2018 INTEGRATED RESOURCE PLAN

Riverside Public Utilities

City Council
December 11, 2018

WHAT IS AN INTEGRATED RESOURCE PLAN (IRP)?

An IRP is used to help guide our decision making process as RPU plans to meet its forecasted annual peak and energy demand while reducing its GHG emissions, using a combination of current and new supply-side and demand-side resources over a 20-year forecast period into the future.

A well developed IRP will:

1. Analyze and evaluate both supply-side and demand-side resources
2. Identify "least-cost, least-risk" solution(s) for meeting future load serving needs
3. Propose environmentally sound and financially sustainable procurement strategies

SB 350 IRP MANDATE

1. Requires that POUs develop IRPs to achieve their share of the electric sector's GHG emissions reduction target. IRPs must be approved/adopted by Jan 1, 2019.
2. IRPs must address all topics specified in the CEC's POU IRP Submission and Review Guidelines
   a) Demand (Load) Forecast
   b) Resource Procurement Plan
   c) System and Local Reliability
   d) Greenhouse Gas Emissions
   e) Retail Rates
   f) Transportation Electrification
   g) Transmission and Distribution Systems
   h) Localized Air Pollutants and Disadvantaged Communities
   i) Energy Efficiency / Energy Storage / Demand Side Management
3. IRPs must be submitted to the CEC for review and compliance by April 1, 2019.

IRP: DOCUMENT OVERVIEW & ORGANIZATION

Ch. 1: Introduction
Ch. 2: RPU System Load & Peak Demand Forecasts
Ch. 3: RPU Generation & Transmission Resources
Ch. 4: RPU Existing Electric System
Ch. 5: Important Legislative & Regulatory Mandates & CAISO Initiatives
Ch. 6: Demand Side Management & Energy Efficiency
Ch. 7: Market Fundamentals
Ch. 8: Intermediate Term (Five-Year Forward) Power Resource Forecasts
Ch. 9: GHG Emission Targets & Forecasts
Ch. 10: Future Assumptions about Current Generation Assets
Ch. 11: Future Resource Adequacy Capacity Needs
Ch. 12: Future Low-carbon and Carbon-free Energy Procurement Strategy
Ch. 13: Long Term (Twenty Year Forward) Portfolio Analyses
Ch. 14: Evaluating the Impact of Increasing Energy Efficiency Program Targets
Ch. 15: Energy Storage
Ch. 16: Retail Rate Design
Ch. 17: Transportation Electrification
Ch. 18: Long Term Impacts of Customer DER Penetration
Ch. 19: RPU Engagement with Disadvantaged Communities
Ch. 20: Conclusion

1. 20 Chapters, 5 Appendices, ~ 360 pages
2. Responsive to all CEC requirements
3. Produced internally by Planning & Analytics staff
4. Incorporates special supporting studies by Ascend Analytics and NewGen Strategies & Solutions

2018 IRP: PRIMARY GOALS

1. Provide background material/overview (Chs 2-4)
   a) 20-year forward energy & peak demand forecasts
   b) Current generation and transmission resources, & distribution electric system
2. Discuss critical legislative/regulatory mandates & CAISO stakeholder initiatives (Ch 5)
   a) CEC, CARB, EPA, SCAQMD
   b) CAISO initiatives
3. Summarize and assess current EE/DSM programs (Ch 6 and Ch 14)
4. Quantify 5 year intermediate-term power resource forecasts (Ch 8)
   a) Projected capacity and RA needs
   b) Renewable energy and RPS mandates
   c) GHG goals and mandates
   d) Cash-flow at risk metrics (hedging assessment)
   e) Power resource budget forecasts

2018 IRP PURPOSE & GOALS (CONT.)

5. Quantify 20 year long-term forecast (issues, decisions & impacts: Ch 7 and Chs 9-13)
   a) Projected load growth impacts and forward market prices
   b) Projected load-normalized Cost-of-Service (COS_{LN}) impacts for future, low-carbon scenarios
   c) Critical long-term budgetary issues for preferred scenarios
   d) Potential IPP replacement options
6. Assess various issues and impacts of emerging technologies (Chs 15-19)
   a) Energy Storage applications
   b) RPU Rate Plan / Utility 2.0
   c) Transportation Electrification
   d) Customer DER penetration
   e) Disadvantaged Communities

KEY FINDINGS: NEAR-TERM, 5-YEAR FORWARD FORECASTS

1. On target to comfortably exceed all minimum RPS mandates
2. Capacity & RA needs are manageable (provided no significant changes in CAISO rules)
3. ~90% of load is naturally hedged via long-term contracts
4. Open energy positions (~ 6.5 M$ annually) can be effectively hedged and managed, Cost-at-Risk (CAR) is relatively low (~ 3.5 M$ annually)
5. Sufficient carbon allowances to cover all expected GHG emissions
6. Projected average net Power Resource budget increases are ~2.6% annually from FY18/19 to FY 22/23

Most significant intermediate term risk(s): New or future CAISO initiatives, resulting in rapidly increasing Flexible RA requirements and/or new ISO-uplift costs (i.e., renewable energy integration issues and grid stability concerns).

GHG EMISSION TARGETS

1. Reducing RPU's GHG emissions to achieve State mandated emission targets is a primary focus of this IRP
   a) Three RPU GHG planning targets are analyzed/discussed in IRP

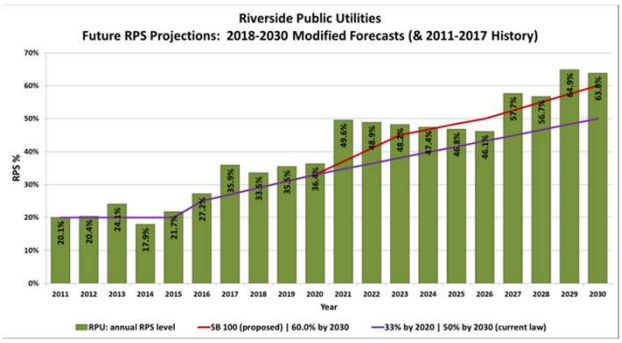
GHG Planning Target	Description	MT CO2-e Emission Value
Baseline	40% below 1990 (utility specific)	647,844
53 MMT Sector Goal	Official RPU target	486,277
42 MMT Sector Goal	More aggressive GHG reduction scenario	385,137

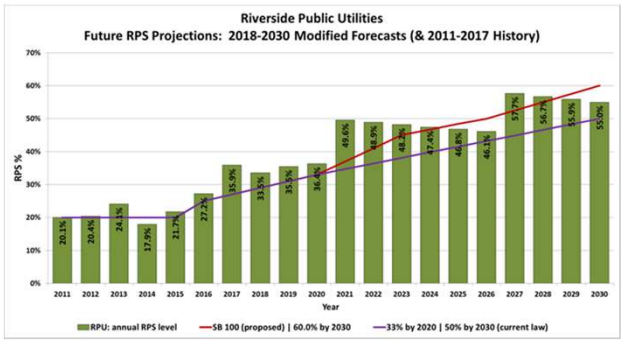
FUTURE LOW-CARBON ENERGY PROCUREMENT STRATEGY

New Renewable/Low-carbon Resource added to Portfolio	COD	Annual MWh
1. 44 MW Solar PV + 22 MW / 88 MWh BESS	2021	144,000
2. Extension and/or repower of 39 MW Cabazon Wind Facility	2025	72,000
3. Contract for Summer (July-Sept) low-carbon energy product	2025	100,000
4. 40 MW baseload renewable asset	2027	298,000
5. 30 MW baseload renewable asset	2029	223,000

a) Executing 1 – 5: RPU meets 42 MMT GHG sector target (aggressive GHG reduction)
b) Executing 1 – 4: RPU meets 53 MMT GHG sector target (official RPU target)

FUTURE LOW-CARBON ENERGY PROCUREMENT STRATEGY





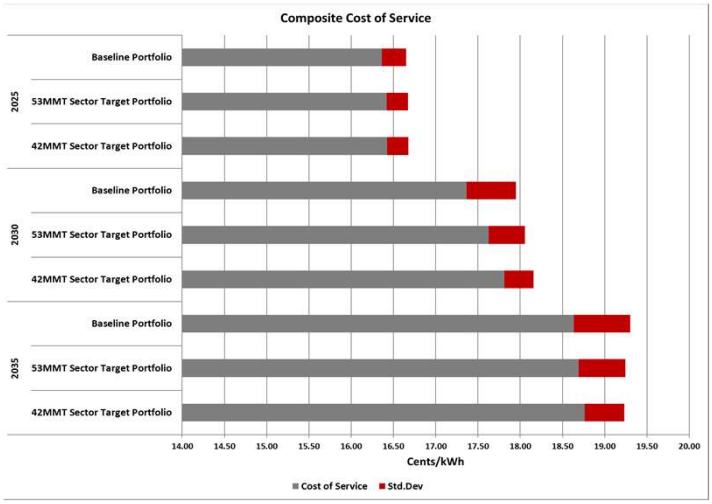
1. **Left Plot:** Projected RPS % with proposed contracts 1 – 5 (assuming contract 3 is non-renewable)
2. **Right Plot:** Projected RPS % with proposed contract 1 – 4 (assuming contract 3 is non-renewable)

PRIMARY LONG-TERM SCENARIOS

Scenario #	Resources	Electric Sector GHG Goal	2030 RPS Mandate	New Renewable Pricing	Capacity / Energy Replacement
baseline	1,2	40% < 1990	50%	Normal	Market
Alt-1	1,2,3,4	53 MMT	~54% to 57%	Normal	Market
Alt-1*	1,2,3,4	53 MMT	~54% to 57%	High	Market
Alt-2	1,2,3,4,5	42 MMT	~63% to 66%	Normal	Market
Alt-2*	1,2,3,4,5	42 MMT	~63% to 66%	High	Market
Alt-3	1,2,3,4,IPP	42 MMT	~63% to 66%	Normal	IPP Repower + Market
Alt-4	1,2,3,4,LMS	42 MMT	~63% to 66%	Normal	LMS 100 + Market

1. 3 GHG goals, 7 potential new resources
2. Quantified projected COS_{LN} and associated risk under each scenario
3. Quantified net value of each new resource to RPU's portfolio

KEY FINDINGS: LONG TERM GHG ANALYSES



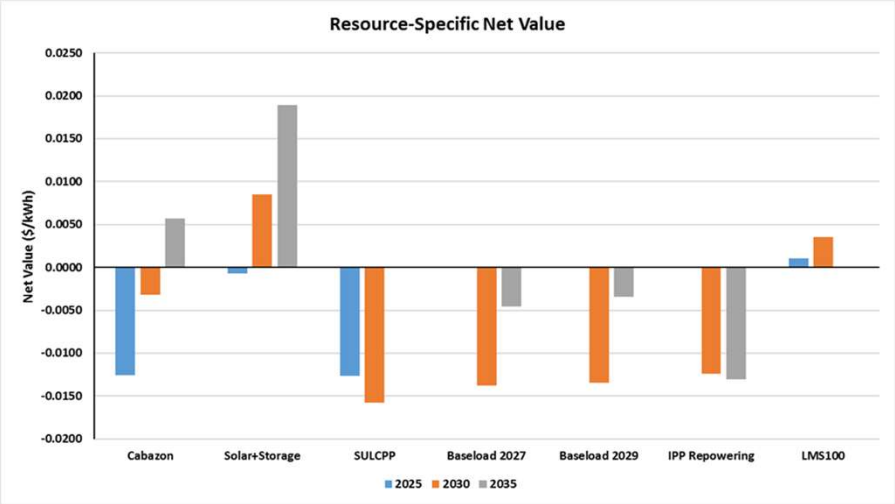
1. **Simulation results suggest that lower GHG emission scenarios should result in manageable total cost impacts.**

2. **Total 2030 cost only impacts:**
   - **1.5% (53 MMT vs Baseline)**
   - **2.6% (42 MMT vs Baseline)**

3. **Total 2030 cost+risk impacts:**
   - **0.6% (53 MMT vs Baseline)**
   - **1.2% (42 MMT vs Baseline)**

RPU should be able to achieve its Official 2030 GHG planning target without significant rate stress, if renewable prices remain competitive.

KEY FINDINGS: NET VALUE ANALYSES



1. **Most of the studied renewable assets exhibit marginally negative net values (except for the Solar PV + Storage project)**
2. **IPP Repowering project exhibits negative net values (which increase over time)**
3. **LMS100 exhibits slightly positive net values (could represent a good alternative to the IPP repowering project)**

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KEY FINDINGS, CHAPTERS 14-19

1. Ch. 14: Evaluating the Impact of Increasing Energy Efficiency Program Targets
   a) At current pricing levels, investing in renewable resources is more cost effective than investing to expand Energy Efficiency programs.
2. Ch. 15: Energy Storage
   a) Ascend Analytics analysis suggests that frequency regulation batteries could be cost effective in the CAISO market, but these preliminary results are still speculative.
3. Ch. 16: Retail Rate Design
   a) Our recently approved electric rate restructuring was designed to allow RPU to meet industry changes by providing better financial and revenue stability.

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KEY FINDINGS, CHAPTERS 14-19 CONT.

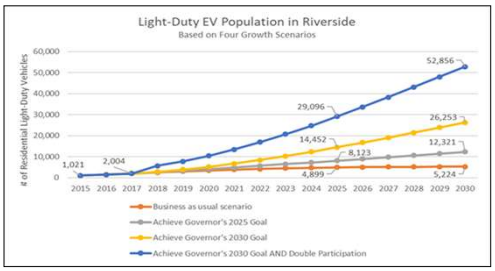
4. Ch. 17: Transportation Electrification
   a) TE has the potential to add significant load and result in additional carbon reduction credits, if local area adoption rates increase.

5. Ch. 18: Long Term Impacts of Customer Solar PV Penetration
   a) Cost shifts within customer classes exist and will need to be addressed.

6. Ch. 19: Minimizing Local Air Pollutants and Green House Gas Emissions in Disadvantaged Communities
   a) RPU and the City have made significant progress minimizing pollutants and emissions, as well as offering a number of services and assistance programs to our lower income customers.

KEY FINDINGS: TRANSPORTATION ELECTRIFICATION

(1)



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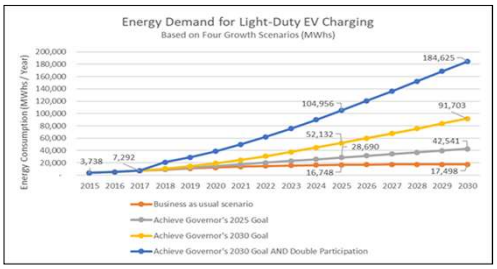

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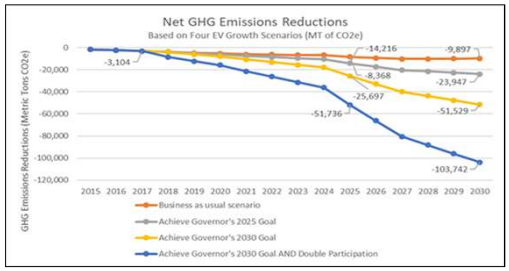
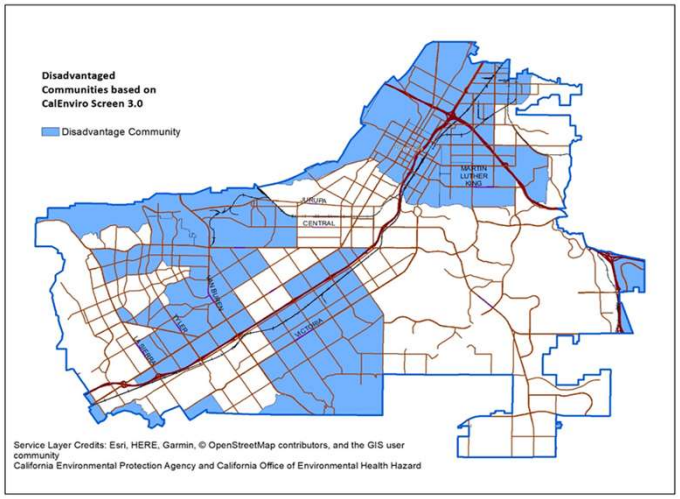


TE offers opportunities for increased energy demand (load growth), as well as credit for net GHG reductions (versus gas powered vehicles).

KEY FINDINGS: DISADVANTAGED COMMUNITIES



1. **City has converted the bulk of its vehicles to clean fuel alternatives.**
2. **RPU has invested significant efforts at RERC to minimize local air pollutants (35% below industry best practices).**
3. **RPU has launched expanded low income assistance programs with the new rate plan.**
4. **Staff are working on new programs to refocus more EE rebates into identified DC areas.**

CONCLUDING REMARKS

1. RPU's 2018 IRP discusses and analyzes a number of diverse resource planning issues in detail, while addressing all of the mandated CEC topic areas.
2. Overall, staff has compiled and presented information within the 20 IRP chapters that also address the six Primary IRP Goals in a comprehensive and analytical manner.
3. The analyses, findings, and recommendations in the 2018 IRP are designed to assist RPU to plan for a lower carbon future in a proactive, intelligent, flexible, and financially responsible manner.

RECOMMENDATIONS

That the City Council:

1. Approve and adopt the 2018 Integrated Resource Plan for Riverside Public Utilities; and

2. Direct staff to file the adopted 2018 Integrated Resource Plan with any applicable supporting material with the California Energy Commission before April 1, 2019.