



MISO/PJM Economic Upgrade Examples

1. Review survey questions
2. More examples
 - Show allocations at the zonal level as well as at the RTO level
 - Show examples with benefit to both
 - Show allocations using joint market versus separate markets (hurdle)
 - Demonstrate a complete example of any and all thresholds we are currently proposing – ie Top to bottom example including allocations
3. More comparisons of the DFAX screen method – how well it correlates with projects showing benefits to both in econ analysis – check anomalous prior results
4. SPP Portfolio approach – presentation
5. Exelon Congestion Charge Analysis - presentation

- ▶ Examples illustrate the economic impact on MISO, PJM and total system of relieving an economic constraint
- ▶ Several constraints selected from a MISO/PJM annual PROMOD base case simulation
- ▶ Each constraint was relieved one at a time and results compared back to base case simulation
- ▶ Constraint relieved by increasing the facility rating to 9999 simulating an upgrade designed to eliminate constraint
- ▶ Purpose of examples is to use actual system simulations to assist group in development of:
 - Cross-border economic constraint threshold/indicator
 - Cross-border economic benefit metric
 - Cross-border economic upgrade cost allocation method

Evaluated Constraints



Monitor Facility	Contingency Facility	Base Case Hours Binding	Estimated Congestion (\$Millions)
Black Oak - Bedington 500 kV	Pruntytown - Mt. Storm 500 kV	1842	440
Palisades - Roosevelt 345 kV	No Outage	1038	16
Saukville - Pleasant Valley 138 kV	Saukville - Barton 138 kV	1377	52
Bedford - Seymour 138 kV	Bedford - Columbus 345 kV	221	58
Paddock 345/138 Transformer	Wempletown-Rockdale 345	3360	88
Cayuga-Eugene 345 kV	Cayuga-Nucor 345	164	4

Evaluated Constraints



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- ▶ Adjusted production cost (APC) is equivalent to total load benefit plus total generation benefit:

$APC = \text{Net Load Payment (NLP)} - \text{Net Gen Revenue (NGR)}$

where NLP= gross load payment minus FTR credits and

NGR= gross gen revenue minus gen production cost

- ▶ Since $APC = NLP - NGR$, the proposed blended metrics that multiply APC by .7 discount generator benefits by 30% and give higher weighting to load impact
- ▶ Proposed blended metrics:
 - $70\%APC + 30\%GLP = .7(NLP) - .7(NGR) + .3(GLP)$
 $= GLP - .7(\text{FTR Credits}) - .7(NGR)$
 - $70\%APC + 30\%NLP = .7(NLP) - .7(NGR) + .3(NLP)$
 $= NLP - .7(NGR)$
 $= GLP - \text{FTR Credits} - .7(NGR)$

- ▶ All study upgrades yield lower total system adjusted production costs and lower total system congestion costs
- ▶ For those upgrades deriving benefit from increased generator revenues, the blended metrics show a smaller amount of benefit or a non-benefit when compared to APC benefit due to higher weight placed on load benefits
- ▶ For those upgrades deriving benefit from decreased load payments, the blended metrics show a larger amount of benefit when compared to APC benefit due to higher weight placed on load benefits
- ▶ 70%APC + 30%NLP metric will always yield a lower benefit value than the 70%APC + 30%GLP metric due to full FTR credit

Observations on Metrics (cont.)

Do study upgrades provide total system benefit for various listed metrics ?

Metric	Backlog Reduction	Plants Forced Out	Skills Retained	Rebuilds/Repairs	Future Traction	Capacity
Grid Benefit	No	Yes	Yes	No	Yes	Yes
Load Benefit	Yes	No	No	Yes	No	No
Adjusted Total Cost Benefit (ARC)	Yes	Yes	Yes	Yes	Yes	Yes
70%ARC+30%CE Benefit	Yes	Yes	Yes	Yes	Yes	No
70%ARC+30%NE Benefit	Yes	No	No	Yes	No	No

Metrics as Allocators



Metric	Black Belt	Pilot Road	Sukle Road Valley	Edo's Road	Pilot Road	Gay Eagle
Load Benefit	PM	MSD	MSD	BOH	MSD	MSD
Adjusted Road Cost Benefit (APC)	PM	BOH	BOH	MSD	BOH	BOH
70/APC+30/CP Benefit	PM	MSD	MSD	BOH	MSD	MSD
70/APC+30/NP Benefit	PM	MSD	MSD	PM	MSD	MSD

- ▶ Table shows beneficiary of each upgrade based on various metrics
- ▶ APC metric shows more benefits to both RTOs while blended metrics show only one RTO as beneficiary
- ▶ Blended metrics place higher weight on load impact and only one RTO typically shows load payment decrease due to locational nature of transmission constraints therefore blended metrics show the RTO with load payment decrease as the beneficiary

	MISO	PJM	Total System
Generation MW	157,728	-157,737	-9
Gross Generation Revenue (GGR)	\$40,312,798	-\$62,651,051	-\$22,338,253
Gen Production Cost	\$10,060,070	-\$25,088,910	-\$15,028,840
Net Gen Revenue (NGR)	\$30,252,728	-\$37,562,141	-\$7,309,413
Load MW	0	0	0
Gross Load Payment (GLP)	\$35,682,057	-\$147,555,128	-\$111,873,070
FTR Credits	\$3,038,997	-\$94,989,142	-\$91,950,145
Net Load Payment (NLP)	\$32,643,061	-\$52,565,986	-\$19,922,925
Net Cost (NLP - NGR)	\$2,390,333	-\$15,003,845	-\$12,613,512

Blended Metrics

Adjusted Production Cost	\$2,390,333	-\$15,003,845	-\$12,613,512	
70%(Gen Prod Cost) + 30%(NLP)	\$16,834,967	-\$33,332,033	-\$16,497,065	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	\$12,377,850	-\$54,769,230	-\$42,391,379	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	\$11,466,152	-\$26,272,487	-\$14,806,336	MISO Method (w/ NLP)

Delta Total System Congestion -89,534,817

Black Oak-Bedington Example

Zonal Load Impact of Constraint Relief

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
ALWST	21,132,718	197,462	0.01
AUEP	50,162,850	-1,309,690	-0.03
CEC	45,935,233	3,824,408	0.08
CGE	33,995,220	1,773,145	0.05
CIL	10,891,850	258,826	0.02
CIPS	21,581,547	-343,919	-0.02
DETED	59,610,024	6,039,738	0.10
FE	74,043,067	17,691,894	0.24 MAX
GRE	13,282,488	163,329	0.01
HEC	7,603,526	155,761	0.02
HUC	312,248	2,227	0.01
ILPC	19,847,458	8,441	0.00
IP&L	17,357,647	412,607	0.02
LBWL	2,474,844	200,117	0.08
MDU	2,203,260	40,921	0.02
MGE	3,480,188	164,726	0.05
MPL	12,401,219	162,474	0.01
NIPS	21,629,173	928,177	0.04
NSP	52,536,316	622,752	0.01
OTP	6,271,153	125,976	0.02
PSI	42,435,426	1,675,472	0.04
SIGE	11,772,946	-402,287	-0.03
SIPC	2,189,962	-90,045	-0.04 MIN
SMMP	3,603,498	19,691	0.01
SPRIL	2,086,509	92,638	0.04
WEP	35,117,253	1,266,190	0.04
WPL	14,991,768	917,588	0.06
WPPI	5,739,224	312,490	0.05
WPS	14,931,569	480,105	0.03
WPSC	3,743,226	290,846	0.08
Total MISO	613,363,409	35,682,058	0.06
Total MISO (reductions only)	85,707,305	-2,145,942	-0.03

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
AEP	162,049,484	12,360,362	0.08
COED	114,021,013	4,432,343	0.04
DP&L	17,720,973	1,466,063	0.08
DQE	15,778,069	5,875,378	0.37 MAX
PJME	160,541,994	-9,619,330	-0.06
PJMS	75,342,989	-70,821,448	-0.94 MIN
PJMW	135,210,018	-5,396,022	-0.04
VP	107,522,012	-85,852,474	-0.80
Total PJM	788,186,552	-147,555,128	-0.19
Total PJM (reductions only)	478,617,013	-171,689,274	-0.36

	MISO	PJM	Total
Delta GLP	\$35,682,058	-\$147,555,128	-\$111,873,070
	0.0%	100.0%	
Delta GLP (reductions only)	-2,145,942	-171,689,274	-173,835,216
	1.2%	98.8%	
Load MW (reductions only)	85,707,305	478,617,013	564,324,318
	15.2%	84.8%	

Black Oak-Bedington Example Generation Shift due to Constraint Relief

Top 15 Units by Increased Gen M

Unit Name	Unit ID	Zone	RTO	delta Gen (MWH)	delta Prod Cost (\$)
FRMNTNRG	1	FE	MISO	14,348	
SAMMIS	4	FE	MISO	13,276	
PRTWSHNG	12	WEP	MISO	10,885	
COVERT	4	CEC	MISO	10,758	
SAMMIS	2	FE	MISO	9,263	
SAMMIS	6	FE	MISO	8,665	
ZLANDMIR	21	CEC	MISO	7,563	
COVERT	3	CEC	MISO	6,432	
COVERT	5	CEC	MISO	5,847	
NEWTON	2	CIPS	MISO	5,527	
MDLNDCGN	1	CEC	MISO	4,878	
SGRCREEK	11	PSI	MISO	4,861	
JACKSON	1	CEC	MISO	4,810	
SAMMIS	3	FE	MISO	4,730	
JACKSON	2	CEC	MISO	4,583	

Top 15
Total MISO 116,423 6,418,463
287,607 15,114,096

Top 15 Units by Decreased Gen

STUART	23	CGE	MISO	-8,378	
PRTWSHNG	11	WEP	MISO	-5,191	
MRONSIPC	4	SIPC	MISO	-4,648	
HAVANA	6	ILPC	MISO	-3,891	
BECKJORD	5	CGE	MISO	-2,923	
MERAMEC	4	AUEP	MISO	-2,718	
NEWTON	1	CIPS	MISO	-2,516	
BLACKDOG	4	NSP	MISO	-2,515	
HGHBRDGE	1	NSP	MISO	-2,484	
GIBSON	3	PSI	MISO	-2,473	
EDGWTRWP	42	WPS	MISO	-2,416	
EDGWTRWP	41	WPL	MISO	-2,264	
HOOTLAKE	3	OTP	MISO	-2,118	
GIBSON	5	PSI	MISO	-2,044	
DALLMAN	2	SPRIL	MISO	-2,032	

Top 15
Total MISO -48,611 -1,640,096
-130,968 -5,054,026

Unit Name	Unit ID	Zone	RTO	delta Gen (MWH)	delta Prod Cost (\$)
HTFLDSFR	1	PJMW	PJM	98,891	
ASW RRRRN	1	PJMW	PJM	70,699	
GERMAN	1	PJMW	PJM	42,009	
SPRNGDLE	1	PJMW	PJM	35,102	
ALBRIGHT	3	PJMW	PJM	29,304	
FRTMR TNM	2	PJMW	PJM	24,352	
HTFLDSFR	3	PJMW	PJM	21,380	
ALBRIGHT	2	PJMW	PJM	17,327	
HNTRSTWN	21	PJMW	PJM	17,214	
BTHLHMCV	22	PJME	PJM	15,912	
LMPRJECT	1	AEP	PJM	15,881	
LWRMNTBT	1	PJMW	PJM	15,792	
LNGVWPWR	1	PJMW	PJM	15,069	
WTRFR2PS	1	AEP	PJM	14,306	
WSHNG3NN	1	AEP	PJM	13,753	

Top 15
Total PJM 446,987 19,986,414
692,518 34,926,237

CATOCTIN	1	PJMW	PJM	-106,802	
PSSMPINT	21	VP	PJM	-54,489	
CPVWRREN	1	PJMW	PJM	-43,996	
DSWLLCMB	1	VP	PJM	-40,274	
DSWLLCMB	2	VP	PJM	-37,146	
ASRNWDPR	1	PJMW	PJM	-31,178	
FLVNNCNT	1	VP	PJM	-25,054	
PND BRNDY	1	PJMS	PJM	-15,806	
WLMNGTON	21	PJME	PJM	-15,187	
CHSTRFLD	12	VP	PJM	-14,869	
BLLMEADE	1	VP	PJM	-14,295	
WLLWSLND	2	PJMW	PJM	-12,889	
HARRI1ON	1	PJMW	PJM	-11,772	
FLLSTWNS	1	PJME	PJM	-11,124	
HARRI1ON	2	PJMW	PJM	-10,816	

Top 15
Total PJM -445,698 -31,083,078
-849,079 -60,015,147



	MISO	PJM	Total System
Generation MM	-148,232	148,282	49
Gross Generation Revenue (GGR)	-\$6,797,368	\$19,452,856	\$12,655,488
Gen Production Cost	-\$5,904,435	\$3,669,824	-\$2,234,610
Net Gen Revenue (NGR)	-\$892,933	\$15,783,032	\$14,890,098
Load MM	0	0	0
Gross Load Payment (GLP)	-\$8,928,930	\$17,192,600	\$8,263,670
FTR Credits	-\$4,853,541	\$2,631,945	-\$2,221,596
Net Load Payment (NLP)	-\$4,075,389	\$14,560,655	\$10,485,266
Net Cost (NLP - NGR)	-\$3,182,455	-\$1,222,377	-\$4,404,832

Blended Metrics

Adjusted Production Cost	-\$3,182,455	-\$1,222,377	-\$4,404,832	
70%(Gen Prod Cost) + 30%(NLP)	-\$5,355,721	\$6,937,074	\$1,581,353	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	-\$4,906,398	\$4,302,116	-\$604,281	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	-\$3,450,335	\$3,512,533	\$62,197	MISO Method (w/ NLP)

Delta Total System Congestion -4,391,818

Palisades-Roosevelt Example

Zonal Load Impact of Constraint Relief

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
ALWST	21,132,718	185,503	0.01
AUEP	50,162,850	421,836	0.01
CEC	45,935,233	-9,869,275	-0.21
CGE	33,995,220	705,499	0.02
CIL	10,891,850	431,895	0.04
CIPS	21,581,547	360,528	0.02
DETED	59,610,024	-4,386,682	-0.07
FE	74,043,067	-1,058,554	-0.01
GRE	13,282,488	145,168	0.01
HEC	7,603,526	149,217	0.02
HUC	312,248	3,931	0.01
ILPC	19,847,458	381,094	0.02
IP&L	17,357,647	450,046	0.03
LBWL	2,474,844	-210,227	-0.08
MDU	2,203,260	18,255	0.01
MGE	3,480,188	32,142	0.01
MPL	12,401,219	128,446	0.01
NIPS	21,629,173	1,003,025	0.05
NSP	52,536,316	804,317	0.02
OTP	6,271,153	50,869	0.01
PSI	42,435,426	1,294,781	0.03
SIGE	11,772,946	194,040	0.02
SIPC	2,189,962	23,598	0.01
SMMP	3,603,498	334,860	0.09 MAX
SPRIL	2,086,509	56,588	0.03
WEP	35,117,253	344,338	0.01
WPL	14,991,768	118,397	0.01
WPPI	5,739,224	7,172	0.00
WPS	14,931,569	127,561	0.01
WPSC	3,743,226	-1,177,297	-0.31 MIN
Total MISO	613,363,409	-8,928,930	-0.01
Total MISO (reductions only)	185,806,394	-16,702,036	-0.09

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
AEP	162,049,484	2,826,930	0.02
COED	114,021,013	3,746,473	0.03
DP&L	17,720,973	282,249	0.02
DQE	15,778,069	-65,964	0.00 MIN
PJME	160,541,994	3,327,273	0.02
PJMS	75,342,989	1,761,144	0.02
PJMW	135,210,018	1,640,337	0.01
VP	107,522,012	3,674,158	0.03 MAX
Total PJM	788,186,552	17,192,600	0.02
Total PJM (reductions only)	15,778,069	-65,964	0.00

	MISO	PJM	Total
Delta GLP	-\$8,928,930	\$17,192,600	\$8,263,670
	100.0%	0.0%	
Delta GLP (reductions only)	-16,702,036	-65,964	-16,768,000
	99.6%	0.4%	
Load MW (reductions only)	185,806,394	15,778,069	201,584,463
	92.2%	7.8%	

Palisades-Roosevelt Example

Generation Shift due to Constraint Relief

Top 15 Units by Increased Gen

UNIT NAME	UNIT ID	COMPANY	RTO	delta Gen (MWH)	delta Prod Cost (\$)
GIBSON	3	PSI	MISO	11,811	
ELMROAD	1	WEP	MISO	10,561	
NEWTON	2	CIPS	MISO	9,191	
GIBSON	1	PSI	MISO	8,259	
EASTBEND	21	CGE	MISO	8,104	
NEWTON	1	CIPS	MISO	8,057	
GIBSON	2	PSI	MISO	7,532	
PRRSTTNR	1	ILPC	MISO	6,492	
CAYUGA	1	PSI	MISO	6,034	
GIBSON	4	PSI	MISO	5,576	
CAYUGA	2	PSI	MISO	5,539	
EDWARDS	3	CIL	MISO	5,271	
GIBSON	5	PSI	MISO	5,106	
MEROM	2	HEC	MISO	4,867	
SCHAHFER	15	NIPS	MISO	4,774	

Top 15
Total MISO 107,173 2,447,093
263,905 7,462,492

Top 15 Units by Decreased G

CMPBL1CC	3	CEC	MISO	-51,867	
CMPBL1CC	2	CEC	MISO	-42,452	
LAKEMICH	1	CEC	MISO	-25,602	
KARN	2	CEC	MISO	-20,457	
ZLANDMIR	21	CEC	MISO	-20,293	
MNRDEDED	4	DEDED	MISO	-20,290	
CMPBL1CC	1	CEC	MISO	-18,211	
COBB	5	CEC	MISO	-16,948	
COBB	4	CEC	MISO	-14,509	
MNRDEDED	2	DEDED	MISO	-10,473	
KARN	1	CEC	MISO	-9,562	
TRNTNCHN	9	DEDED	MISO	-9,238	
WEADOCK	8	CEC	MISO	-8,309	
MNRDEDED	3	DEDED	MISO	-7,540	
MNRDEDED	1	DEDED	MISO	-6,966	

Top 15
Total MISO -282,716 -8,214,552
-411,619 -13,366,927

UNIT NAME	UNIT ID	COMPANY	RTO	delta Gen (MWH)	delta Prod Cost (\$)
AMOS	1	AEP	PJM	8,887	
AMOS	3	AEP	PJM	8,239	
MNTINEER	1	AEP	PJM	6,309	
BGSND1KP	2	AEP	PJM	5,813	
ASREDOAK	1	PJME	PJM	5,520	
KINCAID	1	COED	PJM	5,402	
BRGNPSGF	6	PJME	PJM	5,258	
ELWOODEC	1	COED	PJM	5,195	
KINCAID	2	COED	PJM	4,882	
STUART	31	DP&L	PJM	4,849	
LNGVWPWR	1	PJMW	PJM	4,330	
FLLSTWNS	2	PJME	PJM	4,259	
FIVEFORK	1	VP	PJM	4,202	
HTFLDSFR	1	PJMW	PJM	3,840	
CLOVER	2	VP	PJM	3,836	

Top 15
Total PJM 80,820 2,648,924
223,541 8,422,585

PSSMPINT	21	VP	PJM	-7,117	
INDNRVRN	4	PJME	PJM	-3,623	
BRGNPSGF	2	PJME	PJM	-3,161	
YORKTOWN	1	VP	PJM	-3,078	
FLLSTWNS	1	PJME	PJM	-2,943	
BTHLMCV	22	PJME	PJM	-2,768	
KNDLLCNT	1	COED	PJM	-2,613	
PORTLAND	2	PJMW	PJM	-2,487	
LW RNCBRG	2	AEP	PJM	-1,922	
CRNYSPNT	1	PJME	PJM	-1,894	
GRNENRGY	1	PJMW	PJM	-1,828	
BLLMEADE	1	VP	PJM	-1,812	
HNGNGRCK	2	AEP	PJM	-1,760	
SW RDRLNT	11	PJMW	PJM	-1,735	
MRTNSCRK	3	PJMW	PJM	-1,716	

Top 15
Total PJM -40,457 -2,647,432
-75,332 -4,752,760

	MISO	PJM	Total System
Generation MM	23,449	-23,207	243
Gross Generation Revenue (GGR)	\$13,286,628	\$20,811,440	\$34,098,068
Gen Production Cost	-\$10,774,509	-\$1,050,821	-\$11,825,330
Net Gen Revenue (NGR)	\$24,061,137	\$21,862,261	\$45,923,398
Load MM	0	0	0
Gross Load Payment (GLP)	-\$22,460,643	\$26,525,040	\$4,064,397
FTR Credits	-\$34,695,255	\$5,863,599	-\$28,831,656
Net Load Payment (NLP)	\$12,234,612	\$20,661,441	\$32,896,053
Net Cost (NLP - NGR)	-\$11,826,525	-\$1,200,819	-\$13,027,344

Blended Metrics

Adjusted Production Cost	-\$11,826,525	-\$1,200,819	-\$13,027,344	
70%(Gen Prod Cost) + 30%(NLP)	-\$3,871,773	\$5,462,858	\$1,591,085	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	-\$15,016,760	\$7,116,939	-\$7,899,822	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	-\$4,608,184	\$5,357,859	\$749,675	MISO Method (w/ NLP)

Delta Total System Congestion -30,033,671

Saukville-Pleasant Valley Example

Zonal Load Impact of Constraint Relief

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
ALWST	21,132,718	-1,551,706	-0.07
AUEP	50,162,850	904,361	0.02
CEC	45,935,233	2,791,610	0.06
CGE	33,995,220	1,202,956	0.04
CIL	10,891,850	-93,168	-0.01
CIPS	21,581,547	783,009	0.04
DETED	59,610,024	3,707,198	0.06
FE	74,043,067	1,797,249	0.02
GRE	13,282,488	-512,889	-0.04
HEC	7,603,526	200,617	0.03
HUC	312,248	-9,592	-0.03
ILPC	19,847,458	534,136	0.03
IP&L	17,357,647	518,594	0.03
LBWL	2,474,844	140,897	0.06
MDU	2,203,260	-118,971	-0.05
MGE	3,480,188	-4,858,991	-1.40
MPL	12,401,219	-398,990	-0.03
NIPS	21,629,173	1,535,800	0.07
NSP	52,536,316	-2,566,622	-0.05
OTP	6,271,153	-251,442	-0.04
PSI	42,435,426	1,338,394	0.03
SIGE	11,772,946	158,263	0.01
SIPC	2,189,962	81,453	0.04
SMMP	3,603,498	-419,967	-0.12
SPRIL	2,086,509	329,660	0.16
WEP	35,117,253	-7,739,115	-0.22
WPL	14,991,768	-10,222,518	-0.68
WPPI	5,739,224	-10,239,005	-1.78
WPS	14,931,569	280,430	0.02
WPSC	3,743,226	217,703	0.06
Total MISO	613,363,409	-22,460,643	-0.04
Total MISO (reductions only)	181,963,183	-38,982,975	-0.21

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
AEP	162,049,484	5,503,716	0.03
COED	114,021,013	7,308,031	0.06
DP&L	17,720,973	623,323	0.04
DQE	15,778,069	337,526	0.02
PJME	160,541,994	1,661,058	0.01
PJMS	75,342,989	1,412,183	0.02
PJMW	135,210,018	2,956,151	0.02
VP	107,522,012	6,723,053	0.06
Total PJM	788,186,552	26,525,040	0.03
Total PJM (reductions only)	0	0	0.00

	MISO	PJM	Total
Delta GLP	-\$22,460,643	\$26,525,040	\$4,064,398
	100.0%	0.0%	
Delta GLP (reductions only)	-38,982,975	0	-38,982,975
	100.0%	0.0%	
Load MW (reductions only)	181,963,183	0	181,963,183
	100.0%	0.0%	

Saukville-Pleasant Valley Example

Generation Shift due to Constraint Relief

Top 15 Units by Increased Gen

UNIT				delta Gen	delta Prod
UNIT NAME	ID	COMPANY	RTO	(MWH)	Cost (\$)
PRTWSHNG	12	WEP	MISO	232,206	
PRTWSHNG	11	WEP	MISO	200,628	
MDLNDCGN	1	CEC	MISO	5,555	
SHEBOYGN	1	WPL	MISO	5,398	
NEWTON	2	CIPS	MISO	5,177	
SHEBOYGN	2	WPL	MISO	4,684	
SHRBURNE	31	NSP	MISO	4,467	
VLLEYWEP	2	WEP	MISO	4,302	
VLLEYWEP	1	WEP	MISO	3,271	
NEENAH	2	WEP	MISO	2,678	
GENOA	32	GRE	MISO	2,227	
WSTMR1TT	34	MGE	MISO	1,927	
GRMNTOWN	5	WEP	MISO	1,874	
PARISWEP	4	WEP	MISO	1,701	
EASTBEND	21	CGE	MISO	1,659	

Top 15 477,755 31,302,636
Total MISO 539,181 35,883,794

Top 15 Units by Decreased Gen

RVRSD1RG	1	WPL	MISO	-61,398	
CONCORD	1	WEP	MISO	-56,660	
CONCORD	4	WEP	MISO	-36,983	
CONCORD	3	WEP	MISO	-31,614	
CONCORD	2	WEP	MISO	-23,677	
WESTCMPS	1	MGE	MISO	-18,889	
FOXEGCTR	1	WPS	MISO	-15,223	
MNKTENRG	1	NSP	MISO	-12,503	
RCKGNNRG	3	WPL	MISO	-12,257	
HLLNDNRG	1	CIPS	MISO	-11,995	
RCKGNNRG	2	WPL	MISO	-10,145	
WHTWTRCG	1	WEP	MISO	-9,962	
PWRIOWA1	1	ALWST	MISO	-9,554	
RCKGNNRG	1	WPL	MISO	-9,156	
SHRBURNE	32	SMMP	MISO	-8,626	

Top 15 -328,643 -33,466,769
Total MISO -519,464 -46,658,303

UNIT				delta Gen	delta Prod
UNIT NAME	ID	COMPANY	RTO	(MWH)	Cost (\$)
ASREDOAK	1	PJME	PJM	8,766	
LWRNCCNT	1	AEP	PJM	6,600	
LNDNPSGF	22	PJME	PJM	5,806	
CPVWRREN	1	PJMW	PJM	4,710	
ONTLNNRG	1	PJMW	PJM	4,660	
BRGNPSGF	6	PJME	PJM	4,021	
LW RMNTBT	1	PJMW	PJM	3,990	
HPWLLCGN	1	VP	PJM	3,876	
AEP IGCC	1	AEP	PJM	3,600	
DRESDECT	1	AEP	PJM	2,704	
ZNNRGYCN	2	COED	PJM	2,597	
WAGNER	4	PJMS	PJM	2,458	
SW RDRLNT	11	PJMW	PJM	2,247	
WKGNMDGN	8	COED	PJM	2,131	
BLLMEADE	1	VP	PJM	1,920	

Top 15 60,085 4,087,615
Total PJM 158,649 12,259,407

FLVNCCNT	1	VP	PJM	-9,267	
WSHNG3NN	1	AEP	PJM	-8,573	
ELWOODEC	1	COED	PJM	-8,355	
LNDNPSGF	21	PJME	PJM	-6,978	
PSSMPINT	21	VP	PJM	-6,670	
YORKTOWN	3	VP	PJM	-5,486	
FLLSTWNS	2	PJME	PJM	-5,466	
RCKFR3II	2	COED	PJM	-4,577	
ELWOODEC	2	COED	PJM	-4,552	
KNDLLCNT	3	COED	PJM	-4,452	
LW RNCBRG	2	AEP	PJM	-4,390	
JOLIE1 9	6	COED	PJM	-4,342	
FLLSTWNS	1	PJME	PJM	-4,274	
LBRTYLCT	1	PJME	PJM	-4,169	
LMPROJECT	1	AEP	PJM	-3,946	

Top 15 -85,497 -5,876,872
Total PJM -180,765 -13,310,229

Bedford-Seymour Example

Economic Impact of Constraint Relief



	MISO	PJM	Total System
Generation MW	51,512	-51,368	144
Gross Generation Revenue (GGR)	\$21,604,348	-\$40,634,342	-\$19,029,994
Gen Production Cost	\$3,548,581	-\$5,359,645	-\$1,811,064
Net Gen Revenue (NGR)	\$18,055,767	-\$35,274,696	-\$17,218,930
Load MW	0	0	0
Gross Load Payment (GLP)	-\$20,538,262	-\$34,254,748	-\$54,793,010
FTR Credits	-\$36,627,216	-\$340,542	-\$36,967,758
Net Load Payment (NLP)	\$16,088,954	-\$33,914,205	-\$17,825,251
Net Cost (NLP - NGR)	-\$1,966,813	\$1,360,491	-\$606,322

Blended Metrics

Adjusted Production Cost	-\$1,966,813	\$1,360,491	-\$606,322	
70%(Gen Prod Cost) + 30%(NLP)	\$7,310,693	-\$13,926,013	-\$6,615,320	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	-\$7,538,247	-\$9,324,081	-\$16,862,328	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	\$3,449,917	-\$9,221,918	-\$5,772,001	MISO Method (w NLP)

Delta Total System Congestion -35,763,016

Bedford-Seymour Example

Zonal Load Impact of Constraint Relief

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
ALWST	21,132,718	-81,566	0.00
AUEP	50,162,850	2,284,633	0.05
CEC	45,935,233	-1,896,932	-0.04
CGE	33,995,220	-6,192,895	-0.18
CIL	10,891,850	737,848	0.07
CIPS	21,581,547	2,730,655	0.13
DETED	59,610,024	-3,157,334	-0.05
FE	74,043,067	-4,380,015	-0.06
GRE	13,282,488	137,492	0.01
HEC	7,603,526	537,365	0.07
HUC	312,248	2,964	0.01
ILPC	19,847,458	1,479,690	0.07
IP&L	17,357,647	-1,991,847	-0.11
LBWL	2,474,844	-115,285	-0.05
MDU	2,203,260	-10,690	0.00
MGE	3,480,188	30,873	0.01
MPL	12,401,219	115,853	0.01
NIPS	21,629,173	-20,525	0.00
NSP	52,536,316	855,452	0.02
OTP	6,271,153	-3,976	0.00
PSI	42,435,426	-16,116,011	-0.38
SIGE	11,772,946	3,779,548	0.32
SIPC	2,189,962	195,013	0.09
SMMP	3,603,498	49,703	0.01
SPRIL	2,086,509	-16,832	-0.01
WEP	35,117,253	448,559	0.01
WPL	14,991,768	-7,446	0.00
WPPI	5,739,224	7,508	0.00
WPS	14,931,569	178,785	0.01
WPSC	3,743,226	-118,847	-0.03
Total MISO	613,363,409	-20,538,262	-0.03
Total MISO (reductions only)	347,909,268	-34,110,202	-0.10

MIN
MAX

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
AEP	162,049,484	-11,807,936	-0.07
COED	114,021,013	1,887,623	0.02
DP&L	17,720,973	-2,388,918	-0.13
DQE	15,778,069	-1,017,625	-0.06
PJME	160,541,994	-6,748,876	-0.04
PJMS	75,342,989	-3,940,909	-0.05
PJMW	135,210,018	-5,867,594	-0.04
VP	107,522,012	-4,370,513	-0.04
Total PJM	788,186,552	-34,254,748	-0.04
Total PJM (reductions only)	674,165,539	-36,142,371	-0.05

MIN
MAX

	MISO	PJM	Total
Delta GLP	-\$20,538,262	-\$34,254,748	-\$54,793,010
	37.5%	62.5%	
Delta GLP (reductions only)	-34,110,202	-36,142,371	-70,252,572
	48.6%	51.4%	
Load MW (reductions only)	347,909,268	674,165,539	1,022,074,807
	34.0%	66.0%	

Bedford-Seymour Example

Generation Shift due to Constraint Relief

	UNIT					UNIT					delta Gen		delta Prod	
	UNIT NAME	ID	COMPANY	RTO	(MWH)	Cost (\$)	UNIT NAME	ID	COMPANY	RTO	(MWH)	Cost (\$)		
Top 15 Units by Increased Gen	SGRCREEK	11	PSI	MISO	9,963		BRGNPSGF	6	PJME	PJM	3,119			
	PETE1IPL	22	IP&L	MISO	9,936		HNTRSTWN	21	PJMW	PJM	2,110			
	HLLNDNRG	1	CIPS	MISO	9,420		DSWLLCMB	2	VP	PJM	1,802			
	EDWRDSPR	8	PSI	MISO	8,618		ASREDOAK	1	PJME	PJM	1,665			
	WBSHRVER	7	PSI	MISO	7,231		LMPRJECT	1	AEP	PJM	1,492			
	PETE1IPL	21	IP&L	MISO	3,853		MNTINEER	1	AEP	PJM	1,308			
	PETE1IPL	4	IP&L	MISO	3,769		KNDLLCNT	1	COED	PJM	1,278			
	WRTHNGTN	2	HEC	MISO	3,483		HNGNGRCK	2	AEP	PJM	1,122			
	WRTHNGTN	4	HEC	MISO	3,452		RLNTNRGY	4	COED	PJM	1,093			
	EDWRDSPR	7	PSI	MISO	3,357		BLLMEADE	1	VP	PJM	1,072			
	WRTHNGTN	3	HEC	MISO	2,412		GILBERT	21	PJME	PJM	1,053			
	WRTHNGTN	1	HEC	MISO	2,218		WLMNGTON	21	PJME	PJM	1,046			
	EASTBEND	21	CGE	MISO	2,178		ONTLNNRG	1	PJMW	PJM	1,017			
	GENOA	32	GRE	MISO	2,073		ELWOODEC	2	COED	PJM	1,015			
	GIBSON	11	AUEP	MISO	1,718		STUART	22	AEP	PJM	937			
Top 15					73,680	5,122,447	Top 15					21,127	1,427,456	
Total MISO					139,507	10,409,512	Total PJM					64,033	5,021,430	
Top 15 Units by Decreased G	NBLSVLE	3	PSI	MISO	-4,534		LWRNCBRG	1	AEP	PJM	-5,115			
	COVERT	5	CEC	MISO	-3,340		FLVNNCNT	1	VP	PJM	-3,840			
	SHRBURNE	1	NSP	MISO	-3,299		CSHCTNIG	1	AEP	PJM	-3,800			
	FRMNTNRG	1	FE	MISO	-3,255		LWRNCBRG	2	AEP	PJM	-3,234			
	SHRBURNE	32	SMMP	MISO	-2,201		ASRNWDPR	1	PJMW	PJM	-3,110			
	CTE1	1	FE	MISO	-1,779		LNDNPSGF	21	PJME	PJM	-2,907			
	HGHBRDGE	1	NSP	MISO	-1,694		WTRFR2PS	1	AEP	PJM	-2,866			
	STUART	13	CGE	MISO	-1,674		YORKTOWN	3	VP	PJM	-2,639			
	HRDNGSTR	17	IP&L	MISO	-1,239		GERMAN	1	PJMW	PJM	-2,559			
	RNSSNCPW	2	CEC	MISO	-1,214		LWRMNTBT	1	PJMW	PJM	-2,114			
	MRONSIPC	4	SIPC	MISO	-1,107		BRNTSLND	10	DQE	PJM	-2,062			
	FOXEGCTR	1	WPS	MISO	-1,069		BRGNPSGF	2	PJME	PJM	-2,014			
	PRTWSHNG	12	WEP	MISO	-1,041		LBRTYLCT	1	PJME	PJM	-1,931			
	HRDNGSTR	15	IP&L	MISO	-1,002		RLNGHLL	2	AEP	PJM	-1,880			
	ZLANDMIR	21	CEC	MISO	-1,000		BTHLMCV	21	PJME	PJM	-1,877			
Top 15					-29,448	-1,958,714	Top 15					-41,946	-3,233,923	
Total MISO					-87,511	-6,860,930	Total PJM					-116,470	-10,381,076	

Paddock Transformer Example

Economic Impact of Constraint Relief



	MISO	PJM	Total System
Generation MW	-685,322	685,219	-103
Gross Generation Revenue (GGR)	-\$54,971,344	\$205,385,341	\$150,413,997
Gen Production Cost	-\$58,322,824	\$31,783,332	-\$26,539,492
Net Gen Revenue (NGR)	\$3,351,480	\$173,602,009	\$176,953,489
Load MW	0	0	0
Gross Load Payment (GLP)	-\$69,381,481	\$137,332,017	\$67,950,536
FTR Credits	-\$38,121,223	-\$31,605,877	-\$69,727,100
Net Load Payment (NLP)	-\$31,260,258	\$168,937,894	\$137,677,636
Net Cost (NLP - NGR)	-\$34,611,738	-\$4,664,115	-\$39,275,853

Blended Metrics

Adjusted Production Cost	-\$34,611,738	-\$4,664,115	-\$39,275,853	
70%(Gen Prod Cost) + 30%(NLP)	-\$50,204,054	\$72,929,700	\$22,725,647	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	-\$45,042,661	\$37,934,725	-\$7,107,936	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	-\$33,606,294	\$47,416,488	\$13,810,194	MISO Method (w NLP)

Delta Total System Congestion -82,463,461

Paddock Transformer Example

Zonal Load Impact of Constraint Relief

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
ALWST	21,132,718	5,501,382	0.26
AUEP	50,162,850	11,126,982	0.22
CEC	45,935,233	9,232,910	0.20
CGE	33,995,220	6,213,975	0.18
CIL	10,891,850	4,320,833	0.40 MAX
CIPS	21,581,547	5,431,076	0.25
DETED	59,610,024	11,627,175	0.20
FE	74,043,067	14,696,887	0.20
GRE	13,282,488	-2,223,725	-0.17
HEC	7,603,526	1,419,433	0.19
HUC	312,248	-39,221	-0.13
ILPC	19,847,458	6,083,967	0.31
IP&L	17,357,647	3,402,431	0.20
LBWL	2,474,844	499,282	0.20
MDU	2,203,260	-410,443	-0.19
MGE	3,480,188	-12,090,081	-3.47
MPL	12,401,219	-2,643,657	-0.21
NIPS	21,629,173	6,482,341	0.30
NSP	52,536,316	-9,230,197	-0.18
OTP	6,271,153	-1,426,035	-0.23
PSI	42,435,426	8,206,808	0.19
SIGE	11,772,946	1,940,423	0.16
SIPC	2,189,962	384,803	0.18
SMMP	3,603,498	610,098	0.17
SPRIL	2,086,509	610,242	0.29
WEP	35,117,253	-55,062,622	-1.57
WPL	14,991,768	-56,066,287	-3.74 MIN
WPPI	5,739,224	-10,560,707	-1.84
WPS	14,931,569	-17,975,816	-1.20
WPSC	3,743,226	556,261	0.15
Total MISO	613,363,409	-69,381,482	-0.11
Total MISO (reductions only)	161,266,686	-167,728,789	-1.04

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
AEP	162,049,484	32,798,399	0.20
COED	114,021,013	55,519,723	0.49 MAX
DP&L	17,720,973	3,639,186	0.21
DQE	15,778,069	2,861,042	0.18
PJME	160,541,994	6,188,302	0.04 MIN
PJMS	75,342,989	7,615,431	0.10
PJMW	135,210,018	15,233,217	0.11
VP	107,522,012	13,476,716	0.13
Total PJM	788,186,552	137,332,017	0.17
Total PJM (reductions only)	0	0	0.00

	MISO	PJM	Total
Delta GLP	-\$69,381,482	\$137,332,017	\$67,950,535
	100.0%	0.0%	
Delta GLP (reductions only)	-167,728,789	0	-167,728,789
	100.0%	0.0%	
Load MW (reductions only)	161,266,686	0	161,266,686
	100.0%	0.0%	

Paddock Transformer Example Generation Shift due to Constraint Relief

Top 15 Units by Increased Gen

Unit			delta Gen		delta Prod	Unit			delta Gen		delta Prod
Unit Name	ID	Zone	RTO	(MWH)	Cost (\$)	Unit Name	ID	Zone	RTO	(MWH)	Cost (\$)
HENNEPIN	2	ILPC	MISO	35,185		ELWODEC	2	COED	PJM	37,453	
KAPP	2	ALWST	MISO	32,314		ELWODEC	1	COED	PJM	36,996	
HAVANA	6	ILPC	MISO	27,019		ASRNWDPR	1	PJMW	PJM	28,521	
PRRSTTNR	1	ILPC	MISO	25,550		LWRNCCNT	1	AEP	PJM	26,400	
MREDOSIA	3	CIPS	MISO	24,210		LMPRJECT	1	AEP	PJM	23,238	
WHZIMMER	11	CGE	MISO	23,495		AEP IGCC	1	AEP	PJM	22,200	
PRRSTTNR	2	ILPC	MISO	19,104		AMOS	3	AEP	PJM	17,317	
DALLMAN	3	SPRIL	MISO	18,573		CATOCTIN	1	PJMW	PJM	15,686	
COFFEEN	2	CIPS	MISO	17,336		BGSND1KP	2	AEP	PJM	15,343	
HENNEPIN	1	ILPC	MISO	17,209		SPRNGDLE	1	PJMW	PJM	15,014	
DCKCREEK	1	CIL	MISO	16,847		BRGNPSGF	2	PJME	PJM	12,966	
EDWARDS	3	CIL	MISO	13,702		FLLSTWNS	1	PJME	PJM	11,266	
OTTMWIES	11	ALWST	MISO	13,507		LWRNCBRG	2	AEP	PJM	10,514	
PWRIOWA1	1	ALWST	MISO	13,333		JOLIE1 9	6	COED	PJM	10,346	
CMPBL1CC	3	CEC	MISO	12,968		ONTLNNRG	1	PJMW	PJM	9,540	

Top 15 310,351 8,144,965
Total MISO 1,104,862 37,762,561

Top 15 292,800 13,676,100
Total PJM 775,758 36,862,639

Top 15 Units by Decreased Gen

RVRSD1RG	1	WPL	MISO	-572,183		ASREDOAK	1	PJME	PJM	-11,886	
ELMROAD	1	WEP	MISO	-82,554		WKGNMDGN	8	COED	PJM	-10,590	
EDGWTRWP	51	WPL	MISO	-76,254		WKGNMDGN	6	COED	PJM	-9,193	
PRTWSHNG	12	WEP	MISO	-61,837		CRWFRDMD	8	COED	PJM	-8,494	
FOXEGCTR	1	WPS	MISO	-60,667		FLLSTWNS	2	PJME	PJM	-6,126	
WESTCMPS	1	MGE	MISO	-40,424		CHSPKNRG	4	VP	PJM	-3,463	
PRTWSHNG	11	WEP	MISO	-39,153		LBRTYLCT	1	PJME	PJM	-2,957	
VLLEYWEP	1	WEP	MISO	-38,478		INDNRVRN	4	PJME	PJM	-2,934	
EDGWTRWP	41	WPL	MISO	-33,610		KNDLLCNT	1	COED	PJM	-2,702	
BLOUNT	5	MGE	MISO	-33,114		PSSMPINT	5	VP	PJM	-2,331	
VLLEYWEP	2	WEP	MISO	-33,091		FIVEFORK	1	VP	PJM	-2,304	
BLOUNT	6	MGE	MISO	-33,057		BRNNRSLN	3	PJMW	PJM	-1,491	
PRSQISLE	6	WEP	MISO	-27,277		CLOVER	2	VP	PJM	-1,159	
DEWEY	1	WPL	MISO	-26,388		LGNGNRTN	1	PJME	PJM	-1,138	
WHTWTRCG	1	WEP	MISO	-25,681		MERCER	1	PJME	PJM	-1,019	

Top 15 -1,183,767 -67,443,418
Total MISO -1,789,074 -96,085,384

Top 15 -67,783 -3,208,330
Total PJM -90,577 -5,079,307

Cayuga-Eugene Example

Zonal Load Impact of Constraint Relief



	MISO	PJM	Total System
Generation MW	-100,871	100,882	11
Gross Generation Revenue (GGR)	\$9,390,526	\$22,675,708	\$32,066,235
Gen Production Cost	-\$10,616,346	\$4,366,812	-\$6,249,534
Net Gen Revenue (NGR)	\$20,006,873	\$18,308,896	\$38,315,769
Load MW	0	0	0
Gross Load Payment (GLP)	\$10,058,587	\$11,651,163	\$21,709,750
FTR Credits	-\$3,047,743	-\$6,555,483	-\$9,603,226
Net Load Payment (NLP)	\$13,106,330	\$18,206,646	\$31,312,976
Net Cost (NLP - NGR)	-\$6,900,543	-\$102,250	-\$7,002,793

Blended Metrics

Adjusted Production Cost	-\$6,900,543	-\$102,250	-\$7,002,793	
70%(Gen Prod Cost) + 30%(NLP)	-\$3,499,543	\$8,518,762	\$5,019,219	PJM Method
70%(Adjusted Prod Cost) + 30%(GLP)	-\$1,812,804	\$3,423,774	\$1,610,970	MISO Method
70%(Adjusted Prod Cost) + 30%(NLP)	-\$898,481	\$5,390,419	\$4,491,938	MISO Method (w/ NLP)

Delta Total System Congestion -10,356,485

Cayuga-Eugene Example

Zonal Load Impact of Constraint Relief

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
ALWST	21,132,718	1,675,468	0.08
AUEP	50,162,850	3,970,720	0.08
CEC	45,935,233	2,359,467	0.05
CGE	33,995,220	-1,839,150	-0.05
CIL	10,891,850	1,367,113	0.13
CIPS	21,581,547	4,596,954	0.21
DETED	59,610,024	2,194,394	0.04
FE	74,043,067	1,577,566	0.02
GRE	13,282,488	768,114	0.06
HEC	7,603,526	-1,709,962	-0.22
HUC	312,248	17,440	0.06
ILPC	19,847,458	4,773,996	0.24
IP&L	17,357,647	-7,097,600	-0.41
LBWL	2,474,844	115,484	0.05
MDU	2,203,260	120,496	0.05
MGE	3,480,188	322,610	0.09
MPL	12,401,219	719,344	0.06
NIPS	21,629,173	2,119,033	0.10
NSP	52,536,316	3,034,686	0.06
OTP	6,271,153	368,666	0.06
PSI	42,435,426	-15,024,032	-0.35
SIGE	11,772,946	-1,085,005	-0.09
SIPC	2,189,962	160,865	0.07
SMMP	3,603,498	119,931	0.03
SPRIL	2,086,509	365,879	0.18
WEP	35,117,253	2,803,456	0.08
WPL	14,991,768	1,404,351	0.09
WPPI	5,739,224	582,871	0.10
WPS	14,931,569	1,049,526	0.07
WPSC	3,743,226	225,906	0.06
Total MISO	613,363,409	10,058,586	0.02
Total MISO (reductions only)	113,164,765	-26,755,748	-0.24

MAX
MIN

Company	Total Load (MWH)	Delta Gross Load Payment (\$)	Delta Load-Weighted LMP (\$/MWh)
AEP	162,049,484	1,319,386	0.01
COED	114,021,013	9,950,885	0.09
DP&L	17,720,973	-368,945	-0.02
DQE	15,778,069	347,288	0.02
PJME	160,541,994	-1,828,835	-0.01
PJMS	75,342,989	914,488	0.01
PJMW	135,210,018	1,066,598	0.01
VP	107,522,012	250,298	0.00
Total PJM	788,186,552	11,651,163	0.01
Total PJM (reductions only)	178,262,967	-2,197,780	-0.01

MAX
MIN

	MISO	PJM	Total
Delta GLP	\$10,058,586	\$11,651,163	\$21,709,750
	0.0%	0.0%	
Delta GLP (reductions only)	-26,755,748	-2,197,780	-28,953,529
	92.4%	7.6%	
Load MW (reductions only)	113,164,765	178,262,967	291,427,732
	38.8%	61.2%	

Cayuga-Eugene Example

Generation Shift due to Constraint Relief

Top 15 Units by Increased Gen MWh

Unit Name	Unit ID	Zone	RTO	delta Gen (MWH)	delta Prod Cost (\$)	Unit Name	Unit ID	Zone	RTO	delta Gen (MWH)	delta Prod Cost (\$)
NEWTON	1	CIPS	MISO	66,128		KINCAID	1	COED	PJM	70,748	
NEWTON	2	CIPS	MISO	28,968		KINCAID	2	COED	PJM	43,556	
PRRSTTNR	2	ILPC	MISO	24,893		SPRNGDLE	1	PJMW	PJM	9,106	
VRMLNDMG	2	ILPC	MISO	23,774		LNDNPSGF	21	PJME	PJM	9,004	
HAVANA	6	ILPC	MISO	21,321		WSHNG3NN	1	AEP	PJM	8,740	
PRRSTTNR	1	ILPC	MISO	19,920		BTHLHMCV	22	PJME	PJM	6,867	
COFFEEN	2	CIPS	MISO	16,301		PSSMPINT	21	VP	PJM	6,118	
VRMLNDMG	1	ILPC	MISO	11,393		FLLSTWNS	2	PJME	PJM	6,051	
BLDWNDMG	2	ILPC	MISO	10,111		KNDLLCNT	1	COED	PJM	4,876	
COFFEEN	1	CIPS	MISO	9,748		WILLCNTY	4	COED	PJM	4,076	
BLDWNDMG	3	ILPC	MISO	9,400		ASRNWDPR	1	PJMW	PJM	4,043	
WDRVRDMG	5	ILPC	MISO	9,270		YORKTOWN	3	VP	PJM	4,006	
MREDOSIA	3	CIPS	MISO	8,645		BTHLHMCV	21	PJME	PJM	3,899	
SIOUX	1	AUEP	MISO	7,741		ASREDOAK	1	PJME	PJM	3,551	
EDGWTRWP	51	WPL	MISO	6,781		HNGNGRCK	2	AEP	PJM	3,289	
Top 15				274,394	6,452,090	Top 15				187,930	7,536,111
Total MISO				526,595	15,596,519	Total PJM				267,882	12,400,502

Top 15 Units by Decreased Gen

SGRCREEK	11	PSI	MISO	-97,520		ELWOODEC	1	COED	PJM	-17,083	
MEROM	2	HEC	MISO	-47,447		RCKPRTNM	2	AEP	PJM	-8,856	
CAYUGA	1	PSI	MISO	-27,678		ELWOODEC	2	COED	PJM	-6,398	
CAYUGA	2	PSI	MISO	-27,256		STUART	11	DP&L	PJM	-4,669	
WBSHRVER	6	PSI	MISO	-25,655		CRWFRDMD	8	COED	PJM	-4,311	
HRDNGSTR	7	IP&L	MISO	-23,363		STUART	31	DP&L	PJM	-4,119	
MEROM	1	HEC	MISO	-19,179		BRGNPSGF	6	PJME	PJM	-3,925	
WBSHRVER	3	PSI	MISO	-17,309		KILLEN	21	DP&L	PJM	-3,899	
GIBSON	2	PSI	MISO	-16,789		CPVWRREN	1	PJMW	PJM	-3,760	
GIBSON	1	PSI	MISO	-16,004		AMOS	1	AEP	PJM	-3,461	
GIBSON	3	PSI	MISO	-14,218		WHTWATER	2	AEP	PJM	-3,394	
WBSHRVER	4	PSI	MISO	-13,935		STUART	12	AEP	PJM	-2,956	
WBSHRVER	5	PSI	MISO	-13,239		WILLCNTY	3	COED	PJM	-2,741	
WBSHRVER	2	PSI	MISO	-11,811		BLLMEADE	1	VP	PJM	-2,487	
GIBSON	5	PSI	MISO	-11,258		FLVNNCNT	1	VP	PJM	-2,457	
Top 15				-382,661	-15,245,738	Top 15				-74,516	-2,407,735
Total MISO				-628,707	-26,212,864	Total PJM				-168,288	-8,033,689