Cause No. 45449

Hoosier Energy
2020 Integrated Resource Plan – Public Version
Volume III

Appendix K

Board Presentations

2019 Long Range Resource Planning

Hoosier Energy

February 19 BOD Meeting

CRA Charles River Associates

February 19, 2019

Charles River Associates

Overview

Founded in 1965
650 consultants
Advisory and Expert Services
Five Primary Industry Verticals

CRA Offices

CRA Office Locations

Industries, Services, and Typical Clients

	Energy	Industrials	Life Sciences	Financial Services	Metals & Mining
Advisory ↓ Expert	**Clients:** Utilities Midstream Conglomerate Gas Private Equity	**Clients:** Heavy manufacturing Chemicals	**Clients:** Pharma Hospitals Private Equity	**Clients:** Large Banks SEC, DOJ	**Clients:** Public and Private Companies Private Equity

CRA Charles River Associates

CRA's Energy Practice

CRA's Energy Practice comprises five primary practice areas spanning management consulting to expert services.

Corporate Strategy

- Portfolio optimization
- Offering development
- M&A
- Market entry

Utility Strategy & Investment Planning

- Grid modernization
- Integrated resource plan
- DSP
- The New Utility
- Infrastructure planning
- Storage
- Regulatory

Energy Markets

- Market Rules
- Order 1000
- Fuel Security
- Order 841
- Capacity market design
- Order 744

Transaction Support

- Power plant due diligence
- Market power analysis
- Utility due diligence

Litigation Support

- Damages analysis
- International arbitration
- Commercial litigation
- Expert testimony

CRA's Key Project Team Members

Jim McMahon
Officer in Charge
20+ years experience

Specialties
Utility Strategy
Generation Planning
Capital Allocation

Pat Augustine
Modeling and Markets Leader
10+ years experience

Specialties
Market Modeling
Generation Planning
Portfolio Analysis

Andrew Trump
Portfolio Strategy
25+ years experience

Specialties
Utility Strategy
Business Planning
Technology

Robert Kaineg
Project Manager
10+ years experience

Specialties
Market Modeling
Generation Planning
Price Forecasting

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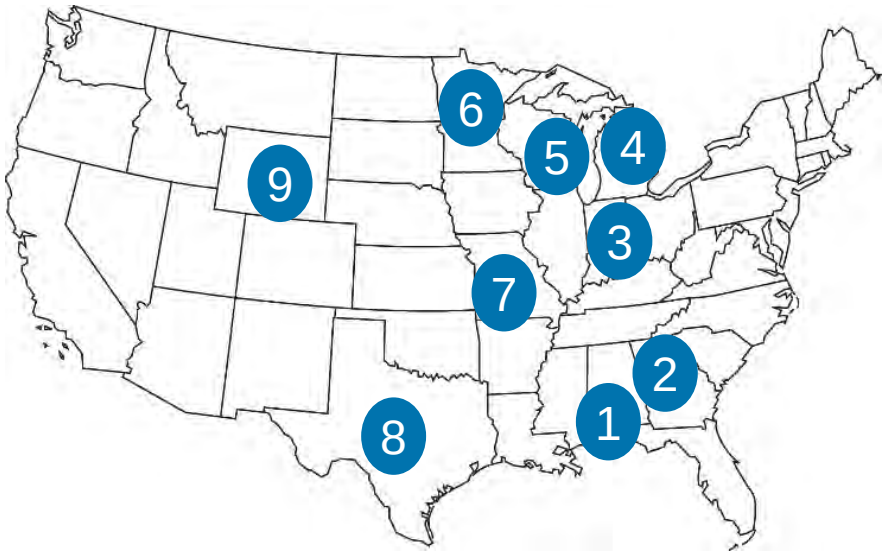
CRA's Recent Resource Planning Activity

CRA has recently worked with a wide range of utilities across the country facing complex resource questions.



Key

Coal | Natural Gas | Solar | Nuclear
Hydro | Wind | Other

#	Utility	Mix
1	Southern	
2	MEAG	
3	NIPSCO	
4	DTE Energy	
5	Alliant	
6	MN Power	
7	Empire	
8	CPS Energy	
9	Cheyenne	

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CRA's Recent Resource Planning Activity

While every utility client presents a unique situation and set of questions, several central questions have emerged.

Central Investment Questions

- Baseload Plant Retirements
- Renewable v. Fossil Replacement
- Storage Investment
- Ownership v. Power Purchase Agreements (PPA)
- Central v. Distribution System Investments
- Demand-side Investment

MEAG – Support Continued Investment in Vogtle

"We are all pleased to have reached an agreement and to be moving forward with the construction of Vogtle Units 3 & 4 which is critical to Georgia's energy future" - Vogtle co-owners, Sep 2018

Plant Specifications

2 x 1215 MW, Newest plant design

Plant Cost and Commercial Operation Date

$14 billion original estimate
$27 billion current estimate
Commercial operation dates: 2021/2022

MEAG Ownership / Contracting

MEAG owns 22.7% share or ~500 MW
MEAG sells a portion of its capacity to JEA under a power purchase agreement

Vogtle 3+4 Nuclear Project

Employment Impact

Vogtle 3 & 4 is currently the largest jobs-producing construction project in the state of Georgia employing more than 7,000 workers from across the country, with more than 800 permanent jobs available once the units begin operating.

MEAG POWER

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Southern – Retire Coal, Replace with Gas + Renew + DSM

"Sustained low gas prices combined with reduced energy demand growth continue to place economic pressure on the Company's remaining coal-fired generating units" – GA Power, Feb 2019

Announced Coal Retirements

McIntosh Unit 1:

143 MW

- First Year in Service: 1979
- Heavily Controlled for Pollutants

Hammond Units 1-4:

840 MW

- First Years in Service: 1954-1970
- Heavily Controlled for Pollutants

Announced Additions

1600 MW of **Demand-Side Management**

1000 MW of **Renewables**

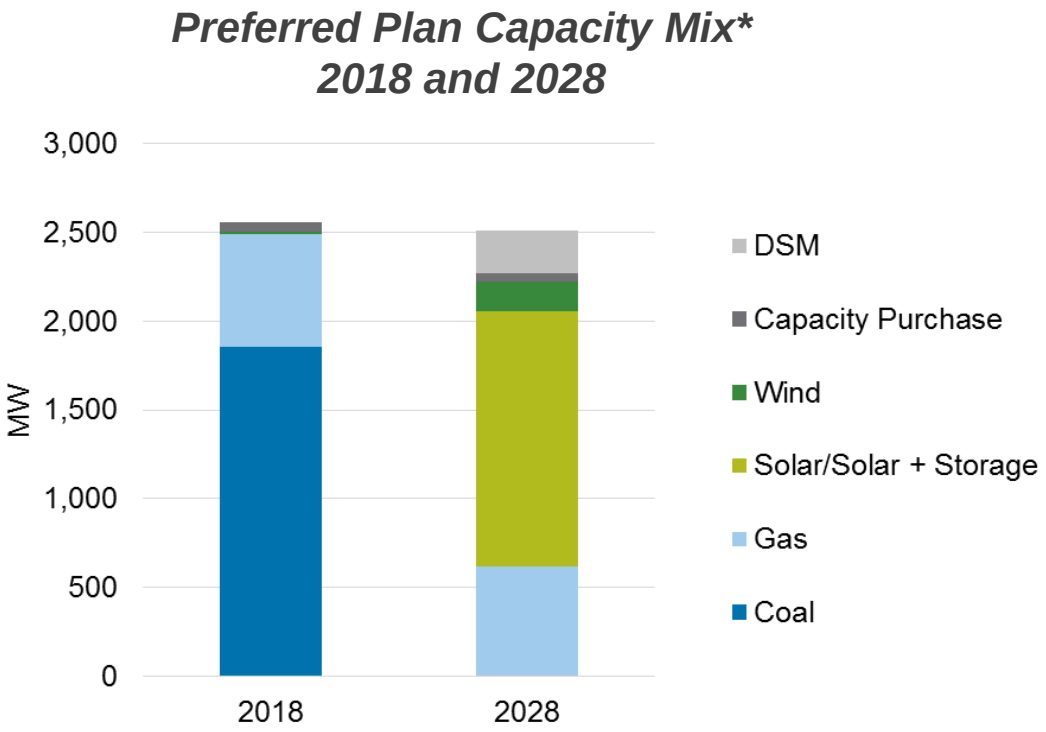
Likelihood of **Combined Cycle and Combustion Turbine units** amid low gas price environment

Southern Company

Source: Georgia Power 2019 Draft IRP

NIPSCO – Retire Coal, Replace with Renewables

NIPSCO's Integrated Resource Plan (IRP) calls for the retirement of 1600 MW of coal by 2023 and all coal by 2028, replaced by almost 4000 MW of nameplate renewables.



IRP results supported rollout of "Your Energy, Your Future" reduce emissions 90% by 2028

BRIEF

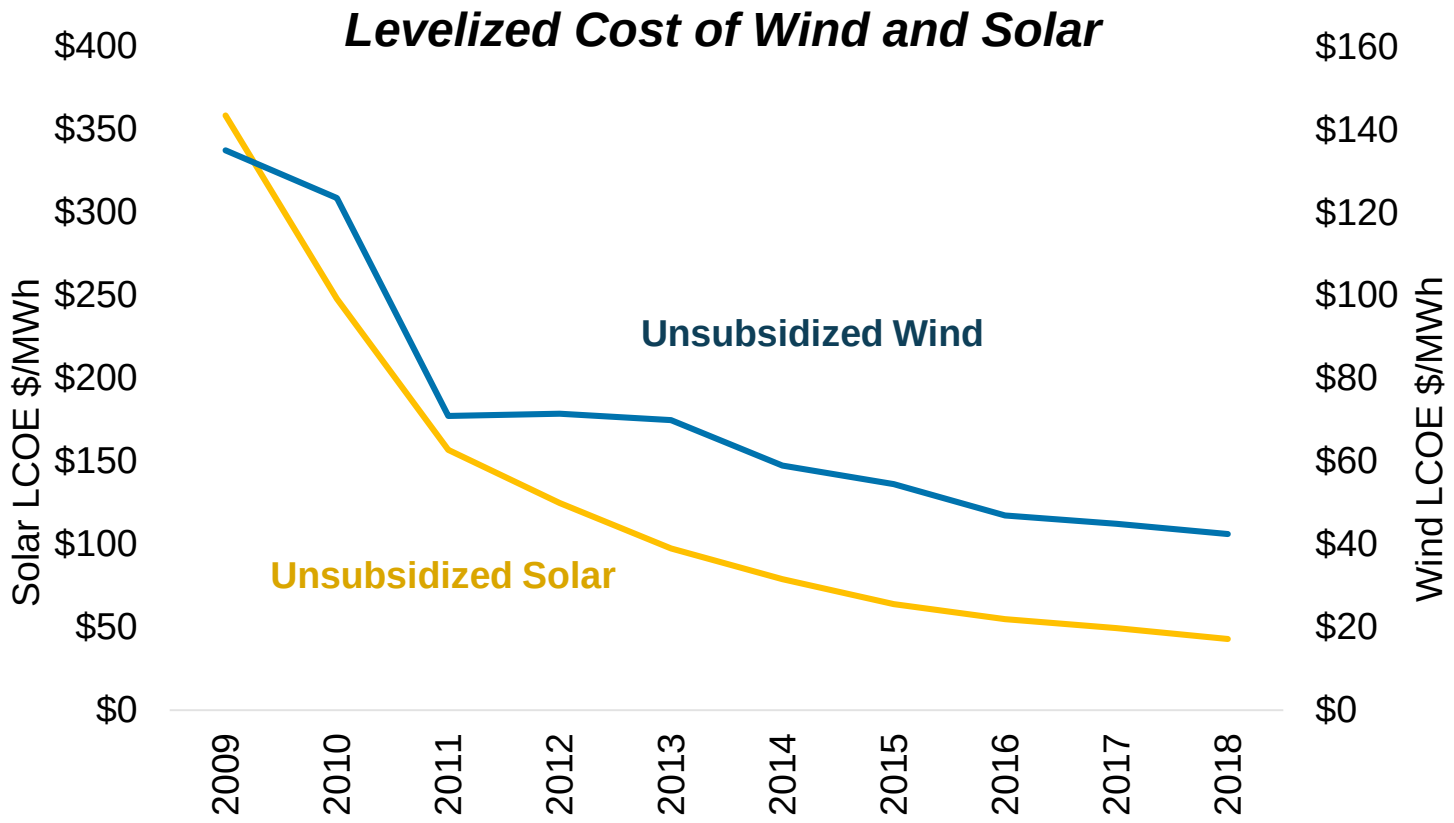
NIPSCO to add 800 MW wind in first steps to coal-free generation

Source: NIPSCO 2018 IRP

Notes: *Capacity in chart reflects capacity eligible to count as a capacity resource in MISO. This is greater than the maximum potential output of a given resource at a moment in time.

Lower Renewable Costs …

The cost of wind and solar have dropped dramatically in the last decade as a result of larger turbines, scale economies, and innovation.



Source: EIA
Notes: LCOE = Levelized Cost of Electricity. This equals the total investment, maintenance, and operating costs of the asset divided by the output of the asset over its life.

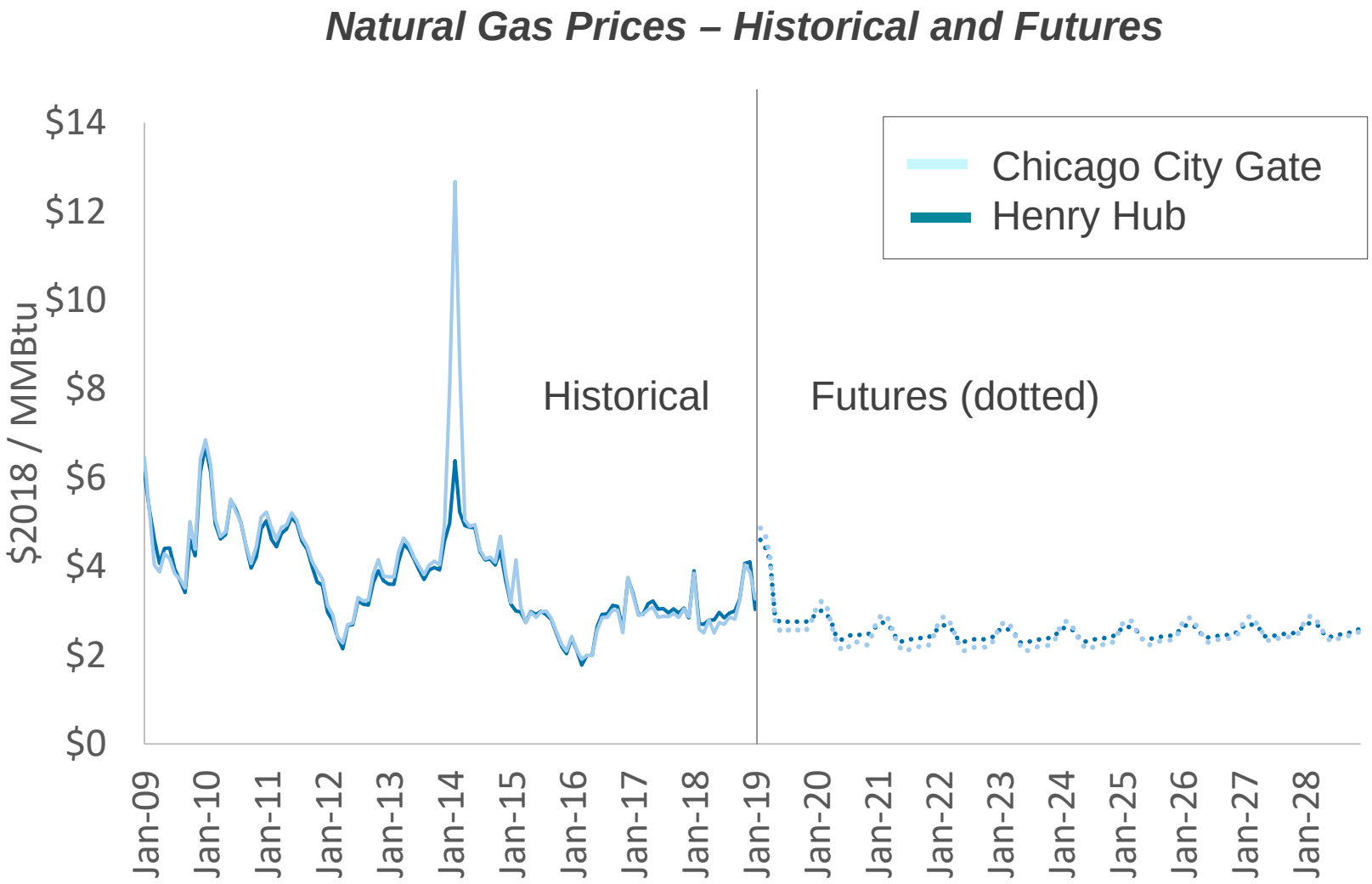
Aggressive State and Federal Energy Policies, …

State and federal policies and mandates are becoming important considerations in resource planning decisions.

State and Federal Energy Policies Impacting Resource Planning and the Timing of The Impact

		Near Term	Long Term	
Federal Policies	Investment Tax Credit	●		*Tax credit related to investment of renewable resources*
	Production Tax Credit	●		*Tax credit related to production of renewable resources*
	Coal Combustion Residuals, Other	●		*Federal rules that impact many coal units*
Fed and State Policies	Carbon Policy	●	●	*Potential to move toward a Paris Accord policy, state rules*
	Energy Efficiency Standards	●	●	*States generally becoming more aggressive*
State Policies	Renewable Energy Standards	●	●	*Some states increasing targets or focus areas*
	Storage Mandates		●	*Some states mandating storage (NY, CA, MA, CT)*
	Off-Shore Wind Mandates		●	*Mandates and incentives for NE and MidAtl states*

Combined With Persistently Low Gas Prices …



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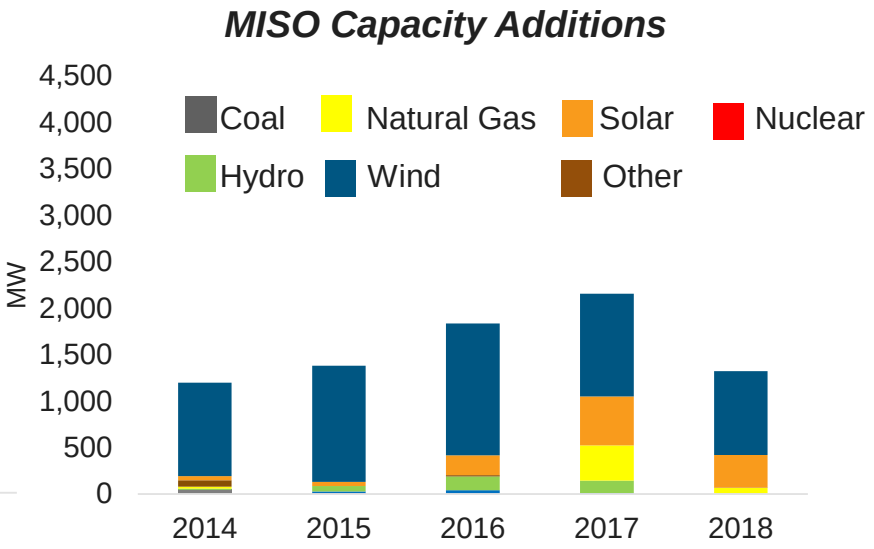
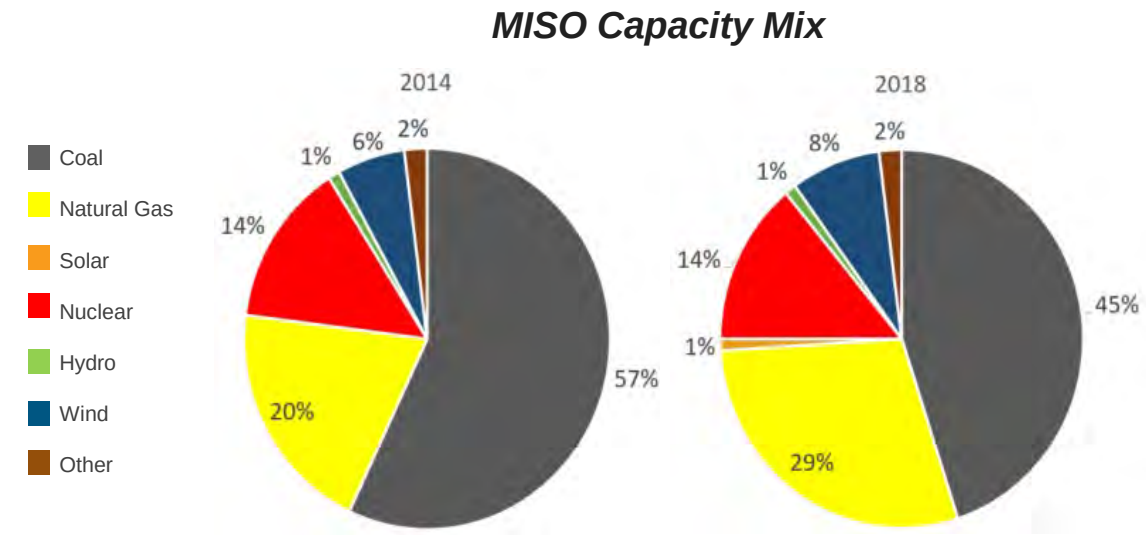
Are Leading to Significant Changes to the US Gen Fleet





Coal capacity in MISO has been displaced by natural gas, wind, and to a lesser extent, solar

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Industry Change Raises Important Questions for Hoosier

- How is Merom performing? Should Hoosier consider changes with respect to how it invests in or operates the plant?
- Does Hoosier have the right mix of resources to best meet its objectives around Least Cost? Risk? Sustainability?
- What are Hoosier's objectives? Have they changed over time?
- Should Hoosier consider resource procurement options that allow customers to better achieve their own objectives?
- How does NIPSCO's (or other utilities') move to divest their coal generation fleet impact Hoosier, if at all?

Hoosier's Generation Strategy Should Be Unique

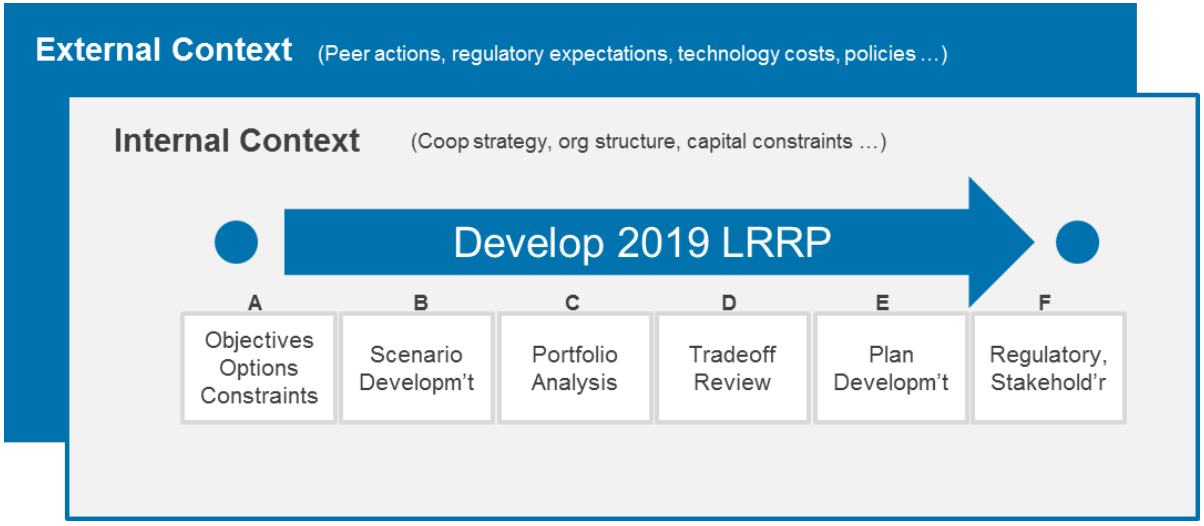
While Hoosier can learn from other utility experiences, its portfolio decision should be based on factors specific to the company.

How Hoosier Differs from Other IOUs That Recently Made Major Baseload Resource Decisions

Utility	Resource Decision	Key Differences to Hoosier
NIPSCO	Retire Coal, Build Renewables	At risk industrial load, enviro costs
Empire District	Possibly Retire Coal, Build Wind	Small coal plant, high wind region
Cheyenne (CL&P)	Maintain Coal	Mine mouth coal plant, unique buy out contract
MEAG Power	Continue Vogtle Nuclear Plant	Non-majority, non-operator of Vogtle
Southern Company	Retire Coal, Build Gas + Nuclear	Sustainability goals, non-ISO, distinct locations

2019 LRRP Decision Framework

This year we will utilize a decision framework that moves Hoosier methodically toward a decision.



Goals of the 2019 Process

- **Collaborative** – direct involvement and feedback from Board
- **Transparent** – process with clear assumptions and decision criteria
- **Robust** – leading models and analytical capabilities
- **Comprehensive** – addresses the complete set of strategic questions
- **Decisional** – provides the Board a decision framework around a set of key questions

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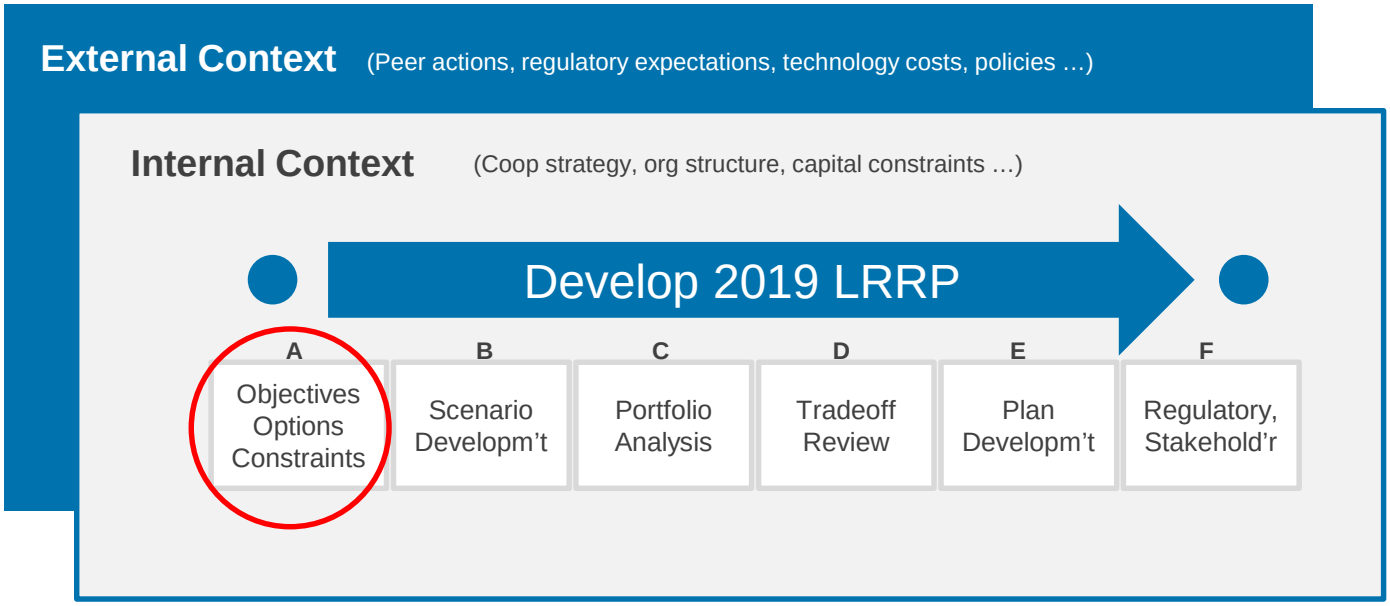
Framework: Step 1 – Define Objectives

Today will focus on discussing the Objectives that will guide the decision-making process.



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Objectives Will Manifest in a Scorecard

The Objectives that we define will be incorporated into a Scorecard for purposes of evaluating tradeoffs between different portfolio options.

Sample Scorecard

ILLUSTRATIVE ONLY — **Summary Framework**

	Cost			Cost Risk			Environmental			
	Present Value of Revenue Requirement			Revenue Requirement Risk			Environmental Stewardship			
Portfolio	*Base Case ($mm)*	*Retail Rate Increase (%)*	*Score*	*Range (High to Low) or Exp. Value*	*Score*	*95th percentile (or worst case outcome)*	*Score*	*CO2 Emissions*	*Score*	*Renew %*	*Score*
Portfolio 1											
Portfolio 2											
Portfolio 3											
...											

Different portfolio constructs from modeling and other stakeholder input

Core metrics from portfolio modeling tools, including scenarios/stochastics

Other key metrics for IRP can be developed within portfolio modeling tools or through additional analyses

Purpose and Elements of a Scorecard

Why Use a Scorecard?

- Helps validate and rationalize decisions
- Forces structured tradeoff discussion
- Improves speed of decisions
- Supports approval process, no arbitrary decisions

What Makes a Good Scorecard Factor?

- Discrete
- Measurable
- Specific
- Collectively exhaustive
- Balanced
- Reflects utility situation

Preliminary List of Scorecard Factors for Discussion

Rate Predictability & Stability

Customer Procurement Flexibility

Resource Location

Ownership of Power Supply Resources

Construction of New Resources

Employee Retention

Resource Diversity

Wholesale Rates

Operation of Portfolio Resources

Deployment of Emerging Technologies

Sustainability of the Portfolio

Development of Demand-Side Resources

Scenario Planning Presentation

May 13, 2019

HOOSIER ENERGY
A Touchstone Energy® Cooperative

CRA Charles River Associates

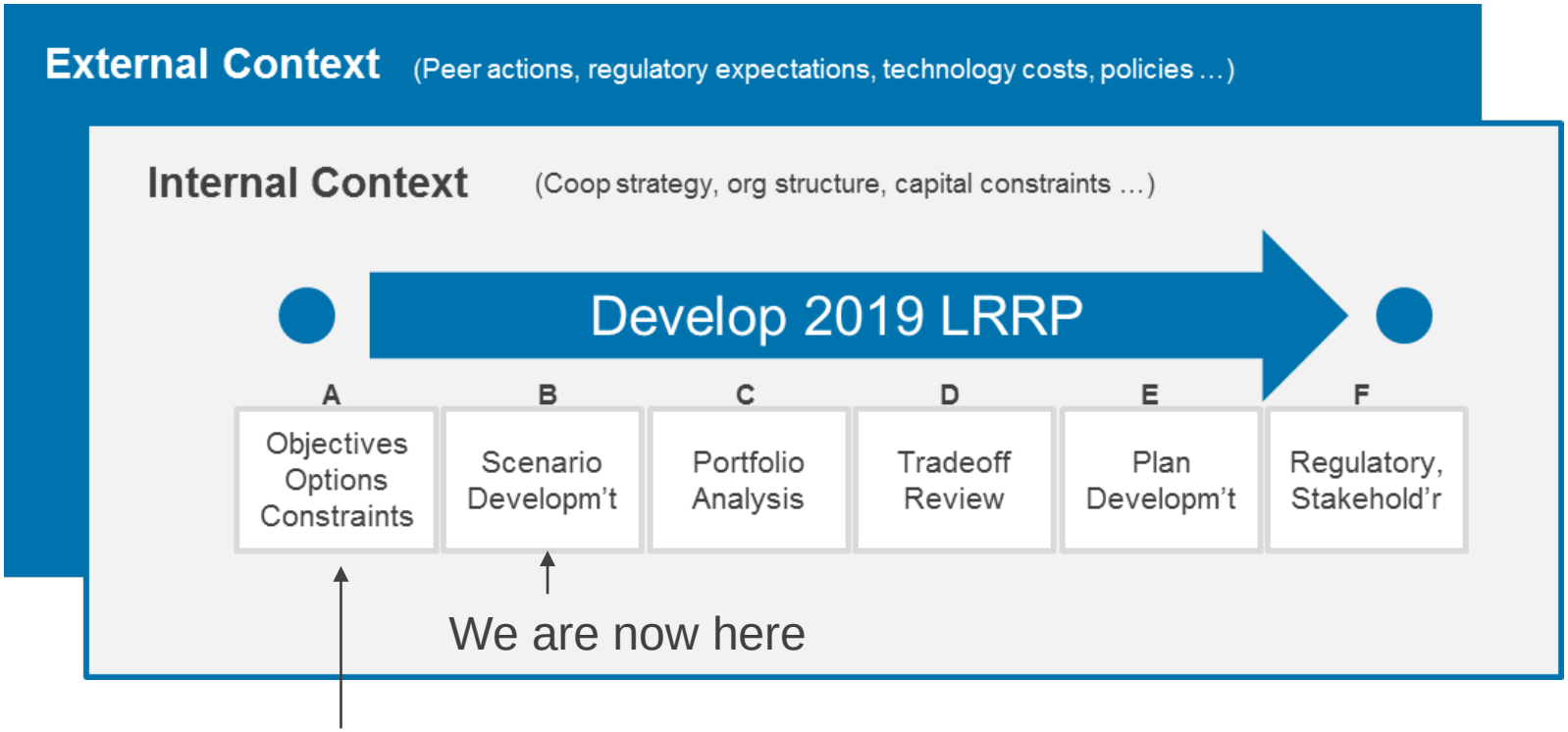
Agenda

- Introduction to Scenarios
- Approach to Scenario Design
- Range of Key Uncertainties
- Proposed Scenarios for 2019 LRRP

2019 LRRP Development Process

The LRRP is now in the analysis phase, beginning with scenario development

LRRP Development Process



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LRRP Modeling Approach

Develop Scenarios "States of the World"

- Multiple scenarios tested
- Drivers of differences – assumptions on technology, policy, economy, customer

Test Hoosier Portfolio Options

Report Outcomes on Scorecard

Objective	Metric
Wholesale Rates	$$
Rate Stability	$$ - $$
Resource Diversity	%
Sustainability	Good / Bad

Objective	Metric
Wholesale Rates	$$
Rate Stability	$$ - $$
Resource Diversity	%
Sustainability	Good / Bad

Objective	Metric
Wholesale Rates	$$
Rate Stability	$$ - $$
Resource Diversity	%
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Objective	Metric
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Objective	Metric
Wholesale Rates	$$
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Sustainability	Good / Bad

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- Introduction to Scenarios
- Approach to Scenario Design
- Range of Key Uncertainties
- Proposed Scenarios for 2019 LRRP

Scenario Design Principles

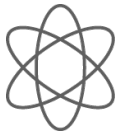
1. Scenarios should be plausible and internally consistent views of the possible market futures

2. Scenarios should be distinct and result in materially different MISO market conditions for testing Hoosier resource decisions

3. Scenarios should be designed to test risks and concerns prioritized by Hoosier's Board and management

Developing Scenario Themes

- Scenarios are constructed through combinations of model “drivers”
- Generally, the major drivers of key portfolio value drivers fall within four major categories



Technology

Supply-side resource options (solar, storage, etc.)

Natural gas extraction

Policy/ Regulation

Renewable tax incentives

Carbon regulations (national or local)

Power market design changes

Economy

Macroeconomic growth

Commodity Prices

Commercial and industrial power demand

Customer Behavior

Energy efficiency and demand side management

Distributed energy penetration

Electric vehicle growth

Developing Scenario Inputs

Scenario Concept Development

Each scenario has a primary theme that drives the combined set of fundamental market modeling inputs

	Primary Drivers			
	Technology	**Policy/ Regulation**	**Economy**	**Customer Behavior**
A		■		
B			■	
C	■			
D				■

Scenario Parameterization

Assumptions are developed across key model inputs and used to forecast energy prices, capacity prices, additions and retirements in the MISO market

Load Growth
Load Shape
New Resource Capital Cost
Capacity Mix Changes

CO2 Price
Natural Gas Prices
Transmission Views
Reserve Margin Value

Major Forecast Movers

	Variable Change	Expected Modeling Outcome
Natural Gas Prices	High Gas Price	Model chooses **renewable options** and/or **retains coal** generation
	Low Gas Price	Model chooses new **gas**-fired gen, deploys **fewer renewables** and **retires more coal**
Load Forecast	High Load	Model requires **new capacity** to meet reserve requirements
	Low Load	Lack of demand for new generation **lowers capacity prices** for MISO resources
CO2 Pressure	High CO2 Price	Model **accelerates fossil retirements and renewable deployment**
	Low CO2 Price	Model **retains existing fossil resources**, **lower** penetration of **renewable** generation

Agenda

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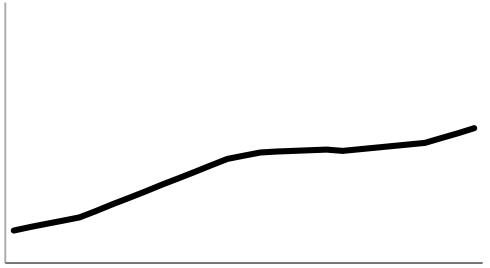
Scenario Development for Resource Planning

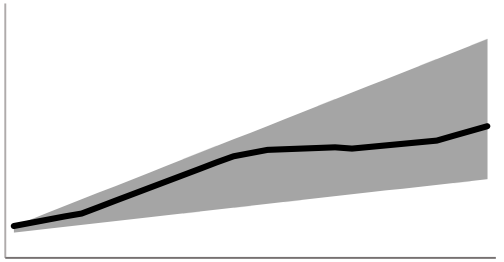
Step 1

Develop “Base Case” scenario that reflects the current expected outlook for key model drivers



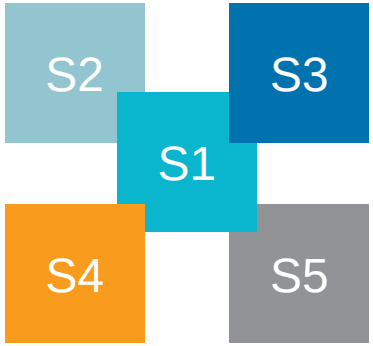
Step 2

Evaluate range of uncertainty around these drivers



Step 3

Develop a manageable set of plausible futures that capture range of uncertainty around key model inputs



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Proposed LRRP Scenarios

Base Case

- The MISO market continues to evolve based on the current outlook for load growth, commodity prices, technology development, and regulatory pressure

Stagnating Economy

- Decline in economic outlook relieves regulatory pressure and results in a low load growth environment and fewer coal retirements

US Economy Decarbonizes

- A national cap on CO2 emissions affects all sectors of the US economy, negatively affecting fossil generation and changing end-use demand patterns

Customers in Control

- Widespread procurement of renewable energy by large C&I customers reduces demand for central station power and impacts load shape

Challenged Gas Economy

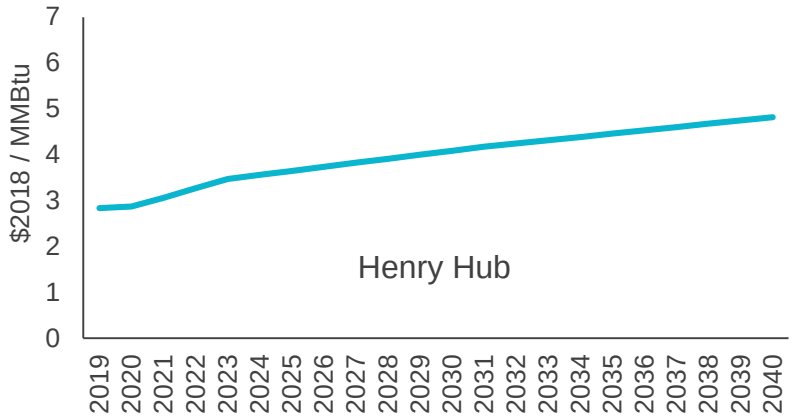
- Restrictions on gas resource and infrastructure expansion result in high commodity prices for natural gas and reduced reliability of gas-fired units

Base Case

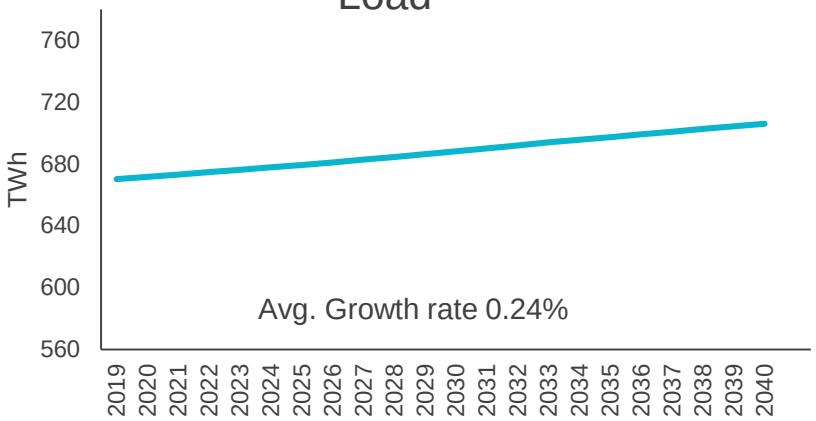
- The MISO market continues to evolve based on the current outlook for load growth, commodity prices, technology development, and regulatory pressure

Primary Drivers

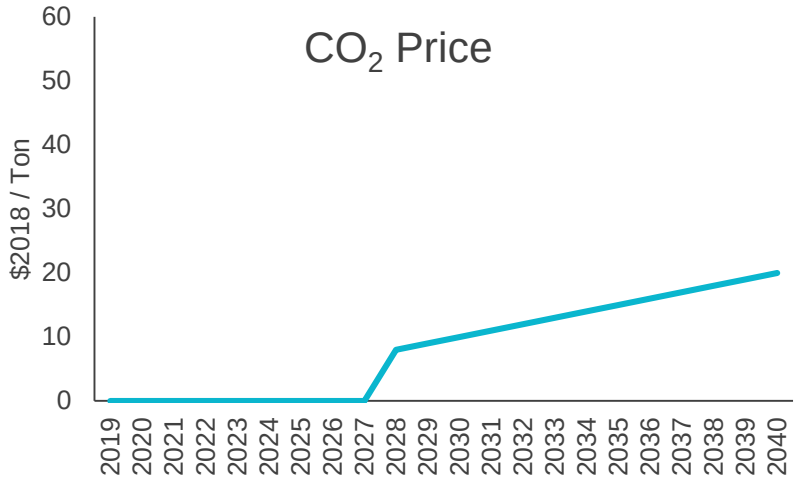
Natural Gas Prices



Load



CO_2 Price



Notes

Load forecast consistent with MISO's "Continuing Fleet Change" forecast

Gas prices grow modestly over time driven by increased domestic and international demand and resource depletion

CO_2 price represents modest level of future emissions pressure, not a specific policy

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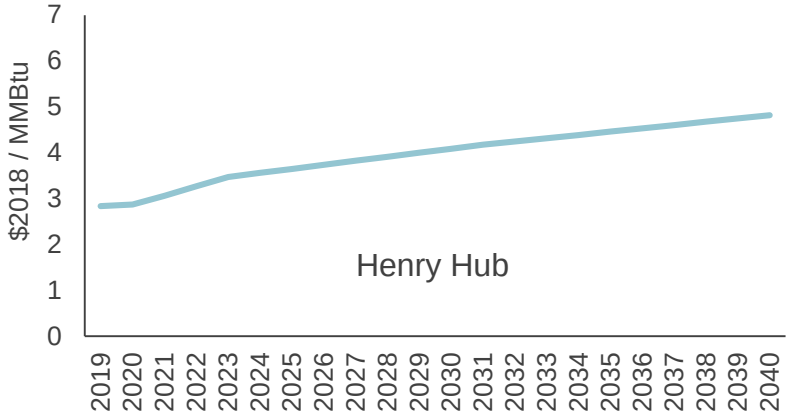
Stagnating Economy

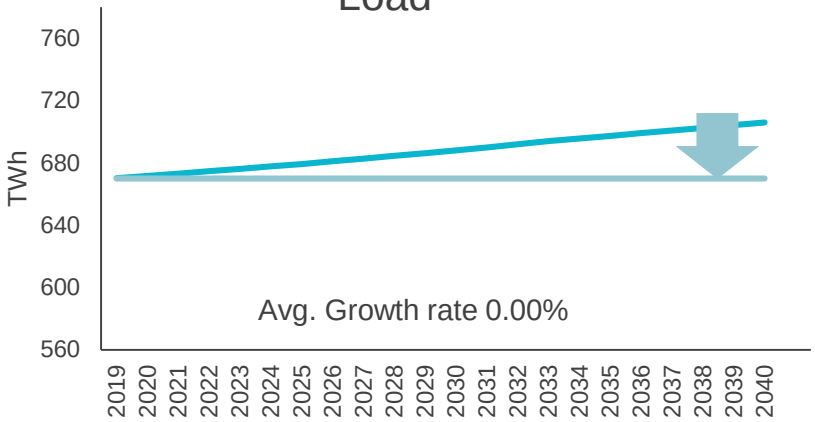
- Decline in economic outlook relieves regulatory pressure and results in a low load growth environment and fewer coal retirements

Primary Drivers

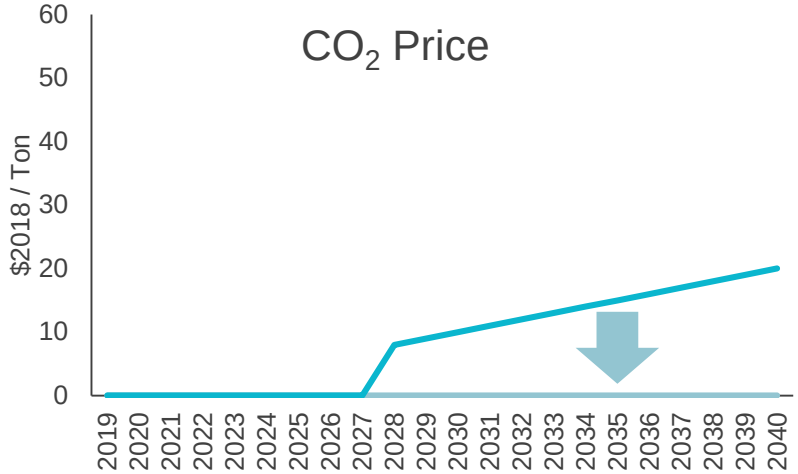
Natural Gas Prices



Load



CO_2 Price



Notes

Case definition includes stagnation of load growth, consistent with the Limited Fleet Change view

Case definition includes regulatory pull-back, with lower CO2 pressure than the Base view

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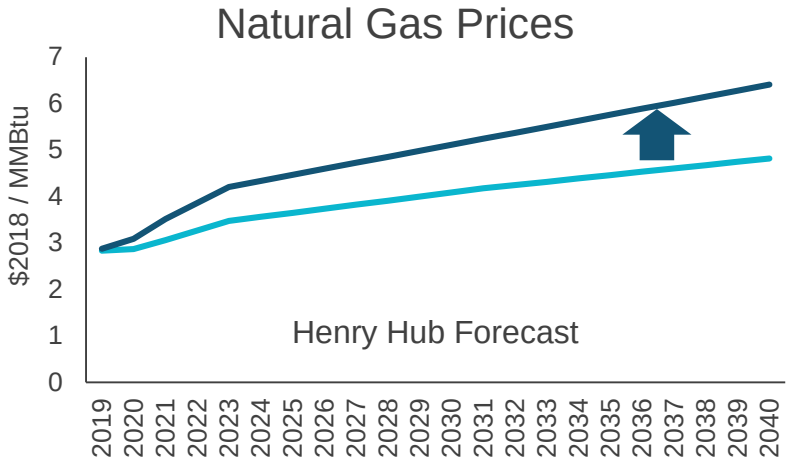
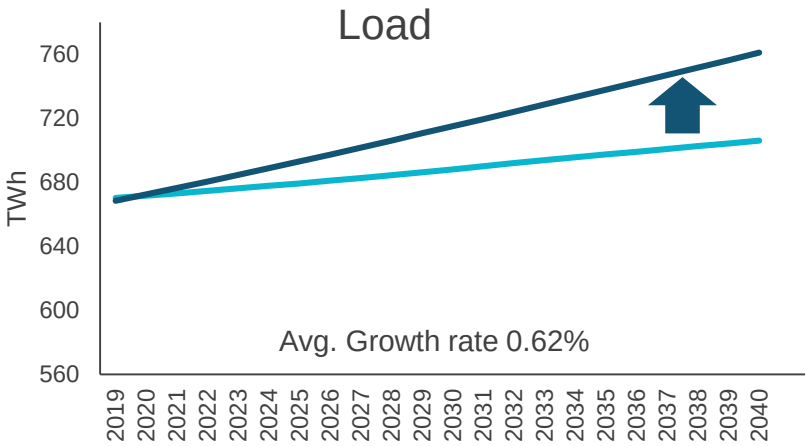
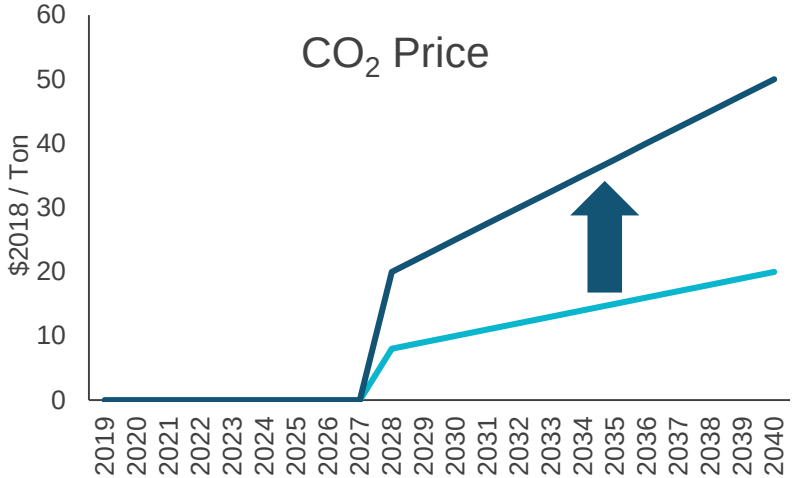
US Economy Decarbonizes

- A national cap on CO2 emissions affects all sectors of the US economy, negatively affecting fossil generation and changing end-use demand patterns

Primary Drivers







Notes

Case contemplates CO2 pressure on US economy, consistent with the Accelerated Fleet Change view

CO2 pressure drives coal-to-gas switching, resulting in increased demand for natural gas and higher prices

CO_2 pressure is the primary driver of this case, emissions drop 20% from current levels by 2040

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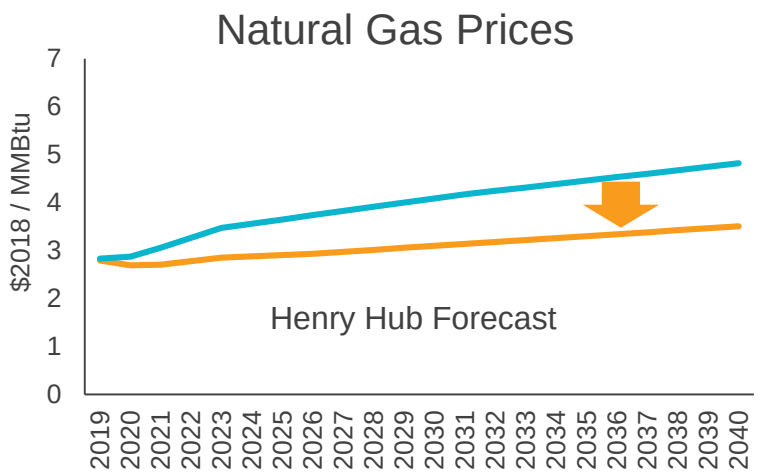
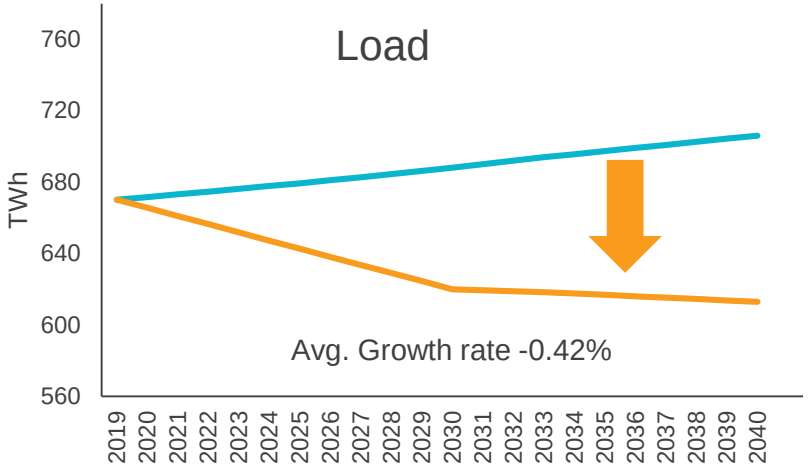
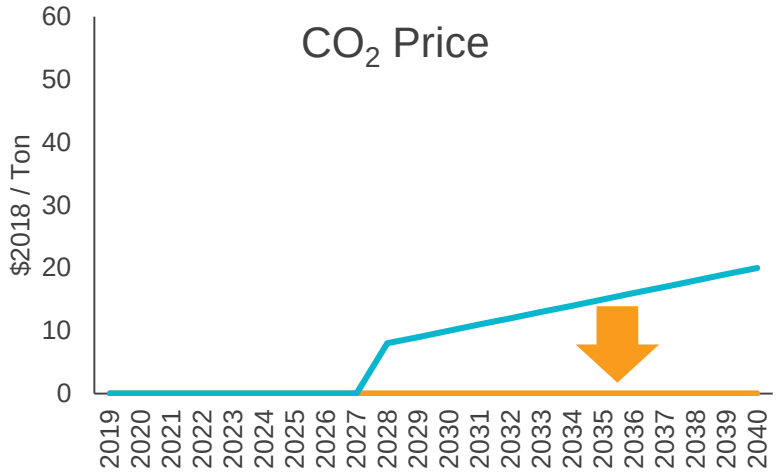
Customers in Control

- Widespread procurement of renewable energy by large C&I customers reduces demand for central station power and impacts load shape

Primary Drivers







Notes

15% C&I 2030 load & 20% C&I 2040 load met by customer procured resource, reducing demand for central station power

Customer preference for renewable generation lowers demand for central station electricity, resulting in lower natural gas prices

Case contemplates customer demand for renewables as manifestation of CO_2 pressure on electric sector

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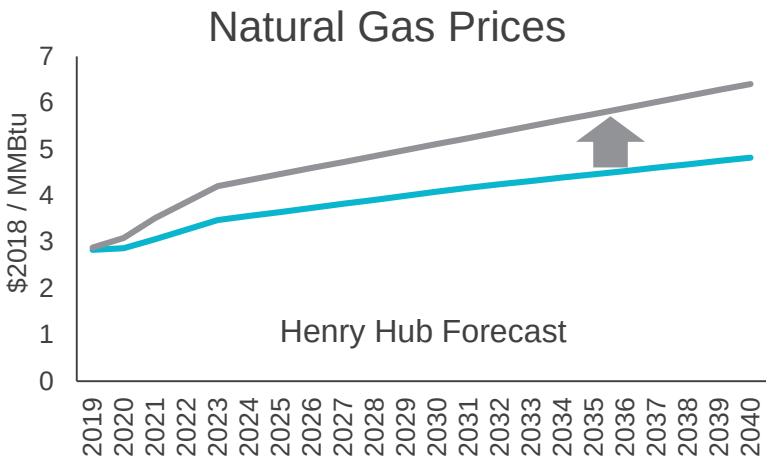
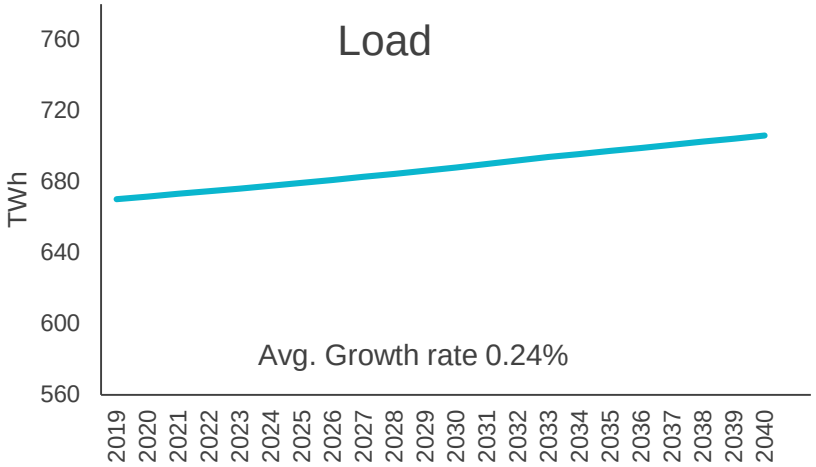
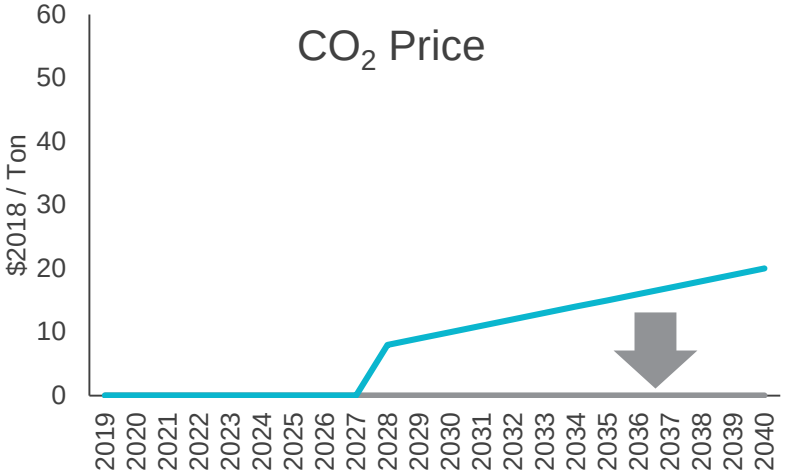
Challenged Gas Economy

- Restrictions on gas resource and infrastructure expansion result in high commodity prices for natural gas and reduced reliability of gas-fired units

Primary Drivers







Notes

Restricted access to gas resource raises commodity price of natural gas

Case contemplates restriction on production and transport of gas as manifestation of CO2 pressure on electric sector

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Scenario Details

Scenario	**Base Case**	**Stagnating Economy**	**U.S. Economy Decarbonizes**	**Customers in Control**	**Challenged Gas Economy**
Core Inputs and drivers	• Low gas prices and decreasing RE costs leading to expected MISO market evolution	• No growth in load • Lower gas commodity prices	• CO_2 tax on electric sector • End-Use Electrification (e.g. EVs)	• Rapid deployment of customer-driven renewables	• High cost natural gas • Reduced capacity value for gas resource
Resulting Changes from Current Trends	• Reduced capacity value for PV	• Fewer MISO Coal retirements • CO2 pressure relaxed	• Low PV, wind, and storage costs • Increase in gas commodity prices • Reduced capacity value for PV	• Reserve margin requirements increase • Reduced PV costs	• Reduced capacity value for gas combined cycle resources
Key Risks Addressed	Low market price outlook requires careful portfolio management	Market prices don't support heavy storage or renewable investment	Reduced economic performance of fossil units and exposure to market changes for all units	Demand destruction from customer-driven generation, changes in daily load patterns, and increase need for load-following resource	Restrictions on production and transportation increase gas prices and reduce reliability of gas-fired options

Appendix

Review: LRRP Analysis Results Reported In The Scorecard

The Scorecard provides a framework for evaluating trade-offs between portfolio alternatives across a set of defined metrics

	Low Wholesale Rates			Rate Stability & Predictability				Resource Diversity			Sustainability of Portfolio		
	5 Yr NPV of System Costs	20 yr NPV of System Costs	Growth in Customer Rates	Max NPV Under Edge Scenario	Min NPV Under Edge Scenario	25th & 75th Percentile Range	NPV of Costs - 95th Percentile	Portfolio Generation by Tech	Portfolio Capacity by Tech	Ratio Owned to Contracted	Total Fleet Emissions	Fleet Water Consumed	Fleet Waste Produced
Portfolio	$/MWh	$/MWh	%	$/MWh	$/MWh	%+ and %-	$/MWh	% by Tech	% by Tech	%	Tons CO2e	Gallons	Tons
Portfolio 1													
Portfolio 2													
Portfolio 3													
...													

Portfolio design is critical component of the LRRP Scorecard

Portfolios are distinct and reflect Hoosier priorities

Scenario results will drive the "Rate Stability& Predictability" metrics on the Scorecard

Recommended Scenario Drivers: Details

Category	Driver	Base Case	Customers in Control	Stagnating Economy	Challenged Gas Economy	US Economy Decarbonizes
Fuel Prices	**Natural Gas Price**	CRA Base	CRA Low	CRA Base	CRA High	CRA High
	Coal Price	CRA Base	CRA Base	CRA Base	CRA Base	CRA Low
Load	**MISO Load Growth**	MTEP CFC	MTEP CFC	MTEP LFC	MISO CFC	MTEP AFC
	MISO Load Shape	MTEP Base	MTEP Base	MTEP Base	MTEP Base	MTEP DET
Generator Costs	**Solar Costs**	CRA Base	CRA Low	CRA High	CRA Base	CRA Low
	Wind Costs	CRA Base	CRA Base	CRA High	CRA Base	CRA Low
	Battery Costs	CRA Base	CRA Base	CRA High	CRA Base	CRA Low
Regulatory	**MISO Emissions**	Base CO_2 Price	No Carbon Price	No Carbon Price	No Carbon Price	High CO_2 Price
Market	**MISO RM**	8.9% by 2024	11.4% by 2024	7.9%	8.9% by 2024	8.9% by 2024
	Capacity Credit	PV: 50% → 30%	PV: 50% → 30%	PV: 50% → 50%	PV: 50% → 30% NGCC: -15%	PV: 50% → 20%
Market Capacity	**Planned Additions**	Planned / Announced	15% by 2030 & 20% by 2040 C&I load served by customer resource	Planned / Announced	Planned / Announced	Planned / Announced
	Planned Retirements	Planned / Announced	Planned / Announced	Fewer Coal Retirements	Planned / Announced	No MISO Nuclear Retirements

Long-Range Resource Plan

Planning Scenarios and Portfolio Options

July 8, 2019 Board Meeting

HOOSIER ENERGY
A Touchstone Energy® Cooperative

CRA Charles River Associates

Objectives

- Respond to the LRRP questions raised by the BOD at the May meeting
- Share the overall LRRP timeline and examples of information that the BOD will review at upcoming meetings
- Discuss the outcome of the MISO market simulations for the LRRP scenarios previously shared with the BOD
- Preview the early plant retirement alternatives that will be tested by CRA in the LRRP portfolio modeling

Agenda

May 13 Board Follow Up

LRRP Schedule

Report on MISO Market Simulations

Early Retirement Analysis

LRRP questions from the May BOD Meeting

- Fifty questions received from the May break-out sessions
- Responses prepared in a memo
- Questions generally covered the following categories:
  - Portfolio modeling approach
  - Fuel and CO2 allowance price forecasting
  - Options for Merom
  - Alternative replacement options and considerations
- Today we will provide some additional detail on the fuel and CO2 allowance price forecast questions

Fuel and CO2 allowance price forecast questions

- Gas Forecast Questions
  - Should we use current gas futures for the LRRP forecast, how long are they reliable?
  - Why does the gas forecast rise above current prices in the Base Case when futures are flat?
- Coal Forecast Questions
  - What are the coal price assumptions for each scenario?
  - How are the gas and coal price forecasts related, and are we being consistent in our views?
- CO_2 Price Modeling Questions
  - Why include a CO_2 price in the base case?

CRA fuels, power, and emissions forecast clients

Sample Utility Clients

Southern Company

Produce Southern Company's natural gas price forecast that is used in IRPs, avoided cost calculations, and other (last 10 years)

CPS ENERGY

Produce planning scenarios that include long-term natural gas price forecasts used in resource planning decisions

OglethorpePower

Produce long-term natural gas, electricity, and emission price forecasts, twice per year

Sample Investor Clients

SIEMENS

Evaluated numerous gas-fired power plants, primarily in the Eastern US

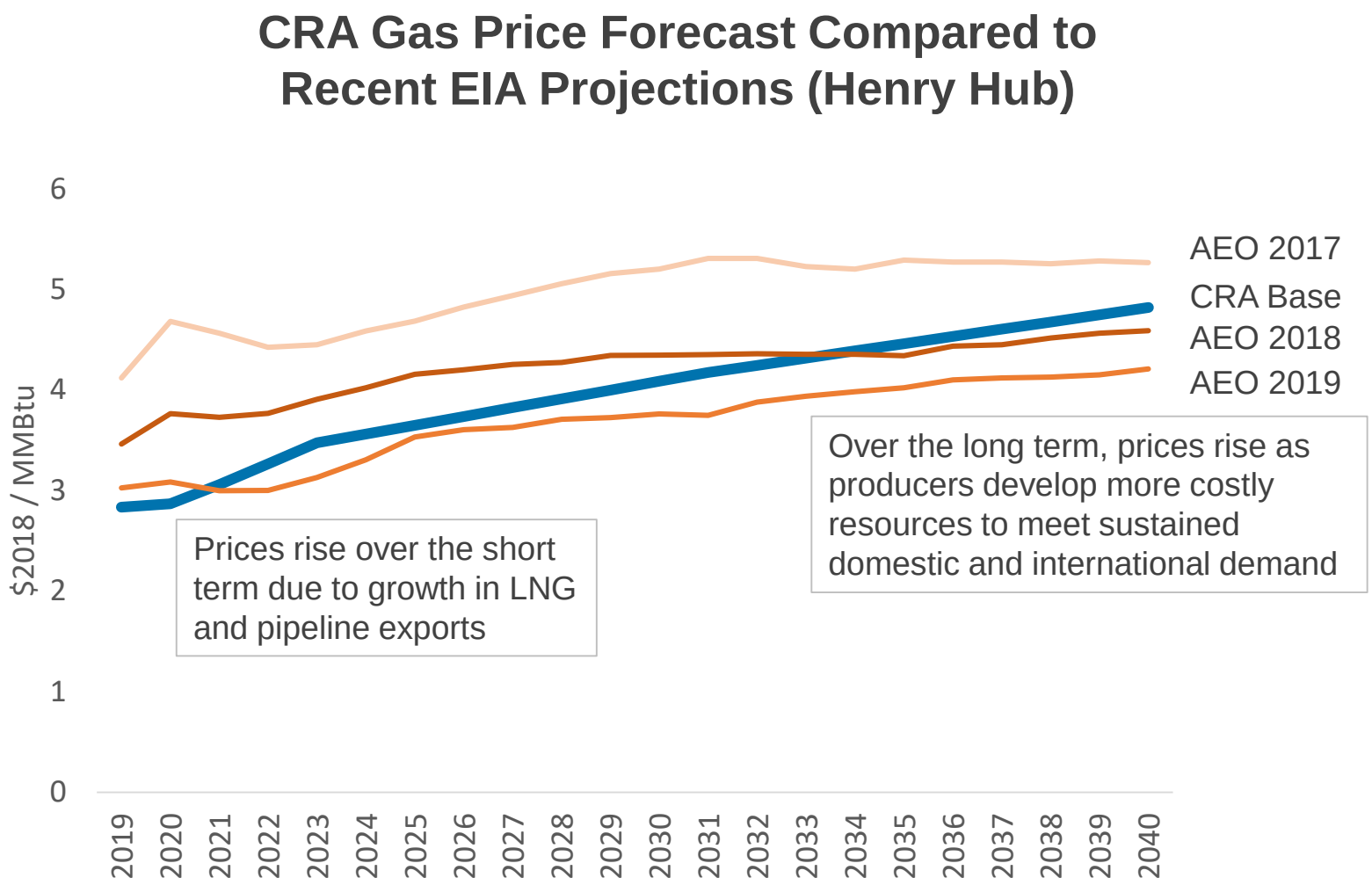
MITSUBISHI HITACHI POWER SYSTEMS

Evaluated dozens of natural gas power plants across the US using CRA gas and power price forecasts

MACQUARIE

Supported numerous utility and power asset transactions across the US

Natural gas price forecast



Source: U.S. Energy Information Administration Annual Energy Outlook (AEO) for 2019, 2018 & 2017, CRA Analysis.

CRA Charles River Associates

CRA's natural gas fundamentals model

A fundamental price forecast answers the question: "What gas price is needed to satisfy total demand and make producers whole?"

CRA Natural Gas Fundamentals Model (NGF)

Gas Supply

- Total resource in place, proved and unproven
- Resource growth over time
- Wet / dry product distribution
- Historic wells drilled and ongoing production
- Conventional & associated production
- Existing tight and coal bed methane
- Existing offshore production

Well Performance

- Drilling & completion costs
- Environmental compliance costs
- Royalties & taxes
- Initial production rates
- Changing drilling and production efficiencies over time
- Productivity decline curve
- Well lifetime
- Distribution of performance

Gas Demand

- Electric and non-electric sector demand forecast (domestic)
- International demand (net pipeline & LNG exports)

Other Market Drivers

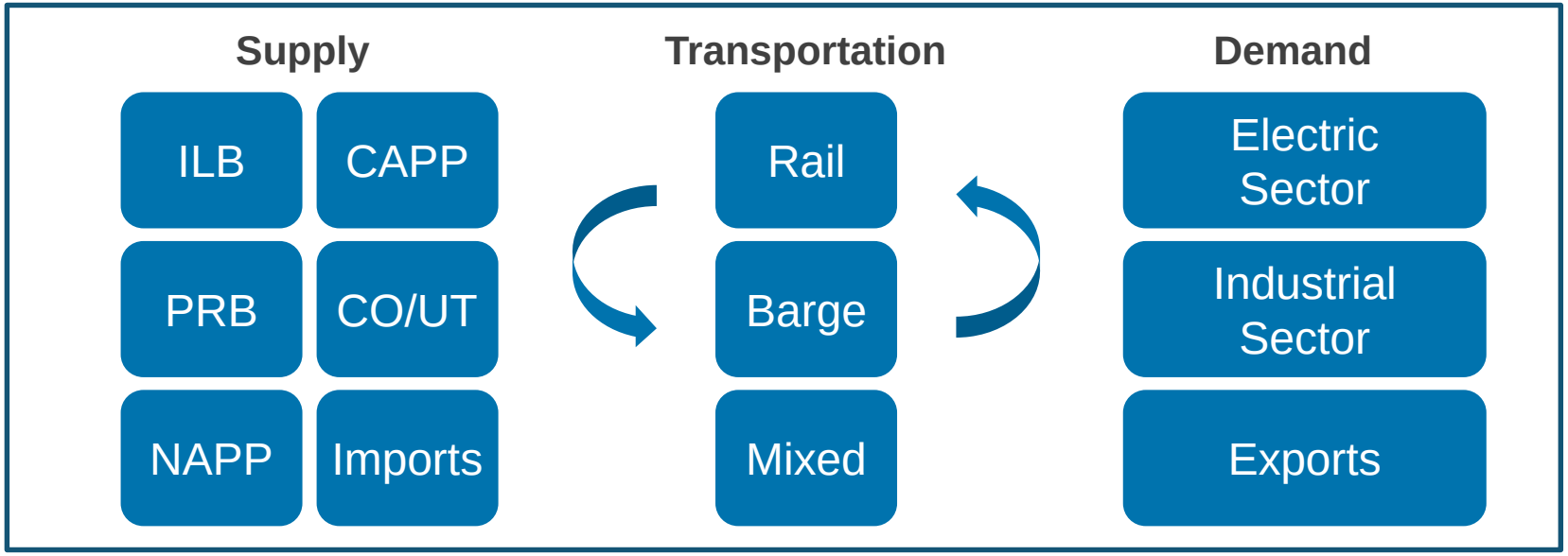
- Value of natural gas liquids and condensates
- Natural gas storage

CRA's approach to forecasting natural gas prices

- CRA is using a NG forecast that is higher than the natural gas futures price, which is flat
  - CRA's NG forecast is "solved" by evaluating the intersection of supply and demand in future periods
  - The NG futures price is a traded contract price for natural gas deliveries out in future time periods
- It is the view of CRA's experts that the NG futures strip is not a reliable indicator of long-term future actual prices
- CRA's NG forecast rises gradually from current prices as a result of producer pricing pressures and increasing demand
- CRA's forecast is consistent with other fundamental forecasts over the long term; we also will run alternative cases for the LRRP

CRA's approach to forecasting coal prices

- Coal forecasting process assesses the future supply and demand balance for the U.S. coal market:
  - Macroeconomic drivers, including domestic and international demand
  - Microeconomic drivers, including trends in mining costs and production trends
- Includes consideration of electric and gas market feedbacks



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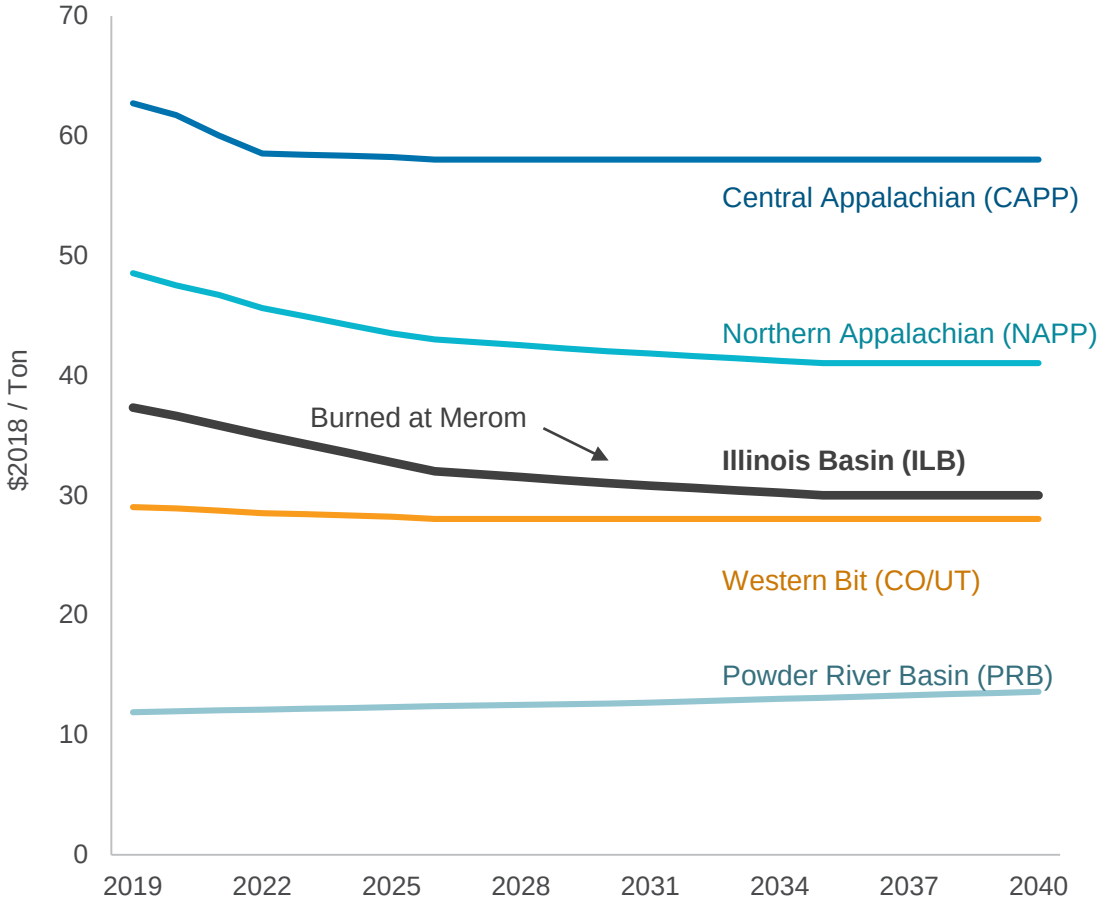
Coal price forecast



Source: CRA Analysis

Comments

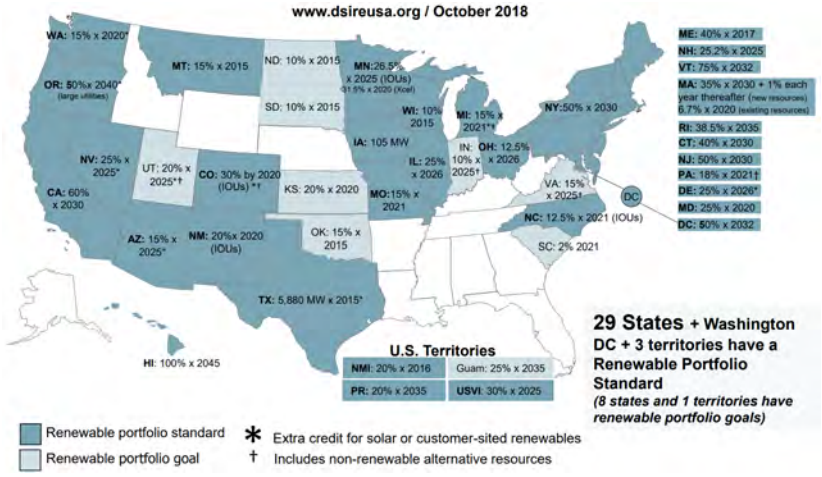
- Flatter prices reflect reduced demand offset by increased production cost
- Exports grow from current levels, but not enough to offset lost domestic demand for steam coal

Considerations in CO2 allowance price forecasting

- Actions targeting CO2 emissions are emerging at the state, federal, and international level
- The generation sector is a likely target for CO2 reduction requirements

Two regional CO2 markets in the US today

Widespread state renewable requirements



Endangerment finding requires EPA to curb emissions

- EPA has set New Source Performance Standards (NSPS) for new or modified sources under the Clean Air Act
- EPA has recently finalized the Affordable Clean Energy Rule, an emissions standards for existing sources that replaces the Clean Power Plan

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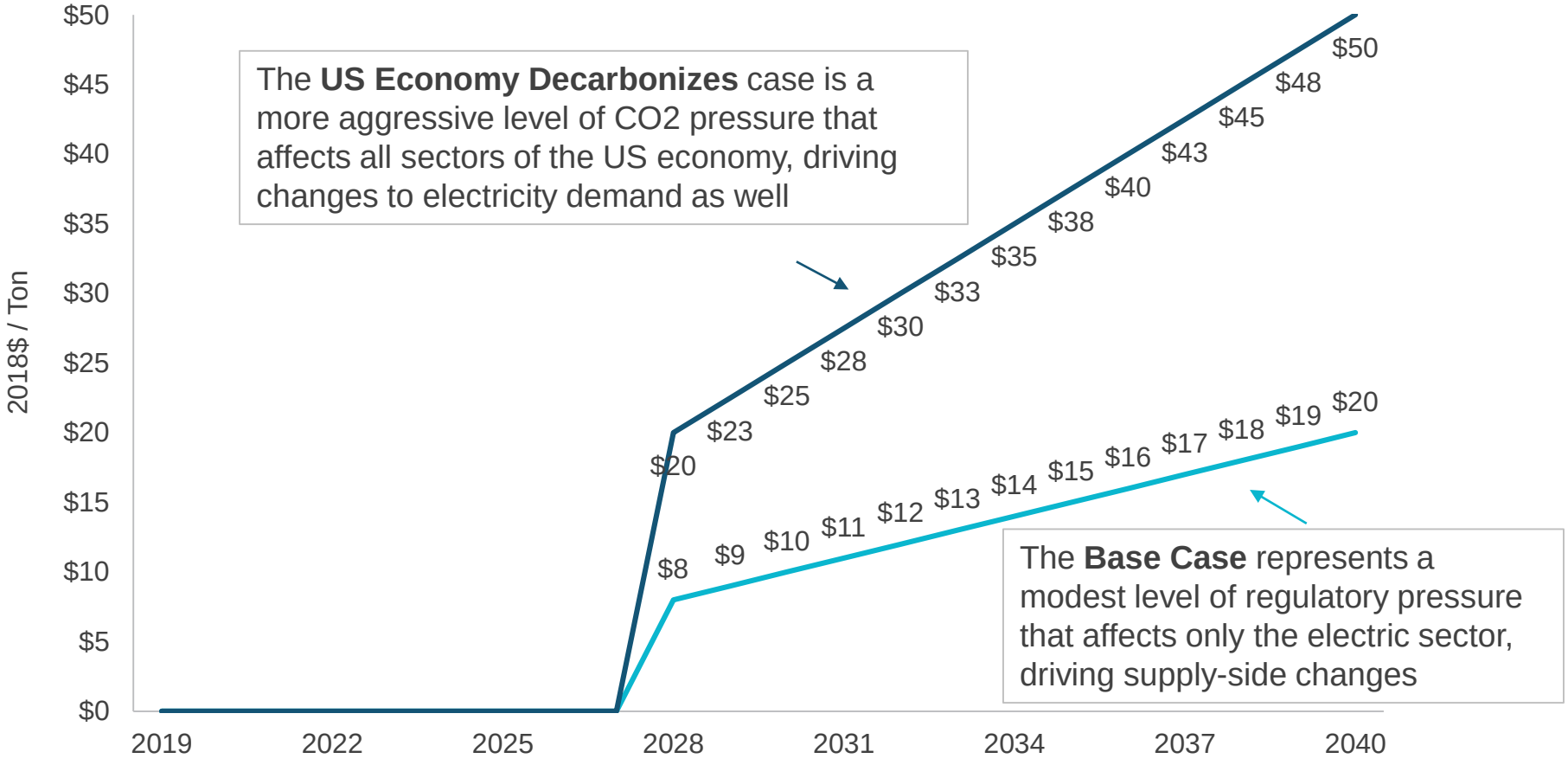
CO2 allowance price forecast



Source: CRA Analysis

CRA Charles River Associates

Agenda

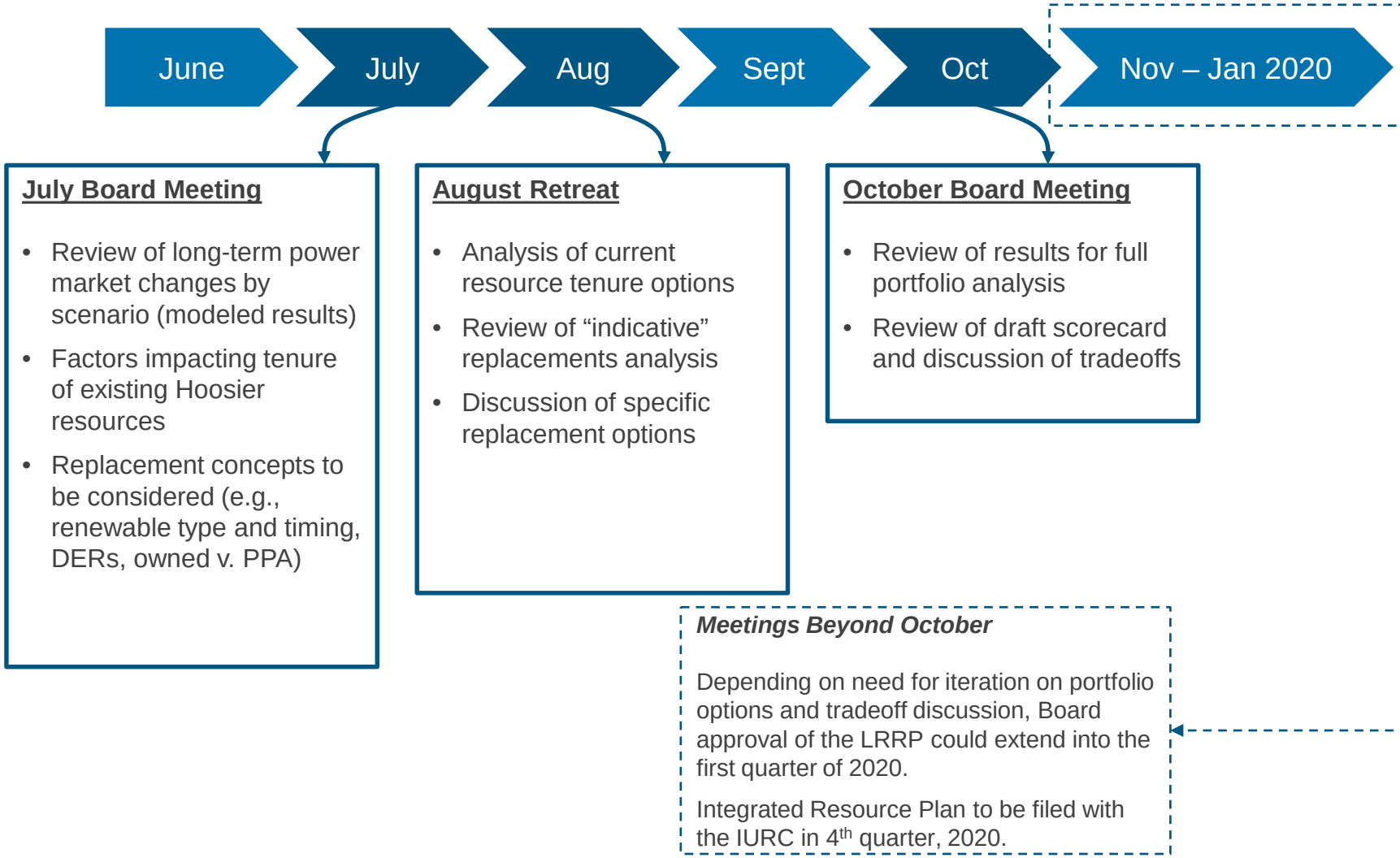
May 13 Board Follow Up

LRRP Schedule

Report on MISO Market Simulations

Early Retirement Analysis

LRRP schedule for upcoming Board meetings



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Agenda

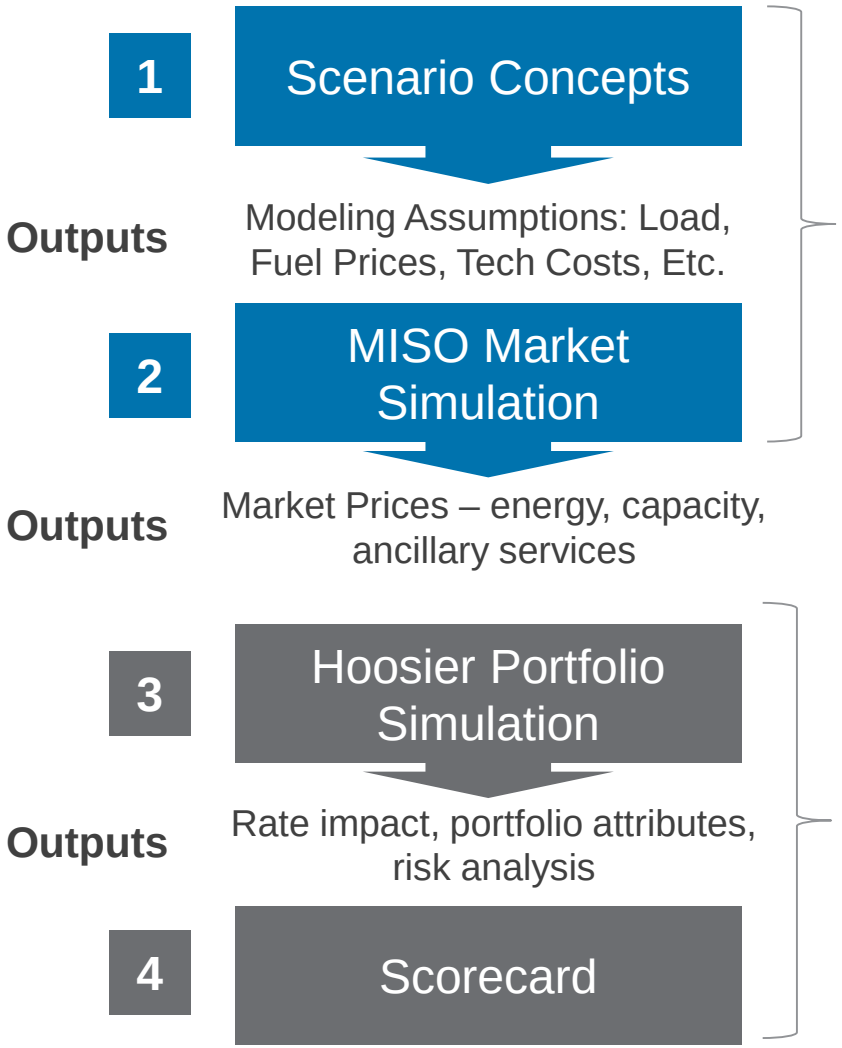
May 13 Board Follow Up

LRRP Schedule

Report on MISO Market Simulations

Early Retirement Analysis

Analytical framework



Focus of Today's Discussion
The price forecasts for each scenario that will be used in the Hoosier portfolio simulation

Focus for August +
Comparison of portfolios when evaluated against each scenario – includes early retirement analysis, resource additions, etc.

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Hoosier market scenarios

Base Case

- The MISO market continues to evolve based on the current outlook for load growth, commodity prices, technology development, and regulatory pressure

Stagnating Economy

- Decline in economic outlook relieves regulatory pressure and results in a low load growth environment and fewer coal retirements

US Economy Decarbonizes

- A national cap on CO2 emissions affects all sectors of the US economy, negatively affecting fossil generation and changing end-use demand patterns

Customers in Control

- Widespread procurement of renewable energy by large C&I customers reduces demand for central station power and impacts load shape

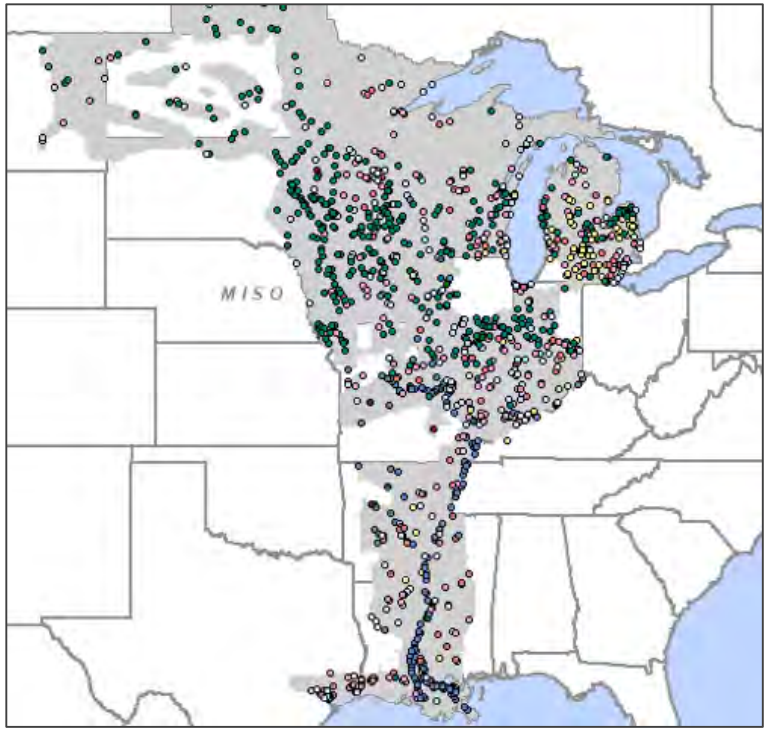
Challenged Gas Economy

- Restrictions on gas resource and infrastructure expansion result in high commodity prices for natural gas and reduced reliability of gas-fired units

MISO market modeling

CRA ran each scenario through Aurora to simulate how demand would be met by power supply in the MISO market

Location of MISO Generating Units

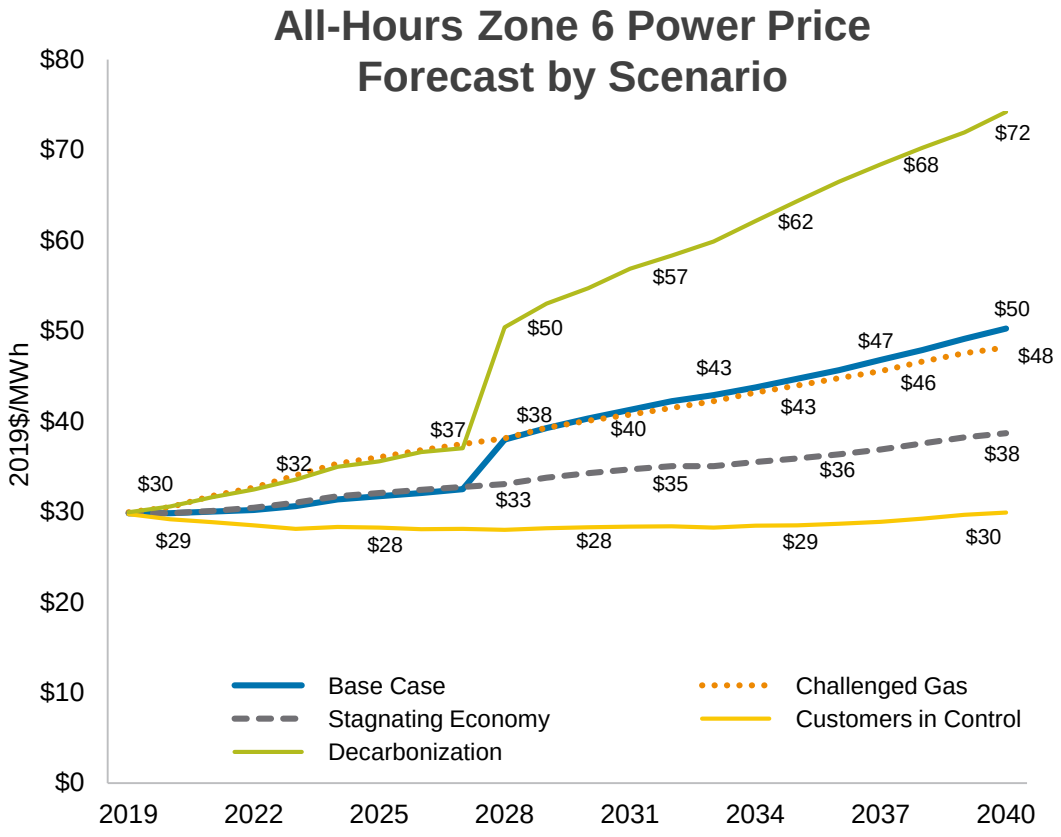


AURORA Electric Forecasting Model

- Hourly chronological dispatch of supply to meet demand in MISO, and beyond
- Detailed representation of load, generating sources, and transmission constraints across zones
- “Solves” system long term to identify least cost retirements, additions, upgrades
- Key outputs of modeling: energy prices, capacity prices

MISO zone 6 (IN) prices by scenario

The power price forecasts produced for each of the scenarios reflect the differences between the cases



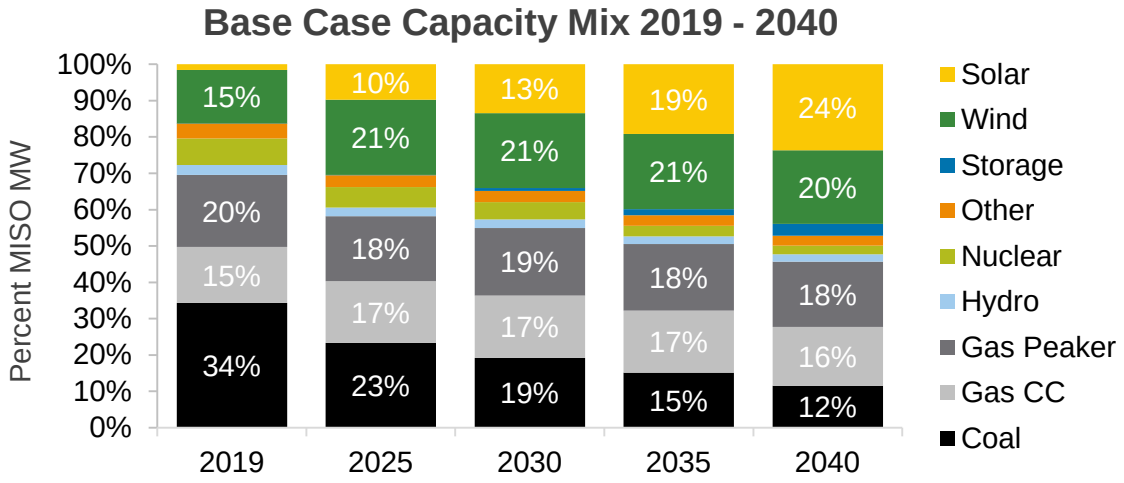
Source: CRA Analysis

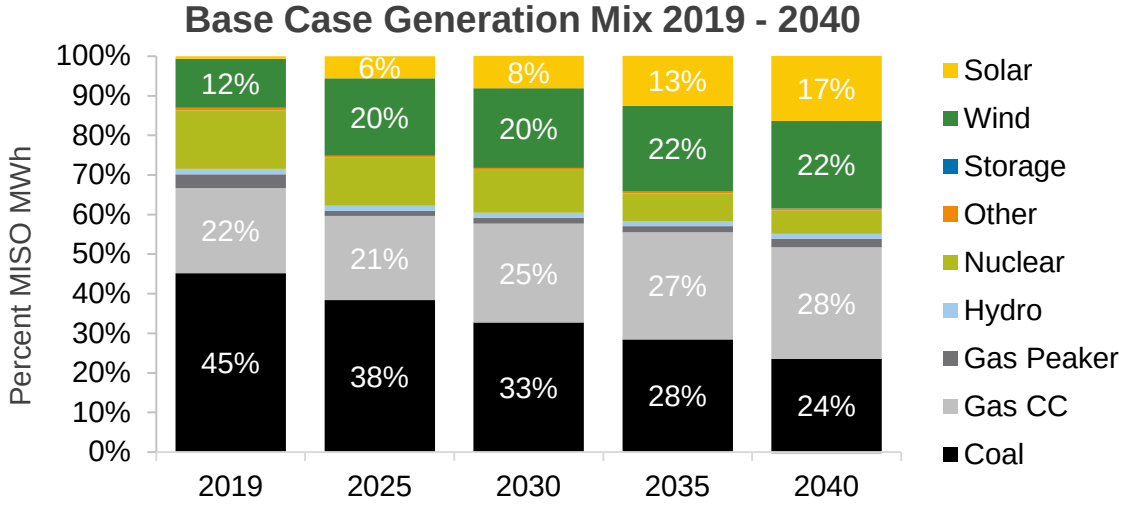
Comments

- Scenarios provide broad spread of power price outcomes around the Base Case
- Base Case gradually increases with gas prices until carbon policy emerges in 2028
- Customers in Control shows the lowest power prices driven by low gas and high renewable penetration
- US Economy Decarbonizes results in highest prices due to high level of CO_2 pressure and high gas price view

Capacity and generation mix – base case

The base case sees a significant shift in the capacity mix





Comments

- Wind and solar grow significantly over the period
- Natural gas capacity grows as coal and nuclear resources retire
- Market generation mix mirrors capacity changes
- Lost coal and nuclear generation replaced by renewables, primarily
- Wind & solar comprise 40% of market generation by 2040

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Agenda

May 13 Board Follow Up

LRRP Schedule

Report on MISO Market Simulations

Early Retirement Analysis

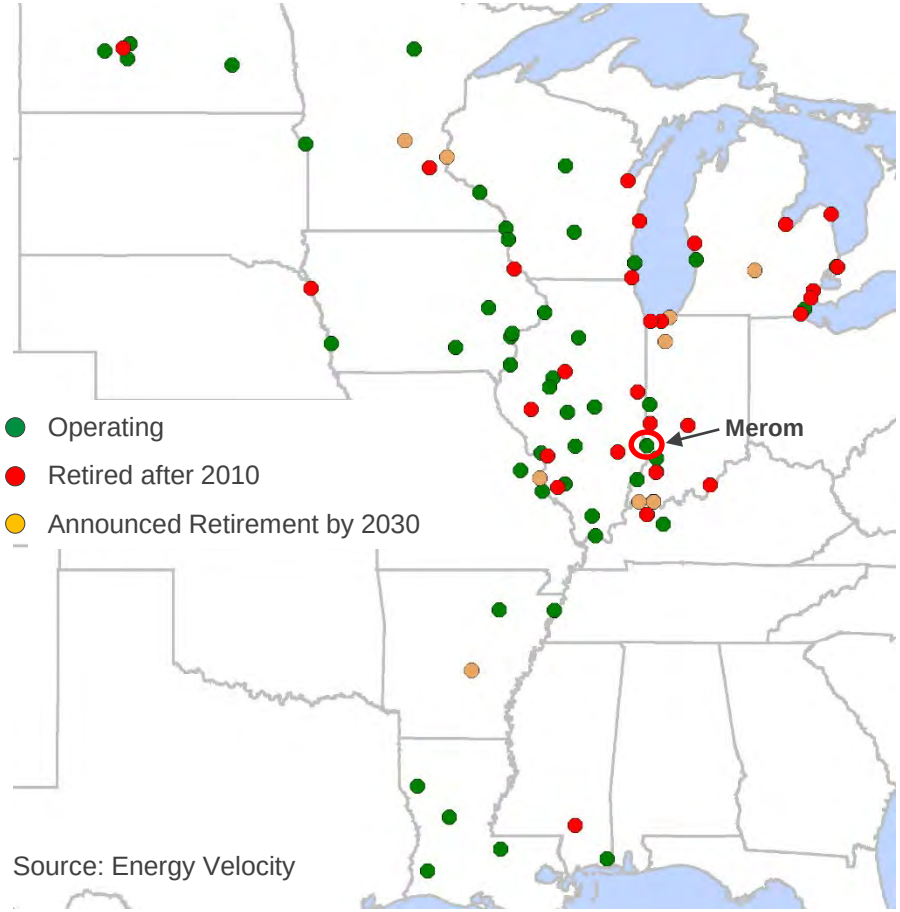
Rationale for evaluating early retirements

- Other utilities retiring coal and older natural gas-fired resources
- The cost of alternative technologies has fallen significantly
- Short term additions of new efficient gas and renewables may put price pressure on older combined cycle gas units
- Flexibility to take advantage of emerging technologies like storage
- Potential for a more renewable, diverse, and flexible portfolio

Note: The analysis will consider that some plant costs are sunk and will need to be recovered even when the plant is retired

Coal units in MISO – operating and retired

Location of Coal Units in MISO
Operating, Retired, Announced Retirement



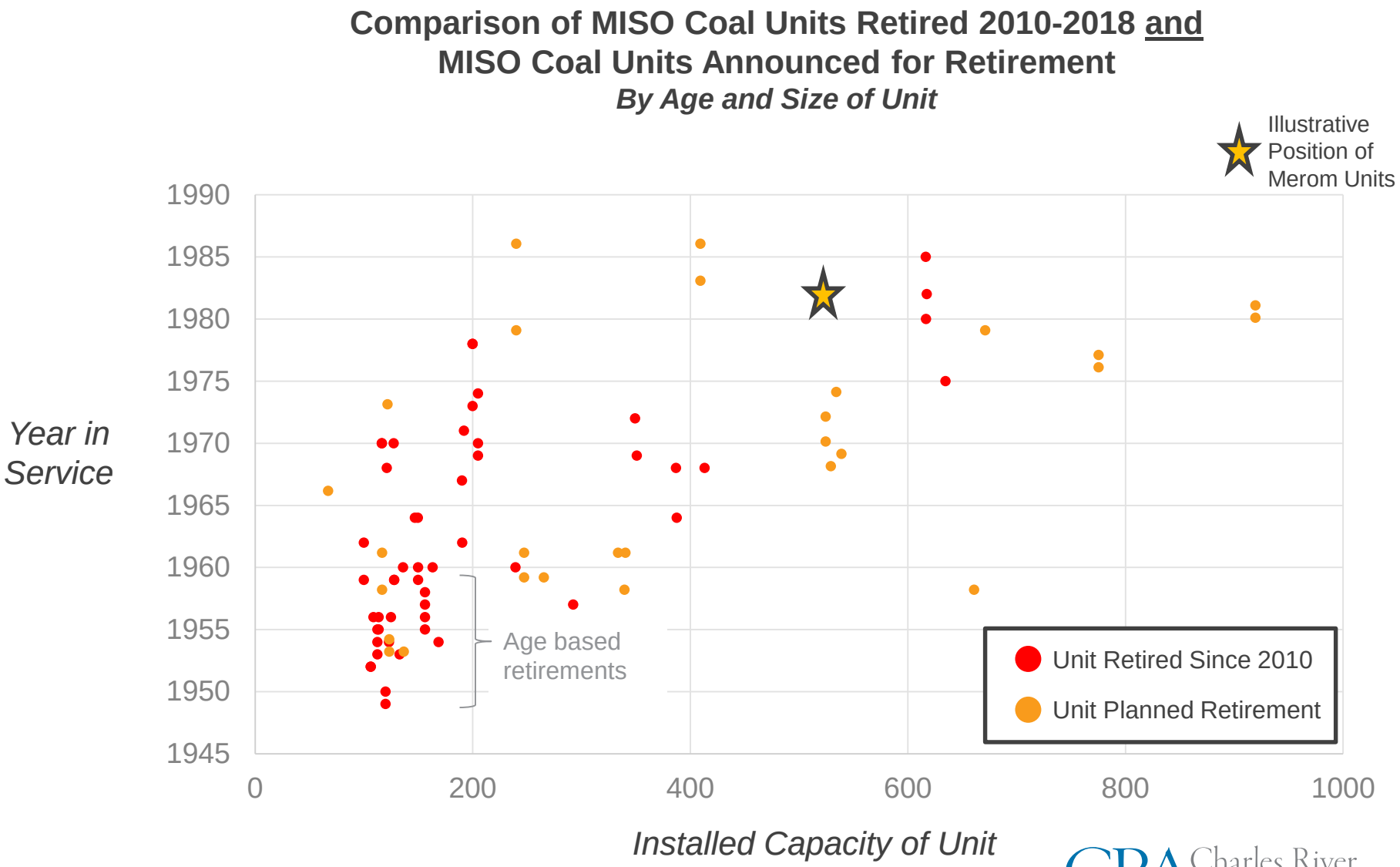
Source: Energy Velocity

Comments

- Since 2010, approximately 10% of coal-fired capacity has been retired in MISO*
  - 52 units total
  - Smaller units: 210 MW ave.
  - Most due to environmental compliance considerations
- Approximately 15% of remaining capacity has been announced for retirement in the next 10 years
  - 28 units total
  - Unit size: 420 MW ave.

**Greater than >100 MW*

Recent and planned coal unit retirements



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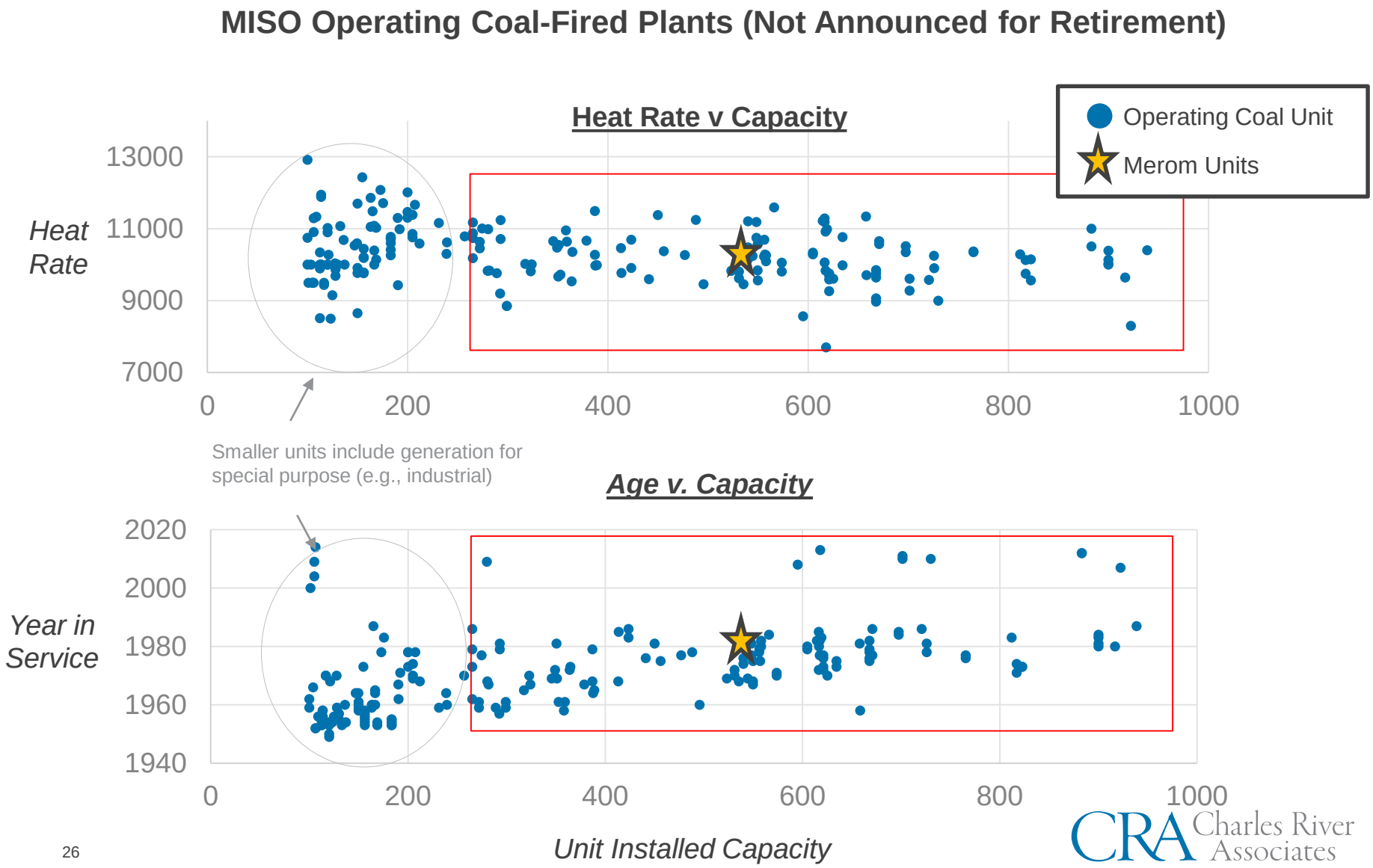
Merom relative to other units – efficiency and age



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Early retirement dates for LRRP modeling

Merom Early Retirement Alternatives

- 2023 is the earliest plausible retirement year
  - Significant work is required to close the units and arrange for replacement capacity
- 2028 market conditions may worsen for Merom
  - By 2028 MISO market conditions (e.g., prices) across the LRRP scenarios have separated meaningfully, which likely impacts Merom economics
- 2033 is the year that Merom will be fully depreciated
  - This is a natural decision point with respect to further operating the facility

Holland Early Retirement Alternative

- Early retirement of Holland will also be considered as part of the “everything on the table” approach to LRRP development

Early retirement plan combinations

Case	Concept	Units	2023	2026	2028	2033
0	No Early Retirement	Merom 1 Merom 2 Holland				
1	Merom Retires End of Book	Merom 1 Merom 2 Holland				Retired Retired
2	Merom EoB, Holland Early	Merom 1 Merom 2 Holland		Retired		Retired Retired
3	Merom 1 & 2 Retire 2023	Merom 1 Merom 2 Holland	Retired Retired			
4	First Possible Retirement	Merom 1 Merom 2 Holland	Retired Retired	Retired		
5	Mixed Late Merom Retirement	Merom 1 Merom 2 Holland			Retired	Retired
6	Merom 1 & 2 Retire 2028	Merom 1 Merom 2 Holland			Retired Retired	
7	Mixed Early Merom Retirement	Merom 1 Merom 2 Holland	Retired		Retired	

Bookend early Merom retirement with and without Holland

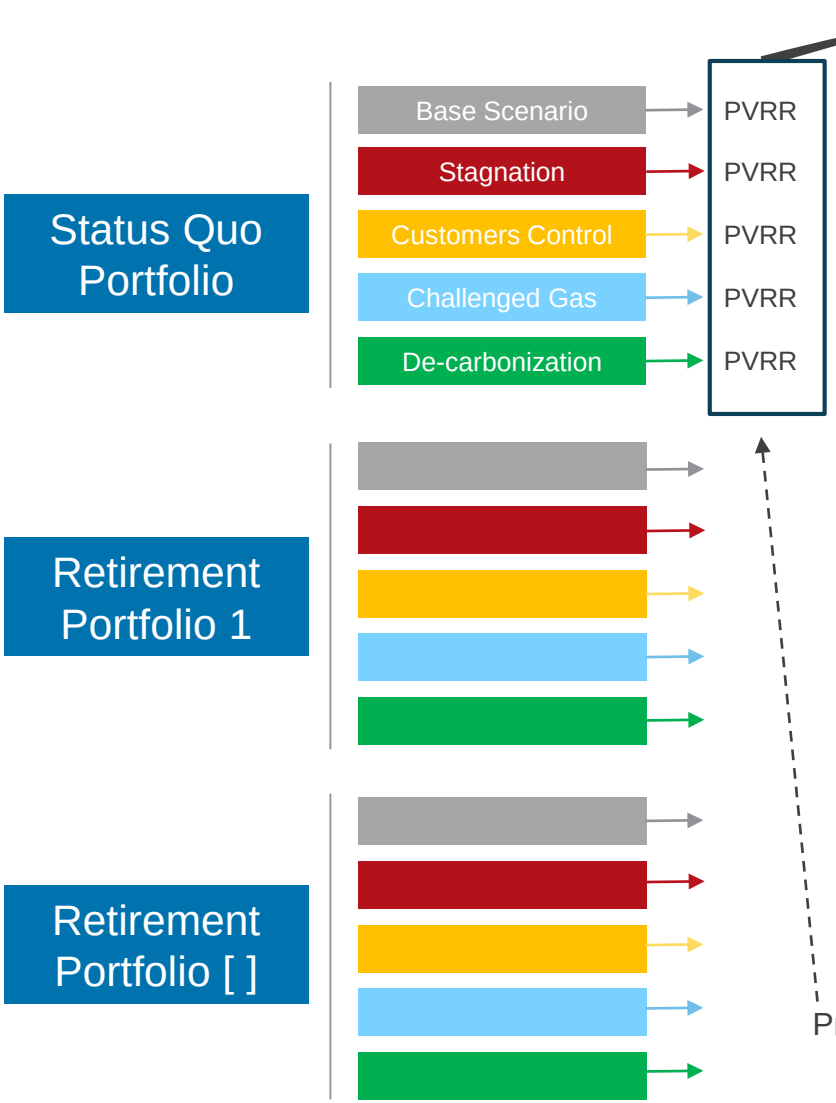
Test impact of alternate Merom retirement dates

Replacement options

- The current stage of the LRRP is focused on whether earlier retirement of Merom or Holland makes sense
- We will use an “indicative” set of replacements to test the alternative retirement combinations
  - Indicative replacements reflect lower cost options selected during the MISO market simulation – e.g., what was chosen to replace coal
- A detailed analysis of the type, size, and timing of replacements will follow once potential retirement approaches are identified
  - Examples: sizing of renewables v gas, central v distributed, owned v PPA

Scorecard development

We will develop a scorecard for each of the retirement portfolios options



Scorecard Objectives >>	Low Wholesale Rates	Rate Stability & Predictability	Environmental & Employee Impacts	Resource Diversity
Portfolio 1				
Portfolio 2				
Portfolio N				

Present Value of Revenue Requirement (PVRR)

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Long Range Resource Plan

Early Retirement Screening

August 19, 2019

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Supply Portfolio

Hoosier Energy will actively manage its current and future supply portfolio to provide reliable and affordable energy emphasizing a diversified portfolio, including traditional and alternative resources.

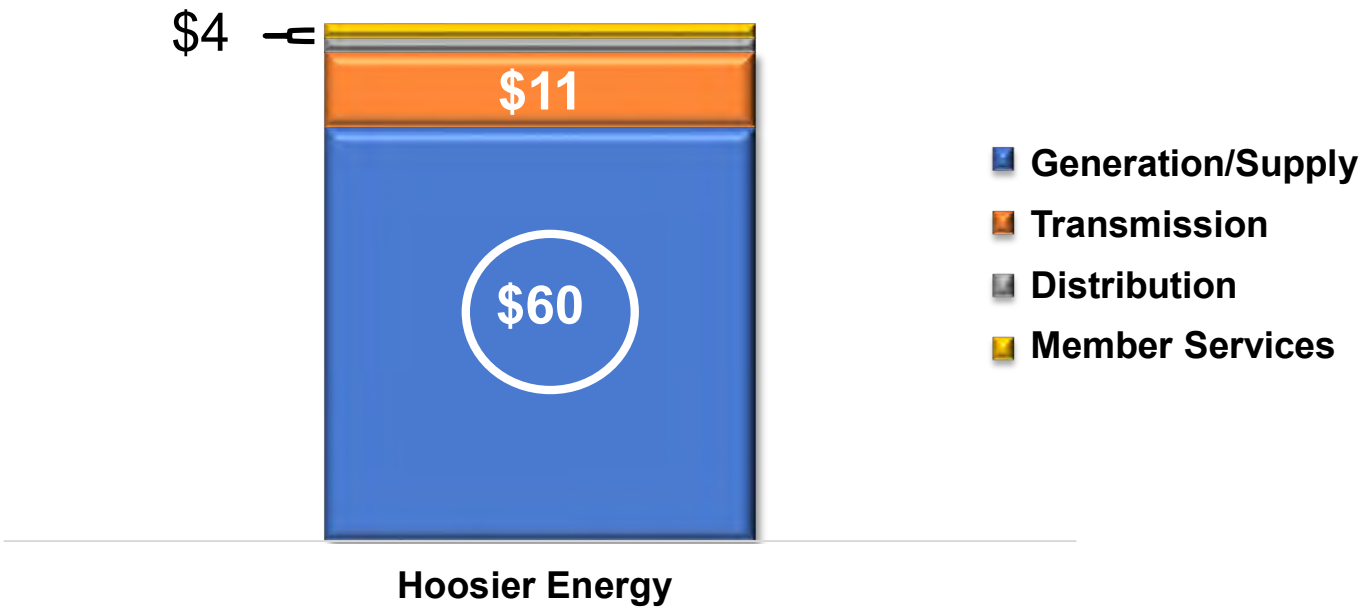
Strategic Considerations

- Emphasis on clear plans and options/contingencies for Merom
- Importance of a diversified portfolio (technologies, fuels, geographies, ownership/PPAs, etc.)
- Understanding of dispatch flexibility in changing markets
- Looking to the future with emerging renewable and other distributed technologies (e.g., battery storage)

Board Oversight – Methods of Monitoring Progress

- Consistent reporting of other G&T portfolios (what, how is it changing, and why)
- Ensure Integrated Resource Plan and Long Range Resource Plan clearly investigate relevant aspects of a diversified portfolio with input from all stakeholders (Board, Managers and Hoosier staff)

Average Electricity Price 2018
($/MWH)



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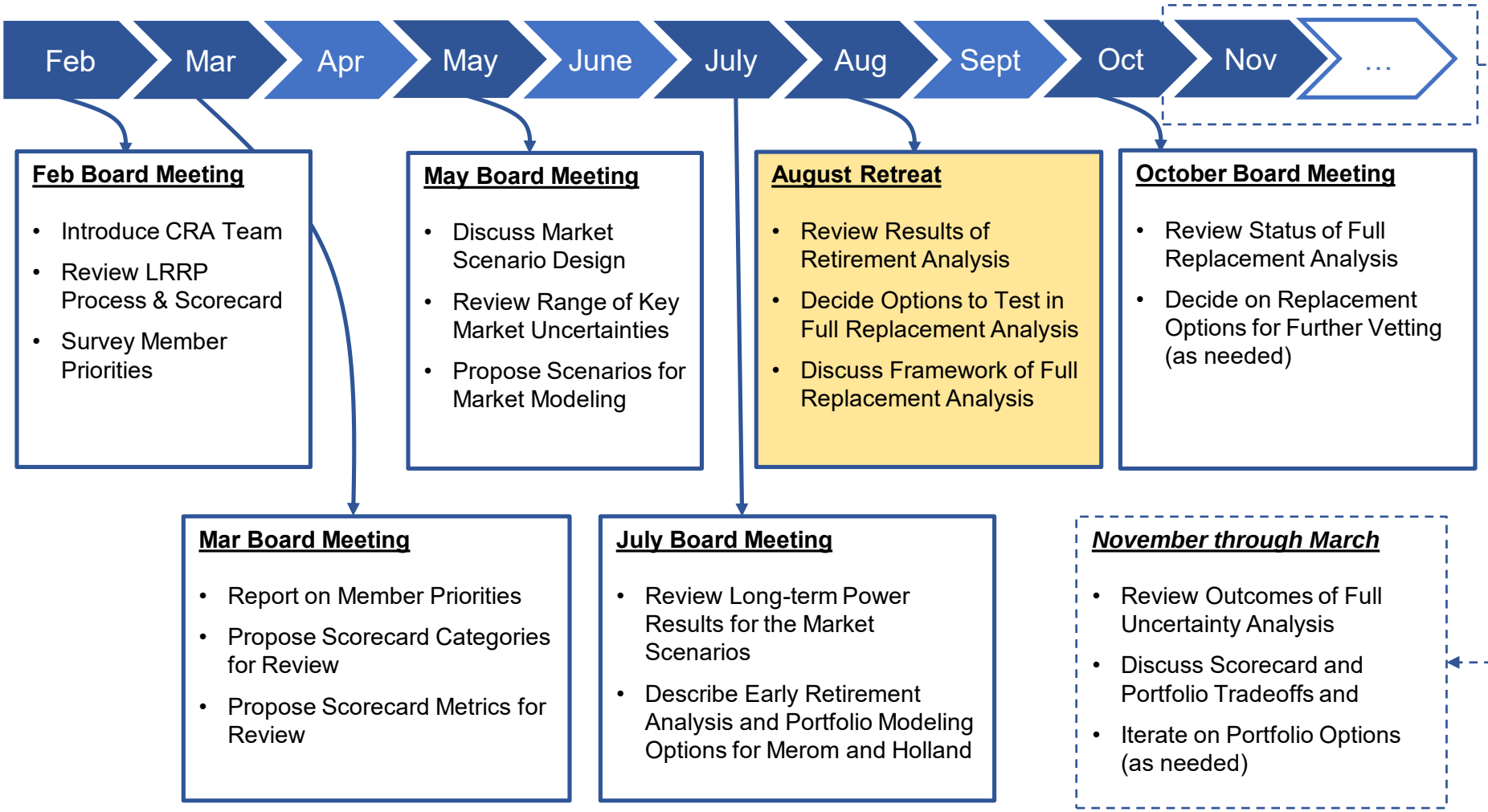
LRRP Schedule



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List of Scorecard Factors

Rate Predictability and Stability	Construction of New Resources	Operation of Portfolio Resources
Customer Procurement Flexibility	Employee Impact	Deployment of Emerging Technologies
Resource Location	Resource Diversity	Sustainability of the Portfolio
Ownership of Power Supply Resources	Wholesale Rates	Development of Demand-Side Resources

The Full Scorecard Will be Used in our Portfolio Analysis

Alternative resource portfolios will be compared on how well they meet objectives for low and stable rates, resource diversity, and sustainability

	Low Wholesale Rates			Rate Stability		Predictability		Sustainability of Portfolio			Resource Diversity			Employee Impact
	Base 5-Year Rate	Base 10-Year Rate	Base 20-Year Rate	20-Year Range	20-Year Max	25th & 75th Percentile Range	NPV of Costs - 95th Percentile	Total Fleet Emissions	Fleet Water Consumed	Fleet Waste Produced	Portfolio Generation by Tech	Portfolio Capacity by Tech	Ratio Owned to Contracted	Portfolio Rating
Portfolio	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh	%+ and %-	$/MWh	MMTons CO2e	MM Gallons	Tons	% by Tech	% by Tech	%	Rating
Portfolio 1														
Portfolio 2														
Portfolio 3														
...														

Early Retirement Screening metrics ensure Hoosier captures the most savings possible from any early unit retirements

The Full Early Retirement / Replacement Analysis will introduce data on the additional objectives affected by more diverse set of new resource choices

Scenarios Evaluated

Base Case

- The MISO market continues to evolve based on the current outlook for load growth, commodity prices, technology development, and regulatory pressure

Flat Gas

- Base case sensitivity where natural gas stays flat according to market futures prices and no carbon policy is enacted

Stagnating Economy

- Decline in economic outlook relieves regulatory pressure and results in a low load growth environment and fewer coal retirements

US Economy Decarbonizes

- A national cap on CO2 emissions affects all sectors of the US economy, negatively affecting fossil generation and changing end-use demand patterns

Customers in Control

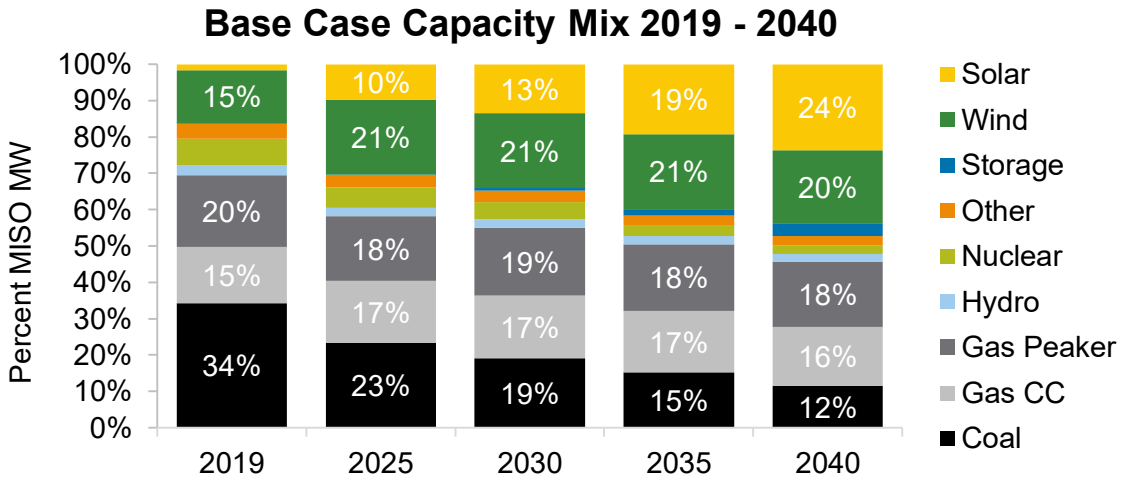
- Widespread procurement of renewable energy by large C&I customers reduces demand for central station power and impacts load shape

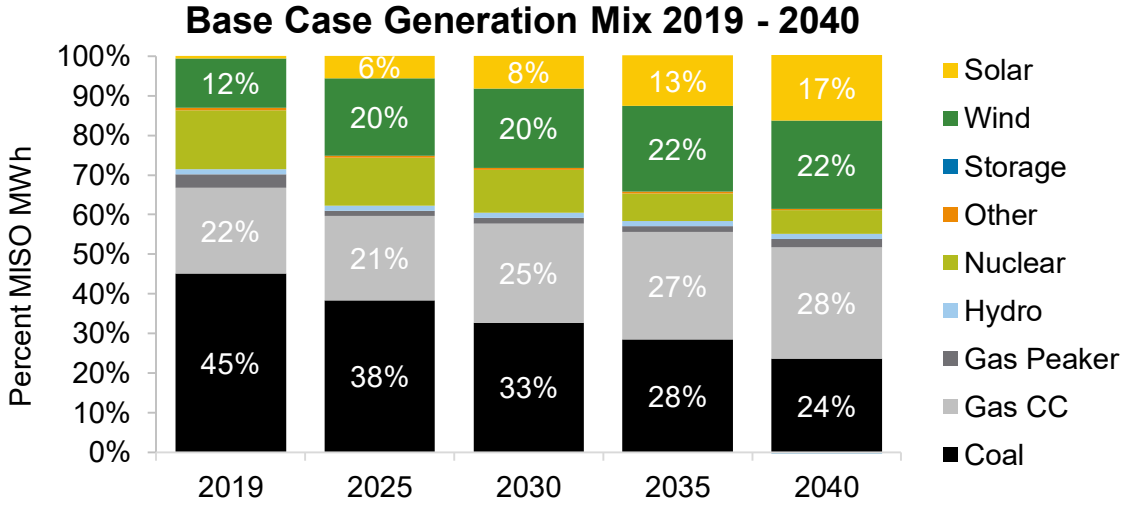
Challenged Gas Economy

- Restrictions on gas resource and infrastructure expansion result in high commodity prices for natural gas and reduced reliability of gas-fired units

MISO capacity and generation mix – base case

The base case sees a significant shift in the capacity mix





Comments

- Wind and solar grow significantly over the period
- Natural gas capacity grows as coal and nuclear resources retire
- Market generation mix mirrors capacity changes
- Lost coal and nuclear generation replaced by renewables, primarily
- Wind & solar comprise 40% of market generation by 2040

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Portfolio Decisions Evaluated

Concept	Units	2023	2026	2028	2033
Current Portfolio	Merom 1				
	Merom 2				
	Holland				
Merom 2023	Merom 1	Retired			
	Merom 2	Retired			
	Holland				
Merom 2023-2028	Merom 1	Retired			
	Merom 2			Retired	
	Holland				
Merom 2028	Merom 1			Retired	
	Merom 2			Retired	
	Holland				
Merom 2028-2033	Merom 1			Retired	
	Merom 2				Retired
	Holland				
Merom 2033	Merom 1				Retired
	Merom 2				Retired
	Holland				
Merom 2023, Holland 2026	Merom 1	Retired			
	Merom 2	Retired			
	Holland		Retired		
Merom 2033, Holland 2026	Merom 1				Retired
	Merom 2				Retired
	Holland		Retired		

*Units retire on 5/31 of given year, consistent with MISO capacity planning timeline

Objective

Establish baseline for comparison

Test impact of different Merom retirement dates

Layer in Holland retirement

Agenda

Objectives

Key Findings of Early Retirement Screening

The Hoosier Portfolio Today

Modeling Approach and Scorecard Template

Early Retirement Screening Results

Conclusions and Next Steps

Forum Objectives

- Summarize indicative portfolio approach to evaluating early retirement options at Merom and Holland
- Share results and insights of early retirement screening of Merom and Holland
- Inform selection of retirement concepts for future analysis

Agenda

Objectives

Key Findings of Early Retirement Screening

The Hoosier Portfolio Today

Modeling Approach and Scorecard Template

Early Retirement Screening Results

Conclusions and Next Steps

Key Observations and Findings

- Retiring both Merom units in 2023 is likely to provide significant savings versus retaining the units through 2040
- Retiring Merom in 2023 is better than a delayed retirement pathway
- Potential savings associated with a Holland retirement are less significant and are dependent on Hoosier resource generating more energy for market sales than members consume
- Merom can look attractive when at least two of the following three market factors prevail:
  - No carbon regulation or carbon pressure
  - Natural gas prices higher than $4/MMBtu (*in real $*)
  - 30% higher than expected costs for new wind, solar, and storage resources

Agenda

Objectives

Key Findings of Early Retirement Screening

The Hoosier Portfolio Today

Modeling Approach and Scorecard Template

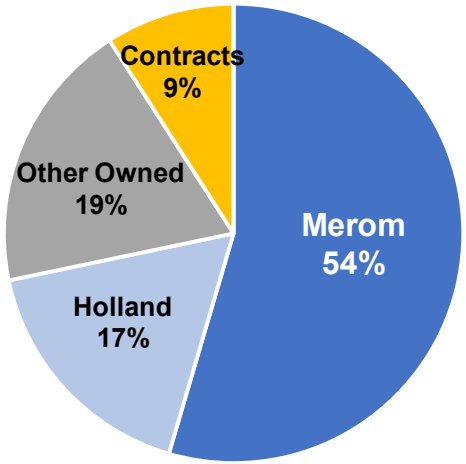
Early Retirement Screening Results

Conclusions and Next Steps

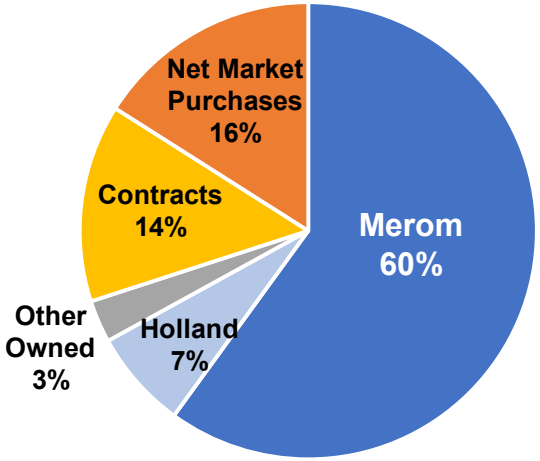
The Hoosier Portfolio Today

- Merom represents over half of Hoosier's capacity, and nearly two-thirds of Hoosier's energy and costs.
- Holland provides very little energy to the portfolio, but is a significant capacity resource and accounts for only 7% of Hoosier's costs. The gas peakers also provide more capacity value than energy value.
- Contracts and net market purchases provide one-third of the portfolio's energy and account for a quarter of the cost.

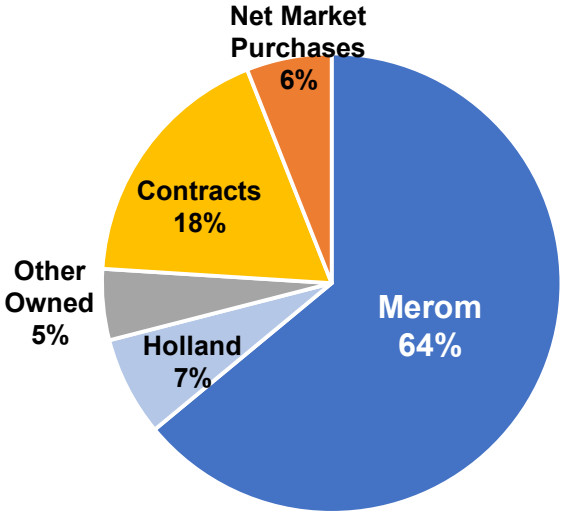
Capacity Mix %
Total 1,915 MW



Energy Mix %
Total 7,965 GWh



Portfolio Cost %
Total Cost $454M



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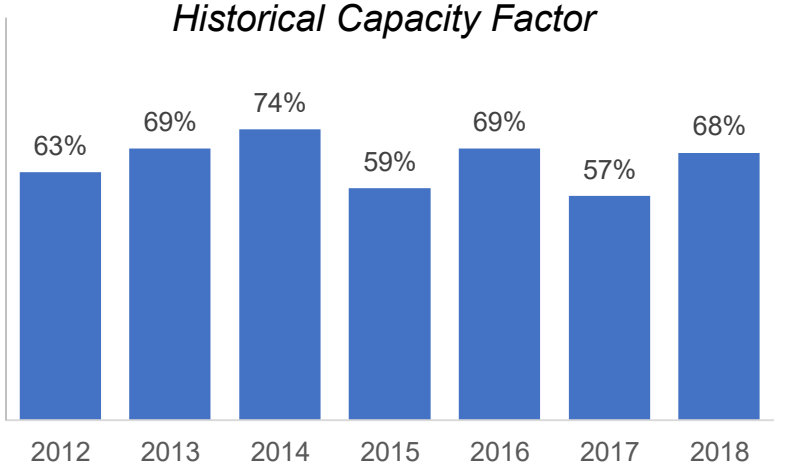
Characteristics of Merom & Holland

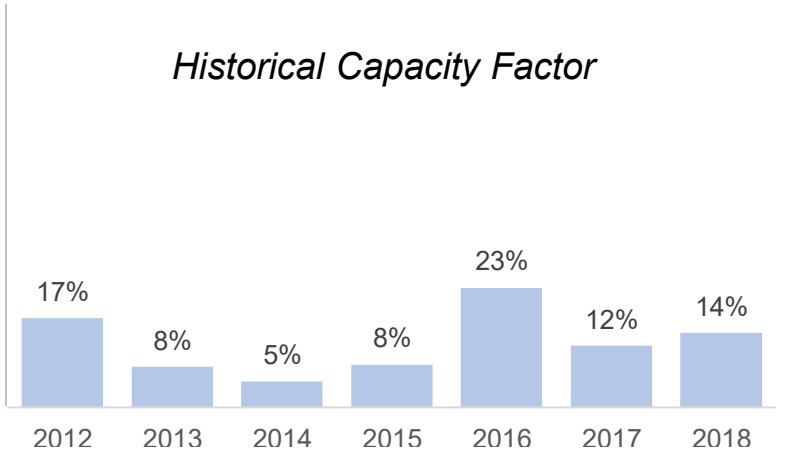
Merom

- 100% Ownership
- Owned Capacity: 1,080 MW
- Age: 37 years
- 2019 average MISO offer cost: $26/MWh



Holland

- 50% Ownership
- Owned Capacity: 351 MW
- Age: 17 years
- 2019 average MISO offer cost: $28/MWh



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Rationale for Early Retirement Screening

- Other utilities retiring coal and older natural gas resources
- The cost of alternative technologies has fallen significantly
- Potential for future carbon pressure and additional environmental regulation
- Short term additions of new efficient gas and renewables may put price pressure on older NGCCs
- Flexibility to take advantage of emerging technologies like storage
- Potential for a more renewable, diverse, and flexible portfolio that provides savings to current portfolio with less overall risk

Agenda

Objectives

Key Findings of Early Retirement Screening

The Hoosier Portfolio Today

Modeling Approach and Scorecard Template

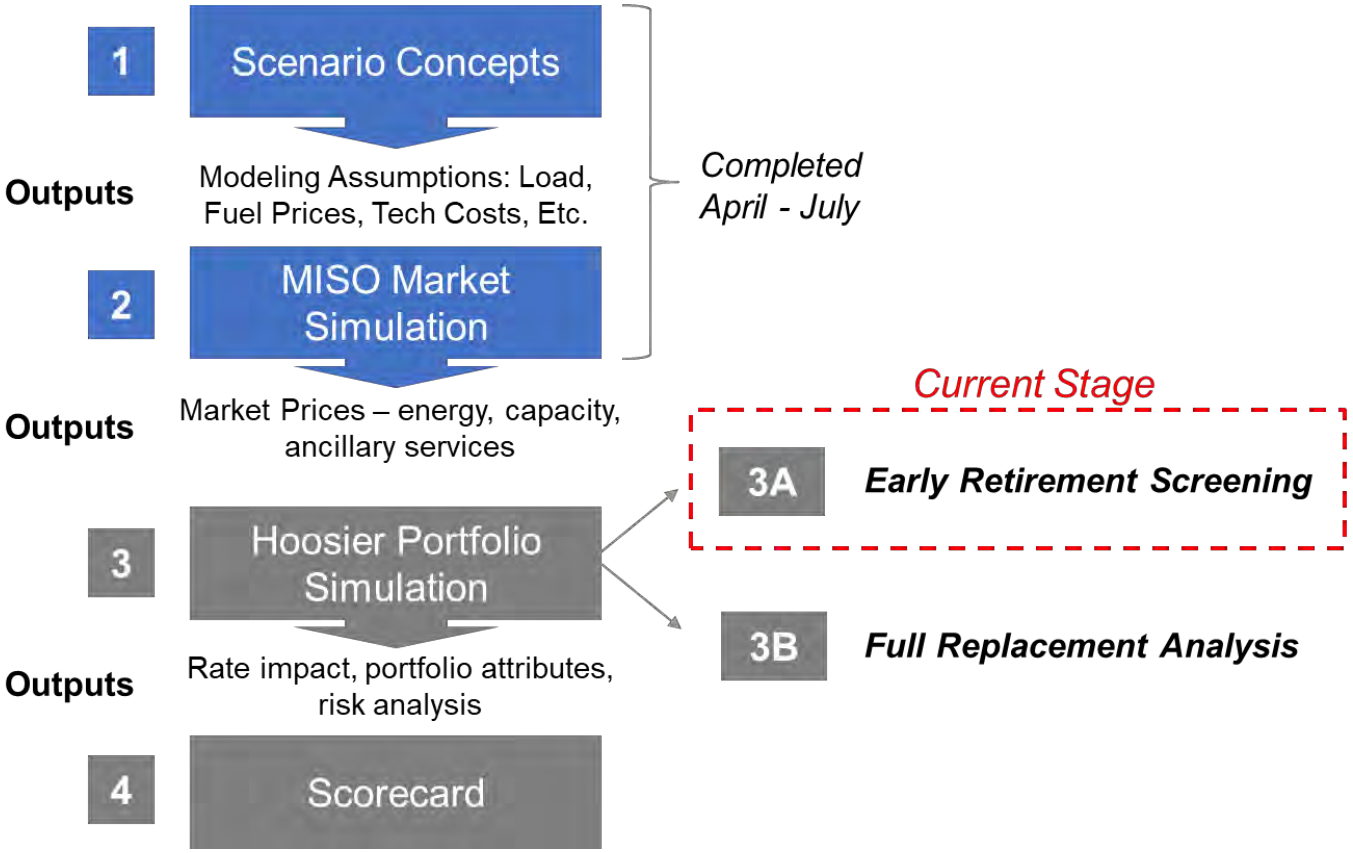
Early Retirement Screening Results

Conclusions and Next Steps

Analytical Framework

The Board is not making a decision today about retiring assets early

Focus is on identifying whether an early retirement of Merom or Holland should be considered further based on initial screening results



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Retirements Screening Scorecard: Key Focus Areas

The Retirement Screening Scorecard includes a subset of objectives from the larger LRRP scorecard that are relevant for this screening stage

	Low Wholesale Rates				Rate Stability & Predictability		
	Base 5-Year Rate	Base 10-Year Rate	Base 20-Year Rate	Annual Growth Rate 2019-2040	20-Year Min	20-Year Max	Scenario Range
Portfolio	$/MWh	$/MWh	$/MWh	%	$/MWh	$/MWh	$/MWh
Merom 2023							
Merom 2023 - 2028							

Primary metric for this purpose – we are trying to understand how timing affects cost savings

Illustrates exposure to market conditions of retirement choices – a key decision criteria

Portfolios Evaluated in the Early Retirements Screening

Concept	Units	2023	2026	2028	2033
Current Portfolio	Merom 1				
	Merom 2				
	Holland				
Merom 2023	Merom 1	Retired			
	Merom 2	Retired			
	Holland				
Merom 2023-2028	Merom 1	Retired			
	Merom 2			Retired	
	Holland				
Merom 2028	Merom 1			Retired	
	Merom 2			Retired	
	Holland				
Merom 2028-2033	Merom 1			Retired	
	Merom 2				Retired
	Holland				
Merom 2033	Merom 1				Retired
	Merom 2				Retired
	Holland				
Merom 2023, Holland 2026	Merom 1	Retired			
	Merom 2	Retired			
	Holland		Retired		
Merom 2033, Holland 2026	Merom 1				Retired
	Merom 2				Retired
	Holland		Retired		

*Units retire on 5/31 of given year, consistent with MISO capacity planning timeline

Objective

Establish baseline for comparison

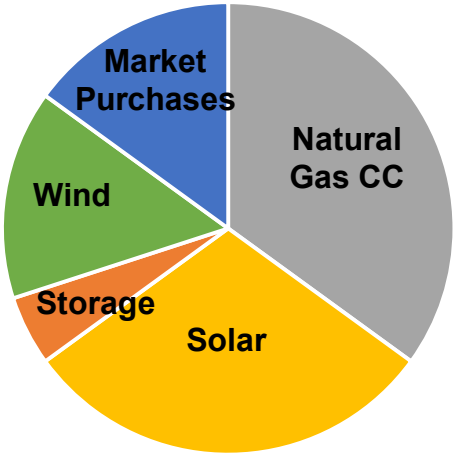
Test impact of different Merom retirement dates

Layer in Holland retirement

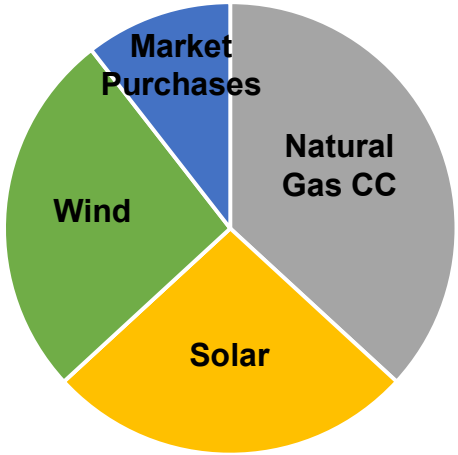
Replacement Resources Used in the Retirement Screening

- *A set of cost-effective "indicative replacements" were identified for testing the viability of an early retirement at Merom or Holland*
- *Indicative replacements are a diverse mix of gas CC, solar, storage, and wind based on MISO long-term capacity expansion and recent Indiana IRP filings*
- *Indicative portfolios rely on short term bilateral capacity purchases and small net energy purchases from MISO to balance portfolios at lowest cost*

Capacity Mix of Indicative Replacements



Energy Mix of Indicative Replacements



Pricing and costs of new resources are benchmarked to public announcements and unsolicited term sheets received by Hoosier

*Note: Actual ratios vary slightly by portfolio and timing of retirement. This representative view is based on 2030 with Merom retired

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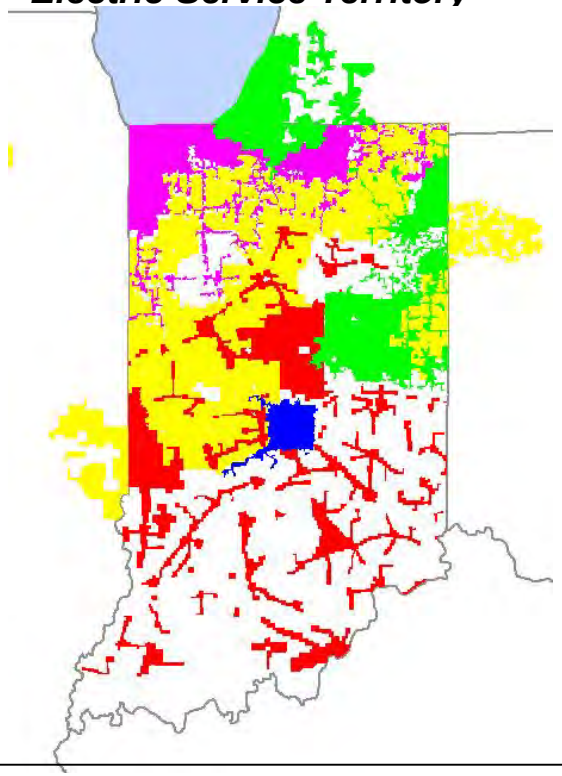
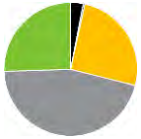
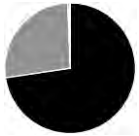
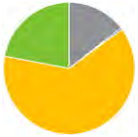
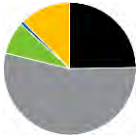
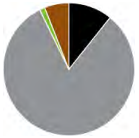
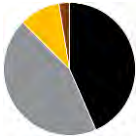
Recent Plans from MISO Neighbors Show Similar Mix

Recent IRPs in Indiana (and other MISO states) have shown utilities replacing coal with the resources included in the indicative set: gas, solar, and wind.

Electric Service Territory



Duke Energy Indiana | Indiana Michigan Power | NIPSCO | Indianapolis Power & Light | Wabash Valley

Utility	Resource Mix - 2018	Resource Mix - 2038
Indiana Michigan Power		
NIPSCO		
Duke Energy Indiana		
Wabash Valley*		
Indianapolis Power & Light		*IRP in progress, significant coal retirements expected*

Coal | Natural Gas | Solar | Nuclear | Hydro | Wind | Other

*Note - * Wabash Valley's most recent IRP reflects the 2017 – 2036 planning period*

Scenarios Represent a Range of Possible Futures

Base Case

- Expected view of the world
- (1) Gas prices rise gradually ($4 in *real$* by 2030, close to $5 by 2040)
  (2) Moderate CO_2 policy in 2028

Flat Gas

- "Status quo" sensitivity
- (1) Flat gas prices close to current levels (below $3), (2) No carbon price

Stagnating Economy

- Decline in economic outlook
- (1) Lower load growth, (2) Lower coal retirements; (3) No CO_2 price; (4) Higher solar, wind, and storage costs

Decarbonization

- CO_2 emission cap, more EVs
- (1) Higher CO_2 prices; (2) Higher gas prices; (3) Lower renew and storage costs; (4) No nuclear retirements

Customers in Control

- High C&I procurement of renewables
- (1) Lower gas prices; (2) Lower solar costs; (3) No CO_2 price; (4) Higher reserve margin; (5) Lower C&I load

Challenged Gas

- Restrictions on gas growth and reliability
- (1) Higher gas prices ($4 in *real$* by 2023, close to $6.5 by 2040)
  (2) No carbon price

Full Scorecard Used in Subsequent Stage

Alternative resource portfolios will be compared on how well they meet objectives for low and stable rates, resource diversity, and sustainability

	Low Wholesale Rates			Rate Stability		Predictability		Sustainability of Portfolio			Resource Diversity			Employee Impact
	Base 5-Year Rate	Base 10-Year Rate	Base 20-Year Rate	20-Year Range	20-Year Max	25th & 75th Percentile Range	NPV of Costs - 95th Percentile	Total Fleet Emissions	Fleet Water Consumed	Fleet Waste Produced	Portfolio Generation by Tech	Portfolio Capacity by Tech	Ratio Owned to Contracted	Portfolio Rating
Portfolio	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh	%+ and %-	$/MWh	MMTons CO2e	MM Gallons	Tons	% by Tech	% by Tech	%	Rating
Portfolio 1														
Portfolio 2														
Portfolio 3														
...														

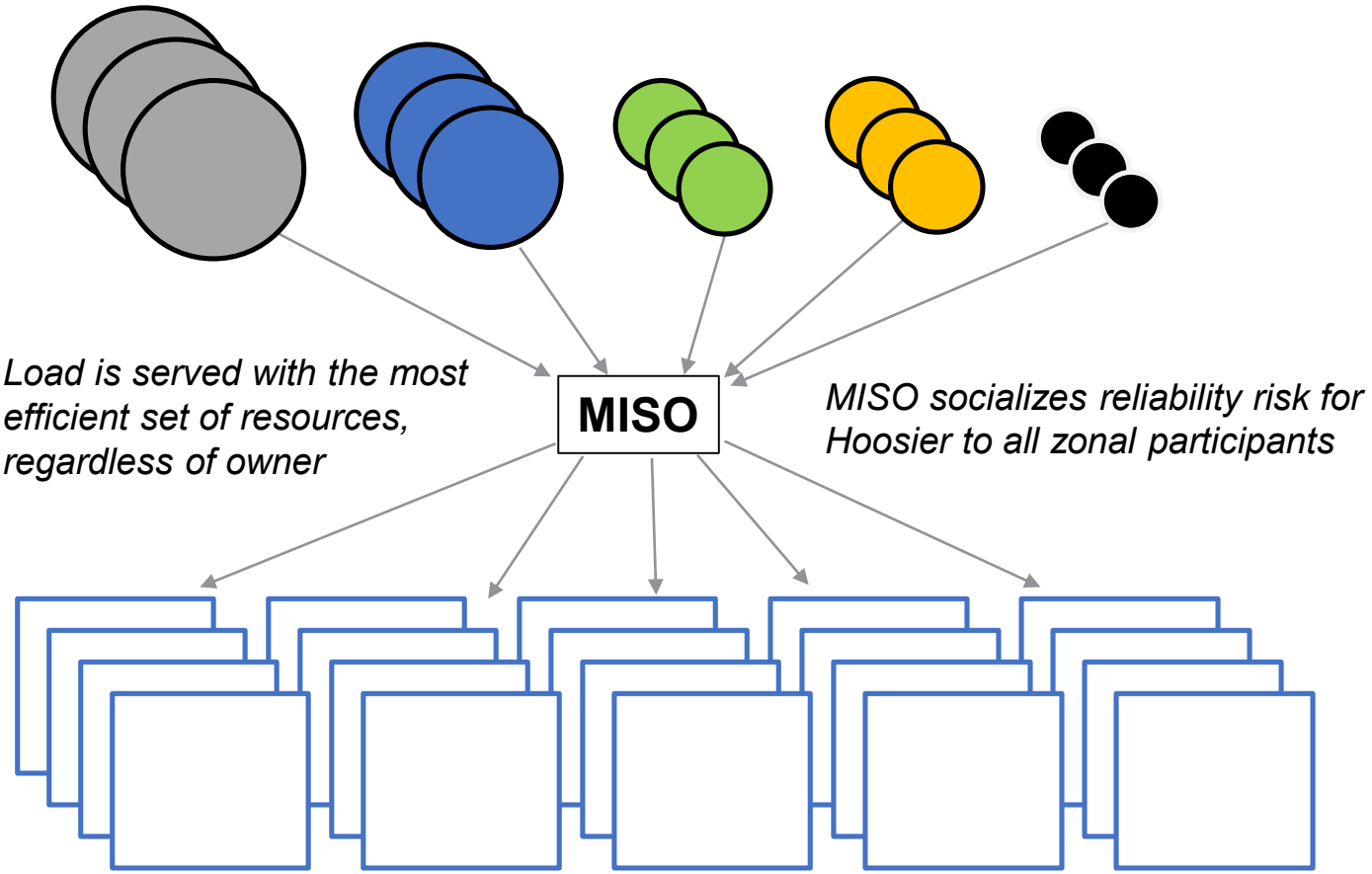
Early Retirement Screening metrics ensure Hoosier captures the most savings possible from any early unit retirements

The Full Replacement Analysis will introduce data on the additional objectives affected by more diverse set of new resource choices

All Portfolio Options Assume Equivalent Reliability

MISO manages resource adequacy and grid reliability. We don't believe Hoosier's portfolio decisions impact future grid reliability.

All Generating Units in MISO (Includes Hoosier)



All Load Serving Entities in MISO (Includes Hoosier Coops)

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Agenda

Objectives

Key Findings of Early Retirement Screening

The Hoosier Portfolio Today

Modeling Approach and Scorecard Template

Early Retirement Screening Results

Conclusions and Next Steps

Portfolio Decisions Evaluated

Concept	Units	2023	2026	2028	2033
Current Portfolio	Merom 1				
	Merom 2				
	Holland				
Merom 2023	Merom 1	Retired			
	Merom 2	Retired			
	Holland				
Merom 2023-2028	Merom 1	Retired			
	Merom 2			Retired	
	Holland				
Merom 2028	Merom 1			Retired	
	Merom 2			Retired	
	Holland				
Merom 2028-2033	Merom 1			Retired	
	Merom 2				Retired
	Holland				
Merom 2033	Merom 1				Retired
	Merom 2				Retired
	Holland				
Merom 2023, Holland 2026	Merom 1	Retired			
	Merom 2	Retired			
	Holland		Retired		
Merom 2033, Holland 2026	Merom 1				Retired
	Merom 2				Retired
	Holland		Retired		

*Units retire on 5/31 of given year, consistent with MISO capacity planning timeline

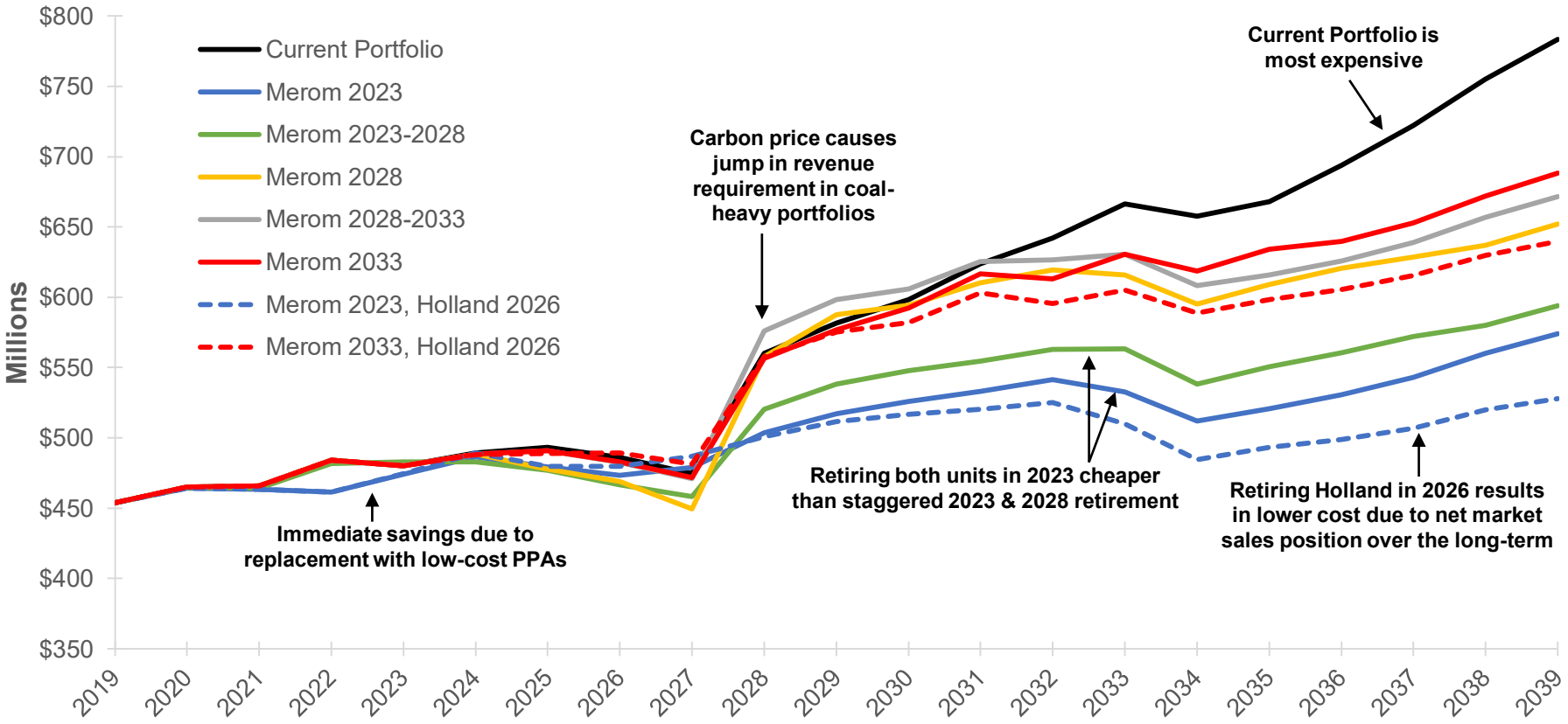
Objective

Establish baseline for comparison

Test impact of different Merom retirement dates

Layer in Holland retirement

Base Case: Annual Revenue Requirement



- *Revenue requirement includes all portfolio supply costs but not T&D or member service costs*
- *The net present value of revenue requirement ("NPVRR") is a way to distill all costs into one number to allow for meaningful comparisons*

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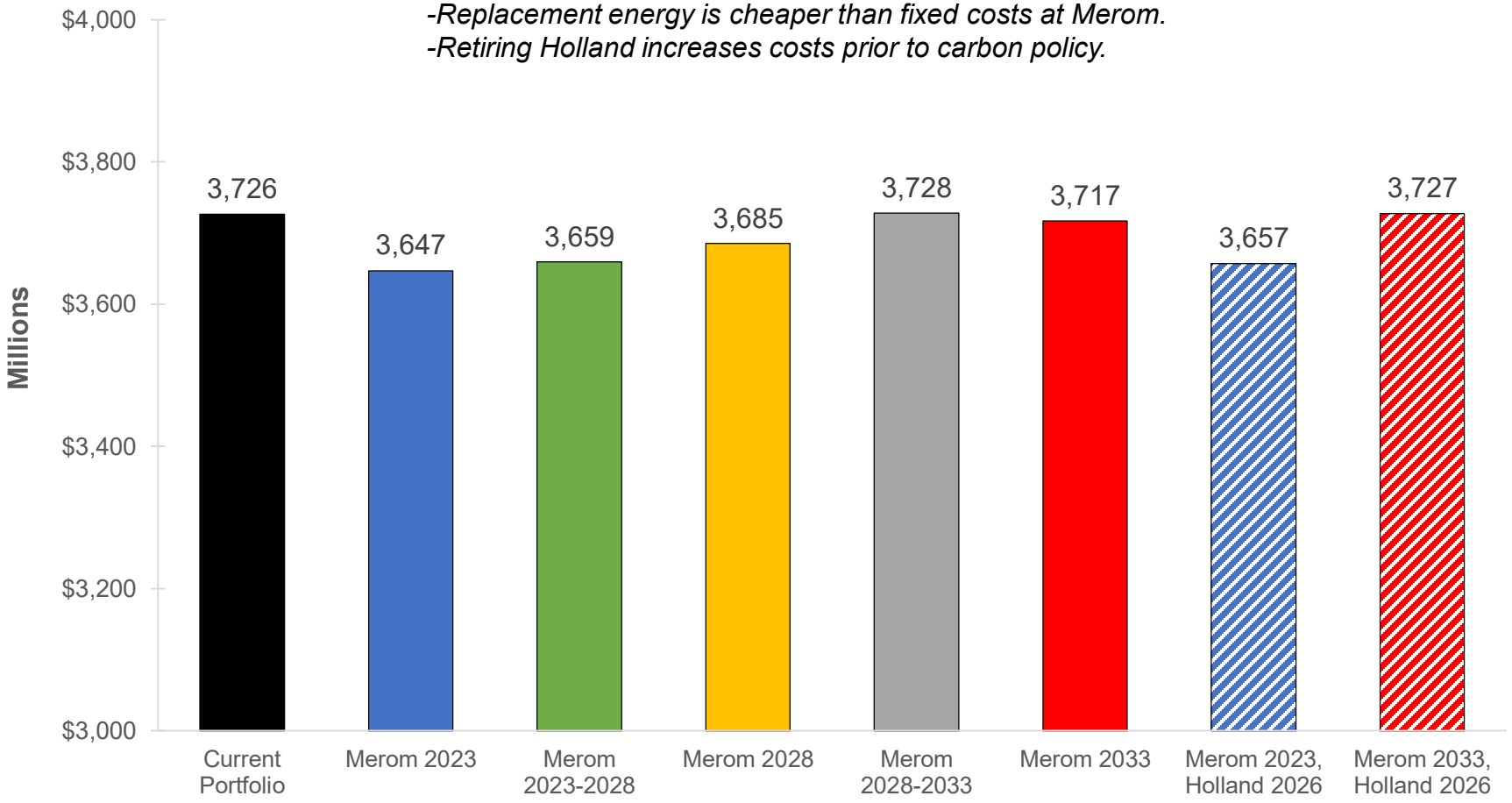
Base Case: 10-Year NPVRR

-Replacement energy is cheaper than fixed costs at Merom.
-Retiring Holland increases costs prior to carbon policy.



Delta ($M)	-	-$79 ⬇	-$67 ⬇	-$41 ⬇	+$2 ⬆	-$9 ⬇	-$69 ⬇	+$1 ⬆
Delta (%)	-	-2.1%	-1.8%	-1.1%	+0.1%	-0.2%	-1.9%	+0.0%

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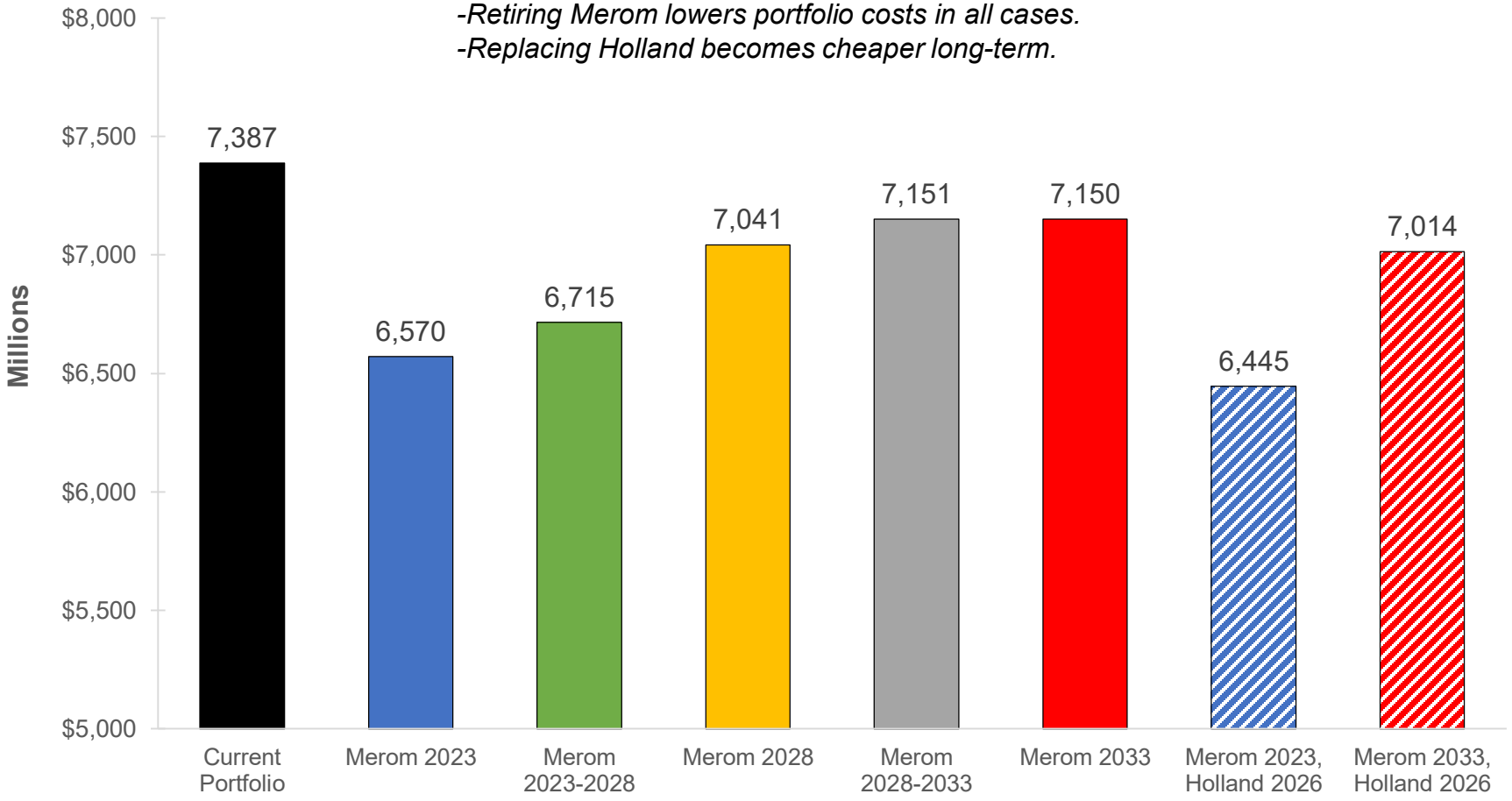
Base Case: 20-Year NPVRR

-Retiring Merom lowers portfolio costs in all cases.
-Replacing Holland becomes cheaper long-term.



Delta ($M)	-	-$817 ⬇	-$672 ⬇	-$346 ⬇	-$236 ⬇	-$237 ⬇	-$942 ⬇	-$373 ⬇
Delta (%)	-	-11.1%	-9.1%	-4.7%	-3.2%	-3.2%	-12.8%	-5.0%

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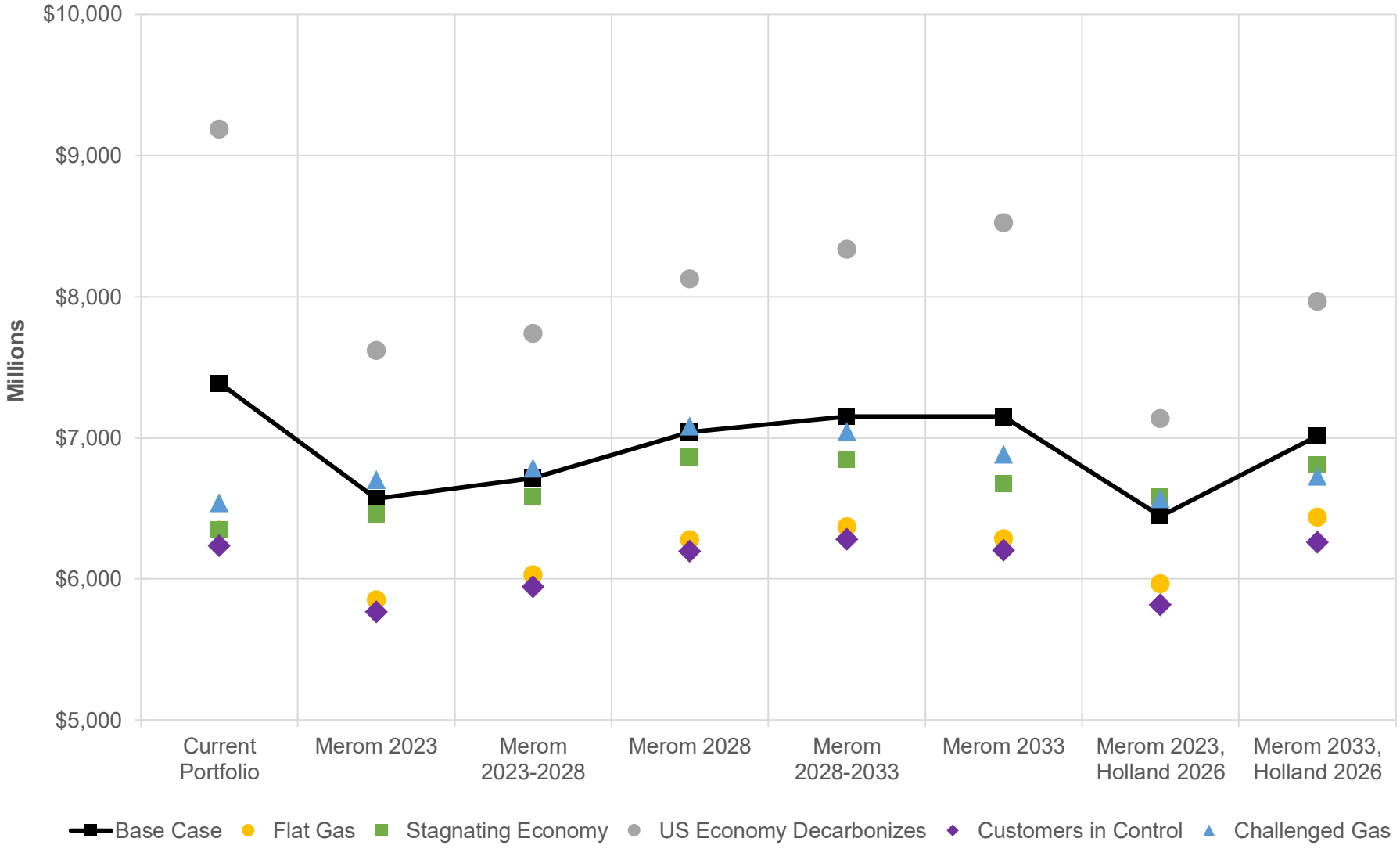
Base Case: Observations

- Early retirement of Merom in 2023 provides substantial savings versus retaining the current portfolio through the study period
- Staggered retirement of Merom units in 2023/28 also offers significant savings and potentially more operational flexibility, but this option would incur more costs at the coal plant and potentially miss the lowest-cost renewable resource opportunities
- Retiring Merom after 2028 provides more limited savings versus the current portfolio
- Early retirement of Holland offers opportunity for additional savings by swapping out low-cost capacity for low-cost energy
  - Mid-term (10-yr) costs for a Holland retirement are higher prior to projected increases in carbon and gas prices
  - This option introduces risk due to its reliance on market sales

Scenario Analysis: 20-Year NPVRR



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Scenario Analysis Customer Supply Costs Table

	Base Case	Flat Gas	Stagnating Economy	US Economy Decarbonizes	Customers in Control	Challenged Gas
Current Portfolio	$66.36	$57.23	$58.25	$76.29	$58.62	$58.96
Merom 2023	$59.20	$52.88	$59.24	$63.96	$54.24	$60.42
Merom 2023-2028	$60.49	$54.46	$60.37	$64.93	$55.88	$61.12
Merom 2028	$63.35	$56.66	$62.88	$68.00	$58.27	$63.75
Merom 2028-2033	$64.33	$57.46	$62.75	$69.72	$59.05	$63.37
Merom 2033	$64.31	$56.72	$61.19	$71.20	$58.32	$61.94
Merom 2023, Holland 2026	$58.11	$53.88	$60.38	$60.18	$54.69	$59.23
Merom 2033, Holland 2026	$63.13	$58.06	$62.41	$66.81	$58.86	$60.60

*Customer supply costs represent the levelized cost of generation and do not include T&D or member services costs

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Scenario Analysis: Observations

- Early retirement of Merom in 2023 is lower cost than retaining the current portfolio in **4 out of the 6** scenarios
  - Merom looks attractive when at least two of the following market factors prevail: no carbon price, high gas prices, and high replacement resource costs
- Retiring Merom in 2023 is always better than a delayed retirement pathway, due to the ability to avoid capital spending at the plant and the opportunity to take advantage of low-cost renewables with tax credits
- Retiring Holland in 2026 is lower cost in **3 out of the 6** scenarios over the long-term (20-yr) and generally higher cost over the mid-term (10-yr)
  - Scenarios with low power prices make early Holland retirement unattractive (Flat Gas, Customers in Control, Stagnating Economy)

Scorecard: Early Retirement Screening

Portfolio Concept	Low Wholesale Rates				Rate Stability & Predictability		
	Supply Cost: Base Case			Annual Growth Rate 2019-2040	Supply Cost: Scenarios		
	5-Year	10-Year	20-Year		20-Year Min	20-Year Max	Range
	$/MWh	$/MWh	$/MWh	%	$/MWh	$/MWh	$/MWh
Current Portfolio	$57.86	$58.36	$66.36	2.18%	$57.23 -14%	$76.29 +15%	$19.06
Merom 2023	$57.02	$57.14	$59.20	0.68%	$52.88 -11%	$63.96 +8%	$11.08
Merom 2023-2028	$57.66	$57.34	$60.49	0.84%	$54.46 -10%	$64.93 +7%	$10.46
Merom 2028	$57.84	$57.74	$63.35	1.26%	$56.66 -11%	$68.00 +7%	$11.35
Merom 2028-2033	$57.84	$58.40	$64.33	1.39%	$57.46 -11%	$69.72 +8%	$12.26
Merom 2033	$57.84	$58.23	$64.31	1.51%	$56.72 -12%	$71.20 +11%	$14.48
Merom 2023, Holland 2026	$57.09	$57.30	$58.11	0.26%	$53.88 -7%	$60.38 +4%	$6.51
Merom 2033, Holland 2026	$57.83	$58.38	$63.13	1.14%	$58.06 -8%	$66.81 +6%	$8.74

*Supply costs represent the levelized cost of generation and do not include T&D or member services costs

Agenda

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Early Retirement Screening Results

Conclusions and Next Steps

Conclusions

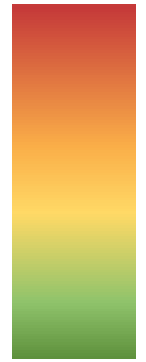
- Retiring Merom in 2023 is less costly than retaining the plant across 4 out of the 6 scenarios
- Early retirement of Merom is always lower cost than later retirement due to deferred maintenance and capital spending and the opportunity to access renewables with significant federal tax credits
- A staggered retirement in 2023 and 2028 may preserve some optionality at slightly higher cost than retirement of both units in 2023
- Retirement of Holland may provide benefit by swapping out low-cost capacity with resources that generate more energy, but this option introduces risk due to its reliance on market sales

Next Steps

- Selection of best portfolio concepts to study further in full replacement analysis
- Exploration of the tradeoffs associated with different replacement options
  - Resource type – Natural gas, wind, solar, storage, market, re-powering
  - Structure – ownership vs. PPA
  - Scale and location
- More robust risk analysis
  - Deeper evaluation of random market shocks (gas and power prices)
  - Assessment of energy generation risk (intermittent resource output)
  - Opportunity to stress test certain variables that are determined to be highly uncertain, such as resource costs, PPA prices, MISO capacity market changes

Scorecard: Early Retirement Screening

Portfolio Concept	Low Wholesale Rates				Rate Stability & Predictability		
	Supply Cost: Base Case			Annual Growth Rate 2019-2040	Supply Cost: Scenarios		
	5-Year	10-Year	20-Year		20-Year Min	20-Year Max	Range
	$/MWh	$/MWh	$/MWh	%	$/MWh	$/MWh	$/MWh
Current Portfolio	$57.86	$58.36	$66.36	2.18%	$57.23 -14%	$76.29 +15%	$19.06
Merom 2023	$57.02	$57.14	$59.20	0.68%	$52.88 -11%	$63.96 +8%	$11.08
Merom 2023-2028	$57.66	$57.34	$60.49	0.84%	$54.46 -10%	$64.93 +7%	$10.46
Merom 2028	$57.84	$57.74	$63.35	1.26%	$56.66 -11%	$68.00 +7%	$11.35
Merom 2028-2033	$57.84	$58.40	$64.33	1.39%	$57.46 -11%	$69.72 +8%	$12.26
Merom 2033	$57.84	$58.23	$64.31	1.51%	$56.72 -12%	$71.20 +11%	$14.48
Merom 2023, Holland 2026	$57.09	$57.30	$58.11	0.26%	$53.88 -7%	$60.38 +4%	$6.51
Merom 2033, Holland 2026	$57.83	$58.38	$63.13	1.14%	$58.06 -8%	$66.81 +6%	$8.74



*Supply costs represent the levelized cost of generation and do not include T&D or member services costs

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Breakout Groups-Two Tasks

- Hoosier staff believes the next step of the resource planning process is to “stress test” each of the four portfolio options (Current Portfolio; Merom 2023 Full Retirement; Staggered Merom Retirement 2023/2028; Merom 2023 Full Retirement and Holland 2026 Retirement)

  Do you agree that these are the right group of portfolio options to look at? Why or why not?

- Resource planning is complicated.

  What questions do you have about the process with staff or Charles River? Are we on the right track of further work? What comments or questions do you have about the process?

Breakout Groups

Group 1 – Truman
Moderator: Bob Richhart
David Smith
Eugene Roberts
John Edwards
Doug Childs
Shannon Thom
Mark McKinney

Group 2 – Kennedy
Moderator: Chris Blunk
Jamie Meredith
John Trinkle
Jason Barnhorst
Mary Jo Thomas
Terry Jobe
Keith Mathews

Group 3 – Eisenhower
Moderator: Mike Mooney
Steve Dieterlen
Jodie Creek
Gary Waninger
Jim Turner
Daryl Donjon
Bill Schmidt

Group 4 – Nixon
Moderator: Robert Kaineg
Darin Duncan
Don Sloan
Rick Wendholt
John Sturm
David Vince
Tom Nowaskie

Group 5 – Ford
Moderator: Caleb Steiner
Janet Anthony
Jerry Pheifer
Bob Stroup
David Lett
Brett Abplanalp
Steve Seibert

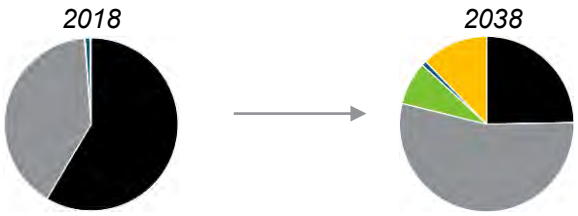
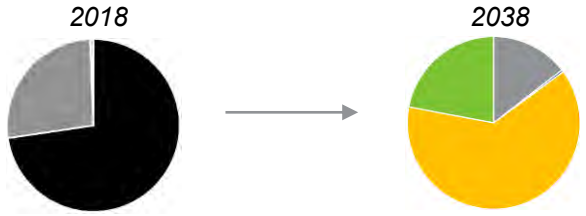
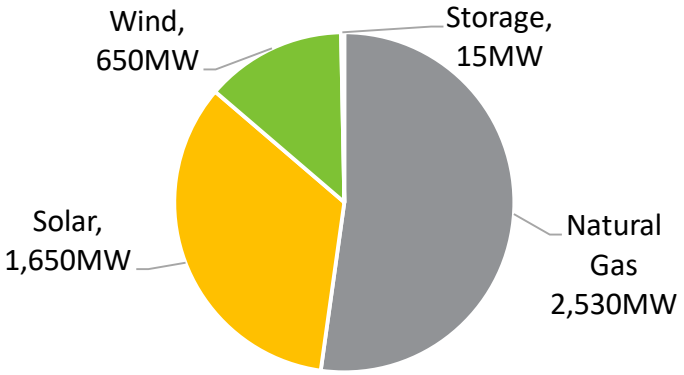
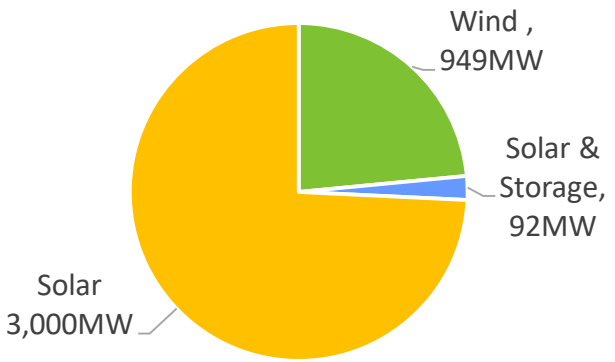
Group 6 – Roosevelt
Moderator: Adam Roberts
Todd Carpenter
Larry Hosselton
Dan Schuckman
Matt Deaton
Joe Henson
James Tanneberger

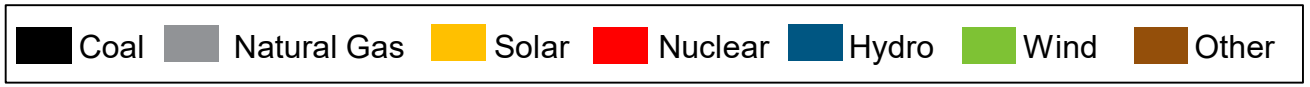
APPENDIX

Scenario Details

Category	Driver	Base Case	Flat Gas Sensitivity	Stagnating Economy	US Economy Decarbonizes	Customers in Control	Challenged Gas Economy
Fuel Prices	**Natural Gas Price**	CRA Base	CRA Flat	CRA Base	CRA High	CRA Low	CRA High
	Coal Price	CRA Base	CRA Base	CRA Base	CRA Low	CRA Base	CRA Base
Load	**MISO Load Growth**	MTEP CFC	MTEP CFC	MTEP LFC	MTEP AFC	MTEP CFC	MISO CFC
	MISO Load Shape	MTEP Base	MTEP Base	MTEP Base	MTEP DET	MTEP Base	MTEP Base
Generator Costs	**Solar Costs**	CRA Base	CRA Base	CRA High	CRA Low	CRA Low	CRA Base
	Wind Costs	CRA Base	CRA Base	CRA High	CRA Low	CRA Base	CRA Base
	Battery Costs	CRA Base	CRA Base	CRA High	CRA Low	CRA Base	CRA Base
Regulatory	**MISO Emissions**	Base CO_2 Price	No Carbon Price	No Carbon Price	High CO_2 Price	No Carbon Price	No Carbon Price
Market	**MISO RM**	8.9% by 2024	8.9% by 2024	7.9%	8.9% by 2024	11.4% by 2024	8.9% by 2024
	Capacity Credit	PV: 50% → 30%	PV: 50% → 30%	PV: 50% → 50%	PV: 50% → 20%	PV: 50% → 20%	PV: 50% → 30% NGCC: -15%
Market Capacity	**Planned Additions**	Planned / Announced	Planned / Announced	Planned / Announced	Planned / Announced	15% by 2030 & 20% by 2040 C&I load served by customer resource	Planned / Announced
	Planned Retirements	Planned / Announced	Planned / Announced	Fewer Coal Retirements	No MISO Nuclear Retirements	Planned / Announced	Planned / Announced

Indiana Utilities Resource Mix

	Duke Energy Indiana	NIPSCO
Resource Mix		
Additional / Replacement Capacity		
Drivers for replacement capacity	• Least cost • Lower carbon emissions • Greater fuel diversity with lower exposure to market risk	• Least cost



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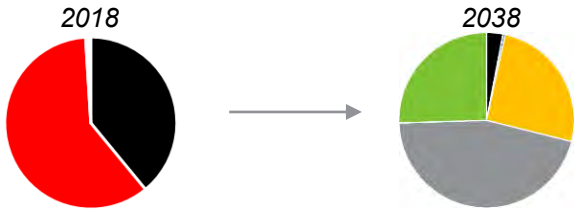
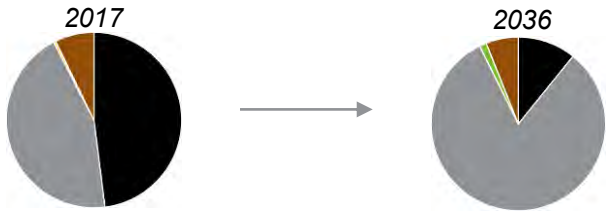
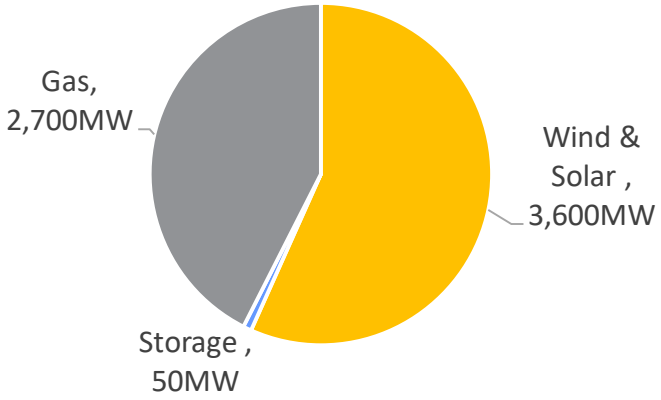
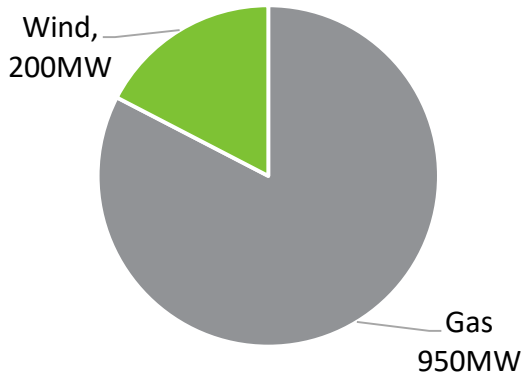
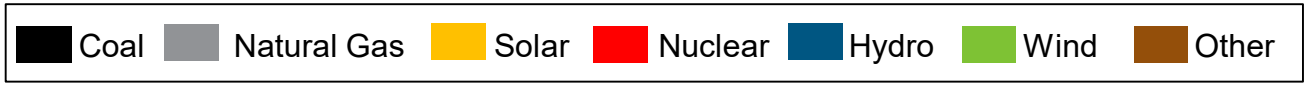
Indiana Utilities Resource Mix

	Indiana Michigan Power Co.	Wabash Valley Power Alliance
Resource Mix		
Additional / Replacement Capacity		
Drivers for replacement capacity	• Least cost • Greater resource diversity	• Least cost



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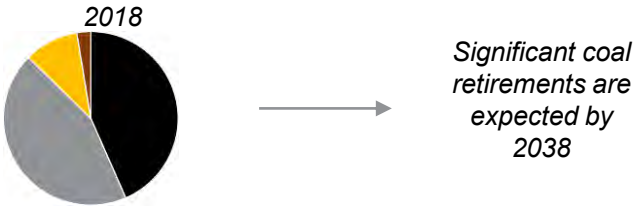
Indiana Utilities Resource Mix

Indianapolis Power & Light Co.

Resource Mix



Additional / Replacement Capacity

- Currently in the middle of 2019 IRP process
- Scenarios being considered at the moment have different accelerated timelines for Petersburg coal plant retirement
- Different scenarios are driven by considerations on cost and attaining lower carbon emissions
- Replacement options have not been decided on yet and will be dependent on preferred retirement scenario

Drivers for replacement capacity

Coal | Natural Gas | Solar | Nuclear | Hydro | Wind | Other

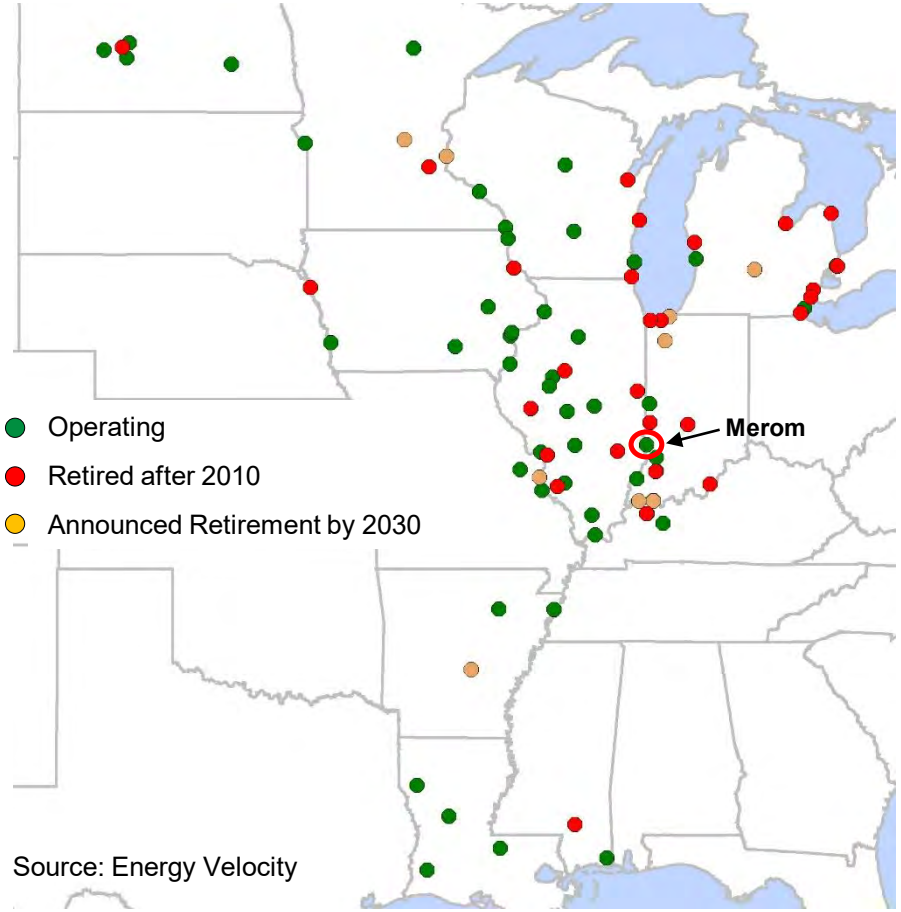
Other Resource Replacements in MISO

Recent IRPs from utilities across the MISO region also show a shift towards gas and renewable capacity

- **DTE Energy Co.** – 11MW solar plus storage pilot projects, ~700MW wind, 2,500 MW solar, current construction on 1,100MW CC plant recently approved
- **Consumers Energy** – ~55 MW wind, 3,200-5,000 MW solar
- **Wisconsin utilities** – 730 MW of current CC construction
  - *WEC Energy Group* – 650 MW mix of wind and solar
  - *Wisconsin Public Service* – 200 MW solar
  - *Wisconsin Power & Light* – 150 MW wind
- **Xcel Northern States** – 3,000MW of solar, 2,400MW of coal retirements (preserve existing gas and nuclear capacity for now)

Coal units in MISO – operating and retired

Location of Coal Units in MISO
Operating, Retired, Announced Retirement



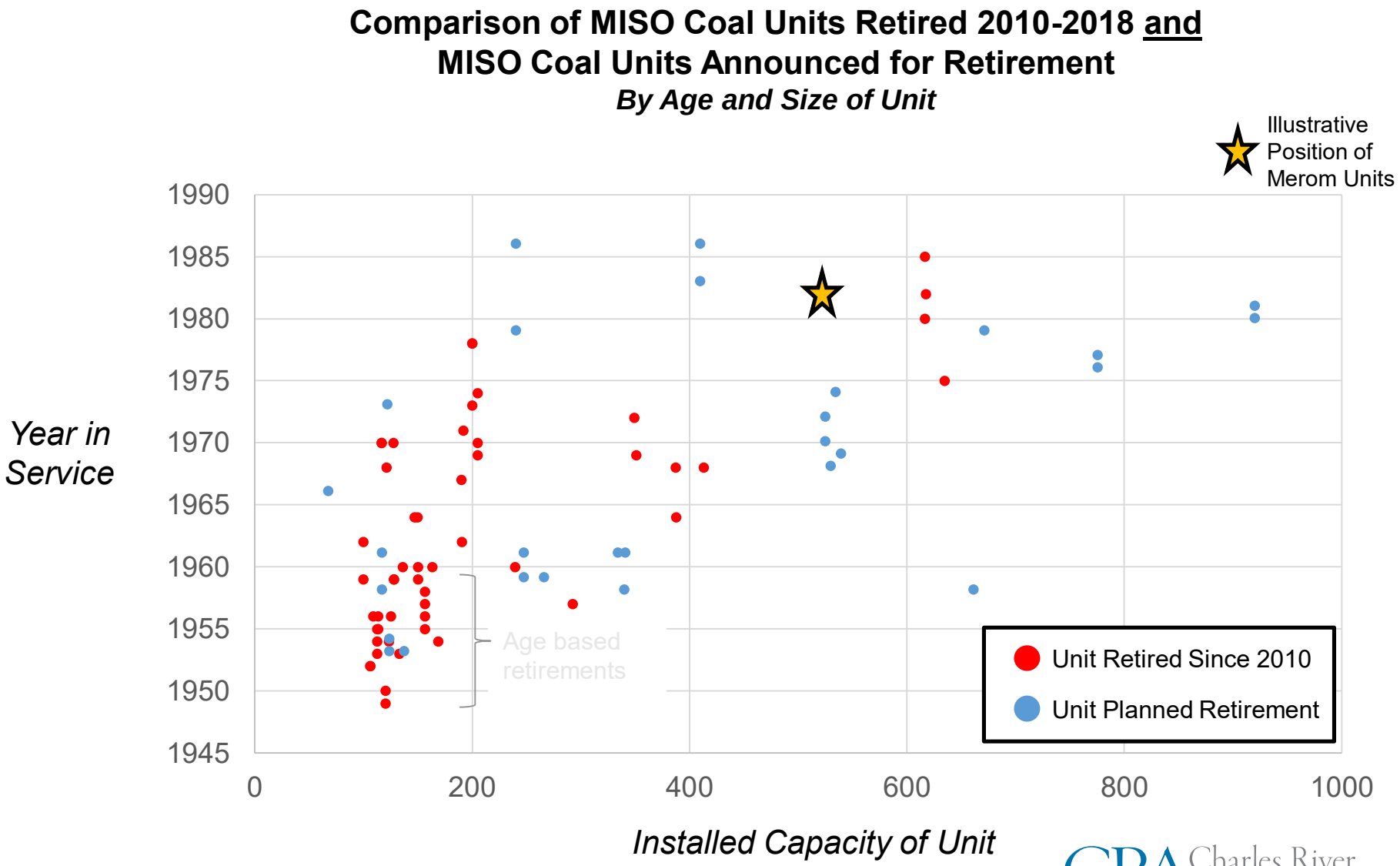
Source: Energy Velocity

Comments

- Since 2010, approximately 10% of coal-fired capacity has been retired in MISO*
  - 52 units total
  - Smaller units: 210 MW ave.
  - Most due to environmental compliance considerations
- Approximately 15% of remaining capacity has been announced for retirement in the next 10 years
  - 28 units total
  - Unit size: 420 MW ave.

**Greater than >100 MW*

Recent and planned coal unit retirements



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Scenarios Evaluated

Base Case

- The MISO market continues to evolve based on the current outlook for load growth, commodity prices, technology development, and regulatory pressure

Flat Gas

- Base case sensitivity where natural gas stays flat according to market futures prices and no carbon policy is enacted

Stagnating Economy

- Decline in economic outlook relieves regulatory pressure and results in a low load growth environment and fewer coal retirements

US Economy Decarbonizes

- A national cap on CO2 emissions affects all sectors of the US economy, negatively affecting fossil generation and changing end-use demand patterns

Customers in Control

- Widespread procurement of renewable energy by large C&I customers reduces demand for central station power and impacts load shape

Challenged Gas Economy

- Restrictions on gas resource and infrastructure expansion result in high commodity prices for natural gas and reduced reliability of gas-fired units

Long Range Resource Plan

Full Replacement Analysis

August 20, 2019

HOOSIER ENERGY
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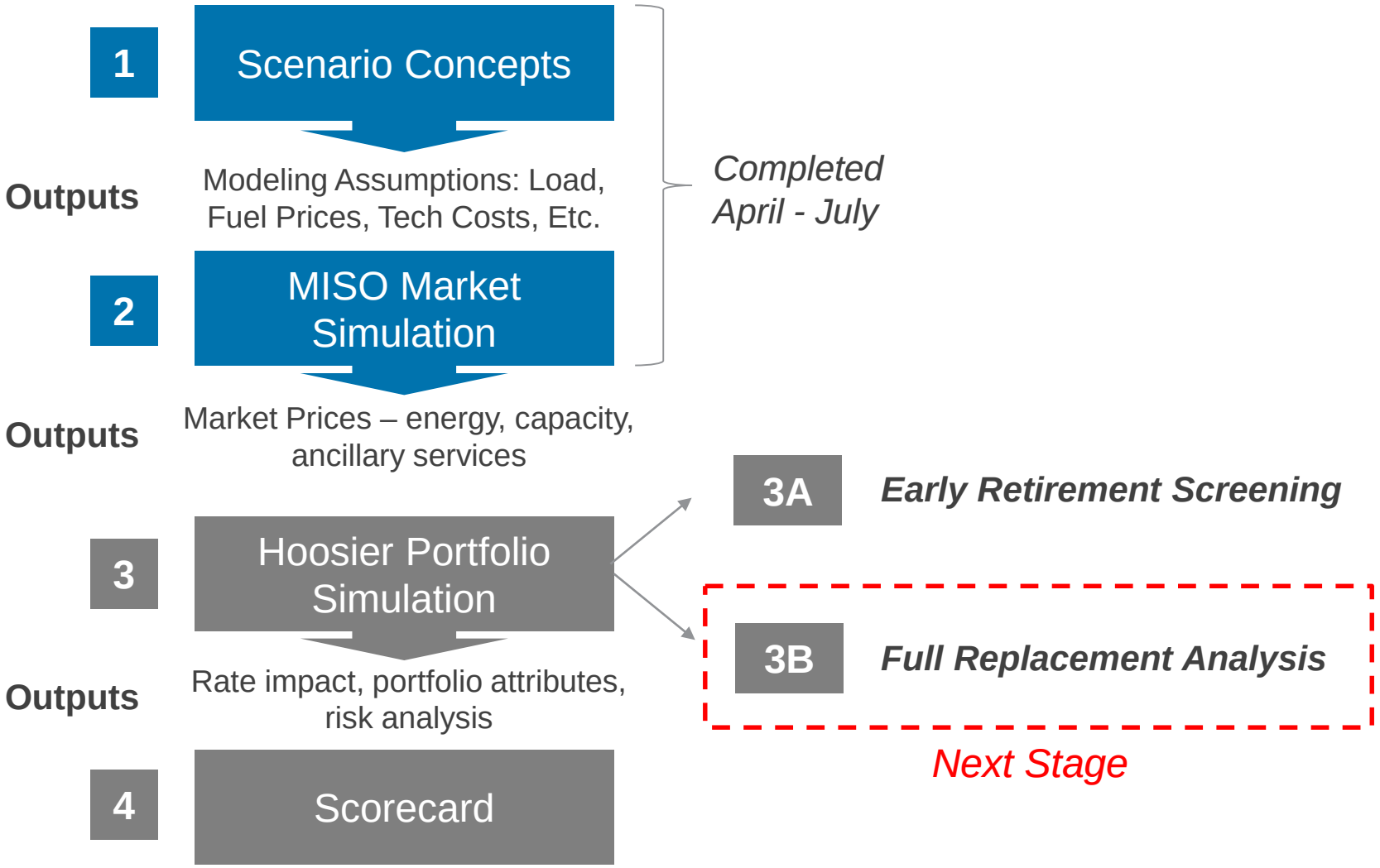
Session Objectives

- Describe the next phase of work: Examining replacement options for any long-term energy and capacity needs
- Identify the key decision elements for replacement options, such as type, timing, location
- Share important considerations for alternative portfolio construction
- Describe how we will evaluate and compare alternative portfolios

Analytical framework



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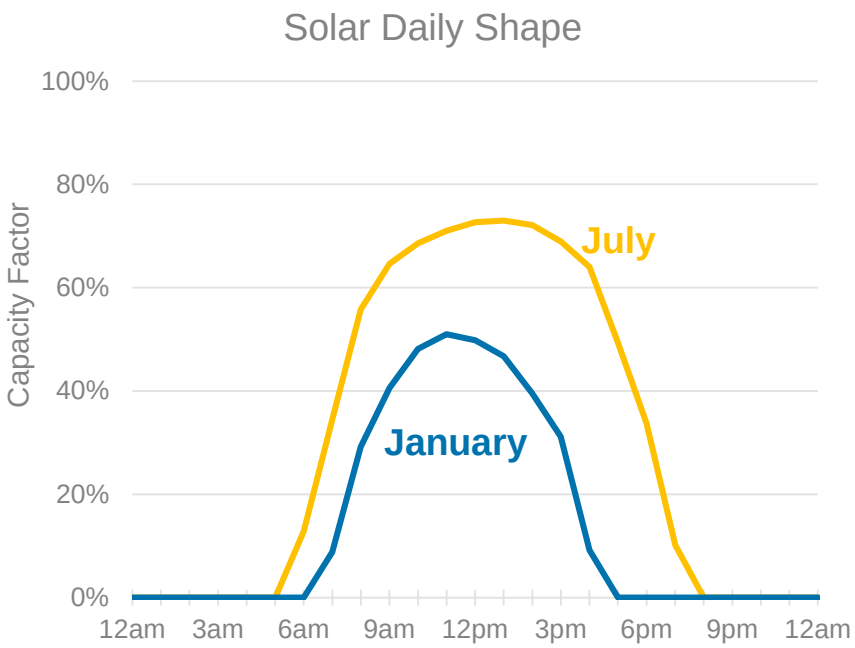
Replacement Options – Decision Elements

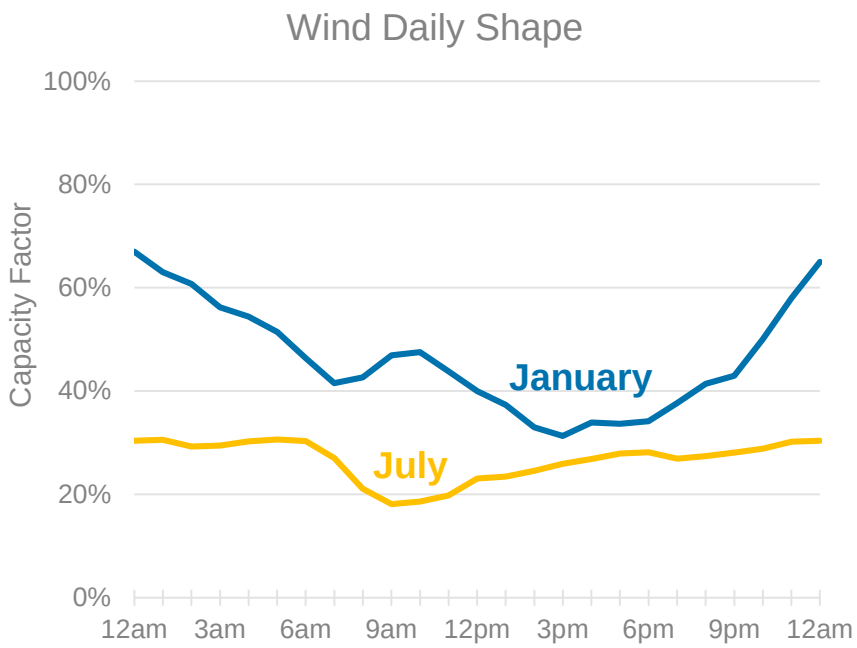
Many combinations of replacement options may be available for filling an identified resource gap.

1- TYPE	2- SIZE	3- LOCATION
Gas combined cycle (CC) *Gas turbine* *Gas aero* *Wind* *Solar* *Storage* *Hybrid* *Demand side mgmt* *Other*	*Could range from 50 MW to 500+ MW, depending on resource*	• *May impact capacity factor, MISO pricing* • *Also, may refer to central v distributed*
4- TIMING	**5- OWNERSHIP V. CONTRACTED**	**6- ASSET OPTIMIZATION**
• *Meet capacity and energy needs* • *Practical considerations*	• *Own/ joint venture* • *If contracted, questions of duration*	• *Repowering* • *Repurposing site*

Considerations in Portfolio Development

Wind and solar run on an intermittent basis and do not align perfectly with load, but can complement each other to improve portfolio performance.





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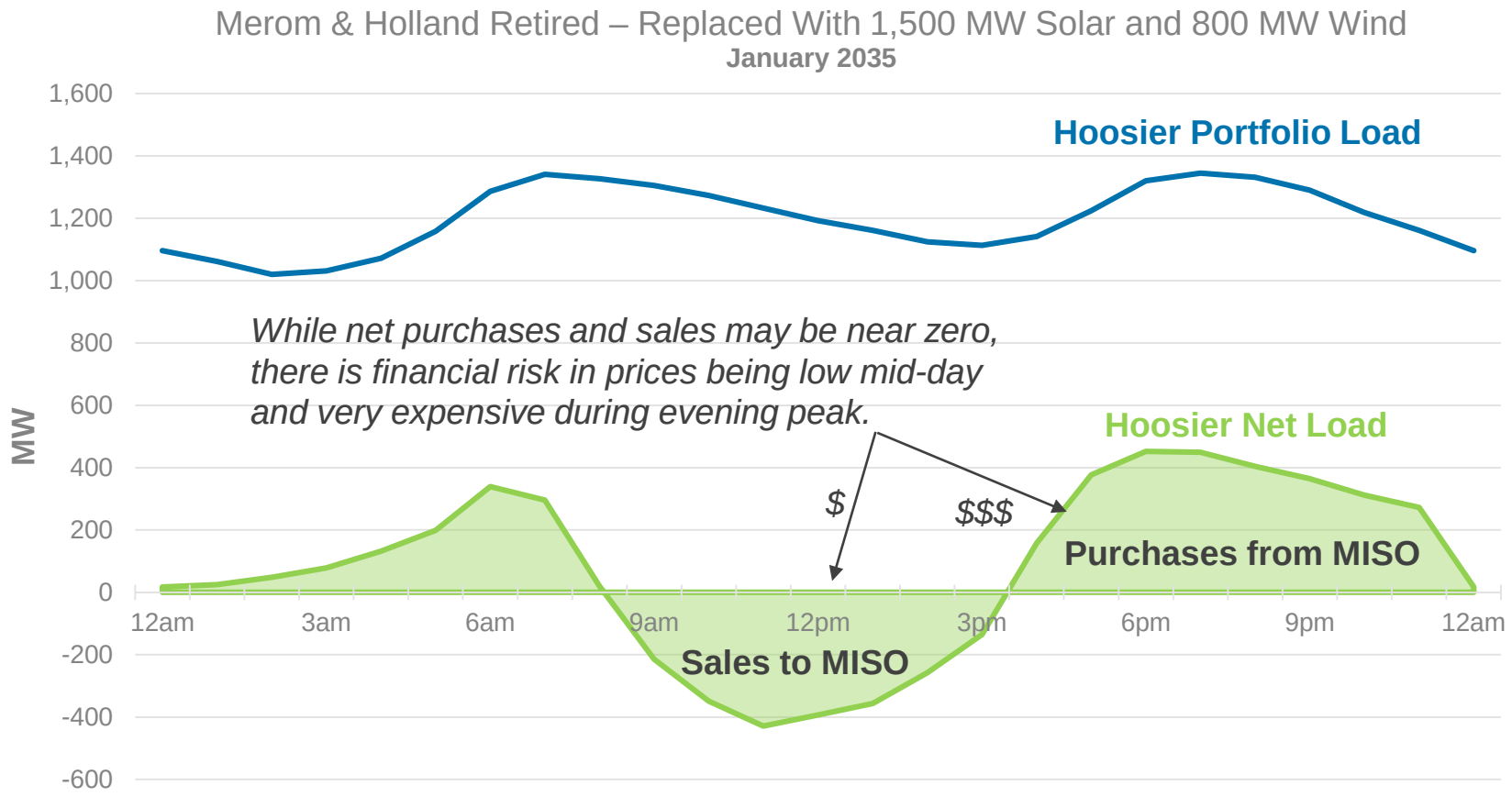
Considerations in Portfolio Development

While MISO provides a liquid market for purchases and sales, Hoosier may not want to rely on market too heavily due to uncertainty in prices.



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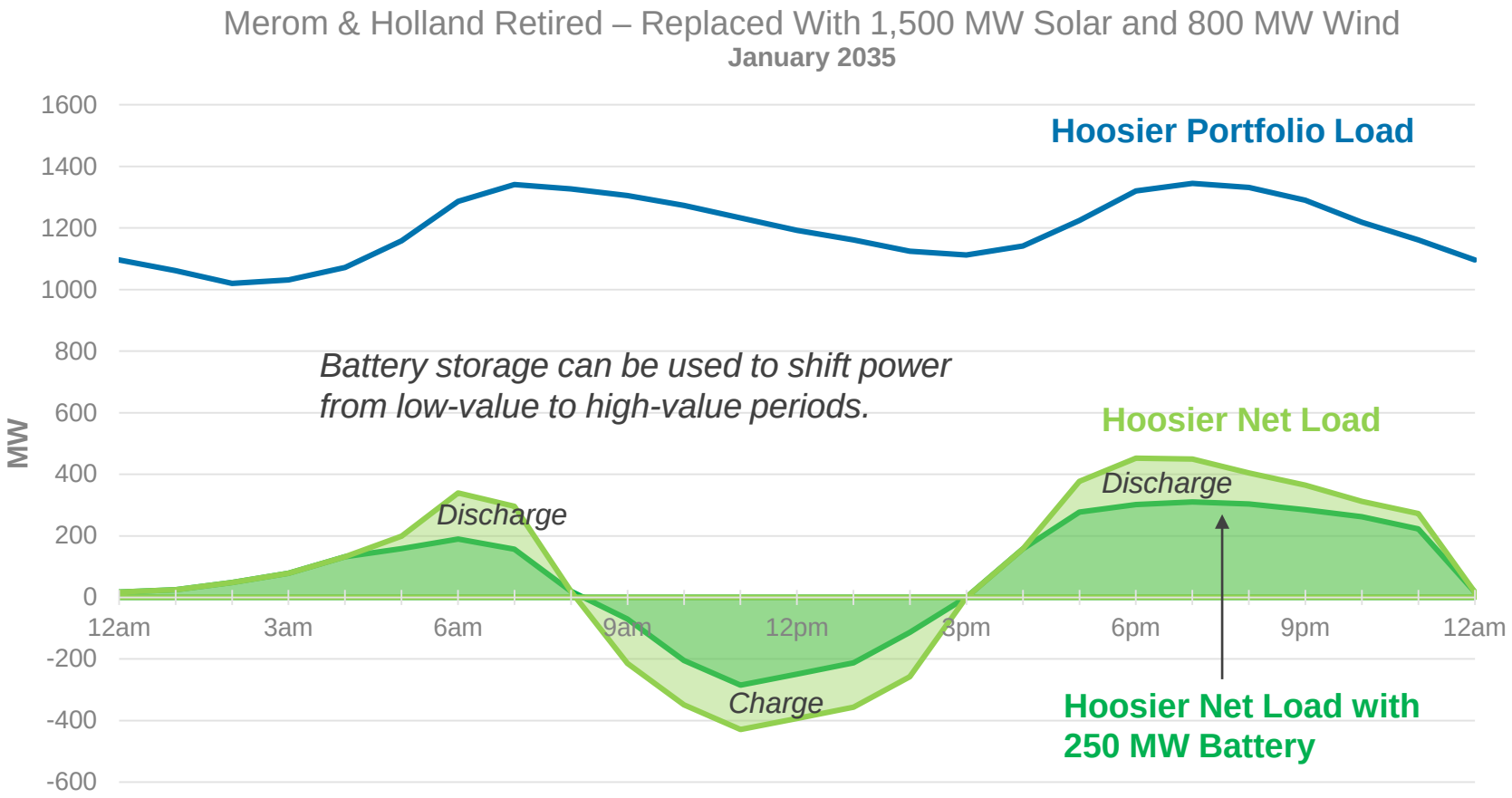
Considerations in Portfolio Development

Storage may offer a solution to intermittent resource output, but there is an added cost to reducing risk. Gas peakers serve a similar purpose and can reduce exposure to high market prices.



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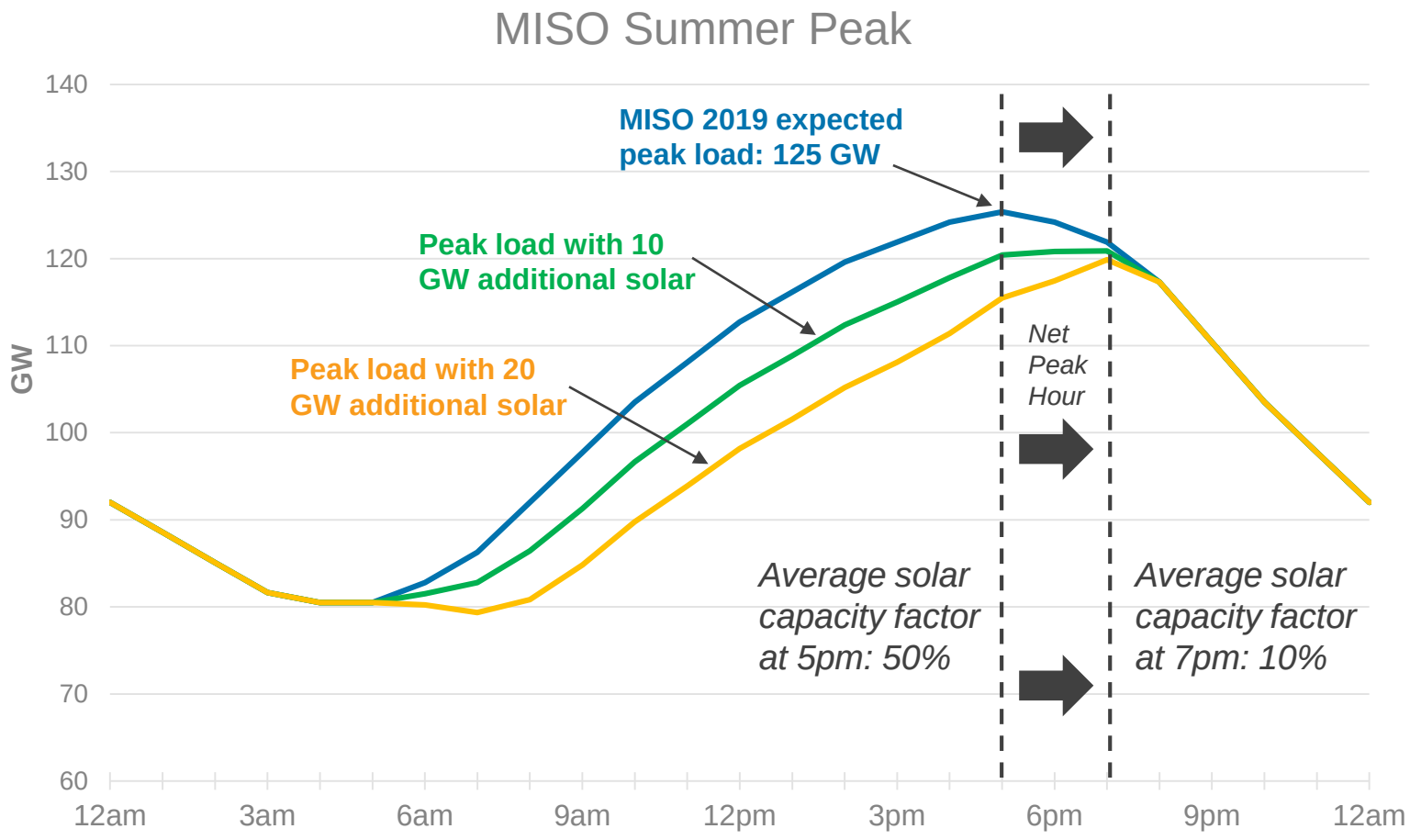
Considerations in Portfolio Development

The value of intermittent capacity could change over time based on market changing conditions (e.g., solar peak credit).



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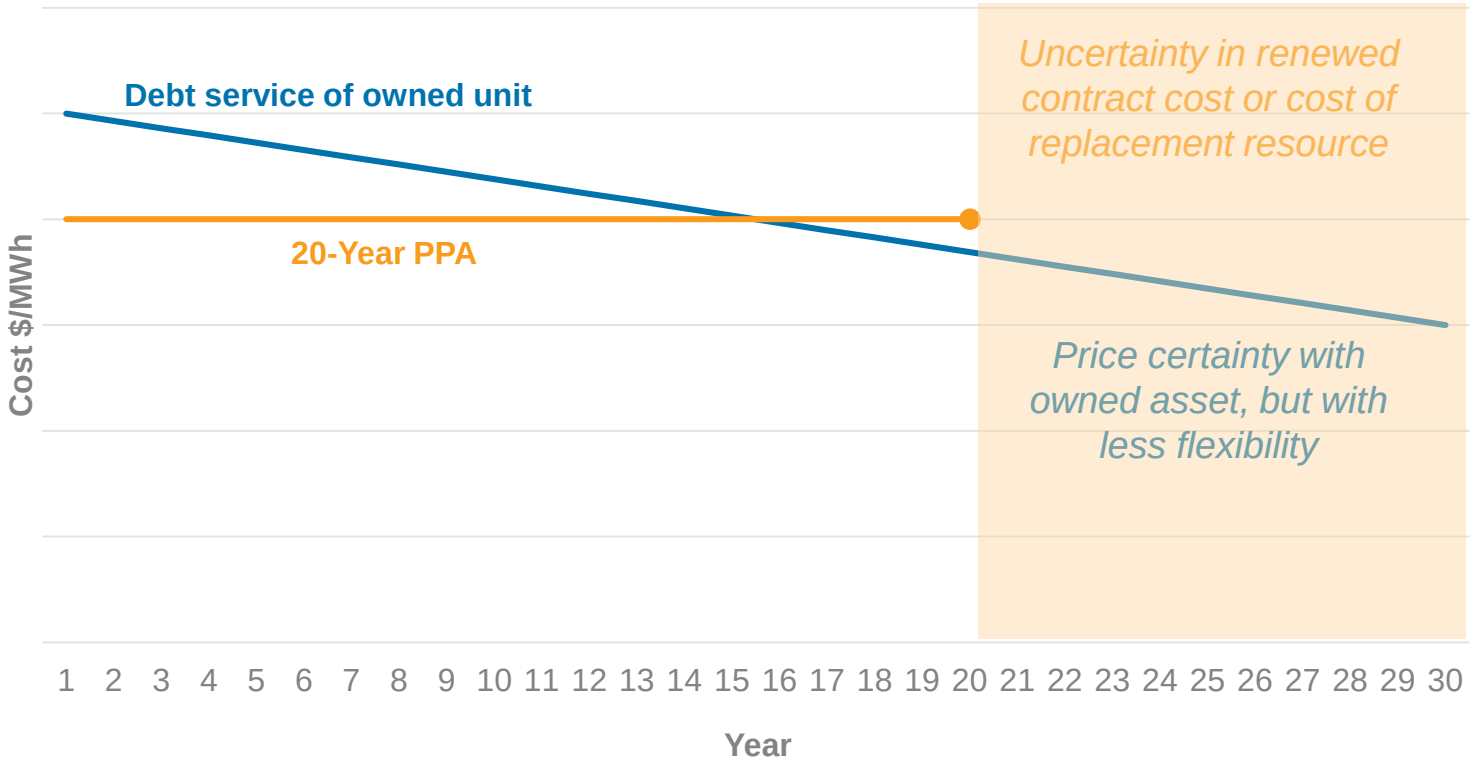
Considerations in Portfolio Development

There are financial and risk tradeoffs in contracting versus ownership of new assets which will be explored.



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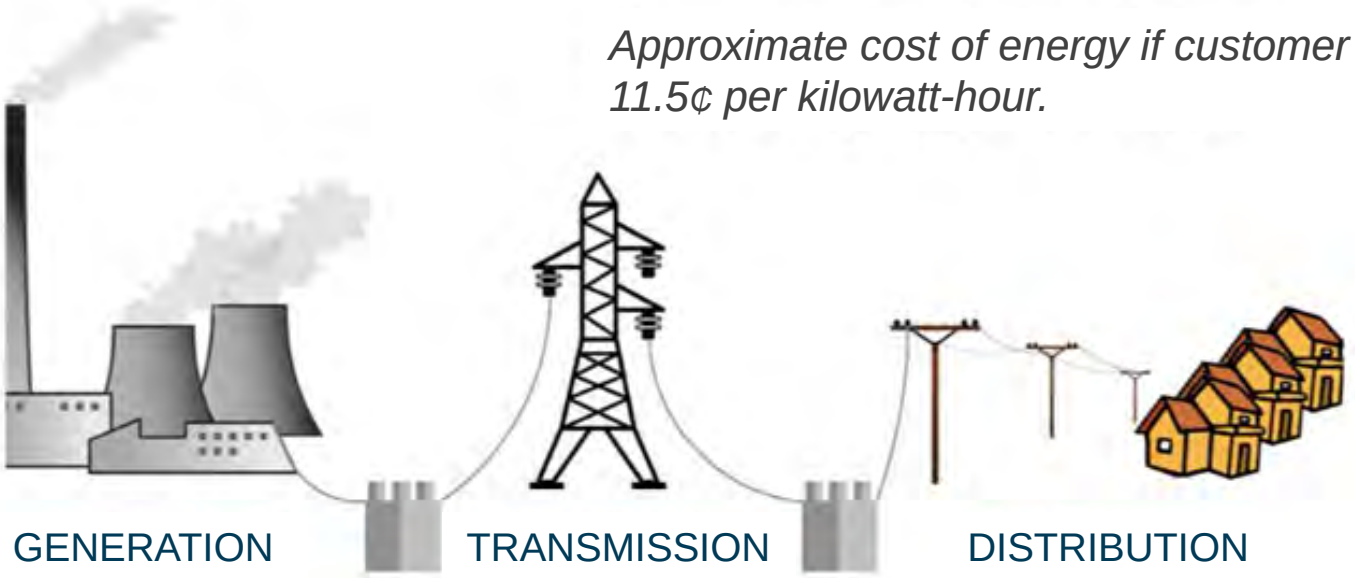
Considerations in Portfolio Development

Distributed resources could be cost competitive with central resources depending on costs they can avoid.

Approximate cost of energy if customer pays 11.5¢ per kilowatt-hour.



Energy has more value the closer it is produced to home

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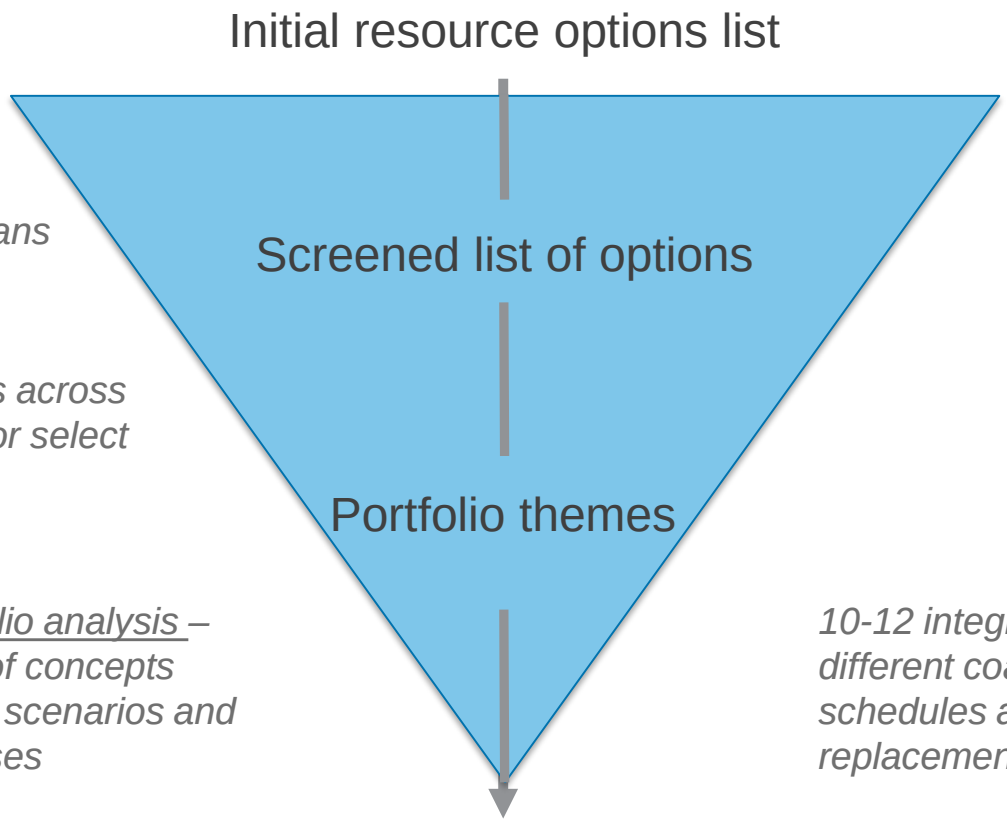
How Will We Decide the Right Replacement Portfolio?

Alternative resource portfolios will be compared on how well they meet objectives for low and stable rates, resource diversity, and sustainability.

	Low Wholesale Rates			Rate Stability & Predictability				Sustainability of Portfolio			Resource Diversity			Employee Impact
	Short Term NPV of System Costs	Long Term NPV of System Costs	Growth in Customer Rates	Max NPV Under Edge Scenario	Min NPV Under Edge Scenario	25th & 75th Percentile Range	NPV of Costs - 95th Percentile	Total Fleet Emissions	Fleet Water Consumed	Fleet Waste Produced	Portfolio Generation by Tech	Portfolio Capacity by Tech	Ratio Owned to Contracted	Portfolio Rating
Portfolio	$/MWh	$/MWh	%	$/MWh	$/MWh	%+ and %-	$/MWh	MMTons CO2e	MM Gallons	Tons	% by Tech	% by Tech	%	Rating
Portfolio 1														
Portfolio 2														
Portfolio 3														
…														

The full retirement and replacement analysis will introduce data on the additional objectives

Replacement Resource Screening



Feasibility screen – Identifying candidate resources from MISO market work and peer plans

Screening tests – Quantitative analysis across different scenarios for select resource types

Full Portfolio analysis – Short-list of concepts against all scenarios and risk analyses

10-12 integrated portfolios with different coal retirement schedules and different replacements

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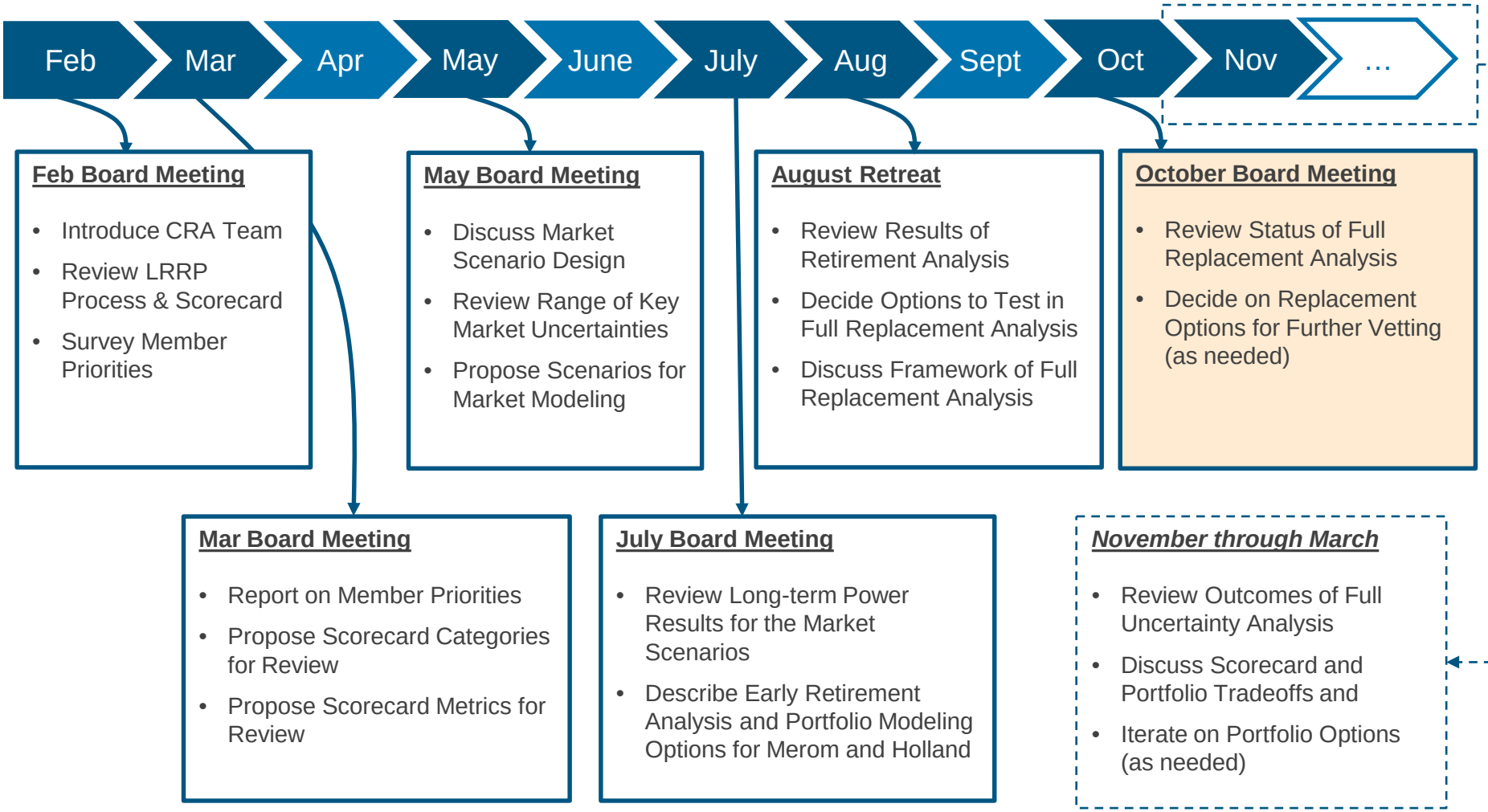
LRRP Schedule



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APPENDIX

Potential Thematic Portfolio Options

Themes can be developed around resource type and commitment

	More natural gas ⟷ More renewables			
Shorter duration commitments - More 15-20-yr PPAs - More short-term capacity purchases ↕	Mostly gas (plus some renewable) power purchase agreements (PPAs)	All solar PPAs	Solar plus wind PPAs	Renewable and storage PPAs
Longer duration commitments - Longer-term PPAs - More owned assets	Owned natural gas combined cycle/ peakers plus smaller renewables	Solar dominant	Solar plus wind	Renewables plus significant storage
Other key resource options	Re-power Merom to Gas	Demand Side Management Options	Distributed Energy Resource Options - to be evaluated further in subsequent phases	

Long Range Resource Plan

Portfolio Analysis

November 13, 2019

HOOSIER ENERGY
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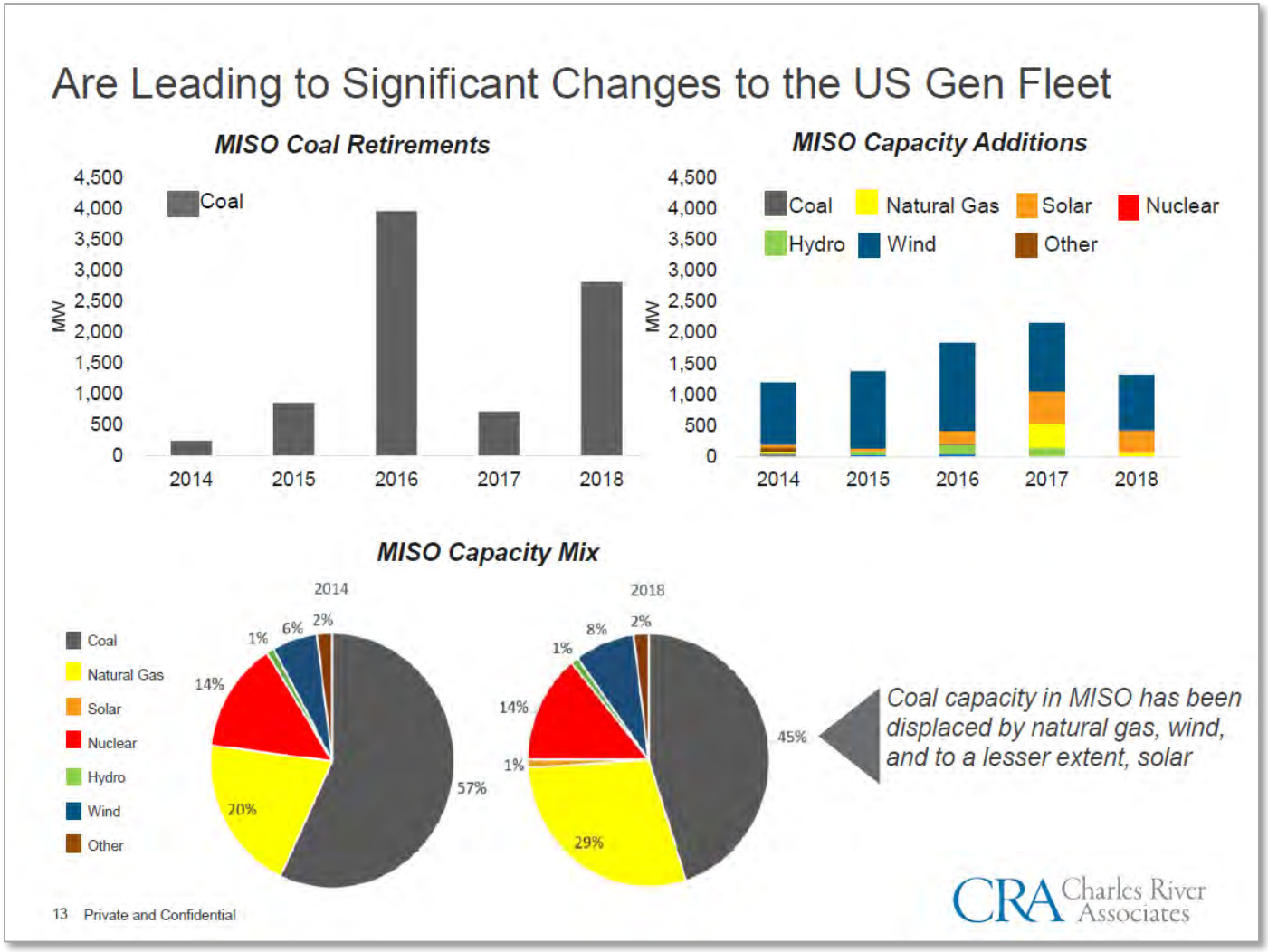
Outline

- Background
- Alternative Portfolio Development
- Portfolio Analysis and Results
- Key Takeaways and Conclusions

Industry Change and Generation Owner Response



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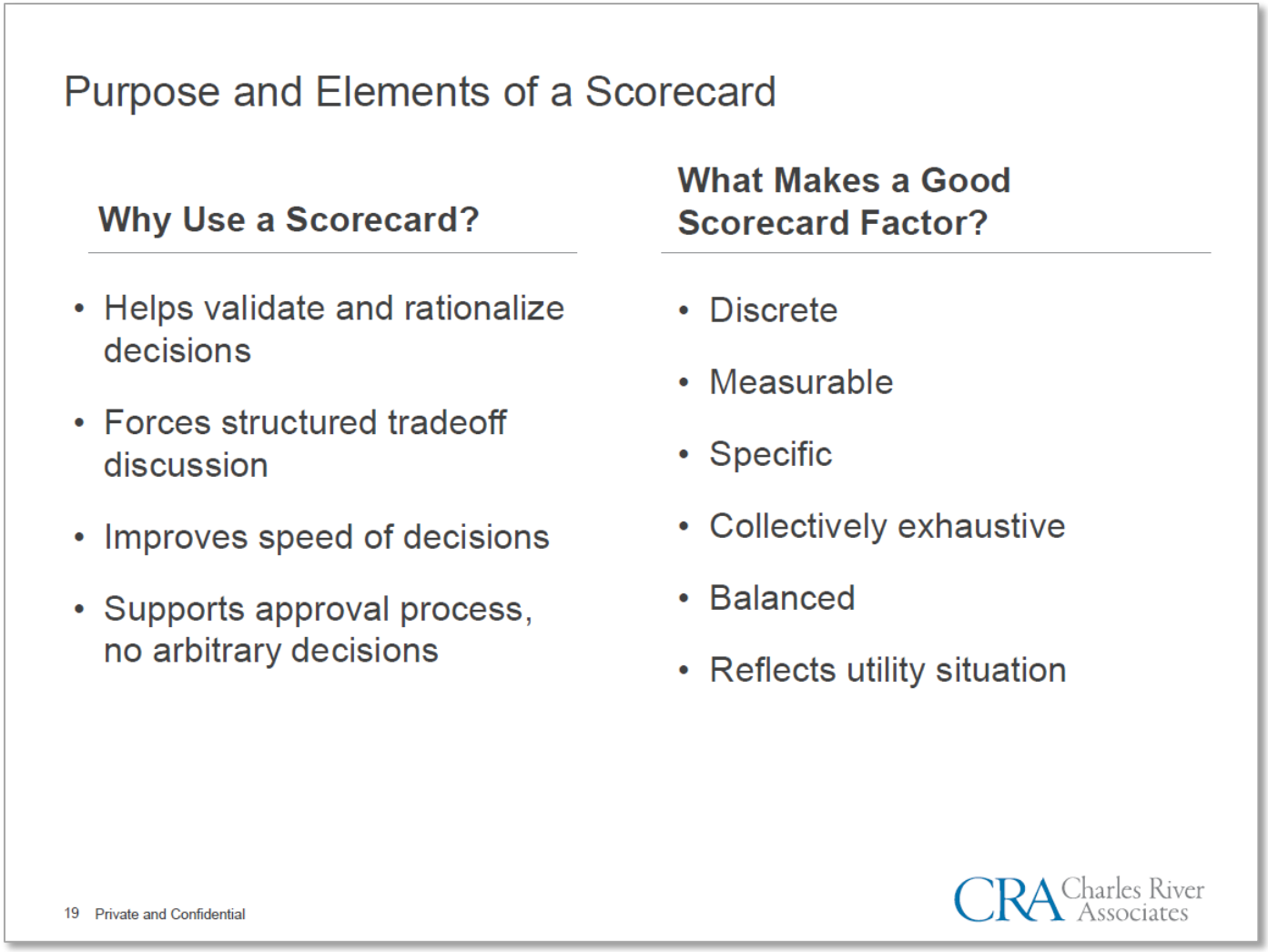
Benefits of a Scorecard in Resource Planning



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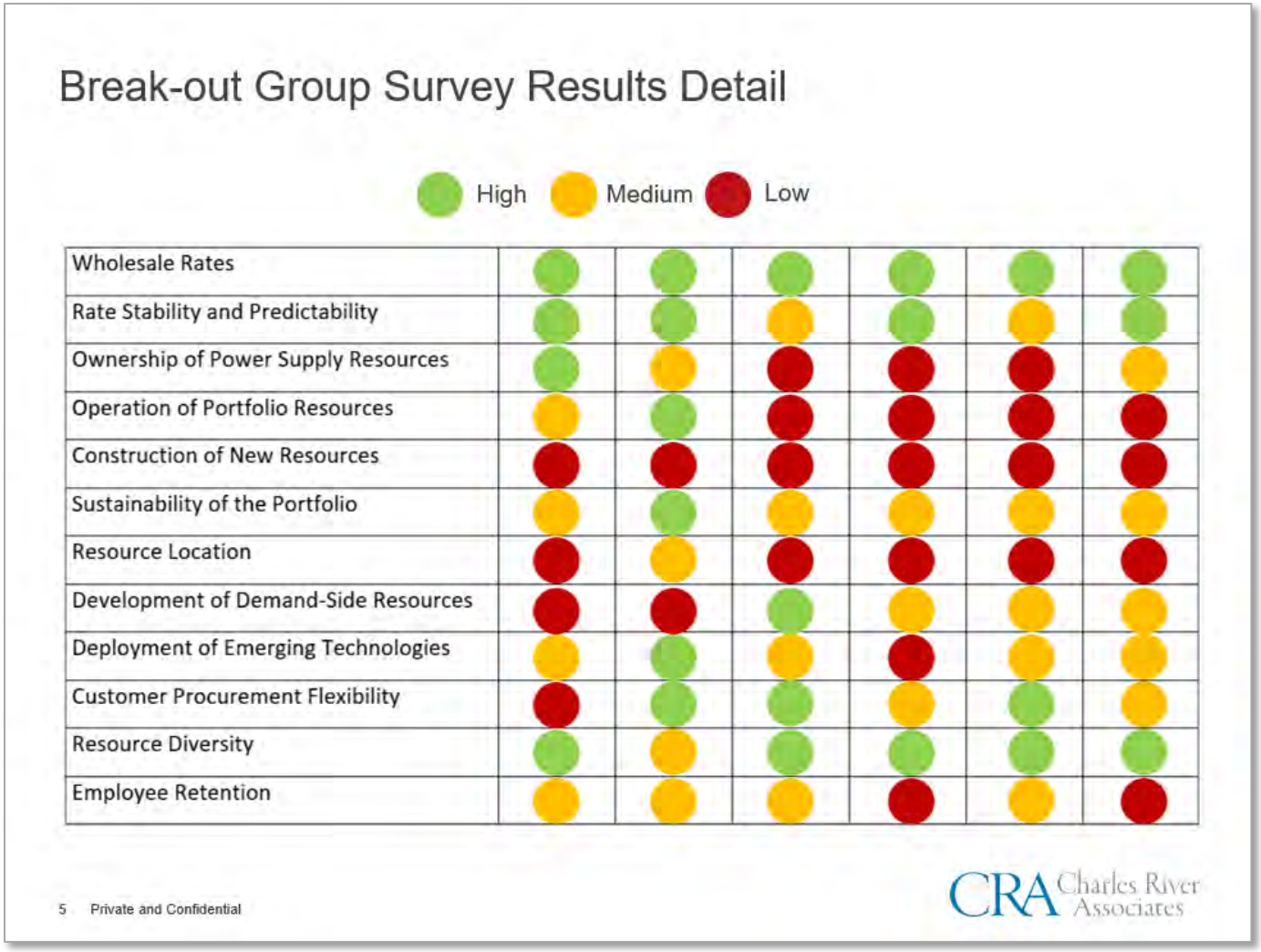
Scorecard Survey Results Review



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Survey results used to generate scorecard objectives

Proposed LRRP scorecard

	Low Wholesale Rates			Rate Stability & Predictability				Sustainability of Portfolio	Resource Diversity		Employee Impact
	Base Case 20-Yr NPV of Supply Cost	Average 2020-2030 Supply Cost	Average 2031-2040 Supply Cost	Lowest Expected 20-Yr NPV of Supply Cost	Highest Expected 20-Yr NPV of Supply Cost	Likely Range of 20-Year Supply Costs	Worst Case of 20-Year Supply Costs	2030 Carbon Reduction from Current Portfolio (Base Case)	Max Resource Type as % of Generation Mix	Maximum Unit Size	Criteria Rating (Low, High)
	$MM	$ / MWh	$ / MWh	$MM	$MM	-$MM +$MM	$MM	% reduction	%	MW	Rating
Current Portfolio											
Alt 1											
Alt 2											
...											

13 Private and Confidential

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Note: Not exact slide from March; current scorecard shown to avoid version confusion

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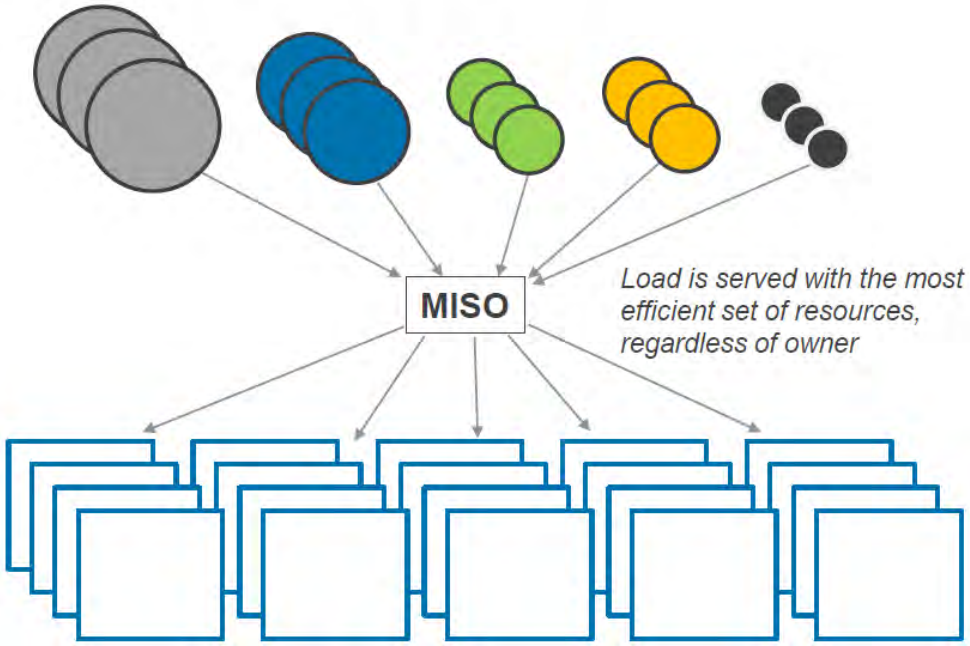
MISO Provides Security, Efficiency

The ISO Model – an efficient market

Today, as a part of MISO, Hoosier's generating units are dispatched economically against all other generators to serve all load



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Scenarios examine how the future might turn out

Developing Scenario Themes

- Scenarios are constructed through combinations of model "drivers"
- Generally, the major drivers of key portfolio value drivers fall within four major categories

Technology

Supply-side resource options (solar, storage, etc.)

Natural gas extraction

Policy/ Regulation

Renewable tax incentives

Carbon regulations (national or local)

Power market design changes

Economy

Macroeconomic growth

Commodity Prices

Commercial and industrial power demand

Customer Behavior

Energy efficiency and demand side management

Distributed energy penetration

Electric vehicle growth

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- **May**
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Initial Set of Planning Scenarios

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- February
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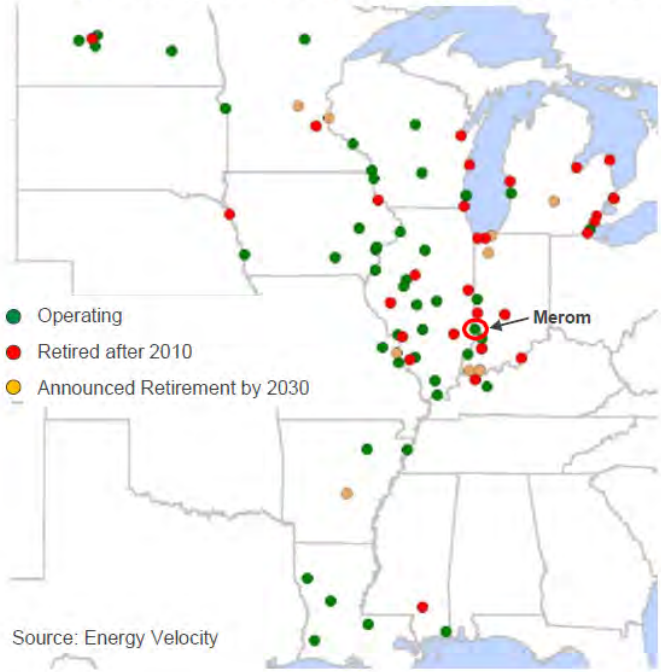
Note: Flat Gas scenario added after May but included to avoid version confusion

MISO Retirements

Coal units in MISO – operating and retired

Location of Coal Units in MISO
Operating, Retired, Announced Retirement



Source: Energy Velocity

Comments

- Since 2010, approximately 10% of coal-fired capacity has been retired in MISO*
  - 52 units total
  - Smaller units: 210 MW ave.
  - Most due to environmental compliance considerations
- Approximately 15% of remaining capacity has been announced for retirement in the next 10 years
  - 28 units total
  - Unit size: 420 MW ave.

**Greater than >100 MW*

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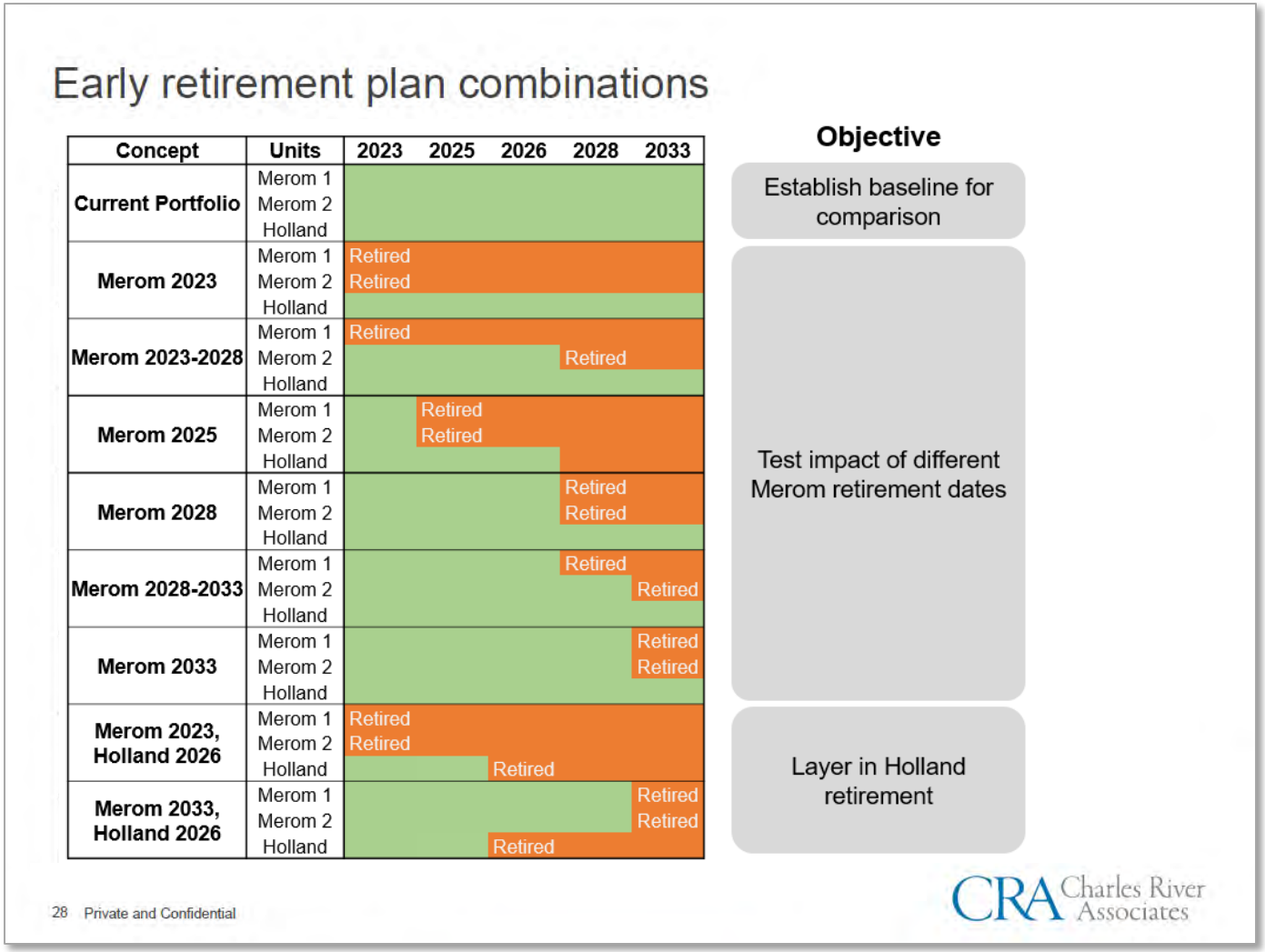
Hoosier Early Retirement Combinations



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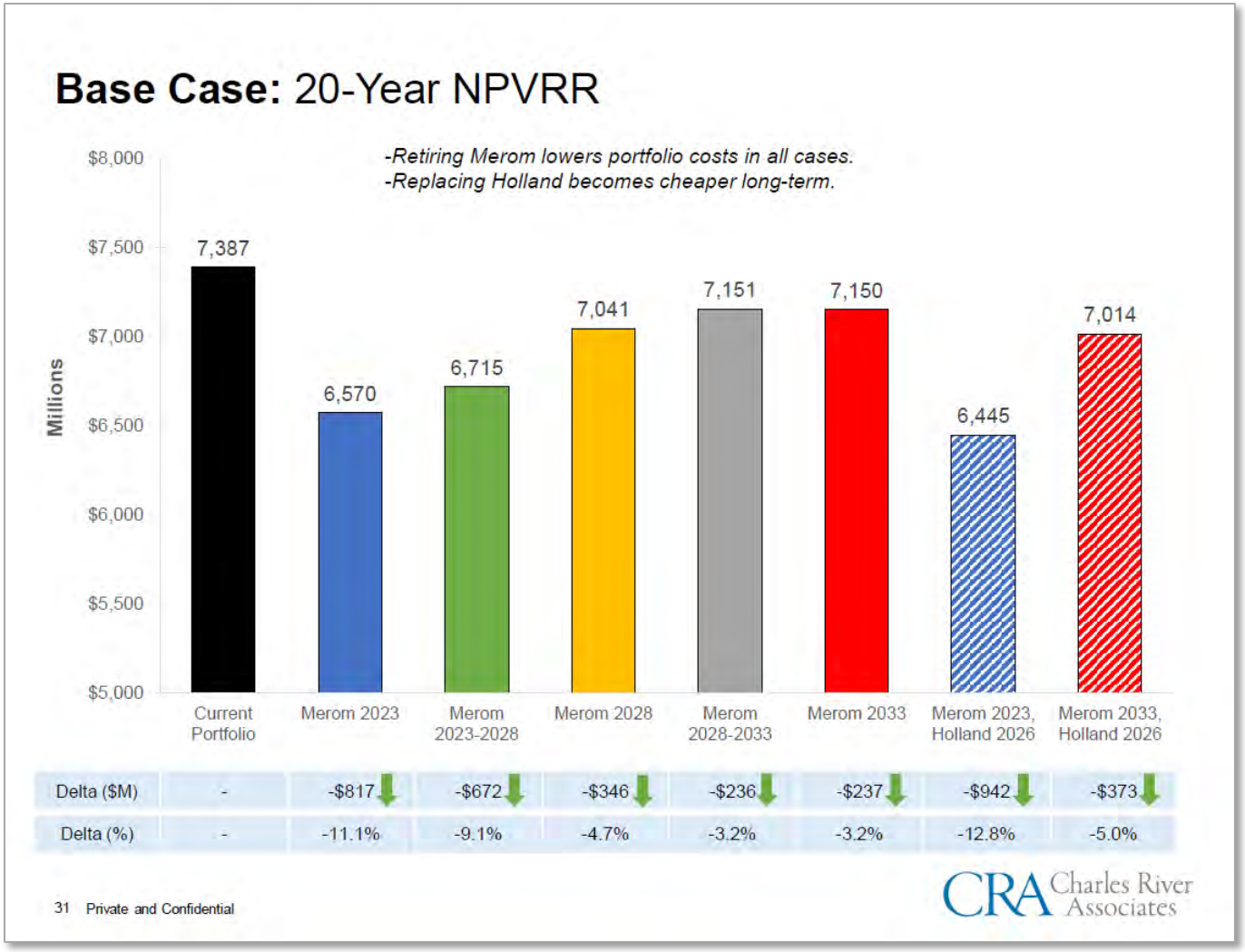
Hoosier Early Retirement Combinations



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Hoosier Early Retirement Combinations

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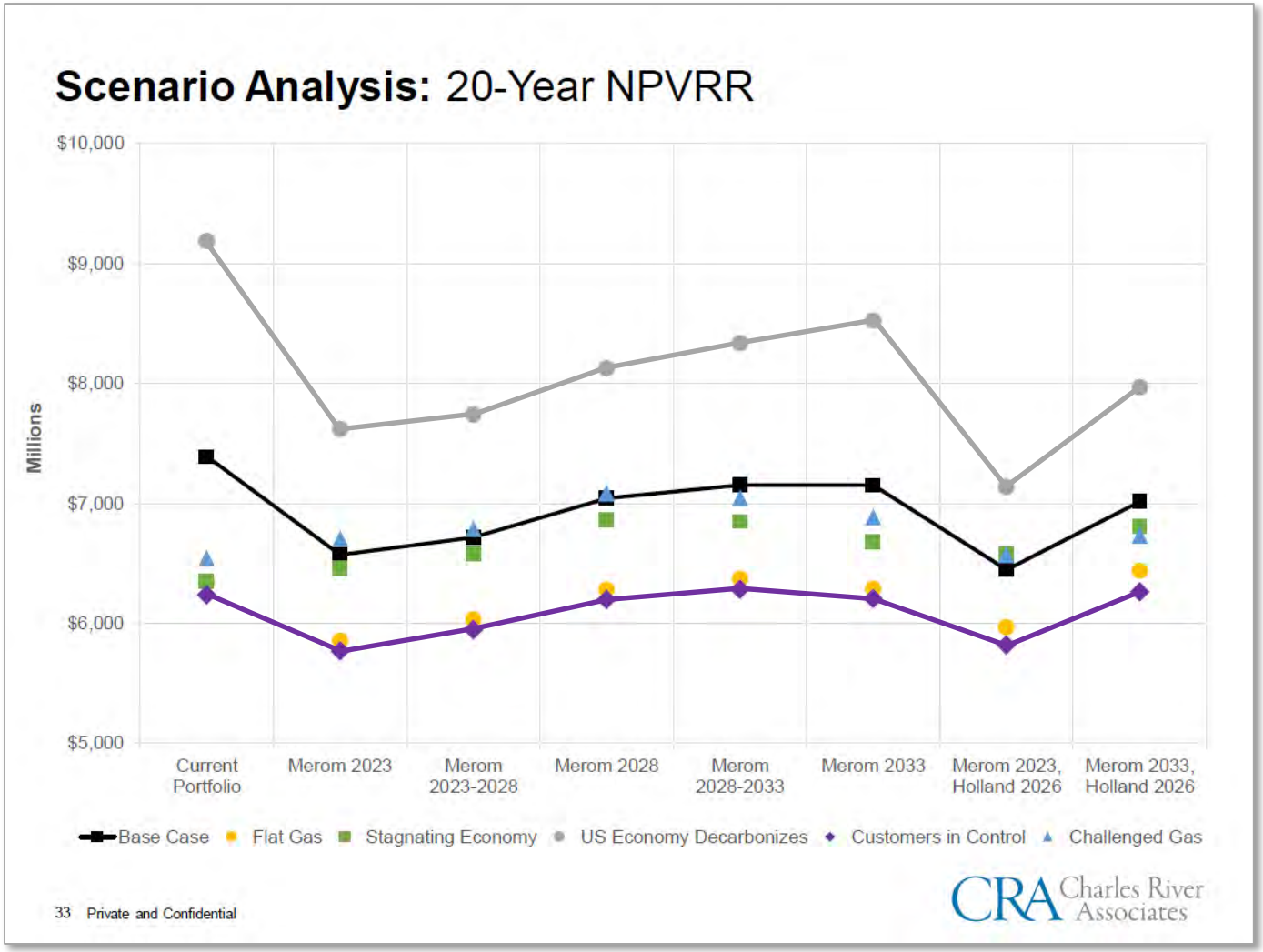

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Note: Connector bars added for high and low scenarios

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Changes to Retirement Options & Timing

Remove Holland Early Retirement

- Early retirement benefits of Holland don't begin to accrue until the late 2020s
  - Can revisit as part of 2023 IRP process
- Significant portfolio changeover at the same time with Merom

Alternative to Staggered Option

- Eliminate staggered Merom retirement 2023/2028
- Replace with Merom 2025 full retirement option
- Splits 2023/2028 timeframe

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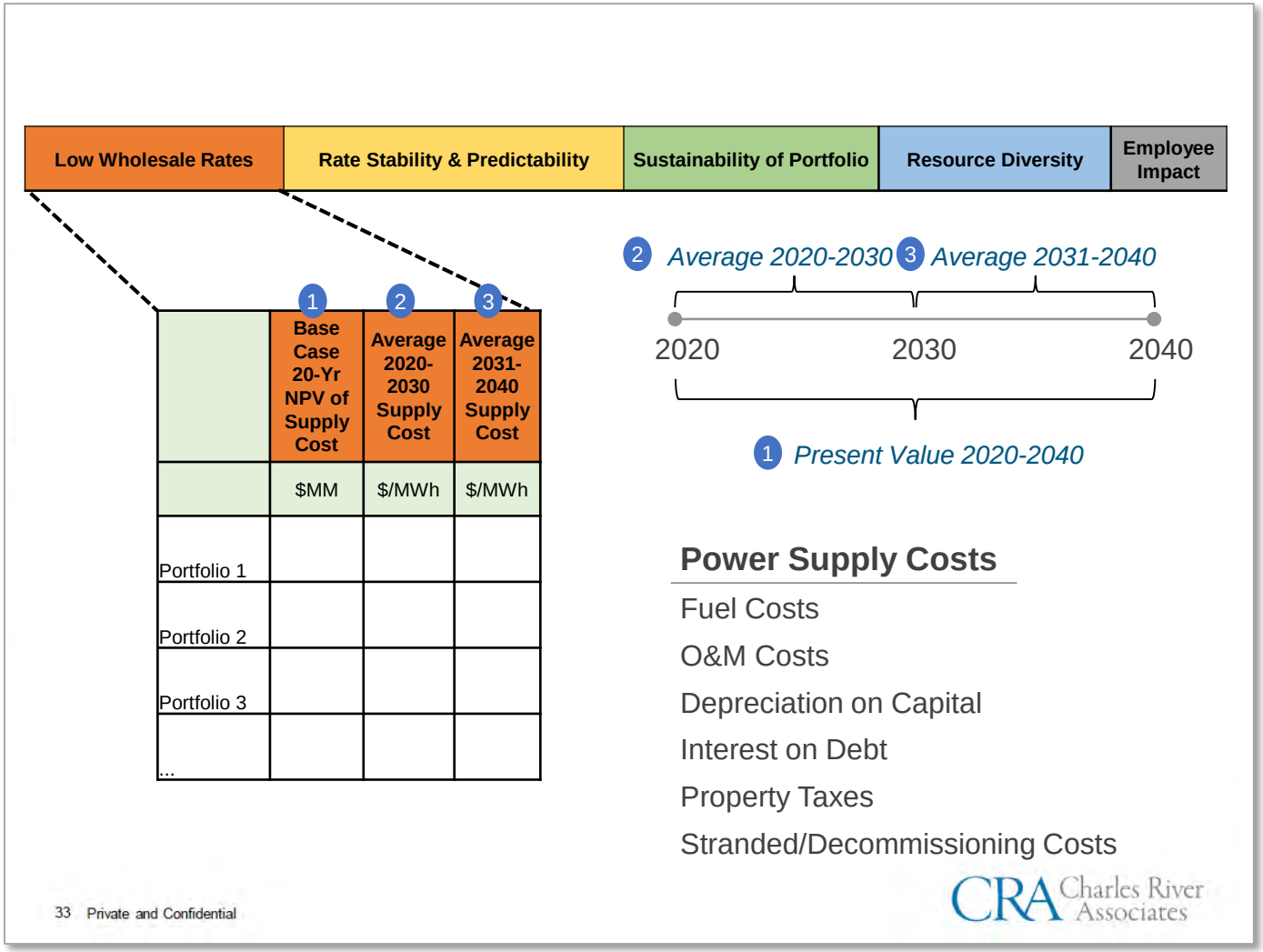
Low wholesale rates reflect Hoosier power supply costs over different time periods



	1 Base Case 20-Yr NPV of Supply Cost	2 Average 2020-2030 Supply Cost	3 Average 2031-2040 Supply Cost
	$MM	$/MWh	$/MWh
Portfolio 1			
Portfolio 2			
Portfolio 3			
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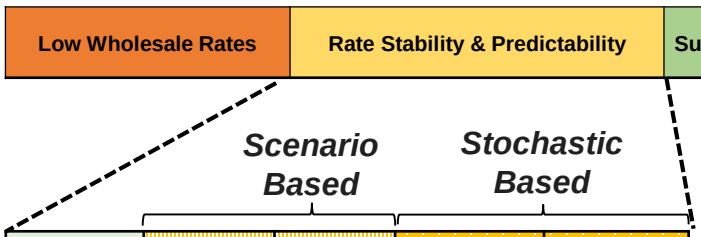
Rate stability and predictability measure supply cost certainty under varying market conditions



Scenario Based | *Stochastic Based*

	Min Case 20-Yr NPV of Supply Cost	Max Case 20-Yr NPV of Supply Cost	Likely Range of 20-Year Supply Costs	Worst Case of 20-Year Supply Costs
	$MM	$MM	-$MM (25th) +$MM (75th)	$MM
Portfolio 1				
Portfolio 2				
Portfolio 3				
...				

Scenario-related metrics illustrate how portfolios perform across different states of the world

Stochastic-related metrics illustrate how portfolio costs respond to market or weather shocks

33 Private and Confidential

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- February
- March
- April
- May
- June
- July
- August
- September
- **October**
- November

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Scenarios represent storylines with distinct trajectories

Base Case

- Expected view of the world
- (1) Gas prices rise gradually ($4 in *real$* by 2030, close to $5 by 2040)
  (2) Moderate CO_2 policy in 2028

Flat Gas

- "Status quo" sensitivity
- (1) Flat gas prices close to current levels (below $3), (2) No carbon price

Stagnating Economy

- Decline in economic outlook
- (1) Lower load growth, (2) Lower coal retirements; (3) No CO_2 price; (4) Higher solar, wind, and storage costs

Decarbonization

- CO_2 emission cap, more EVs
- (1) Higher CO_2 prices; (2) Higher gas prices; (3) Lower renew and storage costs; (4) No nuclear retirements

Customers in Control

- High C&I procurement of renewables
- (1) Lower gas prices; (2) Lower solar costs; (3) No CO_2 price; (4) Higher reserve margin; (5) Lower C&I load

Challenged Gas

- Restrictions on gas growth and reliability
- (1) Higher gas prices ($4 in *real$* by 2023, close to $6.5 by 2040)
  (2) No carbon price

33 Private and Confidential

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February
March
April
May
June
July
August
September
October
November

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Empty Scorecard

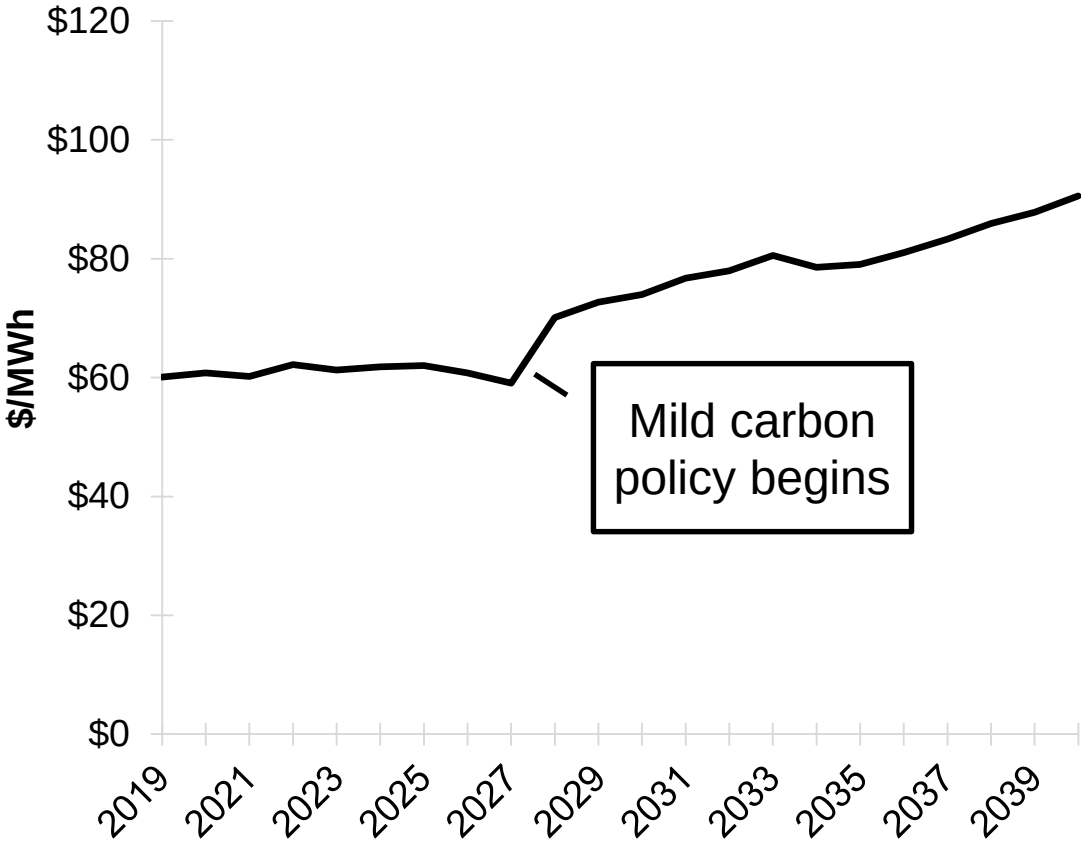
	Low Wholesale Rates			Rate Stability & Predictability				Sustain-ability of Portfolio	Resource Diversity		Employee Impact
	Base Case 20-Yr NPV of Supply Cost	Average 2020-2030 Supply Cost	Average 2031-2040 Supply Cost	Lowest Expected 20-Yr NPV of Supply Cost	Highest Expected 20-Yr NPV of Supply Cost	Likely Range of 20-Year Supply Costs	Worst Case of 20-Year Supply Costs	2030 Carbon Reduction from Current Portfolio (Base Case)	Max Resource Type as % of Generation Mix	Maximum Unit Size	Criteria Rating (Low, High)
	$MM	$ / MWh	$ / MWh	$MM	$MM	-$MM +$MM	$MM	% reduction	%	MW	Rating
Current Portfolio											
2023 Retirement Options											
Alt 1											
Alt 2											
…											
2025 Retirement Options											
Alt 1											
Alt 2											
…											

Outline

- Background
- Alternative Portfolio Development
- Portfolio Analysis and Results
- Key Takeaways and Conclusions

Under the Base Case, Hoosier's long-term supply costs for the current portfolio rise significantly, but are flat near term

Current Portfolio – Base Case Forecast



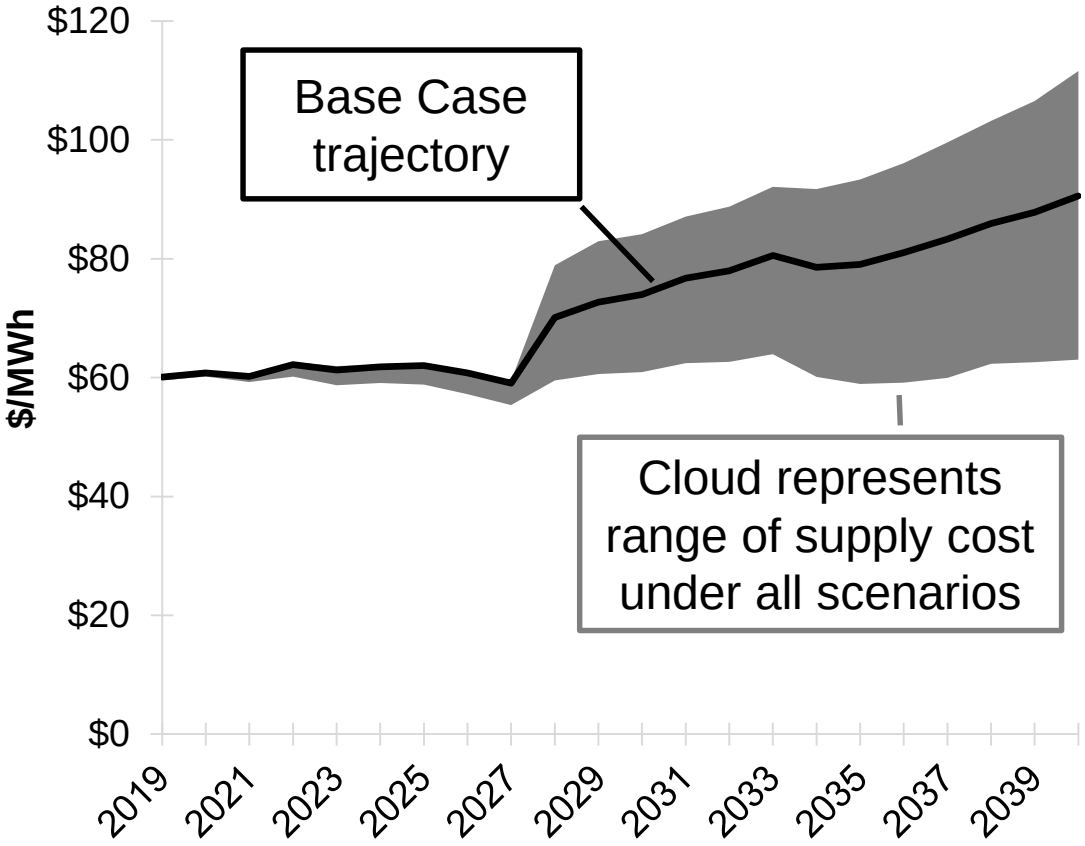
Source: CRA Analysis

Comments

- Supply cost forecast is similar to August presentation
- Costs are flat through 2027 as Merom benefits from rising gas and power prices
- Mild carbon policy starting in 2028 causes a jump in supply costs

Expected supply costs vary widely under different future states of the world

Current Portfolio – Base Case and Scenario Range Forecast



Source: CRA Analysis

Comments

- Current portfolio supply cost is highly uncertain: ranges from flat to rising sharply
- High carbon drives up costs by $10 to $20 per MWh after 2028
- Low gas prices and no carbon policy produce flat cost trajectory

Portfolio alternatives were narrowed down based on detailed assumption review and modeling

- Portfolio concepts were developed based on consideration of all scorecard objectives
- All portfolios developed plan for summer and winter peak needs and to limit market exposure
- A diverse set of resource options were considered to test limits on technology availability (e.g. combined cycle, storage, distributed resources) and varying levels of carbon emission

Three portfolio replacement themes were developed that test a range of gas, renewable, and storage additions

1 "Small Gas CC"

- 300 MW Gas CC is added
- 1,750 MW of renewables added
- 100 MW of Gas Peaker and 350 MW of Storage added

2 "No Gas CC"

- 2,450 MW of renewables added
- 200 MW Gas Peaker and 450 MW of Storage added

3 "No New Fossil"

- 2,400 MW of renewables added
- 675 MW of Storage added

New capacity additions through 2030 (MW)

The replacement themes were tested with a 2023 and a 2025 Merom retirement, totaling 6 portfolios

Merom Retirement Date

		2023	**2025**
1	Small Gas CC	"2023 Small Gas CC"	"2025 Small Gas CC"
2	No Gas CC	"2023 No Gas CC"	"2025 No Gas CC"
3	No New Fossil	"2023 No New Fossil"	"2025 No New Fossil"

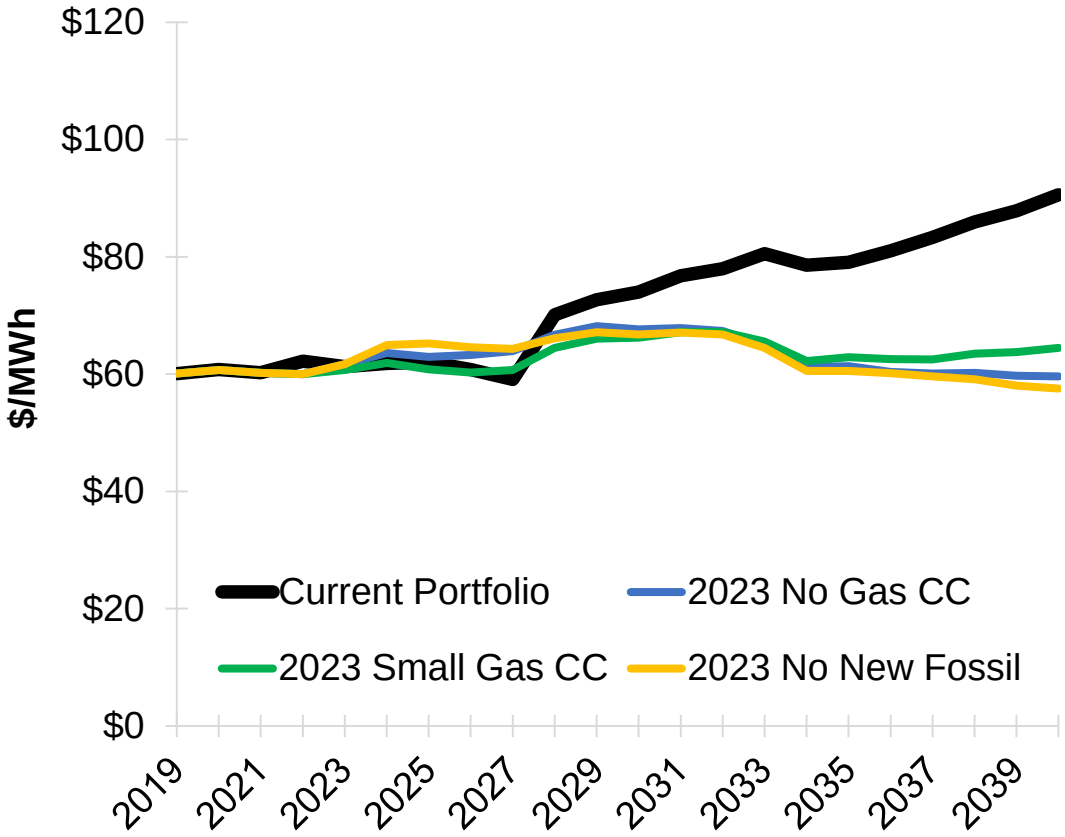
Six portfolio replacement concepts

Outline

- Background
- Alternative Portfolio Development
- Portfolio Analysis and Results
- Key Takeaways and Conclusions

The 2023 retirement portfolios yield large long-term cost savings and track near the current portfolio in the early years

Current and 2023 Retirement Portfolios - Base Case Forecast ($/MWh)

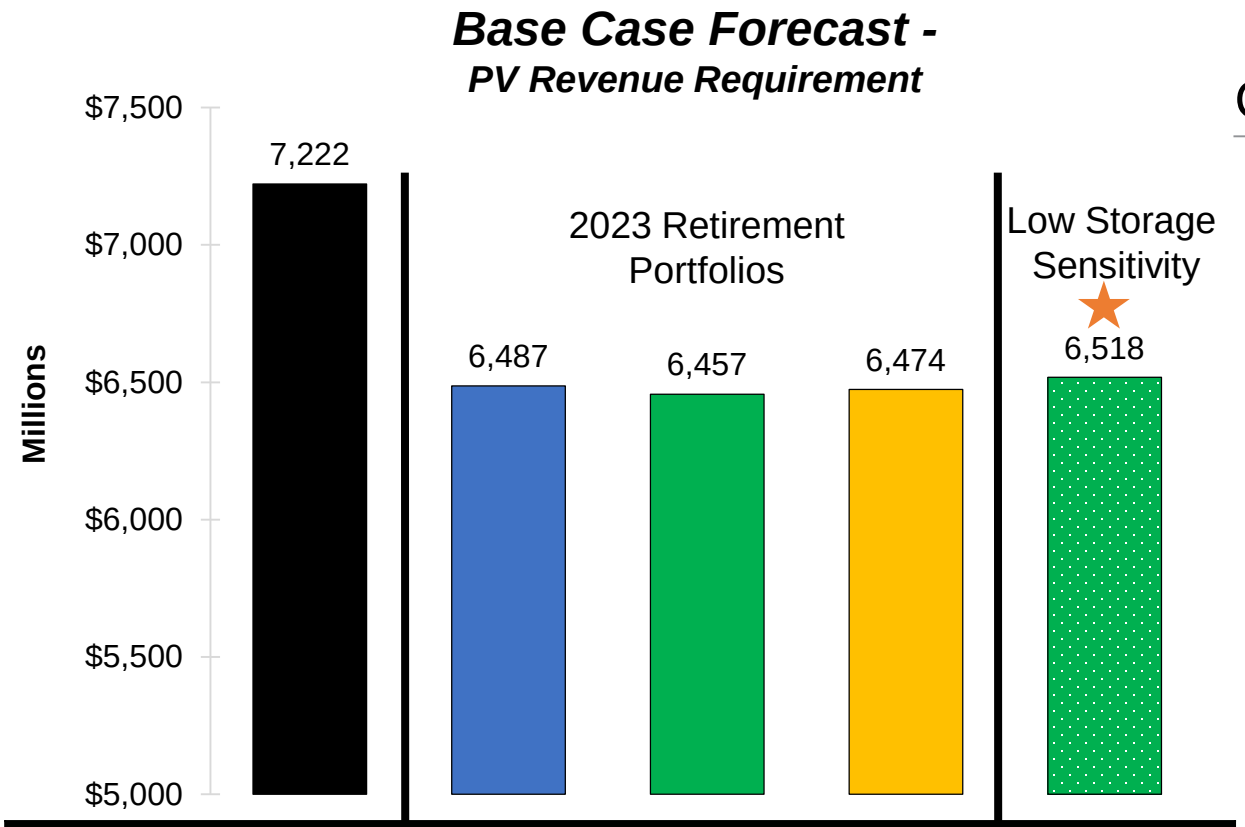


Source: CRA Analysis

Comments

- The No New Fossil portfolio provides the lowest supply costs over the long term
- The Small Gas CC portfolio provides the lowest supply costs in the short term

2023 retirement portfolios lower member supply costs by $700 million to $770 million over 20 years



Portfolio	Current Portfolio	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil	2023 Small CC, Low Storage
Cost Savings ($M)		$735	$765	$748	$704

Comments

- All 2023 portfolios provide significant savings in the Base Case

★ "2023 Small CC, Low Storage"

Sensitivity to test storage technology risk*

*In the sensitivity, storage is assumed to be unavailable until 2035 and lost storage capacity is replaced by gas peakers

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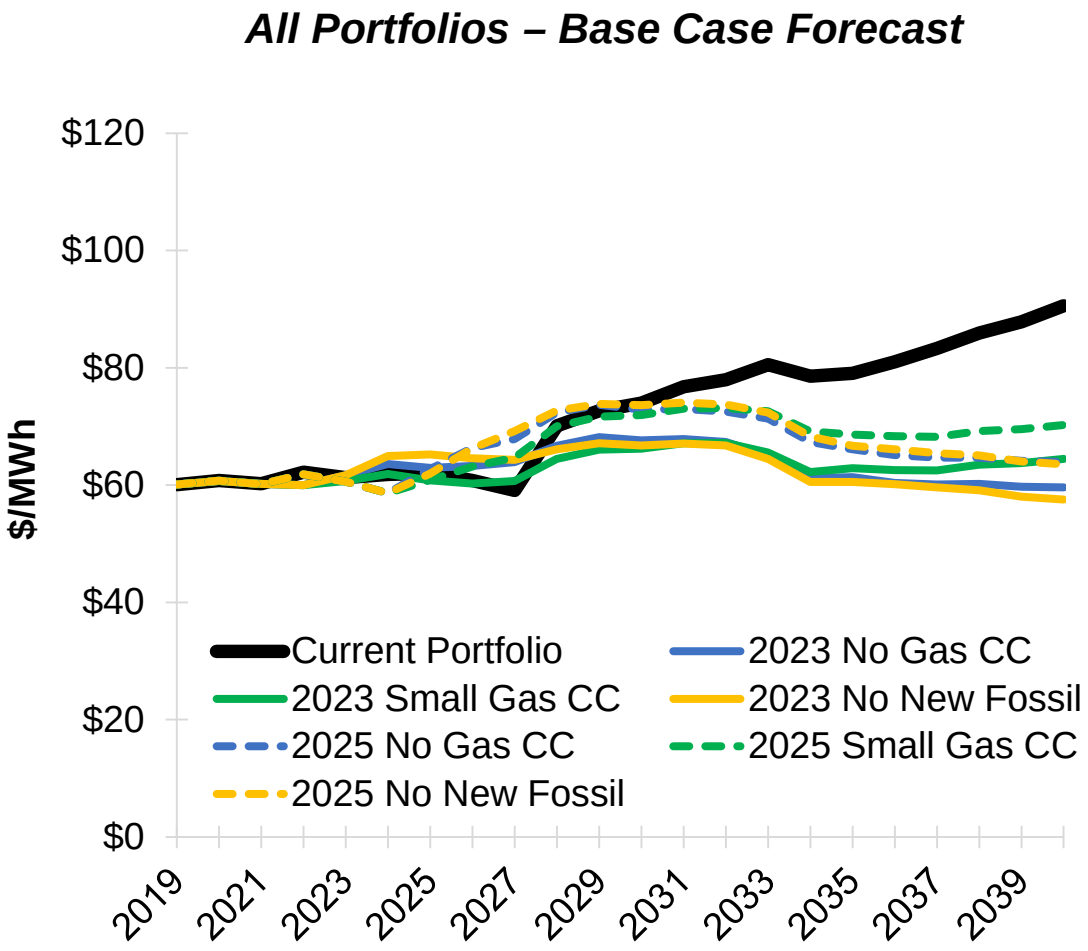
Retiring Merom in 2025 also lowers long-term supply costs to Hoosier members

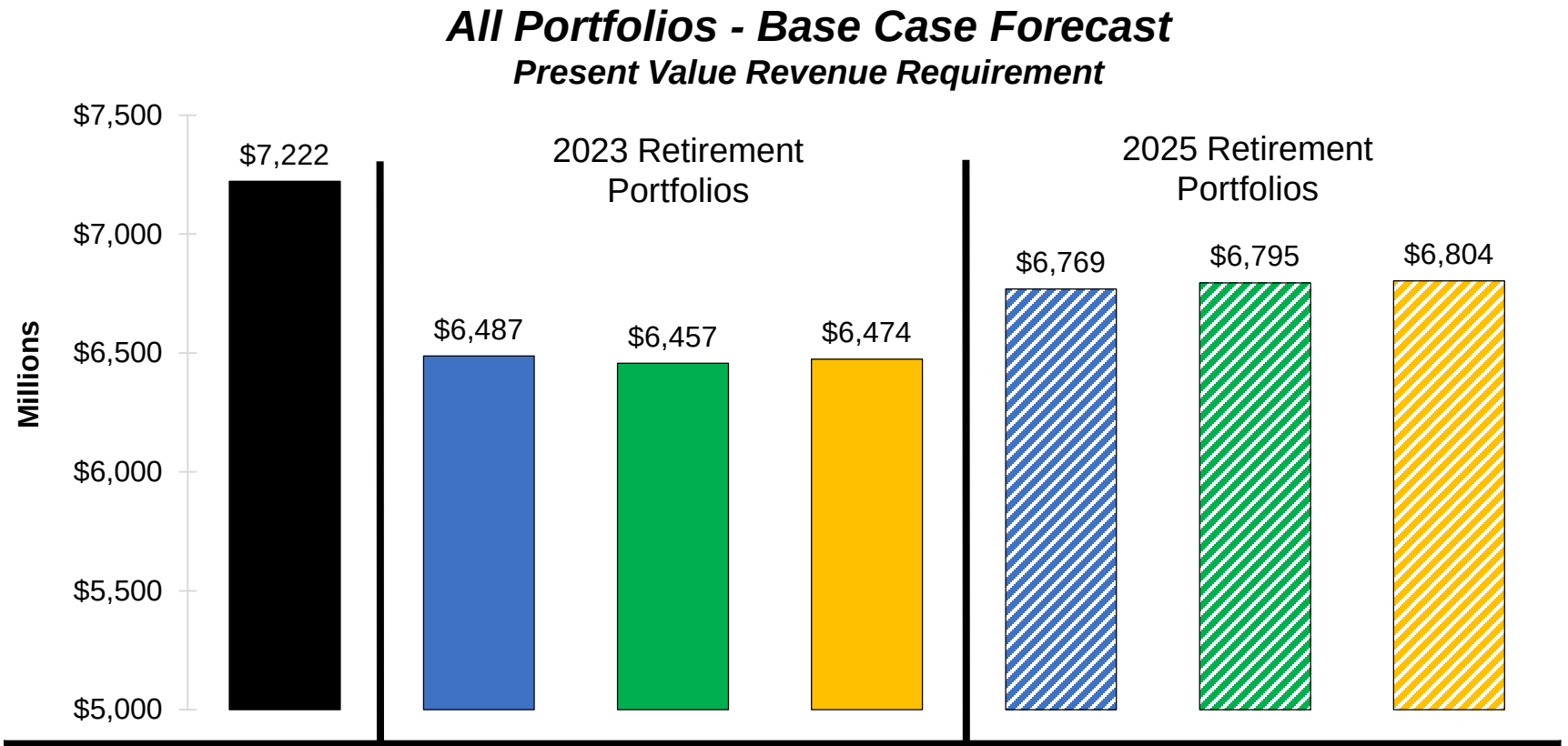


Source: CRA Analysis

Comments

- All 2025 portfolios lower long-term supply costs in the Base Case
- 2025 portfolios show lower savings than 2023 due to higher renewable costs, as tax credits phase out

2025 retirement portfolios miss out on early renewable pricing, but still provide more than $400 million in savings



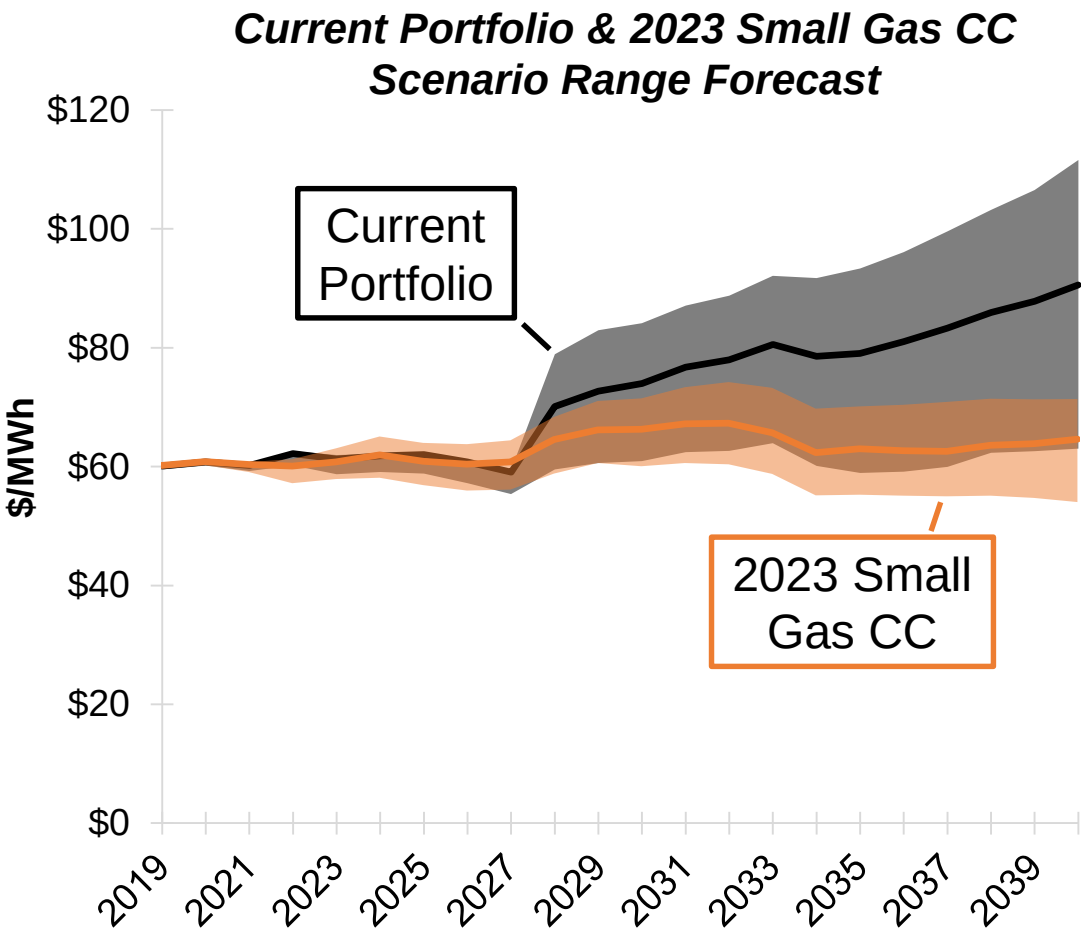
Portfolio	Current Portfolio	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil	2025 No Gas CC	2025 Small Gas CC	2025 No New Fossil
Cost Savings ($M)		$735	$765	$748	$453	$427	$418

Source: CRA Analysis

Scorecard – Low Wholesale Rates

	Low Wholesale Rates			Rate Stability & Predictability				Sustain-ability of Portfolio	Resource Diversity		Employee Impact
	Base Case 20-Yr NPV of Supply Cost	Average 2020-2030 Supply Cost	Average 2031-2040 Supply Cost	Lowest Expected 20-Yr NPV of Supply Cost	Highest Expected 20-Yr NPV of Supply Cost	Likely Range of 20-Year Supply Costs	Worst Case of 20-Year Supply Costs	2030 Carbon Reduction from Current Portfolio (Base Case)	Max Resource Type as % of Generation Mix	Maximum Unit Size	Criteria Rating (Low, High)
	$MM	$ / MWh	$ / MWh	$MM	$MM	-$MM +$MM	$MM	% reduction	%	MW	Rating
Current Portfolio	7,222	64.1	82.2								
2023 Retirement Options											
No Gas CC	6,487	63.5	62.3								
Small Gas CC	6,457	62.0	64.2								
No New Fossil	6,474	63.8	61.4								
2025 Retirement Options											
No Gas CC	6,769	65.3	67.3								
Small Gas CC	6,795	64.0	70.2								
No New Fossil	6,804	65.4	67.9								

The 2023 Small Gas CC portfolio reduces the range of expected supply costs under different scenarios



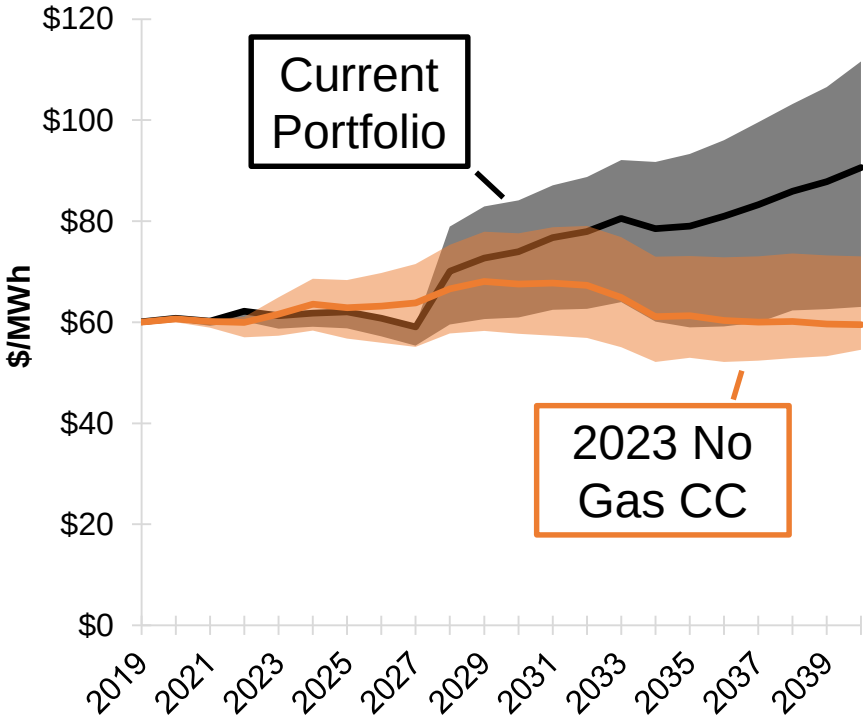
Source: CRA Analysis

Comments

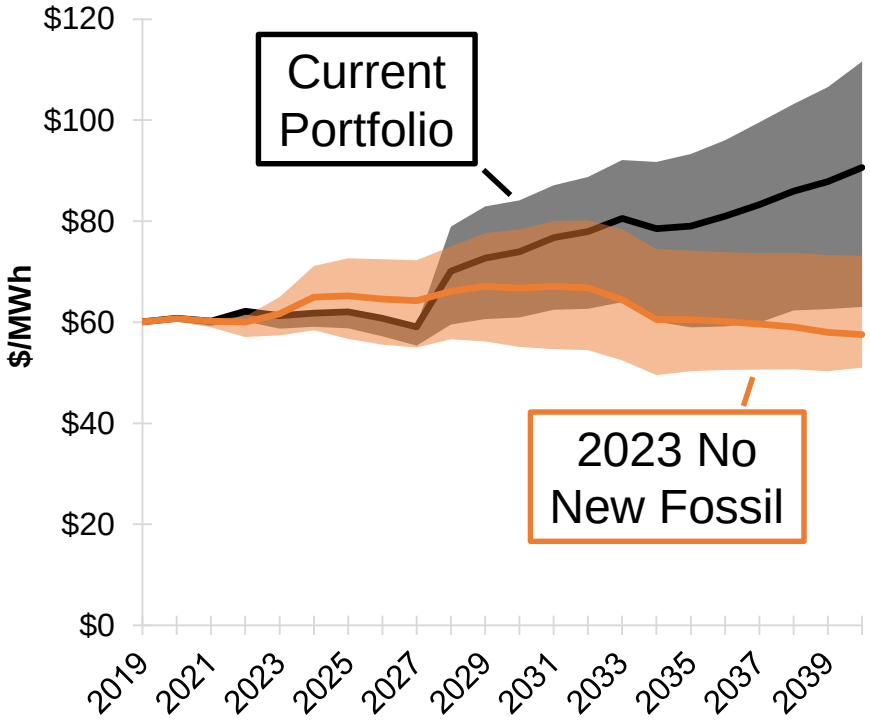
- 2023 Small Gas CC reduces the risk of high rates and high-low spread
- Fuel diversity in the 2023 replacement portfolios reduces overall risk

Other 2023 concepts also show reduced supply cost range under different scenarios

2023 No Gas CC
Scenario Range Forecast

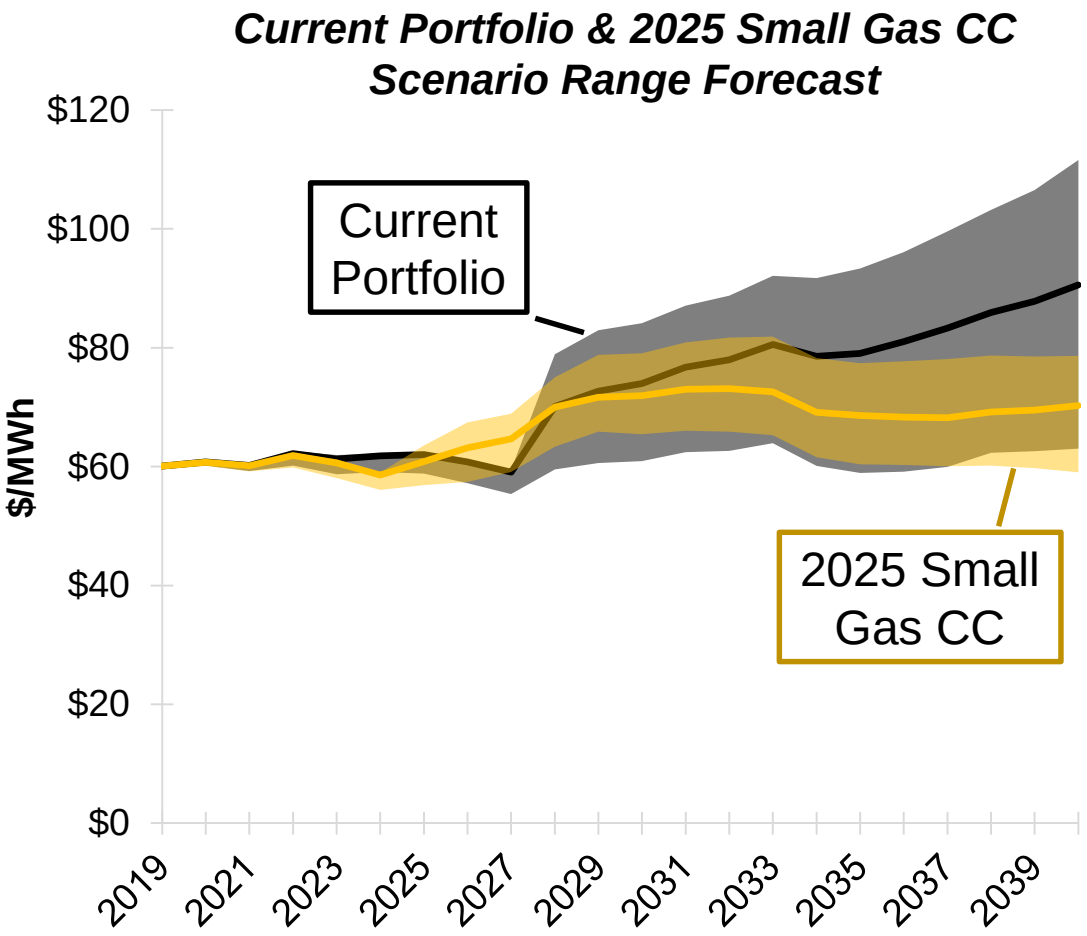


2023 No New Fossil
Scenario Range Forecast



Source: CRA Analysis

The 2025 Small Gas CC portfolio also reduces the range of supply cost, but costs are higher than for a 2023 retirement



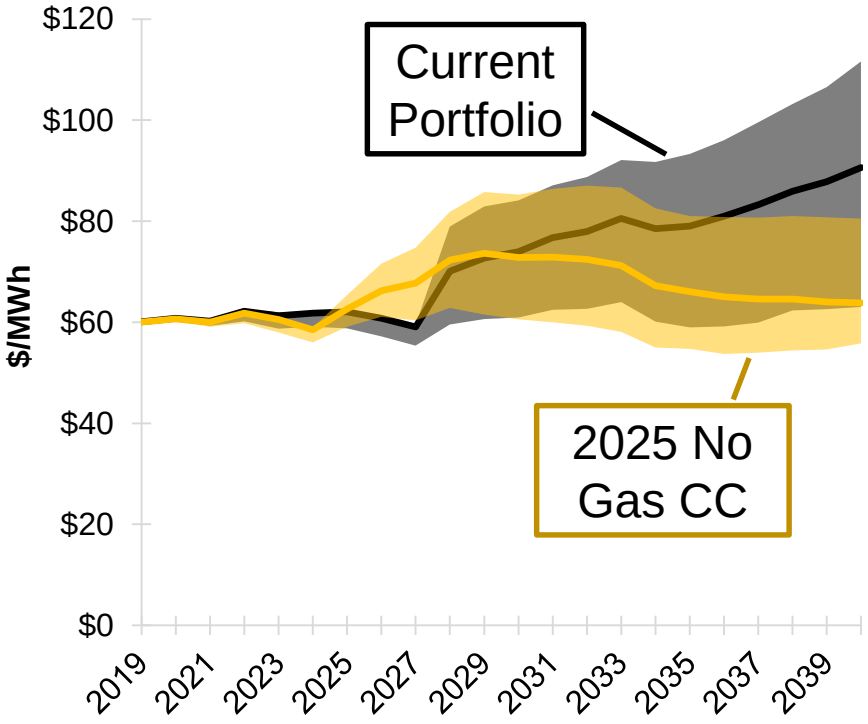
Source: CRA Analysis

Comments

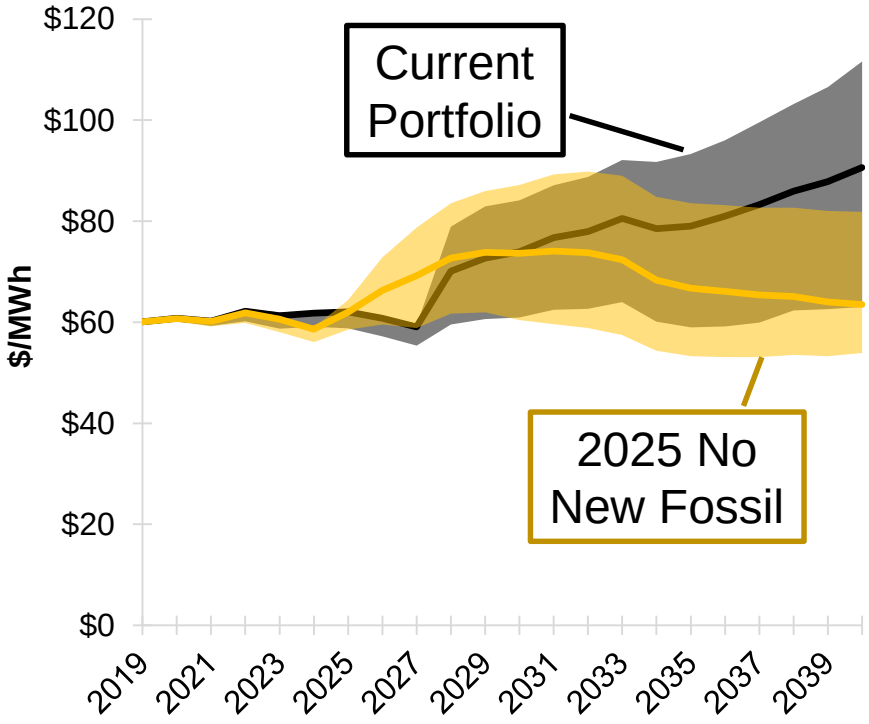
- A 2025 retirement still reduces risk and spread of outcomes significantly
- Missing tax-advantaged renewable window leads to higher costs than 2023

Other 2025 concepts also show reduced supply cost range under different scenarios

2025 No Gas CC
Scenario Range Forecast



2025 No New Fossil
Scenario Range Forecast



Source: CRA Analysis

Analysis also was conducted to evaluate how certain shocks that aren't present in base modeling could impact results

- 500 additional modeling runs were conducted off of the Base Case, where 3 key variables were randomly shocked:
  - Gas prices, Electricity prices, Solar output
- These three variables can experience intra-day volatility, differing significantly in any one hour from their expected values. For instance,
  - Gas prices can spike with unexpected pipeline capacity shortages
  - Electricity prices can spike when a large generator trips off line
  - Solar output can fall with cloud cover
- The additional analysis, called stochastics, evaluates whether this volatility presents any significant additional risk to the alternative portfolios

The stochastic analysis indicated that these potential shocks did not present a significant additional risk to supply costs

Comparison of Base Case Revenue Requirement to 5% Probability Outcome Based on Stochastics

	Current	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil
Base Case	$7,222 M	$6,487 M	$6,457 M	$6,474 M
5% Probability	$7,246 M	$6,520 M	$6,504 M	$6,496 M
Difference	+$24 M	+$33 M	+$47 M	+$22 M

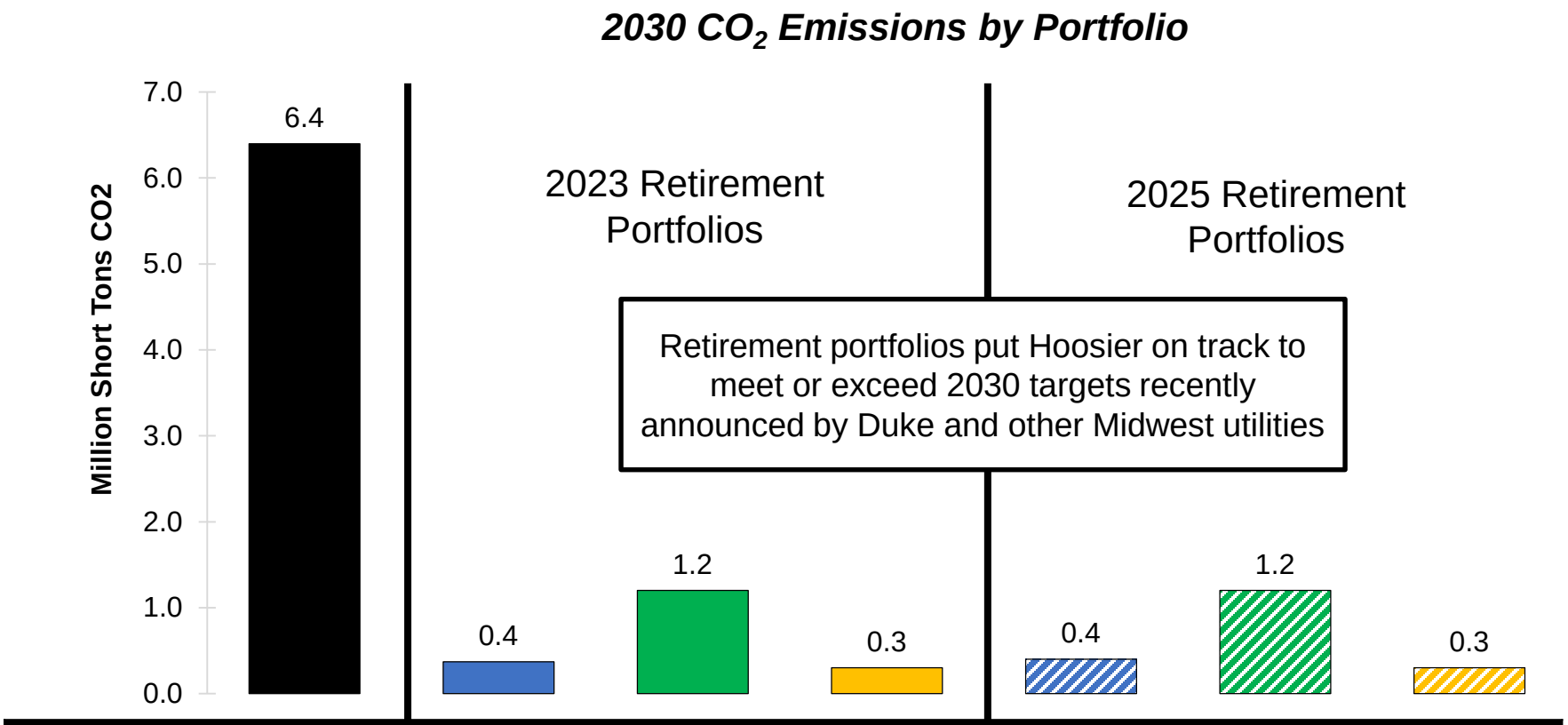
- Portfolios were designed to limit energy market exposure, resulting in relatively small stochastic risk compared to the broader scenario uncertainties

Source: CRA Analysis

Scorecard – Rate Stability & Predictability

	Low Wholesale Rates			Rate Stability & Predictability				Sustain-ability of Portfolio	Resource Diversity		Employee Impact
	Base Case 20-Yr NPV of Supply Cost	Average 2020-2030 Supply Cost	Average 2031-2040 Supply Cost	Lowest Expected 20-Yr NPV of Supply Cost	Highest Expected 20-Yr NPV of Supply Cost	Likely Range of 20-Year Supply Costs	Worst Case of 20-Year Supply Costs	2030 Carbon Reduction from Current Portfolio (Base Case)	Max Resource Type as % of Generation Mix	Maximum Unit Size	Criteria Rating (Low, High)
	$MM	$ / MWh	$ / MWh	$MM	$MM	-$MM +$MM	$MM	% reduction	%	MW	Rating
Current Portfolio				6,109	8,850	-$14 +11	7,246				
2023 Retirement Options											
No Gas CC				6,144	7,126	-$14 +14	6,520				
Small Gas CC				5,938	7,003	-$21 +20	6,504				
No New Fossil				6,183	7,214	-$10 +8	6,496				
2025 Retirement Options											
No Gas CC				6,416	7,452	-$15 +16	6,810				
Small Gas CC				6,155	7,306	-$22 +22	6,850				
No New Fossil				6,463	7,567	-$10 +10	6,834				

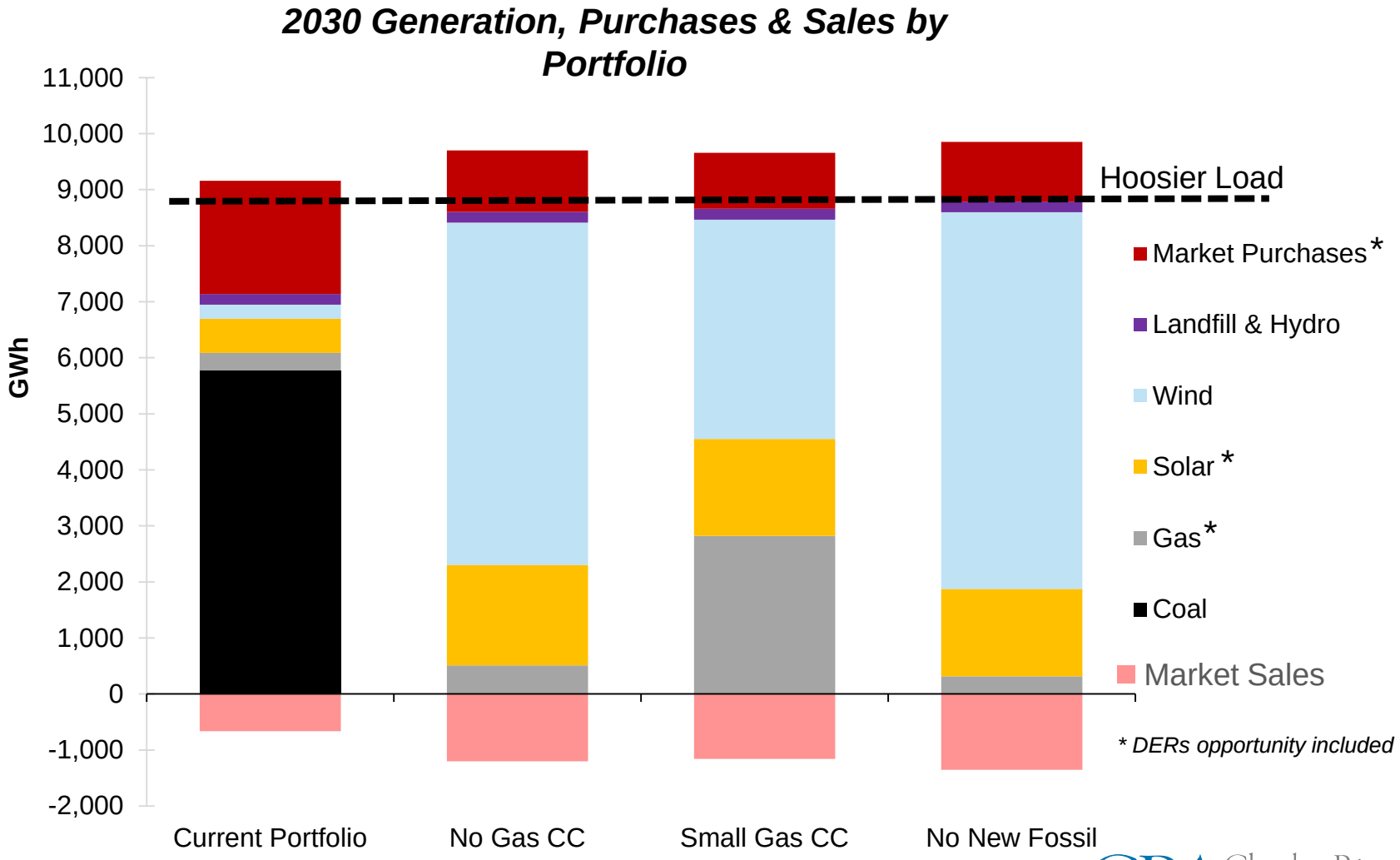
All replacement options significantly improve the sustainability of the supply portfolio



Portfolio	Current Portfolio	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil	2025 No Gas CC	2025 Small Gas CC	2025 No New Fossil
% CO_2 Reduction		94%	81%	96%	94%	82%	96%

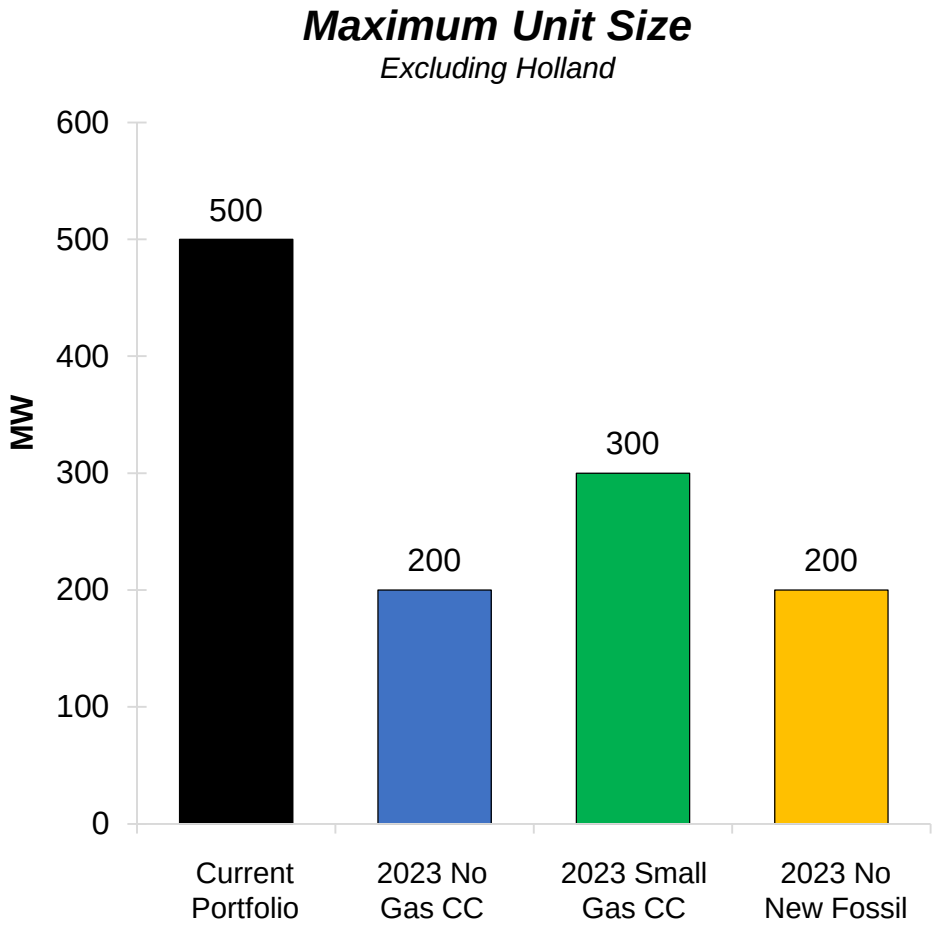
Source: CRA Analysis

Replacement options increase fuel diversity and reduce market purchase reliance relative to the current portfolio



Graph shows 2023 retirement; 2025 replacement portfolios have nearly identical resource mix

All replacement portfolios improve Hoosier's single unit exposure relative to the current portfolio



Comments

- No Gas CC and No New Fossil portfolios rely on resource types with small and modular unit sizes
- The Small Gas CC portfolio has higher single-unit dependency than other replacement options

Source: CRA Analysis

All portfolios that retire Merom have High impact on Hoosier employees

Employee Impact measures level and timing of organizational change driven by resource decisions

Low — Portfolio requires little or no major change in employees or function

High — Major change in employees or function required

Comments

- Retaining Merom has the lowest impact on current Hoosier employees
- 2023 and 2025 retirement of Merom impacts timing, not level, of employee impact

Scorecard – Sustainability, Diversity, Employee Impact

	Low Wholesale Rates			Rate Stability & Predictability				Sustain-ability of Portfolio	Resource Diversity		Employee Impact
	Base Case 20-Yr NPV of Supply Cost	Average 2020-2030 Supply Cost	Average 2031-2040 Supply Cost	Lowest Expected 20-Yr NPV of Supply Cost	Highest Expected 20-Yr NPV of Supply Cost	Likely Range of 20-Year Supply Costs	Worst Case of 20-Year Supply Costs	2030 Carbon Reduction from Current Portfolio (Base Case)	Max Resource Type as % of Generation Mix	Maximum Unit Size	Criteria Rating (Low, High)
	$MM	$ / MWh	$ / MWh	$MM	$MM	-$MM +$MM	$MM	% reduction	%	MW	Rating
Current Portfolio								-	 Coal 63%	500	Low
2023 Retirement Options											
No Gas CC								94%	 Wind 67%	200	High
Small Gas CC								81%	 Wind 43%	300	High
No New Fossil								96%	 Wind 73%	200	High
2025 Retirement Options											
No Gas CC								94%	 Wind 69%	200	High
Small Gas CC								82%	 Wind 41%	300	High
No New Fossil								96%	 Wind 68%	200	High

Outline

- Background
- Alternative Portfolio Development
- Portfolio Analysis and Results
- Key Takeaways and Conclusions

Scorecard – Fully Populated

	Low Wholesale Rates			Rate Stability & Predictability				Sustain-ability of Portfolio	Resource Diversity		Employee Impact
	Base Case 20-Yr NPV of Supply Cost	Average 2020-2030 Supply Cost	Average 2031-2040 Supply Cost	Lowest Expected 20-Yr NPV of Supply Cost	Highest Expected 20-Yr NPV of Supply Cost	Likely Range of 20-Year Supply Costs	Worst Case of 20-Year Supply Costs	2030 Carbon Reduction from Current Portfolio (Base Case)	Max Resource Type as % of Generation Mix	Maximum Unit Size	Criteria Rating (Low, High)
	$MM	$ / MWh	$ / MWh	$MM	$MM	-$MM +$MM	$MM	% reduction	%	MW	Rating
Current Portfolio	7,222	64.1	82.2	6,109	8,850	-$14 +11	7,246	-	 Coal 63%	500	Low
2023 Retirement Options											
No Gas CC	6,487	63.5	62.3	6,144	7,126	-$14 +14	6,520	94%	 Wind 67%	200	High
Small Gas CC	6,457	62.0	64.2	5,938	7,003	-$21 +20	6,504	81%	 Wind 43%	300	High
No New Fossil	6,474	63.8	61.4	6,183	7,214	-$10 +8	6,496	96%	 Wind 73%	200	High
2025 Retirement Options											
No Gas CC	6,769	65.3	67.3	6,416	7,452	-$15 +16	6,810	94%	 Wind 69%	200	High
Small Gas CC	6,795	64.0	70.2	6,155	7,306	-$22 +22	6,850	82%	 Wind 41%	300	High
No New Fossil	6,804	65.4	67.9	6,463	7,567	-$10 +10	6,834	96%	 Wind 68%	200	High

Key Takeaways

Low Wholesale Rates

- Keeping current portfolio is more expensive long-term than all alternative portfolios
- 2023 replacement lowers long term member supply costs by $17-$21 per MWh and saves $750 million in 20-year NPV
- 2025 replacement lowers long term member supply costs by $12-14 per MWh and saves $400 million in 20-year NPV

Rate Stability & Predictability

- Keeping the current portfolio has the greatest cost risk of all the options considered
- 2023 replacement reduces risk across all modeled market futures
- Uncertainty associated with market shocks does not impact the relative cost differences for the portfolios across the scenarios

Key Takeaways (cont.)

Sustainability of Portfolio

- Maintaining the current portfolio keeps future emissions in line with current levels
- Replacement options reduce portfolio carbon intensity by 75%-95%, relative to the current portfolio
- Sustainability benefits are similar between 2023 and 2025 concepts

Resource Diversity

- Current portfolio remains heavily reliant on coal for energy supply
- Replacement options in the Small Gas CC portfolio are the most fuel diverse
- All replacement options reduce exposure to single site risk when compared to current portfolio

Employee Impact

- Retaining Merom is “Low” impact
- All replacement portfolios assume full retirement of Merom and are scored as “High” impact
- Retirement in 2023 or 2025 changes timing but not level of employee impact

Frequently Asked Questions

1. How realistic is 2023 retirement? Can we purchase enough capacity to replace Merom?

2. What are the major drivers/assumptions, and what happens if we are wrong about those assumptions?

3. How does Hoosier's assumption of the carbon tax year and cost compare to other long range resource plans?

4. Savings are mostly in the second ten years of the plan. Why can't we just wait and get the savings then?

5. What are the tradeoffs if we were to compare the value of the 2023 renewable credits versus the value of flexibility if we were to wait until 2025?

6. How do the alternative portfolios match up with our load?

1. How realistic is 2023 retirement? Can we purchase enough capacity to replace Merom?

- Hoosier has recently received 15 unsolicited bids for solar, wind and natural gas combined cycle projects with on-line dates between 2020 and 2023 and total capacity of 3.2 GW

- The MISO queue contains 232 proposed projects comprising 36 GW of potential additions. The resources in the queue are the same technology types considered for this analysis.

- NIPSCO and Vectren recently ran RFPs that received nearly 100 responses each
  - NIPSCO received more than 13 GW of proposed capacity
  - Vectren received nearly 10 GW of proposed capacity

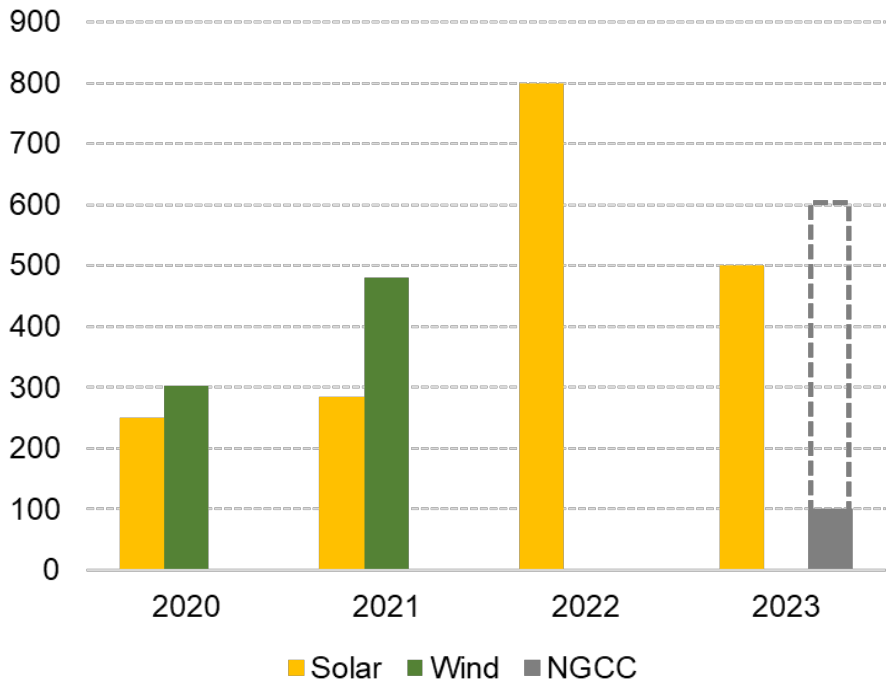
Term sheets provided to Hoosier demonstrate resource availability

Proposals Received

	State	Capacity	Online Year	Term (Yrs)
Solar				
Maple Flats	IL	250	2022	15
Fairbanks	IN	250	2020	
Farmersburg	IN	150	2021	
Greensboro	IN	100	2021-2023	15-20
Ratts 1	IN	150	2022	20-25
New Madrid	MO	200	2023	20
Casey Fork	IL	135	2021	20
Black Diamond	IL	200	2022	12
Wheatland I	IN	100	2022	20
Wildwood	IN	300	2023	15
NGCC				
St. Joseph EC	IN	100-600	2023	20
Wind				
Glacier Sands I	IL	158	2021	12
Lincoln Land	IL	302	2020	20
Clinton	IN	145	2021	20
Sugar Creek	IN	178	2021	20
Total				

Source: Hoosier

Proposal Capacity (MW)



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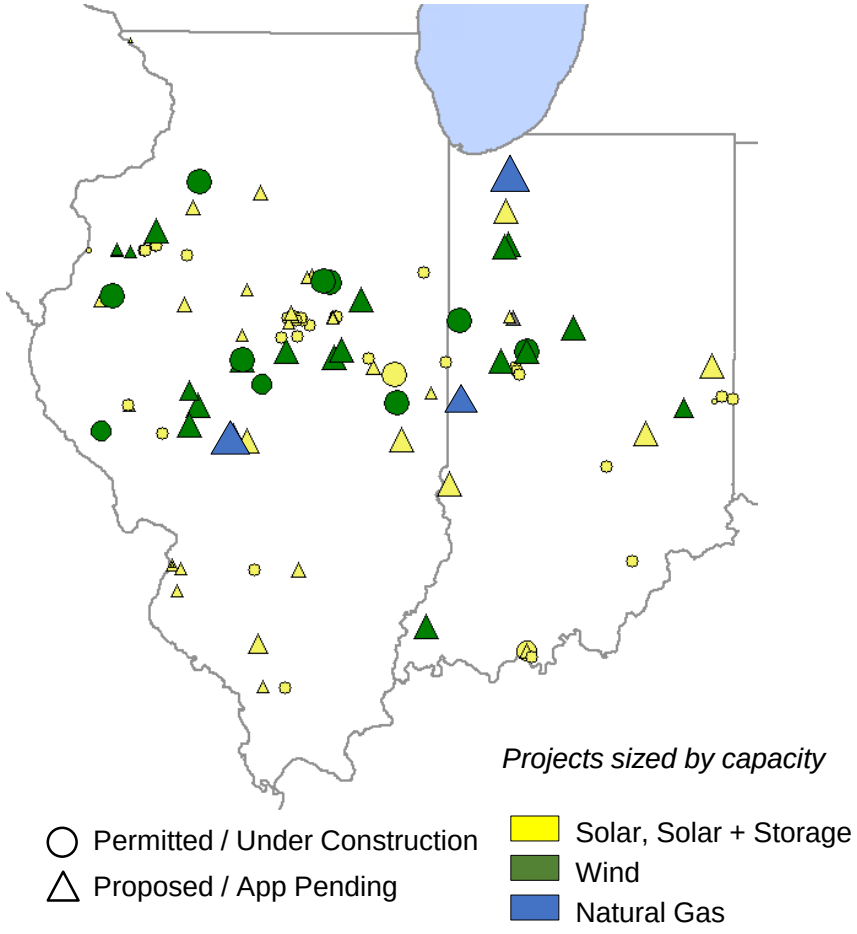
Many utility-scale alternatives are currently proposed and under development in the region

- Over 36,000 MW of new projects are in the MISO interconnection queue
- Over 2,000 MW has been permitted or is under construction in IL and IN

Projects in the MISO Interconnection Queue

	Project Count	Project Capacity
Solar	147	21.5 GW
Solar + Storage	17	2.4 GW
Wind	39	6.6 GW
Battery Storage	16	1.1 GW
Combined Cycle	8	4.2 GW
Gas Peaking	5	0.5 GW
Total	**232**	**36.3 GW**

MISO Proposed Projects Map



Source: MISO Interconnection Queue; Velocity Suite – EIA, FERC, NRC, SEC, CEMS & other federal regulatory data

The NIPSCO RFP demonstrated significant renewable and gas options available in Indiana

NIPSCO Overview of Proposals Received

Count	CCGT	CT	Other Fossil	Wind	Wind + Solar + Storage	Solar	Solar + Storage	Storage	Demand Response	Total
Asset Sale	4	-	-	1	-	1	-	-	-	**6**
PPA	8	-	3	6	26	7	8	1	-	**59**
Option	3	1	-	7	1	8	4	1	-	**25**
Total	**15**	**1**	**3**	**14**	**1**	**35**	**11**	**9**	**1**	**90**
Locations	IN, IL	IN	IN, KY	IA, IN, IL, MN	IN	IL, IN, IA	IN	IN	IN	

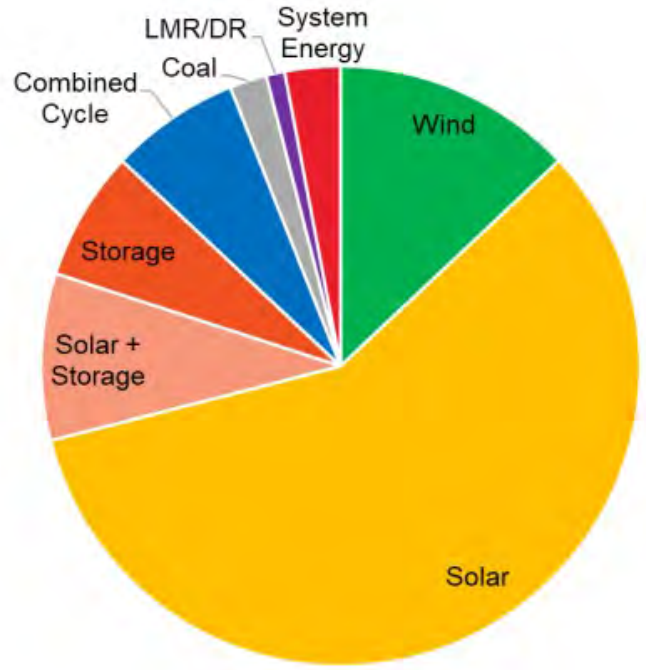
- The RFP generated a tremendous amount of bidder interest
- **90** total proposals were received across a range of deal structures
  - 59 individual projects across five states with **~13.3 gigawatts** capacity
  - Many of the proposals offer variations on pricing structure and term length
  - Several renewable projects paired with storage

Source: NIPSCO IRP July, 2018 Stakeholder Meeting

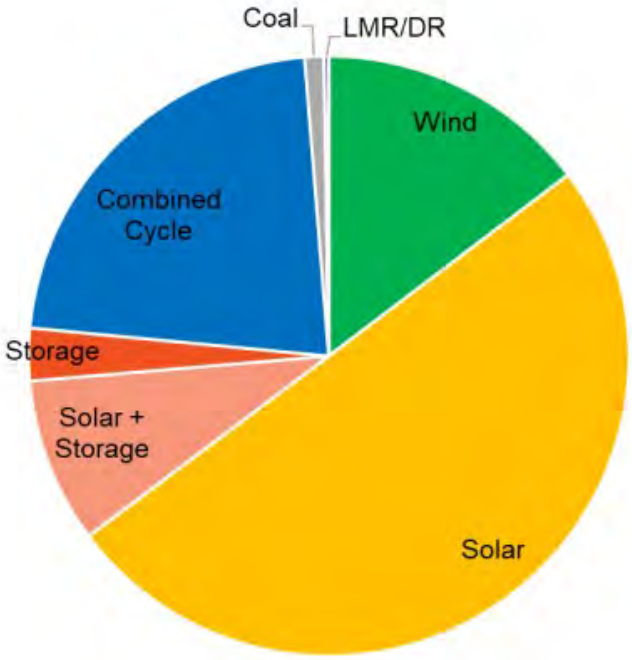
The Vectren RFP further validated the large quantity of renewable and gas options available

Preliminary Vectren RFP Statistics

Proposals Received



Installed Capacity of Proposals (MW)



- 100 proposals from 22 respondents (4/5 in Indiana, 2/3 PPA)

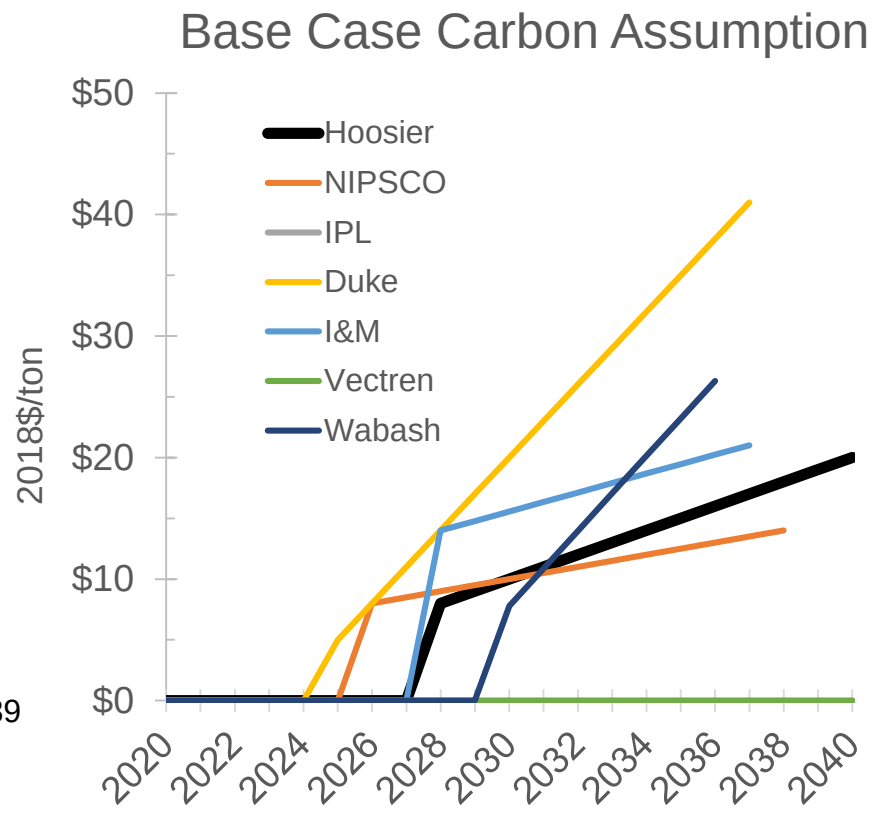
Source: Vectren IRP August, 2019 Stakeholder Meeting

2. What are the major drivers/assumptions, and what happens if we are wrong about those assumptions?

- The major drivers of the analysis are carbon policy/prices, natural gas prices, and renewable technology costs/incentives
- The scenarios and the stochastic analyses test the “what if we are wrong” proposition
- The results indicate that the replacement portfolios perform significantly better than the current portfolio in most cases
    - Portfolio diversity creates resiliency in costs, avoiding large swings in costs across scenarios
    - Replacement portfolios provide member benefits across risk, sustainability, and diversity metrics even when costs are similar or slightly higher than the current portfolio

3. How does Hoosier's assumption of the carbon tax year and cost compare to other long range resource plans?

- NIPSCO 2018 IRP
  - Base: 2026 start, $8 increasing to $14 by 2038
  - High: 2026 start, $20 increasing to $35 by 2038
- IPL 2019 Public Advisory Meeting
  - Base: no carbon price
  - 3 of 4 alternative cases have carbon starting in 2028
- Duke Energy Indiana 2018 IRP
  - Base: 2025 start, $5 increasing to $41 by 2037
  - High Tech: 2025 start, $10 increasing to $47 by 2037
- I&M 2018-2019 IRP Inputs Update
  - Base: 2028 start, $14 increasing to $21 by 2037
- Vectren 2019 Stakeholder Meeting
  - Base: No carbon price
  - High Tech: 2025 start, $1.20 increasing to $8.50 by 2039
  - 80% Reduction: 2025 start, $3.57 increasing to $20 by 2039
- Wabash Valley Power 2017 IRP
  - Used sensitivity range; middle of range has 2030 start, $7.78 rising to $26.30 by 2036



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4. Savings are mostly in the second ten years of the plan. Why can't we just wait and get the savings then?

- Solar, wind, and storage may benefit from large federal tax credits that reduce the construction cost by 30-50% if installed in the early 2020s
- The cost of renewables and storage is primarily in the upfront capital costs; ongoing capital and O&M costs are usually relatively small
- Installing renewables later, when limited tax credits are expected to be available, is likely to be much more expensive.
    - Expiration of tax credits results in a significant increase in renewable costs – amounts to ~$300 million in NPV increase over time
- Delay in retirement and replacement would also expose Hoosier members to additional capital required to maintain Merom.

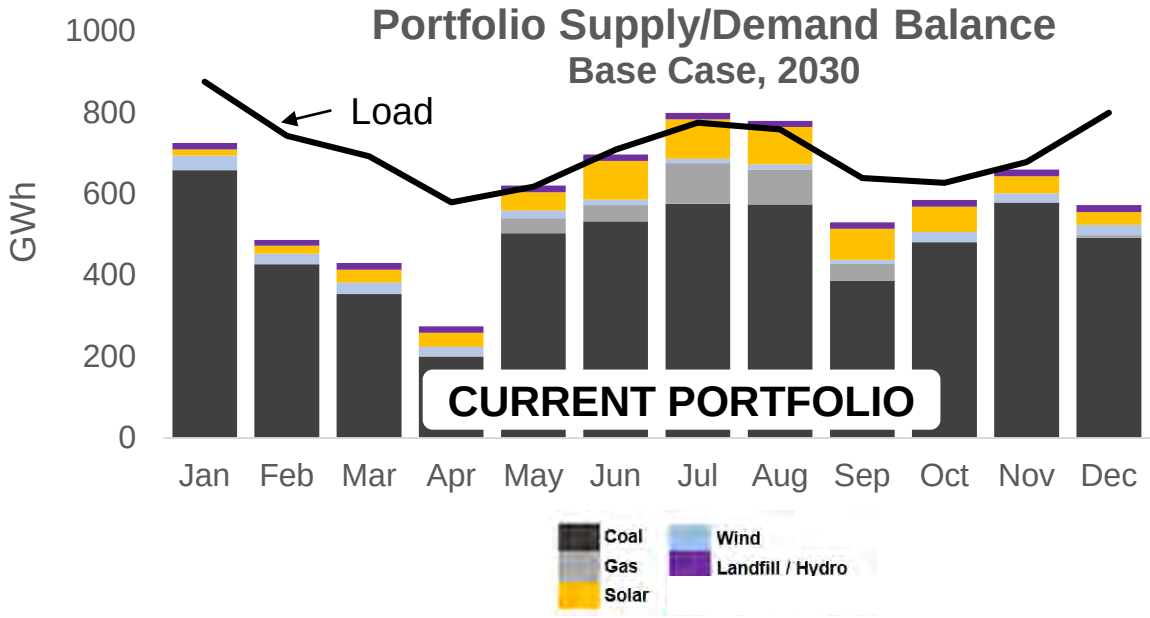
5. What are the tradeoffs if we were to compare the value of the 2023 renewable credits versus the value of flexibility if we were to wait until 2025?

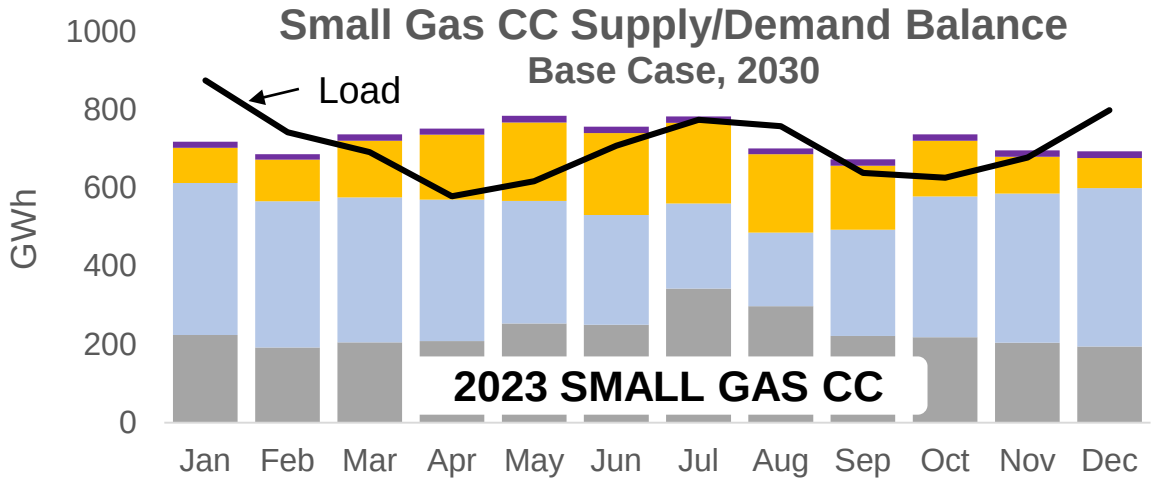
- Based on current assumptions, waiting until 2025 increases supply costs by ~$300 million in 20-year NPV

- Waiting may provide additional clarity on extension of tax credits and timing of CO2 policy that can change the expected value of resource strategies
  - Extension of tax credits has been considered at some level in Congress, but final outcomes are uncertain
  - There may still be considerable uncertainty regarding carbon policy timing and cost to comply two years in the future

- Diversity and sustainability benefits are not compromised between 2023 and 2025 replacement options, though benefits lag by 2-3 years

6. How do the alternative portfolios match up with our load?





- Replacement portfolios are designed to limit market exposure across seasons
- The current portfolio is exposed to market purchases during winter and spring seasons
- Replacement portfolios have a more even generation pattern across the year and more diverse generation sources

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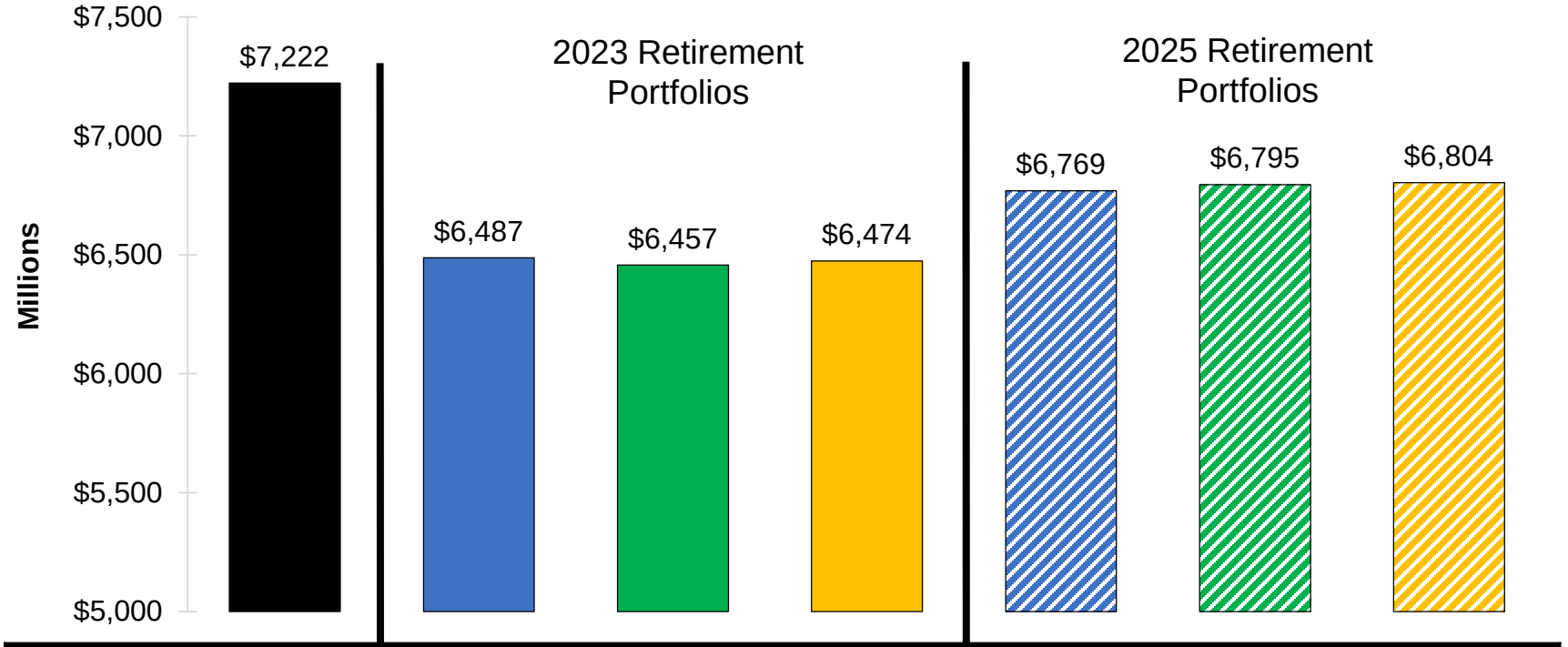
Discussion

APPENDIX

2025 retirement portfolios miss out on early renewable pricing, but still provide more than $400 million in savings

All Portfolios - Base Case Forecast

Present Value Revenue Requirement



Portfolio	Current Portfolio	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil	2025 No Gas CC	2025 Small Gas CC	2025 No New Fossil
Cost Savings ($M)		$735	$765	$748	$453	$427	$418

Source: CRA Analysis

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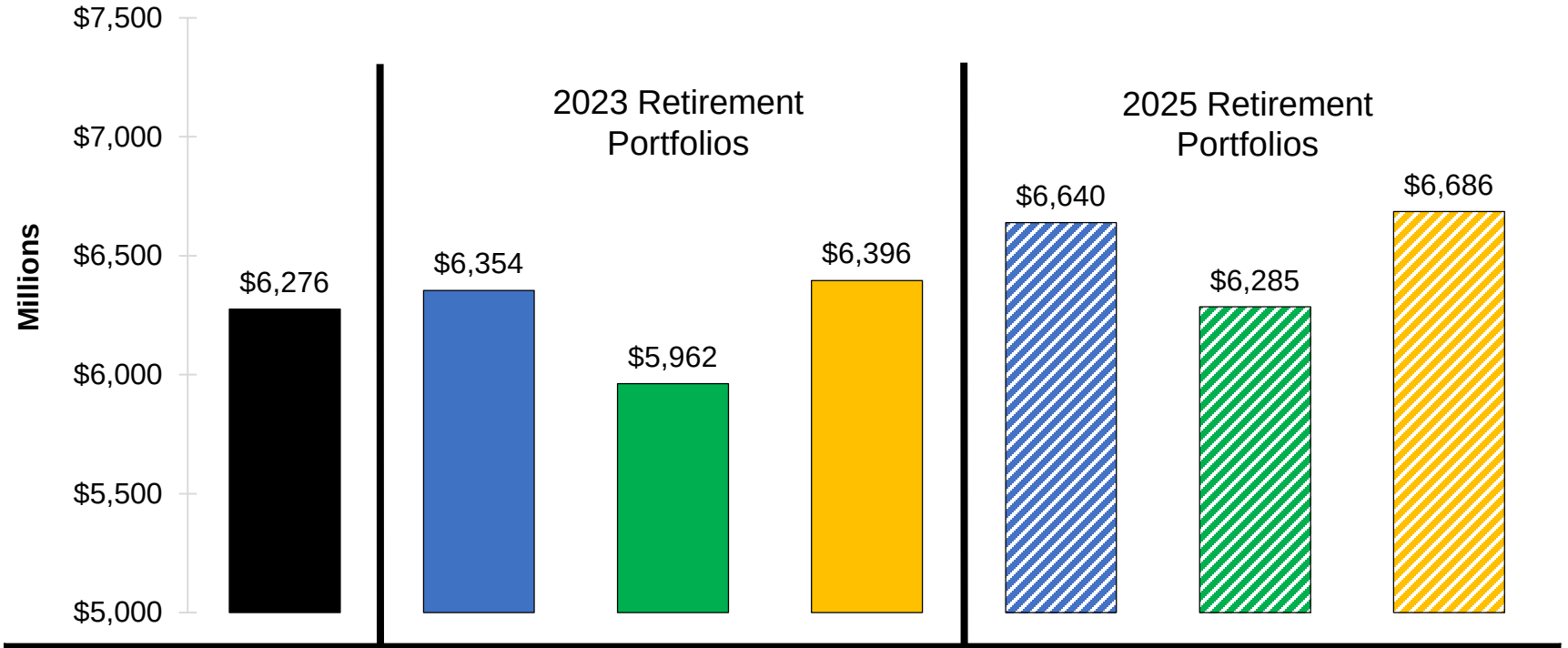
In the Flat Gas scenario with no carbon pressure, the 2023 Small Gas CC portfolio is lowest cost

All Portfolios - Flat Gas Forecast

Present Value Revenue Requirement



Portfolio	Current Portfolio	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil	2025 No Gas CC	2025 Small Gas CC	2025 No New Fossil
Cost Delta ($M)		+$78	-$311	+$120	+$364	+$9	+$410

Source: CRA Analysis

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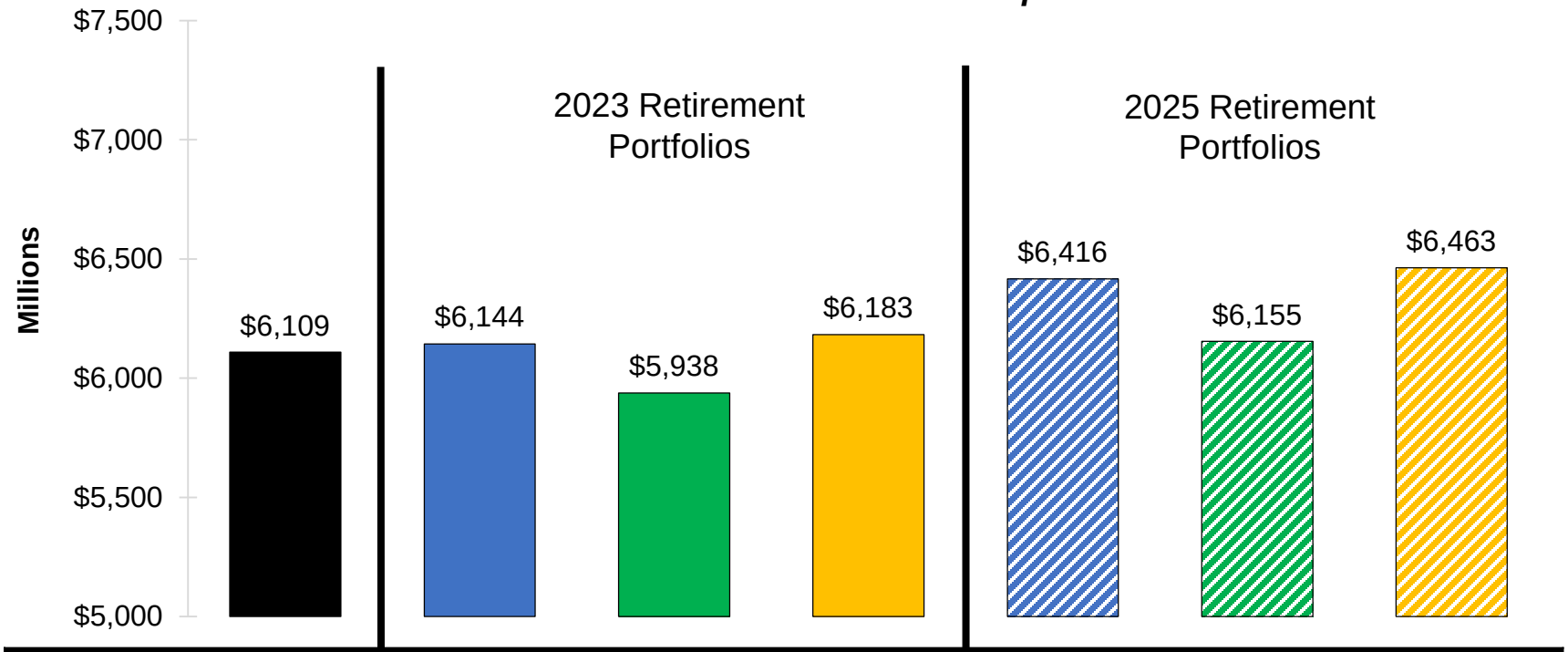
In the Customers in Control scenario, 2023 Small Gas CC is lower cost than current portfolio

All Portfolios – Customers in Control Forecast

Present Value Revenue Requirement

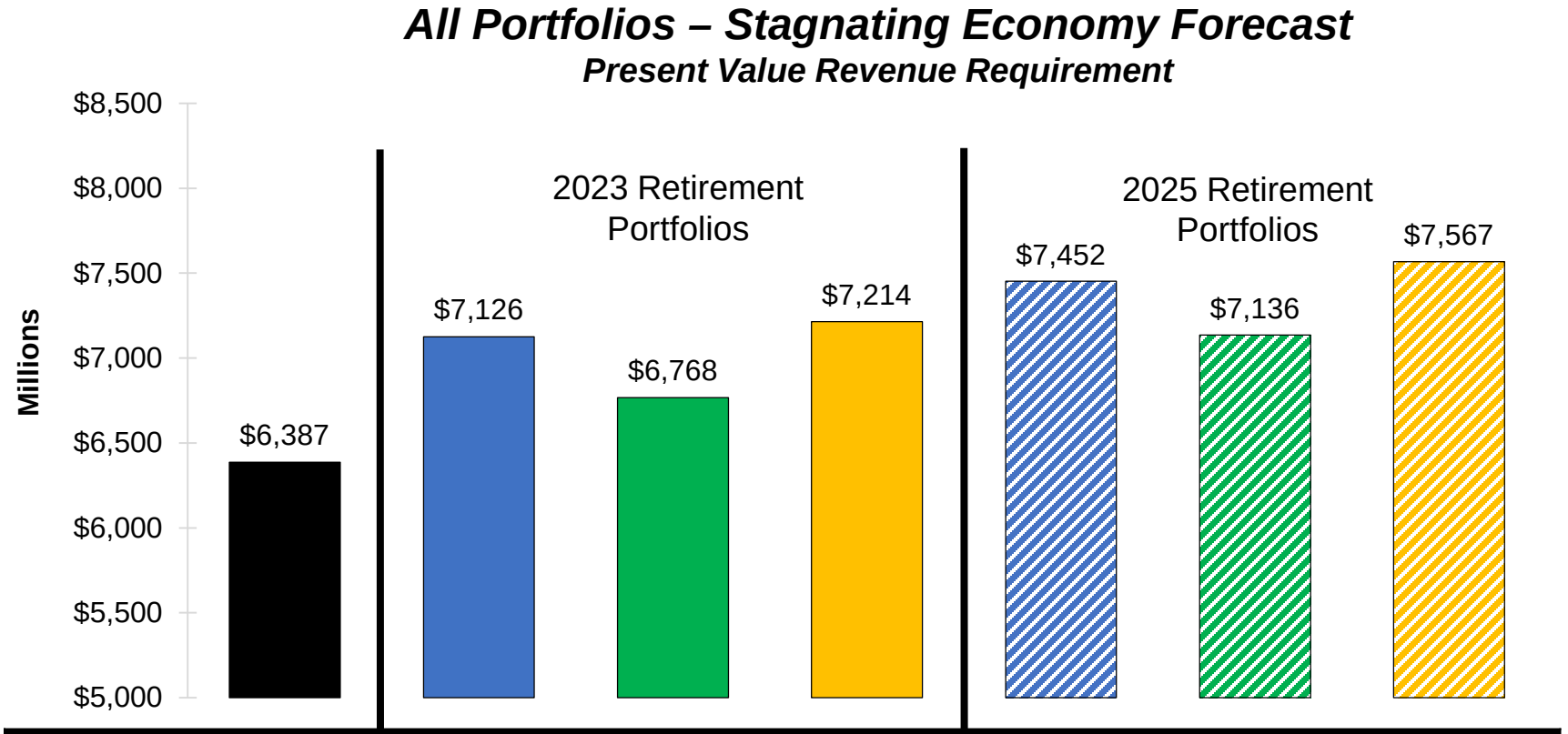


Portfolio	Current Portfolio	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil	2025 No Gas CC	2025 Small Gas CC	2025 No New Fossil
Cost Delta ($M)		+$35	-$171	+$74	+$307	+$46	+$354

Source: CRA Analysis

CRA Charles River Associates

In the Stagnating Economy scenario, Current Portfolio is lowest cost due to high cost replacements in all portfolios



Portfolio	Current Portfolio	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil	2025 No Gas CC	2025 Small Gas CC	2025 No New Fossil
Cost Delta ($M)		+$739	+$381	+$827	+$1,065	+$749	+$1,180

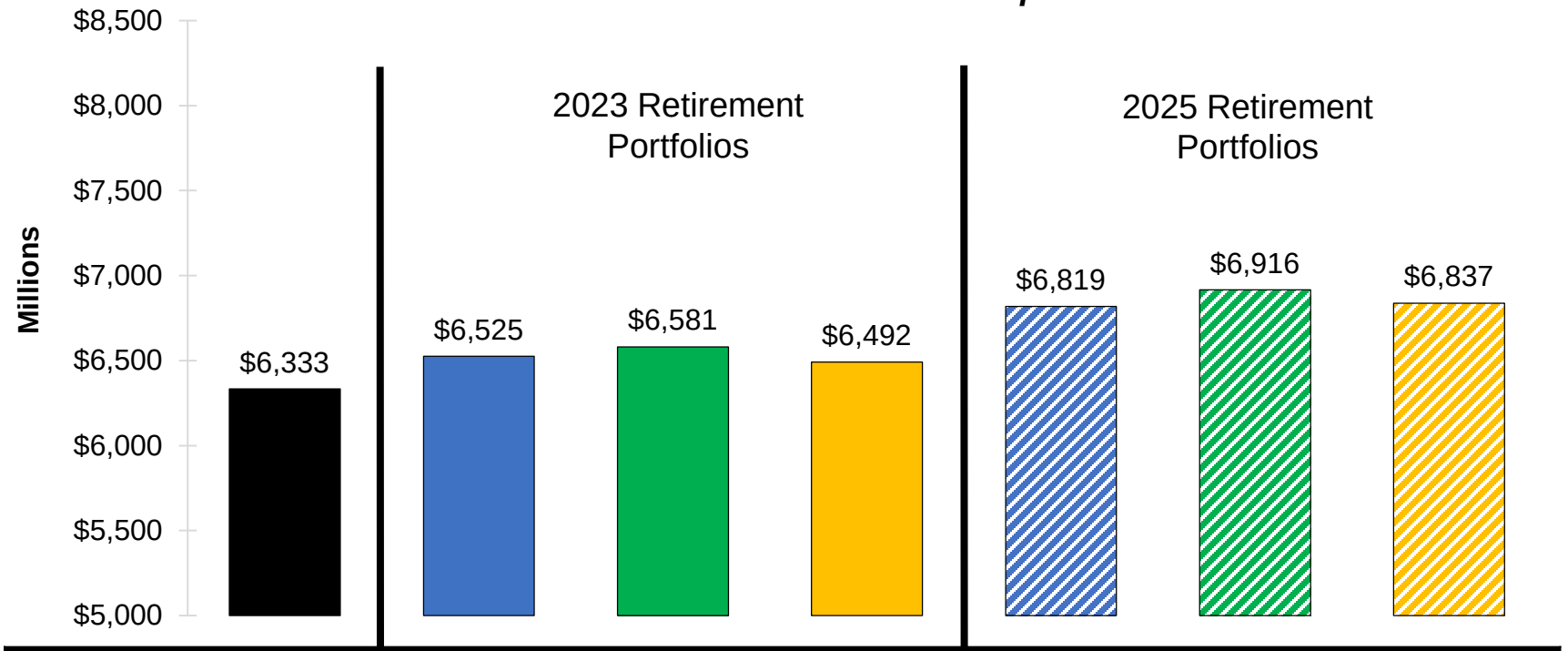
Source: CRA Analysis

CRA Charles River Associates

In the Challenged Gas scenario, Current Portfolio is lowest cost due to assumptions which favor coal

All Portfolios – Challenged Gas Forecast

Present Value Revenue Requirement



Portfolio	Current Portfolio	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil	2025 No Gas CC	2025 Small Gas CC	2025 No New Fossil
Cost Delta ($M)		+$192	+$248	+$159	+$486	+$583	+$504

Source: CRA Analysis

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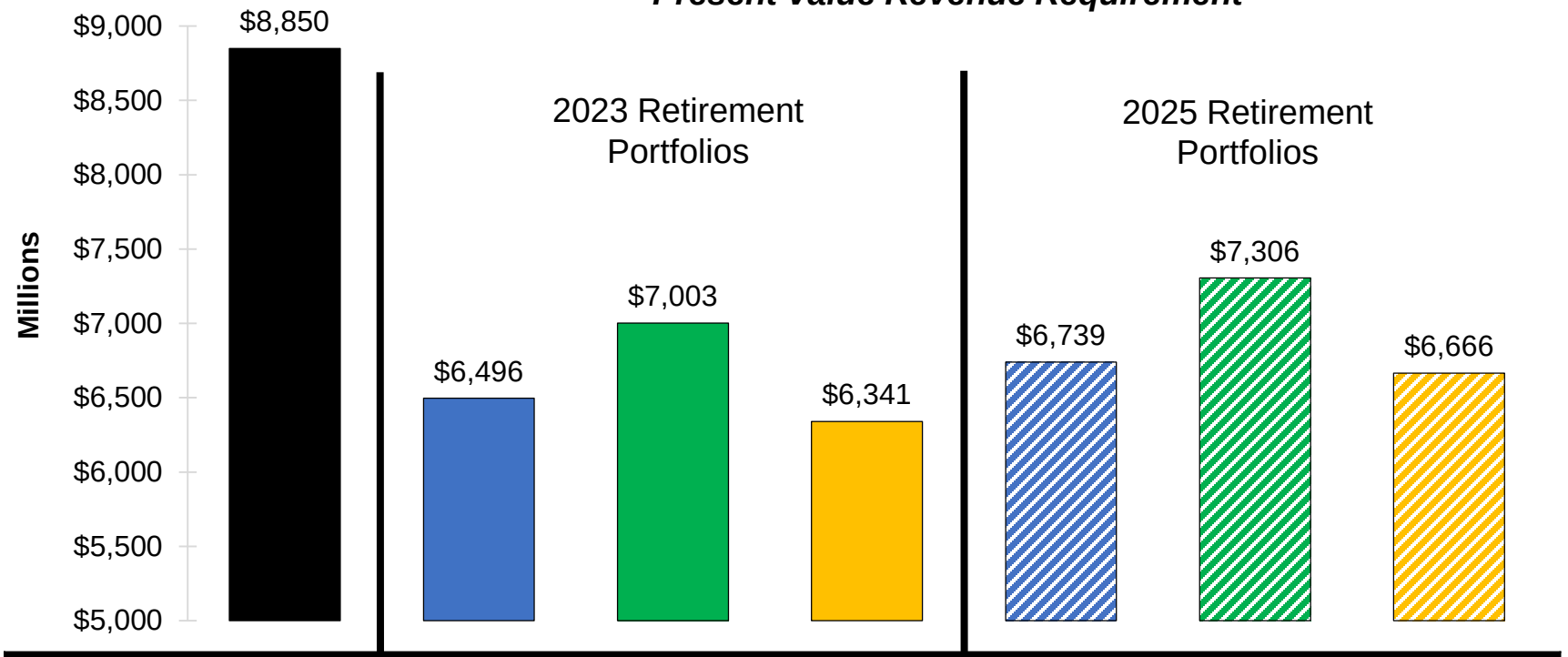
In the US Economy Decarbonizes scenario, 2023 No New Fossil portfolios is lowest cost

All Portfolios – US Economy Decarbonizes Forecast

Present Value Revenue Requirement



Portfolio	Current Portfolio	2023 No Gas CC	2023 Small Gas CC	2023 No New Fossil	2025 No Gas CC	2025 Small Gas CC	2025 No New Fossil
Cost Delta ($M)		-$2,354	-$1,847	-$2,509	-$2,111	-$1,544	-$2,184

Source: CRA Analysis

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HOOSIER ENERGY

A Touchstone Energy® Cooperative

Resource Plan Recommendation

Board of Directors Meeting
January 20, 2020

Resource Plan Recommendation

Retire Merom in 2023 and transition to a more diverse generation mix that includes a combination of low-cost wind, solar, natural gas, market purchases and storage (beginning in 2035)---the “2023 Small CC, Low Storage” portfolio presented in November

- Best meets member-consumer priorities:
  - Low Wholesale Rates-Saves members estimated $700 million over 20 years versus current portfolio
  - Resource Diversity-Mitigates risk through greater fuel source, unit size, term and location diversity
  - Rate Stability/Predictability-Provides clearest opportunity for stable supply costs
  - Sustainability-Reduces carbon footprint nearly 80%
- Transform portfolio while maintaining stable or lowering supply costs while competitors raise rates for similar transition

Resource Plan Recommendation (continued)

Assist impacted employees through retraining, reassignment, professional outplacement and early retirement options

Recover decommissioning and stranded costs (included in analysis)

Pursue Merom site opportunities such as:

- Sell as operating plant
- Promote for industrial development
- Transition to energy campus

SCORECARD	Low Wholesale Rates			Rate Stability & Predictability				Sustain-ability of Portfolio	Resource Diversity		Employee Impact
	Base Case 20-Yr NPV of Supply Cost	Average 2020-2030 Supply Cost	Average 2031-2040 Supply Cost	Lowest Expected 20-Yr NPV of Supply Cost	Highest Expected 20-Yr NPV of Supply Cost	Likely Range of 20-Year Supply Costs	Worst Case of 20-Year Supply Costs	2030 Carbon Reduction from Current Portfolio (Base Case)	Max Resource Type as % of Generation Mix	Max Unit Size	Criteria Rating (Low, High)
	$MM	$ / MWh	$ / MWh	$MM	$MM	-$MM +$MM	$MM	% reduction	%	MW	Rating
Current Portfolio	7,222	64.1	82.2	6,109	8,850	-$14 +11	7,246	-	 Coal 63%	500	Low
2023 Retirement Options											
No Gas CC	6,487	63.5	62.3	6,144	7,126	-$14 +14	6,520	94%	 Wind 67%	200	High
Small Gas CC	6,457	62.0	64.2	5,938	7,003	-$21 +20	6,504	81%	 Wind 43%	300	High
No New Fossil	6,474	63.8	61.4	6,183	7,214	-$10 +8	6,496	96%	 Wind 73%	200	High
Small CC, Low Storage	6,518	62.4	65.1	5,999	7,234	-$21 +$22	6,570	78%	 Wind 43%	300	High
2025 Retirement Options											
No Gas CC	6,769	65.3	67.3	6,416	7,452	-$15 +16	6,810	94%	 Wind 69%	200	High
Small Gas CC	6,795	64.0	70.2	6,155	7,306	-$22 +22	6,850	82%	 Wind 41%	300	High
No New Fossil	6,804	65.4	67.9	6,463	7,567	-$10 +10	6,834	96%	 Wind 68%	200	High

How MISO Views Capacity

- Utilities are required to obtain resources to meet their load plus a reserve margin
- MISO values resources based on performance and availability
- Replacement capacity accreditations not necessarily “one-to-one”:

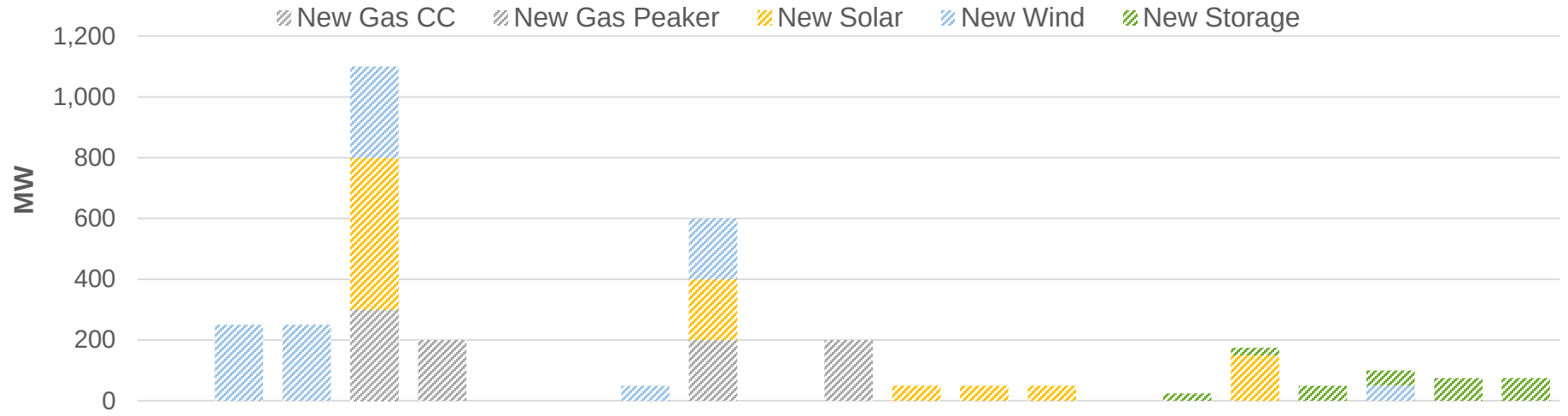
Resource	Today Summer Capacity Credit	Anticipated Winter Capacity Credit
Coal	96%	92%
Natural Gas	91%	90%
Wind	15%	13%
Solar	50% 30% (anticipated 2033)	5%
Battery	98%	98%

Planned Replacements for Merom in 2023

Resource	Nameplate (MW)	MISO Summer Value	Anticipated MISO Winter Value
Riverstart Solar (2022)	200	100	10
Merom retired	990	(947)	(911)
Replacements			
Wind	800	120	104
Solar	500	250	25
Natural Gas	300	291	282
Market		186	490

Planned Resource Additions

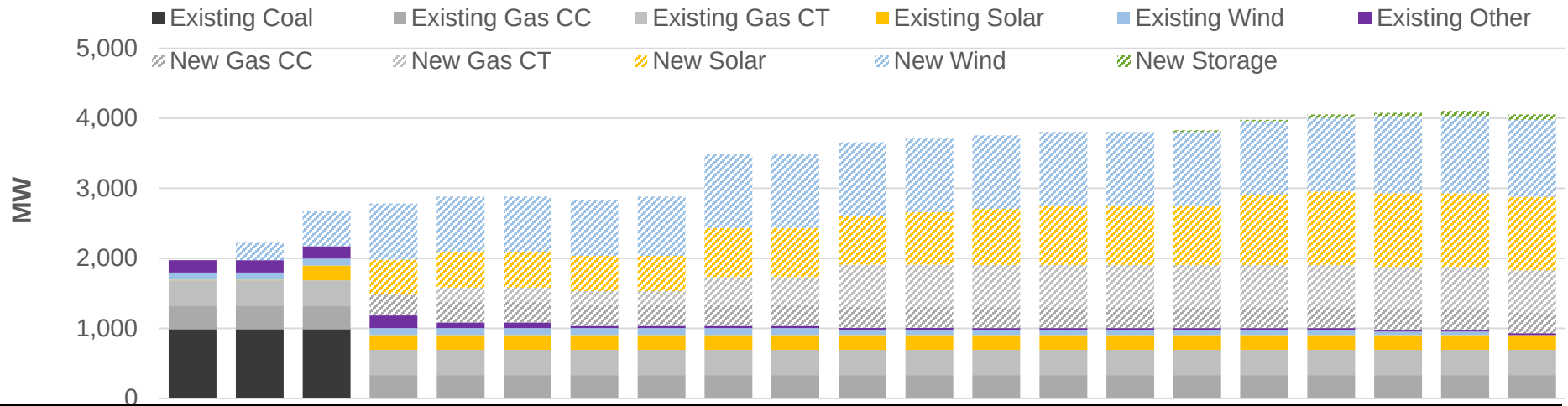
Annual Additions – Nameplate Capacity



Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
New Gas CC	0	0	0	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Gas CT	0	0	0	0	200	0	0	0	200	0	200	0	0	0	0	0	0	0	0	0	0
New Solar	0	0	0	500	0	0	0	0	200	0	0	50	50	50	0	0	150	0	0	0	0
New Wind	0	250	250	300	0	0	0	50	200	0	0	0	0	0	0	0	0	0	50	0	0
New Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	50	50	75	75

Planned Portfolio Summary

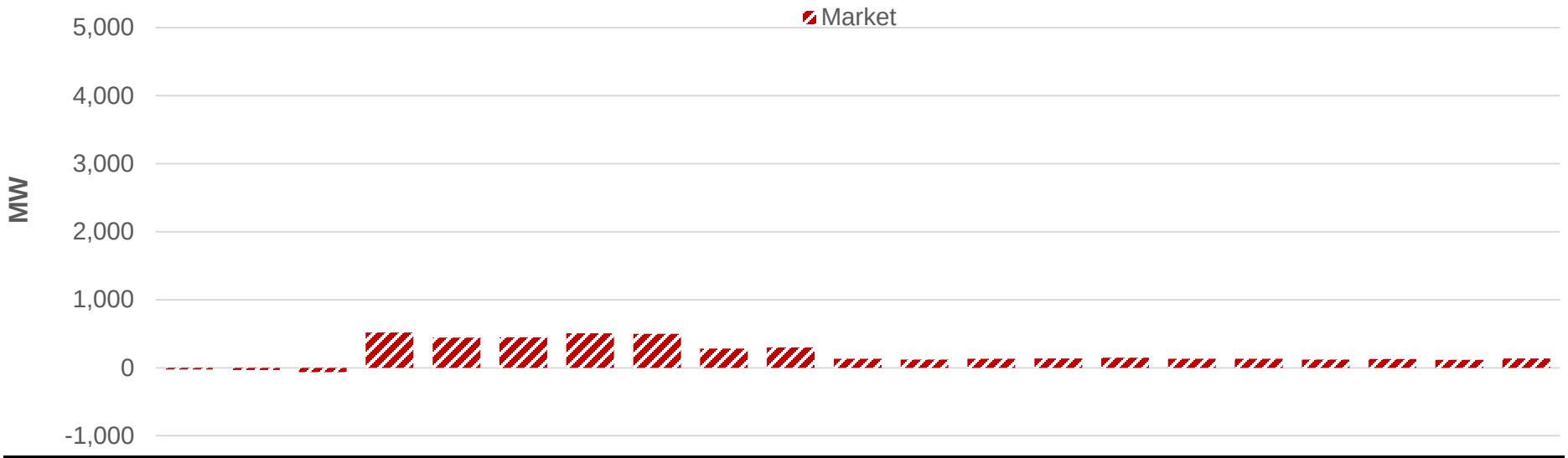
Nameplate Capacity



Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Existing Coal	990	990	990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Existing Gas CC	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335
Existing Gas CT	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360
Existing Solar	11	11	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211
Existing Wind	100	100	100	100	100	100	100	100	100	100	75	75	75	75	75	75	75	75	50	50	0
Existing Other	178	178	178	178	78	78	28	28	28	28	28	28	24	24	24	24	24	24	24	24	24
New Gas CC	0	0	0	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
New Gas CT	0	0	0	0	200	200	200	200	400	400	600	600	600	600	600	600	600	600	600	600	600
New Solar	0	0	0	500	500	500	500	500	700	700	700	750	800	850	850	850	1,000	1,050	1,050	1,050	1,050
New Wind	0	250	500	800	800	800	800	850	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,100	1,100	1,100
New Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	50	50	75	75

Planned Market Resources

Winter Peak Capacity



Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Winter	(24)	(34)	(65)	519	442	448	507	498	282	298	133	121	134	135	147	132	134	120	129	118	136

Follow Up to December/January Discussions

What if renewable credits are extended? Would that change our retirement timing?

- 2020 Budget Bill became law December 20, 2019
  - Wind production tax credit extended one year
  - No extensions for solar
  - No credits for storage (stand-alone or paired with renewables)
  - CRA perspective indicates that the tax credit extension for wind does not significantly impact the analysis and results

Follow Up to December/January Discussions

What is the value of each additional year that Merom operates?

- Merom is challenged today; 2019 saw Merom in economic reserve roughly 25% of the time

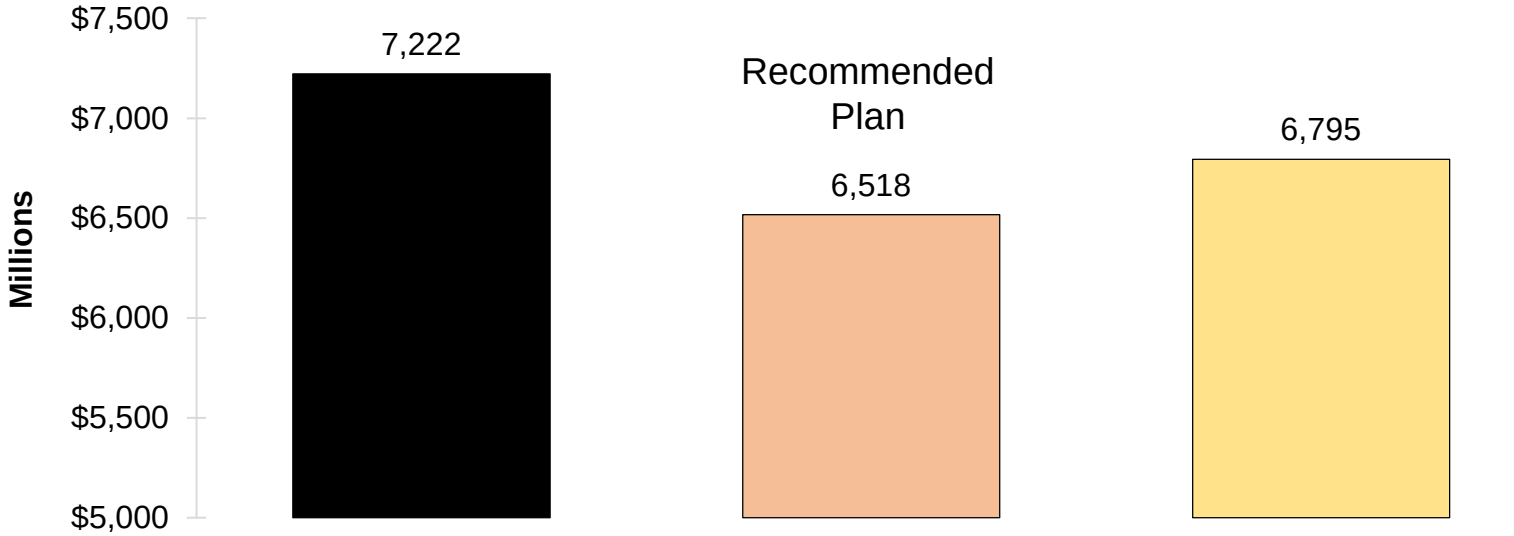
2018 Merom Costs	$/MWh Generated
Fuel & Variable O&M	$23
Fixed O&M, Property Taxes, Insurance	7
Labor & Benefits	6
	$36
Depreciation & Interest	10
Total	$46

Replacements approximately $30

- There is benefit to retiring even with recovery of stranded costs

Recommended Plan Lowers Member Supply Costs by $700 million*

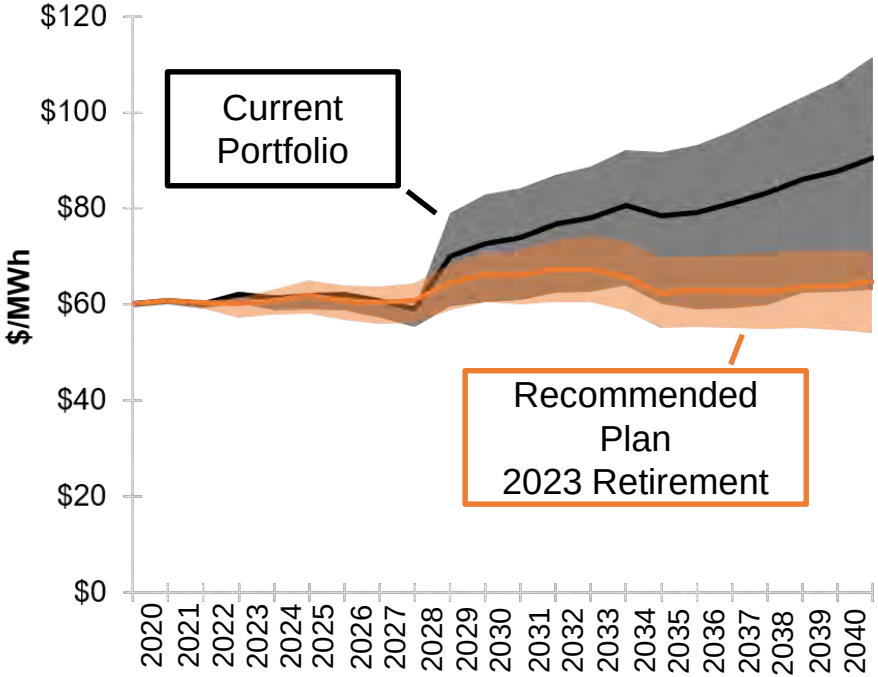
Base Case Forecast – Present Value Revenue Requirement-20 Years

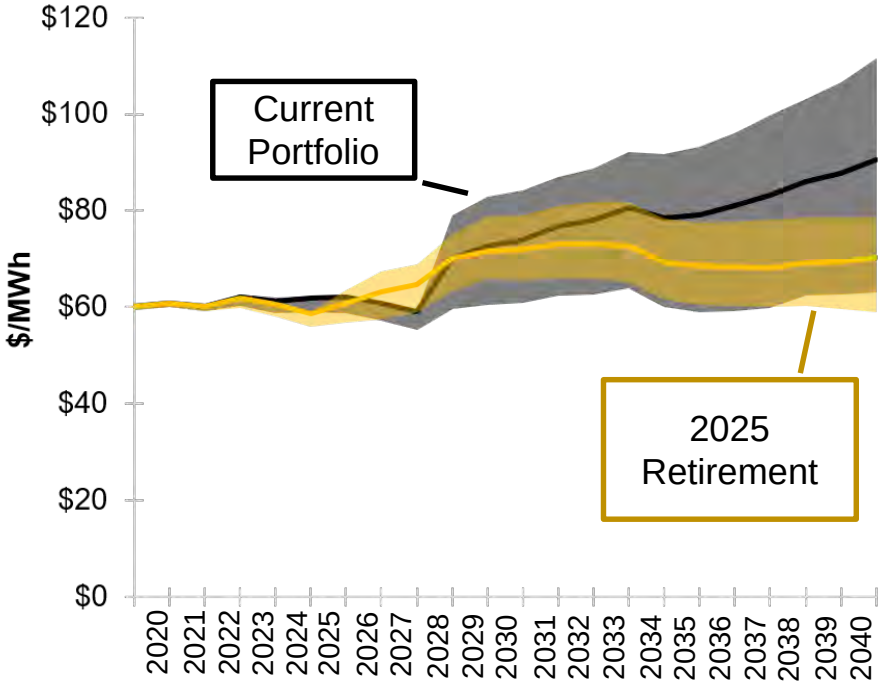


Portfolio	Current Portfolio	2023 Retirement	2025 Retirement
Cost Savings ($M)		$704	$427

* Includes decommissioning and stranded cost recovery

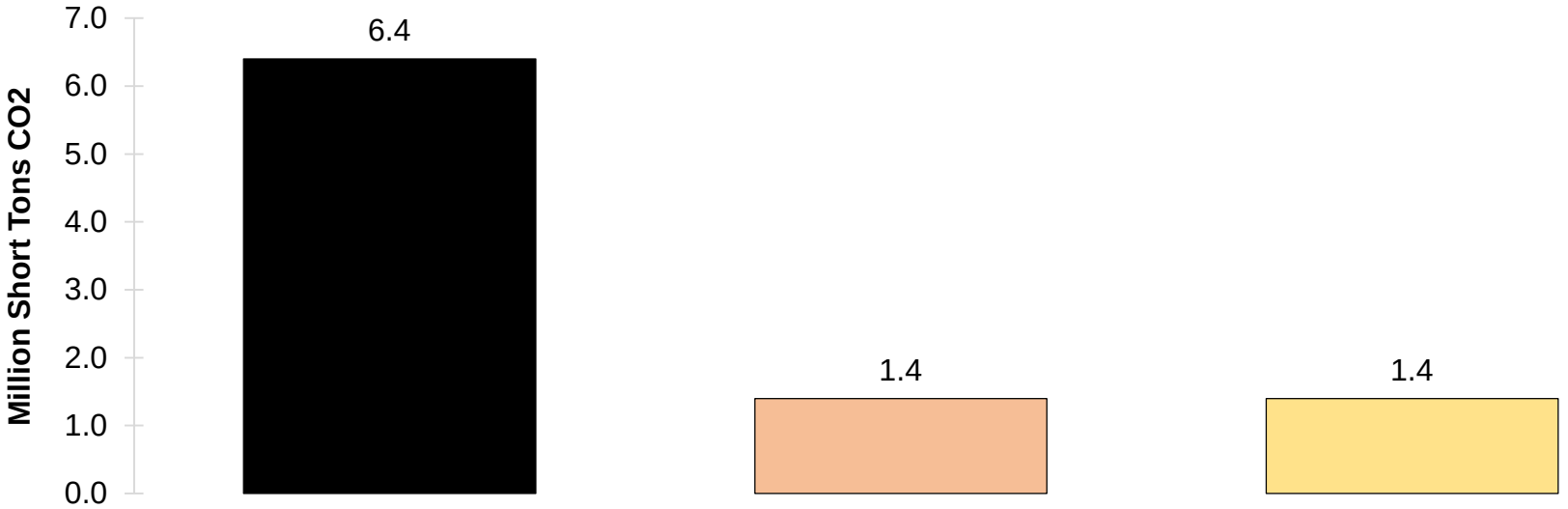
Recommended Plan Reduces the Range of Expected Supply Costs Under Different Future Scenarios





Recommended Plan Puts Hoosier on Track To Meet or Exceed 2030 Targets Recently Announced by Duke and other Midwest Utilities

2030 CO_2 Emissions

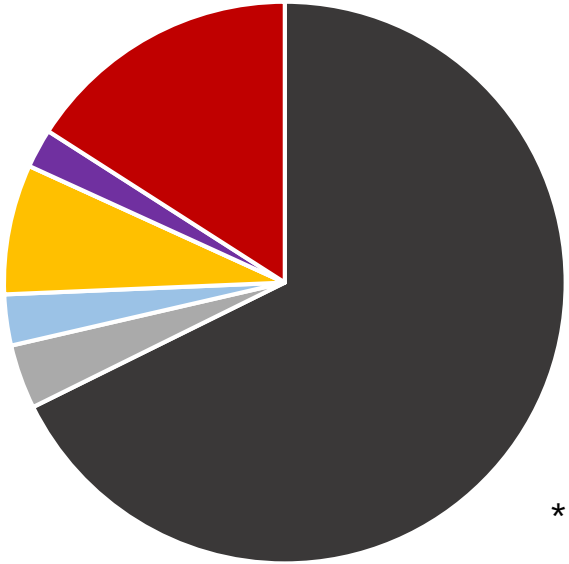


Portfolio	Current Portfolio	2023 Retirement	2025 Retirement
% CO_2 Reduction		78%	78%

Recommended Plan Increases Fuel Diversity and Reduces Market Purchase Reliance

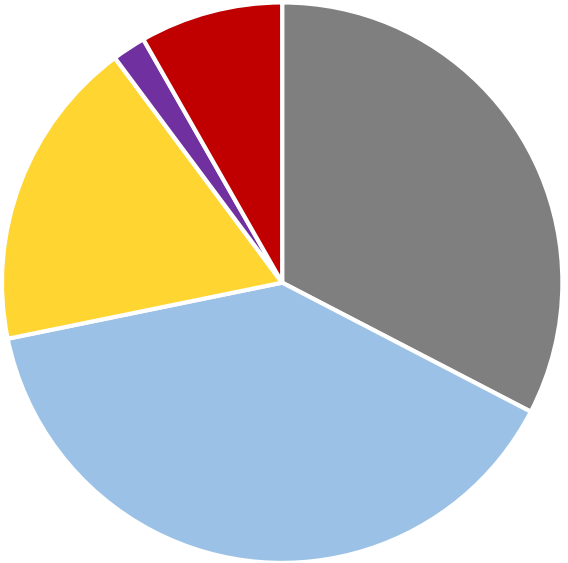
Energy Mix - 2030

Current Portfolio



Coal
Gas*
Wind
Solar*
Other
Market*

Recommended Plan- 2023 Retirement

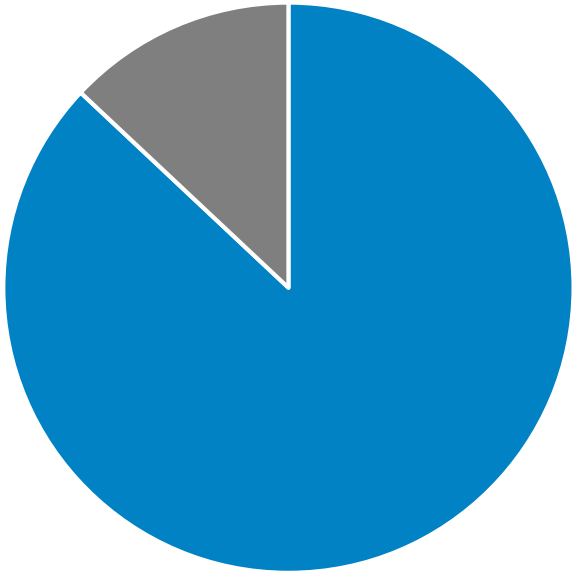


* Opportunities for distributed energy resources

Conceptual Ownership vs Purchase

Capacity - 2023

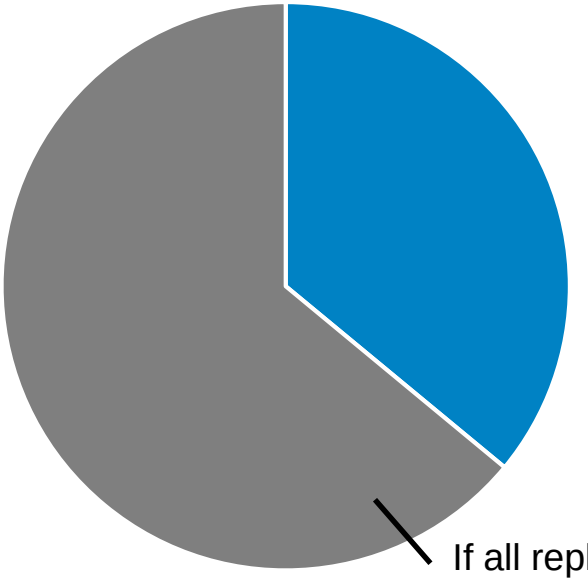
Current Portfolio



Owned

Purchased

Recommended Plan



If all replacements are purchases

Other Diversification Strategies

- Unit Size
  - Maximum 300 MW
  - Consider location concentration
- Diversity in size within resource types
- Purchases
  - Consider current portfolio commitments
  - Stagger terms
  - Different contract lengths
  - Use market products to bridge gaps and ensure staggered terms

Estimated Employees Impacted by the Recommended Plan

Plant Operations (today)	165
Support Staff (today)	20
	185
Move to other positions within Hoosier	30
Needed through decommissioning (through 2028)	20
Needed post decommissioning (ongoing)	5
Employees requiring assistance	130
Experience says some employees will leave or retire over the next 3 years/prior to closure	15
Need assistance once the plant closes	115

Employee Assistance Strategies

Retain - Focus on retention of key personnel to operate the station until the retirement date

Retrain - Identify employees for training programs to replace vacancies in other areas of the company

Retire - Consider early retirement plan for directly impacted employees who are near retirement age at time of closure

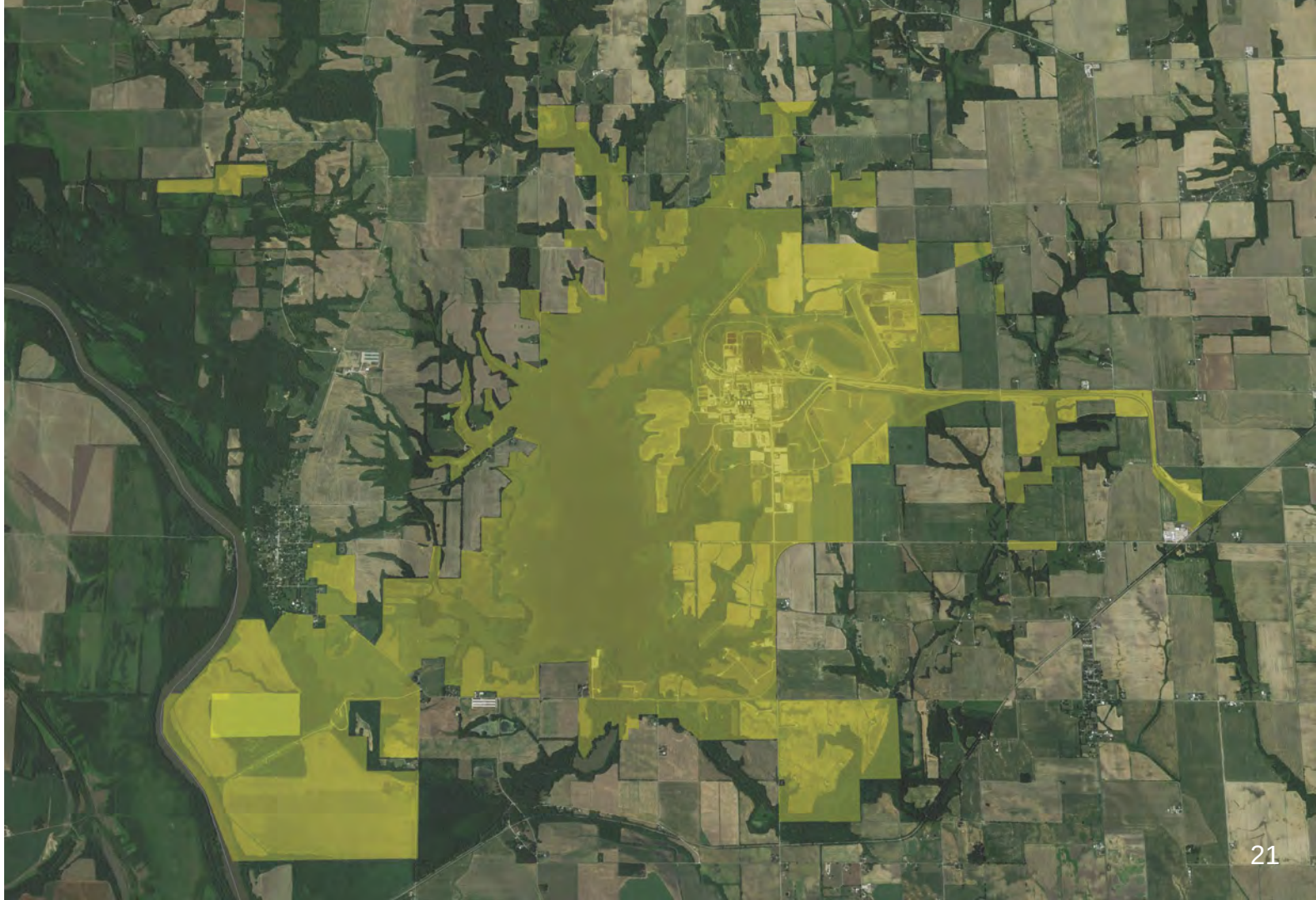
Outplacement Assistance - Provide professional outplacement support for remaining employees

Total investment estimated at $13 million or 1-2% of expected savings over 20 years

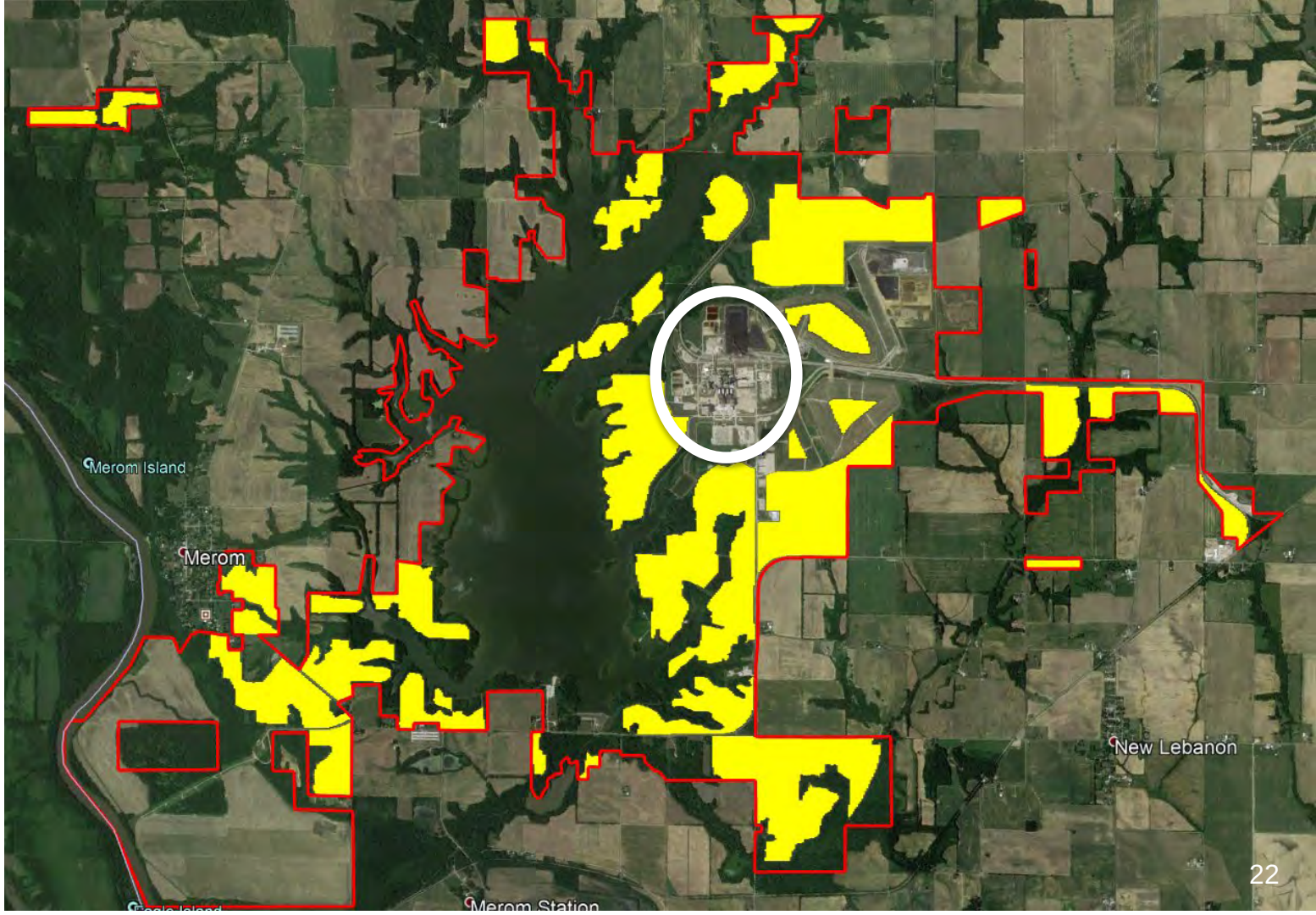
We Will Actively Pursue Merom Site Opportunities

- Sell Merom As Operating Plant
  - Go to market for potential buyers
- Develop Merom Energy Campus
  - Potential site for solar, storage and gas generation resources
  - Take advantage of existing transmission interconnection
- Promote Site as Attractive Industrial Development Opportunity
  - Site features rail, water and wastewater treatment capabilities
  - Labor availability and opportunity

Property Boundary of Merom Site
(7,000+ Acres)



Conceptual Energy Campus & Industrial Development



How We Will Pursue Replacements

- Begin discussions with developers that have already submitted unsolicited term sheets
- Engage CRA to assist us in the request for proposal (RFP) process
- Issue RFP mid-March
- Update board on responses at May board meeting
- Replacement projects to appropriate Board committees and Board beginning in summer 2020 and beyond

Communicating Our Plan

Key Messages

- Saves members estimated $700 million over next 20 years
- Expect to retire Merom in 2023 and transition to more diverse generation portfolio that includes low-cost wind, solar, natural gas and storage
- Sets foundation for supply cost stability
- Reduces carbon footprint by nearly 80%
- Assist impacted employees through retraining, reassignment, professional outplacement and retirement options
- We will work with state and local economic development officials to market portions of the Merom property for industrial development. We will consider renewable energy generation or pursue a sale of the plant

Communicating Our Plan (continued)

Key Stakeholders

- "Who is it that needs to hear first from us?"
  - Hoosier employees
  - Local Directors & co-op communications staff
  - Government officials

Communicating Our Plan (continued)

Timeline

- Day of Board Decision
  - CEOs give heads up to co-op communicators to be available for a 9 am conference call the next day
- Day Following Board Decision

7:15 a.m.	Merom employee meeting
7:45 a.m.	Email to Merom employees
8 a.m.	Email to all Hoosier employees; email to local Directors and CEOs
	Email to CEOs and co-op communicators of 9 am call

Communicating Our Plan (continued)

Timeline

- Day Following Board Decision (continued)

9 a.m.	HQ employee meeting
	Conference call with CEOs and co-op communicators (Email including news release, talking points, logistics for media inquiries)
	News release issued
	Email to key external stakeholders

Communicating Our Plan (continued)

Timeline

- Day Following Board Decision (continued)
  - 1 p.m. Meeting with Ops Center employees
  - 3 p.m. Conference call for local Directors, CEOs and key co-op staff
- Ongoing support beyond initial announcement

Board Actions Related to the Recommended Plan

February 2020 – A long-range resource plan	**Future – Measures to carry out the plan that exceed CEO authority**
Retire Merom in 2023 and	Final shut down determination to MISO (November 2022)
Transition to a more diverse mix that includes wind, solar, natural gas, market purchases and storage	Specific replacement resources
Assist impacted employees	Special early retirement plan
Recover decommissioning and stranded costs	Way in which stranded costs will be recovered - over what period, as “transition” charge etc. (November 2020) Method to recover decommissioning costs (closer to final shutdown)
Pursue Merom site opportunities	Any sale of the plant Industrial development at the site Siting new generation at the site

Board Decision Framework for the Plan

Three portfolio options for consideration

1. Current portfolio to 2040
2. Merom retirement in 2023 (recommended)
3. Merom retirement in 2025

Board Decision Framework (continued)

- Step 1: Should the Long Range Resource Plan include retirement of Merom prior to 2040? Yes/No
  - If majority votes “no”, the current portfolio will be included in the plan to 2040
  - If majority votes “yes”, there is a second step

- Step 2: The Long Range Resource Plan should include retirement of Merom in
  - 2023 (recommended)
  - 2025

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Discussion