STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

PETITION OF DUKE ENERGY INDIANA, LLC PURSUANT TO IND. CODE §§ 8-1-2-42.7 AND 8-1-2-61, FOR (1) AUTHORITY TO MODIFY ITS RATES AND CHARGES FOR ELECTRIC UTILITY SERVICE THROUGH A STEP-IN OF NEW RATES AND CHARGES USING A FORECASTED TEST PERIOD; (2) APPROVAL OF NEW SCHEDULES OF RATES AND CHARGES, GENERAL RULES AND REGULATIONS, AND RIDERS; (3) APPROVAL OF A FEDERAL MANDATE CERTIFICATE UNDER IND. CODE § 8-1-8.4-1; (4) APPROVAL OF REVISED ELECTRIC DEPRECIATION RATES APPLICABLE TO ITS ELECTRIC PLANT IN SERVICE; (5) APPROVAL OF NECESSARY AND APPROPRIATE ACCOUNTING DEFERRAL RELIEF; AND (6) APPROVAL OF A REVENUE DECOUPLING MECHANISM FOR CERTAIN CUSTOMER CLASSES	**)**	**CAUSE NO. 45253**

VERIFIED DIRECT TESTIMONY
OF
JAMES MICHAEL MOSLEY

On Behalf of Petitioner,
DUKE ENERGY INDIANA, LLC

Petitioner's Exhibit 19

July 2, 2019

DIRECT TESTIMONY OF JAMES MICHAEL MOSLEY
VICE PRESIDENT MIDWEST GENERATION
DUKE ENERGY BUSINESS SERVICES LLC
ON BEHALF OF DUKE ENERGY INDIANA, LLC
BEFORE THE INDIANA UTILITY REGULATORY COMMISSION

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is James Michael Mosley, and my business address is 1000 East Main Street, Plainfield, Indiana 46168.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed as Vice President of Midwest Generation by Duke Energy Business Services LLC, a service company subsidiary of Duke Energy Corporation, and a non-utility affiliate of Duke Energy Indiana, LLC ("Duke Energy Indiana," or "Company").

Q. PLEASE DESCRIBE YOUR DUTIES AND RESPONSIBILITIES AS VICE PRESIDENT OF MIDWEST GENERATION.

A. In this role, I am responsible for providing safe, compliant and reliable operation of Duke Energy's Midwest generation fleet, which includes four coal, one combined cycle, one hydro, six simple cycle combustion turbines, and three solar sites serving Indiana, Kentucky, and Ohio, which provide over 7,800 MWs of generation. My primary responsibilities include managing the fleet within design parameters and implementing work practices and procedures that ensure safe and regulatorily compliant operation and maintenance activities.

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I graduated from Mississippi State University with a B.S. in Mechanical Engineering and am a licensed Professional Engineer. Since graduating, I have acquired over 31 years of experience in the aerospace, chemical, and power industries, of which over 15 years have been with Duke Energy/Progress Energy. My significant, relevant positions with Duke Energy and its predecessor companies include: Fuels, Operations and Maintenance Superintendent roles at the Roxboro and Mayo Stations (North Carolina); Manager of Maintenance at the Roxboro Station; Plant Manager roles at the Robinson and Darlington County Stations (South Carolina); Plant Manager roles at the Weatherspoon and Roxboro Stations (North Carolina); and General Manager at Gibson Station (Indiana). I assumed my current position as Vice President Midwest Generation in July 2018.

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

A. The purpose of my testimony in this proceeding is to provide an overview of Duke Energy Indiana's generating fleet; our operating philosophy for the fleet; and the fleet's historical operational performance. My testimony will also review the significant additions to Duke Energy Indiana's generation fleet, including environmental compliance investments, made since the last rate case. I will review the rate case test period production expenditures for both capital and operation and maintenance ("O&M") costs, as well as more broadly discuss historical O&M expenses and future O&M cost forecasts. That will include discussion of cost savings and productivity improvement initiatives that have been, are being, or will be implemented, and their impact on costs. I will also discuss historical, test period, and future generation planned outage O&M expenses. Please note that expenses, operational history, and outage schedules for Edwardsport are not in my testimony, but will be discussed by Duke Energy Indiana witness Mr. Cecil Gurganus in detail.

II. DUKE ENERGY INDIANA'S GENERATING FACILITIES

Q. PLEASE DESCRIBE DUKE ENERGY INDIANA'S GENERATING STATIONS.

A. Petitioner's Exhibit 19-A (JMM) shows Duke Energy Indiana's electric generating properties, which consist of: (1) two syngas/natural gas-fired combustion turbines ("CT") and one steam turbine; (2) one solar-powered facility, located at NSA Crane; (3) steam capacity located at three stations comprised of 9 coal-fired generation units; (4) combined cycle capacity located at one station comprised of three natural gas-fired CTs and two steam turbine-generators; (5) a run-of-river hydroelectric generation facility comprised of three units; and (6) peaking capacity consisting of four oil-fired diesels and 24 natural gas-fired CTs, one of which is configured with dual natural gas and fuel oil capability.

Since the Company's last base rate case, Wabash River Unit 1 (an IGCC unit) was sold to WVPA ("Wabash Valley Power Alliance"), and Wabash River Units 2-6 (five coal-fired units), Edwardsport Steam Generating Facility (three coal-fired units), Miami-Wabash CTs (six oil-fired units), Connersville CTs (two oil-fired units), and Gallagher Units 1 and 3 (two coal-fired units) were retired. In addition, the Company has acquired or constructed generation since the last rate case: Wheatland (gas-fired units), Edwardsport (two syngas/natural gas-fired units), Vermillion (gas-fired units), and Crane (solar). Duke Energy Indiana is also in the process of refurbishing its Markland hydroelectric facility. Finally, the Company is in the process of constructing a solar-powered generating facility at Camp Atterbury, along with two battery storage projects, each of which Duke Energy Indiana witness Mr. Andrew Ritch discusses in more detail in his direct testimony.

Q. MR. MOSLEY, YOU MENTIONED A SALE AND SEVERAL RETIREMENTS THAT HAVE OCCURRED SINCE THE COMPANY'S LAST RATE CASE. PLEASE DISCUSS.

A. In 2006, Duke Energy Indiana sold Wabash River Unit 1 to WVPA. This sale was approved by the Indiana Utility Regulatory Commission ("Commission") in Cause Nos. 43211 and 42909.

Duke Energy Indiana retired Wabash River Units 2-6 in 2016 due to environmental regulations, as well as a settlement agreement. Miami-Wabash and Connersville were retired in 2018, at the end of their useful lives.

In 2011, the Company informed the Commission that it desired to retire Gallagher Units 1 and 3 pursuant to a Consent Decree and purchase the Vermillion Generating Facility. The Commission's Order in Cause No. 43956 authorized Duke Energy Indiana to recover the remaining net book value of Gallagher Units 1 and 3 over the remaining lives of the units through the use of a regulatory asset.

Q. PLEASE ELABORATE ON THE COMPANY'S DECISION TO RETIRE WABASH RIVER STATION.

A. Duke Energy Indiana retired the five coal-fired generating units and three oil-fired diesels at Wabash River Station in 2016.[1] As discussed by Company witnesses in multiple prior proceedings before the Commission, the Wabash River Station coal Units 2-6 retired due to the cost of environmental compliance obligations imposed by the Mercury and Air Toxics Standards ("MATS") rule and the 1-hour National Ambient Air Quality Standard ("NAAQS") for sulfur dioxide ("SO_2").[2] The MATS rule would have required substantial investment in air emission controls at Wabash River Station for mercury, acid gases, and particulate matter reduction, and the 1-hour SO_2 NAAQS would have required substantial reductions in the SO_2 emission rate. As the life of black start diesels generally follows the life of the base plant, the Wabash River Diesel Units 7a-c were also retired.

[1] See https://www.oasis.oati.com/woa/docs/MISO/MISOdocs/Generation_Information.html or for example https://www.oasis.oati.com/woa/docs/MISO/MISOdocs/OASIS_Posting_of_Approved_Generator_Retirements(Public)_2019-02-28.pdf which may be updated periodically by MISO. Because the Wabash River Diesels were behind-the-meter units, they do not appear on the MISO retired unit list posted on OASIS.
[2] For detailed discussion of these regulations and compliance strategy for Wabash River Station, see the direct testimony of Joseph A. Miller Jr. in Cause Nos. 44217 and 44418, and the Duke Energy Indiana 2013 and 2015 Integrated Resource Plans.

These coal unit retirements were economically selected in the Company's 2013 or 2015 Integrated Resource Plans ("IRP").[3] Given this outcome, the Company agreed to formalize the Wabash River Station retirements as part of a legal settlement.[4] Wabash River Units 2-5 were already at their end of life, having a planned retirement date of 2015. Further, as discussed in the 2015 IRP, while the Company evaluated the option of natural gas conversion on Wabash River Unit 6, that option was not economically selected in the analysis.

The retirement of Wabash River Unit 6 was similarly situated as Gallagher Units 1 and 3, in which natural gas conversion was not found to be the best economic choice for customers. Since the Commission authorized regulatory asset treatment for recovery of the Gallagher Units 1 and 3 remaining investment, with similar reasoning the Company established a regulatory asset for Wabash River Unit 6. Duke Energy Indiana witness Ms. Diana Douglas further discusses the accounting treatment of these assets.

Q. PLEASE DESCRIBE THE GENERATING ASSETS DUKE ENERGY INDIANA HAS EITHER CONSTRUCTED OR ACQUIRED SINCE THE COMPANY'S LAST RATE CASE.

A. In 2005, the Commission granted a Certificate of Public Convenience and Necessity ("CPCN") to purchase the Wheatland Generating Facility, consisting of

[3]Please see https://www.duke-energy.com/_/media/pdfs/for-your-home/2013-indiana-public-irp.pdf?la=en and https://www.duke-energy.com/_/media/pdfs/for-your-home/2015-indiana-integrated-resource-plan.pdf?la=en

[4] See "Edwardsport Station Air Permitting Settlement Agreement" dated August 29, 2013, which resolves a variety of specified environmental issues, challenges, concerns, objections, and litigation matters related to various air permitting matters involving Edwardsport IGCC.

four natural gas-fired simple cycle combustion turbines equaling approximately 448 MW. See Consolidated Cause No. 42866.

In Cause No. 43114, Duke Energy Indiana was granted a CPCN to construct an integrated gasification combined cycle facility, consisting of two syngas/natural gas-fired combustion turbines and a steam turbine at Edwardsport. Mr. Gurganus will discuss this generating asset in more detail in his testimony, Petitioner's Exhibit 20.

As mentioned above, the Commission granted Duke Energy Indiana a CPCN for its purchase of a portion of the Vermillion Generating Station in 2011. See Cause No. 43956. Specifically, Duke Energy Indiana acquired 62.5% of the Vermillion Generating Station, with Wabash Valley Power Association purchasing the other 37.5%. This acquisition added approximately 400 MW of natural gas-fired, simple cycle combustion turbines to Duke Energy Indiana's generation portfolio.

In Cause No. 44734, Duke Energy Indiana was granted a CPCN for the construction of a 17 MWac solar-powered generating facility at NSA Crane.

In Cause No. 45002, Duke Energy Indiana received Commission approval to install a 2 MWac/3 MWdc solar-powered generating facility and a 5 MW/5 MWh battery energy storage facility at Camp Atterbury, as well as a 5 MW/5 MWh battery energy storage facility at the Company's Nabb Substation. Duke Energy Indiana witness Mr. Andrew Ritch will discuss these projects in more detail in his direct testimony.

Q. WHAT IS THE CURRENT STATE OF CONSTRUCTION OF THE MARKLAND HYDROELECTRIC UPRATE PROJECT?

A. As approved by the Commission in Cause No. 44767, Duke Energy Indiana has undertaken a three-year uprate at the Markland Hydroelectric Generating Facility. The work on Unit 2 is complete, the unit is back in service, and performance testing, as of this filing, indicated the unit is performing as predicted by the vendor. Unit 3 began its upgrade process in December 2018, and Unit 1 is projected to start in January 2020. Units 3 and 1 are projected to be in-service by 2020.

Q. IN YOUR OPINION, ARE THESE GENERATING FACILITIES USED AND USEFUL IN SUPPLYING ELECTRICAL SERVICE TO DUKE ENERGY INDIANA'S RETAIL CUSTOMERS?

A. Yes. All of these facilities have been approved by the Commission and supply significant amounts of energy to Duke Energy Indiana customers. As such, it is my opinion that this generation is used and useful in serving our customers. The Camp Atterbury Microgrid and Nabb Battery are currently under construction and scheduled to be completed by the end of 2019.

III. ENVIRONMENTAL COMPLIANCE INVESTMENTS

Q. MR. MOSLEY, WHAT OTHER INVESTMENTS HAS DUKE ENERGY INDIANA MADE TO ITS GENERATION FLEET SINCE THE COMPANY'S LAST RATE CASE?

A. Duke Energy Indiana has made significant investments to its generation fleet to comply with federal and state environmental regulations since the Company's last rate case.

To comply with nitrogen oxide ("NOx") State Implementation Plan ("SIP") Call (referred to as the "NOx SIP Call") requirements, Duke Energy Indiana has constructed environmental compliance facilities, which were approved by the Commission in Cause No. 41744, Consolidated Cause Nos. 41744-S1 and 42061 and Cause No. 42411. The Company's NO_x SIP Call compliance projects were constructed as follows:

Table 1

Station	NO_x SIP Call Compliance Plan
Cayuga	Units 1-2 – Boiler optimization, electrostatic precipitators
Gallagher	Units 1-4 – Boiler optimization Unit 4 – Low NO_x burners and fuel flow monitoring
Gibson	Units 1-5 – Selective Catalytic Reduction ("SCRs") including an injection system, ongoing SCR catalyst beds, boiler optimization
Wabash River	Units 2-6 –Boiler optimization Units 2, 3, 5 – Low NO_x burners

Duke Energy Indiana also constructed projects to comply with the EPA's Clean Air Interstate Rule ("CAIR") and Clean Air Mercury Rule ("CAMR"). The following projects were presented to the Commission, and approved in Consolidated Cause No. 42622/42718.

Table 2

Station	CAIR / CAMR Compliance Plan
Cayuga	Units 1-2 – Flue Gas Desulfurization ("FGD Scrubbers"), FGD landfill phase 1 & 2, switchyard addition, mercury monitor
Gallagher	Units 1-4 – Full baghouses, landfill development and land purchase, mercury monitor
Gibson	Units 1-3 – FGD scrubbers Units 4-5 – FGD scrubber upgrades Units 1-5 – Mercury monitor
Wabash River	Units 2-6 – Mercury monitor

In Cause No. 43873, the Commission approved the Company's proposal to construct Dry Sorbent Injection systems at Gallagher Generating Station.

Next, Duke Energy Indiana sought and received approval to construct environmental control equipment for purposes of complying with the Mercury and Air Toxics Standards ("MATS"). The Company's MATS compliance projects were approved in Cause Nos. 44217 and 44418, and constructed as follows:

Table 3

Station	MATS Phase 1 Compliance Plan
Cayuga	Units 1-2 – SCR, catalyst beds, dry sorbent injection, arsenic mitigation system, mercury re-emission chemical injection system
Gibson	Units 1-3, 5 – Mercury re-emission chemical injection system

Table 4

Station	MATS Phase 2 Compliance Plan
Cayuga	Units 1 and 2 – PM CEMS, calcium bromide mercury oxidation chemical injection system
Gibson	Units 1-5 – PM CEMS, calcium bromide mercury oxidation chemical injection system Units 3-5 – Precipitator refurbishment Units 4-5 – Stack improvements Unit 5 – FGD relief duct dampers

In addition, Duke Energy Indiana invested in projects to comply with the federal Coal Combustion Residual ("CCR") rule, Effluent Limitations Guidelines ("ELG") and Reciprocating Internal Combustion Engine National Emission Standards for Hazardous Air Pollutants ("RICE NESHAP"). The following projects were approved by the Commission in Cause No. 44765, and constructed by the Company:

1. Dry bottom ash handling systems, water redirection and lined retention basins at Gibson and Cayuga Stations for purposes of complying with the CCR Rule and the ELG Rule;

2. Installation of pollution control equipment on four diesel generators at its Cayuga Station for purposes of complying with EPA's RICE NESHAP.

The projects listed above have been included in the Company's Environmental Cost Recovery ("ECR") filings under Cause No. 42061- ECR. Associated with the operation of these environmental compliance projects, Duke Energy Indiana has also invested in capital additions and maintenance projects since the last rate case. Although these capital additions and maintenance projects completed from July 1, 2011, through December 31, 2018 have been included in the Company's ECR proceedings, I am including a description of them in my testimony because they will be included in base rates following this proceeding.

Q. IN YOUR OPINION, IS ALL OF DUKE ENERGY INDIANA'S ENVIRONMENTAL COMPLIANCE INVESTMENT USED AND USEFUL IN THE GENERATION OF ELECTRICITY FOR DUKE ENERGY INDIANA'S RETAIL ELECTRIC CUSTOMERS?

A. Yes. All of Duke Energy Indiana's generating units, with the exception of those retired units noted above, were operated during 2018 and are expected to be operating in 2020. The environmental equipment added as discussed (all of which has been approved by the Commission) has been assisting or will assist Duke Energy Indiana with meeting increasingly stringent environmental requirements.

Q. IN ADDITION TO THE PROJECTS DISCUSSED ABOVE, HAS THE COMPANY ALSO INVESTED IN OTHER ENVIRONMENTAL COMPLIANCE PROJECTS?

A. Yes. The Company has been engaged in the studies required by the EPA's 316(a) and 316(b) rules, as well as the National Pollutant Discharge Elimination System ("NPDES") program.

Q. PLEASE DESCRIBE THE 316(A) AND 316(B) RULES AND THEIR REQUIREMENTS IMPACTING THE COMPANY'S GENERATION.

A. The EPA's 316(a) rule, which is implemented through our stations' NPDES permitting process, requires fisheries and aquatic sampling, as well as completion of 316(a) demonstration study reports.

The EPA's 316(b) rule establishes aquatic protection requirements for existing facilities and new on-site facility additions with a design intake flow of two million gallons per day or more from rivers, streams, lakes, reservoirs, estuaries, oceans, or other U.S. waters; that utilize at least 25% of the water withdrawn for cooling purposes; and that are a point source as defined in the Clean Water Act. The rule covers aquatic mortality caused by impingement of organisms against cooling water intake screens, and due to entrainment of organisms in the cooling water systems. All of Duke Energy Indiana's coal-fired facilities[5] are affected sources, as is the Noblesville combined cycle plant.

Activities associated with the impingement provisions of the rule include various aquatic, technical, and engineering studies that are required to be performed. The rule also requires intake structure upgrades, such as the installation of modified intake screens and fish return systems. The Company must also perform impingement mortality monitoring and numeric reporting.

Compliance with the impingement provisions of the rule is tied to the NPDES permit renewal schedule by facility, and compliance dates generally range from 2017 to 2021.

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[5] With the exception of Edwardsport Station, which does not have an intake structure.

Q. ARE THE 316(A) AND (B) RULES AND THE NPDES PROGRAM BOTH FEDERALLY MANDATED REQUIREMENTS?

A. Yes, they are. 316(a) and 316(b) are both provisions of the federal Clean Water Act, and the NPDES permit program was created under the Clean Water Act.

Q. ARE THE COMPANY'S ACTIVITIES RELATED TO 316(A), 316(B) AND NPDES BEING DONE FOR THE PURPOSE OF COMPLYING WITH FEDERALLY MANDATED REQUIREMENTS?

A. Yes, they are. The Company would not be performing these activities without the federal mandated requirements. Therefore, Duke Energy Indiana requests that the Commission allow the Company to defer the expenses related to 316(a), 316(b), and NPDES compliance projects as federally mandated costs under Indiana Code § 8-1-8.4 for recovery through its ECR rider proceedings, as discussed further in the testimony of Company witness Ms. Christa L. Graft.

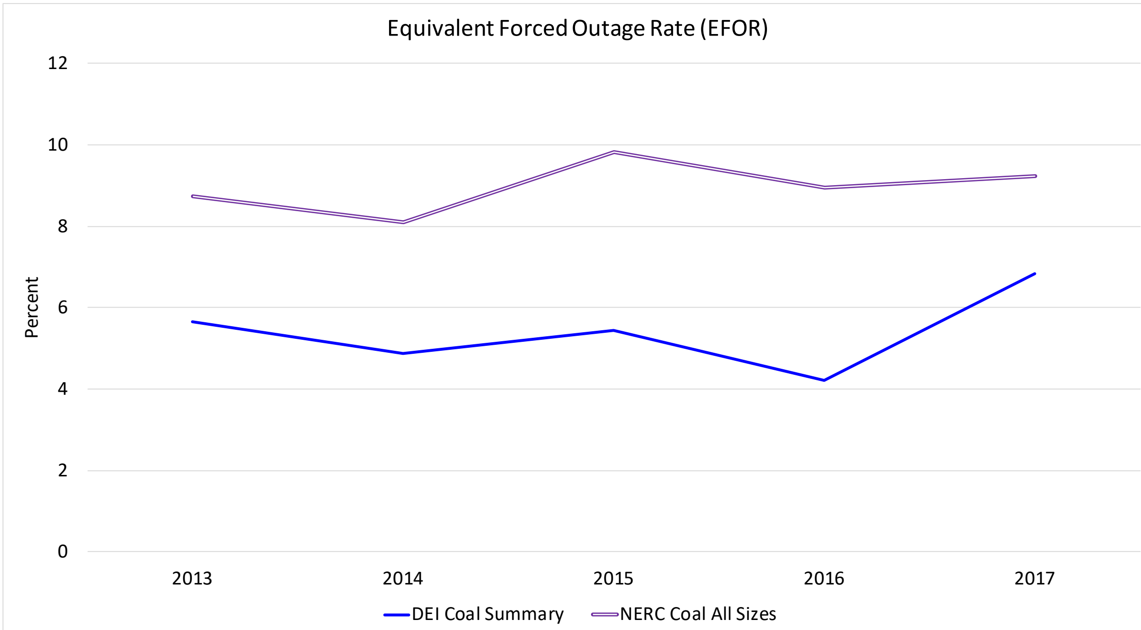
IV. GENERATION PERFORMANCE

Q. PLEASE SUMMARIZE THE EQUIVALENT FORCED OUTAGE RATES ASSOCIATED WITH DUKE ENERGY INDIANA'S GENERATING UNITS.

A. The chart below provides a summary of the Equivalent Forced Outage Rate ("EFOR") for the Company's coal-fired units (Cayuga, Gallagher, and Gibson), and compares it to the EFOR reported for North American Electric Reliability Corporation ("NERC") coal-fired units over the same period.[6]

[6] NERC comparison data for 2018 was not available when this testimony was filed.

Graph 1



Q. PLEASE EXPLAIN HOW EFOR MEASURES UNIT RELIABILITY.

A. A generating unit's EFOR is equal to the hours of unit forced unavailability (unplanned outage hours and equivalent unplanned derated hours) given as a percentage of the total hours of service plus the unavailability of that unit (unplanned outage, unplanned derate, and service hours). For example, if the Midcontinent Independent System Operator ("MISO") anticipated a unit to run 1,000 hours in a certain year but the unit was unable to run 100 of those hours due to unexpected problems, the unit's EFOR would be 10%. A low EFOR number is desirable.

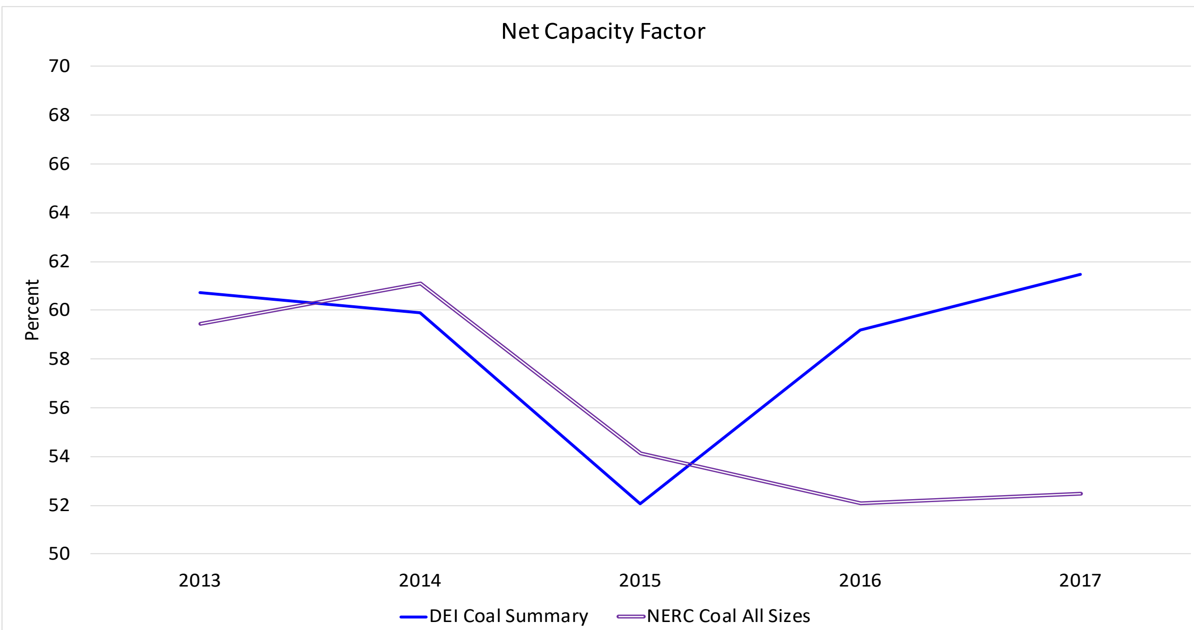
Q. IS THE EFOR FOR DUKE ENERGY INDIANA'S GENERATING UNITS IN LINE WITH INDUSTRY AVERAGES?

A. Yes. Duke Energy Indiana's coal unit EFOR shows a lower forced outage rate than the NERC data.

Q. PLEASE SUMMARIZE THE NET CAPACITY FACTORS ASSOCIATED WITH DUKE ENERGY INDIANA'S GENERATING UNITS.

A. The chart below provides a summary of the net capacity factors ("NCF") for the Company's coal-fired units (Cayuga, Gallagher, and Gibson), and compares it to the NCF reported for NERC coal-fired units over the same period.[7]

Graph 2



Q. PLEASE EXPLAIN HOW NCF MEASURES UNIT RELIABILITY.

A. A generating unit's NCF is the ratio of the net electricity generated, for the time considered, to the energy that could have been generated at continuous full-power operation during the same period. A higher NCF number is desirable.

[7] NERC comparison data for 2018 was not available when this testimony was filed.

Q. IS THE NCF FOR DUKE ENERGY INDIANA'S GENERATING UNITS IN LINE WITH INDUSTRY AVERAGES?

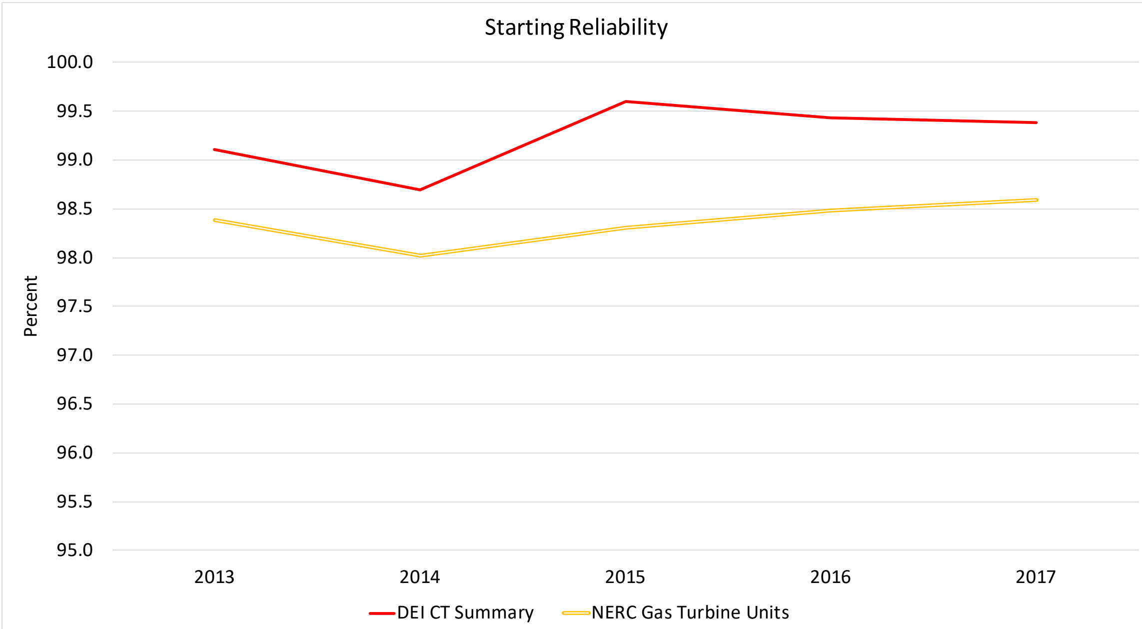
A. Yes. Duke Energy Indiana's coal unit NCF shows an increased net capacity factor over the NERC coal unit data for the same time period. The increase in NCF for 2015 forward simply reflects the fact that our coal units have been running more in the past few years, most likely due to a decrease in our coal prices. This increase in NCF also results in an increase in the propensity for EFOR of the coal units – the harder units are run, the more likely it is that forced outage events may occur.

Q. PLEASE PROVIDE A COMPARISON OF THE COMPANY'S GAS TURBINES STARTING RELIABILITY WITH INDUSTRY AVERAGES.

A. The chart below provides a summary of the starting reliability of the Company's gas-fired units, and compares it to the starting reliability reported for NERC gas-fired units over the same period.[8]

[8] NERC comparison data for 2018 was not available when this testimony was filed.

Graph 3



Q. PLEASE EXPLAIN HOW STARTING RELIABILITY FOR GAS UNITS MEASURES UNIT RELIABILITY.

A. While EFOR is an informative metric for coal-fired units that run at high capacity factors (and hence have high service hours), EFOR on peaking units tends to be volatile due to the typically low number of service hours in the denominator of the calculation. A single forced outage event can result in a large EFOR number, even though total unit availability may be very high. Therefore, we use starting reliability as a more informative metric of CT performance. After all, what really matters for peaking units is that they startup and serve load reliably when they are needed the most. Starting reliability is the ratio of the number of successful startups to the number of attempted startups. A startup is successful if the unit synchronizes to the grid within a certain timeframe. If the unit is unable to start (a start failure) or the startup is delayed, then the unit would be failing in its peaking duty. A high starting reliability is desirable.

Q. IS THE STARTING RELIABILITY FOR DUKE ENERGY INDIANA'S GENERATING UNITS IN LINE WITH INDUSTRY AVERAGES?

A. Yes. Duke Energy Indiana's gas-fired unit starting reliability reflects performance that surpasses starting reliability of comparable NERC gas-fired unit data for the same time period.

Q. PLEASE DESCRIBE THE RELIABILITY OF THE CRANE SOLAR GENERATING FACILITY SINCE IT BECAME OPERATIONAL.

A. For solar generating facilities, the main reliability metrics tracked by the Company are energy yield, which is the percent of energy produced out of the maximum that could have been produced, considering the actual available solar conditions (daylight hours, sun position, degree of cloudiness, etc.); inverter availability, which is tracked as either on or off during daylight hours only; and net capacity factor. The Crane solar generating facility's performance is as follows:

Table 5

	Energy Yield	Inverter Availability	NCF
2018 Annual	93.8%	94.2%	18.5%
2019 YTD March	90.1%	100%	12.5%

The 2019 YTD March NCF looks as if performance of the unit is down for the year, but in fact it is simply coming out of the winter season. Monthly NCF should be higher in the summer, bringing up the annual average. Inverter availability is in line with performance expectations.

Q. MR. MOSLEY, DO YOU EXPECT THE COMPANY'S RELIABILITY METRICS TO REMAIN IN LINE WITH INDUSTRY AVERAGES?

A. Yes, I do. Duke Energy Indiana intends to operate its generating stations in a safe, reliable, and environmentally compliant manner. The execution of planned outages will help sustain reliability performance, and controlling variable costs will allow our units to remain competitive in the market, helping to maintain capacity factors.

V. PRODUCTION O&M AND CAPITAL EXPENDITURES

Q. WHAT LEVEL OF OVERALL POWER PRODUCTION O&M AND CAPITAL EXPENDITURES ARE REFLECTED IN DUKE ENERGY INDIANA'S 2020 FORECAST?

A. Duke Energy Indiana's 2020 Power Production O&M and Capital Expenditures Forecast are $407 million and $208 million, respectively.

Q. ARE YOU SPONSORING THE POWER PRODUCTION O&M AND CAPITAL EXPENDITURES IN THIS FORECAST?

A. Yes. I am sponsoring a portion of the Power Production O&M and Capital Expenditures in this forecast. Duke Energy Indiana Witnesses Mr. Cecil Gurganus, Mr. Timothy Thiemann, and Mr. Andrew Ritch will also be sponsoring portions of the Power Production O&M and Capital Expenditures forecasts, as it relates directly to their testimony. Please see the table below for a split of the 2020 Power Production O&M and Capital Expenditures.

Table 6

Witness	O&M	Capital Expenditures
Edwardsport IGCC	$139	$51
Coal Combustion Products	$12	$33
New Generation Resources	$0	$42
Power Production	$229	$82
Other Miscellaneous Power Production	$27	$0
Total	**$407**	**$208**

Q. WHAT LEVEL OF POWER PRODUCTION CAPITAL EXPENDITURES ARE REFLECTED IN DUKE ENERGY INDIANA'S 2020 FORECAST?

A. Duke Energy Indiana's 2020 Power Production Capital Expenditures Forecast is $82 million.

Q. HOW DOES THE 2020 POWER PRODUCTION CAPITAL EXPENDITURES FORECAST COMPARE TO THE 2019 POWER PRODUCTION CAPITAL EXPENDITURES BUDGET AND THE ACTUAL 2018 POWER PRODUCTION CAPITAL EXPENDITURES?

A. A comparison of the Forecasted 2020 Power Production Capital expenditures to the 2019 Budget and 2018 Actual Power Production Capital Expenditures is shown in the table below.

Table 7

$ in Millions	2018 Actual	2019 Budget	2020 Forecast
Power Production Capital Expenditures	$92	$120	$82
Increase / (Decrease)		$28	($38)

Q. PLEASE DESCRIBE THE MAJOR CHANGES BETWEEN THE 2018 ACTUAL, 2019 BUDGET, AND 2020 FORECASTED POWER PRODUCTION CAPITAL EXPENDITURES INCLUDING ANY MAJOR ASSUMPTIONS UTILIZED TO ARRIVE AT THE 2020 FORECAST.

A. Capital expenditures vary year to year depending on the number of planned outages and equipment maintenance cycles. The major changes between 2018 actuals and 2019 budget are Cayuga Unit 2 generator stator rewind, Gibson deep well header and ammonia header, Noblesville Unit 5 major outage, and Wheatland Unit 3 hot gas path inspection. In 2020, the Markland Generator Rewind and Turbine Uprate projects are winding down.

Q. PLEASE IDENTIFY THE CAPITAL EXPENDITURES THAT ARE INCLUDED IN THE COMPANY'S POWER PRODUCTION 2019 BUDGET AND 2020 FORECAST FROM JANUARY 1, 2019 TO DECEMBER 31, 2020 GREATER THAN $4 MILLION.

A. There are many different capital projects to be completed in 2019 and 2020. Those Power Production projects that involve capital expenditures greater than $4 million include the following:

Table 8

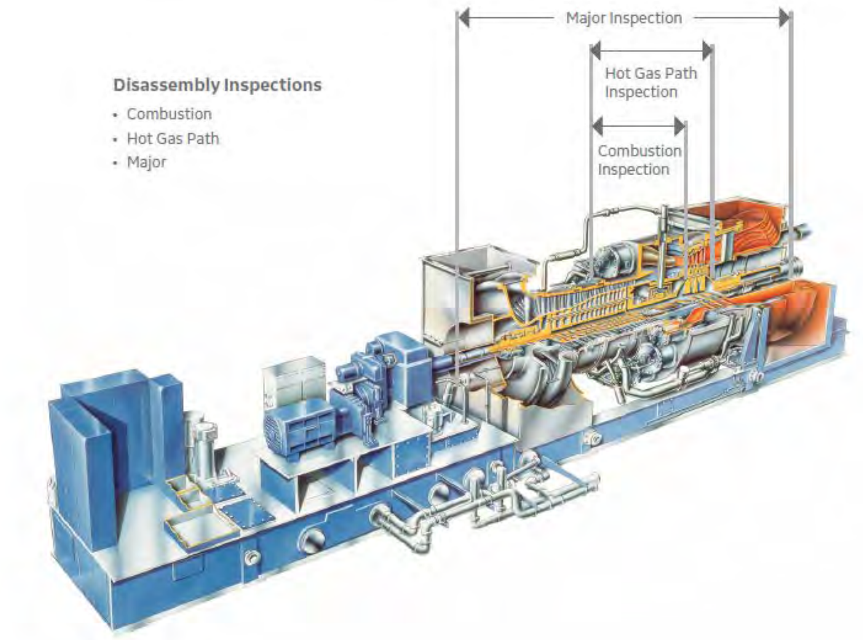
Station	Project	2019 & 2020
Cayuga	Unit 2 Generator Stator Rewind	$10
Gibson	Unit 2 Controls	$5
	Unit 3 Controls	$5
	Deep Well Header	$5
	Ammonia Header	$7
Markland	Unit 1 Turbine Uprate	$22
	Unit 1 Generator Rewind	$7
	Unit 3 Turbine Uprate	$13
	Unit 3 Generator Rewind	$4
Noblesville	Unit CT 5 Major	$5
Wheatland	Unit CT 2 Hot Gas Path Inspection	$8
	Unit CT 3 Hot Gas Path Inspection	$7

Q. PLEASE DESCRIBE THE PROJECTS LISTED ABOVE.

A. It is best to categorize the projects into different groups. First are projects that are needed to replace equipment or components that are at the end of their useful lives. The Cayuga Unit 2 generator project involves replacing the machine's stator windings. Stators are the stationary part of the generator that surrounds the rotor. Unit 2's stator is original and has reached the manufacturer's life expectancy. The Gibson Unit 2 and Unit 3 Controls projects include server, controller and network upgrades in order to maintain compatibility with the latest operating systems and control software.

The next group are combustion turbine projects based on the original equipment manufacturer's ("OEM") recommendations. There are three notable maintenance events associated with these machines. The most frequent are combustion inspections which involve replacement of the combustion components which have a tendency to wear out the quickest. Next frequent is hot gas path inspections which includes replacing worn turbine components such as blade rows and shrouds. A combustion inspection is typically included in this inspection. Least frequent but most significant are the "Major" inspections which further includes replacement of worn compressor components. In addition, this typically includes the two aforementioned inspections of the combustion and turbine components. When each of these three inspections are performed is based on OEM recommendations of the number of operating hours or starts, whichever is reached first. Noblesville CT5 is due for its first major maintenance in 2019 at which point it has reached 48,000 operating hours. Similarly, Wheatland CT2 and CT3 are due for their first hot gas path inspections in 2020 and 2019 respectively for reaching 800 starts each. Even though it is industry standard terminology to call these maintenance events "inspections" the OEM recommended work scope always includes assumed replacement of several capital components such as turbine blade/compressor rows and/or combustion components. Final costs for these types of projects can vary from budgeted amounts because the extent of the work is not fully known until the machines are disassembled. Please see diagram below which is representative of areas addressed by each maintenance event.

Figure 1[9]



The ammonia header project is a component of the OSHA's Process Safety Management ("PSM") compliance program being implemented at Gibson station due to the anhydrous ammonia system used in operation of the SCRs. It involves installing a vaporizer and resizing the distribution piping to dramatically reduce the stored ammonia volume in the piping system. It is required because the existing system distributes liquid ammonia and the cumulative volume of the piping equates to a significant quantity which poses a risk to station employees if the piping is ruptured. The new header system along with using vaporized ammonia reduces the piping volume to less than 100 pounds of anhydrous ammonia.

[9] © General Electric Company. Reprinted with Permission from Heavy-Duty Gas Turbine Operating and Maintenance Considerations GER-3620N (10/17) by GE Power, Atlanta, GA for the sole purpose of Duke Energy Indiana Rate Case direct testimony of Mr. James Michael Mosley submitted as part of a public proceeding to the Indiana Utility Regulatory Commission (IURC).

At Gibson, water used for boilers is obtained from deep wells. The existing deep well header is made of PVC and suffers from frequent leaks and can limit water production which can cause operational issues. The Gibson deep well header project is to install an additional header made from HDPE which is a more reliable material of construction for this type of service.

Lastly, the Markland Units 1 and 3 turbine uprate and generator stator rewind projects are all part of the Markland Uprate effort that I discussed earlier in my testimony.

Q. IS THE AMOUNT OF CAPITAL TO BE INVESTED IN DUKE ENERGY INDIANA'S GENERATION FLEET REASONABLE AND NECESSARY?

A. Yes. Generating units and their individual components can deteriorate, fail, become obsolete or require additional investment and must be replaced or repaired to maintain safe, reliable, efficient, environmentally-compliant service. Additionally, capital investment must be made in response to evolving environmental, safety and regulatory requirements. The amount of investment to be made in 2019 and 2020 represents an appropriate amount based upon the needs of the generating stations to maintain reasonable levels of service.

Q. WITH THE NEW DEPRECIATION RETIREMENT DATES HOW DO YOU PLAN TO MANAGE MAINTENANCE EXPENSE AND RELIABILITY AS A UNIT APPROACHES RETIREMENT?

A. As units approach their retirement dates, within a given maintenance cycle, the value of any needed work is evaluated with consideration of the remaining life of the asset. However, because a unit's capacity value is committed to MISO, of which reliability is a component, the type and amount of maintenance funding is balanced with reliability needs until the unit's last day of operation; with the expectation that safe and compliant operation of a unit is sustained. It should be noted, Duke Energy Indiana has recent experience at successfully managing end of life assets at both Gallagher and Wabash River stations.

VI. POWER PRODUCTION O&M

Q. HOW DOES THE 2020 POWER PRODUCTION O&M FORECAST COMPARE TO THE 2019 POWER PRODUCTION O&M BUDGET AND THE ACTUAL 2018 POWER PRODUCTION O&M EXPENDITURES?

A. A comparison of the Forecasted 2020 Power Production O&M expenses to the 2019 Budget and 2018 Actual Power Production O&M expenses is shown in the table below.

Table 9

$ in Millions	2018 Actual	2019 Budget	2020 Forecast
Power Production O&M	$209	$209	$229
Increase / (Decrease)		$0	$20

Q. PLEASE DESCRIBE THE MAJOR CHANGES BETWEEN THE 2018 ACTUAL, 2019 BUDGET AND 2020 FORECASTED POWER PRODUCTION O&M EXPENDITURES INCLUDING ANY MAJOR ASSUMPTIONS UTILIZED TO ARRIVE AT THE 2020 FORECAST.

A. Like capital expenditures, O&M mostly varies year to year based on outage maintenance cycles. Below, I provide a detailed description of the main O&M expense components and the changes from 2018 to 2020.

Q. PLEASE DESCRIBE DUKE ENERGY INDIANA'S MAIN COMPONENTS OF O&M EXPENSES.

A. Fuel cost is a primary component of ongoing O&M for the generation fleet. The testimony of Duke Energy Indiana witness Mr. Brett Phipps describes the Company's fuel expense, fuel inventory, and fuel purchasing strategy. Non-fuel O&M, outage costs, and non-outage maintenance costs are other main components, which I will discuss below.

Q. WHAT IS NON-FUEL POWER PRODUCTION O&M EXPENSE?

A. Non-fuel O&M expense generally includes the cost associated with the operation, maintenance, administration and support of Duke Energy Indiana's generating units. These costs exclude fuel (which is discussed in Mr. Phipps' testimony), but include labor, materials and supplies, contractor services, reagents, and other miscellaneous expenses for Duke Energy Indiana's generating units.

Q. HOW IS THE TOTAL AMOUNT OF POWER PRODUCTION NON-FUEL O&M DETERMINED?

A. Duke Energy Indiana generally develops its O&M budget based on the costs necessary to operate and maintain its generating units. Ongoing operations typically include expenses associated with labor, fringe benefits, consumable materials and chemicals (*e.g.,* reagents), mandated fees and other ongoing expenses. O&M also includes the expense associated with scheduled outages and maintenance at the Company's generating stations. Incremental needs are also evaluated by Duke Energy management, and the available resources are allocated in order of greatest operational benefit.

Q. WHAT ARE THE NON-FUEL O&M EXPENSES FOR 2018 ACTUAL, 2019 BUDGET AND 2020 FORECAST YOU ARE SUPPORTING IN THIS PROCEEDING?

A. Following is a chart showing the O&M from our 2018 base year, 2019 budget, and the forecasted O&M for 2020, separated into outage and non-outage expenses.

Table 10

$ in Millions	2018 Actual	2019 Budget	2020 Forecast
Non-Outage O&M	$198	$182	$197
Increase / (Decrease)		($16)	$15
Outage O&M	$11	$27	$32
Increase / (Decrease)		$16	$5
Power Production O&M Total	$209	$209	$229

Q. PLEASE DESCRIBE THE NON-OUTAGE AND OUTAGE POWER PRODUCTION O&M EXPENSE.

A. Non-outage O&M expenses are generally incurred on an ongoing basis. Outage O&M expenses however, are generally incurred only periodically based the maintenance cycle of the units.

Q. IS THERE A DIFFERENCE BETWEEN THE NON-FUEL POWER PRODUCTION NON-OUTAGE O&M FOR 2018 ACTUALS, 2019 BUDGET AND 2020 FORECAST?

A. Yes. The non-outage O&M for 2018, 2019 and 2020 should be very similar. Inflationary and cost of service increases are partially offset through the use of cost savings initiatives which I discuss later in my testimony. The 2019 non-outage O&M budget reflected in the table above is understated by approximately $11 million for costs associated with Gibson environmental maintenance. These costs will increase the estimated 2019 non-outage O&M spend.

Q. WHY IS THERE A DIFFERENCE BETWEEN THE NON-FUEL POWER PRODUCTION OUTAGE O&M EXPENSES FOR 2018 ACTUALS, 2019 BUDGET AND 2020 FORECAST?

A. Each of Duke Energy Indiana's generating stations has cyclical maintenance and we attempt to schedule that maintenance to occur during off-peak times of the year, and to stagger the outages to prevent the majority of our units from being out for scheduled maintenance at the same time. Unfortunately, predominantly due to past environmental control retrofit tie-in outages, our major outages on the coal units have been compacted together, and we are still in the process of re-levelizing the outage schedule. Our goal, as represented by the 2019 and the 2020 outage O&M expense estimate, is to get back to having one or two major outages per year among the seven large coal units (Cayuga and Gibson), with the smaller availability outages filling out the rest of the schedule. That will achieve a more consistent level of planned outage spend, as demonstrated in our longer-term forecast.

In 2018, there were fewer outages than is typical for Duke Energy Indiana's system. In 2019, Madison Unit 1 and 2, and Noblesville Unit 4 generator inspections, Wheatland Unit 3 hot gas path inspection, and outages for Gibson Units 2 and 4 are planned. In 2020, outages for Gibson Unit 1 and 3, Cayuga Unit 1, Noblesville Unit 3, Madison CT1, CT2, and CT6 generator inspections are planned.

Q. ARE REAGENTS INCLUDED IN THE BASE COST OF POWER PRODUCTION O&M?

A. Yes, reagents and chemicals are included in the base cost of operations.

Q. PLEASE EXPLAIN THE VARIABILITY IN REAGENT EXPENSES NECESSARY TO OPERATE THE COMPANY'S GENERATING STATIONS IN COMPLIANCE WITH ENVIRONMENTAL REGULATIONS.

A. Just like fuel costs, environmental control reagents consumption varies directly with generation output of the units. The more coal is consumed, the more limestone is needed to remove SO_2 in the scrubbers, the more ammonia is needed to remove NOx in the SCRs, and so on. Because of this variability, we include environmental control reagent costs as variable costs in our MISO offers. But even beyond variation with generation, reagent consumption rates also vary with coal quality. For example, coals with higher sulfur contents require more limestone usage in the scrubbers. Also, the commodity and delivery transportation prices of the reagents themselves can show volatility. Ammonia prices, for example, can increase significantly during farming season. Delivery costs can also move with the cost of oil, due to the fuel cost of transportation.

Q. HOW DOES THE COMPANY PROPOSE TO MANAGE THE VARIABLE NATURE OF THESE REAGENTS?

A. The Company is proposing to build in to its base rates a representative level of the following reagents, based on the types and quantities included in the 2020 forecast:

Table 11

Reagent	Use
Limestone	SO_2 removal in scrubbers
Pulverized limestone	Additive for arsenic mitigation of SCR catalyst
Lime (or quicklime)	Scrubber and fly ash waste fixation
Hydrated lime	SO_2 removal (Gallagher) or sulfuric acid mist mitigation (Cayuga)
Sodium bi-sulfate/Soda ash	Sulfuric acid mist mitigation (Gibson)
Ammonia	NOx removal in SCRs
Sodium formate or "DBA"	Scrubber additive for SO_2 removal (Gibson 5)
Mercury re-emission chemical	Scrubber additive for mercury re-emission mitigation
Mercury oxidation chemical	Additive for enhanced mercury oxidation

As discussed in the testimony of Ms. Graft, due to the variable nature of these reagents, Duke Energy Indiana is proposing to track its reagent expense, both up and down from the level built into base rates, through its approved ECR rider filings, as has been done for many years. Just as fuel expense is treated through the FAC, reagent usage is heavily dependent on generation levels. Therefore, the Company is proposing to treat them in the same manner.

Q. DID YOU PROVIDE THE 2020 POWER PRODUCTION O&M AND CAPITAL EXPENDITURES REFLECTED ABOVE, TO WITNESS MR. CHRIS JACOBI FOR INCLUSION IN THE COMPANY'S FORECASTED TEST PERIOD PROPOSED IN THIS CASE?

A. Yes.

VII. COST SAVINGS INITIATIVES

Q. PLEASE DESCRIBE HOW DUKE ENERGY FOCUSES ON EFFICIENCY AND COST SAVINGS FOR ITS GENERATION FLEET.

A. The Company is constantly seeking ways to reduce or minimize increases in the non-fuel O&M cost of operating its fleet. For example, over the past several years, through a program called SmartGen, Duke Energy has been installing instrumentation on critical equipment (boiler feed pumps, draft fans, transformers, etc.) for remote monitoring and diagnostics. Using this system, it is possible to use pattern recognition software to trend the mechanical or electrical performance of a piece of equipment and predict needed maintenance before failure occurs. This has proven to help avoid costly emergent maintenance and unplanned downtime. Within Power Production, efforts are underway to further investigate opportunities to leverage digital tools and technology, one of which is a mobile application to enable field personnel to complete work orders remotely in the field. Using this application, a worker can quickly and efficiently document an equipment issue or maintenance need. Another is a new work order prioritization tool that utilizes Machine Learning to systematically rank corrective maintenance activities. Historically, considerable time and effort was involved in reviewing and ranking each work order and this tool automates much of that process. Also, increased use of unmanned vehicle (drone) inspections being trialed at our Cayuga and Gibson stations to help assess the condition of boiler tubes and ducts without erecting costly scaffold is proving to be beneficial. Additional testing of drone technology to perform solar field condition assessments is also ongoing at other Duke Energy sites that could be used at Crane solar to help reduce inspection costs. Not only does the use of this technology help offset cost through efficiency gains, it also lowers personnel safety risk exposure.

As for cost savings efforts associated with fuels, please see the testimony of Mr. Brett Phipps.

VIII. GALLAGHER GENERATING STATION

Q. PLEASE DESCRIBE ANY UPCOMING GENERATING UNIT RETIREMENTS IN DUKE ENERGY INDIANA'S PLAN.

A. Pursuant to the Settlement Agreement approved by the Commission in Cause No. 43114 IGCC-15, Gallagher Units 2 and 4 will be retired by December 31, 2022.

Q. ARE THERE OTHER FACTORS DRIVING THE RETIREMENT OF THE GALLAGHER UNITS?

A. Yes. While the Settlement Agreement commitment is an important (and binding) commitment for the Company, Gallagher Units 2 and 4 would also face additional investment for compliance with multiple environmental regulations, including the Coal Combustion Residuals ("CCR") Rule, Steam Electric Effluent Limitations Guidelines ("ELG") Rule, and the 316(b) intake structures rule should they continue to operate. To comply with these rules, the units would need to install dry bottom ash management systems, station process water treatment systems, and cooling water intake screen upgrades. Facing these costs, the units were selected for retirement in 2019 in the Duke Energy Indiana 2015 IRP.[10]

Q. COULD THE COMPANY CONVERT GALLAGHER UNITS 2 AND 4 TO OPERATE ON NATURAL GAS INSTEAD OF RETIRING THEM?

A. Yes. The Settlement Agreement gives the Company the option of converting Gallagher Units 2 and 4 to natural gas fuel, or retiring the units. As discussed in the 2015 IRP, natural gas conversion is not an economic choice for Gallagher Units 2 and 4 because, at most, it would avoid the dry bottom ash management systems, but process water treatment and cooling water intake upgrades would still be required, along with the gas supply pipeline and unit conversion investments. Therefore, the Company filed an Attachment Y retirement study request with MISO. MISO approved the Gallagher Units 2 and 4 retirement request in September of 2018, thus making this a formal commitment by the Company to retire the Gallagher units on December 31, 2022.

[10] https://www.duke-energy.com/_/media/pdfs/for-your-home/2015-indiana-integrated-resource-plan.pdf?la=en

Q. DO YOU CONSIDER THE COMPANY'S DECISION TO RETIRE GALLAGHER UNITS 2 AND 4 REASONABLE?

A. Yes, I do. Gallagher Units 2 and 4 entered service in 1958 and 1961 respectively. Retirement in 2022 will give them a 63-year life on average. 63 years of life is reasonable, particularly considering that Gallagher Units 2 and 4 lack formal flue gas desulfurization and selective catalytic reduction emission controls common to most other units that are still operating today. By all industry comparisons, the Gallagher units are at their end of life by 2022. Duke Energy Indiana witness Ms. Douglas further discusses the accounting treatment of the Gallagher Units 2 and 4 retirements.

IX. CONCLUSION

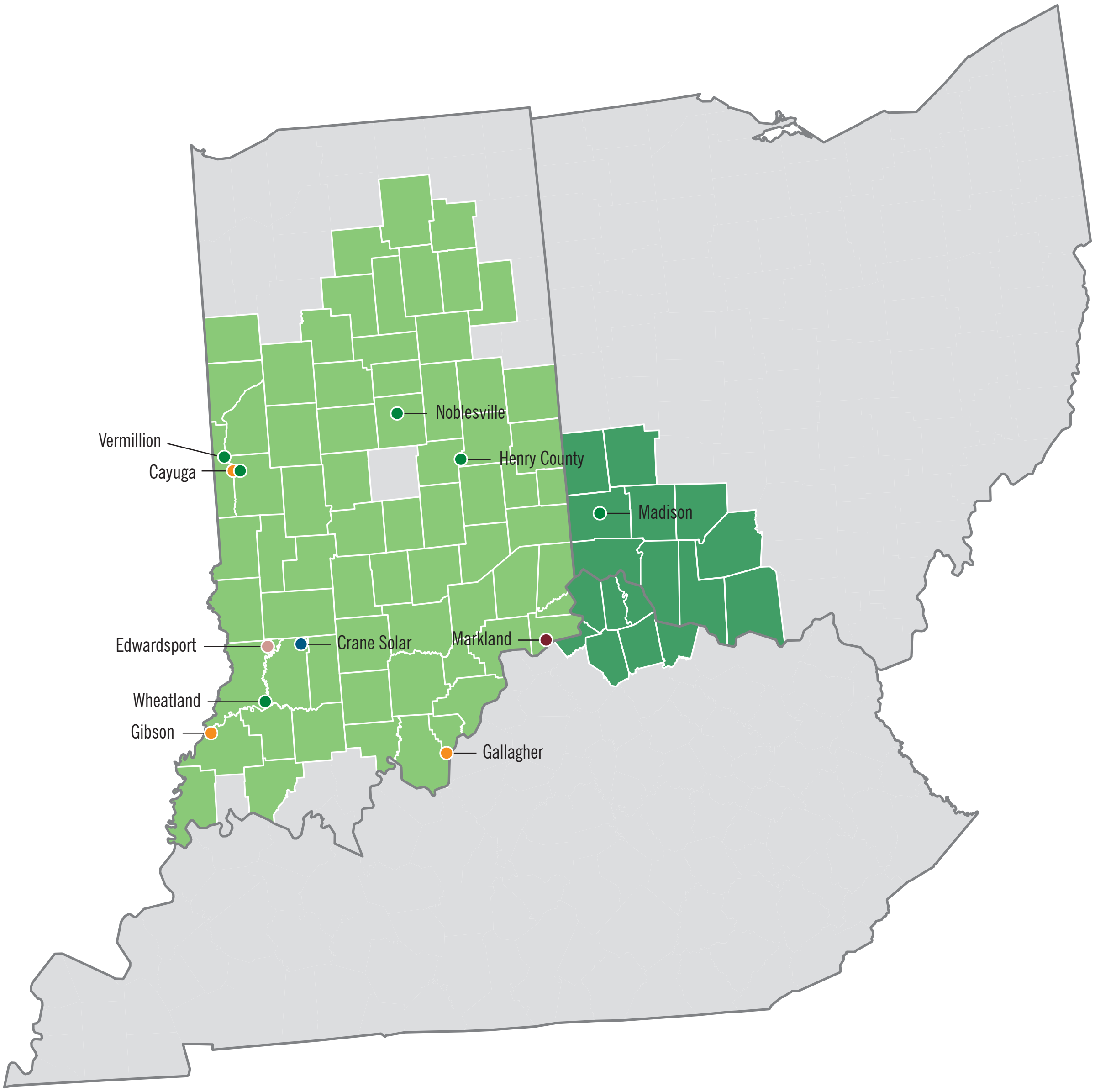
Q. WAS PETITIONER'S EXHIBIT 19-A (JMM) PREPARED BY YOU OR AT YOUR DIRECTION?

A. Yes.

Q. DOES THIS CONCLUDE YOUR PREFILED DIRECT TESTIMONY?

A. Yes, it does.

Duke Energy Indiana Generating Assets



Service Territory
Counties Served*

- **Duke Energy Indiana**
- **Duke Energy Ohio and Kentucky**

**Portions may be served by other utilities.*

Plant Locations
Generation Type

- CC/CT
- Solar
- Hydro
- Syngas
- Coal

DUKE ENERGY®

*BUILDING A **SMARTER** ENERGY FUTURE®*

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: [signature]
James M. Mosley

Dated: 7/2/2019