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**BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSISSIPPI**

**MISS. PUBLIC SERVICE
COMMISSION**

ENTERGY MISSISSIPPI, INC.
EC123-0082-00

MPSC Docket Number 2011-UA-376

IN RE: JOINT APPLICATION OF ENTERGY MISSISSIPPI, INC. AND THE
MIDWEST INDEPENDENT TRANSMISSION SYSTEM OPERATOR,
INC. FOR TRANSFER OF FUNCTIONAL CONTROL OF ENTERGY
MISSISSIPPI'S TRANSMISSION FACILITIES TO MISO

ADDENDUM TO THE DIRECT TESTIMONY

OF

MARC H. VATTER, Ph.D.

CONSULTING ECONOMIST

ON BEHALF OF

THE MISSISSIPPI PUBLIC UTILITIES STAFF

September 12, 2012

Revised Input and Output from Aurora Simulations

On June 19, Entergy Mississippi Incorporated (EMI), Economic Insight (EI), and Mississippi Public Utilities Staff (MPUS) discussed my testimony in a conference call. I sent EMI output showing retirements and additions of generators in several areas modeled in the simulations. EMI replied in an email on June 21 in which they criticized many retirements as not realistic. Some of the criticisms were well-founded, and efforts to address them occasioned significant revisions in the assumptions used in subsequent modeling.

Entergy questioned:

- the overall extent of retirements, many of which occurred in the Entergy Arkansas (EAI) & AECI zone;
- specifically, retirement of SMEPA's share of the Grand Gulf nuclear facility and the Suez and KGen gas-fired generators in the EAI & AECI zone;
- the absence of acquisitions in the SERC South zone, which is mainly the Southern Company, but also includes PowerSouth and others;
- the extent of acquisitions in the small SMEPA MPCo zone, and the change in net exports there between the "Join SPP" and "Join MISO" cases; and
- the pace of acquisitions for Entergy itself.

EMI also inquired as to whether I had modeled SMEPA's participation in SPP's reserve sharing agreement.

On July 18, the Commission cancelled hearings scheduled for July 19 and 20. On July 16, SMEPA made a data request regarding my testimony and further modeling, discussed at the technical conference on July 15. SMEPA's questions touched on acquisitions and retirements, transmission limits and congestion, discounting, and reserves. They were concerned that my simulations showed excessive acquisition of generating resources by SMEPA. MPUS sent my response to SMEPA on July 30. I discussed the response and further issues related to modeling SMEPA with their staff during August, and made adjustments to my assumptions. Specifically, flow limits from the SMEPA MPCo zone to the SERC South zone and from the SMEPA EMI zone to the EMI zone and to the EAI & AECI zone were set to zero.¹ This was done to inhibit simulated resource acquisitions brought on by opportunities for export. In practice, SMEPA does not acquire generation for that purpose. For the same reason, and to help model reserve sharing within SMEPA, I reduced the planning reserve requirement in the SMEPA EMI zone from 15 percent to 12.5 percent. I set the flow limit from the SERC South zone to the SMEPA MPCo zone to 250 MW. Finally, I corrected some data entry errors in the load data for SMEPA.

¹ Flow limits in the opposite directions remain positive.

Results reflecting input from both EMI and SMEPA are summarized in Table 1, gains from trade are generally smaller than in my June testimony, but the implications for the state of Mississippi are similar: the benefits of RTO membership are larger for the state of Mississippi if SMEPA joins the same RTO that EMI and the rest of Entergy join. With SMEPA's participation, the results suggest similar benefits from joining either MISO or SPP. Once Entergy has joined an RTO, SMEPA's joining has a negative impact on the new MISO, but a positive impact on the new SPP. To see this, add the effects on the RTO and All Entergy & AECI when SMEPA joins. For MISO, the effect is:

$$-24,838,874 - 81,805,127 - 38,353,416 + 100,706,527 = -44,290,890$$

Without SMEPA, EMI experiences little impact from membership in an RTO. Outside an RTO, low "trade barriers" among the Entergy zones are assumed, so EMI is already part of a "free trade area," transmission limits notwithstanding, considerably larger than itself. EMI also already has a "balanced" portfolio of generators well-suited to its load profile, which limits the potential benefits from expanded trade. SMEPA, with its relatively high prices and proximity to EMI, a net exporting zone, has a positive impact on EMI when Entergy and SMEPA join either RTO together.

Following is a discussion of 1) modeling changes made in both direct and indirect response to Entergy's criticisms, 2) responses to other criticisms that do not involve such changes, and 3) tables summarizing the revised modeling. An appendix discusses sensitivity analyses to changes in economic hurdle rates and prices for natural gas, as well as a comparison to the results of the Charles River Associates (CRA) earlier cost-benefit analyses.

1. Modeling Changes

Some of the modeling changes came as a direct result of Entergy's criticisms. The need for other changes was discovered in the course of addressing Entergy's criticisms.

A. Changes Made in Direct Response to Entergy's Criticisms

- **Adjusted fixed O&M for Grand Gulf and other resources.** Both Entergy and SMEPA noted that retirement of SMEPA's share of Grand Gulf was doubtful. In addition, it was found that a disproportionate share of retirements were QFs ("qualifying facilities" under the Public Utility Regulatory Policies Act; also called "cogenerators"). The reason for both results was a flaw in the Aurora database. After adjustments, SMEPA's share of Grand Gulf no longer retires.
- **Incorporated additional load data from the Multiregional Modeling Working Group (MMWG) and Entergy pertaining to the Entergy zones.** In my testimony, load was apportioned to the Entergy zones using operating company shares provided by Entergy and assumed load growth given by the EPIS, Inc. database (EPIS). A problem with using operating company shares is that the

Entergy zones group some non-Entergy loads with the operating companies' loads. For example, Associated Electric Cooperative's (AECI) loads are included with those of Entergy Arkansas in the EAI & AECI zone. The new load data allocate loads to the Entergy & AECI zones by summing the load buses associated with each zone, using MMWG load flow studies for 2011 and 2021. Load growth implied by the MMWG data was maintained over the study horizon, but year-on-year changes were forecast using a load forecast for the operating companies provided by Entergy. Entergy focused its criticism of the retirements on the EAI & AECI zone, which is more rural than surrounding areas and is a large exporter of power in these simulations. The largest city in the EAI & AECI zone is Little Rock, but Kansas City, Saint Louis, Memphis, and New Orleans are not far away. Accordingly, this zone maintains a large surplus of capacity. NERC's Summer 2012 Reliability Assessment shows a reserve margin in the SERC-W region of around 45% (p. 134). Thus, an even larger surplus of capacity in the EAI & AECI zone should not be surprising. However, too large a surplus could cause an unrealistically high forecast of retirements. In the new base case, the reserve margin in the EAI & AECI zone starts at 146% in 2013 and declines to 86% in 2021. In my testimony, the reserve margin declined from 163% to 116%.

- **Eliminated reserve requirements in the SMEPA MPCo zone.** Entergy asked whether I had modeled SMEPA's participation in SPP's reserve sharing agreement. In response, the zonal reserve requirement for SMEPA MPCo has been eliminated in order to roughly reflect the benefits of that arrangement to SMEPA, and to address doubts on the part of both Entergy and SMEPA regarding the extent of resource acquisition in that small zone. In the revised base case, no resources are acquired in the SMEPA MPCo zone.

B. Changes Made as Indirect Results of Entergy's Criticisms

- **Updated the Aurora database by categorizing Rex Brown #1 as retired as of June 10, 2011.** Simulations begin in 2013.
- **Prevented Kemper County IGCC Plant from Retiring.** Kemper did not retire in the simulations done for the initial testimony, but the model would retire Kemper under some assumptions. However, the Kemper plant is not allowed to retire in any of the revised simulations. This would only have a large impact on results if Kemper's assumed operating costs were much higher than the total costs of new gas-fired generation. A forecast for lignite prices provided by SMEPA is used.
- **Prevented QFs from retiring.** In its database, EPIS made modifications, notably of heat rates, to reflect how the value of output from QFs other than power to the grid would affect their output to the grid itself. Given this, and the fact that the retirement decision for QFs depends on the value of both types of output in comparison to cost, while only the value of output to the grid is modeled in

Aurora, QFs are prevented from retiring in the revised simulations. Realistically, some QFs would be expected to retire, and not allowing for this flexibility appears to have had the effect of diminishing estimated benefits of Entergy joining an RTO. In the Aurora database, about 10% of generators are QFs. According to data reported on EIA Form 860, about 13% of generators nationwide are “co-generators”.

- **Substituted CRA for EPIS “wheeling rates.”** In my testimony, a combination of wheeling rates from CRA’s report and numbers listed in the “Wheeling” column in the EPIS database were used. As part of investigating Entergy’s question regarding reserve sharing, it was learned that EPIS’ numbers represented opportunity costs of using transmission for sales of non-firm energy, rather than wheeling rates. These opportunity costs are mainly the value of having transmission available to connect reserves to loads and for voltage control. Apart from assuming no reserve requirement in the SMEPA MPCo zone, and a somewhat low planning reserve requirement in the SMEPA EMI zone, reserve sharing is not modeled. Consequently, EPIS’ “wheeling” numbers are not used in the revised modeling, but more extensive use of CRA’s wheeling rates is made.
- **Eliminated ERCOT from the simulations.** ERCOT is not part of the Eastern Interconnection.
- **Dropped “Bid Adders” attached to IPPs in Entergy zones.** It is assumed that inefficiencies caused by the arm’s-length relationship between Entergy and IPPs will be eliminated in the long term, as in the case of the Hinds facility that was purchased by Entergy.
- **Dropped the “QF Bid Adders” scenarios.** These were designed to estimate the benefits of any removal of Entergy’s obligations to purchase power from QFs at avoided cost (determined in regulatory proceedings). CRA did not model this QF element, either.
- **Dropped the “AECI Bid Adder” Scenario.** This was an attempt to model trade barriers between AECI and EAI, both of which are included in the EAI zone, by requiring a \$3/MWh premium above operating cost for AECI’s resources to be dispatched. Results showed large gains when these required premiums were removed as Entergy joined an RTO. Given AECI’s central location, this is not implausible, but it is not clear that one can attribute the large gains predominantly to freer trade, and this scenario was dropped from the analysis.

2. Responses to Comments from Entergy that Did Not Require Modeling Changes

- **Retirement of units with low heat rates.** Entergy questioned the retirement of the Suez and KGen generators in Arkansas that were relatively new, with heat rates of 7000 Btu/KWh. However, EPIS data on these plants indicate that they are less flexible to operate than others in the area. When these inflexibilities were removed in sensitivity analyses, Aurora retired different plants.
- **Capacity additions for Entergy viewed as excessive.** Entergy implied that the modeling that produced estimated net additions for Entergy of 3GW of capacity were excessive. However, calculations indicate that this was consistent with load growth of 1.3% to 2021 and 1.8% to 2016, which do not appear to be excessive. The Entergy Arkansas zone may continue to be a net exporter indefinitely, so acquisition of capacity there well in excess of loads may be efficient.
- **Increase in net exports in the SMEPA MPCo zone between the “Join SPP” and “Join MISO” cases.** This was a result of reallocation of generation within SMEPA. Between "Join SPP" and "Join MISO", there was virtually no change in net exports for SMEPA On-System and SMEPA MPCo combined.
- **No capacity additions around Southern Company.** Entergy also objected to the extent of retirements and lack of acquisitions in the SERC South zone, which includes The Southern Company, PowerSouth, and others. The revised model now retires 8GW of coal- and oil-fired capacity over the course of the base case simulation in the SERC South zone. It shows a reserve margin there of 51% in 2013, declining to 17% in 2021. In fact, The Southern Company is acquiring nuclear capacity. It would appear that criteria other than meeting reserve margins, such as actual, or anticipated, changes in environmental regulations that I do not model, are driving acquisitions by The Southern Company in practice. For example, the modeling does not make any assumption regarding a positive carbon tax. If higher emissions prices were modeled, the benefits of Entergy joining MISO would drop because coal-fired power from “MISO North” would be more expensive.
- **Hurstell testimony regarding Vatter model.** In his testimony, John Hurstell correctly states that the simulations in my testimony were not subject to complete external review. However, Entergy’s review and conference call, along with SMEPA’s data request and subsequent conversations, allowed for reasonable issues to be raised and addressed. The detailed treatment of the state of Mississippi, endogeneity of resource acquisition and retirement, and examination of different economic hurdle rates in the modeling provide additional information to the analysis of Entergy’s proposal to join MISO.

3. Results of Modeling Changes

The AURORA model estimates benefits from expanded trade of non-firm energy and optimization of acquisitions and retirements of generators, in an environment where firm energy and capacity are not traded. This excludes some benefits Entergy has claimed from membership in MISO, such as reserve sharing and relief from the QF responsibility under the Public Utility Regulatory Policies Act. These elements were not addressed in CRA's simulations, either.

The revised modeling generates net gains relative to the base case as shown in Table 1. They are generally smaller than in the June testimony. Table 1 reports on four "core" scenarios, when Entergy joins MISO or SPP, with or without SMEPA. "Joining an RTO" means that the economic hurdle rate and wheeling rates between Entergy and the RTO go to zero. The economic hurdle rate is the difference between price received and cost incurred that a seller requires, or the difference between value derived and price paid that a buyer requires, to make a transaction.

According to trade-theory, optimal trade barriers are higher for economies whose volume of trade is high relative to the economies of their trading partners. Here, "trade barriers" include physical transmission limits and the wheeling rates and economic hurdle rates that fall when joining an RTO. In Table 1, Entergy does better to join the larger RTO, MISO. The smaller SPP does better than MISO when Entergy, and subsequently SMEPA, joins it. SMEPA, which is small, does well to join either of the Entergy-inclusive RTOs; gains are virtually the same.

Only the larger Entergy-inclusive RTO, MISO, suffers a loss because SMEPA joins it. As part of MISO, Entergy has little interest in lower trade barriers with SMEPA. SMEPA's negative impact on EAI and AECI exceeds its positive impact on the rest of the new MISO by a third. The EAI & AECI zone is a large net exporter. When SMEPA joins an Entergy-inclusive SPP, levelized average prices in the EAI & AECI zone rise from 34.02 to 34.26 \$/MWh. When SMEPA joins an Entergy-inclusive MISO, levelized average prices fall from 35.33 to 35.21 \$/MWh. A reasonable interpretation is that MISO North can out-bid SMEPA for exports from the EAI & AECI zone, while SPP cannot, when there is no economic hurdle or wheeling charge between them. As a result, the zone profits from access to SMEPA only when there is an economic hurdle and wheeling charge between it and MISO North. As part of MISO, it suffers a loss when the hurdle with SMEPA falls because the assumed hurdle is not too far from its optimal trade barrier with SMEPA.

When SMEPA joins the smaller Entergy-inclusive SPP, no zone loses, but the gains accrue mainly to the Entergy parts of the RTO, perhaps because of proximity. In Table 1, the trade and resource planning benefits to SMEPA are roughly the same in either MISO or SPP. However, the trade and resource planning benefits that SMEPA confers on other members are greater in the smaller SPP than in the larger MISO.

EMI, which already has “low trade barriers” with the other Entergy zones, does better when they all join the larger RTO, but the impact is smaller than for SMEPA.

SMEPA and the state of Mississippi experience little impact when Entergy joins either MISO or SPP without SMEPA. SMEPA’s annual revenues are on the order of \$700 million. Over nine years, they would be around \$6 billion. The values in Table 1 are not trivial, but they are modest compared even to SMEPA’s revenues.

**Table 1: Net Monetary Gains from Base Case by Area
2013-2021 (2012 NPV @ 7%)**

	Join MISO	Join MISO with SMEPA	Join SPP	Join SPP with SMEPA
Entergy Mississippi	7,432,644	48,154,440	(10,163,657)	18,337,048
SMEPA EMI	6,388,117	(18,062,007)	260,952	(18,677,522)
SMEPA On-System	(12,248,614)	72,358,091	1,238,436	75,805,385
SMEPA MPCo	(2,225,930)	12,522,450	(276,821)	13,443,612
All SMEPA	(8,086,426)	66,818,534	1,222,567	70,571,475
MEAM	(1,574,389)	(1,246,961)	586,547	(2,272,682)
MDEA	314,527	3,751,315	(2,565,616)	383,257
MPCo Non-SMEPA	1,798,912	3,707,758	597,926	(3,536,330)
TVA Mississippi	2,577,472	1,779,806	2,776,420	1,412,136
Mississippi	2,462,740	122,964,891	(7,545,813)	84,894,903
Entergy Arkansas & AECI	62,049,466	(123,423,112)	4,417,984	24,297,868
Entergy NOLATX	12,323,016	50,429,798	(12,165,157)	33,971,429
All Entergy & AECI	81,805,127	(24,838,874)	(17,910,829)	76,606,345
MISO (North)	(100,706,527)	(38,353,416)	(57,939,811)	(2,316,376)
SPP	6,624,361	(14,499,309)	111,488,833	118,847,242
TVA	38,888,418	26,853,374	41,890,097	21,306,048
SERC South	46,981,131	96,833,346	15,615,684	(92,356,280)
MS + NTRG + AECI + RTO	(23,871,304)	11,618,161	96,195,847	262,011,442

The last line of Table 1 shows that the combined benefits to the state of Mississippi, the Entergy & AECI zones, and the RTO that Entergy joins. They are greater when Entergy & AECI, and possibly SMEPA, join SPP, but only when SMEPA joins SPP with Entergy & AECI do the state, SMEPA, Entergy & AECI, and the RTO joined all gain. Under this scenario, the SERC South zone suffers a loss, a small share of which is experienced by MPCo. MEAM also experiences a loss that may be significant for a utility of its size.

Appendix: Sensitivity Studies and Comparison to Results of CRA Cost Benefit Analyses

Changes in Hurdle Rates

Table 2 examines effects of variations in economic hurdle rates. These inputs to the model are critical assumptions in this type of analysis: Estimated gains from trade represent effects of lowering economic hurdles between Entergy (and AECI and sometimes SMEPA) and the RTOs. It is also difficult to determine precise values for these inputs. Thus, it is important to examine the effects of variations in their levels. Based on CRA's work, the economic hurdle between MISO and PJM is half that between those RTOs and third parties. With Entergy in SPP, the ratio of loads in SPP to loads in MISO would be the same as the ratio of loads in MISO to loads in PJM. Accordingly, in the columns referring to a "Low Hurdle with MISO," the economic hurdle between SPP and MISO is \$2.50/MWh, rather than \$5/MWh, and gains for Entergy and SPP are higher than in Table 1, though not for SMEPA.

The columns "High Hurdle Around Entergy" and "High Hurdle Around MISO" represent scenarios in which economic hurdles are half-again as large as in the base case. They show losses to Entergy & AECI and MISO, respectively, compared to the base case. These sensitivities provide no indication that these organizations would have incentive to raise the effective economic hurdle on external transactions, which helps to validate the \$5/MWh economic hurdle I have assumed. Other analysts have used higher hurdles. "Join MISO with High Hurdle Around MISO" shows losses to Entergy and MISO combined compared to "Join MISO," providing no indication that joining MISO would create incentive for Entergy to raise trade barriers with its neighbors.

Changes in Natural Gas Prices

Table 3 shows effects of joining an RTO under higher prices for natural gas. As under the low gas prices case, the state of Mississippi experiences little impact when Entergy and AECI join an RTO without SMEPA. Though it is not the focus of this analysis, one may note that gains in MISO (North) from lower trade barriers with Entergy and AECI are higher than under low prices for natural gas, presumably because it receives more for exports of energy produced using coal.

Comparison to Charles River Associates' Estimated Net Benefits

The Charles River Associates (CRA) cost-benefit analyses of Entergy joining an RTO provided a point of reference for preparing this analysis, regarding time-horizon, wheeling rates, and, more approximately, economic hurdle rates. In these analyses, CRA estimated present-valued reductions in adjusted production costs to a region that included “the area within the Entergy transmission system footprint, and for purposes of the SPP-Entergy CBA included Louisiana Generating and Louisiana Energy and Power Authority”² of \$1.056 billion from joining SPP and \$868 million from joining MISO. Benefits in the Entergy & AEI, SMEPA, MEAM, and MDEA zones using the “with SMEPA” columns in Table 1 are \$145 million for joining SPP and \$44 million for joining MISO.

Despite some intentional similarities, the CRA and Economic Insight (EI) modeling were conducted with different models, approaches, focuses, and assumptions. CRA used its North American Electricity and Environment Model (NEEM) to simulate acquisition and retirement of generators and, then, the General Electric Multi-Area Production Simulation Software (GE MAPS) to simulate operations as a second step; EI used Auroraxmp to simulate both simultaneously. CRA represented the Eastern Interconnection with greater precision in a nodal model than EI did in a zonal model. CRA assumed the same acquisitions and retirements of generators in its status quo and change cases; EI optimized acquisitions and retirements in each case. CRA simulated selected years and interpolated between them; EI simulated a continuous time-horizon. CRA focused on Entergy; EI focused on the state of Mississippi. Results of the two analyses are not strictly comparable. Nonetheless, some specific reasons and possible reasons for differences are discussed below:

1. **I assumed lower hurdle rates than CRA did.** Lower economic hurdles imply greater opportunities for trade outside of an RTO, and fewer benefits from removal of the hurdle upon joining an RTO. Like CRA, I assumed lower hurdle rates between MISO and PJM than elsewhere, and I made extensive use of CRA’s wheeling rates in the revised modeling, but I applied an economic hurdle rate of \$5/MWh broadly. CRA typically applied dispatch hurdles of \$3/MWh or \$5/MWh in combination with commitment hurdles of \$10/MWh, for total economic hurdles of \$13/MWh or \$15/MWh.

² *Cost-Benefit Analysis of Entergy Arkansas, Inc. Joining the SPP RTO*, Charles River Associates, October 27, 2010, p. 2, footnote 8.

The essence of this type of analysis is to estimate the effect of eliminating economic hurdles. The larger the hurdle being eliminated, the larger the effect. The difference in assumed hurdle rates is likely the main reason for the difference in results. I used the lower hurdle rates because the somewhat higher rates examined in the “High Hurdle Around Entergy” and “High Hurdle Around MISO” scenarios left those areas worse off, and using lower rates than other analysts added information to the discussion of the policy choices at hand.

In the “High Hurdle Around Entergy” and “High Hurdle Around MISO” scenarios (see Table 2), I tested whether those areas would benefit from increasing their economic hurdle rates by 50%, generally from \$5/MWh to \$7.50/MWh, but only from \$2.50/MWh to \$3.75/MWh between MISO and PJM. They did not: I found that Entergy & AECI were worse off with higher hurdles by \$245,508,737, and MISO was worse off by \$39,583,264. Although organizations like Entergy and MISO control how much they trade with their neighbors, there is reason to consider the implications of the relatively low (e.g. \$5/MWh) hurdle rates I have assumed. Even if CRA’s higher estimates of economic hurdle rates were accurate in 2010, if market participants can profit from lower trade barriers going forward, it is reasonable to assume that they will find ways to bring them down, even if they do not join RTOs. The main implication of lower hurdles outside RTOs is lower benefits from RTO membership, but the benefits of RTO membership remain significant under some reasonable assumptions.

2. **Prices for natural gas are lower now than when CRA performed its analyses.** In the “High Natural Gas Price”, “Join MISO with High Natural Gas Price”, and “Join SPP with High Natural Gas Price” scenarios from Table 3, natural gas prices are 65% higher than in other scenarios. Benefits in the Entergy & AECI and zones are \$112 million higher for joining MISO and essentially unchanged for joining SPP.
3. **CRA’s time horizon was a year longer.**
4. **CRA used separate models to simulate acquisition and retirement of generators (NEEM) and their operation (GE MAPS).** I used the same model (Auroraxmp) to simulate both simultaneously. One need not make qualitative comparisons of the models or overall approaches employed to observe that simultaneous simulation of acquisition, retirement, and operations could produce acquisitions and retirements more closely suited to operational conditions. Opportunities for trade can substitute for acquisition and retirement. Thus, “opening to trade” with an RTO could confer benefits in CRA’s studies that are attained through acquisition and retirement in the EI studies.

However, it is also true that if acquisitions and retirements are planned equally well with Entergy outside an RTO, one would expect greater, not fewer, benefits from Entergy joining an RTO, given the opportunity to re-optimize Entergy's fleet of generators upon joining. CRA's larger benefits occur despite, not because of, this latter difference in approaches.

5. **Differing definitions of "Entergy"**. Both CRA's definition of the Entergy "footprint" and the EI Entergy "zones" differ from the Entergy operating companies' service territories. The EI Entergy Arkansas zone includes much that is not affiliated with the operating company, such as AECl. I focus on the state of Mississippi, and the zone for Entergy Mississippi corresponds well with the service territory of the operating company Entergy Mississippi.

**Table 2: Net Monetary Gains from Base Case by Area
Using Alternative Hurdle Rates; 2013-2021 (2012 NPV @ 7%)**

	Join SPP with Low Hurdle with MISO	Join SPP with SMEPA and Low Hurdle with MISO	High Hurdle Around Entergy	High Hurdle Around MISO	Join MISO with High Hurdle Around MISO
Entergy Mississippi	(10,885,433)	28,324,084	2,224,861	9,863,635	13,348,490
SMEPA EMI	797,866	(18,545,261)	5,850,984	(57,466)	15,075,719
SMEPA On-System	243,503	74,718,627	(15,657,216)	(613,114)	(30,539,825)
SMEPA MPCo	(502,528)	13,517,405	(2,038,252)	67,518	(4,747,820)
All SMEPA	538,841	69,690,771	(11,844,484)	(603,061)	(20,211,925)
MEAM	436,530	(1,937,982)	(2,245,127)	(1,488,488)	(3,499,003)
MDEA	(2,337,015)	329,691	3,532,500	68,182	4,360,623
MPCo Non-SMEPA	964,603	686,857	(4,452,704)	1,505,976	(264,498)
TVA Mississippi	(827,435)	996,069	2,505,228	(642,375)	1,563,659
Mississippi	(12,109,908)	98,089,491	(10,279,726)	8,703,869	(4,702,655)
-					
Entergy Arkansas & AECI	38,059,685	55,537,660	(212,483,979)	(108,296,543)	90,794,031
Entergy NOLATX	(31,204,386)	22,894,226	(35,249,619)	18,079,287	(47,930,403)
All Entergy & AECI	(4,030,134)	106,755,970	(245,508,737)	(80,353,621)	56,212,118
MISO (North)	(24,592,945)	17,486,032	(30,641,854)	(39,583,264)	(106,971,674)
SPP	171,153,045	147,991,360	1,513,033	(6,904,318)	(56,121,652)
TVA	(12,484,181)	15,028,506	37,798,403	(9,692,033)	23,592,189
SERC South	25,191,968	17,938,251	(116,288,661)	39,330,691	(6,907,746)
-					
MS + NTRG + AECI + RTO	165,898,436	324,512,736			(68,810,701)

**Table 3: Net Monetary Gains from High Natural Gas Price Case
by Area, 2013-2021 (2012 NPV @ 7%)**

	Join SPP with High Natural Gas Price	Join MISO with High Natural Gas Price
Entergy Mississippi	(3,166,929)	(23,900,245)
SMEPA EMI	(4,080)	661,730
SMEPA On-System	734,769	(2,927,377)
SMEPA MPCo	(70,184)	(539,783)
All SMEPA	660,505	(2,805,429)
MEAM	757,124	8,157
MDEA	(147,627)	1,453,296
MPCo Non-SMEPA	(3,212,019)	(925,721)
TVA Mississippi	1,269,227	(279,123)
Mississippi	(3,839,718)	(26,449,065)
Entergy Arkansas & AECI	55,682,694	139,847,852
Entergy NOLATX	28,209,473	(21,651,915)
All Entergy & AECI	80,725,238	94,295,692
MISO (North)	129,048,652	134,653,434
SPP	75,704,926	162,279,986
TVA	19,149,864	(4,211,349)
SERC South	(83,886,424)	(24,176,503)
MS + NTRG + AECI + RTO	155,757,375	226,400,307

I hereby attest that the preceding report, including all facts and representations presented therein, is true to my knowledge, belief, and understanding.

Marc H. Vatter, Ph.D.

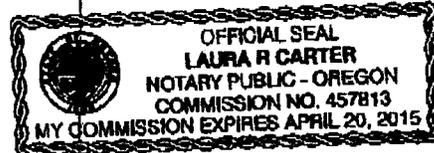
M Vatter

Dated 9-12-12

Subscribed and sworn before me

This 12 day September 2012

Notary Public *Laura Carter*
My Commission Expires: 4-20-2015



CERTIFICATE OF SERVICE

I, Chad J. Reynolds, General Counsel for the Public Utilities Staff, hereby certify that I have this date caused to be served by Electronic Mail, a true and correct copy of the Addendum to the Direct Testimony of Dr. Marc Vatter, consultant to the Mississippi Public Utilities Staff, to the Mississippi Public Service Commission to the following parties:

Hon. Brian U. Ray
Executive Secretary of the
Mississippi Public Service Commission
501 N. West Street, Ste 201-A
P.O. Box 1174
Jackson, MS 39215-1174

and on this day I have caused to be delivered by electronic mail a copy of the foregoing to the following counsel of record:

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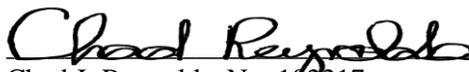
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and that I have complied with Rule 6 of the Commission's Public Utilities Rules of Practice and Procedure.

This the 12th day of September 2012.


Chad J. Reynolds, No. 102217
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