WELCOME

UPDATED 12/12/19
Updated slides: 42-45, 47

Questions during the presentation?

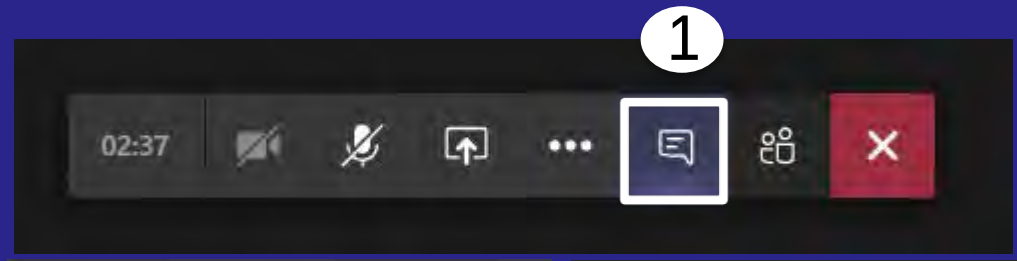
Questions can be taken over the audio bridge or submit a question to us in the chat function at any time.

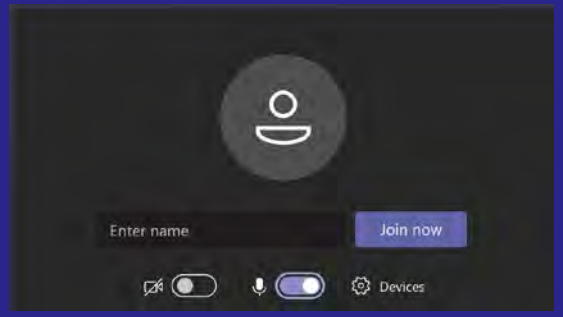
- To access the Meeting Chat, select the conversation icon. 1

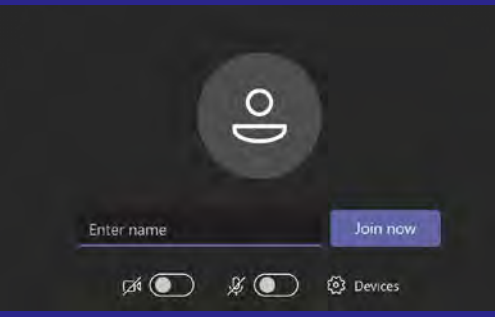
Audio Details

All lines are muted upon entry into the meeting.

- For those using audio via Microsoft Teams browser, you can unmute by selecting the microphone icon
  - Bar is purple when on/unmuted 2
  - Bar is blank/black when off/muted 3
- If you are dialed in from a touch tone phone, you will press *6 to unmute.







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Also, if needed, email IPL directly at ipl.irp@aes.com.

INDIANAPOLIS POWER & LIGHT COMPANY

IPL 2019 IRP: PUBLIC ADVISORY MEETING #5

DECEMBER 9, 2019

INTRODUCTIONS & SAFETY MESSAGE

Shelby Houston

Regulatory Analyst, IPL

MEETING OBJECTIVES & AGENDA

Stewart Ramsey

Meeting Facilitator, Vanry & Associates

AGENDA

Topic	Time (Eastern)	Presenter(s)
Registration & Breakfast	9:00 – 9:30	-
Introductions & Safety Message	9:30 – 9:40	Shelby Houston, Regulatory Analyst, IPL
Meeting Objectives & Agenda	9:40 – 9:50	Stewart Ramsay, Meeting Facilitator, Vanry & Associates
Executive Summary of Preferred Resource Plan	9:50 – 10:20	Vince Parisi, President and CEO, IPL
2019 IRP: Modeling Insights	10:20 – 10:50	Patrick Maguire, Director of Resource Planning, IPL
BREAK	10:50 – 11:00	
Analysis of Alternatives: 2019 IRP Modeling	11:00 – 12:00	Patrick Maguire, Director of Resource Planning, IPL
LUNCH	12:00 – 12:45	
Sensitivity Analysis	12:45 – 1:15	Patrick Maguire, Director of Resource Planning, IPL
Preferred Resource Portfolio & Short Term Action Plan	1:15 – 1:30	Patrick Maguire, Director of Resource Planning, IPL
Concluding Remarks	1:30 – 2:00	Vince Parisi, President and CEO, IPL Stewart Ramsay, Meeting Facilitator, Vanry & Associates

EXECUTIVE SUMMARY OF SHORT TERM ACTION PLAN

Vince Parisi,

President and CEO, IPL

IPL 2019 IRP

INTEGRATED RESOURCE PLAN (IRP):
IPL's plan to provide safe, reliable, and sustainable energy solutions for the communities we serve

- IRP submitted every three years
- Plan created with stakeholder input
- 20-year look at how IPL will serve load
- Modeling and analysis culminates in a preferred resource portfolio

What is a preferred resource portfolio?

> " 'Preferred resource portfolio' means the utility's selected long term supply-side and demand-side resource mix that safely, reliably, efficiently, and cost-effectively meets the electric system demand, taking cost, risk, and uncertainty into consideration."
>
> 170 IAC 4-7-1(cc)

2019 IRP STAKEHOLDER PROCESS

January 29th	March 13th	May 14th	September 30th	December 9th
• 2016 IRP Recap • 2019 IRP Timeline, Objectives, Stakeholder Process • Capacity Discussion • IPL Existing Resources and Preliminary Load Forecast • Introduction to Ascend Analytics • Supply-Side Resource Types • DSM/Load Forecast Schedule	• Stakeholder Presentations • Commodity Assumptions • Capital Cost Assumptions • IPL-Proposed Scenario Framework • Scenario Workshop • MPS Update and Plan	• Summary of Stakeholder Feedback • Present Final Scenarios • Modeling Update • Assumptions Review and Updates	• Summary of Stakeholder Feedback • Preliminary Model Results • Scenario Descriptions and Results • Portfolio metrics and scoring	• Final Model Results • Full set of portfolio metrics and scoring criteria • Preferred Plan • Short Term Action Plan

IPL set out to conduct a robust and collaborative stakeholder process. Multiple communication avenues were provided to ensure that all viewpoints and suggestions were heard from stakeholders wanting to participate in the 2019 IRP process.

IPL PORTFOLIO DIVERSIFICATION: 2009 - 2018

2009

Signed 100 MW PPA at Hoosier Wind Park in NW Indiana

2011

Signed 200 MW PPA at Lakefield Wind Farm in Minnesota

2013-2015

Signed 96 MW PPA for solar in Indianapolis through Rate REP

2016

Retired 260 MW of coal at Eagle Valley

2016

Finalized conversion of 630 MW of coal-fired generation at Harding Street to natural gas

2018

Eagle Valley 671 MW Gas-Fired Combined Cycle Plant Completed

IPL PREFERRED PORTFOLIO & SHORT-TERM ACTION PLAN

RETIRE	REPLACE	SAVE	MONITOR
Retire **630 MW** of coal generation by 2023: • Pete 1: 2021 • Pete 2: 2023	Competitively bid for approximately **200 MW** of firm capacity with all-source RFP	Target ~130,000 MWh per year of new DSM as part of the 2021-2023 DSM Plan	Maintain cost-effective units to retain flexibility and continue to monitor market conditions leading to our 2022 IRP

BENEFITS OF PREFERRED RESOURCE PORTFOLIO

Customer Centricity
Focus on customer needs and wants

Least Cost
Considers current and forecasted market economics

Flexibility & Balance
Measured approach maintaining optionality

Greener Energy Future
Moves the company to more renewables

CUSTOMER CENTRICITY

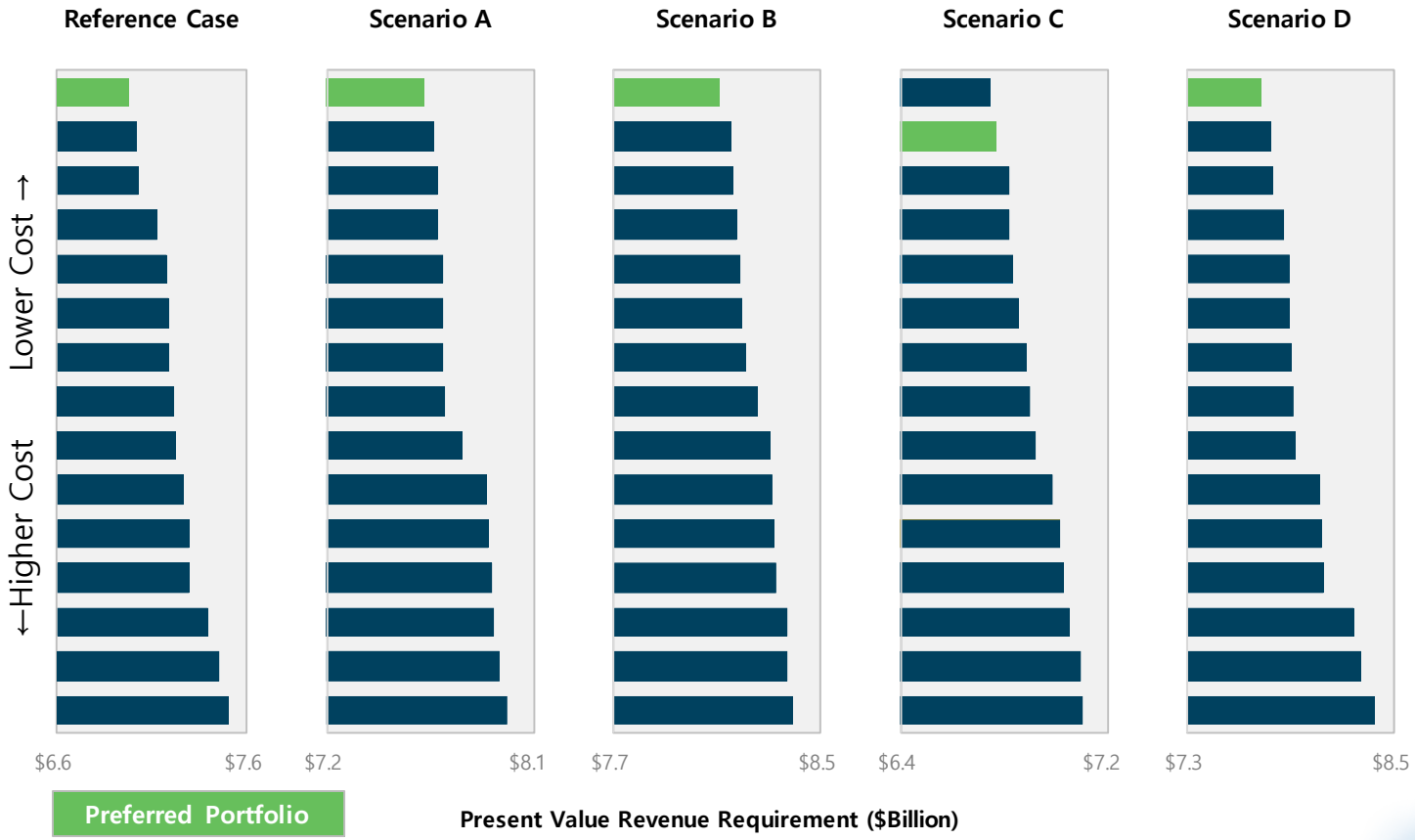
Focus on customer needs and wants

- IPL' s Preferred Resource Portfolio delivers safe, reliable, and economic electricity to customers at just and reasonable rates
- The preferred resource portfolio best serves IPL customers today and into the future, contemplates customers' evolving energy needs, and relies on data-driven models

LEAST COST

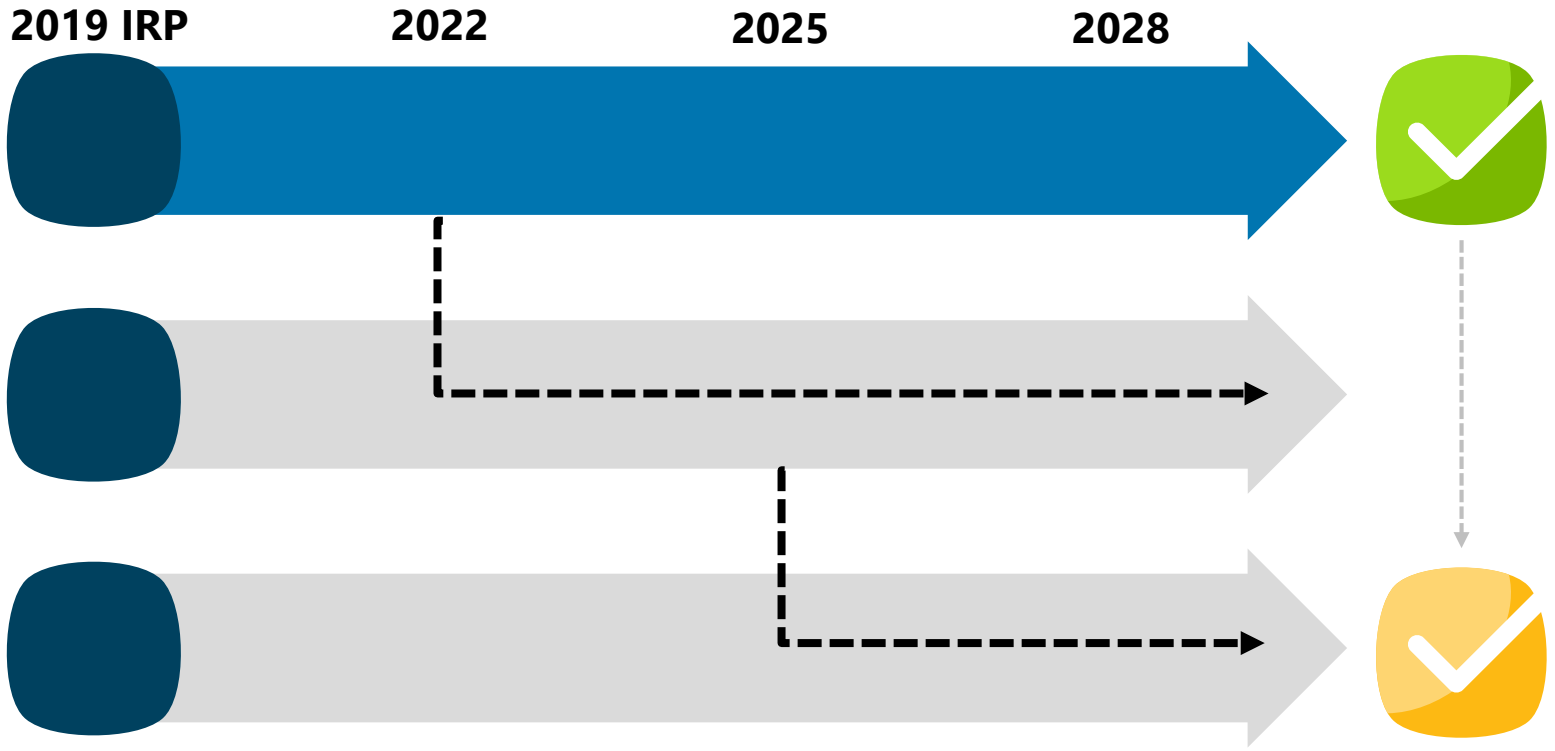
Minimizes total portfolio cost

Preferred Resource Portfolio is the lowest cost portfolio across a wide range of futures, mitigating rate impact and allowing customers to take advantage of low cost renewables in the short term



FLEXIBILITY & BALANCE

Measured approach maintaining optionality



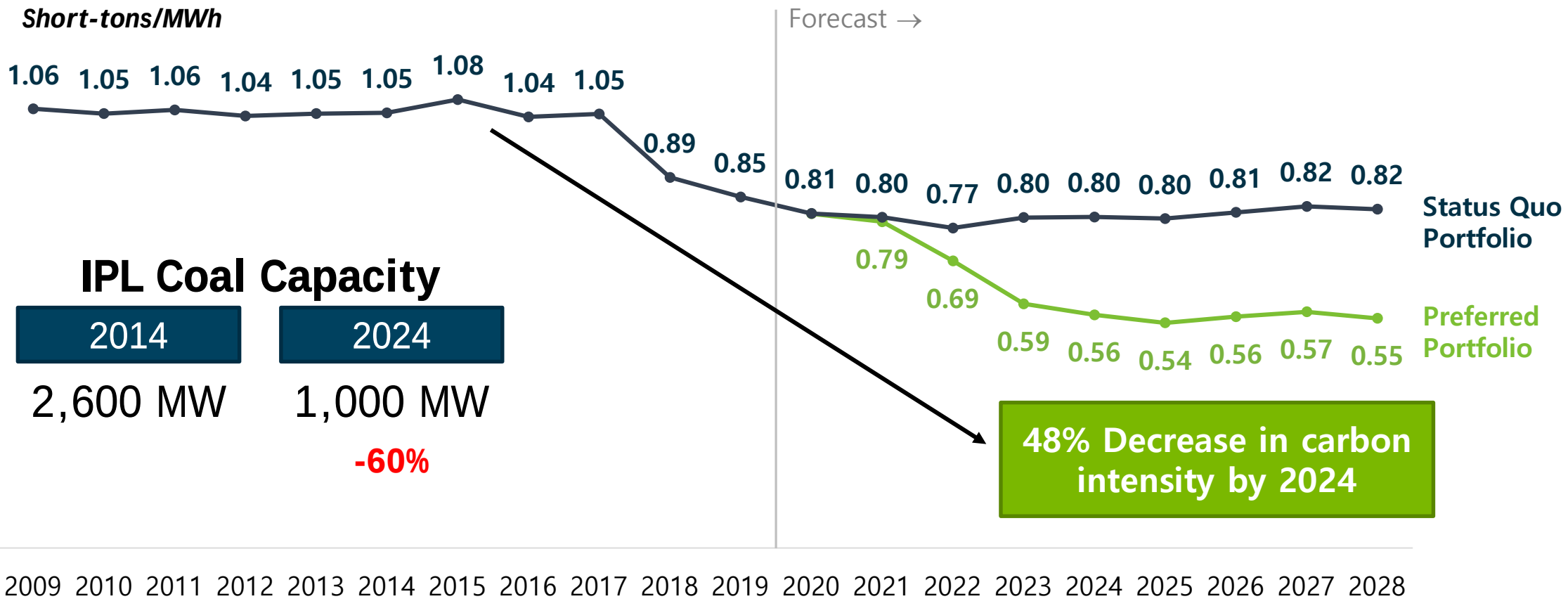
Preferred Portfolio provides lowest cost plan considering information known today

IPL has built-in flexibility to change direction in future IRPs with new information

Preferred portfolio contains embedded optionality with Petersburg Units 3 and 4

GREENER ENERGY FUTURE

Moves the company to more renewables



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2019 IRP: MODELING INSIGHTS

Patrick Maguire

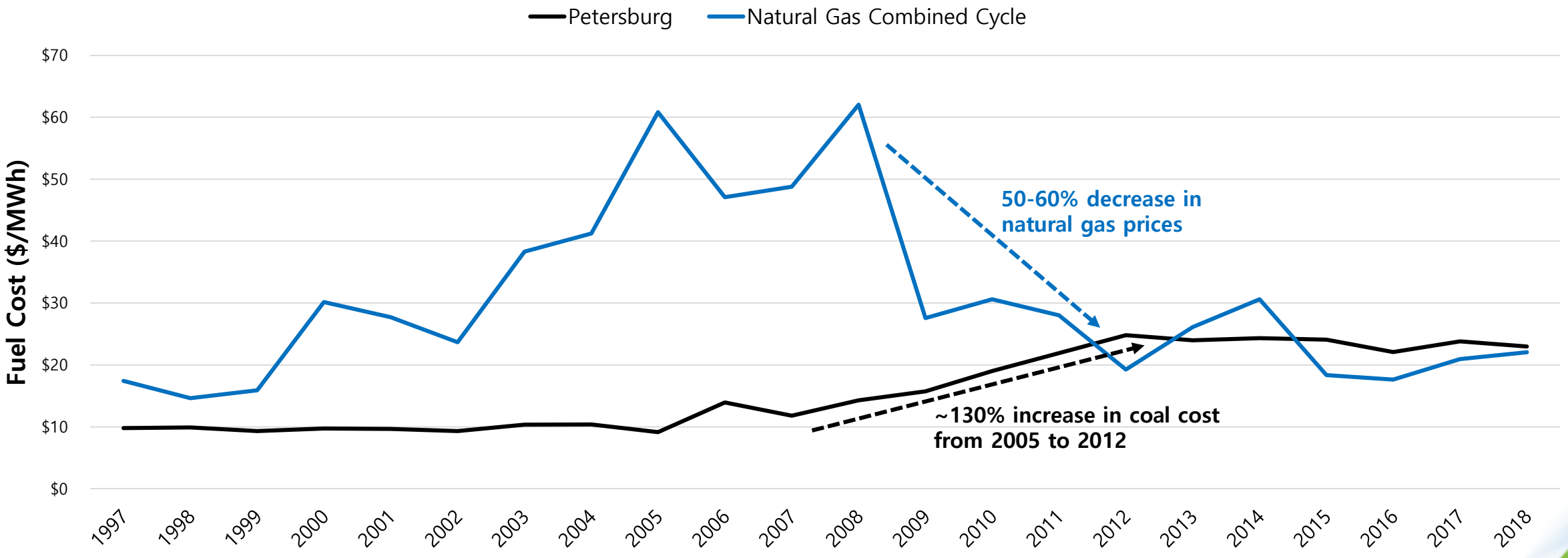
Director of Resource Planning, IPL

HIGH IMPACT MARKET FORCES

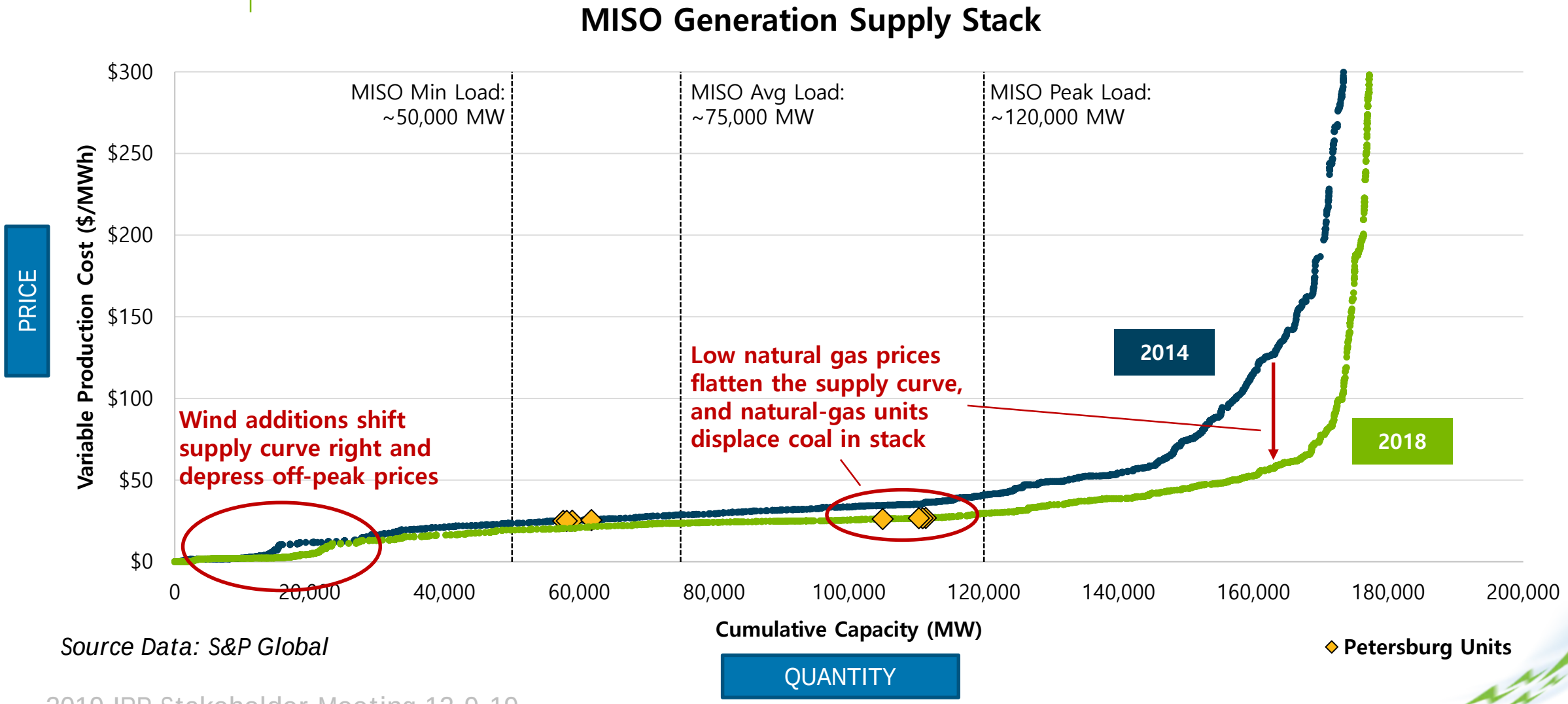
- Significant market changes over the past 10 years have impacted IPL's existing resources
- Opportunities and risk associated with alternative resources
- Present Value Revenue Requirement (PVRR) is key cost metric that is impacted by relative economics of resource technologies
  - Look at underlying fundamentals key to understanding high impact variables on all of the candidate portfolios

COAL ECONOMICS (1 OF 3)

Variable Fuel Cost: Coal vs. Gas, 1997 - 2018



COAL ECONOMICS (2 OF 3)

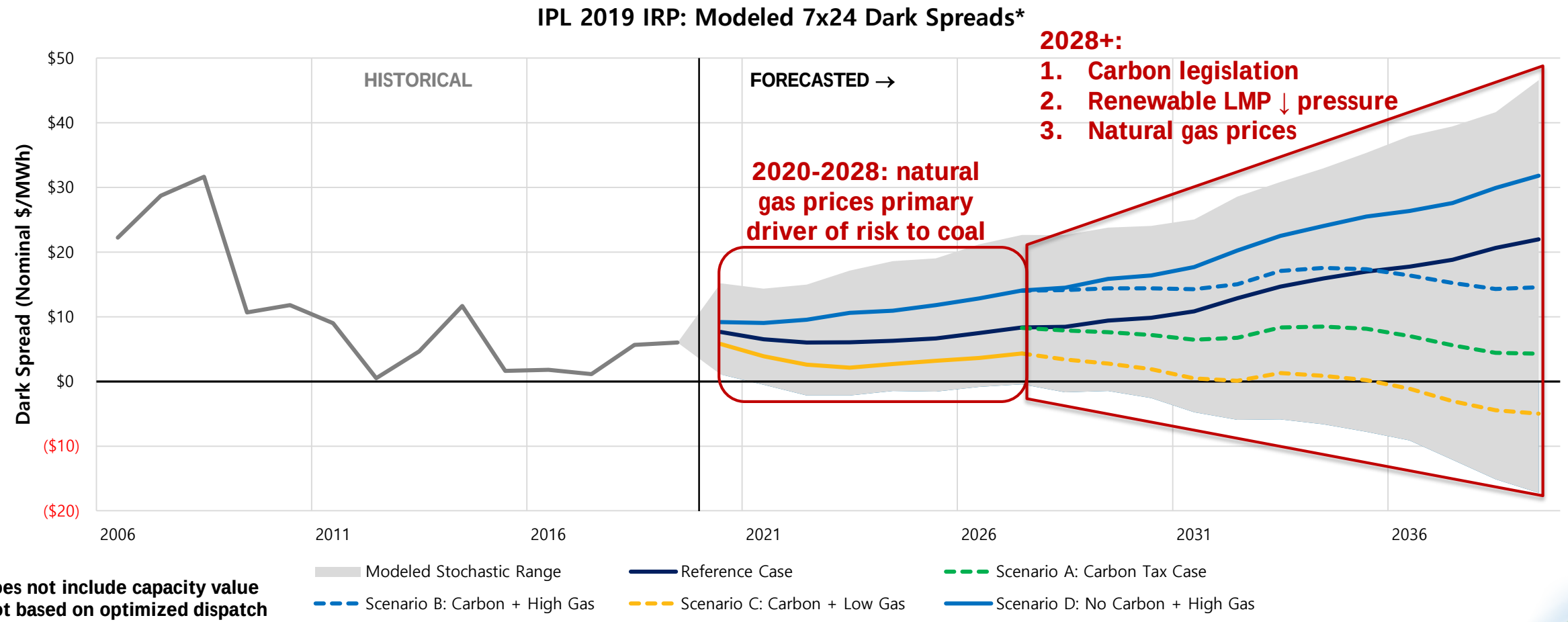


Source Data: S&P Global

COAL ECONOMICS (3 OF 3)

Dark spread = LMP – variable production cost (fuel, VOM, emissions)

Dark spread market indicator of variable margins to offset fixed costs. Does not include capacity value.

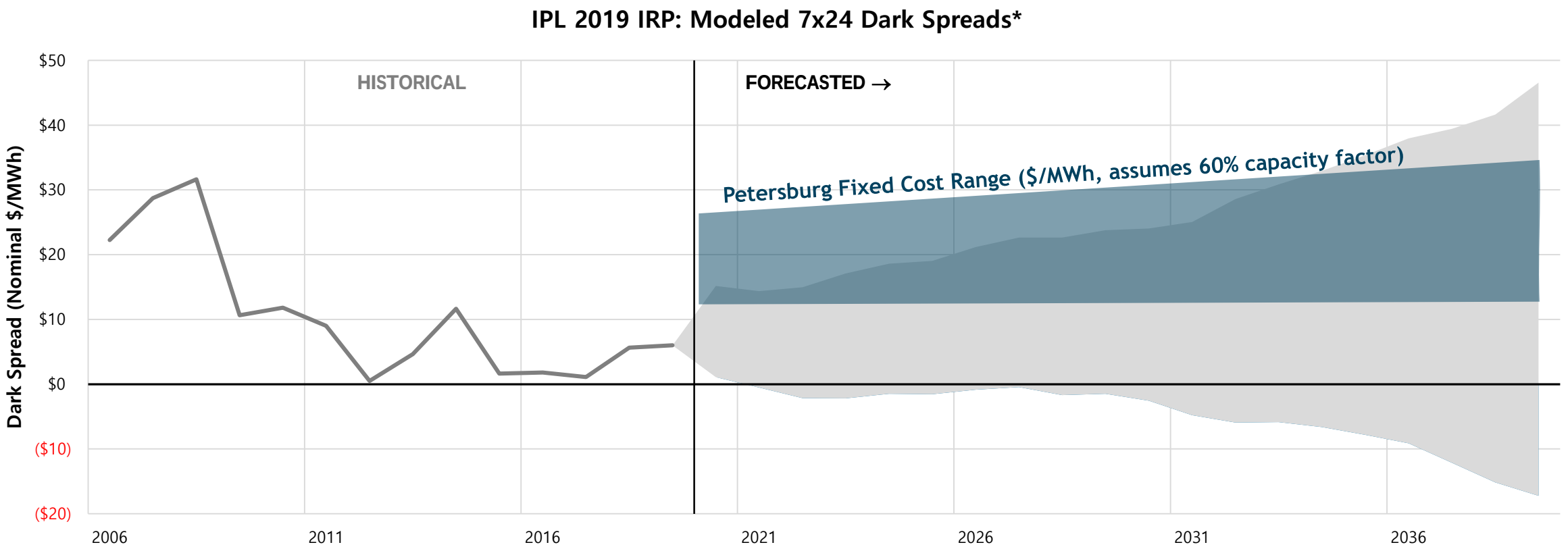


*** Does not include capacity value**
*** Not based on optimized dispatch**

COAL ECONOMICS (3 OF 3)

Dark spread = LMP – variable production cost (fuel, VOM, emissions)

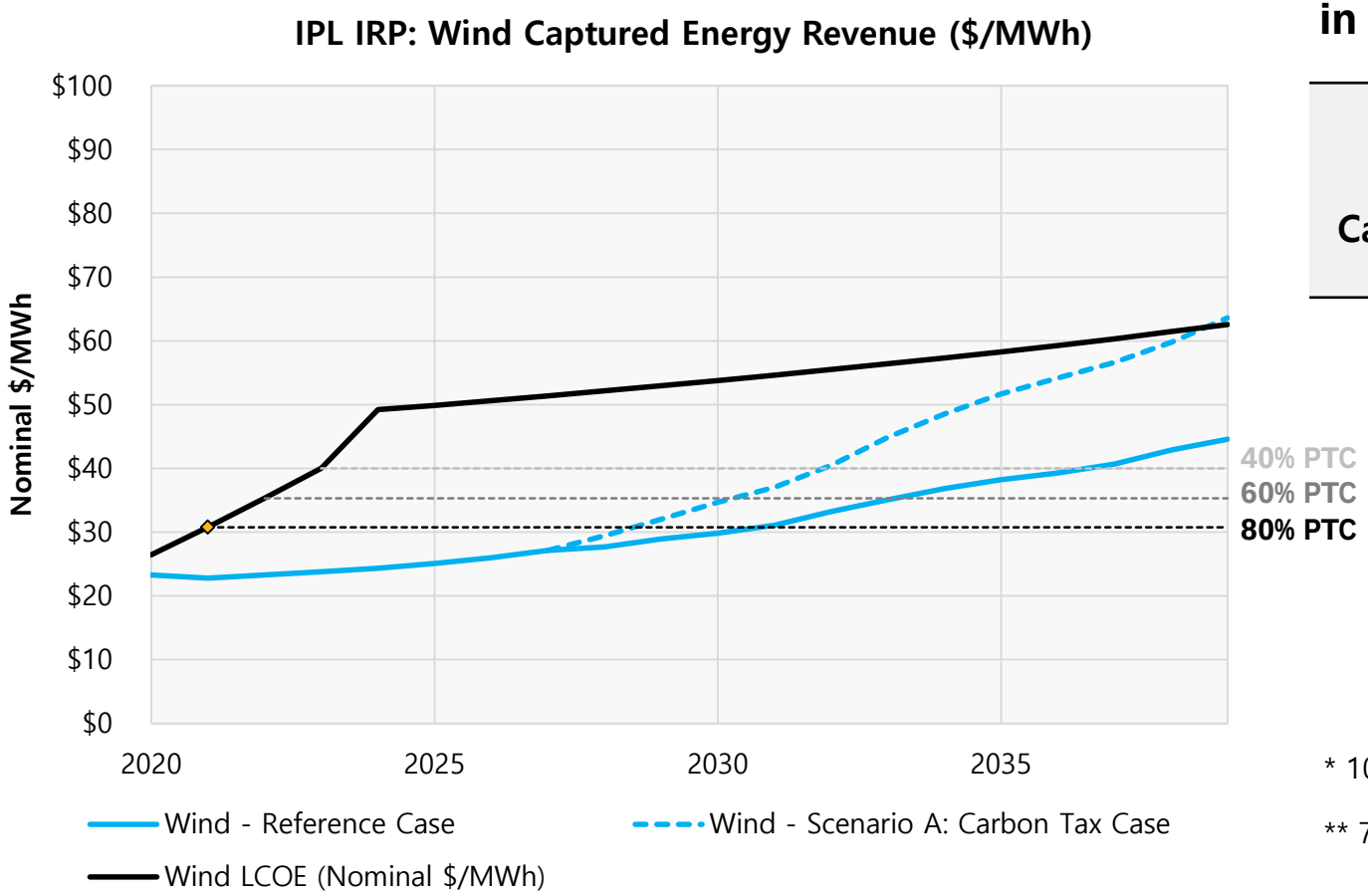
Dark spread market indicator of variable margins to offset fixed costs. Does not include capacity value.



* Does not include capacity value
* Not based on optimized dispatch

This is illustrative to show macro-level trends and forecasts in coal unit economics and is not inclusive of all factors needed to make a decision. The full IRP modeling used detailed hourly economic dispatch models and full cost accounting for coal and new capacity in the total portfolio cost calculation.

WIND ECONOMICS: HEADWINDS AND UPSIDE POTENTIAL



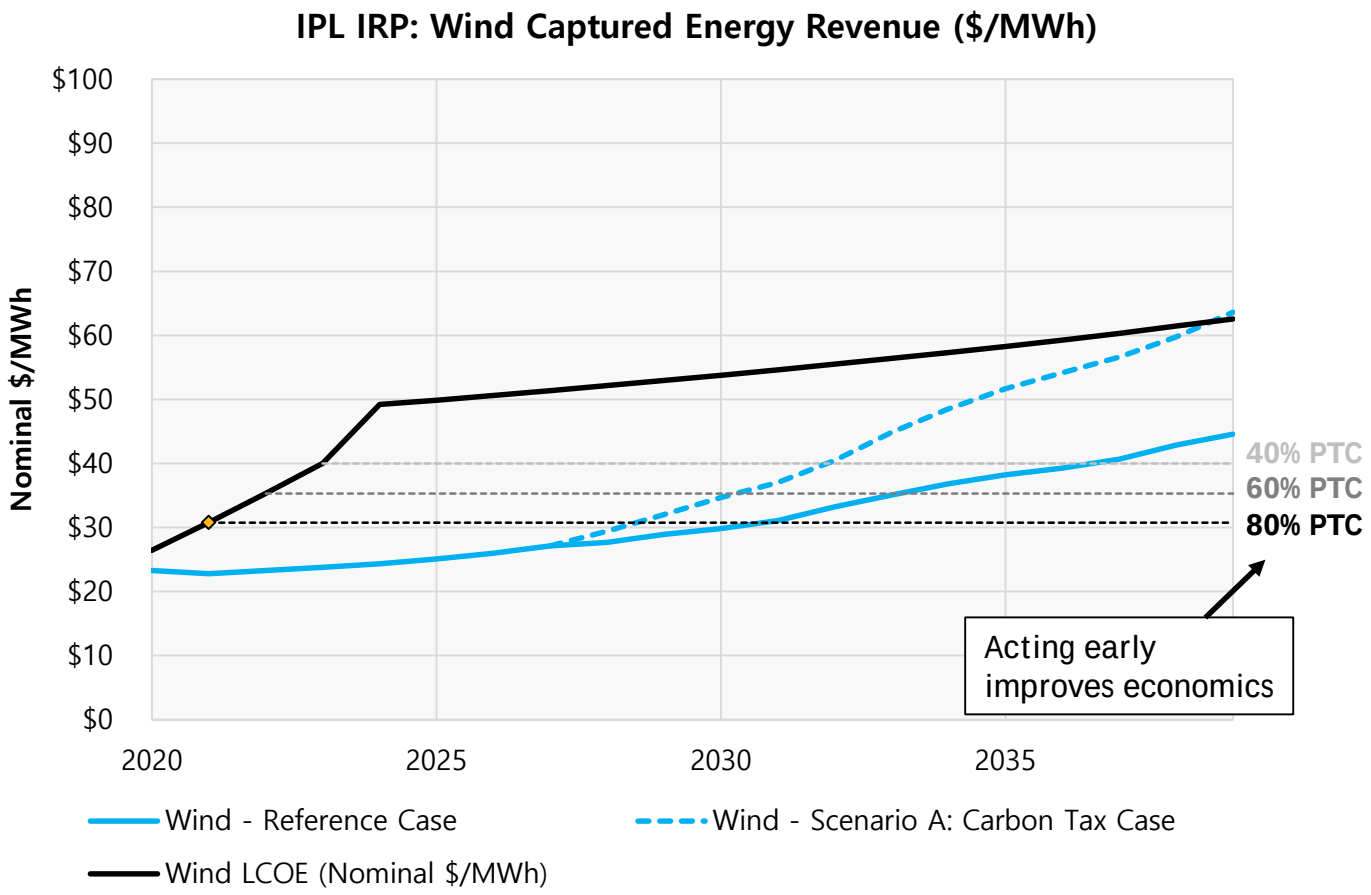
Carbon tax increases wholesale prices via increase in variable cost of fossil units on the margin

Carbon Price ($/ton)	Increase in Variable Cost ($/MWh)	
	Coal Plant*	Natural Gas Combined Cycle**
$2	$2	$1
$5	$5	$2
$10	$11	$4
$20	$22	$8
$40	$43	$17

* 10.5 MMBtu/MWh heat rate, 206 lb/MMBtu CO2 emission rate

** 7.0 MMBtu/MWh heat rate, 119 lb/MMBtu CO2 emission rate

WIND ECONOMICS: HEADWINDS AND UPSIDE POTENTIAL



Challenging wind economics with PTC phaseout

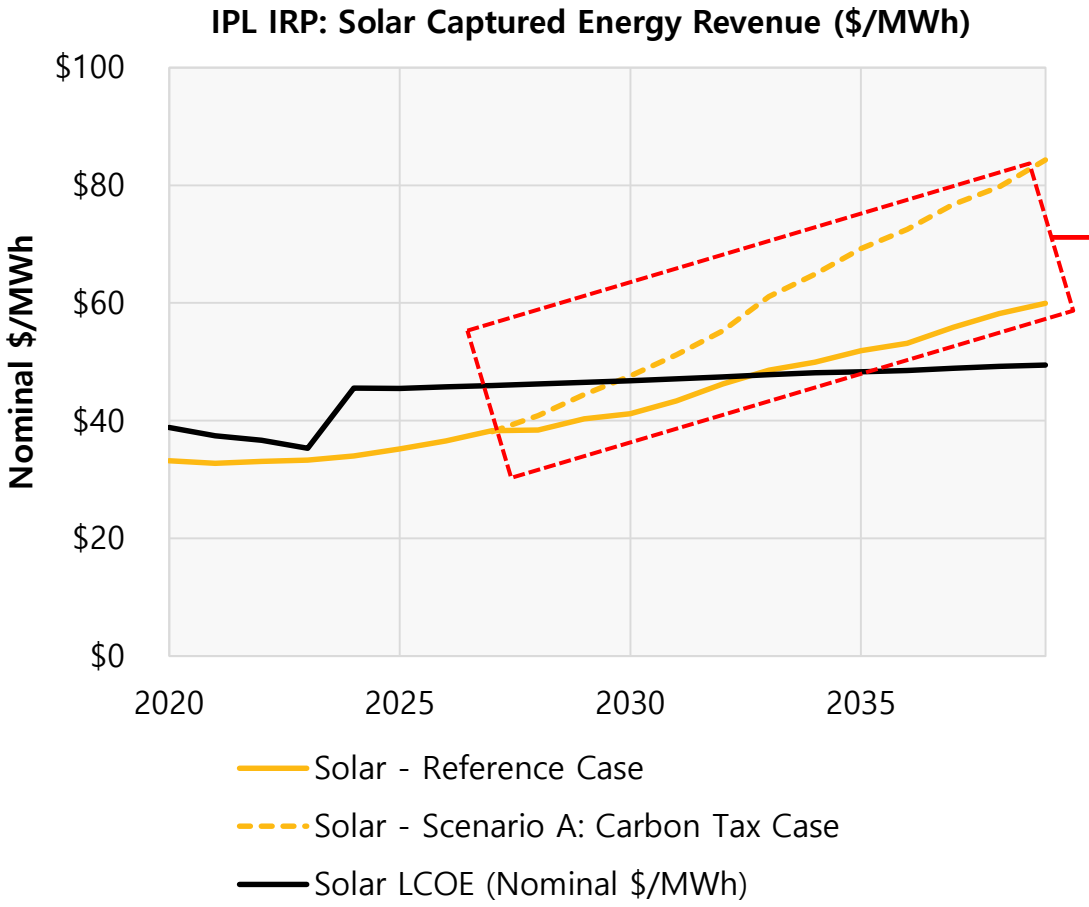
Headwinds:

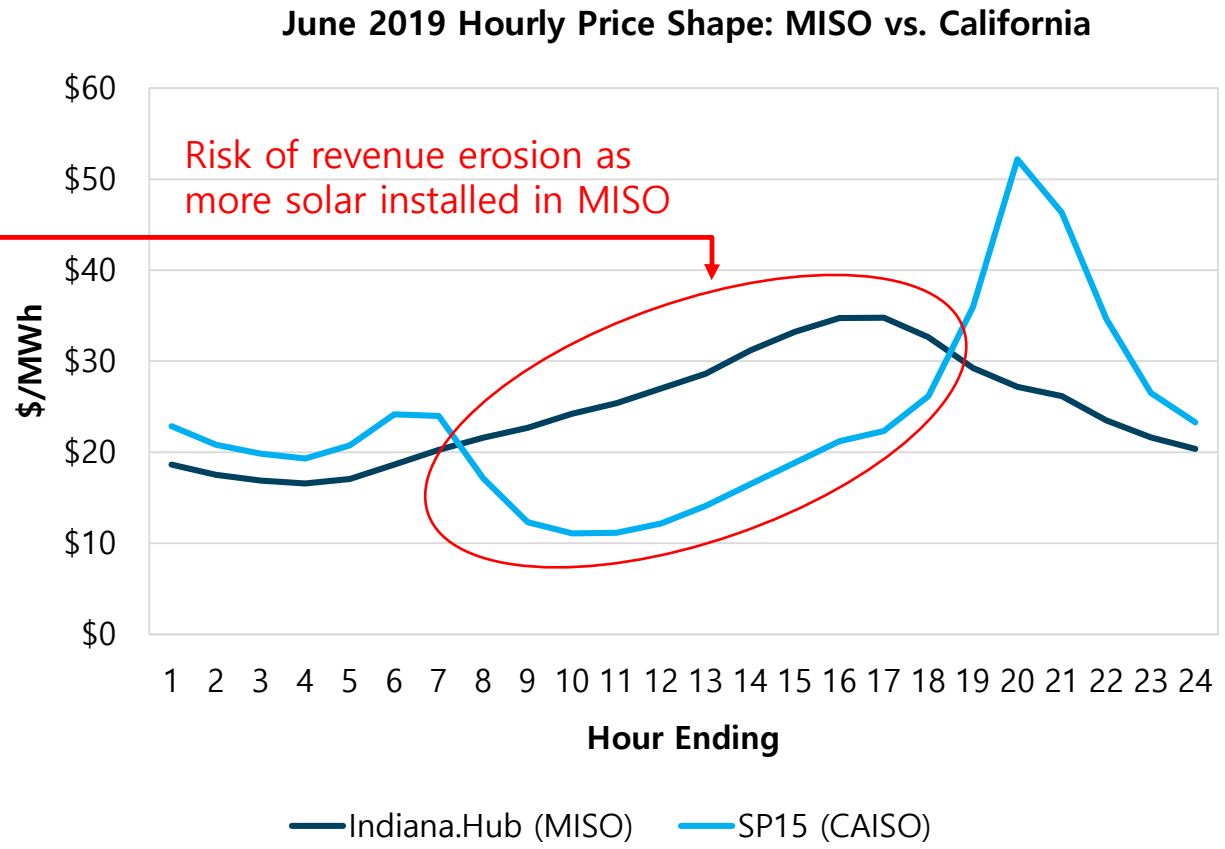
- Each 20% reduction in PTC increases LCOE by $3-$5/MWh
- Captured revenue remains hampered by production shapes, congestion

Upside potential:

- New bulk transmission
- Co-located storage
- New load near site
- Carbon Tax
- PTC Extension

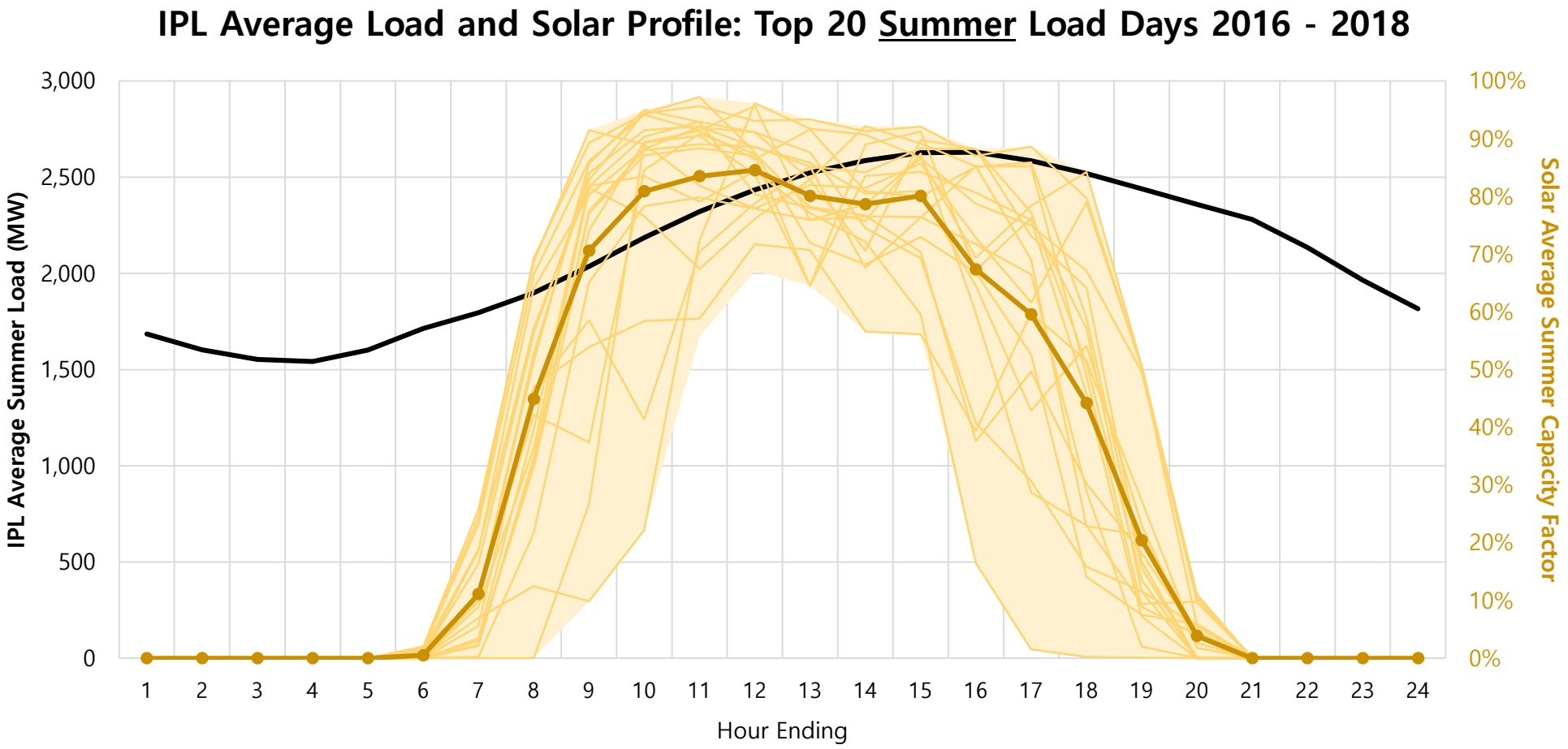
SOLAR ECONOMICS: FAVORABLE IN SHORT TERM, LONG TERM RISKS



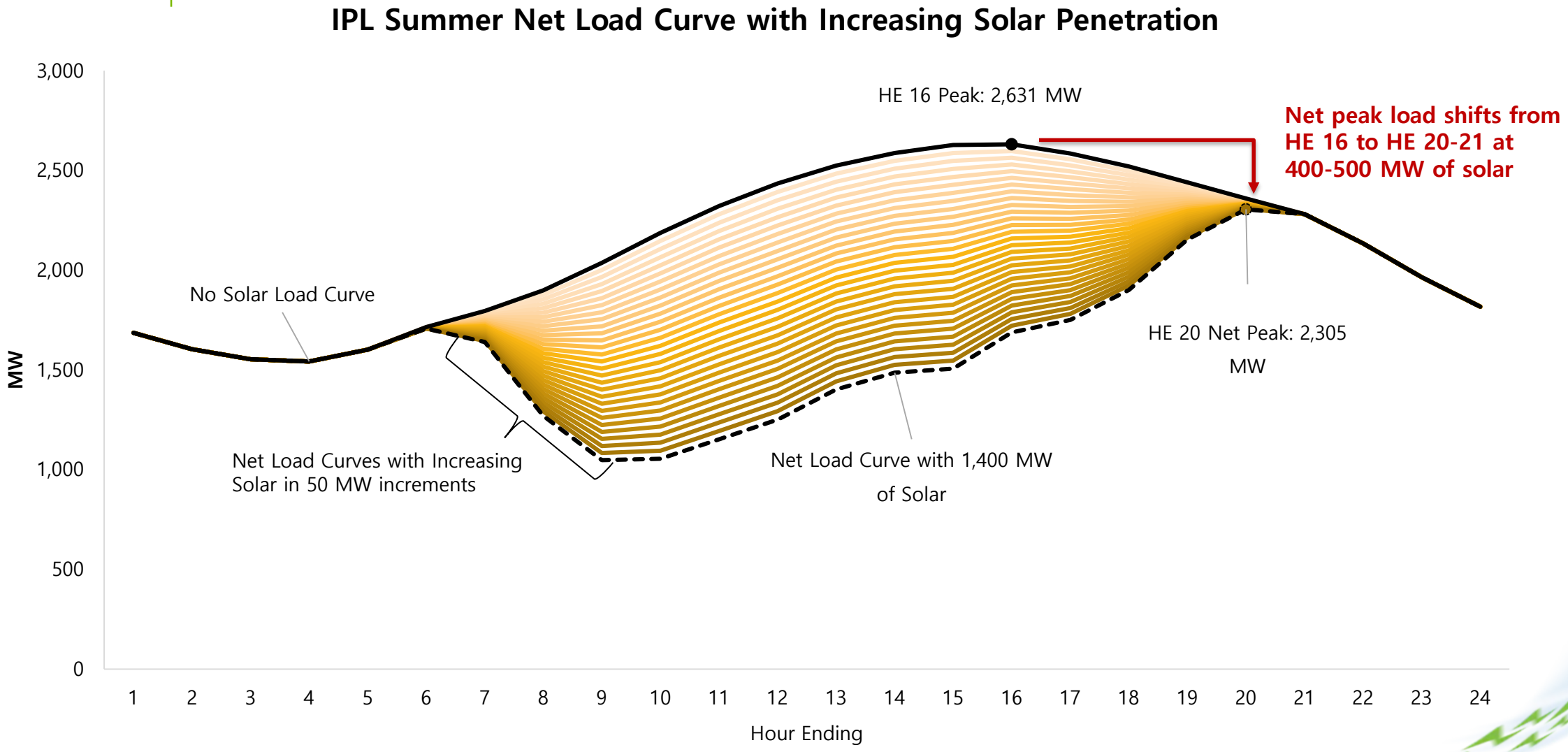


SOLAR CAPACITY CREDIT: SUMMER

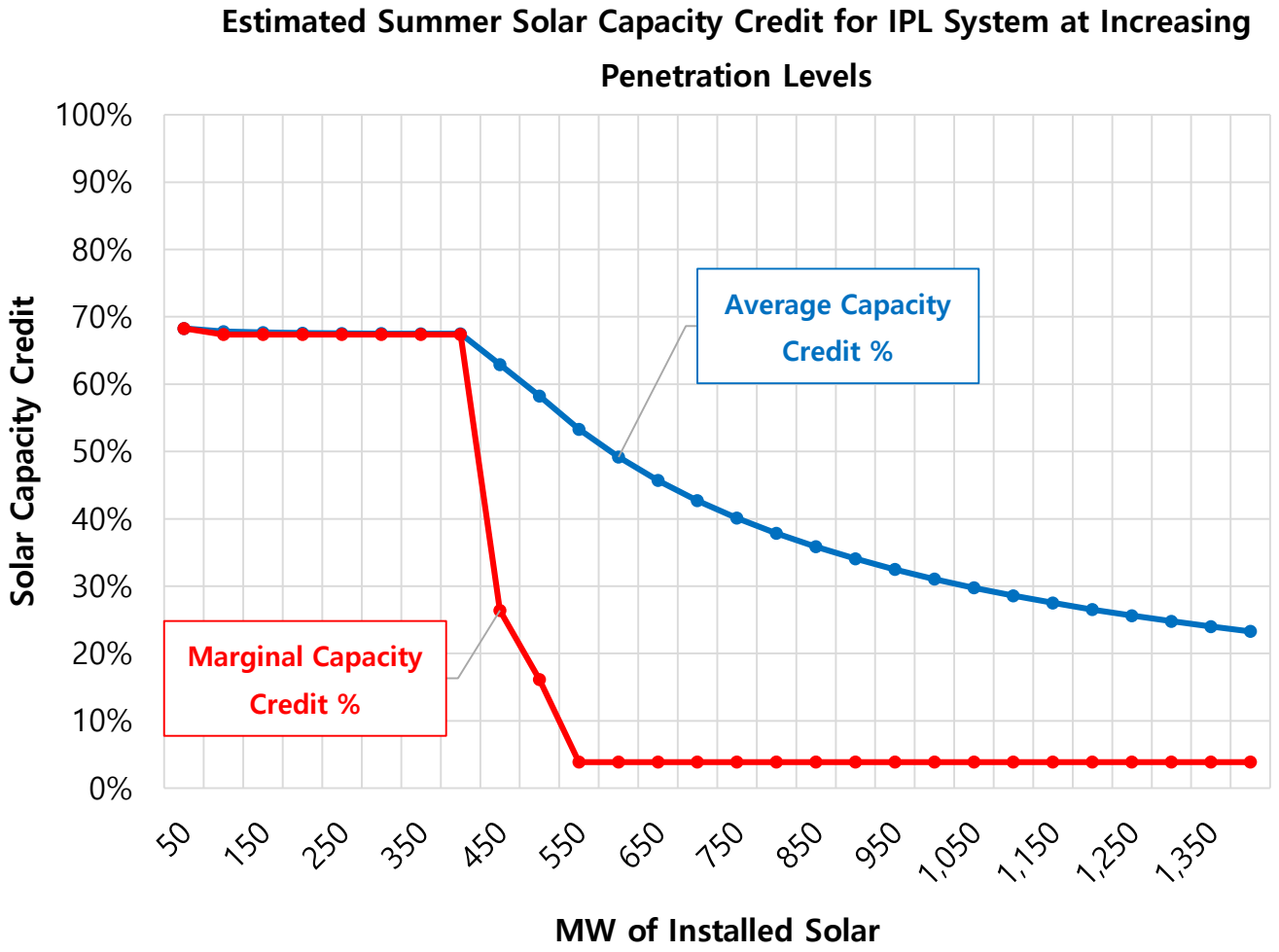
Summer capacity credit for single-axis tracking solar is 60-70% at low penetration levels



SUMMER NET LOAD CURVE



SOLAR CAPACITY CREDIT

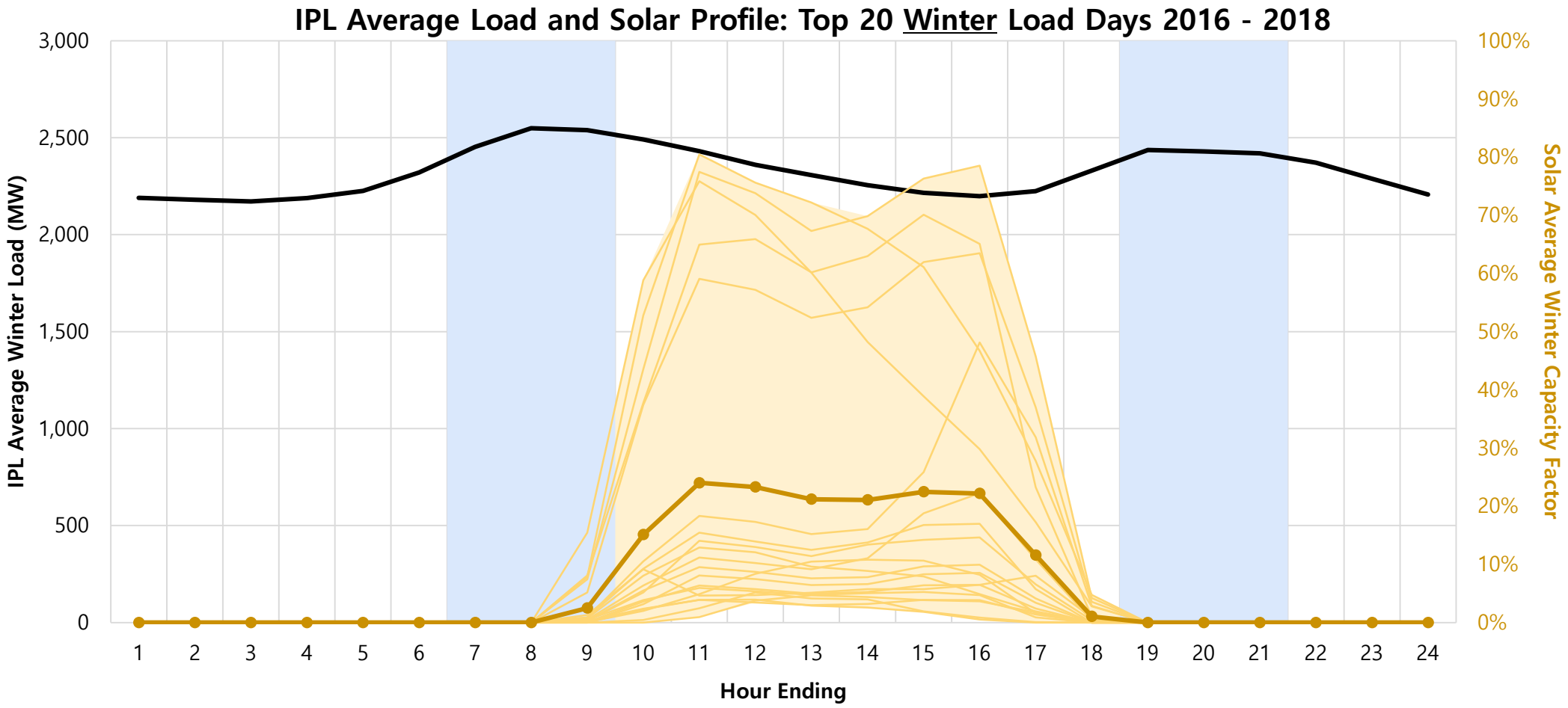


Marginal capacity credit for solar erodes quickly past 400-500 MW without intervention

Mitigation measures to improve solar capacity value: storage, demand response, geographically diverse locations, load shifting DSM/EE measures

SOLAR CAPACITY CREDIT: WINTER

Limited capacity value in the winter for solar as a standalone resource



BREAK

ANALYSIS OF ALTERNATIVES: 2019 IRP MODELING

Patrick Maguire

Director of Resource Planning, IPL

2019 IRP MODELING FRAMEWORK

	PORTFOLIOS	SCENARIOS				
		Reference Case	Scenario A: Carbon Tax Case	Scenario B: Carbon + High Gas	Scenario C: Carbon + Low Gas	Scenario D: No Carbon + High Gas
Portfolio 1	No Early Retirements					
Portfolio 2	Pete Unit 1 Retire 2021 Pete Units 2-4 Operational					
Portfolio 3	Pete 1 Retire 2021; Pete 2 Retire 2023 Pete Units 3-4 Operational					
Portfolio 4	Pete 1 Retire 2021; Pete 2 Retire 2023; Pete 3 Retire 2026; Pete Unit 4 Operational					
Portfolio 5	Pete 1 Retire 2021; Pete 2 Retire 2023; Pete 3 Retire 2026; Pete 4 Retire 2030					

IRP Modeling Framework:

- Systematic evaluation of coal retirements based on age, size, and reasonable transition pathways to allow for construction or acquisition of replacement capacity
- Stochastic capacity expansion with hourly chronological dispatch
- Candidate portfolios stressed against a wide range of uncertainty with stochastic scenario analysis

TESTING FOR COST EFFECTIVENESS OF INCREMENTAL DSM

Presented at Sep. 30th Meeting ↓ New portfolios

	Description	DSM Decrements 1-3	DSM Decrements 1-4	DSM Decrements 1-5
Portfolio 1	No Early Retirements	1a	1b	1c
Portfolio 2	Pete Unit 1 Retire 2021 Pete Units 2-4 Operational	2a	2b	2c
Portfolio 3	Pete 1 Retire 2021; Pete 2 Retire 2023 Pete Units 3-4 Operational	3a	3b	3c
Portfolio 4	Pete 1 Retire 2021; Pete 2 Retire 2023; Pete 3 Retire 2026; Pete Unit 4 Operational	4a	4b	4c
Portfolio 5	Pete 1 Retire 2021; Pete 2 Retire 2023; Pete 3 Retire 2026; Pete 4 Retire 2030	5a	5b	5c

IPL ran 10 additional capacity expansion runs with DSM decrements/bundles forced in to ensure optimal level of DSM targeted in 2021-2023 plan

MODELING SUMMARY

- **Final modeling framework:**
  - 15 candidate resource portfolios containing a wide variety of technologies, DSM, and coal retirements
  - 75 stochastic production cost runs
  - Total of 9,000 iterations across all model runs
  - 1,500+ hours of model simulation time

2019 IMPROVEMENTS

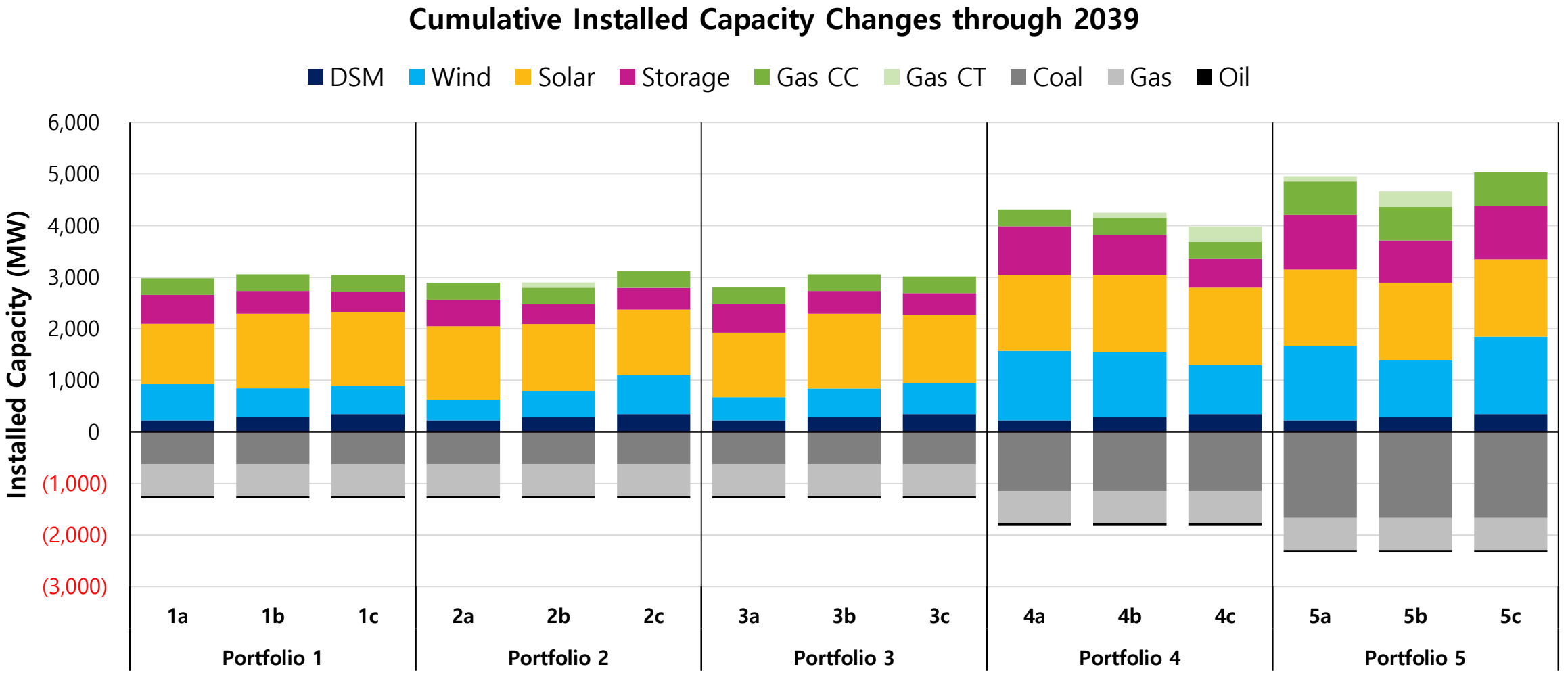
Modeling Tools and Analysis

- Entirely new modeling platform with enhanced load, dispatch, renewable, storage, and stochastic capabilities
- Added power price basis analysis, which is especially important for wind
- Revised scenario framework to allow more portfolio comparison across futures
- Robust risk analysis, both quantitative and qualitative
- Detailed EV and Distributed PV analysis
- Overall improvement in data sharing, transparency, and visibility into modeling and analysis

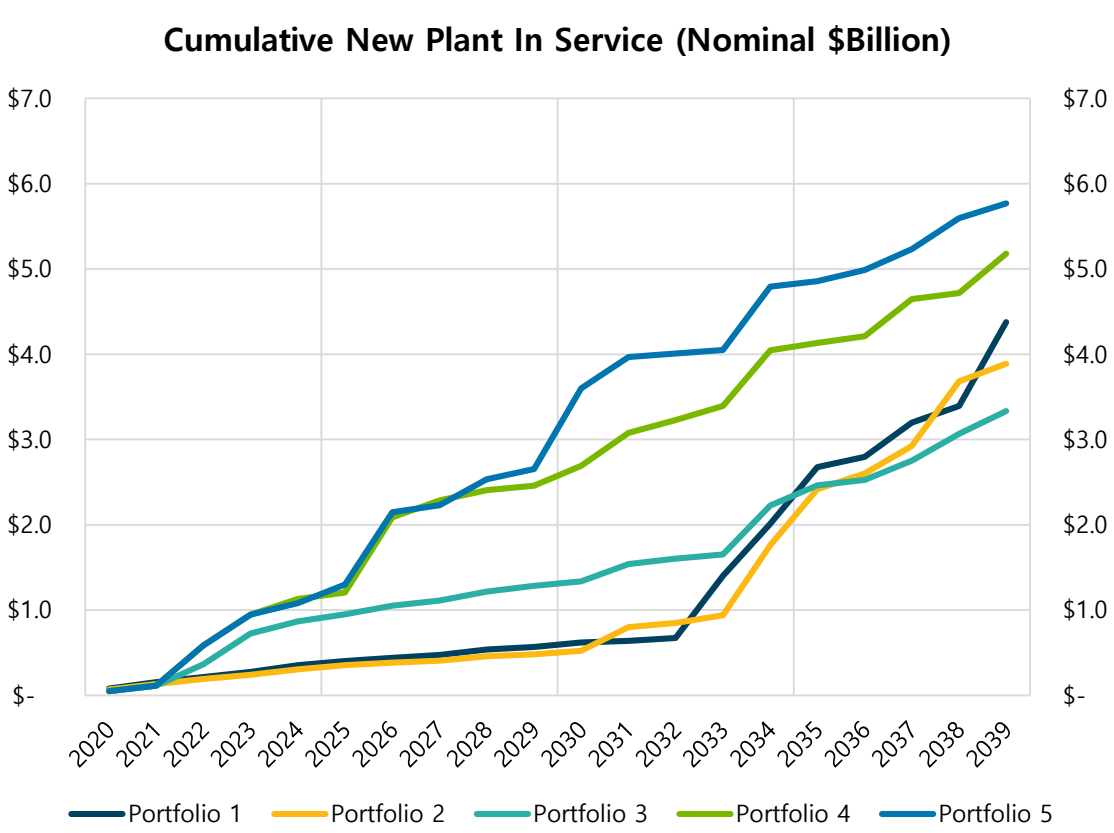
Renewable Modeling

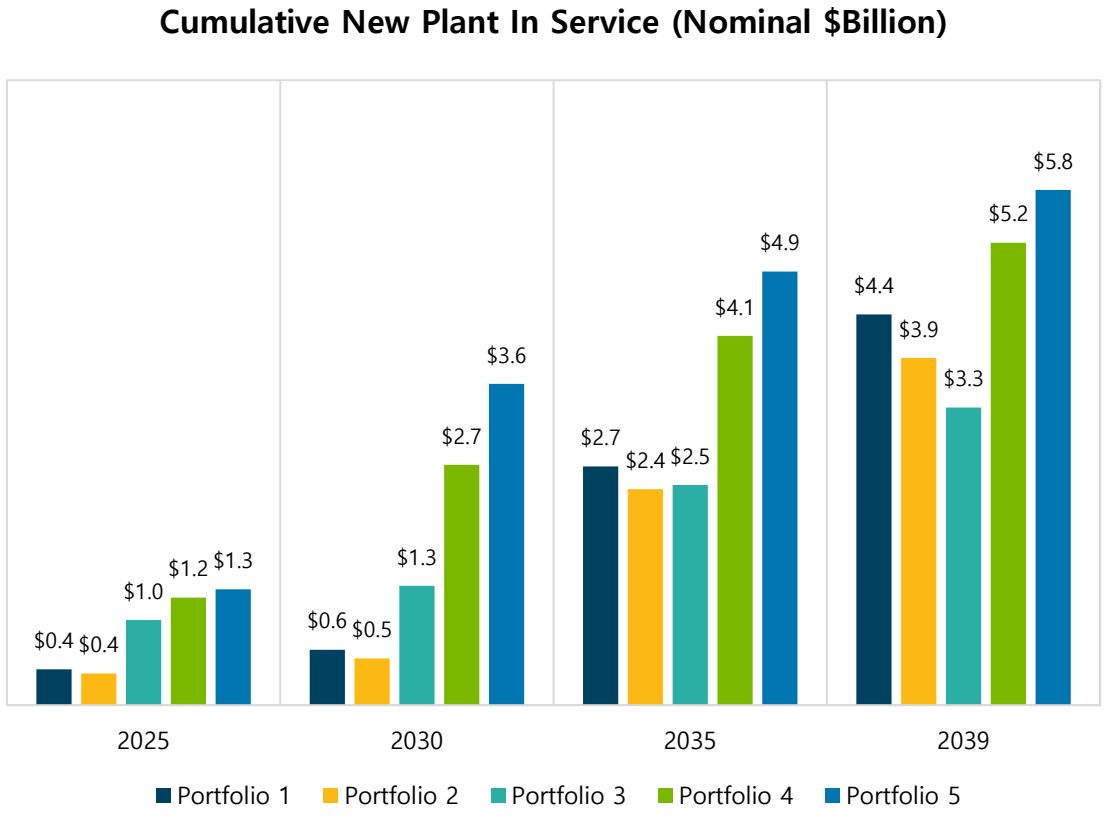
- Robust development of wind and solar profiles
- Solar ELCC and net price shape analysis
- Capital costs: transparent, multi-source cost estimates benchmarked to market bids
- Improved storage modeling

CANDIDATE RESOURCE PORTFOLIOS

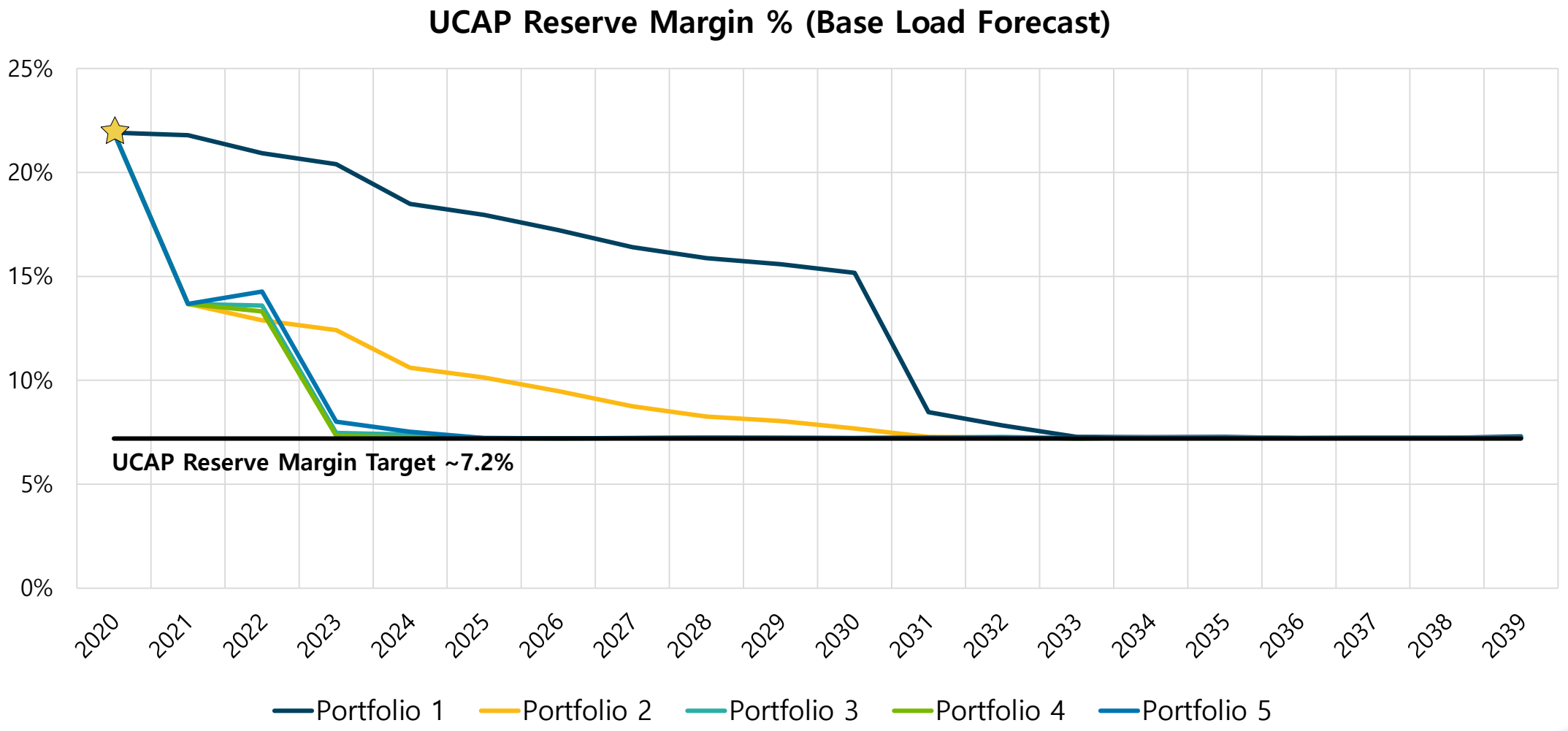


CAPEX REQUIREMENTS BY PORTFOLIO





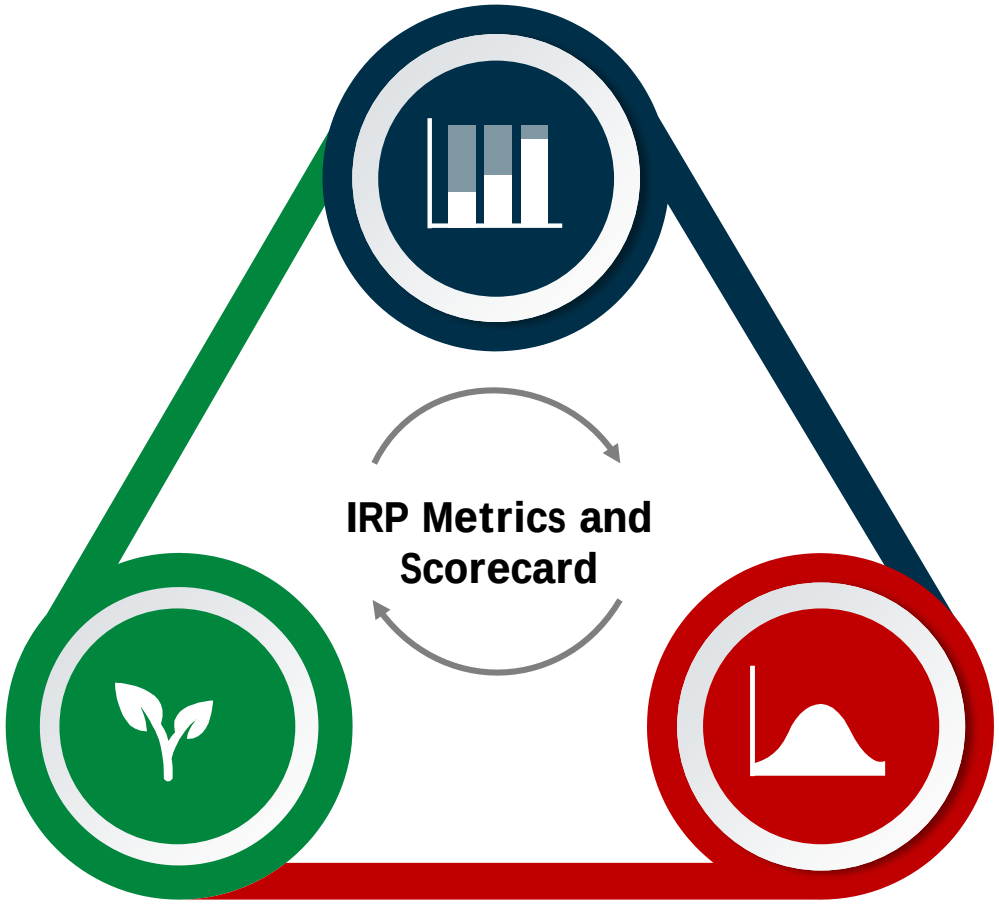
RESERVE MARGIN



PORTFOLIO METRICS

COST

What is the impact on customer rates in the short term and long term?



ENVIRONMENTAL

Consideration of air and water impacts

RISK

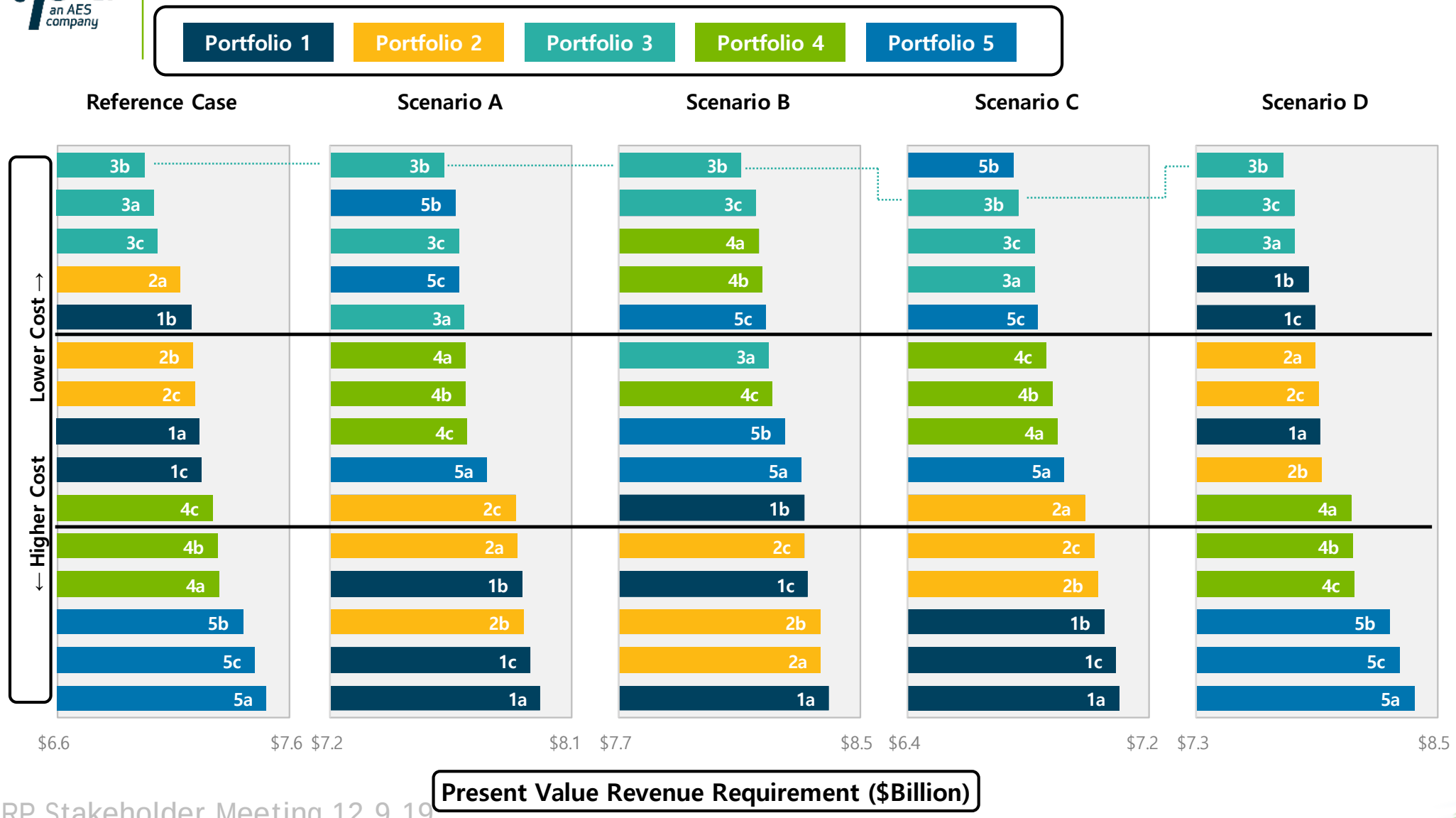
How much risk do the portfolios present to customers?

PVRR SUMMARY TABLE BY SCENARIO

20-Year PVRR ($MM)

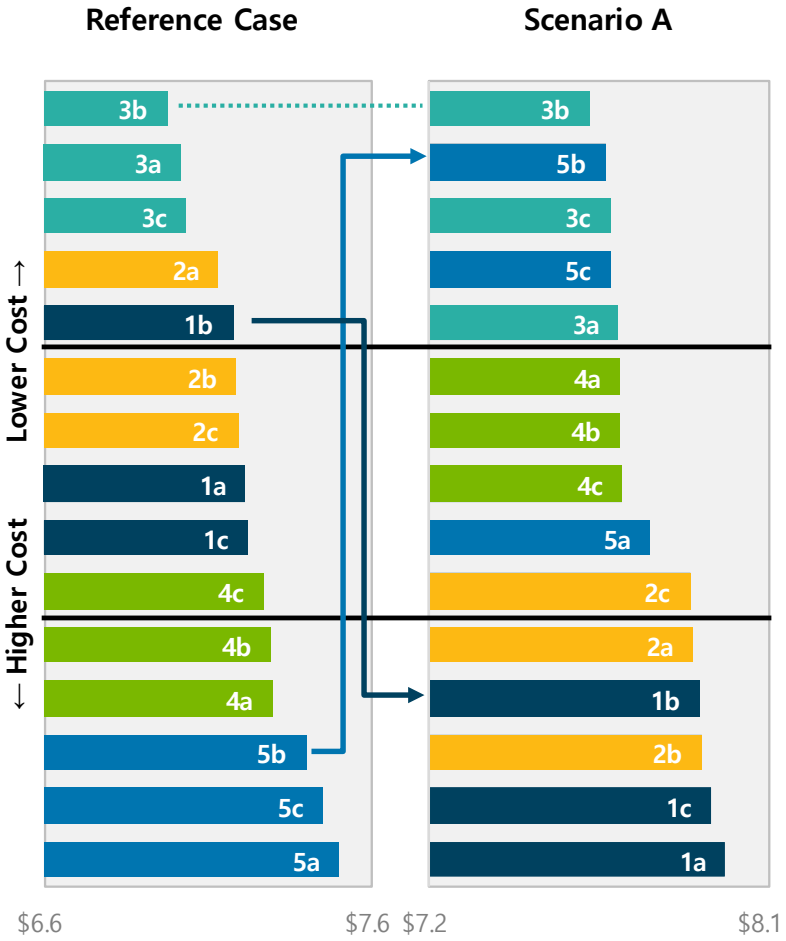
	Reference Case	Scenario A: Carbon Tax Case	Scenario B: Carbon + High Gas	Scenario C: Carbon + Low Gas	Scenario D: No Carbon + High Gas
Portfolio 1a	$7,215	$8,018	$8,427	$7,137	$7,923
Portfolio 2a	$7,132	$7,932	$8,399	$7,017	$7,900
Portfolio 3a	(2) $7,016	$7,737	$8,211	(3) $6,843	(3) $7,798
Portfolio 4a	$7,295	$7,740	(3) $8,174	$6,922	$8,070
Portfolio 5a	$7,500	$7,819	$8,329	$6,948	$8,376
Portfolio 1b	$7,176	$7,950	$8,338	$7,087	$7,864
Portfolio 2b	$7,188	$7,956	$8,398	$7,062	$7,932
Portfolio 3b	(1) $6,976	(1) $7,661	(1) $8,114	(2) $6,786	(1) $7,739
Portfolio 4b	$7,293	$7,742	$8,191	$6,907	$8,082
Portfolio 5b	$7,400	$7,703	$8,272	(1) $6,769	$8,259
Portfolio 1c	$7,223	$7,980	$8,355	$7,128	$7,899
Portfolio 2c	$7,191	$7,923	$8,341	$7,051	$7,912
Portfolio 3c	(3) $7,034	(2) $7,716	(2) $8,165	$6,842	(2) $7,794
Portfolio 4c	$7,269	$7,747	$8,225	$6,883	$8,086
Portfolio 5c	$7,452	(3) $7,716	$8,202	$6,857	$8,306

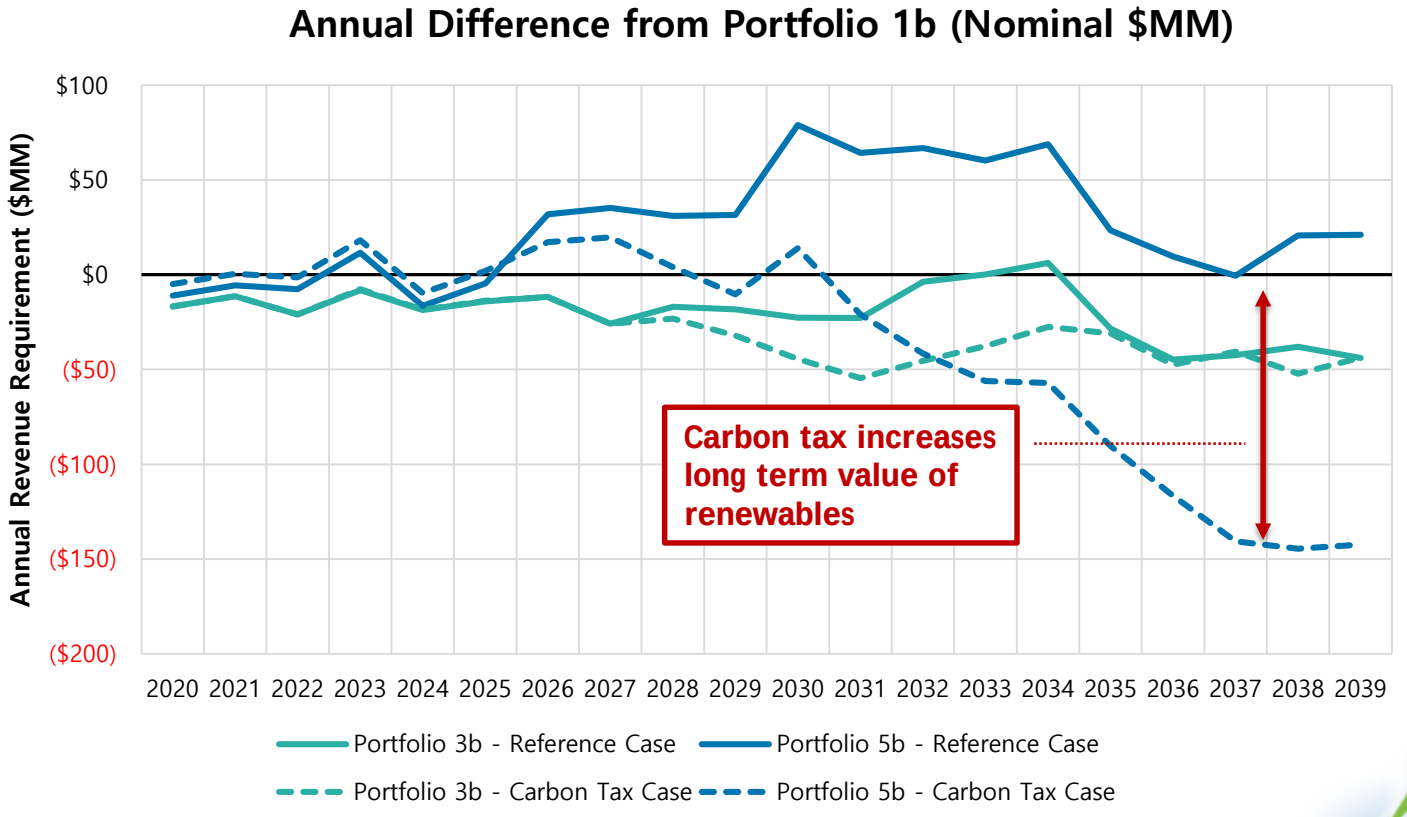
IDENTIFYING ROBUST PORTFOLIOS



SCENARIO A: CARBON TAX CASE

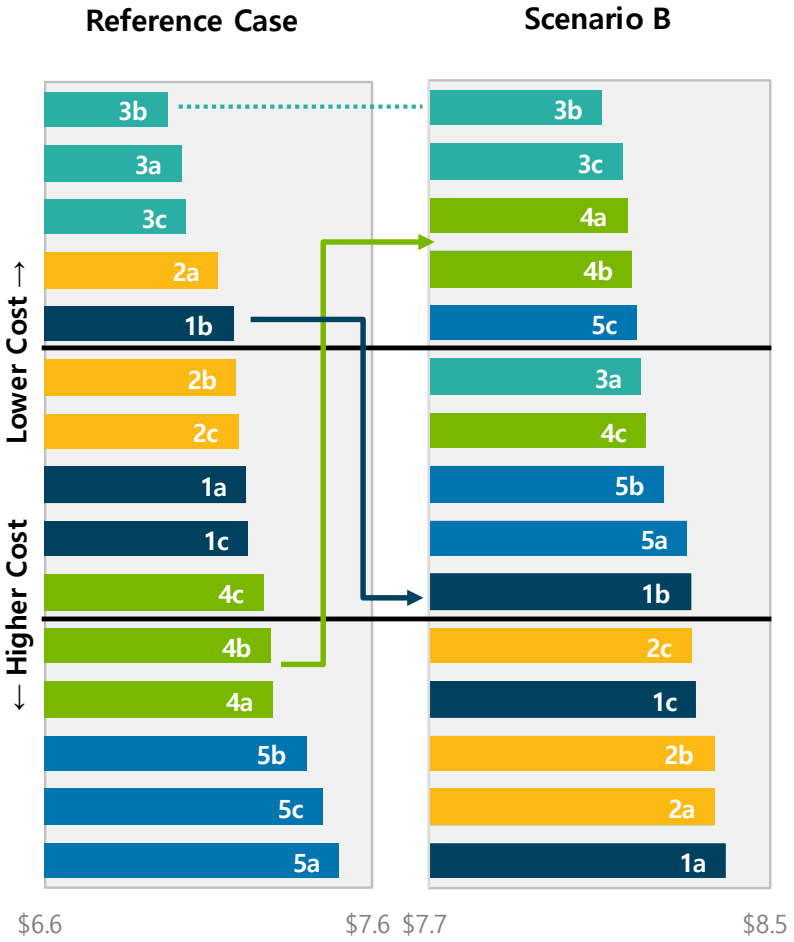
Portfolio 1 | Portfolio 2 | Portfolio 3 | Portfolio 4 | Portfolio 5

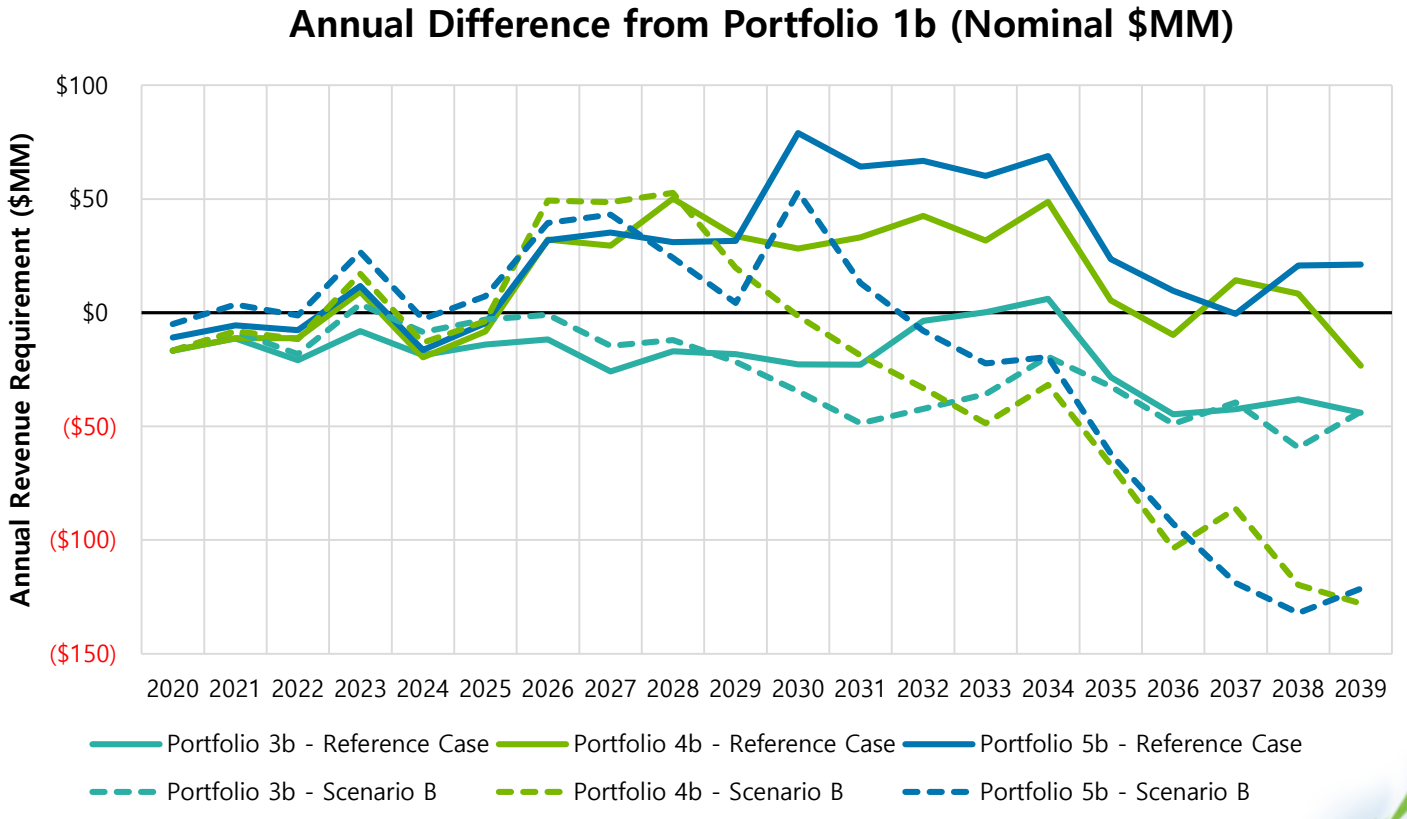




SCENARIO B: CARBON TAX + HIGH GAS

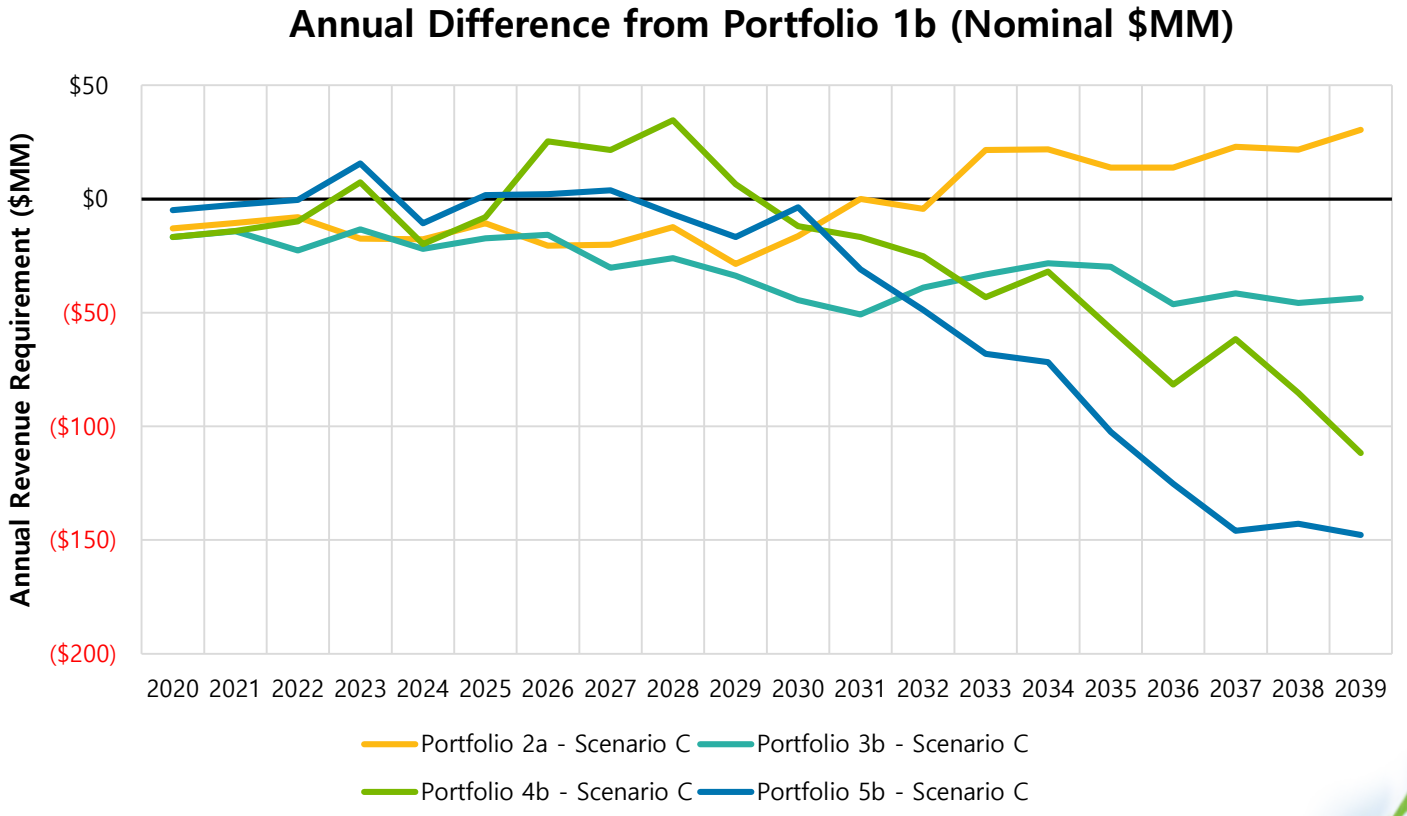
Portfolio 1 | Portfolio 2 | Portfolio 3 | Portfolio 4 | Portfolio 5





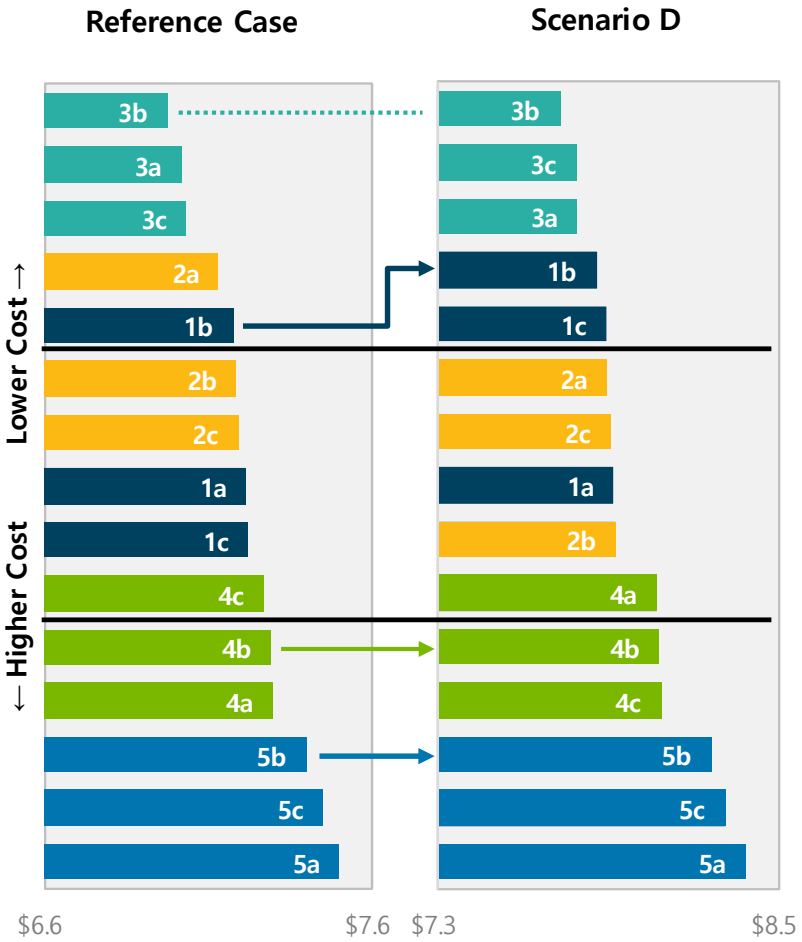
SCENARIO C: CARBON TAX + LOW GAS + LOW LOAD

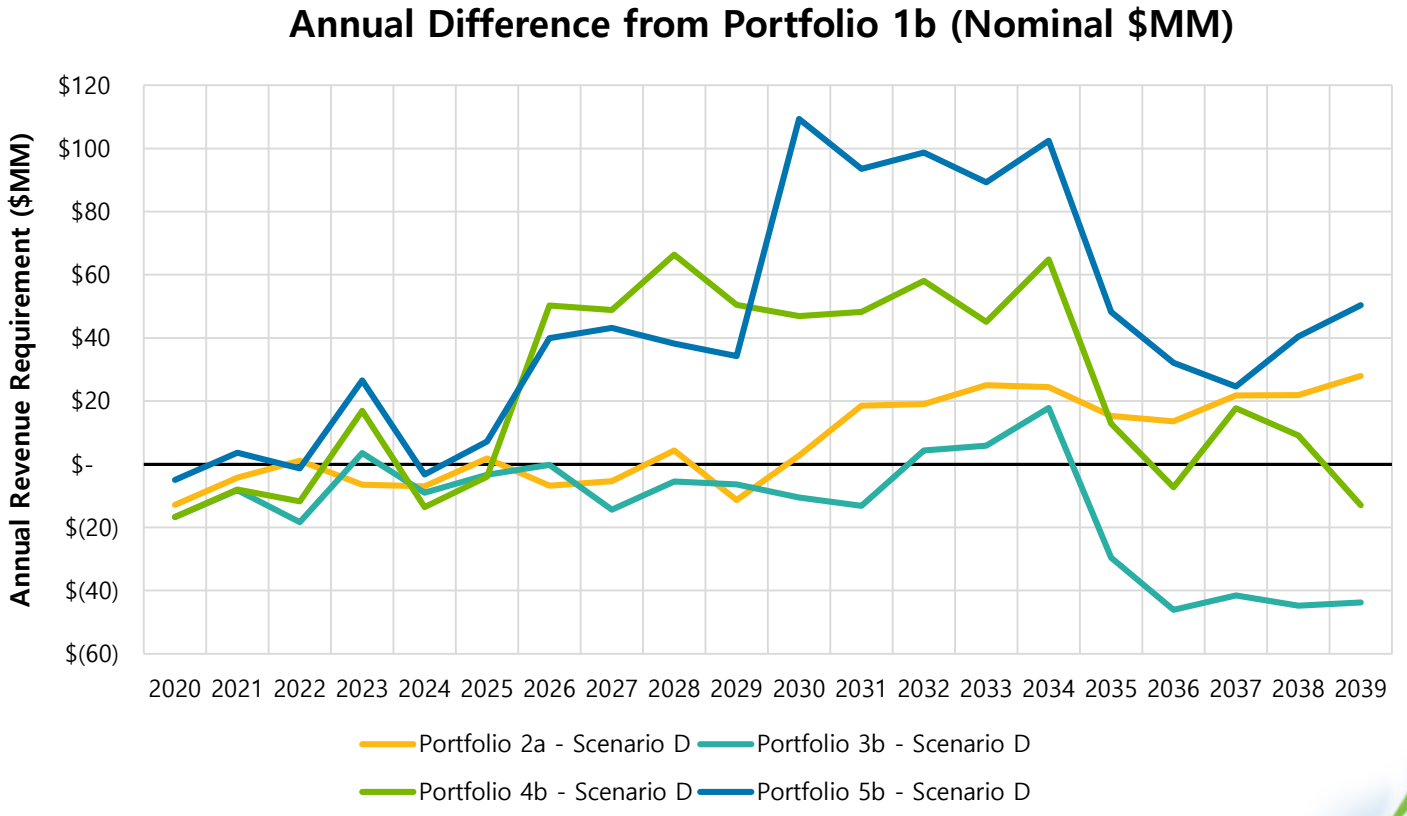
Portfolio 1 | Portfolio 2 | Portfolio 3 | Portfolio 4 | Portfolio 5



SCENARIO D: NO CARBON TAX + HIGH GAS + HIGH LOAD

Portfolio 1 | Portfolio 2 | Portfolio 3 | Portfolio 4 | Portfolio 5





PVRR TAKEAWAYS

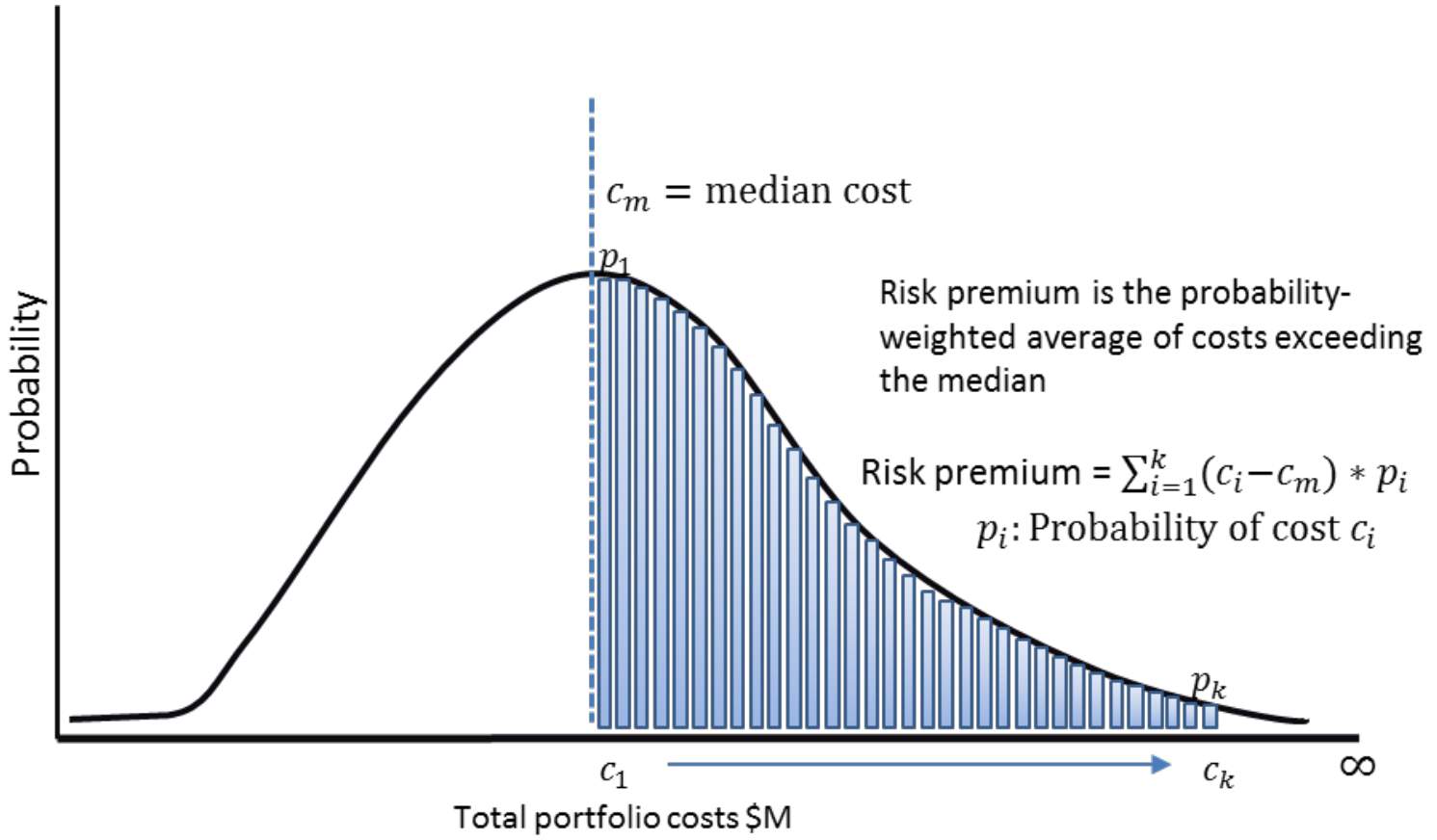
- **Carbon tax single largest driver of changes in PVRR**
  - Coal margins 40-50% lower with carbon tax
  - Renewable captured revenue 30-40% higher because of higher wholesale power prices
  - Reducing exposure to future carbon legislation important
- Natural gas will continue to be a high impact variable as coal and combined cycle units compete for positions in the dispatch stack
- Benefits of portfolio diversity on display:
  - Portfolio 3, which moves toward a 30/40/30 mix of coal, natural gas, and renewables, is the lowest cost across a range of futures

RATE IMPACTS

Levelized Rate $/kWh

	Reference Case	Scenario A: Carbon Tax Case	Scenario B: Carbon + High Gas	Scenario C: Carbon + Low Gas	Scenario D: No Carbon + High Gas
Portfolio 1a	$0.046	$0.051	$0.053	$0.047	$0.048
Portfolio 2a	$0.045	$0.050	$0.053	$0.046	$0.048
Portfolio 3a	$0.044	$0.049	$0.052	$0.045	$0.047
Portfolio 4a	$0.046	$0.049	$0.052	$0.045	$0.049
Portfolio 5a	$0.047	$0.049	$0.053	$0.045	$0.051
Portfolio 1b	$0.046	$0.051	$0.053	$0.047	$0.048
Portfolio 2b	$0.046	$0.051	$0.054	$0.047	$0.049
Portfolio 3b	$0.045	$0.049	$0.052	$0.045	$0.047
Portfolio 4b	$0.047	$0.049	$0.052	$0.046	$0.049
Portfolio 5b	$0.047	$0.049	$0.053	$0.045	$0.051
Portfolio 1c	$0.047	$0.052	$0.054	$0.048	$0.049
Portfolio 2c	$0.046	$0.051	$0.054	$0.047	$0.049
Portfolio 3c	$0.045	$0.050	$0.053	$0.046	$0.048
Portfolio 4c	$0.047	$0.050	$0.053	$0.046	$0.050
Portfolio 5c	$0.048	$0.050	$0.053	$0.046	$0.051

RISK PREMIUM METRIC



The risk premium metric assesses the risk of high cost outcomes based on the stochastic results for each portfolio

Taking the average of the outcomes above the mean captures tail risk better than P75 or P95

RISK PREMIUM ($MM)

	Reference Case	Scenario A	Scenario B	Scenario C	Scenario D
Portfolio 1a	$329	$383	$406	$353	$400
Portfolio 2a	$370	$425	$465	$384	$452
Portfolio 3a	$367	$419	$464	$370	$448
Portfolio 4a	$466	$537	$611	$466	$554
Portfolio 5a	$441	$498	$574	$431	$539
Portfolio 1b	$358	$420	$447	$385	$430
Portfolio 2b	$354	$407	$442	$363	$431
Portfolio 3b	$408	$468	$532	$415	$495
Portfolio 4b	$461	$534	$609	$467	$554
Portfolio 5b	$493	$565	$649	$481	$595
Portfolio 1c	$348	$406	$430	$374	$416
Portfolio 2c	$360	$412	$449	$368	$438
Portfolio 3c	$372	$424	$476	$378	$448
Portfolio 4c	$457	$534	$612	$464	$554
Portfolio 5c	$442	$507	$584	$448	$543

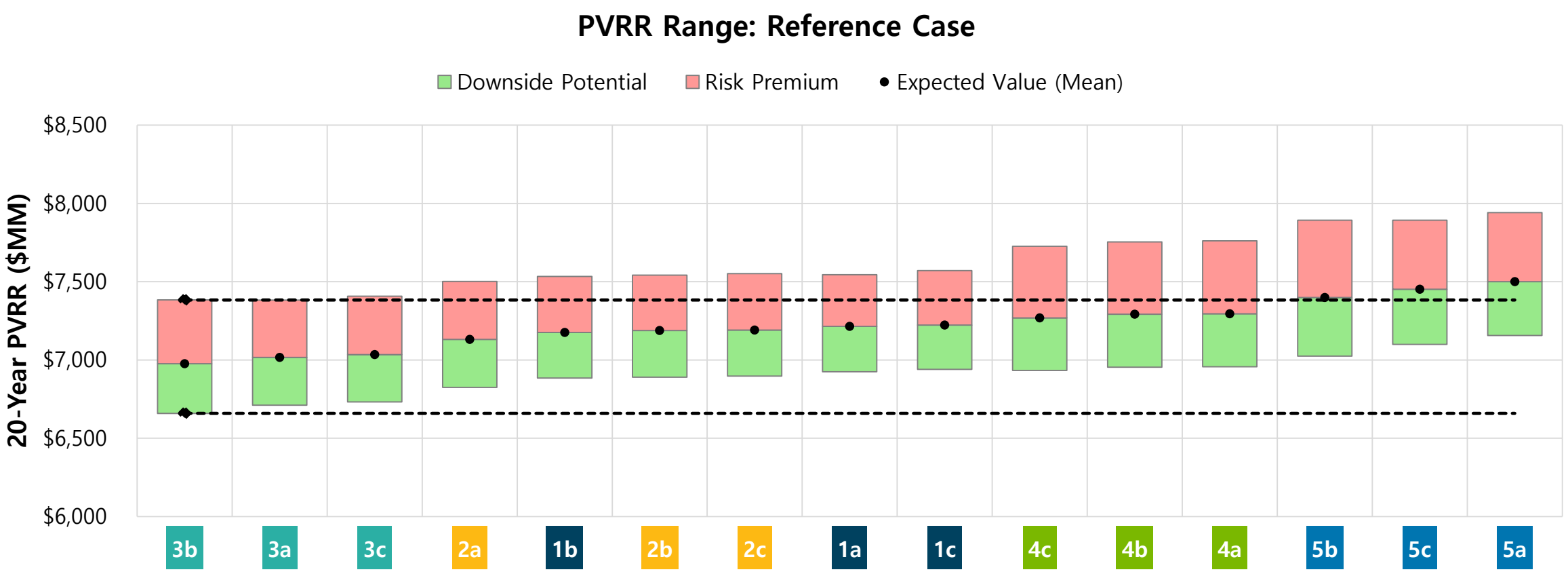
- Risk premiums are 4-7% of total cost
- Risk premium lowest for Portfolios 1 and 2
- Coal prices relatively stable, dispatchability improves economics
- High renewable portfolios can create mismatch between load and generation

RISK-ADJUSTED PVRR ($MM)

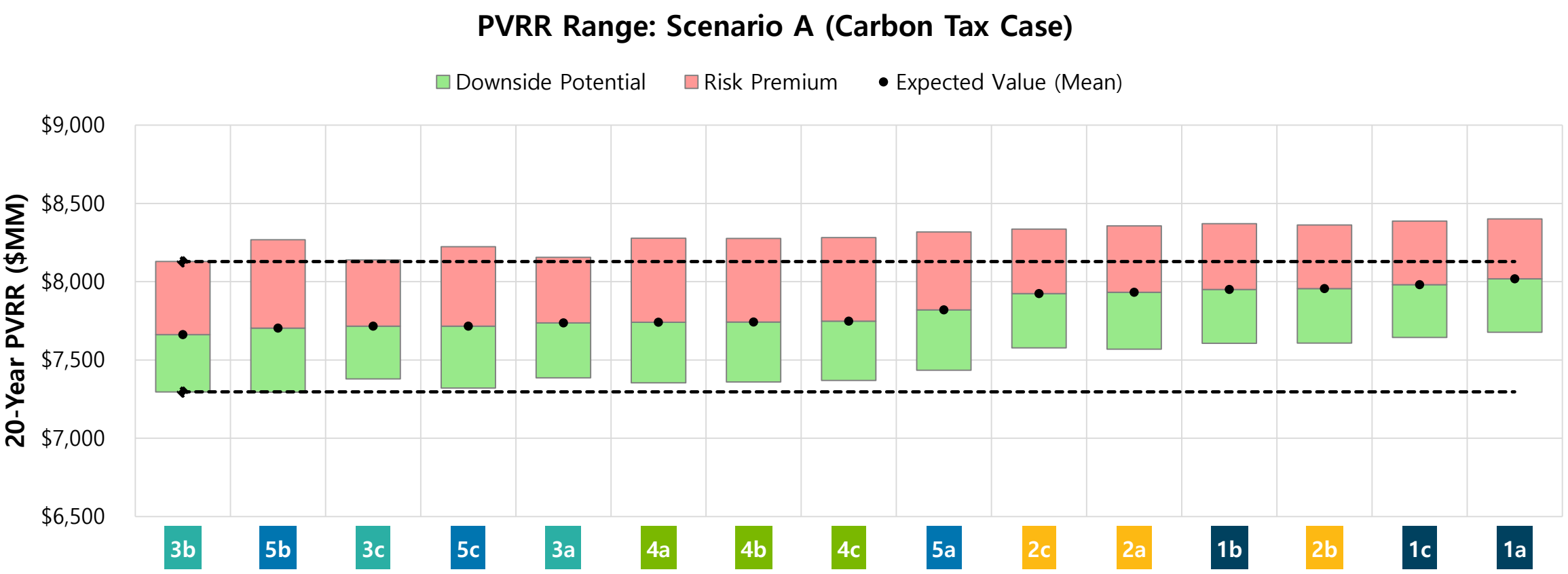
	Reference Case	Scenario A	Scenario B	Scenario C	Scenario D
Portfolio 1a	$7,544	$8,401	$8,833	$7,489	$8,324
Portfolio 2a	$7,502	$8,356	$8,865	$7,401	$8,351
Portfolio 3a	$7,383	$8,156	$8,676	$7,213	$8,246
Portfolio 4a	$7,761	$8,278	$8,784	$7,388	$8,623
Portfolio 5a	$7,941	$8,317	$8,904	$7,379	$8,915
Portfolio 1b	$7,533	$8,370	$8,785	$7,472	$8,294
Portfolio 2b	$7,542	$8,363	$8,840	$7,425	$8,363
Portfolio 3b	$7,384	$8,129	$8,646	$7,201	$8,234
Portfolio 4b	$7,754	$8,277	$8,800	$7,374	$8,636
Portfolio 5b	$7,892	$8,268	$8,921	$7,250	$8,854
Portfolio 1c	$7,571	$8,387	$8,785	$7,502	$8,315
Portfolio 2c	$7,551	$8,335	$8,791	$7,418	$8,350
Portfolio 3c	$7,407	$8,139	$8,642	$7,221	$8,242
Portfolio 4c	$7,726	$8,281	$8,837	$7,347	$8,640
Portfolio 5c	$7,893	$8,223	$8,786	$7,305	$8,849

- Adding risk premium to expected value PVRR puts all portfolios on level playing field
- **Portfolio 3 is lowest cost on a risk-adjusted basis in all scenarios**

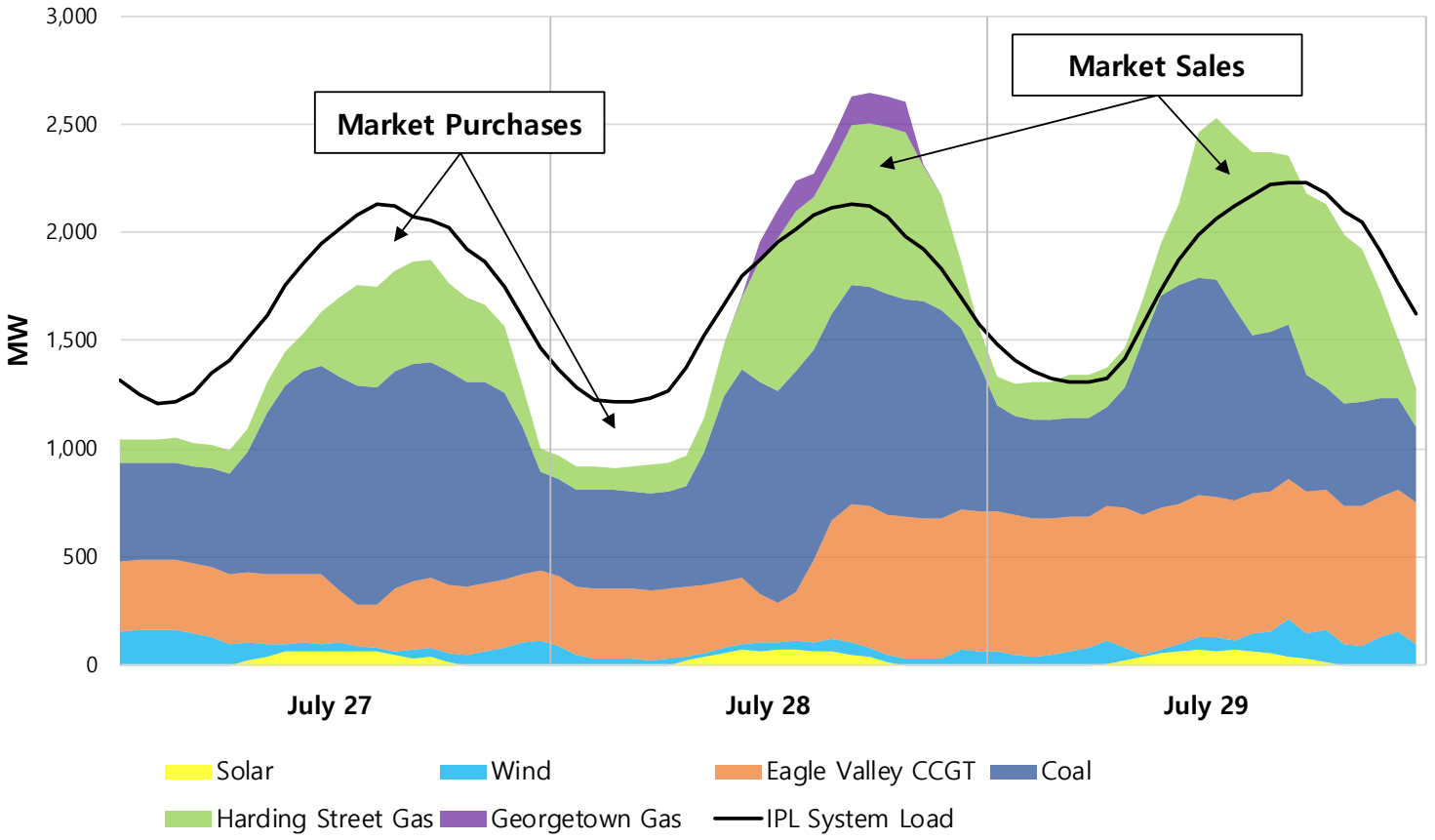
PVRR WITH RISK DISTRIBUTIONS: REFERENCE CASE



PVRR WITH RISK DISTRIBUTIONS: SCENARIO A (CARBON TAX CASE)



RISK METRIC: MARKET INTERACTION



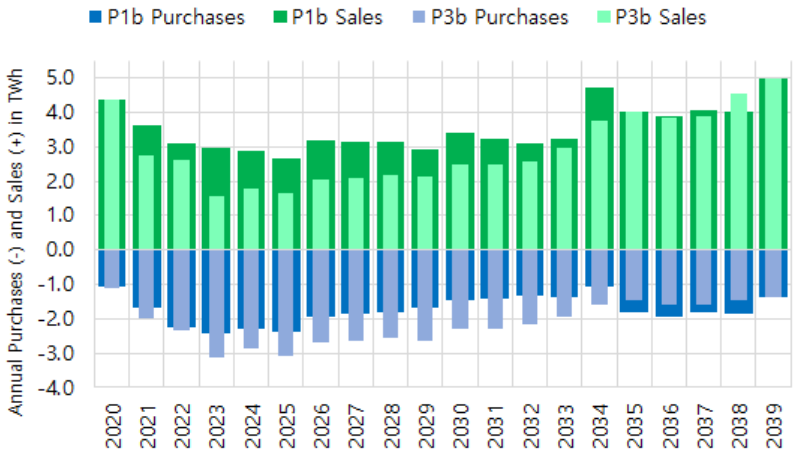
- Looking only at annual energy misses the actual market interaction that will occur hourly
- Market purchases and sales occur in all portfolios
- Relying too heavily on market purchases introduces risk
- Relying on value from market sales is equally risky

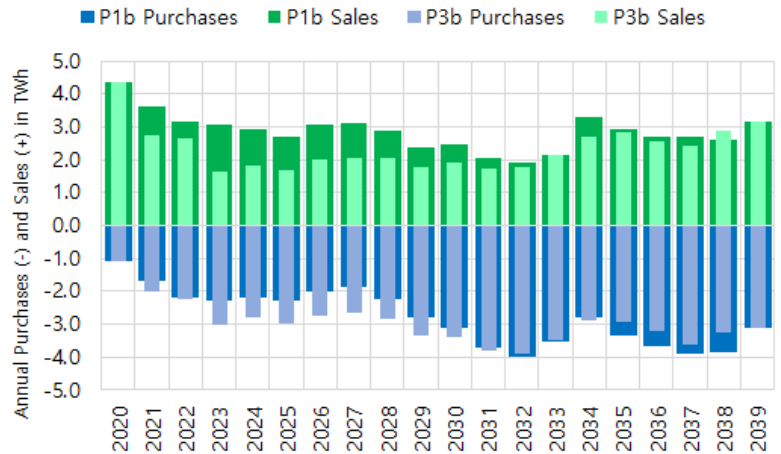
RELIANCE ON THE MARKET: BALANCED APPROACH

Reference Case

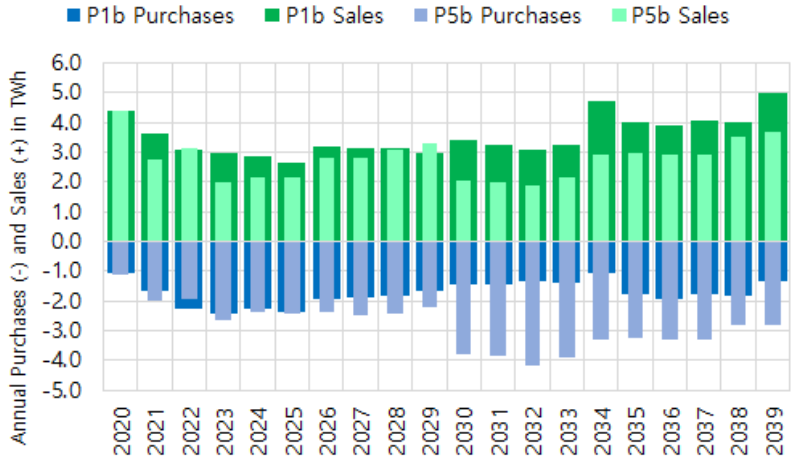
Scenario A: Carbon Case

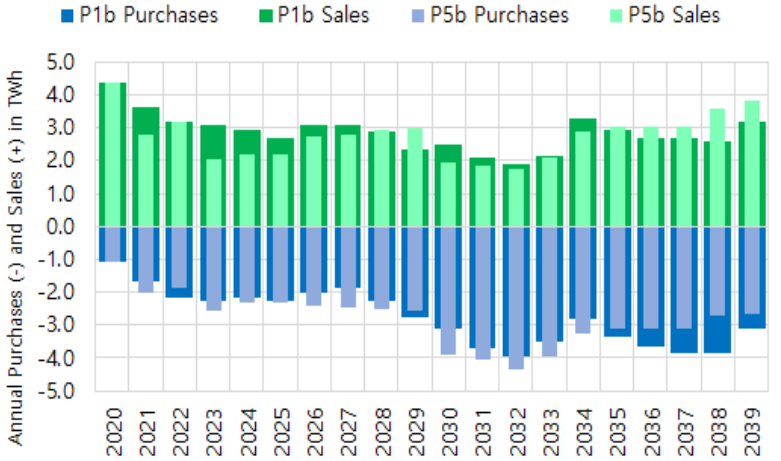
Portfolio 1 vs. Portfolio 3





Portfolio 1 vs. Portfolio 5





Market Interaction

(in Millions of MWh)

|Purchases| + |Sales|

Reference Case

Portfolio	
1b	5.2
3b	5.0
5b	5.6

Scenario A: Carbon Case

Portfolio	
1b	5.7
3b	5.4
5b	5.6

ENVIRONMENTAL: AIR EMISSIONS

Reference Case

	CO_2 (million short-tons)	CO_2 Intensity (short-tons/MWh)	NO_x (short-tons)	SO_2 (short-tons)
2010 - 2012 Baseline (3-year average)	**16.1**	**1.05**	**14,255**	**53,107**
	20-Year Average (2020 - 2039)			
Portfolio 1a	11.9	0.75	8,028	10,972
Portfolio 2a	11.0	0.73	7,120	10,477
Portfolio 3a	9.5	0.64	6,371	9,577
Portfolio 4a	7.0	0.46	5,152	6,038
Portfolio 5a	5.6	0.38	2,991	3,582
Portfolio 1b	11.9	0.74	8,028	10,972
Portfolio 2b	11.1	0.72	7,124	10,477
Portfolio 3b	9.5	0.63	6,371	9,577
Portfolio 4b	7.0	0.47	5,164	6,039
Portfolio 5b	5.8	0.41	3,014	3,583
Portfolio 1c	11.9	0.74	8,028	10,972
Portfolio 2c	11.0	0.71	7,120	10,477
Portfolio 3c	9.5	0.64	6,371	9,577
Portfolio 4c	7.1	0.49	5,182	6,039
Portfolio 5c	5.7	0.38	2,988	3,583

Scenario A: Carbon Tax Case

	CO_2 (million short-tons)	CO_2 Intensity (short-tons/MWh)	NO_x (short-tons)	SO_2 (short-tons)
2010 - 2012 Baseline (3-year average)	**16.1**	**1.05**	**14,255**	**53,107**
Portfolio 1a	10.0	0.71	6,547	8,653
Portfolio 2a	9.3	0.69	5,722	8,203
Portfolio 3a	8.0	0.59	5,085	7,438
Portfolio 4a	6.3	0.43	4,265	5,059
Portfolio 5a	5.6	0.38	2,952	3,552
Portfolio 1b	10.0	0.70	6,547	8,653
Portfolio 2b	9.3	0.68	5,726	8,203
Portfolio 3b	8.0	0.58	5,085	7,438
Portfolio 4b	6.3	0.44	4,277	5,059
Portfolio 5b	5.8	0.41	2,974	3,553
Portfolio 1c	10.0	0.70	6,547	8,653
Portfolio 2c	9.3	0.67	5,722	8,203
Portfolio 3c	8.0	0.59	5,085	7,438
Portfolio 4c	6.4	0.46	4,294	5,060
Portfolio 5c	5.7	0.38	2,950	3,552

ENVIRONMENTAL: NON-AIR IMPACTS

- Impact of coal retirements on water:
  - Retire Units 1 and 2: significant reduction in actual intake flow (estimate: greater than 67%);
  - Retire Units 1-4 (assume no water withdrawal): result in the elimination of 354 million gallons per day (MGD) (100% reduction) of water withdraw from the river

PORTFOLIO METRICS SUMMARY

Cost

- Portfolio 3b is the lowest cost portfolio across wide range scenarios
- O&M and Capex savings from retirements mitigates rate impacts of cost of new capacity

Risk

- Portfolio 3b lowest cost on risk-adjusted basis
- Portfolio 3b resource mix provides balanced energy and load profile and reduction total market interaction

Environmental

- Portfolio 3b benefits:
  - Near term reductions in CO2, NOx, SO2
  - 60-70% reduction in water intake flow at the plant

LUNCH BREAK

SENSITIVITY ANALYSIS

Patrick Maguire

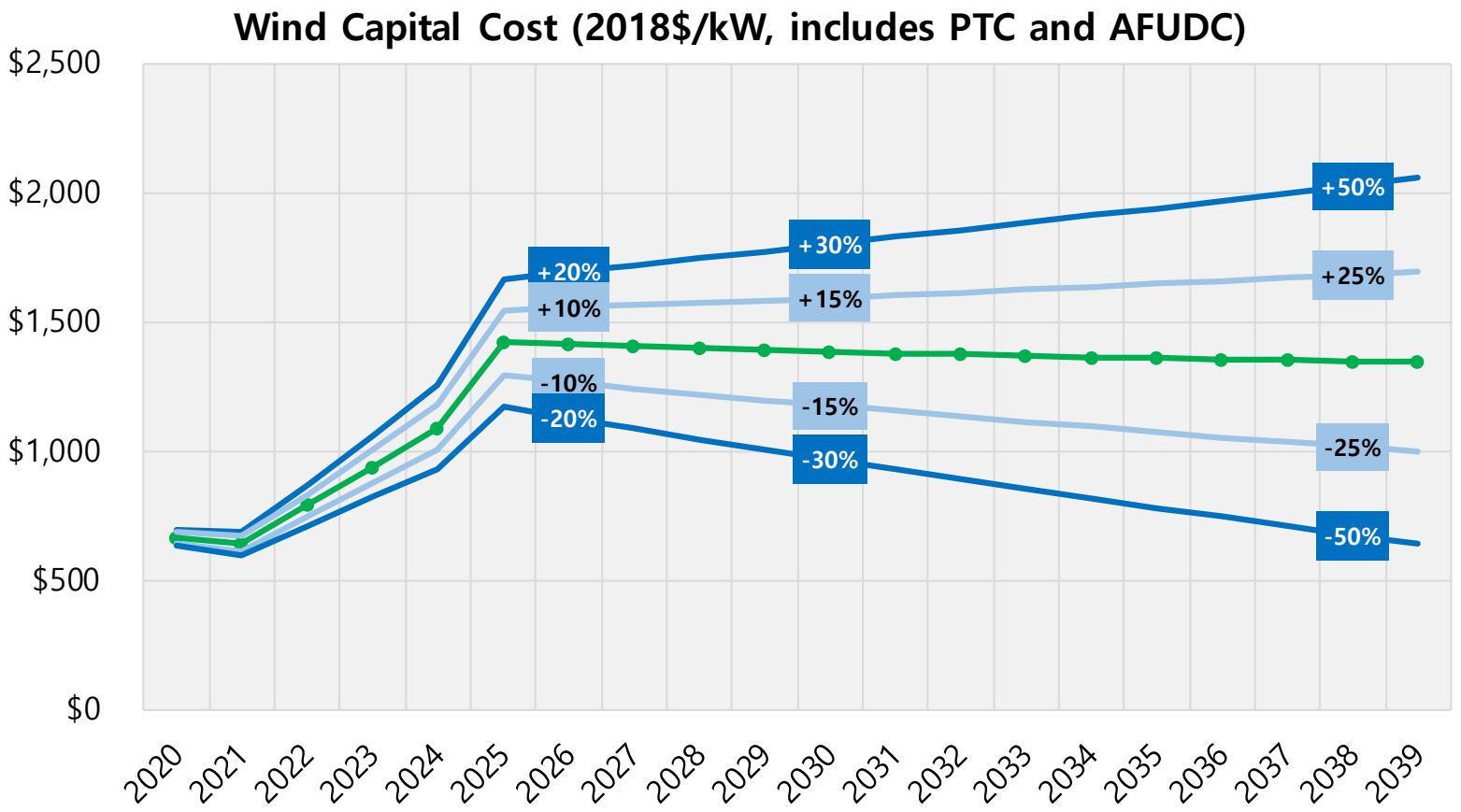
Director of Resource Planning, IPL

SENSITIVITY ANALYSIS

- **<u>Sensitivity</u>: change of a single variable to isolate the impact of future uncertainty**

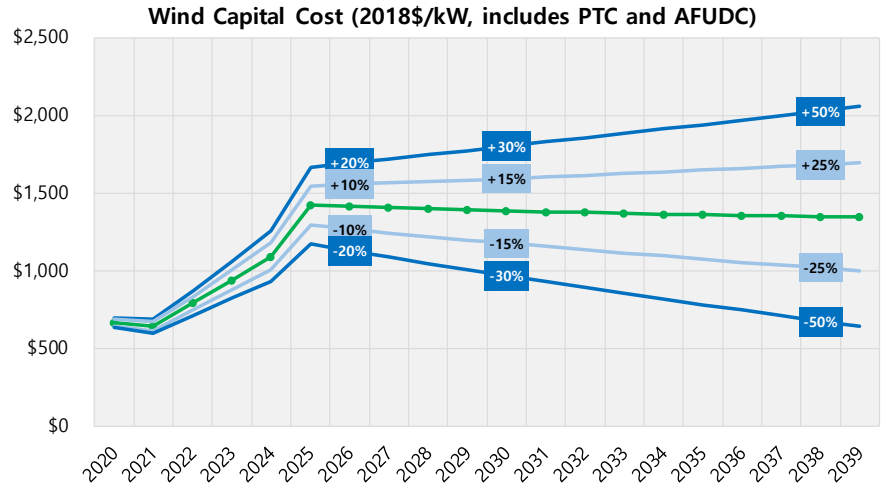
- Four deterministic analyses conducted:
  1. Capital Costs for wind, solar, and storage
  2. MISO Capacity Prices
  3. Wind Capacity Factor
  4. Wind LMP Basis

CAPITAL COST SENSITIVITY (1 OF 4)

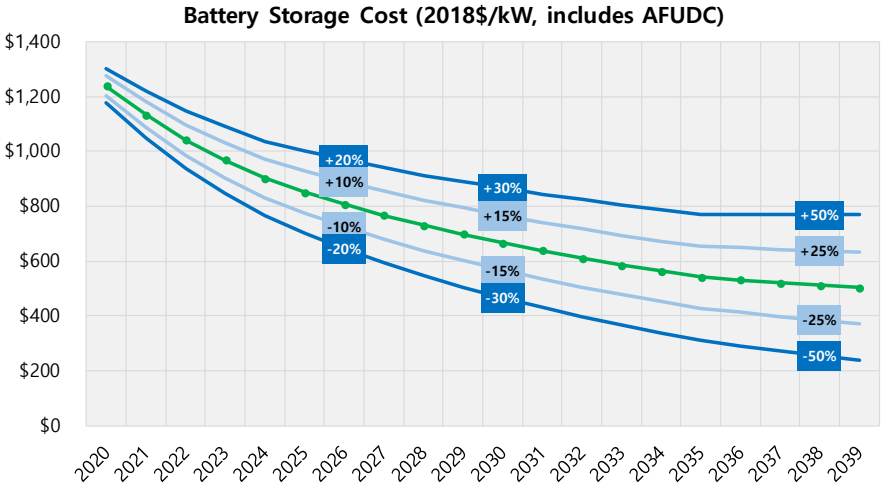


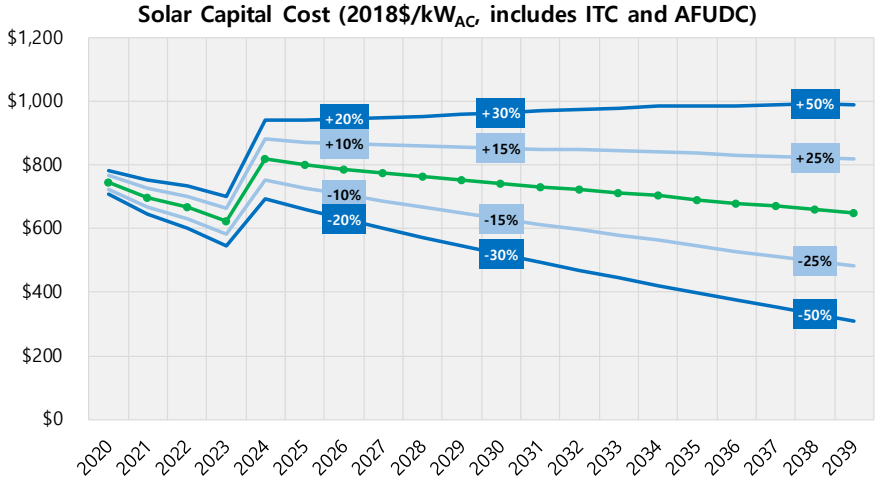
High and low capital cost ranges established for wind, solar, and storage

CAPITAL COST SENSITIVITY (2 OF 4)



- Wind, solar, and storage cost sensitivities applied to fixed portfolios
- All three costs moved together





CAPITAL COST SENSITIVITY (3 OF 4)

Reference Case PVRR ($MM)

	Percent Change by 2030		PVRR w/ Base Capital Costs ↓	Percent Change by 2030	
	-30%	-15%		+15%	+30%
Portfolio 3b	$6,775	$6,874	$6,976	$7,077	$7,177
Portfolio 3a	$6,841	$6,927	$7,016	$7,105	$7,191
Portfolio 3c	$6,843	$6,938	$7,034	$7,131	$7,225
Portfolio 2a	$6,965	$7,049	$7,132	$7,214	$7,298
Portfolio 1b	$7,004	$7,091	$7,176	$7,261	$7,348
Portfolio 2b	$7,010	$7,100	$7,188	$7,276	$7,366
Portfolio 2c	$6,986	$7,089	$7,191	$7,292	$7,396
Portfolio 1a	$7,043	$7,130	$7,215	$7,300	$7,387
Portfolio 1c	$7,043	$7,134	$7,223	$7,312	$7,403
Portfolio 4c	$6,978	$7,121	$7,269	$7,417	$7,560
Portfolio 4b	$6,928	$7,107	$7,293	$7,478	$7,658
Portfolio 4a	$6,912	$7,100	$7,295	$7,490	$7,678
Portfolio 5b	$7,073	$7,234	$7,400	$7,565	$7,726
Portfolio 5c	$7,001	$7,224	$7,452	$7,679	$7,902
Portfolio 5a	$7,100	$7,309	$7,500	$7,741	$7,950

1

2

Takeaways:

1. Portfolio 3b lowest cost with a 30% reduction from base cost forecasts for wind, solar, and storage

2. Portfolio 3b lowest cost with a significant increase in capital costs for wind, solar, and storage

CAPITAL COST SENSITIVITY (4 OF 4)

Scenario A (Carbon Tax Case) PVRR ($MM)

	Percent Change by 2030		PVRR w/ Base Capital Costs ↓	Percent Change by 2030	
	-30%	-15%		+15%	+30%
Portfolio 3b	$7,460	$7,560	$7,661	$7,763	$7,862
Portfolio 5b	$7,377	$7,538	$7,703	$7,869	$8,030
Portfolio 3c	$7,524	$7,619	$7,716	$7,812	$7,907
Portfolio 5c	$7,266	$7,489	$7,716	$7,944	$8,166
Portfolio 3a	$7,562	$7,648	$7,737	$7,826	$7,912
Portfolio 4a	$7,357	$7,546	$7,740	$7,935	$8,123
Portfolio 4b	$7,377	$7,538	$7,742	$7,928	$8,107
Portfolio 4c	$7,456	$7,599	$7,747	$7,896	$8,039
Portfolio 5a	$7,394	$7,603	$7,819	$8,035	$8,244
Portfolio 2c	$7,719	$7,822	$7,923	$8,025	$8,128
Portfolio 2a	$7,765	$7,849	$7,932	$8,014	$8,098
Portfolio 1b	$7,778	$7,865	$7,950	$8,035	$8,122
Portfolio 2b	$7,778	$7,868	$7,956	$8,044	$8,134
Portfolio 1c	$7,800	$7,891	$7,980	$8,069	$8,160
Portfolio 1a	$7,846	$7,933	$8,018	$8,103	$8,190

1

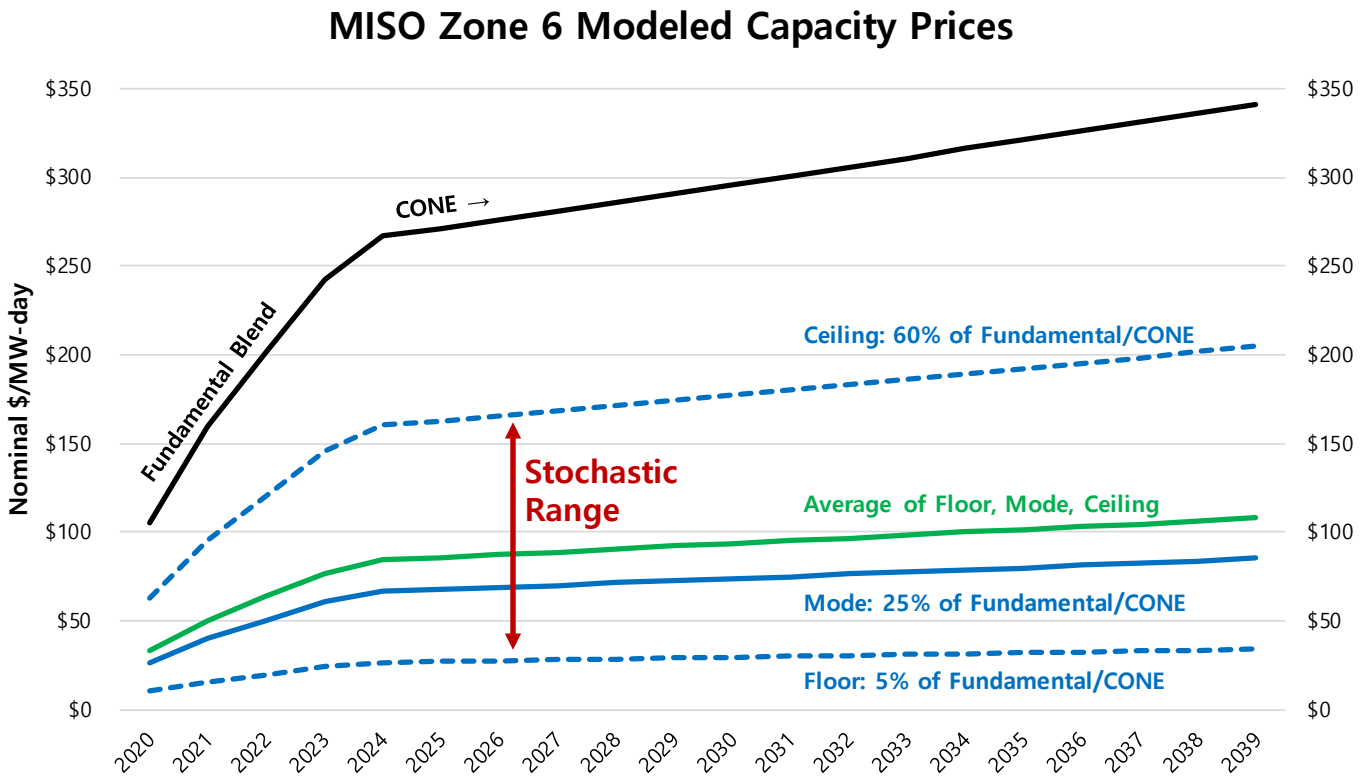
2

Carbon Tax Case Results:

1. Portfolio 5 becomes lowest cost with (a) federal price on carbon and (b) cost declines (from base forecast) in wind, solar, and storage

2. Portfolio 3b lowest cost with a significant increase in capital costs for wind, solar, and storage

MISO CAPACITY PRICE SENSITIVITY (1 OF 3)



- MISO capacity prices applied to portfolio position imbalances (long/short)
- Greatest impact on Portfolios 1 and 2 because IPL is in a net long capacity position today
- Capacity prices modeled stochastically to capture range of uncertainty
- Deterministic sensitivities conducted to measure impact of capacity prices on PVRR results

MISO CAPACITY PRICE SENSITIVITY (2 OF 2)

Reference Case PVRR ($MM)

	Bilateral Floor	Bilateral Most Likely	[Base] Stochastic Mean ↓	Bilateral Ceiling	CONE
Portfolio 3b	$6,983	$6,978	$6,976	$6,966	$6,953
Portfolio 3a	$7,024	$7,018	$7,016	$7,006	$6,993
Portfolio 3c	$7,034	$7,034	$7,034	$7,034	$7,034
Portfolio 2a	$7,146	$7,136	$7,132	$7,113	$7,087
Portfolio 1b	$7,221	$7,190	$7,176	$7,116	$7,035
Portfolio 2b	$7,203	$7,193	$7,188	$7,169	$7,144
Portfolio 2c	$7,191	$7,191	$7,191	$7,191	$7,191
Portfolio 1a	$7,260	$7,229	$7,215	$7,156	$7,074
Portfolio 1c	$7,223	$7,223	$7,223	$7,223	$7,223
Portfolio 4c	$7,269	$7,269	$7,269	$7,269	$7,269
Portfolio 4b	$7,301	$7,295	$7,293	$7,281	$7,267
Portfolio 4a	$7,304	$7,298	$7,295	$7,284	$7,269
Portfolio 5b	$7,408	$7,402	$7,400	$7,389	$7,375
Portfolio 5c	$7,452	$7,452	$7,452	$7,452	$7,452
Portfolio 5a	$7,508	$7,503	$7,500	$7,489	$7,475

2

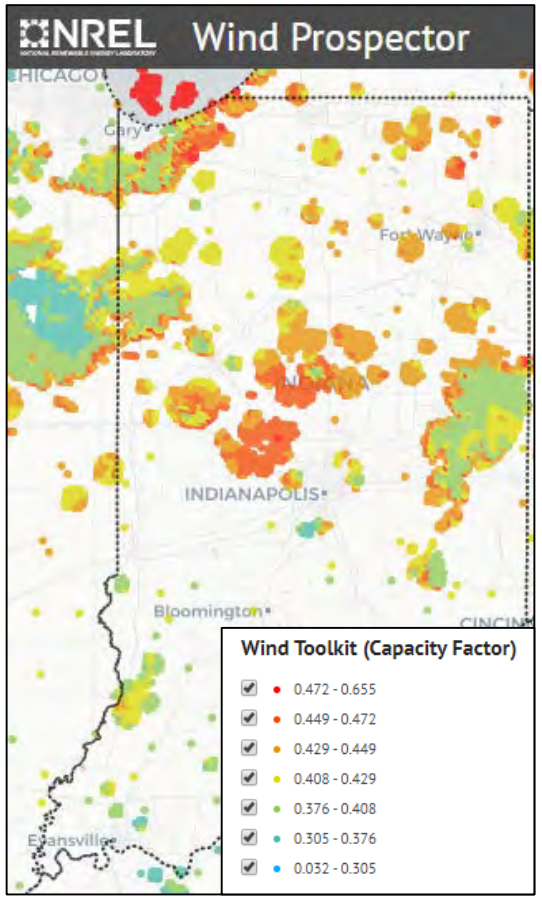
1

Reference Case Results:

1. Portfolio 3b lowest cost even with applying CONE capacity price to capacity length in Portfolios 1 and 2

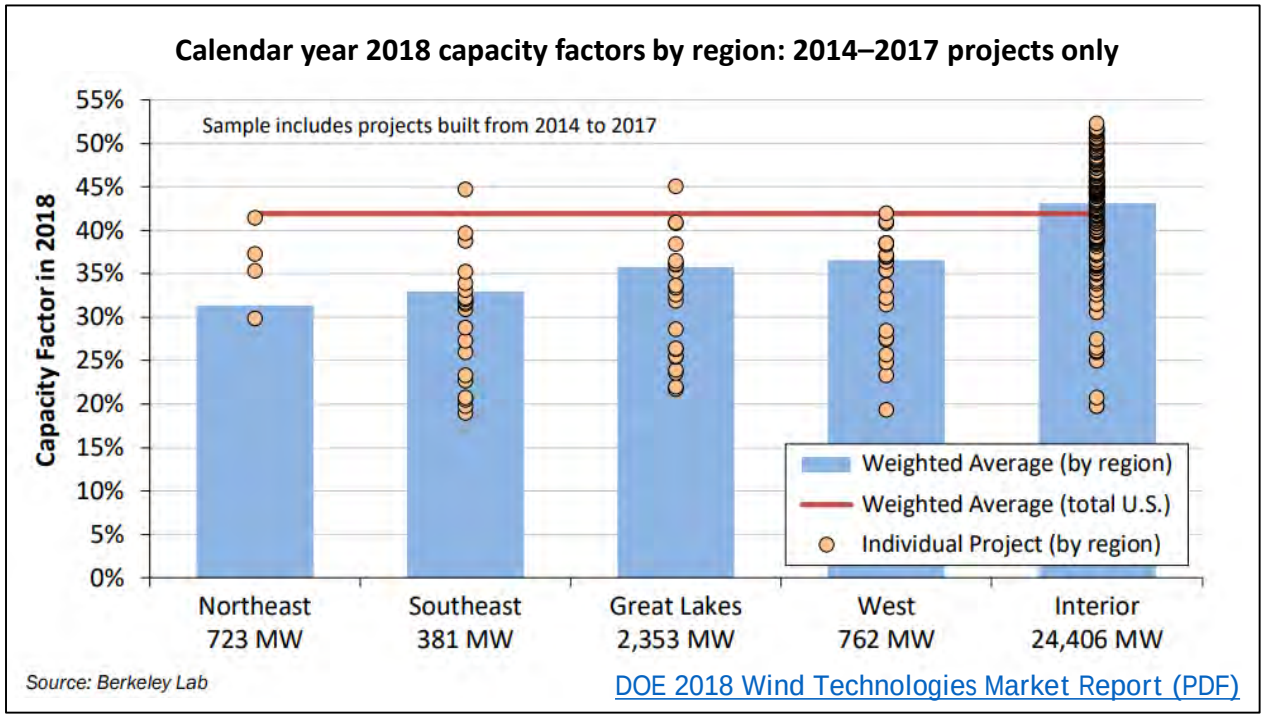
2. Sustained low capacity prices increases value of Portfolio 3 relative to Portfolios 1 and 2

WIND CAPACITY FACTOR (1 OF 3)



Source: NREL

- IPL utilized the NREL Wind Toolkit to source generic hourly wind profiles
- Capacity factor sensitivity evaluates PVRR impact of lower actual wind production compared to modeled
- Captured revenue "locked" from base, MWh adjusted



WIND CAPACITY FACTOR (2 OF 3)

Reference Case PVRR ($MM)

Wind annual capacity factor →

	46%	44%	Base (42%) ↓	40%	38%	36%	34%	32%	30%
Portfolio 3b	$6,959	$6,968	$6,976	$6,987	$6,996	$7,005	$7,014	$7,024	$7,033
Portfolio 3a	$6,991	$7,004	$7,016	$7,032	$7,046	$7,059	$7,073	$7,087	$7,101
Portfolio 3c	$7,012	$7,024	$7,034	$7,049	$7,061	$7,073	$7,086	$7,098	$7,110
Portfolio 2a	$7,128	$7,130	$7,132	$7,134	$7,136	$7,138	$7,140	$7,142	$7,144
Portfolio 1b	$7,172	$7,174	$7,176	$7,178	$7,180	$7,182	$7,184	$7,186	$7,187
Portfolio 2b	$7,179	$7,184	$7,188	$7,194	$7,199	$7,203	$7,208	$7,213	$7,218
Portfolio 2c	$7,180	$7,186	$7,191	$7,198	$7,204	$7,210	$7,215	$7,221	$7,227
Portfolio 1a	$7,208	$7,212	$7,215	$7,219	$7,223	$7,227	$7,230	$7,234	$7,238
Portfolio 1c	$7,217	$7,221	$7,223	$7,227	$7,230	$7,233	$7,237	$7,240	$7,243
Portfolio 4c	$7,222	$7,248	$7,269	$7,299	$7,325	$7,350	$7,376	$7,401	$7,427
Portfolio 4b	$7,234	$7,266	$7,293	$7,330	$7,362	$7,394	$7,426	$7,458	$7,489
Portfolio 4a	$7,228	$7,265	$7,295	$7,338	$7,375	$7,411	$7,448	$7,484	$7,521
Portfolio 5b	$7,355	$7,379	$7,400	$7,428	$7,453	$7,477	$7,502	$7,526	$7,551
Portfolio 5c	$7,372	$7,416	$7,452	$7,503	$7,546	$7,589	$7,633	$7,676	$7,720
Portfolio 5a	$7,417	$7,461	$7,500	$7,549	$7,593	$7,638	$7,682	$7,726	$7,770

Reference Case Results:

1. Very low capacity factor for wind does not change lowest cost portfolio in Reference Case
2. Every 2% decrease in annual net capacity factor for wind increases Portfolio 5 PVRR by ~$43M, or 1%

WIND CAPACITY FACTOR (3 OF 3)

Scenario A (Carbon Tax Case) PVRR ($MM)

Wind annual capacity factor →

	46%	44%	Base (42%) ↓	40%	38%	36%	34%	32%	30%
Portfolio 3b	$7,640	$7,652	$7,661	$7,675	$7,686	$7,698	$7,709	$7,721	$7,733
Portfolio 5b	$7,649	$7,679	$7,703	$7,739	$7,769	$7,798	$7,828	$7,858	$7,888
Portfolio 3c	$7,688	$7,703	$7,716	$7,733	$7,748	$7,764	$7,779	$7,794	$7,809
Portfolio 5c	$7,619	$7,672	$7,716	$7,779	$7,832	$7,886	$7,939	$7,993	$8,046
Portfolio 3a	$7,707	$7,723	$7,737	$7,756	$7,772	$7,789	$7,805	$7,822	$7,838
Portfolio 4a	$7,659	$7,704	$7,740	$7,793	$7,837	$7,881	$7,926	$7,970	$8,015
Portfolio 4b	$7,671	$7,710	$7,742	$7,788	$7,827	$7,867	$7,906	$7,945	$7,984
Portfolio 4c	$7,691	$7,722	$7,747	$7,784	$7,815	$7,845	$7,876	$7,907	$7,938
Portfolio 5a	$7,718	$7,772	$7,819	$7,879	$7,933	$7,986	$8,040	$8,094	$8,148
Portfolio 2c	$7,909	$7,917	$7,923	$7,933	$7,941	$7,949	$7,958	$7,966	$7,974
Portfolio 2a	$7,927	$7,929	$7,932	$7,935	$7,937	$7,940	$7,943	$7,946	$7,948
Portfolio 1b	$7,945	$7,948	$7,950	$7,953	$7,956	$7,959	$7,961	$7,964	$7,967
Portfolio 2b	$7,944	$7,950	$7,956	$7,964	$7,970	$7,977	$7,983	$7,990	$7,996
Portfolio 1c	$7,972	$7,977	$7,980	$7,985	$7,990	$7,994	$7,999	$8,003	$8,008
Portfolio 1a	$8,009	$8,014	$8,018	$8,024	$8,029	$8,034	$8,039	$8,044	$8,050

Carbon Tax Case Results:

1. Portfolio 3b still lowest cost in Carbon Tax case.
2. Lower realized capacity factor for wind moves Portfolio 4 ahead of 5; Portfolio 3 still lowest cost

WIND LMP BASIS/CAPTURED REVENUE (1 OF 3)

- Congestion, due to transmission constraints, outages, and other factors, results in price separation from generator to IPL load
- LMP basis to MISO Indiana Hub applied to existing and new resources to account for congestion impacts on nodal LMPs
- Sensitivity analysis designed to evaluate the impact of removing that LMP discount for wind
- Wind production (MWh) locked and fixed across portfolios
- Captured revenue increased in 5% increments to remove LMP discount

WIND LMP BASIS/CAPTURED REVENUE (2 OF 3)

Reference Case PVRR ($MM)

	Base	Revenue +5%	Revenue +10%	Revenue +15%	Revenue +20%
Portfolio 3b	$6,976	$6,966	$6,956	$6,946	$6,937
Portfolio 3a	$7,016	$7,001	$6,987	$6,972	$6,958
Portfolio 3c	$7,034	$7,021	$7,008	$6,995	$6,982
Portfolio 2a	$7,132	$7,130	$7,128	$7,126	$7,124
Portfolio 1b	$7,176	$7,174	$7,172	$7,170	$7,168
Portfolio 2b	$7,188	$7,183	$7,178	$7,173	$7,168
Portfolio 2c	$7,191	$7,185	$7,178	$7,172	$7,166
Portfolio 1a	$7,215	$7,211	$7,207	$7,203	$7,199
Portfolio 1c	$7,223	$7,220	$7,216	$7,213	$7,210
Portfolio 4c	$7,269	$7,242	$7,215	$7,188	$7,161
Portfolio 4b	$7,293	$7,259	$7,225	$7,191	$7,158
Portfolio 4a	$7,295	$7,256	$7,218	$7,179	$7,140
Portfolio 5b	$7,400	$7,374	$7,348	$7,322	$7,296
Portfolio 5c	$7,452	$7,406	$7,360	$7,314	$7,268
Portfolio 5a	$7,500	$7,453	$7,407	$7,360	$7,314

1

Reference Case Results:

1. Removing the LMP basis on wind closes the gap between Portfolio 5 and Portfolio 3 by ~$124M; Portfolio 3 still lowest cost

WIND LMP BASIS/CAPTURED REVENUE (3 OF 3)

Scenario A (Carbon Tax Case) PVRR ($MM)

	Base	Revenue +5%	Revenue +10%	Revenue +15%	Revenue +20%
Portfolio 3b	$7,661	$7,649	$7,637	$7,625	$7,612
Portfolio 5b	$7,703	$7,672	$7,640	$7,608	$7,576
Portfolio 3c	$7,716	$7,699	$7,683	$7,667	$7,651
Portfolio 5c	$7,716	$7,660	$7,603	$7,547	$7,490
Portfolio 3a	$7,737	$7,720	$7,702	$7,685	$7,668
Portfolio 4a	$7,740	$7,693	$7,646	$7,599	$7,552
Portfolio 4b	$7,742	$7,701	$7,659	$7,618	$7,576
Portfolio 4c	$7,747	$7,715	$7,682	$7,649	$7,616
Portfolio 5a	$7,819	$7,763	$7,706	$7,649	$7,593
Portfolio 2c	$7,923	$7,915	$7,906	$7,898	$7,889
Portfolio 2a	$7,932	$7,929	$7,926	$7,923	$7,920
Portfolio 1b	$7,950	$7,947	$7,944	$7,941	$7,939
Portfolio 2b	$7,956	$7,949	$7,942	$7,935	$7,928
Portfolio 1c	$7,980	$7,976	$7,971	$7,966	$7,961
Portfolio 1a	$8,018	$8,013	$8,007	$8,002	$7,996

Carbon Tax Case Results:

1. Improved congestion, and therefore revenue, for wind increases value of Portfolio 5 compared to Portfolio 3 with a federal price on carbon

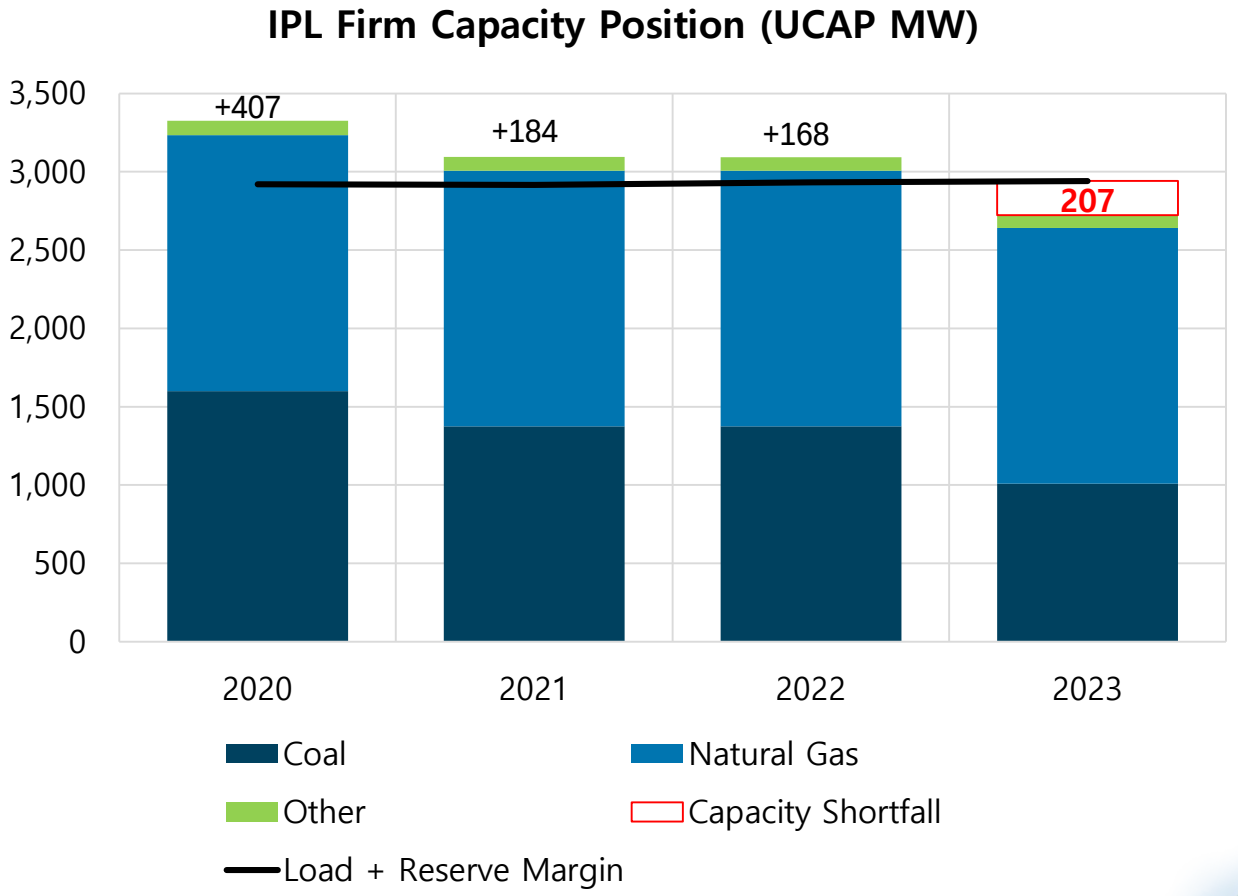
PREFERRED RESOURCE PORTFOLIO & SHORT TERM ACTION PLAN

Patrick Maguire

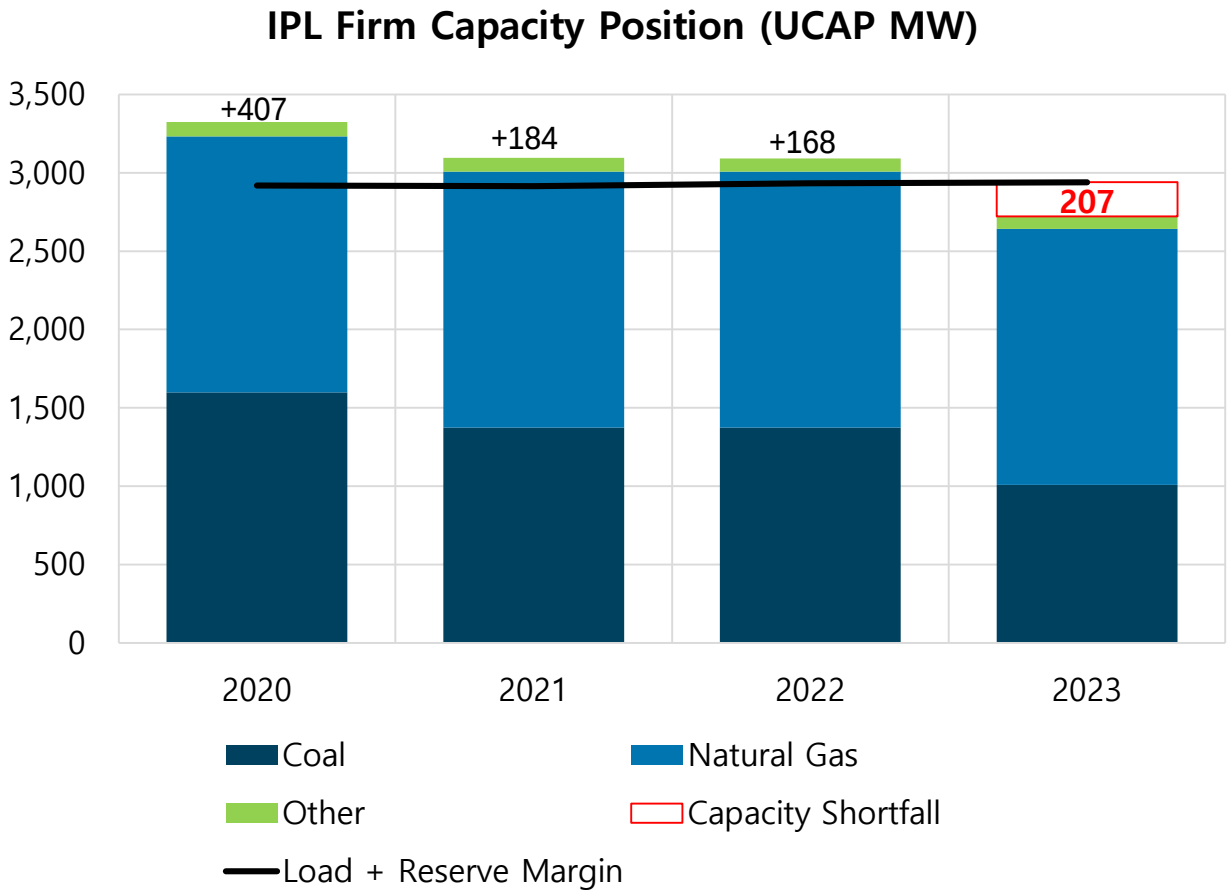
Director of Resource Planning, IPL

PREFERRED PORTFOLIO

- Portfolio 3b:
  - Least cost portfolio on a risk-adjusted basis across a wide range of futures
  - Retirement of Pete 1 and 2 lowest cost when stressing capacity value, cost of replacement capacity, and value of replacement capacity
  - Preserve flexibility and optionality in the face of uncertainty over the next 3-5 years



PREFERRED PORTFOLIO



Model indicating that lowest cost portfolio fills capacity shortfall with a combination of wind, solar, storage, and DSM

~200 MW of firm capacity =

	Portfolio 3a	Portfolio 3b	Portfolio 3c
Wind	250	100	150
Solar	375	450	400
Storage	40	0	20
Total ICAP MW	**665**	**550**	**570**

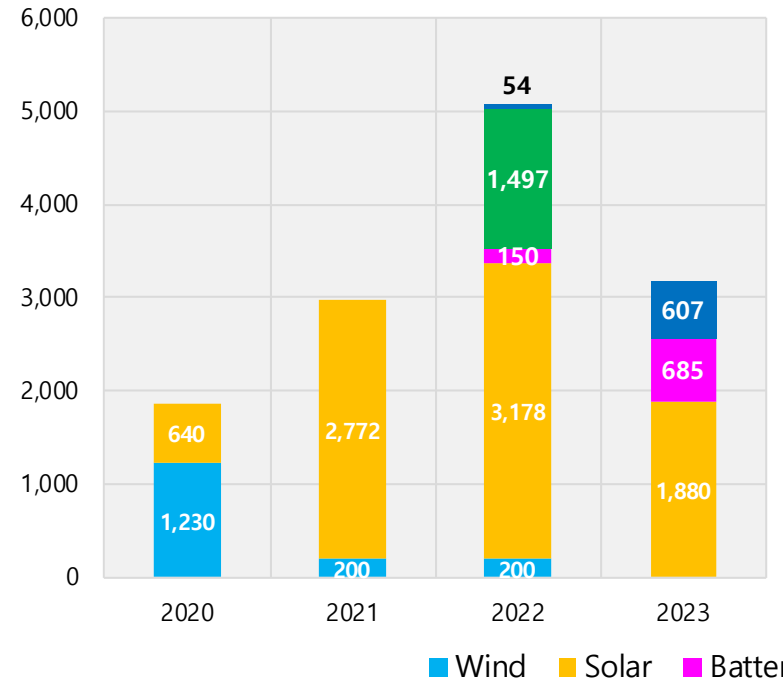
Actual mix will be influenced by bids received in all-source RFP

ALL-SOURCE RFP

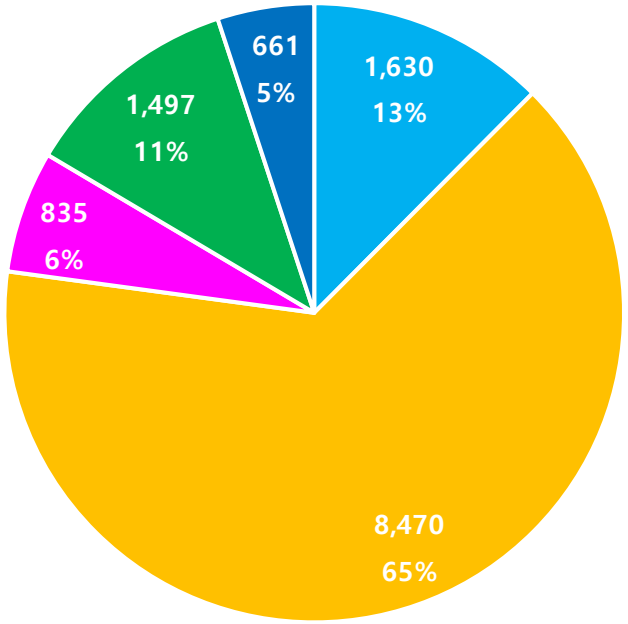
- Sargent & Lundy contracted to run competitively bid, all-source RFP
- More detail will be released in the upcoming weeks
- All information will be hosted at iplpower.com/RFP

MISO Generation Interconnection Queue: Indiana Projects

Annual MW by In-Service Year



Total by 2023: 13,093 MW



Source Data: MISO Generation Inteconnection Queue as of 11/10/2019

DSM ACTION PLAN 2021 – 2023

	2021	2022	2023
Decrements 1 - 3 (Gross MWh)	116,376	112,403	113,197
Decrements 1 - 4 (Gross MWh) *	144,890	146,158	146,490
DSM Action Plan Target (Gross MWh)	116,376 - 144,890	112,403 - 146,158	113,197 - 146,490
***DSM level in Reference Case**			

- IPL will target the level of DSM included in Decrement 4 (Ref Case)
  - Decrement 4 is equivalent to roughly 1% of sales
- Residential general service LEDs will no longer be offered in 2021 – 2023 due to lighting baseline change
  - Currently lighting makes up 40% of Residential savings
  - Change possibly eliminates some Residential programs
  - General service LEDs will still be available to income qualified customers

FUTURE MODELING ENHANCEMENTS

Renewables and storage introduce complexity in the market and fundamentally change the type of modeling required for long-term resource planning

Previous IPL IRPs

- Annual Reserve Margin Target based on Summer Peak
- "Typical week" capacity expansion
- Deterministic view with a single normalized set of load, price, and renewable shapes
- Fixed capacity values for renewables
- Cursory look at electric vehicle and distributed solar

2019 IPL IRP

- Annual Reserve Margin Target based on Summer Peak
- Hourly chronological capacity expansion with stochastic weather, load, and commodity prices
- Solar ELCC considerations through time
- Hourly stochastic variations in weather with an integrated weather-load-price-renewable model
- Top down annual electric vehicle and distributed solar forecasts at the system level

Considerations for Future IRPs

- Seasonal capacity assessment
- Hourly and sub-hourly modeling
- DSM, EE, and DR shapes modeled hourly and sub-hourly to assess peak reduction, load shifting value
- Dynamic wind, solar, and storage ELCC
- Bottom up electric vehicle and distributed solar forecast integrated with generation, transmission, and distribution planning
- Scenario planning centered around decarbonization pathways that prioritize least cost, reliability, and effectiveness

CONCLUDING REMARKS

Vince Parisi

President and CEO, IPL

APPENDIX

ACRONYM LIST

Acronym	Name
CCGT/CC	Combined Cycle
ST	Steam Turbine
CT	Combustion Turbine
UCAP	Unforced Capacity
ICAP	Installed Capacity
PRMR	Planning Reserve Margin Requirement
ELCC	Effective Load Carrying Capability
DR	Demand Response
DSM	Demand Side Management
MISO	Midcontinent Independent System Operator

Acronym	Name
RFP	Request for Proposals
LCOE	Levelized Cost of Energy
LMP	Locational Marginal Price
PPA	Power Purchase Agreement
PTC	Production Tax Credit
ITC	Investment Tax Credit
CONE	Cost of New Entry
NREL	National Renewable Energy Laboratory
RIIA	Renewable Integration Impact Assessment
PVRR	Present Value Revenue Requirement

PORTFOLIO 1 ICAP CHANGES

Portfolio 1a: Includes Decrements 1-3

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
New DSM	0	18	33	49	64	80	97	114	128	143	157	171	183	194	205	215	216	219	220	223
New Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	250	250	700
New Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	425	475	875	950	1,025	1,175	1,175
New Battery Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	100	200	500	520	520	560	560
New Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
New Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Portfolio 1b: Includes Decrements 1-4

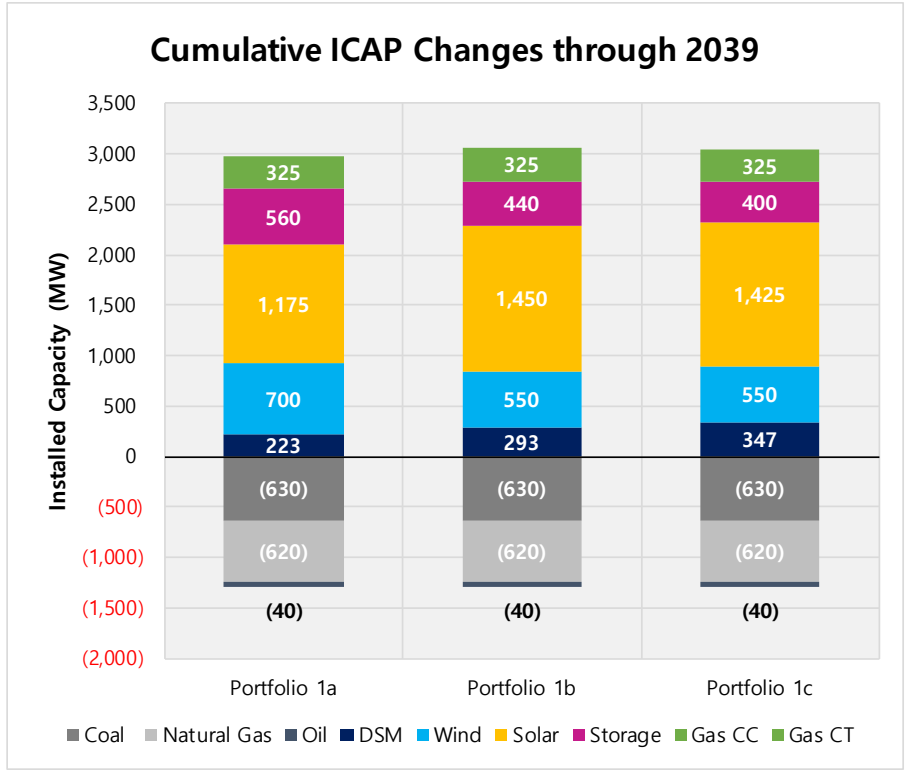
Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
New DSM	0	23	44	63	83	103	124	143	162	181	199	215	230	244	257	271	276	282	288	293
New Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	150	550
New Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	500	900	1,375	1,375	1,450	1,450	1,450
New Battery Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	320	360	360	440	440
New Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
New Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Portfolio 1c: Includes Decrements 1-5

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
New DSM	0	28	50	73	97	120	145	170	191	212	235	252	269	288	303	319	326	332	338	347
New Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	250	400	550
New Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	500	825	1,250	1,325	1,325	1,425	1,425
New Battery Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	300	320	340	380	400
New Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
New Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Retirements in All Portfolio 1 Runs

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	-220	-220	-630	-630	-630	-630	-630
Gas	0	0	0	0	0	0	0	0	0	0	-200	-200	-200	-200	-620	-620	-620	-620	-620	-620
Oil	0	0	0	0	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40



PORTFOLIO 2 ICAP CHANGES

Portfolio 2a: Includes Decrements 1-3

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
New DSM	0	18	33	49	64	80	97	114	128	143	157	171	183	194	205	215	216	219	220	223
New Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	350	400
New Solar	0	0	0	0	0	0	0	0	0	0	0	125	125	175	500	900	1,050	1,150	1,375	1,425
New Battery Storage	0	0	0	0	0	0	0	0	0	0	0	160	180	180	200	500	500	500	500	520
New Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
New Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Portfolio 2b: Includes Decrements 1-4

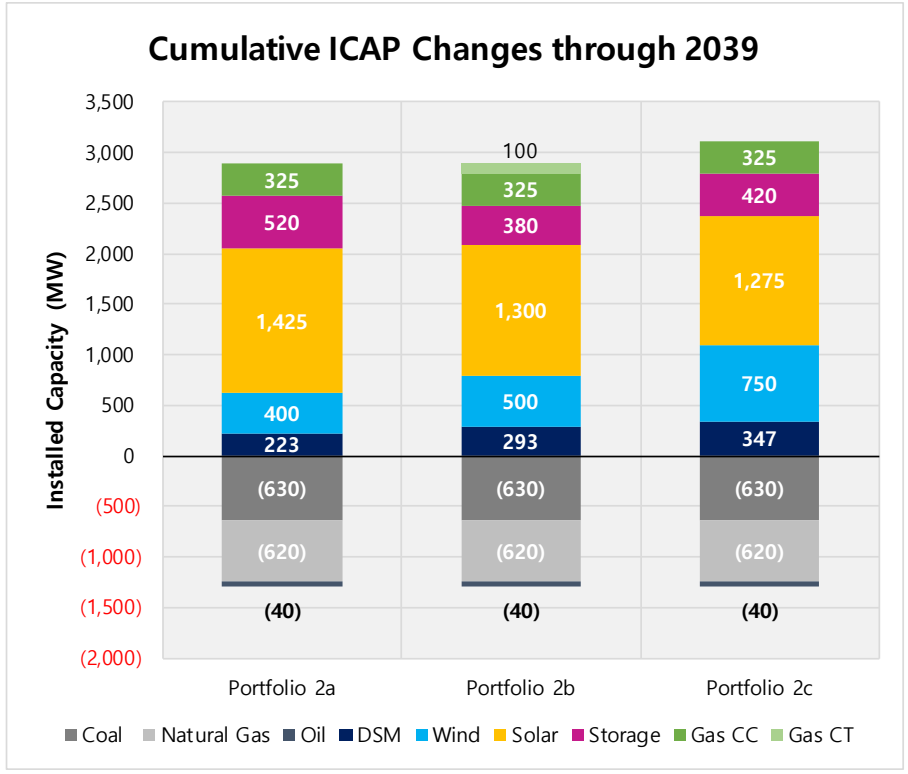
Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
New DSM	0	23	44	63	83	103	124	143	162	181	199	215	230	244	257	271	276	282	288	293
New Wind	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	450	500	500
New Solar	0	0	0	0	0	0	0	0	0	0	0	350	350	400	800	900	900	900	1,175	1,300
New Battery Storage	0	0	0	0	0	0	0	0	0	0	0	40	60	60	60	340	380	380	380	380
New Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
New Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100

Portfolio 2c: Includes Decrements 1-5

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
New DSM	0	28	50	73	97	120	145	170	191	212	235	252	269	288	303	319	326	332	338	347
New Wind	0	0	0	0	0	0	0	0	0	0	0	50	50	100	100	200	200	500	600	750
New Solar	0	0	0	0	0	0	0	0	0	0	0	400	450	475	800	1,150	1,150	1,175	1,200	1,275
New Battery Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	320	360	360	420	420
New Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
New Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Retirements in All Portfolio 1 Runs

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Coal	0	-220	-220	-220	-220	-220	-220	-220	-220	-220	-220	-220	-220	-220	-220	-630	-630	-630	-630	-630
Gas	0	0	0	0	0	0	0	0	0	0	-200	-200	-200	-200	-620	-620	-620	-620	-620	-620
Oil	0	0	0	0	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40



PORTFOLIO 3 ICAP CHANGES

Portfolio 3a: Includes DSM Decrements 1-3

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
DSM	0	18	33	49	64	80	97	114	128	143	157	171	183	194	205	215	216	219	220	223
Wind	0	0	250	250	250	250	250	250	250	250	250	250	250	250	250	350	350	400	400	450
Solar	0	0	0	375	425	475	550	575	650	700	700	700	725	725	725	725	725	825	1,125	1,250
Battery Storage	0	0	0	40	80	80	80	100	100	100	120	340	360	380	500	520	560	560	560	560
Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Portfolio 3b: Includes DSM Decrements 1-4

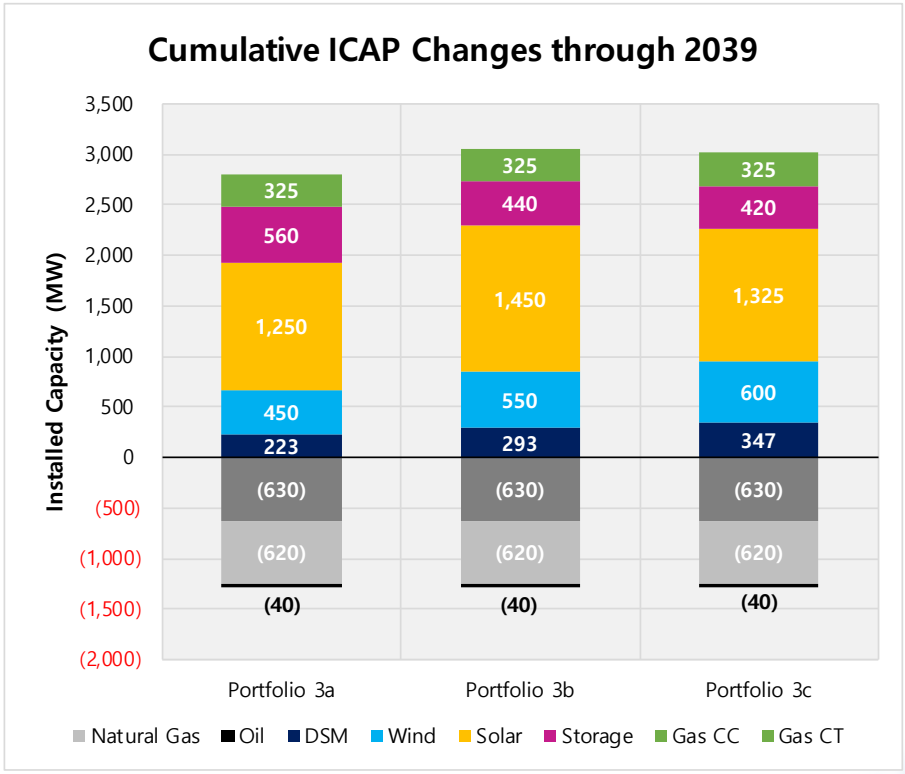
Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
DSM	0	23	44	63	83	103	124	143	162	181	199	215	230	244	257	271	276	282	288	293
Wind	0	0	100	100	100	100	100	100	150	150	150	150	150	250	250	250	250	300	450	550
Solar	0	0	0	450	600	650	725	750	750	800	850	925	1,000	1,050	1,050	1,075	1,075	1,175	1,350	1,450
Battery Storage	0	0	0	0	0	0	0	20	40	40	40	240	240	240	360	380	420	420	440	440
Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Portfolio 3c: Includes DSM Decrements 1-5

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
DSM	0	28	50	73	97	120	145	170	191	212	235	252	269	288	303	319	326	332	338	347
Wind	0	0	150	150	150	150	150	150	150	200	250	250	300	300	300	350	350	400	450	600
Solar	0	0	0	400	525	575	575	575	625	650	675	725	725	775	825	825	875	975	1,250	1,325
Battery Storage	0	0	0	20	20	20	40	60	60	60	60	260	280	280	380	400	420	420	420	420
Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Retirements in All Portfolio 3 Runs:

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Coal	0	(220)	(220)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)	(630)
Natural Gas	0	0	0	0	0	0	0	0	0	0	(200)	(200)	(200)	(200)	(620)	(620)	(620)	(620)	(620)	(620)
Oil	0	0	0	0	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)



PORTFOLIO 4 ICAP CHANGES

Portfolio 4a: Includes Decrements 1-3

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
DSM	0	18	33	49	64	80	97	114	128	143	157	171	183	194	205	215	216	219	220	223
Wind	0	0	500	500	500	500	550	600	600	600	700	800	850	900	950	950	950	1,150	1,150	1,350
Solar	0	0	0	450	600	650	1,125	1,225	1,325	1,350	1,350	1,350	1,375	1,400	1,400	1,450	1,475	1,475	1,475	1,475
Battery Storage	0	0	0	0	0	0	340	340	340	360	380	600	620	640	760	780	820	840	920	940
Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Portfolio 4b: Includes Decrements 1-4

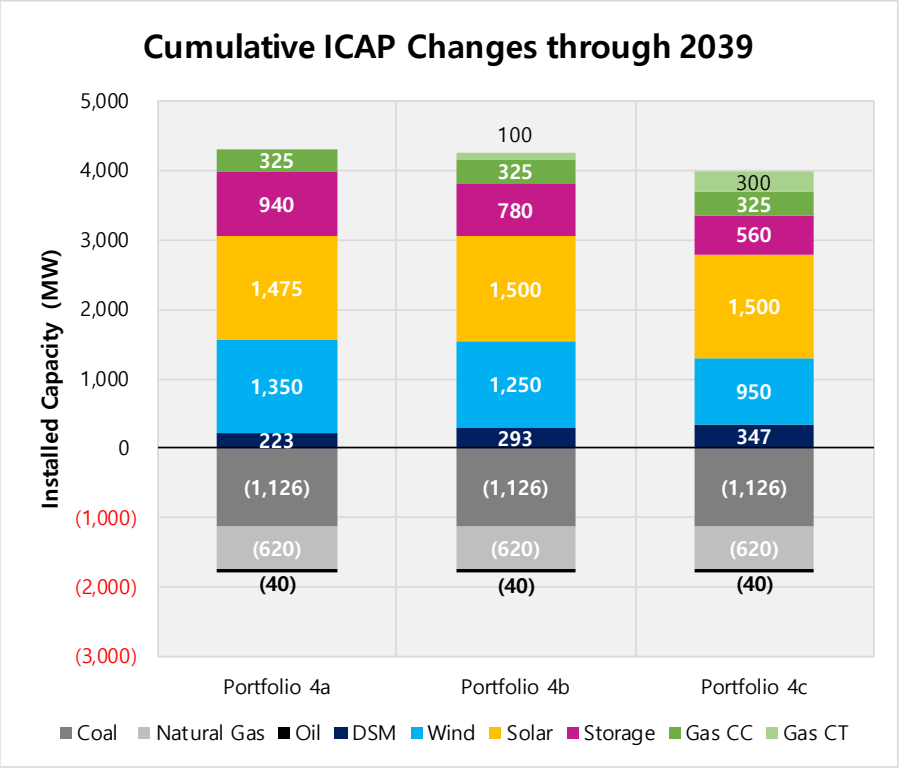
Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
DSM	0	23	44	63	83	103	124	143	162	181	199	215	230	244	257	271	276	282	288	293
Wind	0	0	400	400	400	400	400	400	550	550	600	600	700	800	800	850	950	1,100	1,250	1,250
Solar	0	0	0	425	550	600	1,100	1,200	1,250	1,325	1,325	1,350	1,350	1,350	1,350	1,375	1,425	1,425	1,450	1,500
Battery Storage	0	0	0	0	0	0	240	240	240	240	260	480	500	520	640	660	680	700	760	780
Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
Gas CT	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Portfolio 4c: Includes Decrements 1-5

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
DSM	0	28	50	73	97	120	145	170	191	212	235	252	269	288	303	319	326	332	338	347
Wind	0	0	400	400	400	400	400	400	450	450	450	450	550	600	600	650	650	800	800	950
Solar	0	0	0	400	400	400	900	925	925	975	1,025	1,475	1,475	1,475	1,475	1,500	1,500	1,500	1,500	1,500
Battery Storage	0	0	0	20	80	80	200	220	240	240	240	320	340	360	380	400	440	460	540	560
Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
Gas CT	0	0	0	0	0	0	200	200	200	200	200	200	200	200	300	300	300	300	300	300

Retirements in All Portfolio 3 Runs:

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Coal	0	(220)	(220)	(630)	(630)	(630)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)	(1,126)
Natural Gas	0	0	0	0	0	0	0	0	0	0	(200)	(200)	(200)	(200)	(620)	(620)	(620)	(620)	(620)	(620)
Oil	0	0	0	0	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)



PORTFOLIO 5 ICAP CHANGES

Portfolio 5a: Includes Decrements 1-3

Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
DSM	0	18	33	49	64	80	97	114	128	143	157	171	183	194	205	215	216	219	220	223
Wind	0	0	500	500	500	500	550	600	600	600	700	800	850	900	950	950	950	1,150	1,150	1,350
Solar	0	0	0	450	600	650	1,125	1,225	1,325	1,350	1,350	1,350	1,375	1,400	1,400	1,450	1,475	1,475	1,475	1,475
Battery Storage	0	0	0	0	0	0	340	340	340	360	380	600	620	640	760	780	820	840	920	940
Gas CC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325	325	325	325	325	325
Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Portfolio 5b: Includes Decrements 1-4

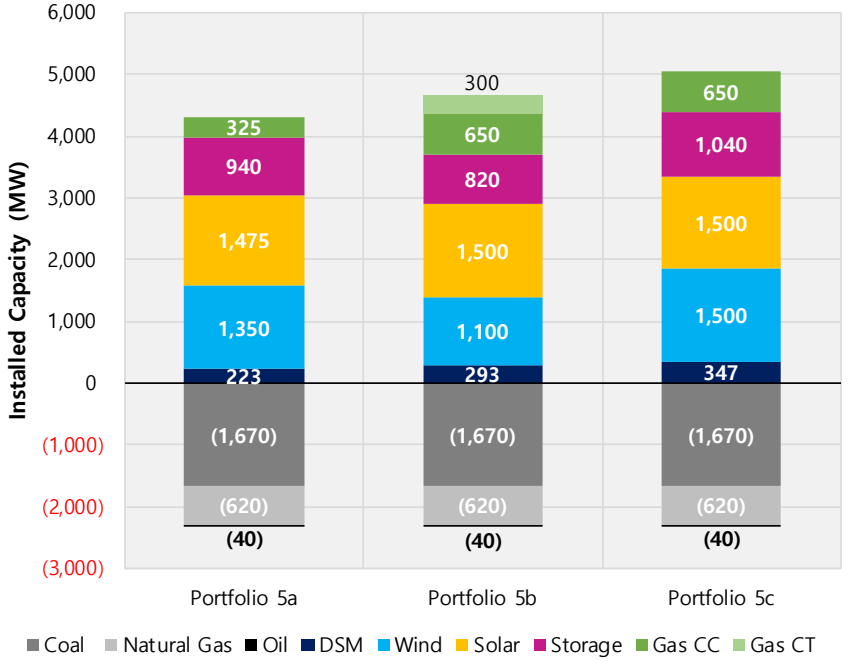
Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
DSM	0	23	44	63	83	103	124	143	162	181	199	215	230	244	257	271	276	282	288	293
Wind	0	0	350	350	350	350	350	350	400	450	450	450	450	550	550	600	600	800	1,000	1,100
Solar	0	0	0	425	550	600	1,100	1,200	1,275	1,275	1,325	1,350	1,375	1,375	1,450	1,475	1,475	1,475	1,475	1,500
Battery Storage	0	0	0	0	0	0	20	20	20	40	300	520	540	560	660	680	720	740	800	820
Gas CC	0	0	0	0	0	0	325	325	325	325	325	325	325	325	650	650	650	650	650	650
Gas CT	0	0	0	0	0	0	0	0	0	0	300	300	300	300	300	300	300	300	300	300

Portfolio 5c: Includes Decrements 1-5

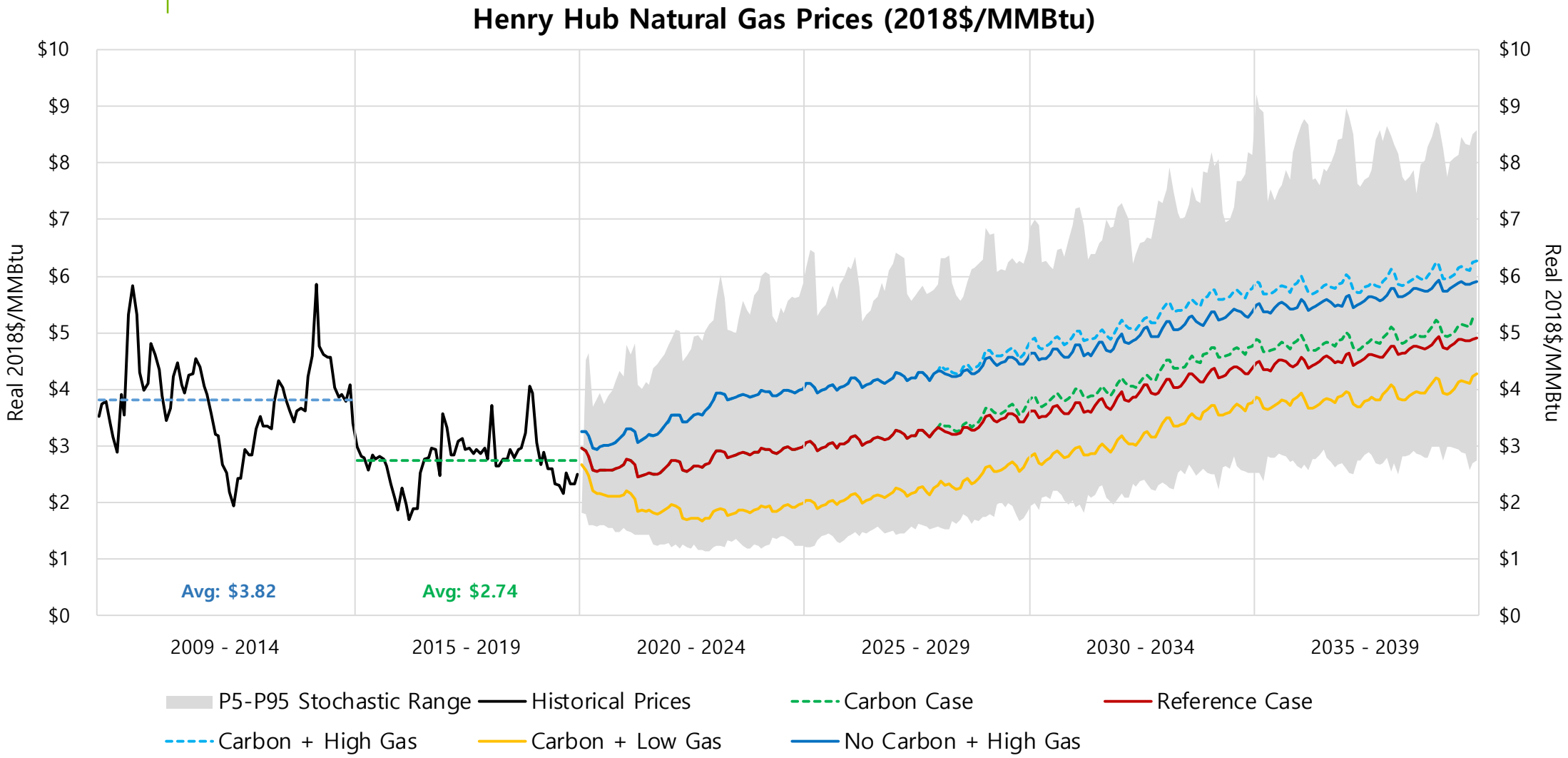
Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
DSM	0	28	50	73	97	120	145	170	191	212	235	252	269	288	303	319	326	332	338	347
Wind	0	0	500	500	500	500	500	550	550	750	950	1,150	1,150	1,200	1,200	1,300	1,300	1,300	1,500	1,500
Solar	0	0	0	425	500	525	725	775	775	775	1,225	1,375	1,400	1,400	1,400	1,400	1,400	1,450	1,450	1,500
Battery Storage	0	0	0	0	20	20	140	140	160	160	560	720	740	760	880	900	940	960	1,020	1,040
Gas CC	0	0	0	0	0	0	325	325	325	325	325	325	325	325	650	650	650	650	650	650
Gas CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Retirements in All Portfolio 3 Runs:

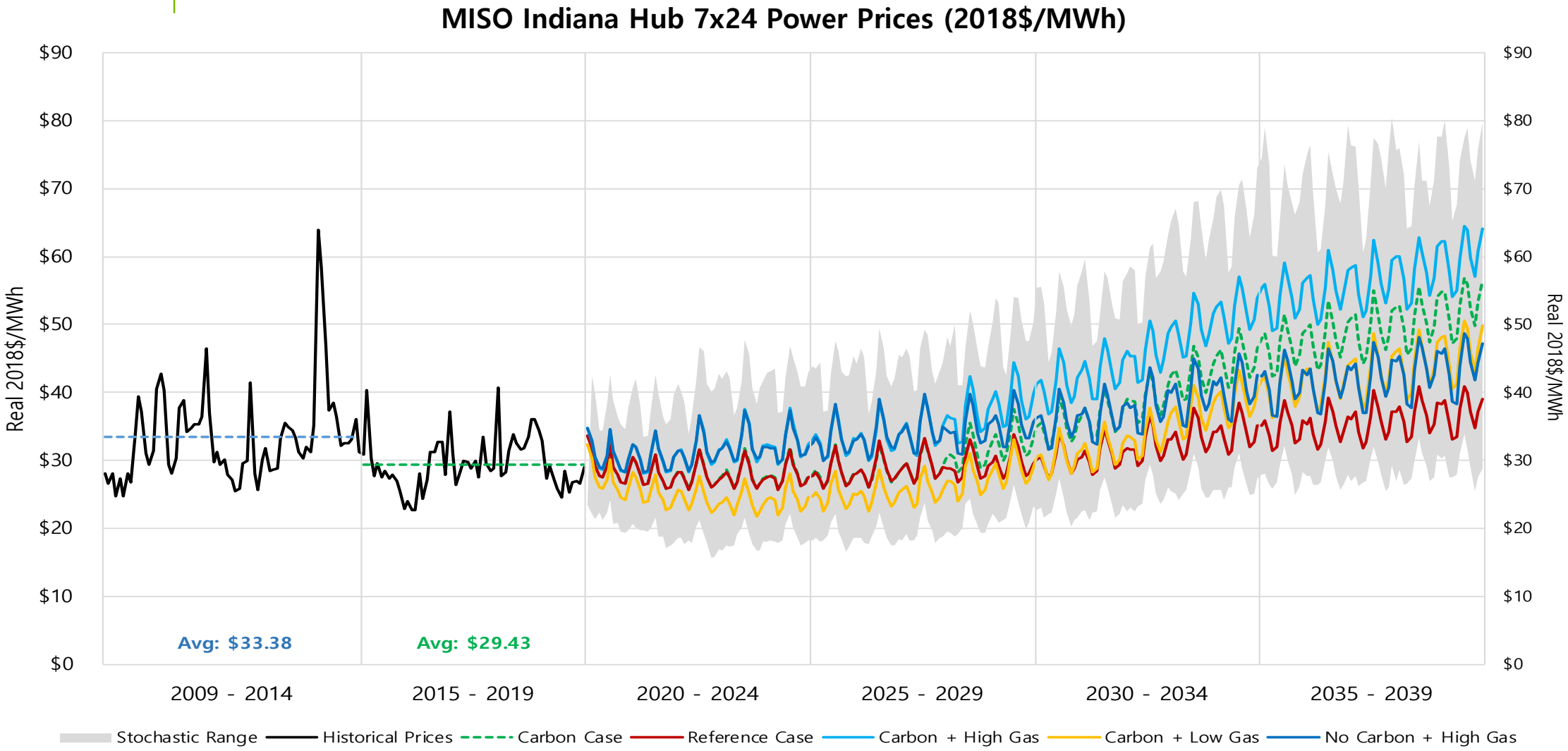
Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Coal	0	(220)	(220)	(630)	(630)	(630)	(1,126)	(1,126)	(1,126)	(1,126)	(1,670)	(1,670)	(1,670)	(1,670)	(1,670)	(1,670)	(1,670)	(1,670)	(1,670)	(1,670)
Natural Gas	0	0	0	0	0	0	0	0	0	0	(200)	(200)	(200)	(200)	(620)	(620)	(620)	(620)	(620)	(620)
Oil	0	0	0	0	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)



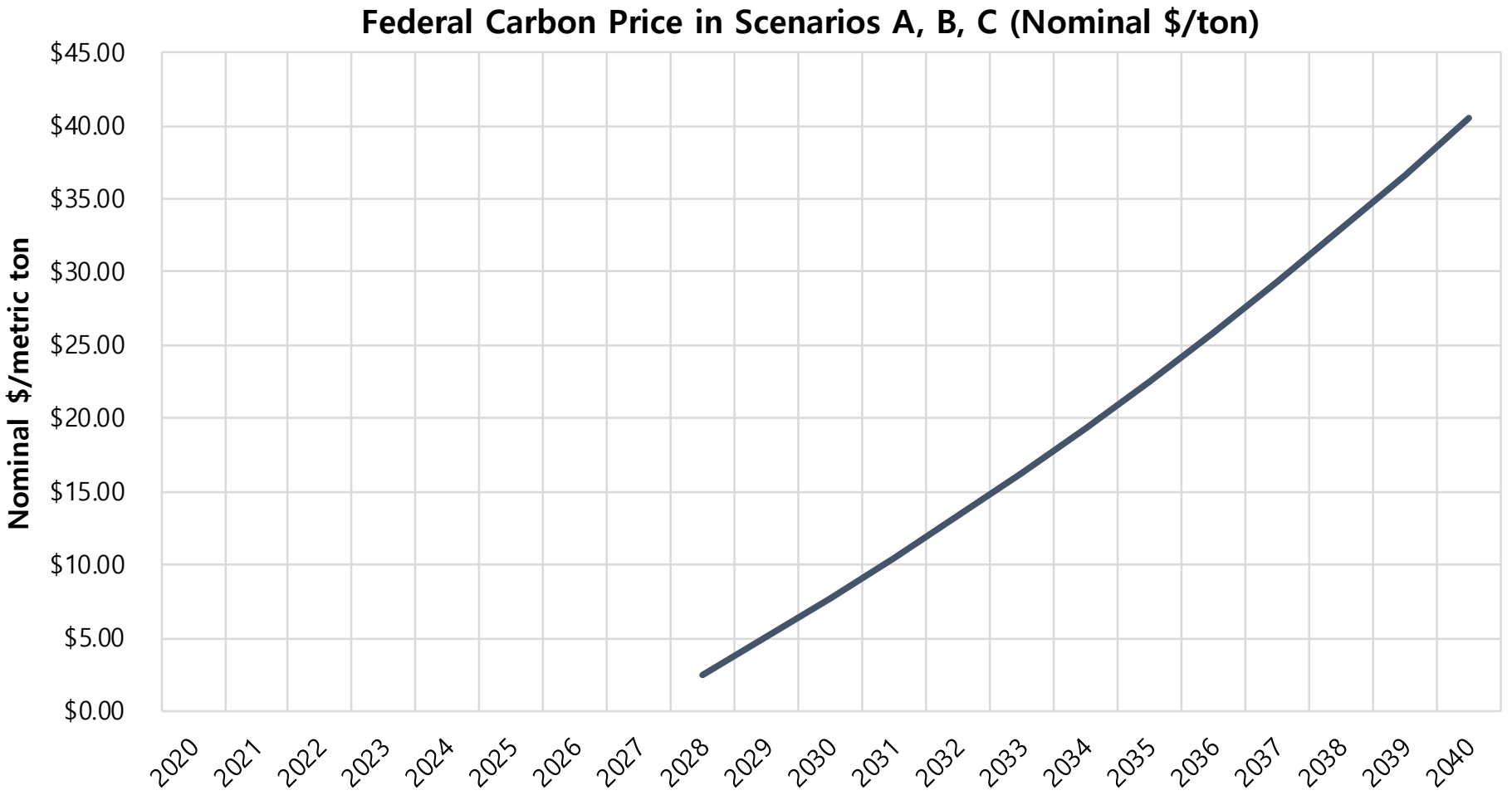
NATURAL GAS PRICES



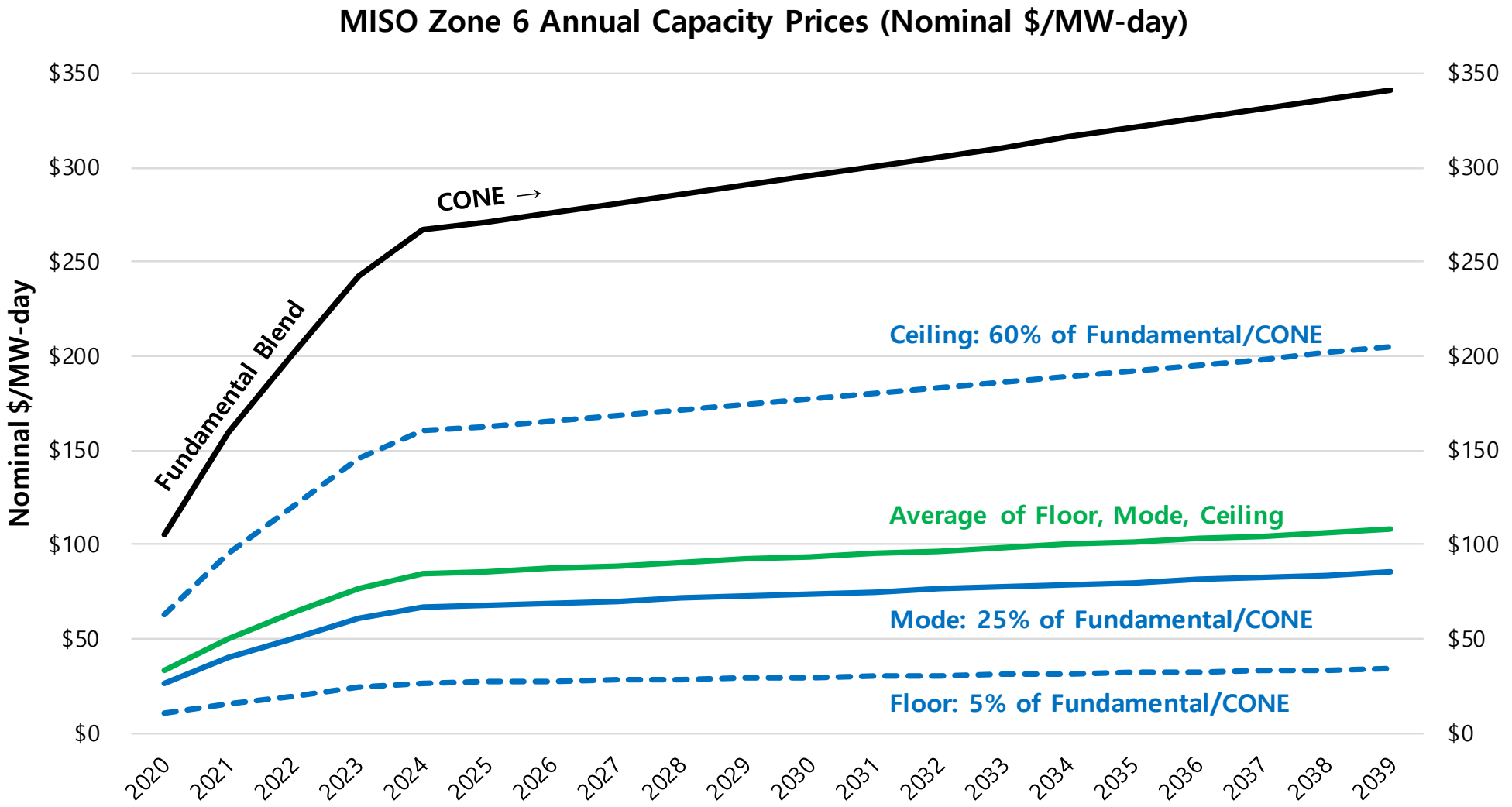
POWER PRICES



CARBON PRICE



CAPACITY PRICES



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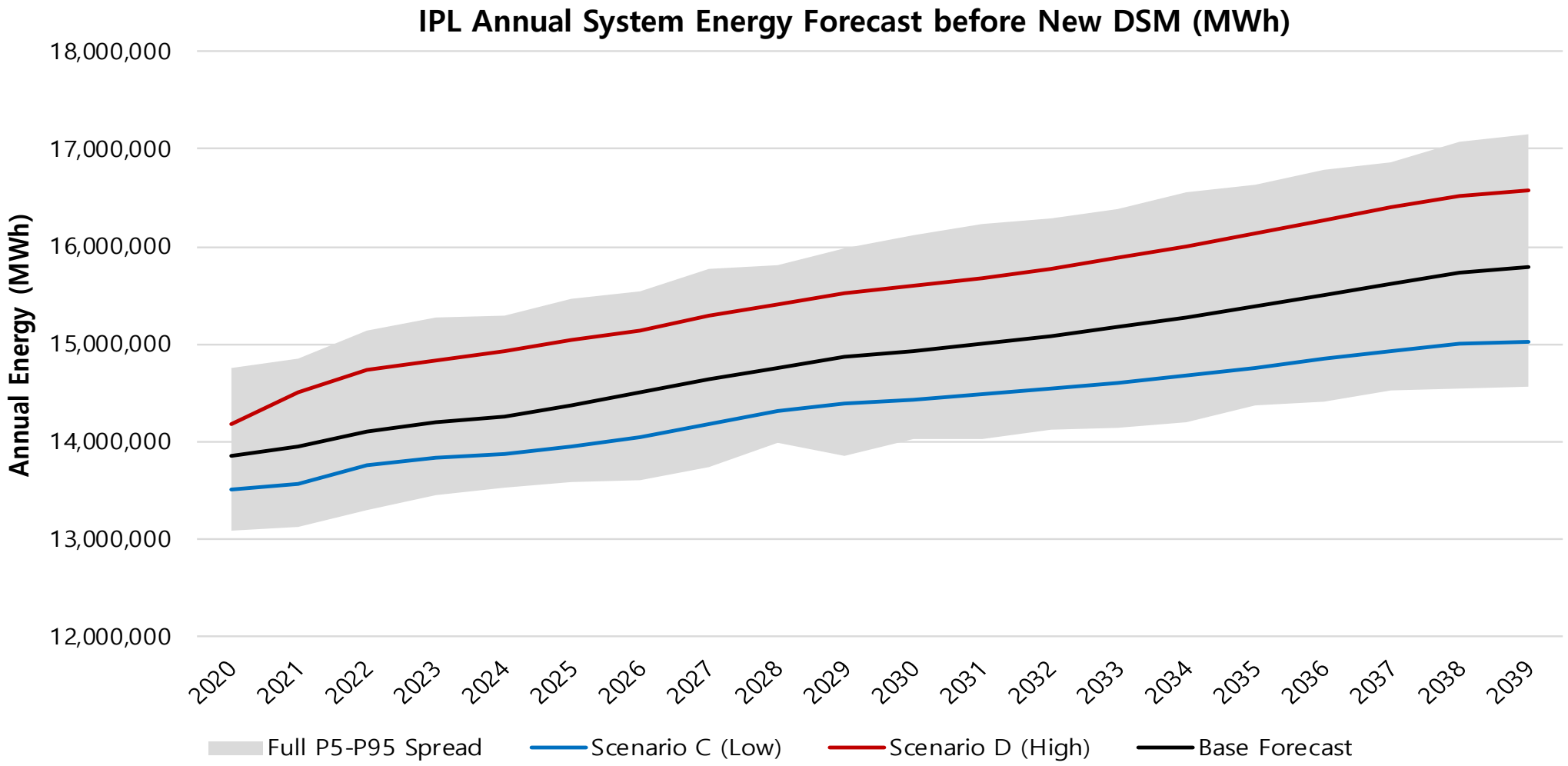

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