2013 Integrated Resource Plan

October 10, 2013

Phillip Popoff
Manager, Integrated Resource Planning

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PSE 2013 IRP Agenda

Introduction and Key Findings

Electric IRP Overview

- Resource Needs
- Resource Plan
- High Level Process & Assumptions
- Results

Colstrip in IRP

Gas IRP Overview

Next Steps

Key Findings

Northwest Energy Markets Changing

- Dwindling Regional Capacity Surplus Will Impact PSE
- Increasing Intermittent Resources Change Market Dynamics

Increasing Reliance on Natural Gas Flexibility

- Upward Pressure on Gas Prices
- Infrastructure May Become Challenged

Least-Cost Resource Plans

- Conservation, Renewables, Peakers for Reliability
- Similar Trends Across Nearly All Future Scenarios

Uncertainty For Coal Industry

- Savings To Customers from Operation of Colstrip Are Significant
- Planning for Possibility of Needing to Replace Colstrip Still Important

Changing Regional Load-Resource Balance

Region Historically Surplus Energy and Capacity

PSE Heavily Dependent on Market for Capacity

- ~1400 MW of Firm Transmission to Short-Term Market for Peak Capacity
- ~23% of Capacity Need

Region Short 2000 MW of Firm Capacity by 2022

- (See Appendix I)

IRP Update Planned for Q4 2013

- Focus on Short-Term Market Reliance for Capacity

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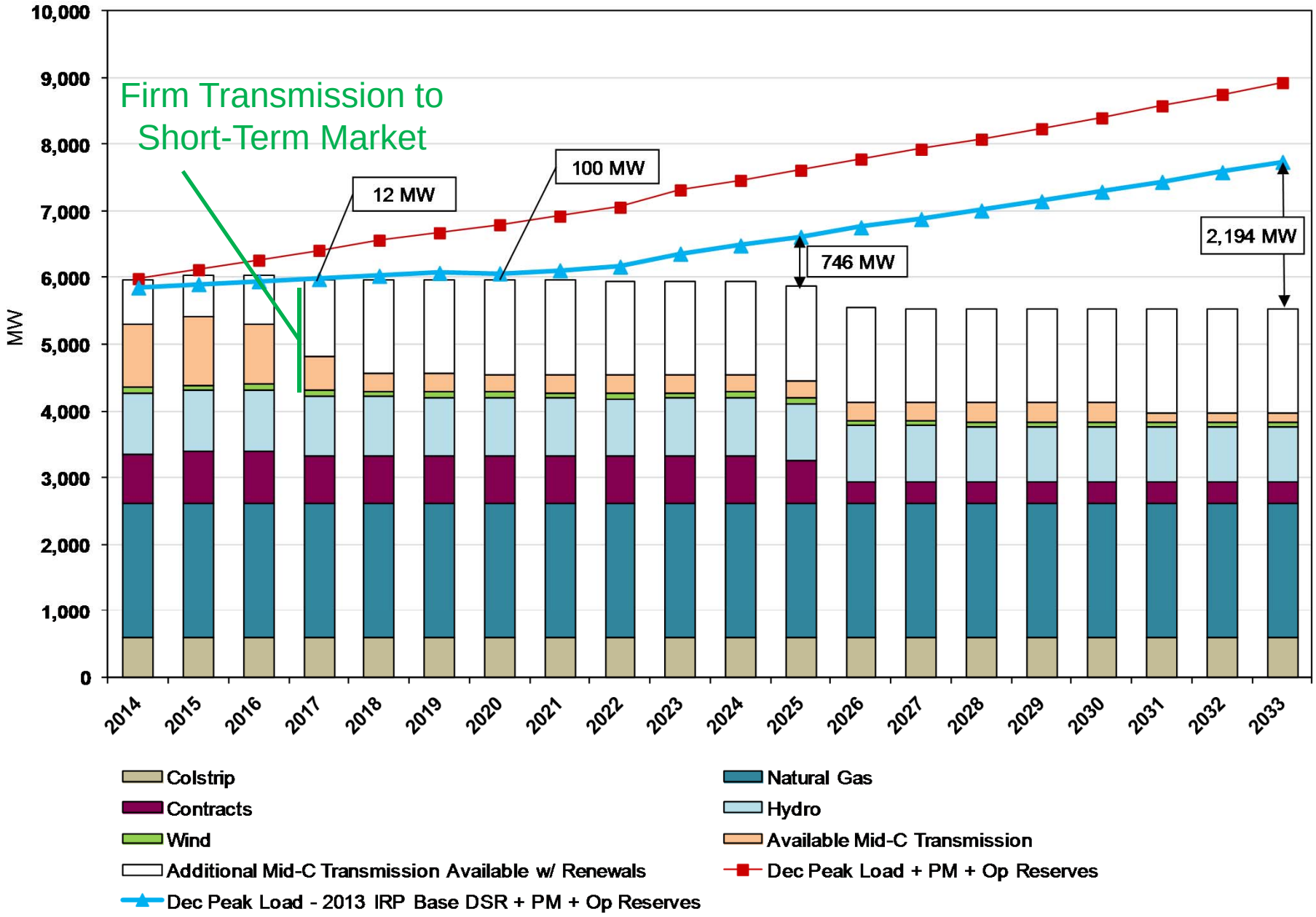
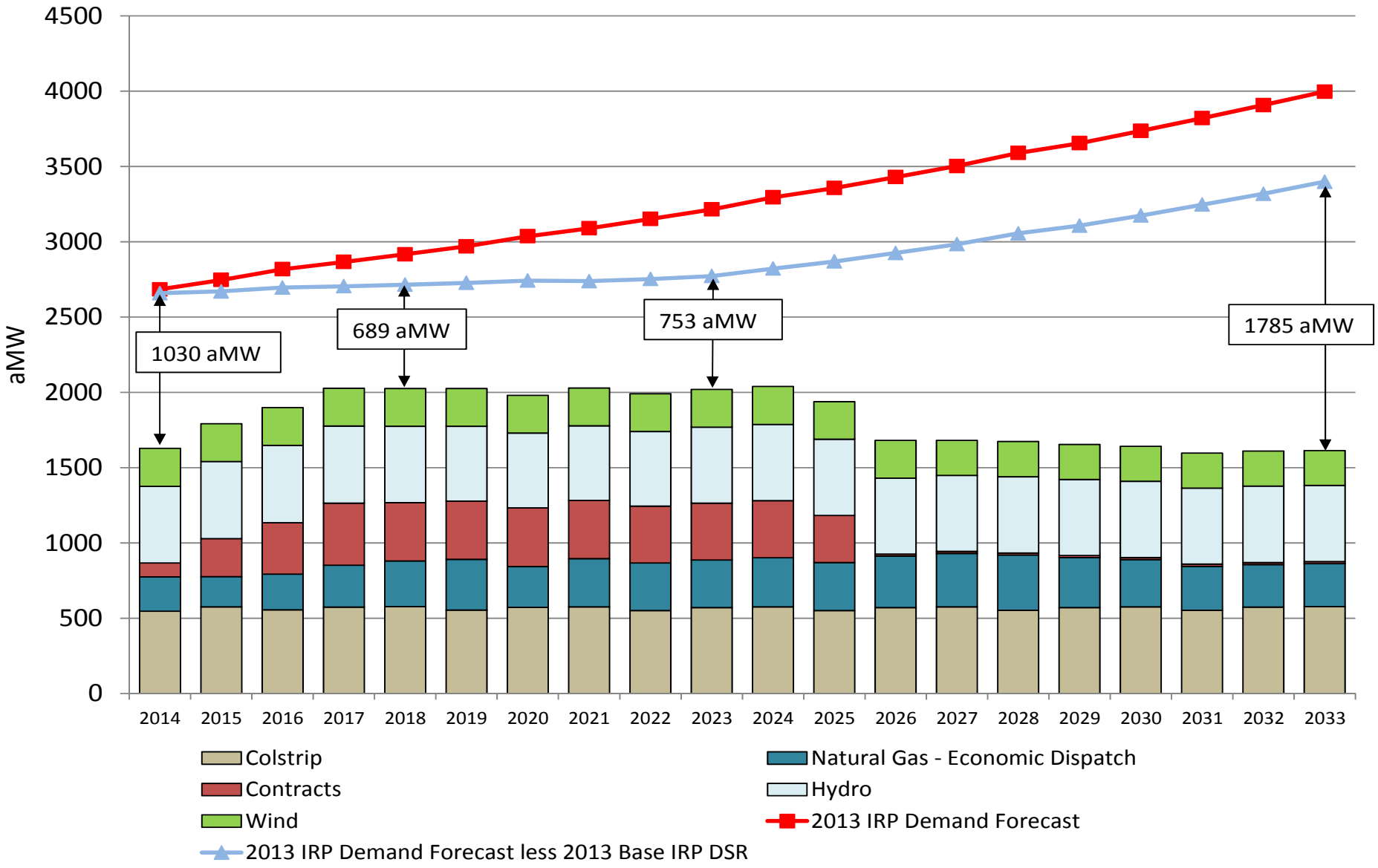
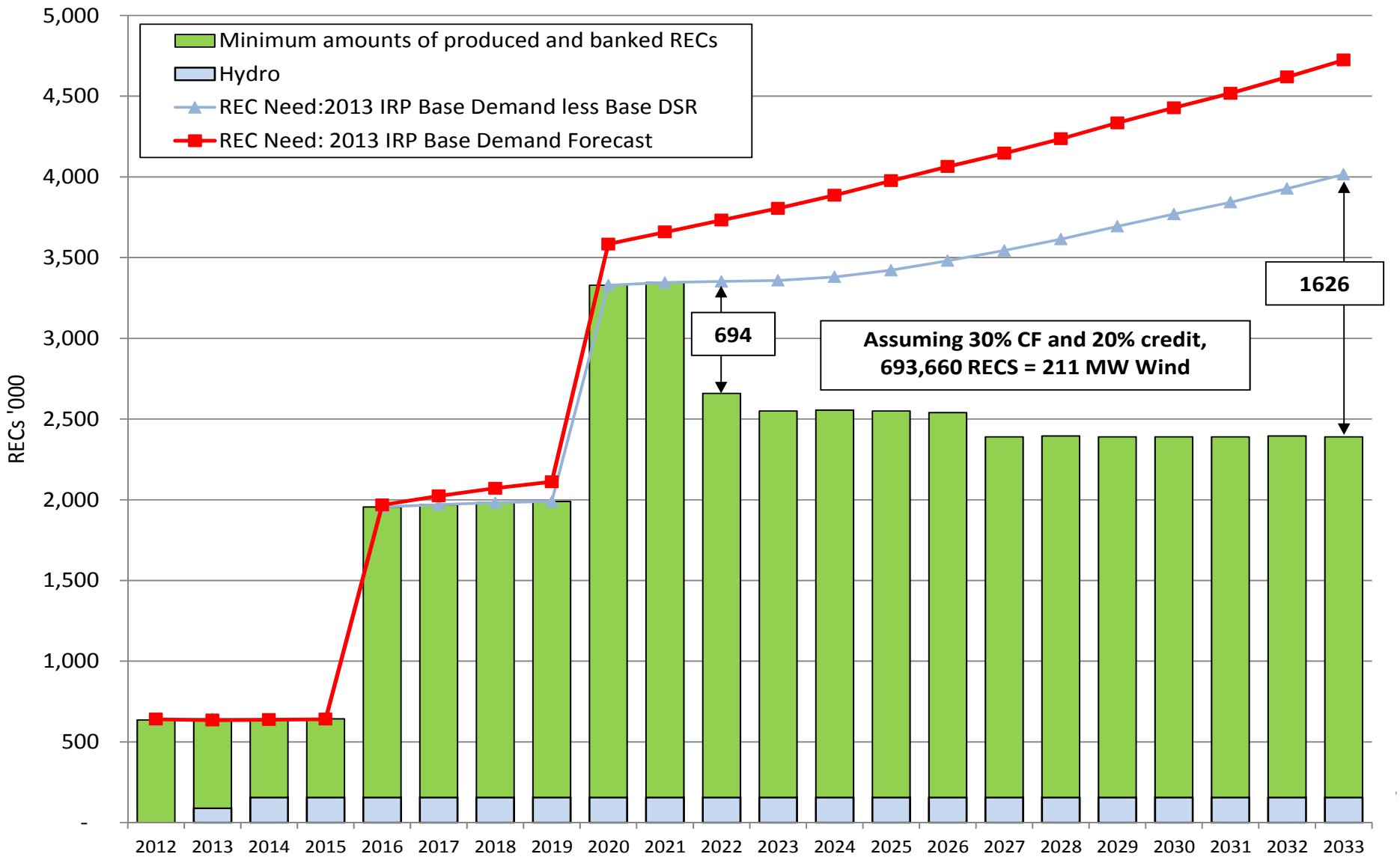
Winter Peak Capacity Need (MW)



Annual Energy Position in aMW: 2013 IRP



Renewable “Energy” Need-Incl. Banking



Electric Resource Plan-Resource Additions

	2017	2023	2027	2033
Demand-Side Resources (MW)	327	800	887	1,007
Wind (MW)	0	300	500	600
Peakers (CT in MW)	221	442	1,327	2,212
Transmission Renewals (MW)	1,141	1,407	1,407	1,567
Gas Storage (MDth/day Gas)	100	100	100	150

Figure 1-4, p. 1-8

Direction for Electric Resource Plan

- Energy Efficiency: Continue Accelerated Acquisition of Demand-Side Resources
- Renewables: Forward Acquisition Has PSE Ahead-More by 2022
- Reliability: Peakers Rather Than Base Load Gas Plants
- Fuel Supply: Storage Increasingly Important for Generation

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Interpreting “The Plan”

Range of Least-Cost Plans Across 30+ Scenarios by 2023

	At Least	Expected	As Much As
Conservation	798 MW	800 MW	800 MW
Wind	200 MW	300 MW	400 MW
*-Peakers	0 MW	442 MW	1,106 MW

Colstrip Wild Card…

If Colstrip is Out of Portfolio: +663 MW of Peakers

*Note: Each Peaker is 221 MW

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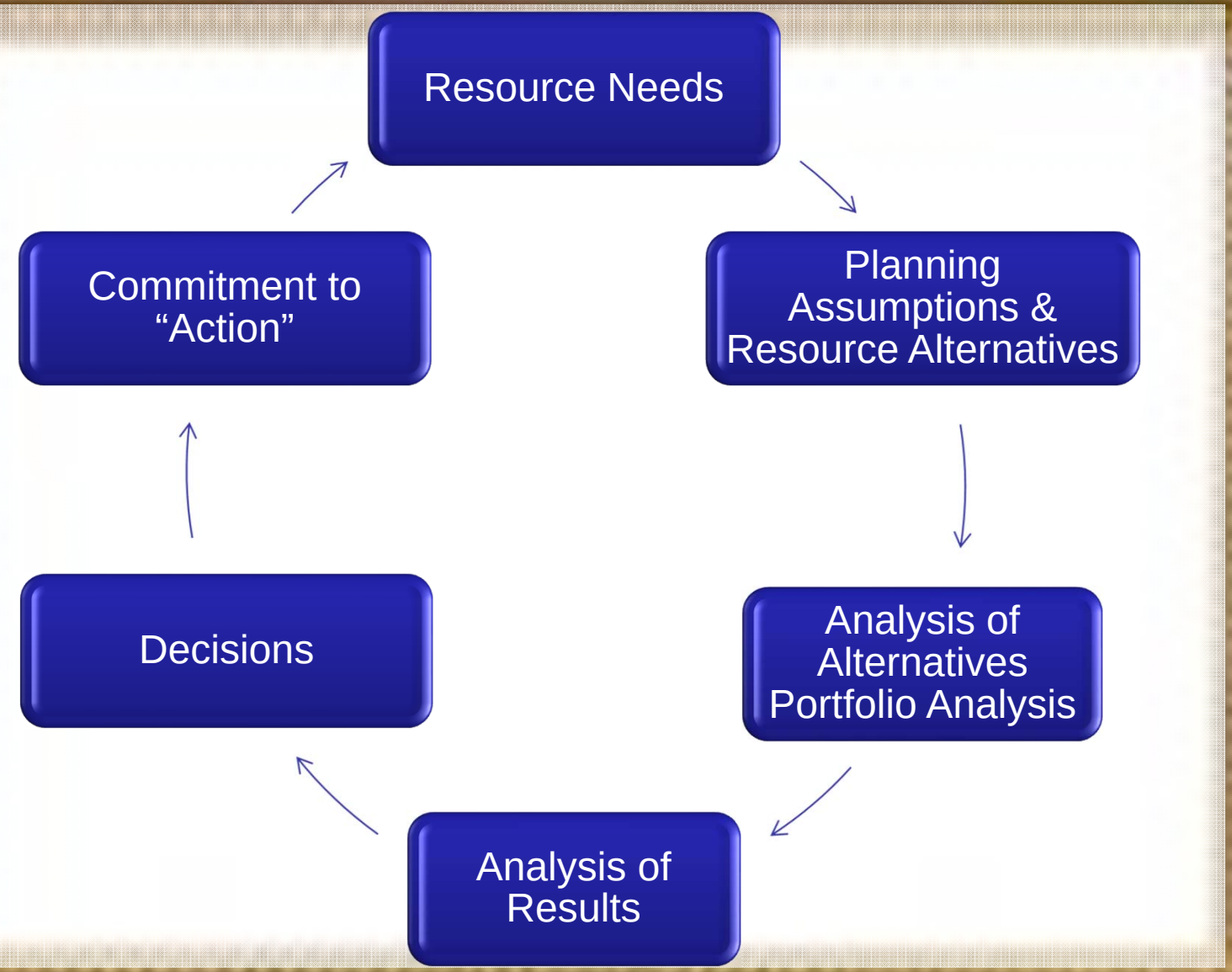
Regulatory Compliance



Stakeholders

Market Outlook

Customer Needs

Two Categories of Uncertainty…

Resource Needs

-Peak Capacity
-Energy
-Renewable “Energy”
-Flexibility

Relative Value of Resources

-Demand-Side
-Peakers: CT & Recip
-Gas CCCT
-Transmission + Market
-Wind/Biomass
-Mid-Term Contracts
-Hydro
-Storage
-PSE Transmission
-Solar/Emerging?
-Gas Pipeline
-Gas Storage

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2013 IRP: Scenarios/Sensitivities/Cases

Market Scenarios

- Base: Mid Load, Mid Gas Price
- Base + Low Gas
- Base + Very Low Gas Price
- Base + Very High Gas Price
- Base + Low CO_2 Cost
- Base + High CO_2 Price
- Base + Very High CO_2 Cost
- Low: Low Load, Low Gas Price
- High: High Load, High Gas Price
- High + High CO_2 Price

Portfolio Sensitivites

- Peaker Type – CT vs Recip
- CT With and Without Oil Back-up
- Location: East/West Cascades
- DSR Acquisition /Ramp Rates
- Colstrip Forced Replacement
- Replace Colstrip with MT Wind
- RPS + 300MW Wind

~48 Deterministic Portfolio Analyses

Colstrip Environmental Compliance Cases

- Case 1–Low Cost: Regional Haze Less Costly Technology Solutic.
- Case 2–Mid Cost: Regional Haze Realistic Estimate of EPA Technologies
- Case 3–High Cost: Case 2 + CCR Hazardous w/Offsite Disposal @ $8/ton
- Case 4—Very High Cost: Case 2 + CCR w/Offsite Disposal at $24/ton

Stochastic Analyses: 250 – 1000 Draws

- Reflecting Market/Load Uncertainty
- Plus CO_2 Policy Risk

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Range of Levelized Sumas Gas Prices With Carbon Costs

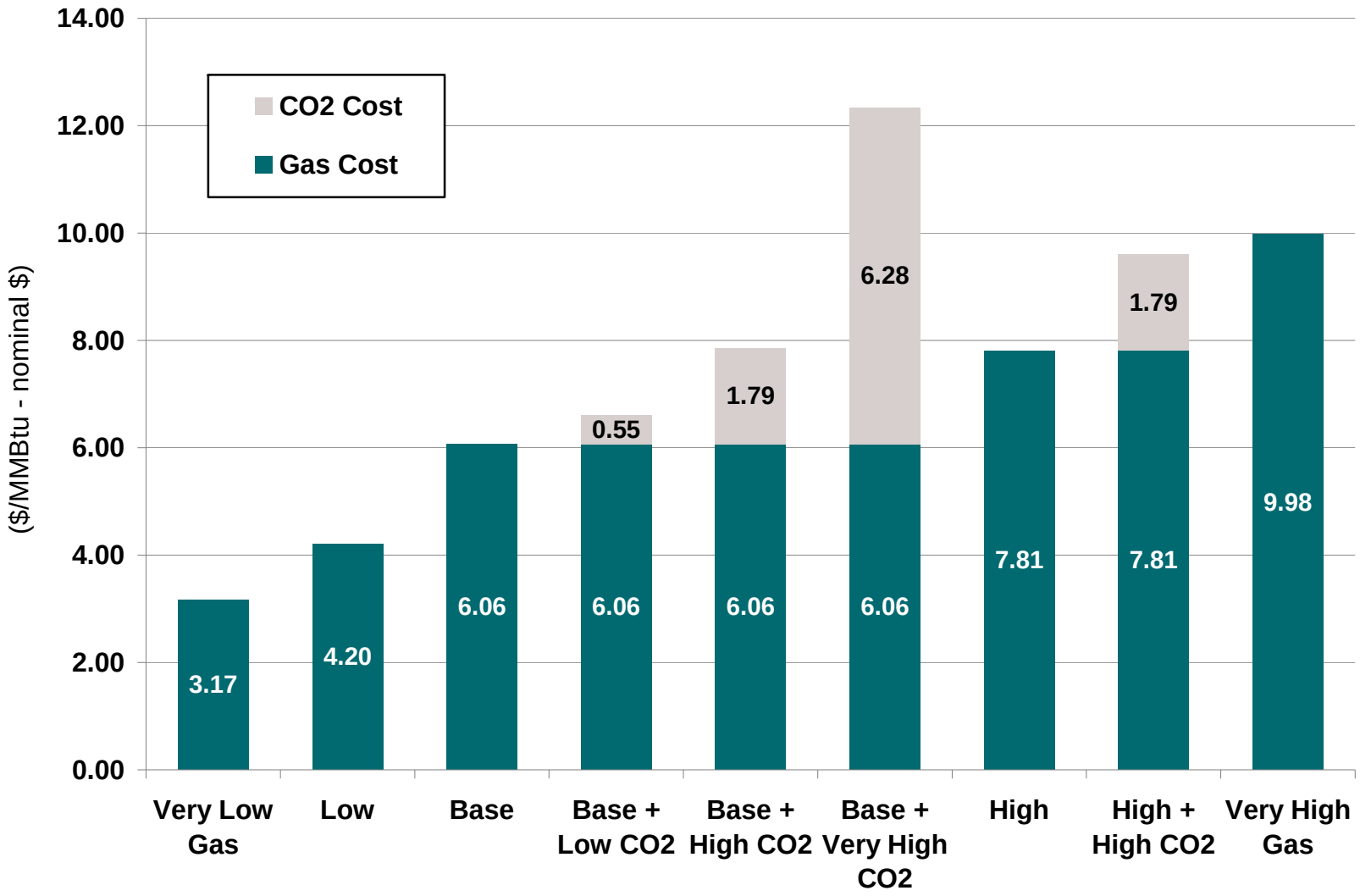

Figure 4-6, p. 4-7

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Range of CO2 Cost/Price Assumptions

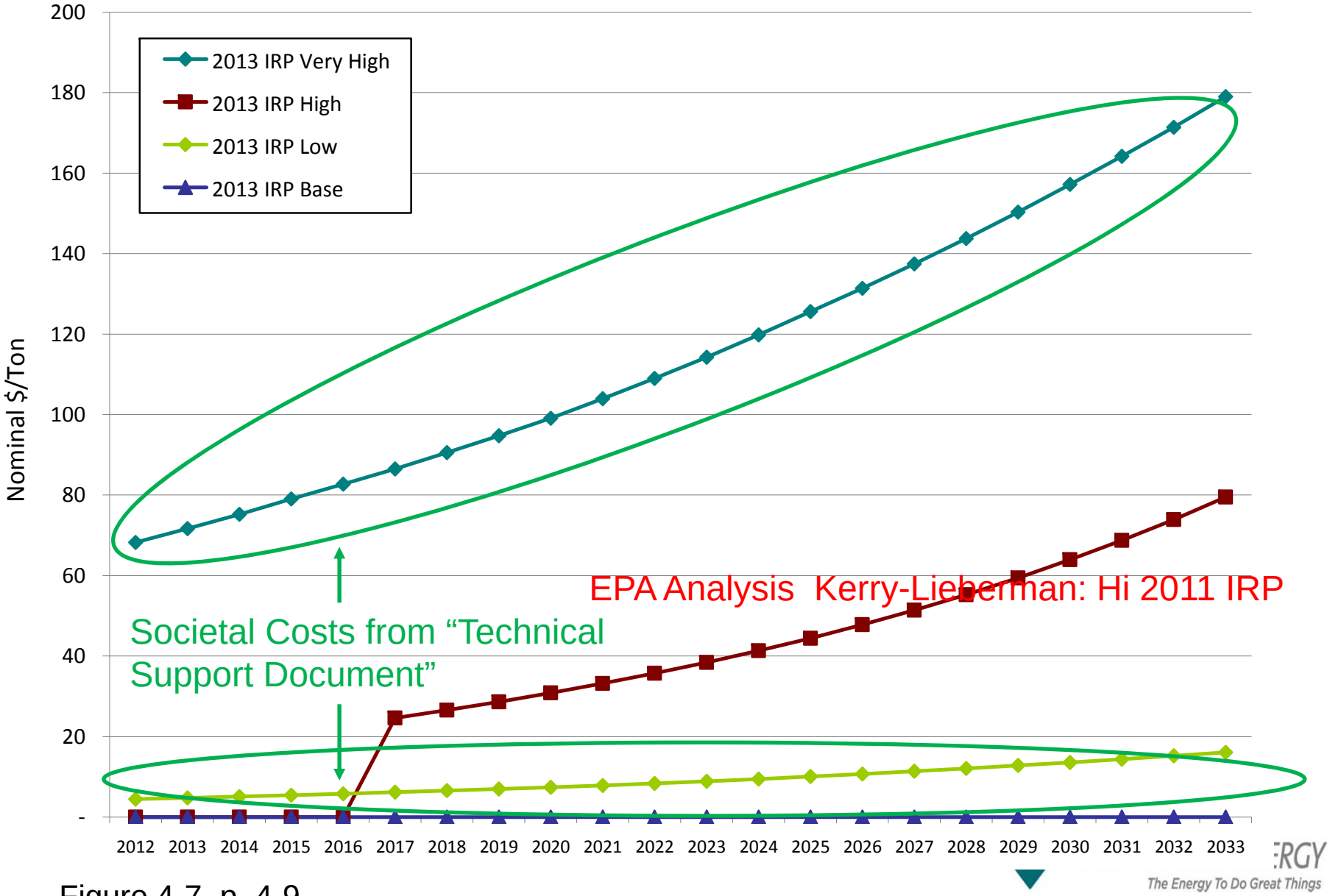

Figure 4-7, p. 4-9

Avg Annual Mid-C Power Prices

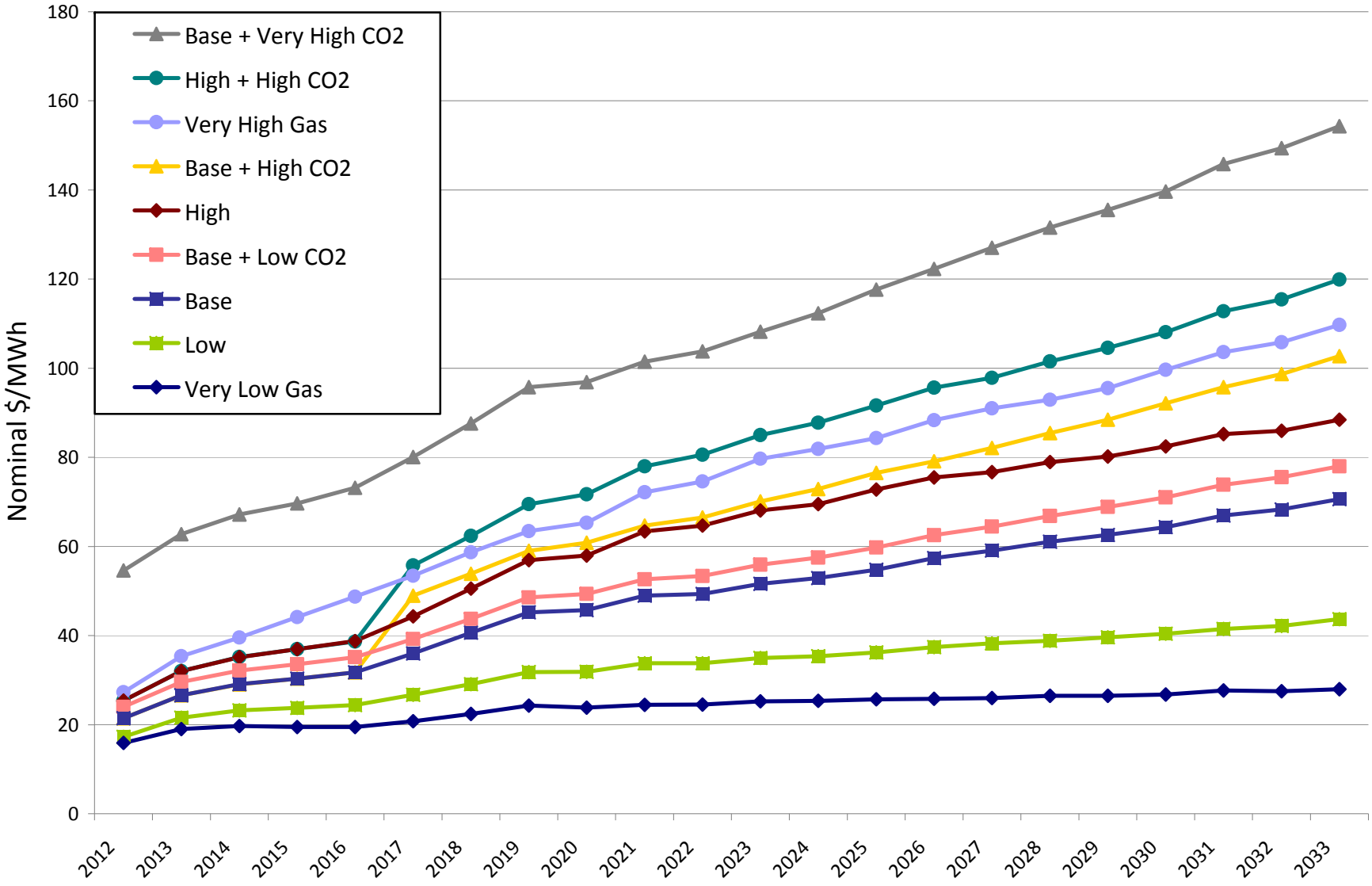

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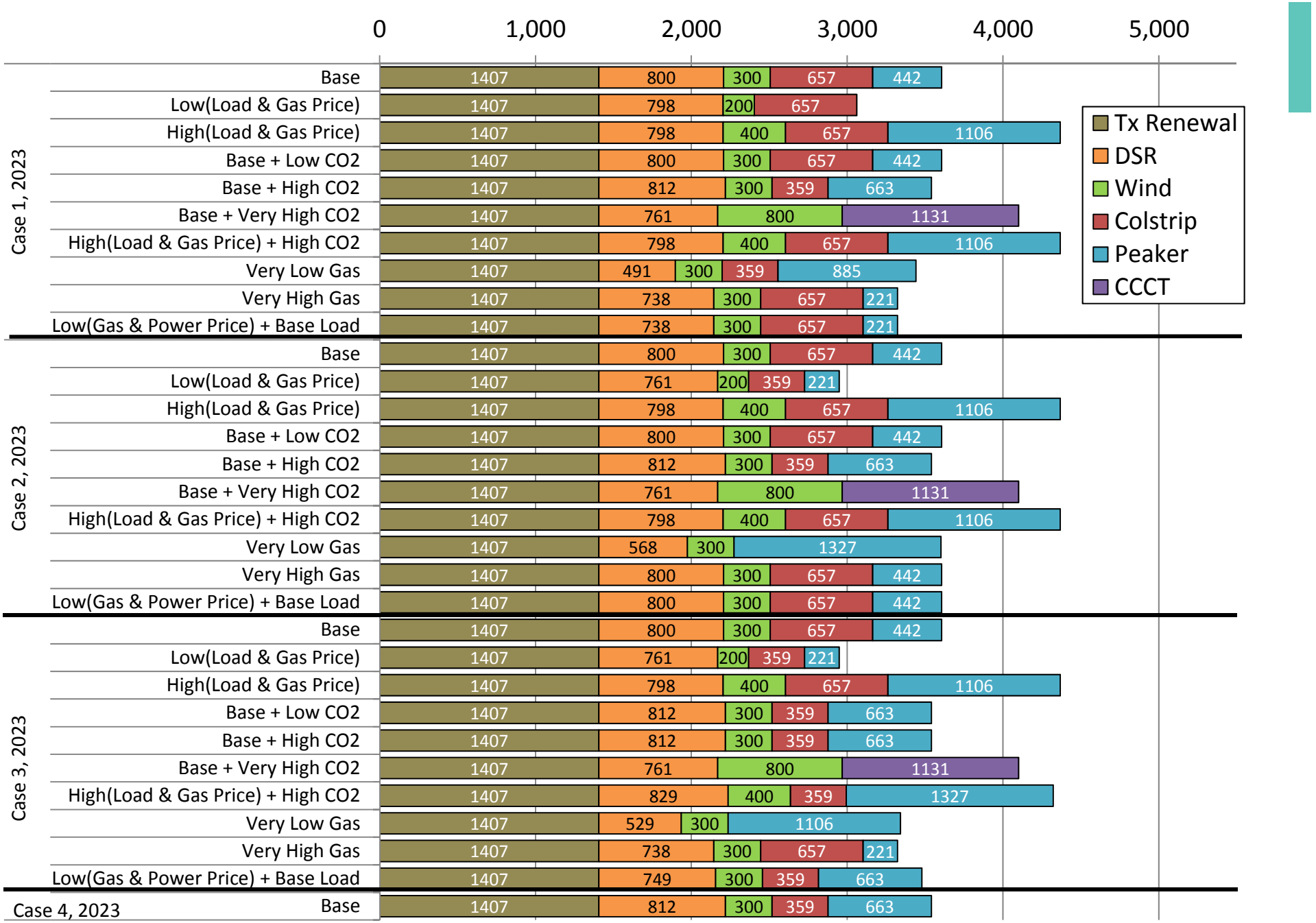
Figure 4-8, p. 4-21



Re-ordered Figure 2-2, p. 2-4 (IRP Figure Left Out Three Scenarios from Case 2)

Things

Long-Term Portfolio Costs Uncertain

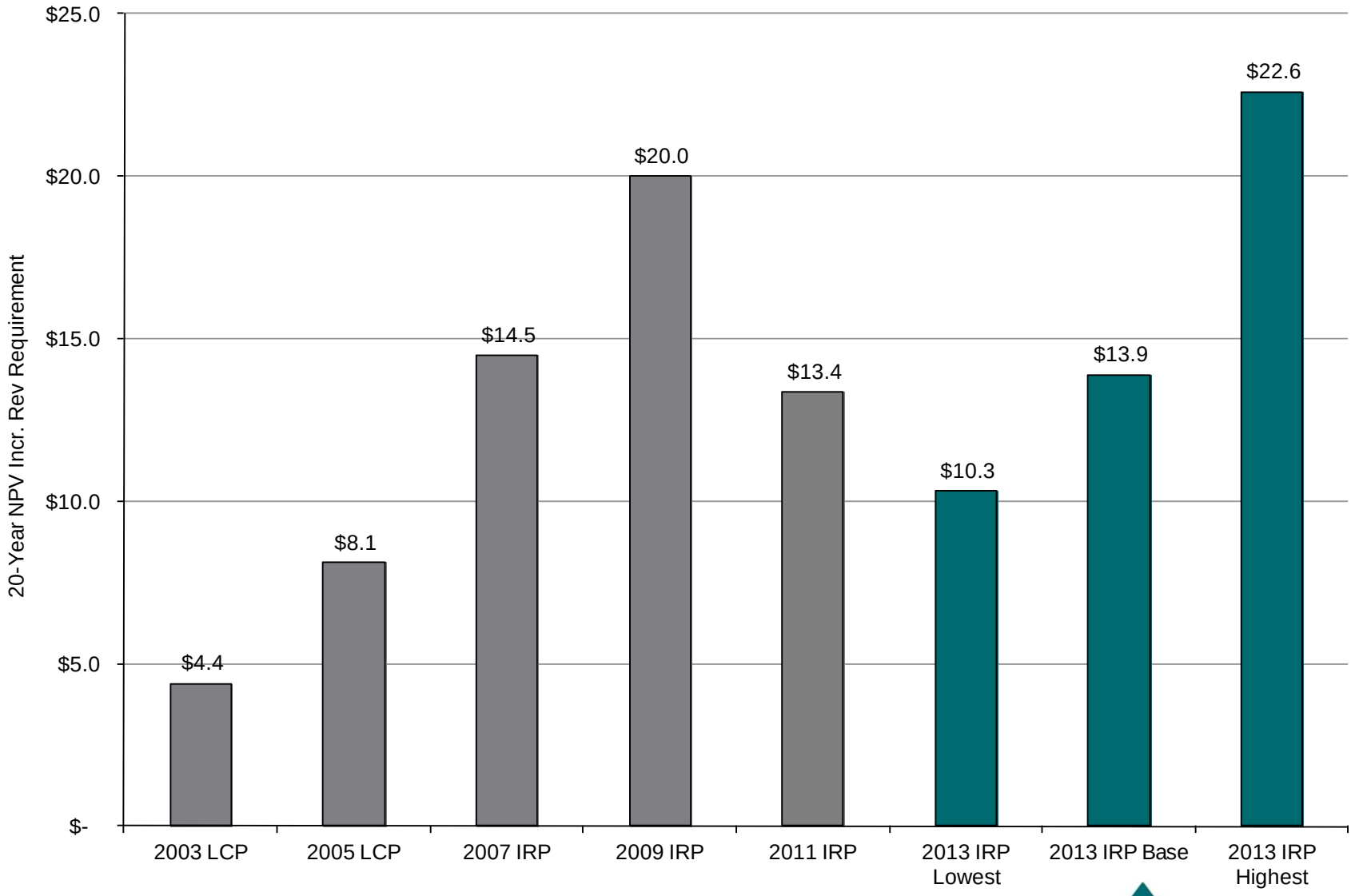


Figure 1-5, p. 1-11

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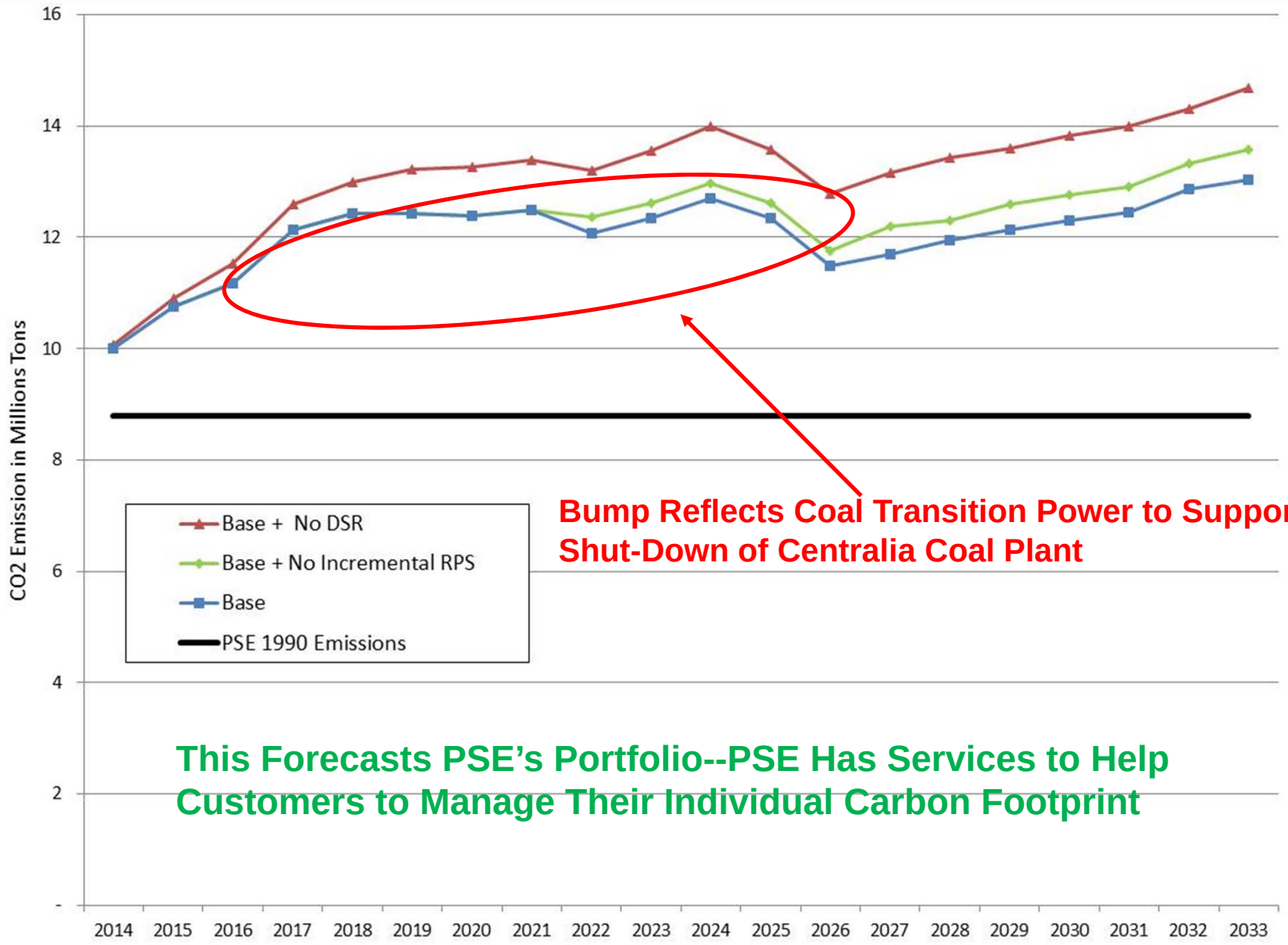
Projected CO_2 Emissions Trending Up Under Existing Policies



Bump Reflects Coal Transition Power to Support Shut-Down of Centralia Coal Plant

This Forecasts PSE's Portfolio--PSE Has Services to Help Customers to Manage Their Individual Carbon Footprint

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Electric Action Plan

- Pursue Cost Effective Demand-Side Resources
- Develop Strategy to Address Reliance on Market for Capacity in the Intermediate to Long-Term
  - Update to IRP in 4th Quarter 2013
- Align Timeline for Resource Acquisitions With Timeline Needed for Infrastructure
- Pursue Prudent Gas Storage Acquisitions for Generation
- Revise Stakeholder Process to Clarify Roles and Expectations & Provide Greater Transparency

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Colstrip in IRP

Gas IRP Overview

Next Steps

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2013 IRP: Overview Colstrip Analysis

- Summary Results and Conclusions
- Overview of Colstrip: Plant and Commercial Arrangements
- Analysis Performed
- Results

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Colstrip: Conclusions in This IRP

Colstrip Significantly Reduces Cost and Cost Risk for Customers

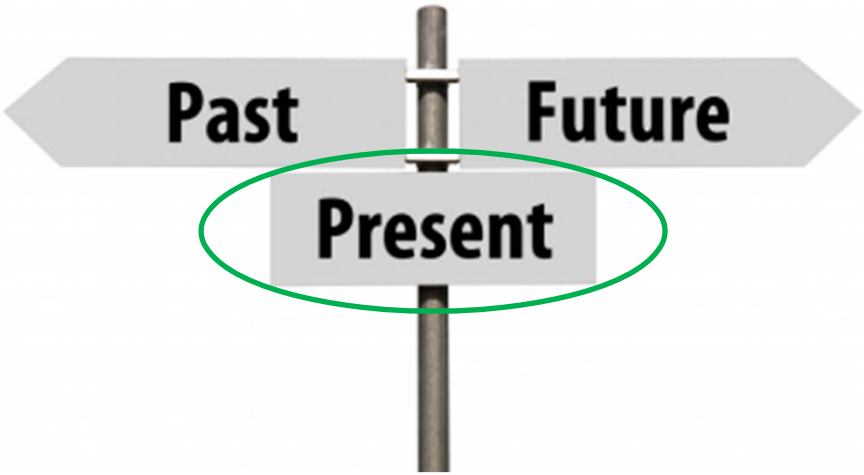
- Including Consideration of Future Carbon Regulation
- Premature to Begin Developing Replacement Resources

May Change in Future

- IRP Comprehensively Studied Potential Risks

Planning For Replacement

- Peakers for Reliability and Market Energy As Needed Across Most Scenarios



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Colstrip: What's in The IRP

Purpose of IRP Analysis

- Broad Examination of Cost of Continuing Operation at Colstrip, Including Range of Anticipated Costs Associated with EPA Regulations
- Understand Factors That Could Render Colstrip Uneconomic
- Understand Impact of Existing Policies

Purpose is to Plan

- What If Policies/Market Conditions Change Unexpectedly?
- What Would Be Least Cost Resources to Replace Colstrip?

IRP is Not A "Decision" To Keep Colstrip Running

Colstrip: Overview

Plant Overview: Details in Appendix J

- Units 1&2, Each 307 MW—PSE 50% Ownership
- Units 3&4, Each 740 MW—PSE 25% Ownership
- PSE is Not Plant Operator

Ownership Agreement Summarized in Appendix J

- Much More Complicated Than Boardman or Centralia
- PSE Contractually Obligated to Pay Its Share of Operating Costs
- PSE Obligated to Take Its Share of Plant Output
- PSE Cannot “Retire” Its Portion of Colstrip Units Unilaterally

Colstrip: What Was Analyzed

Examined Broad Range of Future Colstrip Costs Across Broad Range of Possible Market/Policy Scenarios

- Focus on Replacement Costs
- Four Colstrip Cases: Based on Different Potential Regulation Costs
- 41 Market Scenarios: Loads/Gas Prices/CO2 Prices-Costs
- Deterministic and Stochastic Analyses

Colstrip Costs Included

- Units 1&2 Modeled Separately From Units 3&4
- Base-Level Capital Expenditures
- Variable Operating Costs
- Opportunity Cost of Transmission Based on Timing of Contracts

Colstrip Costs Not Included

- Decommissioning and Remediation Costs: Requirements Not Yet Defined
- Unamortized Capital: No Acceleration/Change
- Impact: Full Cost Impacts to Customers Higher Than Modeled in IRP

4 Colstrip Environmental Compliance Cases

- **Low Cost Case (Case 1):** Based on achieving compliance using existing, installed equipment with a minimum of modifications or additions of equipment.
- **Mid Cost Case (Case 2)**: Includes the cost for addition of equipment that may be needed to assure compliance and is largely based on the analysis of Unit 1 & 2 equipment identified by the EPA's Regional Haze FIP.
- **High Cost Case (Case 3)**: Additional costs for new equipment to meet future requirements and is based on CCR being determined to be hazardous.
- **Very High Cost (Case 4)**: Based on Sierra Club letter. Assumes all Case 2 costs plus it triples the hazardous waste disposal costs included in Case 3 and it accelerates the schedule for meeting other requirements.

See Appendix J, p. J-14 to J-23

Colstrip: Analysis Performed

Portfolio Analysis

- Least Cost Combination of Resources Given Resource Alternatives and Possible Future Conditions
- Stochastic Analysis in Base and With Risk of Future Carbon Policies
- Included Possible Carbon-Price Scenarios

Studied Key States of World for Colstrip

- 1-All Four Units of Colstrip Continue Operation
- 2-Units 1&2 Replaced in 2017, While 3&4 Continue Operation
- 3-All Four Units Need to be Replaced by 2017

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Colstrip: Summary Results and Conclusions

Savings to Customers From Colstrip Significant

- Units 1&2: $55 Million in Savings/Year—2% Rate Increase
- Units 3&4: $76 Million in Savings/Year—3% Rate Increase
- Colstrip Total: $131 Million Savings/Year—5% Rate Increase
- ***NOTE: Savings Reflect Only Replacement Costs***

"Near Term" Expenditures Not Long-Term Cost Risk for Customers

	***Incremental Capital Expenditure for Case 2 (by 2017)**	**Annual Savings Given Case 2 (start 2018)**	**Simple Pay Back (in Years)**
Units 1 & 2	$70 Million	$55 Million/Yr	1.3

Unit 3 & 4 Significant Expenditures More Than 10 Years Out

- Incremental Expenditures 2026 & 2027: $190 Million
- Cumulative Savings 2028-2030: $370 Million

*--See Appendix J, p. J-19

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Colstrip Results Across Scenarios-(All Scenarios)

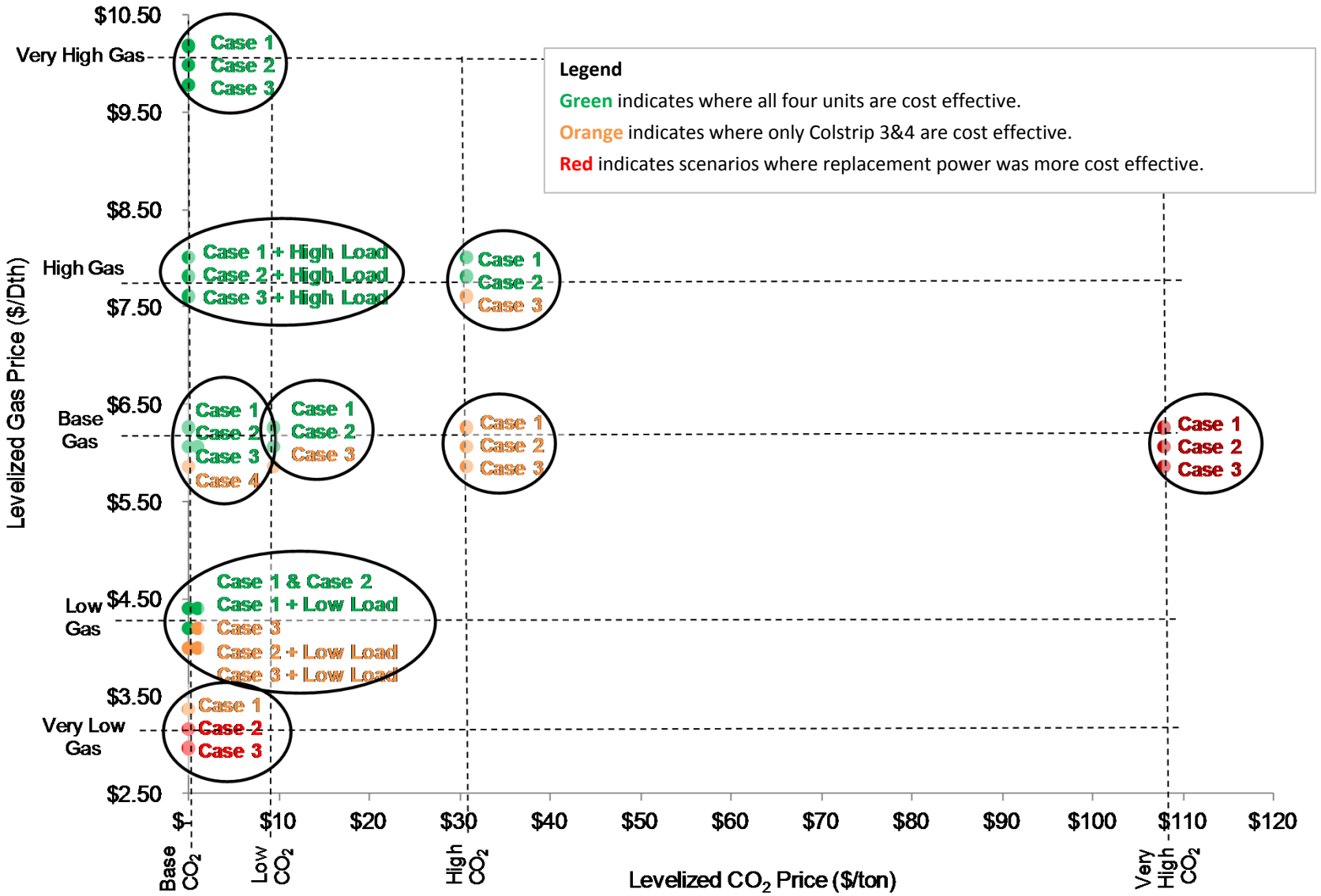

Figure 5-23, p. 5-47

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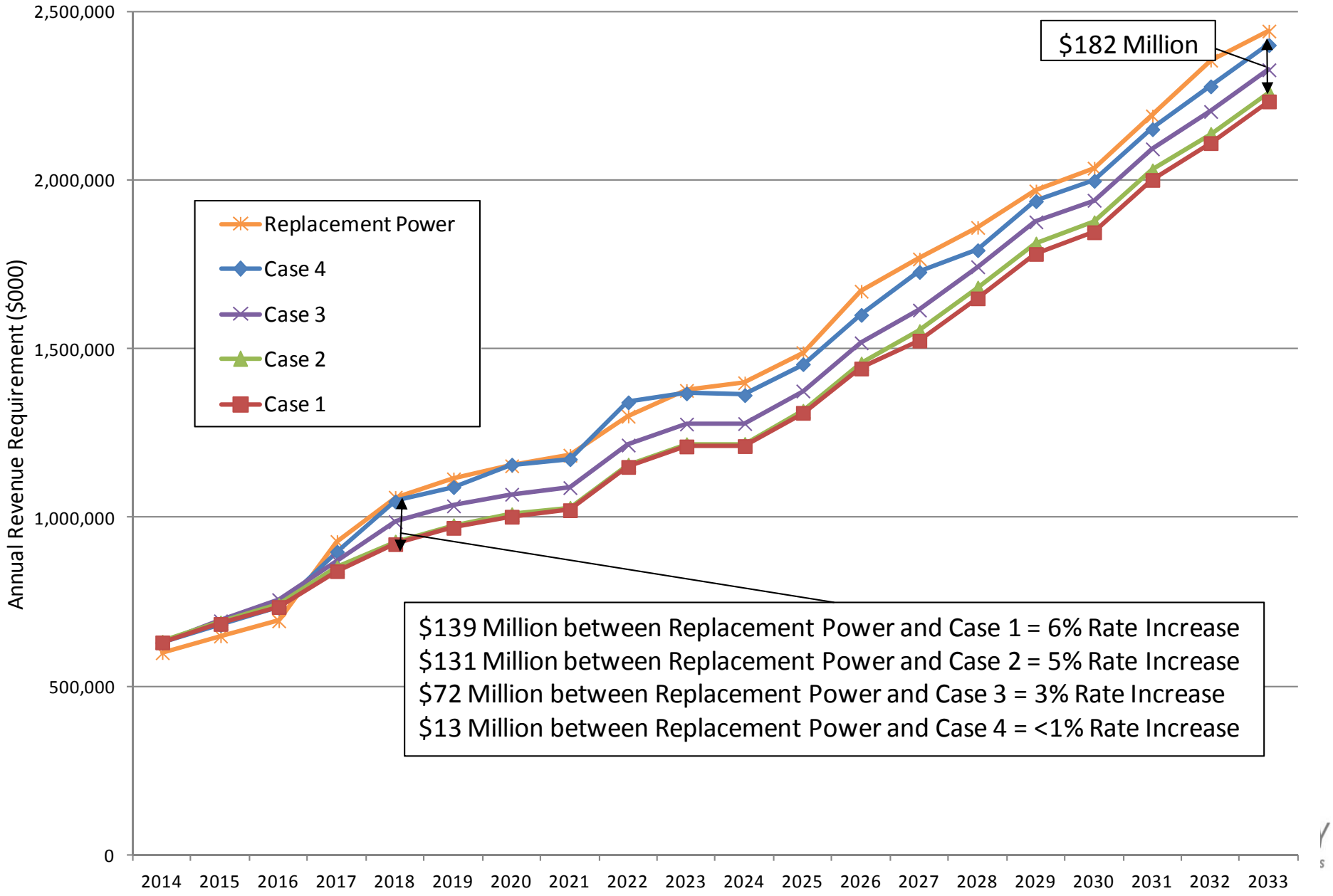
Colstrip Results-Savings in Base Scenario



Wide Range of Savings in Base Scenario for Case 2

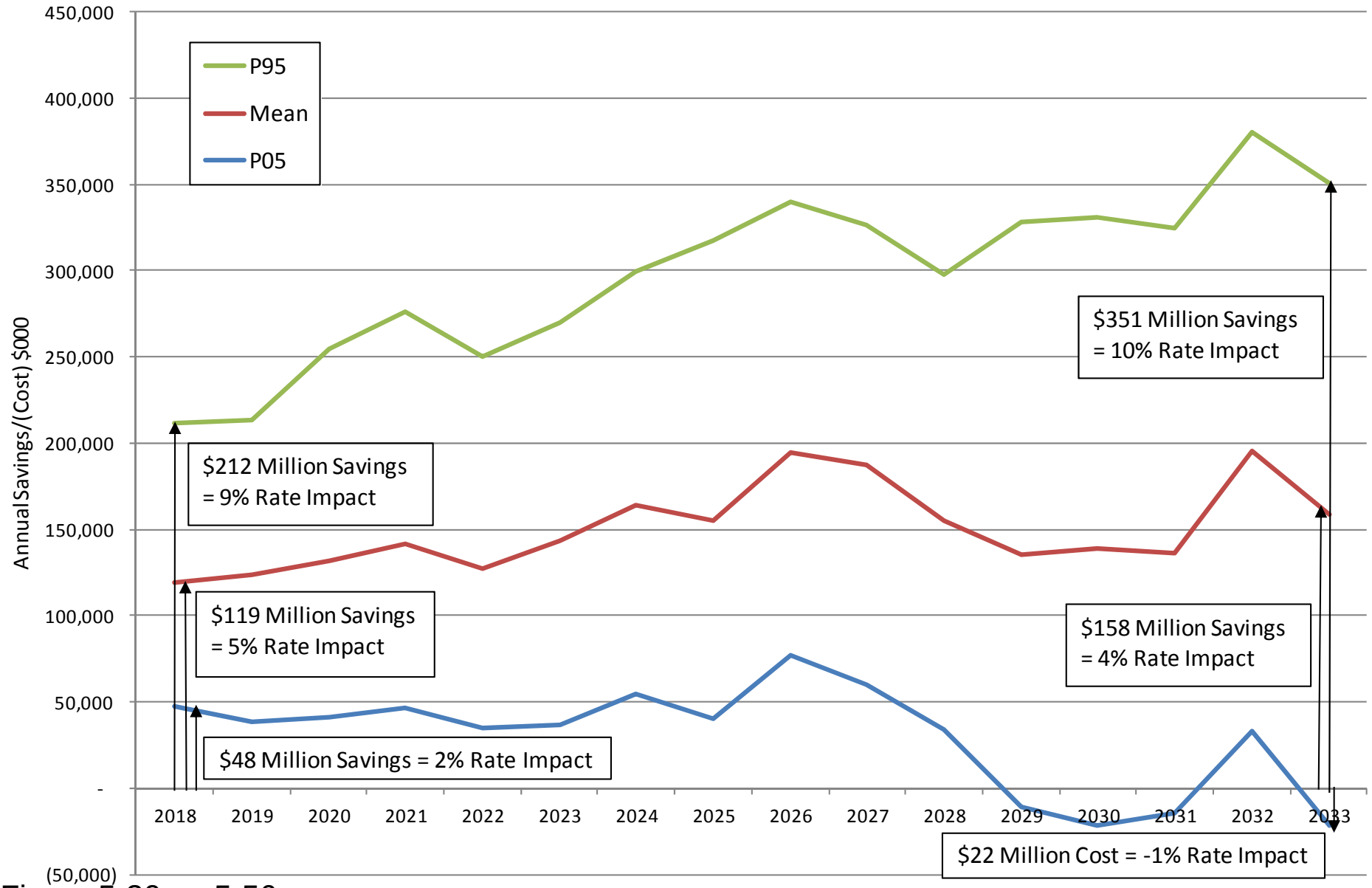
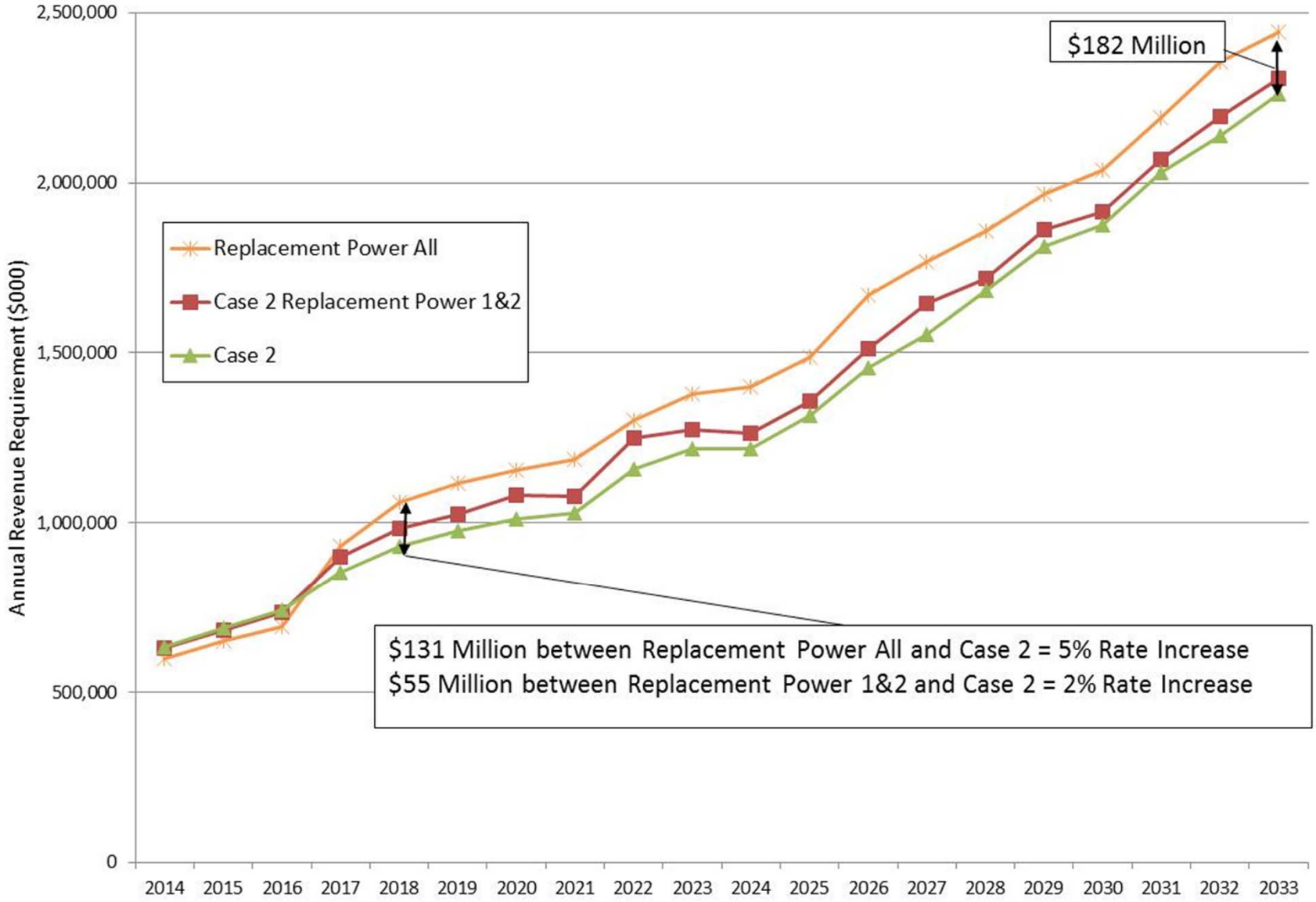


Figure 5-30, p. 5-56

Colstrip 1 & 2 Savings Significant

Annual Incremental Revenue Requirement for Base Scenario, Case 2



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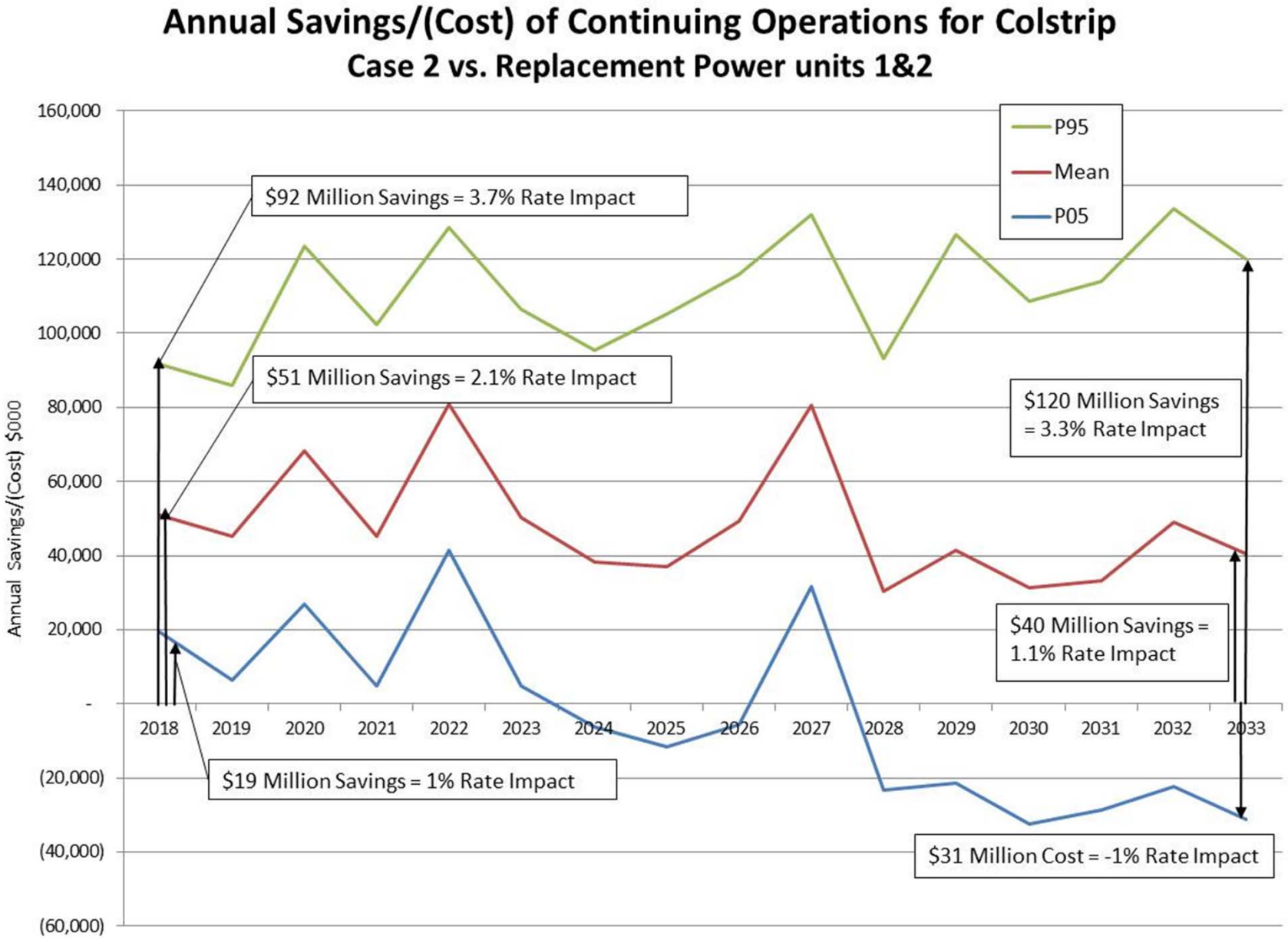
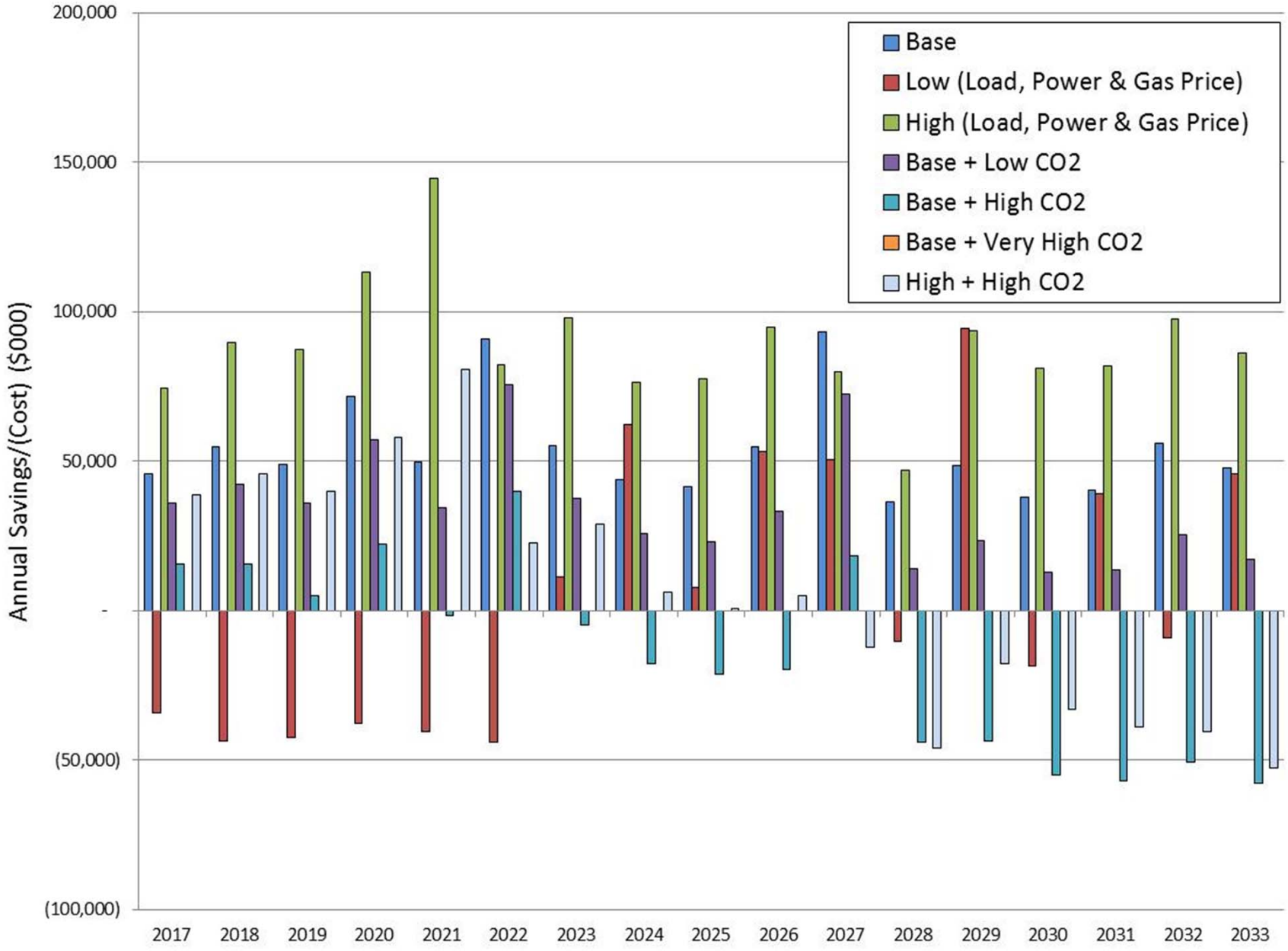
Wide Range of Savings in Base Scenario



Annual Savings/ (Cost) of Continuing Operations of Colstrip Units 1 & 2 for Compliance Case 2 under all Scenarios



Colstrip Reduces Cost & Risk Even With Carbon Price Risk

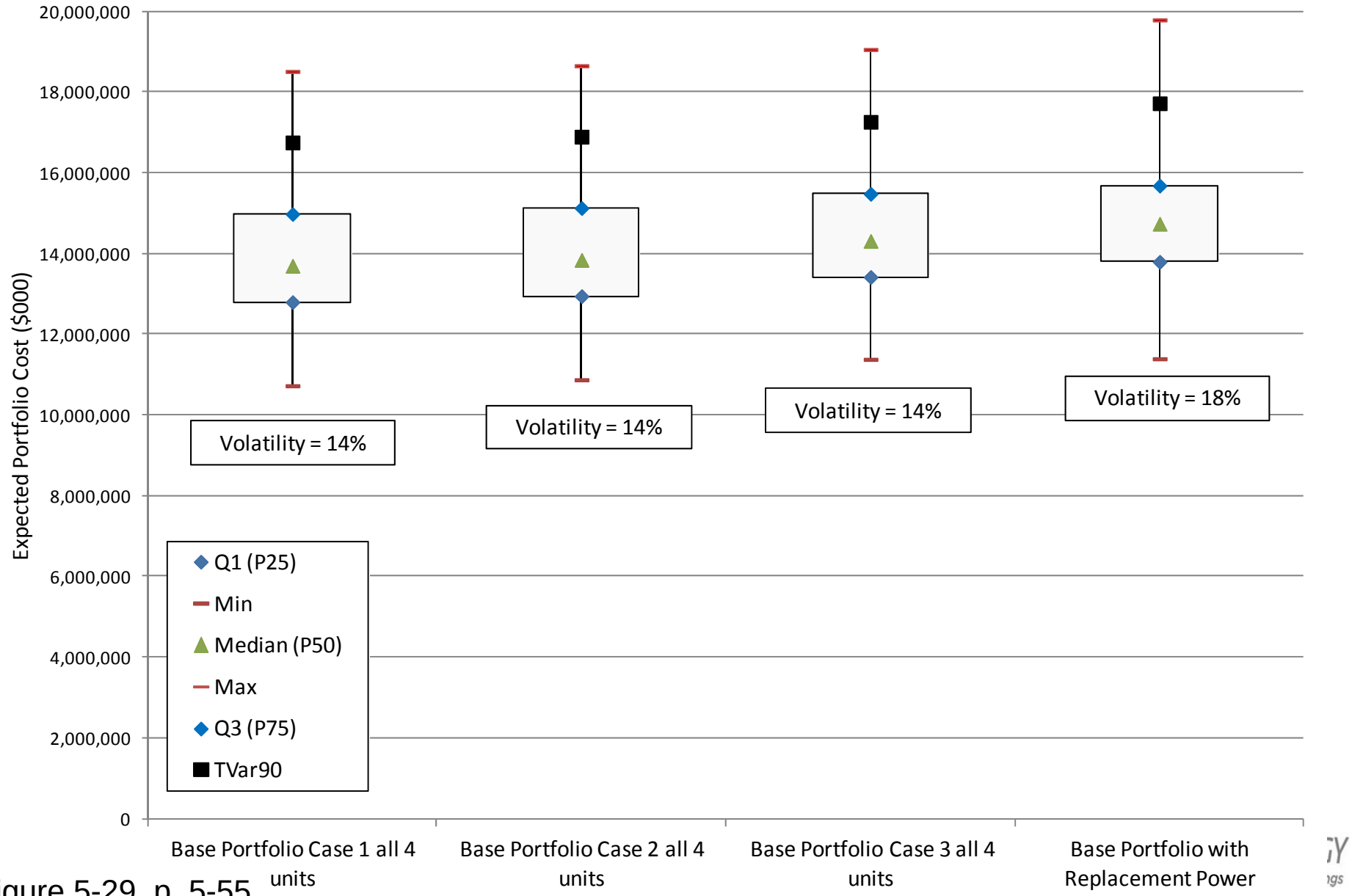


Figure 5-29, p. 5-55

Colstrip: Conclusions in This IRP

Colstrip Significantly Reduces Cost and Cost Risk for Customers

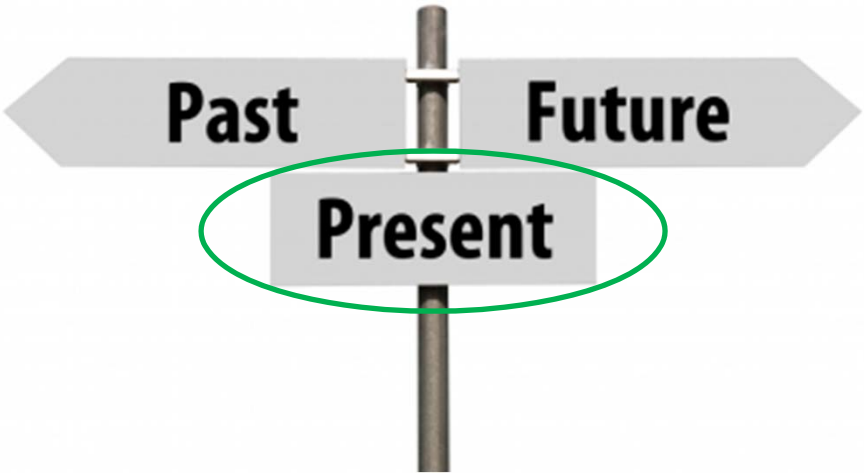
- Including Consideration of Future Carbon Regulation
- Premature to Begin Developing Replacement Resources

May Change in Future

- IRP Comprehensively Studied Potential Risks

Planning For Replacement

- Peakers for Reliability and Market Energy As Needed Across Most Scenarios



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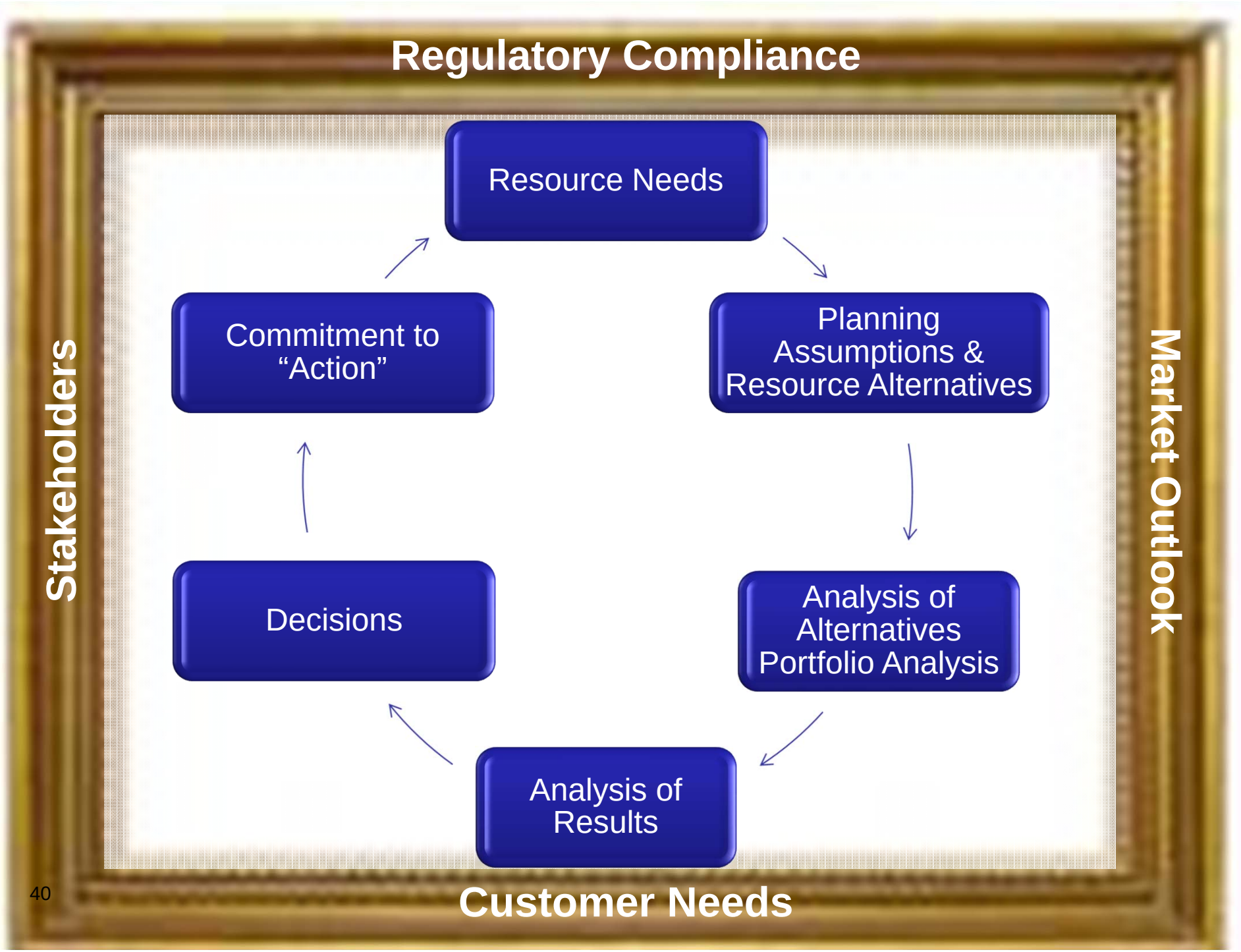
Regulatory Compliance
Resource Needs
Planning Assumptions & Resource Alternatives
Analysis of Alternatives Portfolio Analysis
Analysis of Results
Decisions
Commitment to "Action"
Stakeholders
Market Outlook
Customer Needs

Gas Utility Resource Need

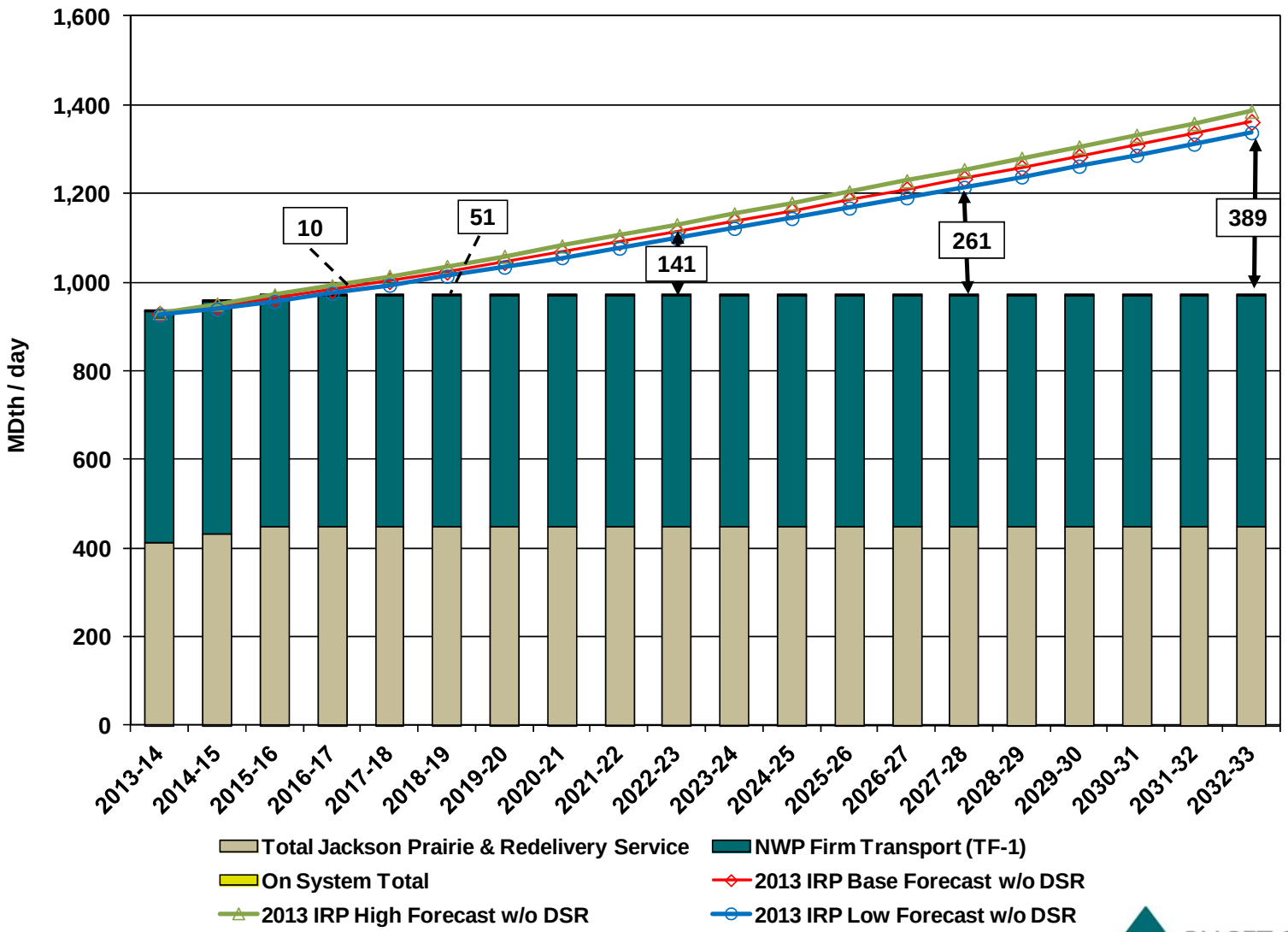

Figure 1-7, p. 1-13

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Gas Supply-Side Resource Alternatives

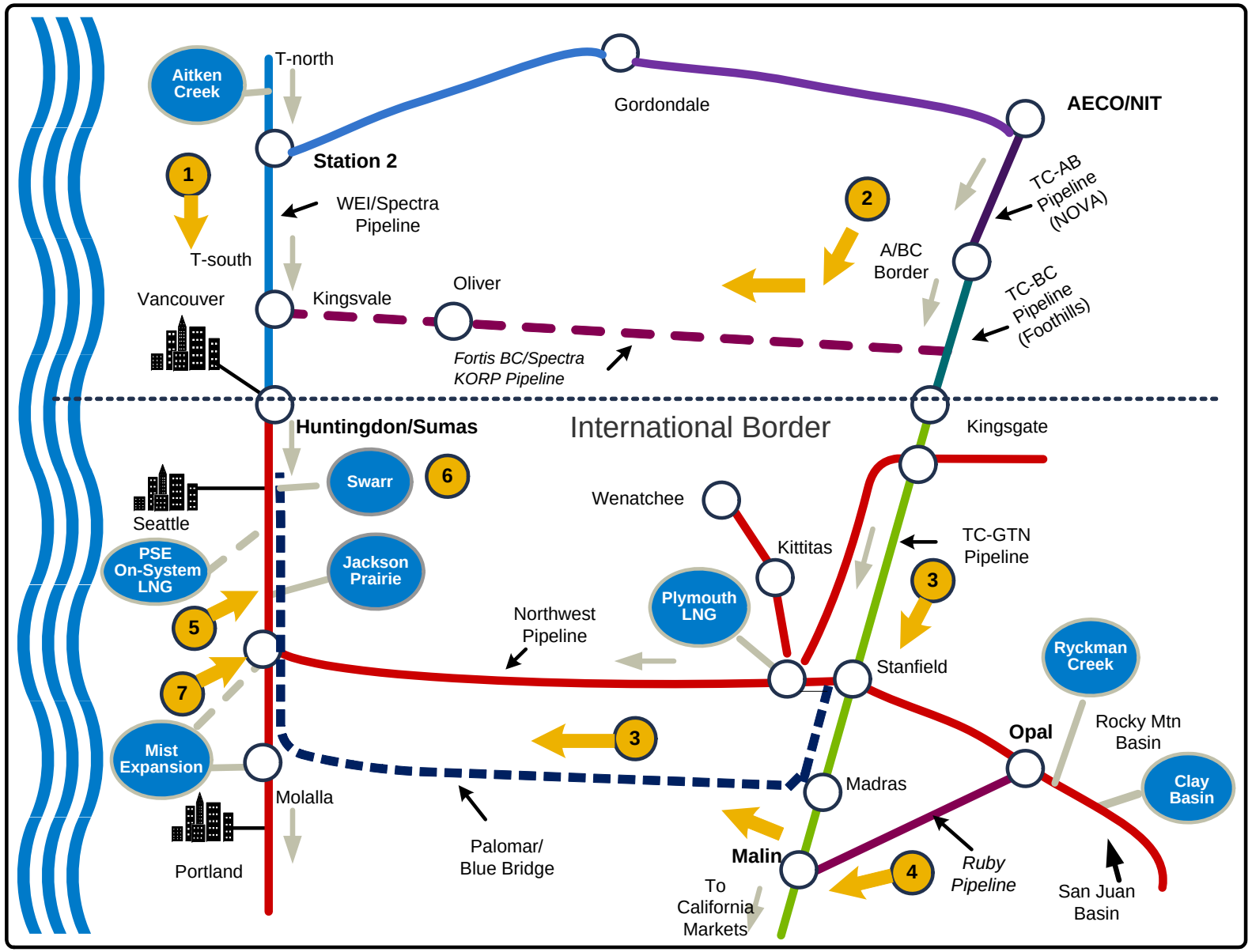

Figure 6-23, p. 6-37

Gas Resource Plan

	2018-19	2022-23	2027-28	2032-33
Demand-Side Resources	15	28	33	37
PSE LNG Peaking Project	50	50	50	50
Swarr Upgrade	30	30	30	30
Mist Storage Expansion	50	50	50	50
NWP/Westcoast Expansion	0	54	150	150
NWP/KORP Expansion	0	0	0	78

Figure 1-8, p. 1-14

Gas Wild Cards…

If Swarr and/or LNG Peaking Unavailable: Additional NWP/Westcoast

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Least-Cost Gas Portfolio Additions-MDth/Day

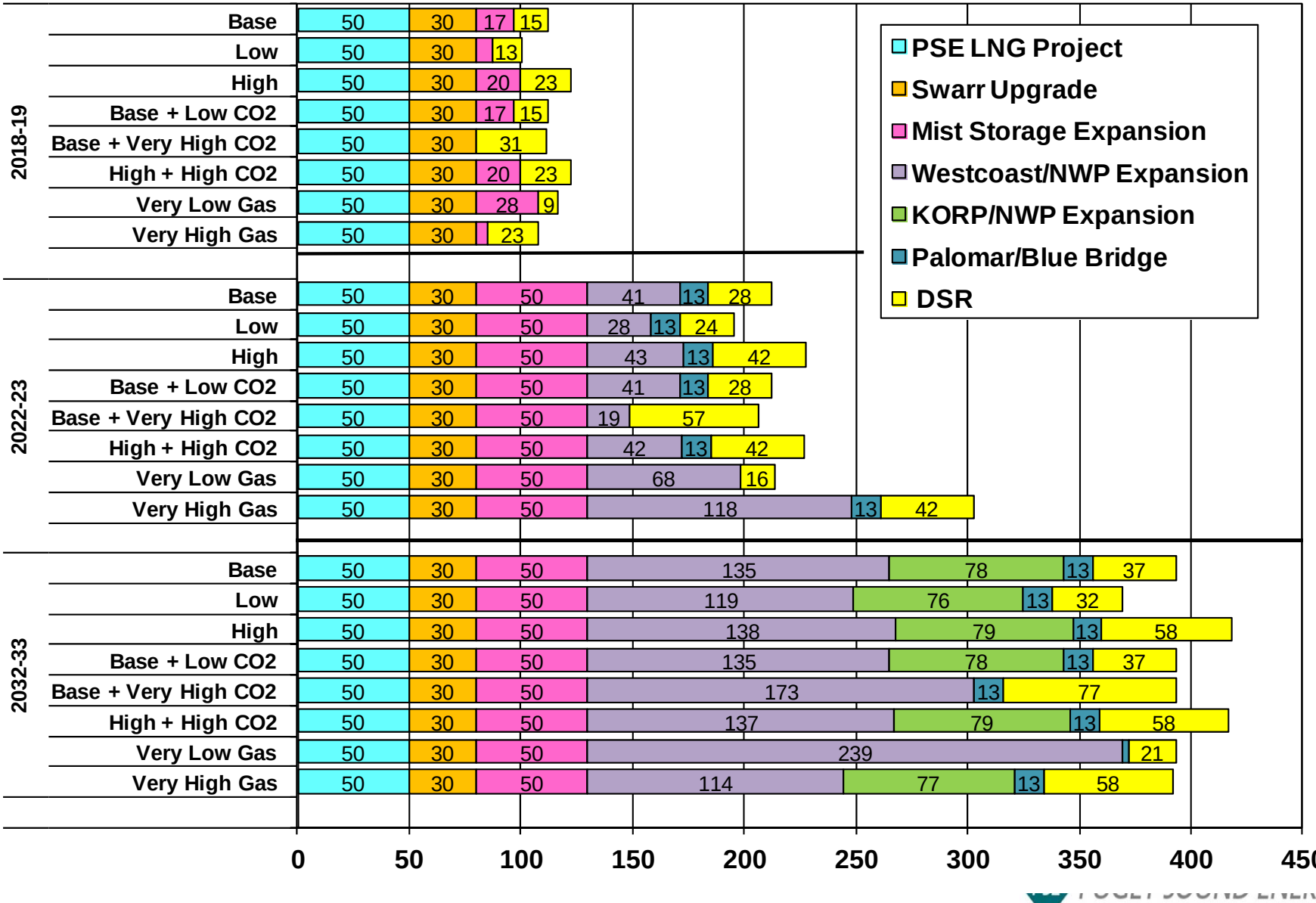

Figure 6-12, p. 6-24

Gas Resource Sensitivities

Examined What-If:

- LNG Peaker Does Not Become Available
- Swarr is Not Upgraded

Findings:

- Additional Storage w/Transport if Available
- Existing Surplus Northwest/Westcoast Pipeline if Not

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Gas Action Plan

- Pursue Cost Effective Demand-Side Resources
- Continue Working Toward Developing PSE LNG Project
- Decisions on Whether to Upgrade Swarr Propane Peaker
- Continue Working with Northwest Natural on Possible Mist Expansion
- Remain Active in Market Place to Move if Planned Resources Unavailable
- Complete Analysis of Whether to Broaden Planning Standard
- Revise Stakeholder Process to Clarify Roles and Expectations & Provide Greater Transparency

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IRP Next Steps

IRP Update To Examine Long-Term Market Reliance

- Still Targeting 4th Quarter 2013

Restructuring Stakeholder Process

- Begin Early 1st Quarter 2014
- Finalizing Consulting Contract to Assist

Kick-Off 2015 IRP Process

- Resource Needs: 1st Quarter 2014
- Work Plan Filed: End of May 2014

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