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The Kemper IGCC Project: Cost and Schedule Risks

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Mississippi Power Company (“MPC” or “the Company”) has recently claimed that the Kemper Integrated Gasification Combined Cycle (“IGCC”) generating project is more than 70 percent complete and is on schedule and within budget.¹ However, evidence in the Company’s monthly reports and the September 2012 URS Independent Monitor’s report for the Mississippi Public Service Commission (“MPSC” or “the Commission”) shows that Kemper is only about 40 to 45 percent complete and is over budget and behind schedule in several significant respects. At the same time, the recent experience in the construction and startup testing of the Edwardsport IGCC project in Indiana demonstrates that there is a substantial risk that the cost of the Kemper Project for ratepayers will continue to increase and that the Project’s in-service date will be significantly delayed beyond the May 2014 date that the Company now claims. Late completion would further increase the costs to ratepayers.

Summary of Findings

1. Kemper is not more than 70 percent complete, as MPC has claimed. Its overall construction and engineering is only about 40-45 percent complete.
2. We testified in MPC Docket No. 2009-UA-014 in early 2010 that the cost of building Kemper would be significantly higher than MPC was then admitting and, unfortunately, we have been proven right, as the direct construction cost has increased by more than 20 percent – and further construction cost increases are likely especially given that the project is using technologies that are untested at this commercial scale, as MPC has acknowledged.
3. Although the Project’s direct construction cost is capped, further cost increases will increase the non-mine financing costs that ratepayers will have to pay.
4. Kemper’s uncapped mine, carbon dioxide (“CO₂”) pipeline and financing costs have increased by perhaps as much as 50 percent since the MPSC certified the Kemper Project in 2010.
5. Documents provided to the Commission by its Independent Monitor show that the Kemper Project is not on schedule, as the Company claims:

¹ For example, see the November 13, 2012 Press Release that is available on the Company’s website.

- As of July 2012, the overall project percent complete was 38 percent vs. a planned 41 complete.
 - Engineering was 87 percent complete vs. a planned 90 percent.
 - Construction was 30 percent complete vs. a planned 34 percent.
 - Actual concrete foundations work was 23 percentage points behind planned. (77% actual vs. 100% planned).
 - Steel work was 10 percentage points behind planned (39% actual vs. 49% planned).
6. The only other IGCC project currently under construction in the U.S. is Duke Energy's Edwardsport Project in Indiana. Edwardsport is approximately two years ahead of Kemper.
 7. Edwardsport has experienced significant schedule delays during its startup and testing due mostly, according to Duke, to a large number of "challenges uncovered during the equipment commissioning and testing phases." As a result, Edwardsport's "expected" in-service date has slipped by eight months since startup and testing activities began. It is reasonable to expect that Kemper will experience similar delays, especially given the new IGCC and CO₂ capture technologies that are being used at commercial scale. These delays will significantly increase the cost impact of the Kemper Project for ratepayers.
 8. The Company's claim that completion of Kemper as an IGCC Project is a lower cost option than either building a new natural gas-fired combined cycle unit or the conversion of Kemper to operate exclusively on natural gas is extremely questionable as MPC's analysis (a) was based on projected natural gas prices that are significantly higher than current projections and futures prices and (b) ignored the fact that MPC does not need all of Kemper's capacity and, consequently, that Kemper will represent significant excess capacity, the cost of which the Company's ratepayers will be unnecessarily forced to bear. Moreover, the analysis also assumes that ratepayers would be forced to bear all of the sunk IGCC-related costs if the Kemper Project were cancelled or converted to burn natural gas. It further

appears that the analysis reflects very optimistic assumptions about Kemper’s future operating performance with IGCC and CO₂ capture technologies that are untested at commercial scale. It also is unclear whether the Company’s most recent economic analyses reflected the Project’s continuing cost escalation or any slippage in its currently forecast May 2014 in-service date.

Capped vs. Uncapped Costs

The Company originally testified that it was confident that the plant could be completed at a cost to the customer of \$2.395 billion. MPC witnesses testified that the risk of cost overruns was “unlikely and comparatively insignificant.” The MPSC accepted MPC’s original budget with the \$2.395 billion number, but after MPC requested the flexibility to go over budget, capped the direct construction cost (also called “certified plant costs”) of the Kemper IGCC project at \$2.880 billion, or 20 percent above the Company’s \$2.3953 billion estimate in 2010. However, the Commission did not cap other costs which MPC wants to pass along to ratepayers, including the costs of the mine that will provide the fuel for the Kemper project, the pipeline that the Company says will carry away the captured CO₂ emissions and project financing costs (also called “AFUDC” - Allowance for Funds Used During Construction).

In fact, as shown in the following table, Kemper’s mine and AFUDC costs already are significantly higher than the amounts projected at the time the Project was certified by the MPSC.

Table 1: Items Excluded per Commission Order (in millions of dollars)

Cost Category	Certification Amount	Current View	Variance from Certification Amount	Actuals Through September 2012
Mine	\$214.2	\$244.6	\$30.4	\$127.0
CO2 Pipeline	\$140.5	\$132.0	-\$8.5	\$53.0
Project AFUDC - Non Mine	\$173.3	\$368.2	\$194.9	\$95.0
Total	\$528.0	\$744.8	\$216.8	\$275.0

Moreover, the September 2012 Report of the PSC’s Independent Monitor (URS) shows that the total uncapped costs for the Project could reach \$600 million not including the \$194.5

million in additional non-mine AFUDC shown in Table 1, above.² This would suggest a total figure for the uncapped costs of approximately \$800 million, or about \$270 million above the estimate at the time that the PSC certified the Kemper Project in Docket No. 2009-UA-014.

Schedule Risk

There are significant uncertainties in the construction and planned operation schedule of the Kemper Project that could ultimately impact customer costs. Current construction and cost reports show that Kemper's engineering and construction is behind schedule, and those reports do not even take into account the consideration that Kemper's new and untested IGCC and CO₂ capture technologies are likely to present delays during pre-operational testing and startup. In fact, construction delays and unanticipated equipment problems continue to trouble the Edwardsport IGCC plant, the only other IGCC plant under construction in the U.S.

The actual duration of the schedule to complete the Kemper Project will affect both the capped direct construction costs and the uncapped financing costs. It also will affect how long MPC's ratepayers would have to pay for the Kemper project before it starts commercial operations if the Commission should decide to reverse its decision to not allow MPC to collect any financing costs before the Project's in-service date ("ISD").

MPC has claimed in the media that the Project is 70 percent complete and has reported to the Commission that the Kemper Project is on schedule for a May 2014 ISD. However, the following evidence suggests that this claim is not accurate and that the Project is behind its planned completion schedule.

First, according to the September 2012 URS Independent Monitor's Report for the MPSC, as of the end of July, engineering and construction for the Kemper Project were behind schedule, with the overall Project about 38 percent complete or about three percentage points behind the planned 41 percent complete. Thus Kemper is significantly less complete than the 70 percent figure that the Company has recently claimed.

² At page 78 of 288.

At the same time, as of the end of July:

- Engineering was 87 percent complete vs. a planned 90 percent.
- Construction was about 30 percent complete vs. a planned 34 percent.³

A subsequent report (*the Covington Civil & Environmental Weekly Construction Report for the Kemper IGCC Project for the week 8/27/12 to 9/2/12*) similarly noted that as of the end of July 2012:

- Actual concrete foundations work was 23 percentage points behind planned. (77% actual vs. 100% planned)
- Steel work was 10 percentage points behind planned. (39% actual vs. 49% planned)
- Actual mechanical equipment work was 18 percentage points behind planned. (9% actual vs. 27% planned)
- Actual underground pipe installed was 4 percentage points behind planned. (72% actual vs. 76% planned)⁴

Despite these delays, MPC has claimed that the Project is on schedule due to additional workarounds such as increasing the size of the night shifts and moving critical tasks to a 7 day 24 hour schedule. However, subsequent information presented in the Company's September 2012 Kemper County IGCC Project Report to the MPSC shows that the actual Project progress has not caught up to the planned schedule. In fact, concrete work was still only 82 percent complete as of the end of September (compared to the 100 percent complete planned by the end of July) and structural steel erection was only 46 percent complete (compared to the 49 percent complete planned by the end of July).

Thus, there is some uncertainty as to when/whether the Project's actual progress will catch up to the planned schedule with a forecast May 2014 ISD. At the same time, there is uncertainty as to whether some or all of the same factors that led to the slower than planned progress to date also will affect future project construction and/or pre-operational testing and startup progress. According to evidence in the Company and the Commission's Independent Monitor's Reports, these factors include lower than planned craft

³ URS IM September 2012 Report, at pages 1 and 2.

⁴ Included as Appendix E to the URS IM September 2012 Report.

productivity, more commodities were installed than had been originally planned (i.e., more steel, concrete, etc., was required than had been estimated) and unanticipated construction/equipment fabrication problems, issues and delays.⁵

In particular, the Kemper IGCC Project involves new and untested technology -- as Company witness Flowers testified in MPSC Docket No. 2009-UA-014, the Kemper County IGCC Project will represent the first large-scale application of the TRIG gasification technology.⁶ In addition, although the process that MPC plans to use to capture the CO₂ from the proposed IGCC plant has been used in industry, it has not yet been used on the commercial scale at which it would be used at the proposed plant.⁷ These new (certainly at commercial scale) technology applications create a substantial risk of additional schedule delays, particularly during pre-operational testing and startup, as the recent experience of the Edwardsport IGCC Project in Indiana indicates. Although Edwardsport uses a different IGCC technology, it is the only other IGCC Project that has been built in the U.S. in approximately two decades.

According to Duke Energy Indiana, the owner of the Edwardsport IGCC Project:

- In December 2009, the Edwardsport IGCC Project was approximately 44 percent complete, or slightly more complete than Kemper has recently been reported to be.⁸ At that time, Duke projected a July 8, 2012 in-service date for Edwardsport.
- By December 2011, engineering work at Edwardsport was complete and all systems had been turned over to the test and startup group.⁹ By this time, the

⁵ For example, the current Kemper budget assumes that 10,236,286 craft labor manhours will be required to install the increased amounts of commodities (concrete, steel, piping, wiring, etc.) for Kemper as compared to the 5,140,288 manhours in the original certified estimate. URS September 2012 IM Report, Appendix C-1.

⁶ Direct Testimony of Kimberly D. Flowers in MPSC Docket No. 2009-UA-014, filed January 16, 2009, at page 40, lines 5-6.

⁷ In September 2009 the Southern Company announced that it had licensed the TRIG process to a facility in Guangdong Province, China. The facility was expected to be in operation in 2011. However, a recent presentation by KBR, the co-owner of the technology, now projects startup in early 2013.

⁸ Testimony of W. Michael Womack on behalf of Duke Energy Indiana in Indiana Utility Regulatory Commission Cause No. 43114 IGCC-4, filed on December 22, 2009.

⁹ Testimony of W. Michael Womack on behalf of Duke Energy Indiana in Indiana Utility Regulatory Commission Cause No. 43114 IGCC-8, filed on December 19, 2011.

projected in-service date had slipped by over two months to September 23, 2012.

- Duke Energy Indiana’s most recent estimate for Edwardsport’s in-service date was submitted to the Indiana Utility Regulatory Commission (“IURC”) on October 31, 2012.¹⁰ In this testimony, Duke now projects an “expected” or “more likely achievable” in-service date of May 29, 2013, representing slippage of eight additional months from the time that startup and testing was approximately 2 percent complete.

The testimony filed by Duke Energy Indiana to the IURC attributes the eight month delay in the in-service date for the Edwardsport IGCC Project from September 2012 to May 2013 to unanticipated equipment problems and challenges experienced during the pre-operational testing and startup of the “first-of-its-kind at this size IGCC plant. For example, Duke witness Womack has recently submitted the following sworn testimony to the IURC in October 2012:

... Given the frequency and volume of challenges uncovered during the equipment commissioning and early [GE New Product Introduction] testing phases from March through August 2012, the team undertook a rigorous schedule analysis focused on the areas of highest schedule uncertainty to create a completion schedule incorporating the Project’s recent start up and testing experience by including estimates of similar challenges into the future activities.... The analysis yielded a schedule we are calling the “expected case” schedule, which was used to prepare the revised cost estimate. On the “expected case” case schedule, the In-Service date is projected to be May 29, 2013 and the Substantial Completion date is projected to be September 22, 2013. Although the team is driving toward earlier dates as discussed above, these are the dates we believe today are more likely achievable.¹¹

* * * *

The root cause of both the schedule extension and cost increase is time and cost necessary to correct deficiencies inherent at this point in the Project, which were discovered during the testing and commissioning of the Project. While none of these problems are expected to have a long term effect on the Plant’s operating capability

¹⁰ Supplemental Direct Testimony of W. Michael Womack on behalf of Duke Energy Indiana in Indiana Utility Regulatory Commission Cause No. 43114 IGCC-9, filed on October 31, 2012.

¹¹ Supplemental Direct Testimony of W. Michael Womack on behalf of Duke Energy Indiana in Indiana Utility Regulatory Commission Cause No. 43114 IGCC-9, filed on October 31, 2012, at page 2.

or reliability, they are numerous and material enough to cause significant schedule delay and cost increase.¹²

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It is reasonable to expect that the Kemper IGCC Project will experience similar currently unanticipated equipment problems and challenges during its pre-operational testing and startup. These schedule delays could significantly increase the rates paid by MPC's customers by increasing the financing costs that will be added to rate base when the plant is completed and/or by increasing any pre-operational capital or financing costs that the Commission may decide to allow MPC to recover in advance of the Project's actual start of commercial operations.

Cost Related Risks

MPC's estimated direct construction cost for the Kemper IGCC Project already has increased by 20 percent from the \$2.3953 billion estimate that the Company presented in late 2009/early 2010 in MPSC Docket No. 2009-UA-014. Moreover, as noted above, the Project's estimated uncapped mine, pipeline and Project non-mine financing costs also have increased by approximately \$270 million, or more than 50 percent.

Although these increases already have been quite substantial, the same factors that could lead to an extension of Kemper's construction schedule (and a delay in the Project's in-service date) also could lead to additional increases in both the capped construction and the uncapped mine, pipeline and Project financing costs. As noted earlier, these factors include lower than planned craft productivity, more commodities were installed than had been originally planned (i.e., more steel, concrete, etc., was required than had been estimated) and unanticipated construction/equipment fabrication problems, issues and delays.

For example, Duke witness Womack has explained how the discovery of previously unanticipated equipment problems during pre-operational testing and startup of

¹² Id., at page 4.

that Company's Edwardsport IGCC Project also has led to cost increases, as well as schedule delays:

These and other issues drive the cost increase in three primary ways. First, while not the largest element of the cost increase, the direct cost of making the modifications and repairs increased. Second, the extended schedule drives increased overhead costs for staff, support contractors, equipment, insurance, taxes, among others, simply because these costs continue to be capitalized to the Project until the Project is declared In-Service. And third, the delay the Project has suffered this year kept the power block portion of the plant from running on natural gas during the summer months when revenue potential was expected to be the greatest. The delay also drove the remaining [GE New Product Introduction] testing into the fall and winter months when revenue opportunities were lower. Also, experience has shown us that the level of staff and contractors needed to support operations during the testing period is higher than previously estimated. The revenue opportunity lost during the summer months coupled with the higher than previously expected cost to operate during start and testing, drives the net operating costs prior to the In-Service date higher than previously estimated.¹³

In fact, MPC already has used up the \$161.6 million of contingency that was included in its original \$2.3953 billion Kemper construction cost estimate and has added another \$43.1 million of contingency to its current cost estimate.¹⁴ Consequently, the entire \$161.3 million of the original contingency funds has been consumed even though the Project is only approximately 40 percent complete overall and only about 61 percent of MPC's projected \$2.880 billion construction budget has been expended. This suggests that more than \$43.1 million in new contingency funds may well be needed.

The Commission's Independent Monitor, URS, has conducted a Cost Risk Assessment that has concluded that the total project capped costs should range between \$2.832 billion and \$2.917 billion, with a probability of 72 percent that the total cost will be less or equal to the Commission's \$2.880 billion construction cap.¹⁵

¹³ Id., at page 5.

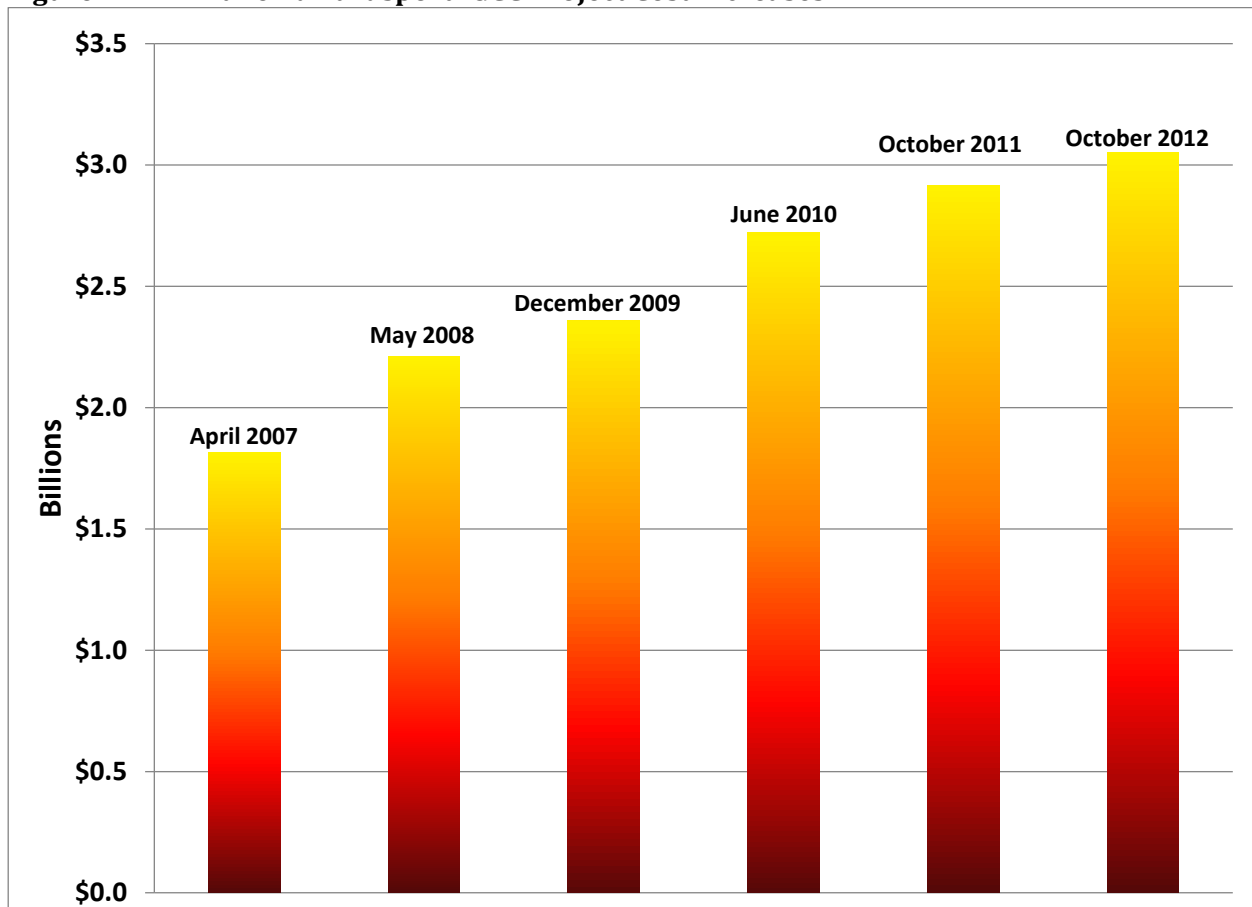
¹⁴ Table 3 in MPC's Kemper *Monthly Status Report through September 2012*.

¹⁵ Memo from Randall Hodges at URS to Shawn Shurden at MPSC, *Kemper IGCC Project June 2012 Cost Risk Assessment*, dated September 19, 2012.

Unfortunately, there are no workpapers for this analysis so it is not possible to determine how these figures were developed. Nor is there any evidence as to how accurately URS has forecast or predicted the actual costs of other power plants, particularly those plants that, like Kemper, involve new technological applications at commercial size.

URS's conclusion that Kemper's construction cost will fall within the very narrow 3 percentage point range between \$2.832 billion and \$2.917 billion is especially questionable given the dramatic cost increases experienced in recent years by other domestic U.S. coal projects and by the actual cost history of the Edwardsport IGCC Project, as shown in Figure 1, below:

Figure 1: Duke Edwardsport IGCC Project Cost Increases



Thus, the estimated direct cost of the Edwardsport IGCC Project, without AFUDC, has increased by approximately 30 percent since December 2009 when that Project was at the same relative stage complete as the Kemper IGCC Project is at now. And the projected in-service date for the Edwardsport IGCC Project has slipped by more than ten months since that time; a delay that has significantly increased that Project's total financing costs. Of course, the increase in the cost to build and finance the Kemper IGCC Project could be less than that experienced at Duke's Edwardsport IGCC Project. However, Edwardsport does provide reasonable evidence that the range of construction costs considered by URS in its Kemper Cost Risk Assessment likely was far too narrow and that there is a more significant construction cost and schedule risk than MPC and URS have acknowledged.

MPC Economic Viability Analysis of the Kemper IGCC Project

URS has accepted MPC's recent analysis of the economic viability of Kemper and the Company's conclusion that completion of Kemper as an IGCC Project is still the most viable option. Unfortunately the documentation reporting the results of this analysis has been heavily redacted and no workpapers have been provided. Thus, it is very difficult to identify all of the questionable assumptions that may have biased its results. Nevertheless, there appear to be a number of questionable assumptions that do substantially bias the Company's economic analysis in favor of completion of Kemper as an IGCC Project.

- The analysis was based on projected natural gas prices that are significantly higher than current projections and futures prices
- The analysis ignored the fact that MPC does not need all of Kemper's capacity and, consequently, that Kemper will represent significant excess capacity, the cost of which the Company's ratepayers will be unnecessarily forced to bear.
- The analysis assumes that ratepayers would be forced to bear all of the IGCC-related sunk costs if the Kemper Project were cancelled or converted to burn natural gas.

It further appears that the analysis reflects very optimistic assumptions about Kemper's future operating performance with IGCC and CO₂ capture technologies that are untested at commercial scale. It also is unclear whether the Company's most recent economic analyses reflected the project's continuing cost escalation or any slippage in its currently projected May 2014 in-service date.