Pasadena Water & Power
2009 Integrated Resource Plan

Public Meeting #4

January 24, 2008

PACE

Agenda

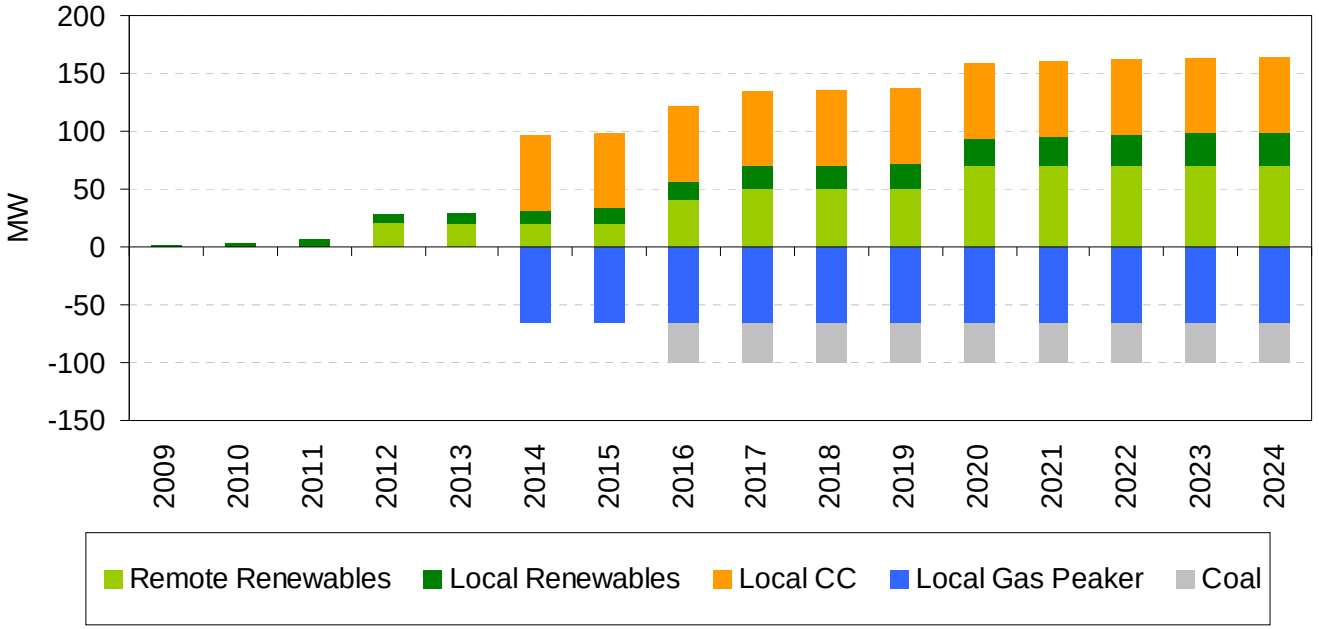
- Executive Summary
- How the Preferred Resource Plan
  - Achieves Key IRP Objectives
  - Allows PWP to Manage Key IRP Risks
- Near-Term Action Plan
- Next Steps

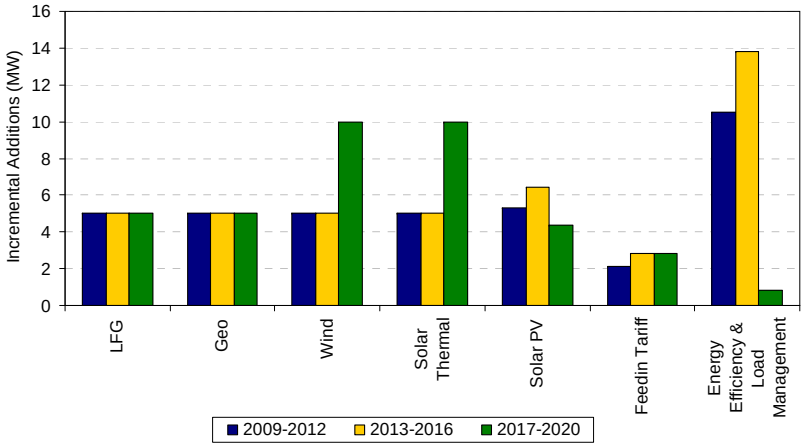
Executive Summary

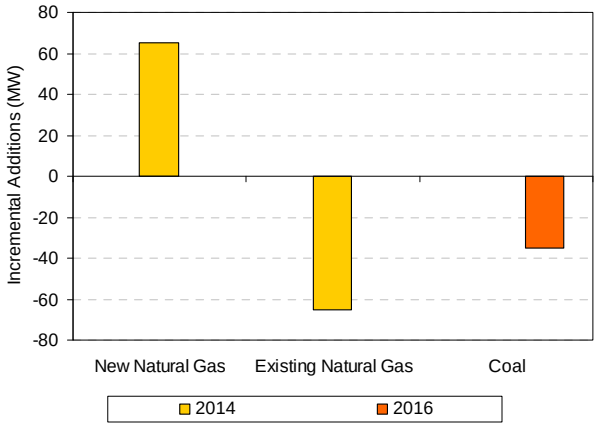
Considerations Supporting Preferred Resource Plan

- The final selection of the Preferred Resource Plan among the various alternatives required determinations on the preferred balance between greater GHG emissions reductions, higher costs, and infrastructure improvements to reduce reliability risks
- Key considerations supporting selection of the Preferred Resource Plan:
  - **Balancing of Cost and Environmental Objectives:** PWP customers are willing and able to pay rate increases of approximately 5-10% in order to achieve the anticipated environmental benefits (GHG Emissions reductions of approximately 40%) and the associated balance of financial and regulatory risks
  - **IPP Sale Feasibility:** A displacement of approximately 35 MW of IPP capacity is feasible and should be pursued in order to reduce PWP's GHG emissions footprint
  - **Local Generation and Reliability:** New local gas-fired generation is essential to ensuring ongoing reliability and options that do not include new local generation produce unacceptable reliability risks that must be avoided
  - **Flexibility for the Future:** There is significant flexibility to adjust the Preferred Resource Plan in the future in response to evolving conditions and customer requirements

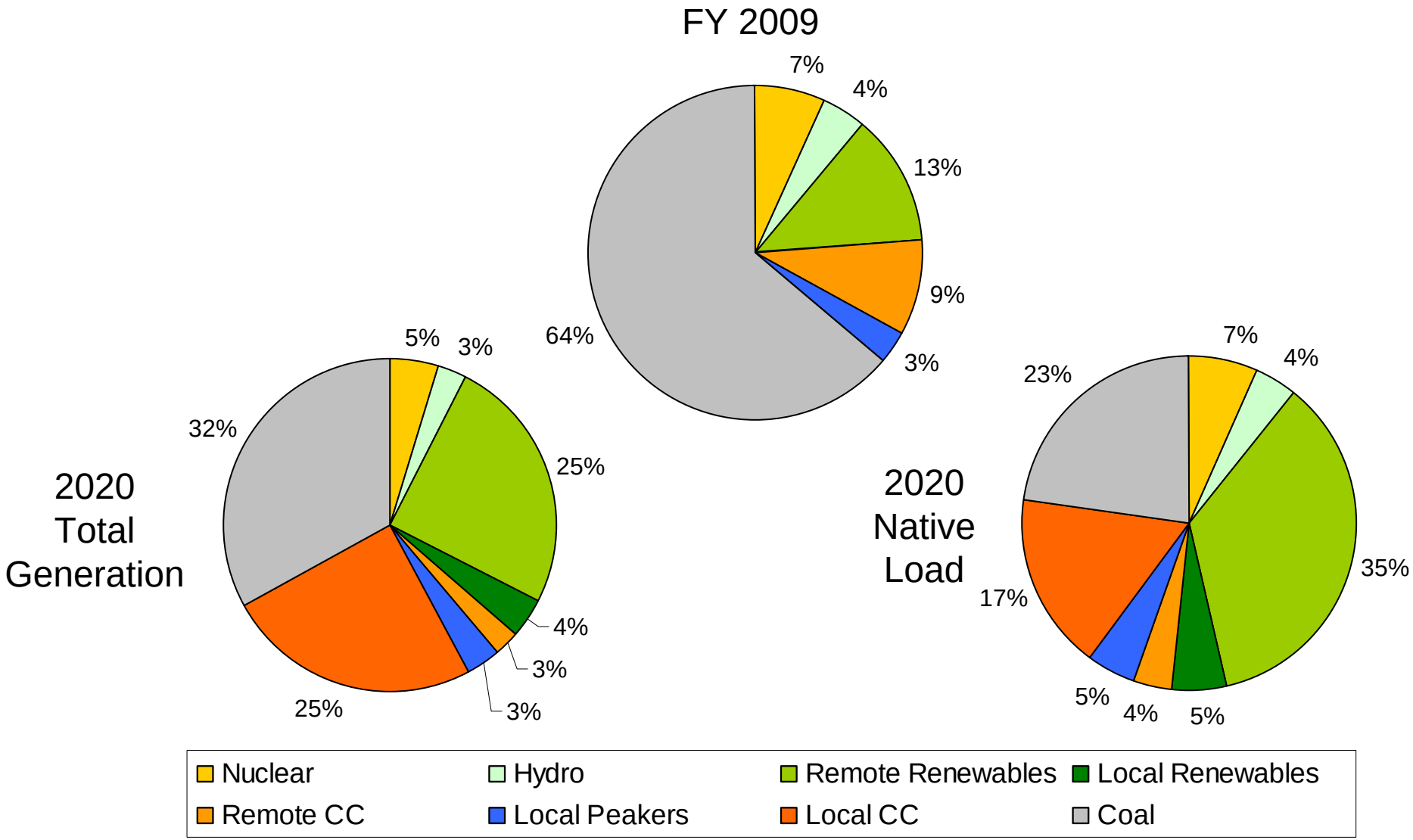
Incremental Resource Commitments—Preferred Resource Plan







Energy Mix—Preferred Resource Plan



Key Elements of Preferred Resource Plan

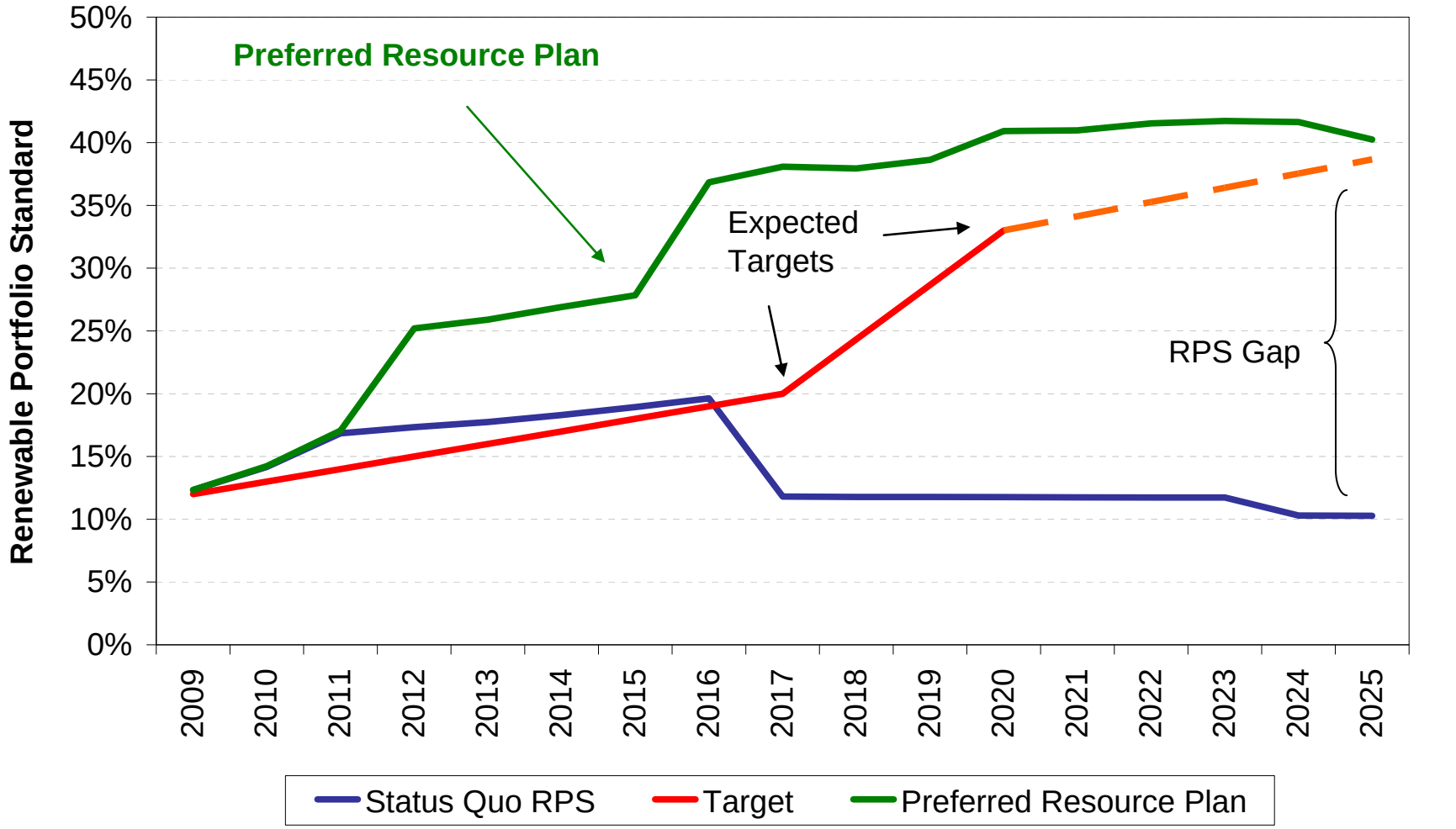
- **Coal Power Displacement:** By 2016, reduce IPP purchases by at least 35 MW
- **New Local Gas-Fired Generation:** By 2014, retire the Broadway 3 power plant and replace it with a 65 MW new gas-fired combined cycle plant at the same site
- **Energy Efficiency and Load Management:** Reduce energy sales by 12.5% by 2016; reduce peak load by 10% by 2012; Reduce peak load by an additional 5 MW by 2012 through demand response programs that provide customers with information and incentives to reduce their consumption during peak periods
- **Renewable Energy:** By 2020, increase the share of PWP's energy mix provided by renewable sources to 40%: 15% by 2010, 33% by 2015, 40% by 2020
- **Solar Photovoltaic:** By 2020, add at least 15 MW of solar photovoltaic installations in Pasadena: 3 MW by 2010, 10 MW by 2015, 15 MW by 2020
- **Feed-In Tariff:** By 2020, establish a feed-in tariff program offering to purchase up to 10 MW of qualifying renewables of all technologies located inside Pasadena at an average price up to 15 cents/kWh, with time-differentiated prices to encourage on-peak production
- **GHG Emissions Reductions:** By 2020, achieve CO2 emission reductions of at least 40% according to the following timeline: 5% by 2010, 25% by 2015, 40% by 2020

Key Elements of Preferred Resource Plan

- **Diverse Renewable Energy Additions:** Add 20 MW of solar thermal, 20 MW of wind, 15 MW of geothermal, 15 MW of landfill, 19 MW of local solar photovoltaic capacity, and a new feed-in tariff program for 10 MW of local renewables.
- **Partial Sale of Intermountain Power Project (IPP) Power:** Approximately 35 MW of IPP capacity would be removed from the portfolio and sold to markets outside of California.
- **New Local Generation:** Add a new 65 MW gas-fired combined cycle facility at the site of Broadway 3, which would be retired at the time the new facility achieves commercial operation. The addition of new local generation is the most cost-effective means to ensure PWP's ongoing ability to satisfy reliability requirements.
- **Upgrades of Existing Generation:** Maintain and upgrade the existing Glenarm 1 & 2 generating units in order to extend their operating lives.

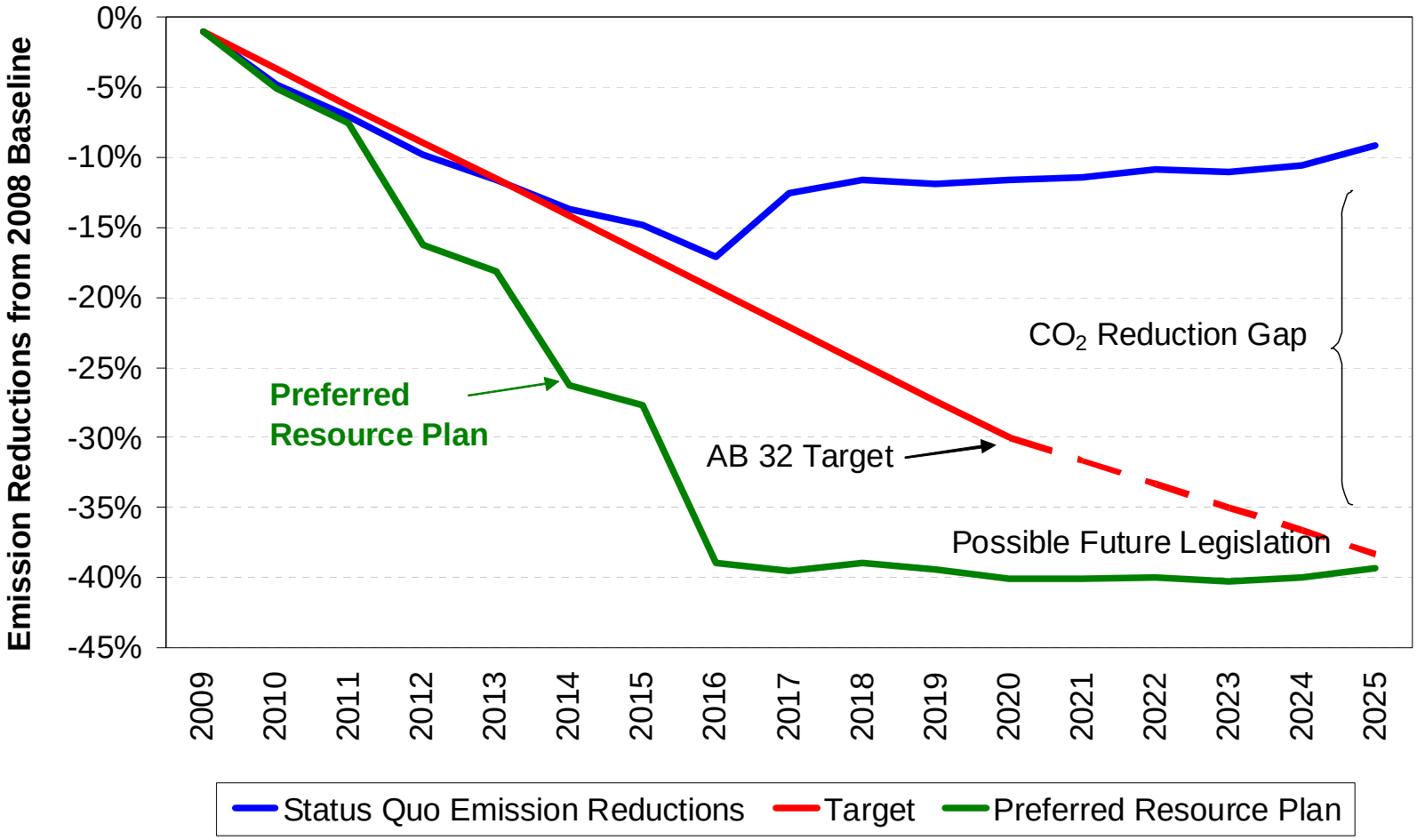
Renewable Portfolio Standard Goals are Exceeded

Policy Goals: 25% by 2012, 35% by 2016, 40% by 2020



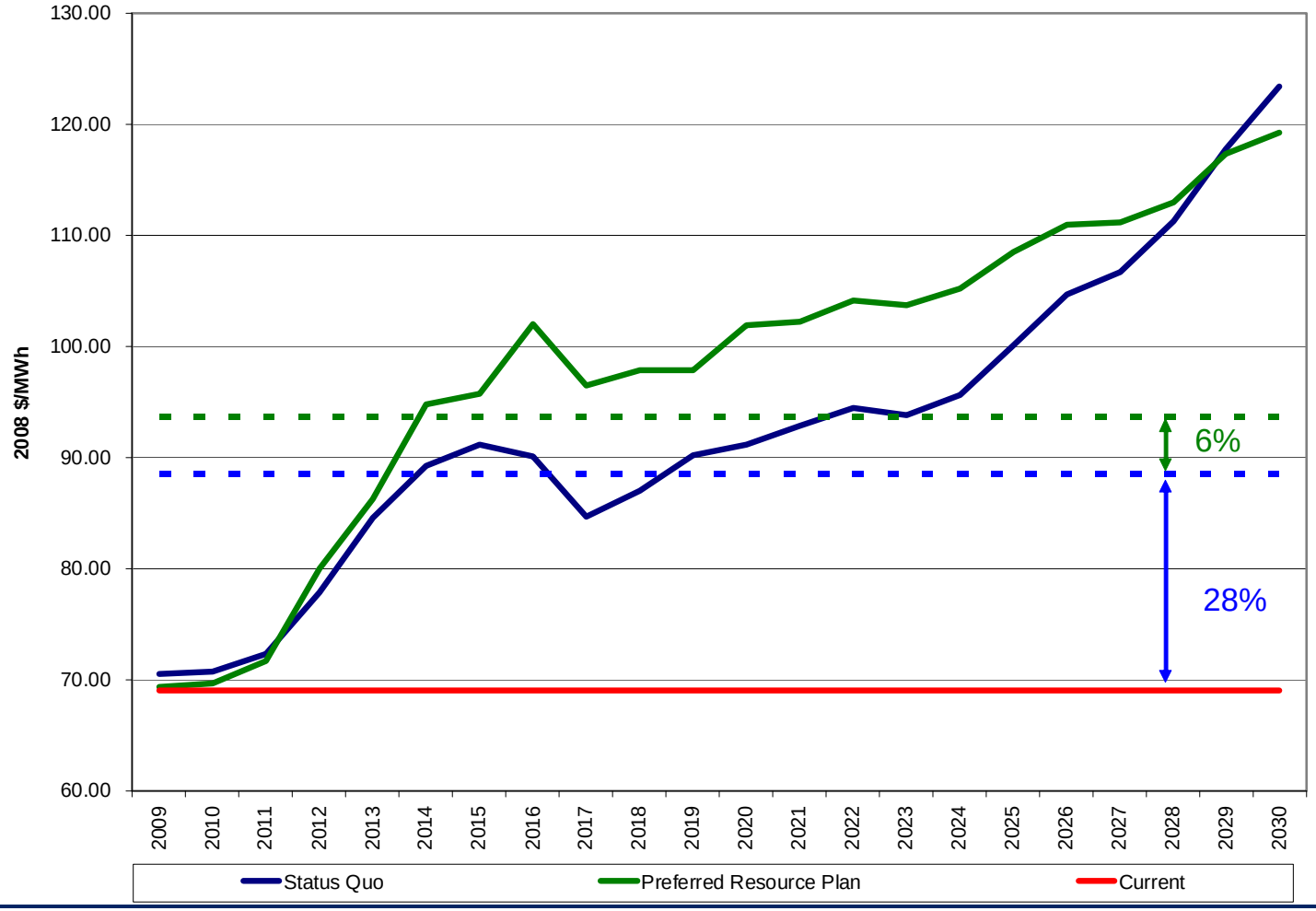
Greenhouse Gas Reduction Goals are Exceeded

Policy Goals: 5% by 2010, 25% by 2015, 40% by 2020

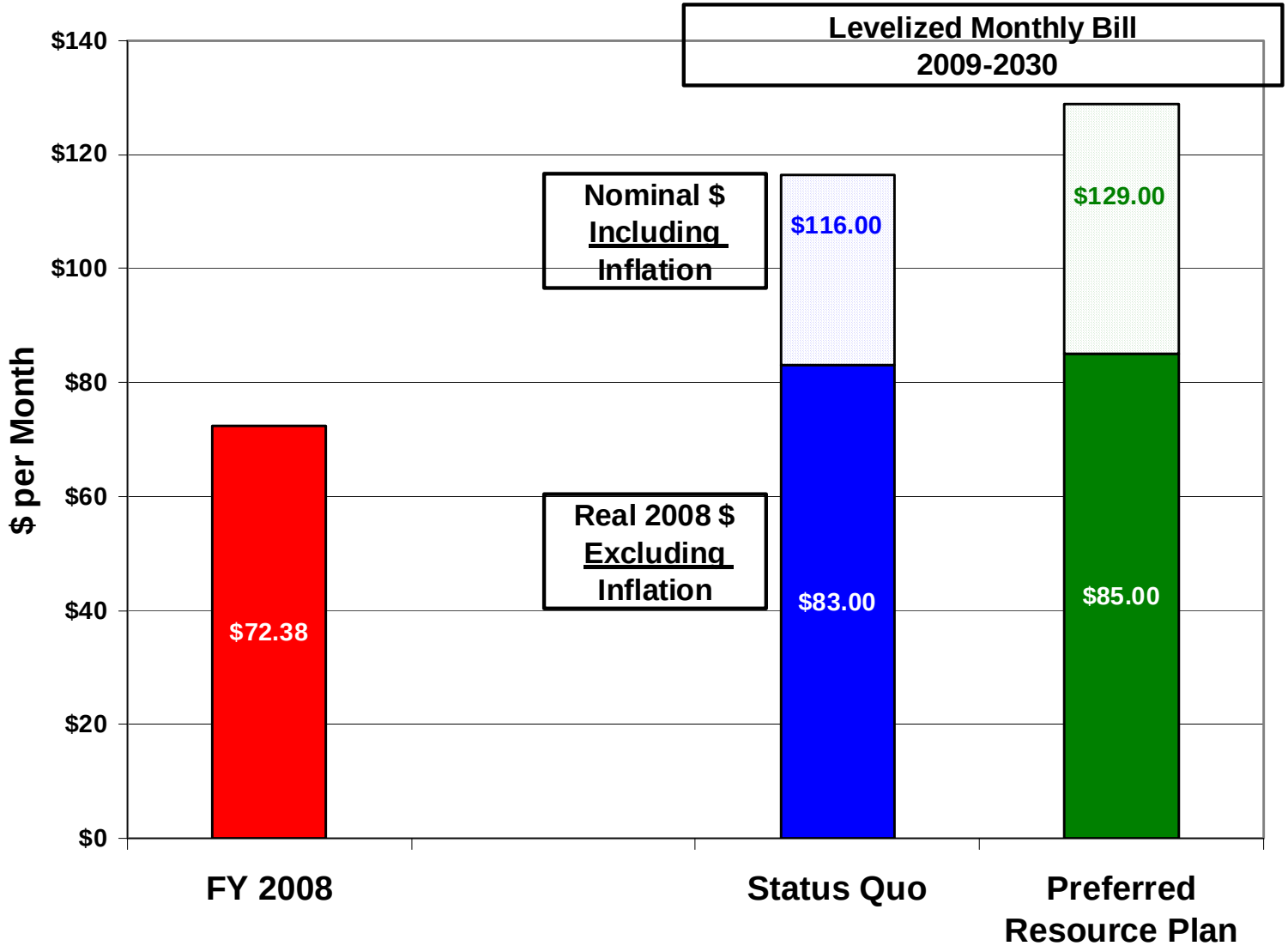


Resource Cost Projections—Annual and Levelized Costs

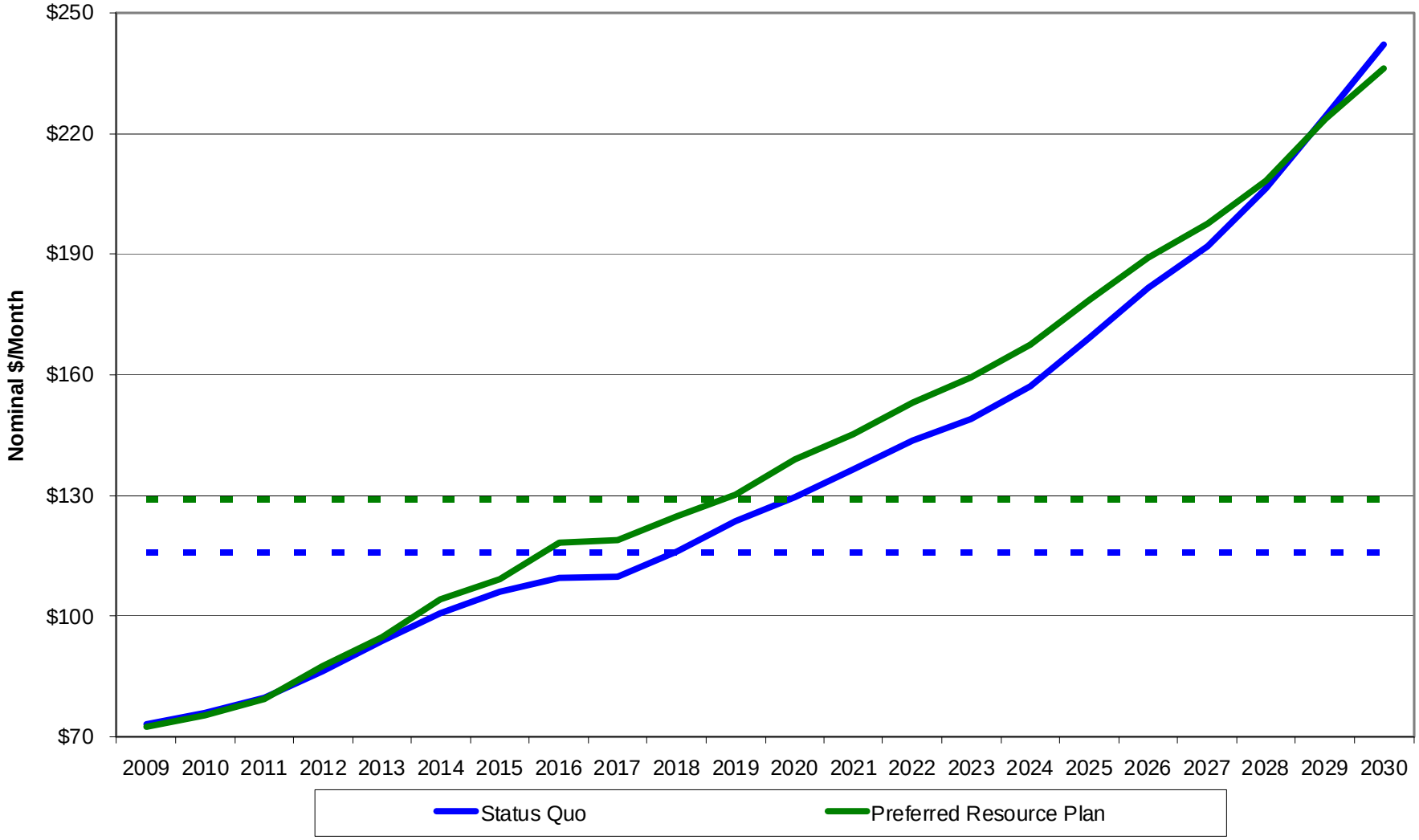
Premium of 6% vs. “Status Quo” Portfolio through 2030



Illustrative Impact on Monthly Residential Customer Bill

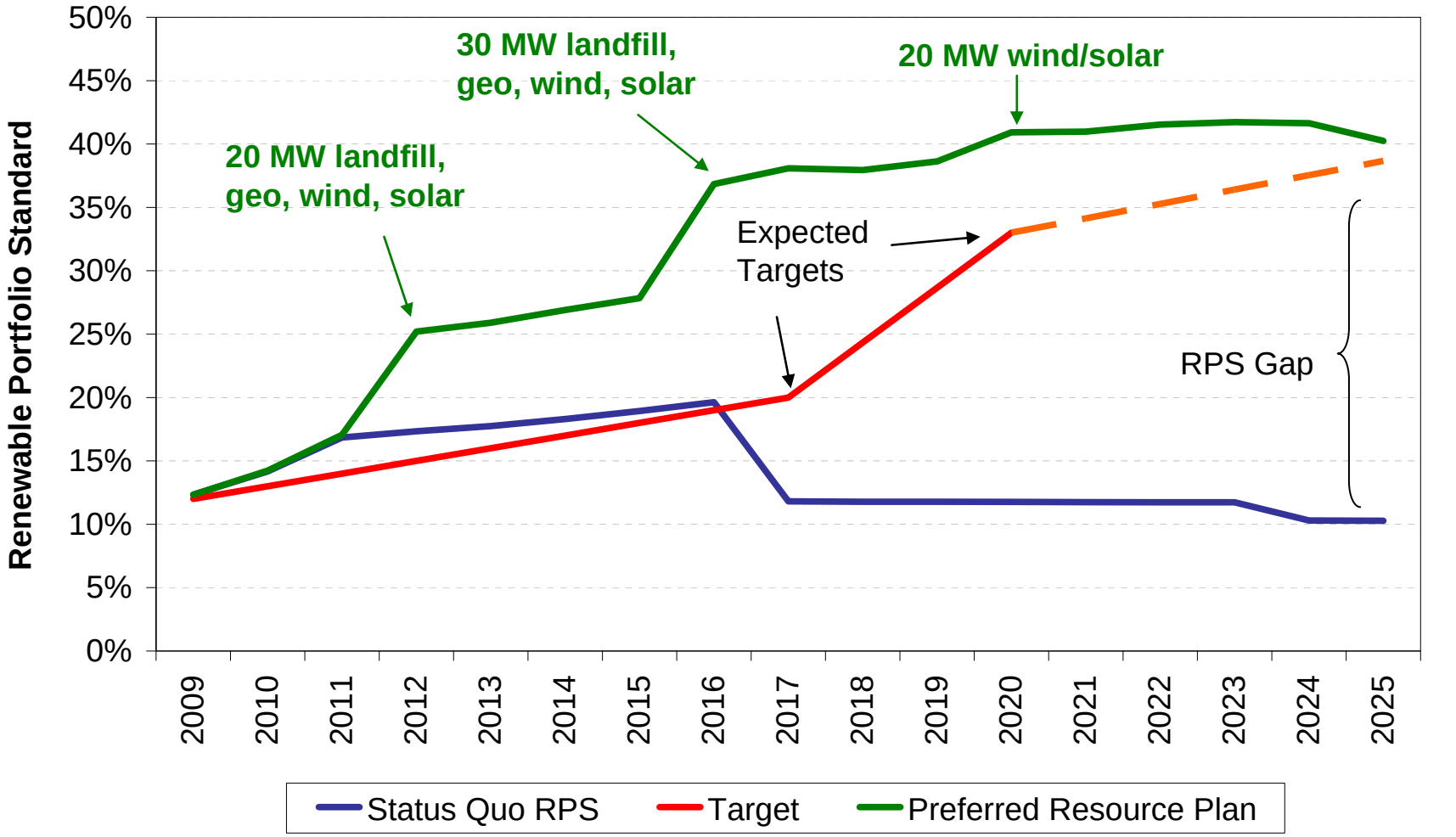


Projected Monthly Residential Customer Bills



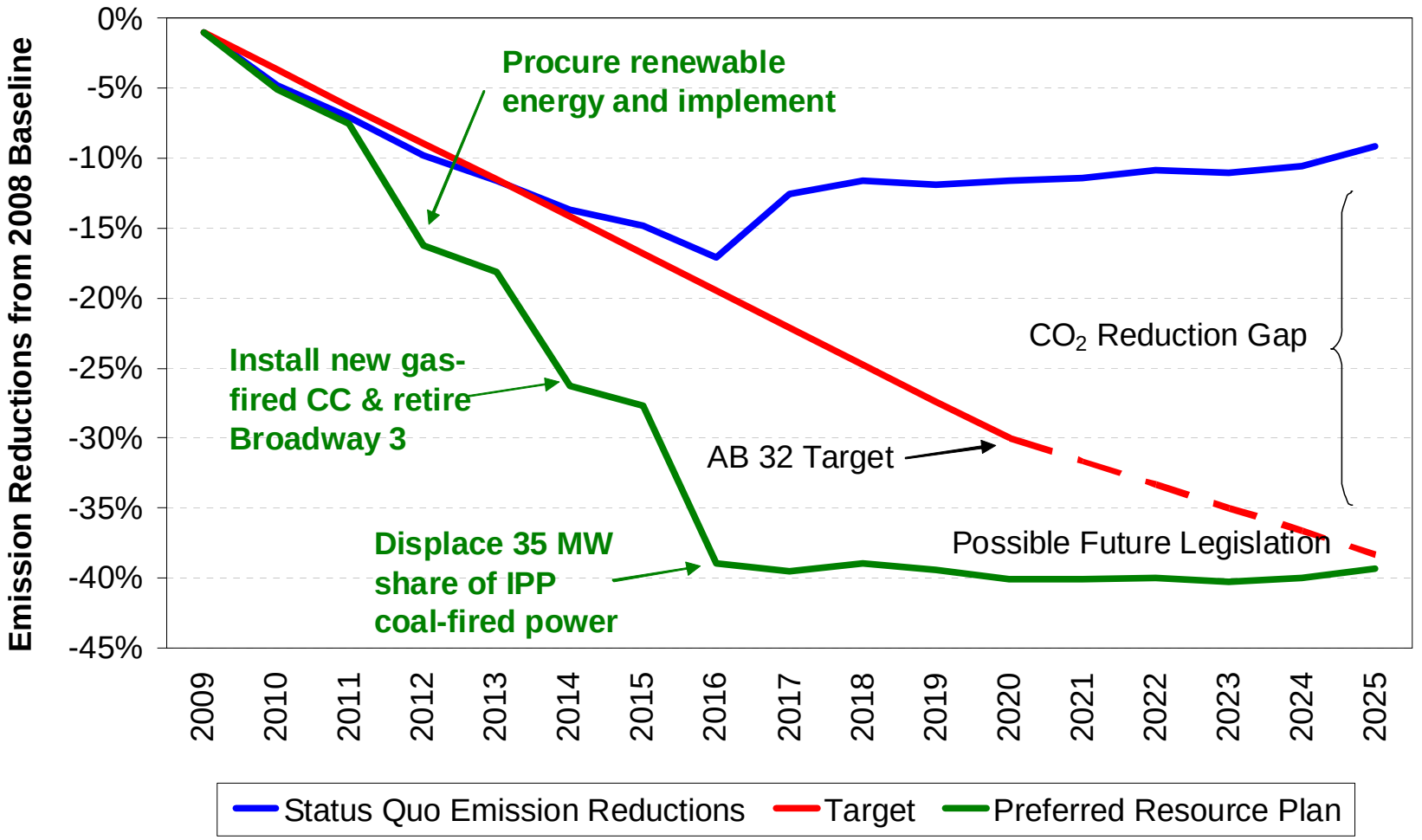
Key Actions and Milestones to Achieve RPS Goals

Policy Goals: 25% by 2012, 35% by 2016, 40% by 2020



Key Actions and Milestones to Achieve GHG Reductions

Policy Goals: 5% by 2010, 25% by 2015, 40% by 2020



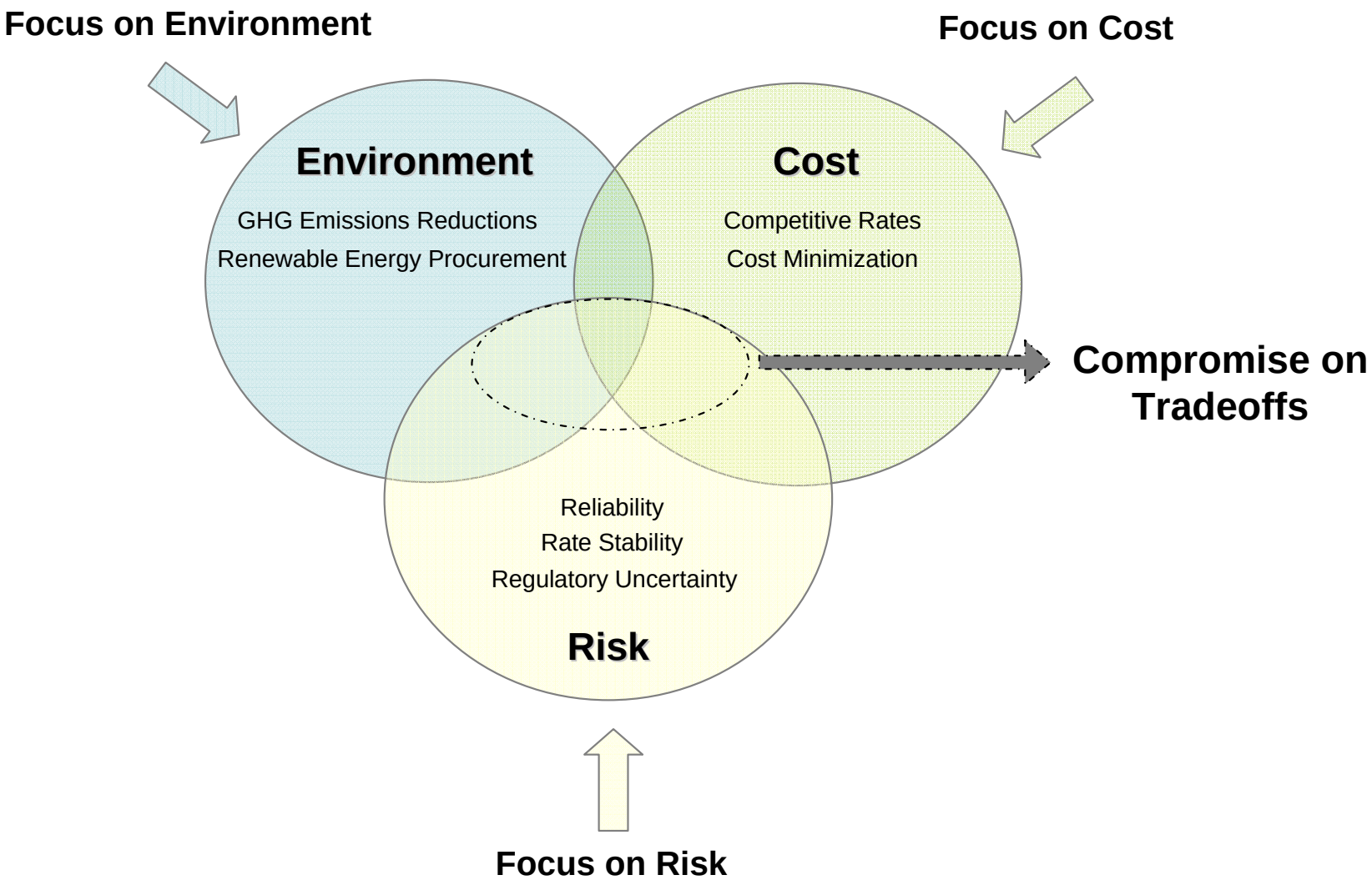
Balancing IRP Objectives

Ranking IRP Goals—Primary and Secondary Objectives

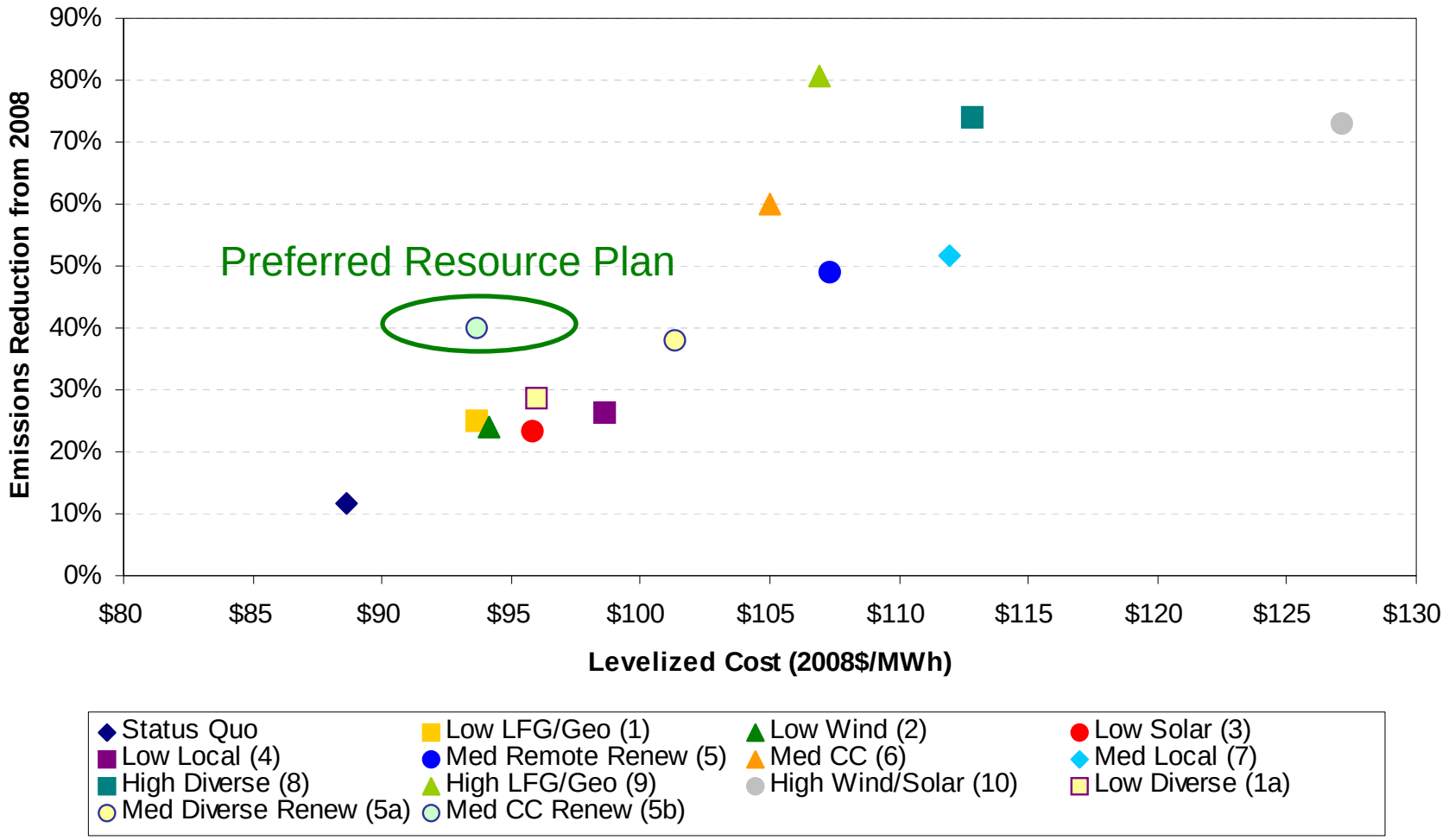
	IRP Advisory Group Rankings	Public Questionnaire 1 Rankings	Public Questionnaire 2 Rankings
Primary Objectives			
Provide Reliable Service	1	1	4
Strive for Environmental Leadership	2	2	1 **
Maintain Stable Rates	3	3	3
Preserve Competitive Rates	5		2
Secondary Objectives			
Allow for Flexibility	4		5
Manage Market Risks	6		5
Maintain Fiscal Health	7		7

** High rankings for "Energy Efficiency and Conservation", Environmental Protection" and "Building a Renewable Energy Portfolio" also incorporated from Public Questionnaire responses

Balancing Pasadena's Primary IRP Objectives



Balancing Cost and Environmental Trade-offs



Selection of the Preferred Resource Plan

- The Preferred Resource Plan (Portfolio 5b) performs best in all of the primary objectives
- It achieves the major environmental goals and performs best or second best on the cost, aggregate price risk (cost plus risk), and reliability metrics
- It receives no “red” rankings and totals three out of five “green rankings” across the primary objectives
- For each of the secondary objectives, it achieves rankings in the middle of all of the candidate resource plans, indicating that there are no major weaknesses that should disqualify its selection as the preferred option

	Primary Objectives					Secondary Objectives			
Portfolio	**Emissions Reduction**	**Cost**	**Aggregate Price Risk**	**RPS 2020**	**Reliability**	**Capital Charges**	**Spot Market Dependence 2020**	**IPP Sale Feasibility**	**Carbon Price Risk**
	% Reduction from 2008	*Levelized $/MWh*	*95% $/MWh*	*% of NEL*		*Annual Levelized $MM in 2030*	*% of 2020 Load*	*Added Cost Levelized $/MWh*	*Added Cost Levelized $/MWh*
Status Quo	12%	89	103	12%		0	4%	0	20
1a: Low Diverse	29%	96	110	40%		31	29%	0	15
5: Med Remote Renew	49%	107	133	58%		65	26%	8	11
5a: Med Diverse Renew	38%	101	118	58%		39	21%	5	13
5b: Med CC Renew	40%	94	115	41%		51	41%	5	12
6: Med CC	60%	105	135	33%		34	-2%	24	10
8: High Diverse	74%	113	136	74%		49	-8%	24	7

Performance Relative to Primary Objectives

Primary Objective	Performance of Preferred Resource Plan
GHG Emissions Reductions	•40% reduction by 2020 exceeds emerging State requirement •Positions PWP to achieve higher GHG Emissions reductions if warranted in the future
Cost	•Costs are comparable to low GHG Emissions reduction options •Lowest cost of all medium/high GHG Emissions reduction options,
Aggregate Price Risk	•Lowest cost of all medium/high reduction options after consideration of load, energy price, carbon price and capital cost risks
Renewable Portfolio Standards	•40% by 2020 exceeds emerging State standard, earlier than required •Positions PWP to achieve higher RPS levels if warranted in the future
Reliability	•Best reliability performance by directly addressing reliability concerns through replacement of aging local units •Lower cost than transmission upgrades likely to cost $100+ million •Can be implemented more quickly, with higher likelihood of success, than transmission upgrades that are expected to require 15 years or more to implement fully and could face significant opposition •New local generation provides a bridge to potential long-term solution to reliability issues involving transmission upgrades

Performance Relative to Secondary Objectives

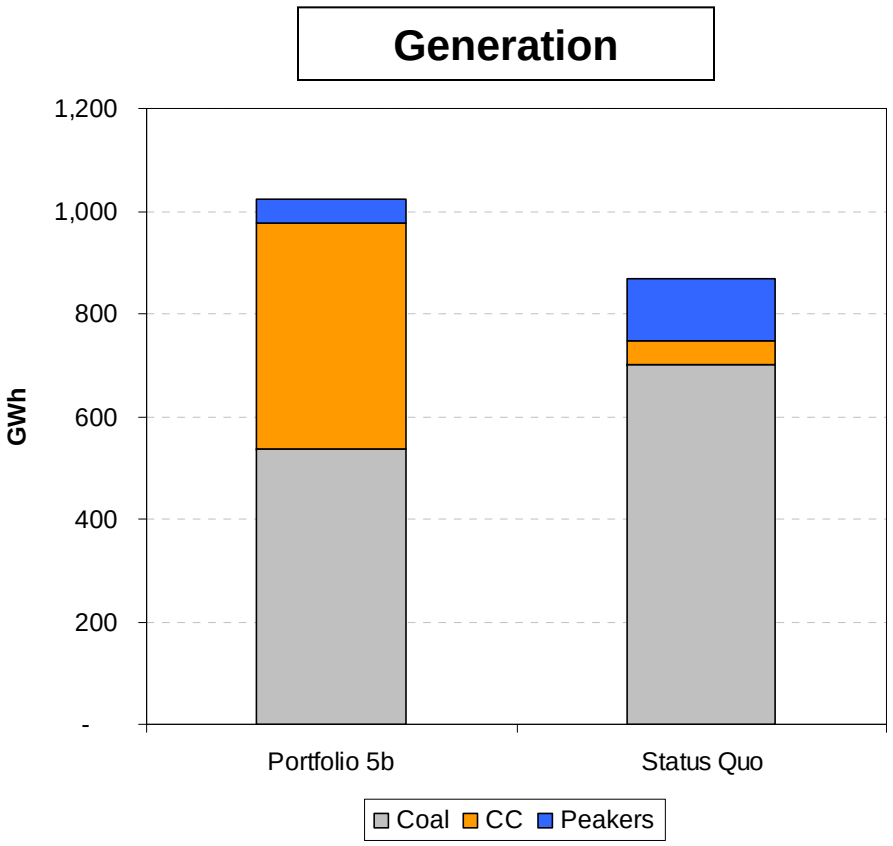
Secondary Objective	Performance of Preferred Resource Plan
Capital Charges	•Moderately higher level of capital charges relative to other options •Capital investment for new local gas-fired generating unit ($86 million) substantially lower than investments in transmission upgrades ($100+ million) and life extension of existing units ($44 million) required for other options
Spot Market Dependence	•New efficient unit likely to be operated more often than existing units to economically displace higher-cost fossil generation in the region •Implies that a higher level of dependence on wholesale sales revenues are needed to achieve the projected net costs of this option •Creates additional risk exposure both to PWP's ability to make wholesale sales and to volatility of wholesale market prices •Remains least-cost option after consideration of this risk factor (reduction of wholesale sales to levels comparable to other options)
IPP Sale Feasibility	•Limited exposure since 35 MW displacement lower than other options •Higher levels of displacement (up to 100%) if feasible in the future
Carbon Price Risk	•Coal displacement significantly reduces exposure to carbon risk •Further mitigation can be pursued if necessary in the future

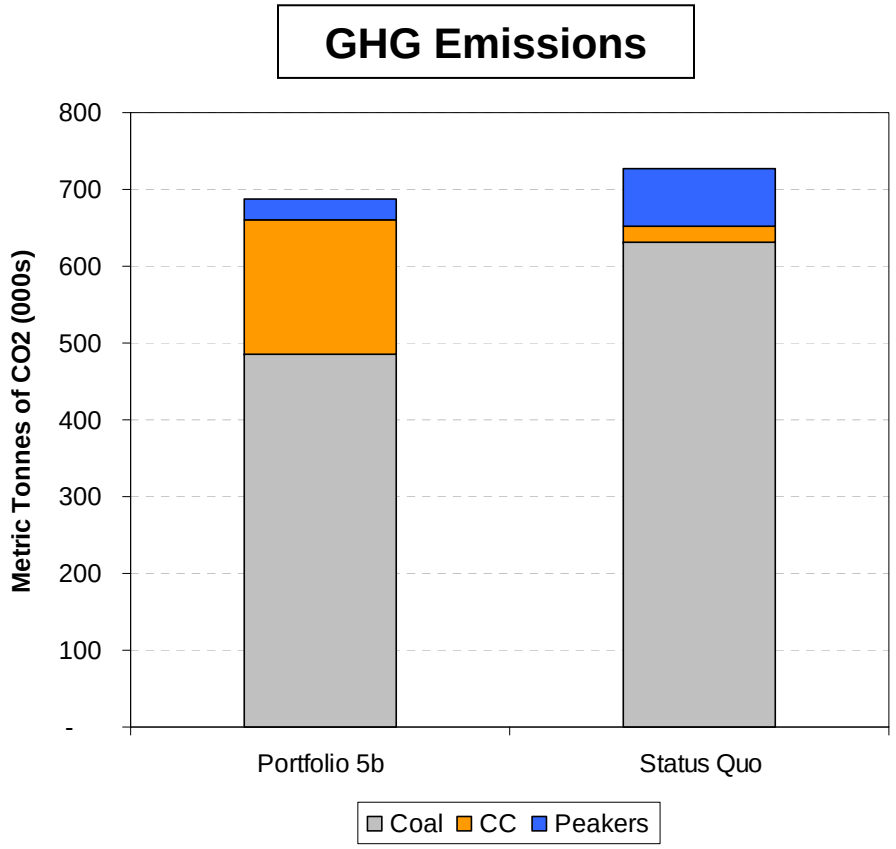
Implications of New Local Gas-Fired Generation Facility

Issue	Performance of Preferred Resource Plan
Reliability	•New combined-cycle facility satisfies PWP's reliability needs and provides a modern, efficient facility that is significantly more cost-effective than the alternatives that include transmission upgrades One viable location for importing remote power—significant risk •Local generation crucial to mitigate the risk of reliance on the single interconnection and limited in-city transmission •Maintaining the existing Broadway 3 unit entails significant costs with no assurance that it will generate power when needed
Wholesale Power Sales	•Efficient, low-cost unit operates more and displaces other sources •Despite new unit's higher output, overall emissions are reduced
GHG Emissions	•GHG Emissions for wholesale sales netted from PWP footprint •Net GHG reductions in State from displacement of other sources
Displacement of Renewables	•Renewable supplies treated as "must take" to ensure they are fully utilized, and will not be economically displaced by gas-fired generation
Plant Dispatch	•New gas-fired facility can be operated flexibly in response to evolving energy and carbon market conditions •Plant dispatch can be limited, at a cost to PWP, to reduce emissions

Impact of New Local Gas-Fired Unit on CO_2 Emissions

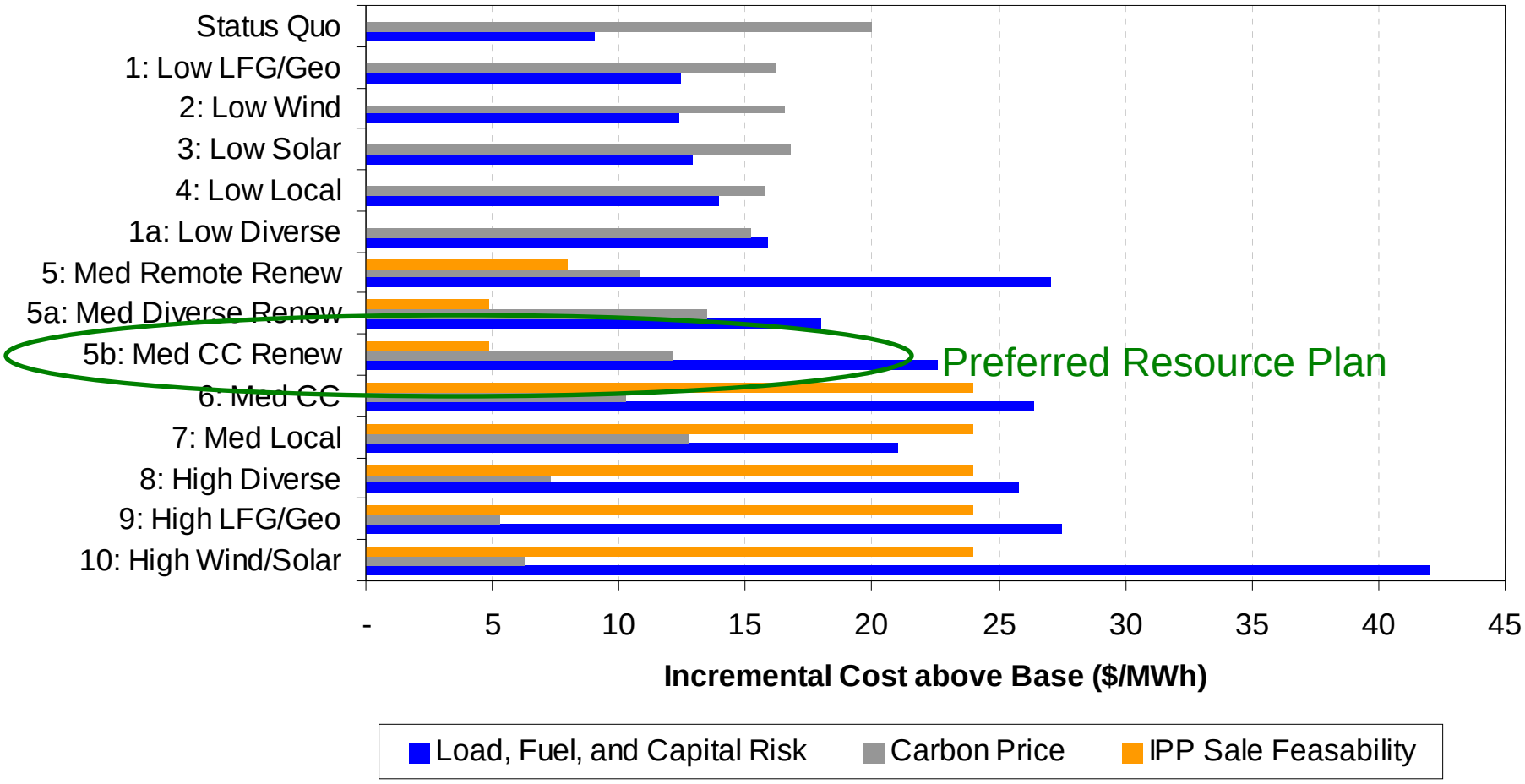
While total generation from fossil resources is 18% higher, *total emissions from fossil resources* are 6% lower in the Preferred Resource Plan vs. the Status Quo. Sales to the wholesale market produce additional emissions reductions beyond Pasadena's footprint by displacing other entities' generation.





Managing Key Risks

Financial Risk—Performance of Preferred Resource Plan



Financial Risk Performance of Preferred Resource Plan

- The Preferred Resource Plan (Portfolio 5b) performs better than any other option with comparable GHG emissions reductions, even after considering the “worst case” outcome for financial risk components.

Portfolio	Primary Objectives					Secondary Objectives			
	Emissions Reduction	Cost	Aggregate Price Risk	RPS 2020	Reliability	Capital Charges	Spot Market Dependence 2020	IPP Sale Feasibility	Carbon Price Risk
	% Reduction from 2008	*Levelized $/MWh*	*95% $/MWh*	*% of NEL*		*Annual Levelized $MM in 2030*	*% of 2020 Load*	*Added Cost Levelized $/MWh*	*Added Cost Levelized $/MWh*
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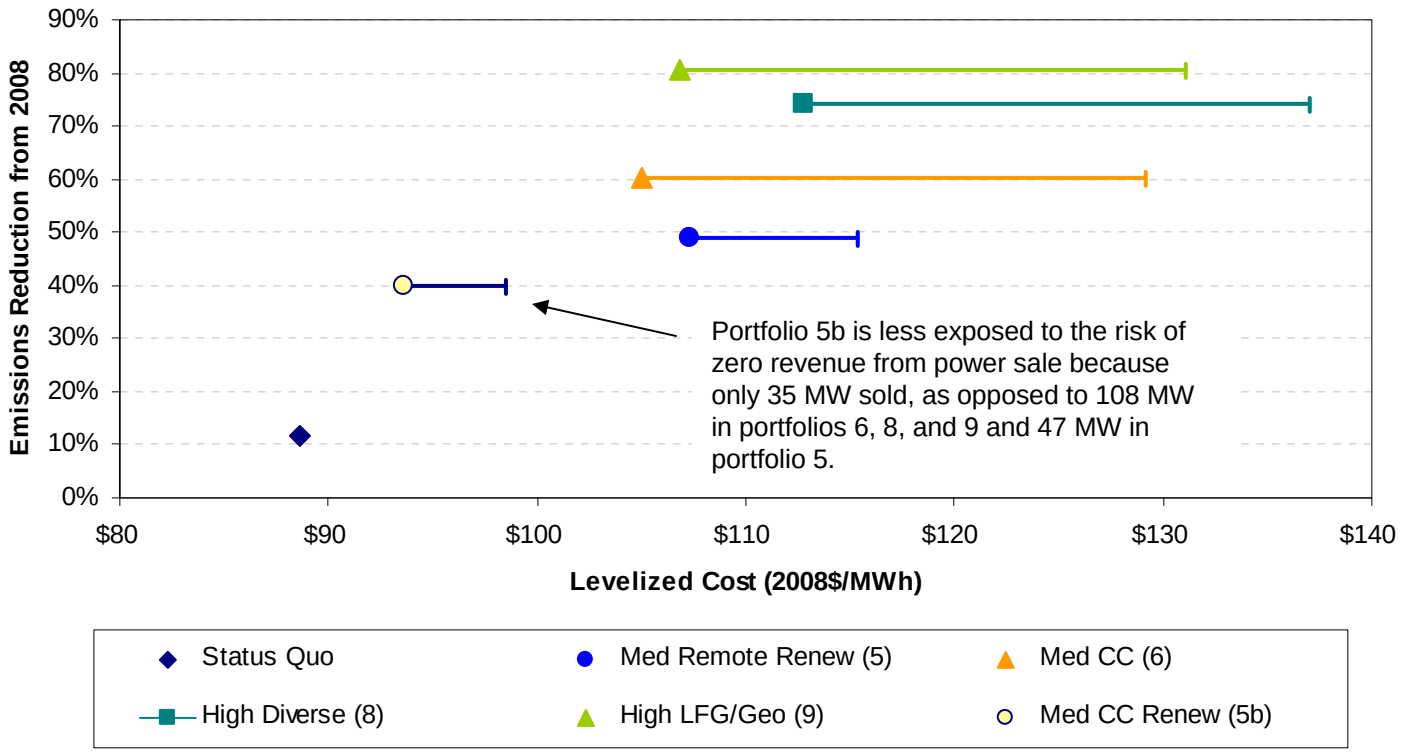
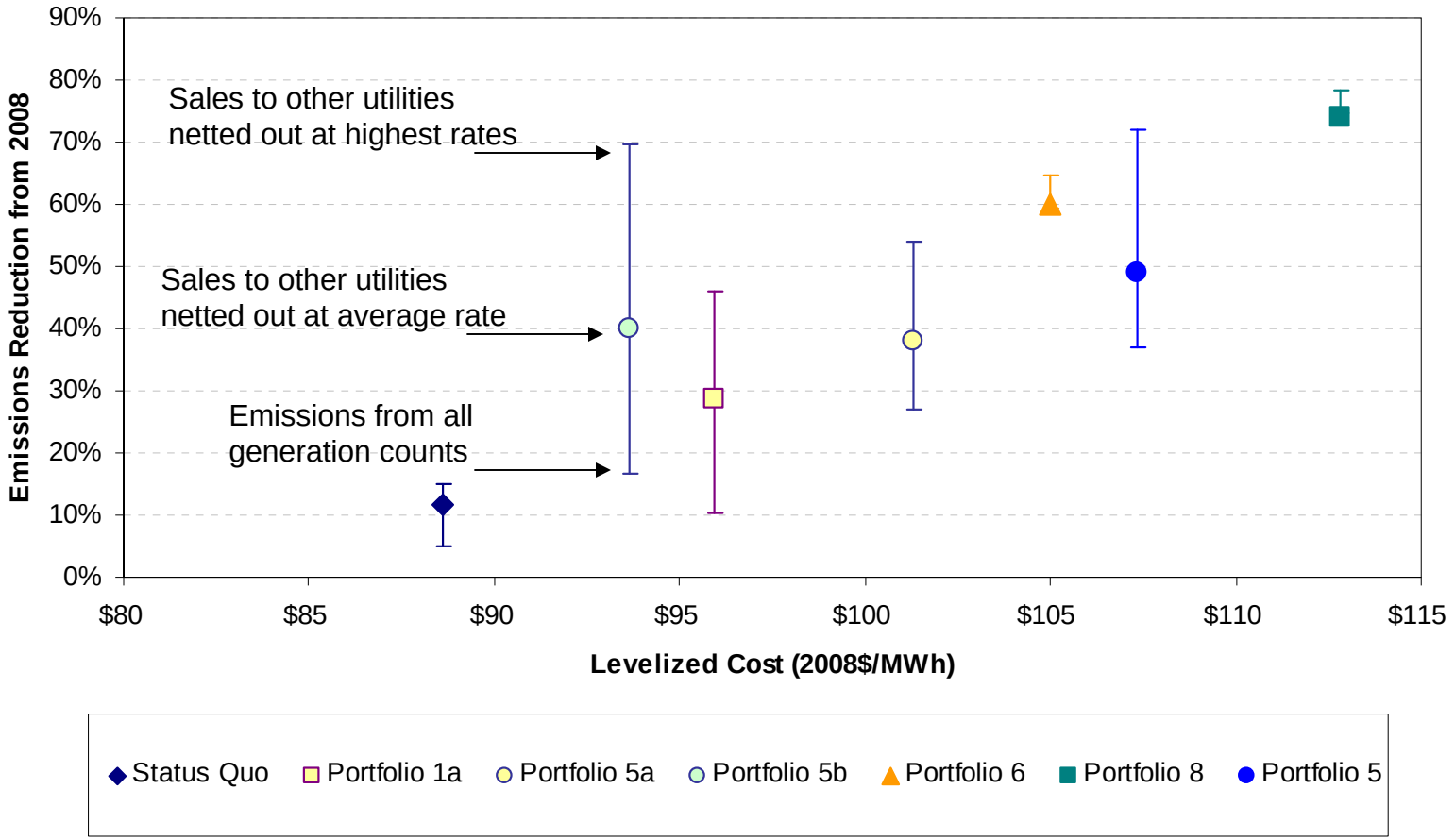
Uncertainty around IPP Sale Feasibility

Medium and high emission reduction portfolios all reliant on sale of all or part of the power generated from IPP (coal)

Zero price for sale of IPP



Accounting Uncertainty for GHG Emissions Reductions



Preferred Resource Plan Performance under Key Risks

Risk	Performance of Preferred Resource Plan
IPP Sale Feasibility Risk	•Modest risk exposure with displacement of 35 MW displacement •Higher levels of displacement (up to 100%) if feasible in the future
Load, Energy Price and Capital Cost Risk	•Exposure to market risks is comparable to other alternatives •Remains least-cost option after consideration of these risk factors
Carbon Price Risk	•Coal displacement significantly reduces exposure to carbon risk •Further risk mitigation can be pursued if necessary in the future
GHG Accounting Rules	•Moderate exposure to uncertain rules governing emissions counting •Flexibility to alter generation dispatch in response to this risk factor
Stricter GHG Emissions Constraints	•Displacement of 35 MW of IPP entitlement is significant driver of projected reductions •Further displacements up to 100% of IPP can pursued in response to more significant GHG emissions reduction requirements
Higher RPS Requirements	•Projected RPS level of 40% by 2020 exceeds expected standard •Higher levels can be achieved if necessary in the future

Near Term Action Plans

Near-Term Action Plan

- PWP should proceed with the following near-term actions in order to implement the Preferred Resource Plan:
  - **Renewable Energy Procurement:** Continue securing contracts for power from a diverse mix of new renewable energy sources, balanced among landfill gas, geothermal, wind and solar projects at levels consistent with the Preferred Resource Plan
  - **Energy Efficiency:** Continue PWP's already aggressive energy efficiency programs and evaluate improvements to energy efficiency education and incentive programs to ensure the targets can be met
  - **Load Management:** Develop demand response programs and rates to provide customers with economic incentives to reduce their peak electricity consumption
  - **Local Renewable Energy:** Develop a new "feed-in tariff" program in which PWP will offer to purchase power, at a fixed price, to any qualifying renewable energy project within the City in order to facilitate the development of local renewable energy sources
  - **Solar PV:** Evaluate innovative new financing approaches and electric rate structures in order to spur more PWP customers to install solar photovoltaic projects inside Pasadena

Near-Term Action Plan (continued)

- PWP should proceed with the following short-term implementation steps in order to implement the Preferred Resource Plan:
  - **New Local Generation:** Pursue the necessary plans, approvals and permits to facilitate development of a new 65 MW gas-fired combined cycle generating unit and retirement of the Broadway 3 unit by 2014
  - **Existing Generation Upgrades:** Pursue the implementation of necessary capital investments in Glenarm 1&2 in order to extend their operating lives for at least the next 20 years
  - **IPP Displacement:** Pursue arrangements to remove at least 35 MW of IPP power by 2016 and evaluate the feasibility of further displacement beyond that level
  - **Transmission Evaluation:** Complete the pending evaluation of long-term alternatives to improve the PWP interconnection facilities and transmission system and update the Preferred Resource Plan as necessary

Next Steps

- Planned Schedule for Remaining IRP Process
  - January 23: Advisory Group Meeting #6
  - January 24 (Saturday): Public Meeting #4
  - February 9: Written Comments due on Draft Report
  - Late February: Presentations and Requests for Support from EAC and MSC
  - March: Request City Council Approval