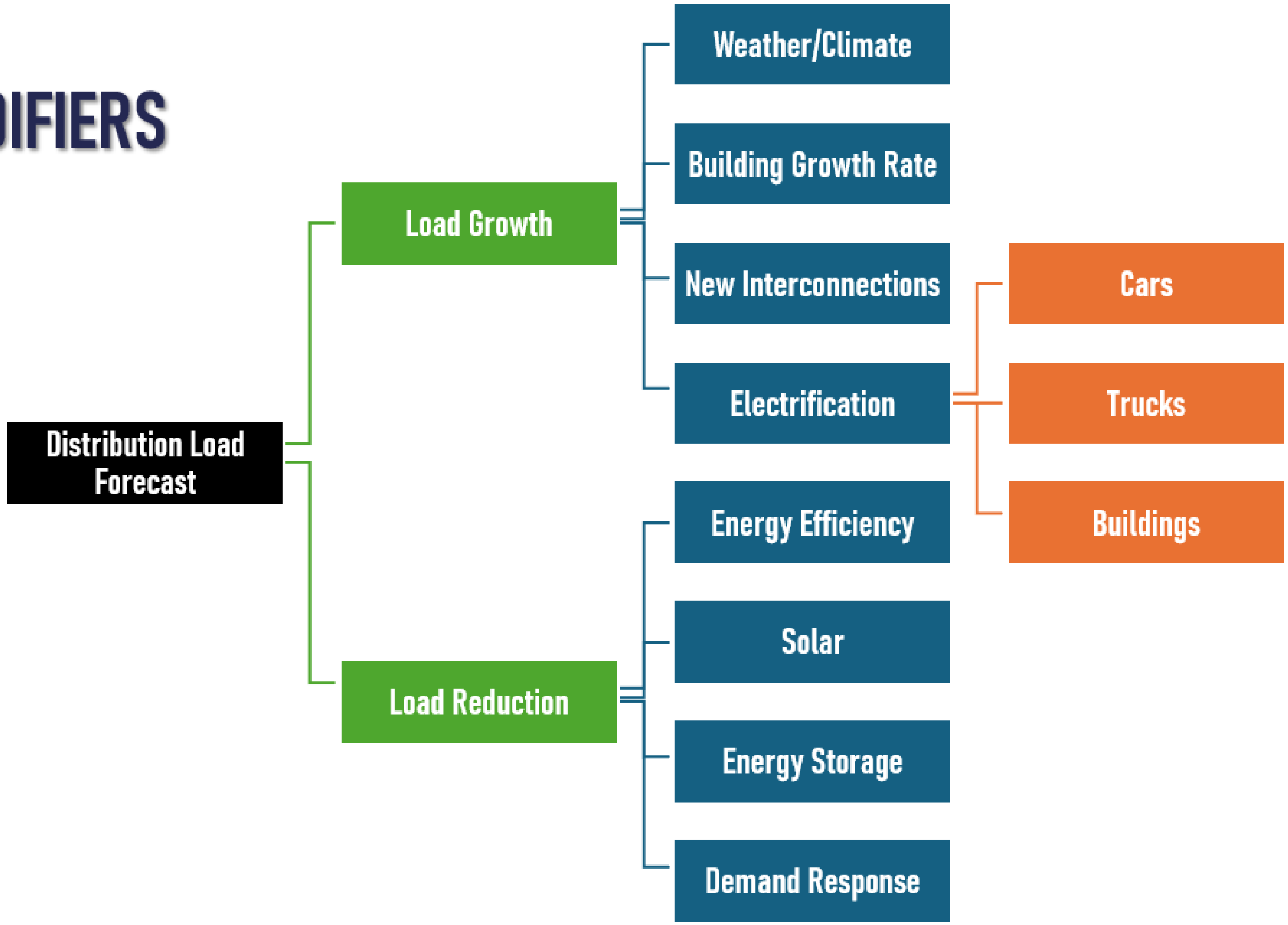
DISTRIBUTION LINES



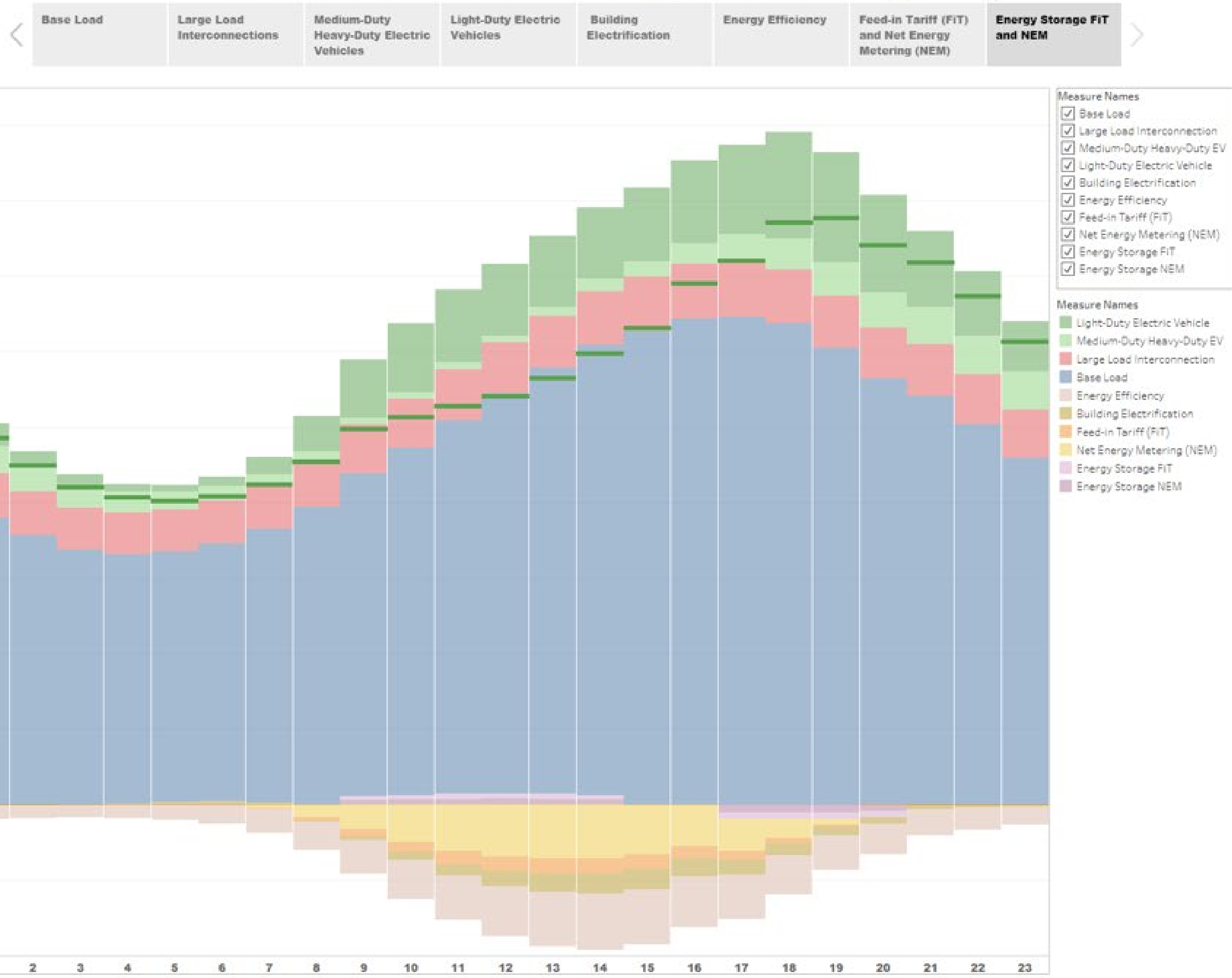
FOCUS OF DISCUSSION – INPUTS AND ASSUMPTIONS



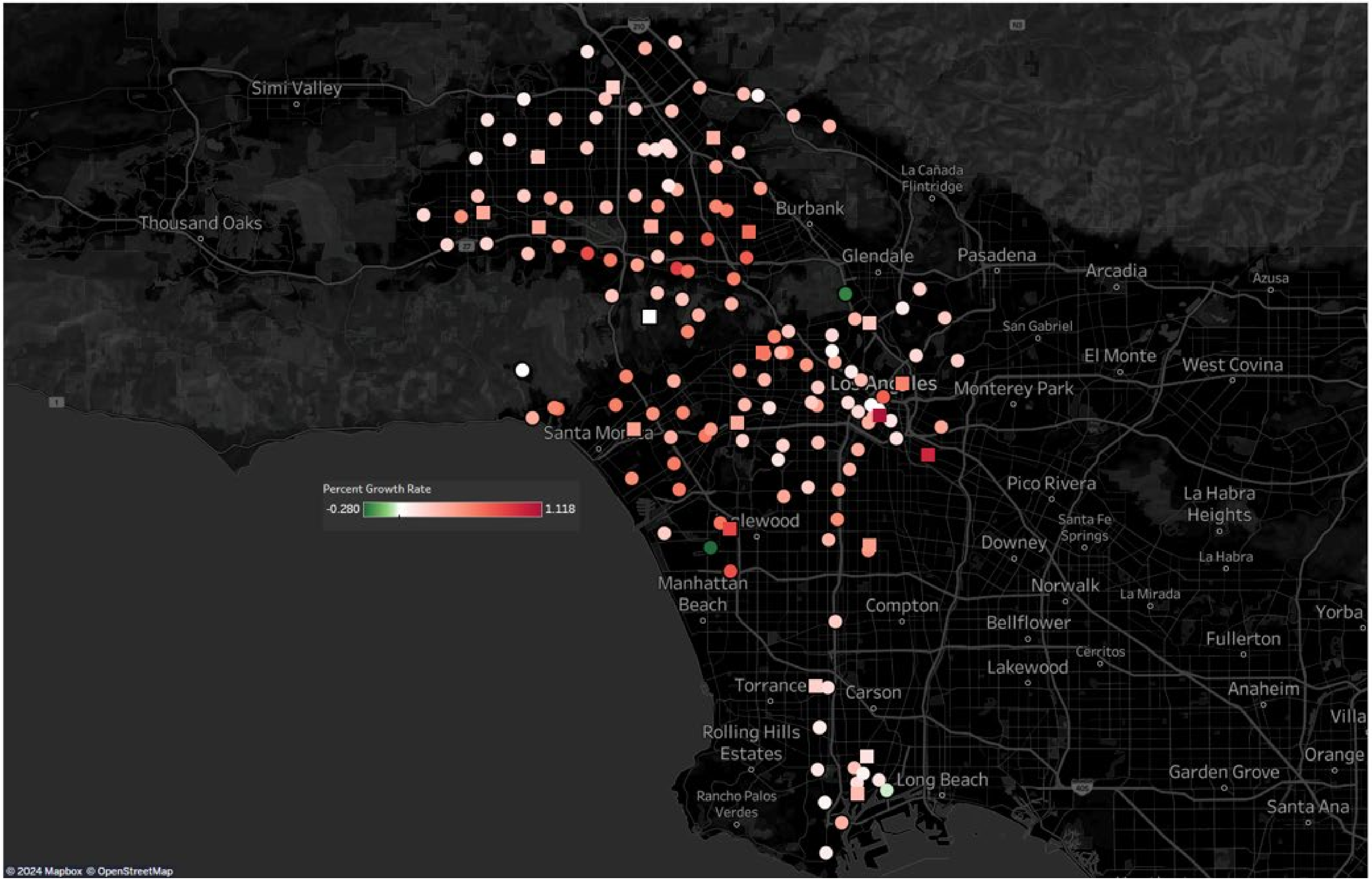
LOAD MODIFIERS



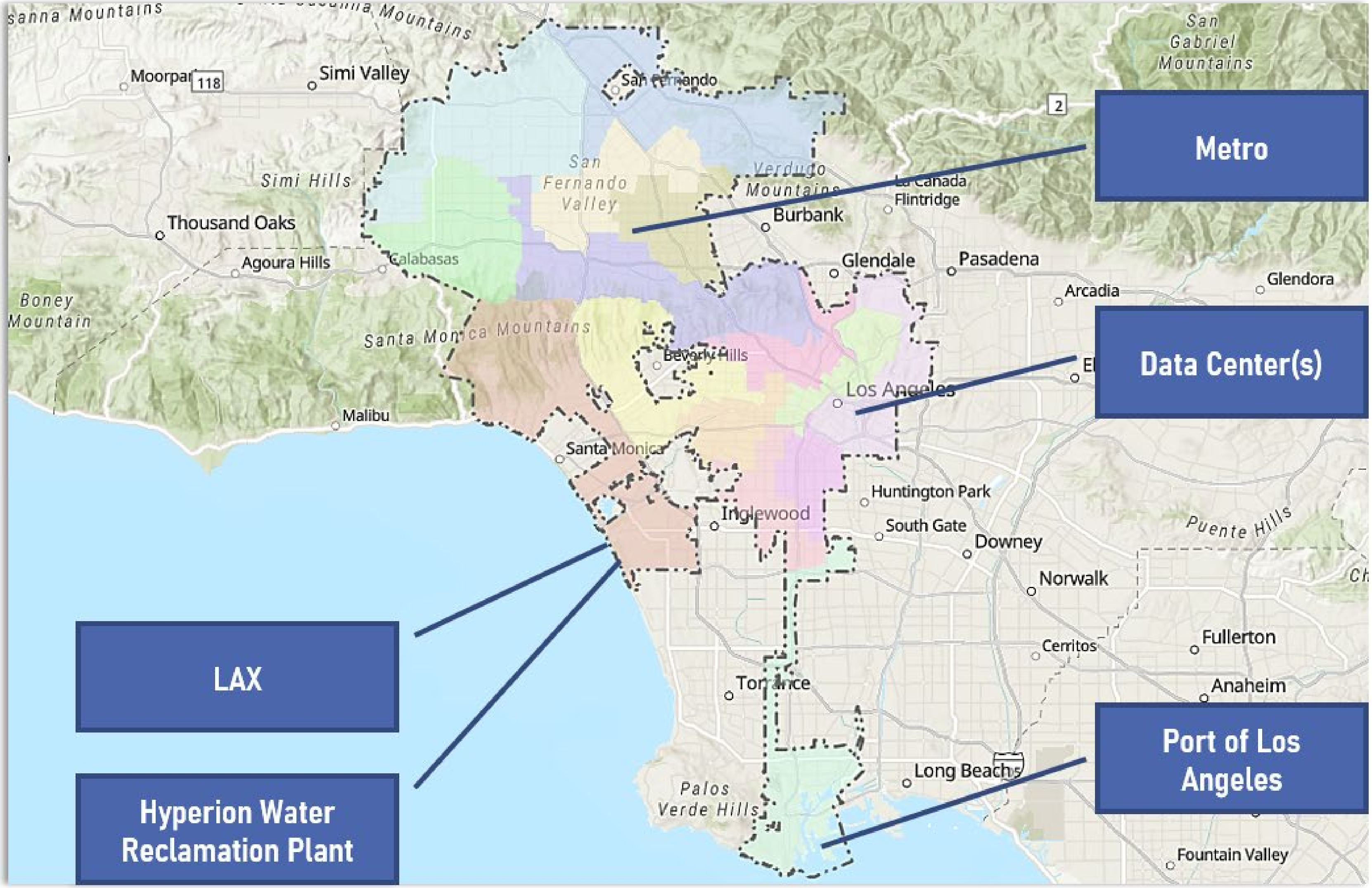
LOAD MODIFIERS (LIVE DEMO)



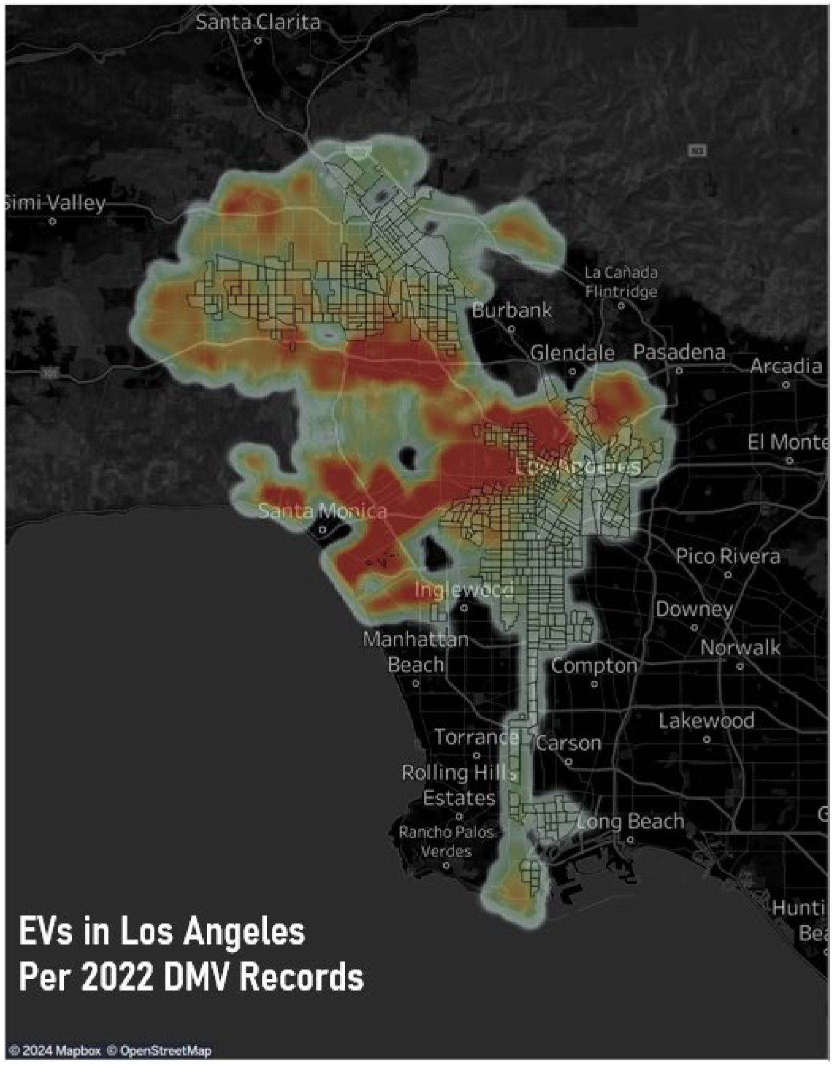
BUILDING GROWTH RATE

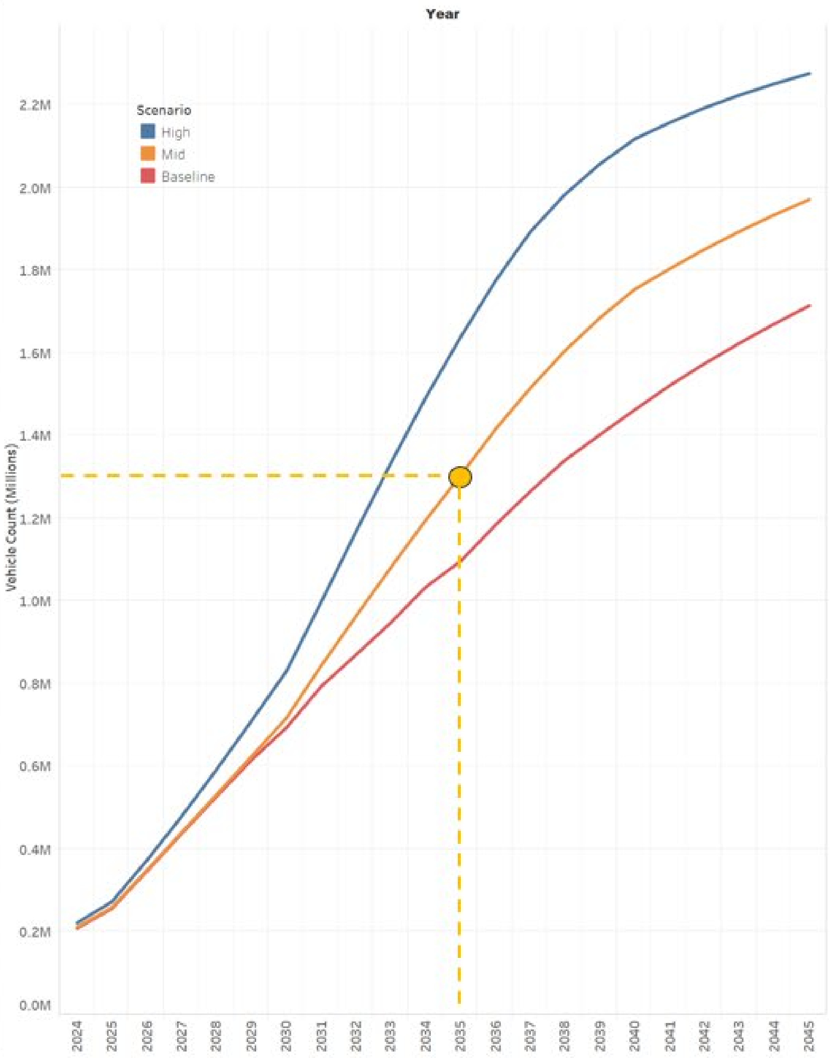


MAJOR ELECTRIFICATION LOADS

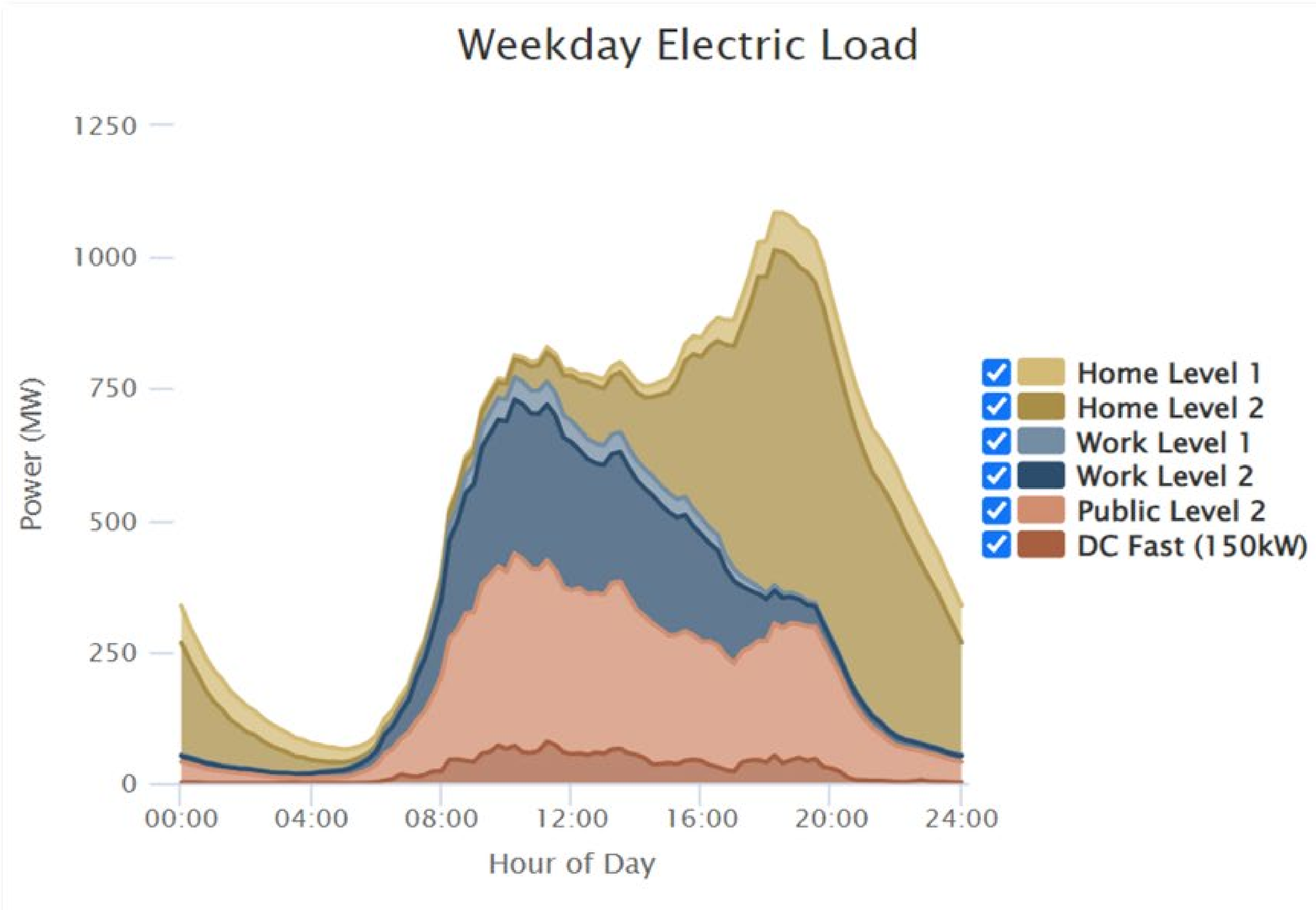


ELECTRIC VEHICLE FORECAST - CARS

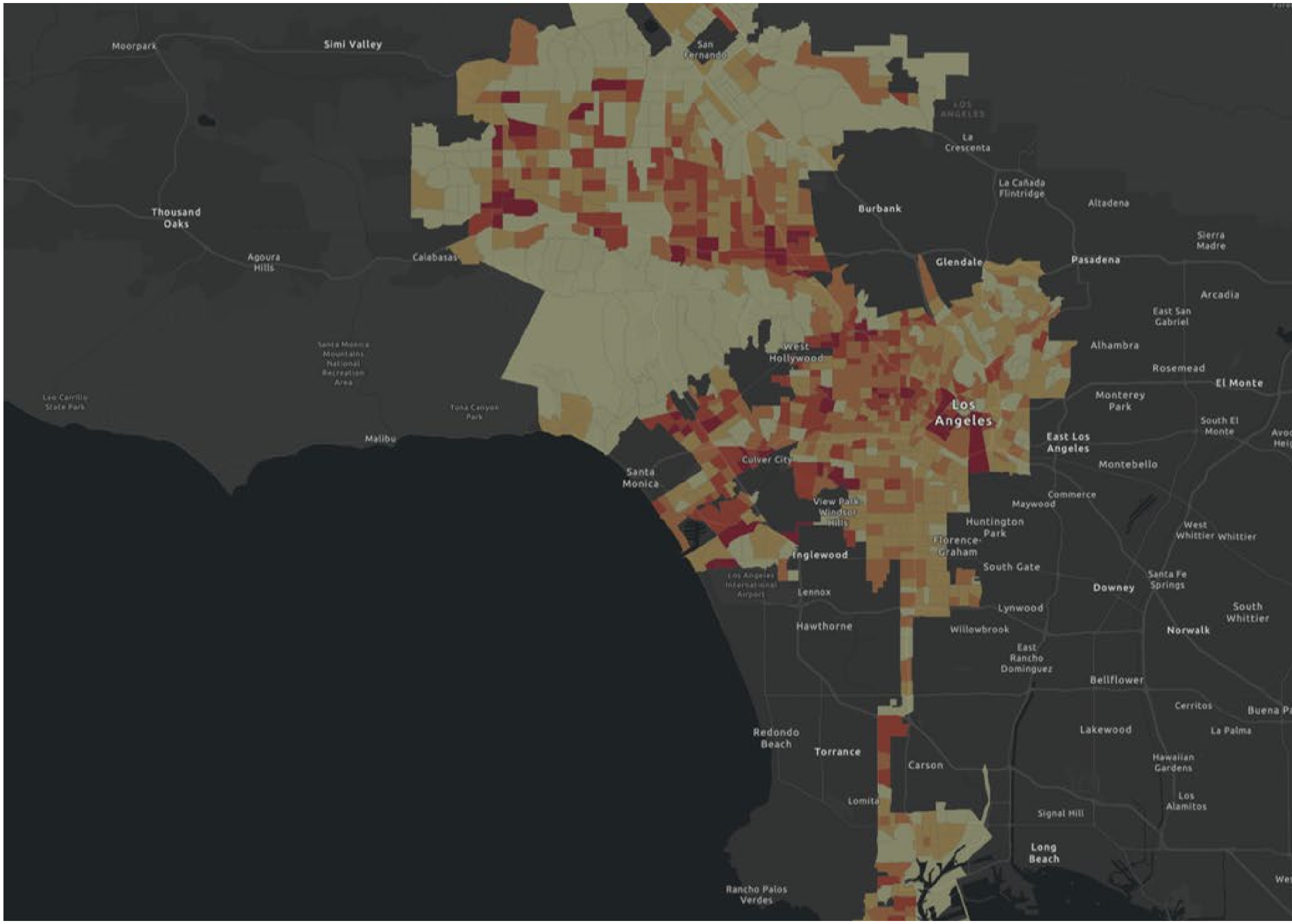




ELECTRIC VEHICLE FORECAST – Live Demo



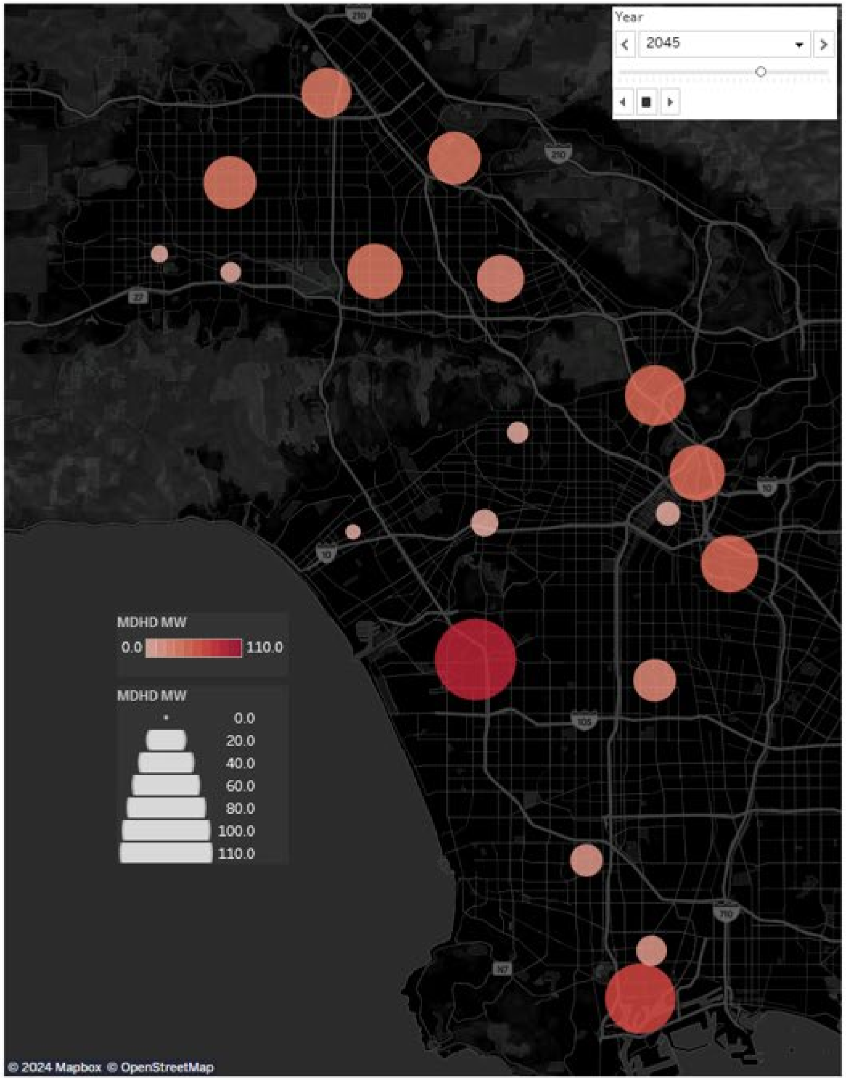
https://afdc.energy.gov/evi-x-toolbox#/evi-pro-ports

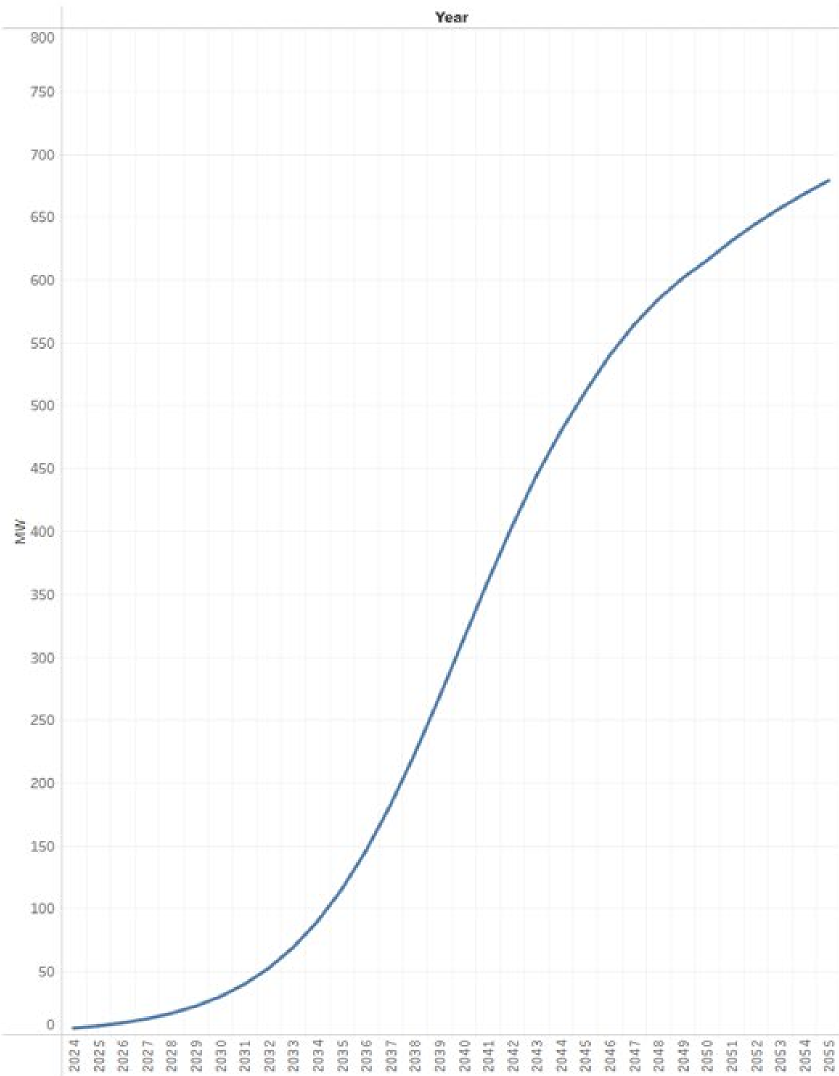


NEED FOR PUBLIC CHARGING INFRASTRUCTURE

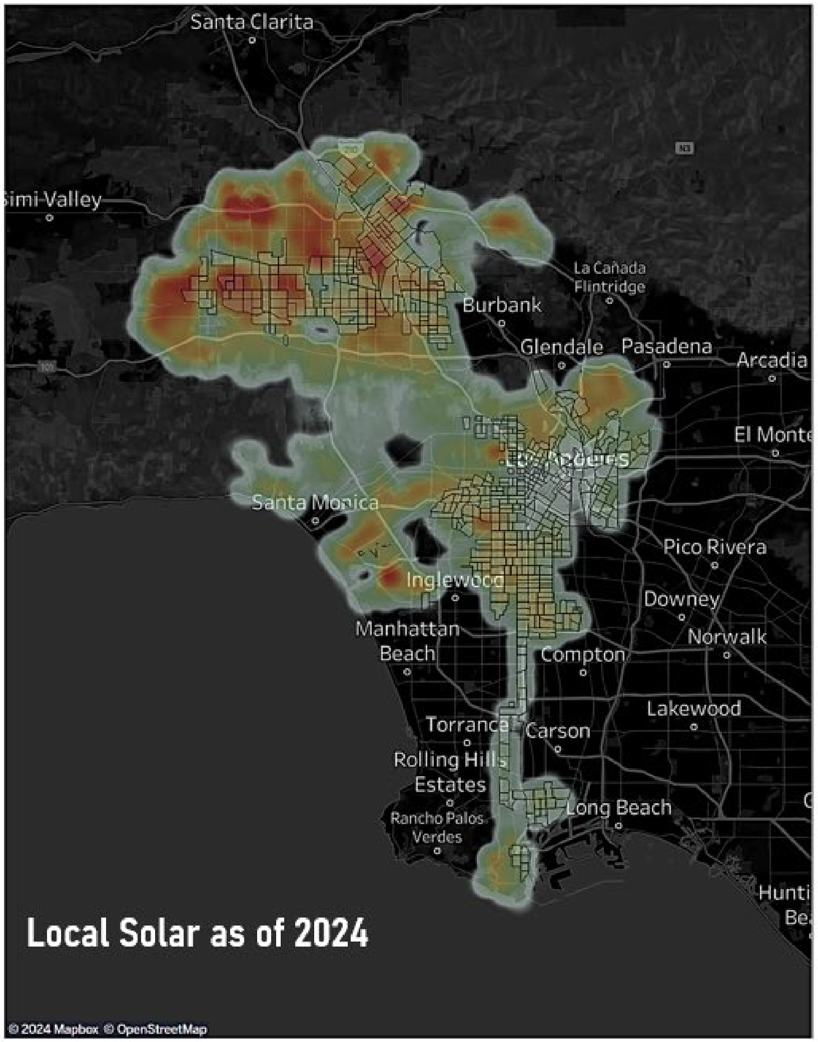
Source: Equity Strategies Study "Charging Orphans"

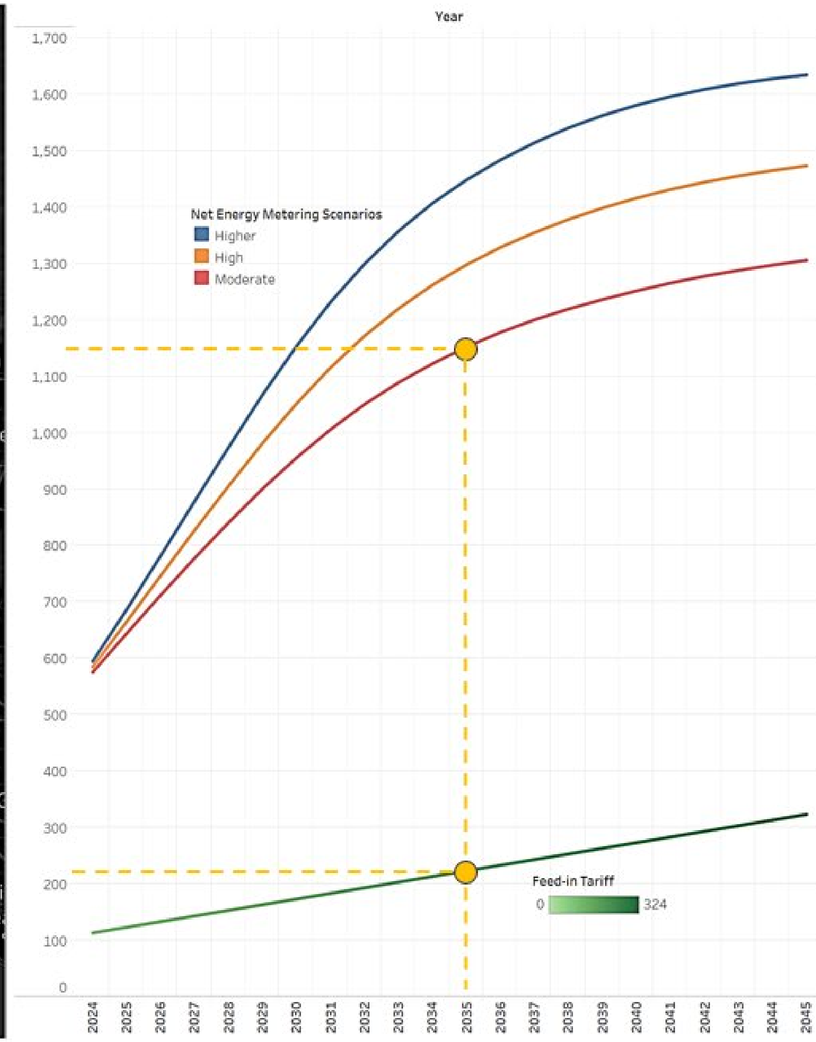
ELECTRIC VEHICLE FORECAST – TRUCKS (LIVE DEMO)





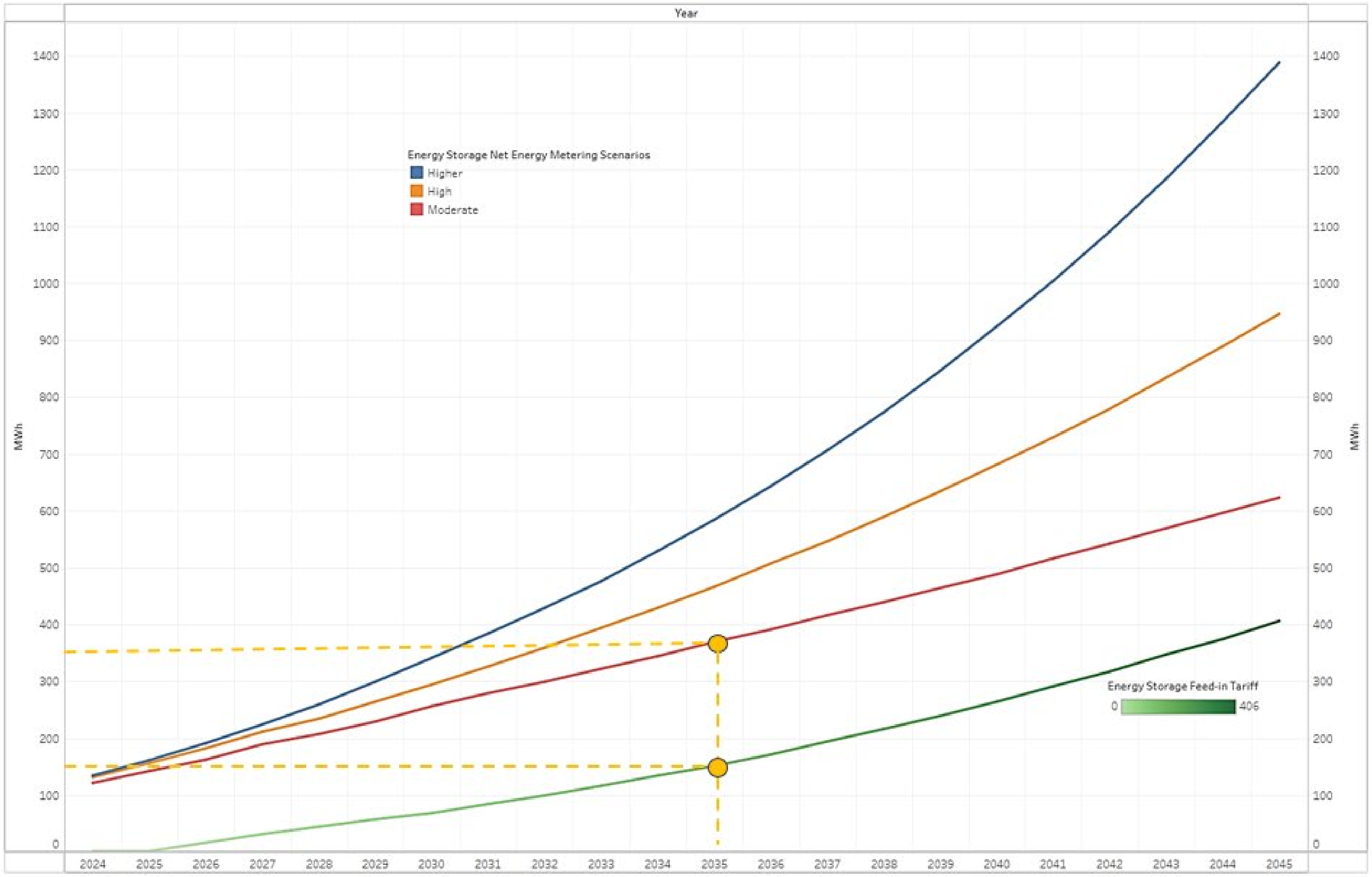
SOLAR PV – IN CITY





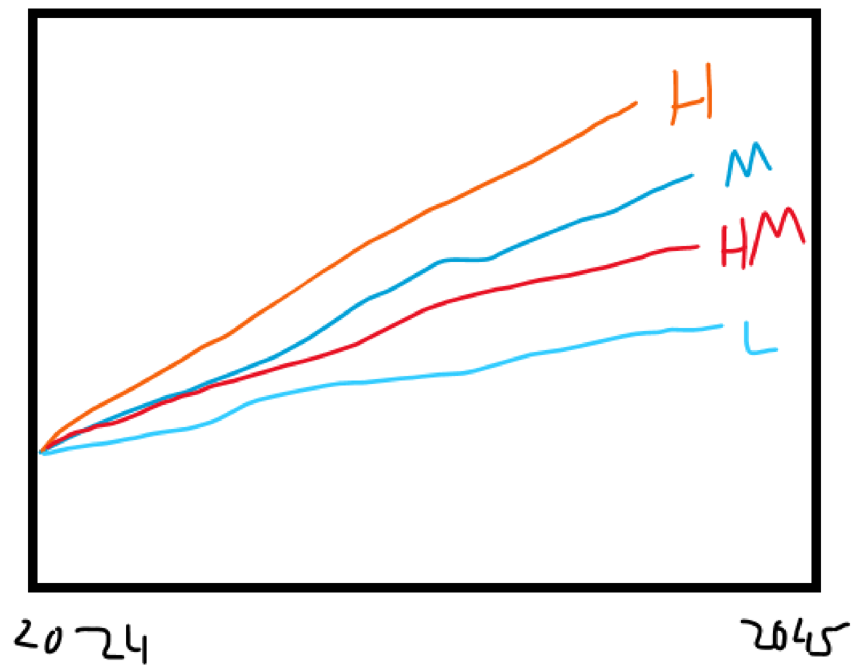

ENERGY
STORAGE
BATTERY

ENERGY STORAGE– IN CITY



SCENARIOS FOR DISTRIBUTION LOAD MODELING

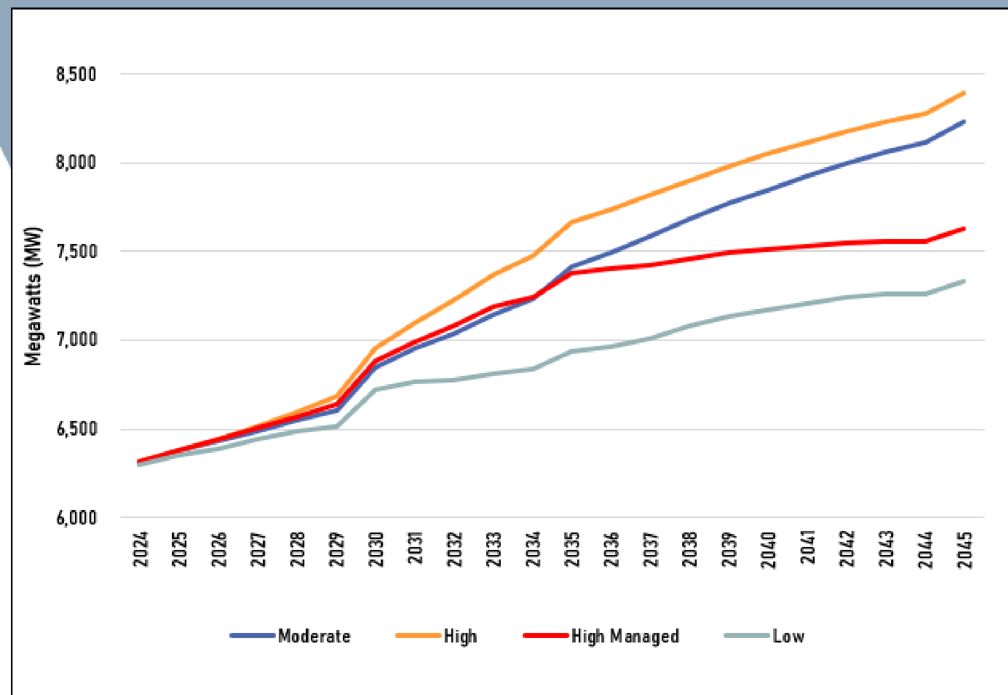
Moderate Moderate DERs	High High EV	High Managed High EV Managed	Low Low EV with High PV
LDEV CEC Mid Case	LDEV CEC High Case	LDEV CEC High Case (M)	LDEV CEC Baseline Case (M)
PV NEM Moderate Case (M)	PV NEM Moderate Case (M)	PV NEM Moderate Case (M)	PV NEM Higher Case (M)
ES NEM Moderate Case (M)	ES NEM Moderate Case (M)	ES NEM Moderate Case (M)	ES NEM Higher Case (M)
PV FiT (M)	PV FiT (M)	PV FiT (M)	PV FiT (M)
ES FiT Moderate Case (M)	ES FiT Moderate Case (M)	ES FiT Moderate Case (M)	ES FiT Moderate Case (M)
MDHD EV EPRI	MDHD EV EPRI	MDHD EV EPRI	MDHD EV EPRI
EE & BE Base Case	EE & BE Base Case	EE & BE Base Case	EE & BE Base Case



Key Findings

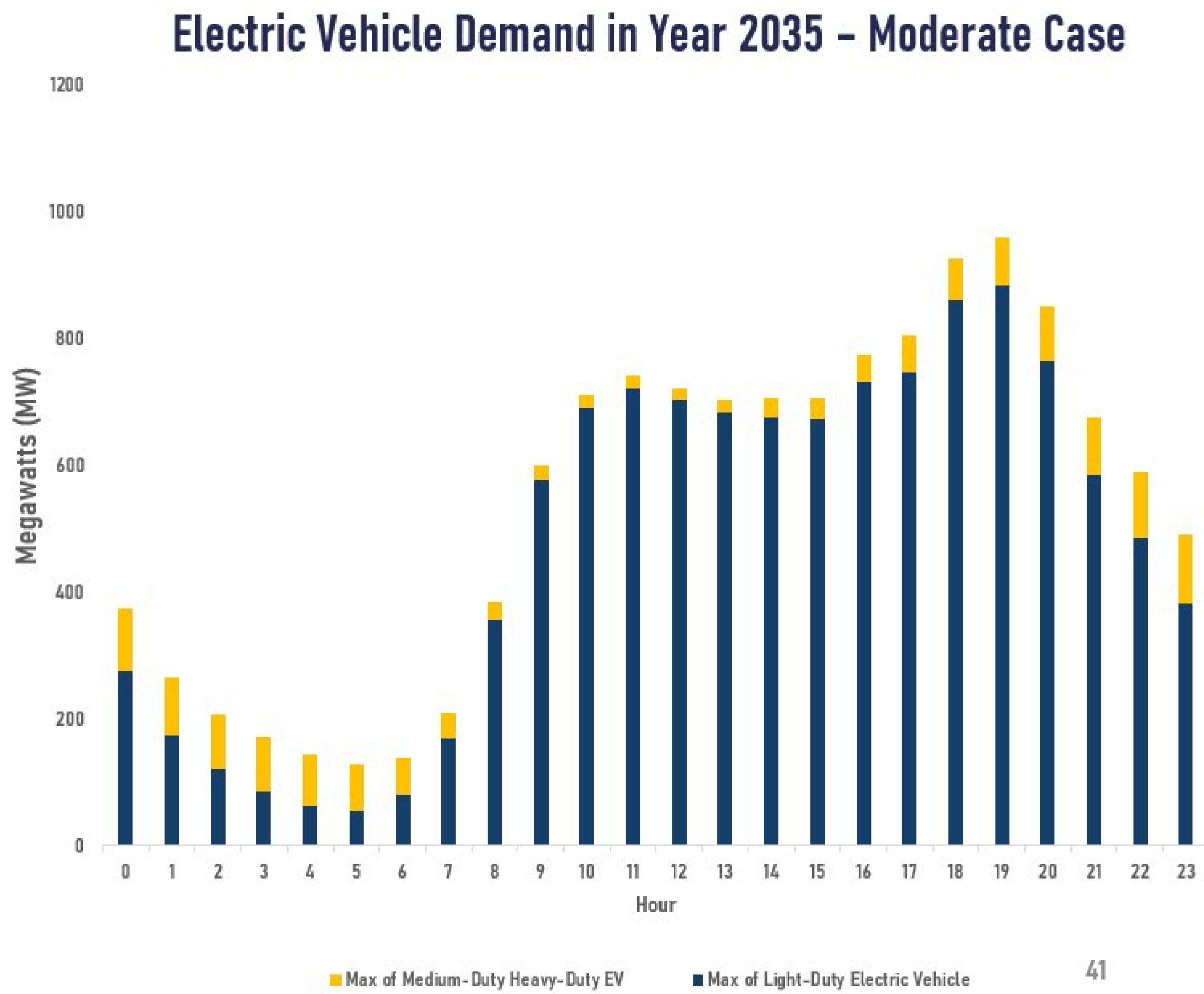
SCENARIOS FOR DISTRIBUTION LOAD MODELING

Moderate Moderate DERs	High High EV	High Managed High EV Managed	Low Low EV with High PV
LDEV CEC Mid Case	LDEV CEC High Case	LDEV CEC High Case (M)	LDEV CEC Baseline Case (M)
PV NEM Moderate Case (M)	PV NEM Moderate Case (M)	PV NEM Moderate Case (M)	PV NEM Higher Case (M)
ES NEM Moderate Case (M)	ES NEM Moderate Case (M)	ES NEM Moderate Case (M)	ES NEM Higher Case (M)
PV FiT (M)	PV FiT (M)	PV FiT (M)	PV FiT (M)
ES FiT Moderate Case (M)	ES FiT Moderate Case (M)	ES FiT Moderate Case (M)	ES FiT Moderate Case (M)
MDHD EV EPRI	MDHD EV EPRI	MDHD EV EPRI	MDHD EV EPRI
EE & BE Base Case	EE & BE Base Case	EE & BE Base Case	EE & BE Base Case



KEY FINDING (1/4)

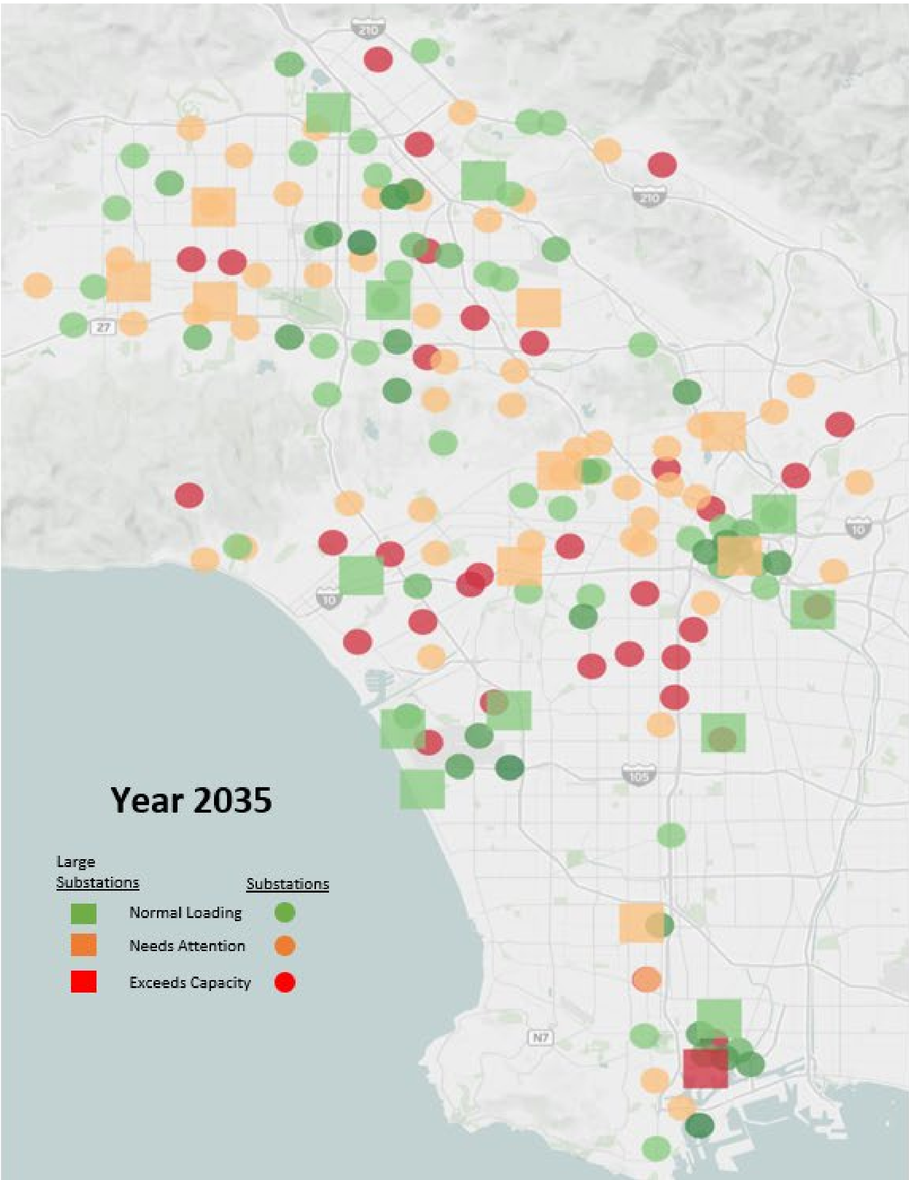
Electric Transportation is the single largest driver of load growth, expected to increase the distribution system demand by up to 900 MW by 2035.



SUBSTATIONS

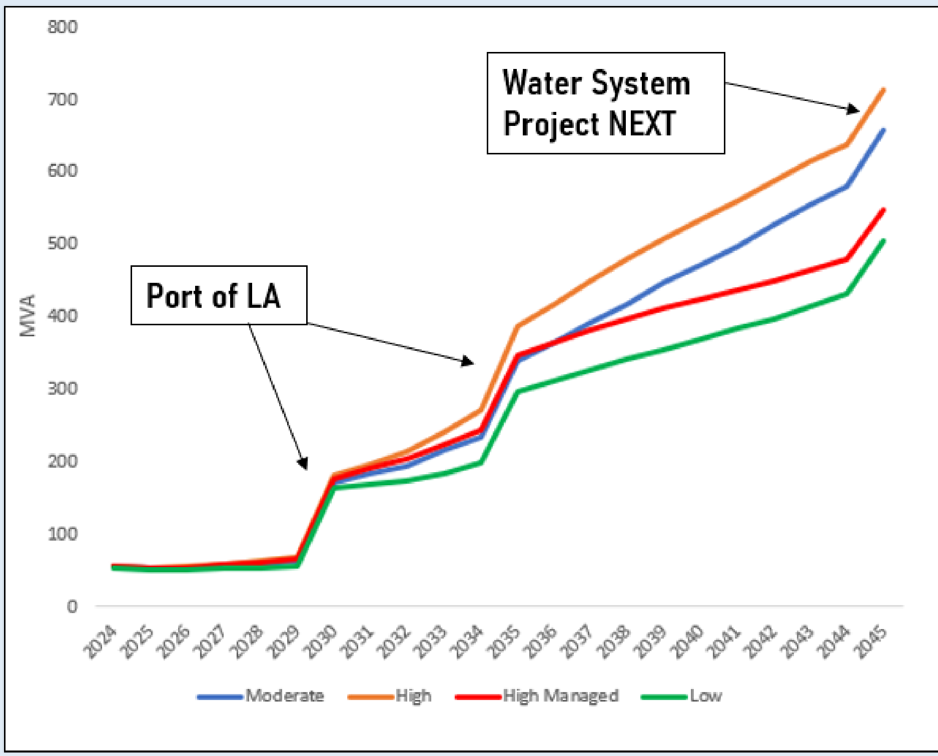
KEY FINDING (2/4)

Tens of substations and hundreds of distribution circuits will need additional capacity to support electrification.

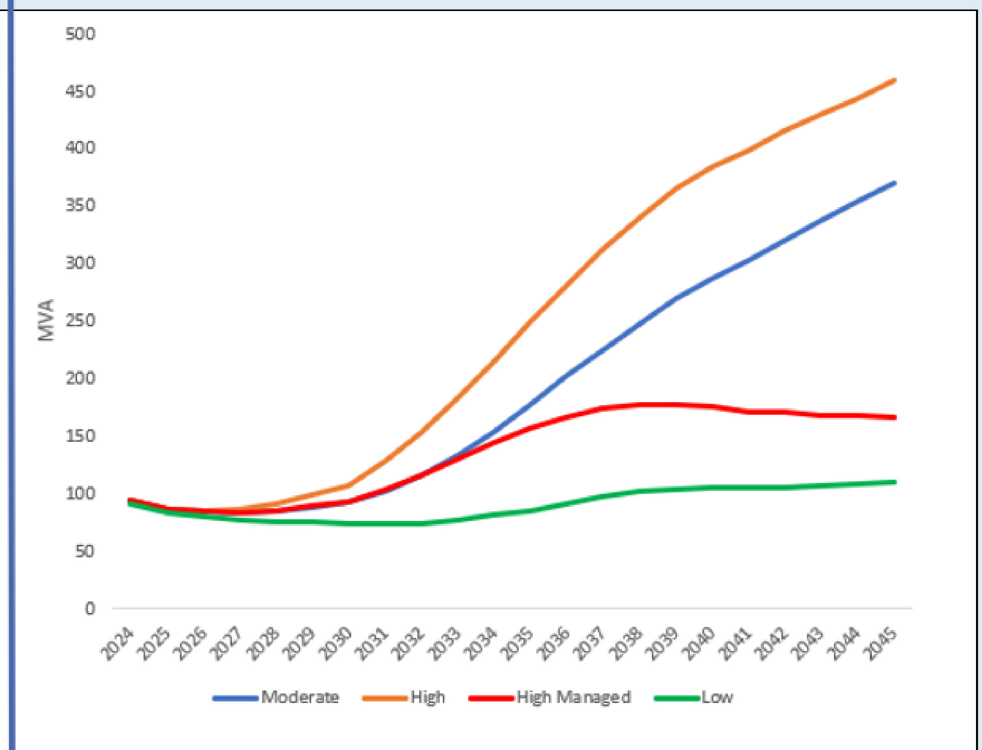


SYSTEM NEEDS – SUBSTATIONS

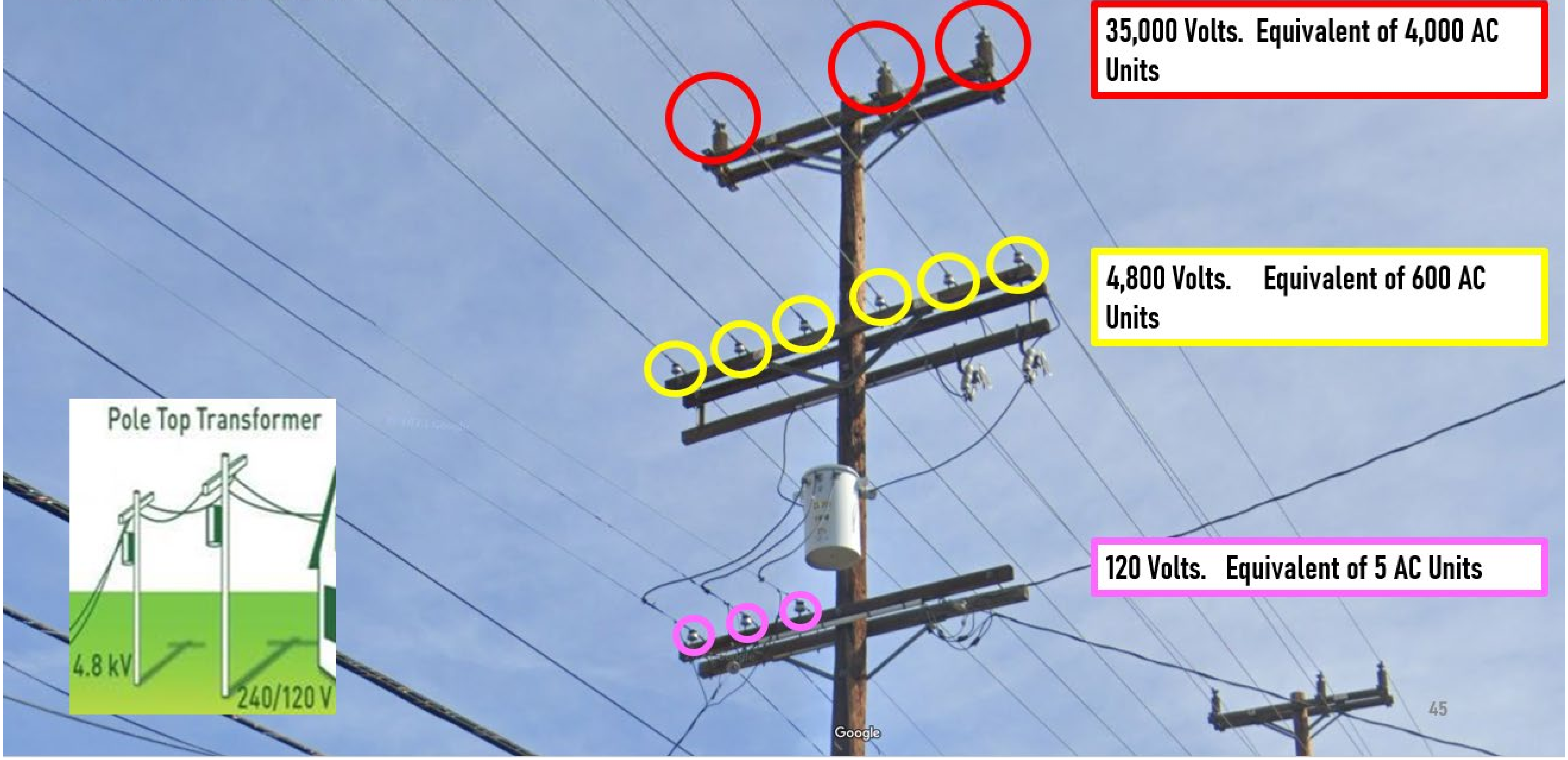
RECEIVING STATION - LARGE SUBSTATIONS



DISTRIBUTING STATION - SUBSTATIONS

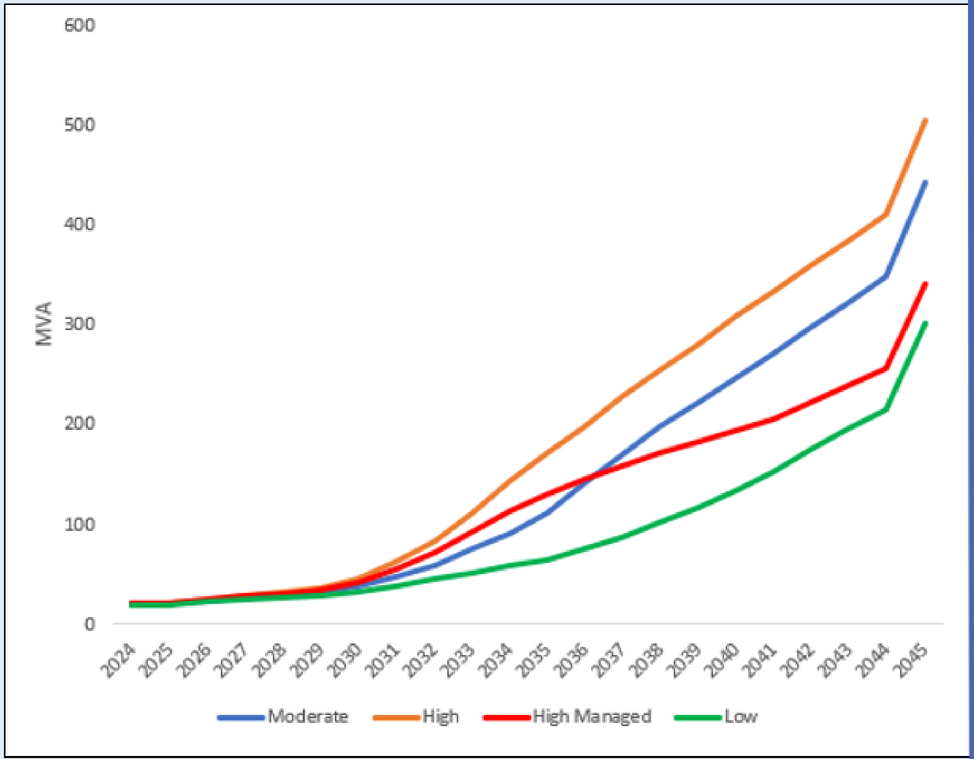


DISTRIBUTION LINES

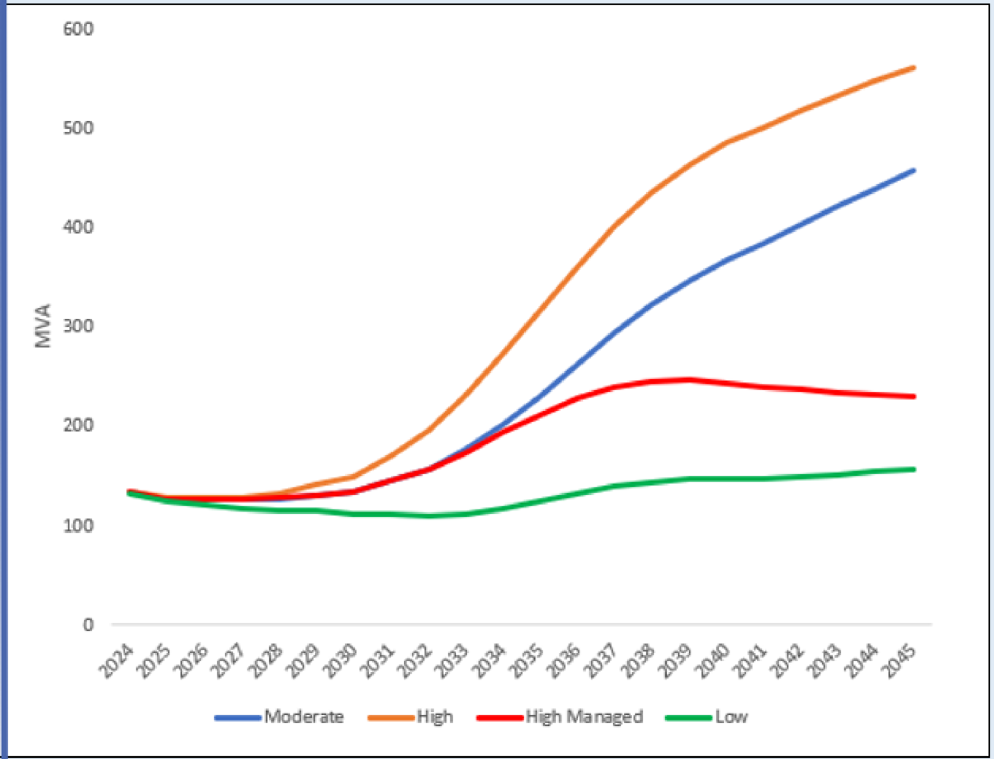


SYSTEM NEEDS – CIRCUITS

34.5 KV CIRCUIT NEEDS

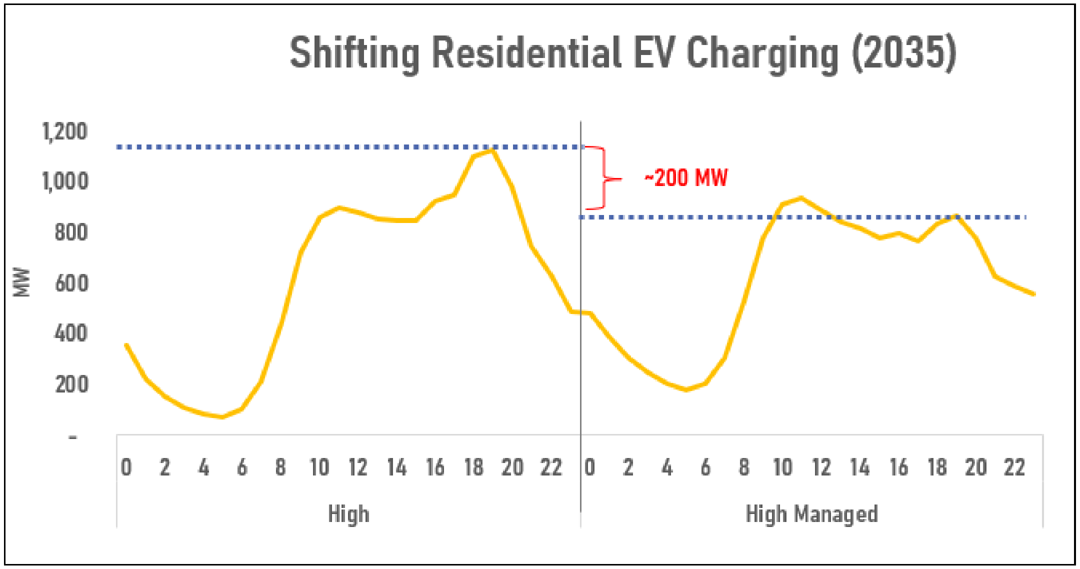


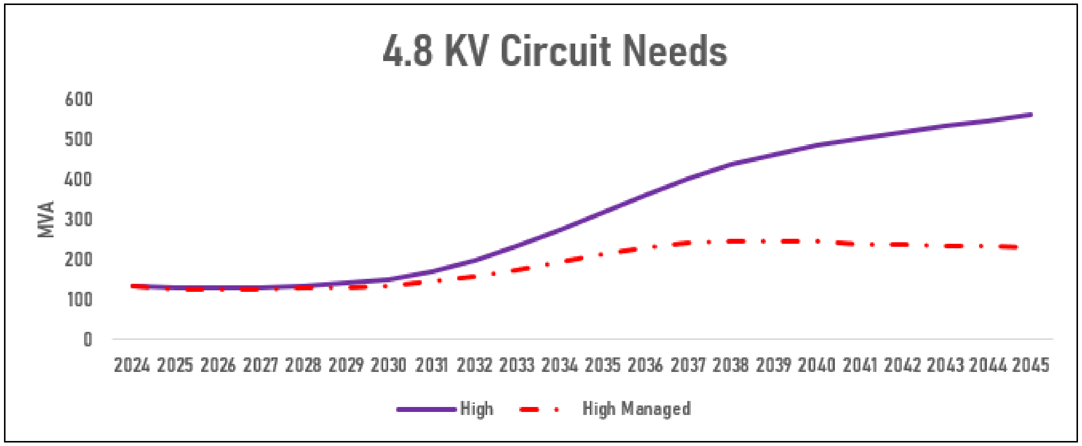
4.8 KV CIRCUIT NEEDS



KEY FINDING (3/4)

- Managing residential EV charging has a significant effect on reducing the demand on the 4.8 kV distribution system.
- Shifting residential charging times away from peak hours reduces the capacity shortfall of Distribution Stations and 4.8 kV Feeders by 31% and 48%, respectively by 2035.

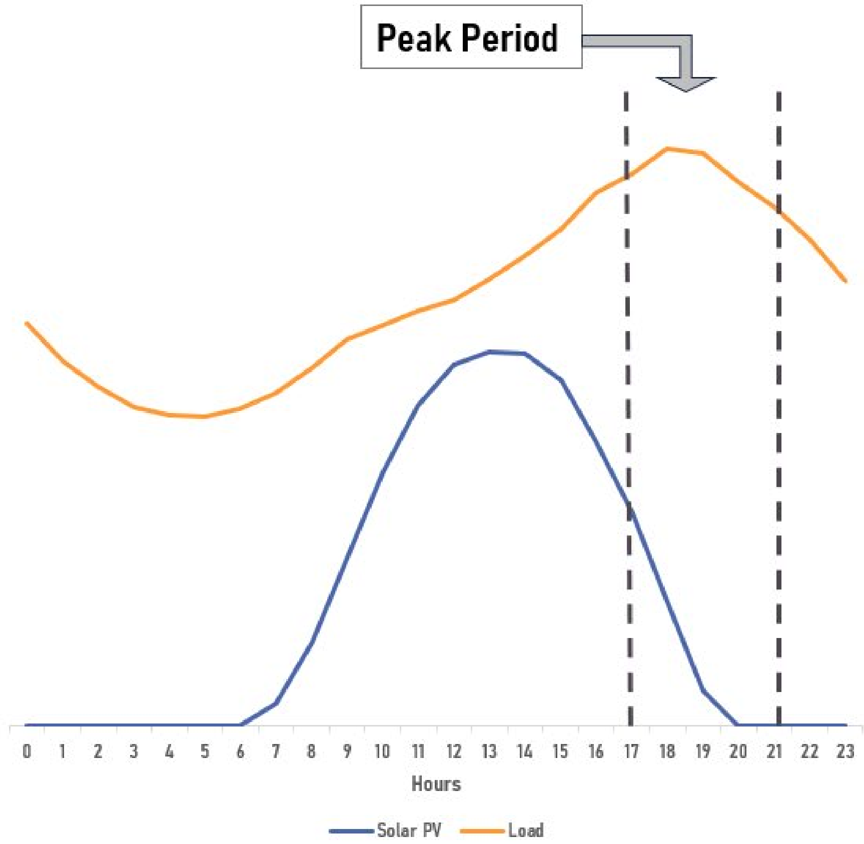




KEY FINDING (4/4)

Local Solar is misaligned with peak demand.

- Peak demand will shift from 5 PM to 7 PM, mainly due to residential EV charging.
- Solar + Storage can align peak demand with local solar.

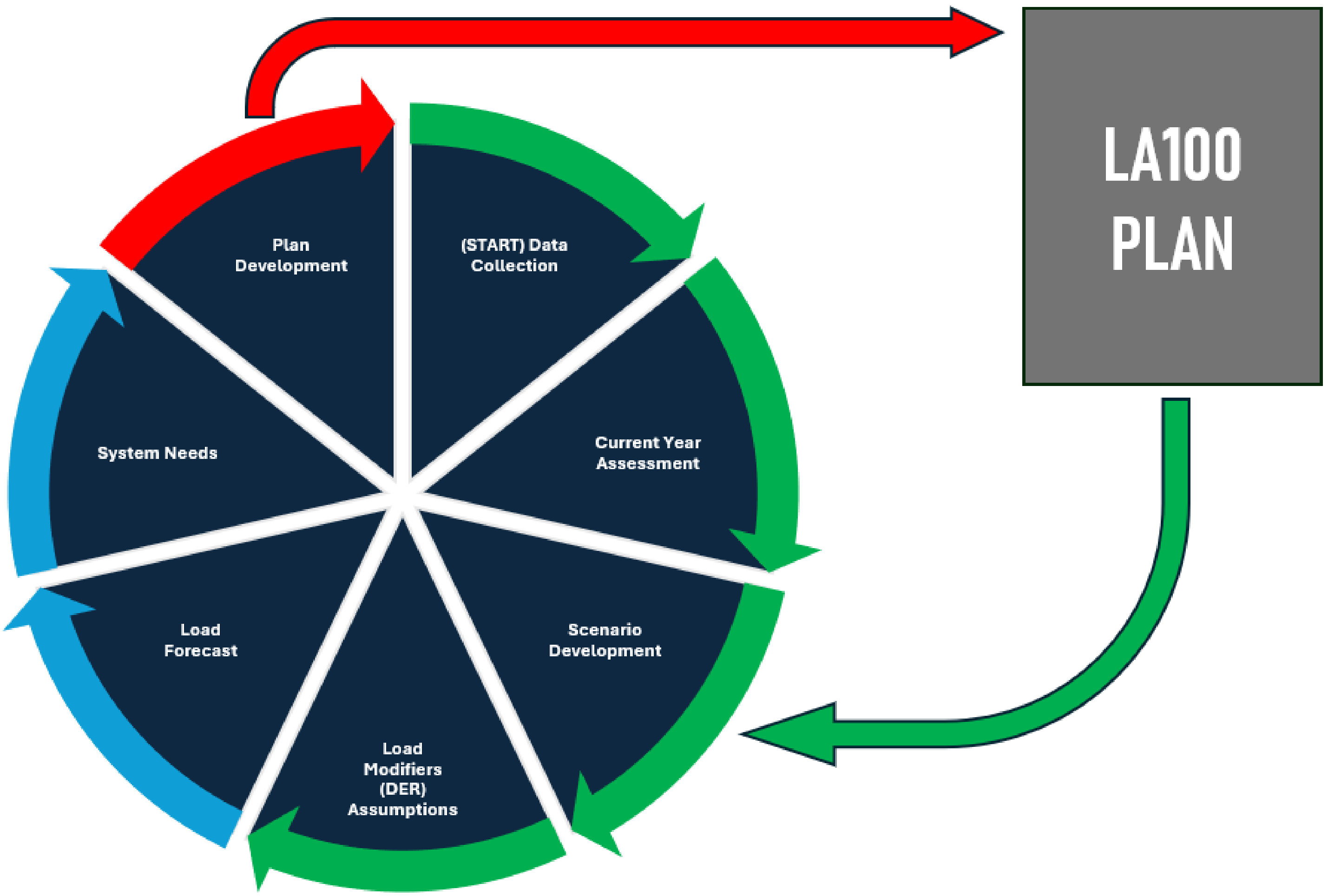


RECOMMENDATIONS

RECOMMENDATIONS

1. Equitably prioritize and address distribution system needs to maintain reliability while supporting future electrification demands.
2. Optimize residential EV charging through strategic rate design and tailored charging programs.
3. Modernize and automate the grid to accommodate higher penetration of Distributed Energy Resources.
4. Pair solar and storage to better align with the shifting distribution system peak.
5. Expand customer programs to address location-specific distribution system challenges effectively.

INTEGRATED PLANNING



Q&A
Advisory Group Discussion and Comments

LA100 PLAN
Preliminary Results (1 of 2)

LA100 PLAN (FORMERLY SLTRP) MODELING OVERVIEW

PRESENTED BY:
Robert Hodel

INTEGRATED RESOURCES PLANNING

DECEMBER 5, 2024

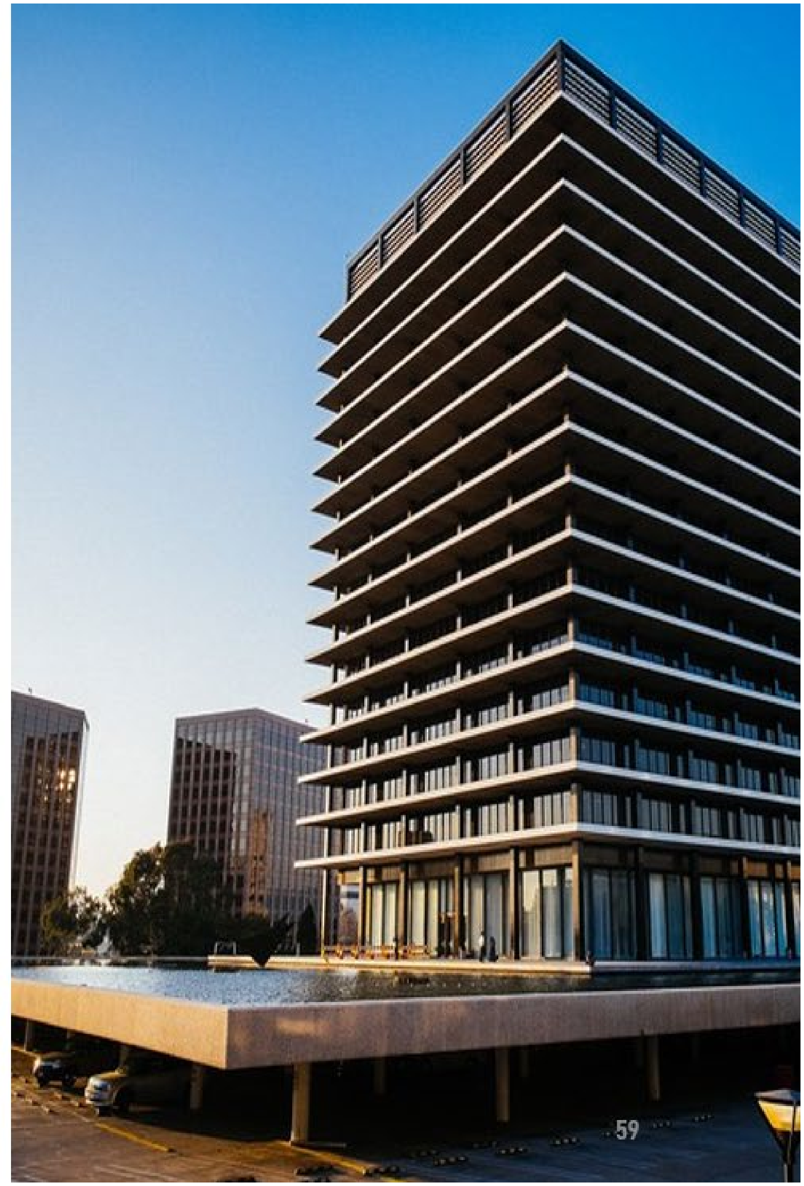
AGENDA

1. Scenario & Modeling Overview

2. State & Local Policy Modeling Results

3. Sensitivities

4. Questions & Answers



MODEL RUNS

LA100 PLAN:

LOCAL POLICY

- **80% RPS by 2030, 100% carbon-free energy by 2035 and thereafter**
- 2030 target is with respect to retail sales of electricity and end-use customers
- 2035 target is with respect to all generation of electricity (including losses)

STATE POLICY

(Reference Only): SB 100

- **60% RPS by 2030,** 90%/95%/**100% clean energy by** 2035/2040/**2045**
- Per State law, all targets are with respect to retail sales of electricity to end-use customers

LA100 PLAN SENSITIVITY:

LOCAL POLICY LOW LOAD

- Modeled Local Policy targets under a lower electric consumption and peak demand

- Additional local policy sensitivities are still being modeled

RPS: Renewable Portfolio Standard; SB 1020 adds 2035/2040 interim targets to SB 100

MODELING OVERVIEW: MODULES

Capacity expansion feeds into other modeling modules

CAPACITY EXPANSION MODELING

- Selects least-cost combination of resources to meet future load while maintaining system needs and policy mandates

RELIABILITY MODELING

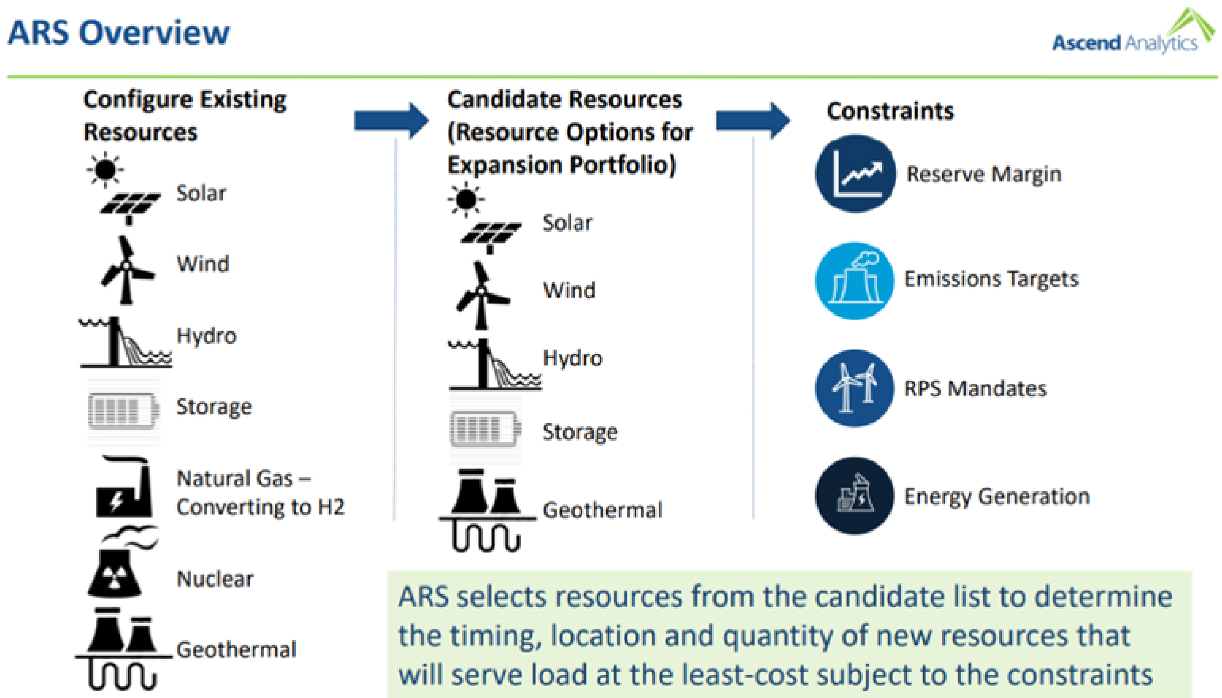
- Tests portfolios to ensure LADWP can meet load on an hourly basis throughout the year
- Provides updated values for capacity contribution of variable renewable resources and energy storage

PRODUCTION COST MODELING

- Uses capacity expansion results to build LADWP system portfolio
- Shows how resources will dispatch over time to serve load
- Provides granular results for costs, emissions, renewable generation, etc.

Iteration is needed to validate results

MODELING OVERVIEW: CAPACITY EXPANSION



ARS: Automated Resource Selection, a proprietary software package by Ascend Analytics for capacity expansion modeling

MODEL DESCRIPTION

Selects least-cost portfolio of resources that meets model constraints

INPUTS

Candidate resource options, price forecasts, model constraints

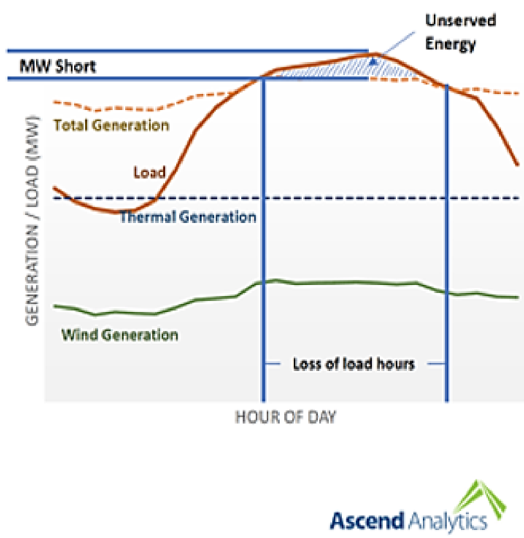
OUTPUTS

Informs what to build, when to build it, how much to build, where to build

MODELING OVERVIEW: RELIABILITY

Metric	Description
LOLP	**Loss of load probability** – The probability of an event where load exceeds available generation resources
LOLH/LOLE	**Loss of load hours / expectation** – The expected number of hours (LOLH) or days (LOLE) where load cannot be met with available generation resources
EUE	**Expected energy unserved** – The expected amount of load, in MWh, that cannot be met with available generation
MW Short	The largest shortfall from inadequate generation resources
ELCC	**Effective load carrying capability** – The expected capacity contribution from variable renewable resources, usually as a function of the penetration of a renewable technology in a power system

** Source: EPRI*



MODEL DESCRIPTION

Assesses capacity expansion resources to ensure there is enough generation capacity to balance electricity supply and demand (resource adequacy)

INPUTS

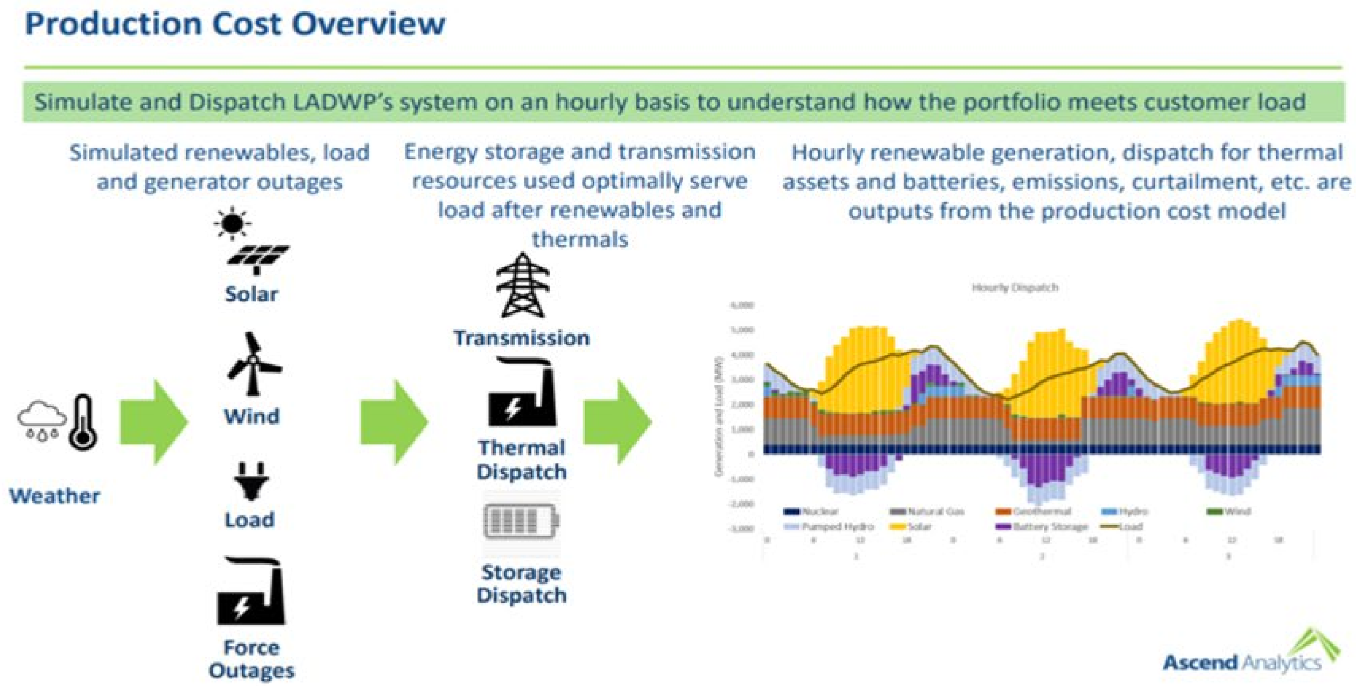
Portfolio of capacity expansion resources

OUTPUTS

Loss of Load Probability (LOLP): The probability of an event where a load exceeds available generation resources

Loss of Load Events (LOLEV)*: The expected count of adequacy events per study horizon (1 event in 10 years)

MODELING OVERVIEW: PRODUCTION COST



MODEL DESCRIPTION

Simulates Power System hourly dispatch to serve customer load

INPUTS

Portfolio of capacity expansion to resources verified via reliability modeling (resource adequacy)

OUTPUTS

System operating costs (fuel, emissions, variable operations & maintenance), energy generation (renewables, & non-renewables), and dispatch (energy storage), emissions, curtailment

MODEL RUN OVERVIEW: LA100 PLAN

Policy

- Assumes **all natural gas-fired generation retires by the start of 2035**.
- Assumes multiple green hydrogen-ready generation projects come in-service to serve as backup.
  - **Starting 2035, all green hydrogen-ready generation is operating solely off green hydrogen**

Distributed Energy Resources and Electrification

- Distributed "Local" Solar: High (1,898 MW by 2035)
- Distributed Energy Storage: High (331 MW by 2035)
- Demand Response: High (815 MW by 2035)
- Energy Efficiency*: High (3,794 GWh by 2035)
- Building Electrification: (1,169 GWh by 2035)
- Transportation Electrification: (5,122 GWh by 2035)

**Incremental to historical quantities, starting 2023-onwards*

MODEL RUN OVERVIEW: (REFERENCE ONLY) SB 100

Policy

- Assumes **natural gas-fired generation** **remains online through 2045** to serve as backup and meet losses pursuant to SB 100.
- Assumes **green hydrogen-ready generation, operating at 30% green hydrogen by volume, from in-service through 2045**, for the following projects:
    - IPP Renewed
    - Scattergood Units 1 and 2 Modernization

Distributed Energy Resources and Electrification

- Distributed "Local" Solar: Moderate (1,616 MW by 2035)
- Distributed Energy Storage: Moderate (248 MW by 2035)
- Demand Response: Moderate (615 MW by 2035)
- Energy Efficiency*: Moderate (3,434 GWh by 2035)
- Building Electrification: (1,169 GWh by 2035)
- Transportation Electrification: (5,122 GWh by 2035)

**Incremental to historical quantities, starting 2023-onwards*

SENSITIVITY OVERVIEW: LA100 PLAN LOW LOAD/HIGH DER (1 OF 10)

Policy

- Assumes **natural gas-fired generation retires by the start of 2035.**
- Assumes multiple green hydrogen-ready generation projects come in-service to serve as backup.
  - **Starting 2035, all green hydrogen-ready generation is operating solely off green hydrogen**
- Assumes lower electric consumption and peak demand

Distributed Energy Resources and Electrification

- Distributed "Local" Solar*: Highest (2,072 MW by 2035)
- Distributed Energy Storage: Highest (432 MW by 2035)
- Demand Response: Highest (948 MW by 2035)
- Energy Efficiency**: High (3,794 GWh by 2035)
- Building Electrification: (1,169 GWh by 2035)
- Transportation Electrification: (5,122 GWh by 2035)

**Only net-energy metered solar increased to "Highest" to reduce load; other distributed solar remained at "High" levels*
***Incremental to historical quantities, starting 2023-onwards*

MODELING RESULTS: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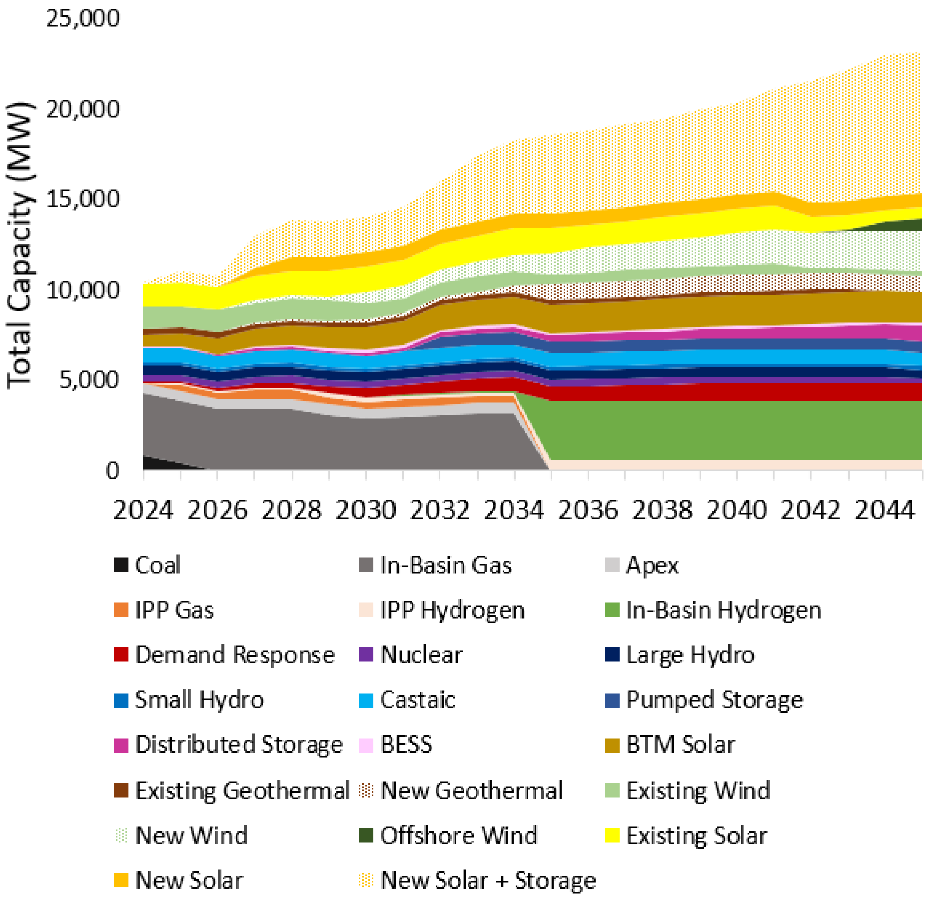
LA100 Plan Model Results

Modeling Status

Model Run	Status
LA100 Plan	Complete
SB100 Reference Case	Complete
LA100 Plan – Low Load	Complete
Price Sensitivity (Low natural gas and high renewable energy prices)	In Review
Price Sensitivity (High natural gas and low renewable energy prices)	In Review
Disallow In-basin Combustion	In Review
No Hydrogen Supply Available	In progress
High Distributed Energy Resources	In progress
Shortage of Hydrogen Supply (Impact to reliability)	In progress
Low Distributed Energy Resources (Shortfall due to low customer adoption)	Not Started
High Load (Accelerated load growth due to electrification)	Not Started
Resource Constrained (scarcity of resource availability)	Not Started

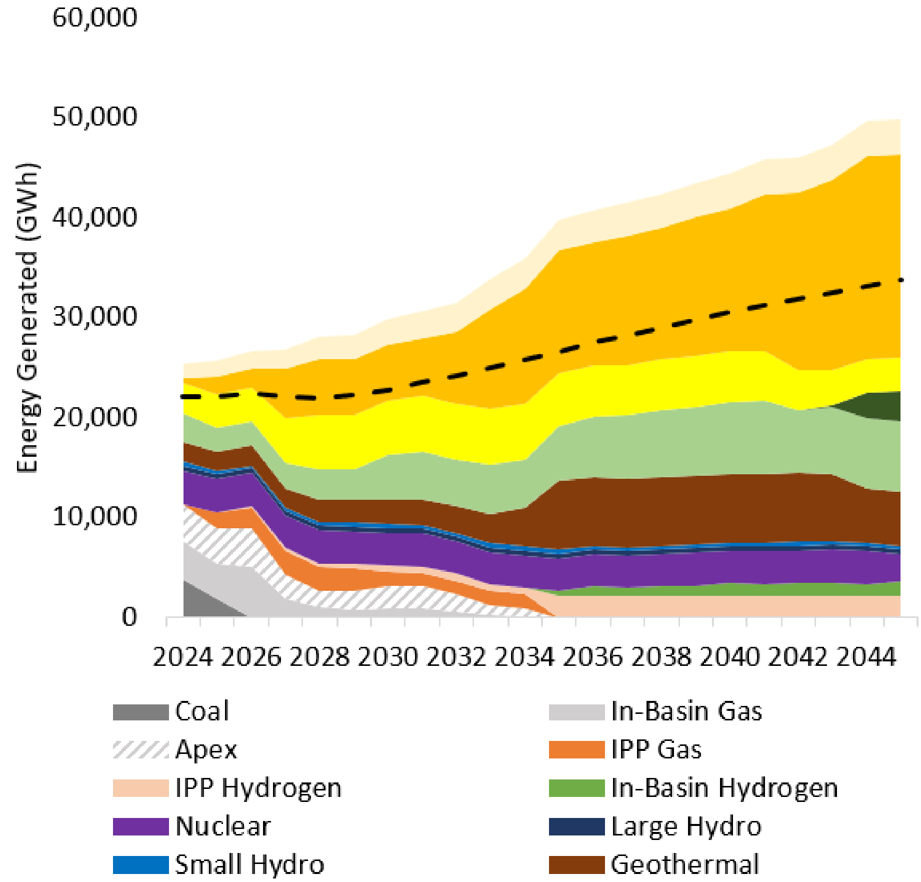
LA100 Plan Key Takeaways

- To reach the goals of the LA100 Plan, LADWP will acquire
  - 2000 MW of Solar collocated with Battery Storage by 2030 (333 MW per year), 4400 MW by 2035, 7750 MW by 2045
  - 500 MW of Wind by 2030 (125 MW per year), 1150 MW by 2035, and 2900 MW by 2045
  - 125 MW of Geothermal by 2030 and 900 MW by 2035
  - 3270 MW of in-basin green hydrogen capacity by 2035
- Demand side plans include
  - Electrification efforts for vehicles and buildings adding 71% of load growth by 2035
  - Energy Efficiency and Rooftop solar growth to save 17% of load by 2035
- Total Cost for LA100 Plan are estimated to add approximately $18 Billion above the costs of meeting California's energy mandates



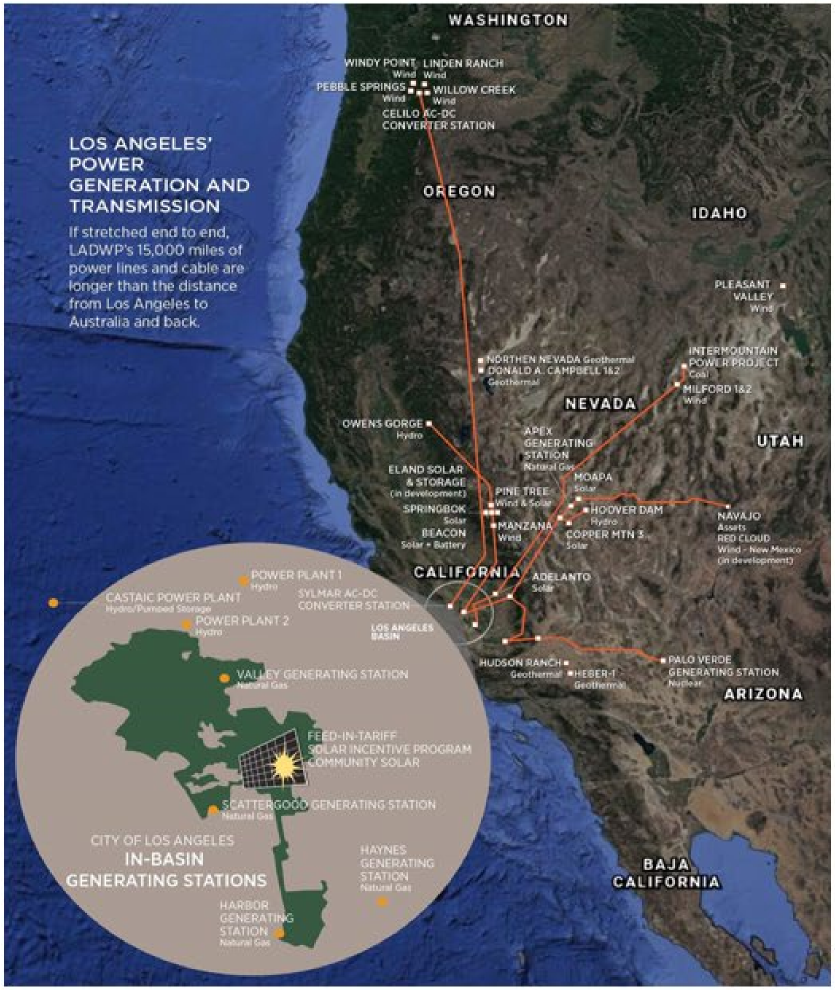
LA100 Plan Generation by Year

- By 2033 Solar generates over half of LADWP's energy.
- In basin green hydrogen provides energy only during critical periods for grid stability
- Starting in 2036 wind and geothermal account for nearly one-third of total generation
- Starting 2035, generation exceeds retail sales by 49%
- Coal retires in June of 2025
- Natural gas provides 30% of generation in 2024, dropping to 15% in 2030 and 0% in 2035
- In basin natural gas provides 15% of generation in 2024
- In basin green hydrogen provides less than 3% of generation starting in 2035



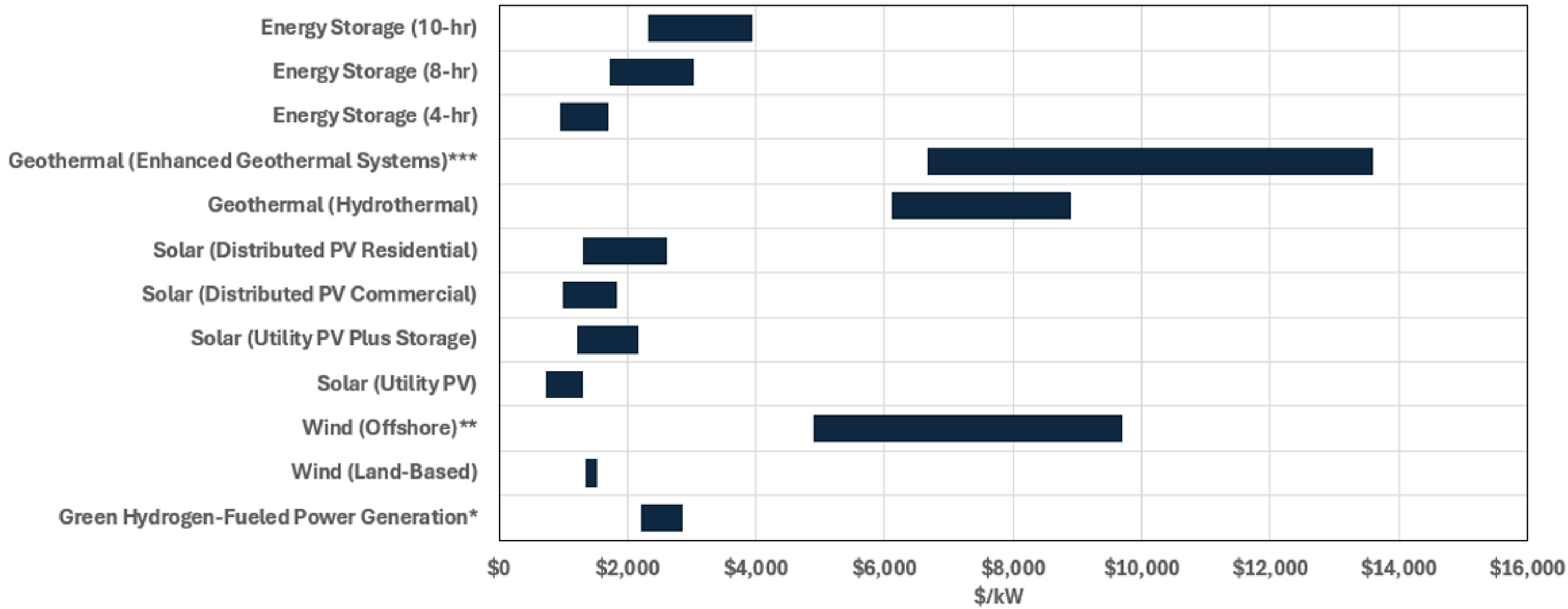
Resource Assumptions for New Builds

- The earliest date to add new candidate resources is 2027
- Solar will continue as the dominate new resource
  - All solar builds are collocated with four-hour storage as the 2:1 ratio of solar to storage capacity (be in 100 MW of solar will have 50 MW of storage)
  - Most solar will be in California and Arizona
  - Annual build limits – 1,000 MW; Total limit – 7,000 MW
- Onshore wind is limited due to low resource potential in Southern California
  - Most likely locations for wind are Wyoming and New Mexico with transmission limits
  - Annual build limits – 500 MW; Total limit – 3000 MW
- Offshore wind becomes available in 2030 as a candidate resource
- Conventional geothermal limit set at 250 MW
- Enhanced geothermal becomes available in 2035
- Green hydrogen will fully replace natural gas generation by 2035



Generation Cost by Technology Type

Capital Cost, 2035: $/kW range by technology



Note: Solar Distributed and Green Hydrogen-Fueled Power Generation resources were fixed into the model, per local policy and reliability purposes, respectively. Estimated prices shown for the year 2035, in 2024$ (USD), and derived from NREL Electricity Annual Technology Baseline (2023 & 2024 versions), Bloomberg New Energy Finance, and LADWP Subject-Matter Experts.

Plan Requirements

LA100 Plan

- Reliability
  - Target Loss of Load Expectation (LOLE) of 0.1 days per year or less
- Energy:
  - 80% of load served with renewable generation by 2030 and beyond
  - 100% of load with clean generation by 2035

SB100 Reference

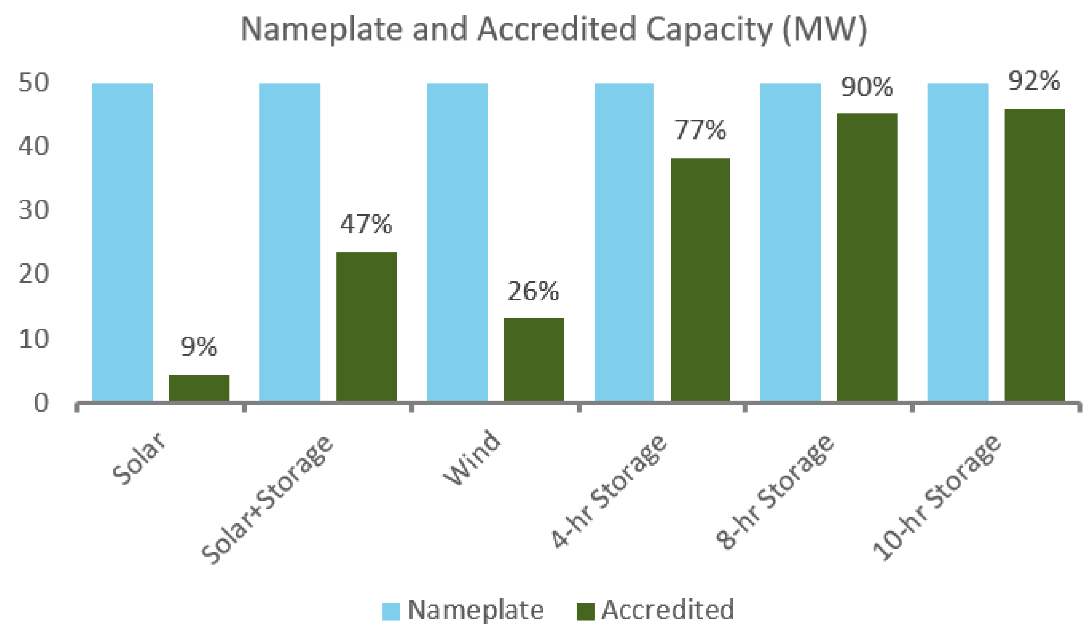
- Reliability
  - Target Loss of Load Expectation (LOLE) of 0.1 days per year or less
- Energy:
  - 60% of retail load served with renewable generation by 2030 and beyond
  - 90% of retail load with clean generation by 2035; 95% by 2040; 100% by 2045

What makes a Plan Reliable?

- Resource Adequacy Models – Stress test the resources mix for serving load around the clock
- Target Result is a Loss of Load Expectation (LOLE) of 0.1 days per year
  - LOLE is an average over many future simulations
  - Load shed during a day is considered a lost day regardless of the duration of outage (1 hour to 24 hours)
  - LOLE = 0.1 indicates that over all future simulations the system will experience an average of 1 day of load shed every ten years
- LOLE is the most common metric among US grid operators and regulators today (e.g. CPUC)
- In recent years some grid operators set a reliability target of Loss of Load Hours = 2.4 hours per year
  - Most have moved to LOLE
  - 2.4 hours per year can be spread over multiple days making LOLH=2.4 a more forgiving target compared to LOLE=0.1
- **The LA100 Plan meets the LOLE=0.1 target all years in the model**

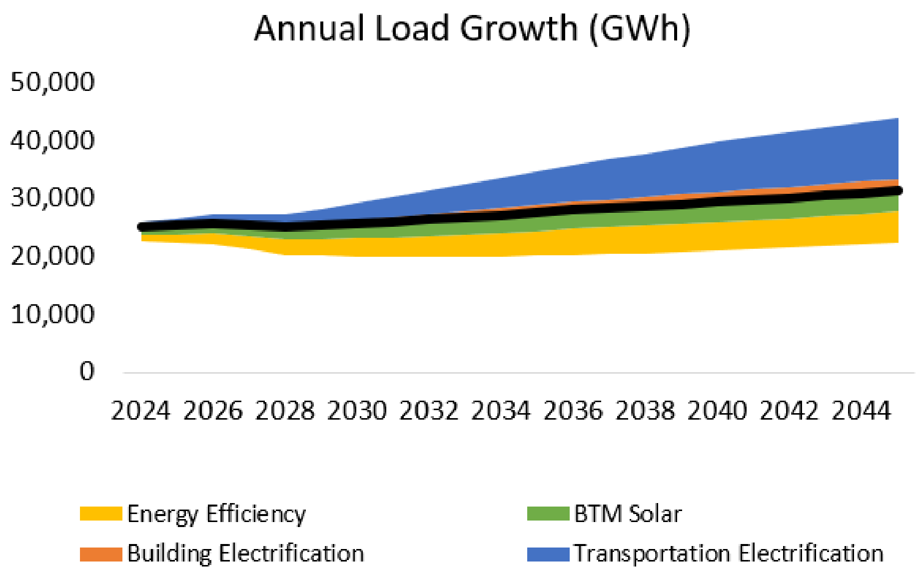
Reliability Contribution

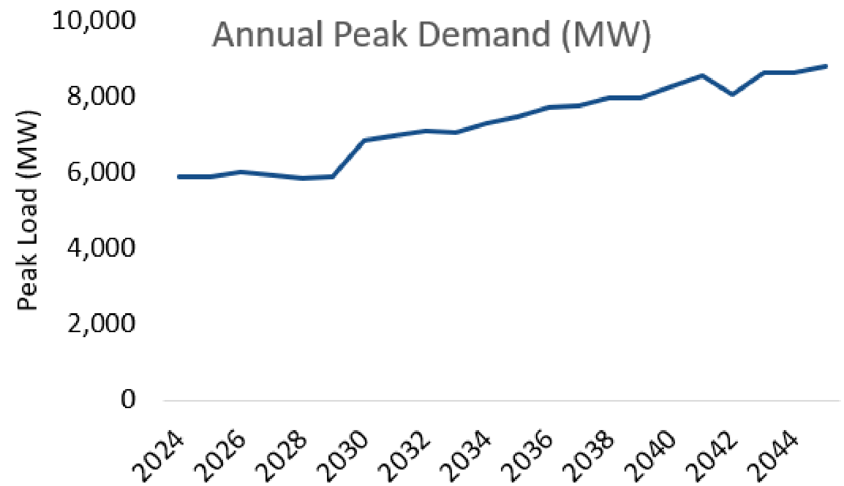
- A resource's contribution towards reliability is expressed as the Effective Load Carrying Capacity (ELCC) which also provides the resource Accredited Capacity
- ELCC can be thought of as the portion of a resource nameplate capacity that counts towards reliability
- Nameplate capacity shows the maximum value a resource can generate at any given time
- Accredited capacity shows the value a resource brings to the system over all hours
- For example, a 100 MW solar plant can generate 100 MW in the middle of the day in the summer, but provides limited reliability in the evening and night hours. The ELCC value is set to 9% in the model.
- In terms of capacity value, solar and storage provides 46% of nameplate capacity towards reliability



LADWP Load Projection – Mid Case

- Load growth projections show modest growth over time with annual load increasing at 1.3% from 2024 to 2035 and 2.6% from 2035 to 2045
- Peak demand will increase more rapidly at 2.5% per year from 2024 to 2035 and 1.6% per year from 2035 to 2045
- Load growth is driven mainly with population changes and electric vehicle adoption rates
- Increased energy efficiency and rooftop solar will offset some of the electric vehicle growth





Total New Resource Build 2025 to 2045 Comparisons

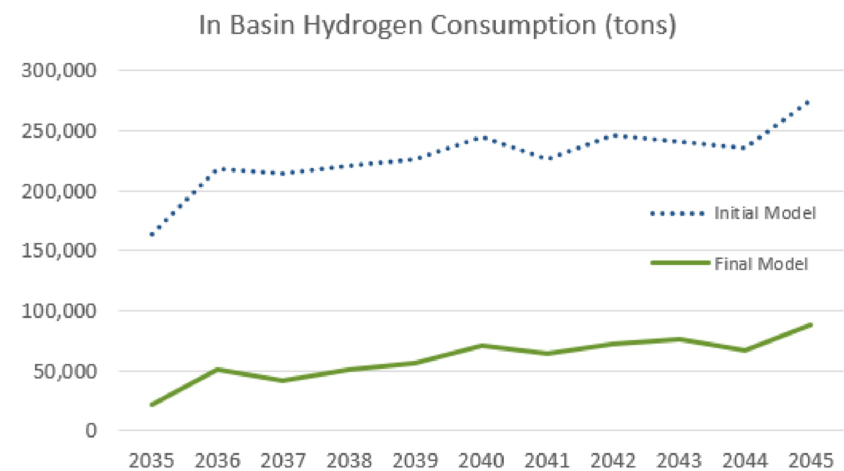
All Values Shown in MW of Nameplate Capacity

Resource	LA100 Plan	SB100 Reference
Solar	8546	6946
Battery Storage (Collocated with Solar)	4616	3066
Battery Storage (Standalone)	145	770
Land-Based Wind	2250	1850
Offshore Wind	650	1050
Geothermal	900	350
Pumped Hydro	650	0
Green Hydrogen – In Basin Generation	3253	39
Green Hydrogen – IPP	600*	65

* LADWP share is shown

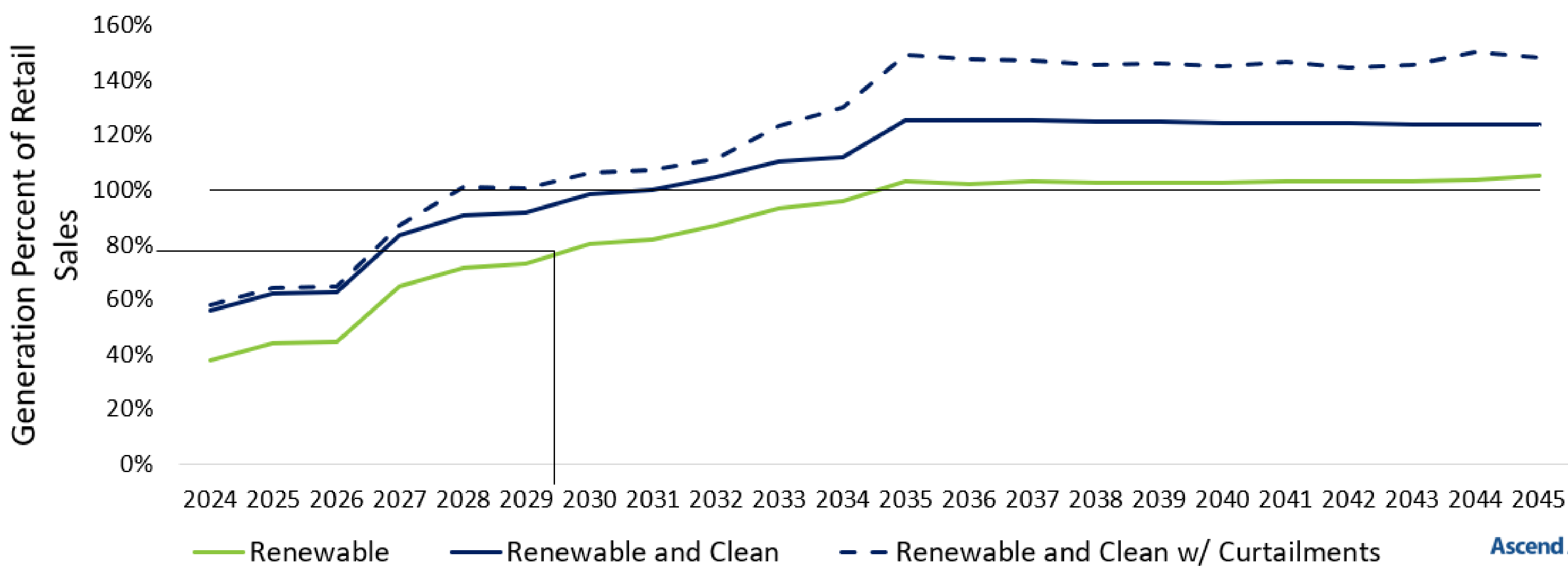
LA100 Model Output Summary

- Initial capacity expansion resulted in a reliable portfolio with in-basin green hydrogen
- Production cost models showed high usage of in-basin green hydrogen
  - Units ran 25% of the time
  - 230 thousand tons of hydrogen fuel consumed annually
- Manual additions for wind, solar, storage, and geothermal reduced reliance on in-basin green hydrogen (reduced NOx)
  - All units run less than 10% of the time, some below 5%
  - Renewable additions reduced hydrogen fuel consumption by 70%
- Solar and storage meet most of LADWP's growing load
  - Solar provides 1/2 of total generation by 2045
  - Storage shifts solar to evening hours to reduce reliance on thermal units



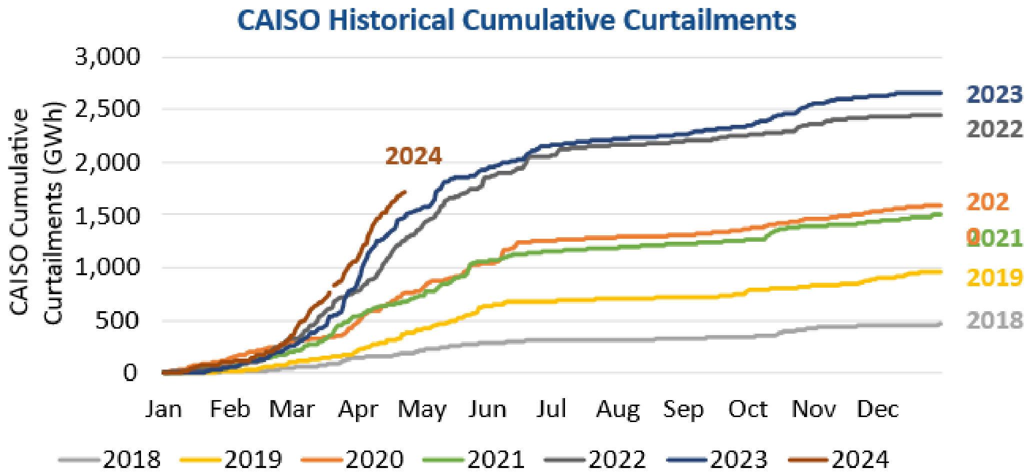
LA100 Plan Percent Renewable and Clean Generation

- LA100 Plan will meet the RPS goal of 80% by 2030
- Clean energy exceeds retail sales on an annual basis starting in 2031
- By 2035 only clean resource remain in the system
- By 2045 clean energy generation will exceed retail sales by 49%, dropping to 24% when curtailed energy is not counted



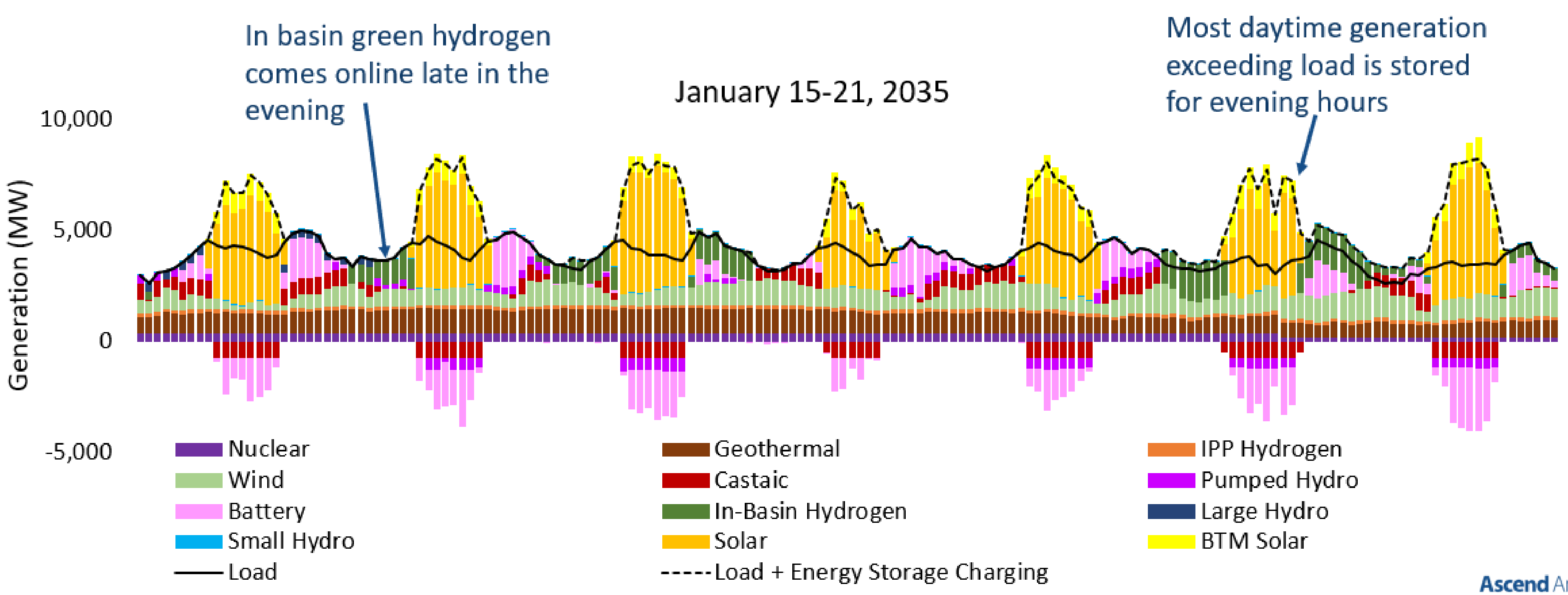
Energy Curtailments in LA100 Plan

- LA100 Plan will include high levels of variable resources leading to the need to curtail or sell power off system during times when generation greatly exceeds load
- Energy storage allows LADWP to shift power to times when it's needed
- Ultimately, the amount of energy storage required to avoid curtailments is prohibitively expensive leading to a need to have some curtailment
- The chart on the right shows curtailed energy amounts in CAISO (the grid operator covering most of California) where energy curtailments increase abruptly every year during spring months



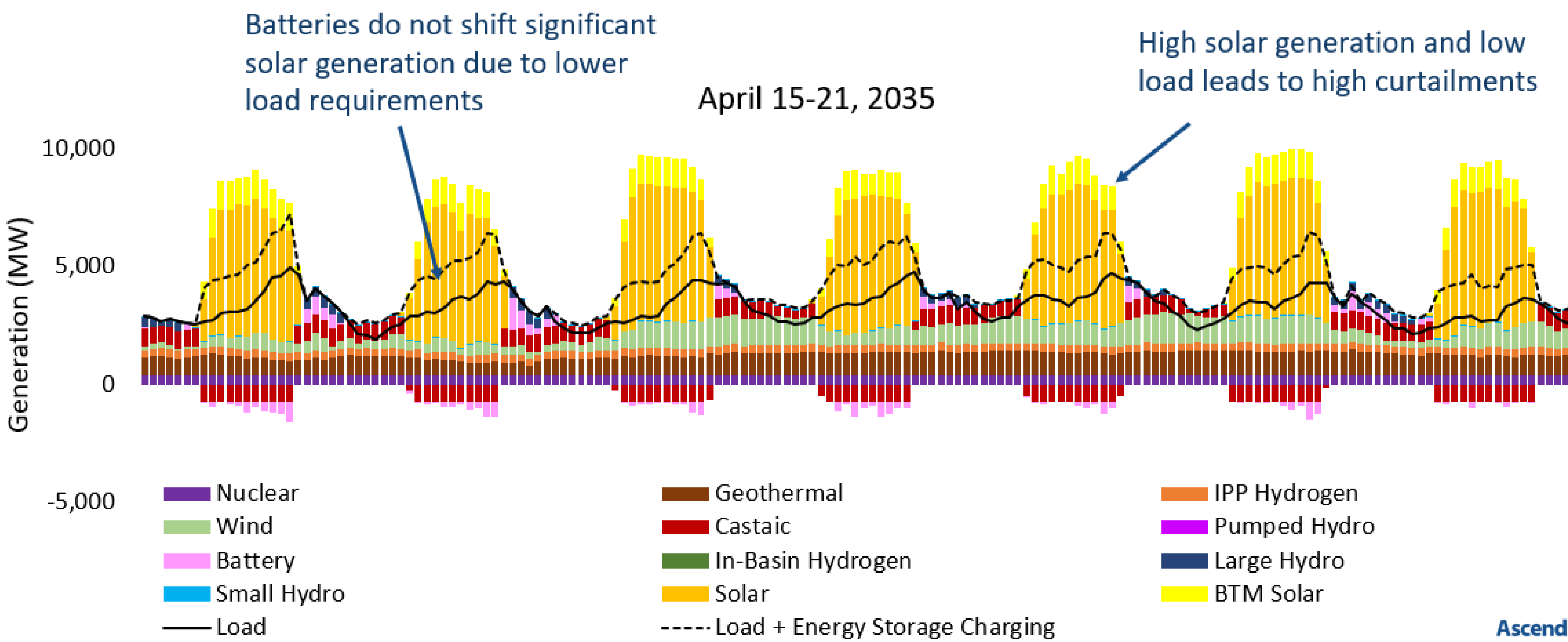
LA100 Plan Hourly Generation – January 2035

- January has modest load requirements coupled with limited solar generation
- Most of the midday generation is stored by batteries for use in the evenings
- In basin hydrogen serves load in the middle of the night after batteries have fully discharged



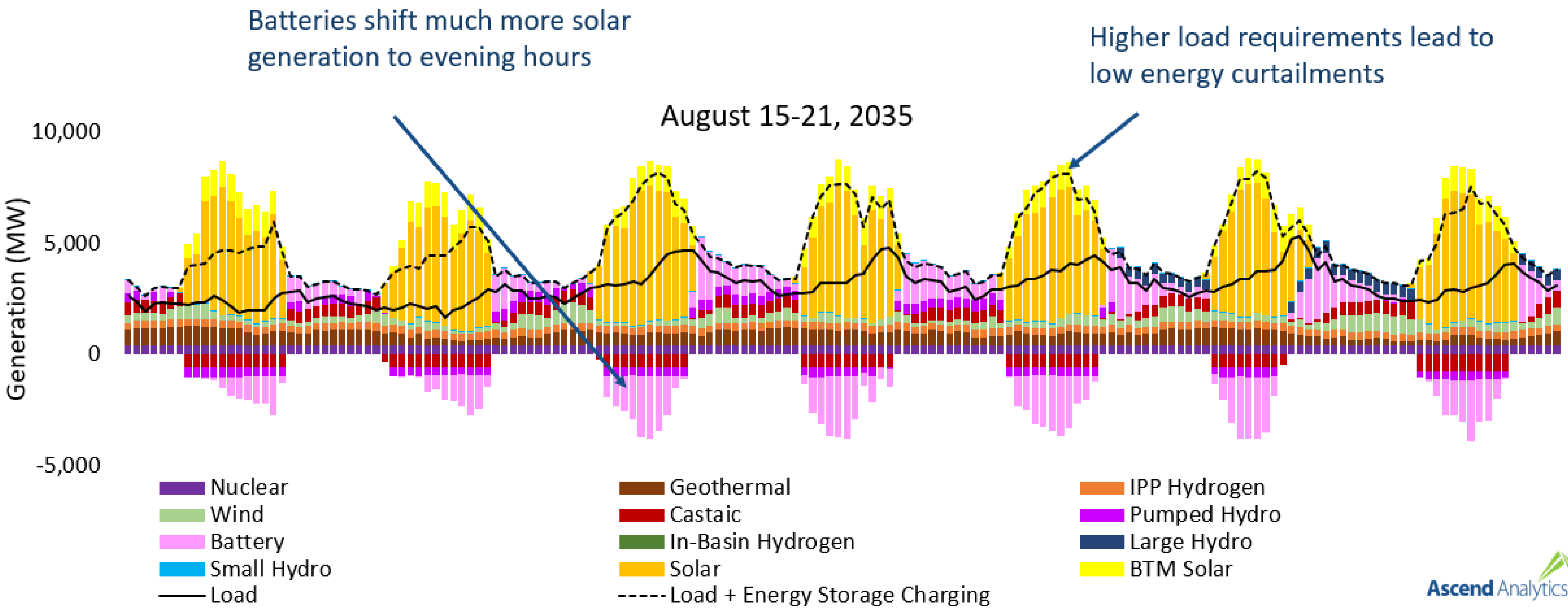
LA100 Plan Hourly Generation – April 2035

- April load is low compared to the other months of the year
- Solar generation is high creating a lot of excess energy during the day with a lot of curtailments
- In basin hydrogen is not needed due to the low load and high solar generation



LA100 Plan Hourly Generation – August 2035

- August generation relies more heavily on battery storage to capture all solar generation exceeding load
- Higher evening load requires the batteries to cycle more in order shift daytime generation to evening hours
- In basin green hydrogen is rarely used since the solar can fill the storage during the day



LA100 Plan Generation Patterns by Month and Hour for 2035

Solar Generation in average MW

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January	0	0	0	0	0	0	0	0	873	3,579	4,910	5,163	5,088	4,996	4,932	4,699	3,689	759	0	0	0	0	0	0
February	0	0	0	0	0	0	0	11	1,921	4,739	5,802	5,896	5,804	5,739	5,752	5,617	5,069	2,588	0	0	0	0	0	0
March	0	0	0	0	0	0	0	513	3,674	5,808	6,592	6,724	6,712	6,730	6,743	6,617	6,329	4,635	1,204	0	0	0	0	0
April	0	0	0	0	0	0	94	2,199	4,637	6,130	6,602	6,703	6,727	6,734	6,737	6,597	6,371	5,476	3,012	0	0	0	0	0
May	0	0	0	0	0	0	902	3,165	4,920	5,843	6,244	6,500	6,594	6,619	6,558	6,518	6,296	5,742	3,988	922	0	0	0	0
June	0	0	0	0	0	34	1,548	3,641	5,095	4,659	6,255	6,521	6,548	6,609	6,580	6,494	6,310	5,976	5,121	1,918	0	0	0	0
July	0	0	0	0	0	3	805	2,863	4,430	5,561	6,036	6,241	6,272	6,237	6,155	5,891	5,696	4,948	3,882	1,207	0	0	0	0
August	0	0	0	0	0	0	454	2,773	4,408	5,809	6,399	6,668	6,701	6,566	6,446	6,168	5,789	5,105	3,523	115	0	0	0	0
September	0	0	0	0	0	0	21	1,711	3,765	5,218	5,922	6,127	6,263	6,167	6,014	5,918	5,561	4,422	1,651	0	0	0	0	0
October	0	0	0	0	0	0	0	711	3,039	4,872	5,898	6,009	5,945	5,856	5,839	5,551	4,910	2,789	0	0	0	0	0	0
November	0	0	0	0	0	0	0	76	1,901	4,345	5,217	5,416	5,334	5,412	5,344	5,003	3,686	690	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	1,019	3,434	4,619	4,701	4,676	4,541	4,361	4,039	2,683	0	0	0	0	0	0	0

Battery Charging and Discharging in average MW

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January	65	36	17	9	13	35	68	139	62	-61	-302	-434	-478	-507	-508	-461	-162	202	481	466	374	287	195	129
February	80	43	23	17	13	26	71	136	8	-90	-243	-334	-426	-477	-535	-515	-403	-31	509	540	454	366	252	164
March	106	50	25	23	27	38	93	70	-8	-59	-115	-198	-270	-390	-468	-522	-531	-305	267	560	478	352	268	201
April	86	51	30	31	30	39	57	-12	-53	-75	-77	-106	-142	-187	-251	-281	-318	-291	-52	386	337	250	180	136
May	96	54	46	25	32	49	8	-16	-25	-28	-38	-44	-70	-77	-123	-154	-178	-184	-75	72	180	124	103	105
June	162	137	103	82	76	85	1	-35	-42	-24	-58	-87	-129	-175	-264	-300	-315	-320	-233	40	350	301	247	193
July	168	153	98	87	86	90	11	-12	-37	-96	-132	-177	-256	-273	-347	-358	-339	-204	-64	185	363	321	274	202
August	147	108	63	53	56	53	36	-13	-64	-153	-230	-286	-330	-344	-343	-303	-236	-145	10	474	451	320	234	176
September	128	79	66	48	48	59	80	0	-33	-108	-181	-230	-326	-365	-367	-334	-279	-137	131	423	387	277	220	149
October	59	33	19	12	20	37	62	27	-17	-177	-301	-357	-383	-371	-363	-317	-174	7	441	422	382	314	244	128
November	48	21	15	6	10	24	48	80	-1	-126	-280	-344	-368	-414	-399	-340	-75	228	393	386	319	229	177	97
December	31	34	17	12	16	27	52	82	19	-72	-303	-355	-386	-395	-355	-285	-10	308	345	330	258	193	140	74

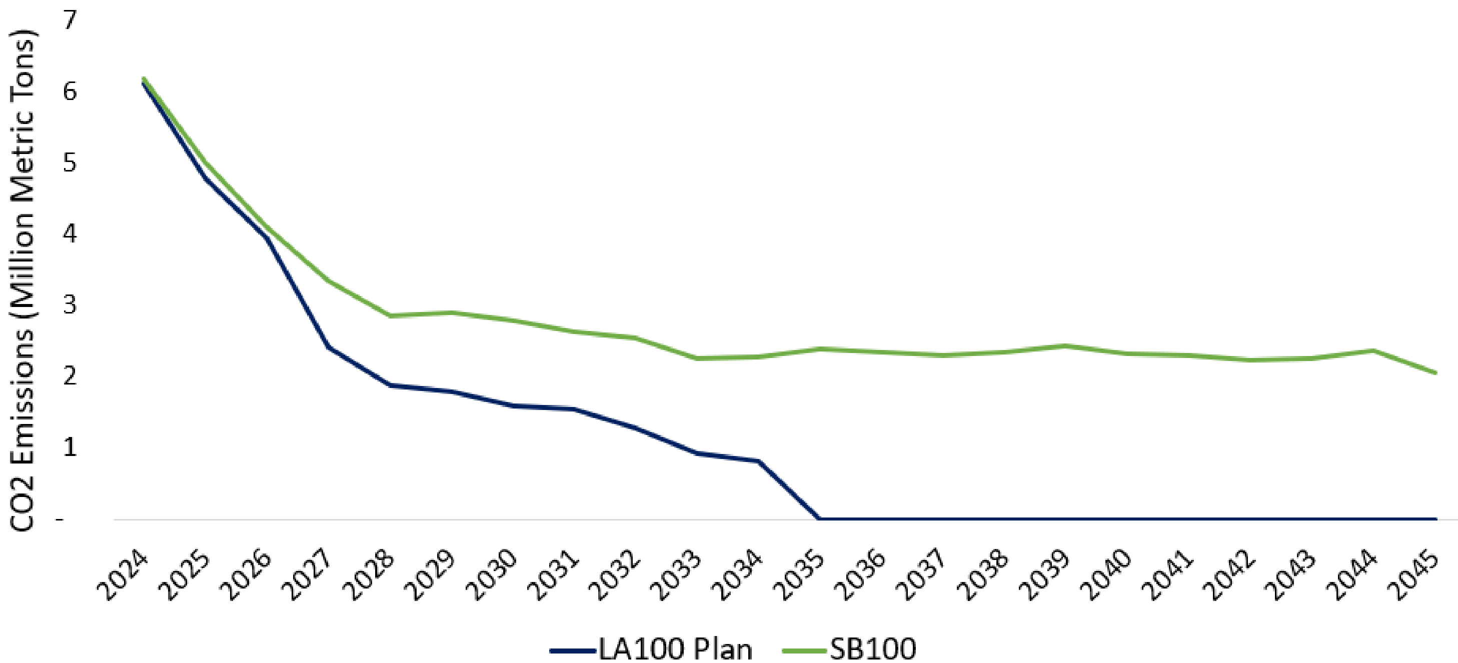
In-Basin Hydrogen Generation in average MW

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January	286	259	252	247	243	249	260	264	243	80	68	62	63	63	65	66	76	249	271	274	282	282	286	282
February	36	31	29	30	30	30	31	32	26	7	5	5	5	5	5	5	6	18	34	35	35	35	37	36
March	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
August	2	2	5	5	5	4	3	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	2	2
September	7	1	1	2	2	3	3	0	0	0	0	0	0	0	0	0	0	0	3	3	4	4	5	5
October	28	29	29	28	28	28	29	24	9	6	6	6	6	6	6	6	6	19	28	30	29	29	29	28
November	24	13	15	11	12	12	12	12	10	2	2	2	2	2	2	2	2	28	27	27	26	26	25	25
December	311	251	258	249	250	262	273	269	233	118	110	110	111	109	109	109	142	342	353	359	359	358	348	341

- Battery Charging aligns with solar generation capturing excess daytime energy
- Battery Discharging is concentrated in the evening hours (hours 19 to 24) with some nighttime generation in June July and August
- In basin hydrogen dispatches mostly in the winter months when solar generation is lower but load is still modest
- Spring months have limited need for batteries due to the low load and high solar generation

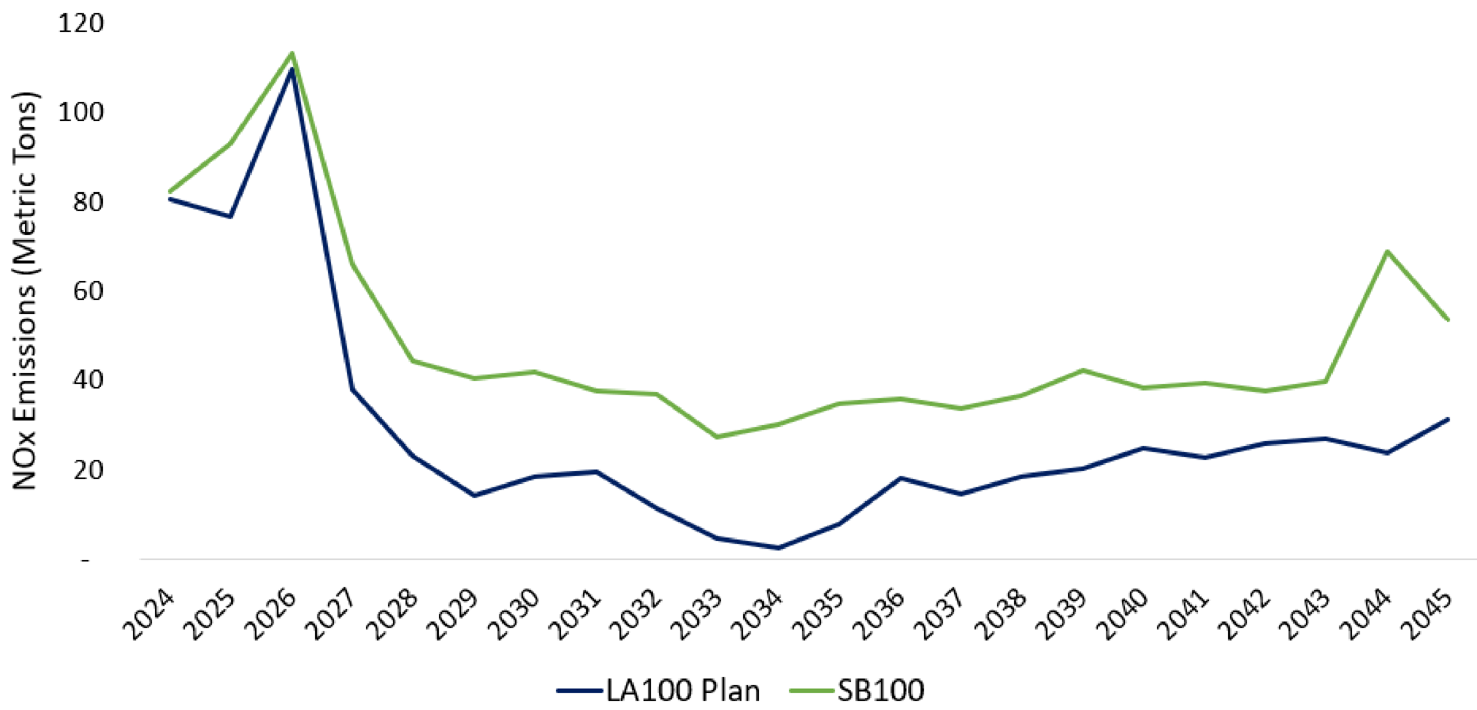
Carbon Emissions

- Carbon emissions will drop by one-third between 2024 and 2026 driven in large part by the retirement of IPP coal
- Starting in 2027, renewable additions will decrease generation from natural gas
- In 2035 carbon emissions go to zero when natural gas is replaced with green hydrogen
- In contrast, the SB100 reference case levels out at around 2.5 million tons of emissions annually



In-Basin NOx Emissions

- Nitrous Oxides will decline with decreased natural gas generation
- Green hydrogen emits nitrous oxides, but the low use of the hydrogen units will result in very low levels of emissions



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PUBLIC OUTREACH
Meetings

LA100 PLAN

PUBLIC OUTREACH MEETINGS

Timeframe	Meeting Description & Content (Topics to be covered)
January/February 2025 (weekday evenings and Saturday morning)	• **Power System Overview:** LADWP Overview and Recent Accomplishments, LA100 Plan Orientation, Key Considerations • **LA100 Plan Preliminary and Sensitivity Results:** LA100 Plan and Sensitivities, Modeling Framework, Preliminary Results and Tradeoffs, Implementation and Considerations for Risk Factors • **Q&A and Discussion**

Additional Meeting Series targeted for March 2025 once final modeling is complete

MEETING DETAILS

JANUARY/FEBRUARY 2025

2 IN-PERSON AND 1 VIRTUAL
HARBOR & VALLEY

BILINGUAL SLIDES

SIMULTANEOUS TRANSLATION

FACILITATED Q&A

OUTREACH TOOLS

ladwp.com/SLTRP
New Webpage
Coming Soon

DIGITAL OUTREACH TOOLKIT

FLYER

SOCIAL MEDIA CONTENT

NEWSLETTER CONTENT

GRAPHIC ASSETS

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NEXTDOOR

EARNED MEDIA

NEWSLETTERS

EMAIL: PowerSLTRP@ladwp.com

New email coming soon

NEXT STEPS: MEETING MAP

Phase 1

Launch
March 2024
Kickoff

Phase 2

Laying the Foundation
April 2024
Building Blocks
Assumptions Package

Phase 3

Scenario Development
May - June 2024
Developing Scenarios
Finalizing Sensitivities

Phase 4

Modeling
July 2024 – March 2025
Modeling
Distribution System
Planning AG Meetings

Phase 5

Results #1
December 2024
Present Results

Phase 6

Public Outreach #1
January – February 2025
Community Outreach
Public Engagement
Debrief on Feedback

Results #2
March 2025
Final AG Meeting
Discuss Final Model Results
Discuss Final Sensitivities
Transmission System
Planning AG Meeting

Phase 7

Public Outreach #2
April 2025
Sensitivities


Q&A