CenterPoint Energy

# CenterPoint Energy Indiana South Integrated Resource Plan

## Public Stakeholder Meeting 4

October 23, 2025

# Stakeholder Meeting Facilitator: 1898 & Co.

WHO: 1898 & Co. is the business, technology, and security consultancy part of Burns & McDonnell

WHAT: The Resource Planning & Market Assessments group has been working on Integrated Resource Plans for over 20 years

HOW: Our team will help facilitate stakeholder meetings – we look forward to working with and hearing from you all

# Agenda

| Time | Topic | Speaker |
|---|---|---|
| 9:00 | Sign-in & Refreshments | |
| 9:30 | Facilitators and Meeting Protocols & Participation | Drew Burczyk, Project Manager, Resource Planning & Market Assessments, 1898 & Co. |
| 9:40 | Safety Share & Welcome | Shane Bradford, Vice President, Indiana Electric, CenterPoint Energy |
| 9:50 | Follow Up Information From Stakeholder Meeting #3 | Leslie Hamby, Manager IRP & Generation Analysis, CenterPoint Energy |
| 10:00 | Preferred Portfolio | Matt Rice, Director Regulatory & Rates, CenterPoint Energy |
| 10:40 | Break | |
| 10:50 | Risk Analysis Modeling and Portfolios | Drew Burczyk, Project Manager, Resource Planning & Market Assessments, 1898 & Co. |
| 11:00 | Portfolio Characteristics and Considerations | Matt Rice, Director Regulatory & Rates, CenterPoint Energy |
| 11:30 | Lunch | |
| 12:30 | Risk Analysis Scorecard | Drew Burczyk, Project Manager, Resource Planning & Market Assessments, 1898 & Co. |
| 12:45 | Alternate Reference Case | Drew Burczyk, Project Manager, Resource Planning & Market Assessments, 1898 & Co. |
| 1:00 | Sensitivity Results | Drew Burczyk, Project Manager, Resource Planning & Market Assessments, 1898 & Co. |
| 1:30 | Summary | Matt Rice, Director Regulatory & Rates, CenterPoint Energy |
| 1:40 | Stakeholder Questions & Feedback | Moderated by Drew Burczyk, Project Manager, Resource Planning & Market Assessments, 1898 & Co. |
| 2:30 | Adjourn | |

# Meeting Protocols

- Please focus questions, comments, and feedback to the IRP process and today's agenda topics
- CenterPoint Energy Indiana (CEI) South does not authorize the use of cameras, video/audio recording devices, or AI transcription during the meeting
- Following the meeting, feedback (concepts, inputs, methodology, etc.) and questions may be sent to IRP@CenterPointEnergy.com
- CEI South will be recording the meeting to accurately capture notes and questions. The public meetings are not transcribed or recordings posted; however, Q&A summaries of our public meetings will be posted on www.CenterPointEnergy.com/irp

# Meeting Participation

Time is allotted for questions following each presentation – please hold questions until the designated question period

For those in the room, please keep side conversations to a minimum. The ceiling mics are sensitive, and additional noise may make it hard for those online to hear

In-person attendees – please raise your hand to be recognized

Virtual attendees will be in listen-only mode – to participate:

- Use the “Raise” hand feature in Teams to be recognized, and your mic will be activated during the allotted time for questions, or
- Enter questions into the “Q&A” feature in Teams

Identifying yourself by name prior to speaking to help us keep track of feedback and follow up actions

There will be a list compiled for items to be addressed later. Questions that are not able to be answered in this meeting will be answered later

# Welcome and Safety Share

Shane Bradford

Vice President, Indiana Electric

# Safety Share - Halloween

Drivers should be aware that around Halloween, there will likely be more pedestrians on the roads and in unexpected places.

## Safety Tips for Drivers

- **#1:** Be alert for trick-or-treaters and other pedestrians.
- **#2:** Slow down and scan the road. Remember: Slower speeds save lives.
- **#3:** Watch for young trick-or-treaters in unexpected places. Children may be unaware of traffic and dart into the street unexpectedly.
- **#4:** If you see a drunk driver, contact law enforcement.

## Safety Tips for Pedestrians

- **#5:** Before festivities begin, create a “buddy system” to get each other home safely and prevent walking alone.
- **#6:** Follow the rules of the road and obey signs and signals.
- **#7:** If possible, cross streets at crosswalks or intersections. Look for cars in all directions, including those turning left or right.



Source: https://www.nhtsa.gov/halloween-safety-tips

Image: https://pixabay.com/

# Stakeholder Feedback & IRP Process Recap

Leslie Hamby

Manager IRP & Generation Analysis

# Summary of Stakeholder Feedback From Meeting #3

| Topic | Stakeholder Comments | CEI South Updates/Responses |
|---|---|---|
| Modeling: | Scenario Portfolios – Explain why manual modifications applied to scenario portfolios to align with the Reference Case load | 1898 & Co. posted documentation to the IRP File Share site for technical stakeholders. However, following Stakeholder feedback, CEI South decided to remove the manual modification. |
| Modeling: | Scenario Portfolios – Request to re-run the capacity expansion simulation instead of the production cost simulation | |
| Modeling: | Scenario Portfolios – Request to share documentation illustrating manual modifications made to the scenario portfolios | |
| Modeling: | Build Limits – Request for CEI South to consider running scenarios with relaxed limits | CEI South ran a simulation and chose to relax limits to allow more resources to be selected within the capacity expansion model. |
| Modeling: | Consider a study with FB Culley 3 retiring in 2030 | Given the unprecedented amount of uncertainty at this time and future transmission upgrades that will help with system reliability and resilience, it would not be prudent to consider retirement prior to 2032, as is being considered within this IRP. |

# Summary of Stakeholder Feedback From Meeting #3

| Topic | Stakeholder Comments | CEI South Updates/Responses |
|---|---|---|
| Affordability Measure | Request for energy burden calculation | CEI South will make the energy burden workpaper available to technical stakeholders with a signed NDA. |
| Rates | Request to provide guidance on bill itemization | Please see the CenterPoint website, where is shows an explanation of the bills. https://www.centerpointenergy.com/en-us/residential/customer-service/resource-hub/understanding-your-bill?sa=in |

# 2025 Stakeholder Process

Proposed 2025 CEI South Stakeholder and Tech to Tech Meetings – *Dates and agendas are subject to change*

## Meeting 1
March 19

- IRP Process, Objectives, & Draft Metrics
- All-Source RFP Results
- MISO Update
- Environmental Compliance Update
- Draft Sales and Demand Forecast (Reference Case)
- Commodity Inputs
- Large Load Sensitivity Discussion
- Resource Options
- Scenario Development

Tech to Tech
April 28

## Meeting 2
May 14

- Follow Up Information From 1st IRP Stakeholder Meeting
- Final Scorecard and Scenarios
- DSM Market Potential Study Update
- Draft Supply-Side Resource Inputs
- Final Load Forecast and Draft Scenario Forecasts
- Probabilistic Modeling Approach and Assumptions
- Portfolio Development Methodology
- Draft Reference Case Modeling Update

Tech to Tech
August 20

## Meeting 3
September 11

- Follow Up Information From 2nd IRP Stakeholder Meeting
- Revisions to Scenarios
- DSM Market Potential Study – Initial Results
- Portfolio Development Methodology and Draft Scenario Optimization Results Draft Deterministic Portfolio Results
- Portfolios Discussion
- Scenario and Probabilistic Modeling Update
- Early Sensitivity Results

Tech to Tech
October 15

## Meeting 4
October 23

- Follow Up Information from 3rd IRP Stakeholder Meeting
- Preferred Portfolio
- Risk Analysis Modeling and Portfolios
- Portfolio Characteristics and Considerations
- Risk Analysis Scorecard
- Alternate Reference Case
- Sensitivity Results

**Target Submission Date: December 5, 2025**

**Stakeholder Engagement is Critical to the IRP Process**
CEI South is committed to meaningful information sharing and dialogue

# Target Data Release Schedule

| Draft Load Forecast | Draft Base Case Model | Updated Base Case + Scenario Models | Probabilistic + Sensitivity Analysis Models |
|---|---|---|---|
| 3/20/2025 1 | 5/5/2025 2 | 8/20/2025 3 | 10/15/2025 4 |

- *Released data and Tech to Tech meeting attendance will be available to the technical stakeholders with a completed Non-Disclosure Agreement (NDA).*
- *Send NDA requests to IRP@Centerpointenergy.com*

# Final Objectives & Metrics

| Objective | Measure | Metrics |
|---|---|---|
| **Affordability:** *Consider portfolios' impact on the retail electric utility service providers' ability to provide affordable power across residential, commercial, and industrial customer classes* | ➢ 20-year Net Present Value Revenue Requirement ("NPVRR") | ➢ $ |
| | ➢ 95th percentile of NPVRR (million$) across 200 dispatch iterations under varying market conditions | ➢ $ |
| | ➢ **5th percentile of NPVRR (million$) across 200 dispatch iterations under varying market conditions** | ➢ $ |
| | ➢ **Incremental Electric energy burden (2030 – 2035)** | ➢ **% HH income** |
| **Environmental Sustainability:** *Consider the impact of environmental regulations on the cost of providing electric utility service and demand from consumers for environmentally sustainable sources of electric generation* | ➢ $CO_2$ Intensity | ➢ Tons $CO_2$/kwh |
| | ➢ $CO_2$ Equivalent Emissions | ➢ Tons $CO_2$e |
| | ➢ **SOx and NOx Emissions** | ➢ **Tons** |
| **Reliability:** *Consider portfolios' ability of the electric system to supply the aggregate electrical demand and energy requirements of end use customers at all times and withstand sudden disturbances* **Resiliency:** *Consider portfolios' ability to adapt to changing conditions and withstand and rapidly recover from disruptions* **Stability:** *Consider portfolios' ability to maintain a state of equilibrium during normal and abnormal conditions or disturbances and deliver a stable source of electricity, in which frequency and voltage are maintained within defined parameters* | ➢ **Unserved energy across 200 dispatch iterations under varying market conditions** | ➢ MWh |
| | ➢ Spinning Reserve | ➢ Portfolio MW's That Offer Spinning Reserve |
| | ➢ Fast Start Capability | ➢ Portfolio MW's That Offer Fast Start |
| | ➢ **Transmission reliability analysis** | ➢ **Dynamic VAR Support (MVAR)**<br>➢ **Short Circuit Ratio** |
| **Risk/Other:** | ➢ Energy market purchase and sales | ➢ % (average, near/long term) |
| | ➢ **Capacity sales and purchases** | ➢ **$** |

***Blue text indicates a new measure for this IRP cycle***



*MWh = Megawatt hour MVAR = Megavolt-Ampere Reactive*

# Q&A

# Preferred Portfolio

Matt Rice

Director, Regulatory and Rates

# How did we get here?

CEI South has navigated considerable uncertainty during our generation transition. While the projected mix of resources has evolved, CEI South has remained focused on providing reliable, affordable, sustainable, stable, and resilient power for its customers.

**2020**

- IRP recommends closing or exiting all coal except F.B. Culley 3, replacing with a diverse mix of renewables and natural gas resources

**2021**

- CEI South files for 626 MWs of solar resources

**2022**

- CEI South files for 130 MWs of solar resources
- CEI South refiles for 150 MWs of solar due to cost increases

**2023**

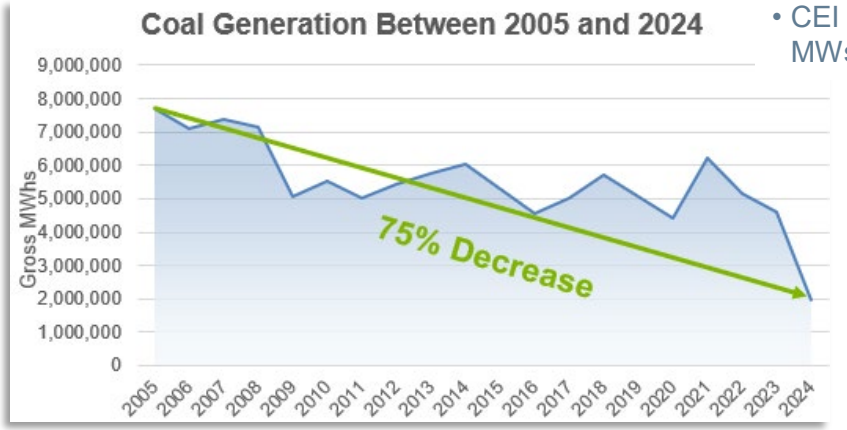
- CEI South files for 200 MWs of wind
- CEI South refiles for 285 MWs of solar due to cost increases
- IRP recommends converting F.B. Culley 3 to natural gas, replacing with wind and solar resources
- CEI South files first base rate case in 14 years (80% of revenue increase was for Posey Solar and A.B. Brown 5 & 6)

**2024**

- 130 MWs of solar canceled due to increased project cost
- FERC approves MISO's accreditation methodology - dramatically lowering capacity credit for solar resources
- CEI South files for 317 MWs of wind resources to replace canceled and at-risk renewables projects

**2025**

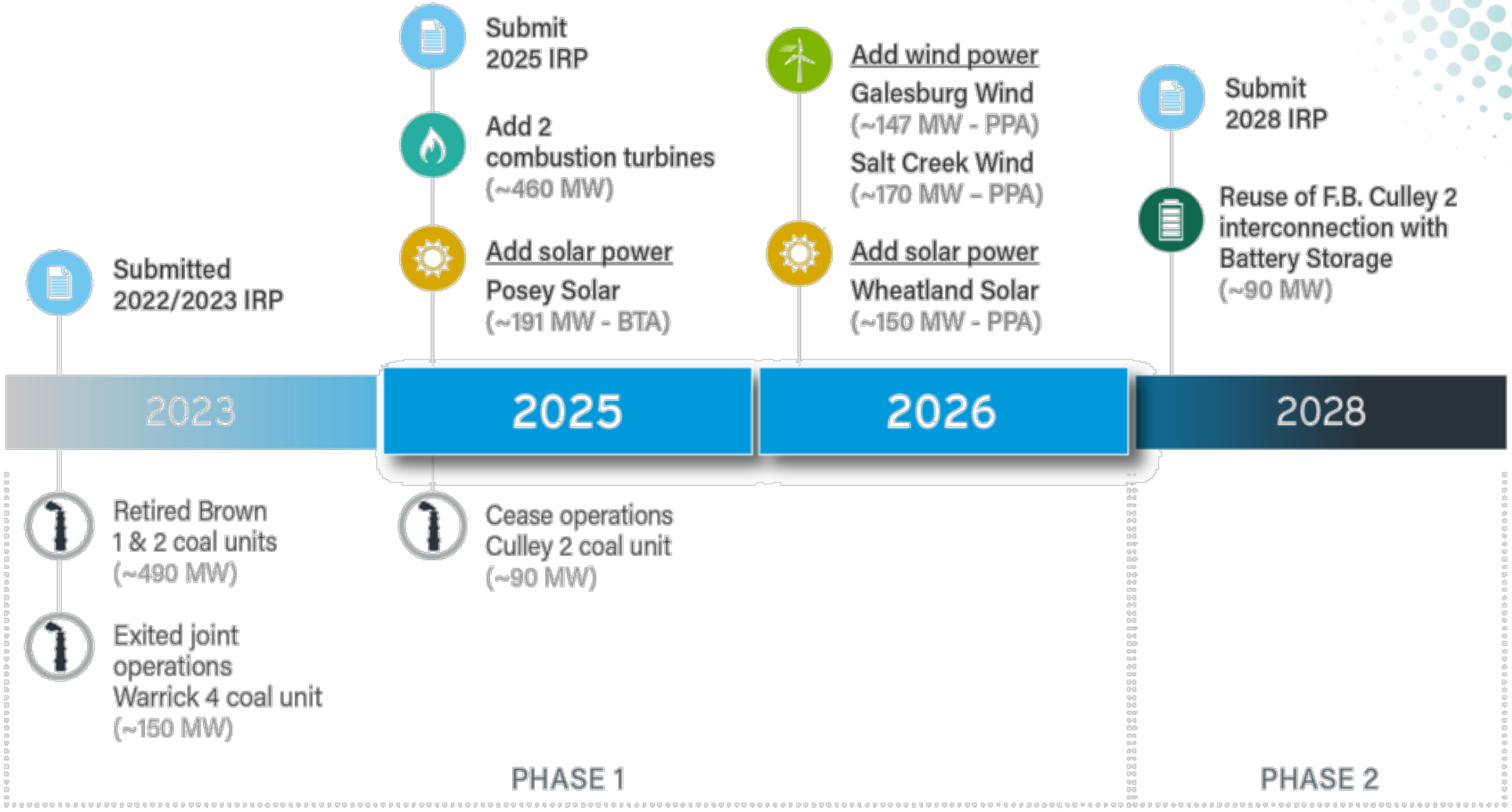
- Given uncertainty and affordability concerns, CEI South re-evaluates conversion of F.B. Culley 3 to natural gas in 2025 IRP
- 190 MW Posey Solar and 460 MW combustion gas turbines come on-line
- Executive orders from Federal and State government to avoid coal retirements
- Repeal of IRA tax incentives for wind and solar resources increases cost
- Repeal of EPA Greenhouse Gas (111) rule proposed
- 200 MW wind project and 285 MWs of solar projects canceled due to cost increases



# Key Risk Considerations

| | CHANGE | RISK |
|---|---|---|
| **MISO Direct Loss of Load ("DLOL")** | Major changes to capacity accreditation construct lowers the amount of installed capacity that counts towards reliability | Could over or under build resources needed to reliably and affordably serve customers |
| **EPA Greenhouse Gas Regulations** | Proposed repeal of rule 111 of the Clean Air Act is still in early stages | If finalized as proposed may not stand up to litigation or future administrations |
| **Cost of Resources** | Costs associated with all types of resources have increased dramatically due to supply chain issues or, in some cases, increased demand in the near term | Unaffordable customer bills in the near and long term |
| **Policy Change** | Executive Orders from Federal and State government focused on preserving coal plants; and less friendly towards renewable resources | May be required to continue running coal units targeted for retirement |
| **Large Load Additions** | Unprecedented load growth | Being able to safely and timely meet demand while isolating stranded asset risk away from existing retail customers |
| **Regulatory Risk** | New IURC Commissioners in 2026; more enhanced state/federal focus on affordability | Increased risk asset costs will not be fully depreciated |

# Generation Timeline[1]



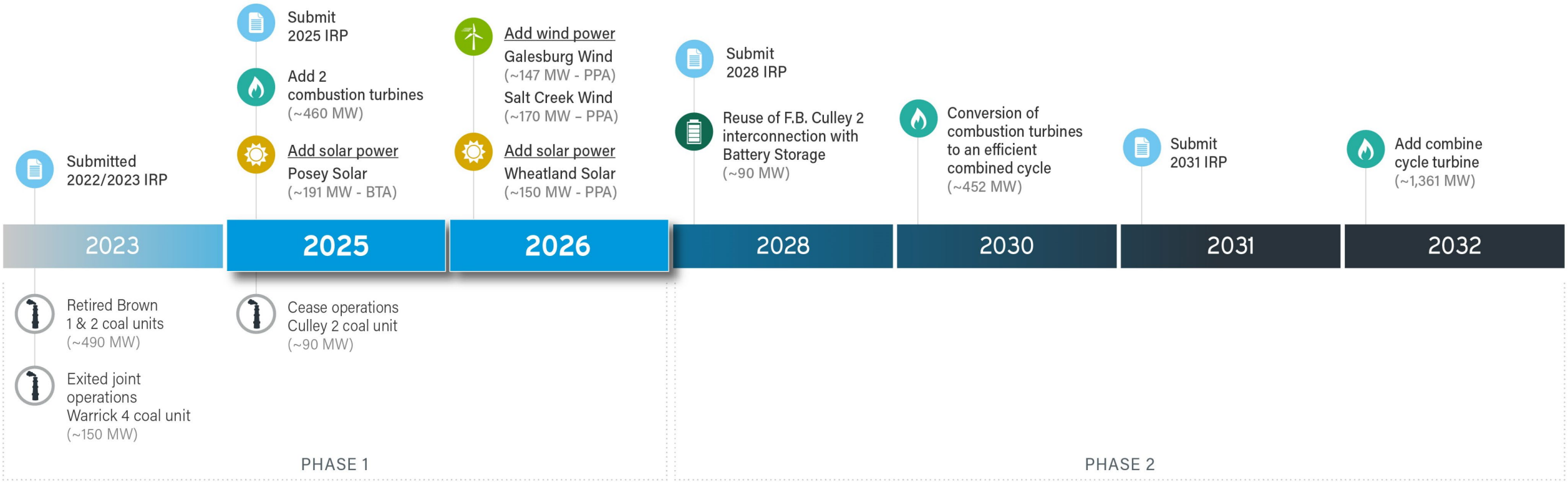

[1] *Beyond 2028, CNP will reassess generation resource selections in the next IRP*

# The Preferred Portfolio[1] provides near term rate stability, while preserving flexibility to adapt to uncertainty

- Based on factors outside of CEI South's control (MISO accreditation, renewable cost increases, and repeal of tax incentives) conversion of F.B. Culley 3 with renewables/storage is no longer affordable relative to alternatives (14-17% higher)
  - The future of F.B. Culley 3 will be evaluated in a subsequent IRP
- Least cost option to replace F.B. Culley 3 in near and long term is conversion of new A.B. Brown combustion turbines (CTs) to combined cycle, along with separate battery storage projects in the near and long term
  - Preferred Portfolio provides near-term rate stability for customer **affordability** by delaying this large capital investment, while F.B. Culley 2 battery storage enables avoidance of certain required capacity purchases
  - Preferred Portfolio is within 3% of the lowest cost option in the long term
  - F.B. Culley 2 battery storage (interconnection may be utilized by 2028) cost estimate to be validated through RFP
- **Maximizes flexibility** to navigate unprecedented uncertainty; **minimizes risk**
- Provides **affordable**, **reliable** energy with a well-balanced mix of **sustainable** energy resources and continued focus on demand side resources
- **Maintains jobs and tax base** in Warrick County
- Produces **reliability** and **stability** benefits with on-system base load resources, particularly on both sides (east and west) of our system
- System **resilience** will continue to be prioritized in the evaluation of F.B. Culley 3
- Provides **flexibility** to serve a large load addition, should an **economic development** project materialize (See Alternate Preferred Portfolio)

[1] *CEI South chose portfolio 12 as the preferred portfolio. Beyond 2028, CNP will reassess generation resource selections in the next IRP.*

# Alternate *Generation Timeline*



# The Alternate Preferred Portfolio provides necessary flexibility to quickly pivot, keeping Southern Indiana competitive for economic development and growth

- Preserves **maximum future flexibility**, keeping Southern Indiana **competitive for economic development** and **growth**
  - Speed to market is important for prospective customers, regardless of industry
  - **Adds tax base and jobs** in our community, which helps all customers thrive
  - Aligns with Federal and State goals
- Conversion of new A.B. Brown CTs to a CCGT and F.B. Culley 2 battery storage become the most **affordable** options in the near term to support ramp
- Utilizes F.B. Culley 3 until replacement / conversion to natural gas is decided
- Adds efficient on-system base load generation for **reliability, stability** and **resilience**

**Due Diligence:**

- CEI South continues to have on-going conversations with prospective customers - No contract has been signed
- CEI South will continue with further studies
- Build out is dependent on prospective customer preferences
- Any new contract will address cost allocations and include protections for existing and future customers
  - Contribution to fixed costs could lower existing customer bills
  - CEI South will work to minimize risk to existing customer base (e.g., stranded assets and subsidization)



*CT = Combustion Turbine* *CCGT = Combined Cycle Gas Turbine*

# Short Term Action Plan (Next Three Years)

## Continue to implement generation transition

1

- Galesburg Wind: 147 MW – PPA (*Approved by IURC)*
- Salt Creek Wind: 170 MW – PPA (*Pending IURC approval)*
- Wheatland Solar: 150 MW – PPA *(Approved by IURC)*

## Conduct an RFP for storage at F.B. Culley 2 and begin negotiations

2

- If affordable, submit a Certificate of Public Convenience and Necessity (CPCN) for 90 MW battery storage

## File for DSM Plan, consistent with results of the Preferred Portfolio

3

## Continue to work through due diligence for possible large load addition

4

# Q&A

# CenterPoint Energy Indiana South Integrated Resource Plan

## Public Stakeholder Meeting 4

# On break – we will return at 10:26 CDT

# Risk Analysis Modeling and Portfolios

Drew Burczyk
Project Manager, Resource Planning & Market Assessments, 1898 & Co.

# Scenario-Driven Portfolios
## *Updated Approach*

Allow the model to construct an optimized portfolio for each scenario, then lock in those model outputs and run through reference case assumptions

| Key Drivers: | Policy Factors | | | Load | Commodity Prices | | Capital Costs | |
|---|---|---|---|---|---|---|---|---|
| **Scenario** | Environmental Policy | Economic Policy | $CO_2$ Regulation | Load | Natural Gas Price | Coal Price | Generation | EE Costs |
| **Reference Case** | ACE Proxy | Modified IRA | No additional $CO_2$ regulation | Base | Base | Base | Base | Base |
| **High Regulatory** | Clean Air Act 111 (b & d) and expansion to existing gas resources | IRA | Addition of $CO_2$ Tax | Lower | Higher | Higher | Lower | Higher |
| **Alternate High Regulatory** | Clean Air Act 111 (b & d) and expansion to existing gas resources; Electrification and EV policy | IRA | No additional $CO_2$ regulation | Higher | Higher | Higher | Higher | Base |
| **Low Regulatory** | No Clean Air Act 111 (b & d) | No IRA | No additional $CO_2$ regulation | Higher | Lower | Lower | Higher | Lower |

# Scenario-Driven Portfolios
## *Updated Approach*

| Year | Optimized Reference Case *(Portfolio 1)* | Optimized Low Reg *(Portfolio 8)* | Optimized High Reg *(Portfolio 9)* | Optimized Alt High Reg *(Portfolio 10)* |
|---|---|---|---|---|
| **2028** | 1 FBC2 Do Nothing | +1 FBC2 Storage (90 MW) | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing |
| **2030** | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) | 1 ABB5/6 Continue<br>+3 Non IRA Wind + Storage (600 + 300 MW) | +1 Non IRA Wind (200 MW) |
| **2032** | -1 FB Culley:3 Retire 2032 (-270 MW) | -1 FB Culley:3 Retire 2032 (-270 MW) | -1 FB Culley:3 Retire 2032 (-270 MW)<br>+1 Non IRA Wind + Storage (200 + 100 MW) | -1 FB Culley:3 Retire 2032 (-270 MW)<br>+1 Non IRA Solar PV (100 MW)<br>+2 Non IRA Wind + Storage (400 + 200 MW) |
| **2033** | +1 100 MW 4 Hour Storage (100 MW) | | | |
| **2034** | | | | +1 AB Brown7: Fired CCGT 2034 (850 MW) |
| **2038** | | +1 50 MW 4 Hour Storage (50 MW) | | |
| **2040** | +1 50 MW 4 Hour Storage (50 MW) | | | |
| **2042** | | +1 50 MW 4 Hour Storage (50 MW) | | |
| **2043** | +1 50 MW 4 Hour Storage (50 MW) | | | |
| **2045** | | +1 Non IRA Solar PV + Storage (100 + 50 MW) | | |

# Updates to F.B. Culley 2 Selections

- As we continued to build out the model and refine inputs, we re-ran portfolios around the F.B. Culley 2 (FBC2) optionality.
- With the updates, the FBC2 storage decision flipped to be slightly less economic than allowing the interconnection rights to expire ("FBC2 Do Nothing") under reference case assumptions.
- The model was re-optimized for all scenarios allowing for the selection of FBC2 pathway, no longer forcing FBC2 battery in all scenario and Final Portfolios.

| Year | F.B. Culley 2 Aeroderivative | F.B. Culley 2 No Interconnect Re-Use | F.B. Culley 2 Reciprocating Engines | F.B. Culley 2 Storage |
|---|---|---|---|---|
| 2028 | +1 FBC2 Aero (86 MW) | 1 FBC2 Do Nothing | +1FBC2 Recip Engines (110 MW) | +1 FBC2 Storage (90 MW) |
| 2030 | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) |
| 2031 | | | | |
| 2032 | -1 FB Culley:3 Retire 2032 (-270 MW)<br>+1 50 MW 4 Hour Storage (50 MW) | -1 FB Culley:3 Retire 2032 (-270 MW) | -1 FB Culley:3 Retire 2032 (-270 MW) | -1 FB Culley:3 Retire 2032 (-270 MW) |
| 2033 | | +1 100 MW 4 Hour Storage (100 MW) | | +1 50 MW 4 Hour Storage (50 MW) |
| 2034 | | | | |
| 2035 | | | | |
| 2038 | | | | |
| 2039 | | | | |
| 2040 | | | | |
| 2041 | +1 Non IRA Solar PV (100 MW) | | +1 50 MW 4 Hour Storage (50 MW) | |
| 2042 | +1 50 MW 4 Hour Storage (50 MW) | +1 50 MW 4 Hour Storage (50 MW) | | |
| 2043 | | | | +1 50 MW 4 Hour Storage (50 MW) |
| 2044 | | | | |
| 2045 | +1 50 MW 4 Hour Storage (50 MW) | +1 50 MW 4 Hour Storage (50 MW) | +1 50 MW 4 Hour Storage (50 MW) | |
| % Delta to Min NPV | 8.1% | 0.0% | 5.3% | 1.0% |

# Updated EE/DR Model Selections

| Program Name | Fixed vs Selectable | Selection Frequency | Selection Percent |
|---|---|---|---|
| **DR Industrial*** | **Fixed** | **19/19** | **100%** |
| DR_CI Battery | Selectable | 0/19 | 0% |
| **DR_CI BYOT** | **Selectable** | **19/19** | **100%** |
| DR_CI EV | Selectable | 0/19 | 0% |
| DR_CI TOU CPP | Selectable | 18/19 | 94% |
| DR_CI WH Grid | Selectable | 9/19 | 47% |
| **DR_Res AC Switch** | **Fixed** | **19/19** | **100%** |
| **DR_Res AC Switch_NT** | **Fixed** | **19/19** | **100%** |
| DR_Res Battery | Selectable | 1/19 | 5% |
| DR_Res BYOT | Selectable | 4/19 | 21% |
| **DR_Res BYOT_NT** | **Fixed** | **19/19** | **100%** |
| DR_Res EV | Selectable | 1/19 | 5% |
| DR_Res Smart Cycle | Selectable | 1/19 | 5% |
| **DR_Res Smart Cycle_NT** | **Fixed** | **19/19** | **100%** |
| **DR_Res TOU CPP** | **Selectable** | **19/19** | **100%** |
| DR_Res WH Grid | Selectable | 1/19 | 5% |
| **DR_Res WH Switch** | **Fixed** | **19/19** | **100%** |
| **DR_Res WH Switch_NT** | **Fixed** | **19/19** | **100%** |
| **EE_CI_ERAP_NT, V1, V2, V3** | **Selectable** | **19/19** | **100%** |
| **EE_IQ HEAR_NT, V1, V2, V3** | **Fixed** | **19/19** | **100%** |
| **EE_IQW_V1, V2, V3** | **Fixed** | **19/19** | **100%** |
| **EE_Res_Tier 1_HER_NT, V1, V2, V3** | **Selectable** | **19/19** | **100%** |
| EE_Res_Tier2_V1, V2, V3 | Selectable | 2/19 - 3/19 | 11-16% |

- The EE/DR programs selected in at least 95% of the optimizations (**bolded**), consistently showed benefits to the portfolio, and were locked in for final portfolios
- The remaining EE/DR programs are still able to be selected in the portfolio optimizations

**DR Industrial is recognized as the DR Aggregation program*

# Final Portfolios

*(NPV values are the average from 200 stochastic runs)*

| Year | Portfolio1_Reference Case Portfolio | Portfolio2_FBC3 NG Flexibility on NG 2035 | Portfolio3_FBC3 on Coal without ABB7 | Portfolio4_FBC3 on Coal to SMR | Portfolio5_FBC3 to Simple Cycle Gas Turbine | Portfolio6_Renewable Heavy Portfolio | Portfolio7_FBC3 Gas Conversion with Renewables | Portfolio8_Low Reg Approach | Portfolio9_High Reg Approach | Portfolio10_Alt High Reg Approach | Portfolio11_FBC3 Co-Fire 2030 | Portfolio12_Delayed Reference Case |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2028 | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | +1 FBC2 Storage (90 MW) | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | +1 FBC2 Storage (90 MW) |
| 2030 | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) | 1 ABB5/6 Continue | +1 AB Brown7: Fired CCGT 2030 (850 MW) | 1 ABB5/6 Continue | 1 ABB5/6 Continue | +1 FB Culley:3 NG 2030 (270 MW)<br>1 ABB5/6 Continue | +1 AB Brown7: Fired CCGT 2030 (850 MW) | 1 ABB5/6 Continue<br>+3 Non IRA Wind + Storage (600 + 300 MW) | +1 Non IRA Wind (200 MW) | +1 FB Culley:3 Co-Fire 2030 (270 MW)<br>+1 AB Brown7: Fired CCGT 2030 (850 MW) | |
| 2032 | -1 FB Culley:3 Retire 2032 (-270 MW) | | +1 100 MW 4 Hour Storage (100 MW) | | | -1 FB Culley:3 Retire 2032 (-270 MW)<br>+3 100 MW 4 Hour Storage (300 MW) | | -1 FB Culley:3 Retire 2032 (-270 MW) | -1 FB Culley:3 Retire 2032 (-270 MW)<br>+1 Non IRA Wind + Storage (200 + 100 MW) | -1 FB Culley:3 Retire 2032 (-270 MW)<br>+1 Non IRA Solar PV (100 MW)<br>+2 Non IRA Wind + Storage (400 + 200 MW) | | |
| 2033 | +1 100 MW 4 Hour Storage (100 MW) | | +2 100 MW 4 Hour Storage (200 MW) | | +1 100 MW 4 Hour Storage (100 MW) | +2 100 MW 4 Hour Storage (200 MW) | +2 100 MW 4 Hour Storage (200 MW)<br>+1 50 MW 4 Hour Storage (50 MW) | | | | | |
| 2034 | | | | | | | | | | +1 AB Brown7: Fired CCGT 2034 (850 MW) | | +1 AB Brown7: Fired CCGT 2034 (850 MW) |
| 2035 | | +1 FB Culley:3 NG 2035 (270 MW) | | -1 FB Culley:3 Retire 2035 (-270 MW)<br>+1 Nuclear - SMR (100 MW) | -1 FB Culley:3 Retire 2035 (-270 MW)<br>+1 J Class SCGT (385 MW) | | | | | | | -1 FB Culley:3 Retire 2035 (-270 MW) |
| 2038 | | | | | | | | +1 50 MW 4 Hour Storage (50 MW) | | | | |
| 2039 | | | | | | | | | | | -1 FB Culley:3 Retire (270 MW)<br>+2 50 MW 4 Hour Storage (100 MW) | |
| 2040 | +1 50 MW 4 Hour Storage (50 MW) | | | | | | +1 Non IRA Wind (200 MW) | | | | +1 50 MW 4 Hour Storage (50 MW) | +1 50 MW 4 Hour Storage (50 MW) |
| 2041 | | | | | +1 Non IRA Wind + Storage (200 + 100 MW) | +1 Non IRA Wind (200 MW) | | | | | | |
| 2042 | | | +1 50 MW 4 Hour Storage (50 MW) | +1 100 MW 4 Hour Storage (100 MW) | | +1 Non IRA Wind + Storage (200 + 100 MW) | +1 50 MW 4 Hour Storage (50 MW) | +1 50 MW 4 Hour Storage (50 MW) | | | | |
| 2043 | +1 50 MW 4 Hour Storage (50 MW) | | | | | | | | | | | |
| 2044 | | | | | | | | | | | +1 50 MW 4 Hour Storage (50 MW) | |
| 2045 | | | +1 FB Culley:3 thru 2045 (270 MW)<br>+2 Non IRA Solar PV (200 MW)<br>+1 Non IRA Wind (200 MW) | | +1 Non IRA Wind (200 MW) | | +1 100 MW 4 Hour Storage (100 MW)<br>+2 Non IRA Wind (400 MW) | +1 Non IRA Solar PV + Storage (100 + 50 MW) | | | | +1 50 MW 4 Hour Storage (50 MW) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portfolio NPV ($000) | $3,726,310 | $3,717,752 | $4,033,713 | $4,455,790 | $4,306,033 | $4,308,725 | $4,375,241 | $3,764,366 | $4,296,985 | $4,211,036 | $3,854,126 | $3,835,823 |
| Delta to Reference ($000) | $0 | -$8,558 | $307,403 | $729,480 | $579,723 | $582,415 | $648,931 | $38,056 | $570,675 | $484,726 | $127,816 | $109,513 |
| Delta to Reference (%) | 0% | 0% | 8% | 20% | 16% | 16% | 17% | 1% | 15% | 13% | 3% | 3% |

# Final Portfolios – Demand Side Selections

| Demand Resource | Portfolio1_ Reference Case Portfolio | Portfolio2_FBC3 NG Flexibility on NG 2035 | Portfolio3_FBC3 on Coal without ABB7 | Portfolio4_FBC3 on Coal to SMR | Portfolio5_FBC3 to Simple Cycle Gas Turbine | Portfolio6_ Renewable Heavy Portfolio | Portfolio7_FBC3 Gas Conversion with Renewables | Portfolio8_Low Reg Approach | Portfolio9_High Reg Approach | Portfolio10_Alt High Reg Approach | Portfolio11_ FBC3 Co-Fire 2030 | Portfolio12_ Delayed Reference Case |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DR Industrial (25 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **DR_CI BYOT (4 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **DR_Res AC Switch (1 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **DR_Res AC Switch_NT (1 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **DR_Res BYOT_NT (13 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **DR_Res Smart Cycle_NT (14 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **DR_Res TOU CPP (6 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **DR_Res WH Switch (0 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **DR_Res WH Switch_NT (0 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_CI_ERAP_NT (4 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_CI_ERAP_V1 (12 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_CI_ERAP_V2 (13 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_CI_ERAP_V3 (39 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_IQ HEAR_NT (0 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_IQ HEAR_V1 (0 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_IQ HEAR_V2 (0 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_IQ HEAR_V3 (2 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_IQW_V1 (1 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_IQW_V2 (1 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_IQW_V3 (6 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_Res_Tier 1_HER_NT (2 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_Res_Tier 1_HER_V1 (9 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_Res_Tier 1_HER_V2 (11 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| **EE_Res_Tier 1_HER_V3 (31 MW)** | x | x | x | x | x | x | x | x | x | x | x | x |
| DR_CI Battery (0 MW) | | | | | | | | x | | | | x |
| DR_CI TOU CPP (2 MW) | x | | x | x | x | x | x | x | x | x | x | x |
| DR_CI WH Grid (3 MW) | x | | | | x | x | x | x | | | | x |
| DR_Res Battery (1 MW) | | | | | | | x | x | | | | |
| DR_Res BYOT (19 MW) | | | | | x | | x | x | | | | x |
| DR_Res EV (1 MW) | | | | | | | | | | | | x |
| EE_Res_Tier2_V1 (3 MW) | | | | | | x | | x | | | | x |
| EE_Res_Tier2_V2 (4 MW) | | | | | | x | | x | | | x | |
| EE_Res_Tier2_V3 (23 MW) | | | x | x | x | | x | | | | | |

***Bolded** programs are those that were fixed into all portfolios*
DR Industrial is recognized as the DR Aggregation program

# Q&A

# Portfolio Characteristics & Considerations

Matt Rice

Director, Regulatory and Rates

# 1- Reference Case

**Benefits**

- More affordable long term. Among lowest cost and cost risk
- Relatively environmentally friendly (highly efficient generation with relatively low SOx and NOx emissions)
- Adds tax base and some jobs in Posey County

**Challenges**

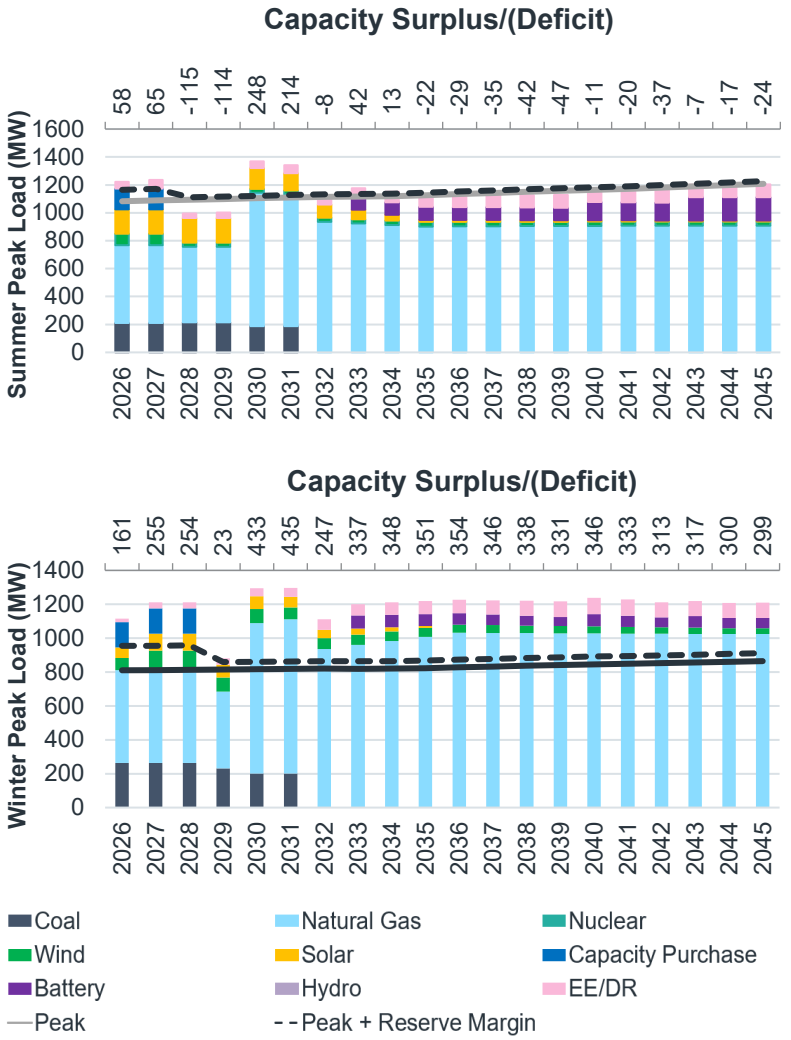
- Less flexible to adapt to regulatory & market conditions
  - EPA policies – Greenhouse Gas
  - MISO accreditation reform
  - State/Federal coal policies
- Fuel costs
- Limiting economic development opportunities (with loss of FBC3)
- Near-term large capital investment on conversion (ABB7) necessitates a near-term rate increase
- Near-term loss of spinning mass on east side of system
- Loss of jobs and tax base in Warrick County in 2032
- Loss of FBC2 interconnection (90MW) – future cost risk
- Loss of FBC3 interconnection (270MW)– future cost risk
- Energy and capacity sales revenue risk
- Increased demand for HRSGs, near term price risk

***Model Selections***

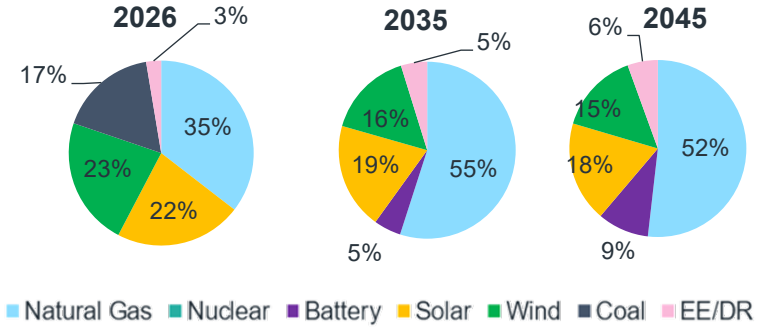
*F.B. Culley 2 Do Nothing*
*A.B. Brown Start CCGT 01/01/2030*
*F.B. Culley 3 Retire 12/31/2031*

*1x 100 MW Storage*
*2x 50 MW Storage*

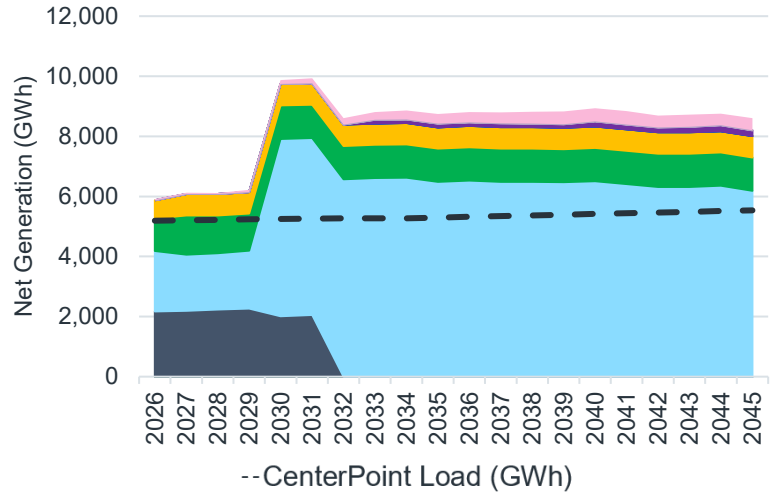
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 2 – FBC3 on NG 2035

**Benefits**

- More affordable long term. Among lowest cost and cost risk
- Maintains jobs and tax base in Warrick County
- Maintains FBC3 interconnection (270MW)
- Maintains spinning mass both sides of system in the long term
- Provides economic development opportunities with excess near term capacity and energy
- Adds tax base and some jobs in Posey County

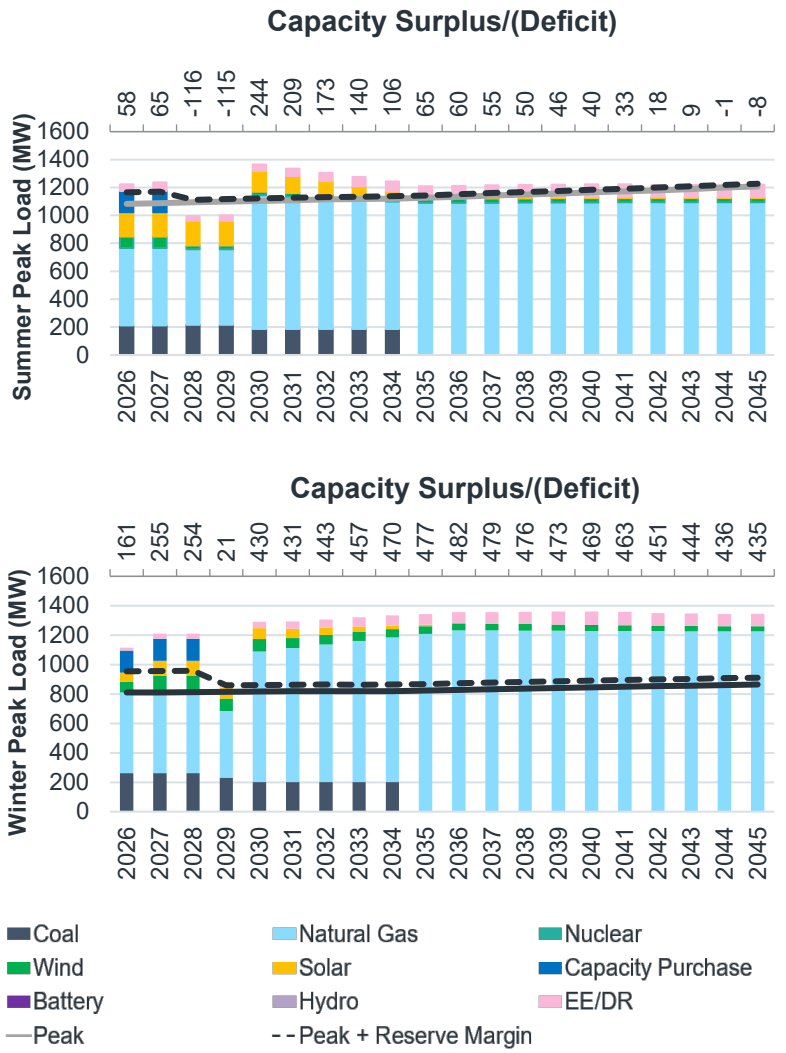
**Challenges**

- Near-term large capital investment on conversion (ABB7) necessitates a near-term rate increase
- Less flexible to adapt to regulatory & market conditions
  - EPA policies – Greenhouse Gas
  - MISO accreditation reform
- Fuel costs
- Overbuilds capacity in the near term
- Highest energy and capacity sales revenue risk
- Loss of FBC2 interconnection (90MW) – future cost risk
- Least resource diversity with least fast start resources
- Availability of gas capacity in 2035 is a risk
- Some unserved energy risk
- Increased demand for HRSGs, near term price risk

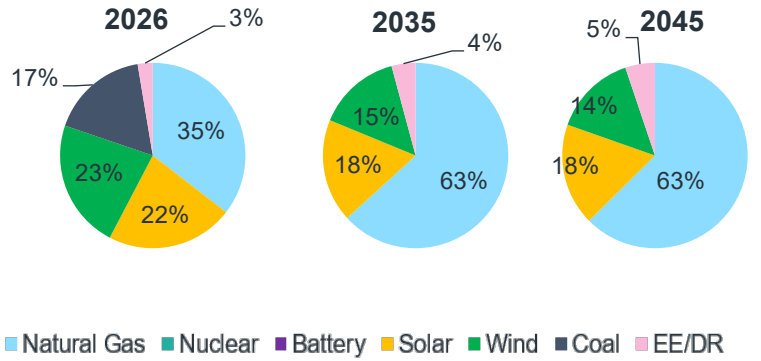
***Model Selections***

*F.B. Culley 2 Do Nothing*
*A.B. Brown Start CCGT 01/01/2030*
*F.B. Culley 3 Start NG 01/01/2035*

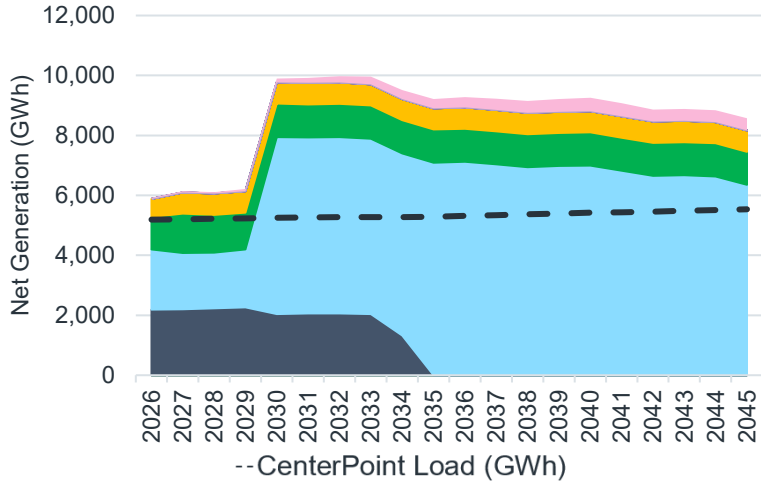
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 3 – FBC3 on Coal without ABB7

**Benefits**

- Provides rate stability - avoids near-term large capital investment before 2032
- Most diverse (widest variety) generation portfolio in the long-term
- Maintains jobs and tax base in Warrick County
- Maintains FBC3 interconnection (270MW)
- Maintains spinning mass both sides of system in the long term
- Consistent with state and federal near-term objectives to maintain coal

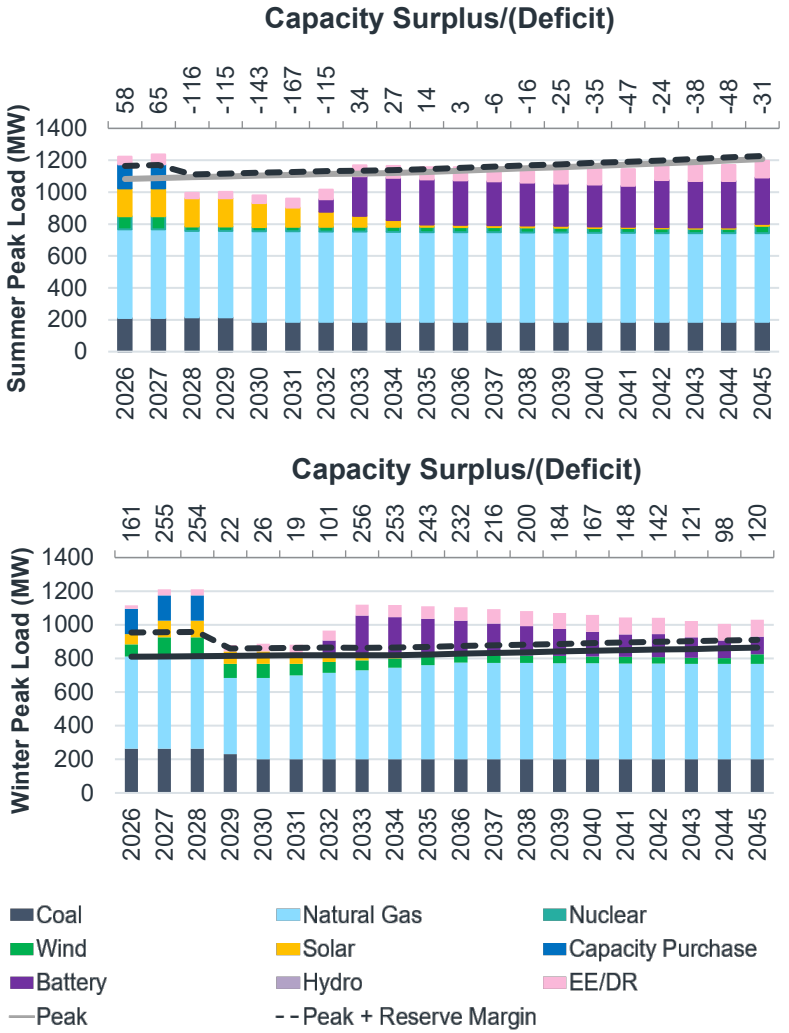
**Challenges**

- Long-term affordability. Higher cost and cost risk
- Environmental Challenges
  - Highest environmental emissions
  - Highly exposed to future regulatory risk
  - Customers' long term health concerns
- Investor risk (contains coal in the long run)
- Loss of FBC2 interconnection (90MW) – future cost risk

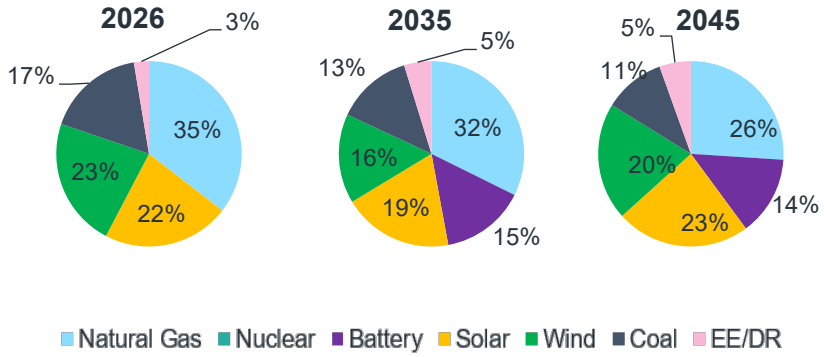
***Model Selections***

*F.B. Culley 2 Do Nothing*
*A.B. Brown 5/6 Continue*
*F.B. Culley 3 Continue on Coal*
*3x 100 MW Storage*
*1x 50 MW Storage*
*2x Non IRA Solar PV*
*1x Non IRA Wind*

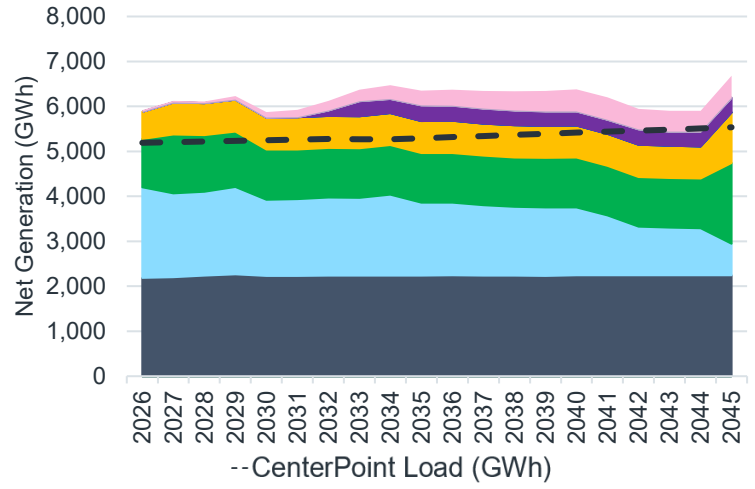
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 4 – FBC3 on Coal to SMR

**Benefits**

- Meets state and federal desire for nuclear energy
- Adds some jobs and tax base in Posey County. Maintain some jobs from F.B. Culley 3 closure
- Maintains spinning mass both sides of system in the near term
- Maintains 270MW interconnection (FBC3) in near-term

**Challenges**

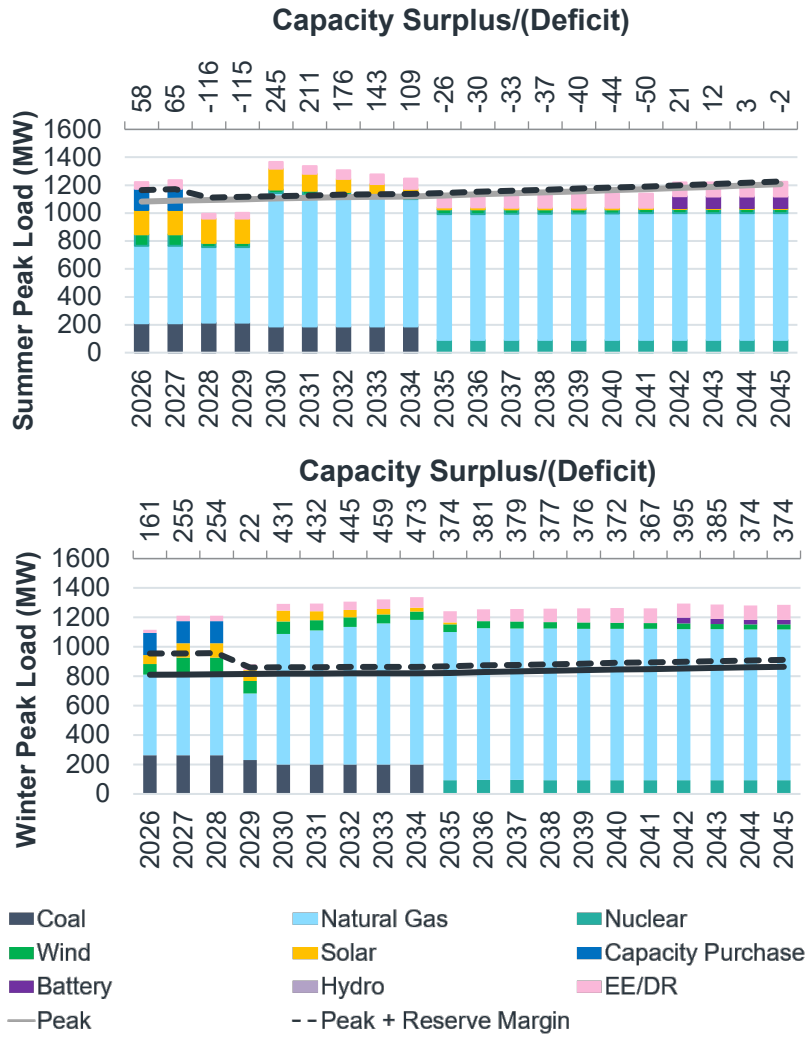
- Highest cost portfolio in the long run
- Long term cost risk – unproven technology
- Less flexible to adapt to regulatory & market conditions
  - EPA policies – Greenhouse Gas
  - MISO accreditation reform
- Fuel costs
- Large near-term capital investment on conversion (ABB7) necessitates a near-term rate increase
- Loss of jobs and tax base in Warrick County in 2035
- Loss of FBC2 interconnection (90MW) – future cost risk
- Energy and capacity sales revenue risk
- Increased demand for HRSGs, near term price risk

***Model Selections***

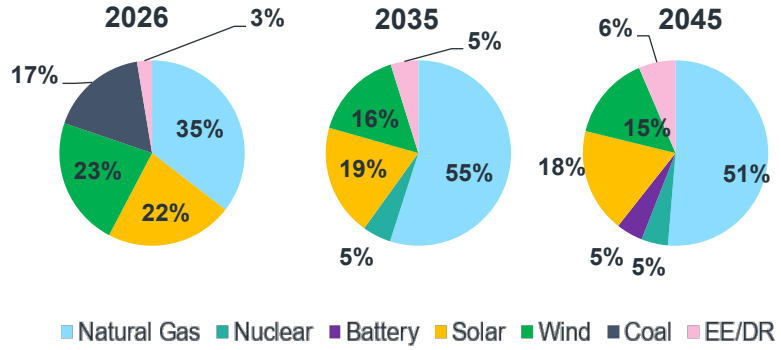
*F.B. Culley 2 Do Nothing*
*A.B. Brown Start CCGT 01/01/2030*
*F.B. Culley 3 Retire 12/31/2034*

*1x 100 MW Nuclear - SMR*
*1x 100 MW Storage*

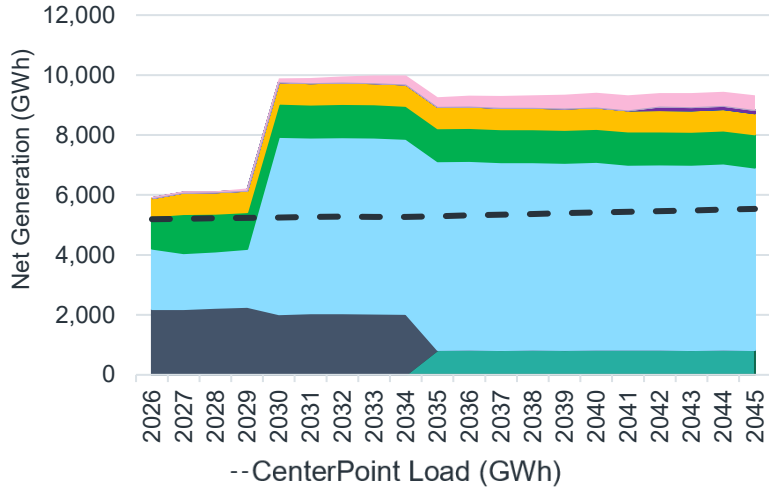
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 5 – FBC3 to Simple Cycle Gas Turbine

**Benefits**

- Less reliant on energy purchases and sales from the market
- Allows for continued reliance on renewables in the long-run
- Flexible. Allows time to adapt to regulatory & market conditions
  - EPA policies – Greenhouse Gas
  - MISO accreditation reform
  - State/Federal coal policies
- Limited/minimum near-term capital investment with relatively low near-term energy burden
- Maintains spinning mass both sides of system in the near term
- Maintains 270MW interconnection (FBC3) in near-term

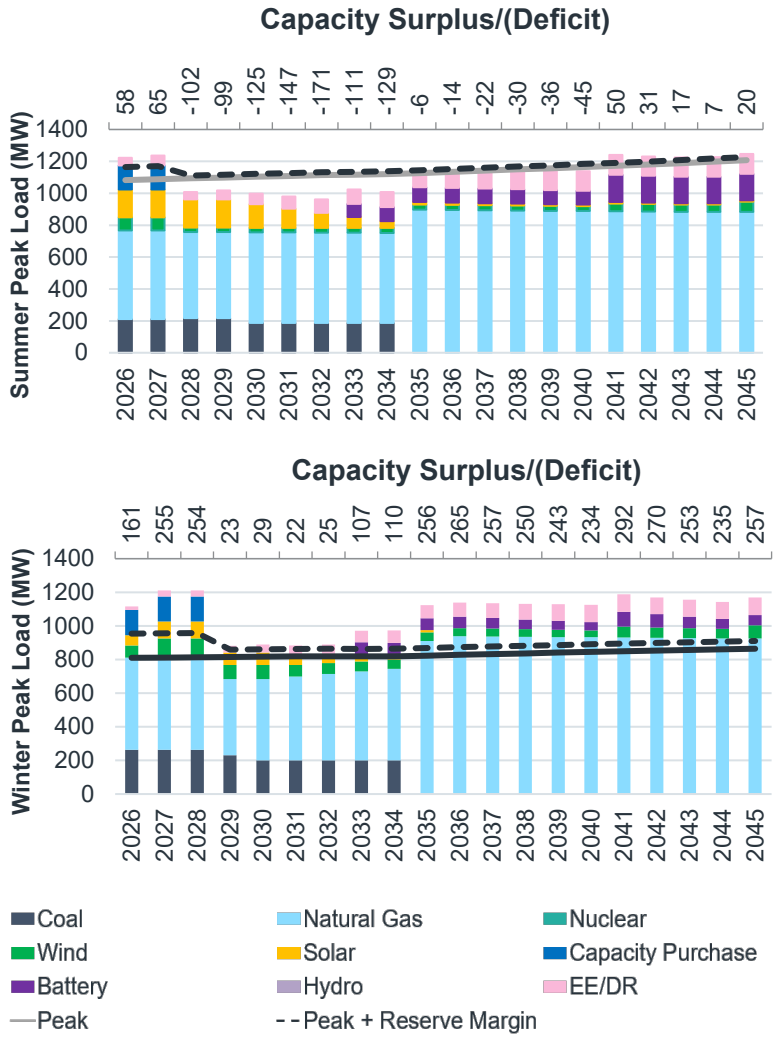
**Challenges**

- High-cost portfolio in the long run
- High long term cost risk
- Low spinning mass both sides of system by 2035
- Less diverse (multiple gas CTs)
- Relatively high long term energy burden
- Availability of gas capacity in 2035 is a risk
- Potential for gas pipeline regulatory risk (siting dependent)
- Loss of FBC2 interconnection (90MW) – future cost risk
- Fuel costs

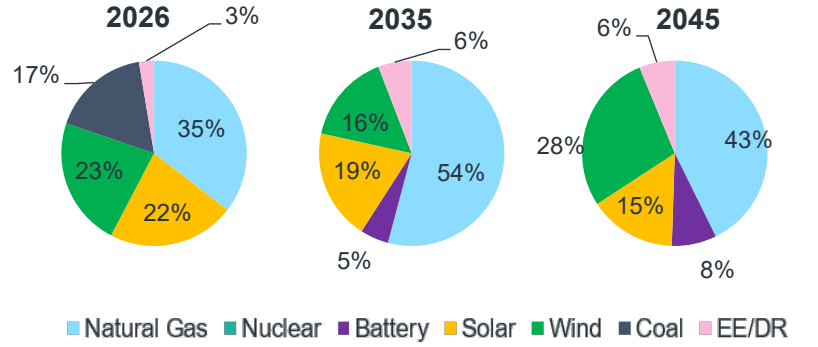
***Model Selections***

*F.B. Culley 2 Do Nothing*
*A.B. Brown 5/6 Continue*
*F.B. Culley 3 Retire 12/31/2034*
*1x 100 MW Storage*
*1x J Class SCGT*
*1x Non IRA Wind + Storage*
*1x Non IRA Wind*

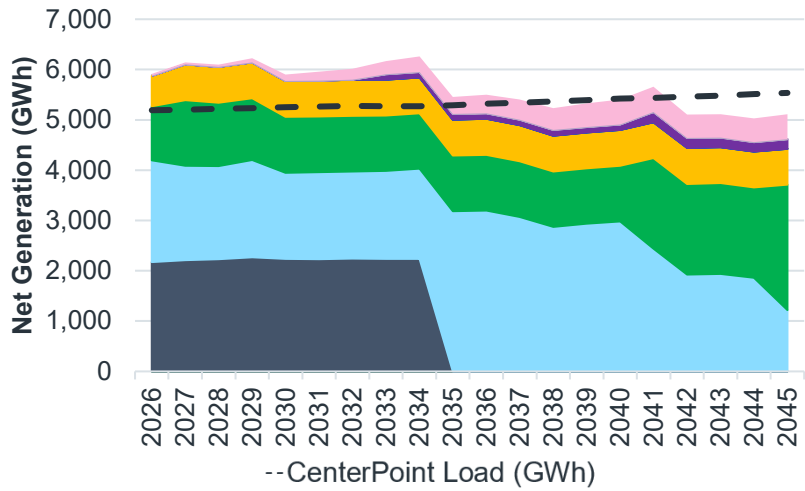
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 6 – Renewable Heavy Portfolio

**Benefits**

- Limited/minimum near-term capital investment until 2032 with low near-term energy burden due to tax incentives
- Environmentally friendly (CO2 emissions)
- Relatively low energy and capacity sales revenue risk
- Less fuel risk
- Less regulatory compliance risk
- Relatively high fast start capability (batteries)

**Challenges**

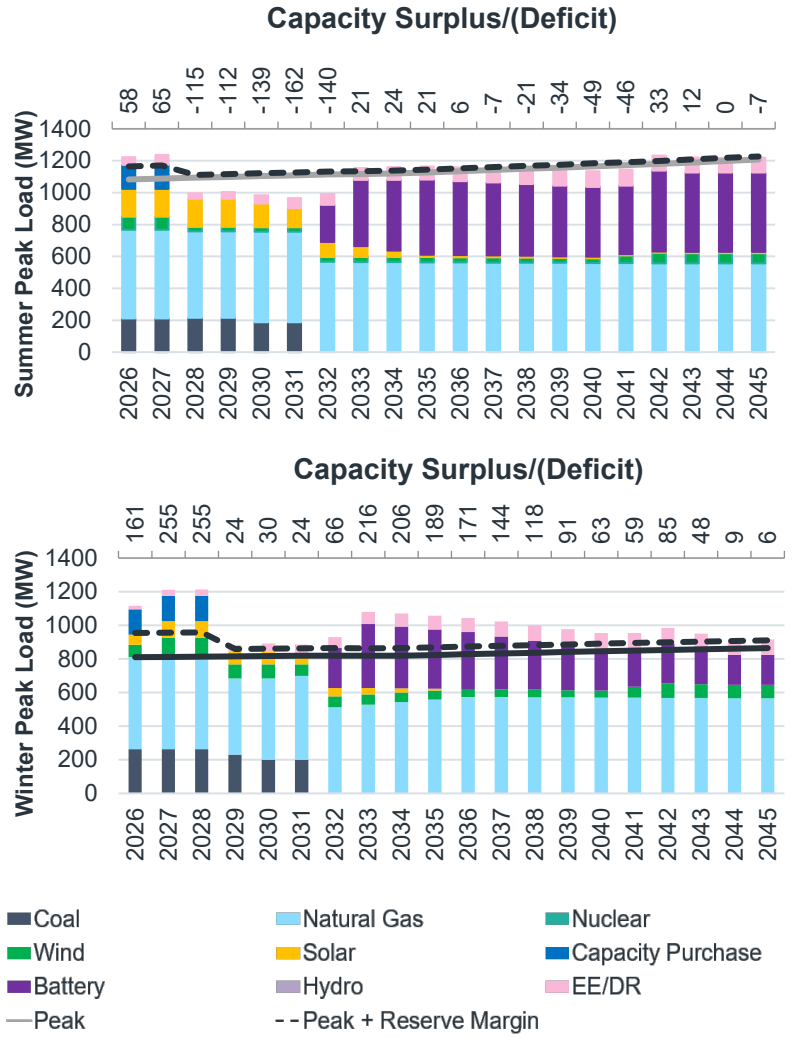
- Much less affordable:
  - High cost and cost risk portfolio in the long run
  - High energy burden in the long run
- Less flexible to adapt to regulatory & market conditions
  - MISO accreditation reform
  - State/ Federal coal policies
- Heavily reliant on energy market purchases
- Loss of spinning mass on East side of system
- More reliant on near term capacity purchases
- Loss of jobs and tax base in Warrick County in 2032
- Execution risk (500 MWs of storage between 2032-2033)
- Includes 300 MWs of additional wind in the long term (likely out of state) – local clearing requirement and congestion risk
- Loss of FBC3 interconnection (270MW)– future cost risk
- Loss of FBC2 interconnection (90MW) – future cost risk
- Limiting economic development opportunities (with loss of FBC3)

***Model Selections***

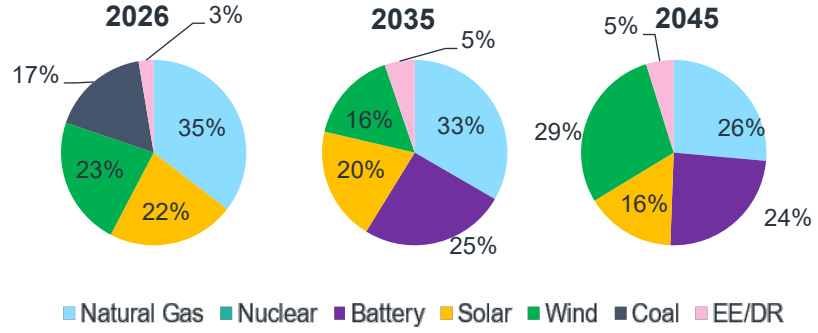
*F.B. Culley 2 Do Nothing*
*A.B. Brown 5/6 Continue*
*F.B. Culley 3 Retire 12/31/2031*

*5x 100 MW Storage*
*1x Non IRA Wind*
*1x Non IRA Wind + Storage*

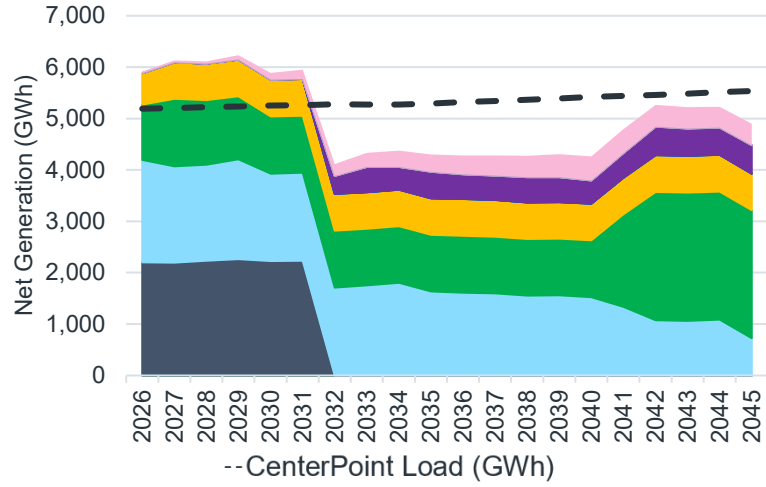
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 7 – FBC3 NG with Renewables

**Benefits**

- Diverse generation portfolio
- Environmentally friendly (CO2 emissions)
- Maintains jobs and tax base in Warrick County in the long run
- Maintains FBC3 interconnection (270MW) – lowers future cost risk
- Maintains spinning mass on east side of system in the long run
- Less regulatory compliance risk

**Challenges**

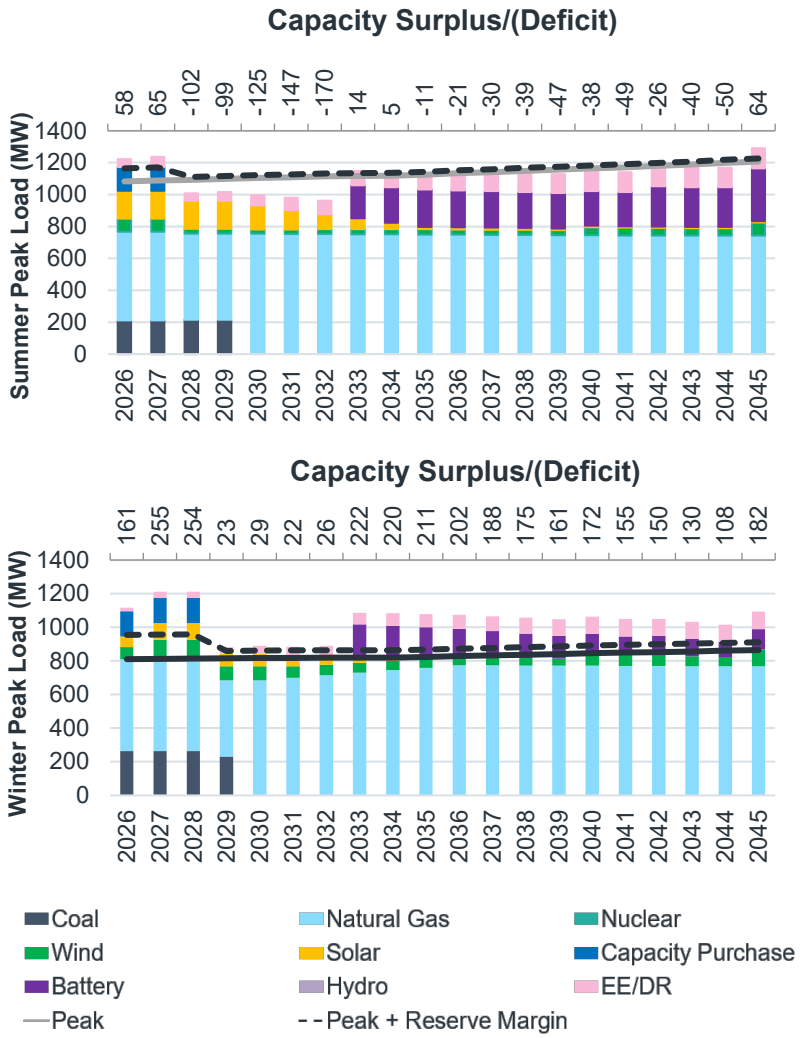
- High-cost portfolio in the long run
- High long term cost risk
- High energy burden in the near and long run
- Less flexible to adapt to regulatory & market conditions
  - MISO accreditation reform
  - State/ Federal coal policies
- Relatively high NOx emissions
- Loss of FBC2 interconnection (90MW) – future cost risk
- Limiting economic development opportunities (with early conversion of FBC3)

***Model Selections***

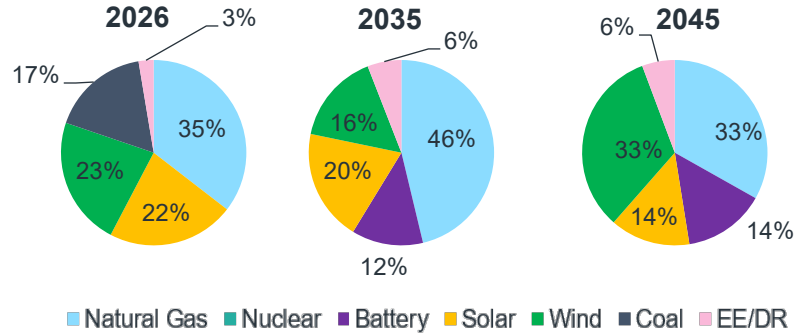
*F.B. Culley 2 Do Nothing*
*A.B. Brown 5/6 Continue*
*F.B. Culley 3 Start NG 01/01/2030*

*3x 100 MW Storage*
*2x 50 MW Storage*
*3x Non IRA Wind*

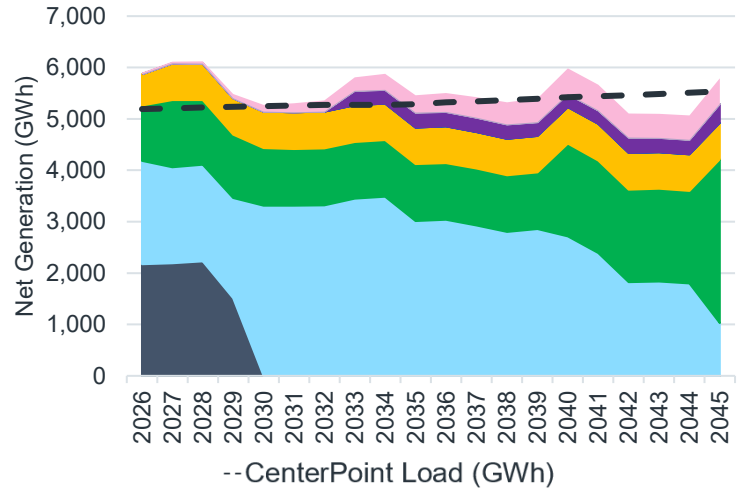
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 8 – Low Reg Approach

**Benefits**

- Long-term affordability. Among lowest cost and cost risk
- Relatively environmentally friendly (highly efficient generation with relatively low SOx and NOx emissions)
- Adds tax base in Posey and Warrick Counties
- Allows for near term economic development opportunities with early excess capacity
- Maintains FBC2 interconnection (90MW) – avoids future cost risk and provides reliability to the system

**Challenges**

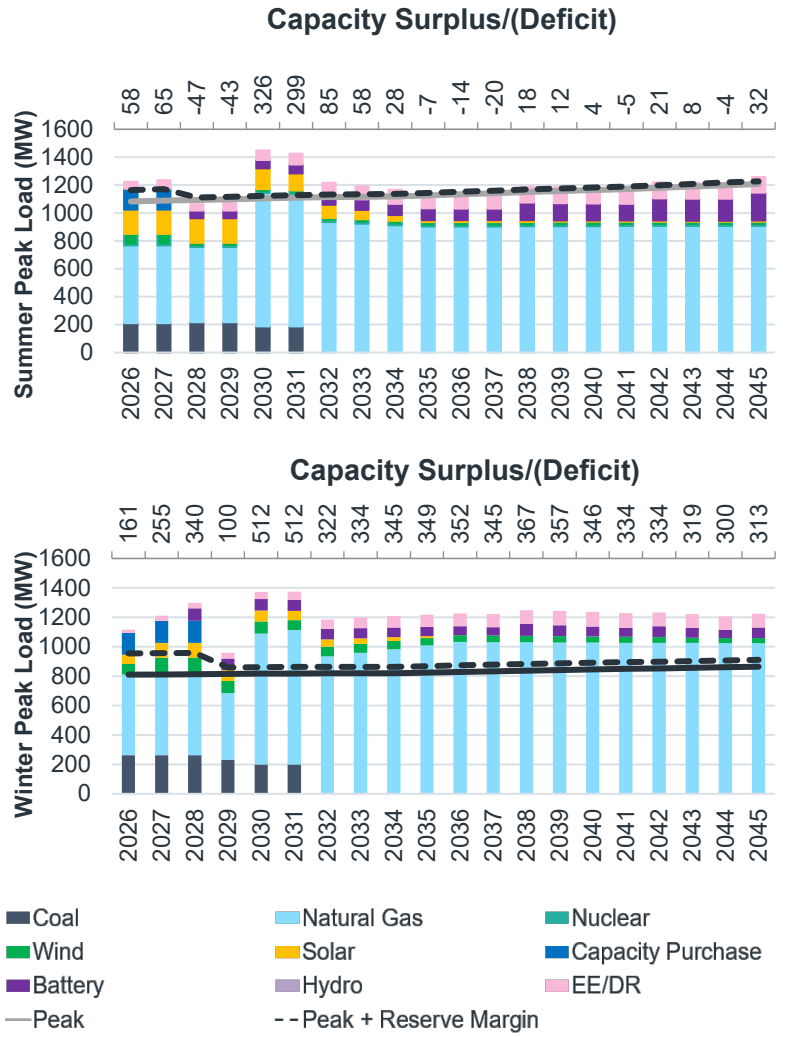
- Less flexible to adapt to regulatory & market conditions
  - EPA policies – Greenhouse Gas
  - MISO accreditation reform
  - State/Federal coal policies
- Fuel costs
- Limiting long-term economic development opportunities (with loss of FBC3)
- Near-term large capital investment on conversion (ABB7) necessitates a near-term rate increase
- Near-term loss of spinning mass on east side of system
- Loss of jobs in Warrick County in 2032
- Loss of FBC3 interconnection (270MW)– future cost risk
- Energy and capacity sales revenue risk
- Increased demand for HRSGs, near term price risk

***Model Selections***

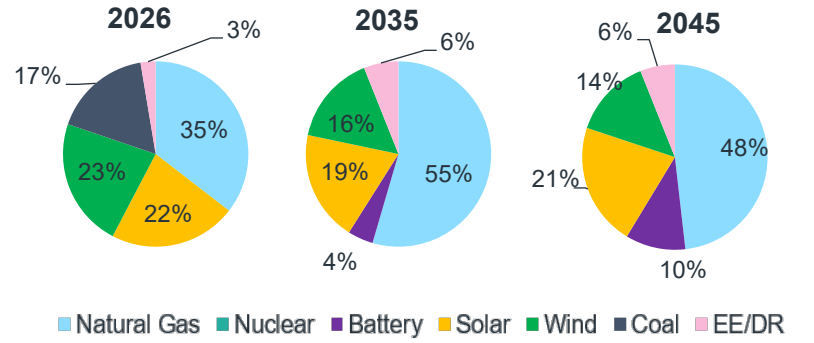
*F.B. Culley 2 Storage*
*A.B. Brown Start CCGT 01/01/2030*
*F.B. Culley 3 Retire 12/31/2031*

*2x 50 MW Storage*
*1x Non IRA Solar + Storage*

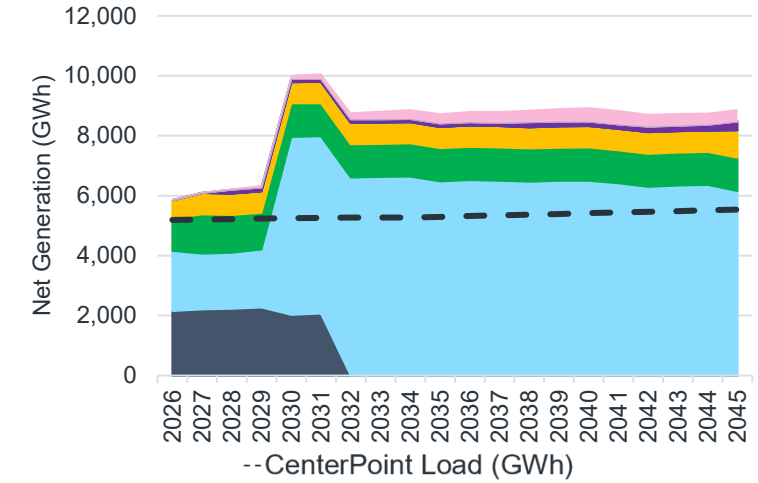
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 9 – High Reg Approach

**Benefits**

- Environmentally friendly (low CO2 emissions)
- Less reliant on energy and capacity sales
- Low fuel cost risk
- Less regulatory compliance risk
- Relatively high fast start capability (batteries)
- Well positioned for potential change in federal policy

**Challenges**

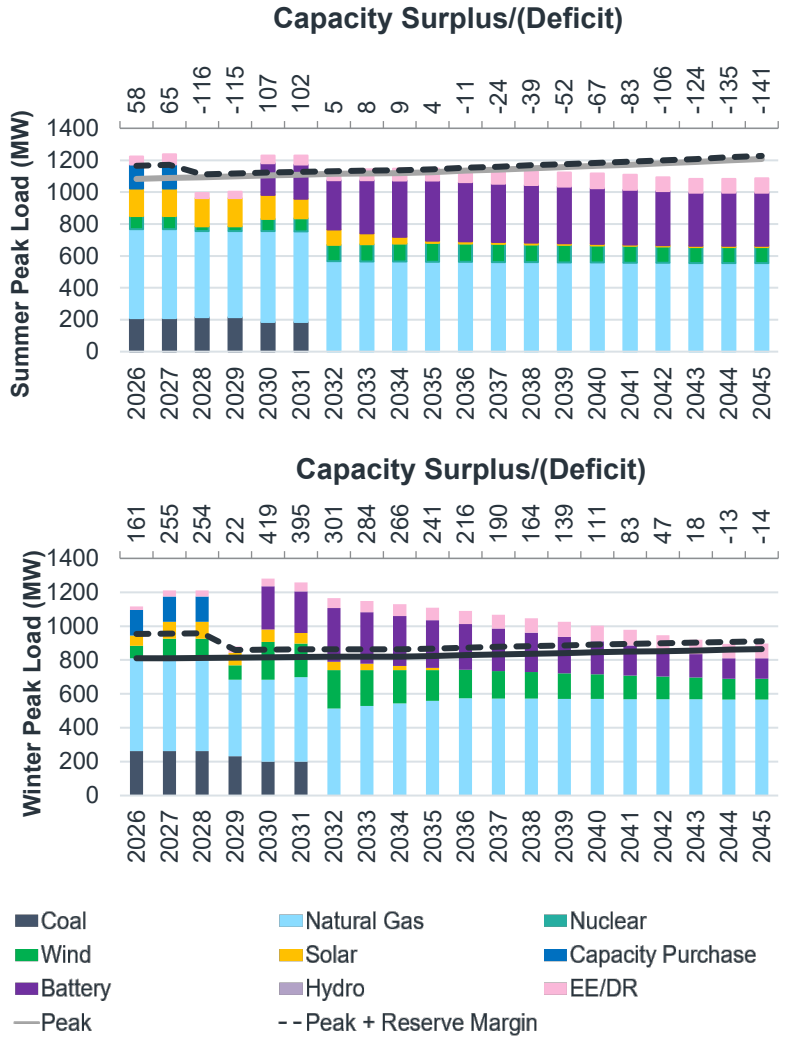
- Much less affordable:
  - High cost and cost risk portfolio in the long run
  - Among the highest energy burden in the near and long run
- Reliant on energy purchases
- Near-term loss of spinning mass on east side of system
- Loss of jobs and tax base in Warrick County
- Execution risk (800 MWs of wind + 400 MW of storage between 2032-2033)
- Includes 800 MWs of additional wind (likely out of state) – local clearing requirement and congestion risk
- Loss of FBC3 interconnection (270MW) – future cost risk
- Loss of FBC2 interconnection (90MW) – future cost risk
- Less flexible to adapt to regulatory & market conditions
  - MISO accreditation reform
  - State/Federal coal policies

***Model Selections***

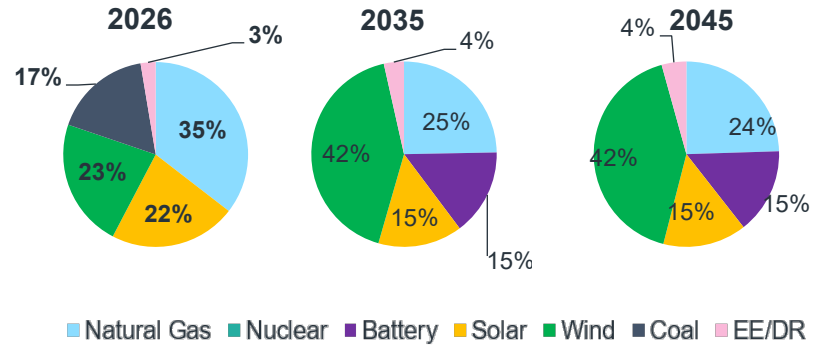
*F.B. Culley 2 Do Nothing*
*A.B. Brown 5/6 Continue*
*F.B. Culley 3 Retire 12/31/2031*

*4x Non IRA Wind + Storage*

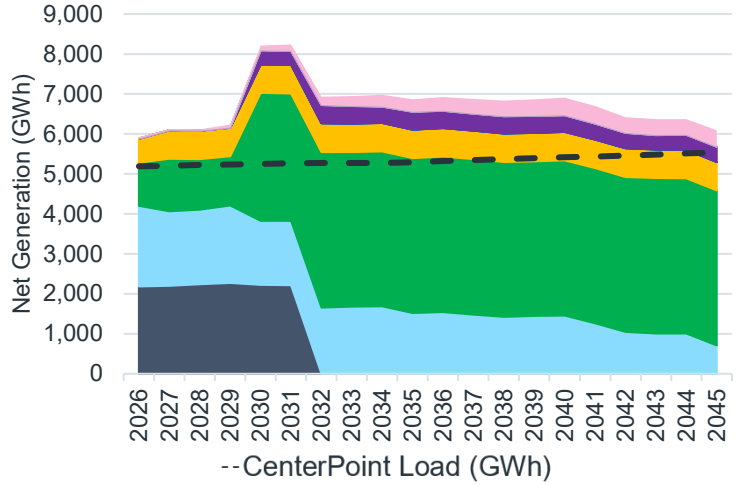
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 10 – Alt High Reg Approach

**Benefits**

- Flexible. Allows time to adapt to regulatory & market conditions
  - EPA policies – Greenhouse Gas
  - MISO accreditation reform
- Fuel costs
- Relatively environmentally friendly (highly efficient generation with relatively low CO2 and SOx emissions)
- Diverse generation portfolio
- Adds some jobs and tax base in Posey County in 2035
- Allows for economic development opportunities with excess capacity in the long run

**Challenges**

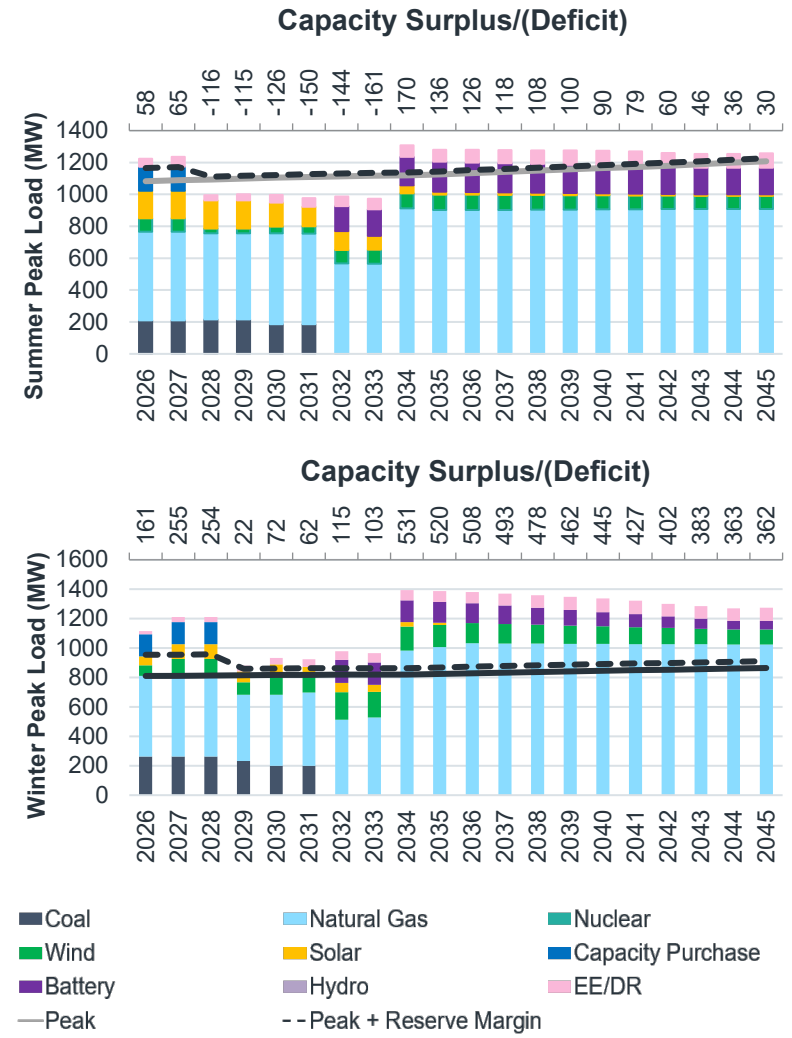
- Much less affordable:
  - High cost and cost risk portfolio in the long run
  - High energy burden in the long run
- Execution risk (wind, solar and battery in the near term)
- Loss of jobs and tax base in Warrick County
- Includes 600 MWs of additional wind (likely out of state) – local clearing requirement and congestion risk
- Near-term loss of spinning mass on east side of system
- More reliant on near term capacity purchases
- Limiting economic development opportunities in near-term (with loss of FBC3)
- Loss of FBC3 interconnection (270MW) – future cost risk
- Loss of FBC2 interconnection (90MW) – future cost risk
- Inconsistent with state and federal near-term objectives to maintain coal

***Model Selections***

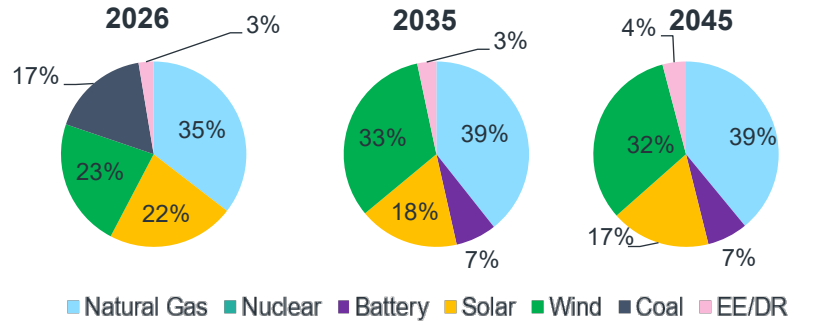
*F.B. Culley 2 Do Nothing*
*A.B. Brown Start CCGT 01/01/2034*
*F.B. Culley 3 Retire 12/31/2031*

*1x Non IRA Wind*
*1x Non IRA Solar*
*2x Non IRA Wind + Storage*

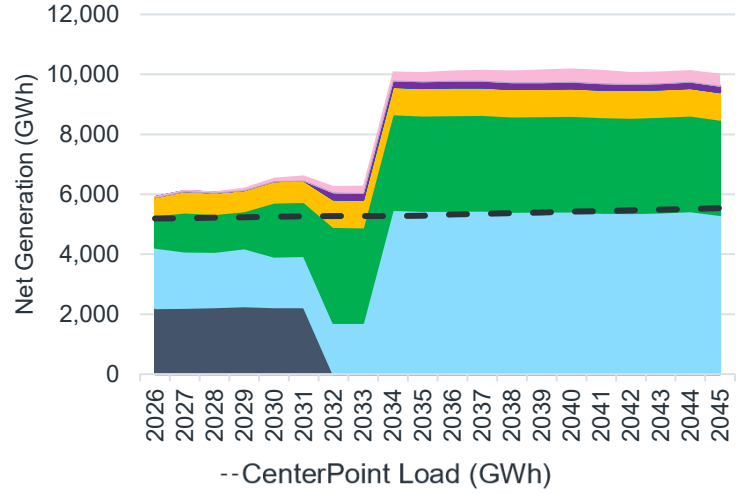
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 11 – FBC3 Co-Fire 2030

**Benefits**

- Relatively low-cost portfolio in the long run
- Relatively low long-term cost risk
- Allows for economic development opportunities with excess capacity and energy
- Consistent with State and Federal near-term objectives to maintain coal
- Maintains jobs and tax base in Warrick County
- Adds tax base and jobs in Posey County
- Slightly lower emissions
- Maintains FBC3 interconnection (270MW) – lowers future cost risk
- Maintains spinning mass on east side of system in the long term

**Challenges**

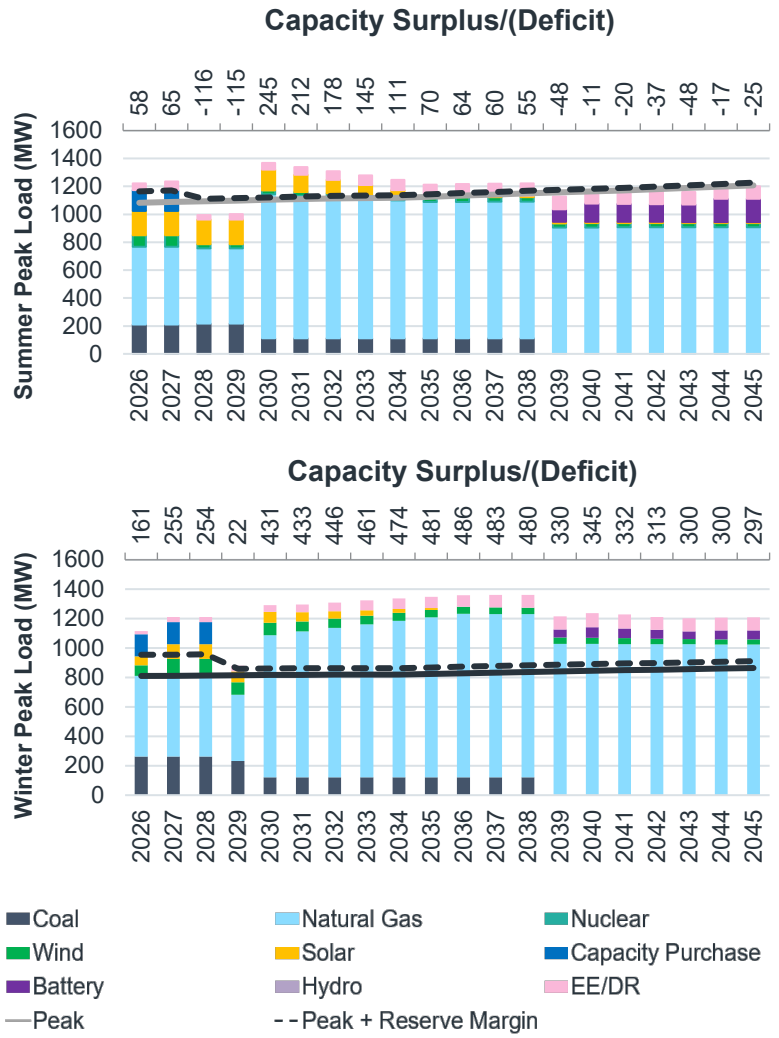
- Less flexible to adapt to regulatory & market conditions
  - EPA policies – Greenhouse Gas
- Fuel costs
- Near-term large capital investment on conversion (ABB7) necessitates a near-term rate increase
- Investor Risk (continues coal in long term)
- Environmental Challenges
  - Highly exposed to future regulatory risk
  - Customers' long tern health concerns
- Near-term execution risk with 2 significant projects
- Operations risk (hybrid fuel combustion)
- Loss of FBC2 interconnection (90MW) – future cost risk
- Energy and capacity sales revenue risk
- Increased demand for HRSGs, near term price risk

***Model Selections***

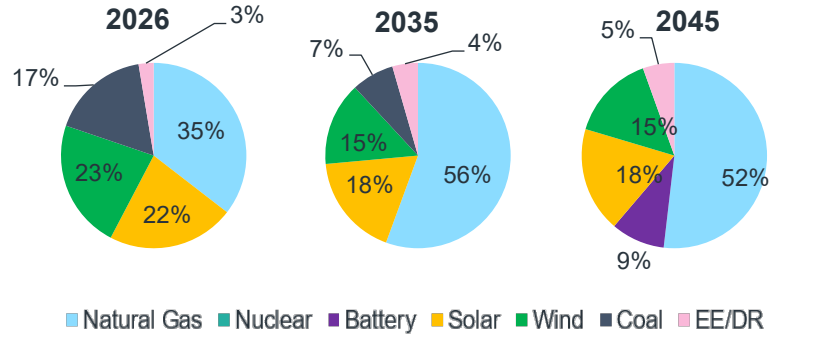
*F.B. Culley 2 Do Nothing*
*A.B. Brown Start CCGT 01/01/2030*
*F.B. Culley 3 Start Co-Fire 01/01/2030 & Retire 12/31/2038*

*4x 50 MW Storage*

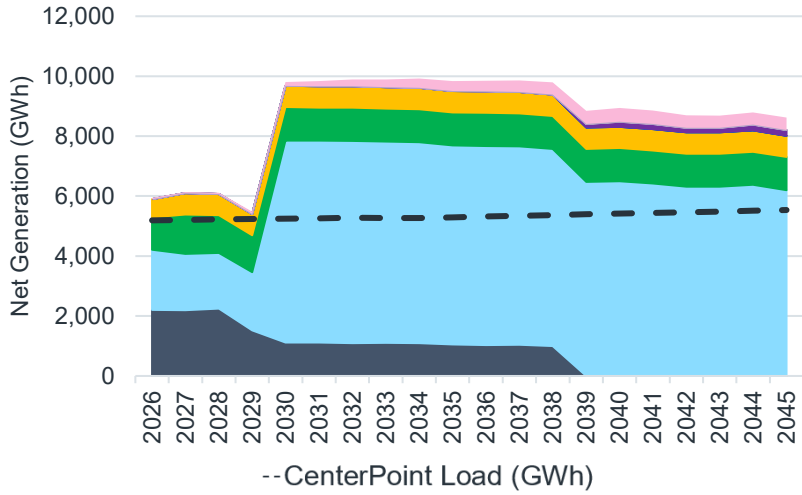
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# 12- Delayed Reference[1]

**Benefits**

- Allows time to reassess in next IRP and adapt to regulatory & market conditions
  - EPA policies – Greenhouse Gas
  - State/Federal coal policies
  - MISO accreditation reform
- Limited near-term capital investment with relatively low energy burden
- Maintains diverse gen portfolio in the near term
- Maintains tax base in Warrick County and jobs through 2035
- Maintains 270MW interconnection (FBC3) in near-term
- Maintains FBC2 interconnection (90MW) – avoids future cost risk and provides reliability to the system
- Maintains spinning mass both sides of system in the near term
- Allows for economic development opportunities
- Adds some jobs and tax base in Posey County in 2034

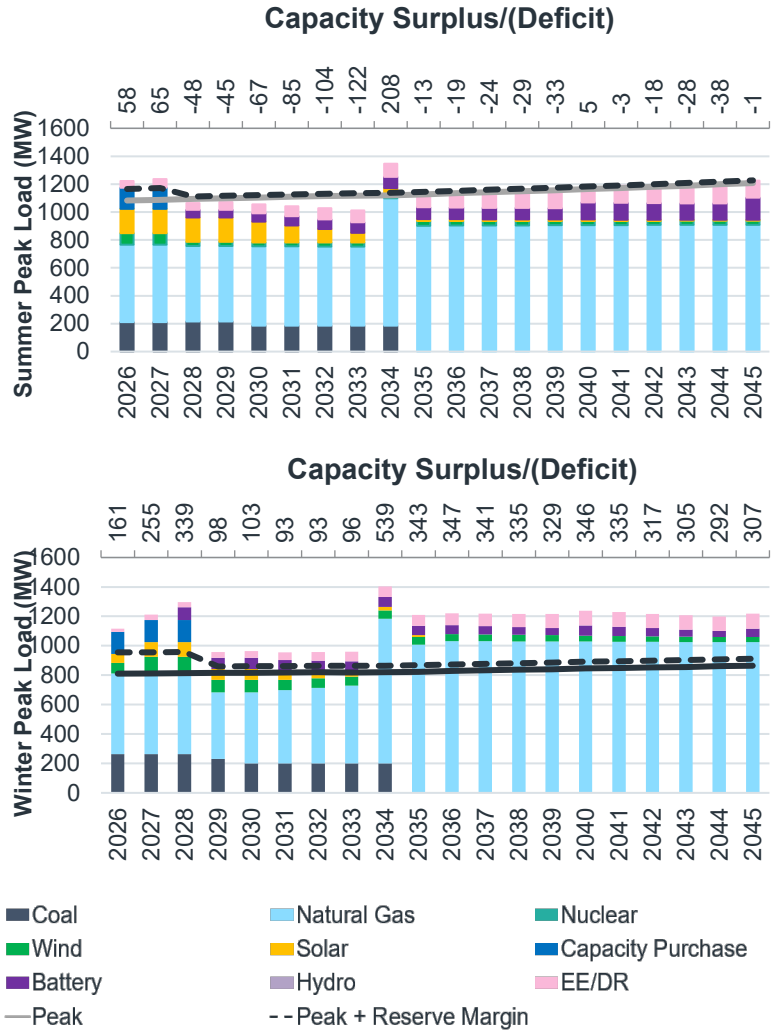
**Challenges**

- Uncertainty of availability of gas capacity in 2035
- Fuel costs in the long run

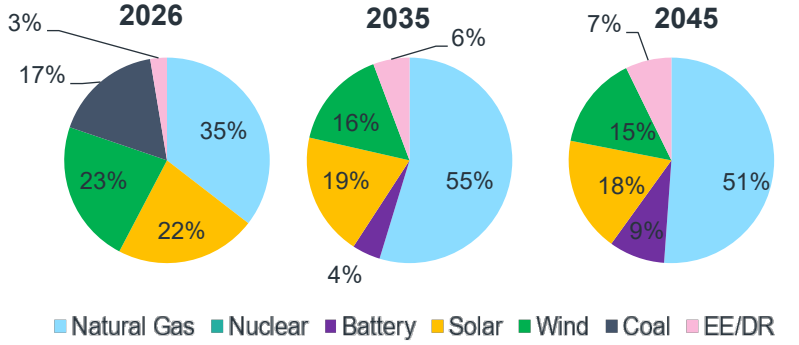
***Model Selections***

*F.B. Culley 2 Storage* — *2x 50 MW Storage*
*A.B. Brown Start CCGT 01/01/2034*
*F.B. Culley 3 Retire 12/31/2034*

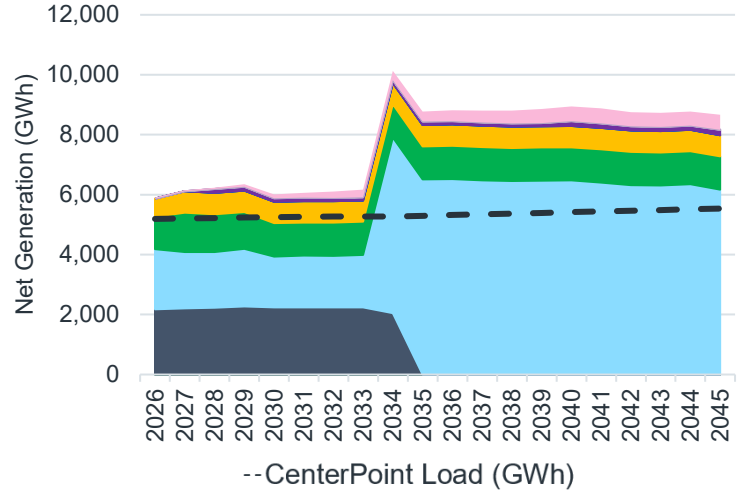
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)






[1] *CEI South chose portfolio 12 as the preferred portfolio. Beyond 2028, CNP will reassess generation resource selections in the next IRP.*

# Q&A

# CenterPoint Energy Indiana South Integrated Resource Plan

## Public Stakeholder Meeting 4

# Lunch – we will return at 12:15 CDT

# Risk Analysis Scorecard

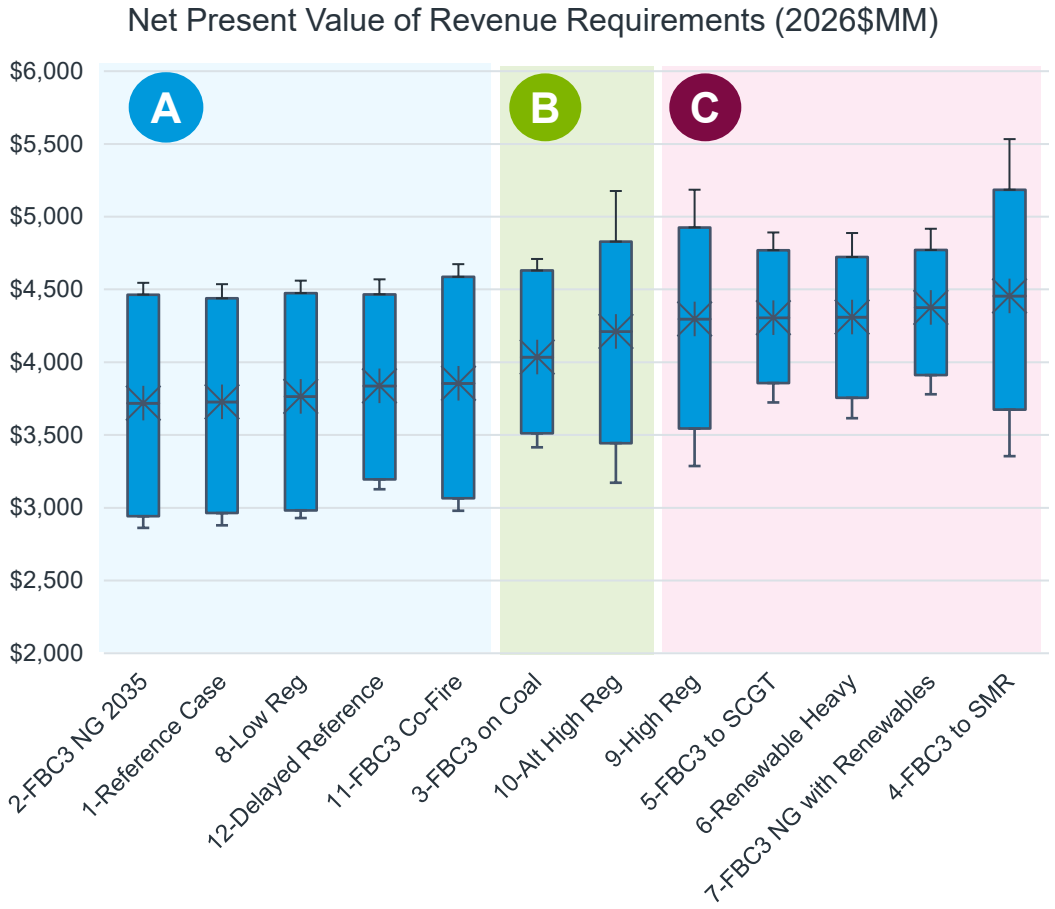
Drew Burczyk
Project Manager, Resource Planning & Market Assessments, 1898 & Co.

# Final Scorecard

| | Affordability | | | | | Environmental Sustainability | | | | Reliability/Resiliency/Stability | | | | | Risk/Other | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portfolio Description | 20 Year NPVRR ($M) | Delta From Reference (%) | 5% Value of NPVRR ($M) | 95% Value of NPVRR ($M) | Incremental Energy Burden (%) 2030 - 2035 | $CO_2$ Intensity (Tons $CO_2e$/MWh) | $CO_2$ Equivalent Emissions (Stack Emissions) (1000s Tons $CO_2e$) | SOx Emissions (Tons) | NOx Emissions (Tons) | Unserved Energy (MWh) | Spinning Reserve (MW) | Fast Start Capability (MW) | Transmission Reliability Analysis MVAR | Transmission Reliability Analysis SCR | Energy Market Sales (%) | Energy Market Purchases (%) | Capacity Sales NPV ($M) | Capacity Purchases NPV ($M) |
| 2-FBC3 NG 2035 | $3,718 | 0% | $2,941 | $4,464 | 0.13% - 0.22% | 0.368 | 48,696 | 18,017 | 13,091 | 119 | 1,031 | 253 | 753 | 3.5 | 26% | 9% | $217 | $6 |
| 1-Reference Case | $3,726 | 0% | $2,963 | $4,439 | 0.11% - 0.25% | 0.346 | 44,302 | 12,877 | 10,650 | 61 | 842 | 340 | 665 | 3.5 | 26% | 10% | $140 | $14 |
| 8-Low Reg | $3,764 | 1% | $2,983 | $4,475 | 0.15% - 0.20% | 0.345 | 44,199 | 12,908 | 10,582 | 49 | 842 | 366 | 665 | 3.5 | 26% | 10% | $167 | $6 |
| 12-Delayed Reference | $3,836 | 3% | $3,195 | $4,467 | 0.16% - 0.26% | 0.391 | 46,535 | 21,885 | 14,539 | 56 | 701 | 444 | 665 | 3.5 | 23% | 12% | $115 | $18 |
| 11-FBC3 Co-Fire | $3,854 | 3% | $3,064 | $4,587 | 0.18% - 0.17% | 0.354 | 46,317 | 14,397 | 11,812 | 61 | 937 | 308 | 753 | 3.5 | 26% | 10% | $192 | $12 |
| 3-FBC3 on Coal | $4,034 | 8% | $3,511 | $4,630 | 0.03% - 0.29% | 0.522 | 53,636 | 51,793 | 25,931 | 43 | 302 | 835 | 626 | 3.5 | 15% | 19% | $117 | $22 |
| 10-Alt High Reg | $4,211 | 13% | $3,444 | $4,829 | 0.17% - 0.48% | 0.280 | 34,415 | 14,226 | 10,985 | 29 | 660 | 486 | 665 | 3.5 | 25% | 9% | $159 | $19 |
| 9-High Reg | $4,297 | 15% | $3,543 | $4,926 | 0.43% - 0.44% | 0.234 | 25,913 | 13,701 | 12,322 | 15 | 113 | 935 | 605 | 3.5 | 20% | 14% | $128 | $23 |
| 5-FBC3 to SCGT | $4,306 | 16% | $3,857 | $4,770 | 0.14% - 0.59% | 0.408 | 41,016 | 22,763 | 16,698 | 73 | 154 | 955 | 665 | 3.5 | 14% | 21% | $93 | $26 |
| 6-Renewable Heavy | $4,309 | 16% | $3,756 | $4,723 | 0.10% - 0.62% | 0.329 | 28,966 | 14,385 | 14,597 | 38 | 113 | 985 | 605 | 3.5 | 11% | 30% | $95 | $22 |
| 7-FBC3 NG with Renewables | $4,375 | 17% | $3,912 | $4,771 | 0.26% - 0.49% | 0.357 | 34,642 | 8,289 | 18,780 | 76 | 302 | 802 | 626 | 3.5 | 14% | 23% | $106 | $24 |
| 4-FBC3 to SMR | $4,456 | 20% | $3,674 | $5,185 | 0.15% - 0.76% | 0.342 | 45,224 | 18,653 | 11,950 | 52 | 938 | 273 | 665 | 3.5 | 26% | 9% | $171 | $13 |

*The color coding represents the relative ranking between the portfolios*

# Affordability
## *Net Present Value of Revenue Requirements (NPVRR)*



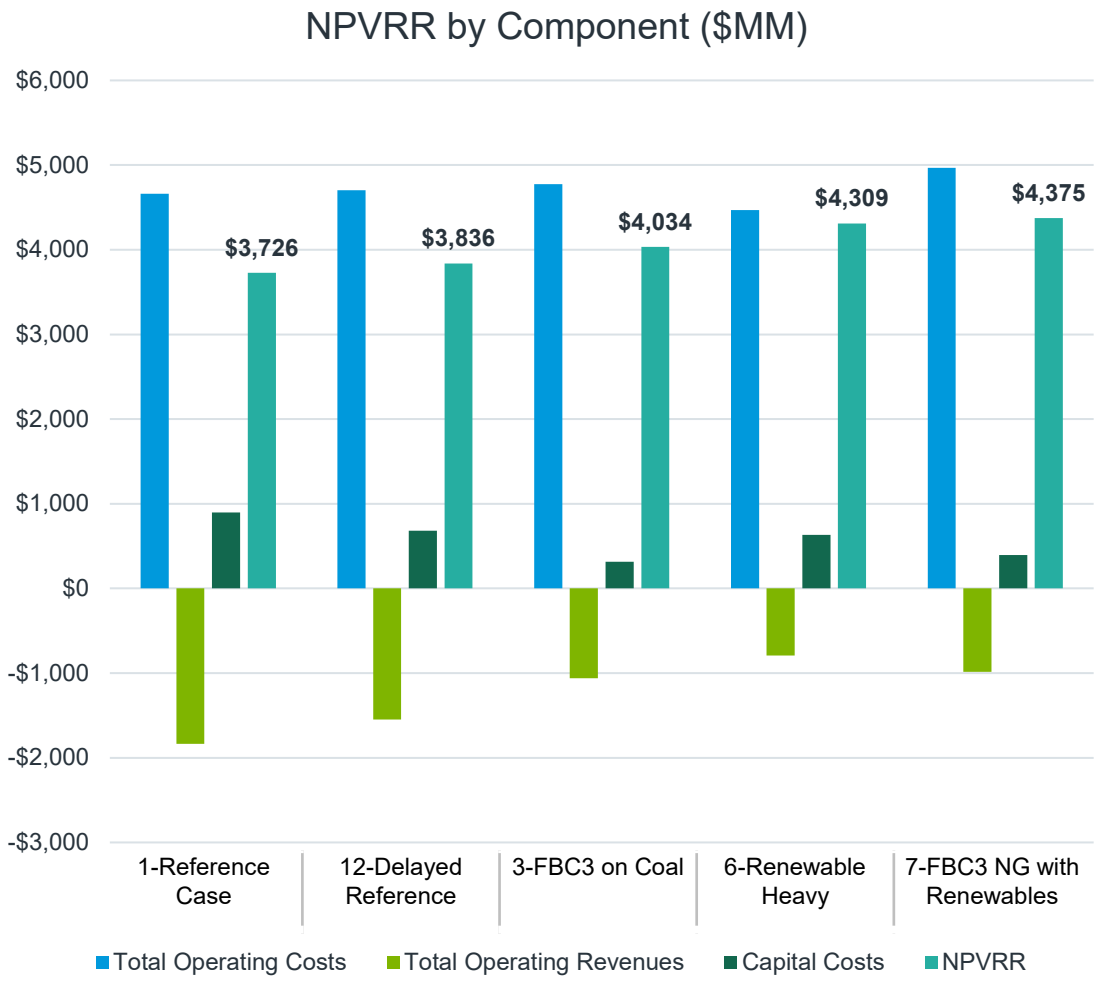

**A. Within 5% of lowest average NPVRR**

**B. Within 15% of lowest average NPVRR**

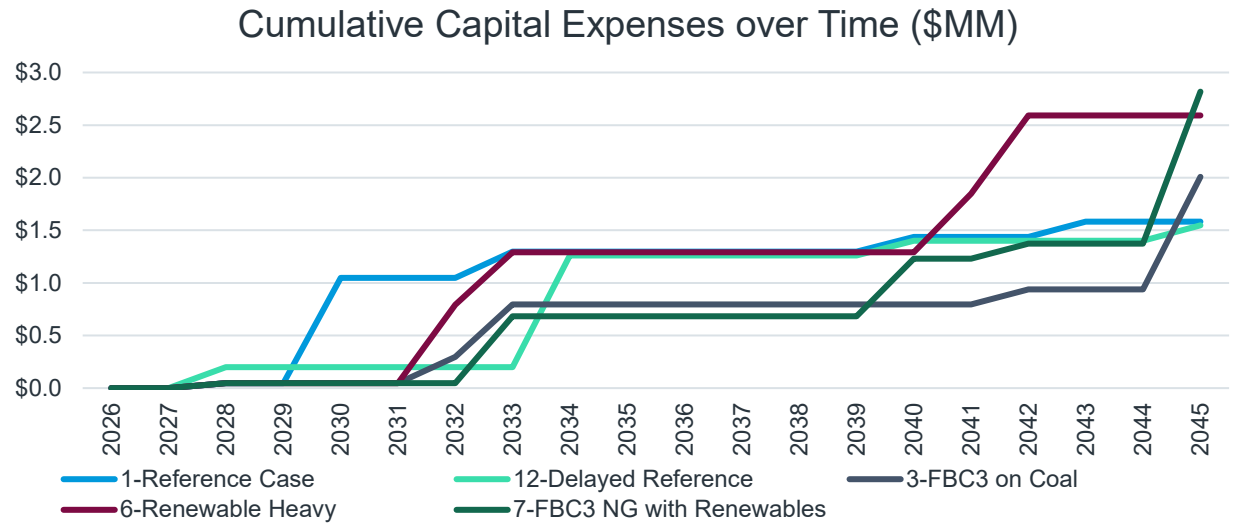
**C. Within 20% of lowest average NPVRR**

- Portfolios including the A.B. Brown conversion to a CCGT generally have a lower average portfolio NPV
- The distribution of NPVRR outcomes (5th and 95th percentiles) illustrates the range of NPVs derived from 200 stochastic simulations
- Factors such as capital cost, fuel cost, $CO_2$ tax, and market purchases or sales influence the variability in portfolio NPV results examined through the risk analysis
- While all portfolios are evaluated, portfolios (1, 3, 6, 7, 12) selected from each NPVRR category (A, B, and C) will be presented for data visualization on the following slides.
- The Preferred Portfolio average NPV is within 3% of the least cost portfolio, while relying less on market sales and capacity revenues than other group A portfolios.

# Affordability
## *Revenue Requirements Components*

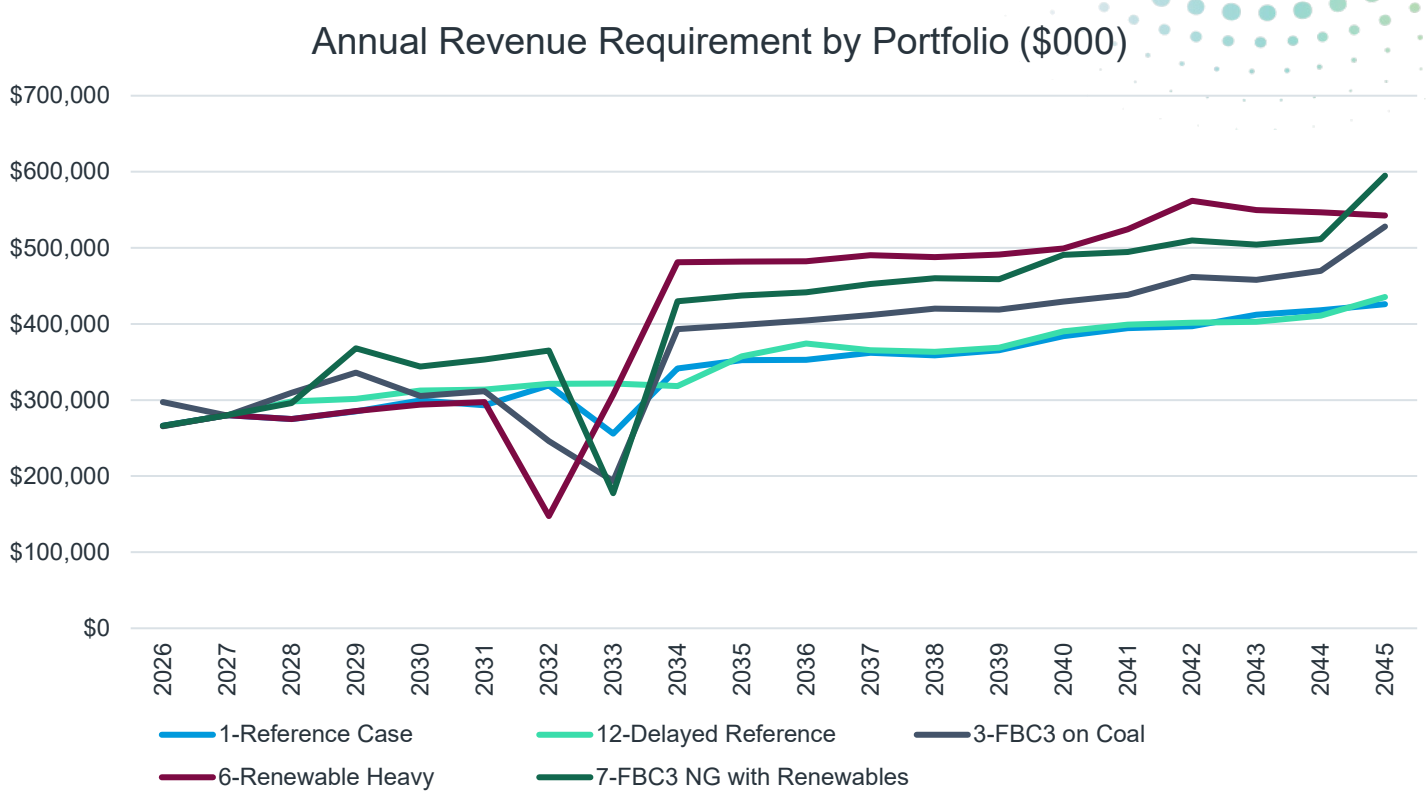



- Timing and magnitude of capital investment vary across portfolios and contribute to the NPVRR ranking of portfolios.
- Operating revenues, associated largely with market energy sales, lower the NPVRR for portfolios with the A.B. Brown conversion to a CCGT.
- Delaying the capital spend in Portfolio 12 leads to an NPV that is ~$200MM less than Reference Case Portfolio



# Affordability
## *Annual Revenue Requirements by Portfolio*

- Revenue Requirements are the sum of the total operating and capital costs minus operating revenues
- Dips in 2032 and 2033 are indicative of investment tax credit (ITC) benefits from adding storage resources to the system
- Portfolio 3, which includes FB Culley 3 on coal, has a slightly higher 2026 revenue requirement due to environmental upgrades.



# Affordability
## *Incremental Electric Energy Burden*

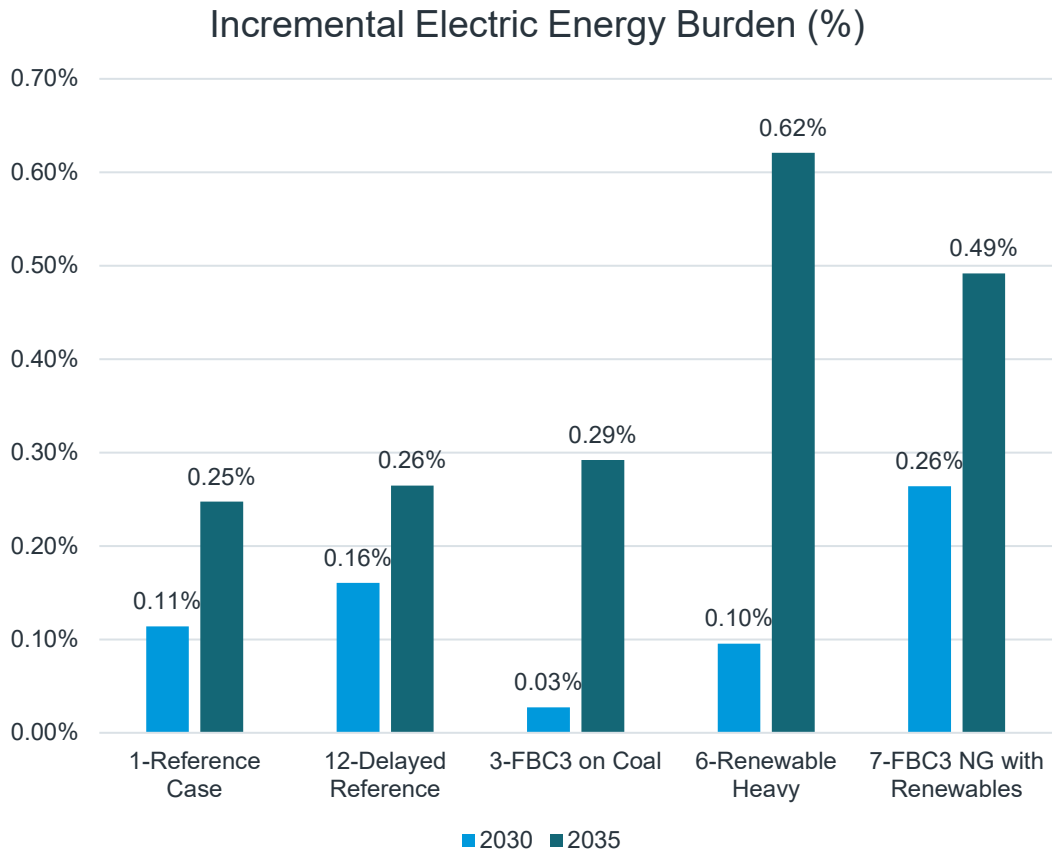
- Electric energy burden measures the affordability of increases in energy prices when compared to median household income of Vanderburgh County

**Incremental Electric Energy Burden Approach**

$$\frac{\left[\text{Expected annual energy bill for a given year}\right] - \left[\text{Expected annual energy bill for 2026}\right]}{\text{Projected Median Household Income for Vanderburgh County for a given year}}$$

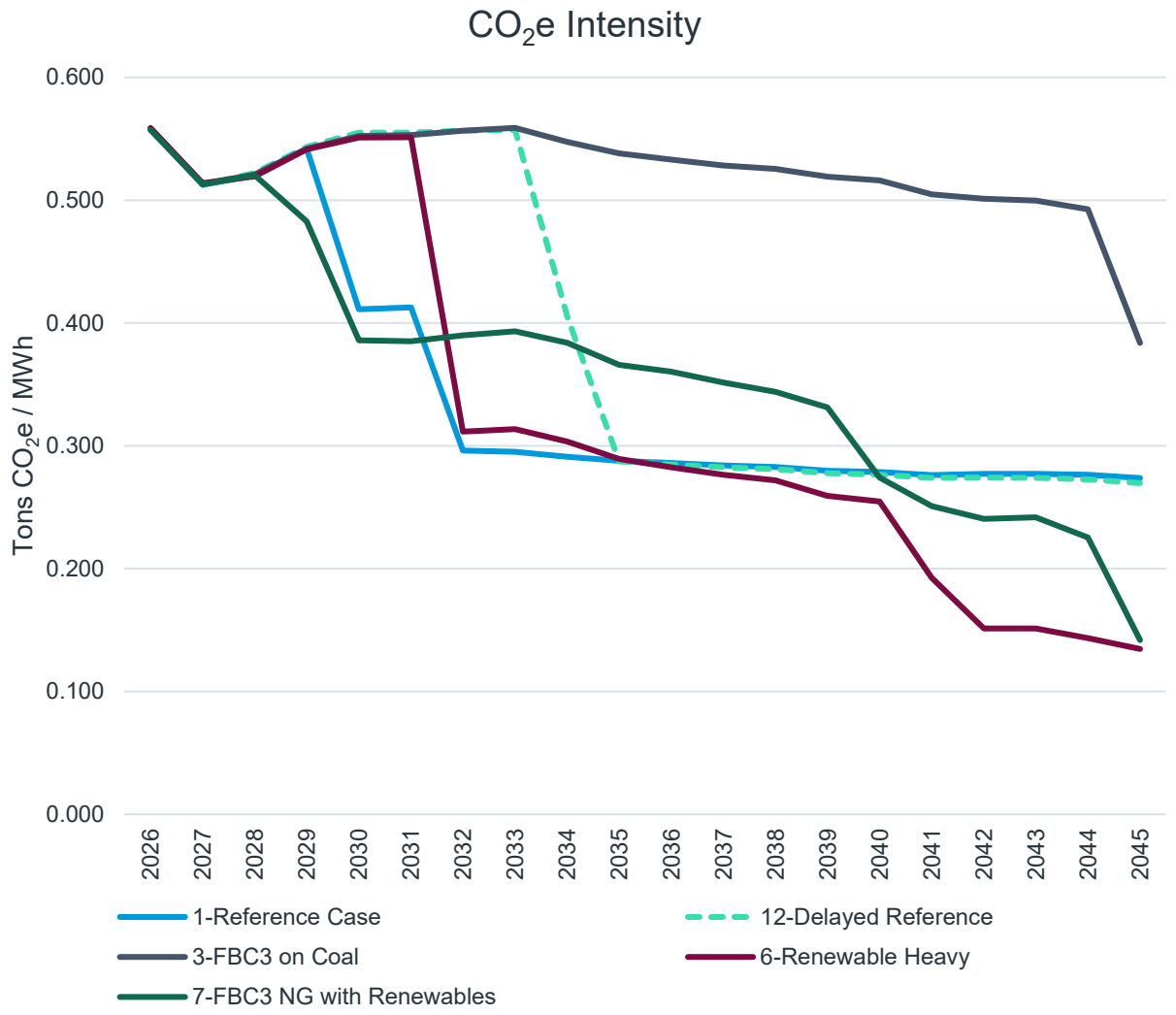
# Affordability
## *Incremental Electric Energy Burden*

- Portfolios that convert A.B. Brown 7 to a CCGT frequently have the lowest average increase in electric energy burden over both 5- and 10-year periods
- Postponing the capital expenditure for A.B. Brown 7 in the Preferred Portfolio results in lower near-term capital investment compared to the Reference Case, reducing the risk of short-term cost increases while still balancing long-term affordability
- The inclusion of 2026 environmental investments in Portfolio 3 leads to a higher initial reference point for calculating incremental energy burden compared to other portfolios



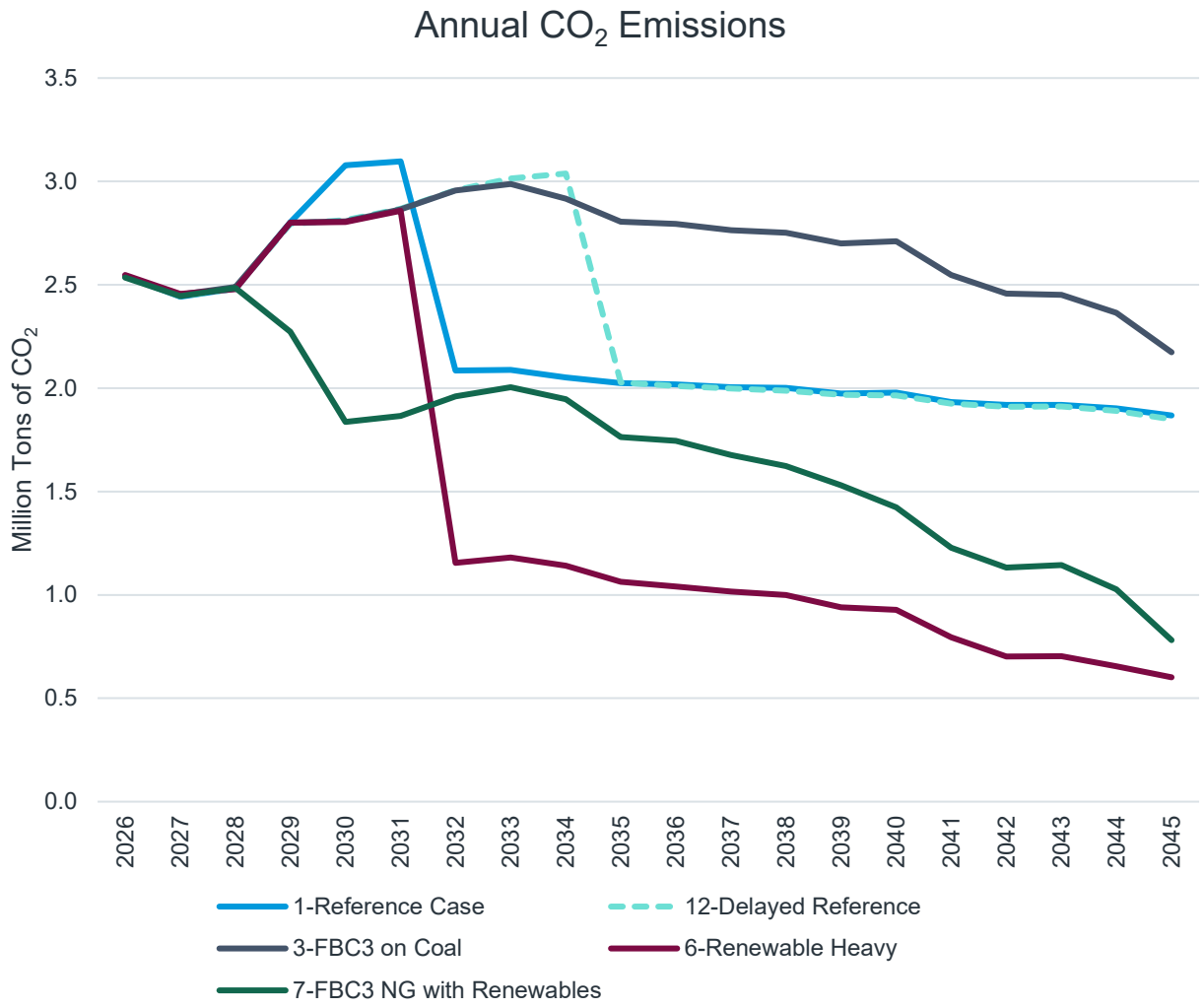
# Sustainability
## *$CO_2e$ Emission Intensity*

- $CO_2$ intensity is a measure of the emissions produced by a portfolio divided by the MWh of the energy produced
- Every portfolio shows a decline in $CO_2e$ intensity over time
- The shutdown or conversion of F.B. Culley 3 in 2030-2035 results in a reduction in emissions intensity for those respective portfolios
- All portfolios, except for Portfolio 3, show a large reduction from 2026 throughout the second half of the study period



# Sustainability
## *$CO_2$ Total Emissions*

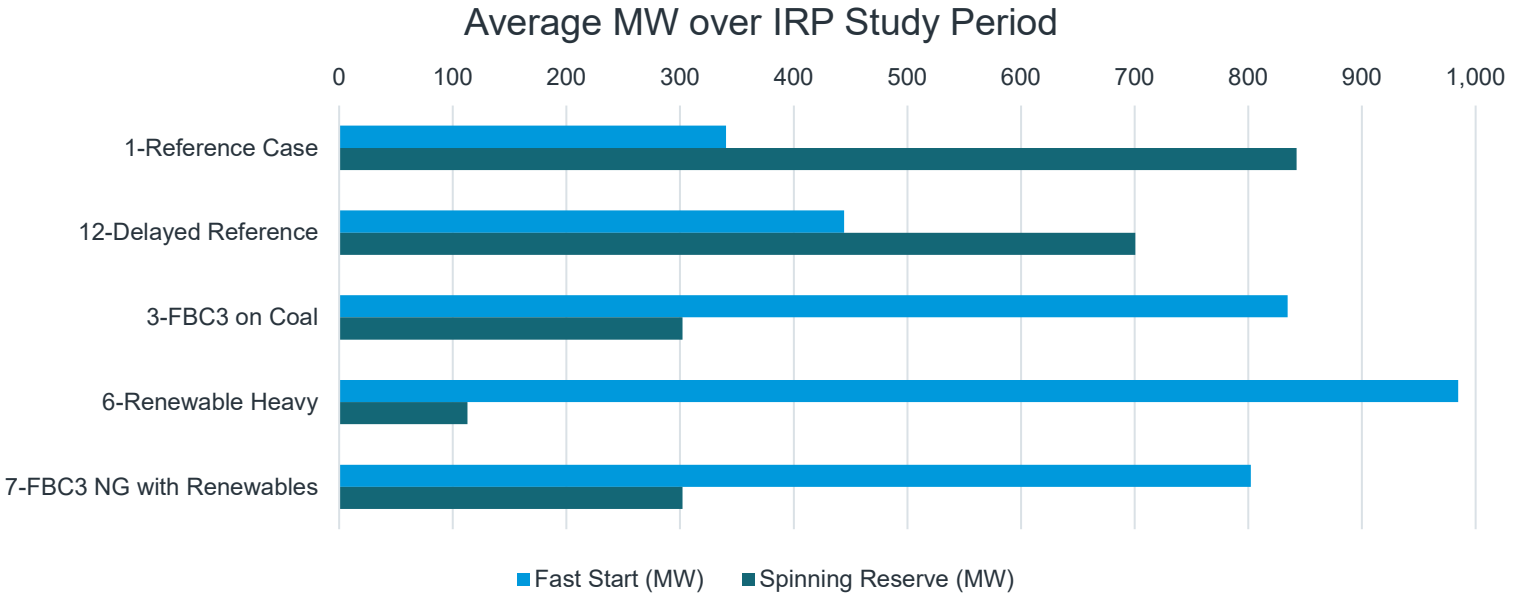
- Total $CO_2$ emissions over the study period follow a similar trend to $CO_2$ intensity by portfolio
- Most portfolios experience a decline in annual emissions over the study period
- This decline is largely associated with the timing of the FB Culley 3 conversion or retirement



# Reliability & Resiliency

## *Fast Start , Spinning Reserves, Unserved Energy*

- Fast Start resources (such as CTs, Batteries) are units that can reach full output within a few minutes. They give the grid operational flexibility by quickly ramping up when there's an unexpected drop in generation or an increase in demand.
- Spinning Reserve resources (CCs, Coal, Nuclear) are already online and synchronized to the grid. They can rapidly increase output to help stabilize system frequency and replace lost generation during sudden outages.



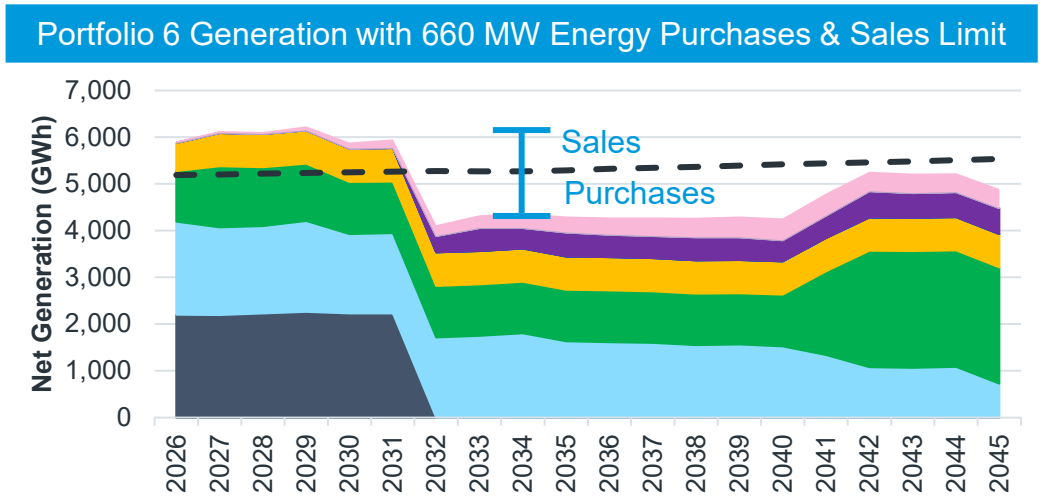

| Portfolio | Average Annual Unserved Energy (MWh) |
|---|---|
| 1-Reference Case | 3.1 |
| 12-Delayed Reference | 2.8 |
| 3-FBC3 on Coal | 2.2 |
| 6-Renewable Heavy | 1.9 |
| 7-FBC3 NG with Renewables | 3.8 |



*Stability and additional transmission analysis slides can be found in the Appendix*

# Risk/Other
## *Energy Purchases/Sales*

- In the production cost model, the purchasing or selling of energy with the MISO market lowers portfolio costs for the benefit of customers
- In the risk analysis, the allowable amount of energy sales varied across the 200 draws to highlight the impact of energy sales on portfolio performance
  - 1/3 of the draws assigned 165 MW energy sales limit
  - 1/3 of the draws assigned 300 MW energy sales limit
  - 1/3 of the draws assigned 660 MW energy sales limit
- In the risk analysis, the limit for energy market purchases was kept at 660 MW for all runs
  - Reducing the market purchases would force portfolios to incur unrealistic unserved energy penalties

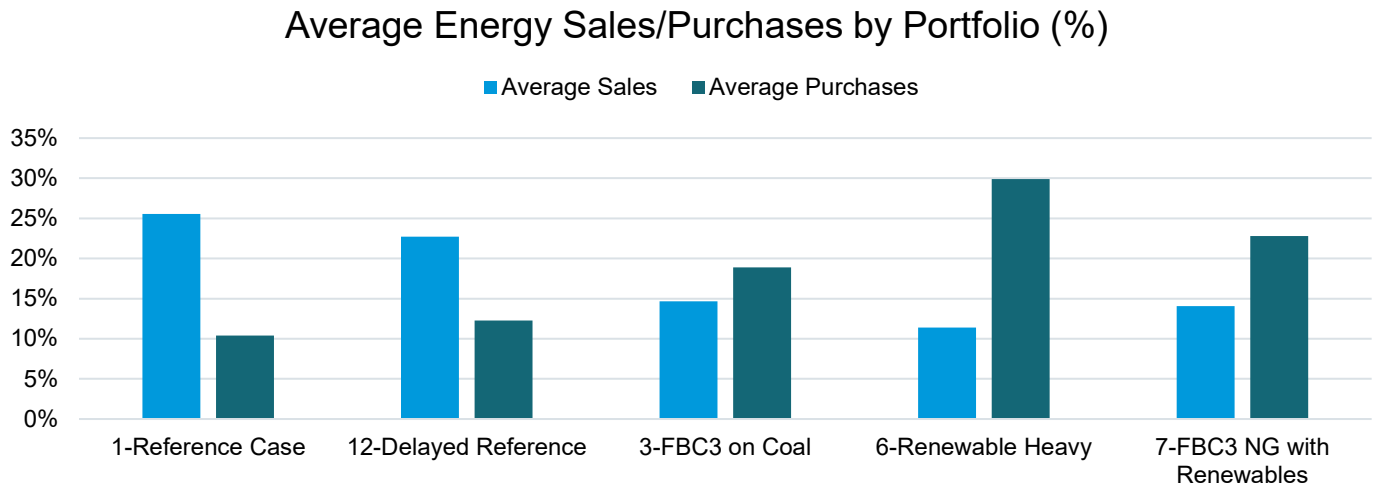


# Risk/Other
## *Energy Purchases/Sales*

- The Preferred Portfolio has moderate energy sales, suggesting that it can sell excess energy but does not depend as much on sales profits to maintain its cost-effectiveness across the study period as other portfolios with A.B. Brown 7.
  - Of the portfolios within 5% of the lowest NPVRR, Portfolio 12 shows the lowest reliance on energy sales over the study period.

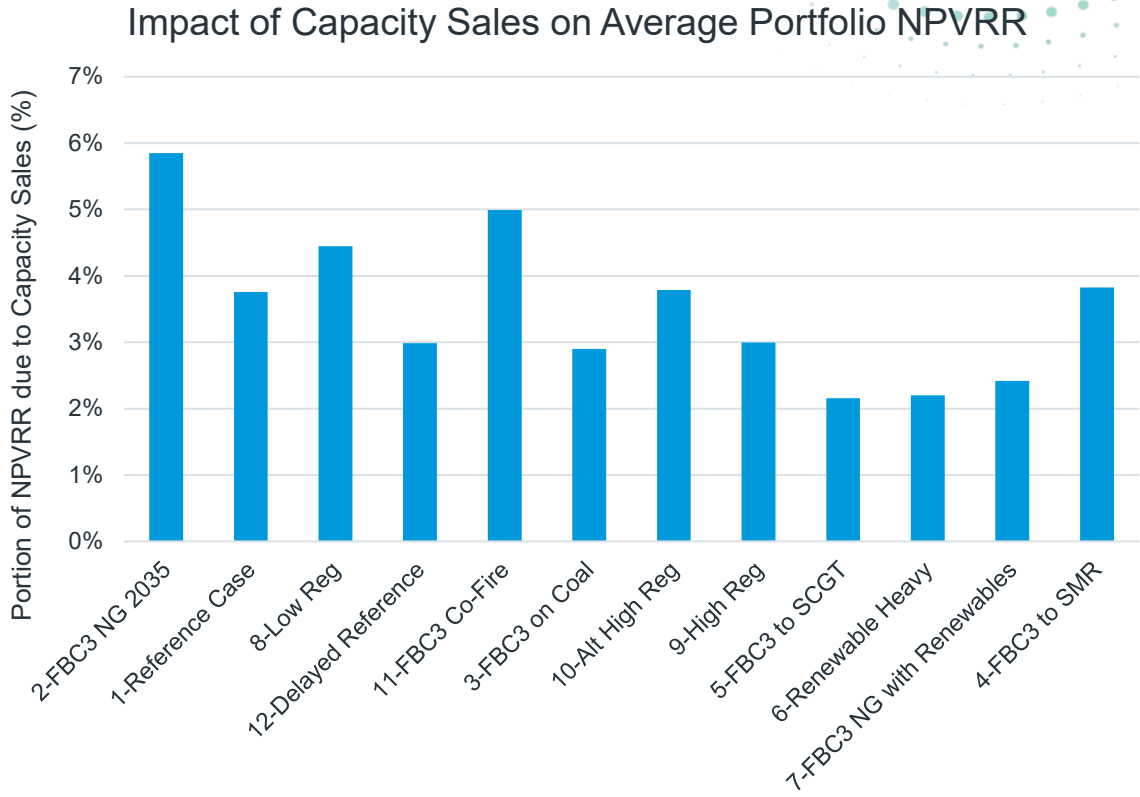
- The Preferred Portfolio shows lower reliance on market purchases, indicating that CEI South can serve its customers' energy needs, while still capable of purchasing energy from the MISO market when economically advantageous to do so.

| Portfolio Description | Energy Market Sales (%) | | | Energy Market Purchases (%) | | |
|---|---|---|---|---|---|---|
| | Average | Short Term Max | Long Term Max | Average | Short Term Max | Long Term Max |
| 2-FBC3 NG 2035 | 26% | 32% | 31% | 9% | 16% | 9% |
| 1-Reference Case | 26% | 32% | 30% | 10% | 17% | 11% |
| 8-Low Reg | 26% | 32% | 30% | 10% | 17% | 11% |
| 12-Delayed Reference | 23% | 17% | 31% | 12% | 21% | 11% |
| 11-FBC3 Co-Fire | 26% | 32% | 31% | 10% | 22% | 11% |
| 3-FBC3 on Coal | 15% | 18% | 18% | 19% | 21% | 26% |
| 10-Alt High Reg | 25% | 20% | 32% | 9% | 17% | 5% |
| 9-High Reg | 20% | 26% | 23% | 14% | 17% | 16% |
| 5-FBC3 to SCGT | 14% | 17% | 18% | 21% | 20% | 29% |
| 6-Renewable Heavy | 11% | 16% | 13% | 30% | 37% | 40% |
| 7-FBC3 NG with Renewables | 14% | 17% | 19% | 23% | 26% | 30% |
| 4-FBC3 to SMR | 26% | 32% | 31% | 9% | 16% | 8% |



# Risk/Other
## *Capacity Purchases/Sales*

- The model is designed to allow CEI South to sell surplus system capacity during any season
- Portfolios containing greater surplus capacity experience increased capacity sales, which reduce the portfolio's NPV
  - Portfolio 2 benefited most relative to other portfolios from the allowance of capacity sales, which led to the stochastic average NPVRR being lower than the Reference Case Portfolio
- Capacity sales are made at the consensus IRP seasonal capacity price. There is uncertainty in the future price and demand for capacity sales, which lead to the breakout of this metric in the risk section of the scorecard.



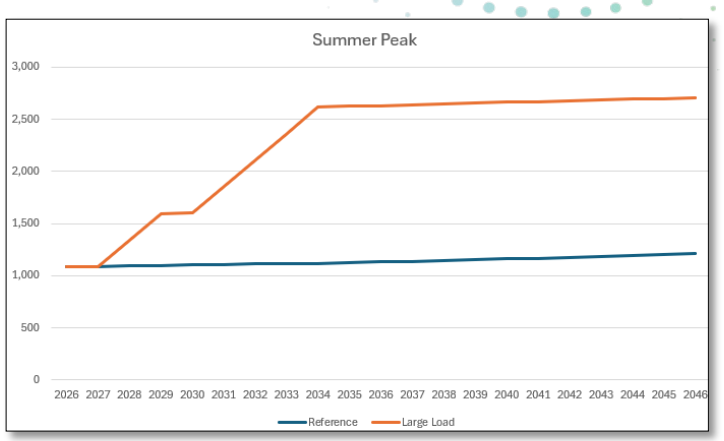
# Q&A

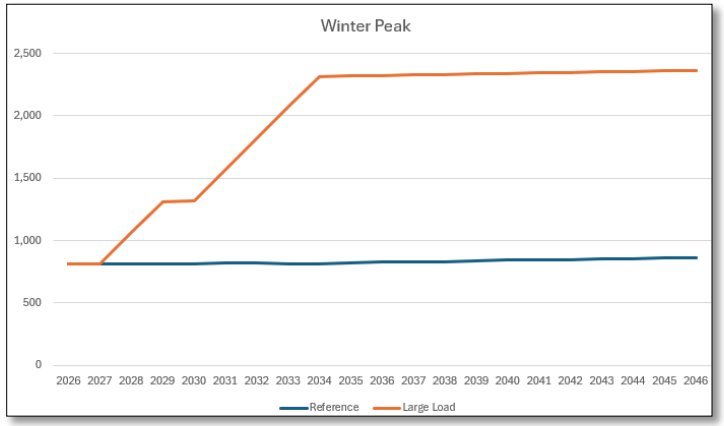
# Alternate Reference Case

Drew Burczyk
Project Manager, Resource Planning & Market Assessments, 1898 & Co.

# Alternate Reference Case

- The alternate reference case includes all the assumptions of the reference case but contains a different load forecast
- Carries the same portfolio development process but did not perform stochastic risk analysis
- Allows for additional resource buildout and extra capacity purchases in the near-term



# Alternate Reference Case Results

In all portfolios, the model selected:

- F.B. Culley 2 storage
- Continue F.B. Culley 3
- Convert A.B. Brown to a CCGT

| Year | 1: Optimization Run | 2: 1x1 J Class in 2032 | 3: Renewables + CT's | 4: FB Culley 3 NG Conversion 2030 | 5: FB Culley 3 NG Conversion 2035 |
|---|---|---|---|---|---|
| 2028 | +1 FBC2 Storage (90 MW) | +1 FBC2 Storage (90 MW) | +1 FBC2 Storage (90 MW) | +1 FBC2 Storage (90 MW) | +1 FBC2 Storage (90 MW) |
| 2030 | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 FB Culley:3 NG 2030 (270 MW)<br>+1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 FB Culley:3 NG 2030 (270 MW)<br>+1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) |
| 2031 | | | +1 Non IRA Wind + Storage (200 + 100 MW) | | |
| 2032 | +1 2x1 J Class Fired CCGT (1361 MW) | +1 1x1 J Class Unfired CCGT (568 MW) | +1 Non IRA Wind + Storage (200 + 100 MW) | +1 2x1 J Class Fired CCGT (1361 MW) | +1 2x1 J Class Unfired CCGT (1144 MW) |
| 2033 | | | +5 Non IRA Wind + Storage (1,000 + 500 MW) | | +1 2x1 J Class Fired CCGT (1361 MW) |
| 2034 | | +1 2x1 J Class Unfired CCGT (1144 MW) | +2 Non IRA Wind + Storage (400 + 200 MW) | | |
| 2035 | +1 J Class SCGT (385 MW) | | +1 J Class SCGT (385 MW) | +1 J Class SCGT (385 MW) | +1 FB Culley:3 NG 2035 (270 MW)<br>+1 Non IRA Wind + Storage (200 + 100 MW) |
| 2036 | | | | | |
| 2037 | | | +1 50 MW 4 Hour Storage (50 MW) | | |
| 2039 | | +1 50 MW 4 Hour Storage (50 MW) | | | |
| 2040 | +1 50 MW 4 Hour Storage (50 MW) | | +1 F Class SCGT (222 MW) | +1 Non IRA Wind (Battery) (100 MW)<br>+1 Non IRA Wind (Hybrid) (200 MW) | |
| 2041 | | | | | +1 50 MW 4 Hour Storage (50 MW) |
| 2042 | +1 100 MW 4 Hour Storage (100 MW) | +1 50 MW 4 Hour Storage (50 MW) | | | |
| 2043 | | | | | +1 50 MW 4 Hour Storage (50 MW) |
| 2044 | | +1 50 MW 4 Hour Storage (50 MW) | +1 Non IRA Wind (200 MW) | | |
| 2045 | +1 FB Culley:3 thru 2045 (270 MW)<br>+1 Non IRA Wind + Storage (200 + 100 MW) | +1 Non IRA Wind + Storage (200 + 100 MW) | +1 FB Culley:3 thru 2045 (270 MW)<br>+1 Non IRA Solar + Storage (100 + 50 MW)<br>+1 Reciprocating Engine (110 MW) | +1 100 MW 4 Hour Storage (100 MW)<br>+1 50 MW 4 Hour Storage (50 MW) | +1 100 MW 4 Hour Storage (100 MW)<br>+1 50 MW 4 Hour Storage (50 MW) |
| % Delta to Min NPV | 0.81% | 0.00% | 6.58% | 1.24% | 2.55% |

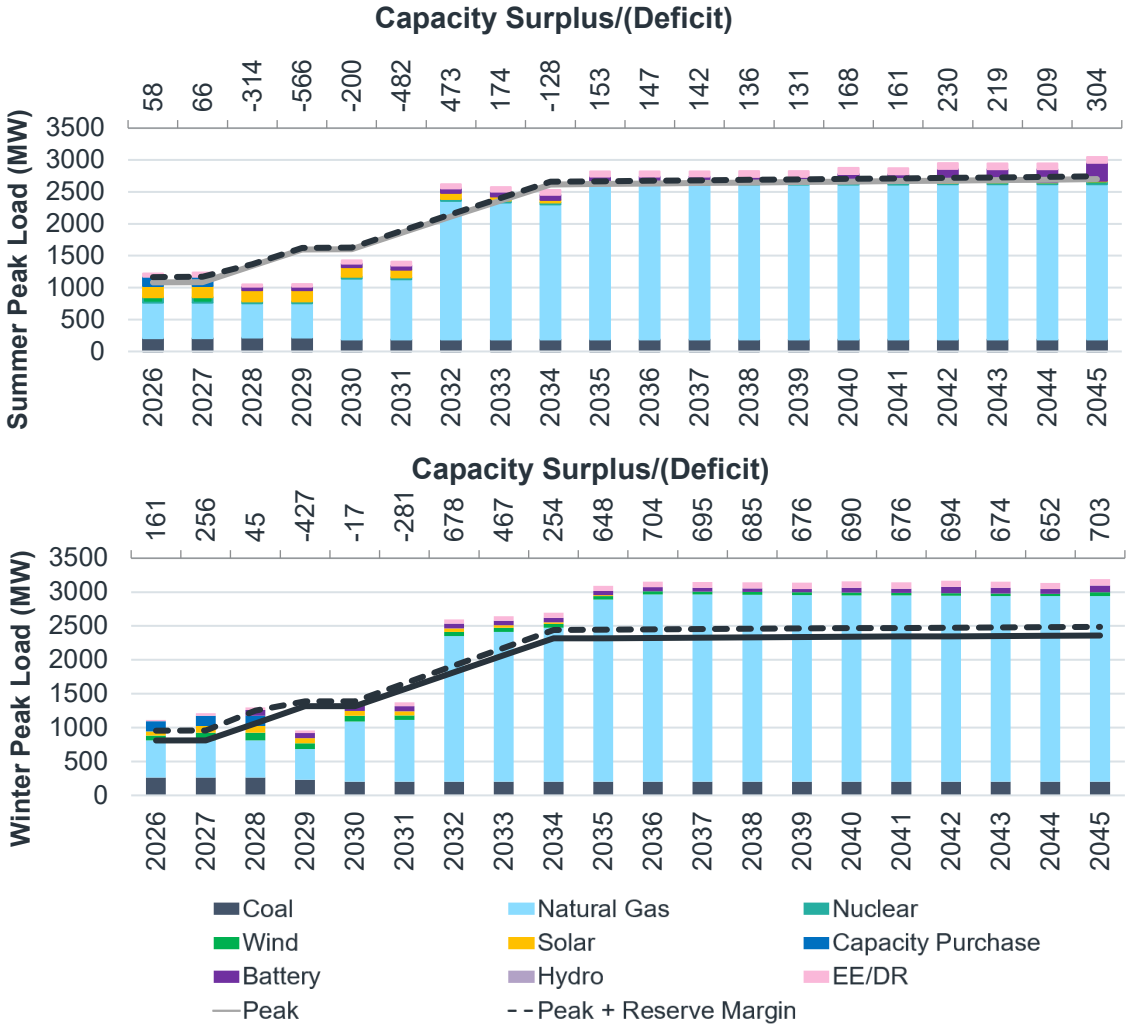
# 1 – Optimized Alternate Reference Case – Alternate Preferred Portfolio

***Model Selections***

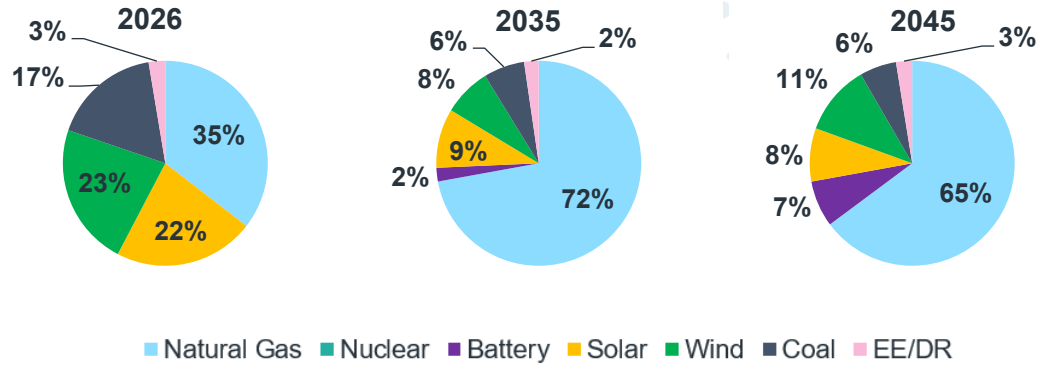
*F.B. Culley 2 Storage*
*A.B. Brown Start CCGT 01/01/2030*
*F.B. Culley 3 Continue on Coal*

*1x 2x1 J Class Fired*
*1x J Class SCGT*
*1x 50 MW Storage*
*1x 100 MW Storage*
*1x Non IRA Wind + Storage*

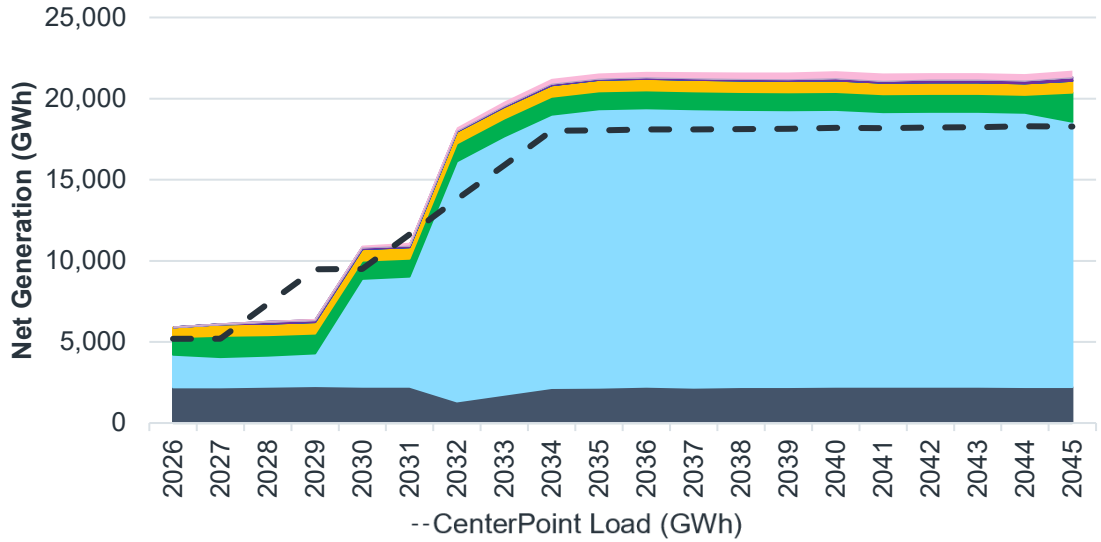
## Balance of Load and Resources




## Installed Capacity (MW)




## Generation (GWh)



# Q&A

# Sensitivity Results

Drew Burczyk
Project Manager, Resource Planning & Market Assessments, 1898 & Co.

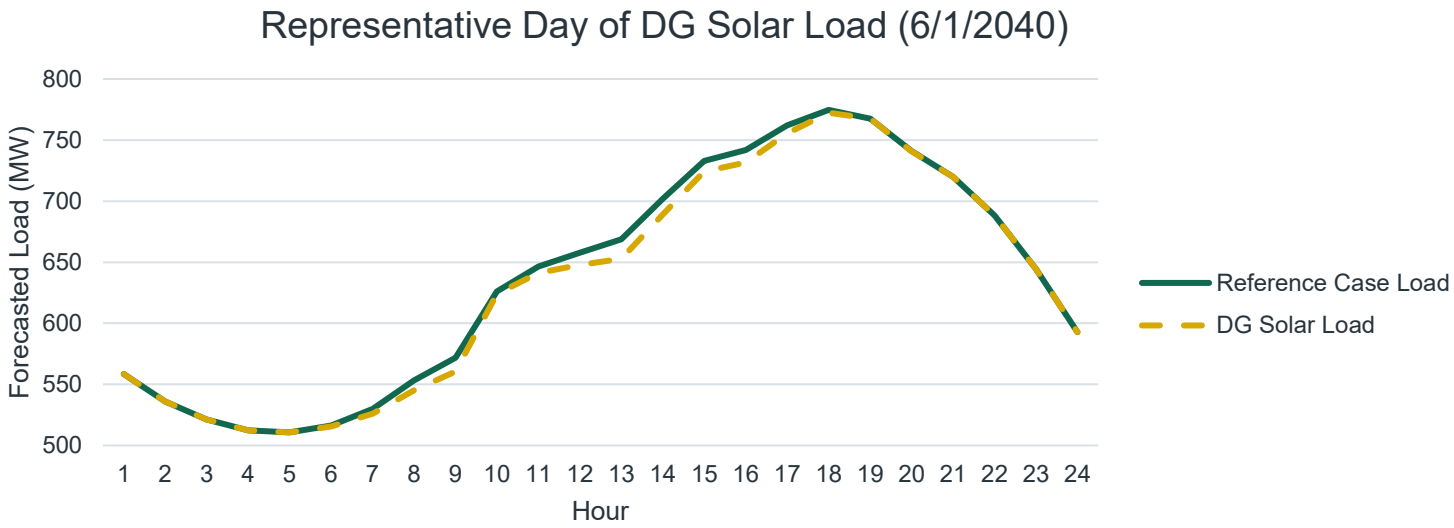
# Sensitivity Modeling Summary

- Sensitivities are used to change only one variable at a time to understand the impact of a single risk factor

| Sensitivity | Description | Results |
|---|---|---|
| **Distributed Solar Incentive** | Adjusts the adoption rate of rooftop solar (results in lower load forecast) to examine the tradeoff of additional distributed solar incentive on total portfolio cost. | The incentive delays the need for new battery storage projects by one year after 2040. However, the cost for the program outweighs the cost benefit. |
| **Large Load addition** | Increases the Reference Case load forecast at three distinct levels. | F.B. Culley 3 is selected in the model to remain online longer for load additions above 300 MW. Additional storage deployment also increases under higher load conditions, due to the need for additional accredited capacity. |
| **A.B. Brown 5/6 Conversion Costs** | Increases the estimated capital costs of converting A.B. Brown 5 and 6 units to a Combined Cycle by up to 30%. | Overall portfolio rankings generally remain consistent with the risk analysis scorecard. The Preferred Portfolio (Portfolio 12) becomes closer to the reference case, within approximately 1% of NPVRR. |
| **F.B. Culley 2 Storage** | Simulates Portfolio 12 with and without F.B. Culley 2 storage, evaluating the effect of allowing interconnection rights to expire. | The cost difference between the cases is negligible, confirming that the inclusion of F.B. Culley 2 storage in the Preferred Portfolio remains reasonable. |
| **Demand Response Term** | Tested the impact on DR selections under a 6-year program duration. | No additional programs were selected when evaluated based on the first 6 years. |
| **Alternate Low Regulatory*** | Simulates a low regulatory environment with reduced load growth to its impact on portfolio build out. | The resource mix resulting from the alternate low regulatory simulation is broadly captured by the low reg and reference case portfolios and a portfolio specifically built for an alternate low reg scenario would be redundant. |

# Distributed Generation (DG) Solar

- DG Solar sensitivity is modeled to reduce system load by 137 MW by 2045 through a$500/kW incentive beginning in 2026
- The reference case model is re-optimized with a lower load forecast and an added cost of $34.6M



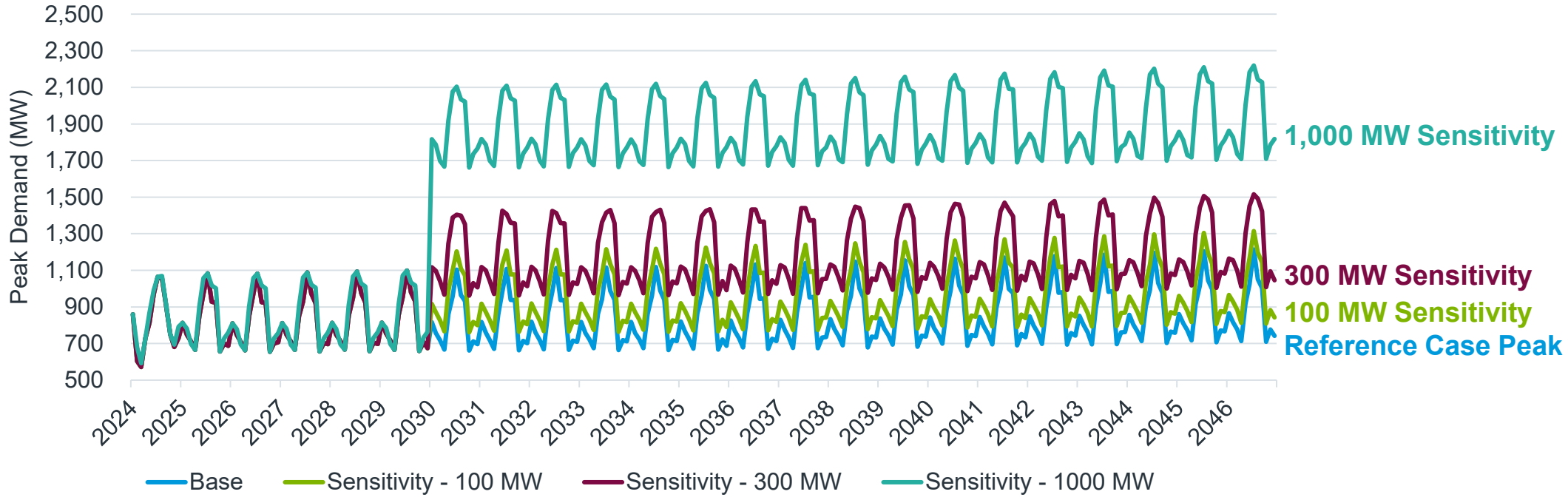
# Distributed Generation (DG) Solar

- Despite lower load, the model selects nearly identical portfolios
- Additional behind-the-meter solar resources do not eliminate the need for CEI South to build other resources
  - DG Solar primarily affects energy, while long-term resource needs continue to be driven by capacity
- The value of the incentive is to delay the battery storage projects for one year after 2040

| Year | Portfolio1_Reference Case | Distributed Solar Optimization |
|---|---|---|
| 2028 | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing |
| 2029 | | |
| 2030 | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) |
| 2032 | -1 FB Culley:3 Retire 2032 (-270 MW) | -1 FB Culley:3 Retire 2032 (-270 MW) |
| 2033 | +1 100 MW 4 Hour Storage (100 MW) | +1 100 MW 4 Hour Storage (100 MW) |
| 2034 | | |
| 2035 | | |
| 2038 | | |
| 2039 | | |
| 2040 | +1 50 MW 4 Hour Storage (50 MW) | |
| 2041 | | +1 50 MW 4 Hour Storage (50 MW) |
| 2042 | | |
| 2043 | +1 50 MW 4 Hour Storage (50 MW) | |
| 2044 | | +1 50 MW 4 Hour Storage (50 MW) |
| 2045 | | |
| Portfolio NPV ($000) | $3,592,252 | $3,605,209 |
| Delta to Reference | - | $12,957 |
| % Delta to Reference | - | 0.36% |

# Large Load Addition

- Analysis of 3 load sizes (100 MW, 300 MW, 1000 MW) representative of any new large load user in CEI South territory
  - New growth, expansion and retention of current customers
  - Not limited to data center customers

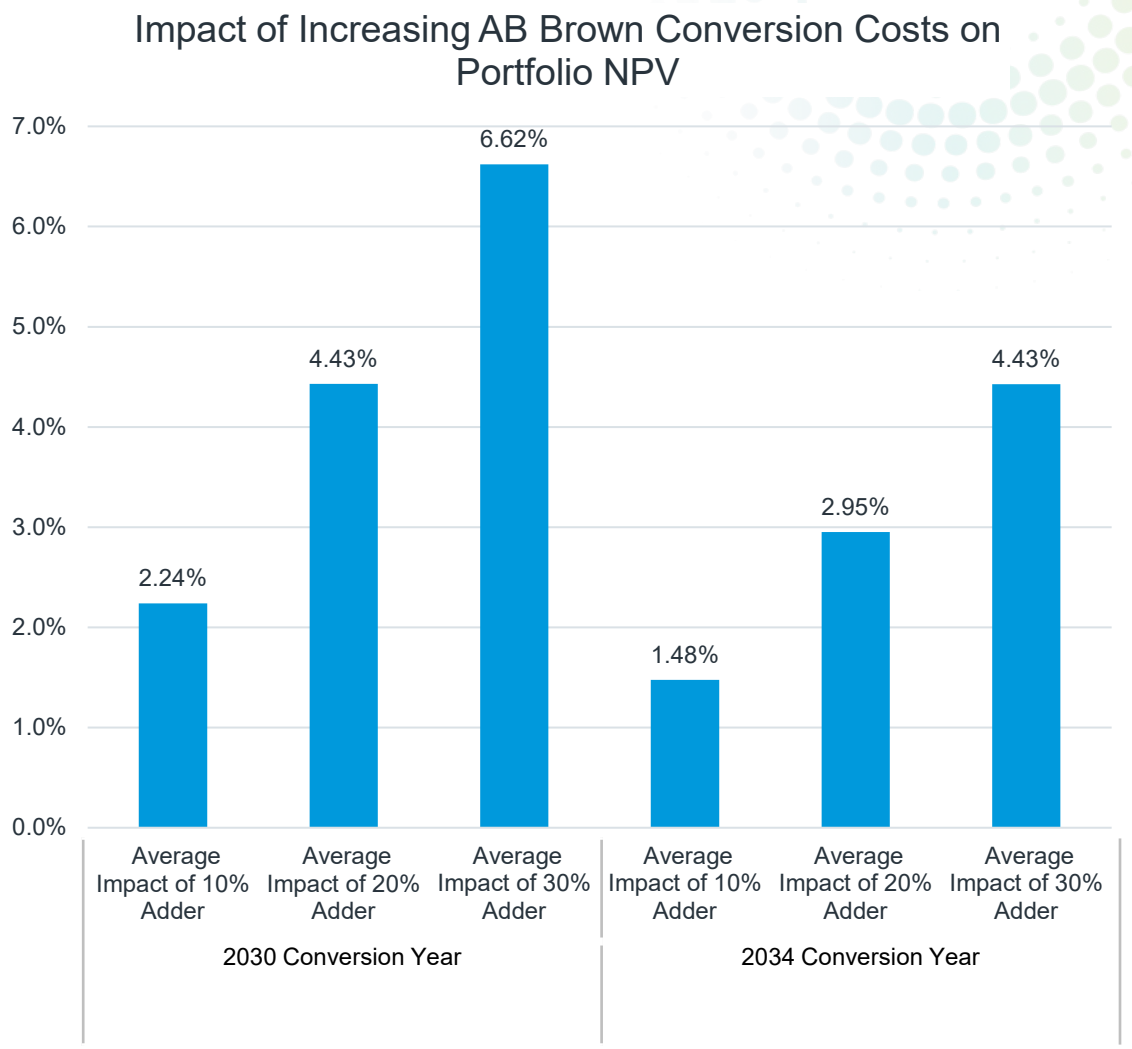


# Large Load Sensitivity

| Year | Reference Case Portfolio | 100 MW Sensitivity | 300 MW Sensitivity | 1,000 MW Sensitivity |
|---|---|---|---|---|
| 2028 | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | 1 FBC2 Do Nothing | +1 FBC2 Storage (90 MW) |
| 2029 | | | | +3 100 MW Solar PV (300 MW) |
| 2030 | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +1 AB Brown7: Fired CCGT 2030 (850 MW) | +4 100 MW 4 Hour Storage (400 MW)<br>+1 AB Brown7: Fired CCGT 2030 (850 MW)<br>+2 Non IRA Wind + Storage (400 + 200 MW) |
| 2032 | -1 FB Culley:3 Retire 2032 (-270 MW) | -1 FB Culley:3 Retire 2032 (-270 MW) | | +1 50 MW 4 Hour Storage (50 MW) |
| 2033 | +1 100 MW 4 Hour Storage (100 MW) | +2 100 MW 4 Hour Storage (200 MW) | +2 100 MW 4 Hour Storage (200 MW)<br>+1 50 MW 4 Hour Storage (50 MW) | +1 100 MW 4 Hour Storage (100 MW) |
| 2034 | | | | |
| 2035 | | | | +1 Non IRA Wind + Storage (200 + 100 MW) |
| 2038 | | | | |
| 2039 | | | | +1 F Class SCGT (222 MW) |
| 2040 | +1 50 MW 4 Hour Storage (50 MW) | +1 50 MW 4 Hour Storage (50 MW) | | |
| 2041 | | | | |
| 2042 | | | +1 50 MW 4 Hour Storage (50 MW) | |
| 2043 | +1 50 MW 4 Hour Storage (50 MW) | | | |
| 2044 | | +1 Non IRA Wind + Storage (200 + 100 MW) | | +1 Non IRA Wind (200 MW) |
| 2045 | | | +1 FB Culley:3 thru 2045 (270 MW)<br>+1 50 MW 4 Hour Storage (50 MW) | +1 FB Culley:3 thru 2045 (270 MW) |
| | | | | |
| Portfolio NPV ($000) | | $4,098,207 | $5,004,166 | $9,989,943 |

# AB Brown 7 Capital Costs

- The capital costs of converting A.B. Brown 5 and 6 to a 2x1 Combined Cycle Gas Turbine are varied stochastically in the risk analysis
- An additional sensitivity was performed to evaluate the impact of a 10%, 20%, or 30% increase in cost for the A.B. Brown conversion
- The results show that increasing costs have a greater effect on the portfolios with an earlier conversion at A.B. Brown



# A.B. Brown 7 Capital Costs

- The portfolios with a 2030 conversion of ABB7 all move in the same direction relative to each other
- The portfolios with a 2034 conversion of ABB7 become closer in cost to those with the ABB7 2030 conversion

| | Delta to Min NPV (200 draws) | Delta to Min NPV (with ABB7 10% adder) | Delta to Min NPV (with ABB7 20% adder) | Delta to Min NPV (with ABB7 30% adder) |
|---|---|---|---|---|
| **Portfolios with ABB SCGT to CCGT Conversion in 2030** | | | | |
| 1-Reference Case | 0.2% | 0.2% | 0.2% | 0.2% |
| 2-FBC3 NG 2035 | 0.0% | 0.0% | 0.0% | 0.0% |
| 4-FBC3 on SMR | 19.9% | 19.9% | 19.9% | 19.9% |
| 8-Low Reg | 1.3% | 1.3% | 1.3% | 1.3% |
| 11-FBC3 Co-Fire | 3.7% | 3.7% | 3.7% | 3.7% |
| **Portfolios with ABB SCGT to CCGT Conversion in 2034** | | | | |
| 10-Alt High Reg | 13.3% | 12.4% | 11.7% | 10.9% |
| 12-Delayed Reference | 3.2% | 2.4% | 1.7% | 1.1% |
| **Portfolios without ABB7** | | | | |
| 3-FBC3 on Coal | 8.5% | 6.1% | 3.9% | 1.8% |
| 5-FBC3 to SCGT | 15.8% | 13.3% | 10.9% | 8.6% |
| 6-Renewable Heavy | 15.9% | 13.4% | 11.0% | 8.7% |
| 7-FBC3 NG with Renewables | 17.7% | 15.1% | 12.7% | 10.4% |
| 9-High Reg | 15.6% | 13.1% | 10.7% | 8.4% |

# F.B. Culley 2 Sensitivity: Portfolio 12

- A sensitivity analysis was performed on Portfolio 12 to determine the portfolio cost impact of building a storage resource at the F.B. Culley 2 site versus allowing the interconnect re-use to expire
- The total portfolio NPV is within 1%, indicating there is minor savings associated with allowing the interconnect to expire

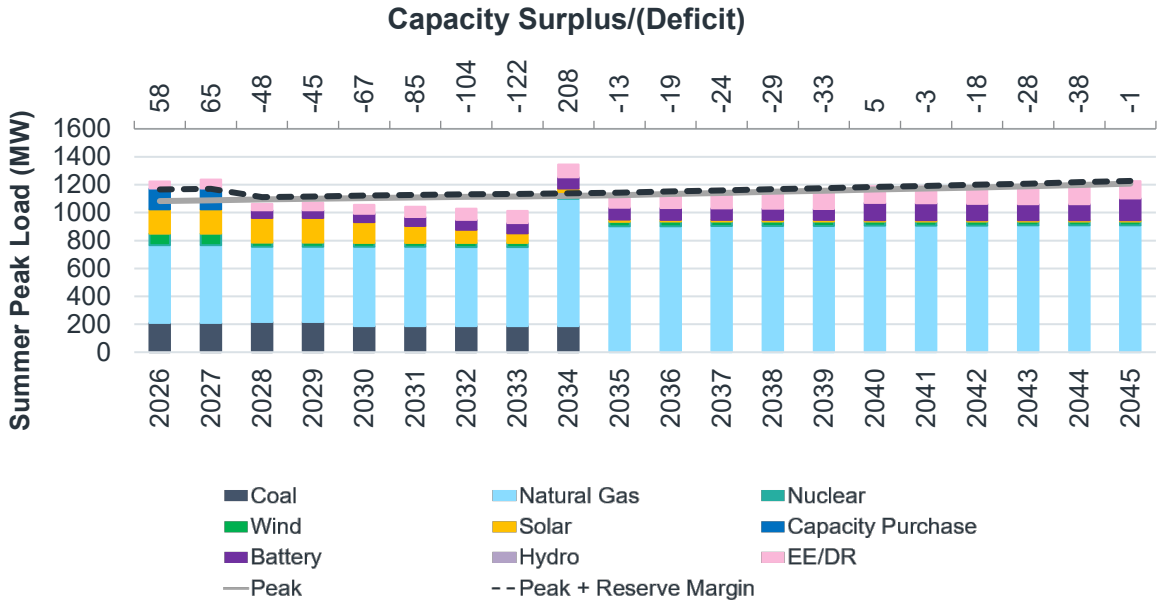
| Year | Portfolio12: Delayed Reference Case *FBC2 Interconnect Expire* | Portfolio12: Delayed Reference Case *FBC2 Storage* |
|---|---|---|
| 2028 | 1 FBC2 Do Nothing | +1 FBC2 Storage (90 MW) |
| 2034 | +1 AB Brown7: Fired CCGT 2034 (850 MW) | +1 AB Brown7: Fired CCGT 2034 (850 MW) |
| 2035 | -1 FB Culley:3 Retire 2035 (-270 MW)<br>+1 50 MW 4 Hour Storage (50 MW) | -1 FB Culley:3 Retire 2035 (-270 MW) |
| 2036 | | |
| 2038 | +1 50 MW 4 Hour Storage (50 MW) | |
| 2039 | | |
| 2040 | | +1 50 MW 4 Hour Storage (50 MW) |
| 2044 | +1 100 MW 4 Hour Storage (100 MW) | |
| 2045 | | +1 50 MW 4 Hour Storage (50 MW) |

| | | |
|---|---|---|
| Portfolio NPV ($000) | $3,735,327 | $3,736,795 |
| Delta to Min NPV | $0 | $1,468 |
| % Delta to Min NPV | 0.00% | 0.04% |

# F.B. Culley 2 Sensitivity: Portfolio 12

- The Preferred Portfolio leverages the interconnection re-use at F.B. Culley 2 to add a 90 MW storage facility reducing near-term capacity needs in 2028 and 2029
- Re-using the existing interconnection avoids additional cost exposure and mitigates risk associated with allowing the interconnection rights to expire
- Aligning the timing of the A.B. Brown conversion with the F.B. Culley 3 retirement reduces the short-term system overbuild, allowing for a smooth transition and continued evaluation.

## Portfolio 12 Balance of Load and Resources



# Q&A

# Summary

Matt Rice

Director, Regulatory and Rates

# Summary

- The Preferred Portfolio:
  - Provides rate stability in the near and long-term
  - Preserves maximum future flexibility to navigate unprecedented uncertainty
  - Provides reliable, resilient, stable, affordable, and environmentally sustainable power
  - The future of F.B. Culley 3 will be evaluated in a subsequent IRP
- The Alternate Preferred Portfolio provides necessary flexibility to quickly pivot, keeping Southern Indiana competitive for economic development and growth
- CEI South will continue to do due diligence while working through the short-term action plan

# Stakeholder Questions and Feedback

Moderated by Drew Burczyk
Project Manager, Resource Planning & Market Assessments, 1898 & Co.

# Q&A

In-person attendees – please raise your hand to be recognized

Virtual attendees will be in listen-only mode – to participate:

- Use the “Raise” hand feature in Teams to be recognized, and your mic will be activated during the allotted time for questions, or
- Enter questions into the “Q&A” feature in Teams

Identify yourself by name prior to speaking to help us keep track of feedback and follow up actions

# Appendix

# General IRP Model Updates

- Increased new resource availability
- Corrected resource CapEx curves (base, high, low across scenarios)
- No longer scaling Scenario-driven portfolios and stochastic purchases/sales limits
    - Allowing for excess capacity purchases and sales to take place
    - Stochastically varying sales limit, kept purchase limit equal to current transmission limitation
- Thermal resources to seasonal capacities (applying DLOL to seasonal outputs) and heat rates
- F.B. Culley 3 conversion costs (Fixed O&M time series in the model)
- Final reference case load shape
- Fixed near term capacity contract firm capacity

# Updated Resource Availability
## *Reference Case and Scenarios*

| Technology | 1st Year Available | Previous Annual Limit | Previous Cumulative Addition Limit | Annual Addition Limit (per Year) | Cumulative Addition Limit (Entire Study Period) |
|---|---|---|---|---|---|
| **Thermal** | | | | | |
| F Class CT | 2030 | 1 Project, 246 MW | 1 Project, 246 MW | 1 Project, 246 MW | 1 Project, 246 MW |
| J Class CT | 2030 | 1 Project, 437 MW | 1 Project, 437 MW | **2 Projects, 874 MW** | **2 Project, 874 MW** |
| Reciprocating Engine | 2030 | 2 Projects, 220 MW | 2 Projects, 220 MW | 2 Projects, 220 MW | **4 Projects, 440 MW** |
| Aeroderivative | 2030 | 2 Projects, 114 MW | 2 Projects, 114 MW | 2 Projects, 114 MW | **4 Projects, 228 MW** |
| 1x1 F Class CC | 2032 | 1 Project, 454 MW | 1 Project, 454 MW | 1 Project, 454 MW | 1 Project, 454 MW |
| 1x1 J Class CC | 2032 | 1 Project, 624 MW | 1 Project, 624 MW | 1 Project, 624 MW | 1 Project, 624 MW |
| **Renewables** | | | | | |
| Solar | 2028 | 2 Projects, 200 MW | 5 Projects, 500 MW | **4 Projects, 400 MW** | **18 Projects, 1,800 MW** |
| Solar + Storage | 2028 | 1 Project, 100 + 50 MW | 3 Projects, 300 + 150 MW | **3 Projects, 300 + 150 MW** | **10 Projects, 500 + 250 MW** |
| Wind | 2030 | 1 Project, 200 MW | 3 Projects, 600 MW | **4 Projects, 800 MW** | **10 Projects, 2,000 MW** |
| Wind + Storage | 2030 | 1 Project, 200 + 100 MW | 3 Projects, 600 + 300 MW | **3 Projects, 600 + 300 MW** | **5 Projects, 1,000 + 500 MW** |
| Hydro | 2032 | 2 Projects, 58 MW | 2 Projects, 58 MW | 2 Projects, 58 MW | 2 Projects, 58 MW |
| **Storage** | | | | | |
| 4-hour 50 MW Storage | 2028 | 3 Projects, 150 MW | 5 Projects, 250 MW | **5 Projects, 250 MW** | **10 Projects, 500 MW** |
| 4-hour 100 MW Storage | 2028 | 3 Projects, 300 MW | 5 Projects, 500 MW | **5 Projects, 500 MW** | **10 Projects, 500 MW** |
| 8-hour 100 MW Storage | 2028 | 3 Projects, 300 MW | 5 Projects, 500 MW | 3 Projects, 300 MW | 5 Projects, 500 MW |
| **Nuclear** | | | | | |
| Nuclear | 2035 | 1 Project, 100 MW | 1 Project, 100 MW | 1 Project, 100 MW | 1 Project, 100 MW |

***Bolded programs indicate a change from the previously shared resource availability.***

# Stability/Transmission Analysis

## *Short Circuit Ratio and Dynamic VAR Support*

- Short circuit ratio (SCR) study:
  - Evaluate SCR at each bus per scenario
  - SCR is defined as the ratio of the apparent power at a point in the system following a fault to a defined benchmark value (100 MW)

$$\mathrm{SCR} = \frac{S_{\mathrm{POI}}}{P_{\mathrm{Benchmark}}}$$

- Dynamic VAR support:
  - Calculate the maximum available VAR support in four scenarios under an outage event by summing the total value per scenario and subtracting the VAR capacity of each generator individually
- Look at the worst-case scenario for both results to generate a minimum support value

# Stability/Transmission Analysis
## *Short Circuit Ratio and Dynamic VAR Support*

- Scenario with AB Brown conversion and F.B. Culley 3 on the system is the strongest case in both categories
- All scenarios had similar short circuit ratios (±0.03%)
- Best dynamic VAR support is 148 MVAR greater than the worst case

| Portfolios | F.B. Culley 3 Path | A.B. Brown Path | Short Circuit Ratio [MVA/100 MW] | *Dynamic VAR Support [MVAR] |
|---|---|---|---|---|
| 3-FBC3 Coal,<br>7-FBC3 NG with Renewables | Stays Online | No Conversion | 3.51 | 626 |
| 1-Reference Case, 4-FBC3 to SMR,<br>5-FBC3 to SCGT, 8-Low Reg,<br>10-Alt High Reg, 12-Delayed Reference | Taken Offline | Conversion | 3.51 | 665 |
| 2-FBC3 NG 2035, 11-FBC3 Co-Fire | Stays Online | Conversion | 3.51 | 753 |
| 6-Renewable Heavy, 9-High Reg | Taken Offline | No Conversion | 3.51 | 605 |

**Under outage conditions*
*The color coding represents the relative ranking between the portfolios*