

2023 RPU Electric Integrated Resource Plan

IRP: Document Overview & Structure

- Chapter 1: Introduction
- Chapter 2: RPU System Load & Peak Demand Forecasts
- Chapter 3: RPU Generation & Transmission Resources
- Chapter 4: RPU Existing Electric System
- Chapter 5: Important Legislative & Regulatory Mandates & CAISO Initiatives
- Chapter 6: Demand Side Management: Energy Efficiency, Fuel Substitution, and DR Resources
- Chapter 7: Market Fundamentals
- Chapter 8: Intermediate Term (Five-Year Forward) Power Resource Forecasts
- Chapter 9: GHG Emission Targets & Forecasts
- Chapter 10: Future Resource Adequacy Capacity Needs
- Chapter 11: Modeling Assumptions for Current and Future Generation Resources
- Chapter 12: Long Term Portfolio Analyses
- Chapter 13: Distribution System Studies of Distributed Energy Resource Impacts
- Chapter 14: Evaluating the Impact of Increasing Energy Efficiency Program Targets
- Chapter 15: Retail Rate Design
- Chapter 16: Transportation Electrification
- Chapter 17: Minimizing Localized Air Pollutants and Greenhouse Gas Emissions in Disadvantaged Communities
- Chapter 18: Potential Future Studies
- Chapter 19: Conclusion

This 2023 IRP will be used to help guide our future decision-making process as RPU plans to meet its forecasted annual peak and energy demand while systematically reducing its GHG emissions, using a combination of current and new supply-side and demand-side resources.

Senate Bill 350 requires that POU's develop IRPs to achieve their share of the electric sector's GHG emissions reduction target. IRPs must be updated, approved, and adopted on at least a 5-year cycle.

IRPs must address multiple topics specified in the CEC's POU IRP Submission and Review Guidelines

- a) Demand (Load) Forecasts
- b) Energy Efficiency & Demand Side Management Programs
- c) Future Resource Procurement Plans (including future Capacity requirements)
- d) Current & Future Greenhouse Gas Emissions
- e) Distributed Energy Resources (including DER Impacts on the Distribution System)
- f) Transportation Electrification
- g) Retail Rates
- h) Localized Air Pollutants and Disadvantaged Communities

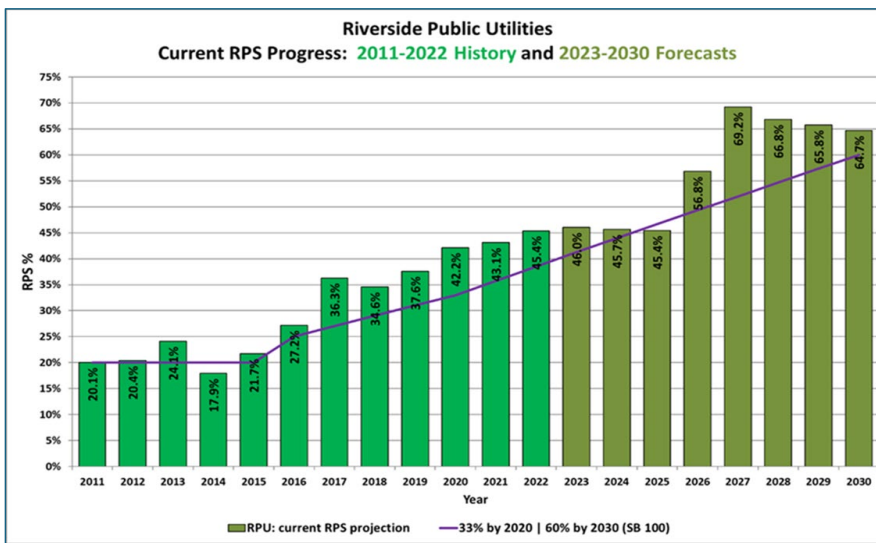
RPU: Current Portfolio of Resources

Resources	Name Plate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Renewable																					
Solar																					
AP North Lake	20																				
Summer	10																				
Antelope Big Sky Ranch	10																				
Tequesquite	7.3																				
Kingbird B	14																				
Antelope DSR	25																				
Columbia II	11																				
Geothermal																					
CalEnergy	86																				
Coso	10/30																				
Wind																					
Cabazon	25																				
Wintec	1.3																				
WKN	6																				
Pattern/SunZia	125																				
Emission Free																					
Large Hydro & Nuclear																					
Hoover Dam	18-28																				
Palo Verde Nuclear	12																				
Conventional																					
Coal																					
Intermountain (IPP)	136																				
Natural Gas																					
Clearwater	28.5																				
RERC 1-4	194																				
Springs	36																				
IPP CCNG	64																				

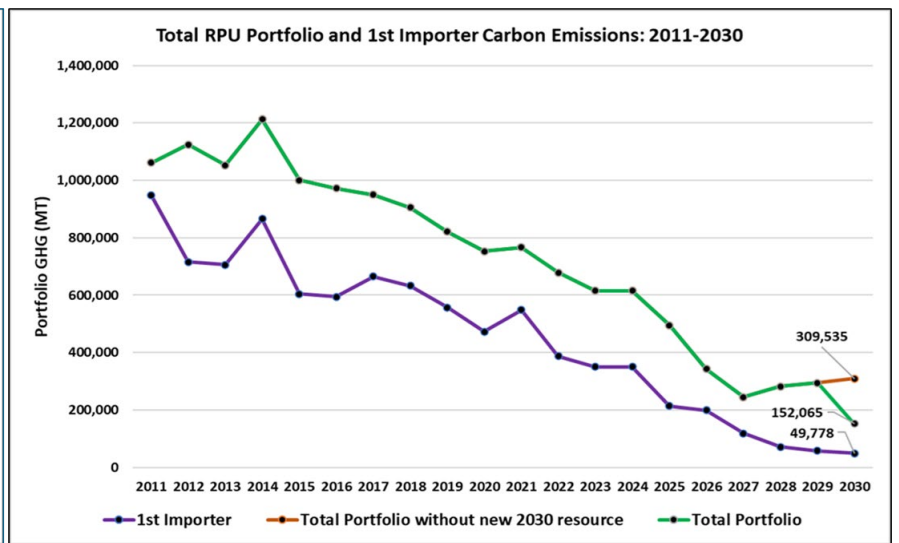
- 7 Solar PV projects
- 2 Geothermal portfolios
- 4 Wind projects
- Hoover Dam
- Palo Verde Nuclear
- IPP Coal (ends in 2025)
- IPP CCNG (ends in 2027)
- RERC Internal Gen
- Springs Internal Gen
- Clearwater Cogen

■ renewable asset ■ contract extension expected
■ conventional asset ■ contract either extended or replaced using same technology
■ emission-free conventional asset

RPS Progress (existing resources only)



GHG Progress (with & without one new Renewable resource)



RPU can meet current RPS requirements through 2030 with its current portfolio of renewable resources.

GHG Planning Target	Description	MT CO ₂ -e Emission Value
38 MMT Sector Goal	Official RPU target	349,000
30 MMT Sector Goal	More aggressive GHG reduction scenario	275,000

Plausible Carbon-free Future Energy Procurement Strategy

New Renewable/Carbon-free Resources	COD	Annual MWh
1a. 50 MW Baseload Geothermal Resource (84% CF)	2030	367,920
1b. 120 MW Solar PV (35% CF) + 50 MW / 200 MWh BESS	2030	367,920
2. Baseload Resource Tranche (90% CF)		
• 50 MW	2034	394,200
• 60 MW	2038	473,040
• 20 MW	2043	157,680
3. 75 MW Solar PV (35% CF)	2037	229,950
4. 75 MW Solar PV (35% CF)	2041	229,950

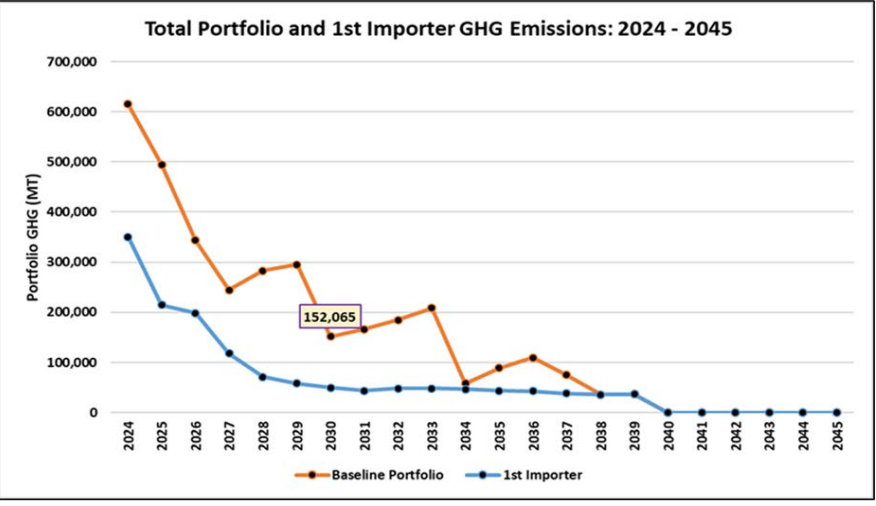
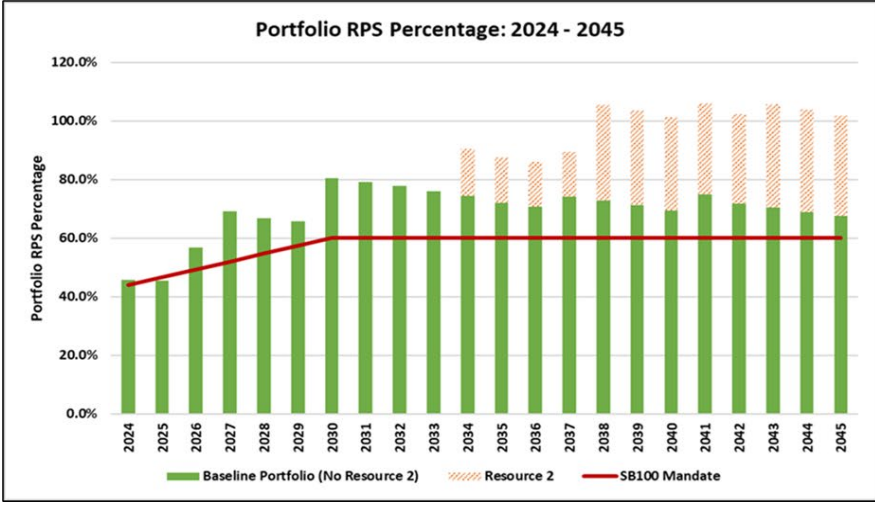
Proposed new renewable/carbon-free resource contracts for 2030-2045.

Resource 1a & 1b were analyzed/compared to determine which would be the most cost effective for RPU's portfolio.

Springs & RERC: Future BES Replacement Strategy

New Resource	Resource Description	COD
Springs 4-hr BESS I	18 MW / 72 MWh BESS	2028
Springs 4-hr BESS II	18 MW / 72 MWh BESS	2030
RERC 4-hr BESS	100 MW / 400 MWh BESS	2035 or 2040
RERC 6-hr BESS	100 MW / 600 MWh BESS	2035 or 2040

Another replacement option studied for RERC has it switching to run on biogas starting January 1, 2035, through its assumed retirement on December 31, 2039.



Under either Baseline (1a or 1b) Portfolio, RPU exceeds a 60% RPS through 2045 even if the Baseload Tranche (Resource 2) is carbon-free but not renewable.
 Under either Baseline (1a or 1b) Portfolio, RPU achieves a carbon free portfolio by 2040 and maintains it through 2045.

Key Findings: Long-term Study Results

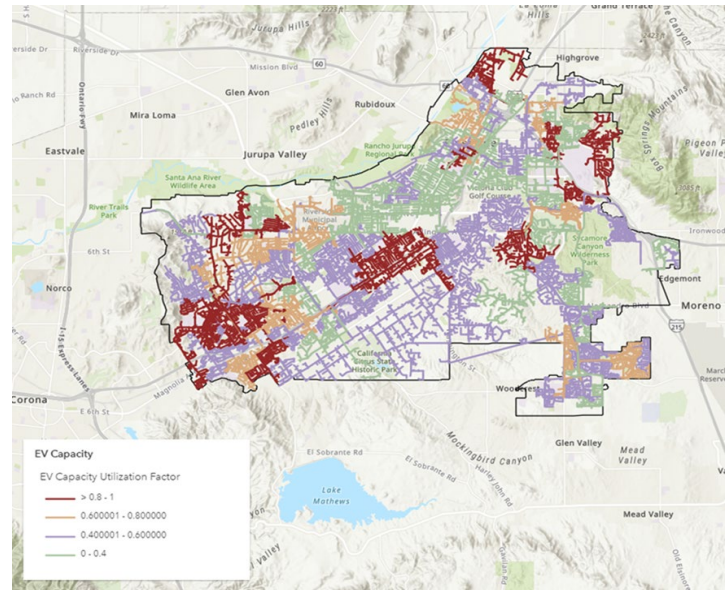
- § Geothermal vs Solar PV + Battery Energy Storage (BES): preference will depend on PPA price points – and possibly also BES MW capacity level.
- § Under mid-point pricing assumptions for all new resources, power supply costs increase by ~2% annually (through 2045).
- § Proposed resource portfolio satisfies all CA RPS mandates & CA/Riverside GHG targets; carbon-free portfolio achieved by 2040.
- § Springs units should be replaced with BES as soon as generation units reach end-of-life.
- § RERC units should also be replaced with BES when generation units reach end-of-life. However, all early (2035) replacement options result in higher power supply costs.
- § Future portfolio costs will be sensitive to new resource price points, regardless of the underlying technology.

DER Impacts: Summary Results

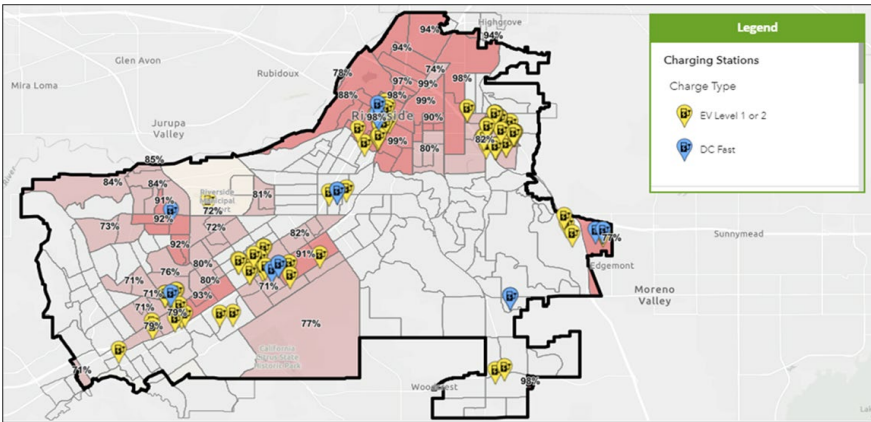
Staff simulated additional PV, EV, FS units required to reach existing distribution system capacity limits.

Results suggest RPU can likely accommodate substantial additions of these resources on most of its distribution grid. However, some circuits are already near their limits.

PV, EV, FS Metric of Interest	kW AC	Sum.MW (100%)	Additional Units at 100% Saturation	Sum.MW (50%)	Additional Units at 50% Saturation
Small Res PV System	5.00	142.51	28,502	71.26	14,251
Large Res PV System	8.00	142.51	17,814	71.26	8,907
Comm PV System	100.00	142.51	1,425	71.26	713
Level 1 EV Charger	1.90	374.31	197,005	187.16	98,503
Level 2 EV Charger	11.50	374.31	32,549	187.16	16,274
Heat Pump	9.60	345.37	35,976	172.69	17,988
Oven	3.30	345.37	104,658	172.69	52,329
Dryer	6.10	345.37	56,618	172.69	28,309
Water Heater	4.50	345.37	76,749	172.69	38,374
Whole House	23.50	345.37	14,697	172.69	7,348

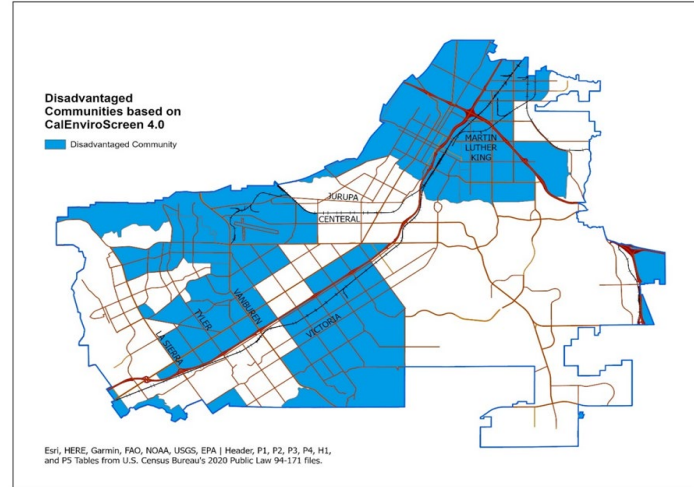


EV Charging Infrastructure



As of Jan 1, 2024, there are approximately 223 Level 2 public chargers, and 59 DC Fast Chargers (40 of which are Tesla) installed in Riverside.

Disadvantaged Communities



Potential Future Studies

The role of future generation technologies in RPU's resource planning efforts (e.g., the need to study and identify viable resources to satisfy the baseload carbon-free energy needs in 2034 and beyond).

Potential future DR and/or EE/DSM efforts (e.g., the need to study and identify savings potential with novel EE, DSM, and DER programs – especially programs that can reduce our peak summer loads).

Improved methodologies for performing more comprehensive distribution system ICA studies (e.g., the need to build on our ICA to enhance our distribution planning efforts).

The value and benefits of a more comprehensive and integrated future TE planning effort (e.g., the need to develop a comprehensive EV Transportation enhancement plan).

Envision Riverside 2025: Strategic Plan Alignment

Goal 4.1: Rapidly decrease Riverside's carbon footprint by acting urgently to reach a zero-carbon electric grid with the goal of reaching 100% zero-carbon electricity production by 2040 while continuing to ensure safe, reliable, and affordable energy for all residents.

Goal 4.6: Implement the requisite measures to achieve citywide carbon neutrality no later than 2040.

Cross-Cutting Threads

 Community Trust

 Fiscal Responsibility

 Sustainability & Resiliency

 Equity

 Innovation