STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF SOUTHERN INDIANA GAS AND ELECTRIC COMPANY d/b/a VECTREN ENERGY DELIVERY OF INDIANA, INC. ("VECTREN SOUTH") FOR (1) ISSUANCE OF A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF A COMBINED CYCLE GAS TURBINE GENERATION FACILITY ("CCGT"); (2) APPROVAL OF ASSOCIATED RATEMAKING AND ACCOUNTING TREATMENT; (3) ISSUANCE OF A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR COMPLIANCE PROJECTS TO MEET FEDERALLY MANDATED REQUIREMENTS ("CULLEY 3 COMPLIANCE PROJECT"); (4) AUTHORITY TO TIMELY RECOVER 80% OF THE COSTS INCURRED DURING CONSTRUCTION AND OPERATION OF THE CULLEY 3 COMPLIANCE PROJECTS THROUGH VECTREN SOUTH'S ENVIRONMENTAL COST ADJUSTMENT MECHANISM; (5) AUTHORITY TO CREATE REGULATORY ASSETS TO RECORD (A) 20% OF THE REVENUE REQUIREMENT FOR COSTS, INCLUDING CAPITAL, OPERATING, MAINTENANCE, DEPRECIATION, TAX AND FINANCING COSTS ON THE CULLEY 3 COMPLIANCE PROJECT WITH CARRYING COSTS AND (B) POST-IN-SERVICE ALLOWANCE FOR FUNDS USED DURING CONSTRUCTION, BOTH DEBT AND EQUITY, AND DEFERRED DEPRECIATION ASSOCIATED WITH THE CCGT AND CULLEY 3 COMPLIANCE PROJECT UNTIL SUCH COSTS ARE REFLECTED IN RETAIL ELECTRIC RATES; (6) ONGOING REVIEW OF THE CCGT; (7) AUTHORITY TO IMPLEMENT A PERIODIC RATE ADJUSTMENT MECHANISM FOR RECOVERY OF COSTS DEFERRED IN ACCORDANCE WITH THE ORDER IN CAUSE NO. 44446; AND (8) AUTHORITY TO ESTABLISH DEPRECIATION RATES FOR THE CCGT AND CULLEY 3 COMPLIANCE PROJECT ALL UNDER IND. CODE §§ 8-1-2-6.7, 8-1-2-23, 8-1-8.4-1 *ET SEQ*, 8-1-8.5-1 *ET SEQ.*, AND 8-1-8.8 -1 *ET SEQ.*	CAUSE NO. 45052

INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR

REDACTED TESTIMONY OF

ANTHONY A. ALVAREZ – PUBLIC'S EXHIBIT NO. 2

AUGUST 10, 2018

Respectfully submitted,

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TESTIMONY OF OUCC WITNESS ANTHONY A. ALVAREZ
CAUSE NO. 45052
SOUTHERN INDIANA GAS AND ELECTRIC COMPANY
D/B/A VECTREN ENERGY DELIVERY OF INDIANA, INC.

I. INTRODUCTION

Q: Please state your name, business address, and employment capacity.

A: My name is Anthony A. Alvarez, and my business address is 115 West Washington Street, Suite 1500 South, Indianapolis, Indiana 46204. I am employed as a Utility Analyst in the Electric Division of the Indiana Office of Utility Consumer Counselor ("OUCC"). I describe my educational background and preparation for this filing in Appendix A to my testimony.

Q: Have you previously testified before the Indiana Utility Regulatory Commission ("Commission")?

A: Yes. I have testified in a number of cases before the Commission, including electric utility base rate cases; environmental tracker cases; Transmission, Distribution, and Storage System Improvement Charge ("TDSIC") cases; and applications for Certificates of Public Convenience and Necessity ("CPCN").

Q: What is the purpose of your testimony?

A: My testimony addresses Southern Indiana Gas and Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc.'s ("Vectren" or "Petitioner") request for an issuance of a CPCN, associated projects, and the engineering and technical issues related to these projects. I support the testimonies of OUCC witnesses Dr. Peter M. Boerger and Ms. Lauren M. Aguilar. Moreover, I present my review of Vectren's system demand and resource requirements including my assessment of its need for

additional generation capacity. I discuss Vectren's proposed generation retirements and viable options available to extend the useful lives of these assets.

Q: Please briefly summarize your review.

A: My review of Vectren's request concluded the following:

1. Vectren experienced negative load growth during the last five years as its total system demand and overall system requirements showed declining trends. These trends do not support Vectren's request for additional generation capacity.

2. Vectren has no resource shortfall or inadequacy that supports its proposed 850 MW Combined Cycle Gas Turbine ("CCGT"). Currently, Vectren has excess supply after serving its peak load and its capacity position remains long after covering its required planning reserve margin. In addition, Vectren has excess capacity to offer into the market and serve new firm wholesale, large industrial, and/or commercial customers that may request service.

3. Vectren's coal units, when compared to the United States coal fleet, performed at par or better than the entire United States coal fleet during the period 2013 through 2017.

4. Vectren did not fully evaluate all options to extend its coal-fired units' useful lives beyond 2023.

5. Vectren eliminated the option early to refuel both A.B. Brown coal-fired units to gas-fired and therefore did not fully evaluate the option in the resource evaluation process.

6. Vectren did not fully evaluate all viable options in this proceeding prior to proposing a CPCN to construct a CCGT.

7. Vectren's proposed generation diversification strategy does not diversify its generation fleet or fuel mix. Instead, Vectren's proposal overhauls and dismantles the backbone of its current generation portfolio in favor of a single large consolidated CCGT unit. Vectren's strategy increases the risks ratepayers will bear with a consolidated generation fleet predominantly reliant on gas.

8. The Commission should not approve Vectren's risky "bet the farm" proposal with its generation fleet.

II. SYSTEM DEMAND REQUIREMENTS

Q: Please describe your review and analysis of Vectren's system demand requirements.

A: I reviewed Vectren's system demand requirements to determine whether there is a need for Vectren's proposed 850 MW CCGT generating plant. I also reviewed the data and information in Vectren's Summer Reliability Outlook ("Summer Reliability") reports Vectren provided the Commission.[1] I reviewed and analyzed Vectren's system load data and information from its responses to OUCC Data Request Sets 5.1 Supplemental ("OUCC DR Set 5.1 – Supplemental") and 15.4 ("OUCC DR Set 15.4").[2] I then compiled the data to represent Vectren's historical five-year (2013-2017) system peak load, total demand and reserve margin requirements for my review and analysis as shown in Table 1 below:

Table 1 - Historical Peak Load, Total Demand and Reserve Margin Requirements, 5-year (2013-2017)

		2013	2014	2015	2016	2017
(a)	System Peak Demand, MW	1,199.90	1,186.00	1,155.00	1,136.10	1,073.80
(b)	Total Demand, MW	1,162.00	1,126.40	1,099.30	1,107.60	1,012.10
(c)	MISO Planning Reserve Margin, %	6.20%	7.30%	7.10%	7.60%	7.80%
(d)	MISO Planning Reserve Margin Requirement, MW	88.20	103.90	96.90	105.60	102.90
(e)	Total System Requirements, MW	1,250.20	1,230.30	1,196.20	1,213.20	1,115.00

Q: What are the results of your review and analysis?

A: Over the last five years (2013-2017), Vectren's total demand and overall system requirements have trended downward, while the Midcontinent Independent System

[1] *See* IURC Summer Capacity Surveys and Presentations website: https://www.in.gov/iurc/2390 htm. Accessed: 07/11/2018.
[2] Public's Attachment AAA-1 – Vectren Response to OUCC DR Sets 5.1 (Supplemental)-R1, 15.4 and 15.7.

Operator ("MISO") Planning Reserve Margin ("PRM") Requirements have trended upward. Since 2013, Vectren has lost approximately 150 MW of total demand and its total system requirements decreased by approximately 135 MW. On average, Vectren lost approximately 50 MW of total demand annually, while its total system requirements decreased by approximately 27 MW annually.[3] During the last five years, Vectren's system did not experience any appreciable load growth, but rather experienced a decline in demand.

Q: What caused Vectren's negative load growth?

A: Based on Vectren's Summer Reliability reports to the Commission, it lost firm wholesale customers when certain contracts with small municipalities expired in 2012, and lost additional firm wholesale customers in 2015.[4] In 2017, Vectren also experienced a significant loss of industrial load when a customer decided to install its own large combined heat and power, or cogeneration, facility to serve its own needs.[5]

Q: Did Vectren forecast any future demand or load growth?

A: Yes. In its 2016 IRP, Vectren forecasted an energy and demand growth of approximately 0.5% beyond 2019. Figure 1 below shows Vectren's 2016 IRP forecasted sales and demand.[6]

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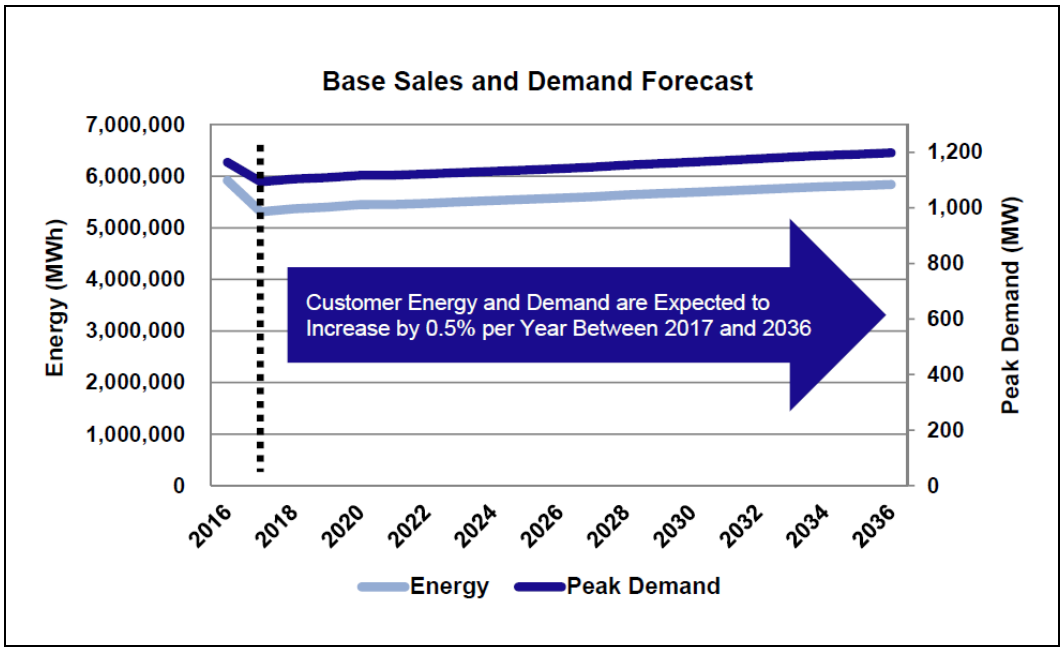
[3] Historical data from Vectren's Summer Reliability reports to the Commission showed a lower degree of negative load growth.
[4] *See* Vectren's 2012 Summer Reliability presentation to the Commission. Website: https://www.in.gov/iurc/2390.htm. Accessed: 07/11/2018. *See also* Vectren's 2015 Summer Reliability presentation to the Commission. Website: https://www.in.gov/iurc/2390.htm. Accessed: 07/11/2018.
[5] John Martin, *SABIC's $180 million CoGen plant signals a greener future*, Courier & Press, May 8, 2017. Website: https://www.courierpress.com/story/news/2017/05/08/sabics-180-million-cogen-plant-signals-greener-future/101323578/. Accessed: 07/11/2018.
[6] Vectren's 2016 IRP, Non-Technical Summary, p. 5.

Figure 1 – Vectren's 2016 IRP Sales and Demand Forecast



Despite this forecast, in an April 7, 2016 IRP stakeholder meeting, Vectren presented an updated forecast that showed it "expected demand to remain relatively flat through the forecast period (Compound Annual Growth Rate ('CAGR') is 0.1%)."[7]

Q: What is the effect of a one-half of one percent (0.5%) load growth Vectren forecasted for its system?

A: A one-half of one percent load growth for Vectren translates into approximately 5 MW of additional annual demand. However, given Vectren's historical negative load growth (approximately -50 MW on average), and without verifiable evidence

[7]Matt Rice, *Long-Term Energy and Demand Forecast Presentation*, 2016 Vectren IRP Stakeholder Meeting, April 7, 2016. Website: https://www.vectren.com/assets/downloads/planning/irp/IRP-2016-meeting1-presentation.pdf. Accessed: 07/12/2018.

to the contrary, it is unrealistic that Vectren will experience a reversal of its negative load growth trend and begin adding 5 MW of load annually to its system.

Q: Based on the results of your review and analysis, did you find any system demand requirement or need that would support Vectren's proposed new 850 MW CCGT unit?

A: No. Based on recent trends, Vectren's negative load growth trend does not support or justify its request for its proposed 850 MW CCGT generating unit.

III. RESOURCE REQUIREMENTS

Q: Please describe your review and analysis of Vectren's resource requirements.

A: I also reviewed Vectren's resource (or supply) requirements to determine whether Vectren needs the proposed 850 MW CCGT unit. I compiled a five-year (2013-2017) historical generation and resources data set, using data and information from Vectren's Summer Reliability reports to the Commission, OUCC DR Set 5.1 – Supplemental, and OUCC DR Set 15.4. I compared Vectren's total resources to its total demand and total system requirements from Table 2 to determine its capacity position in each year. I summarized the results in my Table 2 below.

Table 2 – Vectren Generation and Resources, MW UCAP Basis (2013-2017)

		2013[8]	2014	2015	2016	2017
(a)	Total Resources	1,278.5	1,278.5	1,273.4	1,270.0	1,223.3
(b)	Total Demand (Table 1)	1,162.0	1,126.4	1,099.3	1,107.6	1,012.1
(c)	Supply, Excess (Deficit)	116.5	152.1	174.1	162.4	211.2
(d)	Total System Requirements	1,250.2	1,230.3	1,196.2	1,148.5	1,106.1
(e)	**Capacity Position, Long (Short)**	**28.3**	**48.2**	**77.2**	**121.8**	**117.17**

[8] Estimated based on 2014 capacity resources. Included capacity of Broadway Avenue Gas Station ("BAGS") Unit 1. In its 2014 Summer Reliability report to the Commission, Vectren stated that it did not assign any capacity to Broadway 1 in its resource projections for 2014. However, in Vectren's response to OUCC DR Set 5.2(f), it stated, "BAGS [Broadway] unit 1 was placed in suspension in 2015 so it was not included in Vectren South's Planning Reserve Requirement in 2015, 2016, or 2017." Furthermore, the table presented by Petitioner's witness Wayne D. Games in his direct testimony, pp. 13 and 14, noted (with an asterisk) "Broadway Ave. Unit 1" was "[r]etired in 2018."

Q: Please explain the overall upward trends exhibited by both the "excess" Supply in row (c), and the "long" Capacity Position in row (e), despite the declining trend of Vectren's Total Resources in Table 2 above.

A: For the period 2015-2017, Vectren's "excess" Supply and its "long" Capacity Position trended upward because its Total Demand losses in row (b) were greater than the overall decline in its Total Resources in row (a).[9] Vectren lost approximately 150 MW of demand from 2013 to 2017, although due to de-rates its resources only declined by approximately 55 MW for the same period. Even after it lost the capacity credit of Broadway 1, Vectren maintained a long capacity position in the last five years.[10]

Q: Why are Vectren's Total Resources declining?

A: Each year, MISO conducts generator verification tests, collects unit-specific data and applies necessary forced de-ratings to determine the generating unit's Unforced

[9] In Vectren's 2013 Summer Reliability report to Commission, Vectren stated, its "[s]upply exceeds Demand by 103 MW (9%)" and "[s]upply exceeds PRM Requirements by 33 MW (3%)." However, it based its forecast on a demand that was approximately 37 MW lower than what Vectren stated in OUCC DR Set 15.4 for that year. Moreover, in Vectren's 2013 Summer Reliability report to Commission, Vectren stated, its "[s]upply exceeds Vectren Retail Peak Demand by 139 MW (13%)" and "[s]upply exceeds Requirements by 64 MW (5%)." However, the excess supply (48.2 MW) stated for that year in OUCC DR Set 15.4 was higher.

[10] Public's Attachment AAA-2 - Vectren's Response to OUCC DR Set 8.11.

Broadway Avenue Gas Station (BAGS) Unit 1

After operating for 41 years and showing issues associated with age, in June of 2012 this unit failed during start-up for a capacity test resulting in an estimate of approximately $20M in repairs to bring the unit back to reliable service. Vectren South placed the unit in suspension until 2018 when MISO required the unit to be retired or repaired. Due to the age, heat rate and high repair costs, the unit was retired.

Capacity ("UCAP") rating.[11] The reductions, or de-rates, of A.B. Brown units' UCAP ratings were the results of these tests. Conversely, the slight increases in the overall UCAP ratings of Vectren's gas generation units were also the result of the same tests. Aside from the retirement of Broadway 1, the net effect of A.B. Brown's de-rates contributed much to the overall decline in Vectren's Total Resources for 2017. Table 3 below summarizes the UCAP ratings of Vectren's resources.

Table 3 – UCAP Ratings of Vectren Resources, MW (2013-2017)

		2013	2014	2015	2016	2017
	Coal Generation					
(a)	A.B. Brown 1	229.1	227.8	232.1	232.8	209.4
(b)	A.B. Brown 2	228.7	233.1	229.1	223.1	216.4
(c)	F.B. Culley 2	81.4	83.3	84.9	85.6	84.5
(d)	F.B. Culley 3	252.8	257.3	261.1	263.2	263.9
(e)	Warrick 4	139.6	134.8	129.8	132.2	138.0
(f)	*Total Coal*	*931.6*	*936.3*	*937.0*	*936.9*	*912.2*
(g)	**Gas Generation**					
(h)	A.B. Brown 3	72.1	77.9	72.4	71.7	72.5
(i)	A.B. Brown 4	68.8	69.2	67.8	72.7	73.0
(j)	Broadway 1	38.8	0	0	0	0
(k)	Broadway 2	60.7	59.2	63.2	57.6	57.5
(l)	Northeast 1 & 2	18.8	18.0	17.7	18.9	19.7
(m)	*Total Gas*	*259.2*	*219.3*	*221.1*	*220.9*	*222.7*
(n)	**Purchases**					
(o)	Capacity Purchases	0	0	0	0	0
(p)	OVEC	29.3	30.1	28.5	27.9	27.7
(q)	Wind	8.2	7.3	8.8	9.0	8.1
(r)	*Total Purchases*	*37.5*	*37.4*	*37.3*	*36.9*	*35.8*

[11] *See* MISO, "Planning Year 2013 LOLE [loss of load expectation] Study Report." *Appendix B: GADS ICAP and UCAP Metrics, Section B.2. MISO Outside Management Control Codes,"* p. 28, November 1, 2012. Equivalent Forced Outage Rate (EFORd) [is] a measure of the probability that a generating unit will not be available due to forced outages or forced de-ratings when there is demand on the unit to generate. (MISO Planning Year 2013 LOLE Study Report, p. 9). XEFORd has the same meaning as EFORd, but calculated by excluding causes of outages that were outside management control (OMC). (*Id*). MISO collects generator unit-specific data through the Generating Availability Data System (GADS). (*Id.*, p. 8). GADS information includes the Generation Verification Test Capability (GVTC) MISO uses to determine the generator's Installed Capacity (ICAP) rating, and applies the XEFORd to determine the generator's Unforced Capacity (UCAP) rating.

Q: What are the results of your review?

A: For the last five years, Vectren maintained excess supply after serving its peak load and remained long in its capacity position after covering its MISO PRM requirements, even though its total resources were declining. As Vectren's demand decreases, its excess capacity will increase and will allow Vectren to offer more capacity into the market. Thus, Vectren has more than enough capacity to serve its own load and can still sell excess capacity into the market and provide service to new customers (wholesale, large industrial, commercial) that may enter its service territory. Further, Vectren has the capacity to cover additional MISO reserve margin requirements should the need arise in the near future.

Q: Based on your review, are Vectren's resources inadequate to serve its load?

A: No. As shown previously in Table 2, Vectren has enough excess capacity to serve its load and maintain its capacity long position, which is more than enough to cover its reserve margin requirements. From a resource perspective, Vectren has no resource shortfall or inadequacy that lends support to its proposed 850 MW CCGT unit. Given its current capacity position, it is imprudent for Vectren to shut down and retire power plants to justify the need for a new 850 MW CCGT unit.

IV. VECTREN GENERATION DIVERSIFICATION STRATEGY

Q: Please describe Vectren's generation diversification strategy.

A: As explained by Vectren witness Mr. Carl L. Chapman in his direct testimony, p. 5, Vectren's generation diversification strategy includes retiring four of its five coal generating units, three of its five gas generating units and replacing them with one

gas unit.[12] Vectren's proposal retires approximately 65% (833 MW) of its current generation fleet capacity and replaces it with one 850 MW CCGT unit. At present, Vectren's coal units represent approximately 77% (1,000 MW) of its generation capacity, while its gas units represent approximately 20% (259 MW).[13] If Vectren builds its proposed new 850 MW CCGT and retires its current units, its capacity position by fuel mix will reverse itself, with gas generation representing approximately 77% and coal generation representing approximately 20%.

Q: How does Vectren's proposal impact its current generating capacity?

A: Vectren's generation diversification strategy would retire approximately 73% (730 MW) of its total coal capacity and approximately 33% (85 MW) of its total gas capacity.[14] Of the current generating units, only the F.B. Culley 3 coal unit (270 MW) and the A.B. Brown 3 and 4 gas units (174 MW) would remain operational.

Q: What is your assessment of Vectren's generation diversification strategy?

A: Vectren's strategy does not diversify its generation fleet or fuel mix. Instead, it swings the pendulum from one end of the spectrum (77% coal) to the other end of the spectrum (77% gas). Vectren consolidates its generation fleet in favor of gas and a single large CCGT unit, which overhauls and dismantles the multi-unit, multi-fuel, and multi-technology backbone of its current generation portfolio. Vectren's strategy shifts too much risk onto its ratepayers, by including a gas-dominated

[12] *See also* Mr. Games, pp. 13 and 14.
[13] Based on ICAP, coal generation represents approximately 77.23%, gas generation represents approximately 20% and the rest is power purchase.
[14] Not including Broadway Unit 1, which Vectren already retired in 2014, Vectren proposed to retire four out of its five coal-fired units and three of its five gas-fired units for a total of seven out of ten generation units.

generation fuel mix and a single-unit, single-technology dominated generation portfolio.

Q: Mr. Chapman stated in his direct testimony, p. 7, "[w]hile switching entirely to gas-fired generation might have the lowest net present value ('NPV') from a modeling perspective, such a single fuel portfolio would lack diversity, and therefore, introduce risk to customers if gas prices or other assumptions embedded in the model that favored gas turn out to be wrong."[15] Does Vectren's generation diversification strategy mitigate its customers' risk?

A: No. Mr. Chapman's statement above contradicts and is incongruous with his own stated strategy. He testified about how "a single fuel portfolio would lack diversity" and would "introduce risk to customers." However, his diversity strategy exemplified a consolidated portfolio that would create a higher degree of risk to its ratepayers. Vectren's generation diversification strategy actually magnifies the risk to its ratepayers by exposing them to a generation fuel mix dominated by a single-fuel - gas (77%) - and exposing them further to a generation fleet dominated by a single-unit - an 850 MW CCGT.

Q: What is your recommendation to reduce ratepayers' risk as a result of Vectren's proposed generation diversification strategy?

A: Vectren's decision to build a new 850 MW CCGT is premature. To mitigate the major risks inherent in its strategy, I recommend Vectren explore practical alternatives and options that would primarily save and extend the lives of its existing A.B. Brown units. Additionally, I recommend Vectren mitigate ratepayers' risk by exploring cost effective alternatives that do not require intensive capitalization, but still provide benefits to ratepayers. If Vectren is seeking

[15] Mr. Chapman, Direct at 7, Lines 12 – 15.

generation diversity, it should eliminate its predisposition toward an 850 MW CCGT unit that consolidates its resources rather than diversifies them. Although its 2016 IRP preferred portfolio chose a CCGT, I recommend Vectren not limit its options to that conclusion, which would commit Vectren, and more importantly, its ratepayers, for the next 40 years. Finally, I recommend the Commission require Vectren to evaluate and include practical alternatives and options in its upcoming 2019 IRP stakeholder process. Ms. Aguilar identifies alternatives Vectren should further explore and discusses these alternatives from an environmental perspective. Dr. Boerger discusses these alternatives from an economic perspective.

Q: Did Vectren issue a Request for Proposal ("RFP") for the CCGT?

A: No. While Vectren issued an RFP, that RFP solicited bids to serve Vectren's stated need for 800+ MW of capacity, *not* for the building of the CCGT that it requests in this case. Therefore, the current estimate of $781 million for the building of the CCGT does not meet the requirements of I.C. § 8-1-8.5-5(e), because Vectren did not seek competitive bids for the construction of the unit.[16]

Q: If Vectren reevaluates its resource portfolio during its 2019 IRP, would that leave sufficient time for implementation by 2023?

A: Yes. As discussed in Ms. Aguilar's testimony, most of Vectren's environmental compliance deadlines are in either the mid 2020's or 2023. Therefore, Vectren will have ample time to reevaluate other alternatives during its 2019 IRP.

[16] Ms. Aguilar discusses Vectren's compliance with the CPCN statutes.

V. PROPOSED CAPACITY RETIREMENT AND REPLACEMENT

Q: Please discuss briefly your review of Vectren's proposed capacity retirement and replacement proposal.

A: I verified the capacity of each generator unit that Vectren proposes to retire.[17] I found Vectren included the 60 MW ICAP capacity of Broadway Avenue Gas Station 1 ("BAGS 1") in its calculations. This unit has not received any capacity credit from MISO since 2014, making it inappropriate for Vectren to include the capacity of BAGS 1 to support its proposed 850 MW capacity CCGT. *See*, my fns. 8 & 10 on pages 6 and 7. Without BAGS 1, Vectren's proposed capacity retirement dropped down to 815 MW (ICAP). Any capacity retirement or replacement decision should take into consideration a generator's (retired and replacement) UCAP rating because it represents: (1) the effective capacity of resources taken out (or retired) from the system and (2) the generator's actual capability to respond to demand. In the case of a brand new 850 MW CCGT unit, its forced outage or forced de-rate would be minimal, so its ICAP and UCAP ratings would be closely similar. By comparison, Vectren's proposed capacity retirement would be 725.40 MW (UCAP). Table 4 below summarizes the comparison between the ICAP and UCAP ratings of the units Vectren plans to retire and its proposed 850 MW capacity CCGT.

[17] Mr. Games, table of "Units to be Retired or Exiting," pp. 13 – 14.

Table 4 – Capacity of Planned Generator Retirement and Replacement, MW (ICAP and UCAP)

	Generation Resource	ICAP, MW	UCAP, MW
(a)	A.B. Brown 1	245.00	209.40
(b)	A.B. Brown 2	245.00	216.40
(c)	F.B. Culley 2	90.00	84.50
(d)	Broadway Ave. 1*[18]	-	-
(e)	Broadway Ave. 2	65.00	57.40
(f)	Northeast 1	10.00	9.85
(g)	Northeast 2	10.00	9.85
(h)	Warrick 4	150.00	138.00
(i)	**Net Capacity Retirement**	**815.00**	**725.40**
(j)	Proposed CCGT Unit	850.00	850.00
(k)	**Surplus (Deficit) Capacity, MW**	**35.00**	**125.50**
(m)	Surplus (Deficit) Capacity %	4.29%	17.30%

Q: Did Vectren provide sufficient support for the proposed retirement of Broadway Avenue Gas Station 2 ("BAGS 2") in 2025?

A: No. Vectren's response to OUCC DR Set 8.11 stated:

> Broadway Avenue Gas Station (BAGS) Unit 2
>
> BAGS Unit 2 is currently 37 years old and beginning to show signs of age but still starts reliably when needed. In the 2016 IRP[,] Vectren South projected that this unit would be retired in 2025 due to age (44 years old), repair costs and low capacity factor due to its inefficient operation.

Q: What is your assessment of this response?

A: A utility should not retire an asset simply because it is "beginning to show signs of age." More so, if the asset "still starts reliably when needed." Vectren is responsible for keeping its assets in good operating condition, operating efficiently, and attaining higher capacity factors.

[18] In Vectren's 2014 Summer Reliability report to the Commission, it did not assign any capacity to Broadway 1 in its resource projections for 2014.

Q: Did Vectren provide any studies to support its decision to retire BAGS Unit 2?

A: No. This decision is unsupported. Vectren did not provide any technical or engineering studies or evidence to support its decision to retire BAGS Unit 2 in 2025 or that the BAGS Unit 2's inefficient operation is causing repair costs and low capacity factors so severe to force the unit's retirement.

Q: What are the results of your review?

A: Based on the information shown in Table 4 above, Vectren's proposed capacity retirement and replacement would provide Vectren a surplus of approximately 125.50 MW (17.30% UCAP).[19] If the Commission approves Vectren's proposed 850 MW CCGT unit, but Vectren's load growth remains negative or even stays flat by 2023, Vectren will double its excess capacity at great cost to its ratepayers. Dr. Boerger discusses the economic impact of Vectren's proposal in his testimony.

Q: Why then is Vectren retiring so much capacity from its system?

A: Given the current trend of negative load growth for Vectren and the results of my review, Vectren does not have the demand requirements to justify its proposal for new and additional capacity. However, since Vectren's motive is building this unit, it conveniently concluded that by retiring several generating units, Vectren could prove it does not have enough resource requirements and thus needs to construct its

[19] This shows the importance of using UCAP ratings because it represented: (1) the effective capacity of resources taken out (or retired) from the system and (2) the generator's actual capability to respond to demand.

proposed 850 MW capacity CCGT unit. This is a very risky play for a small utility such as Vectren, and even more risky for Vectren's customers.

Q: Do you agree with Mr. Chapman's statement in his direct testimony, p. 5, claiming Vectren is retiring comparatively small coal units that are not competitive and are inefficient?[20]

A: No. I do not agree with Mr. Chapman's characterization that these coal units are "comparatively small units that suffer in terms of cost competitiveness and efficiency."[21] Vectren's coal units are utility-scale generators.[22] The A.B. Brown coal units slated for retirement have an installed capacity rating of 245 MW each, while the F.B. Culley 3 coal unit (which Vectren plans to keep) has an installed capacity rating of 270 MW. A.B. Brown is the larger generating station with a total capacity of 450 MW; the F.B. Culley station is smaller with a total capacity of 360 MW (including the 90 MW F. B. Culley 2). The sizes of these generating units provided Vectren the flexibility and balance it required to serve its load effectively if it needed to take a unit offline (forced or planned).

Q: Please comment on the cost competitiveness and efficiency of the small coal units.

A: Capacity factor captures and provides a good measurement of a generator's overall competitiveness, efficiency and performance in the marketplace. The U.S. Energy Information Administration defines capacity factor as "[t]he ratio of the electrical energy produced by a generating unit for the period of time considered to the

[20] Mr. Chapman, Direct at 5, Lines 10 – 13.
[21] *Id*.
[22] Typically, a utility-scale generator is 50 MW and above, generates and feeds power into the grid, and supplies a utility with energy. The F.B. Culley 2 is a 90 MW coal unit.

electrical energy that could have been produced at continuous full power operation during the same period."[23] If Mr. Chapman took into consideration the historic performance of Vectren's coal units and compared it with the performance of the U.S. coal fleet from 2013 through 2017, he would see that Vectren's coal units performed at par in some years, and even better in other years, than the entire coal fleet of the country.[24] Table 5 below summarizes the comparison of capacity factors of the utility scale coal fleet across the U.S. for the period 2012-2017.[25]

Table 5 – Capacity Factors - Coal Units, % (2012-2017)

	Coal Unit	2012	2013	2014	2015	2016	2017
(a)	A.B. Brown 1	52.77	61.69	74.72	61.86	[redacted]	[redacted]
(b)	A.B. Brown 2	55.73	52.25	67.21	52.74	60.68	
(c)	F.B. Culley 3	60.03	62.33	66.66	55.27	[redacted]	70.53
(d)	U.S. Coal Fleet[26]	*56.70*	*59.80*	*61.10*	*54.70*	*53.30*	*53.50*

Q: Table 5 above shows Vectren's three coal units outperformed the U.S. coal fleet in 2014. Please explain why there was a notable increase in the U.S. coal fleet's capacity factor in 2014.

A: As shown in Table 5 above, Vectren's three coal units outperformed the U.S. coal fleet during the polar vortex event in 2014. The winter polar vortex in early 2014 precipitated an unprecedented peak demand across the eastern U.S. and the Midwest. System operators in areas hardest hit by the polar vortex (i.e. MISO and

[23] U.S. EIA Glossary: Capacity Factor. Website: https://www.eia.gov/tools/glossary/index.php?id=Capacity_factor. Accessed: 07/19/2018.
[24] *See* U.S. Energy Information Administration, *Electric Power Monthly: with Data for April 2018*. U.S. Department of Energy, Washington, DC. Website: www.eia.gov. Webpage: https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_6_07_a. Accessed: 07/19/2018.
[25] A.B. Brown 1 experienced an outage for repairs in 2016 due to a damage in its turbine by-pass valve. Mr. Games, Direct at 8, Lines 21 – 24.
[26] Source: U.S. EIA, *Electric Power Monthly: with Data for April 2018 – Table 6.7.A. Capacity Factors for Utility Scale Generators Primarily Using Fossil Fuels, January 2008-March 2014*. Website: https://www.eia.gov/electricity/monthly/archive/may2014.pdf. Accessed: 07/19/2018.

PJM, etc.) dispatched their generators to respond to the record demand imposed on the grid. The coal units serving the Midwest and the eastern U.S. contributed to the notable increase in the coal capacity factors in 2014. "Temperatures reached 14 below zero in Indianapolis with a wind chill of minus 39 Monday morning. It reached 12 below zero in Fort Wayne and Terre Haute and even 2 below zero in Evansville in far southern Indiana."[27] The North American Reliability Corporation ("NERC") Polar Vortex Review report (September 2014) showed "PJM exceeded its historic winter peak on both January 7 and January 8, 2014, and MISO reported that they exceeded their historic winter peak for three straight days (January 6–8, 2014)."[28] It was under these conditions that Vectren's coal units outperformed the U.S. coal fleet during the winter of 2014. Below is the NERC graph showing the historic winter peak and the polar vortex load comparison in its Polar Vortex Review report.

[27] *See* WLWT5 Report, *'Polar vortex' drops Tri-State into deep freeze - Region seeing record cold temperatures in places*, Updated: 11:16 PM EST Jan 7, 2014. Website: http://www.wlwt.com/article/polar-vortex-drops-tri-state-into-deep-freeze/3538360. Accessed: 07/20/2018.
[28] NERC, Polar Vortex Review, September 2014. Website: https://www.nerc.com/pa/rrm/January%202014%20Polar%20Vortex%20Review/Polar_Vortex_Review_29_Sept_2014_Final.pdf. Accessed: 07/20/2018.

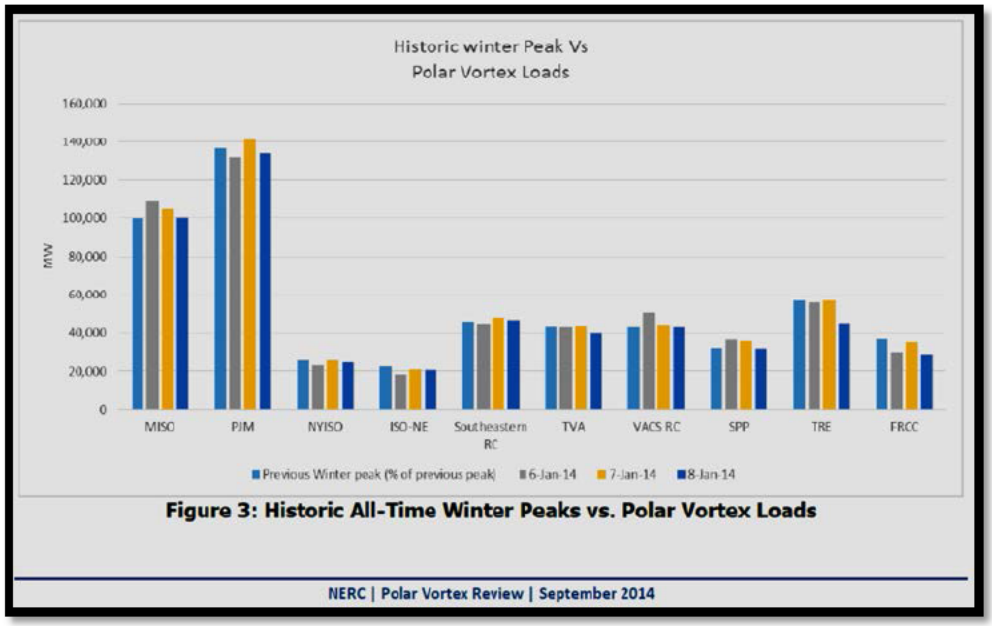


Figure 3: Historic All-Time Winter Peaks vs. Polar Vortex Loads

VI. ALTERNATIVE TECHNOLOGY

Q: Mr. Chapman testified, "[w]ith respect to the Brown units, the biggest issue that impairs their longer term operation is the existing scrubbers built in 1979 and 1986."[29] Please describe the existing scrubbers.

A: The existing scrubbers use a dual alkali method, which is highly corrosive.

Q: Did Vectren identify any viable flue gas desulphurization ("FGD") technology to replace the A.B. Brown scrubbers?

A: Yes. Petitioner's Exhibit No. 4 Attachment WDG-1 identified a wet FGD technology as a viable replacement for the dual alkali scrubbers at A.B. Brown.[30] However, the wet limestone, forced-oxidation ("LSFO") method was the only FGD technology evaluated by Vectren.[31] Mr. Chapman dismissed the opportunity for Vectren to explore other replacement alternatives and concluded, "it makes more sense to retire these [A.B. Brown] units and invest in new CCGT technology."[32]

[29] Mr. Chapman, Direct at 5, Lines 19 – 20.
[30] Mr. Games, Direct at 22, Lines 13 – 22.
[31] *See* Petitioner's Exhibit No. 4 Attachment WDG-1.
[32] Mr. Chapman, Direct at 6, Lines 1.

Q: Do you agree with Mr. Chapman's conclusion, included in the Q&A above?

A: No, I do not. Vectren needs to provide support and justification, including studies and analyses that explore all cost effective options that could extend the life of the generating units paid for by its ratepayers. Ms. Aguilar has identified other viable FGD technology available to Vectren in her testimony.

Q: What is Vectren's capital cost estimate for a wet FGD replacement at A.B. Brown?

A: Vectren determined it could build one wet FGD to serve both A.B. Brown units.[33] Mr. Chapman stated that the replacement cost for the dual alkali scrubbers was approximately $340 million.[34] Vectren's consultant, Burns and McDonnell ("B&McD"), provided a high-level cost estimate breakdown for a wet FGD, as shown below:[35]

Table 1-1: Capital Cost Estimate Summary

Area	Cost
Total Direct Cost	$187,700,000
Indirect Cost	$23,000,000
Owner Costs	$28,600,000
Contingency	$59,800,000
Total Project Cost	$299,100,000

Ms. Aguilar discusses Vectren's environmental compliance issues in her testimony.

[33] Mr. Games, Direct at 22, Lines 20 – 21.
[34] Mr. Chapman, Direct at 6, Lines 1 – 6.
[35] *See* Petitioner's Exhibit No. 4 Attachment WDG-1, p. 8 of 59.

Q: Did you review and evaluate the viability of any other technology that would extend the useful life of the A.B. Brown units?

A: Yes. I researched and evaluated the viability of the coal-to-gas conversion technology to extend the useful life of the A.B. Brown units. I reviewed both Babcock & Wilcox Co. ("B&W") Phases I and II engineering studies for the coal-to-gas conversion of the A.B. Brown units.[36] I researched publicly available technical documents related to B&W's available technology for the conversion of power boilers to gas.[37] I compiled the engineering, performance, and cost estimate information from Vectren's technical studies, and compared this information with the initial results I gathered from recently completed coal-to-gas conversion projects here in Indiana. From an engineering perspective, the B&W coal-to-gas technology is a viable and available alternative that will extend the useful life of the A.B. Brown units.

Q: Please discuss briefly the results of the B&McD studies you reviewed.

A: I reviewed the conceptual engineering design prepared by B&McD to evaluate the feasibility of a coal-to-gas conversion project at A.B. Brown (revisions dated September 2015 and February 2016).[38] [redacted]

[redacted]

[redacted]

[36] Public's Confidential Exhibit AAA-3 – B&W Engineering Study Phase I & II (Vectren's Responses to OUCC DR Sets 4.3-R1 and 4.3-R2).
[37] Babcock & Wilcox website: https://www.babcock.com/en/service/upgrades-retrofits. Accessed: 07/23/2018.
[38] Public's Confidential Exhibit AAA-4 – B&McD Study Rev. 0, Sept. 2015 and Rev. 1, Feb. 2016 (Vectren's Response to OUCC DR Sets 4.3-R3).

[redacted] were not a concern in the recently completed [redacted] gas conversion project because [redacted] issue would be a solvable engineering problem. I do not anticipate the gas conversion alternative will have [redacted]. Therefore, operating at the [redacted] if Vectren converted the A.B. Brown units from coal to gas.

Q: What is the result of the B&W studies you reviewed?

A: The B&W Phase II study [redacted] However, based on the initial performance results of recently completed IPL Harding Street gas-conversion projects where the units retained existing SCRs and installed FGRs

[39] *See* Public's Confidential Exhibit AAA-4 - Section 3.3.1: Prevention of Significant Deterioration Analysis, *B&McD A.B. Brown Coal to Gas Conversion Study*, Revision 1 dated February 2016.
[40] U.S. Environmental Protection Agency, *Integrated Science Assessment for Carbon Monoxide*, National Center for Environmental Assessment-RTP Division, Office of Research and Development, Research Triangle Park, NC, January 2010. EPA/600/R-09/019F. Website: http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=494432. Accessed: 07/25/2018.
[41] Public's Confidential Attachment AAA-3.

as well, the operator did not find the need to operate the SCRs at all. If Vectren's overall gas-conversion cost estimate holds, Vectren [redacted] This would [redacted]

Q: Do you expect any de-rate on the A.B. Brown units after a gas conversion?

A: No. Based on recently completed IPL Harding Street gas conversion projects, I do not expect a de-rate of the A.B. Brown generating units after a conversion to gas. In the completed IPL Harding Street gas conversion projects I reviewed, the three coal-fired boilers achieved full load operation at high Maximum Continuous Rating ("MCR") percentages when firing 100% gas.[42] The initial thermal input analysis of these boilers showed that proper placement and configuration of gas burners and ignitors at previous coal elevations could produce slight excess in thermal energy and increase the furnace heat input. In addition, the gas conversion lifted the parasitic load burden of emission control devices off the unit and added to its capacity. I expect the gas conversion of A.B. Brown would likewise eliminate the parasitic load burden and add to its capacity.

Q: Please discuss your review of the gas conversion cost estimate.

A: B&McD provided the estimate for the gas conversion of both A.B. Brown units. I

[42] The specific percentages are considered confidential by IPL, and are therefore not disclosed here.

reviewed the estimate and verified the project scope included the gas conversion of both A.B. Brown 1 & 2. Moreover, during our meeting with Vectren on July 9, 2018, Vectren witness Mr. Wayne D. Games told the OUCC that the project scope and estimate indeed included both A.B. Brown units. B&McD estimated the gas conversion cost at approximately [redacted], including contingency and owner's cost. However, Vectren modelled the A.B. Brown gas conversion cost at [redacted] per kilowatt ("kW").[43] In comparison, the total cost of the recently completed [redacted] gas conversion projects ranged between $173 per kW and $180 per kW.[44] Vectren's gas conversion estimate represents a very low capital cost for a technically viable option that will extend the useful life of the A.B. Brown units. Vectren should have allowed its Strategist model to select this option in its model runs. Dr. Boerger discusses economic modelling in his testimony.

Q: From an engineering perspective and compared to a CCGT, is repowering the A.B. Brown units with gas a viable option?

A: Yes. From an engineering perspective, gas conversion of the A.B. Brown units is a technically viable option at a fraction of the proposed CCGT's cost. Preserving and extending the life of existing assets at a very low capital cost using proven technology provides greater service to ratepayers.

VII. PROPOSED 850 MW CCGT FACILITY

Q: Did Vectren provide a cost estimate of the proposed CCGT as a result of competitively bid engineering, procurement, or construction contracts?

[43] *See* Confidential Vectren Technology Assessment Summary Table, Coal Fired Technology Assessment Project Options, Appendix A-4.
[44] *See* Cause No. 44339.

A: No. The high-level cost breakdown for the proposed CCGT provided by Mr. Games is not a result of competitively bid engineering, procurement, or construction contracts as required by statute.[45] Vectren based the cost estimate for its proposed CCGT on the conceptual design developed by its consultant.[46] Further, Vectren did not competitively bid the "engineering" scope "because it is not commercially practicable to do so."[47]

Q: Please discuss your review of the cost estimate Vectren provided for its proposed 850 MW CCGT facility.

A: Mr. Games testified the estimated cost of "$781 million (+/- 10%)" is an "anticipated cost."[48] At a capacity rating of 850 MW, Vectren's estimate represented a cost of approximately $919 per kilowatt ("kW"). However, Mr. Chapman testified the cost estimate included an additional 150 MW for a duct firing option at a "very low upfront cost" of approximately $15 million.[49] This meant the base configuration of Vectren's proposed CCGT has a capacity rating of only 700 MW for $766 million, or a "per unit" cost of approximately $1,095 per kW. For comparison, Vectren estimated it could convert the A.B. Brown units to gas-fired for approximately $130 per kW.

Moreover, Vectren has yet to select its equipment manufacturer and seek bids for its proposed CCGT turbines.[50] It foresees specification deviations, design

[45] Mr. Games, Direct at 15. Ind. Code § 8-1-8.5-5(e)(1)(A).
[46] Mr. Games, Direct at 27, Lines 2 - 25. *See also* Petitioner's Witness Ms. Diane M. Fischer, Direct at 29, Lines 8 – 12.
[47] Ms. Fischer, Direct at 37, Lines 1 – 2.
[48] Mr. Games, Direct at 15, Line 8.
[49] Mr. Chapman, Direct at 10, Lines 10 – 11.
[50] Mr. Games, Direct at 16, Lines 1 – 4.

changes and technology advances at the (future) time of the "final competitive bidding." Consequently, Vectren will not finalize its procurement process until after the Commission issues it a CPCN. [51] Given the conditions laid out by Messrs. Games and Chapman in their respective testimonies, it is unrealistic that Vectren can complete this project on time and on budget because there are too many unknowns.

Further, I also reviewed the "EPC Basis of Estimate for the F-Class Configuration (Confidential)" provided by Ms. Fischer that corresponded to the CCGT design type identified by Messrs. Games and Chapman.[52] Certain components of the cost estimate, such as "[redacted]," taken from [redacted]" with reference to "[redacted];" and "[redacted]," further supports the uncertainty with the support Vectren provided on its cost estimate.[53] It is Vectren's responsibility to provide sufficient support for its proposal. Vectren's consultant provided an estimate based on "[redacted]" [54] If Vectren's consultant cannot stand behind its own cost estimate without any qualifications, the OUCC cannot support Vectren's cost estimate proposal. All of these conditions raised "red flags" and signaled the

[51] Mr. Games, Direct at 16, Lines 4 – 13.
[52] *See* Petitioner's Exhibit No. 10, Attachment DMF-6 - EPC Basis of Estimate for the F-Class Configuration (Confidential). *See also* Mr. Games, p. 15, and Mr. Chapman, p. 10.
[53] *See* Pet. Conf. Exh. No. 10 – Section 2.0: Estimate Basis, p. 2-1.
[54] *Id*.

potential for price escalation and construction schedule delays down the line. It is apparent that Vectren's proposal exposes its ratepayers to a high degree of risk.

Q: Did Vectren include all of the costs necessary to build the CCGT in the estimate of $781 million?[55]

A: No. Vectren's $781 million estimate does not include costs for the lateral pipeline Vectren also seeks authority to build. According to Vectren witness Mr. Steven A. Hoover, the estimated cost of the pipeline is $87 million. Direct Testimony of Hoover, p. 4, line 18. However, he stated that the estimate was an AACE Class 2 estimate, indicating a +/- 20% level of confidence. Direct Testimony of Hoover, p. 5, lines 18-20. *See also* Vectren's Exhibit 12, Att. SAH-2 (confidential), for a detailed breakdown of the pipeline estimate. Therefore, using Vectren's own calculations, the cost of the pipeline could be as low as $69.6 million (-20%), or as high as $104.4 million (+20%). This cost to customers would be in addition to the cost of constructing the CCGT, potentially making the total cost for the CCGT as high as $885,400,000 ($781,000,000 + $104,400,000).

Q: Please discuss briefly the results of your review.

A: The cost estimate Vectren provided for its CCGT was not a result of competitively bid engineering, procurement, or construction contracts as required by statute. With a base configuration cost of approximately $1,095 per kW, Vectren should evaluate

[55] In addition to the lateral pipeline, Vectren's 7-Year Electric Plan approved by the Commission in Cause No. 44910 dated Sept. 20, 2017, included a proposed redundant 37 miles of 138 kV transmission line to serve its proposed CCGT at a cost of approximately $59.3 million. *See* Direct Testimony of Vectren witness, Lynnae K. Wilson, Petitioner's Exhibit No. 2, Attachment LKW-2, pp. 12 – 13 of 53, in previous Cause No. 44910, for the project description of Vectren's proposed East West Transmission Line project related to generation capacity addition at A.B. Brown. IURC Portal, Website: https://iurc.portal.in.gov/legal-case-details/?id=3b675b4f-eff9-e611-80fd-1458d04e2f50. Accessed: 08/6/2018.

other cost effective alternatives, such as a $130 per kW gas conversion option for the A.B. Brown units. Vectren should further refine and provide sufficient support for its cost estimate. It should address all the "red flags" in its proposed cost estimate that signal price escalation, construction-scheduling uncertainty, and lack of general confidence in its ability to undertake projects of this magnitude. Finally, it should shield and protect its own ratepayers from this unwarranted risk.

VIII. RECOMMENDATIONS AND CONCLUSIONS

Q: Please summarize your recommendations:

A: Vectren's request for a new 850 MW CCGT is premature. I recommend the Commission deny Vectren's request for a CPCN to build a new CCGT facility for the following reasons:

1. Vectren did not provide evidence showing a resource shortfall, inadequacy, or need for additional generation capacity, i.e., there has been no finding of public necessity.

2. Vectren did not fully evaluate all viable options prior to proposing a CPCN to construct a CCGT in this proceeding (such as operating its coal-fired units and extending its useful life beyond 2023, or refueling both its A.B. Brown coal-fired units to gas).

3. Vectren's proposed generation diversification strategy does not diversify its generation fleet or fuel mix, which increases the risks ratepayers will bear with a consolidated generation fleet predominantly reliant on gas.

Q: Does this conclude your testimony?

A: Yes.

APPENDIX A

I. EDUCATIONAL BACKGROUND AND EXPERIENCE

Q: Please describe your educational background and experience.

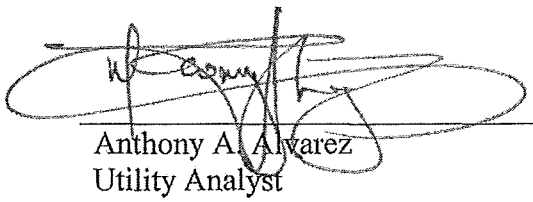
A: I hold an MBA from the University of the Philippines ("UP"), in Diliman, Quezon City, Philippines. I also hold a Bachelor's Degree in Electrical Engineering from the University of Santo Tomas ("UST"), in Manila, Philippines.

I joined the OUCC in July 2009, and have completed the regulatory studies program at Michigan State University sponsored by the National Association of Regulatory Utility Commissioners ("NARUC"). I have also participated in other utility and renewable energy resources-related seminars, forums, and conferences.

Prior to joining the OUCC, I worked for the Manila Electric Company ("MERALCO") in the Philippines as a Senior Project Engineer responsible for overall project and account management for large and medium industrial and commercial customers. I evaluated electrical plans, designed overhead and underground primary and secondary distribution lines and facilities, primary and secondary line revamps, extensions and upgrades with voltages up to 34.5 kV. I successfully completed the MERALCO Power Engineering Program, a two-year program designed for engineers in the power and electrical utility industry.

AFFIRMATION

I affirm, under the penalties for perjury, that the foregoing representations are true.



Anthony A. Alvarez
Utility Analyst
Indiana Office of Utility Consumer Counselor

August 10, 2018
Date

Cause No. 45052
Vectren South Electric

CERTIFICATE OF SERVICE

This is to certify that a copy of the ***OUCC REDACTED TESTIMONY OF ANTHONY A. ALVAREZ*** has been served upon the following parties of record in the captioned proceeding by electronic service on August 10, 2018.

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