

# Review of the LADWP 2022 Strategic Long-Term Resource Plan

**FOR DISCUSSION PURPOSES**

PRESENTED BY

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PRESENTED TO

Neighborhood Council

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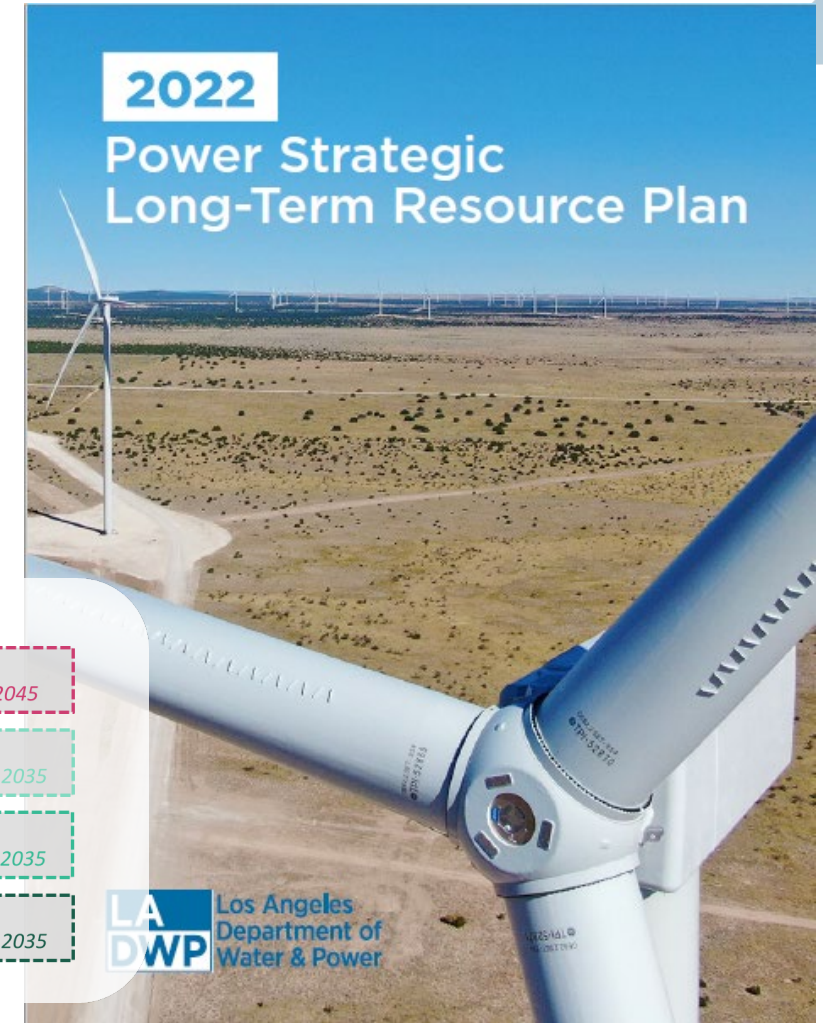
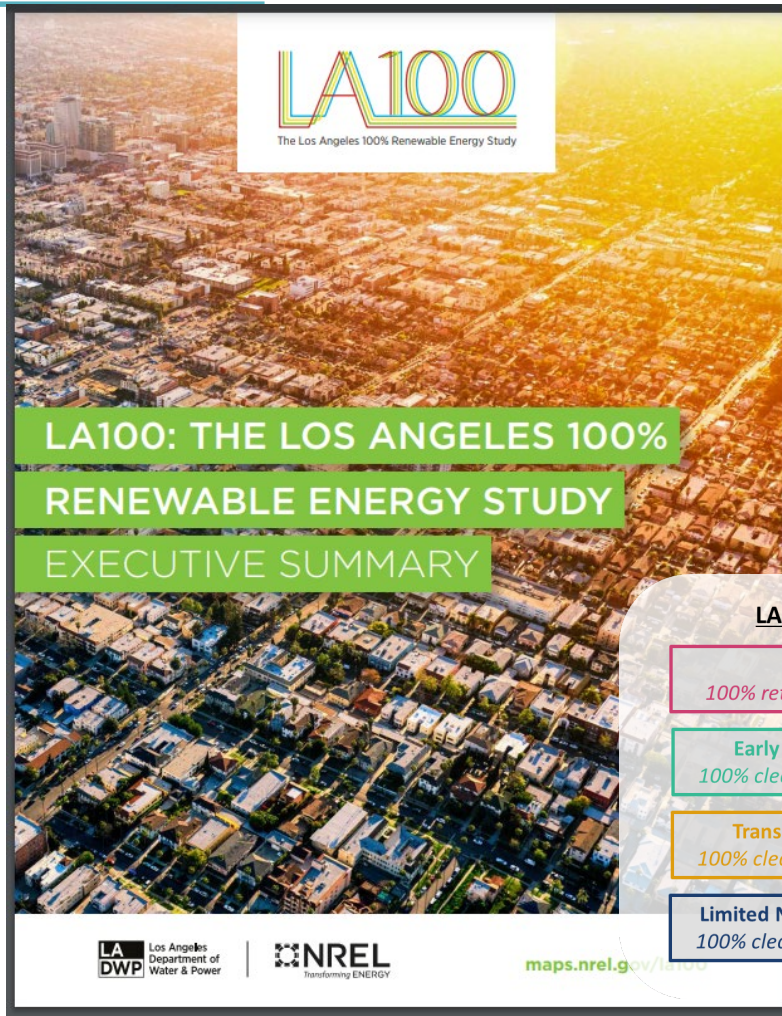
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- Introduction
- Summary of SLTRP
- FSO Analysis Review
- Residential Bill Analysis
- OPA/RPA Observations
- Appendix





# 2022 Strategic Long-Term Resource Plan (SLTRP)



## LA100 Study

- SB 100**  
100% retail sales by 2045
- Early & No Biofuels**  
100% clean energy by 2035
- Transmission Focus**  
100% clean energy by 2045
- Limited New Transmission**  
100% clean energy by 2035

## 2022 SLTRP

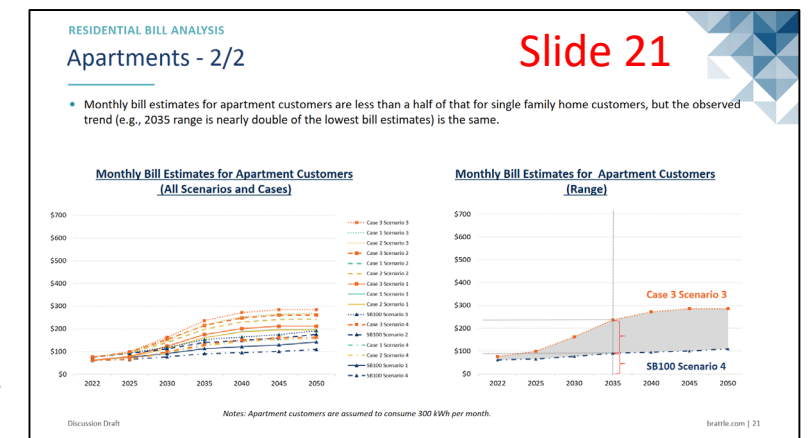
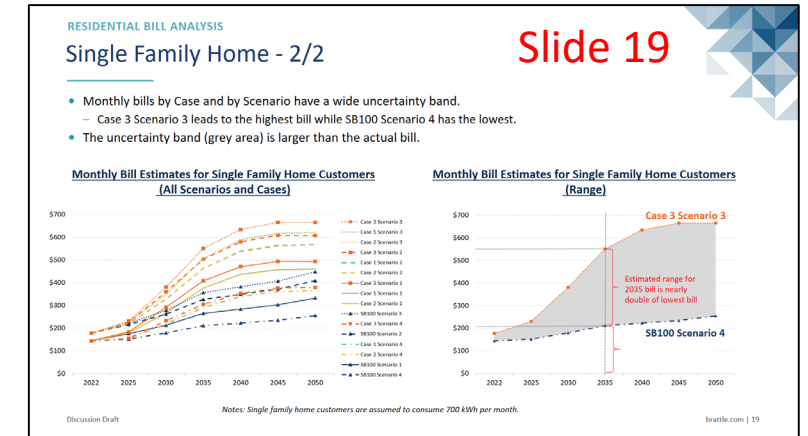
- SB 100**  
100% retail sales by 2045
- Case 1**  
100% clean energy by 2035
- Case 2**  
100% clean energy by 2035
- Case 3**  
100% clean energy by 2035

# Bill Impact Analysis: Sneak Peek

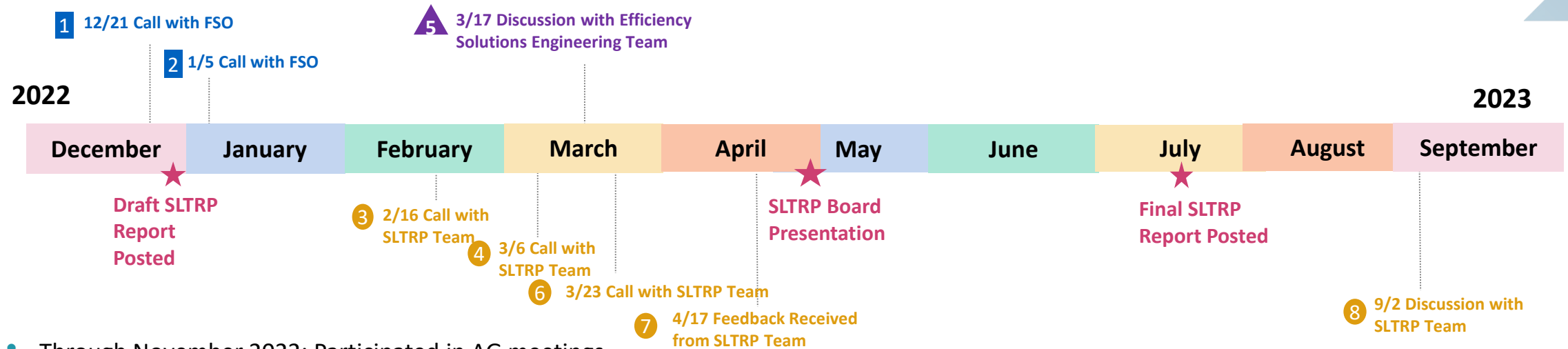
Brattle developed four Scenarios (see appendix) per SLTRP Case for monthly bill impact analysis and observed:

- The trend of monthly bills (2022-2050) for apartment and single family customers are the same:
  - Within a Scenario, Case 3 leads to the highest bill while SB100 has the lowest. Cases 1 and 2 overlap each other and are slightly below Case 3.
  - Within a Case, Scenario 3 leads to the highest bill and Scenario 4 the lowest.
  - Rate has great uncertainty: the uncertainty band is wide and larger than the actual bill. Scenarios used here are simplified allocation methods and do not account for uncertainty, such as realized vs unrealized load.
- The bill difference between Case 1 and SB100 is ~ 40% in 2035 and by over 50% in 2045.
  - The bill increase for SB100 from 2035 to 2045 is 14%.
  - The bill increase for Case 1 from 2035 to 2045 is 22%.
  - Case 1 assumes 100% clean generation by 2045 while SB100 assumes 100% retail sales (approximately 90% clean generation) by 2045.

*The assumed cost and rate/bill impact may warrant further discussion.*



# OPA/RPA SLTRP Reviews and Discussions



- Through November 2022: Participated in AG meetings.
- December 2022: Reviewed rate analysis performed by the Financial Services Office (FSO) (“Review Summary”). 1
- December 2022 – January 2023: Shared Review Summary with FSO and clarified observations (e.g., different gas prices used). 2
- January 2023: Reviewed draft SLTRP report and updated Review Summary. 3
- February 2023 – March 2023: Shared Review Summary and recommendations for future improvements with SLTRP team. 4
- March 2023: Shared Review Summary with Efficiency Solutions Engineering group to discuss Energy Efficiency specifics. 5
- April 2023: Received feedback from SLTRP team. 6
- April 2023: Confirmed that suggested recommendations for future improvements are aligned with SLTRP team, including the need for better coordination among groups and processes. 7
- May – June 2023: Finalized Review Summary (final SLTRP has not been released yet).
- August 2023: Reviewed Final SLTRP report and shared feedback with SLTRP team.
- September 2023: Discussed feedback with SLTRP team. 8



# Key OPA/RPA Recommendations for Future SLTRP

Recommendations for future SLTRP (accepted by SLTRP Team, to be incorporated in the next SLTRP cycle).

- Distinguish Scenarios (Future World) and Approaches (Actionable Items).
  - Distinction will allow LADWP to decide on actions as the future world reveals itself. Otherwise, its difficult to make good use of insights gained from the SLTRP.
- Clarify purpose and design of Scenarios and Sensitivities.
  - Sensitivities should combine factors that move in the same direction, depending on the objective (including drivers of renewables, carbon emission (or reduction) per MWh, or rate impacts) to see the combined impact (as bookends of probable outcomes).
- Clarify underlying assumptions, their purpose, and model behavior.
  - Range of assumptions could help define bookends of probable outcomes.
- Improve future process and involve LADWP subject matter experts (SMEs) from outside the SLTRP team.
  - For example, SMEs focused on PSRP, or energy efficiency and demand-side resources.

## SLTRP Board Presentation Excerpt

### RATEPAYER ADVOCATE FEEDBACK

#	Observations and Recommendations	Considerations For Next SLTRP
1	Distribution Upgrades and Energy Efficiency are Largest Rate Drivers	Optimize the PSRP and EE programs.
2	Energy Efficiency (EE) Triggers Higher Rates And Does Not Appear To Reduce Peak Load	Consider reduction in peak demand for energy efficiency programs to reduce future resources and distribution upgrades
3	Develop Energy Efficiency And Building Electrification (BE) Programs Together To Complement Each Other	Additional studies to optimize EE and BE
4	2022 SLTRP Cases 1, 2, And 3 Are Very Similar In Resource Builds & Rate Impacts. (Consider More Optimized Case Scenarios)	Add flexibility in developing scenarios and evaluate scenarios to minimize rate impacts
5	Distinguish Scenarios And Approaches (outside of DWP's control vs. actionable items)	Expand range of scenarios to capture stakeholder interest
6	Sensitivities Should Combine Factors That Move In The Same Direction, Depending On Objective	Seek and balance additional feedback from stakeholders to align objectives

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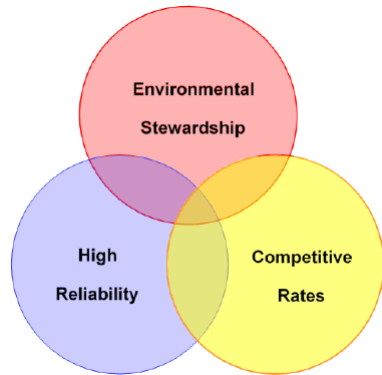


## STRATEGIC LONG-TERM RESOURCE PLAN (SLTRP) UPDATE

JASON RONDOU  
NERMINA RUCIC O'NEILL  
JAY LIM

# Four Cases Studied

## 2022 SLTRP Objectives



The 2022 SLTRP studies four Cases (i.e. SB100, Case 1, Case 2 and Case 3, as shown in the table below).

- SLTRP compares Cases 1, 2, and 3 against SB100 (the baseline case).
- FSO analyzes the rate drivers for each of these four cases.

## SLTRP Modeling Cases

Case 1 Recommended to the Board

		SB100	Case 1	Case 2	Case 3
Clean Energy Target	Total Renewable Portfolio Standard 2030	60%	80%	90%	90%
	Total Clean Energy Penetration Achieved 2035	80%	100%	100%	100%
	Total Clean Energy Penetration Achieved 2045	90% <sup>*1</sup>	100%	100%	100%
Distributed Energy Resource (DER)	Local Solar	1,500 MW	2,240 MW	2,240 MW	2,900 MW
	Local Energy Storage	Reference	High <sup>*2</sup>	High	Highest (Max DERs)
	Energy Efficiency	3,210 GWh	4,350 GWh	4,350 GWh	4,770 GWh
	Demand Response	576 MW	576 MW	576 MW	633 MW
	Building Electrification	Reference	High	High	High
Transmission	New or Upgraded Transmission	Moderate	High	High	High

Notes: <sup>\*1</sup>: SB100 achieves 100% clean energy by 2045 based on retail sales.

<sup>\*2</sup>: The high level of local energy storage refers to over 1,300 MW in total cumulative storage adoption.



# Estimated Load by Case

Forecast retail load sales vary by Case.

- The variation is largely caused by difference in assumed Local solar and storage, Energy Efficiency (EE), Demand Response (DR) and Building Electrification (BE).
- The variation (up to 9% of the average retail load sales projected for the four Cases) is of similar magnitude to LADWP's variation between recent vintages of load projections, and future projection boundaries (see table and figure below).
- Baseline projection appears to reflect load growth.

## LADWP Retail Sales Projection Comparison (GWh)

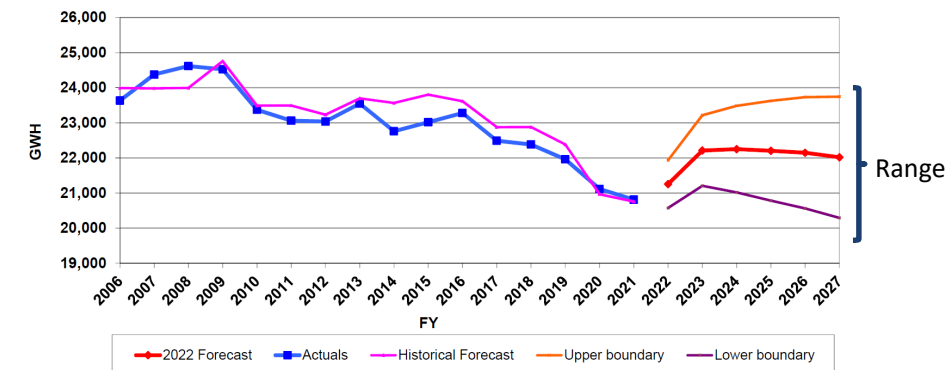
Projection Comparison	2021	2022	2023	2024	2025	2026	2027
2022 Projection [A]	20,811	21,255	22,211	22,521	22,204	22,147	22,019
2021 Projection [B]	20,754	20,926	20,610	20,671	20,834	20,874	21,017
% Difference [C] = [A] / [B] - 1	0%	2%	8%	9%	7%	6%	5%

Source: LADWP 2022 Retail Electricity Sales and Demand Forecast (Preliminary).

## Retail Load Sales Projections by SLTRP Cases (GWh)

	2022	2025	2030	2035	2040	2045	2050
SB100	21,041	21,376	22,638	24,118	25,896	27,624	29,352
Case 1	21,024	21,245	22,027	23,139	25,107	27,884	30,662
Case 2	21,024	21,245	22,027	23,139	25,107	27,884	30,662
Case 3	21,002	20,714	21,125	21,951	23,780	26,510	29,241
Average	21,023	21,145	21,954	23,087	24,972	27,476	29,979
Max Difference	39	661	1,513	2,167	2,116	1,374	1,420
Max Diff/Avg	0%	3%	7%	9%	8%	5%	5%

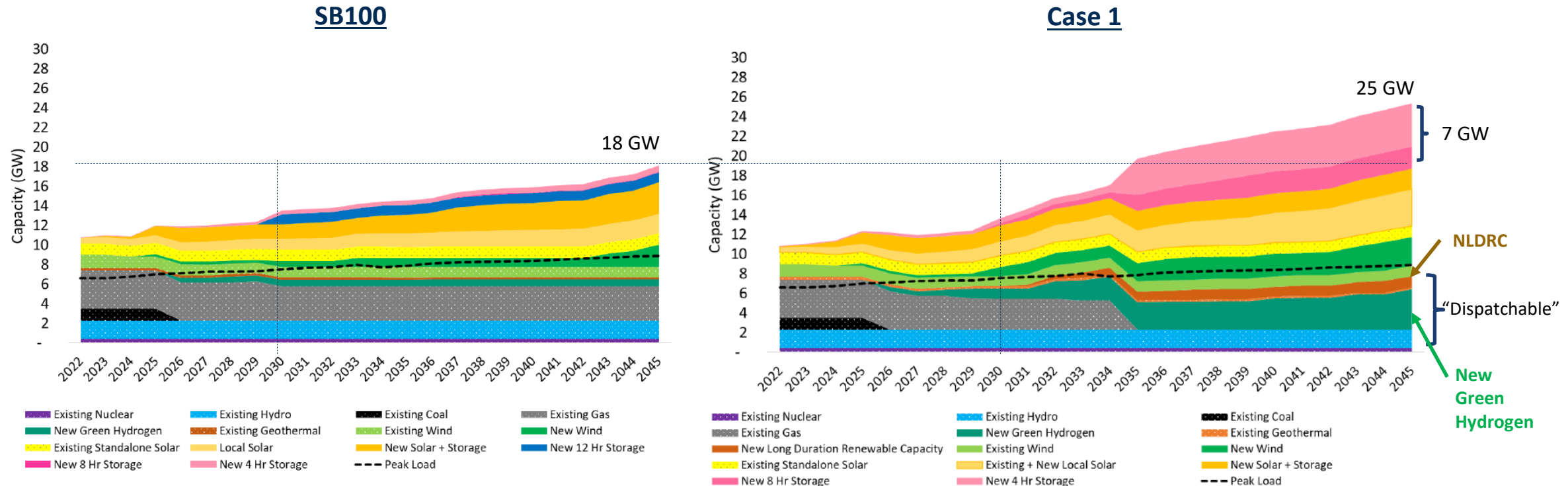
## LADWP Retail Sales 2022 Forecast (GWh)



# Resource Mix by Case: SB100 and Case 1

Varying clean energy targets lead to different resource portfolios for each Case.

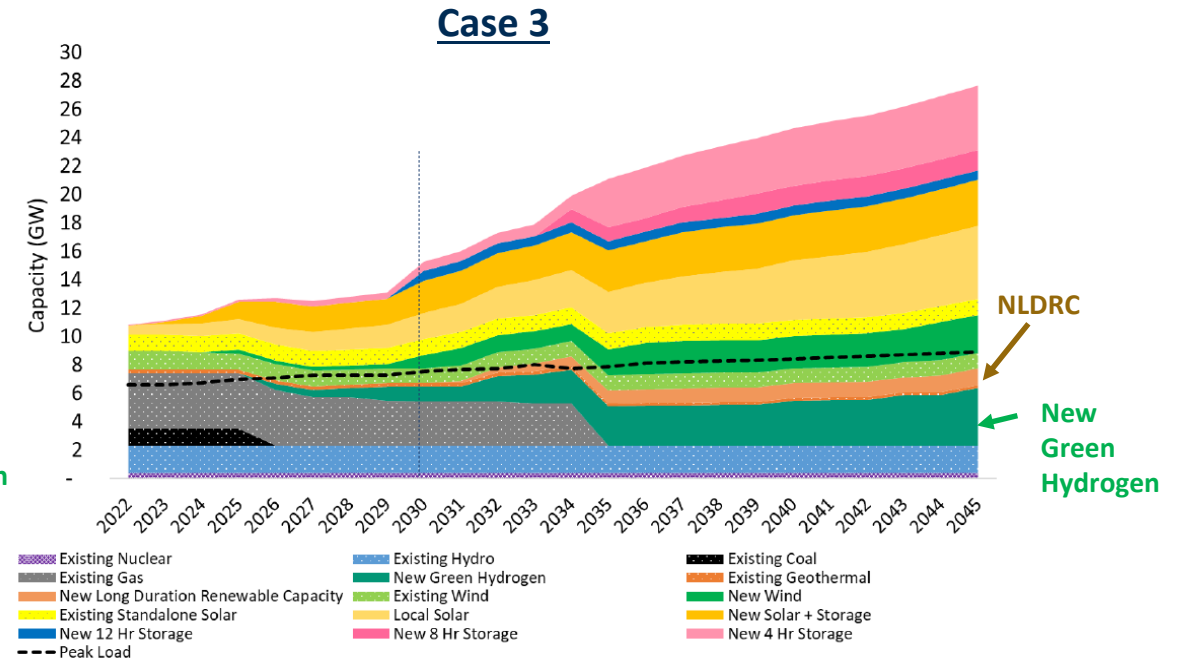
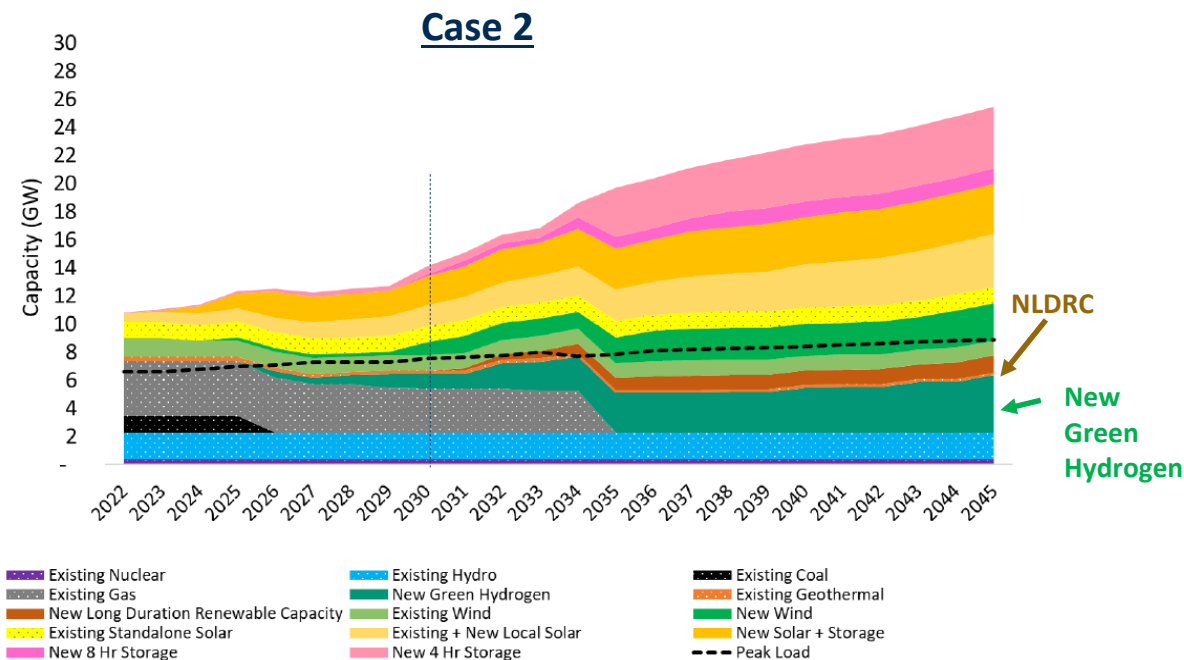
- 2045 capacity is ~18 GW for SB100 (~90% clean generation) and ~25 GW for Case 1 (100% clean generation). This suggests going from 90%\* to 100% clean energy generation requires ~7 GW of additional capacity (while maintain similar levels of “dispatchable” capacity).



# Resource Mix by Case: Case 2 and Case 3

Case 2 and Case 3 have similar buildouts as Case 1.

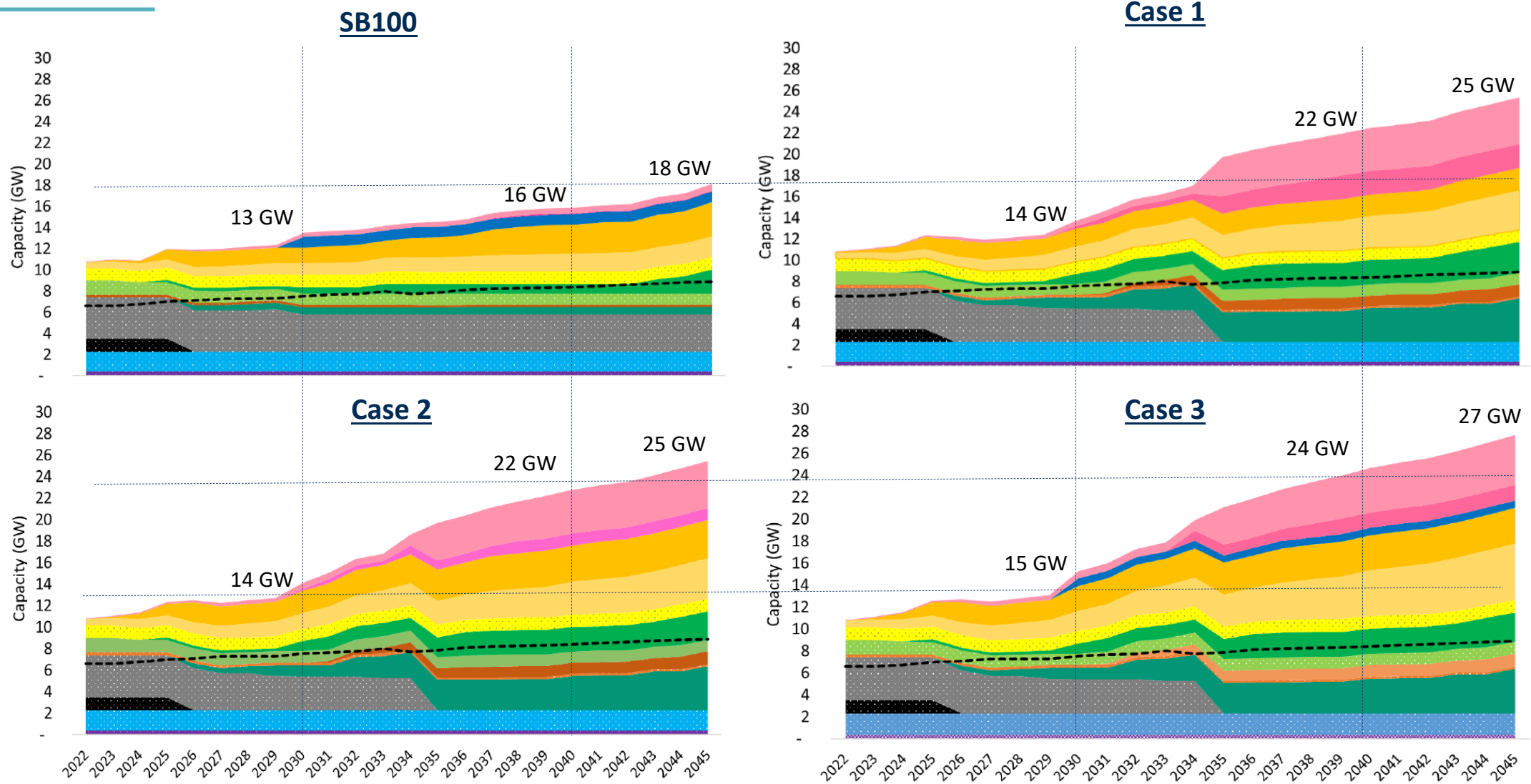
- Cases 1, 2, and 3 all include New Long Duration Renewable Capacity (NLDRC, a generic term that encompasses geothermal as well as other renewables that provide a greater effective load carrying capacity such as concentrating solar-thermal power with storage), indicated by **brown arrows** in figures below and previous slide, that does not appear in SB100.
- Cases 1, 2, and 3 also include **New Green Hydrogen** that effectively replaces existing fossil resources as dispatchable resources.



Source: 2022 Power Strategic Long-term Resource Plan (SLTRP).



# Resource Mix by Case: All Four Cases

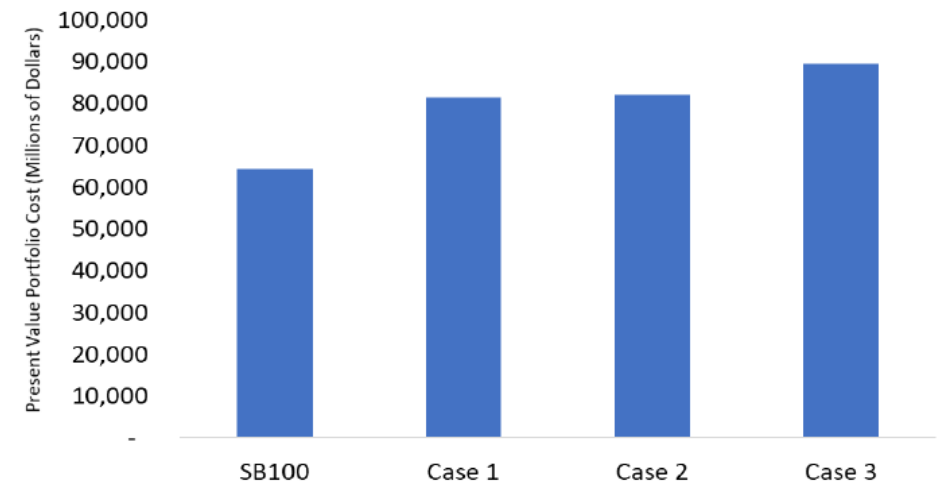


# LADWP Recommendation to Board (Case 1)

- 2022 SLTRP shows three pathways for LADWP to achieve 100% clean energy by 2035. LADWP recommended Case 1 to the Board.
  - Case 1 achieves 80% RPS by 2030 and 100% clean energy by 2035.
  - Case 1 builds over 15,500 MW of clean energy resources (12,823 MW of bulk and 2,694 MW of distributed resources). This indicates ~1,108 MW per year (on average), which is more than 5x of historically (2018-2021) observed build rate of ~200 MW a year.
  - LADWP recognizes the need for firm resources, while expects to minimize the usage of in-basin green hydrogen resources (such as for providing back-up power during contingencies).
  - The Net Present Value (NPV) of the estimated cost for Case 1 is \$80+ billion.\* (NPV for Case 2 is higher than Case 1, and NPV for Case 3 is higher than Case 2).
  - By comparison, the NPV estimated for SB 100 is \$60 billion.
  - \$80+ billion will trigger a rate increase of 7.7% annually (compound average rate increase from 2022 through 2035).
  - Estimated costs (and associated rate increase) will be even higher without successful electrification (transportation and buildings, see slides 15 and 17).

\* LADWP assumes a 5.5% discount rate.

## Net Present Value of Total Costs by SLTRP Scenario



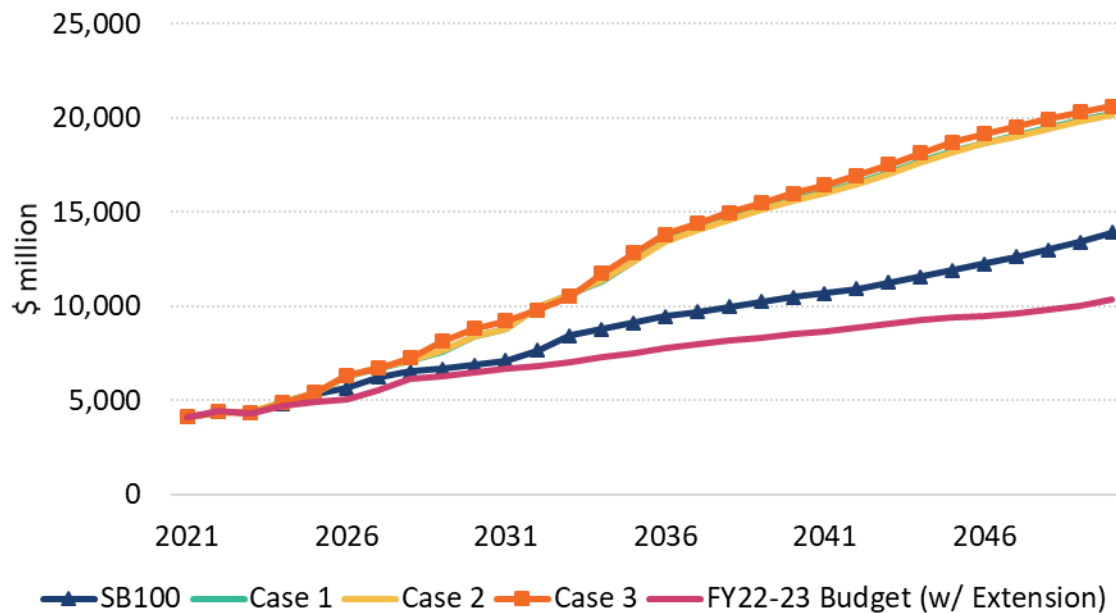
Source: 2022 Power Strategic Long-term Resource Plan (SLTRP).

# Revenue Requirements by Case

Comparing the revenue requirement between Cases:

- Case 3 has the highest revenue requirement while SB100 has the lowest.
- Cases 1 and 2 have similar levels of revenue requirements.
- Revenue requirement for Case 1 is ~1.4x of SB100 in 2035, ~1.5x in 2040, and ~1.3x in 2045.

**Revenue Requirements by Case (\$ Million)**



**Summary of Revenue Requirements by Year (\$ million)**

	2025	2030	2035	2040	2045
SB100	5,338	6,863	9,115	10,479	13,915
Case 1	5,394	8,363	12,418	15,677	18,234
Case 2	5,395	8,392	12,429	15,622	18,178
Case 3	5,415	8,793	12,804	15,983	18,695

**Difference between Case 1 and SB100**

	2025	2030	2035	2040	2045
Delta	56	1,500	3,303	5,198	4,319
Ratio*	1%	22%	36%	50%	31%

\* Ratio = Case 1/SB100 - 1.



# Rate Increase by Decade

Summary Review started with FSO's analysis of the SLTRP rate drivers.

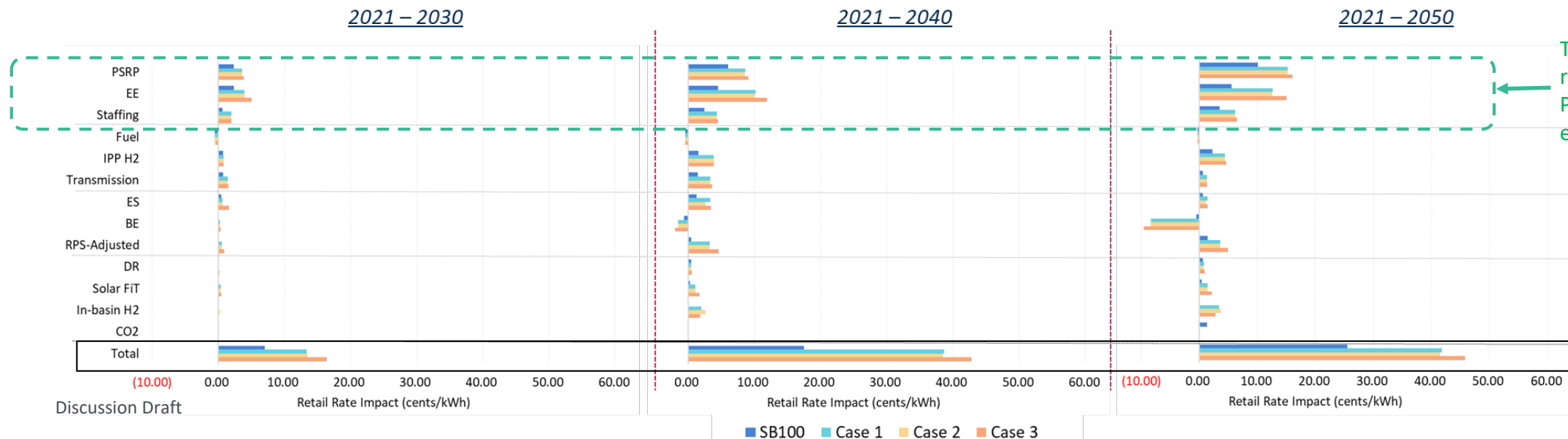
- SLTRP analyzed four future cases (SB100, Case 1, Case 2 and Case 3).
- FSO analyzed SLTRP's rate impacts by for each of the future cases through 2050 drivers (13 drivers identified, see table to the right).
- FSO's analysis shows rates could almost triple between 2021 and 2045 (from ~20 cents per kWh to ~66 cents per kWh).
- A 3% inflation alone would double the rate between 2021 and 2045 (from ~20 cents per kWh to ~40 cents per kWh).

## FSO Rate Drivers

### Driver Items as Described in FSO Analysis

Driver Items as Described in FSO Analysis	Abbreviation
PSRP > FY22-23 Budgeted Level	PSRP
Energy Efficiency	EE
Staffing Requirement	Staffing
Fuel Price Increase	Fuel
IPP hydrogen conversion	IPP H2
Transmission	Transmission
Energy Storage	ES
Building Electrification	BE
RPS (without hydrogen generation and without Energy Storage and with FiT)	RPS-Adjusted
Demand Response	DR
Solar Feed-in-Tariff	Solar FiT
In-basin hydrogen	In-basin H2
CO2 Expense beyond Allocation	CO2

## Summary of Rate Impact (2021 – 2050)



Top 3 are the same, regardless of the Cases. PSRP and Staffing are essential needs.

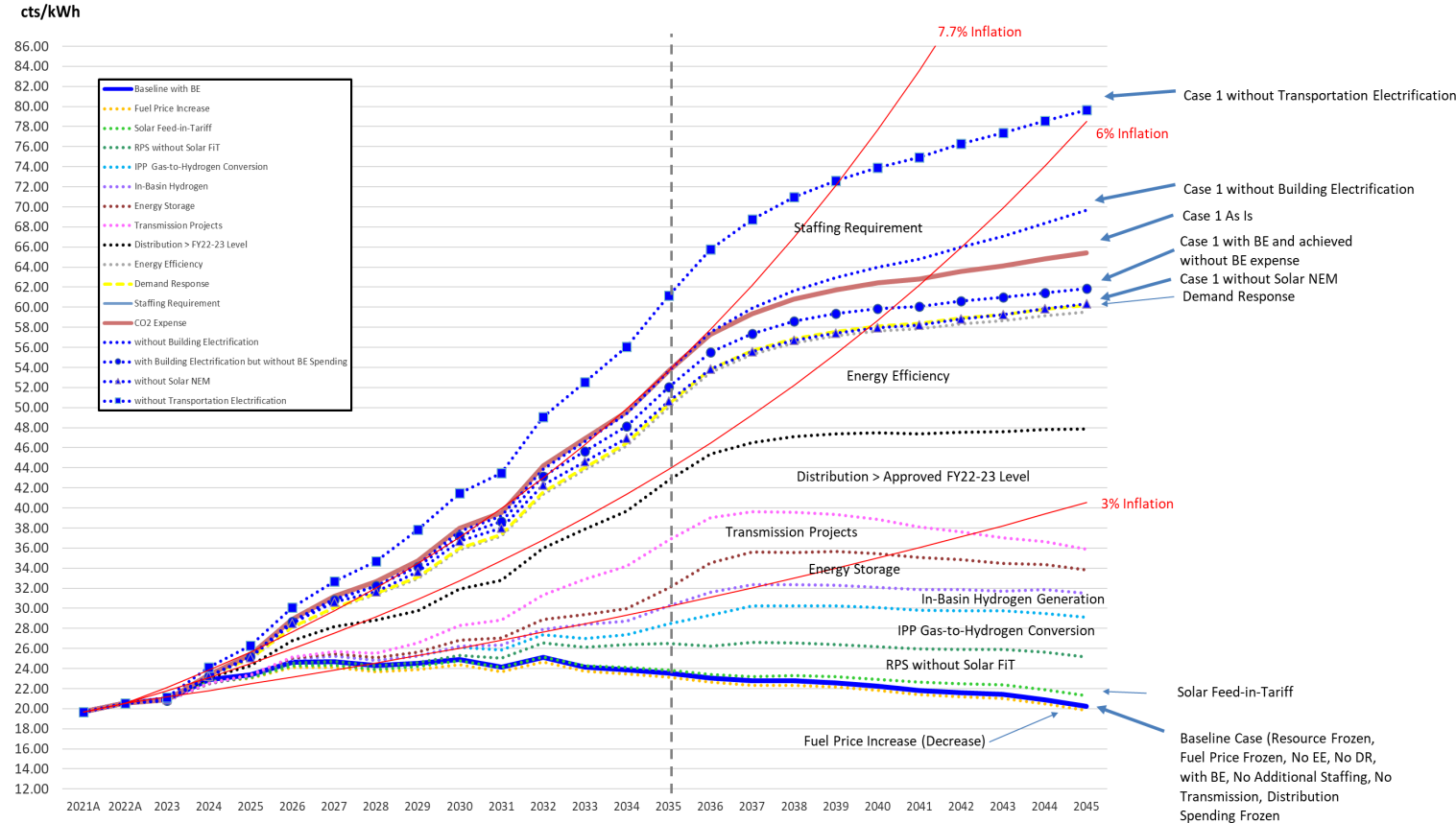
Addition to the current rate of ~20 cents/kWh

# Rate Increase (Case 1)

Brattle reviewed FSO's analysis of the SLTRP rate drivers.

- FSO analyzed SLTRP's rate impacts by drivers (13 rate drivers identified) through 2050.
- FSO's analysis shows rates could more than triple between 2021 and 2045 (from ~20 cents per kWh to ~66 cents per kWh).

## Major Program FSO Rate Drivers (Case 1)



13 rate drivers

### Average Rate Increase % (2022-2035, Compound)

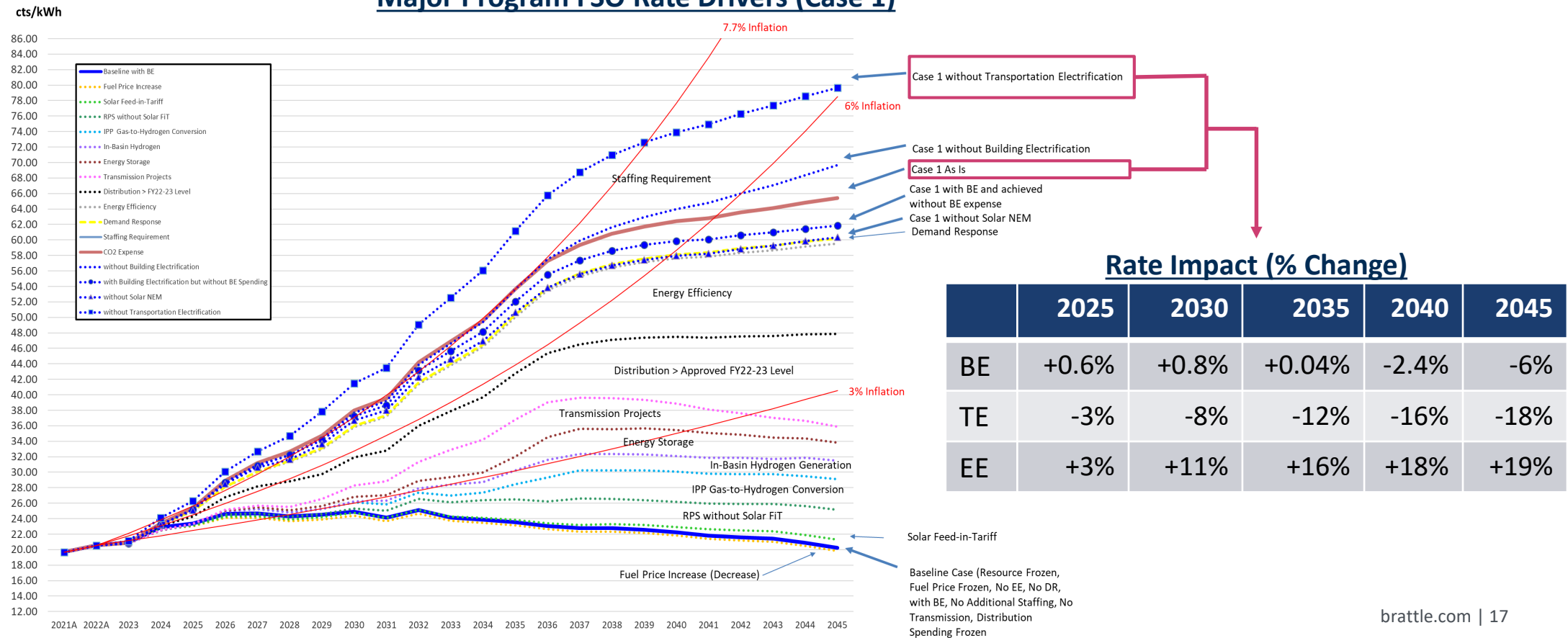
SB100	4.8%
Case 1	7.7%
Case 2	7.7%
Case 3	8.3%

# Impact of Load Electrification and Energy Efficiency

Brattle reviewed FSO's analysis of the SLTRP rate drivers.

- Electrification of transportation (TE) and buildings (BE) decreases rates (by increasing the divisor).
- EE increases rates (by reducing the divisor).

## Major Program FSO Rate Drivers (Case 1)



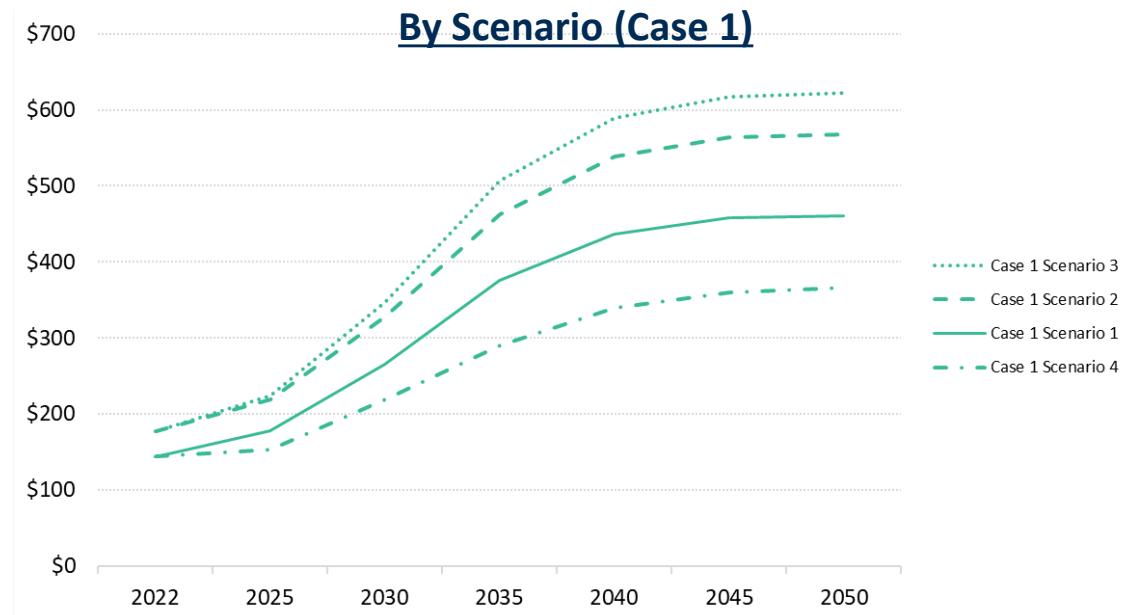
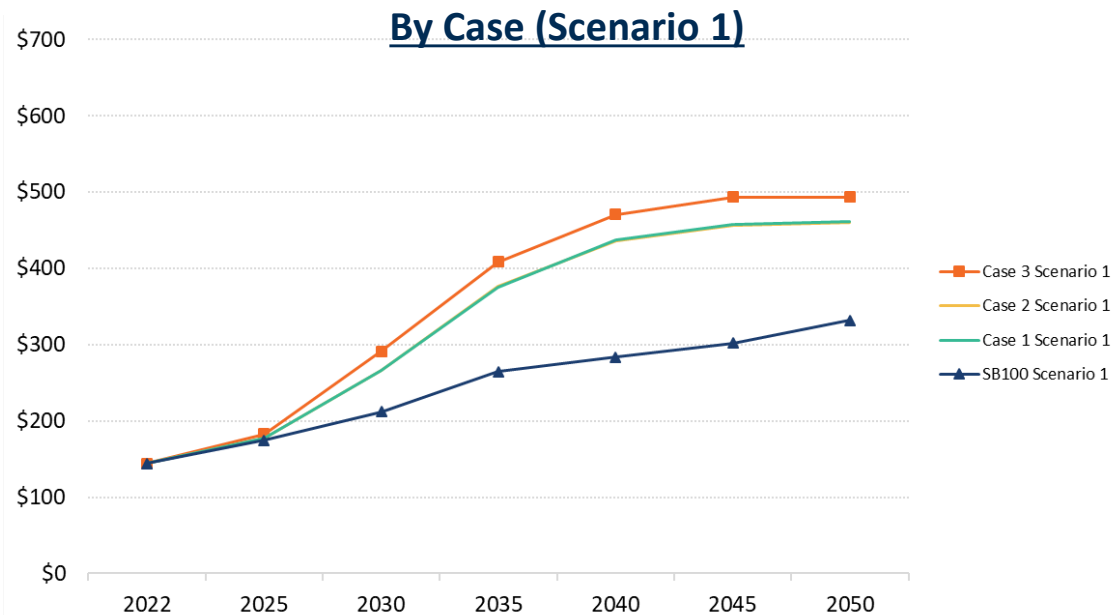


# Single Family Home - 1/2

Brattle developed four Scenarios per SLTRP Case for monthly bill impact analysis (see appendix).

- Within a Scenario (for all four Scenarios):
  - Case 3 leads to the highest bill while SB100 has the lowest.
  - Bills for Cases 1 and 2 are higher than SB100 by ~40% in 2035 and by over 50% in 2045.
- Within a Case (for all four Cases), Scenario 3 leads to the highest bill while Scenario 4 shows the lowest.

## Monthly Bill Estimates for Single Family Home Customers

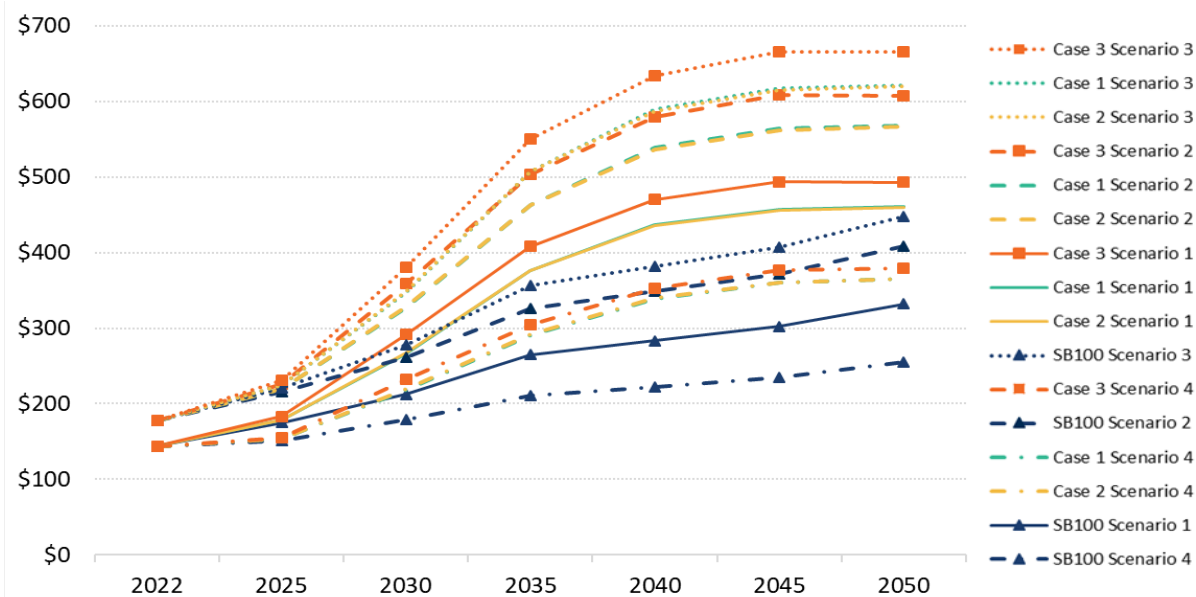


Notes: Single family home customers are assumed to consume 700 kWh per month.

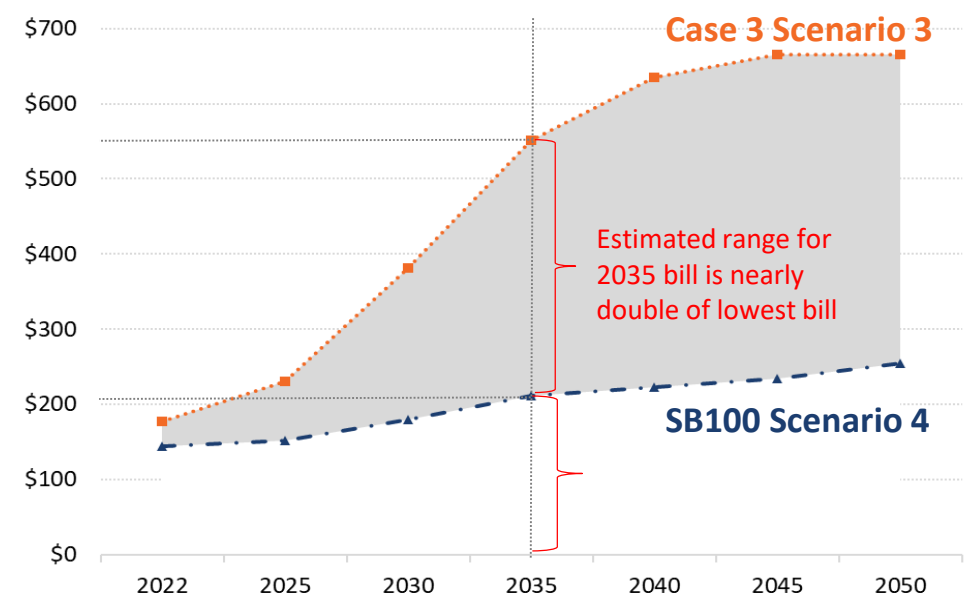
# Single Family Home - 2/2

- Monthly bills by Case and by Scenario have a wide uncertainty band.
  - Case 3 Scenario 3 leads to the highest bill while SB100 Scenario 4 has the lowest.
- The uncertainty band (grey area) is larger than the actual bill.

**Monthly Bill Estimates for Single Family Home Customers**  
**(All Scenarios and Cases)**



**Monthly Bill Estimates for Single Family Home Customers**  
**(Range)**



Notes: Single family home customers are assumed to consume 700 kWh per month.

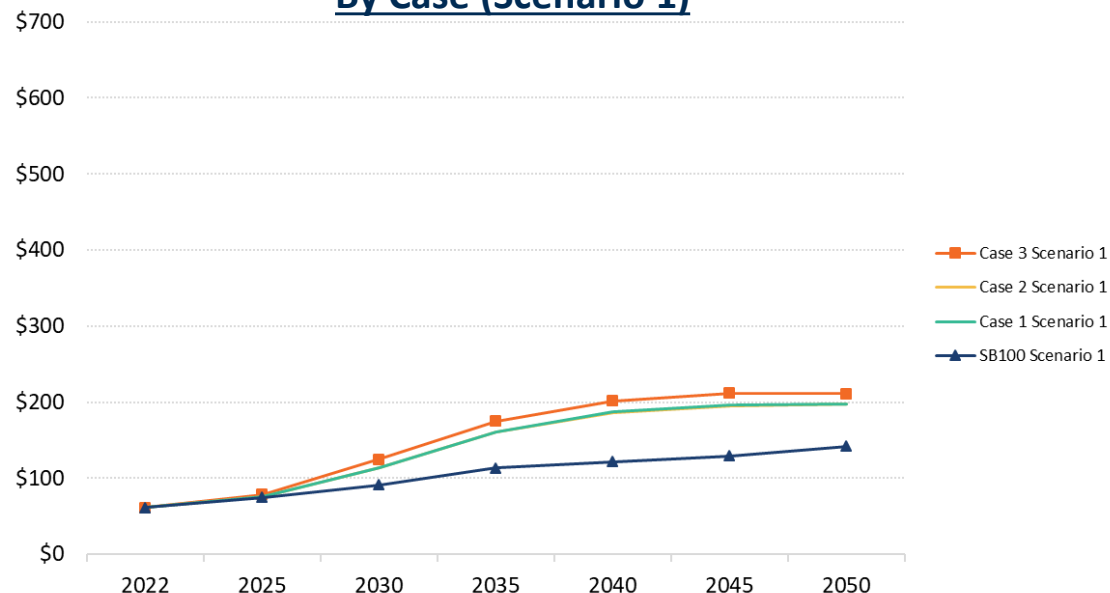
# Apartments - 1/2

Patterns observed for apartment customers are the same as those observed for single family home customers:

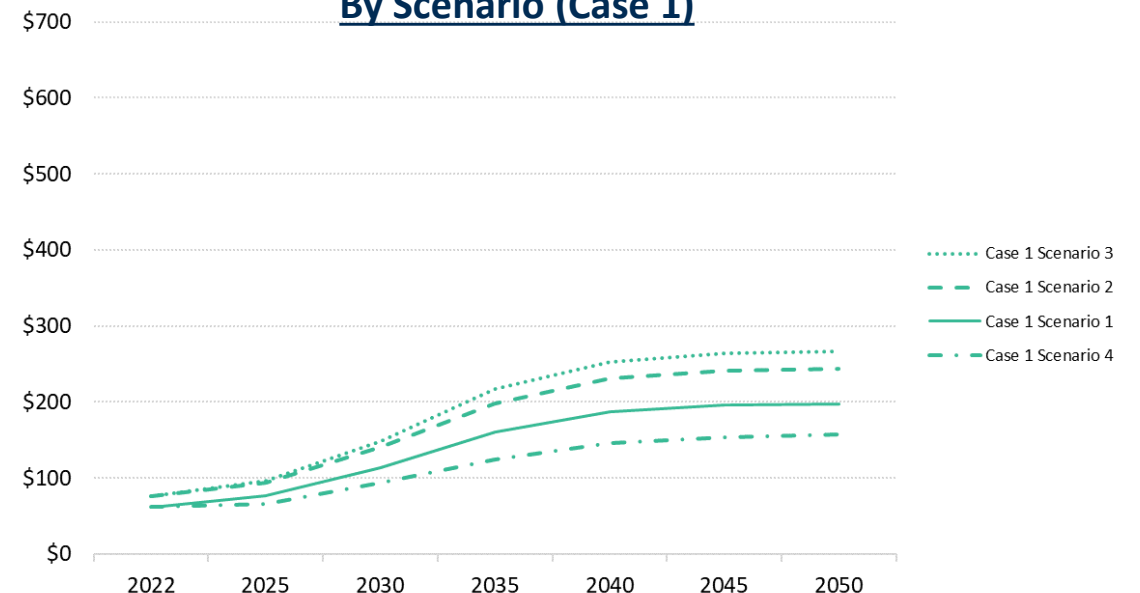
- Within a Scenario (for all four Scenarios):
  - Case 3 leads to the highest bill while SB100 has the lowest.
  - Case 1 bills are higher than SB100 bills by ~ 40% in 2035 and by over 50% in 2045.
- Within a Case (for all four Cases), Scenario 3 leads to the highest bill while Scenario 4 has the lowest.

## Monthly Bill Estimates for Apartment Customers

### By Case (Scenario 1)



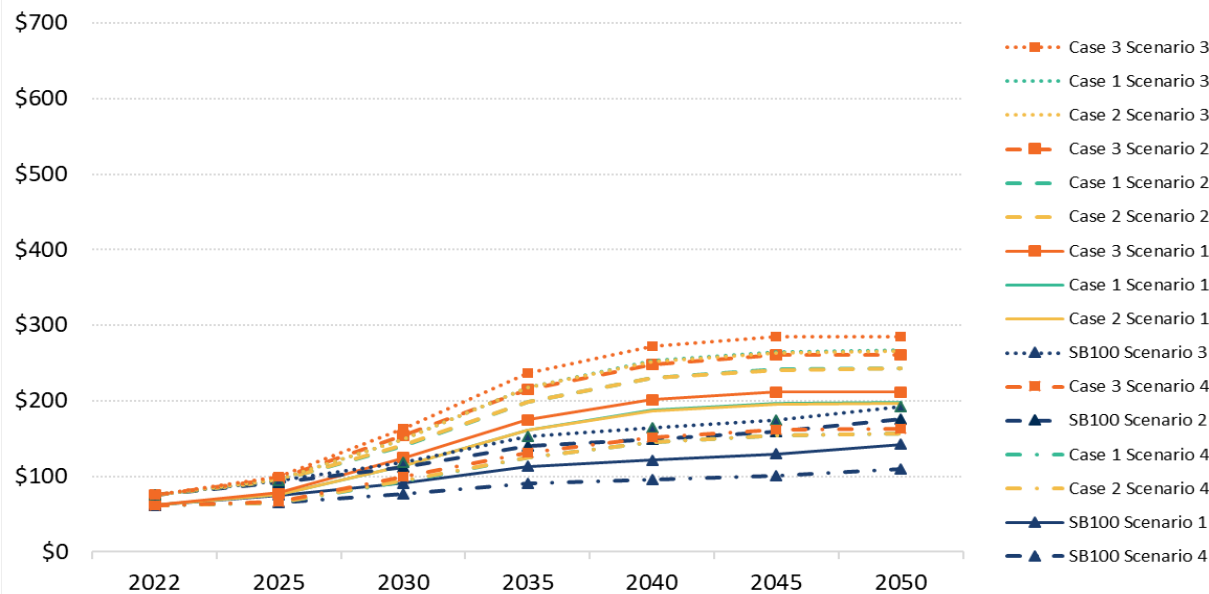
### By Scenario (Case 1)



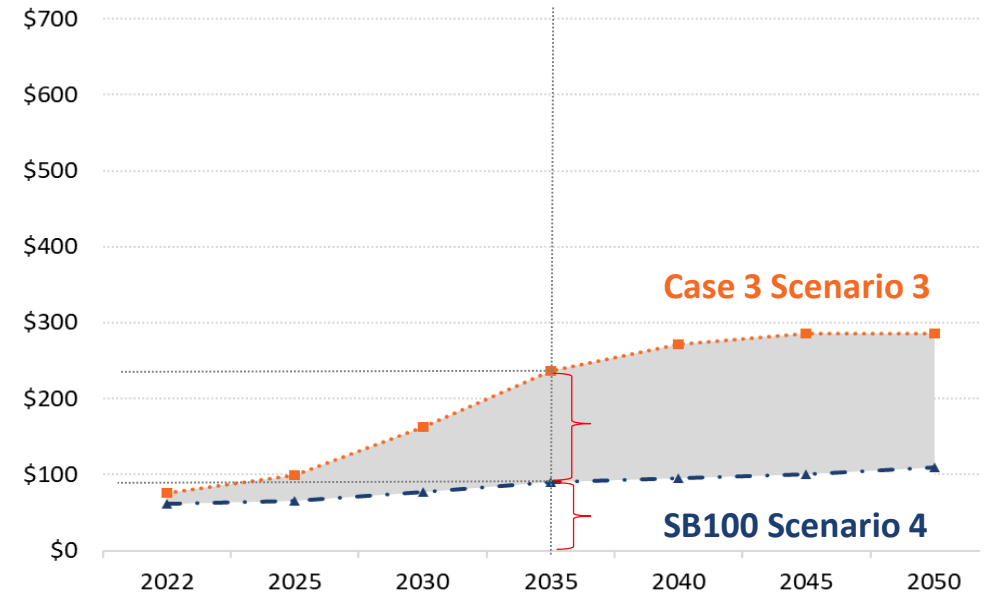
# Apartments - 2/2

- Monthly bill estimates for apartment customers are less than a half of that for single family home customers.
  - The observed trend (e.g., 2035 range is nearly double of the lowest bill estimates) is the same.

**Monthly Bill Estimates for Apartment Customers  
(All Scenarios and Cases)**



**Monthly Bill Estimates for Apartment Customers  
(Range)**



Notes: Apartment customers are assumed to consume 300 kWh per month.



# Summary of Bill Analysis

Bill impacts show a much larger range than the Cases and associated Rates by themselves do.

- Monthly bills are estimated for customers in single family homes (monthly consumption of 700 kWh) and apartments (monthly consumption of 300 kWh).
  - Four methods (referred to as Scenarios 1 through 4, see appendix) were applied for estimating bills.
- As total cost and rate estimates from SLTRP indicate, Case 3 shows the highest bill, and SB100 the lowest.
  - Estimated 2035 bill shows highest estimate to be ~3x of lowest estimate (i.e., estimated range is ~2x of lowest estimate).

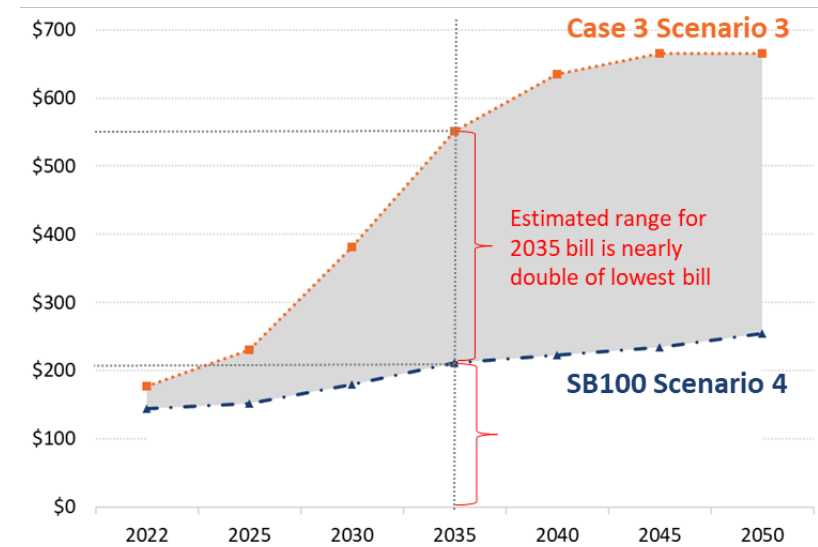
## Estimated Range for Monthly Bill (Single Family Home)

2035 Bill Range*	SB100	Cases 1 and 2	Case 3
Highest	\$350	\$500	\$550
Lowest	\$200	\$300	\$300

\*: Rounded to the nearest \$50.

- The bill difference between Case 1 (recommended case) and SB100 grows further (~40% in 2035 to over 50% in 2045).
  - The bill increase for SB100 from 2035 to 2045 is 14%.
  - The bill increase for Case 1 from 2035 to 2045 is 22%.

## Estimated Range for Monthly Bill (Single Family Home Customer)



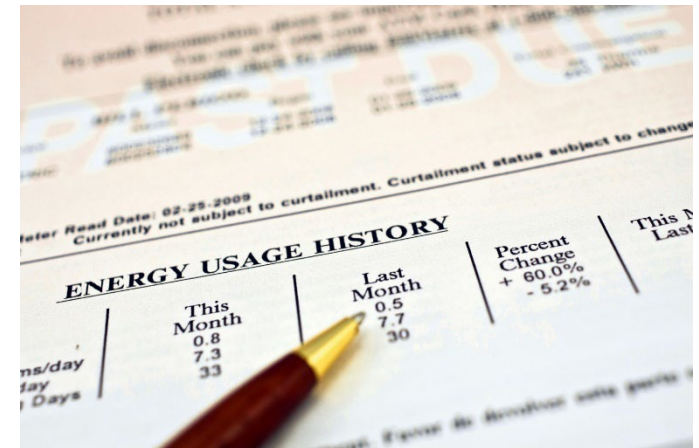
Notes: Single Family Home customers are assumed to consume 700 kWh per month.

# Price of Power

Price of power was the most common feedback topic from stakeholders.

- Estimated cost difference between Case 1 (recommended case) and SB100 are quite significant.
  - NPV of total cost for Case 1 (\$81.4 billion) is 30% higher than SB100 (\$60 billion) (see slide 12).
  - The difference of \$20+ billion is more than 4x of the LADWP Power System fiscal year budget (FY 2021-22 budget was \$4.9 million).
  - With ~1.6 million customers, the average burden per LADWP customer for this \$20 billion calculates to be \$12,500.
  - Average annual rate increase for Case 1 (7.7% per year) is 60% higher than SB100 (4.8% per year).
- Impact to customers' bills are equally significant (see slides 16 through 20).
  - LADWP estimates monthly bills for single family home customers increase by 82% (from the current \$144 to \$262) under SB100, by 162% (to \$373) under Case 1, and by 184% (to \$404) under Case 3.
  - Estimated monthly bills for apartment customers grows at the same rate from the current \$62 to \$112 under SB100, \$160 under Case 1, and \$173 under Case 3.

*The assumed cost and rate/bill impact may warrant further discussion.*

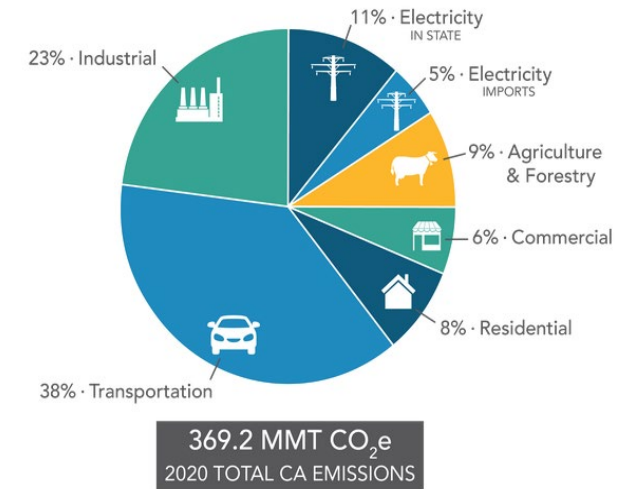


# Air Quality and GHG Emissions

Air quality and GHG emission reduction were key policies driving the SLTRP.

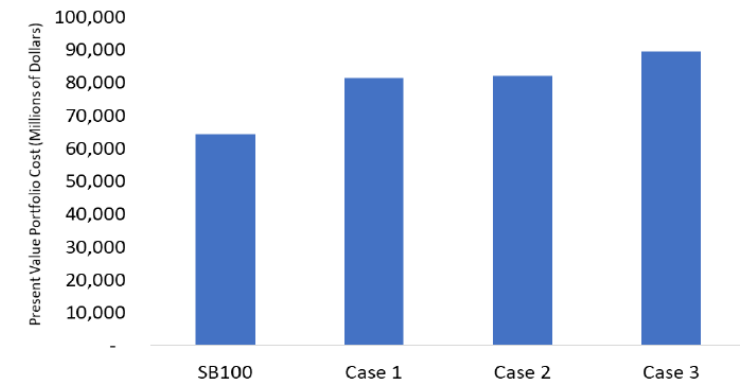
- The difference in greenhouse gas (GHG) emission between Case 1 and SB100 is 20% to 30% in 2035 and ~10% in 2045.
  - SB100 assumes 100% clean energy for retail sales (approximately 90% clean generation) by 2045 while achieving clean energy for retail sales 80% by 2035. Case 1 assumes 100% clean generation by 2035.
  - LADWP's GHG emissions for 2021 were approximately 7.0 million metric tons (MMT), which is less than 2% of the 2020 California economy-wide emission (~370 MMT).
  - 20% of the 7 MMT (1.4 MMT) is less than 0.4% of the 2020 California economy-wide emission (~370 MMT).
- The difference of Net Present Value (NPV) of the estimated cost between Case 1 (recommended case) and SB100 are quite significant.
  - Total cost for Case 1 (\$81.4 billion) is 30% higher than SB100 (\$60 billion).
- Is \$20+ billion dollars (in NPV) worth reducing the economy-wide GHG emission by 0.4%?
  - Are there alternative lower-cost options to reduce GHG emission from other sectors?

## California 2020 GHG Emission by Sector



Source: <https://ww2.arb.ca.gov/ghg-inventory-data>

## Net Present Value of Total Costs by SLTRP Case



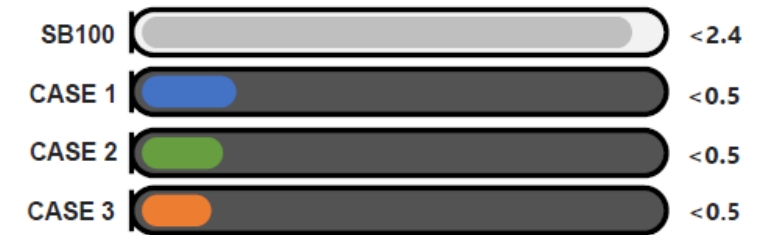
Source: 2022 Power Strategic Long-term Resource Plan (SLTRP).

# Reliability (LOLH)

Reliability & Resiliency is one of the three guiding principles for the SLTRP (in addition to Environmental Benefits & Equity, and Affordability & Rate).

- LADWP uses Loss of Load Hour (LOLH, when generation cannot meet demand) as a measure of reliability.
  - The industry standard is at or below 2.4 LOLH per year. SB100 is at that level.
  - LADWP's current LOLH is about 0.22.
  - Cases 1, 2, and 3 show high reliability levels of LOLH below 0.5.
- LOLH typically looks at the bulk power system and not the distribution network.
  - Distribution networks are typically responsible for 90% or more of service interruptions. In other words, failure on the bulk power system contributes to less than 10% of all service interruptions.
  - LADWP's System Average Interruption Duration Index (SAIDI) shows the average outage duration in minutes per customer during a year to be 139 minutes (or ~2.3 hours). Comparing this to LADWP's LOLH of 0.22 indicates that failure in the bulk system is only responsible for less than 10% of all service interruptions.
- Improving the LOLH from 2.4 hours to 0.5 hours will only reduce system disturbance by ~8%.
  - Is \$20+ billion dollars (in NPV), or the associated rate increase, worth this reduction (improvement in reliability), even after accounting for the environmental benefits (see previous slide)?

## LOLH by SLTRP Case



## RESOURCE ADEQUACY

LOSS OF LOAD HOURS (LOLH)  
LOWER VALUE IS BETTER

Source: 2022 SLTRP Board Presentation Final 09-26-22



# Alternative Technology Options

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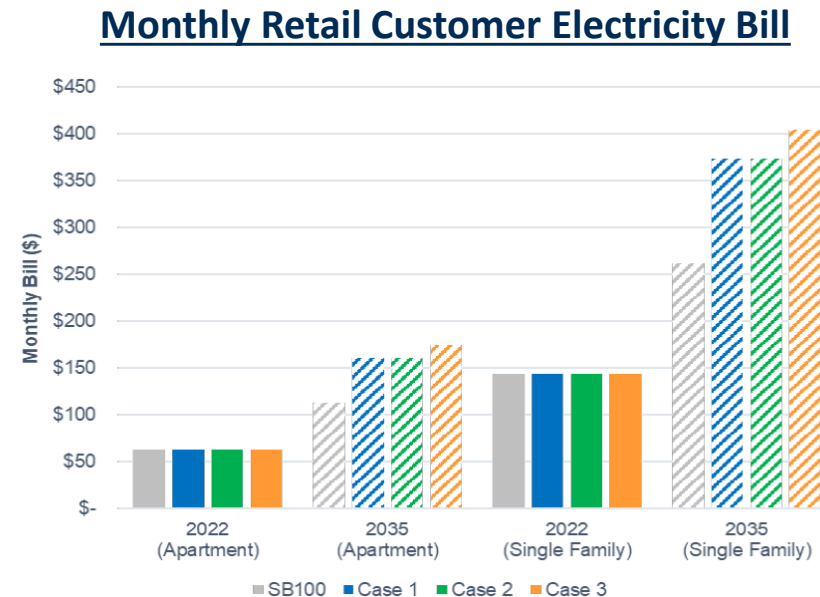
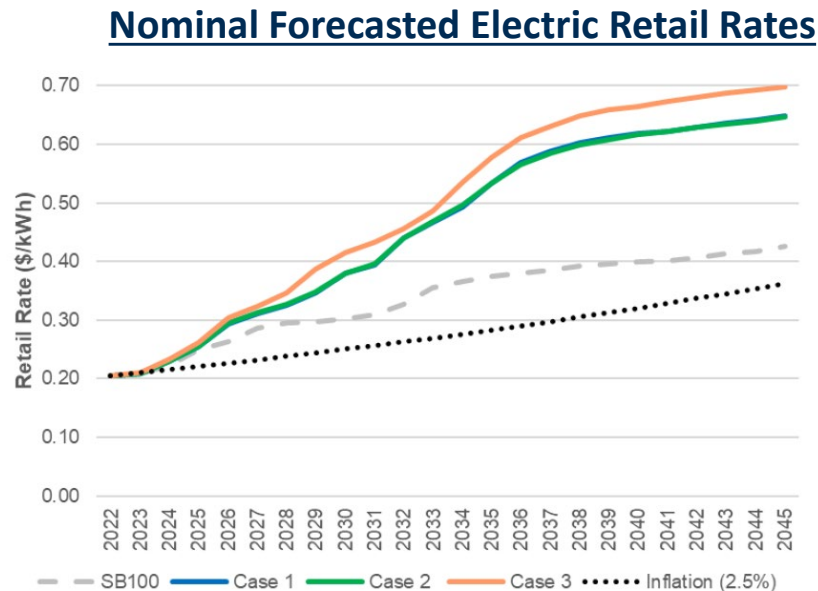
Are there alternative options to balance the three guiding principles?

- Cases 1, 2, and 3 (but not SB100) include **New Green Hydrogen** plants that effectively replace existing fossil resources (largely replacing existing in-basin thermal power plants) as dispatchable resources.
  - SLTRP assumes (with transmission upgrade in place) in-basin green hydrogen to operate at low capacity factors, averaging <2%.
  - SLTRP assumes these green hydrogen turbines to serve as backup resources to maintain reliability during periods of low renewable energy output, and to bolster grid resiliency to ride through and recover from grid outages that can be caused by extreme events such as wildfires, earthquakes, heatwaves, and other types of unplanned events.
  - Conversely, if the transmission upgrade is not completed, SLTRP assumes LADWP must rely on in-basin hydrogen resources to replace the lost energy, with a capacity factor averaging approximately 18% between 2028 and 2045.
- Can Reciprocal Internal Combustion Engines (RICE) be considered as an alternative option?
  - Both gas turbines (GTs) and RICE can accommodate multiple fuel types, including natural gas, fuel oil, and hydrogen (currently being developed for both types).
  - Heat rates and emission rates are comparable between the two technologies.
  - Both technologies provide flexibility with fast responses and wide operating ranges (some RICE more than GTs).
  - Compared to GTs, RICE have lower start-up costs and lower water consumption.
  - RICE come in 10 MW - 20 MW size, and can be built incrementally as needed, easing financial commitment and locational flexibility. The portability of RICE units (can be moved around on a trailer, if needed) also provides locational flexibility.
  - GTs command replacements of hot gas path components (e.g., turbine blades) after several years of operations. RICE do not.

# Four Approaches (Scenarios) for Bill Analysis

Brattle developed four Scenarios per SLTRP case for monthly bill impact analysis:

- Scenario 1: Average System Rates as reported in SLTRP (see slide 12 for Revenue Requirements).
- Scenario 2: Residential Rates (R1A) assuming 45% allocation of Revenue Requirements (same as Scenario 1) to residential customers, and fixed share of retail sales (residential customers' share assumed 37% of all loads for all years).
- Scenario 3: Residential Rates (R1A) assuming 45% allocation of Revenue Requirements (same as Scenario 1) to residential customers, and varying share of retail sales (37% in 2022 to 33% in 2050).
- Scenario 4: Average System Rates Adjusted for Load Sensitivity (including modified Revenue Requirements).

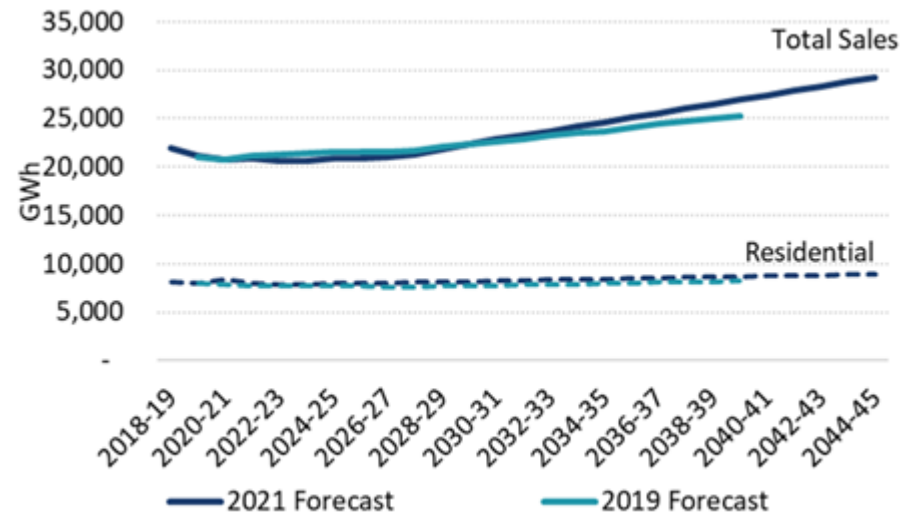


# Need for More Frequent Cost of Service Studies

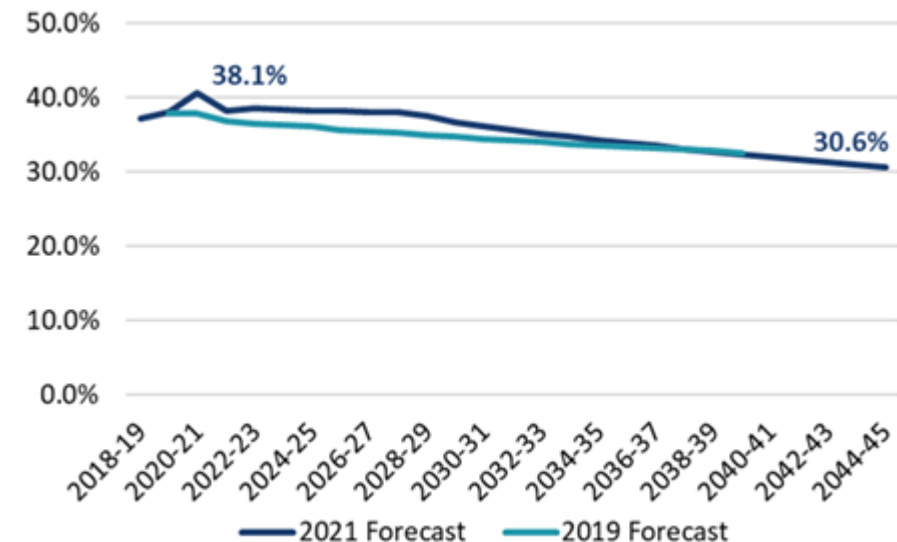
Brattle developed four Scenarios per SLTRP case for monthly bill impact analysis:

- The Scenarios differ by how total costs (revenue requirements) were allocated to residential customers.
  - The current allocation assumes 45% of total costs to be spread among residential customers.
  - Residential customers are about 37% of all loads today. Ideally, the allocation value would roughly equal the share of load.
  - LADWP projects total sales to grow at a higher pace than residential sales (partially due to electrification), indicating the difference between the two values would grow. This suggests a need for a more frequent adjustments of the allocation (derived through cost of service studies).

## Residential and Total Sales Projections



## Residential Sales Share Projections



# Clarity in the face of complexity

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Discussion Draft

