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INDIANA UTILITY
REGULATORY COMMISSION

TESTIMONY OF ROBERT A. MCMURRY
DIRECTOR, INTEGRATED RESOURCE PLANNING
DUKE ENERGY BUSINESS SERVICES LLC
ON BEHALF OF DUKE ENERGY OF INDIANA, INC.
CAUSE NO. 44217 BEFORE THE
INDIANA UTILITY REGULATORY COMMISSION

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND OCCUPATION.

A. My name is Robert A. McMurry and my business address is 526 South Church Street, Charlotte, North Carolina. I am Director, Integrated Resource Planning for Duke Energy Business Services LLC, the service company subsidiary of Duke Energy Corporation (collectively "Duke Energy") and an affiliate of Duke Energy Indiana, Inc ("Duke Energy Indiana" or the "Company").

Q. PLEASE DESCRIBE BRIEFLY YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I am a civil engineer, having received a Bachelor of Science in Engineering from the University of North Carolina at Charlotte. I am a registered professional engineer in North Carolina and South Carolina. I am also a member of the Southeastern Electric Exchange Integrated Resource Planning Task Force.

I began my career at Duke Power Company in 1982 and have had a variety of responsibilities across Duke Energy in areas of structural design, environmental strategy, emission allowance management and resource planning.

Q. PLEASE DESCRIBE YOUR DUTIES AND RESPONSIBILITIES AS DIRECTOR, INTEGRATED RESOURCE PLANNING.

A. As Director, Integrated Resource Planning, I am responsible for planning for the long-term capacity and energy needs of the Duke Energy operating utilities, including the

Duke Energy Indiana system. My responsibilities include supervising the preparation and filing of integrated resource plans ("IRPs") in accordance with state regulations.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to provide results for analyses comparing the installation of environmental controls at Cayuga, Gibson, Gallagher, and Wabash River coal-fired generating stations versus retirement of these assets with natural gas-fired generation as the replacement option. I explain how the Phase 2 environmental controls proposed by Duke Energy Indiana in this proceeding, and the assumed plant retirements are in the best interest of Duke Energy Indiana's customers, even after accounting for potential additional expenditures from preliminary Phase 3 environmental control projects.

II. DESCRIPTION OF ANALYSES PERFORMED

Q. WHAT ROLE DID YOU AND YOUR TEAM HAVE IN THE EVALUATION OF THE PROPOSED ENVIRONMENTAL CONTROL PROJECTS?

A. My team analyzed the economics of installing environmental controls at the stations versus retirement options. Our analyses are based upon the capital and operation and maintenance information associated with the proposed Phase 2 environmental projects and potential Phase 3 environmental projects provided by the Analytical Engineering department, as outlined in the testimony of Mr. Miller. Using the latest load forecast, energy efficiency and demand response projections, fundamental coal and gas prices and allowance cost projections, my team evaluated the production and capital costs associated with installation of the controls versus retirement of the unit(s) and replacement with natural gas-fired generation over a range of sensitivities.

Q. WHAT INPUTS HAVE CHANGED SINCE THE COMPANY FILED ITS 2011 IRP?

A. We made the following changes to reflect updated information since the filing of the 2011 IRP on November 1, 2011:[1]

(1) The load forecast was updated from the Spring 2011 to the Spring 2012 version of the load forecast. The Spring 2012 forecast is discussed in greater detail in the testimony of Mr. Merino.

(2) The energy efficiency requirements associated with the Commission's Generic DSM Order were included in the load forecast, as discussed by Mr. Merino in his testimony. Updated demand response projections were provided by the Market Analytics department within Duke Energy using current participation information. The demand response programs are input into the model as a dispatchable resource, using the constraints of the DR programs.

(3) The reserve margin requirement was updated from 14.2% to 14.9% to correspond to the Midwest Independent Transmission System Operator, Inc. ("MISO") Resource Adequacy Requirement for Planning Year 2012/13, and adjusted for changes to the Resource Adequacy construct beginning with Planning Year 2013/14, which was recently approved by FERC.

(4) Prices for natural gas, MISO energy market, coal, and emission allowances (including CO_2) were updated from the Spring 2011 Duke Fundamental Forecast price curves to the Spring 2012 Duke Fundamental Forecast price curves.

[1] A revised version of the 2011 IRP was filed on May 29, 2012, to provide additional information requested by the Commission. The analyses contained in the IRP were not revised.

(5) For each environmental project evaluated, the associated capital, fixed and variable O&M cost and heat rate impacts were incorporated into the analysis. To be conservative, we assumed high range reagent consumption rates, and that the controls would be utilized 100% of the time that the units were in service. Detailed assumptions are provided in the testimony of Mr. Miller.

(6) The capacity rating, capital cost and operating and maintenance costs were updated for new combined cycle and combustion turbine generation options.

(7) Economic data, such as inflation and discount rates, allowance for funds used during construction ("AFUDC") factors, and levelized fixed charge rates were updated.

Q. WHY DID DUKE ENERGY INDIANA PERFORM THESE ANALYSES?

A. Duke Energy Indiana performs these analyses to assure that the Phase 2 environmental projects proposed in this filing are in the best interest of customers, while also taking into account potential costs associated with the preliminary Phase 3 environmental projects. The Phase 2 environmental projects are primarily associated with the Mercury Air Toxics Standard ("MATS") Rule and the preliminary Phase 3 projects are primarily associated with monitoring, waste water treatment, SO_2 National Ambient Air Quality Standards ("NAAQS") and coal combustion by-products projected requirements. A description of the various projects evaluated for Cayuga, Gallagher and Gibson is provided in the testimony of Mr. Miller.

Q. WHAT OPTIONS DID DUKE ENERGY INDIANA ANALYZE FOR ITS WABASH RIVER GENERATING UNITS?

A. An analysis of anticipated environmental controls versus retirement for Wabash River Units 2-6 was provided in the Duke Energy Indiana 2011 IRP. This analysis was updated

for this proceeding to reflect the current assumptions. Because Wabash River 6 is the largest, newest, and most efficient unit at the station, two other options were evaluated in lieu of retirement: 1) derating the unit to 200 MWs with low sulfur coal, and 2) conversion to natural gas. An overview of the environmental control options considered for Wabash River is discussed in the testimony of Mr. Miller.

Q. WHAT OPTIONS DID DUKE ENERGY INDIANA ANALYZE FOR ITS GIBSON 5 GENERATING UNIT?

A. Duke Energy Indiana analyzed three options for Gibson 5 because of the compliance uncertainty associated with SO_2 NAAQS. The Phase 2 requirements are the same for each option; however, the Phase 3 requirements differ depending on the final SO_2 NAAQS requirements, as discussed by Mr. Miller. An overview of the potential Phase 3 options for Gibson 5 is presented below:

1. The existing FGD can meet the new SO_2 NAAQS with structural repairs. A range of costs were evaluated to represent the conditions if a new stack is required or if the existing stack can be repaired.
2. A new FGD is required to meet the SO_2 NAAQS.
3. The Phase 2 controls are installed but Gibson 5 is retired at the end of 2017 and replaced with combined cycle gas-fired generation. The purpose of analyzing this option is to assure that installation of the Phase 2 controls is in the best interest of customers regardless of whether Gibson Unit 5 ultimately installs Phase 3 environmental controls or is retired by the end of 2017.

A description of regulatory requirements associated with these controls is included in the testimony of Mr. Miller.

Q. WHAT SENSITIVITIES DID YOU INCLUDE IN THE EVALUATION OF PROPOSED PHASE 2 PROJECTS AT CAYUGA, GIBSON, GALLAGHER AND WABASH RIVER?

A. A range of sensitivities was evaluated for environmental control options at Cayuga, Gibson, Gallagher and Wabash River, as described below:

1. Capital Cost of Environmental Controls – a 20% increase and a 5% decrease of the cost for major capital components. The basis for the range of capital costs is addressed in the testimony of Mr. Renner.

2. Fuel Prices

    a. High Fuel Cost –gas prices +35% and coal prices +20%. The base case natural gas price projection is on the lower end of the range generated from multiple vendor estimates. In general, we believe there is more upside risk associated with natural gas because of the potential that suppliers could limit new drilling until there is a higher supporting price. We are observing this in today's market where suppliers are limiting new gas well installations due to the current low natural gas price. The +35% high gas sensitivity was based on two standard deviations off the mean based on the multiple vendor estimates.

    The Company examined the potential for increased coal prices primarily because of the risk of increased international exports. If carbon regulations are delayed from our current projection of 2020, this could also increase demand and the resulting price for coal. The +20% coal price sensitivity generally follows the upper range of vendor estimates.

The energy market prices were also updated to reflect this increase in the projected fuel prices since market prices typically follow fuel prices.

b. Low Fuel Cost –gas prices -20% and coal prices -40%. As stated above, our fundamental natural gas price projection is on the lower end of a range of vendor estimates. Also, the current reduction in drilling and hedging by gas suppliers limits our downside gas price forecast. The -20% low gas sensitivity was based on two standard deviations off the mean based on the multiple vendor estimates.

The Company believes it is reasonable to analyze the potential for lower coal prices because of the significantly lower demand projection by the coal industry driven by coal retirements in the 2015 timeframe, fundamentally lower gas prices that offset coal generation, and additional longer-term retirements based on pending environmental regulations. As the price for natural gas decreases, the demand increases and this normally results in a decrease in the demand for coal and therefore a decrease in coal prices. The -40% coal price sensitivity generally follows the lower range of vendor estimates.

The energy market prices were also updated to reflect this decrease in the projected fuel prices.

3. No Carbon – While the Company continues to believe it is likely that there will be a carbon constrained future, the timing and structure are very uncertain. The CO_2 projection used for base planning starts in 2020 in nominal dollars at \$17/ton CO_2, increasing to \$44/ton by 2032. To gauge carbon's impact on the Present Value of

Revenue Requirements ("PVRR") of continuing to operate units with coal versus retirement and replacement with natural gas, a no CO_2 sensitivity was performed. This sensitivity is a proxy for a future with carbon legislation delayed beyond 2020 or implemented in another way that does not explicitly incorporate a price on carbon emissions.

4. Load Forecast – The High and Low load forecast sensitivities were limited to Cayuga Units 1 and 2 and Gibson Unit 5 to limit the number of expansion plans. For these units, changes in the load forecast can impact the cost-effectiveness of the choice between installing environmental controls vs. retirement and replacement with natural gas generation. The basis for these sensitivities, which represent a 95% confidence interval, is addressed in the testimony of Mr. Merino. These sensitivities can also be considered proxies for lower or higher levels of EE and/or renewables.

5. Capital Cost of New Combined Cycle Units – Because the cost of replacement capacity is an integral part of the economic decision regarding whether to invest in environmental controls, sensitivities were performed using a 30% increase and a 5% decrease of the cost of new Combined Cycle ("CC") units. The basis for the range of capital costs is addressed in the testimony of Mr. Miller.

Q. WHAT PROCESS DID YOU FOLLOW TO PERFORM THE EVALUATION OF THE PHASE 2 AND PRELIMINARY PHASE 3 PROJECTS?

A. The evaluation of the Phase 2 and preliminary Phase 3 environmental projects at Cayuga, Gibson, and Gallagher, along with the update to the environmental analysis of Wabash River, was performed with the latest 2012 assumptions. An overview of the steps taken to perform the analysis is shown below:

1. The data inputs to the production cost model and economic analysis spreadsheets were updated as described above.
2. Economic Analysis
    a. Expansion plans were developed for two cases: 1) continuing to operate each unit under evaluation with environmental controls, and 2) retiring the unit and replacing it with natural gas generation. Based on the historical operation of the units evaluated for this analysis, it was assumed that Cayuga and Gibson Stations were replaced with combined cycle generation and Wabash River and Gallagher Stations were replaced with combustion turbine generation. A supply/demand balance spreadsheet analysis was used to develop the expansion plans needed to meet the reserve margin criteria. To verify that the proper replacement technology was selected, sensitivities were performed replacing the combined cycle generation with combustion turbine generation for the Cayuga and Gibson Stations, and replacing the combustion turbine generation with combined cycle generation at the Wabash River and Gallagher Stations. The results of the Cayuga and Gibson sensitivities demonstrated that the combined cycle replacement generation option was lower cost than replacement with a combustion turbine. For Wabash River and Gallagher, the replacement option with a combustion turbine or combined cycle was approximately breakeven. Based on the projected low capacity factors of the Wabash

River and Gallagher units, a combustion turbine was selected as the replacement option.

b. The Ventyx Prosym model was used to develop the production costs for each of the compliance equipment and retire/replace cases, as well as the sensitivity cases.

c. The total PVRR was determined for Cayuga, Gibson, Gallagher, and Wabash River by incorporating both production and capital costs associated with environmental controls in a spreadsheet. This revenue requirement was then compared to the PVRR assuming the unit was retired and replaced with natural gas-fired generation.

Q. DID DUKE ENERGY INDIANA EXPLICITLY CONSIDER RENEWABLE ENERGY RESOURCES IN ITS ANALYSES OF THE PHASE 2 COMPLIANCE PLAN?

A. Yes. Consistent with the 2011 IRP, an assumption was made that 10% of retail sales would be met with renewable energy sources by 2025, starting in 2016 at 1.0% and increasing 1.0% per year through 2025 to be met primarily with wind, solar, biomass and landfill gas.

Q. DID DUKE ENERGY INDIANA CONSIDER THE PURCHASE OF POWER IN ITS ANALYSES?

A. Yes. While we did not explicitly consider purchased power as an option for replacement of coal-fired generation in this analysis, the new build natural gas replacement options are proxies for purchases.

Q. PLEASE DISCUSS THE STATUS OF THE REQUEST FOR PROPOSALS ("RFP") THAT DUKE ENERGY INDIANA ISSUED IN FEBRUARY 2012.

A. The Company issued an RFP for purchased power for a period of one to three years, starting with Planning Year 2014/15, as a stop-gap measure until longer-term capacity could be built or acquired. The RFP was issued primarily due the expected retirement of Wabash River Units 2-6 in April 2015, as a result of the MATS rule, which was discussed in Duke Energy Indiana's 2011 IRP. The expected retirements were projected to result in a need for 300-400 MW of additional capacity to meet the MISO Resource Adequacy requirement. Five bids were received, three of which have been short-listed as candidates for further analysis and discussion. We are continuing to evaluate our need for short-term capacity and expect to make a decision regarding these bids later this year.

We are also evaluating multiple options to meet the longer-term need, including self build options, purchase of existing assets, natural gas conversion, and purchased power agreements.

III. ANALYSES RESULTS

Q. WHAT WERE THE RESULTS OF YOUR ANALYSES?

A. The results of the Phase 2 and preliminary Phase 3 environmental analysis incorporating the range of sensitivities and the corresponding changes in the expansion plans are summarized in the following Exhibits attached to my testimony:

- Cayuga
  - Exhibit F-1 – Cayuga Unit 1
  - Exhibit F-2 – Cayuga Unit 2
  - Exhibit F-3 – Cayuga Units 1 and 2 Total

- Exhibit F-4 – Cayuga 1-2 Expansion Plans
- Exhibit F-5 – Cayuga 1-2 High Load Expansion Plans
- Exhibit F-6 – Cayuga 1-2 Low Load Expansion Plans

- Gibson Units 1-4
  - Exhibit F-7 – Gibson Unit 1
  - Exhibit F-8 – Gibson Unit 2
  - Exhibit F-9 – Gibson Unit 3
  - Exhibit F-10 – Gibson Unit 4
  - Exhibit F-11 – Gibson 1-4 Expansion Plans
- Gibson Unit 5
  - Exhibit F-12 – Gibson Unit 5 New FGD
  - Exhibit F-13 – Gibson Unit 5 Existing FGD (New Stack)
  - Exhibit F-14 – Gibson Unit 5 Existing FGD and Stack
  - Exhibit F-15 – Gibson Unit 5 Phase 2 Controls, Retire 2017
  - Exhibit F-16 – Gibson 5 Expansion Plans
  - Exhibit F-17 – Gibson 5 High Load Expansion Plans
  - Exhibit F-18 – Gibson 5 Low Load Expansion Plans
- Gallagher Units 2 and 4
  - Exhibit F-19 – Gallagher Unit 2
  - Exhibit F-20 – Gallagher Unit 4
  - Exhibit F-21 – Gallagher 2 and 4 Expansion Plans

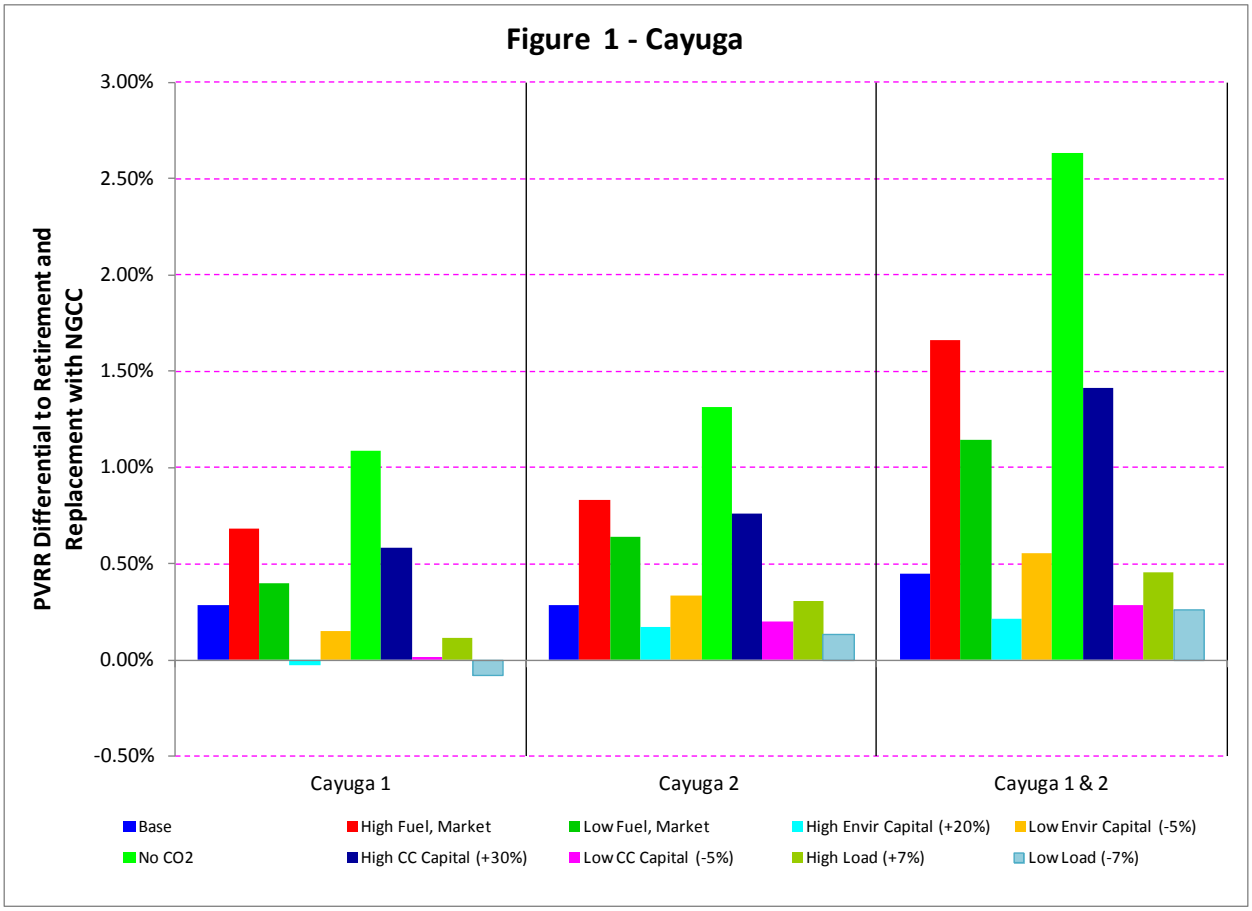
The results of the Wabash River Units 2-6 retirement analysis and the option to convert Wabash River 6 to natural gas are shown in the following Exhibits, which are attached to my testimony:

- Wabash River
  - Exhibit F-22 – Wabash River Unit 2-5
  - Exhibit F-23 – Wabash River Unit 6
  - Exhibit F-24 – Wabash River Unit 6 Natural Gas Conversion
  - Exhibit F-25 – Wabash River Unit 6 Derate 3 Year Life
  - Exhibit F-26 – Wabash River Unit 6 Derate 14 Year Life
  - Exhibit F-27 – Wabash River Expansion Plans

The results for each station will be discussed in more detail below.

Q. PLEASE DISCUSS THE RESULTS OF YOUR ANALYSES FOR CAYUGA.

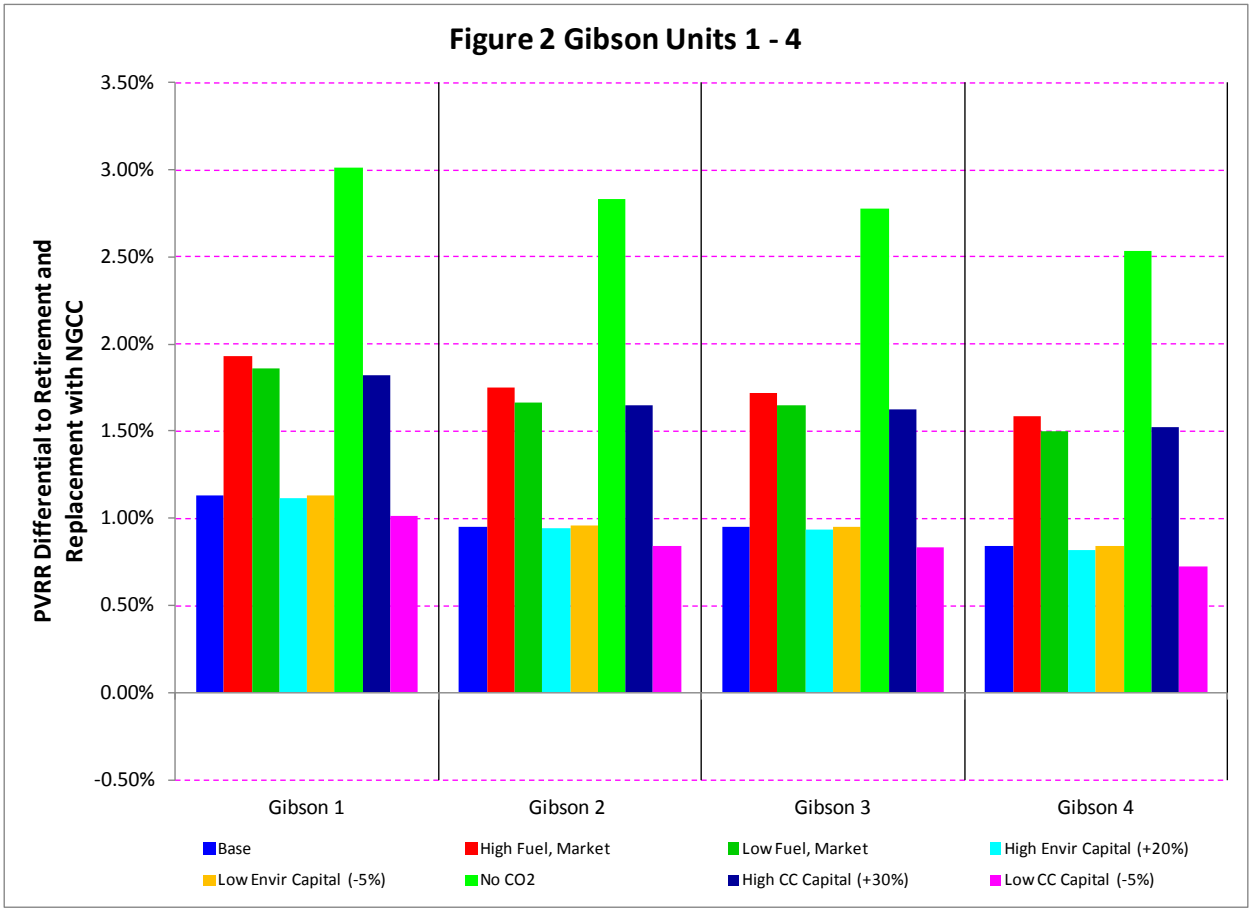
A. The Cayuga Phase 2 and preliminary Phase 3 environmental projects were evaluated on an individual unit basis and on a total basis. The capital cost associated with Cayuga Unit 1 is expected to be higher than Cayuga Unit 2 primarily due to incorporating the engineering cost and shared system cost of both units for several of the environmental projects into Unit 1's cost. The project cost separation for each unit is provided in the testimony of Mr. Miller. An overview over the range of sensitivities is shown in Figure 1 below:



Although I have shown the economics for the Cayuga units separately, the combined Cayuga Units 1 and 2 analysis is the proper way to view the economics due to the shared cost allocations. The modeling shows that installation of Phase 2 and currently expected Phase 3 controls on Cayuga Units 1 and 2 is cost effective by 0.45% versus retirement and replacement with combined cycle generation on a total system PVRR basis. The installation of Phase 2 and currently expected Phase 3 environmental controls on Cayuga is also the most cost effective option versus retirement in all of the sensitivities, ranging from 0.21 % in the High Environmental Capital cost scenario to 2.64% when excluding the impacts of CO_2.

Q. PLEASE DISCUSS THE RESULTS OF YOUR ANALYSES FOR GIBSON 1-4.

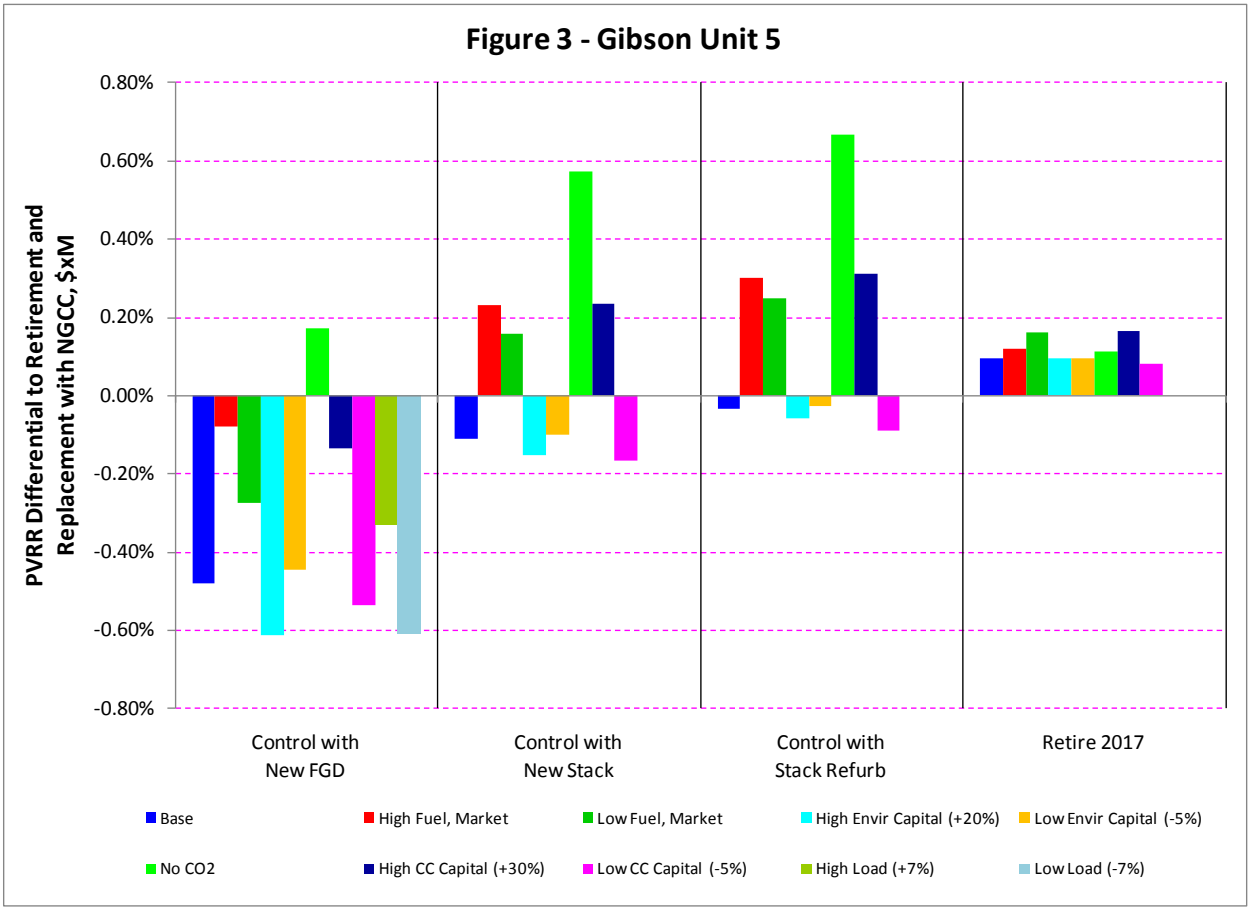
A. Gibson Units 1, 2, 3 and 4 already have advanced FGDs for SO_2 control and SCRs for NOx control that position them well for future environmental regulatory requirements. The Phase 2 and preliminary Phase 3 control options for these units focused mainly on upgrades to existing equipment, reagent injection equipment, monitoring and ash collection and disposal. Each unit was evaluated separately. An overview over the range of sensitivities is shown in Figure 2 below:



In the base case and over the range of sensitivities, installation of Phase 2 and preliminary Phase 3 controls is more cost effective than retirement and replacement with combined cycle generation by more than 0.73% based on total system PVRR.

Q. PLEASE DISCUSS THE RESULTS OF YOUR ANALYSES FOR GIBSON 5.

A. Gibson Unit 5 has an older vintage FGD for SO_2 control that was installed in 1982 and a SCR for NOx control installed to meet the NOx SIP call requirements. Depending on the final environmental requirements discussed by Mr. Geers and Mr. Miller, the existing FGD could be refurbished or a new FGD may be required for compliance. An overview for each option evaluated for Gibson 5 over the range of sensitivities is shown in Figure 3 below:



A range of options for the control of SO_2 was considered for Gibson 5 in addition to the other Phase 2 and preliminary Phase 3 requirements including:

1. Gibson Unit 5 New FGD for SO_2 Control - The results of the analysis including a new FGD for SO_2 control for Gibson Unit 5 is shown in Petitioner's Exhibit F-12.

In the base case, the option to retire and replace the unit with combined cycle is 0.48% better than the installation of Phase 2 and preliminary Phase 3 environmental controls with a new FGD on a system PVRR basis. The only sensitivity where the installation was better than retirement and replacement with a CC was the no CO_2 sensitivity. In this case, the environmental control option was better than retirement and replacement with a CC by 0.17%.

2. Gibson Unit 5 Refurbishment of the Existing FGD with a New Stack - In the base case, the retirement and replacement of Gibson 5 with CC generation is 0.11% more cost effective than the refurbishment of the existing FGD with a new stack, based on the system PVRR. However, in the high and low fuel cost, no CO_2, and higher CC capital cost sensitivities, the refurbishment of the existing FGD is better than retirement and replacing with a CC.

3. Gibson Unit 5 Refurbishment of Both the Existing FGD and Stack - In the base case, the retirement and replacement of Gibson 5 with CC generation is 0.03% more cost effective than the refurbishment of the existing FGD on a system revenue requirement basis. However, in the high and low fuel cost, no CO_2, and higher CC capital cost sensitivities, the refurbishment of the existing FGD is better than retirement and replacing with a CC. In both refurbishment options, the difference in system PVRR is about breakeven with retirement and replacement with combined cycle generation.

Due to the uncertainty of the final environmental requirements and the resulting range of outcomes for Gibson 5, an additional analysis was performed to determine if it remains cost effective to install the Phase 2 environmental controls on Gibson Unit 5 if

the Phase 3 analyses show that the unit should be retired by the end of 2017. This option was compared to retirement in 2015 and replacement with CC generation without the Phase 2 environmental controls. In the base case, the installation of Phase 2 environmental controls is 0.10% more cost effective than retirement and replacing with a CC in 2015 on a system PVRR basis. Over the range of sensitivities, the installation of Phase 2 environmental controls was better than retirement and replacement with a CC in 2015 ranging from 0.08% in the low CC capital cost sensitivity to 0.16% in the low fuel price sensitivity. In other words, even if it turns out that Gibson 5 needs to be retired by 2017, the environmental controls that Duke Energy Indiana is proposing in its Phase 2 plan in this proceeding are still more economic than retiring Gibson 5 earlier in 2015 (which would be required if we did not add the proposed environmental controls).

The bids received from the RFP were also considered as a replacement for Gibson 5 if only Phase 2 environmental controls are installed and the unit is then retired by the end of 2017. Only one of the bids was comparable in operability and size to Gibson 5. The projected fixed O&M and Phase 2 environmental control capital for Gibson 5 to continue to operate through 2017 was less than the capacity charge of the comparable bid. Gibson 5 also has a lower projected operating cost including the Phase 2 environmental controls in the 2015 to 2017 timeframe than the comparable bid. Based on this review, capacity options received from this RFP are not lower cost than continuing to operate Gibson 5 with Phase 2 controls through 2017.

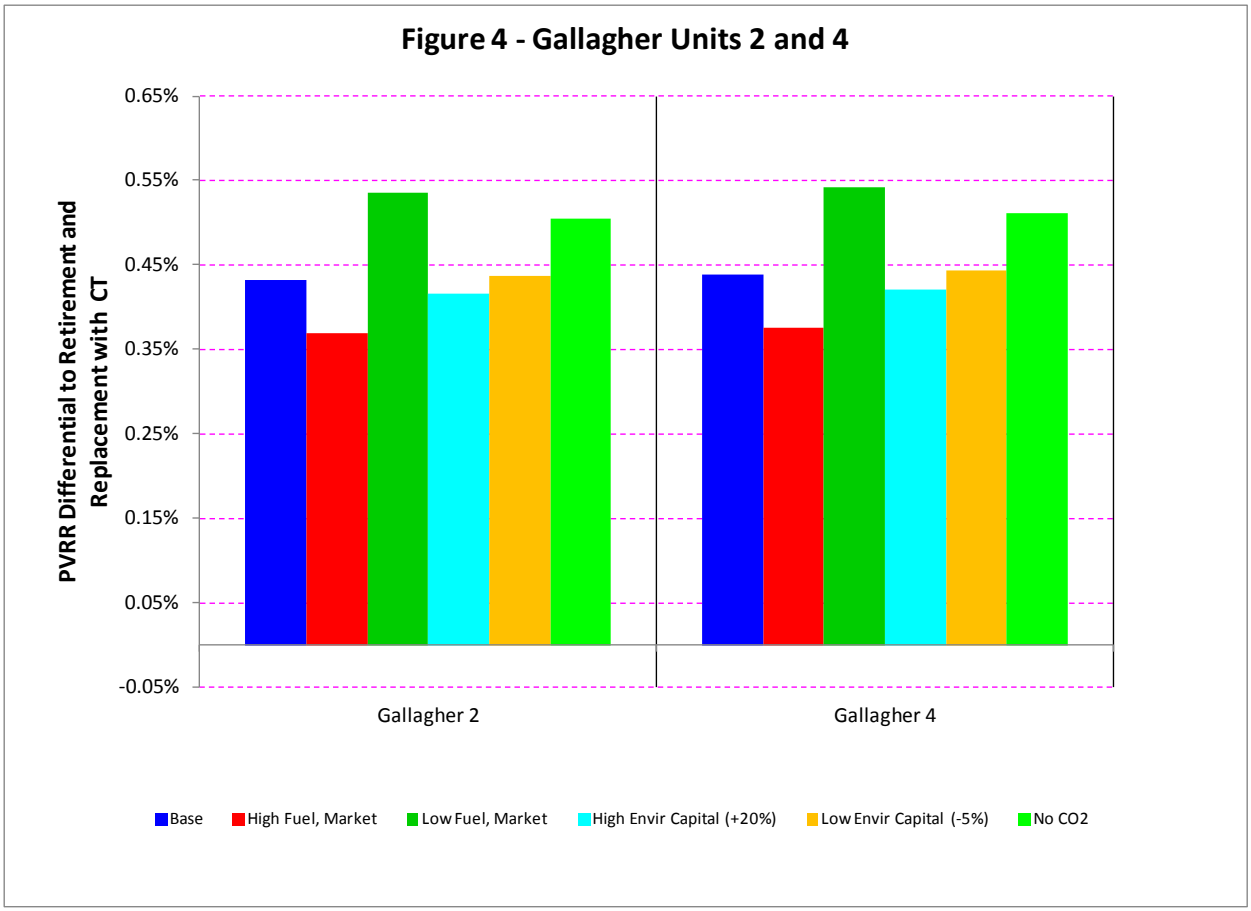
In summary, the decision to upgrade the existing scrubber at Gibson Unit 5 or install a new FGD does not need to be made until 2013. The Company's analysis also shows the Phase 2 controls are cost effective even if the unit is retired at the end of 2017

and replaced with a CC. Installation of these Phase 2 controls preserves the option of continuing to operate the unit longer-term while we await the outcome of the NAAQS and other regulatory uncertainties.

Q. PLEASE DISCUSS THE RESULTS OF YOUR ANALYSES FOR GALLAGHER 2 & 4.

A. Gallagher Units 2 and 4 already have baghouses and dry ash handling systems installed that allow for some level of SO_2 and mercury control that position them well for future environmental regulatory requirements. The Phase 2 and preliminary Phase 3 environmental control options for these units focused mainly on activated carbon injection, monitoring, waste water treatment, bottom ash collection and disposal and the potential for additional NOx reduction.

An overview over the range of sensitivities is shown in Figure 4 below:

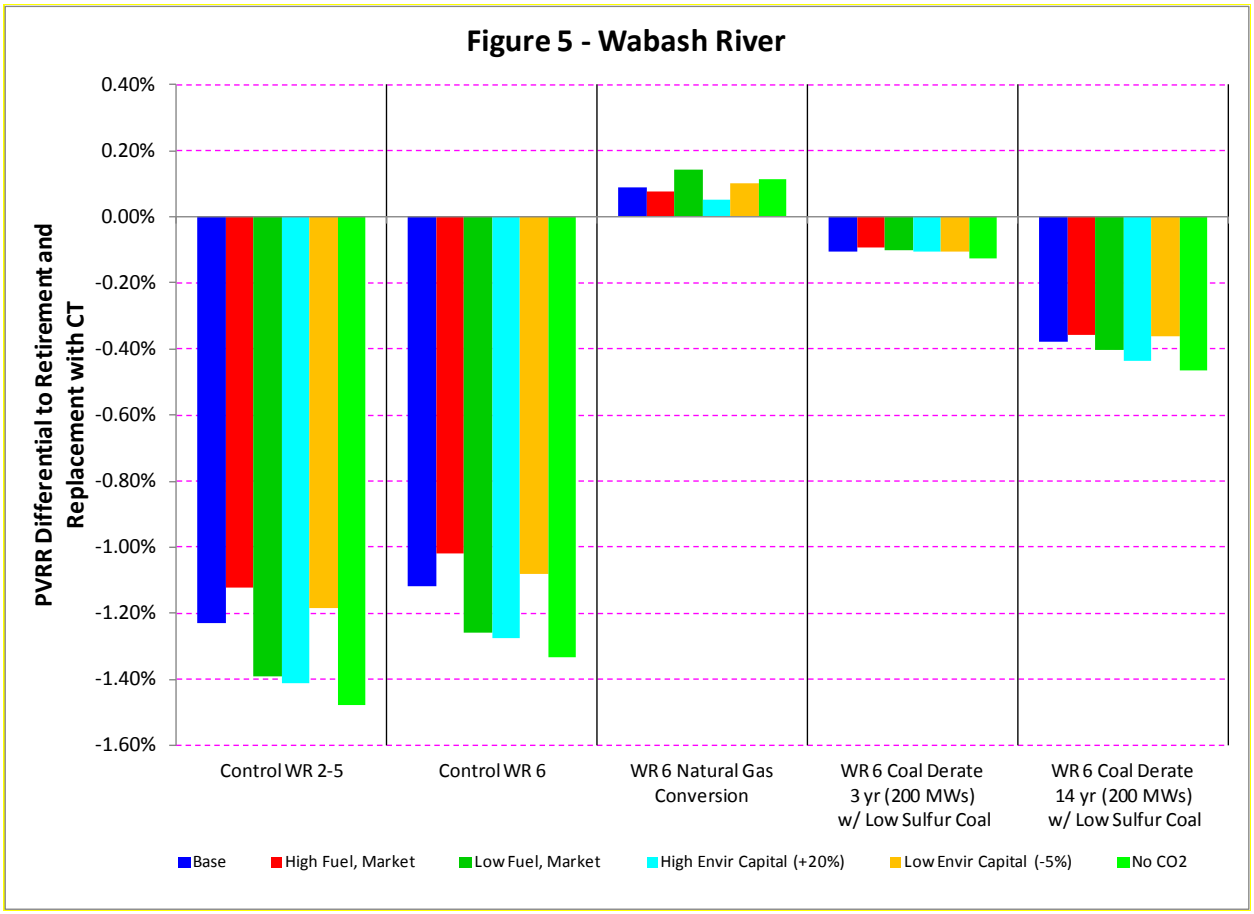


Each unit was evaluated separately, and, in the base case and over the range of sensitivities, installation of the environmental controls is cost effective by more than 0.37% versus retirement and replacement with combustion turbine generation on a system PVRR basis.

Q. PLEASE DISCUSS THE RESULTS OF YOUR ANALYSES FOR WABASH RIVER.

A. Wabash River Units 2-6 do not have any advanced environmental controls and have significant risk of incurring additional costs associated with the MATS rule in 2015 and, longer-term, the new SO_2 NAAQS, and emerging water and coal combustion by-product regulations if they continue to operate on coal. The control options considered for Wabash River 2-5 and for Wabash River 6 are discussed in Mr. Miller's testimony.

An overview over the range of sensitivities is shown in Figure 5 below:



The retirement of Wabash River 2-5 and replacement with Combustion Turbine generation is more cost effective by 1.23% than the installation of environmental controls. The results were similar for the Wabash River 6 retirement option, which is more cost effective by 1.12% than the installation of environmental controls.

Two other options were considered in lieu of retirement for Wabash River Unit 6:

1. Conversion to Natural Gas
2. Switch to low sulfur coal and derate to 200 MWs.

In the Natural Gas Conversion case, Wabash Unit 6 converted to natural gas was compared to replacement with a combustion turbine. Based on a projected 10-year life

for the converted unit, the conversion to natural gas was more cost effective than retirement and replacement with a combustion turbine by 0.09% on a system PVRR basis. A reduced life of 10 years was used because there is a risk of additional expenditures due to the age of the unit and potential environmental regulations that could impact the unit. Detailed engineering and cost estimates have not yet been developed for this option; however, this initial analysis demonstrates this could be a viable alternative for meeting the capacity need in the 2016 timeframe. Once we have completed additional detailed engineering and analyses and made decisions concerning Wabash River 6, we will come back to this Commission for the appropriate approvals (whether for retirement or conversion).

Derating Wabash River Unit 6 to 200 MWs and switching coal types was also evaluated as a low capital cost option to retirement. It was evaluated for a three-year life, which assumes retirement before significant water and coal combustion by-product modifications are expected to be required and over a fourteen year life incorporating these costs. The analysis of the three-year life of the converted unit, demonstrated that the retirement in 2015 and replacement with a combustion turbine was more cost effective than derating Wabash River Unit 6 and then retiring it at the end of 2017 by 0.10% on a system PVRR basis. The analysis of the 14-year life, incorporating the water and coal combustion by-product costs, demonstrated that the retirement in 2015 and replacement with a combustion turbine was more cost effective than derating Wabash River Unit 6 by 0.38% on a system PVRR basis. In addition, a preliminary assessment of this option does not show conclusively that the derate option would meet the MATS requirements in 2015.

IV. CONCLUSIONS

Q. BASED ON YOUR ANALYSES, DO YOU BELIEVE THAT INCURRING THE PHASE 2 ENVIRONMENTAL COSTS IS THE MOST REASONABLE OPTION FOR SERVING THE CAPACITY AND ENERGY NEEDS OF DUKE ENERGY INDIANA'S CUSTOMERS?

A. Yes, my team's analyses demonstrate that proposed Phase 2 environmental projects at Cayuga Units 1-2, Gibson Units 1-4, and Gallagher Units 2 and 4 are cost effective, even after taking into account the projected costs of the preliminary Phase 3 environmental projects.

In addition, the Phase 2 projects for Gibson 5 are in the best interest of Duke Energy Indiana customers over a variety of analyses. Multiple options were considered for Gibson 5 including structural upgrades to the existing FGD, replacement of the existing FGD with a new FGD, and the installation of Phase 2 environmental projects and retirement at the end of 2017. Again, I want to emphasize that the decision to upgrade the existing FGD, install a new FGD, or retire and replace with natural gas combined cycle generation will not be made until there is clarity with regard to the compliance requirements associated with the SO_2 NAAQS. However, our analysis shows that the Phase 2 cost is justified under any of the potential outcomes reviewed.

These analyses confirm the findings in the 2011 IRP that retirement of Wabash River 2-6 and replacement with combustion turbine generation is more cost effective than installing controls and continuing to operate on coal. However, these analyses demonstrate that the conversion Wabash River 6 to natural gas could be a cost effective

alternative to retirement. Again, no final decision on this has yet been made, detailed engineering has not yet been performed and the results of this analysis were provided in this proceeding for informational purposes.

In conclusion, our analyses support the Company's proposed Phase 2 projects for Cayuga 1 and 2, Gallagher 2 and 4, and Gibson 1 – 5.

Q. WERE PETITIONER'S EXHIBITS F-1 THROUGH F-27 PREPARED BY YOU OR AT YOUR DIRECTION?

A. Yes.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

Petitioner's Exhibit F-1

Cayuga Unit 1

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	0.10%
1a	**High Fuel, Market Prices**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	0.68%
1b	**Low Fuel, Market Prices**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	0.40%
1c	**High Env. Capital**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	-0.03%
1d	**Low Env. Capital**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	0.15%
1e	**No CO2**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	1.09%
1f	**High CC Capital**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	0.58%
1g	**Low CC Capital**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	0.01%
1h	**High Load**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	0.11%
1i	**Low Load**	Control Cayuga 1	[redacted]		
		Retire Cayuga 1, Replace with Combined Cycle		[redacted]	-0.08%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-2

Cayuga Unit 2

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	0.28%
1a	**High Fuel, Market Prices**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	0.83%
1b	**Low Fuel, Market Prices**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	0.64%
1c	**High Env. Capital**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	0.17%
1d	**Low Env. Capital**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	0.33%
1e	**No CO2**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	1.32%
1f	**High CC Capital**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	0.76%
1g	**Low CC Capital**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	0.20%
1h	**High Load**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	0.31%
1i	**Low Load**	Control Cayuga 2	[redacted]		
		Retire Cayuga 2, Replace with Combined Cycle		[redacted]	0.13%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-3

Cayuga Unit 1 and 2 Combined

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	0.45%
1a	**High Fuel, Market Prices**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	1.66%
1b	**Low Fuel, Market Prices**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	1.14%
1c	**High Env. Capital**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	0.21%
1d	**Low Env. Capital**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	0.55%
1e	**No CO2**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	2.64%
1f	**High CC Capital**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	1.41%
1g	**Low CC Capital**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	0.29%
1h	**High Load**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	0.46%
1i	**Low Load**	Control Cayuga 1&2 Retire Cayuga 1&2, Replace with Combined Cycle	[redacted]	[redacted]	0.26%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-4

Cayuga Unit 1 and 2 Phase 2 and Preliminary Phase 3 Compliance - Expansion Plans

Control Cayuga 1 & 2

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-668						-166											
New CC	700										350						350					
New CT	673					201								201						201		70
Reserve Margin		18.5%	27.2%	26.1%	15.2%	16.5%	16.9%	17.0%	16.9%	17.4%	19.2%	17.2%	16.1%	17.5%	16.6%	15.7%	19.5%	16.9%	15.6%	16.4%	15.6%	15.8%

Retire Cayuga 1, Replace with Combined Cycle and Control Cayuga 2

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,604	-280			-1158						-166											
New CC	1,190				490						350						350					
New CT	668					201								201						201		65
Reserve Margin		18.5%	27.2%	26.1%	15.2%	16.5%	16.9%	17.1%	16.9%	17.5%	19.2%	17.3%	16.2%	17.6%	16.7%	15.7%	19.5%	16.9%	15.6%	16.4%	15.7%	15.8%

Retire Cayuga 2, Replace with Combined Cycle and Control Cayuga 1

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,599	-280			-1153						-166											
New CC	1,185				485						350						350					
New CT	668					201								201						201		65
Reserve Margin		18.5%	27.2%	26.1%	15.2%	16.5%	16.9%	17.1%	16.9%	17.5%	19.2%	17.3%	16.2%	17.6%	16.7%	15.7%	19.5%	16.9%	15.6%	16.4%	15.7%	15.8%

Retire Cayuga 1 and 2 and Replace with Combined Cycle

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,604	-280			-1,643						-166											
New CC	1,675				975						350						350					
New CT	668					201								201						201		65
Reserve Margin		18.5%	27.2%	26.1%	15.2%	16.5%	16.9%	17.1%	16.9%	17.5%	19.2%	17.3%	16.2%	17.6%	16.7%	15.7%	19.5%	16.9%	15.6%	16.4%	15.7%	15.8%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-5

Cayuga Unit 1 and 2 Phase 2 and Preliminary Phase 3 Compliance - Expansion Plans (High Load)

Control Cayuga 1 & 2

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-668						-166											
New CC	1,400					700							350				350					
New CT	663										402									201		60
Reserve Margin		15.1%	18.1%	17.0%	15.1%	15.6%	15.9%	15.9%	15.7%	16.1%	18.5%	15.3%	19.3%	17.5%	16.5%	15.6%	18.9%	16.5%	15.2%	15.8%	15.1%	14.9%

Retire Cayuga 1, Replace with Combined Cycle and Control Cayuga 2

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,604	-280			-1158						-166											
New CC	1,890					1,190							350				350					
New CT	663										402									201		60
Reserve Margin		15.1%	18.1%	17.0%	15.1%	15.6%	15.9%	15.9%	15.7%	16.1%	18.5%	15.3%	19.3%	17.5%	16.5%	15.6%	18.9%	16.5%	15.2%	15.8%	15.1%	14.9%

Retire Cayuga 2, Replace with Combined Cycle and Control Cayuga 1

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,599	-280			-1153						-166											
New CC	1,885					1,185							350				350					
New CT	663										402									201		60
Reserve Margin		15.1%	18.1%	17.0%	15.1%	15.6%	15.9%	15.9%	15.7%	16.1%	18.5%	15.3%	19.3%	17.5%	16.5%	15.6%	18.9%	16.5%	15.2%	15.8%	15.1%	14.9%

Retire Cayuga 1 and 2 and Replace with Combined Cycle

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-2,089	-280			-1,643						-166											
New CC	2,375					1,675							350				350					
New CT	663										402									201		60
Reserve Margin		15.1%	18.1%	17.0%	14.9%	15.61%	15.9%	15.9%	15.70%	16.1%	18.5%	15.3%	19.3%	17.5%	16.5%	15.6%	18.9%	16.5%	15.2%	15.8%	15.1%	14.9%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-6

Cayuga Unit 1 and 2 Phase 2 and Preliminary Phase 3 Compliance - Expansion Plans (Low Load)

Control Cayuga 1 & 2

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-668						-166											
New CC	0																					
New CT	603																402			201		
Reserve Margin		26.8%	37.8%	36.7%	25.0%	22.9%	23.4%	23.7%	23.6%	24.3%	20.0%	19.6%	18.5%	16.6%	15.8%	14.9%	20.1%	17.3%	16.0%	17.0%	16.3%	15.7%

Retire Cayuga 1, Replace with Combined Cycle and Control Cayuga 2

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,604	-280			-1158						-166											
New CC	490					490																
New CT	603																402			201		
Reserve Margin		26.8%	37.8%	36.7%	16.0%	22.9%	23.5%	23.7%	23.7%	24.3%	20.1%	19.6%	18.6%	16.7%	15.9%	15.0%	20.2%	17.3%	16.1%	17.1%	16.4%	15.8%

Retire Cayuga 2, Replace with Combined Cycle and Control Cayuga 1

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,599	-280			-1153						-166											
New CC	485					485																
New CT	603																402			201		
Reserve Margin		26.8%	37.8%	36.7%	16.0%	22.8%	23.4%	23.6%	23.6%	24.3%	20.0%	19.5%	18.5%	16.6%	15.8%	14.9%	20.1%	17.3%	16.0%	17.0%	16.3%	15.7%

Retire Cayuga 1 and 2 and Replace with Combined Cycle

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-2,089	-280			-1,643						-166											
New CC	975				975																	
New CT	603																402			201		
Reserve Margin		26.8%	37.8%	36.7%	25.1%	22.91%	23.5%	23.7%	23.70%	24.3%	20.1%	19.6%	18.6%	16.7%	15.9%	15.0%	20.2%	17.3%	16.1%	17.1%	16.4%	15.8%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-7

Gibson Unit 1

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Gibson 1	[redacted]		
		Retire Gibson 1, Replace with Combined Cycle		[redacted]	1.13%
1a	**High Fuel, Market Prices**	Control Gibson 1	[redacted]		
		Retire Gibson 1, Replace with Combined Cycle		[redacted]	1.93%
1b	**Low Fuel, Market Prices**	Control Gibson 1	[redacted]		
		Retire Gibson 1, Replace with Combined Cycle		[redacted]	1.86%
1c	**High Env. Capital**	Control Gibson 1	[redacted]		
		Retire Gibson 1, Replace with Combined Cycle		[redacted]	1.12%
1d	**Low Env. Capital**	Control Gibson 1	[redacted]		
		Retire Gibson 1, Replace with Combined Cycle		[redacted]	1.13%
1e	**No CO2**	Control Gibson 1	[redacted]		
		Retire Gibson 1, Replace with Combined Cycle		[redacted]	3.01%
1f	**High CC Capital**	Control Gibson 1	[redacted]		
		Retire Gibson 1, Replace with Combined Cycle		[redacted]	1.82%
1g	**Low CC Capital**	Control Gibson 1	[redacted]		
		Retire Gibson 1, Replace with Combined Cycle		[redacted]	1.01%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-8

Gibson Unit 2

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Gibson 2	[redacted]		
		Retire Gibson 2, Replace with Combined Cycle		[redacted]	0.95%
1a	**High Fuel, Market Prices**	Control Gibson 2	[redacted]		
		Retire Gibson 2, Replace with Combined Cycle		[redacted]	1.75%
1b	**Low Fuel, Market Prices**	Control Gibson 2	[redacted]		
		Retire Gibson 2, Replace with Combined Cycle		[redacted]	1.67%
1c	**High Env. Capital**	Control Gibson 2	[redacted]		
		Retire Gibson 2, Replace with Combined Cycle		[redacted]	0.94%
1d	**Low Env. Capital**	Control Gibson 2	[redacted]		
		Retire Gibson 2, Replace with Combined Cycle		[redacted]	0.96%
1e	**No CO2**	Control Gibson 2	[redacted]		
		Retire Gibson 2, Replace with Combined Cycle		[redacted]	2.83%
1f	**High CC Capital**	Control Gibson 2	[redacted]		
		Retire Gibson 2, Replace with Combined Cycle		[redacted]	1.65%
1g	**Low CC Capital**	Control Gibson 2	[redacted]		
		Retire Gibson 2, Replace with Combined Cycle		[redacted]	0.84%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-9

Gibson Unit 3

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Gibson 3	[redacted]		
		Retire Gibson 3, Replace with Combined Cycle		[redacted]	0.95%
1a	**High Fuel, Market Prices**	Control Gibson 3	[redacted]		
		Retire Gibson 3, Replace with Combined Cycle		[redacted]	1.72%
1b	**Low Fuel, Market Prices**	Control Gibson 3	[redacted]		
		Retire Gibson 3, Replace with Combined Cycle		[redacted]	1.65%
1c	**High Env. Capital**	Control Gibson 3	[redacted]		
		Retire Gibson 3, Replace with Combined Cycle		[redacted]	0.93%
1d	**Low Env. Capital**	Control Gibson 3	[redacted]		
		Retire Gibson 3, Replace with Combined Cycle		[redacted]	0.95%
1e	**No CO2**	Control Gibson 3	[redacted]		
		Retire Gibson 3, Replace with Combined Cycle		[redacted]	2.78%
1f	**High CC Capital**	Control Gibson 3	[redacted]		
		Retire Gibson 3, Replace with Combined Cycle		[redacted]	1.63%
1g	**Low CC Capital**	Control Gibson 3	[redacted]		
		Retire Gibson 3, Replace with Combined Cycle		[redacted]	0.83%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-10

Gibson Unit 4

Phase 2 and Preliminary Phase 3 Compliance Plans

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Gibson 4 Retire Gibson 4, Replace with Combined Cycle	[redacted]	[redacted]	0.84%
1a	**High Fuel, Market Prices**	Control Gibson 4 Retire Gibson 4, Replace with Combined Cycle	[redacted]	[redacted]	1.59%
1b	**Low Fuel, Market Prices**	Control Gibson 4 Retire Gibson 4, Replace with Combined Cycle	[redacted]	[redacted]	1.50%
1c	**High Env. Capital**	Control Gibson 4 Retire Gibson 4, Replace with Combined Cycle	[redacted]	[redacted]	0.82%
1d	**Low Env. Capital**	Control Gibson 4 Retire Gibson 4, Replace with Combined Cycle	[redacted]	[redacted]	0.84%
1e	**No CO2**	Control Gibson 4 Retire Gibson 4, Replace with Combined Cycle	[redacted]	[redacted]	2.54%
1f	**High CC Capital**	Control Gibson 4 Retire Gibson 4, Replace with Combined Cycle	[redacted]	[redacted]	1.52%
1g	**Low CC Capital**	Control Gibson 4 Retire Gibson 4, Replace with Combined Cycle	[redacted]	[redacted]	0.73%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-11

Gibson Unit 1 - 4 Phase 2 and Preliminary Phase 3 Compliance - Expansion Plans

Control Gibson 1 - 4

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-668						-166											
New CC	700										350						350					
New CT	673					201								201						201		70
Reserve Margin		18.5%	27.2%	26.1%	15.2%	16.5%	16.9%	17.0%	16.9%	17.4%	19.2%	17.2%	16.1%	17.5%	16.6%	15.7%	19.5%	16.9%	15.6%	16.4%	15.6%	15.8%

Gibson 1 Retirement, Replace with Combined Cycle and Control Gibson 2 - 4

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-1,298						-166											
New CC	1,400				700						350						350					
New CT	603					201									201					201		
Reserve Margin		18.5%	27.2%	26.1%	16.4%	17.6%	18.1%	18.2%	18.0%	18.6%	20.3%	18.3%	17.3%	15.5%	17.7%	16.8%	20.5%	17.9%	16.6%	17.3%	16.6%	15.8%

Gibson 2 Retirement, Replace with Combined Cycle and Control Gibson 1, 3, & 4

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-1,298						-166											
New CC	1,400				700						350						350					
New CT	603					201									201					201		
Reserve Margin		18.5%	27.2%	26.1%	16.4%	17.6%	18.1%	18.2%	18.0%	18.6%	20.3%	18.3%	17.3%	15.5%	17.7%	16.8%	20.5%	17.9%	16.6%	17.3%	16.6%	15.8%

Gibson 3 Retirement, Replace with Combined Cycle and Control Gibson 1, 2, & 4

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-1,298						-166											
New CC	1,400				700						350						350					
New CT	603					201									201					201		
Reserve Margin		18.5%	27.2%	26.1%	16.4%	17.6%	18.1%	18.2%	18.0%	18.6%	20.3%	18.3%	17.3%	15.5%	17.7%	16.8%	20.5%	17.9%	16.6%	17.4%	16.6%	15.8%

Gibson 4 Retirement, Replace with Combined Cycle and Control Gibson 1 - 3

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-1,290						-166											
New CC	1,400				700						350						350					
New CT	603					201									201					190		
Reserve Margin		18.5%	27.2%	26.1%	16.5%	17.8%	18.2%	18.3%	18.2%	18.7%	20.4%	18.5%	17.4%	15.6%	17.8%	16.9%	20.6%	18.0%	16.7%	17.3%	16.6%	15.8%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-12

Gibson Unit 5 (New FGD)

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.48%
1a	**High Fuel, Market Prices**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.08%
1b	**Low Fuel, Market Prices**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.27%
1c	**High Env. Capital**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.61%
1d	**Low Env. Capital**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.45%
1e	**No CO2**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	0.17%
1f	**High CC Capital**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.14%
1g	**Low CC Capital**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.54%
1f	**High Load**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.33%
1f	**Low Load**	Control Gibson 5 (New FGD) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.61%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-13

Gibson Unit 5 (Existing FGD New Stack)

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Gibson 5 (New Stack) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.11%
1a	**High Fuel, Market Prices**	Control Gibson 5 (New Stack) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	0.23%
1b	**Low Fuel, Market Prices**	Control Gibson 5 (New Stack) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	0.16%
1c	**High Env. Capital**	Control Gibson 5 (New Stack) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.15%
1d	**Low Env. Capital**	Control Gibson 5 (New Stack) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.10%
1e	**No CO2**	Control Gibson 5 (New Stack) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	0.57%
1f	**High CC Capital**	Control Gibson 5 (New Stack) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	0.23%
1g	**Low CC Capital**	Control Gibson 5 (New Stack) Retire Gibson 5, Replace with Combined Cycle	[redacted]	[redacted]	-0.17%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-14

Gibson Unit 5 (Existing FGD and Stack)

Phase 2 and Preliminary Phase 3 Compliance Plans

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Gibson 5 (Refurbish Stack) Retire Gibson 5 Struct Refurb, Replace with Combined Cycle	[redacted]	[redacted]	-0.03%
1a	**High Fuel, Market Prices**	Control Gibson 5 (Refurbish Stack) Retire Gibson 5 Struct Refurb, Replace with Combined Cycle	[redacted]	[redacted]	0.30%
1b	**Low Fuel, Market Prices**	Control Gibson 5 (Refurbish Stack) Retire Gibson 5 Struct Refurb, Replace with Combined Cycle	[redacted]	[redacted]	0.25%
1c	**High Env. Capital**	Control Gibson 5 (Refurbish Stack) Retire Gibson 5 Struct Refurb, Replace with Combined Cycle	[redacted]	[redacted]	-0.06%
1d	**Low Env. Capital**	Control Gibson 5 (Refurbish Stack) Retire Gibson 5 Struct Refurb, Replace with Combined Cycle	[redacted]	[redacted]	-0.03%
1e	**No CO2**	Control Gibson 5 (Refurbish Stack) Retire Gibson 5 Struct Refurb, Replace with Combined Cycle	[redacted]	[redacted]	0.67%
1f	**High CC Capital**	Control Gibson 5 (Refurbish Stack) Retire Gibson 5 Struct Refurb, Replace with Combined Cycle	[redacted]	[redacted]	0.31%
1g	**Low CC Capital**	Control Gibson 5 (Refurbish Stack) Retire Gibson 5 Struct Refurb, Replace with Combined Cycle	[redacted]	[redacted]	-0.09%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-15

Gibson Unit 5 (Controls in 2015, Retire 2017)

Phase 2 and Preliminary Phase 3 Compliance Plans

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Controls in 2015, Retire Gibson 5 2017	[redacted]		
		Retire Gibson 5 2015, Replace with Combined Cycle		[redacted]	0.10%
1a	**High Fuel, Market Prices**	Controls in 2015, Retire Gibson 5 2017	[redacted]		
		Retire Gibson 5 2015, Replace with Combined Cycle		[redacted]	0.12%
1b	**Low Fuel, Market Prices**	Controls in 2015, Retire Gibson 5 2017	[redacted]		
		Retire Gibson 5 2015, Replace with Combined Cycle		[redacted]	0.16%
1c	**High Env. Capital**	Controls in 2015, Retire Gibson 5 2017	[redacted]		
		Retire Gibson 5 2015, Replace with Combined Cycle		[redacted]	0.10%
1d	**Low Env. Capital**	Controls in 2015, Retire Gibson 5 2017	[redacted]		
		Retire Gibson 5 2015, Replace with Combined Cycle		[redacted]	0.10%
1e	**No CO2**	Controls in 2015, Retire Gibson 5 2017	[redacted]		
		Retire Gibson 5 2015, Replace with Combined Cycle		[redacted]	0.11%
1f	**High CC Capital**	Controls in 2015, Retire Gibson 5 2017	[redacted]		
		Retire Gibson 5 2015, Replace with Combined Cycle		[redacted]	0.17%
1g	**Low CC Capital**	Controls in 2015, Retire Gibson 5 2017	[redacted]		
		Retire Gibson 5 2015, Replace with Combined Cycle		[redacted]	0.08%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-16

Gibson Unit 5 Phase 2 and Preliminary Phase 3 Compliance - Expansion Plans

Control Gibson 5 - New FGD / Existing FGD with New Stack / Existing FGD and Stack

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-668						-166											
New CC	700										350						350					
New CT	673					201								201						201		70
Reserve Margin		18.5%	27.2%	26.1%	15.2%	16.5%	16.9%	17.0%	16.9%	17.4%	19.2%	17.2%	16.1%	17.5%	16.6%	15.7%	19.5%	16.9%	15.6%	16.4%	15.6%	15.8%

Gibson 5 2015 Retirement, Replace with Combined Cycle

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,424	-280			-978						-166											
New CC	1,050				350						350						350					
New CT	633					201								201						201		30
Reserve Margin		18.5%	27.2%	26.1%	15.9%	17.1%	17.6%	17.7%	17.5%	18.1%	19.8%	17.9%	16.8%	18.2%	17.2%	16.3%	20.1%	17.4%	16.2%	16.9%	16.2%	15.8%

Gibson 5 Controls, Retire 2017, Replace with Combined Cycle

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,424	-280			-668			-310			-166											
New CC	1,050							350			350						350					
New CT	633					201								201						201		30
Reserve Margin		18.5%	27.2%	26.1%	15.2%	16.5%	16.9%	17.7%	17.5%	18.1%	19.8%	17.9%	16.8%	18.2%	17.2%	16.3%	20.1%	17.4%	16.2%	16.9%	16.2%	15.8%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-17

Gibson Unit 5 Phase 2 and Preliminary Phase 3 Compliance - Expansion Plans (High Load)

Control Gibson 5 - New FGD

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-668						-166											
New CC	1,400					700							350				350					
New CT	663										402									201		60
Reserve Margin		15.1%	18.1%	17.0%	15.1%	15.6%	15.9%	15.9%	15.7%	16.1%	18.5%	15.3%	19.3%	17.5%	16.5%	15.6%	18.9%	16.5%	15.2%	15.8%	15.1%	14.9%

Gibson 5 2015 Retirement, Replace with Combined Cycle

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,424	-280			-978						-166											
New CC	1,750					1,050							350				350					
New CT	623										402									201		20
Reserve Margin		15.1%	18.1%	17.0%	20.0%	16.2%	16.5%	16.6%	16.3%	16.8%	19.1%	15.9%	19.9%	18.1%	17.1%	16.2%	19.5%	17.0%	15.8%	16.3%	15.6%	14.9%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-18

Gibson Unit 5 Phase 2 and Preliminary Phase 3 Compliance - Expansion Plans (Low Load)

Control Gibson 5 - New FGD

	Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-668						-166											
New CC	0																					
New CT	603																402			201		
Reserve Margin		26.8%	37.8%	36.7%	25.0%	22.9%	23.4%	23.7%	23.6%	24.3%	20.0%	19.6%	18.5%	16.6%	15.8%	14.9%	20.1%	17.3%	16.0%	17.0%	16.3%	15.7%

Gibson 5 2015 Retirement, Replace with Combined Cycle

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,424	-280			-978						-166											
New CC	350					350																
New CT	562																402			160		
Reserve Margin		26.8%	37.8%	36.7%	19.3%	23.58%	24.2%	24.4%	24.37%	25.0%	20.7%	20.3%	19.2%	17.3%	16.5%	15.6%	20.8%	17.9%	16.7%	17.0%	16.3%	15.7%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-19

Gallagher Unit 2

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Gallagher 2	[redacted]		
		Retire Gallagher 2, Replace with CT		[redacted]	0.43%
1a	**High Fuel, Market Prices**	Control Gallagher 2	[redacted]		
		Retire Gallagher 2, Replace with CT		[redacted]	0.37%
1b	**Low Fuel, Market Prices**	Control Gallagher 2	[redacted]		
		Retire Gallagher 2, Replace with CT		[redacted]	0.54%
1c	**High Env. Capital**	Control Gallagher 2	[redacted]		
		Retire Gallagher 2, Replace with CT		[redacted]	0.42%
1d	**Low Env. Capital**	Control Gallagher 2	[redacted]		
		Retire Gallagher 2, Replace with CT		[redacted]	0.44%
1e	**No CO2**	Control Gallagher 2	[redacted]		
		Retire Gallagher 2, Replace with CT		[redacted]	0.50%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-20

Gallagher Unit 4

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Gallagher 4	[redacted]		
		Retire Gallagher 4, Replace with CT		[redacted]	0.44%
1a	**High Fuel, Market Prices**	Control Gallagher 4	[redacted]		
		Retire Gallagher 4, Replace with CT		[redacted]	0.37%
1b	**Low Fuel, Market Prices**	Control Gallagher 4	[redacted]		
		Retire Gallagher 4, Replace with CT		[redacted]	0.54%
1c	**High Env. Capital**	Control Gallagher 4	[redacted]		
		Retire Gallagher 4, Replace with CT		[redacted]	0.42%
1d	**Low Env. Capital**	Control Gallagher 4	[redacted]		
		Retire Gallagher 4, Replace with CT		[redacted]	0.44%
1e	**No CO2**	Control Gallagher 4	[redacted]		
		Retire Gallagher 4, Replace with CT		[redacted]	0.51%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-21

Gallagher Unit 2 and 4 Phase 2 and Preliminary Phase 3 Compliance - Expansion Plans

Control Gallagher 2 and 4

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-668						-166											
New CC	350																350					
New CT	1,020					201					201	201		201						201		15
Reserve Margin		18.5%	27.2%	26.1%	15.2%	16.5%	16.9%	17.0%	16.9%	17.4%	16.7%	18.1%	17.0%	18.4%	17.4%	16.5%	20.2%	17.6%	16.4%	17.1%	16.4%	15.8%

Gallagher 2 Retirement - Replace with Combustion Turbine and Control Gallagher 4

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,254	-280			-808						-166											
New CC	350																350					
New CT	1,160				201	201					201		201		201					155		
Reserve Margin		18.5%	27.2%	26.1%	16.2%	17.5%	17.9%	18.0%	17.9%	18.4%	17.7%	15.8%	17.9%	16.2%	18.4%	17.4%	21.2%	18.5%	17.2%	17.3%	16.6%	15.8%

Gallagher 4 Retirement - Replace with Combustion Turbine and Control Gallagher 2

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,254	-280			-808						-166											
New CC	350																350					
New CT	1,160				201	201					201		201		201					155		
Reserve Margin		18.5%	27.2%	26.1%	16.2%	17.5%	17.9%	18.0%	17.9%	18.4%	17.7%	15.8%	17.9%	16.2%	18.4%	17.4%	21.2%	18.5%	17.2%	17.3%	16.6%	15.8%

Note: Plans assume retirement of Wabash River 2-6 in 2015 per the 2011 IRP

Petitioner's Exhibit F-22

Wabash River Unit 2, 3, 4, 5

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Wabash River 2-5	[redacted]		
		Retire Wabash River 2-5, Replace with CT		[redacted]	-1.23%
1a	**High Fuel, Market Prices**	Control Wabash River 2-5	[redacted]		
		Retire Wabash River 2-5, Replace with CT		[redacted]	-1.12%
1b	**Low Fuel, Market Prices**	Control Wabash River 2-5	[redacted]		
		Retire Wabash River 2-5, Replace with CT		[redacted]	-1.39%
1c	**High Env. Capital**	Control Wabash River 2-5	[redacted]		
		Retire Wabash River 2-5, Replace with CT		[redacted]	-1.41%
1d	**Low Env. Capital**	Control Wabash River 2-5	[redacted]		
		Retire Wabash River 2-5, Replace with CT		[redacted]	-1.19%
1e	**No CO2**	Control Wabash River 2-5	[redacted]		
		Retire Wabash River 2-5, Replace with CT		[redacted]	-1.48%

Note: Plans assume retirement of Wabash River 6 in 2015

Petitioner's Exhibit F-23

Wabash River Unit 6

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Control Wabash River 6	[redacted]		
		Retire Wabash River 6, Replace with CT		[redacted]	-1.12%
1a	**High Fuel, Market Prices**	Control Wabash River 6	[redacted]		
		Retire Wabash River 6, Replace with CT		[redacted]	-1.02%
1b	**Low Fuel, Market Prices**	Control Wabash River 6	[redacted]		
		Retire Wabash River 6, Replace with CT		[redacted]	-1.26%
1c	**High Env. Capital**	Control Wabash River 6	[redacted]		
		Retire Wabash River 6, Replace with CT		[redacted]	-1.28%
1d	**Low Env. Capital**	Control Wabash River 6	[redacted]		
		Retire Wabash River 6, Replace with CT		[redacted]	-1.08%
1e	**No CO2**	Control Wabash River 6	[redacted]		
		Retire Wabash River 6, Replace with CT		[redacted]	-1.33%

Note: Plans assume retirement of Wabash River 2-5 in 2015

Petitioner's Exhibit F-24

Wabash River Unit 6 Natural Gas Conversion

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total System Costs (PVRR 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Wabash River 6 Natural Gas Conversion 10 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	0.09%
1a	**High Fuel, Market Prices**	Wabash River 6 Natural Gas Conversion 10 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	0.08%
1b	**Low Fuel, Market Prices**	Wabash River 6 Natural Gas Conversion 10 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	0.14%
1c	**High Env. Capital**	Wabash River 6 Natural Gas Conversion 10 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	0.05%
1d	**Low Env. Capital**	Wabash River 6 Natural Gas Conversion 10 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	0.10%
1e	**No CO2**	Wabash River 6 Natural Gas Conversion 10 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	0.11%

Note: Plans assume retirement of Wabash River 2-5 in 2015

Petitioner's Exhibit F-25

Wabash River Unit 6 Low Sulfur Coal Derated to 200 MWs (3 year life)

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total Costs (NPV 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Wabash River 6 Low Sulfur Coal 200 MW 3 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.10%
1a	**High Fuel, Market Prices**	Wabash River 6 Low Sulfur Coal 200 MW 3 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.09%
1b	**Low Fuel, Market Prices**	Wabash River 6 Low Sulfur Coal 200 MW 3 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.10%
1c	**High Env. Capital**	Wabash River 6 Low Sulfur Coal 200 MW 3 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.10%
1d	**Low Env. Capital**	Wabash River 6 Low Sulfur Coal 200 MW 3 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.10%
1e	**No CO2**	Wabash River 6 Low Sulfur Coal 200 MW 3 year life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.13%

Note: Plans assume retirement of Wabash River 2-5 in 2015

Petitioner's Exhibit F-26

Wabash River Unit 6 Low Sulfur Coal Derated to 200 MWs (14 year life)

(Phase 2 and Preliminary Phase 3 Compliance Plans)

Summary of Total Costs (NPV 2012-2034)					
			Total Cost ($Billon)	**Delta ($Million)**	**Delta**
1	**Base Case**	Wabash River 6 Low Sulfur Coal 200 MW 14yr life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.38%
1a	**High Fuel, Market Prices**	Wabash River 6 Low Sulfur Coal 200 MW 14yr life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.36%
1b	**Low Fuel, Market Prices**	Wabash River 6 Low Sulfur Coal 200 MW 14yr life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.40%
1c	**High Env. Capital**	Wabash River 6 Low Sulfur Coal 200 MW 14yr life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.44%
1d	**Low Env. Capital**	Wabash River 6 Low Sulfur Coal 200 MW 14yr life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.36%
1e	**No CO2**	Wabash River 6 Low Sulfur Coal 200 MW 14yr life Retire Wabash River 6, Replace with CT	[redacted]	[redacted]	-0.46%

Note: Plans assume retirement of Wabash River 2-5 in 2015

Petitioner's Exhibit F-27

Wabash River Phase 2 and Preliminary Phase 3 Compliance - Expansion Plans

Reitre Wabash River 2-6, Replace with a Combustion Turbine

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-668						-166											
New CC	350																350					
New CT	1,020					201					201	201		201						201		15
Reserve Margin		18.5%	27.2%	26.1%	15.2%	16.5%	16.9%	17.0%	16.9%	17.4%	16.7%	18.1%	17.0%	18.4%	17.4%	16.5%	20.2%	17.6%	16.4%	17.1%	16.4%	15.8%

Control Wabash River 2-5 Retire Wabash River 6, Replace with Combustion Turbine

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-764	-280			-318						-166											
New CC	350																350					
New CT	673											201		201		201					70	
Reserve Margin		18.5%	27.2%	26.1%	21.2%	18.94%	19.4%	19.5%	19.35%	19.9%	15.9%	17.2%	16.1%	17.5%	16.6%	18.8%	22.5%	19.8%	18.5%	16.4%	16.6%	15.8%

Control Wabash River 6, Retire WR 2-5, Replace with Combustion Turbine

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-796	-280			-350						-166											
New CC	350																350					
New CT	703										201			201	201					100		
Reserve Margin		18.5%	27.2%	26.1%	20.6%	18.41%	18.8%	19.0%	18.81%	19.4%	18.6%	16.7%	15.6%	17.0%	19.2%	18.3%	22.0%	19.3%	18.1%	17.3%	16.6%	15.8%

Wabash River 6 Gas Conversion, 10 Year Life, Retire WR 2-5, Replace with Combustion Turbine

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-814	-280			-368						-166				-300							
New CC	350																350					
New CT	1,005											201		201	402					201		15
Reserve Margin		18.5%	27.2%	26.1%	20.3%	18.11%	18.5%	18.7%	18.51%	19.1%	15.1%	16.4%	15.4%	16.8%	17.4%	16.5%	20.2%	17.6%	16.4%	17.1%	16.4%	15.8%

Wabash River 6 Derated to 200 MWs 3 year life, Retire Wabash River 2-5, Replace with Combustion Turbine

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-468			-200			-166											
New CC																	350					
New CT								201			201	201		201						201		15
Reserve Margin		18.5%	27.2%	26.1%	18.6%	16.4%	16.9%	17.0%	16.9%	17.4%	16.7%	18.1%	17.0%	18.4%	17.4%	16.5%	20.2%	17.6%	16.4%	17.1%	16.4%	15.8%

Wabash River 6 Derated to 200 MWs 14 year life, Retire Wabash River 2-5, Replace with Combustion Turbine

	Unit Totals	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capacity Retirements	-1,114	-280			-468						-166								-200			
New CC																	350					
New CT											201	201		201					201	201		15
Reserve Margin		18.5%	27.2%	26.1%	18.6%	16.4%	16.9%	17.0%	16.9%	17.4%	16.7%	18.1%	17.0%	18.4%	17.4%	16.5%	20.2%	17.6%	16.4%	17.1%	16.4%	15.8%

VERIFICATION

I hereby verify under the penalties of perjury that the foregoing representations are true to the best of my knowledge, information and belief.

Signed: Robert A McMurry
Robert A. McMurry

Dated: June 21st, 2012