NIPSCO
A NiSource Company




2021 NIPSCO Integrated Resource Plan

NiSource

Stakeholder Advisory Meeting #4

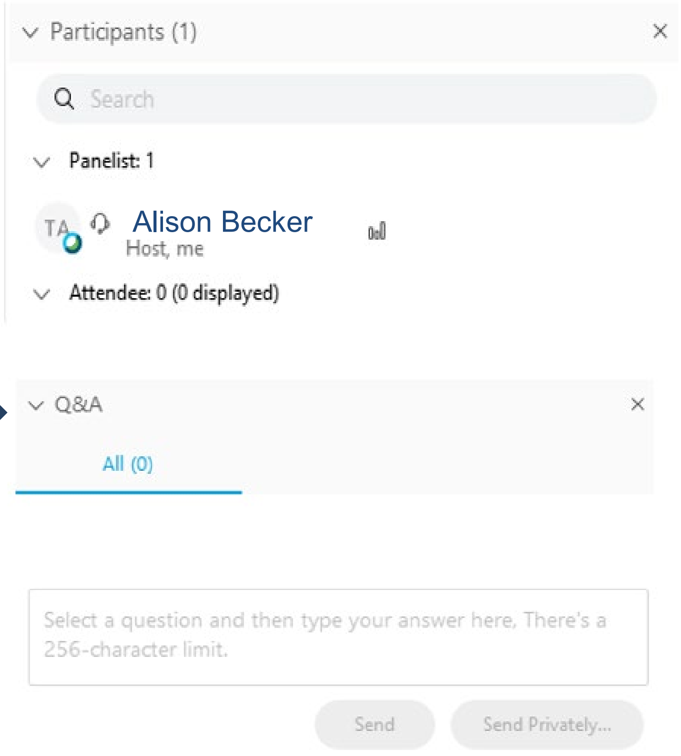
September 21st, 2021
9:00AM-2:00PM CT




SAFETY MOMENT

STAKEHOLDER ADVISORY MEETING PROTOCOLS

- Your input and feedback is critical to NIPSCO's Integrated Resource Plan ("IRP") Process
- The Public Advisory Process provides NIPSCO with feedback on its assumptions and sources of data. This helps inform the modeling process and overall IRP
- We set aside time at the end of each section to ask questions
- Your candid and ongoing feedback is key:
  - Please ask questions and make comments on the content presented
  - Please provide feedback on the process itself
- While we will mostly utilize the chat feature in WebEx to facilitate comments, we will gladly unmute you if you would like to speak. Please identify yourself by name prior to speaking. This will help keep track of comments and follow up actions
- If you wish to make a presentation during a meeting, please reach out to Alison Becker (abecker@nisource.com)



AGENDA

Time *Central Time	Topic	Speaker
9:00-9:05AM	Webinar Introduction, Safety Moment, Meeting Protocols, Agenda	Alison Becker, Manager Regulatory Policy, NIPSCO
9:05-9:15AM	Welcome	Mike Hooper, President & COO, NIPSCO
9:15-9:45AM	NIPSCO's Public Advisory Process and Updates From Last Meeting	Fred Gomos, Director Strategy & Risk Integration, NiSource
9:45-10:45AM	Resource Planning Activity Review	Fred Gomos, Director Strategy & Risk Integration, NiSource Pat Augustine, Vice President, CRA
10:45-11:30AM	Lunch	
11:30AM-12:30PM	Existing Fleet Analysis & Results	Fred Gomos, Director Strategy & Risk Integration, NiSource Pat Augustine, Vice President, CRA
12:30-12:45PM	Break	
12:45-1:55PM	Replacement Analysis & Results	Fred Gomos, Director Strategy & Risk Integration, NiSource Pat Augustine, Vice President, CRA
1:55-2:00PM	Analysis Next Steps	Erin Whitehead, Vice President Regulatory & Major Accounts, NIPSCO

WELCOME

Mike Hooper, President & COO, NIPSCO

PILLARS OF OUR ONGOING GENERATION TRANSITION PLAN

This plan creates a vision for the future that is better for our customers and it's consistent with our goal to transition to the best cost, cleanest electric supply mix available while maintaining reliability, diversity and flexibility for the technology and market changes on the horizon.

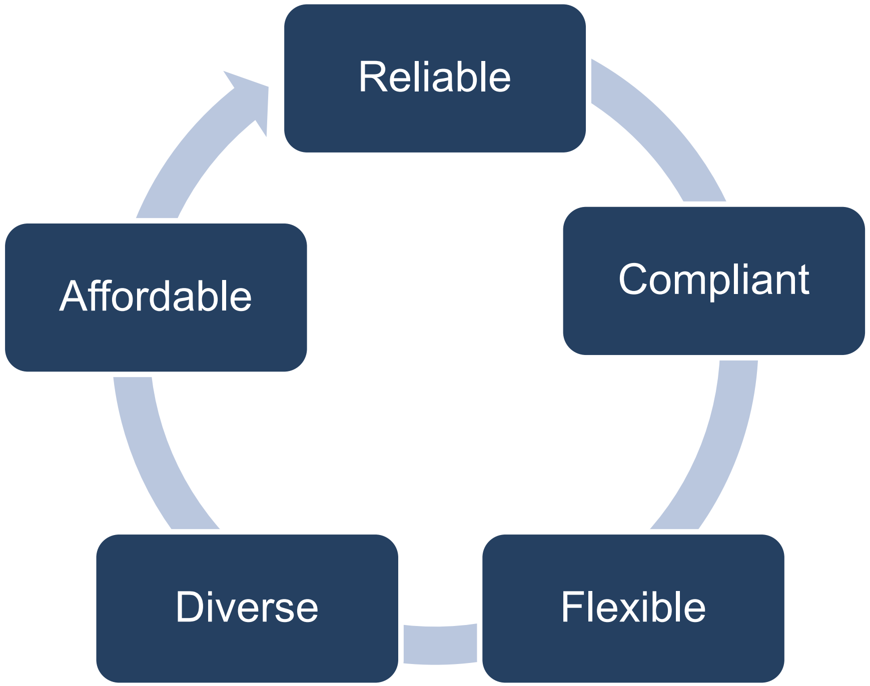
Reliable and sustainable	Flexibility for the future	Local and statewide economic benefits	Best plan for customers and the company

NIPSCO'S PUBLIC ADVISORY PROCESS UPDATES FROM LAST MEETING

Fred Gomos, Director Strategy & Risk Integration, NiSource

HOW DOES NIPSCO PLAN FOR THE FUTURE?

- At least every three years, NIPSCO outlines its long-term plan to supply electricity to customers over the next 20 years
- This study – known as an IRP – is required of all electric utilities in Indiana
- The IRP process includes extensive analysis of a range of generation scenarios, with criteria such as reliable, affordable, compliant, diverse and flexible



Requires Careful Planning and Consideration for:
- NIPSCO's employees
- Environmental regulations
- Changes in the local economy (property tax, supplier spending, employee base)

2021 STAKEHOLDER ADVISORY MEETING ROADMAP

Technical Webinar focused on Reliability Assessment 10/12/2021

Meeting	Meeting 1 (March)	Meeting 2 (May)	Meeting 3 (July)	Meeting 4 (September)	Meeting 5 (October)
Date	3/19/2021	5/20/2021	7/13/2021	9/21/2021	10/21/2021
Location	Virtual	Virtual	Virtual	Virtual	Virtual
Key Questions	• How has NIPSCO progressed in the 2018 Short Term Action Plan? • What has changed since the 2018 IRP? • How are energy and demand expected change over time? • What is the high level plan for stakeholder communication and feedback for the 2021 IRP?	• How do regulatory developments and initiatives at the MISO level impact NIPSCO's 2021 IRP planning framework? • How has environmental policy changed since 2018? • What scenario themes and stochastics will NIPSCO explore in 2021?	• How are DSM resources considered in the IRP? • How will NIPSCO evaluate potential DER options? • What are the preliminary RFP results?	• What are the preliminary findings from the modeling?	• What is NIPSCO's preferred plan? • What is the short-term action plan?
Content	• 2018 Short Term Action Plan Update (Retirements, Replacement projects) • Resource Planning and 2021 Continuous Improvements • Update on Key Inputs/Assumptions (commodity prices, demand forecast) • Scenario Themes – Introduction • 2021 Public Advisory Process	• MISO Regulatory Developments and Initiatives • 2021 Environmental Policy Update • Scenarios and Stochastic Analysis	• DSM Modeling and Methodology • DER Inputs • Preliminary RFP Results	• Existing Fleet Review Modeling Results, Scorecard • Replacement Modeling Results, Scorecard	• Preferred replacement path and logic relative to alternatives • 2021 NIPSCO Short Term Action Plan
Meeting Goals	• Communicate what has changed since the 2018 IRP • Communicate NIPSCO's focus on reliability • Communicate updates to key inputs/assumptions • Communicate the 2021 public advisory process, timing, and input sought from stakeholders	• Common understanding of MISO regulatory updates • Communicate environmental policy considerations • Communicate scenario themes and stochastic analysis approach, along with major input details and assumptions	• Common understanding of DSM modeling methodology • Communicate preliminary RFP results • Explain next steps for portfolio modeling	• Communicate the Existing Fleet Portfolios and the Replacement Portfolios • Develop a shared understanding of economic modeling outcomes and preliminary results to facilitate stakeholder feedback	• Communicate NIPSCO's preferred resource plan and short-term action plan • Obtain feedback from stakeholders on preferred plan

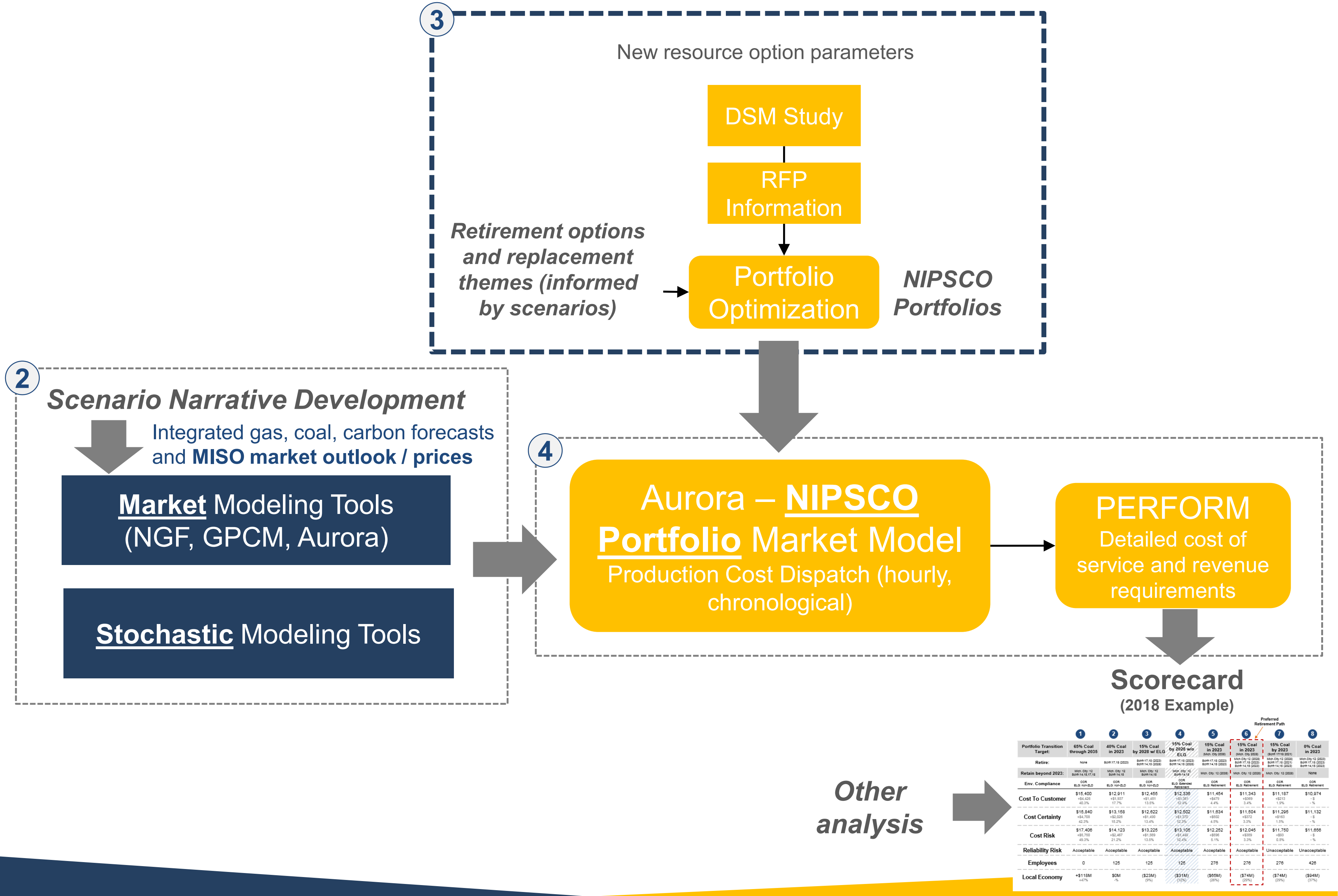
ONE ON ONE INTERACTIONS SINCE JULY STAKEHOLDER MEETING

- NIPSCO met with stakeholders to discuss a variety of IRP topics, share feedback/perspective, and help provide answers to questions

Stakeholder	Date	Subject Area/Discussion Topic
Citizens Action Coalition of Indiana (CAC)	7/23	• Follow up from topics presented in the July stakeholder meeting • Topics included portfolio optimization, portfolio modeling, DSM, reliability criteria, supply-side DER
	9/7	• Reliability criteria approach discussion, including third-party and NIPSCO subject matter experts
Indiana Office of Utility Consumer Counselor (OUCC)	9/15	• Topics included IRP recap, supply demand picture, reliability criteria approach

RESOURCE PLANNING APPROACH

	Activity		Timing
1	Identify key planning questions and themes	✓	Mar
2	Develop market perspectives (planning reference case and scenarios / stochastic inputs)	✓	Mar-May
3	Develop integrated resource strategies for NIPSCO (portfolios)	✓	Jun-Jul
4	Portfolio modeling ▪ Detailed scenario dispatch ▪ Stochastic simulations		Aug-Sep
5	Evaluate trade-offs and produce recommendation		Sep-Oct



RESOURCE PLANNING ACTIVITY REVIEW

Fred Gomos, Director Strategy & Risk Integration, NiSource

Pat Augustine, Vice President, CRA

1 IDENTIFY KEY PLANNING QUESTIONS AND THEMES

- The ongoing fleet transition in MISO makes it critical for NIPSCO's IRP to capture several changing dynamics to allow NIPSCO to remain flexible
- Over the course of the IRP, NIPSCO has discussed or will be discussing these topics:

Topic		Stakeholder Meeting
Retirement Timing for Existing Coal and Gas Units	Assessing the retirement timing of the remaining generating fleet after the Schahfer coal units retire, which includes Michigan City Unit 12, Schahfer Units 16A and 16B, and Sugar Creek	Meeting 4
Flexibility & Adaptability of The Portfolio	Incorporating evolving capacity credit expectations for resources and an imminent seasonal resource adequacy requirement	Meetings 1-3
Long-Term Reliability Implications	Understanding system reliability implications of a portfolio that will have significant intermittent resources, in light of the MISO market evolution and NIPSCO's operational responsibilities	Meeting 2, 3
Carbon Emissions & Regulation/Incentives	Assessing diverse portfolio options in the context of increased policy conversations that push for 100% decarbonization of the power sector by the middle of the next decade	Meeting 2

1 IDENTIFY KEY PLANNING QUESTIONS AND THEMES

As in the 2018 IRP, multiple objectives and indicators are summarized across portfolios in an integrated scorecard framework against which to test portfolios and evaluate the major planning questions

Objective	Indicator
Affordability	Cost to Customer
Rate Stability	Cost Certainty
	Cost Risk
	Lower Cost Opportunity
Environmental Sustainability	Carbon Emissions
Reliable, Flexible, and Resilient Supply	Reliability
	Resource Optionality
Positive Social & Economic Impacts	Employees
	Local Economy

- The scorecard is a means of reporting key metrics for different portfolio options to transparently review tradeoffs and relative performance; it does not produce a single score or ranking of portfolios, but serves as a tool to facilitate decision-making
- NIPSCO has identified **5 major planning objectives** and multiple metrics within **9 key indicator categories**
- The Existing Fleet Analysis scorecard focuses on scenario costs, carbon emissions, and impact on NIPSCO employees and the local economy
- The Replacement Analysis scorecard incorporates broader perspectives on risk (stochastic analysis) and reliability than the Existing Fleet Analysis scorecard

2 DEVELOP MARKET PERSPECTIVES (REF CASE, SCENARIOS / STOCHASTIC INPUTS)

- NIPSCO's 2021 IRP analysis uses **both scenarios and stochastic analysis** to perform a robust assessment of risk

Scenarios ***Single, Integrated Set of Assumptions***	***Stochastic Analysis:*** ***Statistical Distributions of Inputs***

Scenarios — Single, Integrated Set of Assumptions

- **Can be used to answer the "What if…" questions**
  - Major events can change fundamental outlook for key drivers, altering portfolio performance
    - New policy or regulation (carbon regulation, tax credits)
    - Fundamental gas price change (change in resource base, production costs, large shifts in demand)
    - Major load shifts
- **Can tie portfolio performance directly to a "storyline"**
  - Easier to explain a specific reasoning why Portfolio A performs differently than Portfolio B

Stochastic Analysis: Statistical Distributions of Inputs

- **Can evaluate volatility and "tail risk" impacts**
  - Short-term price and generation output volatility impacts portfolio performance
    - Granular market price volatility and resource output uncertainty may not be fully captured under "expected" conditions
    - Certain short-term extreme events are not assessed under deterministic scenarios

2 DEVELOP MARKET PERSPECTIVES (REF CASE, SCENARIOS / STOCHASTIC INPUTS)

- NIPSCO has developed four integrated market scenarios or "future states of the world"
  - Scenarios incorporate a range of future outcomes for load, commodity prices, technology, and policy
  - The 2021 IRP includes two distinct policy frameworks for achieving net-zero emission trajectories for the broader power market
- Stochastic inputs have been developed for key components of quantifiable stochastic risk
  - For the 2021 IRP, the stochastic analysis has been expanded to include hourly renewable availability in addition to commodity price volatility

Reference Case

- The MISO market continues to evolve based on current expectations for load growth, commodity price trajectories, technology development, and policy change (some carbon regulation and MISO rules evolution)

Status Quo Extended ("SQE")

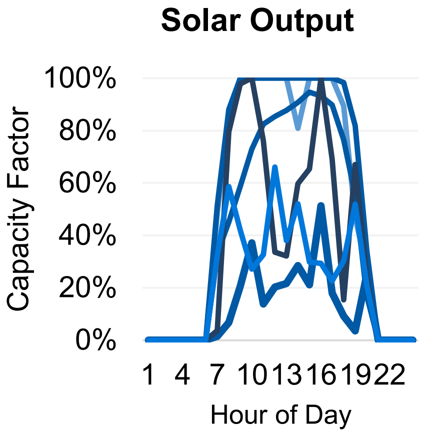
- Binding federal limits on carbon emissions are not implemented; natural gas prices remain low and result in new gas additions remaining competitive versus renewables, as coal capacity more gradually fades from the MISO market

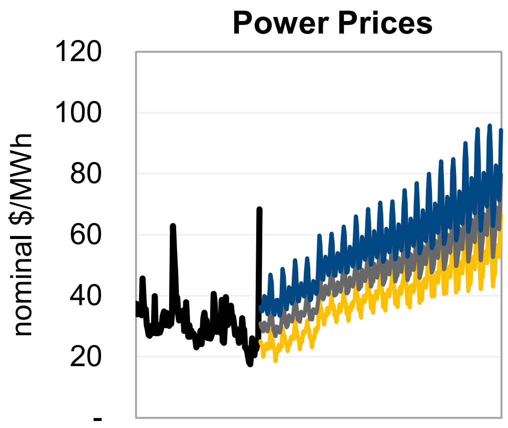
Aggressive Environmental Regulation ("AER")

- Carbon emissions from the power sector are regulated through a mix of incentives and a federal tax/cap-and-trade program that results in a significant CO_2 price and net-zero emission targets for the power sector by 2040; restrictions on natural gas production increase gas prices

Economy-Wide Decarbonization ("EWD")

- Technology development and federal incentives push towards a decarbonized economy, including through a power sector Clean Energy Standard (supporting renewables and other non-emitting technologies) and large-scale electrification in other sectors (EVs, heating, processes, etc.)



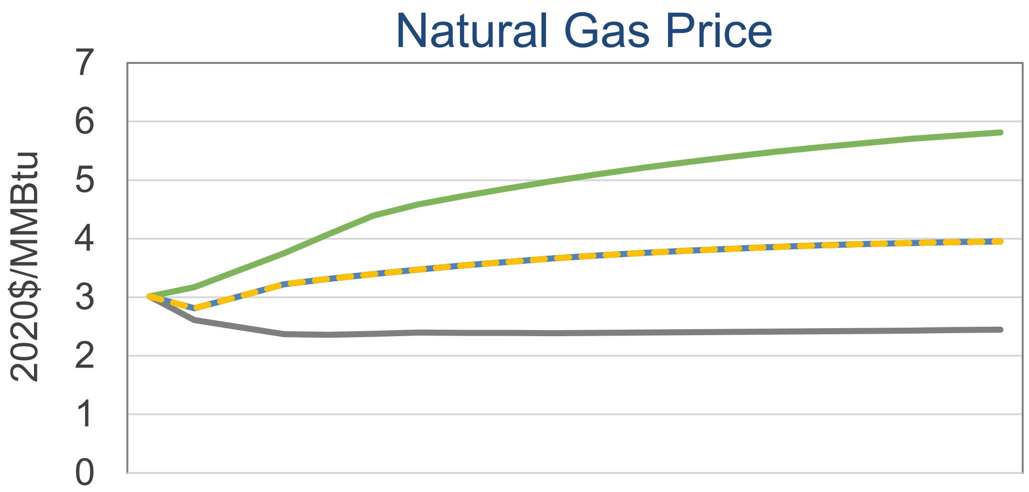


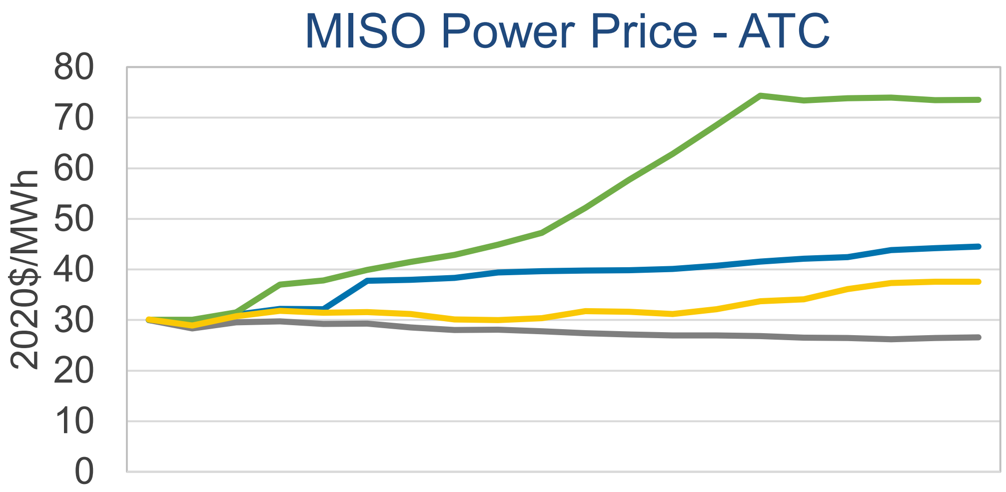
2 MAJOR SCENARIO PARAMETERS

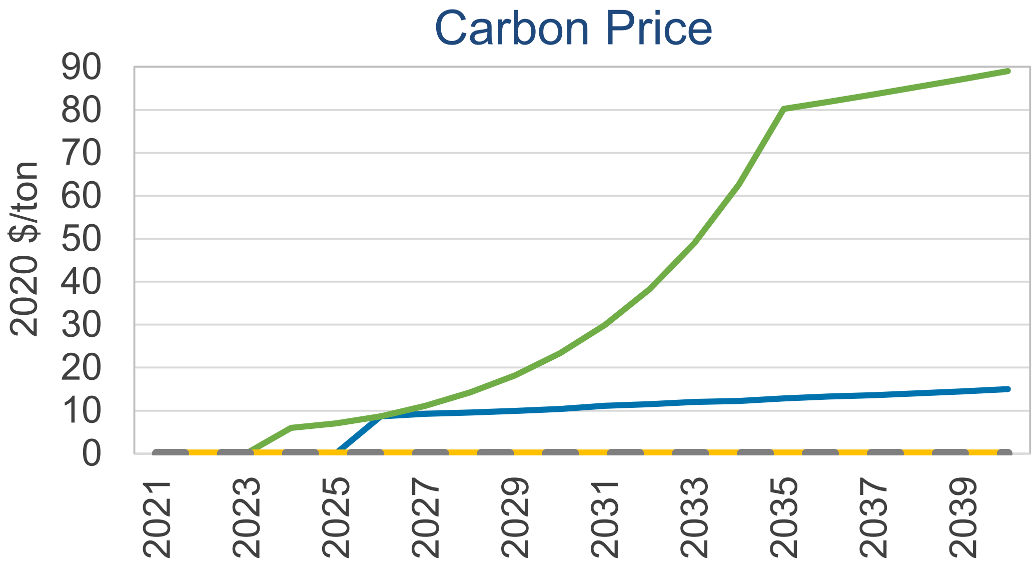
Scenario Name	Gas Price	CO_2 Price	Federal Tech. Incentives	Load Growth	Solar Capacity (ELCC) Credit* (Current → 2040)
Reference Case	Base	Base	2-year ITC extension (solar); 1-year PTC extension (60%)	Base	50% → 25%
Status Quo Extended	Low	None	No change to current policy	Lower	50% → 30%
Aggressive Environmental Regulation	High	High	5-year ITC extension (solar) plus expansion to storage; 3-year PTC extension (60%)	Close to Base	50% → 15%
Economy-Wide Decarbonization	Base	None	10-year ITC extension (solar) plus expansion to storage; 10-year PTC extension (60%); tracking further potential federal support for advanced tech including hydrogen and NG CCS	Higher	50% → 15%

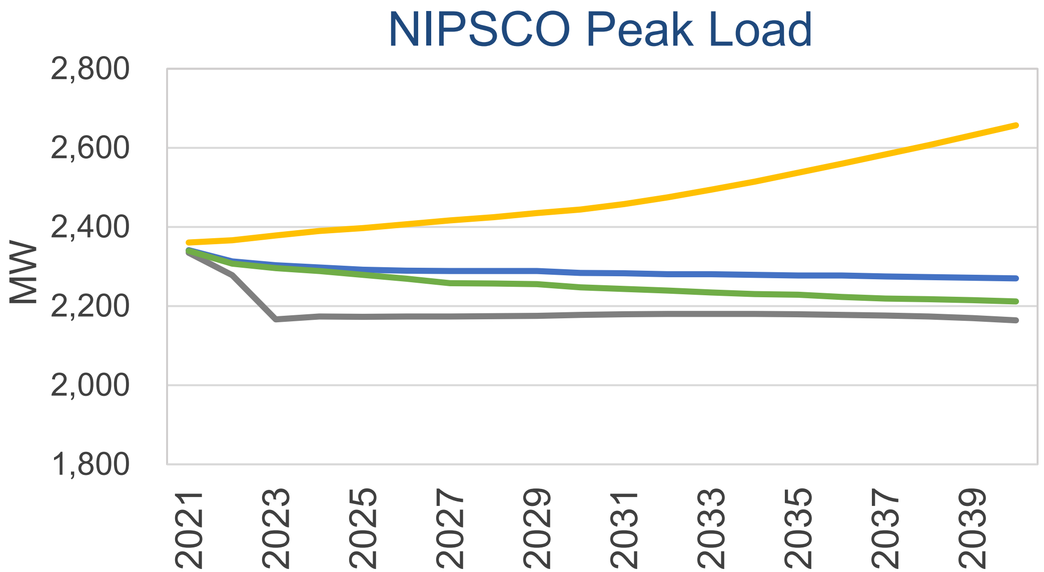
*Based on CRA capacity expansion and latest MISO-wide studies from RIIA Summary Report (Figure RA-18 at https://cdn.misoenergy.org/RIIA%20Summary%20Report520051.pdf)

2 SUMMARY RANGE OF KEY SCENARIO VARIABLES









- Reference Case
- Status Quo Extended
- Aggressive Environmental Regulation
- Economy-Wide Decarbonization

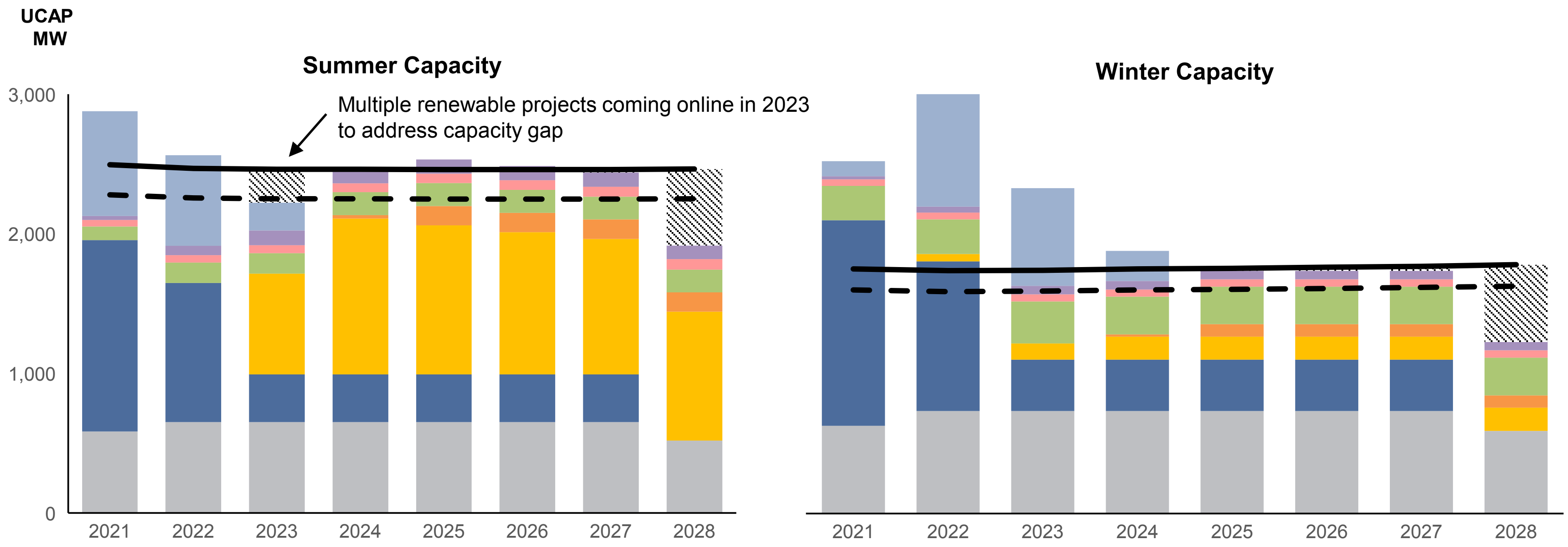
3 DEVELOP INTEGRATED RESOURCE STRATEGIES FOR NIPSCO

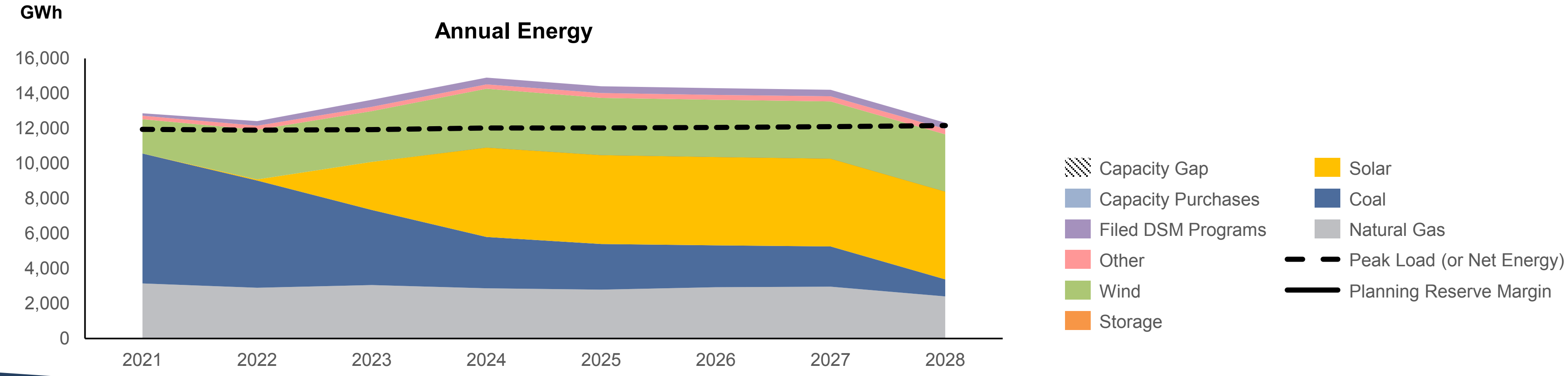
- NIPSCO has identified several future resource options (**reviewed in Stakeholder Meeting #3**):
  - Demand Side Management resources (Energy Efficiency and Demand Response)
  - Distributed Energy Resources (DERs)
  - Resources from the Request for Proposal (RFP) process

- Based on NIPSCO's starting capacity and energy position, the IRP analysis constructs a range of portfolio options (**to be reviewed in detail today**) that will:
  - Assess different Existing Fleet retirement timing options
  - Evaluate different Replacement portfolio themes

3 STARTING NEAR-TERM CAPACITY AND ENERGY BALANCE

NIPSCO is now monitoring summer and winter reserve margins plus the annual energy balance



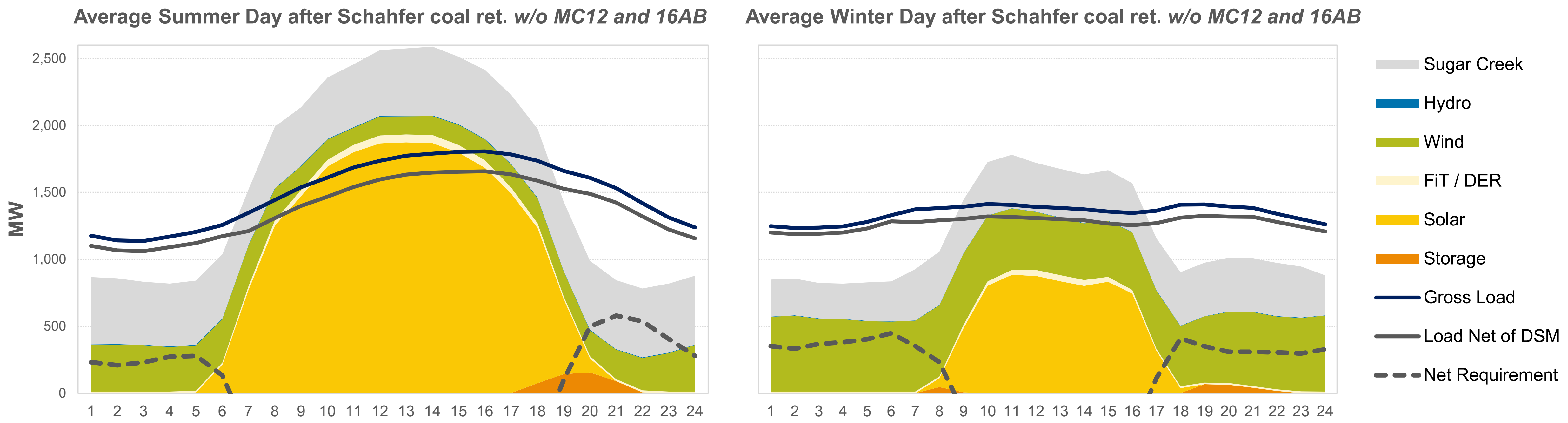


Key Points

- The capacity credit for some of the 2023 projects are not reflected until 2024 due to in service date timing;
- Capacity credit for some storage resources is not reflected until 2025 (after a full year of operations) due to plant configuration
- While winter loads are lower, the lower capacity credit in the winter for solar resources results in a similar reserve margin
- On an annual basis, the net energy position for the portfolio is long, driven by the energy value and economic dispatch advantage of wind and solar resources. However, the tight capacity position may create hourly gaps, particularly in the winter mornings and evenings when solar resources ramp down (next slide)

3 STARTING ENERGY BALANCE VARIES ON AN HOURLY BASIS

- There are hours of the day where renewable resources are not available (ex: overnight for solar). Furthermore, solar resources may experience steep production declines in the evening hours
- Currently, Sugar Creek (natural gas CC), Schahfer 16AB (natural gas peaker), and Michigan City 12 (coal) are part of the portfolio, and when economic, NIPSCO can purchase from the MISO market
- As 16AB and MC12 retire, the portfolio will require new resources to be available to mitigate against specific hourly energy exposure



LUNCH

EXISTING FLEET ANALYSIS

Fred Gomos, Director Strategy & Risk Integration, NiSource
Pat Augustine, Vice President, CRA

ANALYTICAL FRAMEWORK REMINDER

- The IRP analysis is performed in two phases; the first phase examines current and future resource additions to confirm timing of retirement for existing units with retirement dates falling within the IRP horizon
- Insight and conclusions from existing fleet analysis inform replacement concepts to evaluate. Once a preferred existing portfolio is established, future replacements are evaluated across a range of objectives

	Existing Fleet Analysis	Replacement Analysis
Core Questions	*How does the cost to keep a unit compare to the cost to replace with economically optimized resources?* *Is the portfolio flexible and adaptable to address changes in market rules and energy policy?*	*What are the replacement resource portfolio options?* *How do different replacement themes compare with regard to cost, risk, environmental sustainability, and reliability?*
All-Source RFP	**Actual projects available to NIPSCO**	**Actual projects available to NIPSCO**
Key Decision	What units should retire, and when?	What new resources should be added to meet customers' needs?

CONSTRUCTED RETIREMENT PORTFOLIOS TO COVER THE RANGE OF TIMING POSSIBILITIES FOR REMAINING FOSSIL UNITS

	1	2	3	4	5	6	7	7H
Portfolio Transition Target:	**15% Coal through 2032** MC 12 Through Book life	**15% Coal through 2028** 2018 IRP Preferred Plan	**15% Coal through 2026** Early Retirement of MC 12	**15% Coal through 2024** Early Retirement of MC 12	**15% Coal through 2028** 2018 IRP Preferred Plan + 2025 16AB retirement	**15% Coal through 2026** Early Retirement of MC 12 + 2025 16AB retirement	**15% Coal through 2028 Fossil Free by 2032** 2018 IRP Preferred Plan + 2025 16AB ret. + 2032 SC ret.	**15% Coal through 2028 Option for Fossil Free by 2032** 2018 IRP Preferred Plan + 2025 16AB ret. + 2032 SC conv.
Retain beyond 2032	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	None	Sugar Creek converts to H2 (2032)
Michigan City 12	**Retire** **2032**	**Retire** **2028**	**Retire** **2026**	**Retire** **2024**	**Retire** **2028**	**Retire** **2026**	**Retire** **2028**	
Schahfer 16AB	**Retire** **2028**				**Retire** **2025**			
Sugar Creek	**Retain**						**Retire** **2032**	**Convert to H2** **2032**

Short term (portfolios 1–6) **Longer term** (portfolios 7–7H)

Not a viable pathway due to implementation timing

Key Points

- Portfolio construction is necessarily broad to fully address tradeoffs
- Portfolios 1-4 focus on the timing of the Michigan City retirement
- Portfolios 5 and 6 focus on the replacement timing for Schahfer 16AB. Units are not retained beyond 2028 in any portfolio given current condition and age
- Portfolio 7 and 7H are assessing implications of carbon free portfolio pathways

EXISTING FLEET ANALYSIS SELECTIONS ARE DRIVEN BY ECONOMIC OPTIMIZATION

Resource options include RFP tranches, DSM bundles, DER options, and an opportunity to uprate capacity at Sugar Creek

- Driven by a binding winter reserve margin and the energy resources already obtained from the 2018 IRP Preferred Plan, the indicative ordering of model selection preference favors resources that offer greater levels of firm capacity
- This is not NIPSCO's replacement resource selection or plan, but an optimized set of additions to facilitate evaluation of the various existing fleet strategies

COST-EFFECTIVENESS: More → Less

Portfolio 1 — MC12 Through Book Life

Technology	ICAP MW	Year
NIPSCO DER	10	2026
Sugar Creek Uprate	53	2027
DSM*	68	2027*
Thermal Contract	50	2024
Thermal Contract	100	2026
Gas Peaker	300	2032
Storage	135	2027
Total	**693**	

Portfolios 2 | 3 | 4 — 2018 IRP (MC 2028) | MC 2026 | MC 2028

Technology	ICAP MW	Year P2	Year P3	Year P4
NIPSCO DER	10	2026	2026	2026
Sugar Creek Uprate	53	2027	2027	2027
DSM*	68	2027*	2027*	2027*
Thermal Contract	50	2024	2024	2024
Thermal Contract	100	2026	2026	2026
Gas Peaker	300	2028	2026	2024
Storage	135	2027	2027	2025
Solar	100 / 200^	2026	2026	2026
Total	**793 / 893^**			

^ P2/3 have 100 MW of solar; P4 has 200 MW

Portfolios 5 | 6 — Portfolio 2 w/ 16AB 2025 | Portfolio 3 w/ 16AB 2025

Technology	ICAP MW	Year P5	Year P6
NIPSCO DER	10	2026	2026
Sugar Creek Uprate	53	2027	2027
DSM*	68	2027*	2027*
Thermal Contract	50	2024	2024
Thermal Contract	100	2026	2026
Gas Peaker	300	2028	2026
Storage	135	2025	2025
Solar	100	2026	2026
Wind	200	N/A	2026
Total	**993**		

Portfolio 7 — Fossil Free By 2032

Technology	ICAP MW	Year
NIPSCO DER	10	2026
DSM*	68	2027*
Storage	235	2025
Storage	100	2026
Storage	235	2027
Solar	250	2026
Wind	200	2026
Total	**1,020**	

Portfolio 7H — Fossil Free Option by 2032 w/ SC Conversion (incl. capital costs)

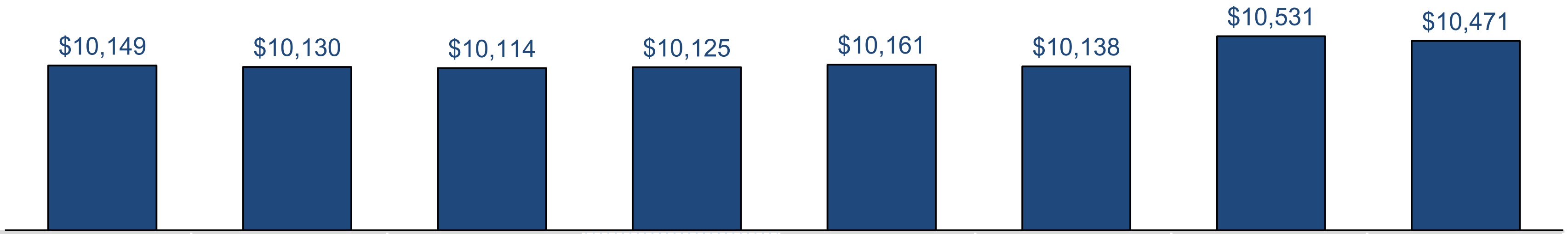
Technology	ICAP MW	Year
NIPSCO DER	10	2026
Sugar Creek Uprate	53	2027
DSM*	68	2027*
Storage	235	2025
Storage	135	2027
Solar	250	2026
Wind	200	2026
Hydrogen-Enabled Gas Peaker	193	2025
SC Electrolyzer Pilot	20	2026
Total	**1,131**	

*DSM includes the cumulative impact of both Residential and Commercial programs by 2027, with Commercial being most cost effective. DSM is reported on a summer peak basis. Note that the winter impact is ~46MW.

Notes: Portfolios were optimized against winter reserve margin constraints (9.4%), followed by summer to ensure compliance with both.
A maximum net energy sales limit of 30% during the fleet transition (2023-2026), falling to 25% in 2030+, was also enforced.
Wind outside LRZ6 was not included in optimization analysis, given lack of capacity deliverability to LRZ6 and significant congestion risk.

EXISTING FLEET ANALYSIS: DETERMINISTIC COST TO CUSTOMERS RESULTS

Net Present Value of Revenue Requirement
(2021-2050, $M)



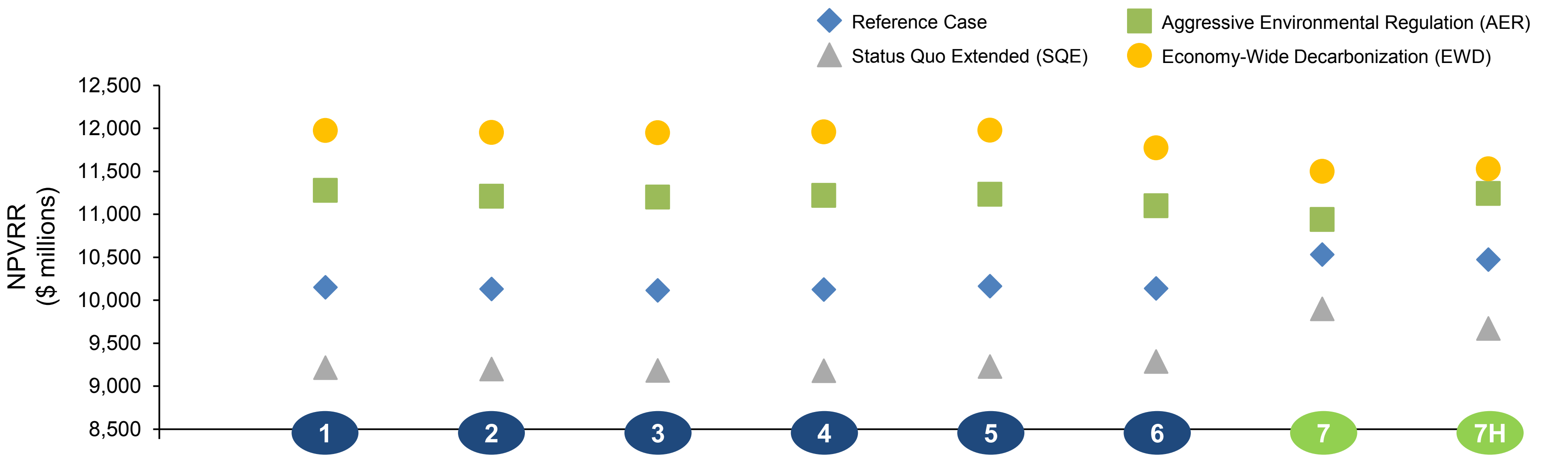
Portfolio Transition Target:	15% Coal through 2032 1	15% Coal through 2028 2	15% Coal through 2026 3	15% Coal through 2024 4	15% Coal through 2028 5	15% Coal through 2026 6	15% Coal through 2028 Fossil Free by 2032 7	15% Coal through 2028 Option for Fossil Free by 2032 7H
Retire:	MC: 12 (2032) Schfr: 16AB (2028)	MC: 12 (2028) Schfr: 16AB (2028)	MC: 12 (2026) Schfr: 16AB (2028)	MC: 12 (2024) Schfr: 16AB (2028)	MC: 12 (2028) Schfr: 16 AB (2025)	MC: 12 (2026) Schfr: 16AB (2025)	MC: 12 (2028) Schfr: 16AB (2025) SC: (2032)	MC: 12 (2028) Schfr: 16AB (2025) SC to H2: (2032)
Retain beyond 2032:	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	None	Sugar Creek converts to H2 (2032)
Rank (1=Least Cost)	5	3	1	2	6	4	8	7
Delta from Least Cost	$35M 0.3%	$16M 0.2%	-	$10M 0.1%	$47M 0.5%	$24M 0.2%	$417M 4.1%	$357M 3.5%

Not a viable pathway due to implementation timing

Observations

- The difference in NPVRR from the highest cost to lowest cost portfolio is approximately $430 million
- Consistent with NIPSCO's prior IRP findings, early retirement of coal is generally cost effective for customers, although the difference in cost across several portfolios is small, since much of the remaining portfolio is fixed and small changes in retirement dates are now being assessed
- Retaining Units 16A/B until 2028 may be cost effective, given the portfolio's capacity needs. However, this is contingent on the operational condition of these older vintage units, and the cost impacts of earlier retirement are well less than 1% in NPVRR

EXISTING FLEET ANALYSIS: SCENARIO RESULTS



	Portfolio Transition Target:	15% Coal through 2032	15% Coal through 2028	15% Coal through 2026	15% Coal through 2024	15% Coal through 2028	15% Coal through 2026	15% Coal through 2028 Fossil Free by 2032	15% Coal through 2028; Option for Fossil Free by 2032
	Retire:	MC: 12 (2032) Schfr: 16AB (2028)	MC: 12 (2028) Schfr: 16AB (2028)	MC: 12 (2026) Schfr: 16AB (2028)	MC: 12 (2024) Schfr: 16AB (2028)	MC: 12 (2028) Schfr: 16 AB (2025)	MC: 12 (2026) Schfr: 16AB (2025)	MC: 12 (2028) Schfr: 16AB (2025) SC: (2032)	MC: 12 (2028) Schfr: 16AB (2025) SC to H2: (2032)
	Retain beyond 2032:	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	None	Sugar Creek converts to H2 (2032)
Reference Case	**Delta from Lowest Cost to Customer**	$35 0.3%	$16 0.2%	- -	$10 0.1%	$47 0.5%	$24 0.2%	$417 4.1%	$357 3.5%
Status Quo Extended	**Delta from Lowest Cost to Customer**	$36 0.4%	$18 0.2%	$2 0.0%	- -	$49 0.5%	$108 1.2%	$720 7.8%	$492 5.4%
Aggressive Env. Reg.	**Delta from Lowest Cost to Customer**	$336 3.1%	$269 2.5%	$259 2.4%	$277 2.5%	$292 2.7%	$157 1.4%	- -	$303 2.8%
Econ-Wide Decarbonization	**Delta from Lowest Cost to Customer**	$477 4.1%	$454 3.9%	$449 3.9%	$459 4.0%	$478 4.2%	$276 2.4%	- -	$29 0.3%

Not a viable pathway due to implementation timing

*Note that a $0.50/kg H2 subsidy is assumed in AER and EWD

Observations

- MC12 retirement in 2026 has a small cost benefit (<$20M) relative to retirement in 2028 across all scenarios
- MC 12 retirement in 2032 is always higher cost than earlier retirement, with the largest difference in the AER scenario (high carbon price)
- Portfolio 2 is slightly lower cost than Portfolio 5, although additional renewable additions with early 16AB retirement (Portfolio 6) lower costs under high carbon regulation scenarios
- Portfolios 7 and 7H have the smallest range, as their future renewable, hydrogen, and storage investments hedge against high-cost power market outcomes

EXISTING FLEET ANALYSIS SCORECARD

Objective	Indicator	Description and Metrics
Affordability	**Cost to Customer**	• Impact to customer bills • Metric: 30-year NPV of revenue requirement (Reference Case scenario deterministic results)
Rate Stability	**Cost Certainty**	• Certainty that revenue requirement within the most likely range of outcomes • Metric: Scenario range NPVRR
	Cost Risk	• Risk of unacceptable, high-cost outcomes • Metric: Highest scenario NPVRR
	Lower Cost Opportunity	• Potential for lower cost outcomes • Metric: Lowest scenario NPVRR
Environmental Sustainability	**Carbon Emissions**	• Carbon intensity of portfolio • Metric: Cumulative carbon emissions (2024-40 short tons of CO_2) from the generation portfolio
Reliable, Flexible, and Resilient Supply	**Reliability**	• *To be addressed in Replacement Analysis stage*
	Resource Optionality	
Positive Social & Economic Impacts	**Employees**	• Net impact on NiSource jobs • Metric: Approx. number of permanent NiSource jobs associated with generation
	Local Economy	• Net effect on the local economy (relative to 2018 IRP) from new projects and ongoing property taxes • Metric: NPV of existing fleet property tax relative to 2018 IRP

Additional risk metrics will be included in the Replacement Analysis, when broader set of resource types are evaluated

Key Points

- Two closely related, but distinct scorecards are used for the Existing Fleet Analysis and the Replacement Analysis
- The Existing Fleet Analysis focuses on scenario costs, carbon emissions, and impact on NIPSCO employees and the local economy
- The Replacement Analysis expands the risk assessment to include a stochastic assessment and introduces reliability metrics to assess a broader range of future resource options

EXISTING FLEET ANALYSIS SCORECARD

Preliminary	1	2	3	4	5	6	7	7H
Portfolio Transition Target:	15% Coal through 2032	15% Coal through 2028	15% Coal through 2026	15% Coal through 2024	15% Coal through 2028	15% Coal through 2026	15% Coal through 2028 Fossil Free by 2032	15% Coal through 2028 Fossil Free by 2032
Retire:	MC: 12 (2032) Schfr: 16AB (2028)	MC: 12 (2028) Schfr: 16AB (2028)	MC: 12 (2026) Schfr: 16AB (2028)	MC: 12 (2024) Schfr: 16AB (2028)	MC: 12 (2028) Schfr: 16 AB (2025)	MC: 12 (2026) Schfr: 16AB (2025)	MC: 12 (2028) Schfr: 16AB (2025) SC: (2032)	MC: 12 (2028) Schfr: 16AB (2025) SC to H2: (2032)
Retain beyond 2032:	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	Sugar Creek	None	Sugar Creek converts to H2 (2032)
Cost To Customer 30-year NPV of revenue requirement (Ref Case)	$10,149 +$35 0.3%	$10,130 +$16 0.2%	$10,114 - -	$10,125 $10 0.1%	$10,161 +$47 0.5%	$10,138 +$24 0.2%	$10,531 +$417 4.1%	$10,471 +$357 3.5%
Cost Certainty Scenario Range (NPVRR)	$2,759 +$1,161 72.6%	$2,754 +$1,156 72.3%	$2,766 +$1,167 73.0%	$2,777 +$1,179 73.8%	$2,747 +$1,149 71.9%	$2,487 +$889 55.6%	$1,598 - -	$1,855 +$257 16.1%
Cost Risk Highest Scenario NPVRR	$11,974 +$477 4.1%	$11,951 $454 3.9%	$11,947 +$449 3.9%	$11,957 +$459 4.0%	$11,976 +$478 4.2%	$11,773 +$276 2.4%	$11,498 - -	$11,527 +$29 0.3%
Lower Cost Opportunity Lowest Scenario NPVRR	$9,215 +$36 0.4%	$9,197 +$18 0.2%	$9,181 +$2 0.0%	$9,179 - -	$9,229 +$49 0.5%	$9,287 +$108 1.2%	$9,899 +$720 7.8%	$9,671 +$492 5.3%
Carbon Emissions M of tons 2024-40 Cum. (Scenario Avg.)	43.3 +22 102%	33.7 +12 57%	28.5 +7 33%	23.0 +2 8%	33.7 +12 57%	28.5 +7 33%	21.4 - -	30.9 +9 44%
Employees Approx. existing gen. jobs compared to 2018 IRP*	+127	0	-127	-127	-4	-131	-34	-4
Local Economy NPV of existing fleet property tax relative to 2018 IRP	+$13	$0	-$10	-$23	$0	-$10	-$16	+$13

Not a viable pathway due to implementation timing

*Adding replacement projects could have an impact on net jobs

PORTFOLIO-LEVEL OBSERVATIONS

- Retaining Michigan City 12 beyond the currently planned retirement date of 2028 (**Portfolio 1**) is higher cost than the alternatives across all four scenarios
- Retirement of Michigan City 12 in 2024 (**Portfolio 4**) is higher cost than later retirement in three out of the four scenarios and is not a viable pathway given insufficient timing to secure replacement capacity
- Retirement of Michigan City 12 in 2026 (**Portfolio 3**) has the lowest Cost to Customer under the Reference Case and in three out of four scenarios and achieves the most significant CO2 reductions of the viable portfolios testing coal retirement
- Retirement of Michigan City in 2028 (**Portfolio 2**) is very close to Portfolio 3 on all cost metrics, while also preserving some NIPSCO jobs and local property tax benefits for two additional years
- Acceleration of the Schahfer 16A/B retirement to 2025 (**Portfolios 5 and 6**) is slightly higher cost than retaining the units until 2028, but early retirement could be influenced by unit operational condition and other external policy and technology factors, since additional renewable energy replacement (**Portfolios 6**) provides lower costs under scenarios with significant carbon regulation (AER and EWD)
- A retirement of Sugar Creek in the 2030s (**Portfolio 7**) offers the lowest carbon emission profile and, along with potential retrofit to reduce CO2 emissions (**Portfolio 7H**), provides a hedge against significant environmental regulations that would otherwise raise portfolio costs

OVERARCHING EXISTING FLEET ANALYSIS OBSERVATIONS

- Portfolios 2 (2028 MC12 retirement) and 3 (2026 MC12 retirement) tend to be lowest cost amongst viable portfolios testing Michigan City and Schahfer 16AB retirement dates
  - Preserving optionality for the MC12 retirement date will allow NIPSCO to perform full due diligence on RFP projects to confirm timing and costs, monitor ongoing market design and environmental policy changes, and react to technology evolution
  - Schahfer 16AB may provide relatively low-cost capacity through 2028, but NIPSCO is likely to be flexible with retirement timing based on MC12 retirement plans and 16A/B operational conditions and to efficiently pursue replacement opportunities that may cost-effectively cover capacity needs for all retiring resources as technology and policy evolves

- Portfolios 7 and 7H are higher cost under currently expected conditions, but retirement or conversion of Sugar Creek in the 2030s, with additional early renewable additions, would be lower cost than continuing to operate the unit fully on natural gas in the event of a high carbon price or other aggressive clean energy policies
  - NIPSCO can keep such options open regardless of retirement date for Michigan City
  - These portfolio concepts remain part of the Replacement Analysis phase for broader study

BREAK

REPLACEMENT ANALYSIS

Fred Gomos, Director Strategy & Risk Integration, NiSource

Pat Augustine, Vice President, CRA

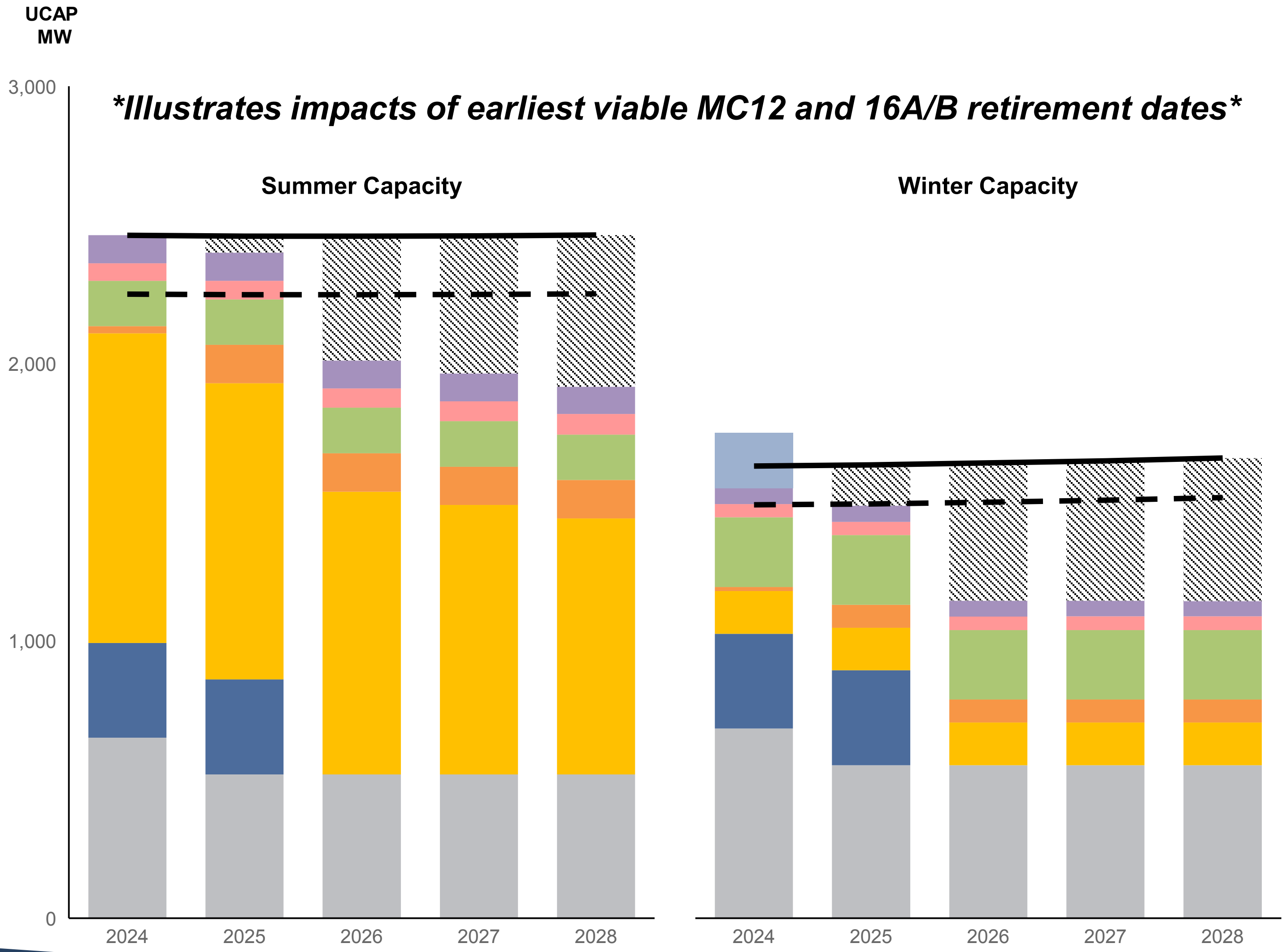
ANALYTICAL FRAMEWORK REMINDER

- The IRP analysis is performed in two phases; the first phase examines current and future resource additions to confirm timing of retirement for existing units with retirement dates falling within the IRP horizon
- Insight and conclusions from existing fleet analysis inform replacement concepts to evaluate. Once a preferred exiting portfolio is established, future replacements are evaluated across a range of objectives

	Existing Fleet Analysis	Replacement Analysis
Core Questions	*How does the cost to keep a unit compare to the cost to replace with economically optimized resources?* *Is the portfolio flexible and adaptable to address changes in market rules and energy policy?*	*What are the replacement resource portfolio options?* *How do different replacement themes compare with regard to cost, risk, environmental sustainability, and reliability?*
All-Source RFP	**Actual projects available to NIPSCO**	**Actual projects available to NIPSCO**
Key Decision	What units should retire, and when?	What new resources should be added to meet customers' needs?

A CAPACITY GAP OPENS UPON RESOURCE RETIREMENTS

Uncertainty in the capacity gap is driven by future load growth, MISO planning reserve margin targets, and realized renewable resource capacity credit



Summer Estimated Capacity Excess/(Need) in MWs

	2026	2028
As-Is	25	(73)
Retire Michigan City 12	(317)	(415)
Retire Schahfer 16 A/B	(449)	(547)

Increase over time driven primarily by expectations for declining solar capacity credit

Winter Estimated Capacity Excess/(Need) in MWs

	2026	2028
As-Is	(23)	(41)
Retire Michigan City 12	(365)	(383)
Retire Schahfer 16 A/B	(497)	(515)

Increase over time driven primarily by winter load growth

REPLACEMENT ANALYSIS PORTFOLIOS HAVE BEEN DEVELOPED ACROSS NINE CONCEPTS

The concepts are informed by the IRP themes, findings from Existing Fleet Analysis, and additional optimization testing

- For the Replacement Analysis, **Portfolio 3** from the Existing Fleet analysis has been used to assess portfolio selection under the earliest possible retirement of MC12, noting that Portfolio 2 would have similar results, with small changes in resource addition timing. This approach does not imply that NIPSCO has determined a specific MC12 retirement date
- Resource combinations are constructed based on RFP projects (tranches) and other opportunities to explore a range of emissions profiles and dispatchability under current and proposed market rules

Dispatchability

Emissions	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
Higher Carbon Emissions	Thermal PPAs, solar and storage (A)	Non-service territory gas peaking (no early storage) (B)	Natural gas dominant (CC) (C)
Mid Carbon Emissions	No new thermal resources; solar dominant w/ storage (D)	Thermal PPAs plus storage and solar (E)	Local gas peaker, plus solar and storage (F)
Low Carbon Emissions	Solar dominant w/ storage, plus retire Sugar Creek (G)	All renewables and storage, plus retire Sugar Creek (Portfolio 7) (H)	New H2-enabled peaker plus solar and storage, plus SC conversion to H2 (Portfolio 7H) (I)

Sugar Creek is retained through modeling horizon

Sugar Creek Retires or converts to H2

Net Zero Concepts

ICAP ADDITIONS– RFP PROJECTS AND OTHER NEAR-TERM OPPORTUNITIES

- Several resource additions are common across all themes, *when allowed*: **R&C DSM programs**, **Thermal PPAs, attractive NIPSCO DER, SC uprate**
- A range of solar, storage, gas, wind, and hydrogen-enabled resources are incorporated across portfolios

ICAP Additions through 2027 Planning Year

Dispatchability (columns) / **Emissions** (rows)

Emissions	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
Higher Carbon Emissions	**A** NIPSCO DER 10MW SC Uprate 53MW Thermal PPA 150MW Storage 135MW Solar+Storage 450MW* Solar 250MW	**B** NIPSCO DER 10MW SC Uprate 53MW Gas Peaker** 443MW Thermal PPA 150MW Solar 250MW	**C** NIPSCO DER 10MW SC Uprate 53MW Gas CC 650MW *Portfolio violates normal net long energy sales constraints enforced in optimization*
Mid Carbon Emissions	**D** NIPSCO DER 10MW SC Uprate 53MW Storage 135MW Solar+Storage 450MW* Solar 400MW	**E** NIPSCO DER 10MW SC Uprate 53MW Thermal PPA 150MW Storage 470MW Solar 250MW	**F** NIPSCO DER 10MW SC Uprate 53MW Gas Peaker** 300MW Thermal PPA 150MW Storage 135MW Solar 100MW
Low Carbon Emissions	**G** NIPSCO DER 10MW Storage 135MW Solar+Storage 450MW* Solar 450MW	**H** NIPSCO DER 10MW Wind 200MW Storage 570MW Solar 250MW	**I** NIPSCO DER 10MW SC H2 Electrolyzer 20MW SC Uprate 53MW H2 Enabled Peaker 193MW Wind 200MW Storage 370MW Solar 250MW

Sugar Creek is retained through modeling horizon (Higher and Mid Carbon Emissions)

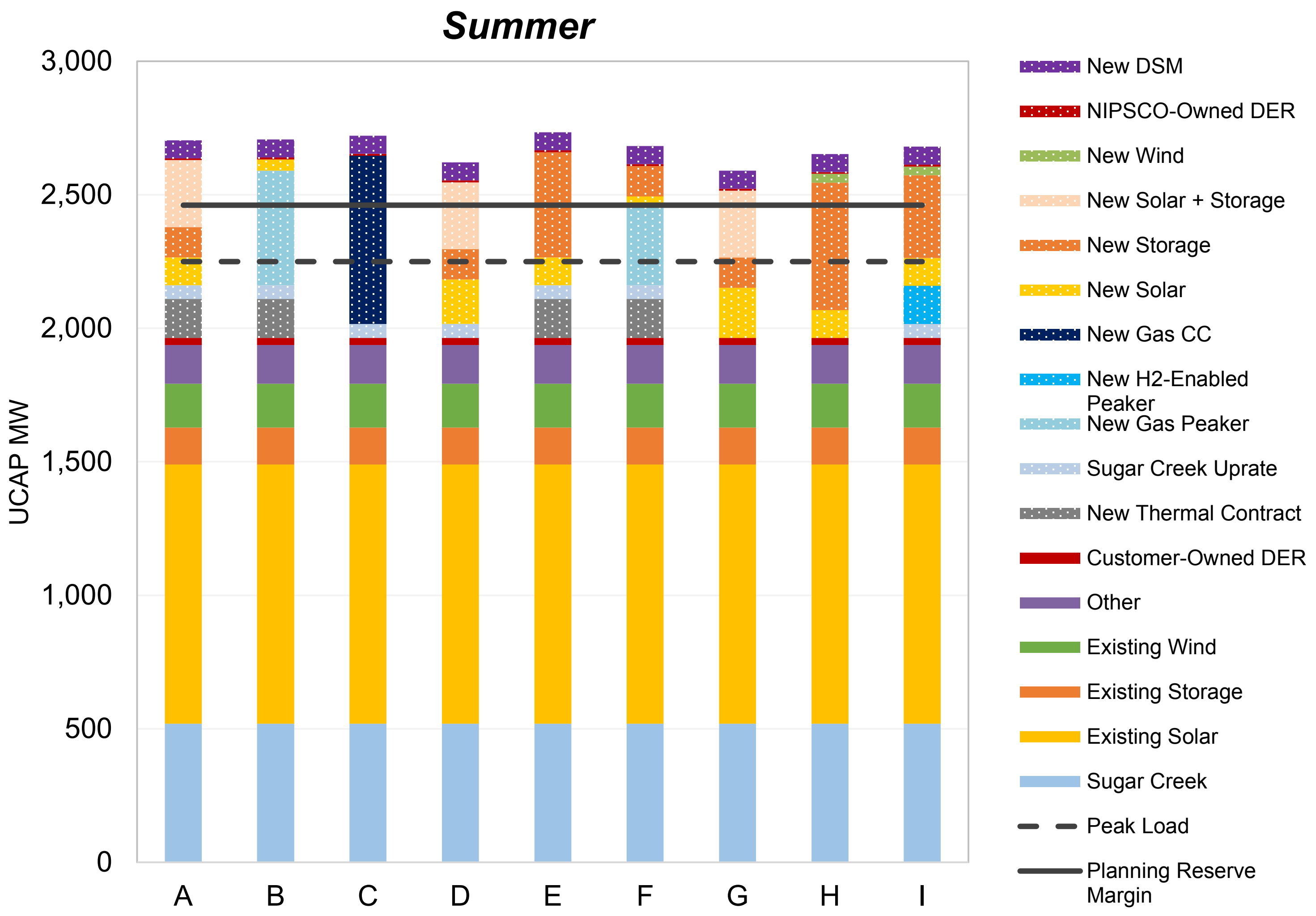
Sugar Creek Retires or converts to H2 (Low Carbon Emissions)

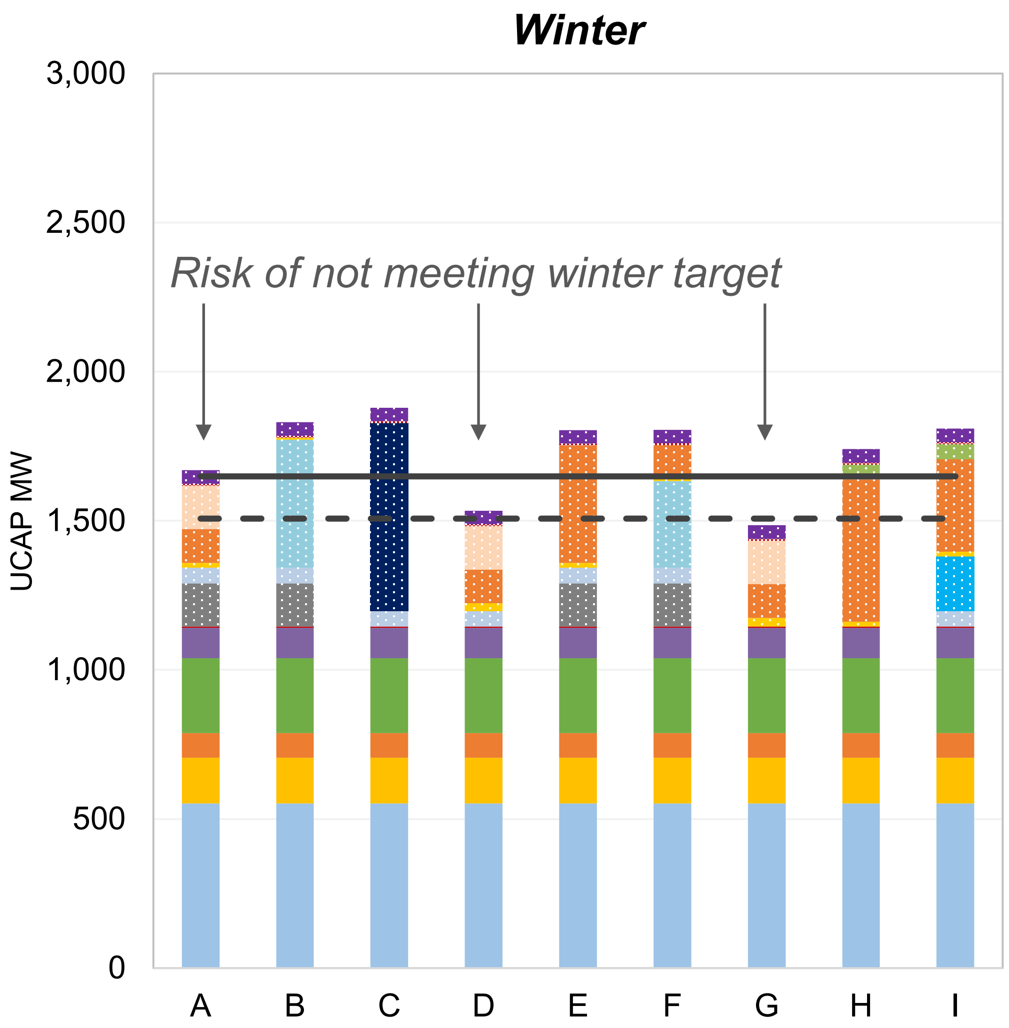
Net Zero Concepts

Note: Residential/Commercial DSM universally selected across portfolios
**Represents 300 MW of solar and 150 MW of storage*
***Gas peaker in Portfolio B represents an out-of-service territory PPA; Gas peaker in Portfolio F represents asset sale proposal*

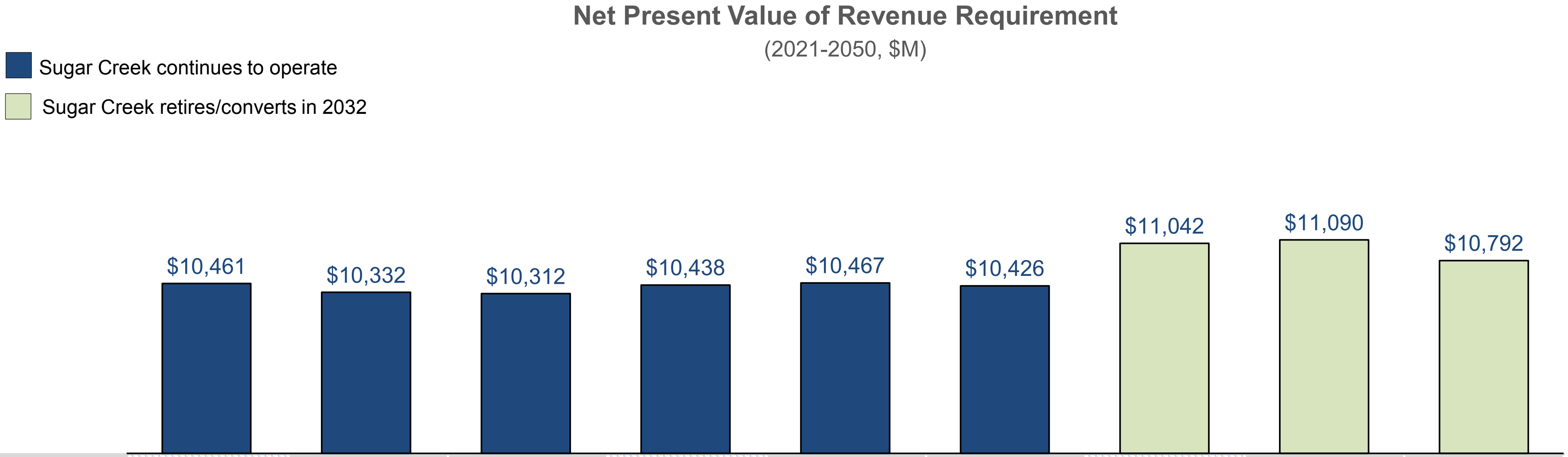
2027 SUPPLY-DEMAND BALANCE WITH NEW RESOURCE ADDITIONS

Assumes Michigan City 12 and Schahfer 16AB are retired for illustration





RESULTS: COST TO CUSTOMER REFERENCE CASE



Replacement Theme	Thermal PPAs, solar and storage	Non-service territory gas peaking (no early storage)	Natural gas dominant (CC)	No new thermal resources; solar dominant w/ storage	Thermal PPAs plus storage and solar	Local gas peaker, plus solar and storage	Solar dominant w/ storage, plus retire Sugar Creek	All renewables and storage, plus retire Sugar Creek (Portfolio 7)	New H2-enabled peaker plus solar and storage, plus SC conversion to H2 (Portfolio 7H)
	A	B	C	D	E	F	G	H	I
Carbon Emissions	Higher	Higher	Higher	Mid	Mid	Mid	Low	Low	Low
Dispatchability	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
Rank (1=Least Cost)	5	2	1	4	6	3	8	9	7
Delta from Least Cost	$150 1.5%	$21 0.2%	-	$126 1.2%	$156 1.5%	$115 1.1%	$730 7.1%	$778 7.5%	$480 4.7%

Not a viable pathway due to not meeting winter planning reserve margins

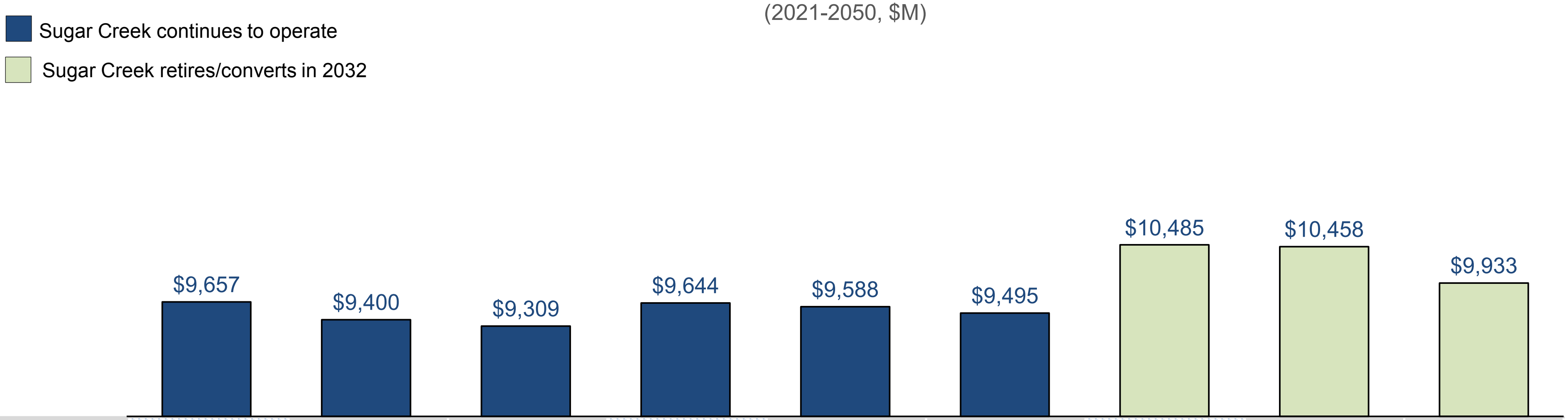
Observations

- Portfolios A through F are all within ~$150 million NVPRR
- Portfolios A and D (solar dominant that only meet summer RM) are not tenable options given potential market rule changes
- Portfolio C develops a very net long position and is higher cost than several alternatives over a 20-year period, as economics are driven by long-term “merchant” margins
- Portfolios with significant storage (E in particular) have potential value in ancillary services markets
- Portfolios G, H, and I (net zero concepts) are higher cost, with Portfolio I retaining the optionality to burn natural gas at Sugar Creek under Reference Case conditions

SCENARIO RESULTS: COST TO CUSTOMER STATUS QUO EXTENDED (SQE)

Net Present Value of Revenue Requirement

(2021-2050, $M)



Replacement Theme	Thermal PPAs, solar and storage	Non-service territory gas peaking (no early storage)	Natural gas dominant (CC)	No new thermal resources; solar dominant w/ storage	Thermal PPAs plus storage and solar	Local gas peaker, plus solar and storage	Solar dominant w/ storage, plus retire Sugar Creek	All renewables and storage, plus retire Sugar Creek (Portfolio 7)	New H2-enabled peaker plus solar and storage, plus SC conversion to H2 (Portfolio 7H)
	A	B	C	D	E	F	G	H	I
Carbon Emissions	Higher	Higher	Higher	Mid	Mid	Mid	Low	Low	Low
Dispatchability	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
Rank (1=Least Cost)	6	2	1	5	4	3	9	8	7
Delta from Least Cost	$347 3.7%	$91 1.0%	-	$334 3.6%	$278 3.0%	$186 2.0%	$1,176 12.6%	$1,149 12.3%	$684 7.3%

Not a viable pathway due to not meeting winter planning reserve margins

Observations

- With no carbon regulation and low natural gas prices, portfolios with more gas generation (particularly C) are lower in cost
- The cost of pursuing a net zero strategy in this environment increases, with the spread from the lowest to highest cost portfolios widening to over $1 billion in NPVRR

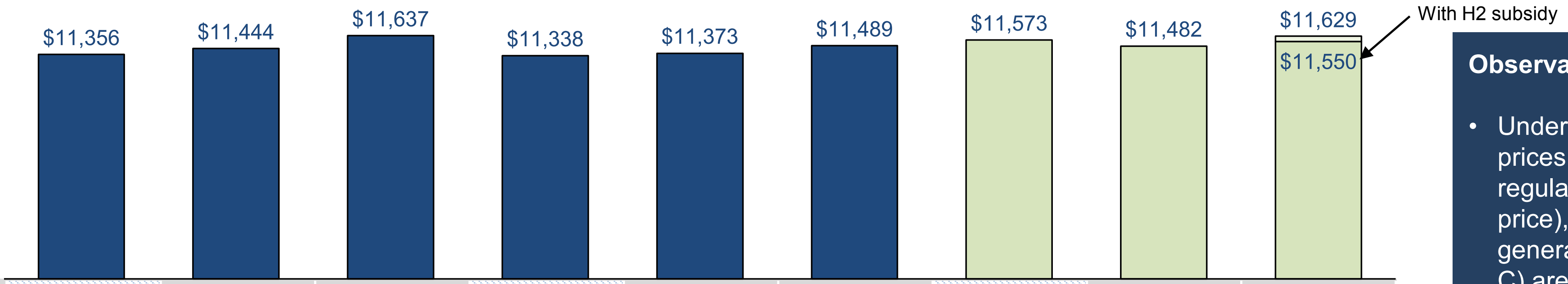
SCENARIO RESULTS: COST TO CUSTOMER AGGRESSIVE ENVIRONMENTAL REGULATION (AER)

Net Present Value of Revenue Requirement

(2021-2050, $M)

Sugar Creek continues to operate

Sugar Creek retires/converts in 2032



	A	B	C	D	E	F	G	H	I
Replacement Theme	**Thermal PPAs, solar and storage**	**Non-service territory gas peaking (no early storage)**	**Natural gas dominant (CC)**	**No new thermal resources; solar dominant w/ storage**	**Thermal PPAs plus storage and solar**	**Local gas peaker, plus solar and storage**	**Solar dominant w/ storage, plus retire Sugar Creek**	**All renewables and storage, plus retire Sugar Creek (Portfolio 7)**	**New H2-enabled peaker plus solar and storage, plus SC conversion to H2 (Portfolio 7H)**
Carbon Emissions	Higher	Higher	Higher	Mid	Mid	Mid	Low	Low	Low
Dispatchability	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
Rank (1=Least Cost)	2	4	9	1	3	6	8	5	7
Delta from Least Cost	$18 0.2%	$106 0.9%	$299 2.6%	-	$35 0.3%	$151 1.3%	$235 2.1%	$144 1.3%	$212 1.9%

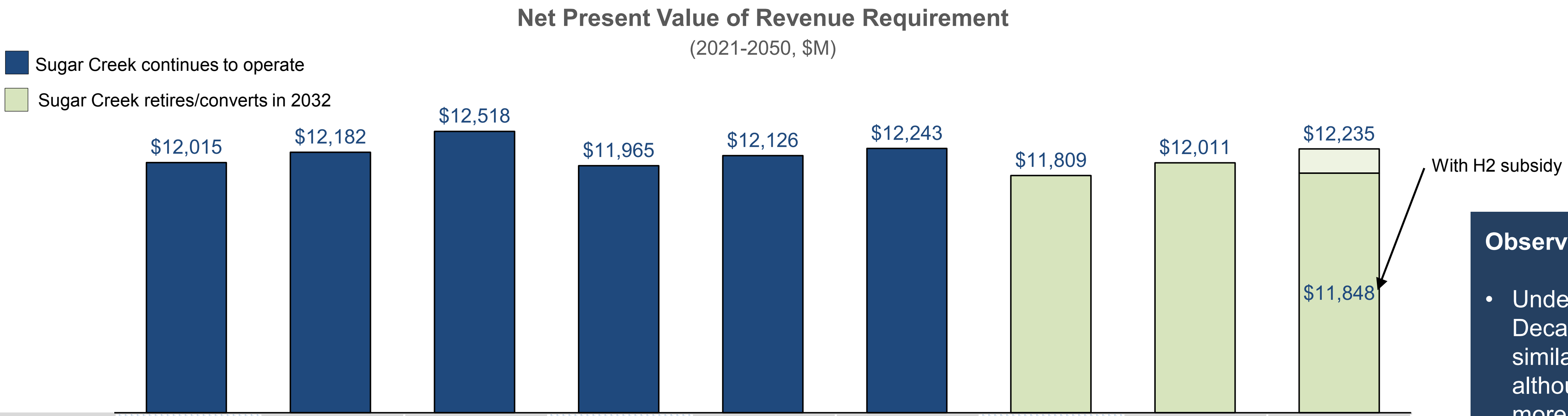
Not a viable pathway due to not meeting winter planning reserve margins

*Note: Rank and Delta from Least Cost utilize 3I **with** the H2 subsidy at $0.50/kg.

Observations

- Under a scenario with rising gas prices and strict environmental regulation (through a carbon price), portfolios with more gas generation (particularly Portfolio C) are higher cost
- Among viable options, Portfolio E (storage and solar, with no new gas capacity additions) is lowest cost

SCENARIO RESULTS: COST TO CUSTOMER ECONOMY-WIDE DECARBONIZATION (EWD)



Replacement Theme	Thermal PPAs, solar and storage	Non-service territory gas peaking (no early storage)	Natural gas dominant (CC)	No new thermal resources; solar dominant w/ storage	Thermal PPAs plus storage and solar	Local gas peaker, plus solar and storage	Solar dominant w/ storage, plus retire Sugar Creek	All renewables and storage, plus retire Sugar Creek (Portfolio 7)	New H2-enabled peaker plus solar and storage, plus SC conversion to H2 (Portfolio 7H)
	A	B	C	D	E	F	G	H	I
Carbon Emissions	Higher	Higher	Higher	Mid	Mid	Mid	Low	Low	Low
Dispatchability	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
Rank (1=Least Cost)	5	7	9	3	6	8	1	4	2
Delta from Least Cost	$207 1.7%	$373 3.2%	$709 6.0%	$156 1.3%	$317 2.7%	$434 3.7%	-	$202 1.7%	$39 0.3%

Observations

- Under the Economy-Wide Decarbonization scenario, similar trends are evident, although clean energy has more value under the Clean Energy Standard construct, resulting in Portfolio I (assuming a future H2 subsidy) having lowest costs among viable portfolios.

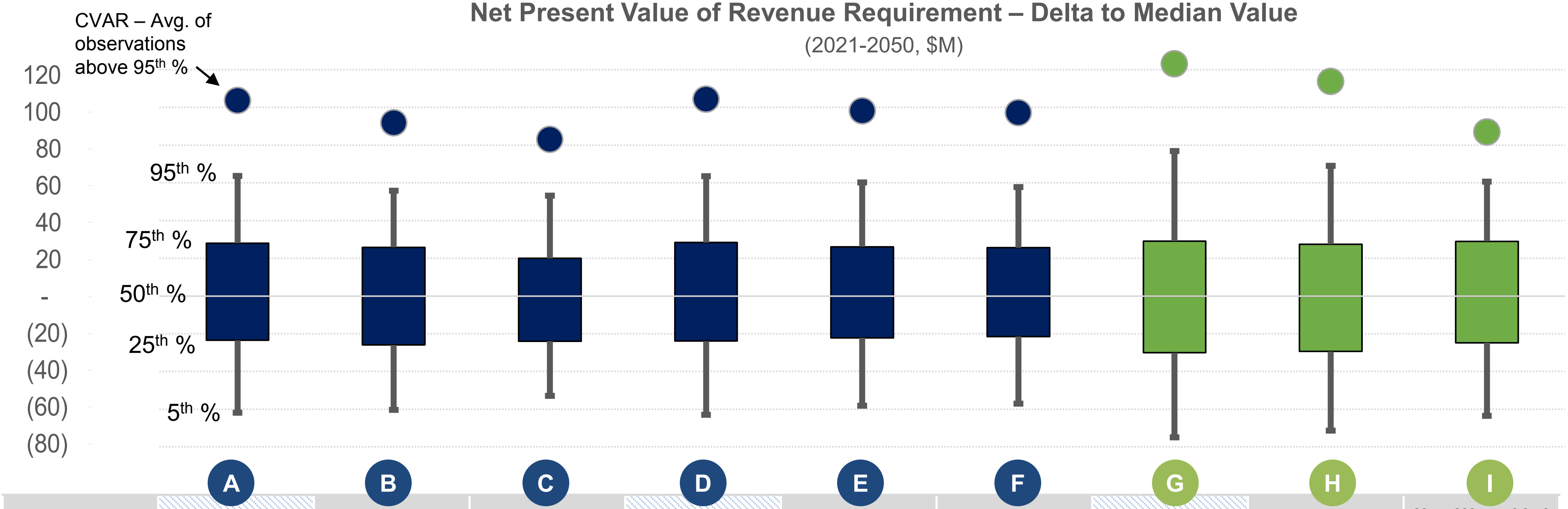
Not a viable pathway due to not meeting winter planning reserve margins

*Note: Rank and Delta from Least Cost utilize 3I **with** the H2 subsidy at $0.50/kg.

RESULTS: STOCHASTIC ANALYSIS

Net Present Value of Revenue Requirement – Delta to Median Value

(2021-2050, $M)



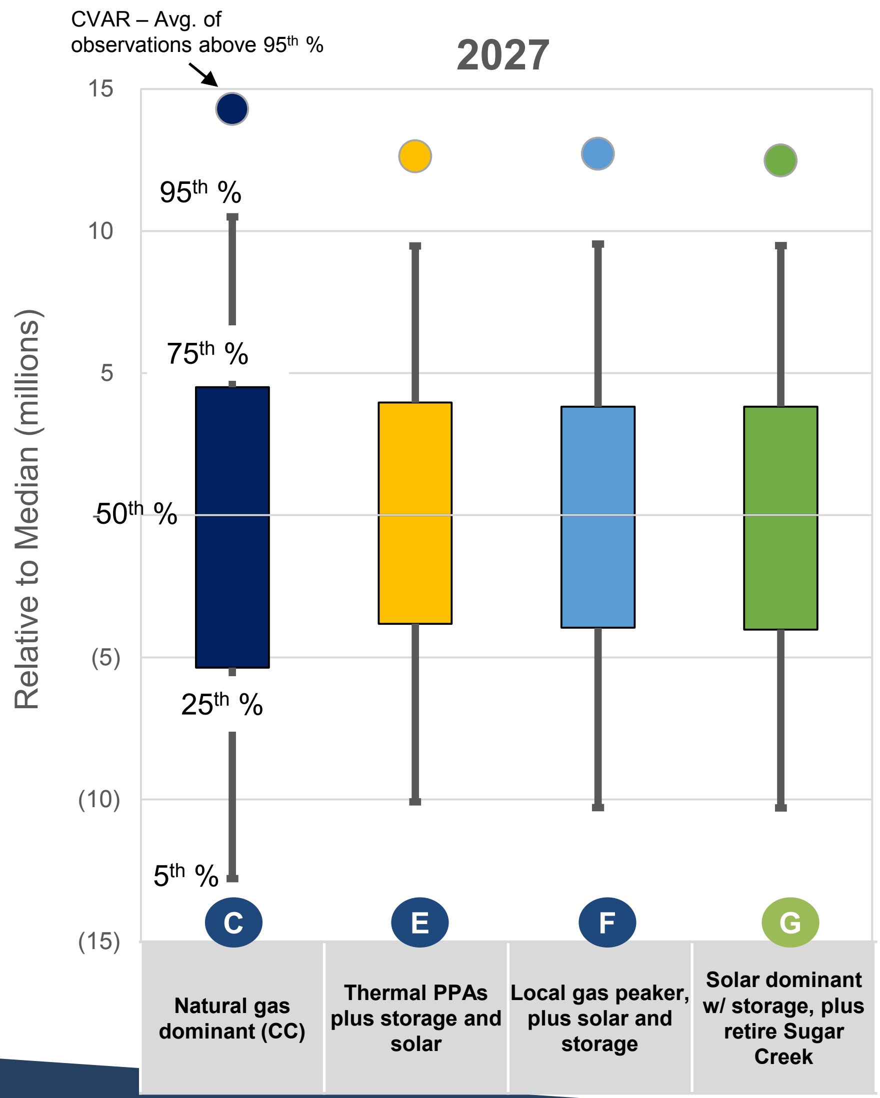
Replacement Theme	Thermal PPAs, solar and storage	Non-service territory gas peaking (no early storage)	Natural gas dominant (CC)	No new thermal resources; solar dominant w/ storage	Thermal PPAs plus storage and solar	Local gas peaker, plus solar and storage	Solar dominant w/ storage, plus retire Sugar Creek	All renewables and storage, plus retire Sugar Creek (Portfolio 7)	New H2-enabled peaker plus solar and storage, plus SC conversion to H2 (Portfolio 7H)
Carbon Emissions	Higher	Higher	Higher	Mid	Mid	Mid	Low	Low	Low
Dispatchability	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
95th % CVAR Delta from Low	21	9	-	21	15	14	40	31	4
75th % Delta from Low	8	6	-	8	6	6	9	7	9
5th % Delta from Low	13	15	22	12	17	18	-	4	11

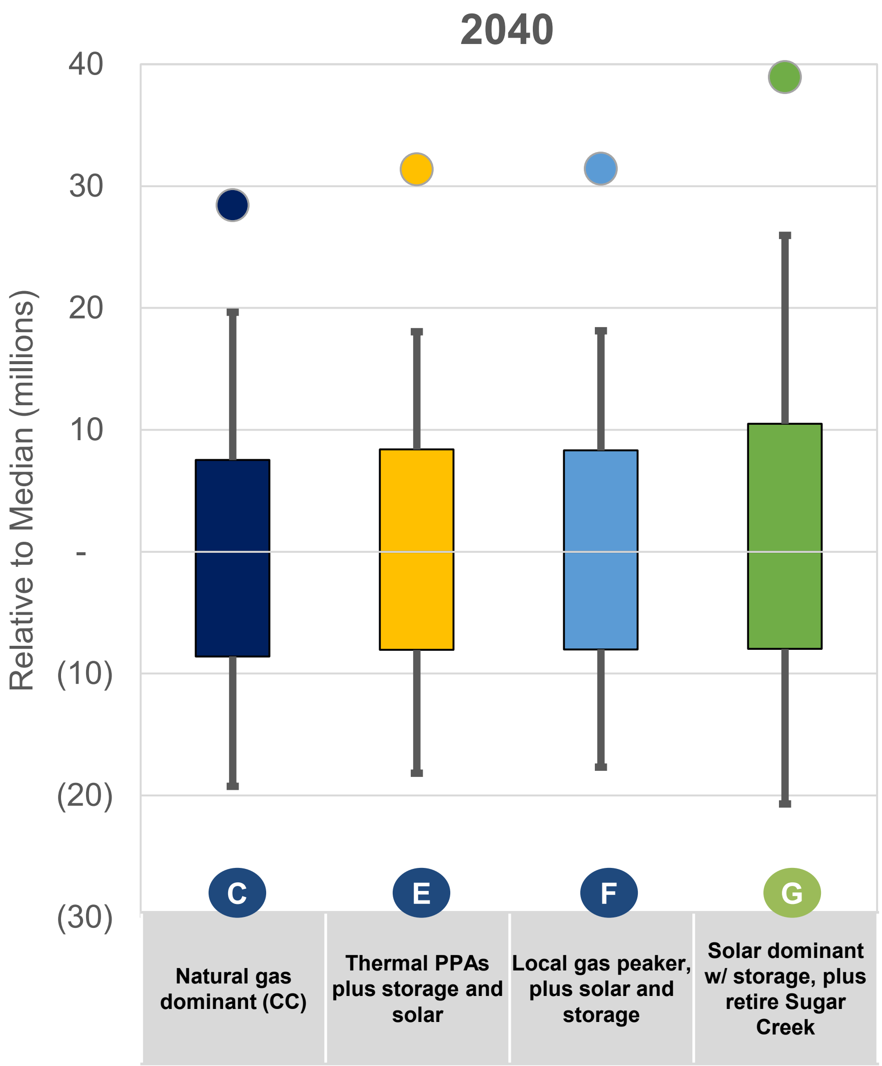
Observations

- The stochastic analysis evaluates short-term volatility in commodity prices (natural gas and power) and hourly renewable (solar and wind) output
- The overall magnitude of cost distributions across portfolios is narrower than the scenario range, suggesting that stochastic risk for these portfolio options is less impactful than the major policy or market shifts evaluated across scenarios
- Over the 30-year time horizon, dispatchability serves to mitigate tail risk, as portfolios that retain SC or add gas (including with hydrogen enablement) or storage capacity perform best at minimizing upside risk
- The lowest downside range is observed in renewable-dominant portfolios

THE RISK PROFILE CHANGES OVER TIME

Sample of Portfolios – 2027 and 2040



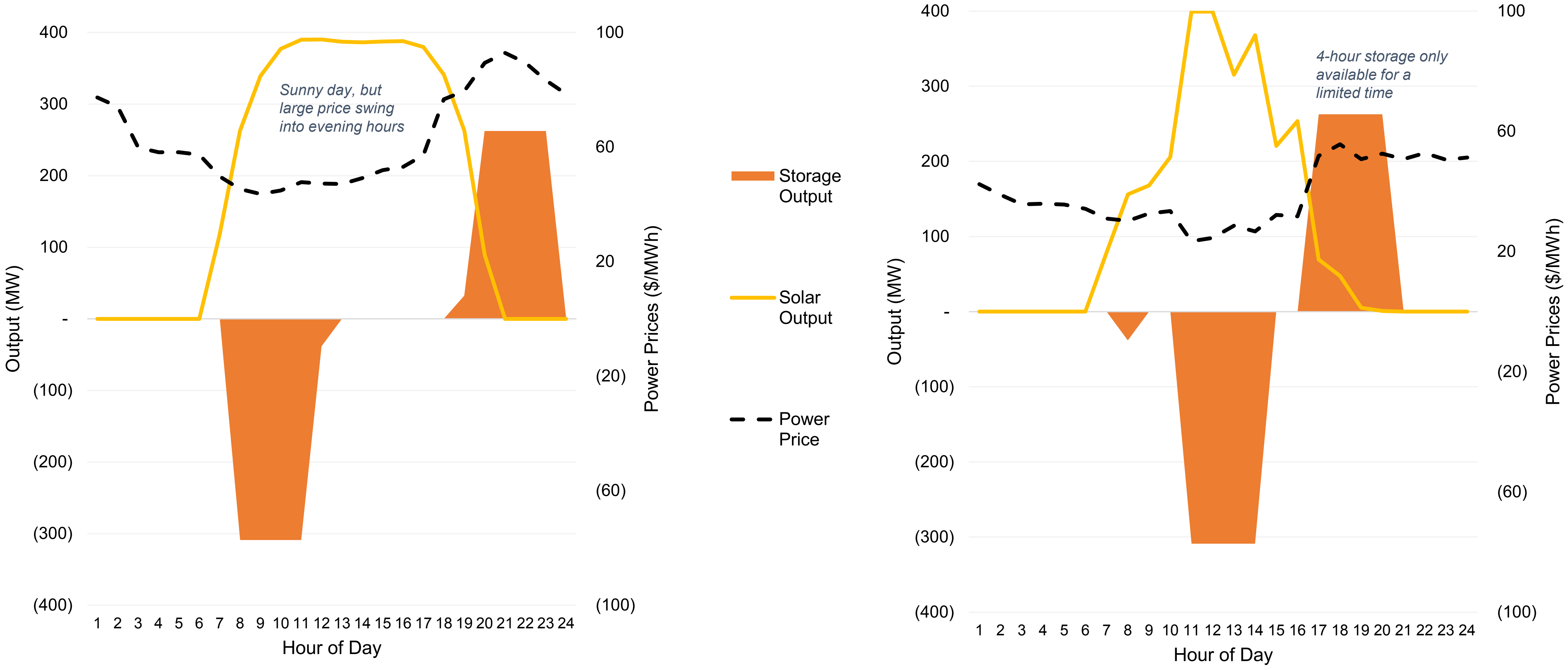


Observations

- In the early years, additional gas capacity (particularly the combined cycle in Portfolio C) adds risk to the portfolio given natural gas volatility and long energy position
- Over time, as the MISO market evolves to include more intermittent renewable capacity, renewable output uncertainty becomes more correlated to power prices, exposing renewable-dominant portfolios (particularly G) to more uncertainty
- Portfolios that integrate some level of dispatchable capacity in the form of peaking or storage resources (Portfolios E and F) perform similarly from a risk perspective over time and hedge against both near-term and long-term stochastic risk exposure

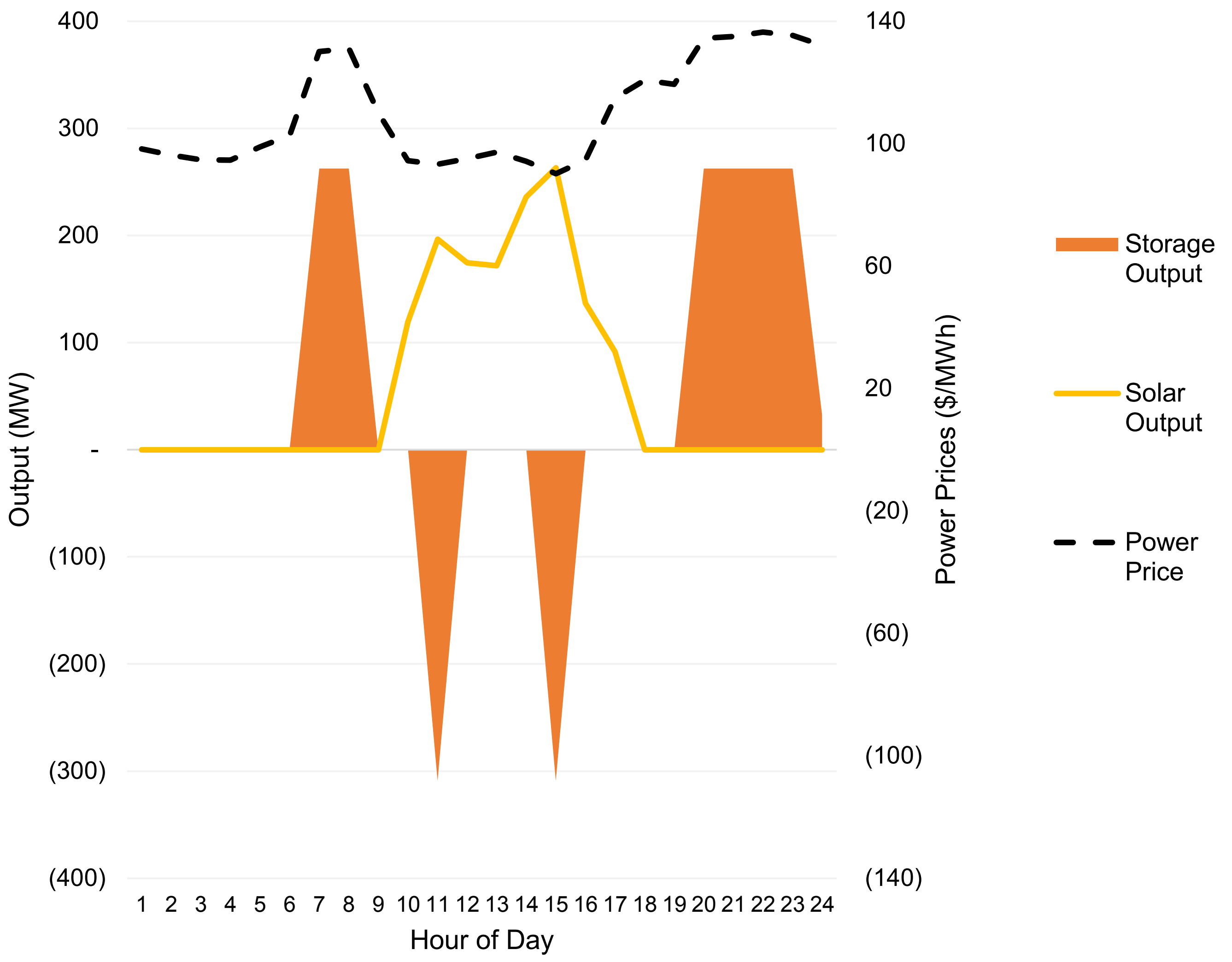
SAMPLE SUMMER DAYS – 2040 STOCHASTIC ANALYSIS

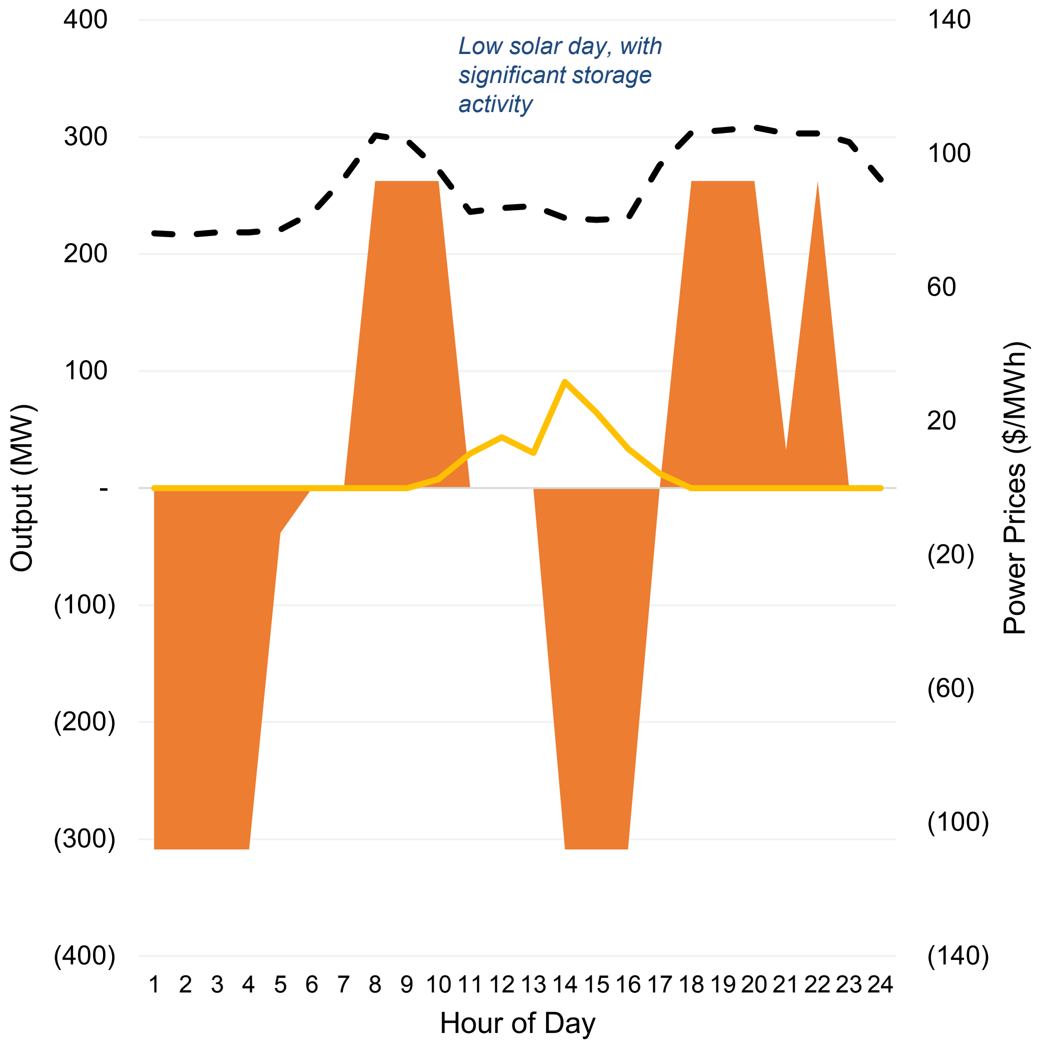
Over time, solar output is likely to correspond to lower price periods of the day, with storage (or gas peakers) able to dispatch when prices are high



SAMPLE WINTER DAYS – 2040 STOCHASTIC ANALYSIS

Solar output tends to be lower in the winter, with dual price peaks in the morning and evening





REPLACEMENT ANALYSIS SCORECARD

Objective	Indicator	Description and Metrics
Affordability	**Cost to Customer**	• Impact to customer bills • Metric: 30-year NPV of revenue requirement (Reference Case scenario deterministic results)
Rate Stability	**Cost Certainty**	• Certainty that revenue requirement within the most likely range of outcomes • Metric: Scenario range NPVRR and 75^{th} % range vs. median
	Cost Risk	• Risk of unacceptable, high-cost outcomes • Metric: Highest scenario NPVRR and 95^{th} % conditional value at risk (average of all outcomes above 95^{th} % vs. median)
	Lower Cost Opportunity	• Potential for lower cost outcomes • Metric: Lowest scenario NPVRR and 5^{th} % range vs. median
Environmental Sustainability	**Carbon Emissions**	• Carbon intensity of portfolio • Metric: Cumulative carbon emissions (2024-40 short tons of CO_2) from the generation portfolio
Reliable, Flexible, and Resilient Supply	**Reliability**	• The ability of the portfolio to provide reliable and flexible supply for NIPSCO in light of evolving market conditions and rules • Metric: *Sub-hourly A/S value impact and additional scoring (under development)*
	Resource Optionality	• The ability of the portfolio to flexibly respond to changes in NIPSCO load, technology, or market rules over time • Metric: MW weighted duration of generation commitments (UCAP – 2027)
Positive Social & Economic Impacts	**Employees**	• *Addressed in Existing Fleet Analysis for existing generation assets; employee numbers will be dependent on specific asset replacements*
	Local Economy	• Effect on the local economy from new projects and ongoing property taxes • Metric: NPV of property taxes from the entire portfolio

Key Points

- As in the 2018 IRP, multiple objectives and indicators are summarized across portfolios in an integrated scorecard framework
- The Replacement Analysis scorecard incorporates broader perspectives on risk (stochastic analysis) and reliability than the Existing Fleet Analysis scorecard

REPLACEMENT ANALYSIS SCORECARD

Preliminary

	A	B	C	D	E	F	G	H	I
Replacement Theme	**Thermal PPAs, solar and storage**	**Non-service territory gas peaking (no early storage)**	**Natural gas dominant (CC)**	**No new thermal resources; solar dominant w/ storage**	**Thermal PPAs plus storage and solar**	**Local gas peaker, plus solar and storage**	**Solar dominant w/ storage, plus retire Sugar Creek**	**All renewables and storage, plus retire Sugar Creek (Portfolio 7)**	**New H2-enabled peaker plus solar and storage, plus SC conversion to H2 (Portfolio 7H)**
Carbon Emissions	Higher	Higher	Higher	Mid	Mid	Mid	Low	Low	Low
Dispatchability	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
Cost To Customer 30-year NPV of revenue requirement (Ref Case) $M	$10,461 +$150	$10,332 +$21	$10,312 -	$10,438 +$126	$10,467 +$156	$10,426 +$115	$11,042 +$730	$11,090 +$778	$10,792 +$480
Cost Certainty Scenario Range (NPVRR) $M	$2,359 +$1,035	$2,782 +$1,458	$3,208 +1,885	$2,322 +$998	$2,538 +$1,215	$2,748 +$1,424	$1,324 -	$1,553 +$229	$1,855 +$531
Cost Risk – Highest Scenario NPVRR $M	$12,015 +$207	$12,182 +$373	$12,518 +$709	$11,965 +$156	$12,126 +$317	$12,243 +$434	$11,809 -	$12,011 +$202	$11,848 +$39
Cost Risk – Stochastic 95% CVAR – 50%	$104 +$21	$92 +$9	$83 -	$104 +$21	$98 +$15	$97 +$14	$123 +$40	$114 +$31	$87 +$4
Lower Cost Opp. Lowest Scenario NPVRR $M	$9,657 +$347	$9,400 +$91	$9,309 -	$9,644 +$334	$9,588 +$278	$9,495 +$186	$10,485 +$1,176	$10,458 +$1,149	$9,933 +$684
Carbon Emissions M of tons 2024-40 Cum. (Scenario Avg.)	27.3 +11.3	30.4 +14.4	47.2 +31.2	27.3 +11.3	27.3 +11.3	28.5 +12.4	16.1 -	16.1 -	25.2 +9.2
Reliability	*To be added in final scorecard*								
Resource Optionality MW-weighted duration of 2027 generation commitments (yrs.)	20.01 +3.0	20.53 +3.5	23.55 +6.6	20.37 +3.4	21.15 +4.2	22.12 +5.1	17.00 -	18.19 +1.2	21.46 +4.5
Local Economy NPV of property taxes	$420 -$66	$388 -$98	$451 -$35	$417 -$69	$413 -$73	$416 -$70	$486 -	$477 -$9	$421 -$65

*Note: Appendix contains more detailed scorecard data

PORTFOLIO-LEVEL OBSERVATIONS

- Portfolios that have the highest solar additions and meet only the summer reserve margin target (**Portfolios A, D, G**) perform best under high environmental regulation scenarios (AER and EWD), but are higher cost in other scenarios and are not feasible, given expected market rules changes
- Although adding new combined cycle capacity (**Portfolio C**) results in lowest costs under the Reference and SQE scenarios and provides a new dispatchable energy resource to mitigate future intermittency risk, this strategy carries the highest scenario cost exposure and uncertainty, results in the highest CO2 emissions, and reduces future resource optionality
- While a portfolio approach that retires all thermal resources by 2032 and relies solely on renewables and storage (**Portfolio H**) provides a high level of scenario cost certainty, the lowest emission profile, and significant additional local economic investment, it has the highest cost under Reference scenario conditions and exposes the portfolio to high stochastic tail risk, given high levels of intermittent resources
- While portfolios that retain Sugar Creek and add some amount of new peaking and storage resources (**Portfolios B, E, and F**) do not score best on any single metric, they minimize cost risks, continue NIPSCO down a path of significant CO2 emission reductions, and allow for flexibility and optionality
- A portfolio that includes additional renewables and storage, as well as options to pursue hydrogen at existing and new thermal facilities (**Portfolio I**), produces lower CO2 emissions than B, E, and F, performs better under scenarios with high environmental regulation/incentives (particularly EWD), and mitigates stochastic tail risk

OVERARCHING REPLACEMENT ANALYSIS INITIAL OBSERVATIONS

- Certain resources that provide near-term capacity (Sugar Creek uprate, attractive DER opportunities, and thermal capacity contracts) appear to be cost-effective additions to the portfolio to firm up the capacity position in the near-term and in anticipation of future retirements

- Storage and gas peaking resources appear to be economic replacement options for Michigan City and Schahfer 16AB
  - The quantities and characteristics of storage and gas peaking resource additions likely require further study to assess reliability tradeoffs, understand the value of each resource type given ongoing and potential market and policy changes, and monitor technology change

- Integrating dispatchable capacity into the portfolio over the long term (without materially increasing gas-fired energy exposure and CO_2 emissions through a combined cycle) tends to mitigate cost risk associated with intermittent resources; additionally, it appears impossible to meet seasonal reserve margin requirements with only renewable (without storage) resources

- Short-term acquisition of capacity resources will still allow NIPSCO the optionality to monitor technology and policy trends to inform future action and maintain a pathway to a Net Zero portfolio over the long term, including with emerging technology like hydrogen

PREFERRED PORTFOLIOS INFORM THE ACTION PLAN

- Replacement Portfolios B, E, F, & I could be preferred under different, but plausible future scenarios
- These various portfolios will inform the preferred plan and both the short-term and long-term action plans

ICAP Additions through 2027 Planning Year

Dispatchability

Emissions	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
Higher Carbon Emissions	**A** NIPSCO DER 10MW SC Uprate 53MW Thermal PPA 150MW Storage 135MW Solar+Storage 450MW* Solar 250MW	**B** NIPSCO DER 10MW SC Uprate 53MW Gas Peaker** 443MW Thermal PPA 150MW Solar 250MW	**C** NIPSCO DER 10MW SC Uprate 53MW Gas CC 650MW
Mid Carbon Emissions	**D** NIPSCO DER 10MW SC Uprate 53MW Storage 135MW Solar+Storage 450MW* Solar 400MW	**E** NIPSCO DER 10MW SC Uprate 53MW Thermal PPA 150MW Storage 470MW Solar 250MW	**F** NIPSCO DER 10MW SC Uprate 53MW Gas Peaker** 300MW Thermal PPA 150MW Storage 135MW Solar 100MW
Low Carbon Emissions	**G** NIPSCO DER 10MW Storage 135MW Solar+Storage 450MW* Solar 450MW	**H** NIPSCO DER 10MW Wind 200MW Storage 570MW Solar 250MW	**I** NIPSCO DER 10MW SC H2 Electrolyzer 20MW SC Uprate 53MW H2 Enabled Peaker 193MW Wind 200MW Storage 370MW Solar 250MW

Sugar Creek is retained through modeling horizon

Sugar Creek Retires or converts to H2

Net Zero Concepts

Note: Residential/Commercial DSM universally selected across portfolios
**Represents 300 MW of solar and 150 MW of storage*
***Gas peaker in Portfolio B represents an out-of-service territory PPA; Gas peaker in Portfolio F represents asset sale proposal*

BREAK

CORE ECONOMIC MODELING CAPTURES SOME ELEMENTS OF RELIABILITY

Additional analysis and assessment is required for a fuller perspective

Focus of NIPSCO's IRP (Resource Adequacy, Energy Adequacy) — *NIPSCO coordinates with MISO* (Operating Reliability)

	Resource Adequacy	Energy Adequacy	Operating Reliability
Definition:	Having sufficient resources to reliably serve demand	Ability to provide energy in all operating hours continuously throughout the year	Ability to withstand unanticipated component losses or disturbances
Forward Planning Horizon:	Year-ahead	Day-ahead	Real-time or Emergency
Reliability Factors:	Reserve margin, ELCC and energy duration	Dispatchability, energy market risk exposure	Real Time Balancing System
IRP Modeling Approach:	Portfolio development constraints, with ELCC and seasonal accounting	Hourly dispatch analysis, including stochastic risk	**Ancillary services analysis (regulation, reserves), with sub-hourly granularity**

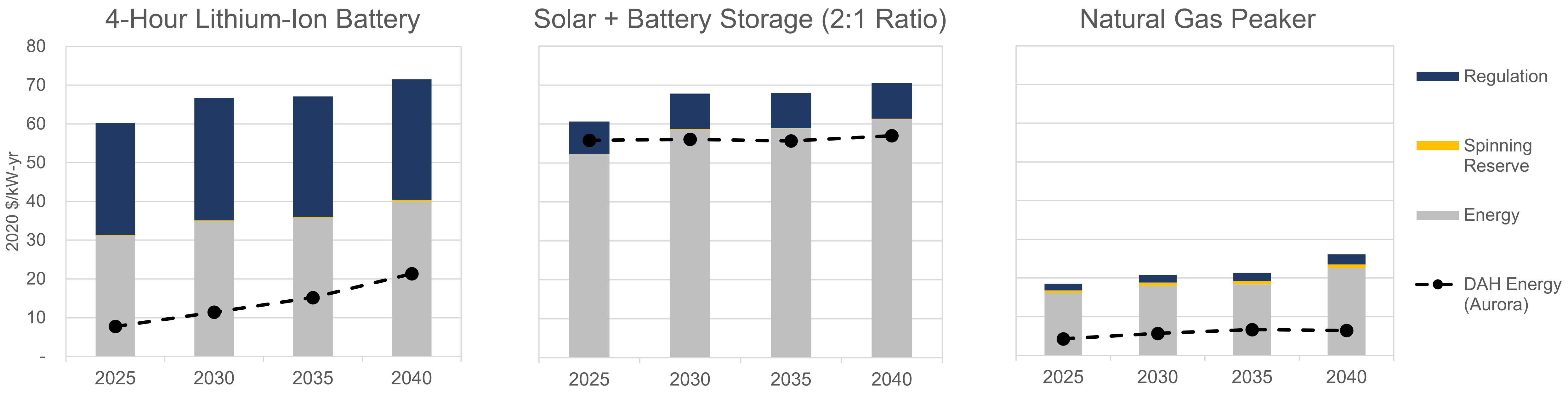
SUB-HOURLY ENERGY AND ANCILLARY SERVICES EVALUATION

- While most of NIPSCO's existing portfolio (including new renewables) realize nearly all value from energy and capacity contributions, highly flexible resources that do not provide a lot of energy to the portfolio may still provide value in the form of ancillary services and in their ability to respond to changing market conditions in real time at sub-hourly granularity:
  - The MISO market currently operates markets for spinning reserves and regulation
  - FERC Order 841 also requires ISOs to redesign markets to accommodate energy storage

- Long-term market developments are uncertain, and fundamental evaluation of sub-hourly ancillary services markets is challenging, but the 2021 IRP has performed an analysis, incorporating:
  - 5-minute granularity for energy and ancillary services based on historical data observations and future energy market scenario projections
  - Operational parameters for various storage and gas peaking options
  - ***Incremental value, above and beyond what is picked up in the Aurora-based hourly energy dispatch, is assessed and summarized on a portfolio level***

SUB-HOURLY ANALYSIS INDICATES POTENTIAL UPSIDE FOR STORAGE ASSETS

Reference Case



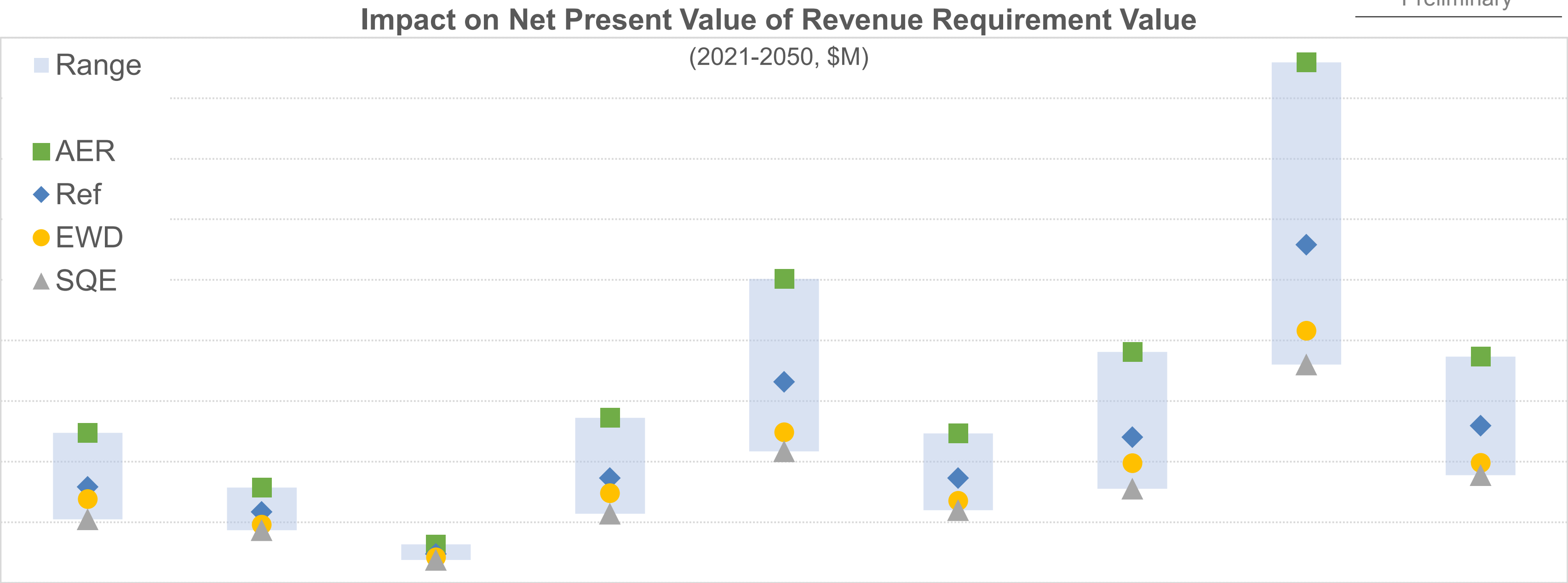
- Highly flexible battery able to respond in real time to changing price signals
- Can participate regularly in the regulation market (providing up and down service, given charging and discharging capabilities)

- Solar component provides significant energy value, which is also captured in fundamental modeling
- Investment tax credit rules limit the battery's flexibility and ability to take advantage of the regulation market (must charge predominantly from the solar)

- Real-time volatility is greater than day ahead hourly dispatch value, providing value upside compared to Aurora modeling
- Regulation opportunities are only available when the unit is already operating for energy

RANGE OF ADDITIONAL VALUE OPPORTUNITY (NPVRR COST REDUCTION) BY PORTFOLIO

Preliminary



	A	B	C	D	E	F	G	H	I
Replacement Theme	**Thermal PPAs, solar and storage**	**Non-service territory gas peaking (no early storage)**	**Natural gas dominant (CC)**	**No new thermal resources; solar dominant w/ storage**	**Thermal PPAs plus storage and solar**	**Local gas peaker, plus solar and storage**	**Solar dominant w/ storage, plus retire Sugar Creek**	**All renewables and storage, plus retire Sugar Creek (Portfolio 7)**	**New H2-enabled peaker plus solar and storage, plus SC conversion to H2 (Portfolio 7H)**
Carbon Emissions	Higher	Higher	Higher	Mid	Mid	Mid	Low	Low	Low
Dispatchability	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)

Observations

- *Additional value is uncertain and dependent on market rules evolution, MISO generation mix changes, and market participant behavior*
- Portfolios with the largest amounts of storage (E and H) have the greatest potential to lower NPVRR by capturing flexibility value that may manifest in the sub-hourly energy and ancillary services markets
- A wide range of value is possible, with higher prices and price spreads in the AER scenario driving higher estimates

RELIABILITY ASSESSMENT PROCESS OVERVIEW

1 Define Initial Assessment Criteria

Collaborated with NIPSCO transmission planning and system operations group to develop initial framework and criteria

2 Obtain Stakeholder Feedback

We will seek feedback from interested stakeholders who want to learn more about the assessment criteria and provide input and feedback

3 Engage 3rd Party Reviewer

Engage a qualified 3rd party expert to review the assessment criteria, develop the scoring methodology and score and rank the various resource technologies under consideration

August-September

4 Incorporate into IRP Analysis Scorecard(s)

Incorporate the scoring and ranking results of the assessment into the IRP Analysis Scorecard(s)

September-October

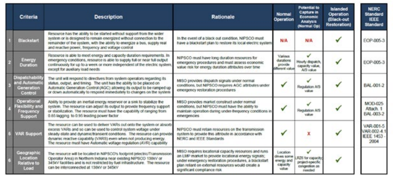
RELIABILITY ASSESSMENT AND RANKING UPDATE

Assess NIPSCO's Reliability Needs

- Power Ramping
- Frequency Response
- Short Circuit Strength
- Flicker
- Black Start

Near Completion

Review & Map Reliability Needs to Existing Reliability Metrics



In Progress

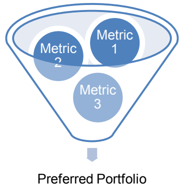
Apply a Series of Reliability Filters to IRP Portfolios

In Progress

Scoring Criteria

In Progress

Ranking Portfolios



In Progress

INITIAL RELIABILITY ASSESSMENT CRITERIA

Preliminary – Updated from Last Stakeholder Meeting

	Criteria	Description	Rationale	Normal Operation	Potential to Capture in Economic Analysis (Normal Op)	Islanded Operation (Black-out Restoration)	NERC Standard IEEE Standard
1	Blackstart	Resource has the ability to be started without support from the wider system or is designed to remain energized without connection to the remainder of the system, with the ability to energize a bus, supply real and reactive power, frequency and voltage control	In the event of a black out condition, NIPSCO must have a blackstart plan to restore its local electric system.	N/A	N/A	✓	EOP-005-3
2	Energy Duration	Resource is able to meet energy and capacity duration requirements. In emergency conditions, resource is able to supply full or near full output continuously for up to a week or more independent of the electric system except for auxiliary load needs	NIPSCO must have long duration resources for emergency procedures and must assess economic value risk for energy duration attributes over time	Various durations provide different value	✓ Hourly dispatch, capacity value, A/S value	✓	EOP-005-3
3	Dispatchability and Automatic Generation Control	The unit will respond to directives from system operators regarding its status, output, and timing. The unit has the ability to be placed on Automatic Generation Control (AGC) allowing its output to be ramped up or down automatically to respond immediately to changes on the system	MISO provides dispatch signals under normal conditions, but NIPSCO requires AGC attributes under emergency restoration procedures	✓	✓ Regulation A/S value	✓	BAL-001-2
4	Operational Flexibility and Frequency Support	Ability to provide inertial energy reservoir or a sink to stability the system. The resource can adjust its output to provide frequency support or stabilization in response to frequency deviations with a droop of 5% or better	MISO provides market construct under normal conditions, but NIPSCO must have the ability to maintain operation during under-frequency conditions in emergencies	✓	✓ Regulation A/S value	✓	MOD-025 Attach. 1 BAL-003-2
5	VAR Support	The resource can be used to deliver VARs out onto the system or absorb excess VARs and so can be used to control system voltage under steady-state and dynamic/transient conditions. The resource can provide dynamic reactive capability (VARs) even when not producing energy. The resource must have Automatic voltage regulation (AVR) capability. The resource must have the capability ranging from 0.85 lagging to 0.95 leading power factor	NIPSCO must retain resources on the transmission system to provide this attribute in accordance with NERC and IEEE Standards	✓	X	✓	VAR-001-5 VAR-002-4.1 IEEE 1453 - 2004
6	Geographic Location Relative to Load	The resource will be located in NIPSCO's footprint (electric/Transmission Operator Area) in Northern Indiana near existing NIPSCO 138kV or 345kV facilities and is not restricted by fuel infrastructure. The resource can be interconnected at 138kV or 345kV	MISO requires locational capacity resources and runs an LMP market to provide locational energy signals; under emergency restoration procedures, a blackstart plan reliant on external resources would create a significant compliance risk	Location drives some energy and capacity value	✓ LRZ6 for capacity; project-specific congestion as needed	✓	

ANALYSIS NEXT STEPS

Erin Whitehead, Vice President Regulatory & Major Accounts, NIPSCO

STAKEHOLDER FEEDBACK

Seeking Feedback

- Seeking feedback regarding the modeling results presented today
- Reach out to Alison Becker (abecker@nisource.com) for 1x1 meetings

Upcoming Stakeholder Meetings

- Converted the **October 12th** stakeholder meeting to a **Technical Webinar** focused on the Reliability Assessment
- Final Public Stakeholder Advisory Meeting #5 is scheduled for **October 21st**

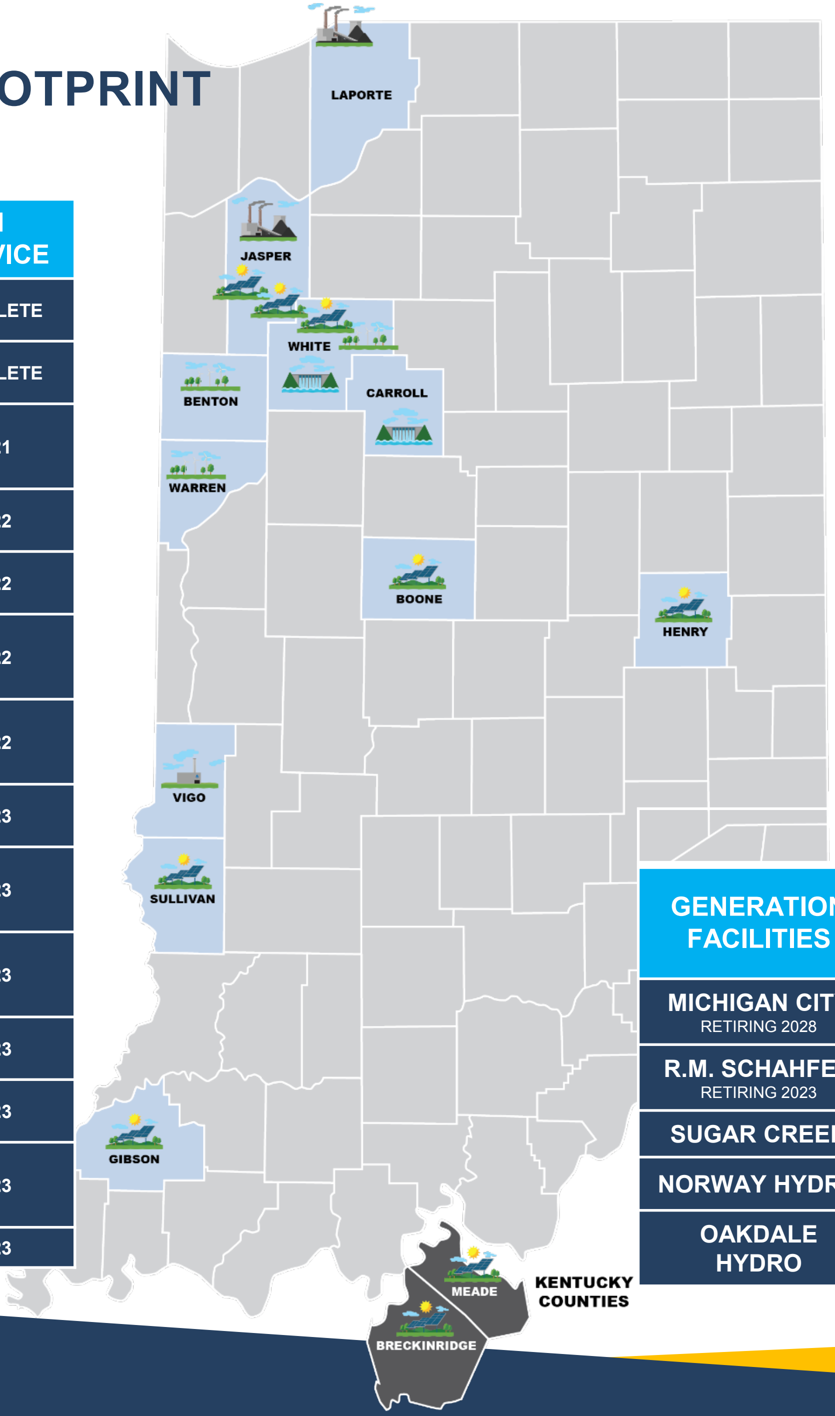
Stakeholder engagement is a critical part of the IRP process

APPENDIX

2023 ANTICIPATED GENERATION FOOTPRINT

New Generation Facilities

PROJECT	INSTALLED CAPACITY (MW)	COUNTY	IN SERVICE
ROSEWATER WIND	102MW	WHITE	COMPLETE
JORDAN CREEK WIND	400MW	BENTON WARREN	COMPLETE
INDIANA CROSSROADS WIND	300MW	WHITE	2021
DUNNS BRIDGE SOLAR I	265MW	JASPER	2022
BRICKYARD SOLAR	200MW	BOONE	2022
GREENSBORO SOLAR	100MW +30MW BATTERY	HENRY	2022
INDIANA CROSSROADS SOLAR	200MW	WHITE	2022
GREEN RIVER SOLAR	200MW	BRECKINRIDGE & MEADE (KENTUCKY)	2023
DUNNS BRIDGE SOLAR II	435MW +75MW BATTERY	JASPER	2023
CAVALRY SOLAR	200MW +60MW BATTERY	WHITE	2023
GIBSON SOLAR	280MW	GIBSON	2023
FAIRBANKS SOLAR	250MW	SULLIVAN	2023
INDIANA CROSSROADS II WIND	204MW	WHITE	2023
ELLIOT SOLAR	200MW	GIBSON	2023



- Planned renewable resources expected to add 3,330MW installed capacity
- Additional $5 billion capital investments, much of which stays in the Indiana economy
- Generation transition plan generates more than $4 billion in cost-savings for our customers with industry-leading emissions reductions

Current Facilities

GENERATION FACILITIES	INSTALLED CAPACITY (MW)	FUEL	COUNTY
MICHIGAN CITY RETIRING 2028	469MW	COAL	LAPORTE
R.M. SCHAHFER RETIRING 2023	1,780MW	COAL	JASPER
SUGAR CREEK	535MW	NATURAL GAS	VIGO
NORWAY HYDRO	7.2MW	WATER	WHITE
OAKDALE HYDRO	9.2MW	WATER	CARROLL

CONSIDERATIONS FOR LONG-TERM PLANNING WITH INTERMITTENT RESOURCES

As we established in the previous 3 stakeholder meetings, reliability is a key focus for the 2021 IRP

Context

- The ongoing energy transition is transforming the way that resource planners need to think about reliability, and a power market with more intermittent resources will require ongoing enhancements to modeling approaches and new performance metrics for portfolio evaluation
- As a member of MISO, NIPSCO is not independently responsible for all elements of reliability, but must be prepared to meet changing market rules and standards

2021 IRP Approach

1 Ensure consistency with MISO rules evolution

- Seasonal resource adequacy
- Future effective load carrying capability (ELCC) accounting

2 Expand Uncertainty Analysis

- Incorporation of renewable output uncertainty
- Broadening risk analysis to incorporate granular views of tail risk

3 Incorporate New Metrics

- Incorporating new scorecard metrics informed by stochastic analysis and capabilities of portfolio resources

REGULATORY EVOLUTION SINCE 2018

Several regulatory developments and evolving initiatives since NIPSCO's 2018 IRP influence the way we conduct the 2021 IRP

	Initiatives and Regulatory Developments	Overview	Implications for the IRP
1	**Effective Load Carrying Capability (ELCC)**	**Renewable capacity credit** (particularly solar) is likely to decline as net peak shifts to evening hours	• Solar ELCC credit declines over time • Solar ELCC credit range across scenarios
2	**Resource Availability and Need (RAN) - Seasonal Capacity Construct**	MISO process to explore a shift to **reserve margin tracking throughout the year** (not just summer peak)	• Monthly peak load forecasting • Seasonal reserve margin planning constraints (particularly summer and winter)
3	**Renewable Integration Impact Assessment (RIIA)**	Multi-faceted review of the **impacts of growing renewable penetration** on the MISO market	• Seasonal reserve margin planning • Hourly renewable uncertainty • Operational flexibility metric • Ancillary services
4	**FERC Order 2222**	Order enabling **distributed energy resources (DER)** to participate fully in wholesale markets	• Broader view of DER ranges

PREVIOUS RELIABILITY ASSESSMENTS

2018 Retirement Scorecard	
Criteria	**Description**
Cost to Customer	• Impact to customer bills • Metric: 30-year NPV of revenue requirement (Base scenario deterministic results)
Cost Certainty	• Certainty that revenue requirement falls within the most likely range of distribution of outcomes (75% certainty that cost will be at or below this level) • Metric: 75th percentile of cost to customer
Cost Risk	• Risk of extreme, high-cost outcomes • Metric: 95th percentile of cost to customer
Reliability Risk	• Assess the ability to confidently transition the resources and maintain customer and system reliability • Metric: Qualitative assessment of orderly transition
Employees	• Net impact on NiSource jobs by 2023 • Metric: Approximate number of permanent NiSource jobs affected
Local Economy	• Property tax amount relative to NIPSCO's 2016 IRP • Metric: Difference in NPV of estimated modeled property taxes on existing assets relative to the 2016 IRP

2020 Portfolio Analysis Scorecard	
Criteria	**Description**
Cost to Customer	• Impact to customer bills • Metric: 34 year NPV of revenue requirement (Base scenario deterministic results)
Long term Optionality	• Flexibility resulting from combinations of ownership, duration, and diversity • Metric: MW weighted duration of generation commitments
Capital Requirement	• Estimated amount of capital investment required by portfolio • Metric: 2020 -2023 capital needs
Fuel Security	• Power plants with reduced exposure to short-term fuel supply and/or deliverability issues (e.g., ability to store fuel on-site and/or requires no fuel) • Metric: Percentage of capacity sourced from resources other than natural gas (2025 UCAP MW sourced from non-gas resources)
Environmental	• Carbon intensity of portfolio / Total carbon emissions • Metric: Total annual carbon emissions (2030 short tons of CO_2) from the generation portfolio
Operational Flexibility	• The ability of the portfolio to be controlled in manner to respond to changes in load (dispatchable) • Metric: % of 2025 Controllable MW in gen. portfolio

SCENARIO OVERVIEW

Reference Case

- The MISO market continues to evolve based on current expectations for load growth, commodity price trajectories, technology development, and policy change (some carbon regulation and MISO rules evolution)

Status Quo Extended ("SQE")

- Binding federal limits on carbon emissions are not implemented; natural gas prices remain low and result in new gas additions remaining competitive versus renewables, as coal capacity more gradually fades from the MISO market

Aggressive Environmental Regulation ("AER")

- Carbon emissions from the power sector are regulated through a mix of incentives and a federal tax/cap-and-trade program that results in a significant CO_2 price and net-zero emission targets for the power sector by 2040; restrictions on natural gas production increase gas prices

Economy-Wide Decarbonization ("EWD")

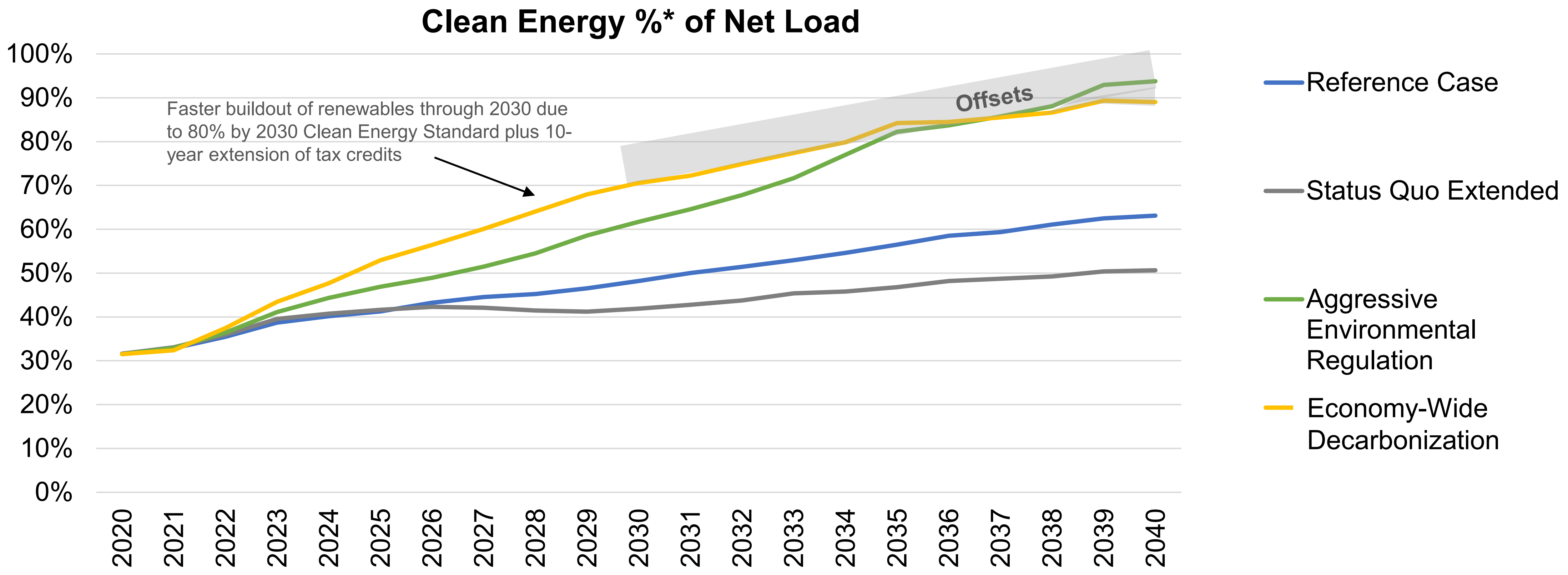
- Technology development and federal incentives push towards a decarbonized economy, including through a power sector Clean Energy Standard (supporting renewables and other non-emitting technologies) and large-scale electrification in other sectors (EVs, heating, processes, etc.)

SCENARIO IMPACTS TO NIPSCO LOAD

Scenario Name	Economic Growth	EV Penetration	DER Penetration	Other Electrification	NIPSCO Industrial Load
Reference Case	**Base** *Moody's Baseline forecast*	**Low** *Current trends persist (MTEP Future I)*	**Base** *Baseline expectations for continued growth, which is exponential in areas*		
Status Quo Extended	**Low** *Moody's 90th percentile downside: COVID impacts linger; consumer spending lags stimulus amounts, unemployment grows again*	**Low** *Current trends persist; economics continue to favor ICE (MTEP Future I)*	**Low** *Lower electric rates decelerate penetration trends*		**Low** *Additional industrial load migration – down to 70 MW firm 831*
Aggressive Environmental Regulation	**Base** *Moody's Baseline forecast*	**Mid** *Customers respond to cost increases in gasoline, and EV growth rates increase (MTEP Future II)*	**High** *Higher electric rates and lower technology costs accelerate penetration trends*		
Economy-Wide Decarbonization	**High** *Moody's 10th percentile upside: vaccine facilitates faster re-openings, fiscal stimulus boosts economy more than expected*	**High** *Policy, technology, behavioral change drive towards high EV scenario (MTEP Future III)*	**High** *Technology-driven increase, as solar costs decline and policies facilitate installations*	**High** *MTEP Future III for R/C/I HVAC, appliances, processes*	

CLEAN ENERGY PERCENTAGE ACROSS MISO

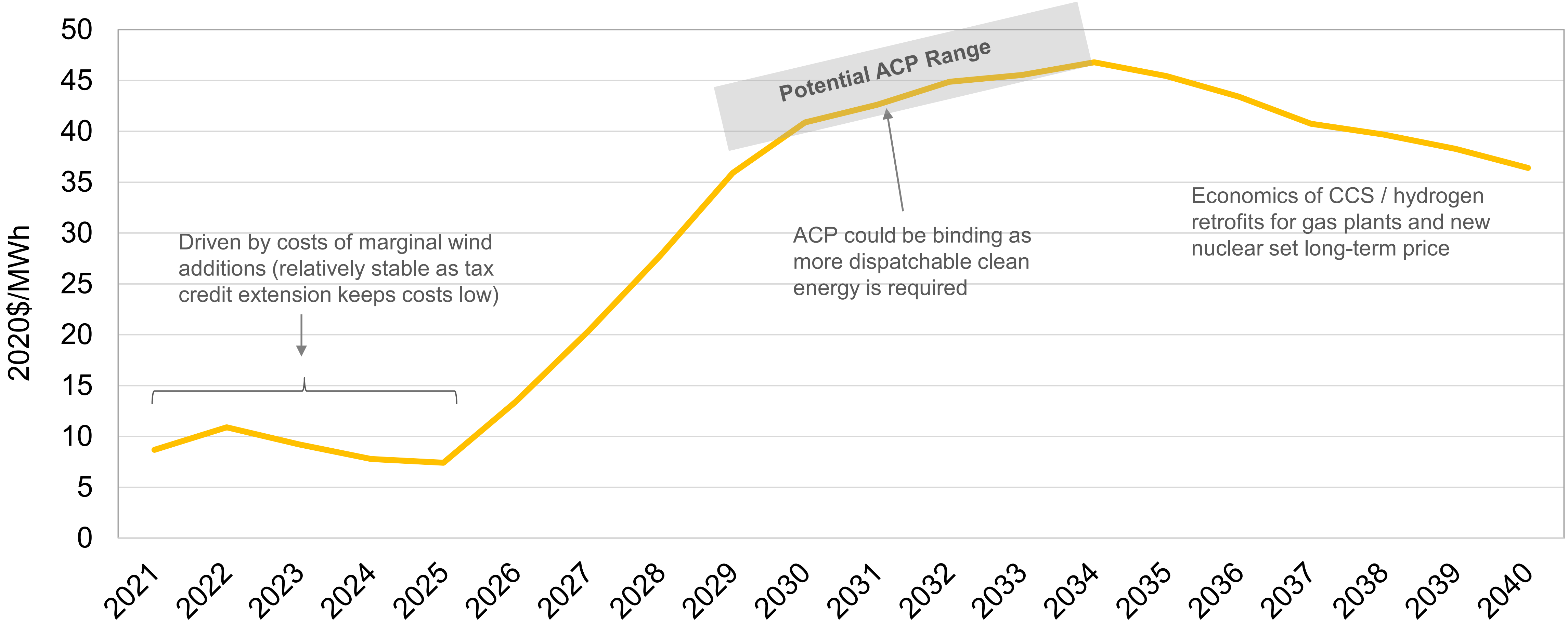
- Escalating carbon price pushes clean energy percentage to >90% in AER, while the implementation of a Clean Energy Standard achieves a very similar outcome in EWD
- Offsets outside the power sector would be expected to be available to achieve Net Zero



This calculation is based on total MISO clean energy generation (wind, solar, hydro, other renewables, nuclear, CCS, hydrogen), adjusted for projected imports and exports, divided by MISO net load.

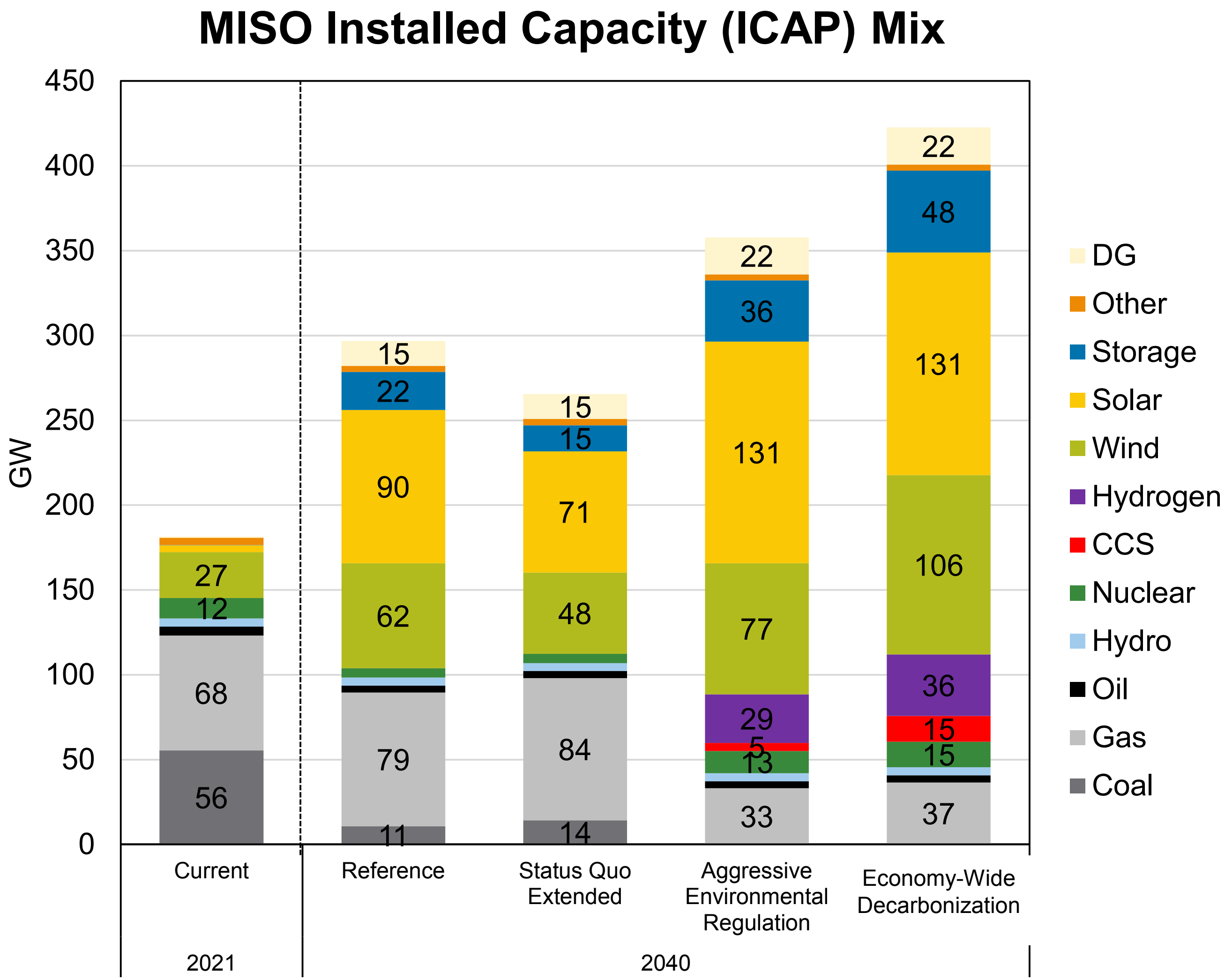
CLEAN ENERGY CREDIT PRICING

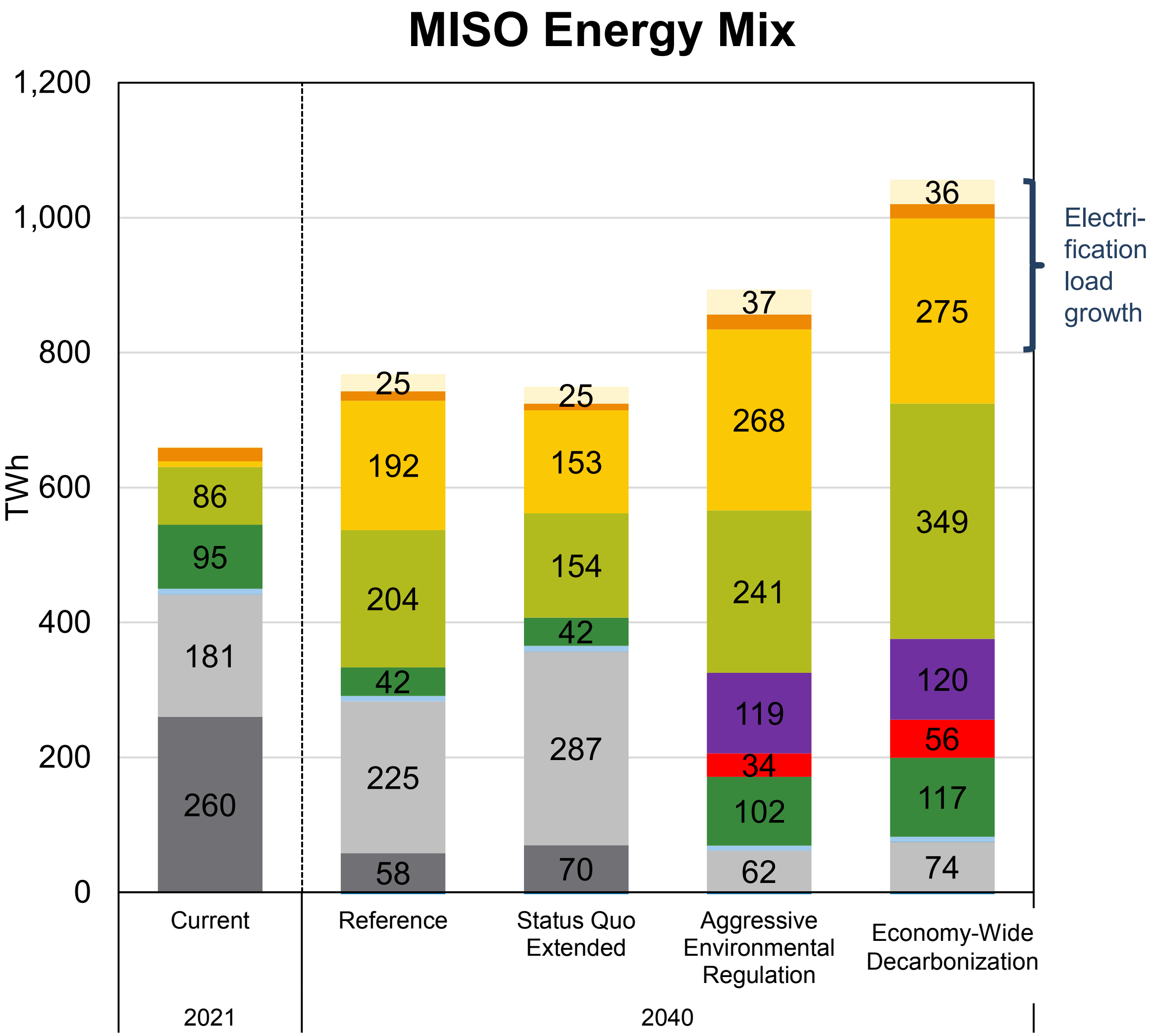
In the Economy-Wide Decarbonization scenario, a Clean Energy Standard with an Alternative Compliance Payment (ACP) would likely drive the development of a national Clean Energy Credit / Zero Emission Electricity Credit market



Note that ACP backstop price range is based loosely on provisions in the proposed CLEAN Future Act

MISO CAPACITY AND ENERGY MIX OUTLOOK ACROSS SCENARIOS





STOCHASTIC ANALYSIS APPROACH

The 2021 IRP has incorporated commodity price and renewable output stochastic analysis

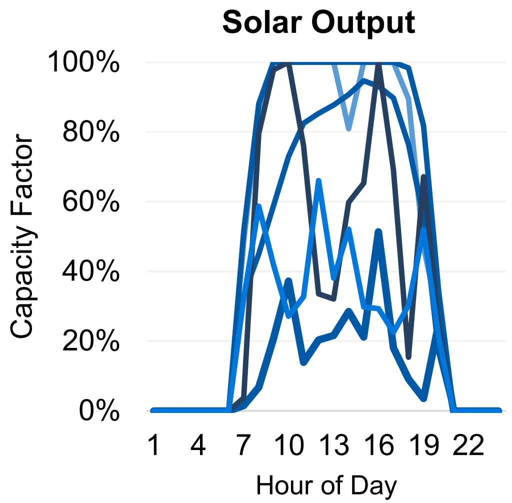
1 *Input Data Development*

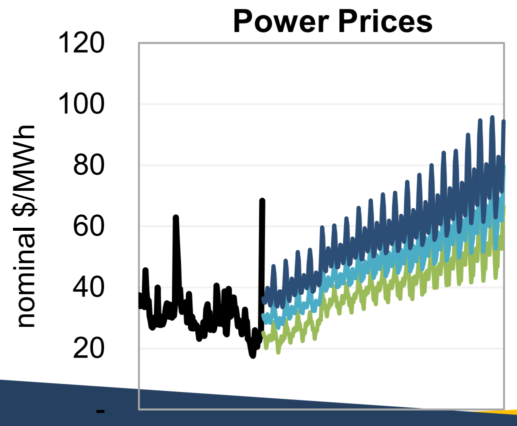
- Fundamental forecasts
- Historical price data
- Historical weather data (and corresponding renewable output)

2 *Statistical and Fundamental Analysis*

- Commodity price path simulation
- Impact analysis of renewable output on power prices

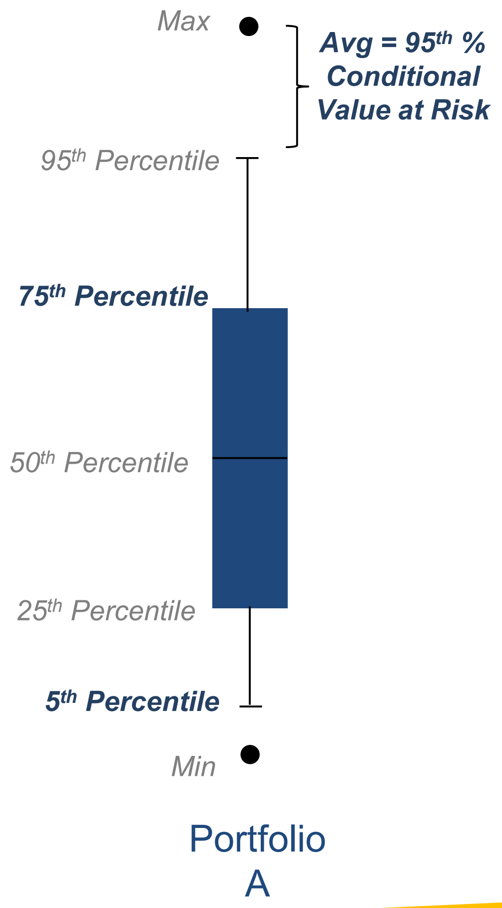
3 *Stochastic Input Development*





Evaluate NIPSCO portfolios 500 times

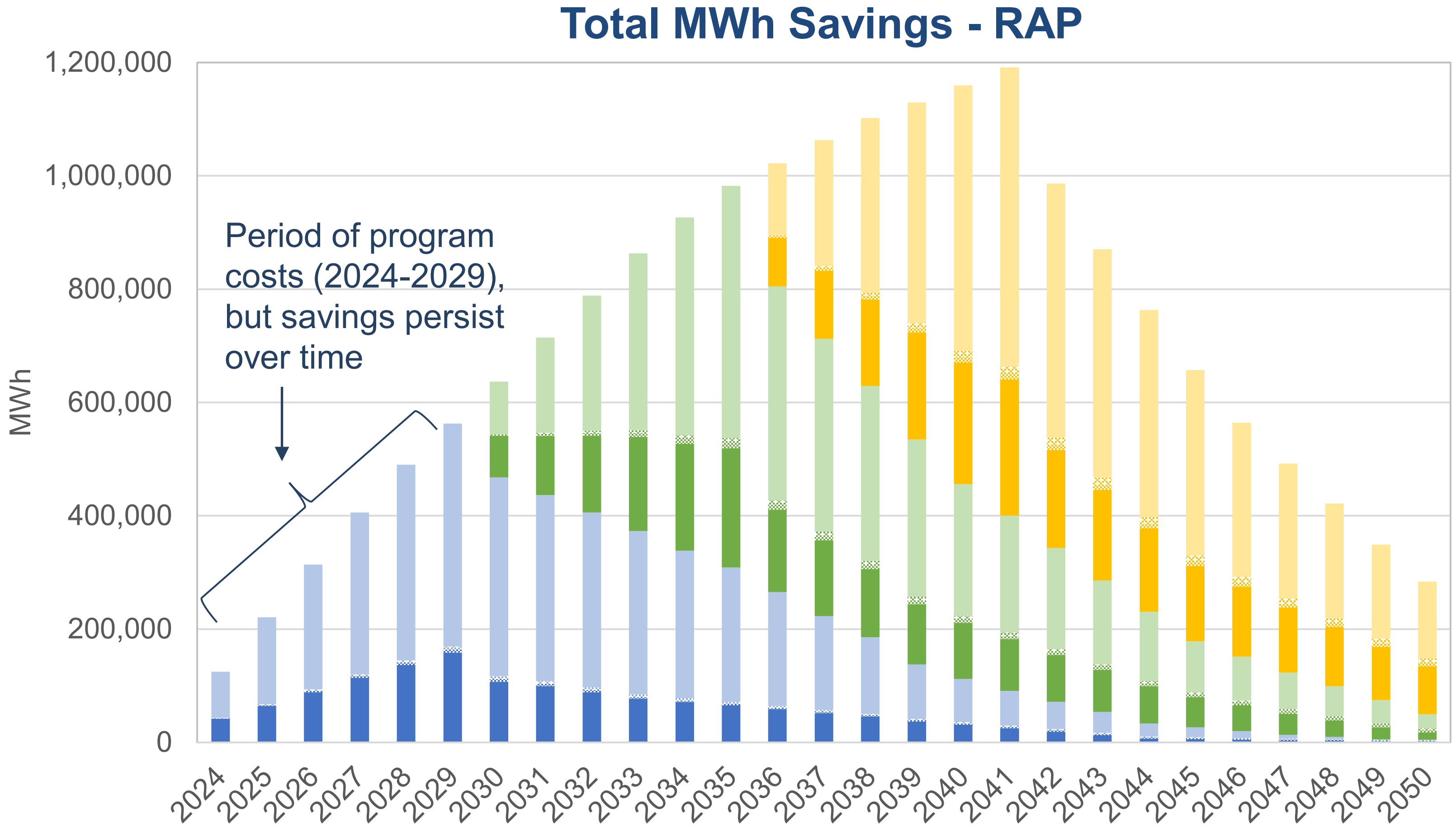
4 *NIPSCO Portfolio Analysis*



Illustrative

ENERGY EFFICIENCY BUNDLES FOR IRP MODELING

- DSM bundling approach allows for a representation of potential program duration over time, with differentiation across customer type and costs
- Annual costs and savings (inclusive of marginal line losses) are incorporated



Bundle	Levelized Cost ($/MWh)
2036-2041 C&I	29
2036-2041 IQW	138
2036-2041 Residential Tier 2	253
2036-2041 Residential Tier 1	65
2030-2035 C&I	28
2030-2035 IQW	140
2030-2035 Residential Tier 2	244
2030-2035 Residential Tier 1	60
2024 - 2029 C&I	25
2024 - 2029 IQW	146
2024 - 2029 Residential Tier 2	231
2024 - 2029 Residential Tier 1	53

IQW = Income Qualified Weatherization

DISTRIBUTED ENERGY RESOURCES

- NIPSCO and CRA categorized the projects identified by the distribution planning team into High, Medium, and Low bundles of deferred distribution investment costs
- These resource options were available for selection and analysis in the portfolio assessment phase:
  - *Near-term opportunities only*, to defer required distribution system investments currently identified
  - Distribution-level cost premiums assessed relative to larger scale projects
  - NPV of deferred distribution investment effectively subtracted from capital cost of the resource options

Deferral Cost Bundle	Resource	Battery Storage MW	Solar MW	Range of Potential NPV of Deferred Investment ($/kW)
High	Solar + Battery	7.0	2.7	**700 – 900**
Mid	Solar + Battery	7.0	9.1	**200 – 300**
Low	Solar + Battery	2.0	2.7	**10 – 100**

← *Indicative ranges, subject to change for actual projects*

- The IRP aims to identify the *types of DER projects and characteristics of candidate locations* that may be attractive, with additional project-specific evaluation required in the future
- NIPSCO intends to continue assessing DER options in more detail in future IRPs as integrated planning advancements are made and as MISO makes its filings in response to FERC Order 2222 (See Stakeholder Meeting #2 slides for more information)

RFP INFORMATION: TRANCHE DEVELOPMENT

A three-step process to incorporate RFP data and run the IRP models

**Additional screening focus in 2021 to inform tranche development

1 Tranche Development

Screen Bids

- High-level bid review by RFP team to confirm compliance w/ requirements and overall viability

Aggregate Bids into Groupings by Type

- Bids are organized by:
  - Technology
  - Asset sale or PPA
  - Commitment duration
  - Costs
  - Oper. characteristics
- Aggregated cost and operational information compiled in Aurora

2 Portfolio Optimization

Select Portfolios

- Based on portfolio concepts (retirement / replacement), capacity need, and other constraints, identify which tranches (or portions of tranches) are selected for the portfolio through Aurora optimization

Confirm Reasonableness

- Confirm that optimization model is selecting feasible block sizes and options based on resource-specific data

3 Portfolio Modeling

Refine Portfolio Details

- Adjust model setup as necessary to cover full range of retirement and replacement options

Analyze Portfolios

- Evaluate each portfolio across range of scenarios and stochastic inputs
- Report portfolio costs and other metrics to support scorecard development

TRANCHE SUMMARY – PPA OPTIONS

Tranche	ICAP (MW)	Heat Rate (Btu/kWh)	Energy Price ($/MWh)	Capacity Price ($/kW-mo)	First Eligible Start Year**	PPA Term (years)	Escalation Rate
Wind P1	500		$48.37		2025	20	0%
Wind P2 (Non-LRZ 6)	835		$33.28		2024	15	0%
Solar P1	825		$49.73		2024	20	0%
Solar P2	588		$37.50		2024	17	0.9%
Solar + Storage P1	300:150^		$39.00	$7.43	2025	15	0%
Solar + Storage P2	1,135:478^		$44.49	$6.14	2023	20	0%
Storage P1	863			$11.95	2025	19	0.2%
Gas Peaking P1	443	10,244	*	$6.47	2026	20	0%
Gas Peaking P2	193	10,238	*	**$8 – $9**	2025	20	2.1%
Gas CC P1	1,365	6,627	$0.98*	$8.89	2024	20	0.1%
Other Thermal P1	50	12,500	**$2 – $3***	**$5 – $6**	2024	10	
Other Thermal P2	150			**$3 – $4**	2026	10	2.0%
Hydrogen P1 – Enabled Peaker	193	10,238	*	**$9 – $10**	2025	20	
Hydrogen P2 – Electrolyzer Pilot	20			**$25 – $30**	2026	20	

Notes: **Red-colored** price information shown as a range to protect confidentiality when tranches are composed of a limited number of bids.
^Capacity for Solar + Storage tranches is represented in the format of “Solar:Storage.”
*Fuel and emission variable costs are additive to the Energy Price and are incorporated in the portfolio modeling for the Gas Peaking P1, Gas Peaking P2, Gas CC P1, Other Thermal P1, and Hydrogen P1 tranches.
**First Eligible Start Year indicates the first year some part of the tranche is expected to be available, although capacity is available to start in subsequent years according to bidder information; this is incorporated in the portfolio modeling.

TRANCHE SUMMARY – ASSET SALE OPTIONS

Tranche	ICAP (MW)	Heat Rate (Btu/kWh)	First Eligible Start Year**	Asset Sale ($/kW)
Solar A1	1,250		2025	$1,282
Solar A2	1,150		2025	$1,603
Solar + Storage A1	901:305^		2024	$1,346
Solar + Storage A2	549:275^		2025	$1,167
Storage A1	406		2025	$984
Gas Peaking A1	369	11,471	2024	$575
Gas CC A1	650	6,540	2026	**$1,100 - $1,300**

Notes: **Red-colored** price information shown as a range to protect confidentiality when tranches are composed of a limited number of bids.
^Capacity for Solar + Storage tranches is represented in the format of "Solar:Storage."
**First Eligible Start Year indicates the first year some part of the tranche is expected to be available, although capacity is available to start in subsequent years according to bidder information; this is incorporated in the portfolio modeling.

TOTAL ADDITIONS THROUGH 2040

ICAP Additions by 2040 Planning Year

Dispatchability

Emissions	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)
Higher Carbon Emissions	**A** NIPSCO DER 10MW SC Uprate 53MW Thermal PPA 150MW** **Storage 335MW** Solar+Storage 450MW* **Solar 1,650MW**	**B** NIPSCO DER 10MW SC Uprate 53MW Gas Peaker*** 443MW Thermal PPA 150MW** **Storage 200MW** **Solar 1,200MW**	**C** NIPSCO DER 10MW SC Uprate 53MW Gas CC 650MW **Storage 100MW** **Solar 500MW**
Mid Carbon Emissions	**D** NIPSCO DER 10MW SC Uprate 53MW **Storage 335MW** Solar+Storage 450MW* **Solar 1,650MW**	**E** NIPSCO DER 10MW SC Uprate 53MW Thermal PPA 150MW** **Storage 770MW** **Solar 1,350MW**	**F** NIPSCO DER 10MW SC Uprate 53MW Gas Peaker*** 300MW Thermal PPA 150MW** **Storage 335MW** **Solar 1,200MW**
Low Carbon Emissions	**G** NIPSCO DER 10MW **Storage 535MW** Solar+Storage 450MW* **Solar 3,150MW**	**H** NIPSCO DER 10MW Wind 200MW **Storage 1,370MW** **Solar 2,250MW**	**I** NIPSCO DER 10MW SC H2 Electrolyzer 20MW SC Uprate 53MW H2 Enabled Peaker 193MW Wind 200MW **Storage 470MW** **Solar 1,450MW**

Observations

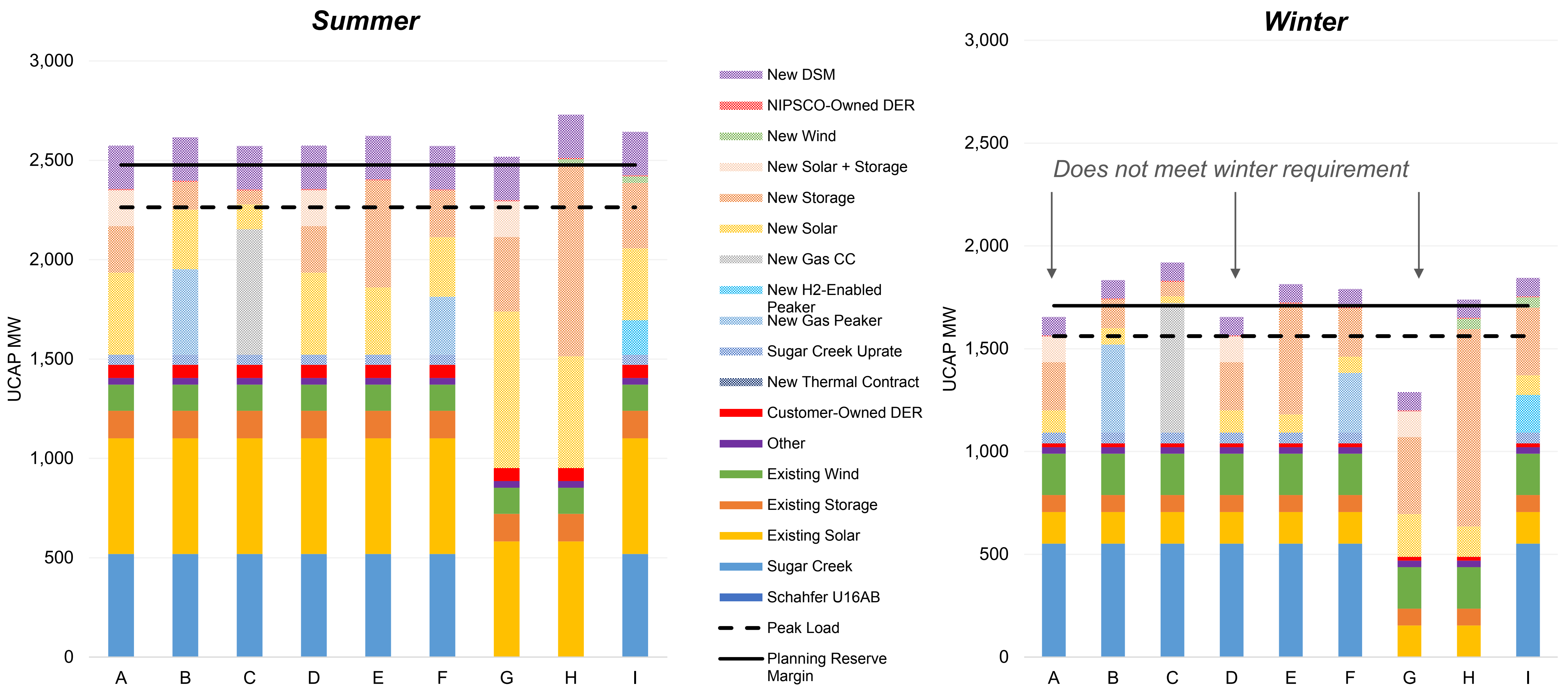
- Renewables and storage remain the most cost-effective long-term resource for the portfolio
- Over time, more energy resources are likely to be needed, as wind contracts roll off, existing solar degrades, and Sugar Creek is expected to run less
- Future IRPs will be able to refine long-term plan, just as this IRP is refining the 2018 preferred portfolio

Sugar Creek Retires or converts to H2

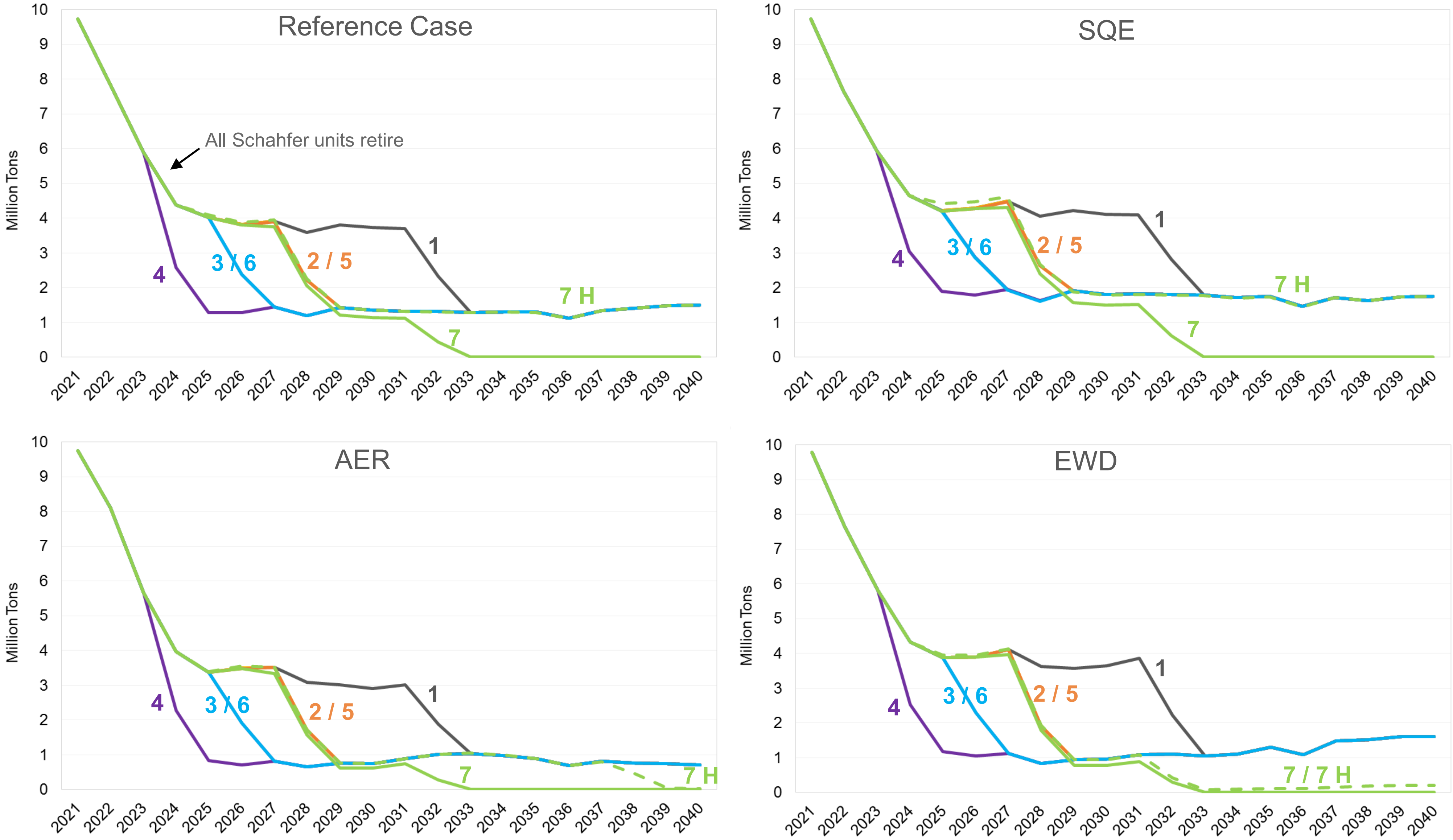
Net Zero Concepts

Note: Residential/Commercial DSM plus a DR Rates program universally selected across portfolios
**Represents 300 MW of solar and 150 MW of storage*
***Ten-year PPA term would have this resource expire by mid-2030s*
****Gas peaker in Portfolio B represents an out-of-service territory PPA; Gas peaker in Portfolio F represents asset sale proposal*

2040 SUPPLY-DEMAND BALANCE



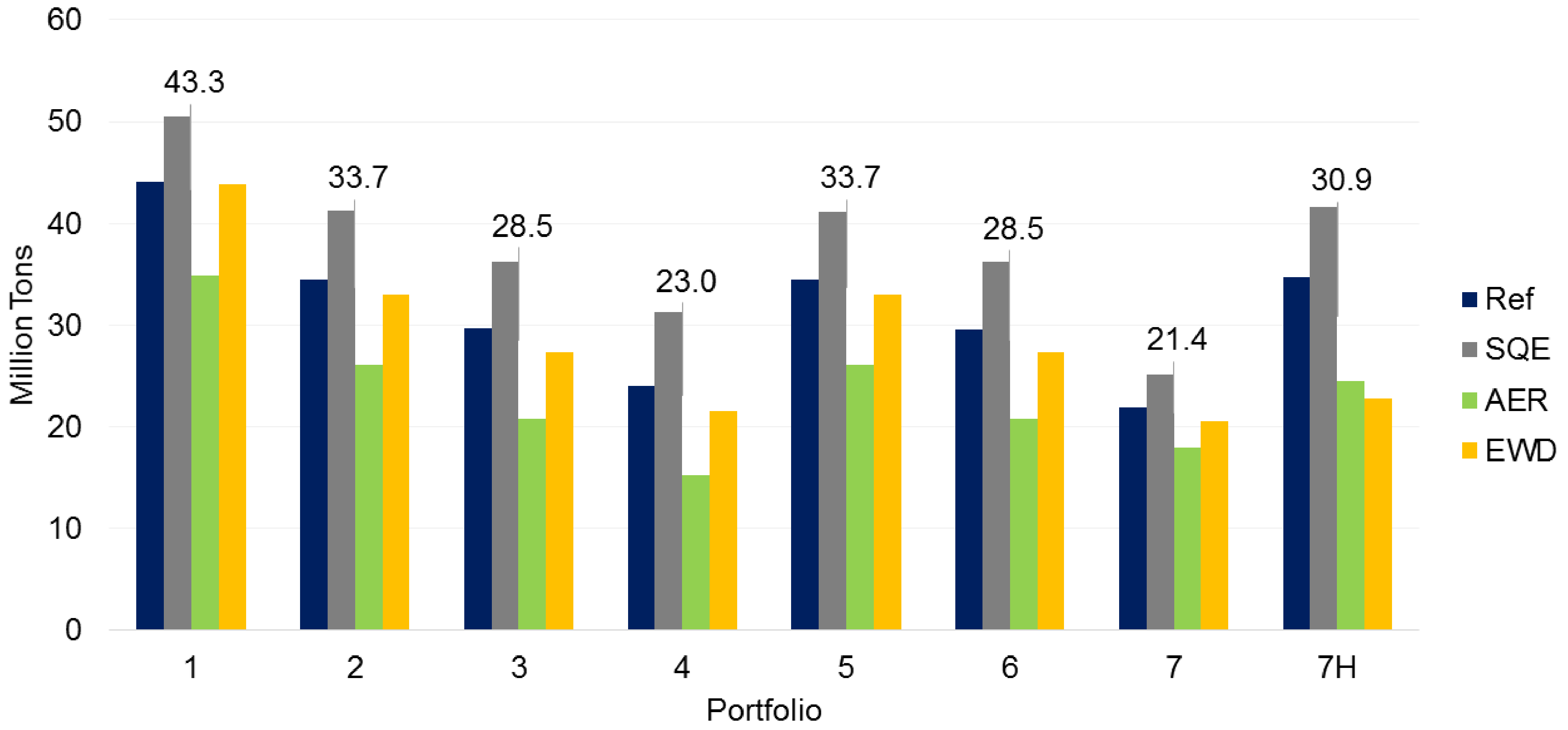
CO2 EMISSIONS – EXISTING FLEET ANALYSIS



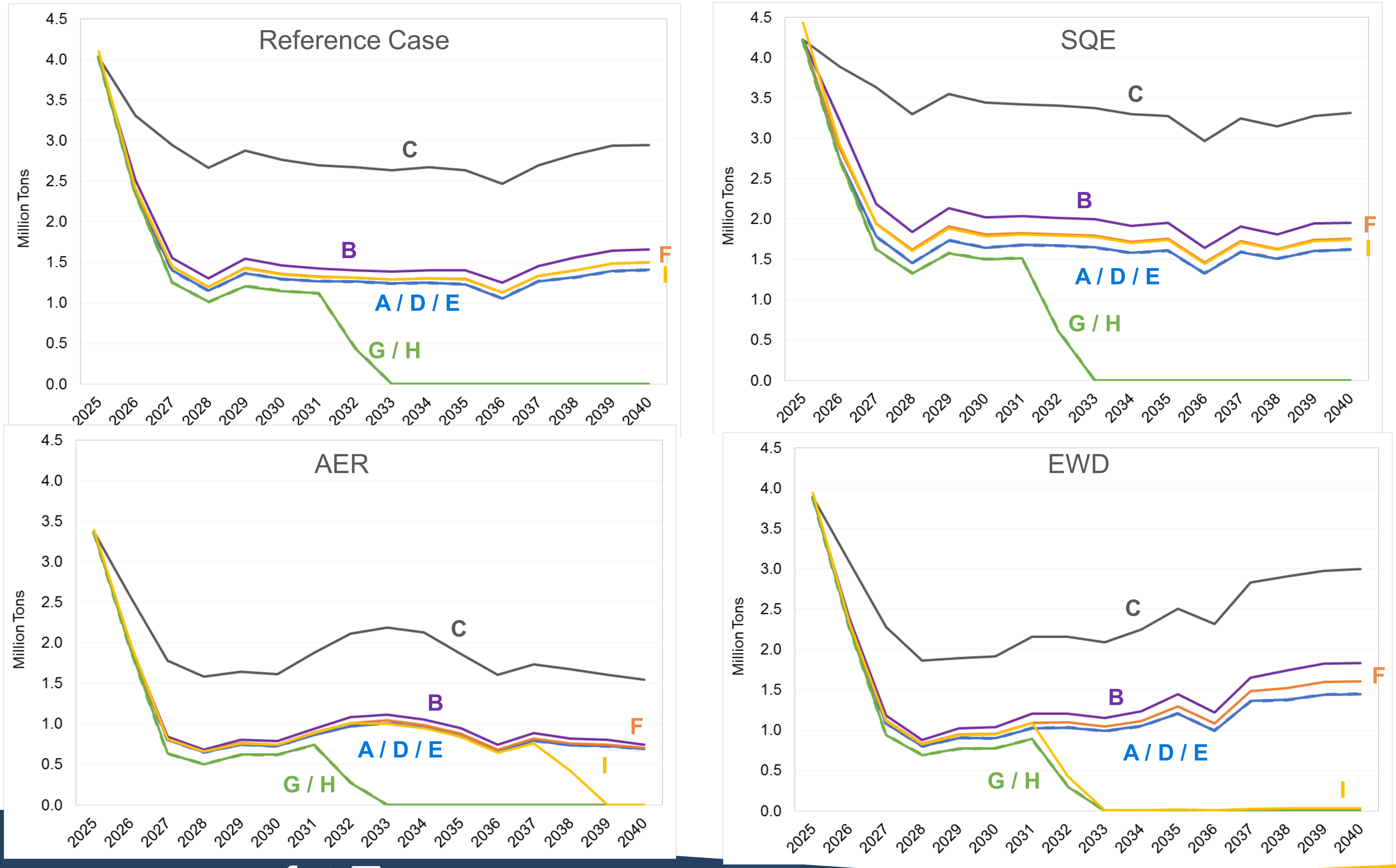
Key Points

- Emission trajectories are largely driven by the Michigan City retirement date
- Portfolio 7H preserves the optionality to burn natural gas and continues to do so under Reference and SQE market conditions, while transitioning to hydrogen in AER and EWD

ENVIRONMENTAL STEWARDSHIP- 2024-2040 CUMULATIVE MILLION SHORT TONS OF CO_2 – EXISTING FLEET ANALYSIS



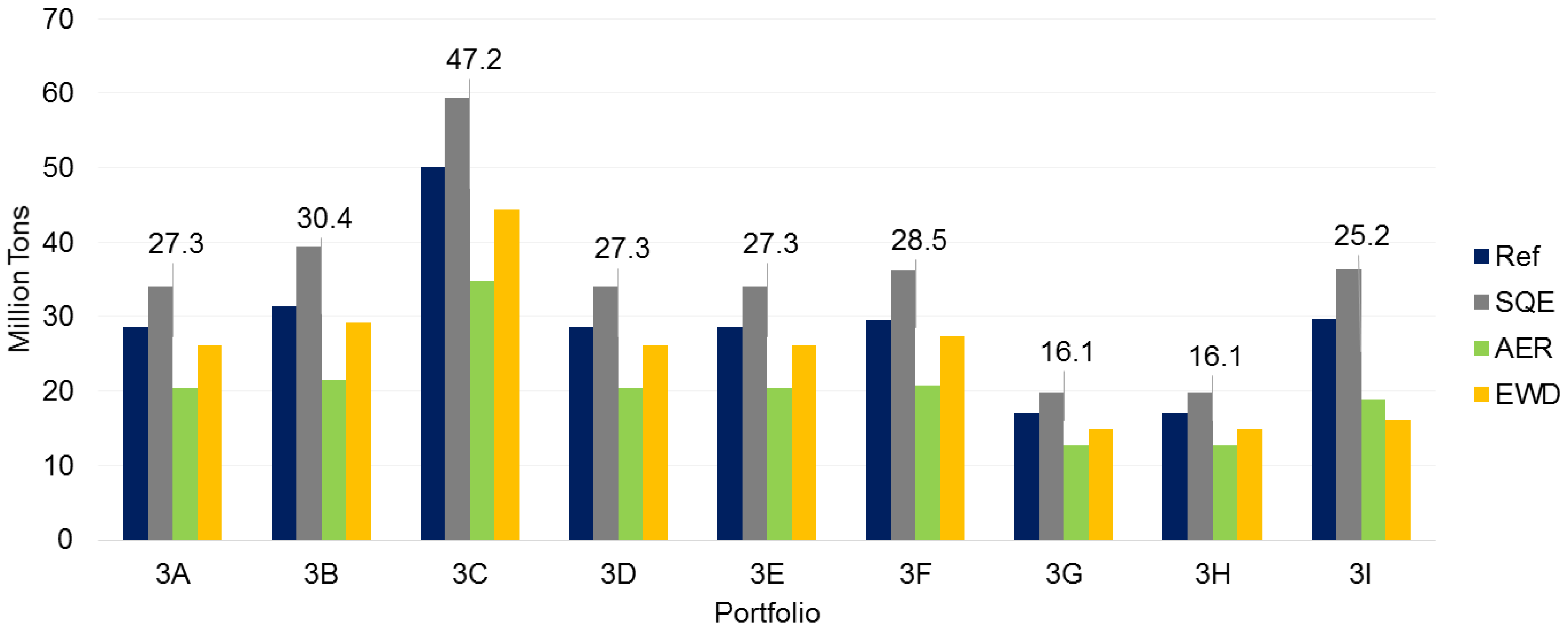
CO2 EMISSIONS – REPLACEMENT ANALYSIS



Key Points

- Gas plant dispatch varies across scenarios (due to fuel prices, carbon prices, surrounding MISO market drivers)
- Portfolio C (new CC) has the highest emissions
- Portfolio I preserves the optionality to burn natural gas and continues to do so under Reference and SQE market conditions, while transitioning to hydrogen in AER and EWD

ENVIRONMENTAL STEWARDSHIP- 2024-2040 CUMULATIVE MILLION SHORT TONS OF CO2 – REPLACEMENT ANALYSIS



KEY HYDROGEN PARAMETERS FOR MODELING

Short-Term: RFP Bids

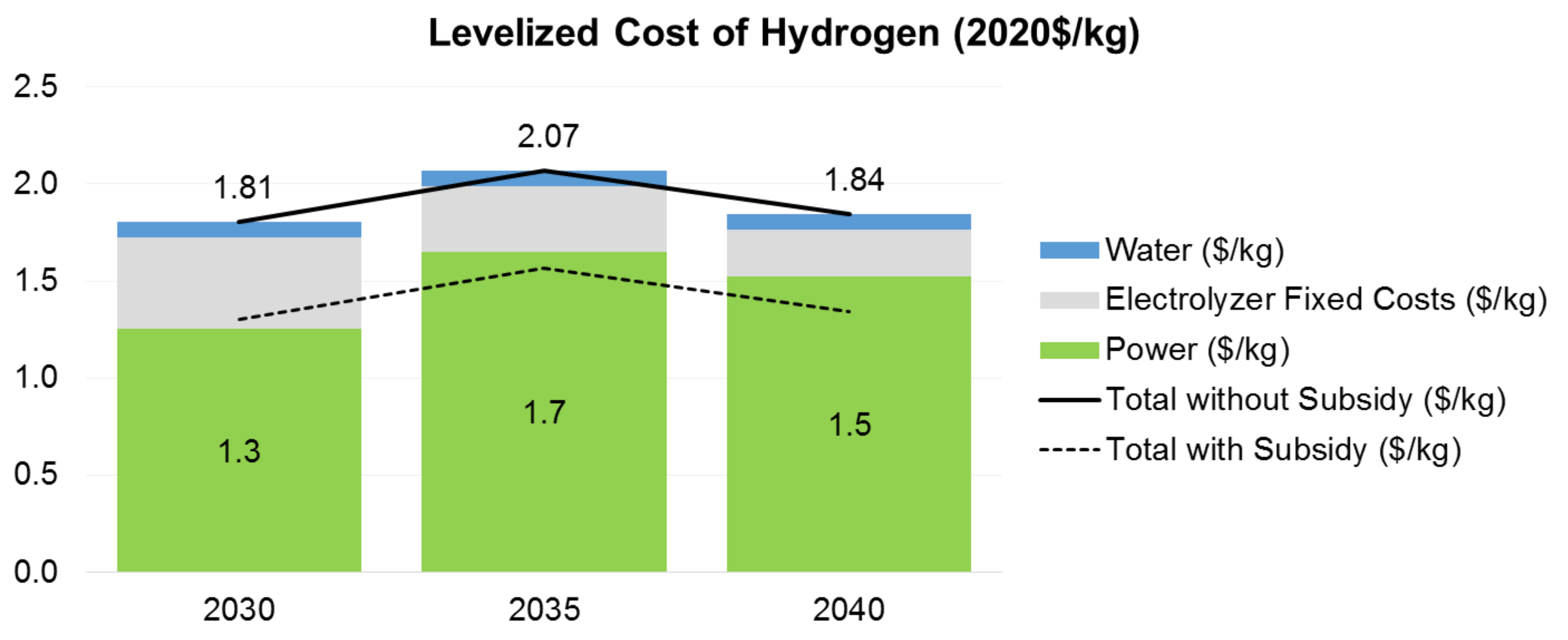
- **Sugar Creek Electrolyzer Pilot**
  - 20 MW electrolyzer at fixed PPA price starting 12/31/2025 (includes capex, FOM)
  - Daily production of 8,000 kg hydrogen, 2,920,000 kg annually (equates to less than 5% of total fuel at full capacity)
  - No additional retrofit costs at Sugar Creek required to be 5% hydrogen-enabled
- **5% Hydrogen-Enabled Peaker**
  - Additional fixed capacity payments associated with infrastructure to enable 5% hydrogen blending in *new* peaker development
  - Higher levels of hydrogen blending not contemplated and would be higher cost
  - No fuel supply (ie, NIPSCO would be responsible for delivering hydrogen to the plant)

Long-Term: Independent Cost Estimates

- **Long-term fuel cost trajectories were developed based on public and CRA forecasts to represent an all-in "market" cost of hydrogen production (and hence hydrogen fuel)**
  - Electrolyzer capex costs based on declining trajectory
  - Modest improvements in electrolyzer conversion efficiency to 74% by 2050
  - Electricity costs based on an optimized mix of renewables, battery storage, and market power purchases
  - Variable costs of water
  - Federal subsidy of $0.50/kg evaluated as a sensitivity
- **Plant retrofit costs to enable Sugar Creek to blend up to 100% hydrogen**
  - ~$300/kW investment assumed based on review of public sources and indicative turbine supplier data

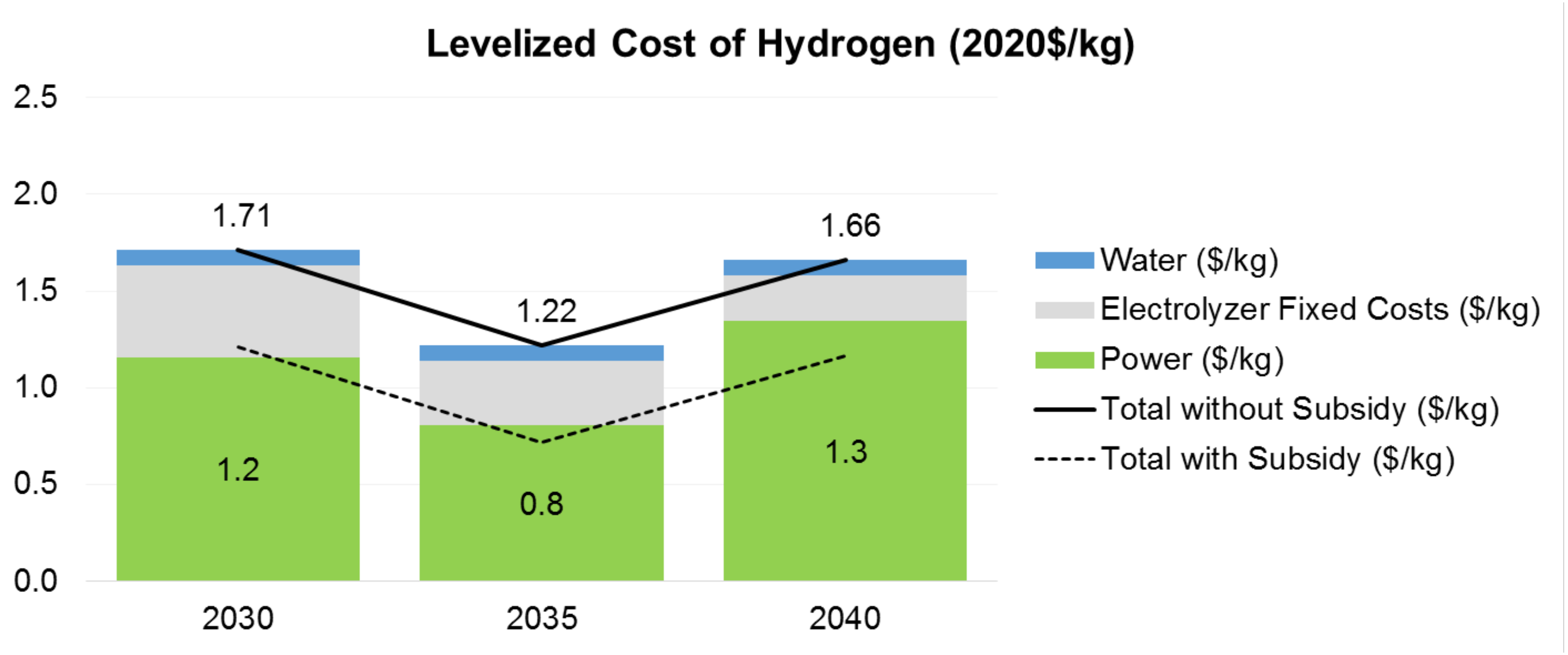
LONG-TERM GREEN HYDROGEN PRODUCTION COSTS – AER

ELECTRICITY COSTS BASED ON OPTIMIZED MIX OF RENEWABLES, BATTERY STORAGE, AND MARKET PURCHASES



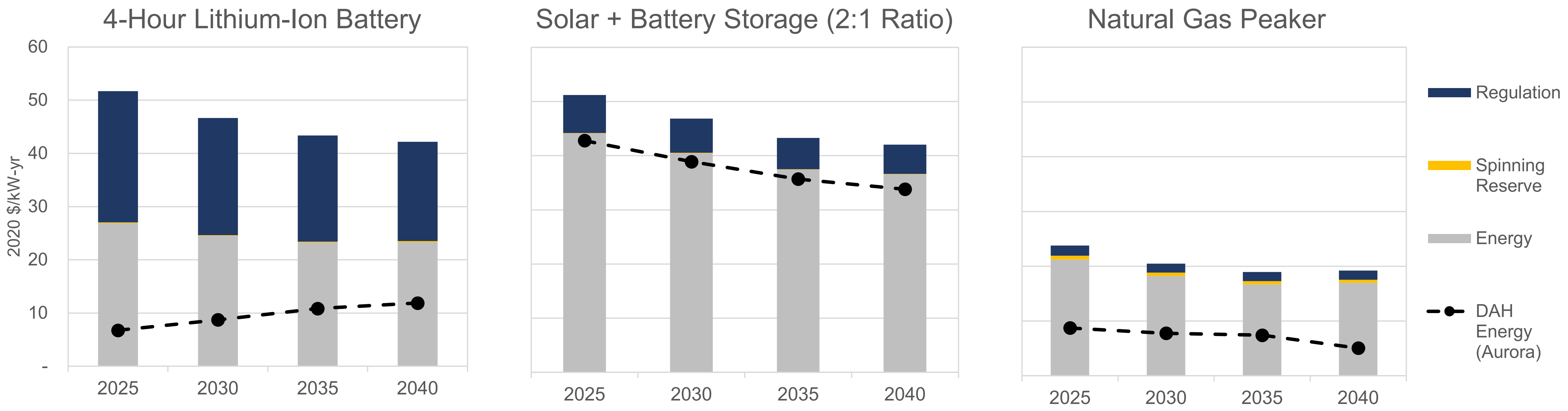
LONG-TERM GREEN HYDROGEN PRODUCTION COSTS – EWD

ELECTRICITY COSTS BASED ON OPTIMIZED MIX OF RENEWABLES, BATTERY STORAGE, AND MARKET PURCHASES



SUB-HOURLY ANALYSIS INDICATES POTENTIAL UPSIDE FOR STORAGE ASSETS

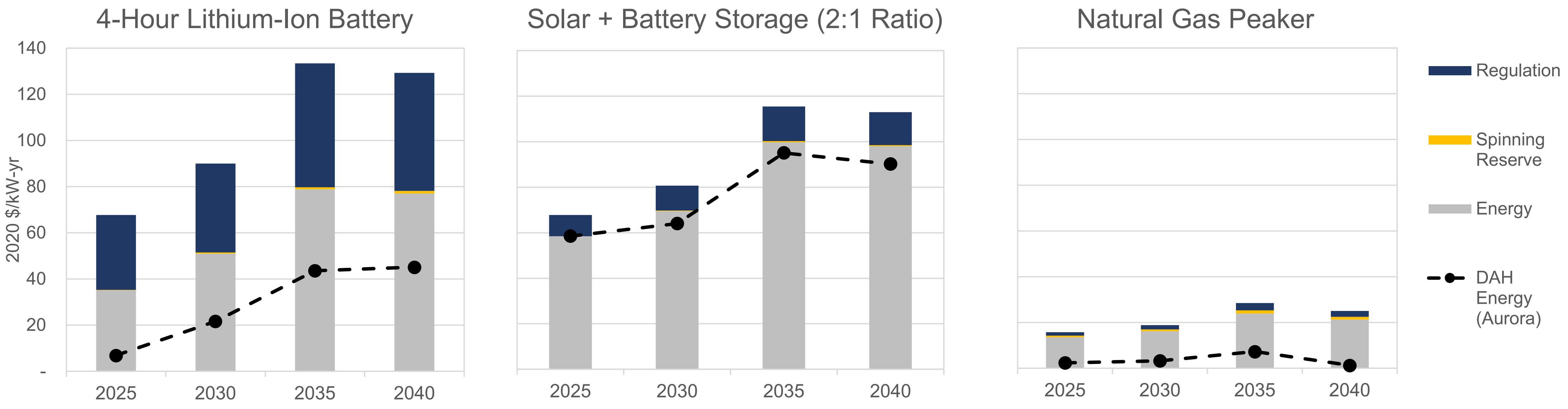
Status Quo Extended



- Lower overall power prices reduce margin expectations for all technologies, although premium between day ahead Aurora-based value and sub-hourly / ancillary services impact is comparable for solar + storage and gas peaker options
- Upside for stand-alone storage is mitigated over time as energy arbitrage opportunities are less valuable

SUB-HOURLY ANALYSIS INDICATES POTENTIAL UPSIDE FOR STORAGE ASSETS

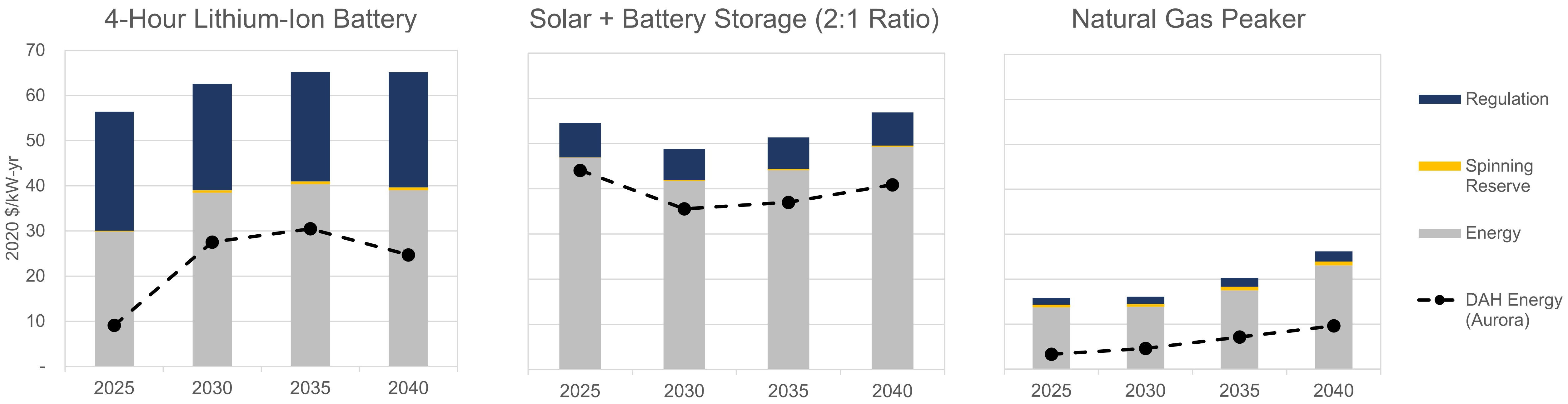
Aggressive Environmental Regulation



- Higher overall power prices increase margin opportunities, particularly for storage resources, which have significant upside potential with greater energy price spreads and higher ancillary services prices
- Natural gas peaker upside is more limited, given high carbon price and high natural gas price embedded in this scenario

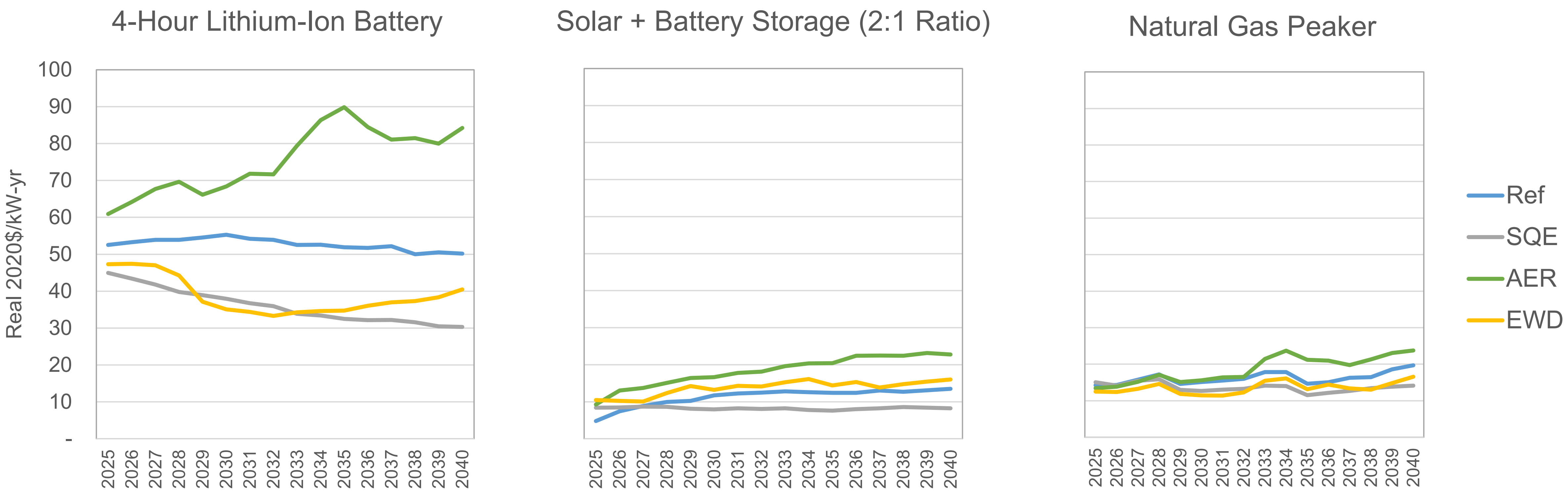
SUB-HOURLY ANALYSIS INDICATES POTENTIAL UPSIDE FOR STORAGE ASSETS

Economy-Wide Decarbonization



- Prices in the EWD scenario are lower than the Reference Case, but renewable penetration is high, resulting in sustained upside opportunities for battery resources

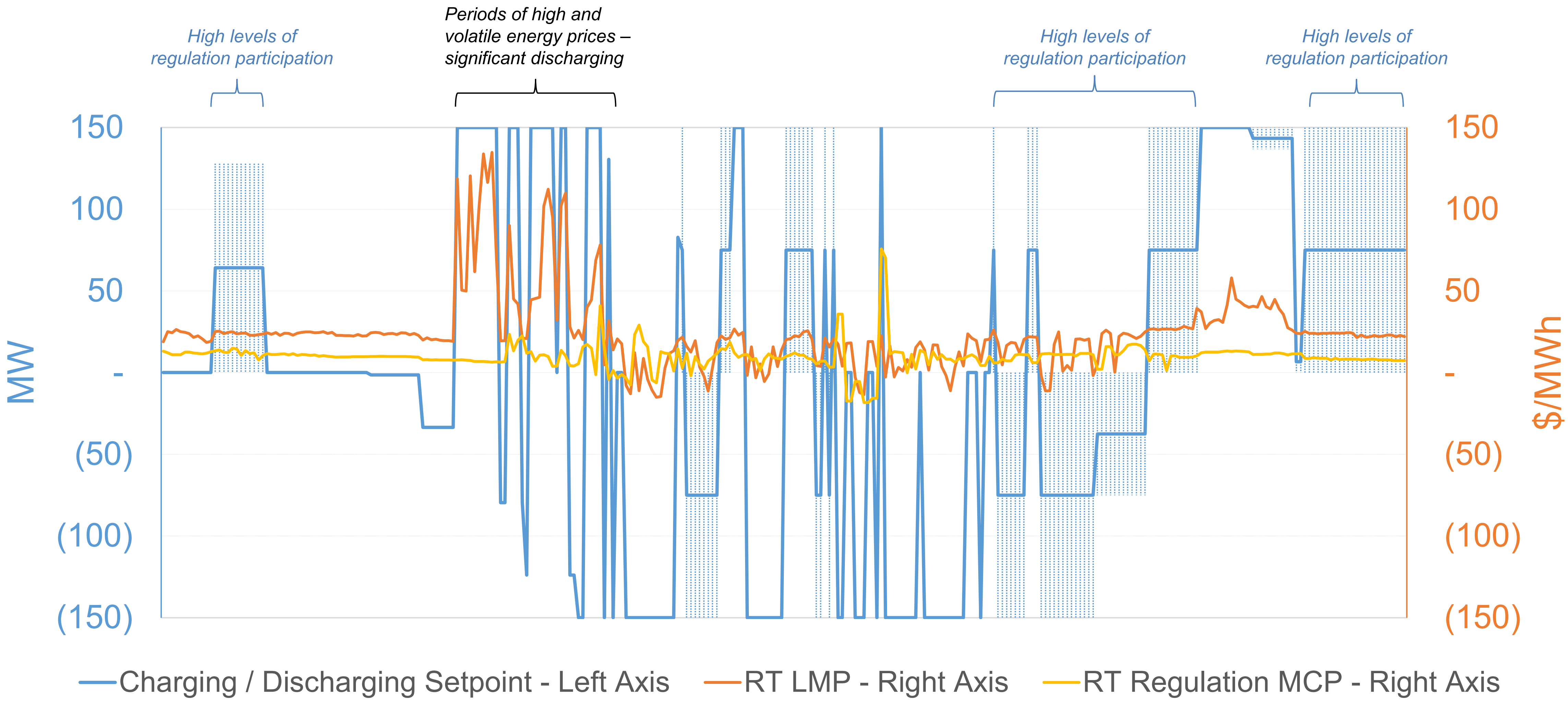
INCREMENTAL REAL TIME ENERGY AND ANCILLARY SERVICES VALUE ACROSS SCENARIOS



- Stand-alone storage resources have the largest upside opportunity in the sub-hourly real time energy and ancillary services markets
- The upside is greatest in the AER scenario, with highest prices and larger price spreads

ESOP DISPATCH EXAMPLE – SAMPLE 2025 SUMMER DAY

5-Minute Granularity across a Single Day – Reference Case



REPLACEMENT ANALYSIS SCORECARD

Preliminary

	A	B	C	D	E	F	G	H	I	
Replacement Theme	**Thermal PPAs, solar and storage**	**Non-service territory gas peaking (no early storage)**	**Natural gas dominant (CC)**	**No new thermal resources; solar dominant w/ storage**	**Thermal PPAs plus storage and solar**	**Local gas peaker, plus solar and storage**	**Solar dominant w/ storage, plus retire Sugar Creek**	**All renewables and storage, plus retire Sugar Creek (Portfolio 7)**	**New H2-enabled peaker plus solar and storage, plus SC conversion to H2 (Portfolio 7H)**	
Carbon Emissions	Higher	Higher	Higher	Mid	Mid	Mid	Low	Low	Low	
Dispatchability	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	Current Planning Reserve Margin	Winter & Summer Reserve Margin	Enhanced Reserve Margin (Local w/ Higher Energy Duration)	
Cost To Customer 30-year NPV of revenue requirement (Ref Case) $M	$10,461 +$150 5	$10,332 +$21 2	$10,312 - 1	$10,438 +$126 4	$10,467 +$156 6	$10,426 +$115 3	$11,042 +$730 8	$11,090 +$778 9	$10,792 +$480 7	Rank
Cost Certainty Scenario Range (NPVRR) $M	$2,359 +$1,035 5	$2,782 +$1,458 8	$3,208 +1,885 9	$2,322 +$998 4	$2,538 +$1,215 6	$2,748 +$1,424 7	$1,324 - 1	$1,553 +$229 2	$1,855 +$531 3	
Cost Risk – Highest Scenario NPVRR $M	$12,015 +$207 5	$12,182 +$373 7	$12,518 +$709 9	$11,965 +$156 3	$12,126 +$317 6	$12,243 +$434 8	$11,809 - 1	$12,011 +$202 4	$11,848 +$39 2	
Cost Risk – Stochastic 95% CVAR – 50%	$104 +$21 6	$92 +$9 3	$83 - 1	$104 +$21 6	$98 +$15 5	$97 +$14 4	$123 +$40 9	$114 +$31 8	$87 +$4 2	
Lower Cost Opp. Lowest Scenario NPVRR $M	$9,657 +$348 6	$9,400 +$91 2	$9,309 - 1	$9,644 +$334 5	$9,588 +$278 4	$9,495 +$186 3	$10,485 +$1,176 9	$10,458 +$1,149 8	$9,933 +$684 7	
Carbon Emissions M of tons 2024-40 Cum. (Scenario Avg.)	27.3 +11.3 4	30.4 +14.4 8	47.2 +31.2 9	27.3 +11.3 4	27.3 +11.3 4	28.5 +12.4 7	16.1 - 1	16.1 - 1	25.2 +9.2 3	
Reliability	*To be added in final scorecard*									
Resource Optionality MW-weighted duration of 2027 generation commitments (yrs.)	20.01 3	20.53 5	23.55 9	20.37 4	21.15 6	22.12 8	17.00 1	18.19 2	21.46 7	
Local Economy NPV of property taxes	$420 5	$388 9	$451 3	$417 6	$413 8	$416 7	$486 1	$477 2	$421 4	

QUANTA TECHNOLOGY WILL ASSIST NIPSCO WITH THE REVIEW AND DEVELOPMENT OF METRICS, SCORING METHODOLOGY, AND RANKING OF PROJECTS AND PORTFOLIOS

Scope of Work

Review and Assessment of Metrics	•Critical assessment of existing metrics •Propose Additional metrics tailored to assure supply resilience and reliability needs of systems with high penetration of inverter-based resources (IBR)
NIPSCO's Reliability Needs & Constraints	•High-level study/assessment of NIPSCO's system constraints, reliability needs, and grid value to integrating IBRs. •Examples: Need for more reserves & inertial response; locational limits due to short circuit strength; Grid value of Non-Wire Solutions, …etc.
Scoring Methodology	•Review the existing qualitative scoring methodology •Propose "simplified" quantitative scoring of each selected reliability attribute, suitable for single/multiple technology projects.
Portfolios Scoring & Ranking	•Apply the scoring methodology to select projects or portfolios, and evaluate reasonableness of results •Develop a ranking methodology •Rank selected portfolios
Stakeholder Engagement	•Support regulatory and market outreach initiatives as requested by NIPSCO