STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF DUKE ENERGY INDIANA, INC. SEEKING (1) APPROVAL OF AN ONGOING REVIEW PROGRESS REPORT PURSUANT TO IND. CODE 8-1-8.5 AND 8-1-8.7; AND (2) AUTHORITY TO REFLECT COSTS INCURRED FOR THE EDWARDSPORT INTEGRATED GASIFICATION COMBINED CYCLE GENERATING FACILITY ("IGCC PROJECT") PROPERTY UNDER CONSTRUCTION IN ITS RATES AND AUTHORITY TO RECOVER APPUCABLE RELATED COSTS AND CREDITS THROUGH ITS INTEGRATED COAL GASIFICATION COMBINED CYCLE GENERATING FACILITY COST RECOVERY ADJUSTMENT, STANDARD CONTRACT RIDER NO. 61 PURSUANT TO IND. CODE §§ 8-1-8.8-11 AND-12)	)	**CAUSE NO. 43114 IGCC-12 & 13**

DIRECT TESTIMONY OF DAVID A. SCHLISSEL
ON BEHALF OF
JOINT INTERVENORS
DECEMBER 15, 2014

PUBLIC VERSION—CONFIDENTIAL INFORMATION REDACTED

INTRODUCTION

Q. Please state your name and business address.

A. My name is David A. Schlissel. I am the President of Schlissel Technical Consulting, Inc., 45 Horace Road, Belmont, MA 02478.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of the Citizens Action Coalition of Indiana, Valley Watch, Save the Valley and the Sierra Club. ("Joint Intervenors")

Q. Please summarize your educational background and recent work experience.

A. I graduated from the Massachusetts Institute of Technology in 1968 with a Bachelor of Science Degree in Engineering. In 1969, I received a Master of Science Degree in Engineering from Stanford University. In 1973, I received a Law Degree from Stanford University. In addition, I studied nuclear engineering at the Massachusetts Institute of Technology during the years 1983-1986.

Since 1983 I have been retained by governmental bodies, publicly-owned utilities, and private organizations in 38 states to prepare expert testimony and analyses on engineering and economic issues related to electric utilities. My recent clients have included the U.S. Department of Justice, the Attorney General and the Governor of the State of New York, state consumer advocates, and national and local environmental and consumer organizations.

I have filed expert testimony before state regulatory commissions in Arkansas, Arizona, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Rhode Island, South Carolina, South Dakota, Texas, Vermont, Virginia, West Virginia, and Wisconsin and before an Atomic Safety & Licensing Board of the U.S. Nuclear Regulatory Commission.

A copy of my current resume is included as Exhibit DAS-1. Additional information about my work is available at www.schlissel-technical.com.

Q. Have you testified previously before this Commission?

A. Yes. I have testified in Causes Nos. 38045, 43114, 43114 S1, and 43114 IGCC-1, IGCC-4, IGCC-4S1, IGCC-8 and IGCC-10. I also submitted testimony in Cause 38702-FAC-40-S1 which was settled prior to the scheduled hearings.

Q. Have you previously submitted testimony in Cause No. 43114 IGCC-12?

A. Yes.

Q. Are you withdrawing that testimony?

A. Yes. I am withdrawing that testimony and will address the same issues in this testimony.

Q. What is the purpose of your testimony in this proceeding?

A. I have been requested by Joint Intervenors to assess (1) whether the Edwardsport Integrated Gasification Combined Cycle ("Edwardsport" or "IGCC") was in service between June 7, 2013 and the March 31, 2014 end of the IGCC-13 review period and (2) the current status and future prospects of the Edwardsport Project, with a particular emphasis on the plant's operating performance, technical problems and related costs which pose significant risks to ratepayers notwithstanding the Settlement approved by the Commission, with certain modifications, in Cause No. 43114-IGCC-4S1.

Q. What materials have you reviewed in your preparation of this testimony?

A. I have reviewed the testimony and exhibits of the Duke Energy Indiana's ("Duke," "DEI" or "the Company") witnesses in IGCC-12 and IGCC-13 and the Company's responses to discovery requests submitted by Joint Intervenors and the other active parties to those proceedings, as well as the testimony and

discovery responses filed by Duke in Causes Nos. 38707-FAC-99 through FAC-102.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q. Please summarize your principal conclusions and findings.

A. My principal conclusions are as follows:

1. The Company's declaration that Edwardsport was "in-service" on June 7, 2013 was an obvious attempt to circumvent or evade the construction cost cap proposed in the IGCC-4S1 Settlement and adopted by the IURC in its final order of December 27, 2012 as the plant was not "in service" in any meaningful way between June 7, 2013 and the March 31, 2014 end of the IGCC-12 and IGCC-13 review periods.

2. By any reasonable measure such as availability on syngas, average power output, capacity factor and heat rate, Edwardsport's operating performance during the period June 7, 2013 through March 31, 2014 was extremely poor and unreliable and was significantly worse than the Company had claimed it would be in IGCC-4S1.

   More specifically:

   (a) Edwardsport's availability on syngas was only 35 percent, far below the 75 percent availability on syngas that Duke had promised for the plant's first 15 months of operation.

   (b) Edwardsport's actual capacity factor on syngas was only 21 percent, far below the 72 percent capacity factor that the Company had forecast for the plant's first year of operation. Its actual capacity factor on both syngas and natural gas was only 31 percent.

   (c) Edwardsport's actual generation was less than one-half of what Duke had forecast for the period June 2013 through March 31, 2014

at the end of December 2012, a mere six months before the plant was declared to be in-service.

(d) Edwardsport generated 586 MW net, its summer month net capacity rating, for only a single hour during the summer months of the IGCC-12 and IGCC-13 review periods, and that was on August 9, 2013. Edwardsport has never generated at its 618 MW net non-summer month capacity rating at any time during the IGCC-12 and IGCC-13 review periods.

(e) Edwardsport's actual monthly heat rates were much higher (that is, worse) than the 9313 BTU/KWh heat rate at which the Company told the IURC the plant would operate.

(f) Edwardsport had a dramatically higher Equivalent Forced Outage Rate than the relevant industry comparison group.

3. This extremely poor performance demonstrated that Edwardsport was not in commercial operation as an integrated gasification combined cycle (IGCC) base load power plant with a rated capacity of 618 megawatts (MW) for the months of October through May and 586 MW for the months of June through September or ready for commercial operation, either on June 7, 2013 or at any time during the IGCC-12 and IGCC-13 review periods.

4. It is unambiguous that in 2011, Duke told the Commission that it intended Edwardsport to be "in-service" when the full capacity of the plant operating as an IGCC plant was economically dispatchable by MISO. However, the plant was neither available at full load nor economically dispatchable by MISO when it was declared "in-service" by Duke on June 7, 2013. More than a year later, Edwardsport still has not met this criterion the Company gave the Commission in IGCC-4S1.

5. As the plant's construction cost rose and its schedule became extended, Duke decided to declare Edwardsport "in-service" prior to the date when Edwardsport had achieved the "substantial completion" milestone in its contract with General Electric. Instead, the Company decided that it would declare Edwardsport to be "in-service" after both gasifiers had run in parallel for five days or 120 hours of non-consecutive operation. However, Duke actually declared the plant "in-service" on June 7, 2013, after the gasifiers had only run in parallel for 53 hours.

6. Duke only offered Edwardsport for economic dispatch by MISO for a very limited number of hours during the IGCC-12 and IGCC-13 review periods when it was operating on natural gas. Instead, during the remaining hours of the review periods, including all of the hours when the plant was operating on syngas, it was "self-scheduled" by Duke as a "must run" unit during those periods and its output has been classified as test generation.

7. There was only one instance in March 2014 when MISO called upon Edwardsport to operate. However, Duke declined to start the plant at that time.

8. Edwardsport was still being self-scheduled by Duke as "must run" as of the mid-September start of Edwardsport's Fall 2014 outage. Duke has said that it would no longer designate Edwardsport as "must run" by MISO only at the conclusion of the fall 2014 outage, which occurred in the first half of October, 16 months after it declared the plant to be "in-service." However, it is unclear whether this has actually happened.

9. In IGCC-8 in 2012, the Company said that Edwardsport would be declared "in-service for accounting and rate-making purposes when testing is complete and the plant is ready for its intended use as an integrated gasification combined cycle generating facility." However, Edwardsport had not completed all necessary startup and preoperational testing as of

June 7, 2013, the date when it was declared to be "in-service," or as of March 31, 2014, further demonstrating that the plant was not in commercial operation or ready for commercial operation at any point in the IGCC-12 and the IGCC-13 review periods.

10. The gasification portion of Edwardsport cannot be considered to have been "in-service" during the period June 7, 2013 through March 31, 2014 given the incomplete status of testing, the ongoing technical issues and equipment problems, and poor availability. Without both trains of its gasification plant operating as intended in tandem with both its combustion turbines and its steam turbine to produce electricity economically dispatched by MISO, Edwardsport as a whole cannot be considered to be "in-service" as an **Integrated** Gasification Combined Cycle power plant.

11. The Company originally projected low CO_2 emissions from Edwardsport even without the carbon capture and sequestration. However, Edwardsport's CO_2 emissions during 2013 after it was declared "in service" and the first nine months of 2014 were substantially higher than Duke projected in the IGCC-4S1 proceedings.

Q. Please summarize your recommendations.

A. I am recommending that the IURC:

1. Find that Edwardsport was not "in-service" as that term was defined in the IGCC-4S1 Settlement at any time during the period June 7, 2013 through March 31, 2014.

2. Adopt a performance standard that requires that the Company, not ratepayers, bear all costs resulting from the plant's failure to achieve a 72 percent capacity factor while burning syngas during Edwardsport's first 15 months of commercial operation.

3. Adopt a performance standard that requires that the Company, not ratepayers, bear all costs resulting from the plant's failure to achieve an 82 percent capacity factor while burning syngas during each twelve-month period following the end of Edwardsport's first 15 months of commercial operation.

4. Adopt a performance standard that requires that the Company, not ratepayers, bear all costs resulting from the plant's failure to achieve and maintain on an ongoing basis during its commercial operation the CO_2 emissions rate projected during its CPCN proceedings.

Q. In the testimony which you earlier pre-filed on April 2, 2014 in Cause No. 43114 IGCC-12 but have now withdrawn and replaced with this testimony in consolidated Cause Nos. 43114-IGCC-12 & 13, you recommended that the Commission initiate a special investigation of Edwardsport and/or a general rate case for Duke Energy Indiana. Do you renew that recommendation in this testimony?

A. I am advised by counsel for Joint Intervenors that it remains my clients' legal position that Edwardsport should be determined by the Commission in a general rate case for Duke Energy Indiana to be "used and useful" within the meaning of Ind. Code § 8-1-2-6 prior to authorizing the recovery through rates under Ind. Code § 8-1-8.8-1 *et seq*. of the post in-service operating costs of Edwardsport, notwithstanding the Commission's ruling to the contrary in its Docket Entry of June 10, 2014. It also remains my professional opinion that sound regulatory policy requires that the post in-service operating costs of a baseload generating plant of the size and cost of Edwardsport be authorized for recovery through customer rates only after the Commission has determined the plant to be both "in service" and "reasonably necessary for the provision of utility service" in a general rate case for the utility which owns 100% of the plant. So, this testimony of mine should not be construed to withdraw, abandon or waive those positions for purposes of any subsequent appeal which my clients may take of a

Commission final order in this consolidated Cause premised on the June 10, 2014 Docket Entry.

However, my testimony does not rely on the legal and policy positions earlier taken by my clients and me regarding the necessity for a "used and useful" determination within the meaning of Ind. Code § 8-1-2-6 by the Commission in a general rate case. Instead, my testimony relies on the overwhelming evidence that Edwardsport has not been in "commercial operation" or ready for commercial operation but instead has been in "testing" for the entire period of June 7, 2013 through March 31, 2014 and thus none of its costs during that period may properly be characterized as "reasonable and necessary" operating costs within the meaning of Ind. Code § 8-1-8.8-1 *et seq*. Instead, they should be characterized as construction costs subject to the "cost cap" approved by the Commission in Cause No. 43114-IGGC-4S1. Alternatively, should the Commission conclude that Edwardsport has been in "commercial operation" or ready for commercial operation for some or all of the period between June 7, 2013 and March 31, 2014, my testimony is based on the overwhelming evidence that the costs during that period have been excessive in significant part and thus not "reasonable and necessary" within the meaning of Ind. Code § 8-1-8.8-1 *et seq*.

As a result, my recommendation in this consolidated cause is that the costs incurred for Edwardsport from June 7, 2013 through March 31, 2014 should be disallowed, in whole or in significant part, for purposes of recovery from customers through Rider 61 without the need for a Duke Energy Indiana general rate case or a further special investigation of Edwardsport.

EDWARDSPORT OPERATIONS DURING THE PERIOD JUNE 2013 THROUGH MARCH 2014.

Q. Do you agree with Duke witness Stultz that availability is a better measure of a generating facility's performance than its capacity factor?[1]

A. No. A power plant's availability only measures the number of hours it is able to provide electricity to the grid during a certain period (e.g., monthly or yearly), divided by the total number of hours in that period. It does not measure the level of generation actually provided by the plant during that period.

For example, when calculating the availability factor, an hour in which a large generating facility like Edwardsport is able to provide one MW of power is considered the same as an hour in which the facility is able to operate at full power, which for Edwardsport is 586 MW in the summer and 618 MW for the other months of the year. Moreover, availability has nothing to say about the economics of a particular plant. The cost of operating a plant does not dictate its availability, but cost certainly has a *major* impact on whether a plant is dispatched or not.

Therefore, capacity factor is the more important measure because it reflects how much energy (that is, how many MWh) the power plant actually generates during the period of time, which is a function of availability, power level *and* cost. And generation is what is important to Duke's ratepayers. As Duke witness Hager explained in her March 2011 testimony in IGCC-4S1:

> [T]he IGCC Project is projected to be the first Duke Energy Indiana plant dispatched to meet customers' energy needs because of its projected low fuel costs. Thus, from the day it is operational, it will be displacing less efficient and less environmentally friendly units, serving to reduce operating costs and thereby benefitting

[1] Stultz IGCC-13 Testimony, at page 14, lines 3-9.

customers.[2]

Q. Please explain why this is so.

A. Duke's ratepayers are being forced to pay very high fixed costs for Edwardsport because of the plant's expensive construction cost and fixed operating costs. Duke's ratepayers are only able to offset even a portion of these very high fixed costs if the plant consistently generates large quantities of low cost energy (MWh) that displace higher cost power that would otherwise be generated at other Duke plants or purchased from the MISO energy market. For this reason, Duke's ratepayers are vitally interested in how much energy the plant actually generates and the plant's capacity factor, not its availability, is a measure of this.

Q. Mr. Stultz claims that availability is the better measure than capacity factor because there are factors well beyond an operator's control that will affect the capacity factor of a unit.[3] Do you agree?

A. No. Because Edwardsport was being self-scheduled by Duke rather than dispatched by MISO, nearly everything about Edwardsport's capacity factor during the IGCC 12 & 13 review period was within the operator's control. So this portion of Mr. Stultz's testimony is completely irrelevant to the period under review in this proceeding. Nevertheless, his claim that a plant's availability is a better measure than its capacity factor is wrong for any time period because, as I just discussed, ratepayers are vitally concerned with how much energy Edwardsport will produce and at what cost. Capacity factor, not availability, is the appropriate measure to reflect that concern.

---

[2] Supplemental Testimony of Janice Hager in IGCC-4S1, Duke Exhibit TT, March 10, 2011, page 3, lines 6-10, https://myweb.in.gov/IURC/eds/Modules/Ecms/Cases/Docketed_Cases/ViewDocument.aspx?DocID=0900b6318015df68.

[3] Stultz IGCC-13 Testimony, at page 14, lines 10-17.

Q. Have you seen any evidence that Duke itself believes that availability is not the best measure for evaluating a power plant's operating performance?

A. Yes. On October 11, 2014, Lynn J. Good, Duke Energy's President & Chief Executive Officer asked Dhiaa M. Jamil, Duke's Executive Vice President & President of Regulated Generation, for an update on Edwardsport's operating performance during August and September 2014.[4] Table 1, below, replicates the information that Mr. Jamil provided in response to Ms. Good's request.

[4] The e-mail exchange between Ms. Good and Mr. Jamil, received by JIs in DEI's Attachment CAC 1.7-B, is included as Exhibit DAS-2.

Table 1: Internal Duke Energy Report on Edwardsport's Operating Performance from June 2013 through September 2014.

	Site Capacity Factor (Natural Gas & Syngas)	Capacity Factor (Syngas Only)	Equivalent Availability Factor (Natural Gas & Syngas)	Gasification Availability Factor
Sep-14	14.93	13.34	27.13	26.57%
2014 YTD	40.75	35.96	65.96	55.35%
Q3, 2014	48.45	45.76	60.88	69.66%
Jun-13	12.38	9.92	82.37	21.53%
Jul-13	26.19	7.96	68.97	14.45%
Aug-13	60.39	50.56	80.83	76.01%
Sep-13	31.66	24.83	63.36	47.96%
Oct-13	43.31	40.84	61.32	58.60%
Nov-13	28.28	22.77	65.87	32.19%
Dec-13	32.39	19.5	61.46	41.69%
Jan-14	17.54	2.3	60.78	4.84%
Feb-14	5.21	0.12	41.72	0.61%
Mar-14	32.77	26.92	77.25	50.93%
Apr-14	37.99	33.89	68.26	61.56%
May-14	66.8	65.68	87.77	82.79%
Jun-14	58.39	54.86	73.02	84.74%
Jul-14	67.63	63.47	79.27	90.99%
Aug-14	61.7	59.42	75.15	90.02%
Sep-14	14.93	13.34	27.13	26.57%
Cumulative thru September 2014	37.63	31.27	67.36	49.78%

It is extremely noteworthy that Mr. Jamil, whose overall management responsibilities include Edwardsport, did not include the plant's overall availability as a measure of Edwardsport's operating performance in this report to Duke Energy's President & Chief Executive Officer. Instead, he included four separate measures of Edwardsport's operating performance: its capacity factor on both syngas and natural gas; its capacity factor on syngas; its Equivalent Availability Factor (EAF) on both natural gas and syngas; and its Gasification

Availability Factor.[5] This is directly contrary to Mr. Stultz's claim that the plant's overall availability on syngas and natural gas is the best measure as Mr. Jamil's report did not even mention Edwardsport's overall availability in response to Ms. Good's request for an update on Edwardsport's operating performance.

Q. Is there anything else that is significant about the information in Table 1, above, that Mr. Jamil reported to Ms. Good?

A. There are two other critical facts readily apparent from the information that Mr. Jamil reported to Ms. Good, in addition to the fact that it appears that Duke's senior management does not consider Edwardsport's overall availability to be as significant a measure of its operating performance as its capacity factor.

1. The information in Table 1 reinforces my conclusion, as presented in Figures 1 through 11, below, that Edwardsport's operating performance during the IGCC-12 and 13 review periods was extremely poor.

2. This information also shows operating performance has continued to be poor beyond the March 31, 2014 end of the IGCC-13 review period.

Q. Even if the IURC were to accept that availability is one of the best measures for evaluating Edwardsport's operating performance, do the monthly availability factors from Mr. Stultz accurately and reasonably reflect the plant's overall availability during the IGCC-12 & 13 review periods?

A. No. The availability factors presented by Mr. Stultz severely overstate Edwardsport's availability during the IGCC-12 & 13 review period in a number of ways.

---

[5] The Equivalent Availability Factor included in Table 1 differs from the Availability Factor discussed by Mr. Stultz in that it reflects the hours during which the plant operated at less than full power as well as the hours when it was not operating. Consequently, it is a better measure of the plant's overall operating performance than the Availability Factors discussed by Mr. Stultz in his testimony at pages 12-16.

First, and most significantly, Mr. Stultz's availability factors reflect both the hours when the plant was available on syngas and the hours when it was available on natural gas. However, Edwardsport is intended to be an IGCC plant that burns syngas. Duke originally projected that Edwardsport's would achieve an 85 percent annual availability on syngas in every year immediately after beginning commercial operations. This was subsequently changed to a forecast that the plant would achieve a 75 percent availability, again just on syngas, during its first 15 months of operations. Thus, if the Commission wants to consider Edwardsport's availability during the IGCC-12 and 13 review periods, it should examine the plant's availability on syngas, not its availability on both syngas and natural gas.

Second, Mr. Stultz's availability factors do not reflect that Edwardsport only achieved its 586 MW summer net capacity rating during a single hour in August 2013 and that it never achieved its 618 MW non-summer net capacity rating.[6] Nor do Mr. Stultz's availability factors reflect that Edwardsport's full power capacity rating is significantly lower when burning natural gas than when the plant is burning syngas. For example, Edwardsport's net full power capacity rating when burning natural gas is only 458 MW during the summer months as compared to its 586 MW net full power capacity rating while burning syngas. Mr. Stultz's availability factors also do not reflect the fact that the plant often operated at less than its rated capacity due to forced deratings from equipment problems and technical issues.

Third, some of the information that Mr. Stultz used to develop his monthly availability factors is questionable. For example, Mr. Stultz's availability factor for June 2013 is 99.72 percent. This reflects only [redacted] hours of unavailable time for Edwardsport. However, the plant experienced a full trip on June 13, 2013 that

---

[6] Duke response to OUCC 15.16 is included as Exhibit DAS-3. Confidential Attachment to OUCC 15.16 is included in my workpapers.

kept it shut down for the remainder of the month – a period of some 424 hours.[7] But Mr. Stultz reflects virtually none of this outage time in his availability factor for that month.

Finally, Edwardsport has been offered to MISO as a must run unit for those periods when it was available on syngas or was performing testing while running on natural gas. According to the Company's confidential attachment to CAC 6.9,[8] Mr. Stultz's monthly availability figures reflect some [redacted] hours during the IGCC-12 and 13 review periods when the plant was available to operate on natural gas without any testing going on. Duke claims that during these hours the plant was offered to MISO for economic dispatch. It is very significant that, if correct, despite being offered for economic dispatch for some [redacted] hours while it was operating on natural gas (but no testing was being done), MISO only selected Edwardsport for dispatch in a single hour in March 2014, and Duke declined to run the plant in that hour. This would have been an indication of the plant's high operating costs on natural gas and its relatively poor economics compared to other generators in MISO.

Q. You mention that the monthly availability factors presented by Mr. Stultz are inflated because they combine both the hours when the plant was available on syngas and hours when it was available on natural gas. How do Mr. Stultz's availability factors on both syngas and natural gas compare to Edwardsport's monthly availability just on syngas?

A. Figure 1, below, compares the monthly availability factors on both syngas and natural gas with its monthly gasification availability. As can be seen from this comparison, its gasification availability was much worse than Mr. Stultz's

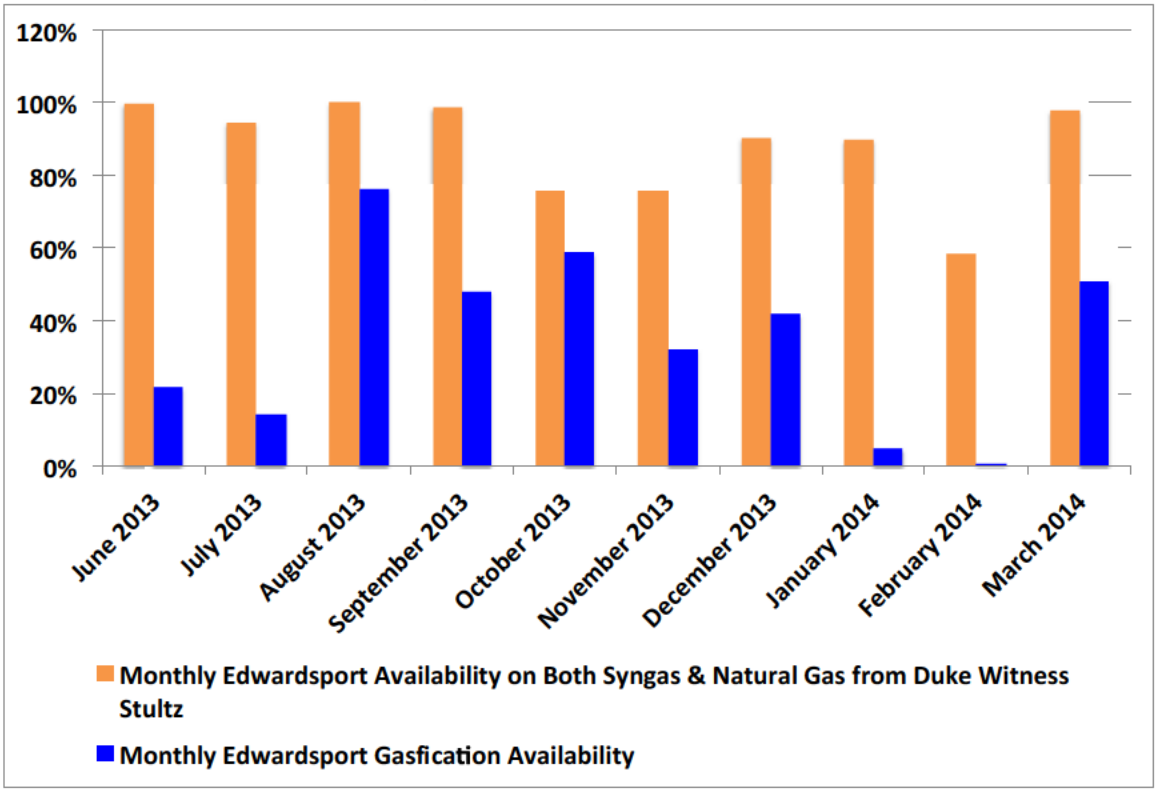
---

[7] *See* the Edwardsport IGCC Progress Report No. 62 for July 2013 and No. 67 for December 2013.

[8] Please see DEI Confidential Attachment to CAC 6.9 in my workpapers.

testimony would suggest. This is the more appropriate measure as Edwardsport is intended to be an IGCC plant that burns syngas.

Figure 1: Stultz Monthly Availability Factors vs. Edwardsport's Gasification Availability



In fact, Edwardsport's gasification availability for the entire period June 2013 through March 31, 2014, was only 35 percent or far less than the 88 percent availability on both syngas and natural gas presented by Mr. Stultz.

Q. Are you testifying that Edwardsport's monthly gasification availability is the best measure for evaluating the plant's performance?

A. No. The gasification availability factors presented in Table 1 and Figure 1 still do not reflect the plant's actual generation and, therefore, are not as important as a measure of its operating performance as its monthly capacity factors. Moreover, it is not clear whether the monthly gasification availability factors presented in

Table 1 and Figure 1 reflect those hours when Edwardsport's power output was derated (that is reduced) due to equipment problems and technical issues.

Q. Have you seen any instance where Mr. Stultz has testified that a plant's availability should be adjusted to reflect any hours in which it was not able to generate at full power?

A. Yes. Mr. Stultz had the following exchange with CAC counsel during the November 7, 2011 hearing in IGCC-4S1, Phase 1:

> Stultz: Availability takes into consideration derate hours as well as full unit hours, and the derate hours are adjusted based on the percent derate.
>
> Polk: All right. So if you had a unit that was available for 100 hours but at a 50 percent derate, that would be – that would yield an availability of 50 hours instead of 100 hours?
>
> Stultz: It would yield an equivalent availability of 50.[9]

Consequently, it appears that Mr. Stultz was testifying that the appropriate measure to use to evaluate Edwardsport's operating performance was its Equivalent Availability Factor (EAF), not its Availability Factor. Power plant EAFs reflect both the hours when the plant is unavailable to generate any power and the hours during which it is unavailable to generate at its full power rating. Unfortunately, Duke has not made any such adjustment in calculating the availability factors Mr. Stultz has presented in this proceeding.

Q. Should the Commission then rely on the monthly EAF figures presented in Table 1, above, as a measure of Edwardsport's operating performance?

A. No. Although I believe that EAF, in general, can be a meaningful measure of a plant's operating performance, I believe that the Company's EAF figures in Table 1 overstate Edwardsport's operating performance because they reflect both the

[9] Hearing Transcript, page P-11, lines 4-13.

hours when the plant was available (albeit at reduced output) on syngas and the hours when it was available (again, albeit at reduced output) on natural gas. Edwardsport's gasification EAF would be the more appropriate measure. Unfortunately, that information was not reported to Ms. Good in Table 1 in Exhibit DAS-2.

Q. If the availability figures discussed by Mr. Stultz's are so overstated, why then do you think that the Company has chosen to focus on Edwardsport's combined availability on both syngas and natural gas?

A. I think, quite simply, that Duke has chosen to focus on Edwardsport's overall availability on syngas and natural gas because, as shown in Table 1, above, and Figures 2 through 9, below, its operating performance under other, and more meaningful, measures has been very dismal and far worse than the Company had previously predicted when it was attempting to convince the IURC that completion of Edwardsport as an IGCC plant was the lowest cost option for ratepayers.

Q. What did the Company project for Edwardsport's availability during its initial months of operation?

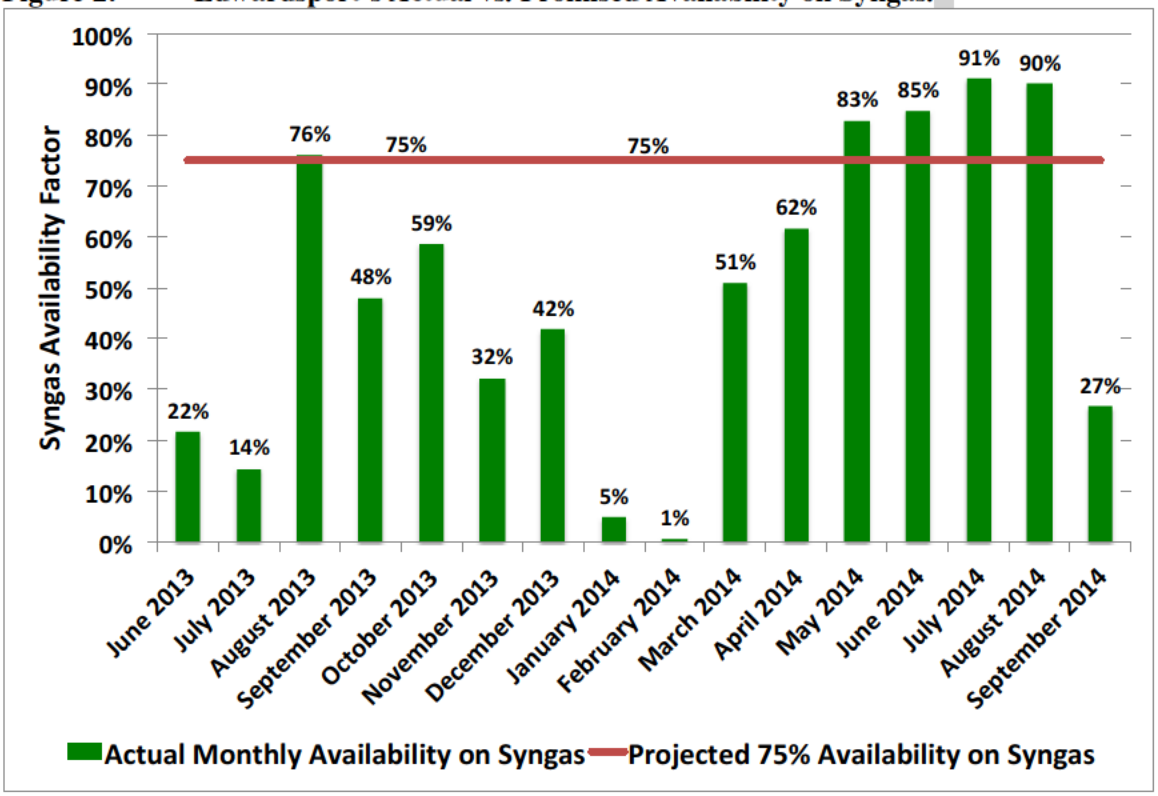
A. For years, Duke's witnesses testified that Edwardsport would achieve an 85 percent availability on syngas "right out of the box" once it was designated as being in-service, with an even higher availability if operations on natural gas were included. Beginning in 2011, however, the Company adopted the position that Edwardsport would achieve a 75 percent availability on syngas during its first 15 months of operation. As the IURC itself noted in its Final Order in IGCC-4S1 when referring to Mr. Stultz's testimony in that proceeding: "He anticipates that

during the first 15 months of commercial operation, 75% is a reasonable availability rate for the IGCC project operating on syngas…."[10]

Q. What has been Edwardsport's actual availability on syngas since the unit was designated as being in-service on June 7, 2013?

A. Figure 2, below, compares Edwardsport's actual monthly availability on syngas to the 75 percent availability on syngas that the Company projected in IGCC-4S1 in 2011.

Figure 2: Edwardsport's Actual vs. Promised Availability on Syngas.[11]



Thus, Edwardsport's availability on syngas for the ten-month period from June 2013 to March 2014, the months during the IGCC 12 & 13 review period when it

[10] At page 14.

[11] Edwardsport's actual monthly availability on syngas comes from Exhibit DAS-2.

was "in-service" according to Duke, was only 35 percent. The plant's availability on syngas for the sixteen-month period June 2013 through September 2014 was only 50 percent.[12] Both of these were far below the 75 percent availability on syngas that Duke assumed in the 2011 cost effectiveness modeling the Company used in IGCC-4S1 to argue to the IURC that completion of the project as an IGCC plant was the most economic option. And it is possible that even the monthly syngas availability numbers in Figure 1 are inflated because they may not account for the ability, or the inability as the case may be, of the gasifiers to produce enough syngas to power the plant at full load.

Q. What capacity factor did Duke project Edwardsport would achieve during its first months of commercial operation?

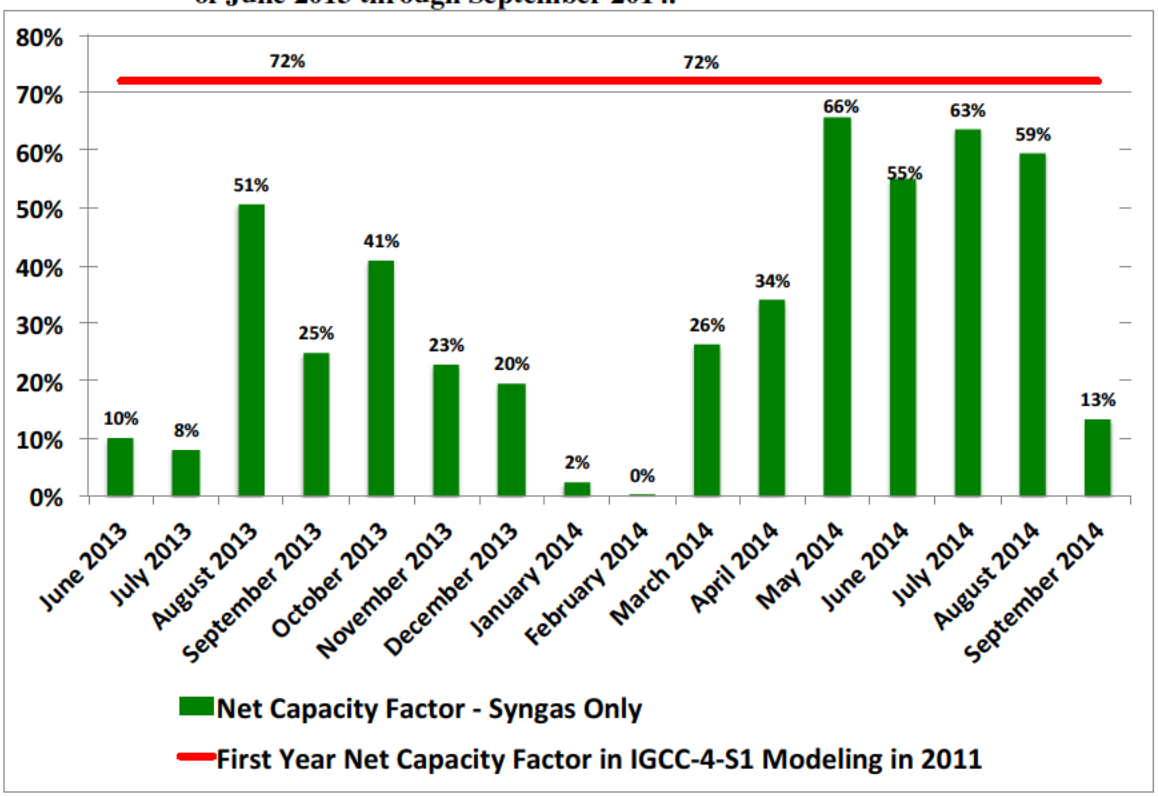
A. Duke's reduced availability modeling runs in IGCC-4S1 projected a 72 percent capacity factor on syngas during the plant's initial year to 15 months of operation.

Q. What has been Edwardsport's actual capacity factor on syngas since the plant was declared "in-service" on June 7, 2013?

A. As shown in Figure 3, below, Edwardsport's monthly capacity factors on syngas for the months of June 2013 through September 2014 were significantly worse than the 72 percent average capacity factor that was forecast by the Company in Cause No. 43114 IGCC-4S1.

[12] *See* Exhibit DAS-2.

Figure 3: Edwardsport's Monthly Capacity Factors on Syngas for the Months of June 2013 through September 2014.[13]



The monthly capacity factors shown in Figure 2 represent an average 21 percent capacity factor for the ten-month period, June 2013 through March 2014, and a 31 percent average capacity factor for the sixteen-month period, June 2013 through September 2014. Clearly then, the plant's actual operation on syngas has been much worse than the 72 percent average capacity factor that Duke forecasted in Cause No. 43114 IGCC-4S1.

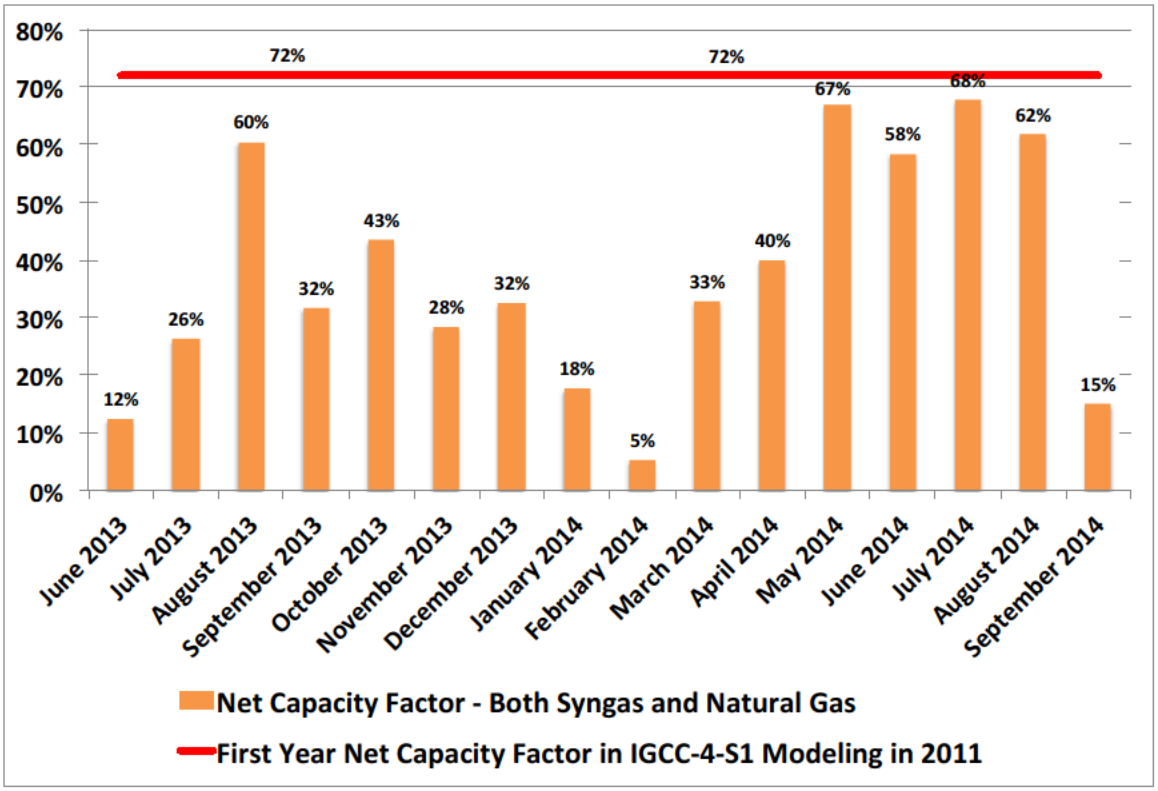
Q. What has been Edwardsport's actual operating performance on both syngas and natural gas since the plant was declared "in-service" on June 7, 2013?

A. Edwardsport's monthly capacity factors on both syngas and natural gas for the period June 2013 through September 2014 also have been significantly worse

[13] The actual monthly capacity factors on syngas and both syngas and natural gas come from Exhibit DAS-2.

than the 72 percent average capacity factor that the Company had forecast for syngas alone in Cause No. 43114 IGCC-4S1, as shown in Figure 4, below.

Figure 4: Edwardsport's Monthly Capacity Factors on Both Syngas and Natural Gas During the Months of June 2013 through September 2014.[14]



The monthly capacity factors shown in Figure 3 represent an average 31 percent capacity factor on both syngas and natural gas for the ten-month period, June 2013 through March 2014, and a 37 percent average capacity factor for the sixteen-month period, June 2013 through September 2014.

Thus, even if Edwardsport's total operation on both syngas and natural gas are considered, the plant's actual operating performance since it was designated as

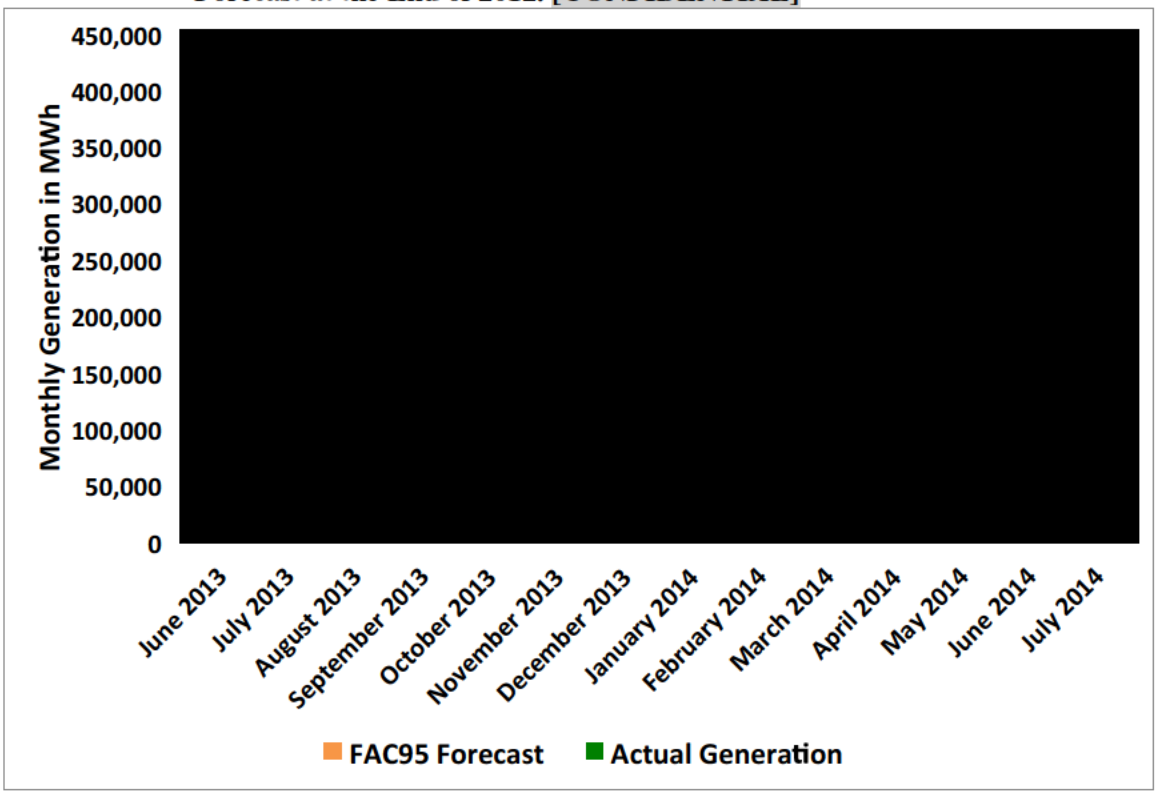
[14] The actual monthly capacity factors on syngas and both syngas and natural gas come from Exhibit DAS-2.

"in-service" by Duke has been extremely poor and far below what the Company said it would be back in 2011.

Q. How have Edwardsport's actual operations compared to more recent Company forecasts (rather than those presented by Duke in IGCC-4S1 in 2011)?

A. Figure 5, below, compares Edwardsport's actual net generation in the months of June 2013 through July 2014 with the net generation that the Company had forecast at the end of 2012 as part of Cause 38707 FAC-95.

Figure 5: Edwardsport's Actual Net Monthly Generation During the period of June 2013 through July 2014 compared to the Company's FAC-95 Forecast at the End of 2012. [CONFIDENTIAL][15]



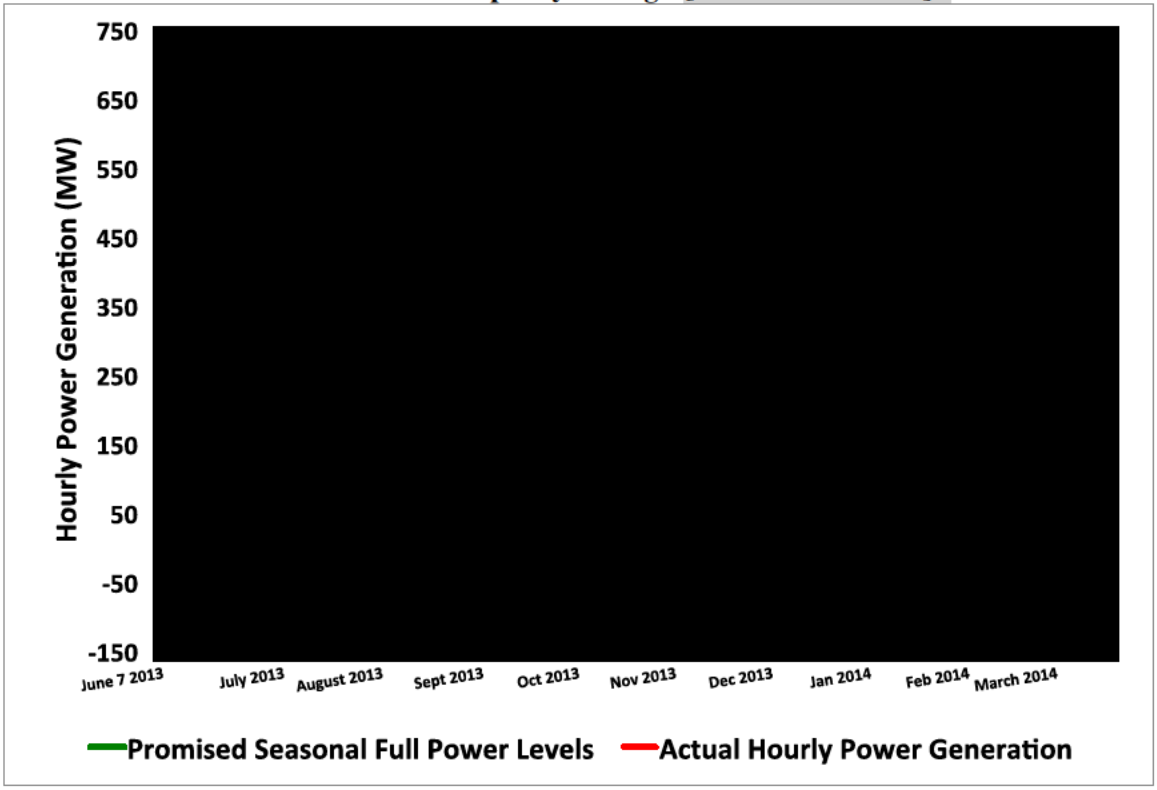
[15] The FAC 95 Forecast was provided as Confidential Attachment DEI-IG 5.11(attached as Exhibit DAS-4-Confidential) and the actual hourly plant output came from Duke's Confidential Response to DEI-IG 4.24 (attached as Exhibit DAS-5-Confidential).

Thus, Edwardsport's actual generation from June 2013 when the plant was declared to be "in service" through the March 31, 2014 end of the IGCC-13 review period was only [redacted] percent of what the Company had forecast for this period at the end of 2012, which is significant because it was Duke, not MISO, which determined when and for how long Edwardsport would operate.

Q. Has Edwardsport operated at a consistently high power level since the plant was declared to be "in service" on June 7, 2013?

A. No. The plant's performance has been very inconsistent during this period and, in fact, the plant only achieved its 586 MW summer net full power capacity output rating for only a single hour during this period. The plant never achieved its 618 MW net non-summer full power capacity rating at any time during the IGCC 12 and 13 review periods. This can be seen in Figure 6 below.

Figure 6: Edwardsport's Actual Hourly Net Power Generation for June 7, 2013 through March 31, 2014 vs. Promised Summer and Non-Summer Full Power Capacity Ratings. [CONFIDENTIAL][16]



Thus, during the period June 7, 2013 through March 31, 2014, after the plant had been declared "in service" by Duke:

- Edwardsport only achieved its 586 MW net summer full power rated output for a single hour on August 9, 2013.
- Edwardsport never ran at its 618 MW net non-summer full power rating during the entire period between June 7, 2013 and March 31, 2014.
- Edwardsport's output only exceeded [redacted] MW in [redacted] hours, or approximately [redacted] percent of the total hours in the entire period.
- Edwardsport had a negative net generation (that is it was using more power from the grid than it put out into the grid) during almost [redacted] hours, or approximately [redacted] percent of the total hours in the period.

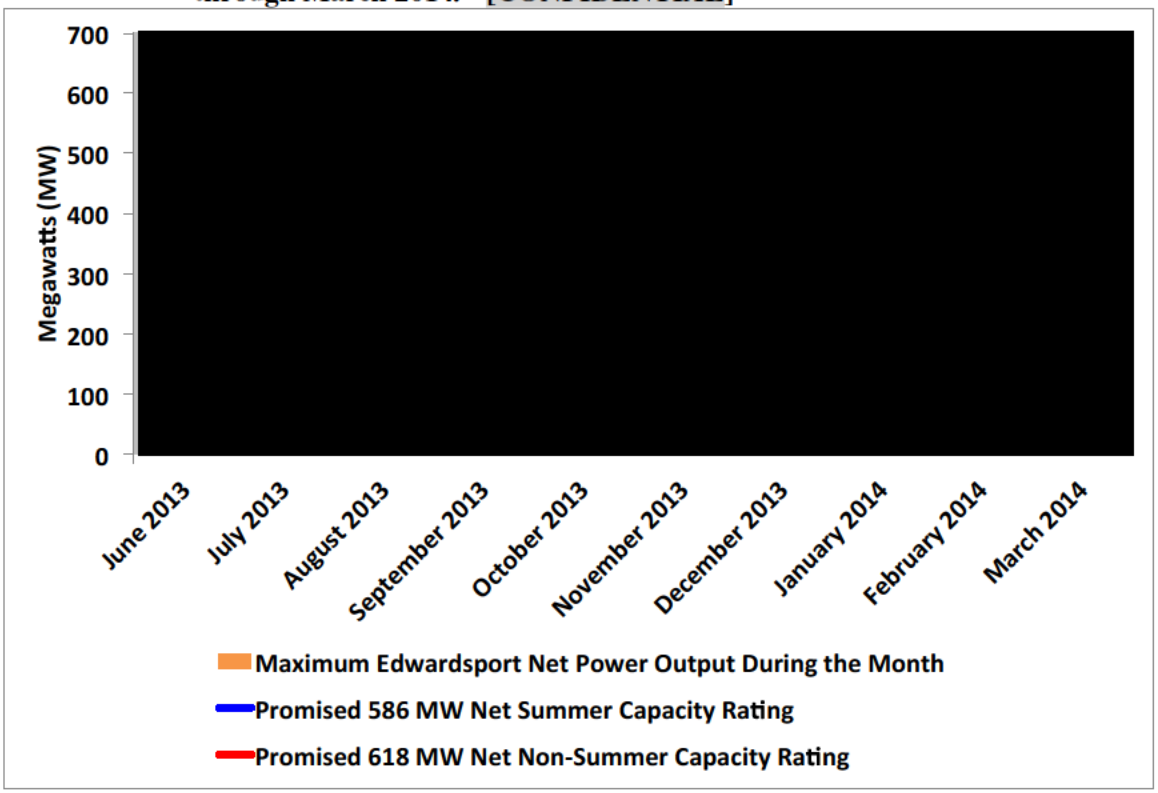
[16] The actual hourly plant outputs shown in Figure 2 are from DEI's Confidential Attachments OUCC 3.2-A and CAC 6.11-A, which are included in my workpapers.

- Edwardsport's average net power level during this period was only [redacted] MW or only approximately [redacted] percent of its projected full power.

Q. Figure 6, above, shows Edwardsport's hourly generation. What was the plant's maximum output in MW in each month of the period June 2013 through March 2014?

A. Figure 7, below, shows the maximum power output achieved by Edwardsport in each of the months between June 7, 2013 and March 31, 2014.

Figure 7: Edwardsport's Maximum Monthly Power Outputs in June 2013 through March 2014.[17] [CONFIDENTIAL]



[17] The information in Figure 7 was taken from Duke's Confidential Attachments CAC 6.38-A and CAC 6.11-A, which are included in my workpapers.

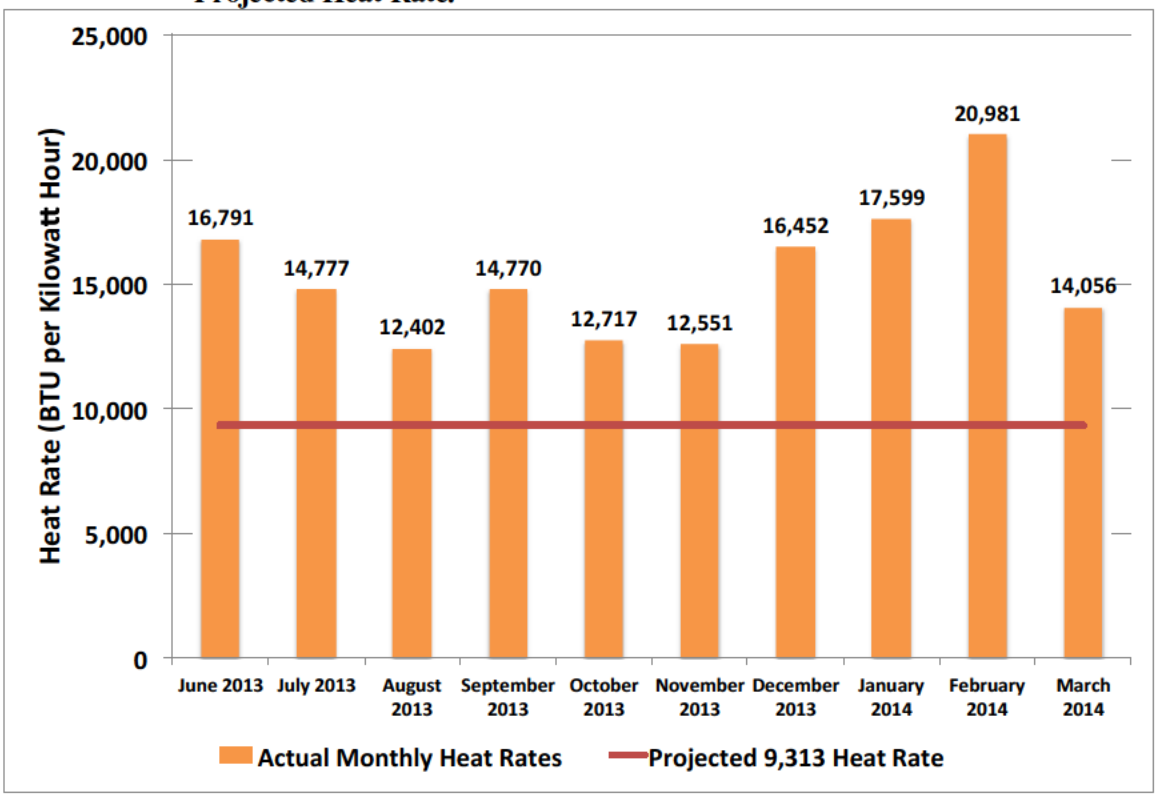
Q. What did Duke forecast would be Edwardsport's heat rate?

A. In April 2010, when Duke witness Womack filed his Direct Testimony in IGCC-4S1, the Company was projecting a 9313 BTU/KWH heat rate for Edwardsport.[18]

Q. Did the Company achieve this heat rate in the IGCC-12 & 13 review period?

A. No. As shown in Figure 8, below, Edwardsport's actual monthly heat rates have been significantly worse than the Company told the Commission back in April 2010.

Figure 8: Edwardsport's Actual Monthly Heat Rates vs. 9313 BTU/KWh Projected Heat Rate.[19]



[18] Direct Testimony of W. Michael Womack in IGCC-4S-1, filed in April 2010, at page 36.

[19] Edwardsport's monthly actual station heat rates were provided in Duke's declassified response to SDI 1.3, which is attached as Exhibit DAS-6.

Q. Has Duke offered any explanation for why Edwardsport's actual heat rates are so much higher than the Company had projected?

A. No. However, a plant that has as many stops and starts and that operates at a power level so far below full power as Edwardsport did through March 2014 will necessarily have a higher heat rate. Available evidence also suggests that the plant's heat rates are being increased by larger than predicted parasitic loads, as well as inefficiencies in the conversion of coal to syngas. If Edwardsport continues to have such higher heat rates going forward into the future, Duke's ability to have the plant economically dispatched by MISO would be severely compromised. This would hurt ratepayers by leading to higher fuel and purchased power costs than if Edwardsport operated at the predicted and supposedly guaranteed heat rates.

Q. Is there any other commonly accepted measure by which the IURC should evaluate Edwardsport's operating performance since the plant was declared "in-service" by Duke in June 2013?

A. Yes. Another commonly accepted measure for evaluating a power plant's operating performance is its Equivalent Forced Outage Rate (EFOR). EFOR is a measure of the probability that a unit will not be available due to forced outages of the entire plant and deratings (that is, where the plant is available to generate but only a lower power output due to unplanned equipment problems or technical issues).

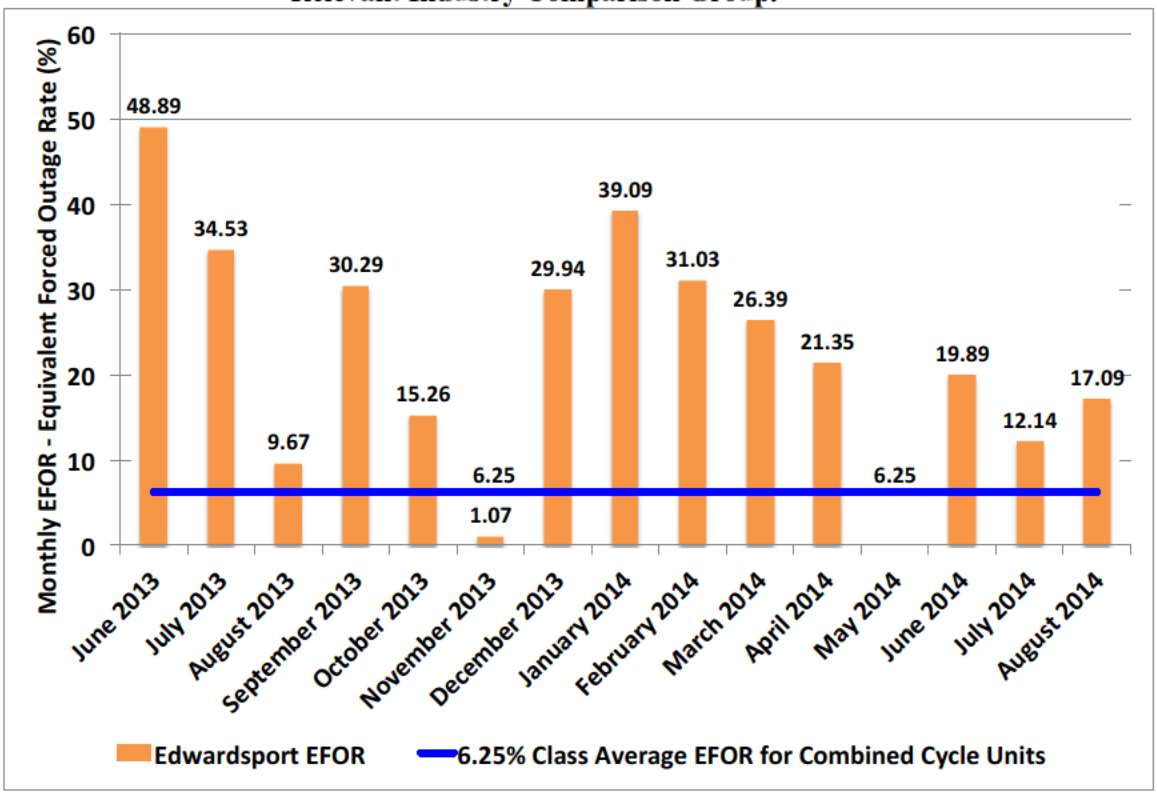
Q. How does Edwardsport's EFOR compare to that of comparable power plants?

A. Figure 9, below, compares Edwardsport's monthly EFORs for Duke to the average EFOR for combined cycle units.[20] This was the comparison group that Duke used in its 2013 Generator Verification Test Capacity submission to MISO in 2013.[21] As can be seen from Figure 9, Edwardsport's EFOR between June 2013 and August 2014 was dramatically higher than the average EFOR of what Duke believed to be the relevant industry comparison group.

[20] Unfortunately, as I was preparing this comparison, I realized that the Company had not provided Edwardsport's EFOR for the month of May 2014. Therefore, there is no bar in Figure 9 for that month.

[21] Duke's Response to CAC 16.1-16.3 is included as Exhibit DAS-7. Duke's Confidential Attachment to CAC 16.3-A is included as Exhibit DAS-8-Confidential.

Figure 9: Edwardsport's Monthly Equivalent Forced Outage Rate (EFOR) vs. Relevant Industry Comparison Group.[22]



In fact, Edwardsport had an average 26.62 percent EFOR for the entire period of June 2013 through the March 31, 2014 end of the IGCC-13 review period. This was more than four times higher than the average EFOR of the industry comparison group.

Q. Do you agree with Mr. Stultz's observation that "the plant has operated about where we expected it to in the early months of operation?"[23]

A. Not at all. I believe that this statement in Mr. Stultz's June 12, 2014 Testimony in IGCC-13 is a gross misrepresentation of Edwardsport's operations through the

---

22 The Edwardsport monthly EFORs were provided in Duke's Confidential Response to CAC 20.01, which is included as Exhibit DAS-9-Confidential. The industry comparison group EFOR was taken from the NERC GADS statistical brochure for the years 2009-2013.

23 Stultz IGCC-13 Testimony, at page 15, lines 13-14.

March 31, 2014 end of the IGCC-12 and IGCC-13 review periods at issue in this proceeding. By any reasonable measure, Edwardsport operated very poorly after it was declared to be "in-service" on June 7, 2013, and at levels far below what the Company had promised or forecast over the years.

More specifically:

(1) Edwardsport's availability on syngas was only 35 percent, far below the 75 percent availability on syngas that Duke had promised during IGCC-4S1 for the plant's first 15 months of operation.

(2) Edwardsport's actual capacity factor on syngas was only 21 percent, far below the 72 percent capacity factor that the Company had forecast in IGCC-4S1 for the plant's first year of operation. Its actual capacity factor on both syngas and natural gas was only 31 percent.

(3) Edwardsport's actual generation was less than one-half of what Duke had later forecast for the period June 2013 through March 31, 2014 at the end of December 2012, a mere six months before the plant was declared to be "in-service."

(4) Edwardsport generated 586 MW net, its summer month net capacity rating, for only a single hour during the summer months of the IGCC-12 and IGCC-13 review periods, and that was on August 9, 2013. Edwardsport never generated at its 618 MW net non-summer month capacity rating at any time during the IGCC-12 and IGCC-13 review periods.

(5) Edwardsport's actual monthly heat rates were much higher (that is, worse) than the 9313 BTU/KWh heat rate at which the Company had told the IURC the plant would operate.

(6) Edwardsport had a dramatically higher Equivalent Forced Outage Rate than the relevant industry comparison group.

This poor performance demonstrated that on June 7, 2013 or at any time through March 31, 2014, Edwardsport certainly was not in commercial operation or ready for commercial operation, i.e. to be dispatched economically by MISO on syngas as an IGCC plant with a summer net full power rating of 586 MW and a non-summer net full power rating of 618 MW.

DUKE'S DECLARATION THAT EDWARDSPORT WAS "IN-SERVICE"

Q. Did Duke provide the IURC with a consistent and comprehensive set of definitive technical or operational criteria by which it would determine when Edwardsport should be declared "in-service?"

A. No. Duke has repeatedly avoided wedding itself to any comprehensive set of definitive engineering or operational criteria for "in service." However, the Company did identify two pre-conditions for an "in-service" declaration. During the hearings in IGCC-4 and IGCC-4S1, Duke witnesses said on multiple occasions that dispatch of the plant by MISO, the "system load dispatcher" would indicate that Edwardsport was "in-service." At the same time, Duke witness Stultz testified that the Company would not place Edwardsport into service until it had operated the plant at full power. Unfortunately, Duke did not fulfill either of those preconditions.

For example, Duke witness Womack had the following exchange with Commissioner Ziegner during the April 6, 2010 hearing in IGCC-4:

> Womack: … What we're planning to do is to get the plant in good enough shape by the Summer of 2012 that we can interrupt testing and tuning of the equipment and run the plant to make load for customer demand that summer during high peak demand periods. There is a lot of details to be worked out in that game plan, a lot of interaction with MISO that we have to figure out as far as how that would exactly work, but we're pursuing that plan so that we can provide power even in the summer – during that summer even though we're not officially, substantially complete.
>
> Ziegner: And just so I'm clear, that would be prior to the August

> 27th new in-service date?
>
> Womack: Yes; yes. The new August 27th date that we're now projecting is the, if you will, substantial – formal, official, substantial completion date has the meaning that it always had. It would be what we call the in-service date. It would be the date at which we would hand the plant over and tell MISO it's fully dispatchable; do with it whatever you want; turn it on; turn it off, whatever. [24]

Duke witness Stultz similarly testified in IGCC-4S1 that once Edwardsport was operational, MISO would "perform economic dispatch and ultimately determine the capacity factor of the plant."[25] Mr. Stultz re-emphasized this point about MISO economically dispatching Edwardsport during cross-examination while, at the same time, indicating that the plant would be available at full power when it was available for dispatch.

For example, Mr. Stultz testified to the following in response to questions by Joint Intervenors' counsel Polk and Agnew:

> Polk: How do you define commercially available?
>
> Stultz: To me, I use the term that's been referred to in our working groups for years. It's used and useful, when it's available for dispatch to the benefit of the ratepayer.
>
> Polk: So is it your testimony that the plant will be available for dispatching at 600 megawatts of capacity come November of next year?
>
> Stultz: It's my testimony that that unit will be available at 618 megawatts for dispatch in late September –
>
> Polk: And how –
>
> Stultz: -- 2013.
>
> Polk: And how much will be bid into MISO at that time?
>
> Stultz: They'll bid whatever is available.

---

[24] Hearing Transcript in Cause 43114 IGCC-4 on April 6, 2010 at pages 49 and 50.

[25] Duke Exhibit FFF in IGCC-4S1, at page 3, lines 3-5.

Polk: And how much will be available?

Stultz: Well, we wouldn't take it commercial on a given day if it weren't 100 percent available at that point. That could change the next day just because of the complexity of power plants, but it will be available.[26]

And:

Agnew: Do you know . . . when the dispatch decisions are going to be turned over to the ISO, the MISO?

Stultz: Well, we'll remain in a testing phase until the end of September 2012, and at that point, we, by schedule today, will officially list the unit as commercial, and at that point, MISO will take responsibility for the dispatch and tell us when to put it on and take if off based on economics.

Agnew: Okay, and that will be dispatched as a –

Stultz: As a typical plant anywhere. At that point, the construction is not 100 percent done; there's some things that will be left like painting and potentially some road work or ditch work, but the plant itself will be fully operational, and it will work as any other plant in the Duke system.

Agnew: Burning gasified coal?

Stultz: Yes.[27]

Duke witness Womack gave similar testimony in response to questions from DEI Industrial Group counsel Stewart:

Stewart: Well, you say there "We have chosen…," and I'm looking at Line 19, "…to use the reinstallation of the gas turbine rotor after GE's validation test as the trigger event for declaring 'in service.'"; is that right?

Womack: That's correct, yes.

---

[26] Cause No. 43114 IGCC-4S1, Phase I, Hearing Transcript, November 7, 2011, pp. P-43 and P-44.

[27] Cause No. 43114 IGCC-4S1, Phase II, Hearing Transcript, December 15, 2011, pp. P-3 and P-4.

Stewart: Now, would MISO be able to dispatch that plant at 600 megawatts at that point?

Womack: Yes.[28]

Taken together, it is unambiguous that in 2011, Duke told the Commission that it intended Edwardsport to be "in-service" when the full capacity of the plant was economically dispatchable by MISO. However, the plant was neither available at full load nor economically dispatchable by MISO when it was declared "in-service" by Duke on June 7, 2013. More than a year later, Edwardsport still has not met the standard the Company gave the Commission in IGCC-4S1.

Q. Just to be clear, did Edwardsport operate at 100 percent power at any time prior to June 7, 2013 when Duke declared it was "in-service"?

A. No.[29] Edwardsport generated a maximum of between [redacted] MW and [redacted] MW of net power in eight hours during the days preceding June 7, 2013. This was far below the plant's 586 MW summer seasonal net 100 percent power rating.

Q. At any time prior to June 7, 2013, was Edwardsport offered to MISO for economic dispatch while the plant was operating on syngas?

A. No.

Q. At any time prior to June 7, 2013, did Duke state that Edwardsport would only be declared "in-service" after startup testing was completed?

A. Yes. In IGCC-8 the Company stated that the plant would be declared "in-service for accounting and rate-making purposes when testing is complete and the plant is ready for its intended use as an integrated gasification combined cycle generating facility."[30]

---

[28] Cause No. 43114-IGCC-4S1, Phase II, Hearing Transcript, December 13, 2011, pp. M-72-M-73.

[29] Duke's Confidential Attachment to OUCC 3.2-A is included in my workpapers.

[30] Duke Response to CAC 4.4 in Cause 43114 IGCC-8 is included as Exhibit DAS-10.

Q. Was testing completed at Edwardsport by the time when Duke declared the plant to be "in-service" on June 7, 2013?

A. No. Edwardsport had not completed either the GE New Product Introduction (NPI) testimony or its preoperational and startup testing before Duke declared the plant "in-service" on June 7, 2013. Consequently, it is impossible to see how Duke could have decided in early June 2013 that Edwardsport was ready for its intended use as an integrated gasification combined cycle generating facility before the NPI and preoperational and startup testing that was necessary to assure that the plant would run as it was intended to run had been completed.

Q. When was the GE NPI testing completed?

A. The exact date when Duke and GE completed the required NPI testing is unclear. However, Duke has most recently said that GE's NPI testimony was completed by September 2013, or three months after the plant had been declared to be in-service.[31]

Q. Was the NPI testing just for the benefit of GE or was it an integral part of the plant's testing?

A. The NPI originally was an integral part of the overall Edwardsport plant testing but as the schedule became extended and costs escalated, Duke looked for ways to reduce the testing period and to rush the plant into service. Consequently, the Company began to differentiate between an "in-service" date and the date when the plant would be substantially completed.

[31] Duke Response to DEI-IG 8.2 is included as Exhibit DAS-11.

Q. Had the Company completed Edwardsport's integrated performance testing as of June 7, 2013?

A. No. The Company's startup testing program included the integrated preliminary and final capacity and heat performance tests that were not completed until April and May 2014, that is, after the March 31, 2014 end of the combined IGCC-12 and 13 review period.[32]

Q. Was this integrated performance testing merely a condition of the contract with GE?

A. The performance testing was required under its contract with General Electric and pursuant to ASME Standard PTC 47, which is the industry standard for the testing of IGCC plants.[33]

Q. Were there other important integrated plant performance tests also not completed as of the March 31, 2014 end of the IGCC-13 review period?

A. Yes. The plant ramping test was not completed until August of 2014. The plant's operability tests were completed November 12, 2014.[34]

Q. How long did Duke initially claim that it would take to achieve "substantial" completion after Edwardsport was "in-service"?

A. In his Settlement Rebuttal Testimony in IGCC-4S1, Company witness Womack testified that it was then Duke's "best estimate" that Edwardsport should be "in-service" sometime early in the first quarter of 2013, with substantial completion occurring in the second quarter of 2013, i.e. approximately three months later.[35]

---

[32] Duke's Third Supplemental Response provided on 12-5-2014 to DEI-IG 1.8 is included as Exhibit DAS-12.

[33] Duke Response to OUCC 15.18 is included as Exhibit DAS-13.

[34] Duke Supplemental Response to DEI-IG 8.03 is included as Exhibit DAS-14.

[35] Petitioner's Exhibit LLL, July 6, 2012, at page 5, lines 20-21.

Q. When did the plant achieve "substantial completion" and "final completion" as defined in the contract with General Electric?

A. The plant has not yet achieved the milestone of "substantial" completion, more than eighteen months after it was declared "in-service" by Duke.

Q. When does Duke currently anticipate that Edwardsport will achieve the "substantial completion" and "final completion" milestones?

A. The Company's recent response to DEI-IG 1.8 states that Duke Energy Indiana currently expects that substantial completion will be achieved by the end of 2014 and the final completion will be achieved in the spring of 2015.[36]

Q. If by June 7, 2013, Edwardsport had not operated at 100 percent power while operating on syngas, had not achieved substantial completion, had not been offered to MISO for economic dispatch while operating on syngas and had not completed its preoperational and startup testing, then what criteria did Duke use to declare Edwardsport "in-service"?

A. Internal Duke e-mails show that the Company decided it would declare Edwardsport as being "in-service" after both gasifiers had run in parallel for five days or 120 hours of non-consecutive operation.[37]

Q. Did the plant complete 120 hours of parallel running of both gasifiers prior to its being declared in-service on June 7, 2013?

A. No. Duke rushed the plant into service after the gasifiers had only run in parallel for 53 hours.

---

[36] *See* Exhibit DAS-12.

[37] *See* 43114 IGCC 12 & 13, DEI Confidential Attachment CAC 4.2-A, BS 090015313-0002551; 43114 IGCC 11, DEI Confidential Attachment 1.4-A, BS 090002913-0000193; 43114 IGCC 11, DEI Confidential Attachment CAC 4.6-A, BS 090002913-0001203. These emails have been included as Exhibit DAS-15-Confidential.

Q. Did the gasifiers run in parallel for a total of 120 hours at any point in June 2013?

A. No. The plant entered an extended outage on June 13, 2013, at which point the gasifiers had only run in parallel for a total of 119 hours.[38]

Q. Was Duke the only entity that decided that Edwardsport was "in-service" beginning on June 7, 2013?

A. Yes. No other entity (e.g., MISO or the IURC) took part in the decision.[39]

Q. When did Edwardsport achieve full power operation?

A. Edwardsport generated 586 MW (net) of power, its summer full power rating, for a single hour on August 9, 2013, coming close for a second hour on the same day. The plant did not generate 618 MW (net) of power, its non-summer full power rating, during any hour in the IGCC 12 & 13 review period. Indeed, the plant did not achieve stable generation at or near its rated capacity for a period of time sufficient to perform even its Preliminary Performance Test under Section T of Duke's contract with GE until shortly before that Test was conducted on April 2, 2014.[40]

Q. Was Edwardsport offered for economic dispatch by MISO during the IGCC 12 & 13 review period?

A. When the plant has been operating on syngas or when testing was being performed while it was operating on natural gas, Edwardsport has been self-scheduled by Duke and designated as a "must run" unit and its output has been

---

[38] Cause No. 43114 IGCC 11, Duke's Supplemental Response to CAC Data Request 2.1(b) is included as Exhibit DAS-16.

[39] Duke Response to OUCC 15.2 is included as Exhibit DAS-17.

[40] Compare DEI Confidential Attachment CAC 1.6-E, BS 090015313-0005207 with DEI Confidential Attachment CAC 1.6-E, BS 090015313-0004777, which are included as Exhibit DAS-18-Confidential.

recorded as test generation.[41] During those hours when the plant was running on natural gas but no testing was being done, the unit was offered to MISO for economic dispatch.

Q. Did MISO actually dispatch Edwardsport at any time during the IGCC-12 and 13 review period?

A. No. Edwardsport was not economically dispatched by MISO during the IGCC 12 and 13 review periods.[42] From April 2013 through March 2014, all of the energy generated by Edwardsport was offered to MISO with a commit status of Must Run, according to Duke's responses to data request CAC 2.1(a) and its Supplemental Responses to CAC 6.8 and 6.10.

However, there appears to have been one instance in March 2014 when MISO called upon the plant to operate but Duke declined to start the plant at that time.

Q. Did the plant continue to be offered as "must run" after the March 31, 2014 end of the IGCC 12 & 13 review period?

A. Yes. Edwardsport was still being offered as "must run" at least through the start of the fall 2014 outage which began in September.[43]

Q. What are the Company's current plans for offering Edwardsport for economic dispatch by MISO?

A. According to the testimony filed by Company witness Swez in 38707-FAC-101, Duke has planned to no longer designate Edwardsport as "must run" by MISO only after coming out of the fall 2014 outage, which I believe occurred sometime

---

41 Duke Responses to CAC 2.1(a), CAC 6.8, and CAC 6.10 are included as Exhibit DAS-19.

42 *See* pp. 1-3 of Exhibit DAS-19.

43 Cause No. 38707 FAC 102, Petitioner's Exhibit 6, pp. 20-24.

in the first two weeks of October.[44] However, it is unclear whether Duke actually has done so.

Q. Did Edwardsport meet the preconditions promised by the Company for an "in-service" declaration either by June 7, 2013 or by the March 31, 2014 end of the IGCC-12 and 13 review periods?

A. No. Edwardsport had *not* satisfied *any* of its own preconditions either by the time Edwardsport was declared to be "in-service" on June 7, 2013 or by the March 31, 2014 end of IGCC-12 and IGCC-13 review periods.

- Duke had not shown that Edwardsport was ready to operate consistently and reliably at full power as an IGCC plant burning syngas.
- Edwardsport has not been economically dispatched by MISO while operating as an IGCC plant burning syngas.
- Duke had not completed Edwardsport's preoperational startup testing.

Q. Has the IURC previously ruled whether an IGCC power plant had met the criteria necessary to be declared "in-service"?

A. Yes. The Commission determined in its Final Order in Cause No. 40003 issued on September 27, 1996, that the Wabash River Coal Gasification Repowering Project (WRCGRP) had met the criteria to be declared "in-service."

Q. In your opinion is the IURC's decision regarding whether the Wabash River CGRP was "in-service" relevant to Edwardsport?

A. No. The Wabash River CGRP "in-service" determination is clearly distinguishable in several critical respects from the situation with Edwardsport:

---

[44] *Id*.

(1) The Wabash River plant was a U.S. Department of Energy (DOE) demonstration project for which the total cost and rate impact were dramatically lower than Edwardsport – and DOE was paying 50 percent of the construction costs.

(2) Destec, not PSI, was the owner and responsible party for the gasification process used at Wabash River. Therefore, its capital costs were not being included in PSI's rate base and the Company's customers were only paying for the plant's output when they received it as a fuel cost.

(3) With Edwardsport, the Company made express representations to the Commission and its ratepayers in advance regarding key preconditions as to its availability for MISO dispatch at 100% of its rated capacity prior to an "in-service" declaration which had not been made prior to the WRCGP "in-service" declaration.

(4) The Commission approved a Settlement in Cause No. 43114-IGCC-4S1 which established an "in-service" standard that Edwardsport be in commercial operation or ready for commercial operation which all parties and the Commission understood to incorporate the Company's representations regarding the plant's availability on syngas for MISO dispatch at or near 100% of its rated capacity.

(5) Finally, unlike the Wabash River proceeding, here the Commission has overwhelming evidence as to how extremely poorly Edwardsport actually has performed since Duke declared it to be "in-service." The Commission also has information that Edwardsport did not satisfy any of the Company's promised preconditions to being placed "in-service," either on June 7, 2013 or at any time during the period of June 7, 2013 to March 31, 2014.

ADDITIONAL CONCERNS

Q. Do you have any concerns in addition to Duke's premature "in-service" declaration regarding the current status and future prospects of the Edwardsport Project that, in your opinion, pose significant risks to the Company's retail ratepayers notwithstanding the Settlement approved by the Commission, with certain modifications, in Cause No. 43114-IGCC-4S1?

A. Yes, I have three such additional concerns. In particular, I am concerned that:

(1) Duke's retail customers will be charged excessive rates for Edwardsport's generation given the plant's performance and costs to date;

(2) Duke is claiming certain repair and related costs as Operating and Maintenance (O&M) expenses for purposes of retail rate recovery which, under the Settlement, should be classified as Construction Costs subject to the Hard Cost Cap; and

(3) Duke's retail customers will be asked to bear the risks and costs associated with Edwardsport's CO_2 emissions being significantly in excess of those projected by the Company during the plant's CPCN proceedings.

Excessive Rates in Relation to Plant Performance and Costs to Date

Q. Please explain your concern that Duke's retail customers will be charged excessive rates for Edwardsport's generation given the plant's performance and costs to whatever date the Commission determines the plant actually achieves commercial operation.

A. This concern has three components: (1) capital costs; (2) fuel-related costs; and (3) O&M costs other than fuel-related costs.

Capital Costs

Under the Settlement, the Settling Parties agreed:

> Other than as set forth in this Settlement, the Non-Duke Settling Parties agree that they will seek no further rate or regulatory "penalties" relative to the construction and overall final Construction Costs of the Project (plus AFUDC as allowed above); however, the non-Duke Settling Parties shall retain all rights under Indiana law to make arguments and seek relief concerning post-in-service operating performance of the Project.

I am advised by counsel that this provision is not binding on Joint Intervenors or on the Commission -- only on the Non-Duke Settling Parties. I am further advised that the language after the semi-colon expressly and plainly gives even those parties "all rights under Indiana law to make arguments and seek relief concerning post-in-service operating performance of the Project."

As my earlier testimony plainly shows, the performance of Edwardsport in generating power since Duke declared the plant to be in commercial operation as of June 7, 2013 has fallen woefully short of that on which the economics underlying its CPCN as most recently modified by the Commission were based. In particular:

- Edwardsport's actual net generation for the period June 2013 through March 2014, part of the IGCC-12 and 13 review periods included within the scope of this proceeding, was only 45 percent of the net generation that the Company had forecasted for this period in December 2012.
- Edwardsport's actual net generation for the period June 2013 through July 2014 was only 59 percent of the net generation forecasted by Duke for this period in December 2012.

Under these circumstances, my professional opinion is that it is and will continue to be grossly inequitable for Duke's retail ratepayers to be charged 100% of the capital costs (i.e. return plus depreciation) approved in Cause No. 43114-IGCC-4S1 for Edwardsport. Accordingly, it is my recommendation that the Commission discount those costs charged to ratepayers to reflect actual generating performance during the period of actual commercial operation.

For example, if the Commission – notwithstanding my unequivocal opinion to the contrary – were to determine that Edwardsport was in commercial operation as of June 7, 2013, then the capital costs included in the retail revenue requirement for IGCC-12 and 13 for the period June 7, 2013 through March 31, 2014 should only be 45% of those claimed by the Company. Of course, the discounting percentage would vary for a later "in-service" date determined by the Commission based on the plant's generating performance between that date and March 31, 2014.

Fuel-Related Costs

I am advised by counsel that fuel-related costs for Edwardsport are recovered by Duke in its FAC and not in its IGCC proceedings, including the current IGCC-12 and 13 consolidated proceeding. In addition, I am advised that the FAC proceeding initiated by the Commission in Cause No. 38707-FAC-99-S1 to determine the implications of the Commission's findings and conclusions in the current consolidated IGCC proceeding has been stayed pending the outcome of this proceeding. Accordingly, I will defer my testimony regarding those implications until such time, except to state here that whatever actual "in-service" date the Commission would determine for Edwardsport in this proceeding, it would definitely have implications for the proper amounts of fuel-related cost recovery in Duke's FAC proceedings covering time periods after June 7, 2013.

O&M Costs Other Than Fuel-Related Costs

I am advised by counsel that O&M costs other than fuel-related costs for Edwardsport are recovered by Duke in its IGCC proceedings, including the current IGCC-12 and 13 consolidated proceeding. Accordingly, my professional opinion is that it is and will continue to be grossly inequitable for Duke's retail ratepayers to be charged 100% of the O&M costs claimed by the Company for Edwardsport in this proceeding. Accordingly, it is my recommendation that the Commission discount those costs charged to ratepayers to reflect projections the Company made during Cause No. 43114-IGCC-4S1 on which the Settlement and

Order in that Cause were premised. The testimony of Joint Intervenors' witness Smith reflects the analyses and calculations required to implement this recommendation.

My recommendation is based on principles of fundamental fairness and regulatory accountability. Certificate of Public Convenience and Necessity (CPCN) proceedings such as IGCC-4S1 are, among other purposes, intended to assure that monopoly utilities are permitted only to construct major generating facilities, such as Edwardsport, for which their captive customers will be charged only when they are demonstrated by substantial evidence to be the lowest reasonable cost resource option available to match reliable predictions of future supply and demand. If a utility is permitted to charge its customers for construction and/or operating costs materially higher than those it projected for a major plant like Edwardsport during its Certificate of Need proceedings, the result amounts to a "bait and switch" for customers and a perverse incentive for utilities.

Accordingly, I believe it is critical for regulators to hold utilities accountable for their promises and predictions of performance and cost made for major plants such as Edwardsport in their CPCN proceedings. I believe that such a result is especially critical here where Edwardsport's performance is so much poorer and it costs so much higher than the Company projected and where the Commission approved and re-approved the plant.

Improperly Classified O&M Expenses

Q. Please explain your concern that Duke is claiming certain repair and related costs as Operating and Maintenance (O&M) expenses for purposes of retail rate recovery which, under the Settlement, should be classified as Construction Costs subject to the Hard Cost Cap.

A. Section 2.E of the Settlement approved by the Commission in Cause No. 43114-IGCC-4S1 with modifications not relevant here states:

E. "Construction Costs" of the Project shall be defined in accordance with usual utility practices and in accordance with FERC guidelines and includes all costs required to achieve "final completion," as that term is defined in the December 20, 2007 contract between Duke Energy Indiana and GE (see Attachment A), such as engineering, materials, construction and equipment purchases, capitalized AFUDC (through June 30, 2012), and all start-up and testing, validation and commissioning costs, and costs of repairs and modifications identified during start-up, testing, validation and commissioning and all such costs required whether actually disbursed or only obligated during such period, as well as any costs subsequently incurred to pay claims disallowed or unpaid during such period; except that: "Construction Costs" of the Project and the Hard Cost Cap shall not include normal operating and maintenance ("O&M") expenditures on the Project, which, according to FERC guidelines, begin after the "InService Operational Date" and shall not include subsequent ongoing capital spent on the Project for normal capitalized repairs or maintenance expenditures or additional plant and equipment necessary for the continued operation of the Project after the "In-Service Operational Date", unless identified during start-up, testing, validation and commissioning as being necessary to reach "final completion", nor does the cap apply to orders of the Commission approving cost recovery related to carbon capture and storage (including study costs) involving the Project.

In this context, I am concerned that substantial costs claimed by the Company as operating and maintenance expenses should have been classified as “construction costs” under the Settlement because, as a factual matter, they were incurred for “repairs and modifications identified during start-up, testing, validation and commissioning as being necessary to reach ‘final completion.’”

Mr. Smith will explain the accounting aspects of this matter in his testimony, but the technical aspects are my responsibility. Specifically, my review of Mr. Stultz’s prefiled testimony from page 10 line 5 through page 16 line 3 in IGCC-12 and from page 3 line 3 through page 11 line 21 and page 19 line 4 through page 21 line 9 in IGCC-13, as well as the Company’s responses to related discovery requests in Joint Intervenors’ Discovery Request Sets 6, 10, 13, 17, 22 and 25 indicate that there are important categories of costs claimed by the Company to be

recoverable from ratepayers as incurred for normal capitalized repairs and expensed maintenance activities "necessary for the continued operation of the Project after the 'InService Operational Date'" which were, in fact, incurred for "repairs and modifications identified during start-up, testing, validation and commissioning as being necessary to reach 'final completion.'"

These important categories of costs include at least the following:

(1) Costs for "repairs and modifications identified . . . as being necessary to reach 'final completion'" which the Company claims were identified during a time period on and after June 7, 2013 which the Company considered to be a period of "commercial operation" which should have been considered a period of further "testing" within the meaning of the Settlement;

(2) Costs incurred on and after June 7, 2013 for "repairs and modifications identified during start-up, testing, validation and commissioning" prior to June 7, 2013 "as being necessary to reach 'final completion'" which the Company has nonetheless expensed currently since June 7, 2013.

The first category of improperly classified O&M expenses is, of course, inherent in the dispute between the Company and other parties regarding whether the period from June 7, 2013 through March 31, 2014 (or even later) should be considered a period of "commercial operation" or a period of further "testing" for Edwardsport. But, it is important to recognize that the implications of this dispute extend beyond the reclassification of all costs incurred before the appropriate "In Service Operation Date" to some costs incurred after that date. It is undisputed that, even assuming without conceding that the "In Service Operation Date" under the Settlement is June 7, 2013, there were "startup" and "testing" activities within the meaning of those terms under the Settlement which took place through at least

May 2014 and perhaps as late as November 2014.[45] Accordingly, "repairs and modifications required for Final Completion" identified during those post-June 7, 2013 "startup" and "testing" activities should be classified as "Construction Costs" under the Settlement.

The other category of improperly classified O&M expenses arises out of the manner in which repair and modification costs to address equipment problems and technical issues identified prior to June 7, 2013, are being reviewed and some are being classified as "Construction Costs" by the Company. Duke witness Stultz testified in both IGCC-12 (page 12, lines 18 to 21) and IGCC-13 (page 21, lines 4 to 9) that a team of Company employees meets on a regular basis "to review the maintenance needs of the Plant with an eye towards ensuring that no expenses are presented for recovery in this proceeding (or any other) that would contravene the Commission's Order in Cause No. 43114 IGCC 4S1." However, Joint Intervenors' follow up discovery shows that that this review team is not reviewing all or even most of the maintenance activities and associated work orders initiated at the Plant, but only a comparatively limited number of requests for capital expenditures and then those comparatively few requests are screened against a pre-determined "short list" of narrowly defined categories of repairs and modifications which the Company has unilaterally decided meet the criteria set out in Section 2.E of the Settlement.

Joint Intervenors have experienced significant difficulty in obtaining the documentation from the Company necessary to identify and quantify the second and third categories of improperly classified O&M expenses. Indeed, most of the relevant information has been obtained only through follow up discovery requests and responses after the Commission granted Joint Intervenors' Motion to Compel involving initial requests included in Discovery Request Sets 6 and 10. But, there

[45] See Duke Response and 8-11-14 Supplemental Response to DEI-IG DR1.4

can be no question that these misclassified costs exist and are significant in amount.

For instance, Duke itself stated in a high-level communication from Mr. Thompson to Mr. Sundstrom at GE on November 8, 2013 (Duke Numbered Letter No. 1116, page 3 of 7) that a significant design issue attributable to GE was the cause of slagging occasioning frequent corrective maintenance activities and related O&M costs for Duke:

Moreover, there are numerous maintenance work orders the costs of which are included in the O&M costs which the Company is seeking to recover in IGCC-12 and 13 which are at least arguably and, in some cases, even indisputably traceable to design and construction issues identified as requiring correction prior to the Company's "in-service" declaration of June 7, 2013, which the Company is not considering, especially but not exclusively in the gasification and grey water processes of the Plant. Finally, it appears from my review that the Company is considering repairs and modifications directly related to correcting certain design and construction issues which it has correctly identified as meeting the criteria for classifying their costs as "Construction Costs" under the Settlement (e.g. HeatTrace/FreezeProtection, Liquid Nitrogen Pumps and Supply), but is not so classifying the consequential costs of repairs and/or modifications to other equipment and/or processes which were adversely affected by a "cascade effect" resulting from the underlying technical issues and equipment problems.

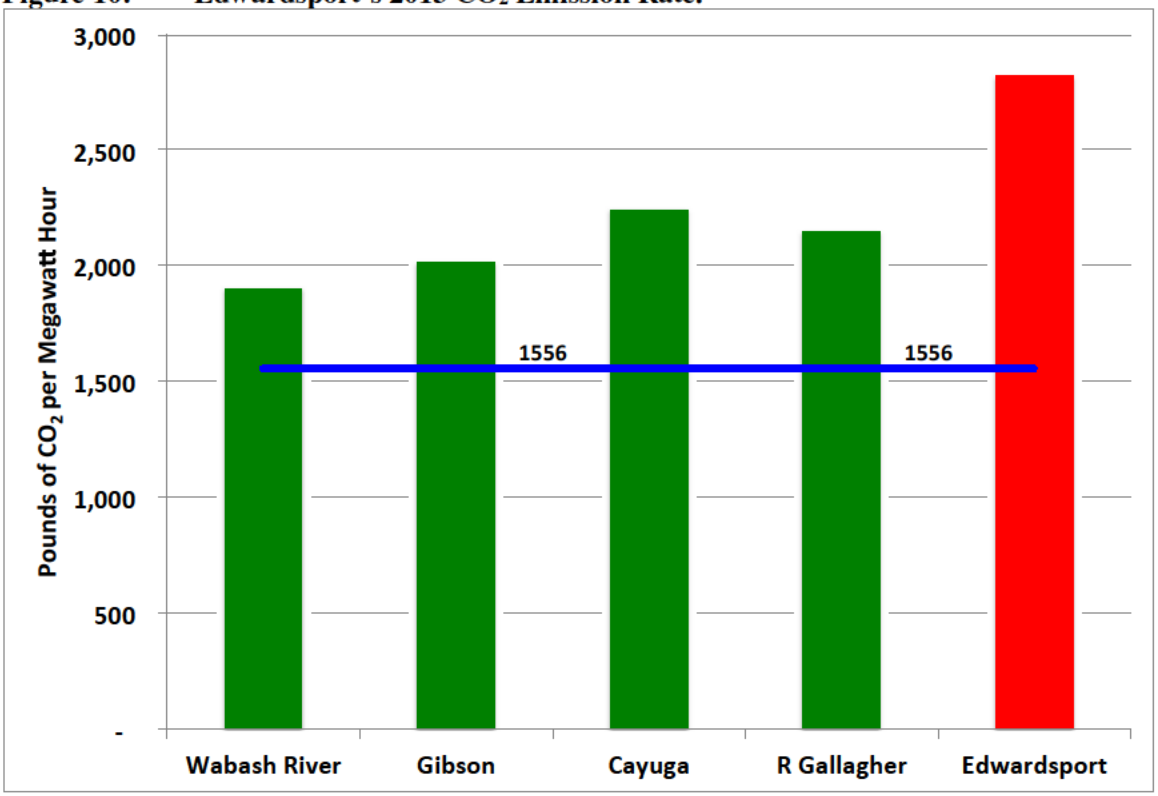
Carbon Dioxide Emissions

Q. How have Edwardsport's actual Carbon Dioxide (CO_2) emissions compared to what the Company told the Commission they would be?

A. The Company originally projected that Edwardsport would emit, on average 1,556 pounds per MWH of CO_2 from Edwardsport.[46] However, as shown in Figures 10 and 11, below, Edwardsport's actual CO_2 emissions during 2013 and the first nine months of 2014 were substantially higher than what Duke promised the Commission could be achieved back in 2007. Please note that the promised CO_2 emission rate only reflected what Duke thought the IGCC technology could achieve—it did not include carbon capture and sequestration.

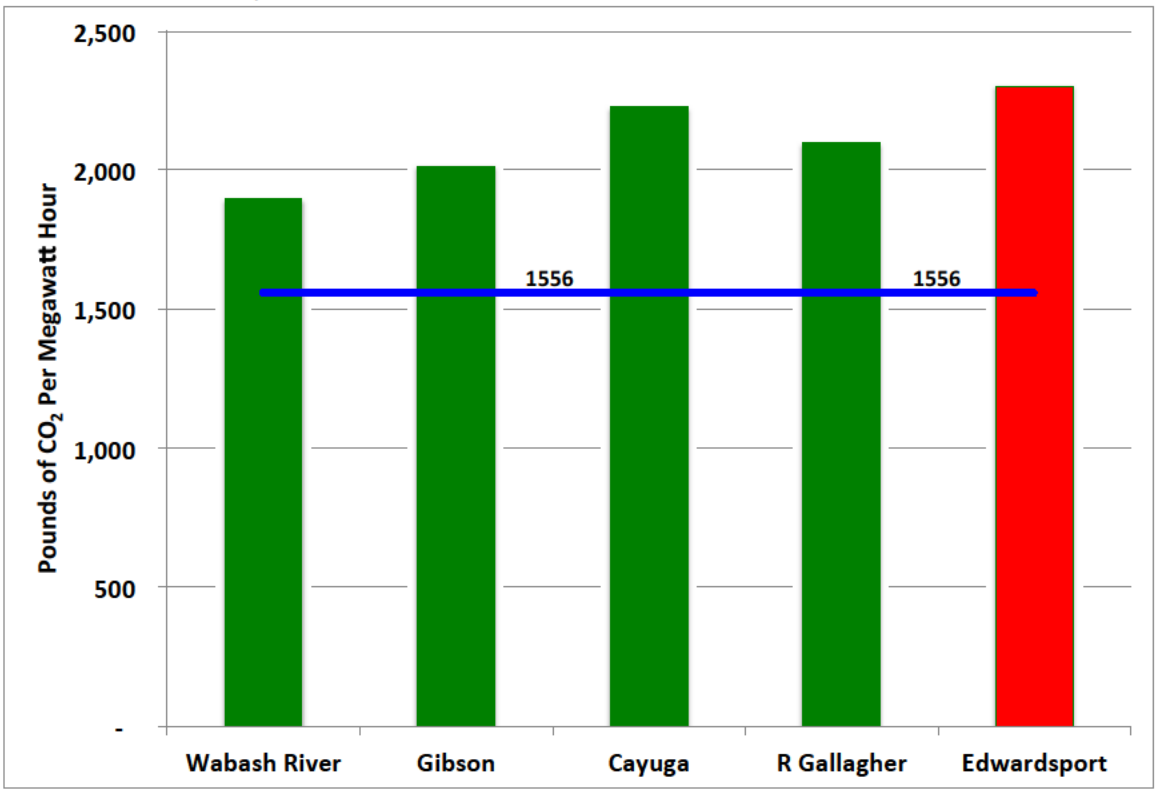
[46] Cause No. 43114, Petitioner's Exhibit 17-B.

Figure 10: Edwardsport's 2013 CO_2 Emission Rate.[47]



[47] Wabash River, Gibson, Cayuga, R Gallagher emission rates are for all of 2013. The Edwardsport emission rate begins at the date which Duke declared Edwardsport "in service", i.e. June 7, 2013. Source: SNL Financial.

Figure 11: Edwardsport's CO_2 Emission Rate – January through September 2014.[48]



As can be seen in Figures 10 and 11, Edwardsport's CO_2 emission rate was higher than that of the Company's four other coal plants.

Q. What is the significance of these higher than projected CO_2 emissions?

A. As explained more fully in the prefiled testimony of Joint Intervenors' witness Kanfer, Edwardsport's higher than projected CO_2 emissions will make it more difficult for the Company and the state to comply with the EPA's proposed Section 111(d) regulations when they become final. In addition, these emissions will make the plant more expensive for ratepayers when an actual carbon price is placed on the CO_2 emitted by Edwardsport. As such, these increased emissions are a foreseeable future risk for Duke's ratepayers because Edwardsport will be

[48] Sources: U.S. EPA's CEMS database and SNL Financial.

classified as a major source of CO_2 emissions under whatever regulatory regime is adopted in the future for those emissions and will be subject to that regime because it is projected to have a future operating life of over 30 years.

Q. Do you have a recommendation as to how the Commission should address these implications of the Plant's higher than projected CO_2 emissions?

A. Yes. The Commission should adopt a performance standard that requires that the Company, not ratepayers bear all costs resulting from the plant's failure to achieve and maintain on an ongoing basis during its period of commercial operation the CO_2 emissions rate projected during its CPCN proceedings.

Q. Does this complete your testimony at this time?

A. Yes.