Northwest **Power** and **Conservation** Council

July 6, 2016

MEMORANDUM

TO: **Power Committee**

FROM: **Elizabeth Osborne, Washington Staff**

SUBJECT: **Puget Sound Energy's IRP, Demand Response, and Energy Efficiency**

BACKGROUND:

Presenter: Phillip Popoff, Puget Sound Energy

Summary Phillip Popoff, Manager of Integrated Resource Planning at Puget Sound Energy, will brief the Power Committee on PSE's latest IRP. The availability of market resources is declining, and the IRP determined a mix of resources that would reliably meet the needs of PSE's customers in the future. These resources include energy efficiency, demand response, wind, and combined cycle and peaker gas plants. Mr. Popoff will discuss the company's planning process and potential trade-offs between different resources that could be used to meet or reduce peak demand, including energy efficiency and demand response.

More Info: Links to all chapters and appendices of PSE's 2015 Integrated Resource Plan – https://pse.com/aboutpse/EnergySupply/Pages/Resource-Planning.aspx

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2015 IRP Overview

NWPCC

Phillip Popoff
Manager Integrated Resource Planning

July 12, 2016

PSE 2015 IRP Overview

- Electric Resource Plan
- Review Planning Standard
- Looking Toward PSE's 2017 IRP
- Key Interactions with Council

Resource Plan

Figure 1-7: Electric Resource Plan Forecast,
Cumulative Nameplate Capacity of Resource Additions

	2021	2026	2030	2035
Conservation (MW)	411	669	770	906
Demand Response (MW)	121	130	138	148
Wind (MW)	-	206	337	337
Combined Cycle Gas (MW)	-	577	577	805
Peaker/CT Dual Fuel (MW)	277	403	609	609

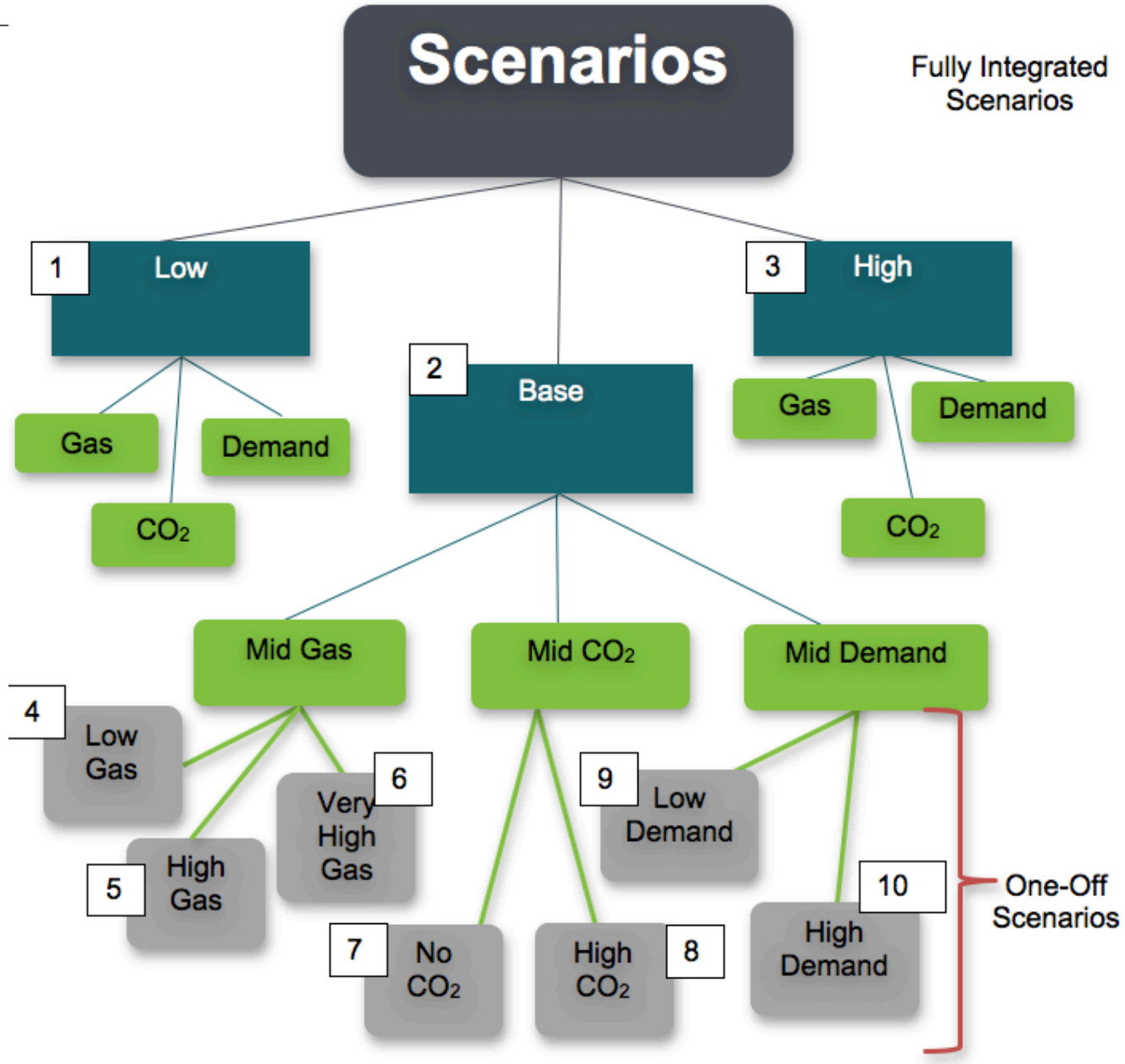
Additional…if Colstrip Retired by 2026

- Units 1 & 2: Additional Peaker/CT
- All 4 Units: Additional Combined Cycle Gas

Key Findings

- Conservation and demand response primary resources in next few years
- Renewables to meet RPS
- CCCT vs Peakers: depends on sufficiency of back-up fuel.
- Primary approach to manage cost-risk is in resource adequacy.

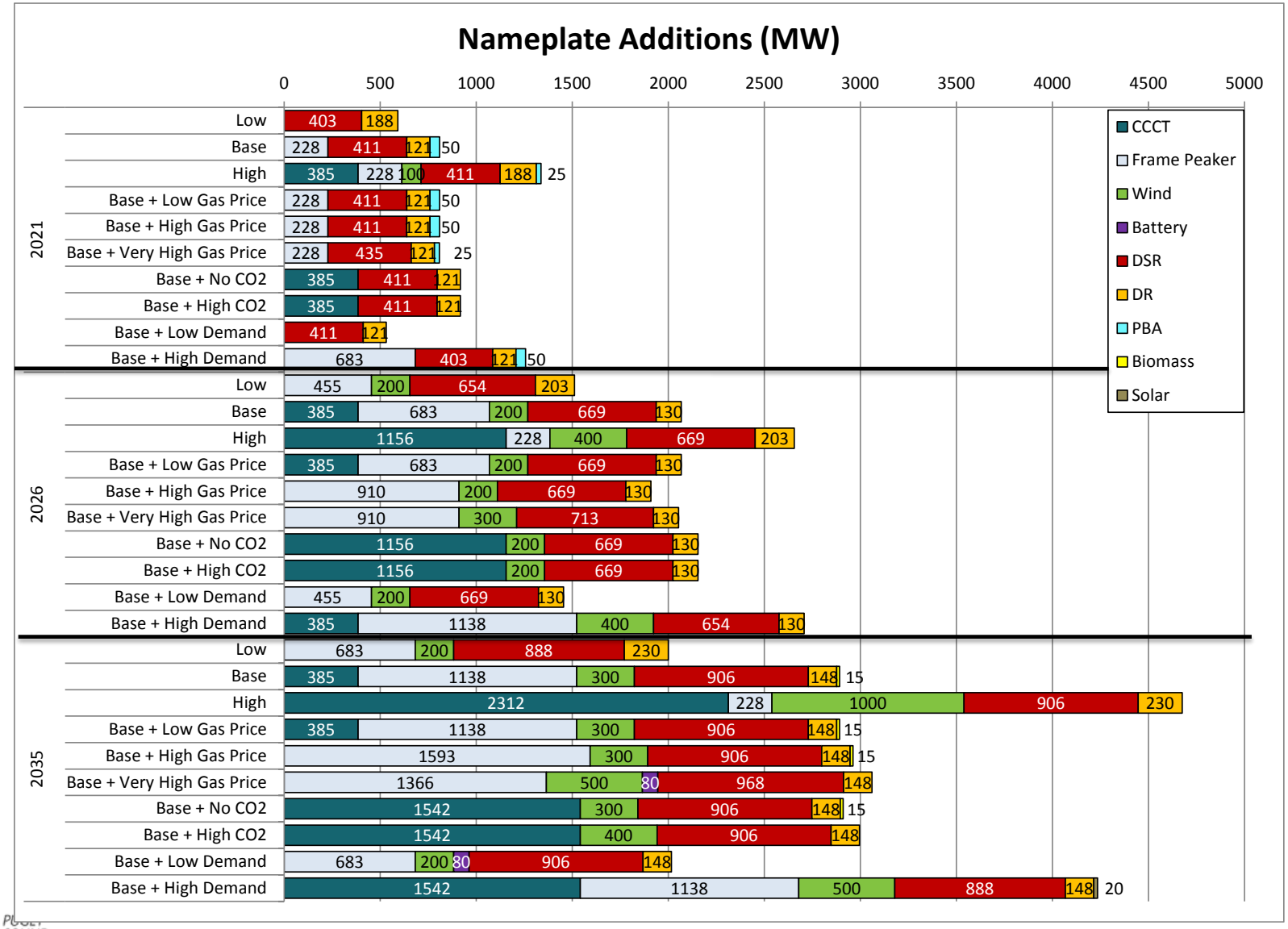
Figure 4-1: Diagram of 2015 IRP Scenarios



Additional Portfolio Sensitivities

A. Colstrip
    1. Units 1 & 2 Retire 2026
    2. All 4 Units Retire 2026
B. Demand Side Resources
C. Thermal Mix
D. Gas Plant Location—East/West Cascades
E. Gas Transport Needed for Peakers
F. Energy Storage/Flexibility
G. Reciprocating Engine/Flexibility
H. Montana Wind
    1. Base line
    2. Lower
    3. Colstrip Embedded Transmission Cost
I. Solar Penetration—Increased Distributed Solar Penetration
J. Carbon Reduction Impact of Added Wind

Results of Deterministic Optimization Analysis



Deterministic Analysis Informs Stochastic

Next Step is Determine Focus of Stochastic Portfolio Analysis

Conservation & Demand Response Nearly Same in Every Scenario

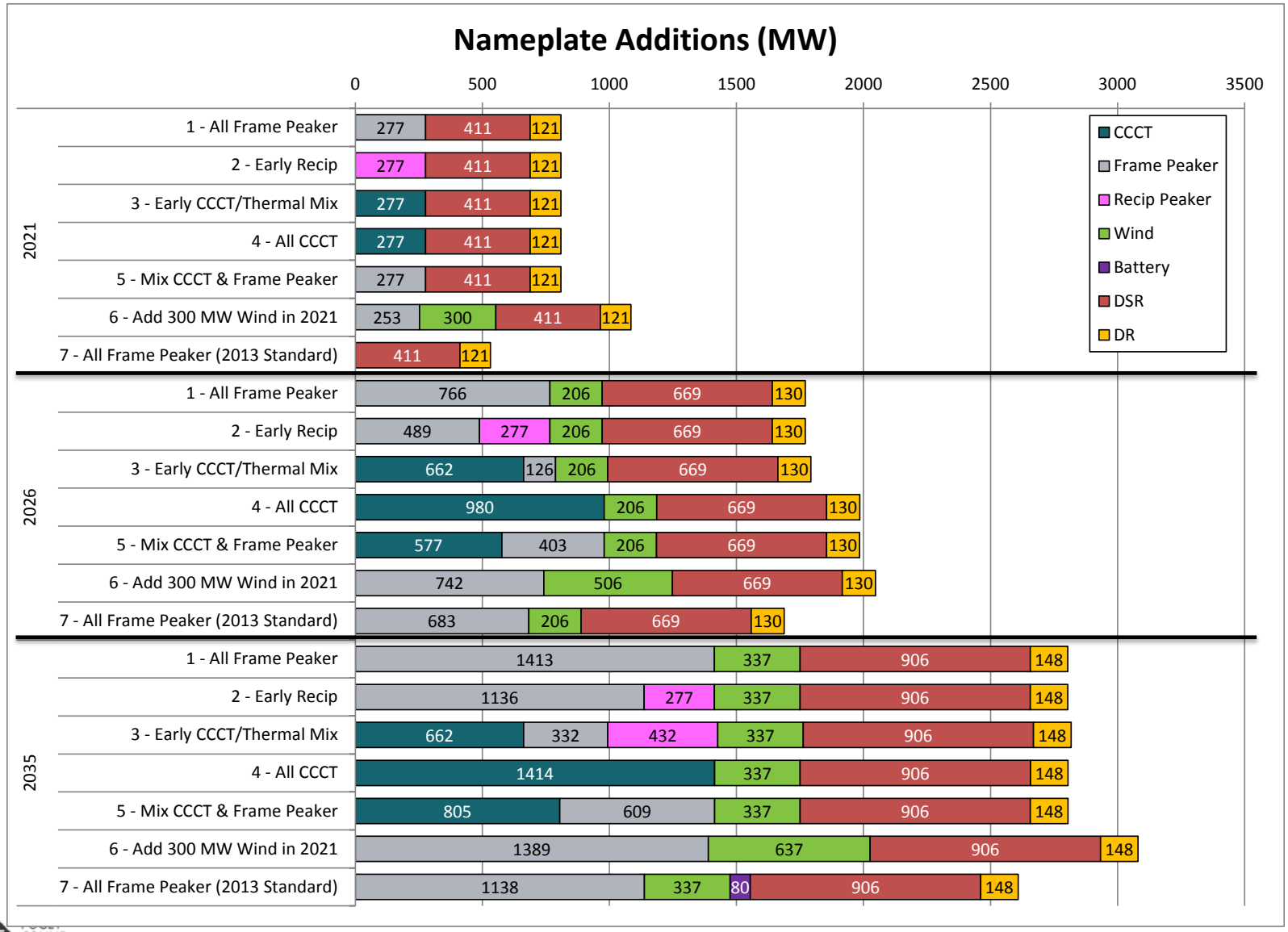
Renewables Stable Across Scenarios

- Driven by RPS: Washington wind forecast to be least cost
- Variation primarily driven by load forecast.
- MT wind driven by binary issue: access to embedded cost transmission—not well suited to stochastic analysis.

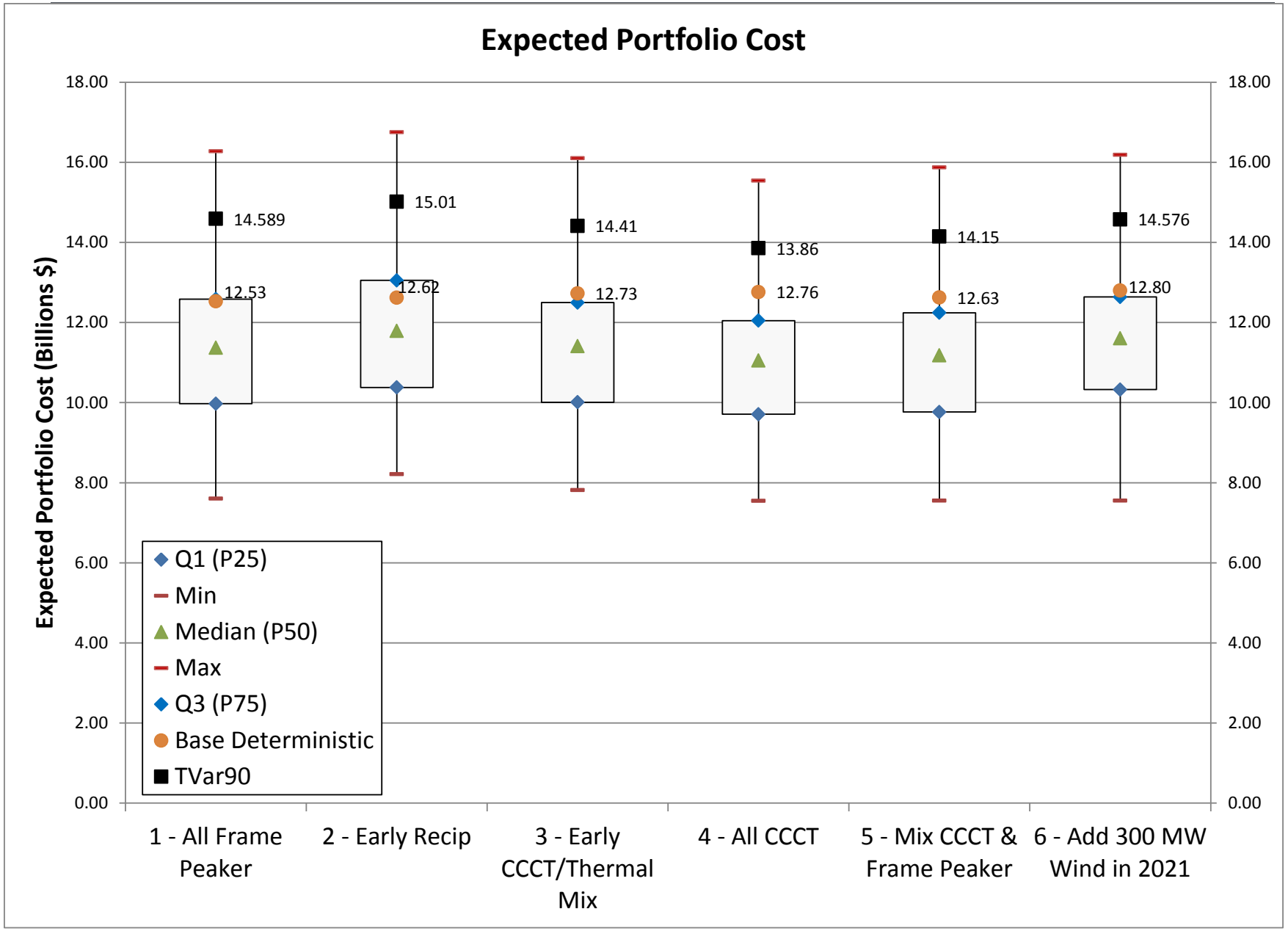
Variability: CCCT vs Peakers

- 2 Scenarios only CCCT
- 2 Scenarios only Peaker
- 5 Scenarios different Combinations

Led to Portfolios for Stochastic Analysis



Results of Stochastic Portfolio Analysis



Market Context

Electric Market Concerns: Resource Adequacy

- Northwest Power and Conservation Council
  - May 2015 Adequacy Assessment: Region short 1,150 MW by 2021
  - August 2015 Draft 7th Power Plan: Region okay if meet conservation and demand response targets.
- Conclusion: No longer assume short-term market 100% reliable
  - Regional adequacy assessments never supported that assumption.

Gas Market Concerns

- Pipeline capacity on Westcoast (upstream of Northwest Pipeline) is being fully utilized to peak capacity.
  - Short-term commodity markets may not be available to meet demand at Sumas under significantly cold weather conditions.
- Generation Fuel: Sufficient back-up fuel critical economic factor.

Planning Standard Update: Process Overview

Annualized Benefit/Cost Analysis

Benefit

- Using MWh shortfalls from PSE's RAM: 6160 simulations in 2021
- Apply value of lost load from DOE's ICE calculator
- Changing resources leads to change in VOLL

Cost: Levelized cost of CT

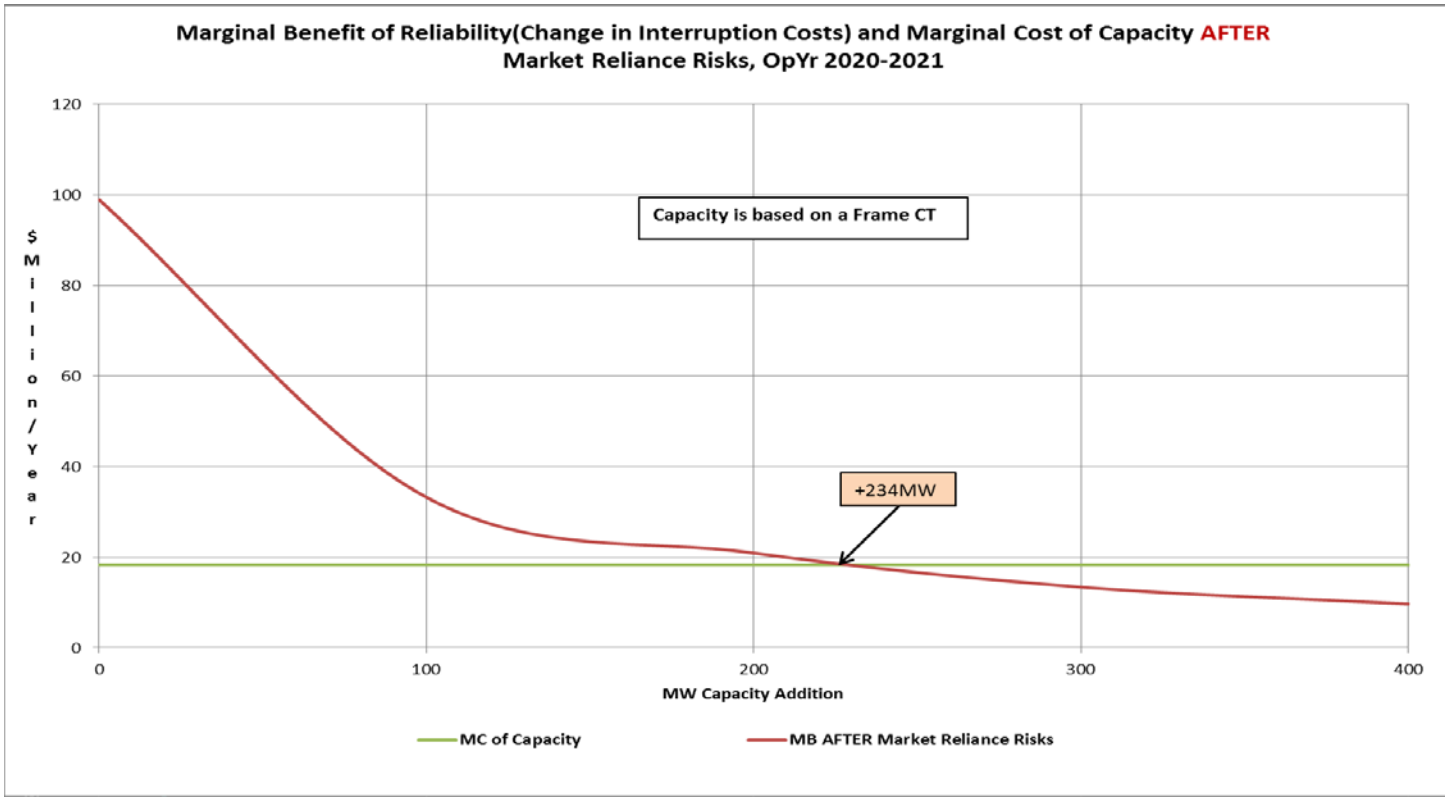
Resource Additions Primary Risk Mitigation Alternative

Figure 1-1: Comparison of Old and New Electric Capacity Planning Standard

		Reliability Metric		2021 Capacity (Surplus)/ Need after DSR (MW)	Customer Value of Lost Load	
		LOLP	EUE (MWh)		Expected ($million/yr)	Risk-TailVar90 ($million/yr)
1	2013 Planning Standard with Market Risk	5%	50.0	(117)	169	1,691
2	2015 Optimal Customer Planning Standard (Includes Market Risk)	1%	10.9	234	39	385
	Change			351	(130)	(1,306)

3. Benefit-Cost Analysis

Figure 6-4: Marginal Benefit of Reliability, 2015 Optimal Planning Standard



- Reflects expected VOLL, not risk.
- Additional generation would further reduce risk.
- Previous slide showed risk from updated standard all ready drops from $1.6 billion to $385 million.

Planning Standard Decision

- WUTC concerned about value of lost load used in analysis.
- Prefer PSE stay consistent with regional standard.
- Back to 5% LOLP.
- Work with the RAAC to improve resource adequacy metrics.

Looking Forward to 2017 IRP

“Surplus” peak capacity until 2025

- Assumes ~1400 MW of market at peak.
- If PSE pursues 2015 IRP conservation and demand response.
- Assumes Colstrip continues operation.

Additional Focus on Demand Response

- Examine accelerated acquisition like energy efficiency.
- Incorporate sub-hourly flexibility values, when relevant.
- PSE will pursue the least cost combination of resources.

Key Interactions with Council

Resource Adequacy Advisory Committee: Critical Function

Work with RTF: Essential Information

Relationship with Council Staff: Outstanding

- Extremely sharp group
- Great to work with
- Always helpful

Thank You

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