PJM/MISO Cost Allocation For Economic Upgrades



Stakeholder Meeting Wilmington, DE

May 9, 2006





Introductions

- Pending Request for Extension of Time
- Potential Benefits and Allocation Metrics
 - Alternatives and Issues
 - Examples from MISO Internal Allocation Discussions
- Exelon Proposal
- Next Steps
- Future Meetings







Potential Benefits and Allocation Metrics





Economic Metrics Under Consideration for RTO

Load LMP (Payments)

- Load LMP net of Congestion Rents (FTR Revenues) (Net Payments)
- Generator LMP (Revenues)
- Production Cost (System / Zonal)
- Blends of the above





Load LMP (Payments)

- Reduction in annual load payments due to the expansion, measured by projections in hourly load node LMP
- From simulations using a security constrained dispatch model (E.g. PROMOD)
- Can be calculated on a system-wide basis and on a zonal basis
- Most accurate if Offer behavior tends towards costs, or if behavior simulated





Load LMP net of Congestion Rents (FTR Revenues) (Net Payments)

- Reduction in annual load payments *Net* of congestion rents that are returned to loads via FTR holders, or via distributions
- This is the same measure on a system-wide basis as Generator Revenues (LMP) since
 - (Load LMP Generator LMP) = Congestion Rents
- Can be calculated on a system-wide basis
- Difficult to calculate on zonal basis since do not know FTR holdings and distributions on a zonal basis – may be able to reasonably estimated
- For bundled loads, could overstate benefits if bundled generators also see reduced profits





Generator LMP (Revenues)

- As a Load Benefit, represented by a reduction in annual payments to generators
- Equivalent to a reduction in annual Net Load Payments on a system-wide basis
- Need to adjust for Generator Revenues paid by non-RTO loads (Sales)





Production Costs

- Reduction in annual Generator production costs
- Must be adjusted for off-system purchases and sales to represent change in production costs paid by RTO loads only
- For completely bundled environment, this is the benefit to bundled loads which pay production cost
- For completely unbundled or mixed environment, Load benefits cannot be directly determined from PC





Depends on Relationship of Generation to Load

If all zonal Generators <u>Bundled</u> or contractually bound to pass profits back to zonal loads

Load Benefits = Load Net Payment decr + Generator Net

- Revenue Incr
- = (Load LMP-FTR Rev) + (Gen LMP PC)
- = Production Cost decr





Depends on Relationship of Generation to Load

If all zonal Generators <u>unbundled</u> with no obligation to pass profits back to zonal loads

Load Benefits = Load Net Payment decr

= (Load LMP-FTR Rev)

- FTR Rev returned to zonal loads will need to be estimated
 - One proposal is to estimate as difference in zonal Generation LMP and Load LMP
 - This would be equivalent to assuming that all zonal load was scheduled from zonal generation as an approximation





Load LMP:

- Easy to see beneficiaries (allocate)
- Hard to calculate accurately, could overstate benefits if don't reduce for FTRs
- Could overstate if bundled generators pass losses to loads
- Better if all loads unbundled from generators





- Load LMP net of Congestion Rents (FTR Revenues) (Net Payments)
 - Hard to know what zonal congestion rents returned are
 - If can estimate rents, good measure of load benefits for unbundled environment





Generator LMP (Revenues)

- With adjustments for Purch/Sales, same as Net Load LMP on a system basis
- Could approximate Net Load LMP on a zonal basis





Production Cost (System / Zonal)

- Easy to calculate with reasonable accuracy
- With adjustments for Purch/Sales, best measure for bundled environment
- Not so good for unbundled





Internal Allocation Methods in Discussion at MISO

By Projected Economic Benefits

- Zonal Load Payments (LMP)
- Hybrid of Load LMP and Production Costs ("Assured Gain : No Loss")
- By Postage Stamp + Other
 - 20% Postage Stamp + LODF (RECB as for BRP)
 - >20% Postage Stamp + LODF
 - X% Postage Stamp + Econ Benefits





- Changing zonal benefits over time may make PS as good as more detailed methods
- Blends would put some but not entire emphasis on arguable projections of benefits

FERC may favor methods that inlcude some degree of PS, as in RECB I (Reliability Projects)





Arguments for Pure Economic Benefits Methods

If projects are justified on projected economic benefits, allocation should be on same basis







Benefit Metric Examples for Relief of Various Constraints in MISO





- Dune Acre-Michigan City (Northern Indiana)
- Farr Road-Tippy (Michigan)
- Galesburg Tie (Southern Illinois)
- Newton-Effingham (Northern Illinois)
- Petersburg-Oakland City (Central Indiana)
- Smith-Green River Steel (Ky)



Dune Acre-Michigan City







Dune Acre-Michigan City

No Net Benefit in Load Payments or System Production Cost

	Load Payment (Load LiviP)		Adjusted Production Cost	
Company			Ropofit (\$)	Allocation (%)
			(\$100 162)	
	\$309,703			
	\$40,915 ¢640,722		φ40,092 (\$405,520)	
	\$640,733			
	(\$2,347,791)		\$96,383	N/A
SIPC	(\$50,100)	N/A	(\$58,120)	N/A
NSP	(\$2,507,616)	N/A	(\$540,252)	N/A
MP	(\$718,732)	N/A	(\$84,846)	N/A
GRE	(\$665,578)	N/A	(\$30,663)	N/A
CINERGY	\$644,913	N/A	(\$542,392)	N/A
ΟΤΡ	(\$193,605)	N/A	\$159,326	N/A
MDU	(\$110,354)	N/A	(\$2,983)	N/A
CWLP	(\$236,598)	N/A	(\$13,671)	N/A
IP	(\$611,126)	N/A	\$820,865	N/A
CILC	(\$1,211,478)	N/A	(\$1,027,045)	N/A
ALTW	(\$1,552,287)	N/A	(\$227,193)	N/A
ATC	(\$9,218,644)	N/A	(\$388,574)	N/A
NIPS	(\$6,250,428)	N/A	(\$2,374,108)	N/A
FE	\$5,235,281	N/A	\$139,409	N/A
ITC	\$5,715,637	N/A	(\$297,208)	N/A
METC	\$9,011,120	N/A	\$2,339,495	N/A
IPL	(\$28,343)	N/A	(\$107,803)	N/A
		0.00%		0.00%
Total Positive	\$21,598,302		\$3,601,570	
Total Negative	(\$25,702,680)		(\$5,999,541)	
Total Net	(\$4,104,378)		(\$2,397,971)	

Farr Road-Tippy









Farr Road-Tippy (cont'd)

	Load Payment (Load LMP)			
	Opt	ion 1	Adjusted Production Cost	
Company	Benefit (\$)	Allocation (%)	Benefit (\$)	Allocation (%)
VECT	\$286,386	0.96%	\$57,344	1.11%
HE	\$45,279	0.15%	\$2,420	0.05%
LGEE	\$234,619	0.79%	\$106,990	2.06%
AMRN	(\$459,799)	0.00%	\$193,283	3.73%
SIPC	(\$17,266)	0.00%	(\$6,518)	0.00%
NSP	\$700,204	2.35%	\$140,365	2.71%
MP	\$152,608	0.51%	(\$10,566)	0.00%
GRE	\$145,266	0.49%	\$19,003	0.37%
CINERGY	(\$506,118)	0.00%	(\$25,794)	0.00%
ΟΤΡ	\$29,784	0.10%	(\$22,469)	0.00%
MDU	\$18,054	0.06%	(\$4,550)	0.00%
CWLP	\$3,516	0.01%	(\$16,902)	0.00%
IP	\$58,176	0.20%	(\$36,434)	0.00%
CILC	(\$4,467)	0.00%	\$5,861	0.11%
ALTW	\$101,994	0.34%	\$3,802	0.07%
ATC	\$896,305	3.01%	\$205,631	3.96%
NIPS	(\$641,933)	0.00%	(\$38,188)	0.00%
FE	\$2,289,536	7.69%	\$516,440	9.96%
ITC	\$7,394,686	24.82%	\$1,155,789	22.28%
METC	\$17,433,964	58.52%	\$2,779,818	53.59%
IPL	(\$129,746)	0.00%	(\$15,832)	0.00%
		100.00%		100.00%
Total Positive	\$29,790,377		\$5,186,746	
Total Negative	(\$1,759,329)		(\$177,253)	
Total Net	\$28,031,048		\$5,009,493	







	Load Payment (Load LMP)			
	Opt	ion 1	Adjusted Production Cost	
Company	Benefit (\$)	Allocation (%)	Benefit (\$)	Allocation (%)
VECT	\$112,161	0.68%	\$47,732	N/A
HE	(\$23,836)	0.00%	\$24,428	N/A
LGEE	(\$223,033)	0.00%	(\$33,833)	N/A
AMRN	\$1,163,261	7.06%	\$178,358	N/A
SIPC	\$7,827	0.05%	(\$37,123)	N/A
NSP	(\$2,301,460)	0.00%	(\$347,685)	N/A
MP	(\$750,111)	0.00%	(\$238,149)	N/A
GRE	(\$668,157)	0.00%	\$35,425	N/A
CINERGY	(\$486,823)	0.00%	(\$34,179)	N/A
ΟΤΡ	(\$208,804)	0.00%	\$113,670	N/A
MDU	(\$123,275)	0.00%	(\$7,745)	N/A
CWLP	\$528,284	3.21%	(\$24,212)	N/A
IP	\$5,932,126	36.01%	(\$1,550,082)	N/A
CILC	\$2,025,524	12.30%	\$1,518,607	N/A
ALTW	(\$3,521,939)	0.00%	(\$348,647)	N/A
ATC	\$291,796	1.77%	\$75,741	N/A
NIPS	(\$62,918)	0.00%	(\$296,022)	N/A
FE	\$969,256	5.88%	\$103,565	N/A
ITC	\$1,932,713	11.73%	\$266,270	N/A
METC	\$3,510,943	21.31%	\$155,975	N/A
IPL	(\$96,724)	0.00%	(\$101,009)	N/A
		100.00%		0.00%
Total Positive	\$16,473,891		\$2,519,771	
Total Negative	(\$8,467,080)		(\$3,018,686)	
Total Net	\$8,006,811		(\$498,915)	



Newton-Effingham (cont'd)

	Load Payment (Load LMP)			
	Option 1		Adjusted Production Cost	
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Company	Benefit (\$)	Allocation (%)	Benefit (\$)	Allocation (%)
VECT	\$792,842	2.17%	\$265,935	4.84%
HE	\$472,403	1.30%	(\$116,089)	0.00%
LGEE	\$2,864,027	7.85%	(\$155,884)	0.00%
AMRN	\$1,688,830	4.63%	\$1,961,801	35.73%
SIPC	(\$56,865)	0.00%	(\$67,941)	0.00%
NSP	\$58,506	0.16%	(\$9,131)	0.00%
MP	\$5,430	0.01%	(\$59,050)	0.00%
GRE	\$27,777	0.08%	\$31,667	0.58%
CINERGY	\$4,081,515	11.19%	\$561,364	10.23%
ΟΤΡ	(\$20,863)	0.00%	\$114,138	2.08%
MDU	(\$6,794)	0.00%	(\$10,661)	0.00%
CWLP	\$248,126	0.68%	(\$84,585)	0.00%
IP	\$636,106	1.74%	\$638,298	11.63%
CILC	\$637,769	1.75%	\$372,663	6.79%
ALTW	(\$403,516)	0.00%	(\$119,259)	0.00%
ATC	\$5,367,016	14.72%	\$39,038	0.71%
NIPS	\$1,631,506	4.47%	\$197,992	3.61%
FE	\$3,699,677	10.14%	\$479,878	8.74%
ITC	\$6,164,941	16.90%	\$630,119	11.48%
METC	\$6,944,456	19.04%	(\$108,485)	0.00%
IPL	\$1,151,841	3.16%	\$197,190	3.59%
		100.00%		100.00%
Total Positive	\$36,472,767		\$5,490,080	
Total Negative	(\$488,037)		(\$731,084)	
Total Net	\$35,984,730		\$4,758,997	

Petersburg-Oakland City





Petersburg-Oakland City (cont'd)

	Load Payment (Load LMP)			
	Option 1		Adjusted Production Cost	
Company	Benefit (\$)	Allocation (%)	Benefit (\$)	Allocation (%)
VECT	\$4,393,361	34.11%	\$1,521,439	58.09%
HE	\$382,134	2.97%	\$38,686	1.48%
LGEE	\$1,049,148	8.15%	\$243,154	9.28%
AMRN	(\$521,625)	0.00%	\$2,934	0.11%
SIPC	\$22,098	0.17%	(\$452)	0.00%
NSP	\$170,300	1.32%	(\$1,981)	0.00%
MP	\$20,148	0.16%	\$23,610	0.90%
GRE	\$35,119	0.27%	\$64,817	2.47%
CINERGY	(\$85,806)	0.00%	(\$218,684)	0.00%
ΟΤΡ	(\$17,236)	0.00%	\$65,639	2.51%
MDU	(\$23,800)	0.00%	(\$16,681)	0.00%
CWLP	(\$32,030)	0.00%	(\$210)	0.00%
IP	(\$45,293)	0.00%	\$126,125	4.82%
CILC	(\$42,846)	0.00%	(\$29,742)	0.00%
ALTW	\$117,048	0.91%	(\$8,810)	0.00%
ATC	\$315,442	2.45%	\$52,892	2.02%
NIPS	(\$74,505)	0.00%	(\$100,933)	0.00%
FE	\$823,354	6.39%	\$186,153	7.11%
ITC	\$2,220,566	17.24%	\$175,359	6.69%
METC	\$3,329,607	25.85%	\$118,451	4.52%
IPL	(\$364,948)	0.00%	(\$88,117)	0.00%
		100.00%		100.00%
1 otal Positive	\$12,878,325		\$2,619,259	
Total Negative	(\$1,208,089)		(\$465,610)	
Total Net	\$11,670,236		\$2,153,649	

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Smith-Green River Steel (cont'd)

	Load Payment (Load LMP)			
	Option 1		Adjusted Production Cost	
Company	Benefit (\$)	Allocation (%)	Benefit (\$)	Allocation (%)
VECT	\$130,867	2.48%	\$410,733	15.40%
HE	\$230,863	4.37%	\$97,565	3.66%
LGEE	(\$4,555,335)	0.00%	\$1,424,932	53.42%
AMRN	\$177,312	3.36%	(\$130,479)	0.00%
SIPC	(\$7,109)	0.00%	\$1,994	0.07%
NSP	\$395,319	7.48%	\$15,716	0.59%
MP	\$154,984	2.93%	\$58,943	2.21%
GRE	\$114,754	2.17%	\$8,717	0.33%
CINERGY	\$803,121	15.21%	\$120,528	4.52%
ΟΤΡ	\$40,821	0.77%	\$19,482	0.73%
MDU	\$23,108	0.44%	\$5,165	0.19%
CWLP	(\$32,777)	0.00%	\$27,163	1.02%
IP	\$95,647	1.81%	(\$181,462)	0.00%
CILC	\$3,204	0.06%	\$59,853	2.24%
ALTW	\$469,372	8.89%	\$22,679	0.85%
ATC	\$177,140	3.35%	(\$66,354)	0.00%
NIPS	\$319,549	6.05%	\$34,755	1.30%
FE	\$585,190	11.08%	(\$21,359)	0.00%
ITC	\$563,064	10.66%	\$116,770	4.38%
METC	\$788,357	14.93%	\$101,563	3.81%
IPL	\$209,042	3.96%	\$140,961	5.28%
		100.00%		100.00%
Total Positive	\$5,281,714		\$2,667,5 19	
Total Negative	(\$4,595,221)		(\$399,654)	
Total Net	\$686,493		\$2,267,865	

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- Production cost measures much smaller than marginal cost-based measures
- 4 Projects showed net system benefits on both metrics
- 1 project "winner" by LMP, "loser" by Production Cost
- 1 project not beneficial on either
- For all projects there are some "losers"
- Projects that show system benefit in Production Cost were had net benefits by LMP also (limited sample)





- If one RTO measures project benefits by larger LMP, and other by smaller production costs, would likely need to resolve to lowest perceived benefit
- System production cost could be an acceptable least common denominator
- Would need to resolve issue of which RTO a generator is "in" for production cost metric
 - Life of project is very long
 - Supply relationships change







Background Information Metric Relationships





Flow of Money In RTO Market



- Load Payment = Load MW x Load LMP
- FTR Revenue = (Load LMP (congestion) Gen LMP (congestion)) x FTR MW
- Marginal Loss Credit = any over collection of losses
- Generator Revenue = Gen MW x Gen LMP
- Ancillary service charges are ignored for this discussion

Assume all Bundled Load



Numbers from a Small Example







Bundled Loads Pay Gen Production Costs



If Some Unbundled Generators ...



With <u>ALL Unbundled</u> Generators Loads Pay LMP Less FTR Rev



Fully Bundled		Fully Unbundled		
\$4910	Production Costs	\$5838	Load LMP less FTR & Loss Revenues Or Generator LMP	





What if Loads Not Fully Hedged?

